

## PRELIMINARY DATA SHEET

# SKY77643-61 SkyLiTE™ Multimode Multiband Power Amplifier Module

## Applications

- Multiband 3G / LTE handsets
- CDMA
  - Band Classes BC0, BC1, BC4, BC6, BC10, BC15
- WCDMA
  - Bands I, II, III, IV, V, VIII, IX
- TD-SCDMA
  - Bands 34, 39
- FDD LTE
  - Bands 1, 2, 3, 4, 5, 7, 8, 9, 12, 13, 17, 20, 25, 26, 28, 30, 71
- TDD LTE
  - Bands 34, 38, 39, 40, 41

## Features

- LTE Power Class 2 High Power User Equipment (HPUE) operation
- Two T/R (RX) ports and 14 outputs
- Industry-leading PAE for 3G/4G
- Optimized for APT DCDC operation
- Fully programmable Mobile Industry Processor Interface (MIPI) control
- Dual Low Band RF inputs support separate transceiver outputs or interstage filtering
- MIPI programmable bias modes optimize best efficiency / linearity trade-off for 3G and 4G; minimizes DG09 for 3G.
- Small, low profile package:
  - 4.0 x 6.8 x 0.71 mm
  - 42-pad configuration



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to Skyworks Definition of Green™, document number SQ04-0074.

## Description

Skyworks SKY77643-61 SkyLiTE™ is a multimode multiband (MMMB) Power Amplifier Module (PAM) that supports 3G / 4G handsets and operates efficiently in CDMA, WCDMA, TD-SCDMA, and LTE modes. The module is fully programmable through a Mobile Industry Processor Interface (MIPI®).

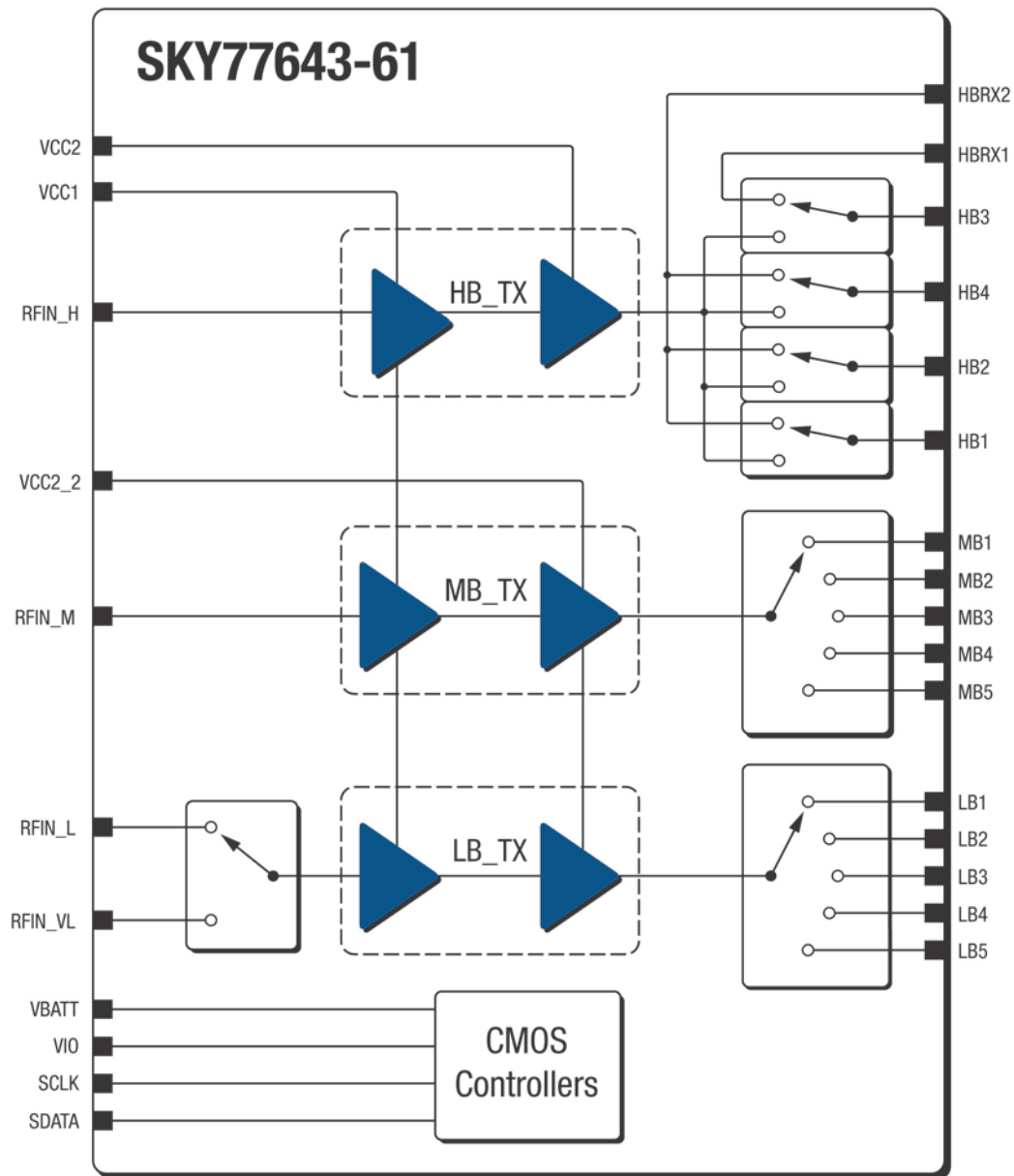
The PAM consists of a WCDMA / LTE block for low, high, and mid-bands, a Multi-Function Control (MFC) block, and RF input/output ports internally matched to 50  $\Omega$  (reduces the number of external components). A CMOS integrated circuit provides the internal MFC interface and operation using standard MIPI controls. Extremely low leakage current maximizes handset standby time.

The InGaP die and the silicon die and passive components are mounted on a multi-layer laminate substrate. The assembly is encapsulated in a 4.0 mm x 6.8 mm x 0.71 mm, 42-pad MCM, SMT package which allows for a highly manufactural, low cost solution.

**3G:** The SKY77643-61 supports CDMA, WCDMA, High-Speed Downlink Packet Access (HSDPA), High Speed Uplink Packet Access (HSUPA), High Speed Packet Access (HSPA+), and TD-SCDMA modulations. Varying the input power level provides output power control. Vcc is adjusted using a DCDC converter to maximize efficiency for each power level and modulation type.

**4G:** The SKY77643-61 supports 1.4, 3, 5, 10, 15, 20 MHz channel bandwidths. Similar to 3G operation, output power is controlled by varying the input power and Vcc is adjusted using a DCDC converter to maximize efficiency for each power level. Supports LTE Power Class 2 HPUE operation.

- 3G / 4G Modulation scheme includes:
  - WCDMA Voice Release 99
  - HSDPA categories
  - HSUPA
  - HSPA+
  - TD-SCDMA
  - CDMA2000 1xRC1, 1xRC3
  - CDMA2000 EVDO
  - LTE 1.4, 3, 5, 10, 15, 20 MHz Channel BW
  - TDD LTE
  - Uplink Carrier Aggregation (CA) support for Band 39 (35 MHz) and Bands 40/41 (40 MHz)



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**Figure 1. SKY77643-61 Functional Block Diagram**

## Electrical Specifications

The following tables list the electrical characteristics of the SKY77643-61 Power Amplifier Module. The absolute maximum conditions are provided in Table 1; recommended operating conditions are specified in Table 2. Tables 3 through 18 contain the performance characteristics of the SKY77643-61.

The SKY77643-61 is a static-sensitive electronic device and should not be stored nor operated near strong electrostatic fields. Detailed information on device dimensions, pad descriptions, packaging and handling can be found in later sections of this data sheet.

**Table 1. SKY77643-61 Absolute Maximum Conditions<sup>1</sup>**

| Parameter                     | Symbol                                                   | Min               | Nom | Max  | Unit  |
|-------------------------------|----------------------------------------------------------|-------------------|-----|------|-------|
| RF Input Power                | P <sub>IN</sub>                                          |                   | 0   | 10   | dBm   |
| Supply Voltage                | No RF V <sub>BATT</sub>                                  | -1.2 <sup>3</sup> | 3.4 | 6.0  | Volts |
|                               | V <sub>CC1</sub> , V <sub>CC2</sub> , V <sub>CC2_2</sub> | 0                 | 3.4 | 6.0  |       |
|                               | With RF V <sub>BATT</sub>                                | 0                 | 3.4 | 6.0  |       |
|                               | V <sub>CC1</sub> , V <sub>CC2</sub> , V <sub>CC2_2</sub> | 0                 | 3.4 | 5.5  |       |
| Digital Control Lines         | V <sub>IO</sub> , SCLK, SDATA                            |                   |     | 2    | Volts |
| Case Temperature <sup>2</sup> | Operating T <sub>CASE</sub>                              | -30               | 25  | +100 | °C    |
|                               | Storage T <sub>STG</sub>                                 | -40               |     | +150 |       |
| ESD – Human Body Mode (HBM)   | ESD <sub>HBM</sub>                                       | -1                |     | 1    | kV    |

<sup>1</sup> Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value.

<sup>2</sup> Case Operating Temperature (T<sub>CASE</sub>) refers to the temperature of the GROUND PAD at the underside of the package.

<sup>3</sup> Pulsed for up to 100 μs

**Table 2. SKY77643-61 Recommended Operating Conditions**

| Parameter                                                               | Symbol                                                                              | Min                   | Nom | Max                   | Unit  |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------|-----|-----------------------|-------|
| Supply Voltage                                                          | V <sub>CC1</sub>                                                                    | 0.55                  | 3.4 | 4.6 <sup>1</sup>      | Volts |
|                                                                         | V <sub>CC2</sub> , V <sub>CC2_2</sub>                                               | 0.55                  | 3.4 | 4.6 <sup>1</sup>      |       |
|                                                                         | V <sub>BATT</sub>                                                                   | 3.0                   | 3.4 | 4.8                   |       |
| MIPI RFFE Supply                                                        | V <sub>IO</sub>                                                                     | 1.65                  | 1.8 | 1.95                  | Volts |
| MIPI RFFE Signal Levels for SCLK, SDATA                                 | Low V <sub>MIPI_LOW</sub>                                                           | 0.0                   | 0.0 | 0.2 x V <sub>IO</sub> | Volts |
|                                                                         | High V <sub>MIPI_HIGH</sub>                                                         | 0.8 x V <sub>IO</sub> | 1.8 | V <sub>IO</sub>       |       |
| Leakage Current                                                         | V <sub>BATT</sub> = 3.4 V I <sub>BATT_LK</sub>                                      |                       |     | 10                    | μA    |
|                                                                         | V <sub>CC1</sub> , V <sub>CC2</sub> , V <sub>CC2_2</sub> = 3.4 V I <sub>CC_LK</sub> |                       |     | 10                    |       |
| Case Operating Temperature Range                                        | T <sub>RANGE</sub>                                                                  | -20                   | +25 | +85                   | °C    |
| Case Operating Temperature Range – Extended for automotive applications | T <sub>RANGE_EXT</sub>                                                              | -40                   | +25 | +105                  | °C    |

<sup>1</sup> Derate Band 7 and 30 FDD output power by 400 mW/V for V<sub>CC1</sub>, V<sub>CC2</sub> above 3.8 V.

**Table 3. SKY77643-61 Electrical Specifications – General**

| Parameter           | Symbol            | Condition                                                                                  | Min | Typ | Max | Unit |
|---------------------|-------------------|--------------------------------------------------------------------------------------------|-----|-----|-----|------|
| Turn On Time        | T <sub>ON</sub>   | Gain settled to within 0.5 dB of G <sub>P</sub> (P <sub>OUT</sub> = P <sub>OUT_MAX</sub> ) |     |     | 5   | μs   |
| Turn Off Time       | T <sub>OFF</sub>  | Gain ≤ G <sub>P</sub> (P <sub>OUT</sub> = P <sub>OUT_MAX</sub> ) – 30 dB                   |     |     | 5   | μs   |
| Mode Switching Time | T <sub>MODE</sub> | Time to transition from HPM to LPM, or LPM to HPM by changing state of Reg 0 [1]           |     |     | 2.5 | μs   |
| Switching Time      | T <sub>SW</sub>   | Time to transition from Iso to RX, Iso to TX, TX to RX, RX to TX, RX to Iso, and TX to Iso |     |     | 2.5 | μs   |

**Table 4. SKY77643-61 Electrical Specifications for Nominal Operating Conditions – FDD LTE Band 7**

**Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100RB for MPR = 1.**

| Parameter                            | Symbol         | Condition                                                                                                                                                        | Min                                                                                           | Typ   | Max  | Unit   |
|--------------------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------|------|--------|
| Operating Frequency                  | $f_0$          |                                                                                                                                                                  | 2500                                                                                          | 2535  | 2570 | MHz    |
| Max Output Power                     | POUT_MAX       | MPR = 0 <sup>1</sup>                                                                                                                                             | 29.0                                                                                          |       |      | dBm    |
|                                      | POUT_MAX_ETC   | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                      | 27.5                                                                                          |       |      |        |
| Gain                                 | GP_NTC         | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$                                                                                              | 28.5                                                                                          | 30.5  | 32.0 | dB     |
|                                      | GP_EXT         | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                | 26.5                                                                                          |       | 33.0 |        |
|                                      | GP_LOW         | $P_{OUT} = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                              | 13.0                                                                                          | 15.5  | 17.5 |        |
| Power Added Efficiency <sup>2</sup>  | PAEAPT         | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                         |                                                                                               | 34    |      | %      |
| Total Supply Current <sup>3</sup>    | $I_{TOT\_MAX}$ | $P_{OUT} = P_{OUT\_MAX}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                             |                                                                                               | 650   |      | mA     |
| Adjacent Channel Leakage power Ratio | EUTRA          | E-UTRA_ACLR1                                                                                                                                                     | $P_{OUT} = P_{OUT\_MAX}$                                                                      |       | -38  | dBc    |
|                                      |                |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -33  |        |
|                                      | UTRA1          | UTRA_ACLR1                                                                                                                                                       | $P_{OUT} = P_{OUT\_MAX}$                                                                      |       | -40  |        |
|                                      |                |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -35  |        |
|                                      | UTRA2          | UTRA_ACLR2                                                                                                                                                       | $P_{OUT} = P_{OUT\_MAX}$                                                                      |       | -43  |        |
|                                      |                |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -39  |        |
| Harmonic Suppression                 | Second         | $2f_0$                                                                                                                                                           | $P_{OUT} \leq P_{OUT\_MAX}$                                                                   |       | -15  | dBm    |
|                                      | Third          | $3f_0$                                                                                                                                                           |                                                                                               |       | -20  |        |
|                                      | Fourth         | $4f_0$                                                                                                                                                           |                                                                                               |       | -26  |        |
|                                      | Fifth          | $5f_0$                                                                                                                                                           |                                                                                               |       | -36  |        |
| Tx Noise in Rx Bands                 | Rx Band        | PNRX_LTE                                                                                                                                                         | 2620 MHz–2690 MHz <sup>4</sup>                                                                |       | -126 | dBm/Hz |
|                                      | GPS Rx         | PNRX_GPS                                                                                                                                                         | 1574 MHz–1577 MHz <sup>4</sup>                                                                |       | -140 |        |
|                                      | BT, WLAN       | PNRX_BT                                                                                                                                                          | 2400 MHz–2452 MHz <sup>4</sup>                                                                |       | -108 |        |
|                                      | WLAN           | PNRX_5GHz                                                                                                                                                        | 4900 MHz–5800 MHz <sup>4</sup>                                                                |       | -140 |        |
| EVM                                  | EVM            | $V_{BATT} = 3.0\text{ to }4.6\text{ V}$ , Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                                 |                                                                                               | 3     | 5    | %      |
| Input Voltage Standing Wave Ratio    | VSWR           |                                                                                                                                                                  |                                                                                               | 1.5:1 |      |        |
| Stability (Spurious output)          | S              | Load VSWR = 6:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 3.0\text{ V to }4.6\text{ V}$ , $T_{CASE} = T_{RANGE}$                              | All spurious below -36 dBm                                                                    |       |      |        |
| Ruggedness                           | Ru             | Load VSWR = 10:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation                                                     |       |      |        |

<sup>1</sup> MPR is the maximum power reduction as defined in 3GPP TS36.101

<sup>2</sup> Vcc optimized for ACLR1\_EUTRA = -39 dBc, QPSK 10 MHz / 12RB.

<sup>3</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.2\text{ V}$ ,  $DC\_DC\_EFF \sim 96\%$ .

<sup>4</sup> Measured with 20 MHz/100RB LTE Waveform.

**Table 5. SKY77643-61 Electrical Specifications for Nominal Operating Conditions – FDD LTE Band 30 (WCS)**

**Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/10 MHz/50RB for MPR = 1.**

| Parameter                            | Symbol         | Condition                                                                                                                                                        | Min                                                                                           | Typ   | Max  | Unit   |
|--------------------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-------|------|--------|
| Operating Frequency                  | $f_0$          |                                                                                                                                                                  | 2305                                                                                          | 2310  | 2315 | MHz    |
| Maximum Output Power                 | POUT_MAX       | MPR = 0 <sup>1</sup>                                                                                                                                             | 29.0                                                                                          |       |      | dBm    |
|                                      | POUT_MAX_ETC   | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                      | 27.2                                                                                          |       |      |        |
| Gain                                 | GP_NTC         | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$                                                                                              | 28.0                                                                                          | 29.5  | 31.5 | dB     |
|                                      | GP_EXT         | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                | 26.5                                                                                          |       | 32.5 |        |
|                                      | GP_LOW         | $P_{OUT} = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                              | 13.0                                                                                          | 15.3  | 17.5 |        |
| Power Added Efficiency <sup>2</sup>  | PAEAPT         | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                         |                                                                                               | 34    |      | %      |
| Total Supply Current <sup>3</sup>    | $I_{TOT\_MAX}$ | $P_{OUT} = P_{OUT\_MAX}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                             |                                                                                               | 605   |      | mA     |
| Adjacent Channel Leakage power Ratio | EUTRA          | E-UTRA_ACLR1                                                                                                                                                     | $P_{OUT} = P_{OUT\_MAX}$                                                                      |       | -38  | dBc    |
|                                      |                |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -33  |        |
|                                      | UTRA1          | UTRA_ACLR1                                                                                                                                                       | $P_{OUT} = P_{OUT\_MAX}$                                                                      |       | -40  |        |
|                                      |                |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -35  |        |
|                                      | UTRA2          | UTRA_ACLR2                                                                                                                                                       | $P_{OUT} = P_{OUT\_MAX}$                                                                      |       | -43  |        |
|                                      |                |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -39  |        |
| Harmonic Suppression                 | Second         | $2f_0$                                                                                                                                                           | $P_{OUT} \leq P_{OUT\_MAX}$                                                                   |       | -15  | dBm    |
|                                      | Third          | $3f_0$                                                                                                                                                           |                                                                                               |       | -20  |        |
|                                      | Fourth         | $4f_0$                                                                                                                                                           |                                                                                               |       | -21  |        |
|                                      | Fifth          | $5f_0$                                                                                                                                                           |                                                                                               |       | -36  |        |
| Tx Noise in Rx Bands                 | GPS Rx         | PNRX_GPS                                                                                                                                                         | 1574 MHz–1577 MHz <sup>4</sup>                                                                |       | -140 | dBm/Hz |
|                                      | BT, WLAN       | PNRX_BT                                                                                                                                                          | 2400 MHz–2483.5 MHz <sup>4</sup>                                                              |       | -113 |        |
|                                      | WLAN           | PNRX_5GHz                                                                                                                                                        | 4900 MHz–5800 MHz <sup>4</sup>                                                                |       | -140 |        |
| EVM                                  | EVM            | $V_{BATT} = 3.0\text{ to }4.6\text{ V}$ , Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                                 |                                                                                               | 3     | 5    | %      |
| Input Voltage Standing Wave Ratio    | VSWR           |                                                                                                                                                                  |                                                                                               | 1.8:1 |      |        |
| Stability (Spurious output)          | S              | Load VSWR = 6:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 3.0\text{ V to }4.6\text{ V}$ , $T_{CASE} = T_{RANGE}$                              | All spurious below -36 dBm                                                                    |       |      |        |
| Ruggedness                           | Ru             | Load VSWR = 10:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation                                                     |       |      |        |

<sup>1</sup> MPR is the maximum power reduction as defined in 3GPP TS36.101

<sup>2</sup> Vcc optimized for ACLR1\_EUTRA = -39 dBc, QPSK 10 MHz / 12RB.

<sup>3</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ . Vcc ~ 3.2 V, DC\_DC\_EFF ~ 96%.

<sup>4</sup> Measured with 10 MHz/50RB LTE Waveform.

**Table 6. SKY77643-61 Electrical Specifications for Nominal Operating Conditions – TDD LTE Band 38**

**Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; LTE Signal = QPSK/10 MHz/12RB for  $MPR = 0$  and QPSK/20 MHz/100 RB for  $MPR = 1$ .**

| Parameter                            | Symbol         | Condition                                                                                                                                                   | Min                                                                                      | Typ   | Max  | Unit   |
|--------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------|------|--------|
| Operating Frequency                  | $f_0$          |                                                                                                                                                             | 2570                                                                                     | 2595  | 2620 | MHz    |
| Maximum Output Power                 | POUT_MAX       | $MPR = 0^1$                                                                                                                                                 | 29.0                                                                                     |       |      | dBm    |
|                                      | POUT_MAX_ETC   | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                 | 27.2                                                                                     |       |      |        |
| Gain                                 | GP_NTC         | $POUT = POUT_{MAX}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$                                                                                              | 28.5                                                                                     | 30.5  | 32.0 | dB     |
|                                      | GP_EXT         | $POUT = POUT_{MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                | 26.5                                                                                     |       | 33.0 |        |
|                                      | GP_LOW         | $POUT = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                            | 13.0                                                                                     | 15.0  | 17.5 |        |
| Power Added Efficiency <sup>2</sup>  | PAEAPT         | $POUT = POUT_{MAX}$                                                                                                                                         |                                                                                          | 34    |      | %      |
| Total Supply Current <sup>3</sup>    | $I_{TOT\_MAX}$ | $POUT = POUT_{MAX}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                             |                                                                                          | 605   |      | mA     |
| Adjacent Channel Leakage power Ratio | EUTRA          | E-UTRA_ACLR1                                                                                                                                                | $POUT = POUT_{MAX}$                                                                      |       | -38  | dBc    |
|                                      |                |                                                                                                                                                             | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -33  |        |
|                                      | UTRA1          | UTRA_ACLR1                                                                                                                                                  | $POUT = POUT_{MAX}$                                                                      |       | -40  |        |
|                                      |                |                                                                                                                                                             | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -35  |        |
|                                      | UTRA2          | UTRA_ACLR2                                                                                                                                                  | $POUT = POUT_{MAX}$                                                                      |       | -43  |        |
|                                      |                |                                                                                                                                                             | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -39  |        |
| Harmonic Suppression                 | Second         | $2f_0$                                                                                                                                                      | $POUT \leq POUT_{MAX}$                                                                   |       | -15  | dBm    |
|                                      | Third          | $3f_0$                                                                                                                                                      |                                                                                          |       | -20  |        |
|                                      | Fourth         | $4f_0$                                                                                                                                                      |                                                                                          |       | -26  |        |
|                                      | Fifth          | $5f_0$                                                                                                                                                      |                                                                                          |       | -36  |        |
| Tx Noise in Rx Bands                 | GPS Rx         | PNRX_GPS                                                                                                                                                    | 1574 MHz–1577 MHz <sup>4</sup>                                                           |       | -140 | dBm/Hz |
|                                      | BT, WLAN       | PNRX_BT                                                                                                                                                     | 2400 MHz–2483.5 MHz <sup>4</sup>                                                         |       | -113 |        |
|                                      | WLAN           | PNRX_5GHz                                                                                                                                                   | 4900 MHz–5800 MHz <sup>4</sup>                                                           |       | -140 |        |
| EVM                                  | EVM            | $V_{BATT} = 3.0\text{ to }4.6\text{ V}$ , Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                            |                                                                                          | 3     | 5    | %      |
| Input Voltage Standing Wave Ratio    | VSWR           |                                                                                                                                                             |                                                                                          | 1.5:1 |      |        |
| Stability (Spurious output)          | S              | Load VSWR = 6:1, all phase angles, $POUT \leq POUT_{MAX}$ , $V_{BATT} = 3.0\text{ V to }4.6\text{ V}$ , $T_{CASE} = T_{RANGE}$                              | All spurious below -36 dBm                                                               |       |      |        |
| Ruggedness                           | Ru             | Load VSWR = 10:1, all phase angles, $POUT \leq POUT_{MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation                                                |       |      |        |

<sup>1</sup> MPR is the maximum power reduction as defined in 3GPP TS36.101

<sup>2</sup> Vcc optimized for ACLR1\_EUTRA = -39 dBc, QPSK 10 MHz / 12RB.

<sup>3</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ . Vcc ~ 3.2 V, DC\_DC\_EFF ~ 96%.

<sup>4</sup> Measured with 20 MHz/100RB LTE Waveform.

**Table 7. SKY77643-61 Electrical Specifications for Nominal Operating Conditions – TDD LTE Band 40**

**Unless otherwise specified:  $V_{BATT} = 3.4$  V;  $T_{CASE} = +25$  °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100 RB for MPR = 1.**

| Parameter                               | Symbol        | Condition                                                                                                      | Min                                                                        | Typ   | Max  | Unit   |
|-----------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------|------|--------|
| Operating Frequency                     | $f_0$         |                                                                                                                | 2300                                                                       | 2350  | 2400 | MHz    |
| Maximum Output Power                    | POUT_MAX      | MPR = 0 <sup>1</sup>                                                                                           | 29.0                                                                       |       |      | dBm    |
|                                         | POUT_MAX_ETC  | $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$                                                            | 27.2                                                                       |       |      |        |
| Maximum Output Power – HPUE Operation   | POUT_MAX_HPUE | MPR = 0, $V_{CC} = 3.4$ V                                                                                      | 30.0                                                                       |       |      | dBm    |
|                                         |               | MPR = 0, $V_{CC} = 4.3$ V                                                                                      | 32.0                                                                       |       |      |        |
| Gain                                    | GP_NTC        | POUT = POUT_MAX, $T_{CASE} = +25$ °C                                                                           | 28.0                                                                       | 30.0  | 32.0 | dB     |
|                                         | GP_EXT        | POUT = POUT_MAX, $T_{CASE} = T_{RANGE}$                                                                        | 26.5                                                                       |       | 33.0 |        |
|                                         | GP_LOW        | POUT = 3 dBm, $V_{CC} = 0.55$ V                                                                                | 13.0                                                                       | 15.0  | 17.5 |        |
| Power Added Efficiency <sup>2</sup>     | PAE_APT       | POUT = POUT_MAX                                                                                                |                                                                            | 34    |      | %      |
| Power Added Efficiency – HPUE Operation | PAE_APT_HPUE  | POUT = POUT_MAX_HPUE                                                                                           |                                                                            | 35    |      | %      |
| Total Supply Current <sup>3</sup>       | I_TOT_MAX     | POUT = POUT_MAX, $V_{BATT} = 3.8$ V                                                                            |                                                                            | 605   |      | mA     |
| Adjacent Channel Leakage power Ratio    | E-UTRA        | E-UTRA_ACLR1                                                                                                   | POUT = POUT_MAX                                                            |       | –38  | dBc    |
|                                         |               |                                                                                                                | POUT = POUT_MAX_RANGE, $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       | –33  |        |
|                                         |               | E-UTRA_ACLR1_CA                                                                                                | POUT = POUT_MAX<br>Modulation = QPSK/40 MHz/200RB                          |       | –37  |        |
|                                         |               | E-UTRA_ACLR1_HPUE                                                                                              | POUT = POUT_MAX_HPUE                                                       |       | –38  |        |
|                                         | UTRA1         | UTRA_ACLR1                                                                                                     | POUT = POUT_MAX                                                            |       | –40  |        |
|                                         |               |                                                                                                                | POUT = POUT_MAX_RANGE, $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       | –35  |        |
|                                         | UTRA2         | UTRA_ACLR2                                                                                                     | POUT = POUT_MAX                                                            |       | –43  |        |
|                                         |               |                                                                                                                | POUT = POUT_MAX_RANGE, $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       | –39  |        |
| Harmonic Suppression                    | Second        | $2f_0$                                                                                                         | POUT ≤ POUT_MAX                                                            |       | –15  | dBm    |
|                                         | Third         | $3f_0$                                                                                                         |                                                                            |       | –20  |        |
|                                         | Fourth        | $4f_0$                                                                                                         |                                                                            |       | –21  |        |
|                                         | Fifth         | $5f_0$                                                                                                         |                                                                            |       | –36  |        |
| Tx Noise in Rx Bands                    | GPS Rx        | PNRX_GPS                                                                                                       | 1574 MHz–1577 MHz <sup>4</sup>                                             |       | –140 | dBm/Hz |
|                                         | BT, WLAN      | PNRX_BT                                                                                                        | 2447 MHz–2483.5 MHz <sup>4</sup>                                           |       | –104 |        |
|                                         | WLAN          | PNRX_5GHz                                                                                                      | 4900 MHz–5800 MHz <sup>4</sup>                                             |       | –140 |        |
| EVM                                     | EVM           | $V_{BATT} = 3.0$ to $4.6$ V, Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                            |                                                                            | 3     | 5    | %      |
| Input Voltage Standing Wave Ratio       | VSWR          |                                                                                                                |                                                                            | 1.8:1 |      |        |
| Stability (Spurious output)             | S             | Load VSWR = 6:1, all phase angles, POUT ≤ POUT_MAX, $V_{BATT} = 3.0$ V to $4.6$ V, $T_{CASE} = T_{RANGE}$      | All spurious below –36 dBm                                                 |       |      |        |
| Ruggedness                              | Ru            | Load VSWR = 10:1, all phase angles, POUT ≤ POUT_MAX, $V_{BATT} = 4.6$ V, $V_{CC} = 4.6$ V, $T_{CASE} = +25$ °C | No module damage or permanent degradation                                  |       |      |        |

<sup>1</sup> MPR is the maximum power reduction as defined in 3GPP TS36.101

<sup>2</sup>  $V_{CC}$  optimized for ACLR1\_EUTRA = –39 dBc, QPSK 10 MHz / 12RB.

<sup>3</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.2$  V,  $DC\_DC\_EFF \sim 96\%$ .

<sup>4</sup> Measured with 20 MHz/100RB LTE Wave form.

**Table 8. SKY77643-61 Electrical Specifications for Nominal Operating Conditions – TDD LTE Band 41, TDD AXGP Band**

**Unless otherwise specified:  $V_{BATT} = 3.4$  V;  $T_{CASE} = +25$  °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100 RB for MPR = 1.**

| Parameter                               | Symbol        | Condition                                                                                                      | Min                                                                        | Typ   | Max  | Unit   |
|-----------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|-------|------|--------|
| Operating Frequency                     | $f_0$         |                                                                                                                | 2496                                                                       | 2595  | 2690 | MHz    |
| Maximum Output Power                    | POUT_MAX      | MPR = 0 <sup>1</sup>                                                                                           | 29.0                                                                       |       |      | dBm    |
|                                         | POUT_MAX_ETC  | $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$                                                            | 27.0                                                                       |       |      |        |
| Maximum Output Power – HPUE Operation   | POUT_MAX_HPUE | MPR = 0, $V_{CC} = 3.4$ V                                                                                      | 30.0                                                                       |       |      | dBm    |
|                                         |               | MPR = 0, $V_{CC} = 4.3$ V                                                                                      | 32.0                                                                       |       |      |        |
| Gain                                    | GP_NTC        | POUT = POUT_MAX, $T_{CASE} = +25$ °C                                                                           | 28.5                                                                       | 30.5  | 32.5 | dB     |
|                                         | GP_EXT        | POUT = POUT_MAX, $T_{CASE} = T_{RANGE}$                                                                        | 26.5                                                                       |       | 33.5 |        |
|                                         | GP_LOW        | POUT = 3 dBm, $V_{CC} = 0.55$ V                                                                                | 13.0                                                                       | 15.0  | 17.5 |        |
| Power Added Efficiency <sup>2</sup>     | PAEAPT        | POUT = POUT_MAX                                                                                                |                                                                            | 32    |      | %      |
| Power Added Efficiency – HPUE Operation | PAE_APT_HPUE  | POUT = POUT_MAX_HPUE                                                                                           |                                                                            | 35    |      | %      |
| Total Supply Current <sup>3</sup>       | I_TOT_MAX     | POUT = POUT_MAX, $V_{BATT} = 3.8$ V                                                                            |                                                                            | 605   |      | mA     |
| Adjacent Channel Leakage power Ratio    | E-UTRA        | E-UTRA_ACLR1                                                                                                   | POUT = POUT_MAX                                                            |       | –38  | dBc    |
|                                         |               |                                                                                                                | POUT = POUT_MAX_RANGE, $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       | –33  |        |
|                                         |               | E-UTRA_ACLR1_CA                                                                                                | POUT = POUT_MAX<br>Modulation = QPSK/40 MHz/200RB                          |       | –37  |        |
|                                         |               | E-UTRA_ACLR1_HPUE                                                                                              | POUT = POUT_MAX_HPUE                                                       |       | –38  |        |
|                                         | UTRA1         | UTRA_ACLR1                                                                                                     | POUT = POUT_MAX                                                            |       | –40  | dBc    |
|                                         |               |                                                                                                                | POUT = POUT_MAX_RANGE, $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       | –35  |        |
|                                         | UTRA2         | UTRA_ACLR2                                                                                                     | POUT = POUT_MAX                                                            |       | –43  |        |
|                                         |               |                                                                                                                | POUT = POUT_MAX_RANGE, $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       | –39  |        |
| Harmonic Suppression                    | Second        | $2f_0$                                                                                                         | POUT ≤ POUT_MAX                                                            |       | –15  | dBm    |
|                                         | Third         | $3f_0$                                                                                                         |                                                                            |       | –20  |        |
|                                         | Fourth        | $4f_0$                                                                                                         |                                                                            |       | –26  |        |
|                                         | Fifth         | $5f_0$                                                                                                         |                                                                            |       | –36  |        |
| Tx Noise in Rx Bands                    | GPS Rx        | PNRX_GPS                                                                                                       | 1574 MHz–1577 MHz <sup>4</sup>                                             |       | –140 | dBm/Hz |
|                                         | BT, WLAN      | PNRX_BT                                                                                                        | 2400 MHz–2452 MHz <sup>4</sup>                                             |       | –104 |        |
|                                         | WLAN          | PNRX_5GHz                                                                                                      | 4900 MHz–5800 MHz <sup>4</sup>                                             |       | –140 |        |
| EVM                                     | EVM           | $V_{BATT} = 3.0$ to 4.6 V, Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                              |                                                                            | 3     | 5    | %      |
| Input Voltage Standing Wave Ratio       | VSWR          |                                                                                                                |                                                                            | 1.5:1 |      |        |
| Stability (Spurious output)             | S             | Load VSWR = 6:1, all phase angles, POUT ≤ POUT_MAX, $V_{BATT} = 3.0$ V to 4.6 V, $T_{CASE} = T_{RANGE}$        | All spurious below –36 dBm                                                 |       |      |        |
| Ruggedness                              | Ru            | Load VSWR = 10:1, all phase angles, POUT ≤ POUT_MAX, $V_{BATT} = 4.6$ V, $V_{CC} = 4.6$ V, $T_{CASE} = +25$ °C | No module damage or permanent degradation                                  |       |      |        |

<sup>1</sup> MPR is the maximum power reduction as defined in 3GPP TS36.101

<sup>2</sup>  $V_{CC}$  optimized for ACLR1\_EUTRA = –39 dBc, QPSK 10 MHz / 12RB.

<sup>3</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.2$  V,  $DC\_DC\_EFF \sim 96\%$ .

<sup>4</sup> Measured with 20 MHz/100RB LTE Wave form.



**Table 9. SKY77643-61 Electrical Specifications – Transmit WCDMA Mid-Band**  
**Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; Voice RMC 12.2 kbps**

| Parameter                                                          |                                            | Symbol               | Conditions                                                                                                                                                             | Min                                       | Typ    | Max  | Units  |
|--------------------------------------------------------------------|--------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------|------|--------|
| Operating Frequency                                                | Band 1                                     | $f_0$                |                                                                                                                                                                        | 1920                                      |        | 1980 | MHz    |
|                                                                    | Band 2                                     |                      |                                                                                                                                                                        | 1850                                      |        | 1910 |        |
|                                                                    | Band 3                                     |                      |                                                                                                                                                                        | 1710                                      |        | 1785 |        |
|                                                                    | Band 4                                     |                      |                                                                                                                                                                        | 1710                                      |        | 1755 |        |
| Maximum Output Power                                               | Band 1, 4                                  | $P_{OUT\_MAX}$       |                                                                                                                                                                        | 29.5                                      |        |      | dBm    |
|                                                                    |                                            | $P_{OUT\_MAX\_ETC}$  | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                            | 27.0                                      |        |      |        |
|                                                                    | Bands 2, 3                                 | $P_{OUT\_MAX}$       |                                                                                                                                                                        | 29.5                                      |        |      |        |
|                                                                    |                                            | $P_{OUT\_MAX\_ETC}$  | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                            | 27.5                                      |        |      |        |
| Power Gain                                                         | Bands 1, 2                                 | $GP\_NTC$            | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | 27.0                                      |        | 31.0 | dB     |
|                                                                    |                                            | $GP\_EXT$            | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                      | 26.0                                      |        | 32.0 |        |
|                                                                    | Bands 3, 4                                 | $GP\_NTC$            | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | 27.5                                      |        | 31.0 |        |
|                                                                    |                                            | $GP\_EXT$            | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                      | 26.5                                      |        | 32.5 |        |
|                                                                    |                                            | $GP\_LOW$            | $P_{OUT} = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                                    |                                           | 15.0   | 20.0 |        |
|                                                                    |                                            |                      |                                                                                                                                                                        |                                           |        |      |        |
| Power Added Efficiency <sup>1</sup>                                |                                            |                      | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               |                                           | 40     |      | %      |
| Total Supply Current <sup>2</sup>                                  |                                            | $I_{TOT\_MAX\_B1,4}$ | $P_{OUT} = 28.5\text{ dBm}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                                |                                           | 510    |      | mA     |
|                                                                    |                                            | $I_{TOT\_MAX\_B2,3}$ | $P_{OUT} = 29.0\text{ dBm}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                                |                                           | 560    |      |        |
| Adjacent Channel Leakage power Ratio                               | 5 MHz offset                               | ACLR1                | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               |                                           | -40    | -38  | dBc    |
|                                                                    |                                            |                      | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                            |                                           |        | -36  |        |
|                                                                    | 10 MHz offset                              | ACLR2                | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               |                                           | -52    | -48  |        |
|                                                                    |                                            |                      | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                            |                                           |        | -46  |        |
| Modulation Accuracy                                                |                                            | EVM                  | $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ ,<br>Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                                |                                           | 2.5    | 5.0  | %      |
| Harmonics                                                          | Second                                     | $2f_0$               | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                            |                                           | -16    | -12  | dBm    |
|                                                                    | Third                                      | $3f_0$               |                                                                                                                                                                        |                                           | -23    | -15  |        |
|                                                                    | Fourth and higher                          | $4f_0$               |                                                                                                                                                                        |                                           |        | -20  |        |
| Noise Power in Rx Band at Duplex Frequency with WCDMA Modulated Tx |                                            |                      |                                                                                                                                                                        |                                           |        |      | dBm/Hz |
|                                                                    | B1 $f_{TX} = 1920\text{--}1980\text{ MHz}$ | $P_{NOISE\_DPX}$     | $f_{RX} = f_{TX} + 190\text{ MHz}$                                                                                                                                     |                                           | -133.5 |      |        |
|                                                                    | B2 $f_{TX} = 1850\text{--}1910\text{ MHz}$ |                      | $f_{RX} = f_{TX} + 80\text{ MHz}$                                                                                                                                      |                                           | -133.0 |      |        |
|                                                                    | B3 $f_{TX} = 1710\text{--}1785\text{ MHz}$ |                      | $f_{RX} = f_{TX} + 95\text{ MHz}$                                                                                                                                      |                                           | -132.5 |      |        |
|                                                                    | B4 $f_{TX} = 1710\text{--}1755\text{ MHz}$ |                      | $f_{RX} = f_{TX} + 400\text{ MHz}$                                                                                                                                     |                                           | -137.0 |      |        |
| Input VSWR                                                         |                                            | $VSWR_{IN}$          | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                            |                                           | 1.3:1  | 2:1  |        |
| Stability                                                          |                                            | S                    | Load VSWR = 6:1, all phase angles,<br>$P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ ,<br>$T_{CASE} = T_{RANGE}$                            | All spurious below -36 dBm                |        |      |        |
| Ruggedness                                                         |                                            | $R_u$                | Load VSWR = 10:1, all phase angles,<br>$P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ ,<br>$T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation |        |      |        |

<sup>1</sup>  $V_{CC}$  optimized for ACLR1 = -40 dBc.

<sup>2</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.2\text{ V}$ .  $DC\_DC\_EFF \sim 96\%$ .

**Table 10. SKY77643-61 Electrical Specifications – Transmit WCDMA Low Band****Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; Voice RMC 12.2 kbps**

| Parameter                                                          | Symbol                                   | Conditions          | Min                                                                                                                                                                    | Typ                                       | Max  | Units  |
|--------------------------------------------------------------------|------------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------|--------|
| Operating Frequency                                                | Band 5                                   | $f_0$               | 824                                                                                                                                                                    |                                           | 849  | MHz    |
|                                                                    | Band 8                                   |                     | 880                                                                                                                                                                    |                                           | 915  |        |
| Maximum Output Power                                               | Bands 5, 8                               | $P_{OUT\_MAX}$      | 29.0                                                                                                                                                                   |                                           |      | dBm    |
|                                                                    |                                          | $P_{OUT\_MAX\_ETC}$ | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                            | 27.0                                      |      |        |
| Power Gain                                                         |                                          | $GP\_NTC$           | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | 28.0                                      | 31.5 | dB     |
|                                                                    |                                          | $GP\_EXT$           | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                      | 27.0                                      | 33.0 |        |
|                                                                    |                                          | $GP\_LOW$           | $P_{OUT} = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                                    |                                           | 14.5 | 20.0   |
| Power Added Efficiency <sup>1</sup>                                |                                          | $PAE\_APT$          | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | 42                                        |      | %      |
| Total Supply Current <sup>2</sup>                                  |                                          | $I_{TOT\_MAX}$      | $P_{OUT} = P_{OUT\_MAX}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                                   | 480                                       |      | mA     |
| Adjacent Channel Leakage power Ratio                               | 5 MHz offset                             | ACLR1               | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               |                                           | -40  | dBc    |
|                                                                    |                                          |                     | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                            |                                           | -36  |        |
|                                                                    | 10 MHz offset                            | ACLR2               | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               |                                           | -52  |        |
|                                                                    |                                          |                     | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                            |                                           | -46  |        |
| Modulation Accuracy                                                |                                          | EVM                 | $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ ,<br>Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                                | 2.5                                       | 5.0  | %      |
| Harmonics                                                          | Second                                   | $2f_0$              | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                            | -16                                       | -13  | dBm    |
|                                                                    | Third                                    | $3f_0$              |                                                                                                                                                                        | -23                                       | -15  |        |
|                                                                    | Fourth and higher                        | $4f_0$              |                                                                                                                                                                        |                                           | -20  |        |
| Noise Power in Rx Band at Duplex Frequency with WCDMA Modulated Tx |                                          |                     |                                                                                                                                                                        |                                           |      | dBm/Hz |
|                                                                    | B5 $f_{TX} = 824\text{--}849\text{ MHz}$ | $P_{NOISE\_DPX}$    | $f_{RX} = f_{TX} + 45\text{ MHz}$                                                                                                                                      | -131.5                                    |      |        |
|                                                                    | B8 $f_{TX} = 880\text{--}915\text{ MHz}$ |                     | $f_{RX} = f_{TX} + 45\text{ MHz}$                                                                                                                                      | -131.5                                    |      |        |
| Input VSWR                                                         |                                          | $VSWR\_IN$          | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                            | 1.6:1                                     | 2:1  |        |
| Stability                                                          |                                          | S                   | Load VSWR = 4.7:1, all phase angles,<br>$P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ ,<br>$T_{CASE} = T_{RANGE}$                          | All spurious below -36 dBm                |      |        |
| Ruggedness                                                         |                                          | $R_u$               | Load VSWR = 10:1, all phase angles,<br>$P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ ,<br>$T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation |      |        |

<sup>1</sup>  $V_{CC}$  optimized for ACLR1 = -40 dBc.<sup>2</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.0\text{ V}$ .  $DC\_DC\_EFF \sim 96\%$ .

**Table 11. SKY77643-61 Electrical Specifications – Transmit LTE Mid-Band**

**Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/20 MHz/100RB for MPR = 1.**

| Parameter                                                        | Symbol                                      | Conditions                                                                                                                                                       | Min                                                                                         | Typ    | Max  | Units  |
|------------------------------------------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------|------|--------|
| Operating Frequency                                              | Band 1                                      | $f_0$                                                                                                                                                            | 1920                                                                                        |        | 1980 | MHz    |
|                                                                  | Band 2                                      |                                                                                                                                                                  | 1850                                                                                        |        | 1910 |        |
|                                                                  | Band 3                                      |                                                                                                                                                                  | 1710                                                                                        |        | 1785 |        |
|                                                                  | Band 4                                      |                                                                                                                                                                  | 1710                                                                                        |        | 1755 |        |
|                                                                  | Band 25                                     |                                                                                                                                                                  | 1850                                                                                        |        | 1915 |        |
| Maximum Output Power                                             | Band 1, 4                                   | $P_{OUT\_MAX}$                                                                                                                                                   | 28.5                                                                                        |        |      | dBm    |
|                                                                  |                                             | $P_{OUT\_MAX\_ETC}$                                                                                                                                              | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                 |        |      |        |
|                                                                  | Bands 2, 3, 25                              | $P_{OUT\_MAX}$                                                                                                                                                   | 28.5                                                                                        |        |      |        |
|                                                                  |                                             | $P_{OUT\_MAX\_ETC}$                                                                                                                                              | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                 |        |      |        |
| Power Gain                                                       | GP_NTC                                      | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                         | 28.0                                                                                        |        | 32.0 | dB     |
|                                                                  | GP_EXT                                      | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                | 27.0                                                                                        |        | 33.0 |        |
|                                                                  | GP_LOW                                      | $P_{OUT} = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                              |                                                                                             | 15.0   | 20.0 | dB     |
| Power Added Efficiency <sup>1</sup>                              | PAE_APT                                     | $P_{OUT\_MAX}$                                                                                                                                                   |                                                                                             | 36     |      | %      |
| Total Supply Current <sup>2</sup>                                | $I_{TOT\_MAX\_B1,4}$                        | $P_{OUT} = 27.5\text{ dBm}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                          |                                                                                             | 465    |      | mA     |
|                                                                  | $I_{TOT\_MAX\_B2,3,25}$                     | $P_{OUT} = 28.0\text{ dBm}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                          |                                                                                             | 495    |      |        |
| Adjacent Channel Leakage power Ratio                             | EUTRA                                       | EUTRA_ACLR1                                                                                                                                                      | $P_{OUT} = P_{OUT\_MAX}$                                                                    | -38    | -36  | dBc    |
|                                                                  |                                             |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |        | -33  |        |
|                                                                  | UTRA1                                       | UTRA_ACLR1                                                                                                                                                       | $P_{OUT} = P_{OUT\_MAX}$                                                                    | -40    | -37  | dBc    |
|                                                                  |                                             |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |        | -36  |        |
|                                                                  | UTRA2                                       | UTRA_ACLR2                                                                                                                                                       | $P_{OUT} = P_{OUT\_MAX}$                                                                    | -43    | -41  | dBc    |
|                                                                  |                                             |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |        | -39  |        |
| Modulation Accuracy                                              | EVM                                         | $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ , Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                             |                                                                                             | 2.5    | 5.0  | %      |
| Harmonics                                                        | Second                                      | $2f_0$                                                                                                                                                           |                                                                                             | -15    | -12  | dBm    |
|                                                                  | Third                                       | $3f_0$                                                                                                                                                           |                                                                                             | -23    | -15  |        |
|                                                                  | Fourth and higher                           | $4f_0$                                                                                                                                                           |                                                                                             |        | -20  |        |
| Noise Power in Rx Band at Duplex Frequency with LTE <sup>3</sup> |                                             |                                                                                                                                                                  |                                                                                             |        |      | dBm/Hz |
|                                                                  | B1 $f_{TX} = 1920\text{--}1980\text{ MHz}$  | $P_{NOISE\_DPX}$                                                                                                                                                 | $f_{RX} = f_{TX} + 190\text{ MHz}$                                                          | -133.0 |      |        |
|                                                                  | B2 $f_{TX} = 1850\text{--}1910\text{ MHz}$  |                                                                                                                                                                  | $f_{RX} = f_{TX} + 80\text{ MHz}$                                                           | -131.5 |      |        |
|                                                                  | B25 $f_{TX} = 1850\text{--}1915\text{ MHz}$ |                                                                                                                                                                  | $f_{RX} = f_{TX} + 80\text{ MHz}$                                                           | -131.5 |      |        |
|                                                                  | B3 $f_{TX} = 1710\text{--}1785\text{ MHz}$  |                                                                                                                                                                  | $f_{RX} = f_{TX} + 95\text{ MHz}$                                                           | -132.6 |      |        |
|                                                                  | B4 $f_{TX} = 1710\text{--}1755\text{ MHz}$  |                                                                                                                                                                  | $f_{RX} = f_{TX} + 400\text{ MHz}$                                                          | -136.0 |      |        |
| Input VSWR                                                       | VSWR_IN                                     | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                      |                                                                                             | 1.3:1  | 2:1  |        |
| Stability                                                        | S                                           | Load VSWR = 6:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ , $T_{CASE} = T_{RANGE}$                            | All spurious below -36 dBm                                                                  |        |      |        |
| Ruggedness                                                       | Ru                                          | Load VSWR = 10:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation                                                   |        |      |        |

<sup>1</sup>  $V_{CC}$  optimized for ACLR1\_UTRA = -40 dBc.

<sup>2</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.3\text{ V}$ .  $DC\_DC\_EFF \sim 96\%$ .

<sup>3</sup> Measured with 10 MHz/1RB LTE Waveform.

**Table 12-1. SKY77643-61 Electrical Specifications – Transmit LTE Low Band**

**Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; LTE Signal = QPSK/10 MHz/12RB for  $MPR = 0$  and QPSK/20 MHz/100RB for  $MPR = 1$ .**

| Parameter                            | Symbol                   | Conditions                   | Min                                                                                         | Typ  | Max  | Units |
|--------------------------------------|--------------------------|------------------------------|---------------------------------------------------------------------------------------------|------|------|-------|
| Frequency                            | Band 5                   | $f_0$                        | 824                                                                                         |      | 849  | MHz   |
|                                      | Band 8                   |                              | 880                                                                                         |      | 915  |       |
|                                      | Band 12                  |                              | 699                                                                                         |      | 716  |       |
|                                      | Band 13                  |                              | 777                                                                                         |      | 787  |       |
|                                      | Band 17                  |                              | 704                                                                                         |      | 716  |       |
|                                      | Band 20                  |                              | 832                                                                                         |      | 862  |       |
|                                      | Band 26                  |                              | 814                                                                                         |      | 849  |       |
|                                      | Band 28                  |                              | 703                                                                                         |      | 748  |       |
|                                      | Band 71                  |                              | 663                                                                                         |      | 698  |       |
| Maximum Output Power                 | Bands 5, 8, 20, 26       | $P_{OUT\_MAX}$               | 28.0                                                                                        |      |      | dBm   |
|                                      |                          | $P_{OUT\_MAX\_ETC}$          | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                 | 26.0 |      |       |
|                                      | Bands 12, 13, 17, 28, 71 | $P_{OUT\_MAX}$               | 28.0                                                                                        |      |      |       |
|                                      |                          | $P_{OUT\_MAX\_ETC}$          | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                 | 26.5 |      |       |
| Power Gain                           |                          | $GP\_NTC$                    | $P_{OUT} = P_{OUT\_MAX}$                                                                    | 28.0 |      | 32.0  |
|                                      |                          | $GP\_EXT$                    | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = T_{RANGE}$                                           | 27.0 |      | 33.0  |
|                                      |                          | $GP\_LOW$                    | $P_{OUT} = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                         |      | 15.0 | 20.0  |
| Power Added Efficiency <sup>1</sup>  | Band 12, 17, 28, 71      | $PAE\_APT$                   | $P_{OUT\_MAX}$                                                                              | 36   |      | %     |
|                                      | Bands 5, 8, 13, 20, 26   |                              |                                                                                             | 37   |      |       |
| Total Supply Current <sup>2</sup>    |                          | $I_{TOT\_MAX\_B12,17,28,71}$ | $P_{OUT} = 28.0\text{ dBm}$ , $V_{BATT} = 3.8\text{ V}$                                     | 490  |      | mA    |
|                                      |                          | $I_{TOT\_MAX\_B13}$          |                                                                                             | 470  |      |       |
|                                      |                          | $I_{TOT\_MAX\_B5,8,20,26}$   | $P_{OUT} = 27.5\text{ dBm}$ , $V_{BATT} = 3.8\text{ V}$                                     | 430  |      |       |
| Adjacent Channel Leakage power Ratio | EUTRA                    | EUTRA_ACLR1                  | $P_{OUT} = P_{OUT\_MAX}$                                                                    | -38  | -36  | dBc   |
|                                      |                          |                              | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |      | -33  |       |
|                                      | UTRA1                    | UTRA_ACLR1                   | $P_{OUT} = P_{OUT\_MAX}$                                                                    | -40  | -37  |       |
|                                      |                          |                              | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |      | -36  |       |
|                                      | UTRA2                    | UTRA_ACLR2                   | $P_{OUT} = P_{OUT\_MAX}$                                                                    | -43  | -41  |       |
|                                      |                          |                              | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |      | -39  |       |

**Table 12-2. SKY77643-61 Electrical Specifications – Transmit LTE Low Band**

**Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; LTE Signal = QPSK/10 MHz/12RB for  $MPR = 0$  and QPSK/20 MHz/100RB for  $MPR = 1$ .**

| Parameter                                                        |                                           | Symbol                 | Conditions                                                                                                                                                             | Min                                       | Typ    | Max | Units  |
|------------------------------------------------------------------|-------------------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------|-----|--------|
| Modulation Accuracy                                              |                                           | EVM                    | $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ , Load = 50 ohms,<br>$T_{CASE} = T_{RANGE}$                                                                                |                                           | 2.5    | 5.0 | %      |
| Harmonics                                                        | Second                                    | Bands 12, 17, 28, 71   | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                            |                                           | -13    | -7  | dBm    |
|                                                                  |                                           | Bands 5, 8, 13, 20, 26 |                                                                                                                                                                        |                                           | -20    | -13 |        |
|                                                                  | Third                                     | $3f_0$                 |                                                                                                                                                                        |                                           | -23    | -14 |        |
|                                                                  | Fourth and higher                         | $4f_0$                 |                                                                                                                                                                        |                                           |        | -20 |        |
| Noise Power in Rx Band at Duplex Frequency with LTE <sup>3</sup> |                                           |                        |                                                                                                                                                                        |                                           |        |     | dBm/Hz |
|                                                                  | B26 $f_{TX} = 814\text{--}849\text{ MHz}$ | $P_{NOISE\_DPX}$       | $f_{RX} = f_{TX} + 45\text{ MHz}$                                                                                                                                      |                                           | -133.5 |     |        |
|                                                                  | B5 $f_{TX} = 824\text{--}849\text{ MHz}$  |                        | $f_{RX} = f_{TX} + 45\text{ MHz}$                                                                                                                                      |                                           | -133.5 |     |        |
|                                                                  | B8 $f_{TX} = 880\text{--}915\text{ MHz}$  |                        | $f_{RX} = f_{TX} + 45\text{ MHz}$                                                                                                                                      |                                           | -133.3 |     |        |
|                                                                  | B13 $f_{TX} = 777\text{--}787\text{ MHz}$ |                        | $f_{RX} = f_{TX} - 31\text{ MHz}$                                                                                                                                      |                                           | -130.0 |     |        |
|                                                                  | B17 $f_{TX} = 704\text{--}716\text{ MHz}$ |                        | $f_{RX} = f_{TX} + 30\text{ MHz}$                                                                                                                                      |                                           | -131.0 |     |        |
|                                                                  | B20 $f_{TX} = 832\text{--}862\text{ MHz}$ |                        | $f_{RX} = f_{TX} - 41\text{ MHz}$                                                                                                                                      |                                           | -133.0 |     |        |
|                                                                  | B28 $f_{TX} = 703\text{--}748\text{ MHz}$ |                        | $f_{RX} = 758\text{--}803\text{ MHz}$                                                                                                                                  |                                           | -133.0 |     |        |
| Input VSWR                                                       |                                           | VSWR_IN                | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                            |                                           | 1.6:1  | 2:1 |        |
| Stability                                                        |                                           | S                      | Load VSWR = 6:1, all phase angles,<br>$P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ ,<br>$T_{CASE} = T_{RANGE}$                            | All spurious below -36 dBm                |        |     |        |
| Ruggedness                                                       |                                           | Ru                     | Load VSWR = 10:1, all phase angles,<br>$P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ ,<br>$T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation |        |     |        |

<sup>1</sup>  $V_{CC}$  optimized for ACLR1\_UTRA = -40 dBc.

<sup>2</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.2\text{ V}$ .  $DC\_DC\_EFF \sim 96\%$ .

<sup>3</sup> Measured with 10 MHz/1RB LTE Waveform.

**Table 13. SKY77643-61 Electrical Specifications – TD-SCDMA Bands 34, 39****Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; Voice Modulation**

| Parameter                            | Symbol              | Conditions                                                                                                                                                       | Min                                                                                         | Typ   | Max  | Units |
|--------------------------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------|------|-------|
| Operating Frequency                  | Band 34             | $f_0$                                                                                                                                                            | 2010                                                                                        |       | 2025 | MHz   |
|                                      | Band 39             |                                                                                                                                                                  | 1880                                                                                        |       | 1920 |       |
| Maximum Output Power                 | $P_{OUT\_MAX}$      |                                                                                                                                                                  | 29.5                                                                                        |       |      | dBm   |
|                                      | $P_{OUT\_MAX\_ETC}$ | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                      | 27.0                                                                                        |       |      |       |
| Power Gain                           | $GP\_NTC$           | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                         | 27.5                                                                                        | 30.0  | 31.0 | dB    |
|                                      | $GP\_EXT$           | $P_{OUT} = P_{OUT\_MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                | 26.5                                                                                        |       | 32.5 |       |
|                                      | $GP\_LOW$           | $P_{OUT} = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                              |                                                                                             | 15.0  | 20.0 | dB    |
| Power Added Efficiency <sup>1</sup>  | $PAE\_APT$          | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                         |                                                                                             | 43    |      | %     |
| Total Supply Current <sup>2</sup>    | $I_{TOT\_MAX}$      |                                                                                                                                                                  |                                                                                             | 485   |      |       |
| Adjacent Channel Leakage Power Ratio | 1.6 MHz offset      | $ACLR1$                                                                                                                                                          | $P_{OUT} = P_{OUT\_MAX}$                                                                    |       | -43  | dBc   |
|                                      |                     |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -36  |       |
|                                      | 3.2 MHz offset      | $ACLR2$                                                                                                                                                          | $P_{OUT} = P_{OUT\_MAX}$                                                                    |       | -52  |       |
|                                      |                     |                                                                                                                                                                  | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -46  |       |
| Modulation Accuracy                  | $EVM$               | $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ , Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                             |                                                                                             | 2.5   | 5.0  | %     |
| Harmonics                            | Second              | $2f_0$                                                                                                                                                           | $P_{OUT} \leq P_{OUT\_MAX}$                                                                 | -16   | -13  | dBm   |
|                                      | Third               | $3f_0$                                                                                                                                                           |                                                                                             | -23   | -15  |       |
|                                      | Fourth and higher   | $4f_0$                                                                                                                                                           |                                                                                             |       | -20  |       |
| Input VSWR                           | $VSWR\_IN$          | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                      |                                                                                             | 1.3:1 | 2:1  |       |
| Stability                            | $S$                 | Load VSWR = 6:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ , $T_{CASE} = T_{RANGE}$                            | All spurious below -36 dBm                                                                  |       |      |       |
| Ruggedness                           | $R_u$               | Load VSWR = 10:1, all phase angles, $P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation                                                   |       |      |       |

<sup>1</sup> VCC optimized for  $ACLR1 = -40\text{ dBc}$ .<sup>2</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.0\text{ V}$ .  $DC\_DC\_EFF \sim 96\%$ .

**Table 14. SKY77643-61 Electrical Specifications – Transmit TDD LTE Band 39**

**Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; LTE Signal = QPSK/10 MHz/12RB for  $MPR = 0$  and QPSK/20 MHz/100RB for  $MPR = 1$ .**

| Parameter                            | Symbol            | Conditions                                                                                                                                                  | Min                                                                                      | Typ   | Max  | Units |
|--------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------|------|-------|
| Frequency                            | $f$               |                                                                                                                                                             | 1880                                                                                     |       | 1920 | MHz   |
| Maximum Output Power                 | POUT_MAX          |                                                                                                                                                             | 28.5                                                                                     |       |      | dBm   |
|                                      | POUT_MAX_ETC      | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                 | 26.0                                                                                     |       |      |       |
| Power Gain                           | GP_NTC            | $POUT = POUT_{MAX}$                                                                                                                                         | 28.0                                                                                     |       | 31.5 | dB    |
|                                      | GP_EXT            | $POUT = POUT_{MAX}$ , $T_{CASE} = T_{RANGE}$                                                                                                                | 27.0                                                                                     |       | 33.0 |       |
|                                      | GP_LOW            | $POUT = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                            |                                                                                          | 15.0  | 20.0 | dB    |
| Power Added Efficiency <sup>1</sup>  | PAE_APT           | $POUT = POUT_{MAX}$                                                                                                                                         |                                                                                          | 36    |      | %     |
| Total Supply Current <sup>2</sup>    | I_TOT_MAX         | $POUT = POUT_{MAX}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                             |                                                                                          | 475   |      | mA    |
| Adjacent Channel Leakage power Ratio | EUTRA             | E-UTRA_ACLR1                                                                                                                                                | $POUT = POUT_{MAX}$                                                                      |       | -38  | dBc   |
|                                      |                   |                                                                                                                                                             | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -33  |       |
|                                      |                   | E-UTRA_ACLR1_CA                                                                                                                                             | $POUT = POUT_{MAX}$<br>Modulation = QPSK/35 MHz/175RB                                    |       | -37  |       |
|                                      | UTRA1             | UTRA_ACLR1                                                                                                                                                  | $POUT = POUT_{MAX}$                                                                      |       | -40  |       |
|                                      |                   |                                                                                                                                                             | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -36  |       |
|                                      | UTRA2             | UTRA_ACLR2                                                                                                                                                  | $POUT = POUT_{MAX}$                                                                      |       | -43  |       |
|                                      |                   |                                                                                                                                                             | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$ |       | -39  |       |
|                                      |                   |                                                                                                                                                             |                                                                                          |       |      |       |
| Modulation Accuracy                  | EVM               | $V_{BATT} = 3.0\text{ to }4.6\text{ V}$ , Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                            |                                                                                          | 2.5   | 5.0  | %     |
| Harmonics                            | Second            | $2f_0$                                                                                                                                                      | $POUT = POUT_{MAX}$                                                                      | -16   | -15  | dBm   |
|                                      | Third             | $3f_0$                                                                                                                                                      |                                                                                          | -23   | -20  |       |
|                                      | Fourth and higher | $4f_0$                                                                                                                                                      |                                                                                          |       | -20  |       |
| Input VSWR                           | VSWR_IN           | $POUT \leq POUT_{MAX}$                                                                                                                                      |                                                                                          | 1.3:1 | 2:1  |       |
| Stability                            | S                 | Load VSWR = 6:1, all phase angles, $POUT \leq POUT_{MAX}$ , $V_{BATT} = 3.0\text{ V to }4.6\text{ V}$ , $T_{CASE} = T_{RANGE}$                              | All spurious below -36 dBm                                                               |       |      |       |
| Ruggedness                           | Ru                | Load VSWR = 10:1, all phase angles, $POUT \leq POUT_{MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ , $T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation                                                |       |      |       |

<sup>1</sup> Vcc optimized for ACLR1\_UTRA = -40 dBc.

<sup>2</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.4\text{ V}$ .  $DC\_DC\_EFF \sim 96\%$ .

**Table 15. SKY77643-31 Electrical Specifications – Transmit TDD LTE Band 34**

**Unless otherwise specified:  $V_{BATT} = 3.4$  V;  $T_{CASE} = +25$  °C; LTE Signal = QPSK/10 MHz/12RB for MPR = 0 and QPSK/15 MHz/75RB for MPR = 1.**

| Parameter                            | Symbol            | Conditions                                                                                                             | Min                                                                              | Typ   | Max  | Units |
|--------------------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------|------|-------|
| Frequency                            | $f$               |                                                                                                                        | 2010                                                                             |       | 2025 | MHz   |
| Maximum Output Power                 | POUT_MAX          |                                                                                                                        | 28.5                                                                             |       |      | dBm   |
|                                      | POUT_MAX_ETC      | $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$                                                                    | 26.0                                                                             |       |      |       |
| Power Gain                           | GP_NTC            | $POUT = POUT_{MAX}$                                                                                                    |                                                                                  | 29.5  |      | dB    |
|                                      | GP_EXT            | $POUT = POUT_{MAX}$ , $T_{CASE} = T_{RANGE}$                                                                           |                                                                                  | 29.5  |      |       |
|                                      | GP_LOW            | $POUT = 3$ dBm, $V_{CC} = 0.55$ V                                                                                      |                                                                                  | 15.0  |      | dB    |
| Power Added Efficiency <sup>1</sup>  | PAE_APT           | $POUT = POUT_{MAX}$                                                                                                    |                                                                                  | 36    |      | %     |
| Total Supply Current <sup>2</sup>    | $I_{TOT\_MAX}$    | $POUT = POUT_{MAX}$ , $V_{BATT} = 3.8$ V                                                                               |                                                                                  | 475   |      | mA    |
| Adjacent Channel Leakage power Ratio | EUTRA             | E-UTRA_ACLR1                                                                                                           | $POUT = POUT_{MAX}$                                                              |       | -39  | dBc   |
|                                      |                   |                                                                                                                        | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       |      |       |
|                                      | UTRA1             | UTRA_ACLR1                                                                                                             | $POUT = POUT_{MAX}$                                                              |       | -40  |       |
|                                      |                   |                                                                                                                        | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       |      |       |
|                                      | UTRA2             | UTRA_ACLR2                                                                                                             | $POUT = POUT_{MAX}$                                                              |       | -43  |       |
|                                      |                   |                                                                                                                        | $POUT = POUT_{MAX\_RANGE}$ , $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$ |       |      |       |
| Modulation Accuracy                  | EVM               | $V_{BATT} = 3.0$ to $4.6$ V, Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                    |                                                                                  | 2.5   |      | %     |
| Harmonics                            | Second            | $2f_0$                                                                                                                 | $POUT = POUT_{MAX}$                                                              | -15   |      | dBm   |
|                                      | Third             | $3f_0$                                                                                                                 |                                                                                  | -20   |      |       |
|                                      | Fourth and higher | $4f_0$                                                                                                                 |                                                                                  |       |      |       |
| Input VSWR                           | VSWR_IN           | $POUT \leq POUT_{MAX}$                                                                                                 |                                                                                  | 1.3:1 |      |       |
| Stability                            | S                 | Load VSWR = 6:1, all phase angles, $POUT \leq POUT_{MAX}$ , $V_{BATT} = 3.0$ V to $4.6$ V, $T_{CASE} = T_{RANGE}$      | All spurious below -36 dBm                                                       |       |      |       |
| Ruggedness                           | Ru                | Load VSWR = 10:1, all phase angles, $POUT \leq POUT_{MAX}$ , $V_{BATT} = 4.6$ V, $V_{CC} = 4.6$ V, $T_{CASE} = +25$ °C | No module damage or permanent degradation                                        |       |      |       |

<sup>1</sup> Vcc optimized for ACLR1\_UTRA = -40 dBc.

<sup>2</sup>  $I_{TOT} = I_{BATT} + (ICC1 + ICC2)(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ . VCC ~ 3.4 V. DC\_DC\_EFF ~ 96%.



**Table 16. SKY77643-61 Electrical Specifications – Transmit CDMA2000 Low Band****Unless otherwise specified:  $V_{BATT} = 3.4$  V;  $T_{CASE} = +25$  °C; 1x RC1**

| Parameter                                  | Symbol                    | Conditions                                                                                                                              | Min                                                                                              | Typ   | Max  | Units  |
|--------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------|------|--------|
| Frequency                                  | Band BC0                  | $f$                                                                                                                                     | 815                                                                                              |       | 849  | MHz    |
|                                            | Band BC10                 |                                                                                                                                         | 806                                                                                              |       | 901  |        |
| Maximum Output Power                       | P <sub>OUT_MAX_BC0</sub>  | CDMA RC1                                                                                                                                | 28.5                                                                                             |       |      | dBm    |
|                                            |                           | CDMA EVDO                                                                                                                               | 28.0                                                                                             |       |      |        |
|                                            | P <sub>OUT_MAX_BC10</sub> | CDMA RC1                                                                                                                                | 28.0                                                                                             |       |      |        |
|                                            |                           | CDMA EVDO                                                                                                                               | 28.0                                                                                             |       |      |        |
|                                            | P <sub>OUT_MAX_ETC</sub>  | $V_{BATT} = V_{CC} = 3.0$ V, $T_{CASE} = T_{RANGE}$                                                                                     | 27.0                                                                                             |       |      |        |
| Power Gain                                 | GP_NTC                    | P <sub>OUT</sub> = P <sub>OUT_MAX</sub>                                                                                                 | 28.0                                                                                             |       | 31.5 | dB     |
|                                            | GP_EXT                    | P <sub>OUT</sub> = P <sub>OUT_MAX</sub> , $T_{CASE} = T_{RANGE}$                                                                        | 27.0                                                                                             |       | 33.0 |        |
|                                            | GP_LOW                    | P <sub>OUT</sub> = 3 dBm, $V_{CC} = 0.55$ V                                                                                             |                                                                                                  | 14.5  | 20.0 | dB     |
| Power Added Efficiency <sup>1</sup>        | PAE_APT                   | P <sub>OUT</sub> = P <sub>OUT_MAX</sub>                                                                                                 |                                                                                                  | 39    |      | %      |
| Total Supply Current <sup>2</sup>          | I <sub>TOT_MAX</sub>      | P <sub>OUT</sub> = P <sub>OUT_MAX</sub> , $V_{BATT} = 3.8$ V                                                                            |                                                                                                  | 510   |      | mA     |
| Adjacent Channel Leakage power Ratio       | 885 kHz offset            | ACLR1                                                                                                                                   | P <sub>OUT</sub> = P <sub>OUT_MAX</sub>                                                          |       | -50  | dBc    |
|                                            |                           |                                                                                                                                         | P <sub>OUT</sub> = P <sub>OUT_MAX_ETC</sub> , $V_{BATT} = V_{CC} = 3.0$ , $T_{CASE} = T_{RANGE}$ |       | -45  |        |
|                                            | 1.98 MHz offset           | ACLR2                                                                                                                                   | P <sub>OUT</sub> = P <sub>OUT_MAX</sub>                                                          |       | -60  |        |
|                                            |                           |                                                                                                                                         | P <sub>OUT</sub> = P <sub>OUT_MAX_ETC</sub> , $V_{BATT} = V_{CC} = 3.0$ , $T_{CASE} = T_{RANGE}$ |       | -57  |        |
| Modulation Accuracy                        | EVM                       | $V_{BATT} = 3.0$ V to 4.6 V, Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                     |                                                                                                  | 2.5   | 5.0  | %      |
| Harmonics                                  | Second                    | 2fo                                                                                                                                     | P <sub>OUT</sub> ≤ P <sub>OUT_MAX</sub> , MBW = 1 MHz                                            | -16   | -12  | dBm    |
|                                            | Third                     | 3fo                                                                                                                                     |                                                                                                  | -15   | -12  |        |
|                                            | Fourth and higher         | 4fo                                                                                                                                     |                                                                                                  |       | -20  |        |
| Noise Power in Rx Band at Duplex Frequency |                           |                                                                                                                                         |                                                                                                  |       |      | dBm/Hz |
| BC0 f <sub>TX</sub> = 815 MHz –849 MHz     |                           | P <sub>NOISE_DPX</sub>                                                                                                                  | f <sub>RX</sub> = f <sub>TX</sub> +45 MHz                                                        | -133  |      |        |
| BC10 f <sub>TX</sub> = 806 MHz –901 MHz    |                           |                                                                                                                                         | f <sub>RX</sub> = f <sub>TX</sub> +45 MHz                                                        | -133  |      |        |
| Input VSWR                                 | VSWR_IN                   | P <sub>OUT</sub> ≤ P <sub>OUT_MAX</sub>                                                                                                 |                                                                                                  | 1.6:1 | 2:1  |        |
| Stability                                  | S                         | Load VSWR = 6:1, all phase angles, P <sub>OUT</sub> ≤ P <sub>OUT_MAX</sub> , $V_{BATT} = 3.0$ V to 4.6 V, $T_{CASE} = T_{RANGE}$        | All spurious below -36 dBm                                                                       |       |      |        |
| Ruggedness                                 | Ru                        | Load VSWR = 10:1, all phase angles, P <sub>OUT</sub> ≤ P <sub>OUT_MAX</sub> , $V_{BATT} = 4.6$ V, $V_{CC} = 4.6$ V, $T_{CASE} = +25$ °C | No module damage or permanent degradation                                                        |       |      |        |

<sup>1</sup> V<sub>CC</sub> optimized for ACLR1 = -50 dBc.<sup>2</sup> I<sub>TOT</sub> = I<sub>BATT</sub> + (I<sub>CC1</sub> + I<sub>CC2</sub>)(V<sub>CC</sub>/V<sub>BATT</sub>)(1/DC\_DC\_EFF). V<sub>CC</sub> ~ 3.4 V, DC\_DC\_EFF ~ 96%.

**Table 17. SKY77643-61 Electrical Specifications – Transmit CDMA2000 Mid-Band****Unless otherwise specified:  $V_{BATT} = 3.4\text{ V}$ ;  $T_{CASE} = +25\text{ }^{\circ}\text{C}$ ; 1x RC1**

| Parameter                                  | Symbol                                              | Conditions                | Min                                                                                                                                                                    | Typ                                       | Max  | Units  |
|--------------------------------------------|-----------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------|--------|
| Frequency                                  | Band BC15                                           | $f_o$                     | 1710                                                                                                                                                                   |                                           | 1755 | MHz    |
|                                            | Band BC4                                            |                           | 1750                                                                                                                                                                   |                                           | 1780 |        |
|                                            | Band BC1                                            |                           | 1850                                                                                                                                                                   |                                           | 1910 |        |
|                                            | Band BC6                                            |                           | 1920                                                                                                                                                                   |                                           | 1980 |        |
| Maximum Output Power                       | CDMA RC1                                            | $P_{OUT\_MAX\_RC1}$       | 29.0                                                                                                                                                                   |                                           |      | dBm    |
|                                            |                                                     | $P_{OUT\_MAX\_ETC\_RC1}$  | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                            | 27.0                                      |      |        |
|                                            | CDMA EVDO                                           | $P_{OUT\_MAX\_EVDO}$      | 28.5                                                                                                                                                                   |                                           |      |        |
|                                            |                                                     | $P_{OUT\_MAX\_ETC\_EVDO}$ | $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                                                            | 27.25                                     |      |        |
| Power Gain                                 | BC1, BC6                                            | $GP\_NTC$                 | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | 27.0                                      |      | dB     |
|                                            |                                                     | $GP\_EXT$                 | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $T_{CASE} = T_{RANGE}$                                                                                                                 | 25.5                                      |      |        |
|                                            | BC4, BC15                                           | $GP\_NTC$                 | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | 27.5                                      |      |        |
|                                            |                                                     | $GP\_EXT$                 | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $T_{CASE} = T_{RANGE}$                                                                                                                 | 26.5                                      |      |        |
|                                            |                                                     | $GP\_LOW$                 | $P_{OUT} = 3\text{ dBm}$ , $V_{CC} = 0.55\text{ V}$                                                                                                                    | 15.0                                      | 20.0 |        |
|                                            |                                                     |                           |                                                                                                                                                                        |                                           |      |        |
| Power Added Efficiency <sup>1</sup>        |                                                     | $PAE\_APT$                | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | 39                                        |      | %      |
| Total Supply Current <sup>2</sup>          |                                                     | $I_{TOT\_MAX\_BC6\_BC15}$ | $P_{OUT} = P_{OUT\_MAX}$ , $V_{BATT} = 3.8\text{ V}$                                                                                                                   | 520                                       |      | mA     |
|                                            |                                                     | $I_{TOT\_MAX\_BC1\_BC4}$  |                                                                                                                                                                        | 530                                       |      |        |
| Adjacent Channel Leakage power Ratio       | 1.25 MHz offset                                     | ACLR1                     | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | -50                                       | -47  | dBc    |
|                                            |                                                     |                           | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                            |                                           | -45  |        |
|                                            | 1.98 MHz offset                                     | ACLR2                     | $P_{OUT} = P_{OUT\_MAX}$                                                                                                                                               | -60                                       | -56  |        |
|                                            |                                                     |                           | $P_{OUT} = P_{OUT\_MAX\_ETC}$ , $V_{BATT} = V_{CC} = 3.0\text{ V}$ , $T_{CASE} = T_{RANGE}$                                                                            |                                           | -55  |        |
| Modulation Accuracy                        |                                                     | EVM                       | $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ ,<br>Load = 50 ohms, $T_{CASE} = T_{RANGE}$                                                                                | 2.5                                       | 5.0  | %      |
| Harmonics                                  | Second                                              | $2f_o$                    | $P_{OUT} \leq P_{OUT\_MAX}$ , $MBW = 1\text{ MHz}$                                                                                                                     | -16                                       | -11  | dBm    |
|                                            | Third                                               | $3f_o$                    |                                                                                                                                                                        | -23                                       | -14  |        |
|                                            | Fourth and higher                                   | $4f_o$                    |                                                                                                                                                                        |                                           | -20  |        |
| Noise Power in Rx Band at Duplex Frequency |                                                     |                           |                                                                                                                                                                        |                                           |      | dBm/Hz |
|                                            | BC15 $f_{TX} = 1710\text{ MHz}$ – $1755\text{ MHz}$ | $P_{NOISE\_DPX}$          | $f_{RX} = f_{TX} + 400\text{ MHz}$                                                                                                                                     | -137.0                                    |      |        |
|                                            | BC4 $f_{TX} = 1750\text{ MHz}$ – $1780\text{ MHz}$  |                           | $f_{RX} = f_{TX} + 90\text{ MHz}$                                                                                                                                      | -133.0                                    |      |        |
|                                            | BC1 $f_{TX} = 1850\text{ MHz}$ – $1910\text{ MHz}$  |                           | $f_{RX} = f_{TX} + 80\text{ MHz}$                                                                                                                                      | -133.0                                    |      |        |
|                                            | BC6 $f_{TX} = 1920\text{ MHz}$ – $1980\text{ MHz}$  |                           | $f_{RX} = f_{TX} + 190\text{ MHz}$                                                                                                                                     | -133.5                                    |      |        |
| Input VSWR                                 |                                                     | $VSWR\_IN$                | $P_{OUT} \leq P_{OUT\_MAX}$                                                                                                                                            | 1.3:1                                     | 2:1  |        |
| Stability                                  |                                                     | S                         | Load VSWR = 6:1, all phase angles,<br>$P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 3.0\text{ V}$ to $4.6\text{ V}$ ,<br>$T_{CASE} = T_{RANGE}$                            | All spurious below -36 dBm                |      |        |
| Ruggedness                                 |                                                     | $R_u$                     | Load VSWR = 10:1, all phase angles,<br>$P_{OUT} \leq P_{OUT\_MAX}$ , $V_{BATT} = 4.6\text{ V}$ , $V_{CC} = 4.6\text{ V}$ ,<br>$T_{CASE} = +25\text{ }^{\circ}\text{C}$ | No module damage or permanent degradation |      |        |

<sup>1</sup>  $V_{CC}$  optimized for ACLR1 = -50 dBc.<sup>2</sup>  $I_{TOT} = I_{BATT} + (I_{CC1} + I_{CC2})(V_{CC}/V_{BATT})(1/DC\_DC\_EFF)$ .  $V_{CC} \sim 3.35\text{ V}$ ,  $DC\_DC\_EFF \sim 96\%$ .

**Table 18. SKY77643-61 Electrical Specification – Band Select Switch**

| Parameter       | Symbol   | Conditions                    | Min                                                             | Typ  | Max   | Unit |
|-----------------|----------|-------------------------------|-----------------------------------------------------------------|------|-------|------|
| Frequency Range | $f_{LB}$ |                               | 663                                                             |      | 915   | MHz  |
|                 | $f_{MB}$ |                               | 1710                                                            |      | 1980  |      |
|                 | $f_{HB}$ |                               | 2300                                                            |      | 2690  |      |
| Insertion Loss  | IL       | HB1 to HBRx2                  |                                                                 | 0.70 |       | dB   |
|                 |          | HB2 to HBRx2                  |                                                                 | 0.75 |       |      |
|                 |          | HB3 to HBRx1                  |                                                                 | 0.75 |       |      |
|                 |          | HB4 to HBRx2                  |                                                                 | 0.75 |       |      |
| VSWR            | SWR      | Any RF port tested in Rx mode |                                                                 |      | 1.8:1 |      |
| Isolation       | Tx Mode  | ISO_Tx                        | Tx output at HB1,<br>Isolation to HB2                           | 30   |       | dB   |
|                 |          |                               | Tx output at HB1,<br>Isolation to HB3, HB4, HBRx1               | 35   |       |      |
|                 |          |                               | Tx output at HB1,<br>Isolation to HBRx2                         | 25   |       |      |
|                 |          |                               | Tx output at HB2,<br>Isolation to HB1, HB3, HB4, HBRx1          | 30   |       |      |
|                 |          |                               | Tx output at HB2,<br>Isolation to HBRX2                         | 25   |       |      |
|                 |          |                               | Tx output at HB3,<br>Isolation to HB1, HB2, HB4, HBRx1          | 30   |       |      |
|                 |          |                               | Tx output at HB3,<br>Isolation to HBRX2                         | 28   |       |      |
|                 |          |                               | Tx output at HB4,<br>Isolation to HB2, HB3                      | 35   |       |      |
|                 |          |                               | Tx output at HB4,<br>Isolation to HBRX1                         | 30   |       |      |
|                 |          |                               | Tx output at HB4,<br>Isolation to HB1, HBRx2                    | 27   |       |      |
|                 |          |                               | Tx output at any LB output,<br>Isolation to any other LB output | 35   |       |      |
|                 |          |                               | Tx output at any MB output,<br>Isolation to MB1, MB2, MB3, MB4  | 29   |       |      |
|                 |          |                               | Tx output at any MB output,<br>Isolation to MB5                 | 23   |       |      |
|                 | Rx Mode  | ISO_Rx                        | Rx Path: HB1 to HBRx2<br>Isolation to HB2, HB3, HB4, HBRx1      | 25   |       |      |
|                 |          |                               | Rx Path: HB2 to HBRx2<br>Isolation to HB1, HB3, HB4, HBRx1      | 25   |       |      |
|                 |          |                               | Rx Path: HB3 to HBRx1<br>Isolation to HB1, HB2, HB4, HBRx2      | 25   |       |      |
|                 |          |                               | Rx Path: HB4 to HBRx2<br>Isolation to HB1, HB2, HB3, HBRx1      | 25   |       |      |

**Table 19. SKY77643-61 LTE Maximum Power Reduction (MPR)**

| Modulation | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 5 MHz + 10 MHz  | 10 MHz + 10 MHz  | 5 MHz + 20 MHz  | 10 MHz + 20 MHz  | 15 MHz + 15 MHz  | 15 MHz + 20 MHz  | 20 MHz + 20 MHz  | MPR (dB) |
|------------|---------|---------|-------|--------|--------|--------|-----------------|------------------|-----------------|------------------|------------------|------------------|------------------|----------|
| QPSK       | ≤ 5     | ≤ 4     | ≤ 8   | ≤ 12   | ≤ 16   | ≤ 18   | N/A             | N/A              | N/A             | N/A              | N/A              | N/A              | N/A              | 0        |
| QPSK       | > 5     | > 4     | > 8   | > 12   | > 16   | > 18   | 8 < RB ≤ 25     | 12 < RB ≤ 50     | 8 < RB ≤ 25     | 12 < RB ≤ 50     | 16 < RB ≤ 75     | 16 < RB ≤ 75     | 18 < RB ≤ 100    | ≤ 1      |
| 16QAM      | ≤ 5     | ≤ 4     | ≤ 8   | ≤ 12   | ≤ 16   | ≤ 18   | ≤ 8             | ≤ 12             | ≤ 8             | ≤ 12             | ≤ 16             | ≤ 16             | ≤ 18             | ≤ 1      |
| QPSK       | N/A     | N/A     | N/A   | N/A    | N/A    | N/A    | > 25            | > 50             | > 25            | > 50             | > 75             | > 75             | > 100            | ≤ 2      |
| 16QAM      | > 5     | > 4     | > 8   | > 12   | > 16   | > 18   | 8 < RB ≤ 25     | 12 < RB ≤ 50     | 8 < RB ≤ 25     | 12 < RB ≤ 50     | 16 < RB ≤ 75     | 16 < RB ≤ 75     | 18 < RB ≤ 100    | ≤ 2      |
| 64QAM      | ≤ 5     | ≤ 4     | ≤ 8   | ≤ 12   | ≤ 16   | ≤ 18   | ≤ 8 and one CC  | ≤ 12 and one CC  | ≤ 8 and one CC  | ≤ 12 and one CC  | ≤ 16 and one CC  | ≤ 16 and one CC  | ≤ 18 and one CC  | ≤ 2      |
| 16QAM      | N/A     | N/A     | N/A   | N/A    | N/A    | N/A    | > 25            | > 50             | > 25            | > 50             | > 75             | > 75             | > 100            | ≤ 3      |
| 64QAM      | > 5     | > 4     | > 8   | > 12   | > 16   | > 18   | > 8 or two CC's | > 12 or two CC's | > 8 or two CC's | > 12 or two CC's | > 16 or two CC's | > 16 or two CC's | > 18 or two CC's | ≤ 3      |

**Table 20. SKY77643-61 Power vs. Modulation**

| Band  | WDCMA              |                                |               |            |               |  | LTE                                     |                                                          |                              |  |                                         |                                                          |                              |  |                                         |                                                                                          |      |  |
|-------|--------------------|--------------------------------|---------------|------------|---------------|--|-----------------------------------------|----------------------------------------------------------|------------------------------|--|-----------------------------------------|----------------------------------------------------------|------------------------------|--|-----------------------------------------|------------------------------------------------------------------------------------------|------|--|
|       | 3GPP HS Test Cases |                                |               |            |               |  | 3GPP Test Cases: QPSK                   |                                                          |                              |  | 3GPP Test Cases: 16QAM                  |                                                          |                              |  | 3GPP Test Cases: 64QAM                  |                                                                                          |      |  |
|       | R99                | HSDPA ST 1, 2<br>HSUPA ST 1, 5 | HSDPA ST 3, 4 | HSUPA ST 3 | HSUPA ST 2, 4 |  | 5 MHz 8RB<br>10 MHz 12RB<br>20 MHz 18RB | 5 MHz 25RB<br>10 MHz 50RB<br>15 MHz 75RB<br>20 MHz 100RB | 35 MHz 175RB<br>40 MHz 200RB |  | 5 MHz 8RB<br>10 MHz 12RB<br>20 MHz 18RB | 5 MHz 25RB<br>10 MHz 50RB<br>15 MHz 75RB<br>20 MHz 100RB | 35 MHz 175RB<br>40 MHz 200RB |  | 5 MHz 8RB<br>10 MHz 12RB<br>20 MHz 18RB | 5 MHz 25RB<br>10 MHz 50RB<br>15 MHz 75RB<br>20 MHz 100RB<br>35 MHz 175RB<br>40 MHz 200RB |      |  |
| 1     | 29.5               | 28.5                           | 28.0          | 27.5       | 26.5          |  | 28.5                                    | 27.5                                                     | 26.5                         |  | 27.5                                    | 26.5                                                     | 25.5                         |  | 26.5                                    |                                                                                          | 25.5 |  |
| 2, 25 | 29.5               | 28.5                           | 28.0          | 27.5       | 26.5          |  | 28.5                                    | 27.5                                                     | 26.5                         |  | 27.5                                    | 26.5                                                     | 25.5                         |  | 26.5                                    |                                                                                          | 25.5 |  |
| 3     | 29.5               | 28.5                           | 28.0          | 27.5       | 26.5          |  | 28.5                                    | 27.5                                                     | 26.5                         |  | 27.5                                    | 26.5                                                     | 25.5                         |  | 26.5                                    |                                                                                          | 25.5 |  |
| 4     | 29.5               | 28.5                           | 28.0          | 27.5       | 26.5          |  | 28.5                                    | 27.5                                                     | 26.5                         |  | 27.5                                    | 26.5                                                     | 25.5                         |  | 26.5                                    |                                                                                          | 25.5 |  |
| 5, 26 | 29.0               | 28.0                           | 27.5          | 27.0       | 26.0          |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    | 26.0                                                     | N/A                          |  | 26.0                                    |                                                                                          | 25.0 |  |
| 8     | 29.0               | 28.0                           | 27.5          | 27.0       | 26.0          |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    | 26.0                                                     | N/A                          |  | 26.0                                    |                                                                                          | 25.0 |  |
| 12    |                    |                                |               |            |               |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    | 26.0                                                     | N/A                          |  | 26.0                                    |                                                                                          | 25.0 |  |
| 13    |                    |                                |               |            |               |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    | 26.0                                                     | N/A                          |  | 26.0                                    |                                                                                          | 25.0 |  |
| 17    |                    |                                |               |            |               |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    | 26.0                                                     | N/A                          |  | 26.0                                    |                                                                                          | 25.0 |  |
| 20    |                    |                                |               |            |               |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    | 26.0                                                     | N/A                          |  | 26.0                                    |                                                                                          | 25.0 |  |
| 28    |                    |                                |               |            |               |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    | 26.0                                                     | N/A                          |  | 26.0                                    |                                                                                          | 25.0 |  |
| 71    |                    |                                |               |            |               |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    | 26.0                                                     | N/A                          |  | 26.0                                    |                                                                                          | 25.0 |  |
| 34    |                    |                                |               |            |               |  | 28.5                                    | 27.5                                                     | N/A                          |  | 27.5                                    | 26.5                                                     | N/A                          |  | 26.5                                    |                                                                                          | 25.5 |  |
| 39    |                    |                                |               |            |               |  | 28.5                                    | 27.5                                                     | 26.5                         |  | 27.5                                    | 26.5                                                     | 25.5                         |  | 26.5                                    |                                                                                          | 25.5 |  |
| 38    |                    |                                |               |            |               |  | 29.0                                    | 28.0                                                     | 27.0                         |  | 28.0                                    | 27.0                                                     | 26.0                         |  | 27.0                                    |                                                                                          | 26.0 |  |
| 40    |                    |                                |               |            |               |  | 29.0                                    | 28.0                                                     | 27.0                         |  | 28.0                                    | 27.0                                                     | 26.0                         |  | 27.0                                    |                                                                                          | 26.0 |  |
| 41    |                    |                                |               |            |               |  | 29.0                                    | 28.0                                                     | 27.0                         |  | 28.0                                    | 27.0                                                     | 26.0                         |  | 27.0                                    |                                                                                          | 26.0 |  |
| 7     |                    |                                |               |            |               |  | 29.0                                    | 28.0                                                     | 27.0                         |  | 28.0                                    | 27.0                                                     | 26.0                         |  | 27.0                                    |                                                                                          | 26.0 |  |
| 30    |                    |                                |               |            |               |  | 29.0                                    | 28.0                                                     | N/A                          |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    |                                                                                          | 26.0 |  |
| AXGP  |                    |                                |               |            |               |  | 29.0                                    | 28.0                                                     | N/A                          |  | 28.0                                    | 27.0                                                     | N/A                          |  | 27.0                                    |                                                                                          | 26.0 |  |

## MIPI RFFE Information

**Table 21-1. MIPI RFFE Standard Register Map**

| Register 0, Address 0x00 (PA_CTRL0)          |                             |                 |                             |          |                                                                    |                                          |
|----------------------------------------------|-----------------------------|-----------------|-----------------------------|----------|--------------------------------------------------------------------|------------------------------------------|
| Register 0                                   | Description                 | Trigger Support | R/W                         | Default  | Notes                                                              |                                          |
| [7]                                          | Spare                       | Trigger0        | R/W                         | 0        |                                                                    |                                          |
| [6:3]                                        | PA Band Select Control Mode |                 | R/W                         | 0000     | Control Mode                                                       |                                          |
|                                              |                             |                 | 0000 = PA's Disabled        |          |                                                                    |                                          |
|                                              |                             |                 | 0001 = LB1_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 0010 = LB2_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 0011 = LB3_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 0100 = LB4_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 0101 = LB5_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 0110 = MB1_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 0111 = MB2_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 1000 = MB3_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 1001 = MB4_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 1010 = MB5_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 1011 = HB1_TX               |          |                                                                    |                                          |
|                                              |                             |                 | 1100 = HB2_TX               |          |                                                                    |                                          |
| 1101 = HB3_TX                                |                             |                 |                             |          |                                                                    |                                          |
| 1110 = HB4_TX                                |                             |                 |                             |          |                                                                    |                                          |
| 1111 = PA's Disabled (High switch isolation) |                             |                 |                             |          |                                                                    |                                          |
| [2:1]                                        | PA Mode                     |                 | R/W                         | 0        | 00 = PA Off                                                        |                                          |
|                                              |                             |                 |                             |          | 01 = HPUE                                                          |                                          |
|                                              |                             |                 |                             |          | 10 = HPM                                                           |                                          |
|                                              |                             |                 |                             |          | 11 = LPM                                                           |                                          |
| [0]                                          | LB Input Switch             |                 | R/W                         | 0        | LB input                                                           | 1 = RFIN_VL                              |
|                                              |                             |                 |                             |          |                                                                    | 0 = RFIN_L (default for MB/HB operation) |
| Register 1, Address 0x01 (BIAS_CTRL1)        |                             |                 |                             |          |                                                                    |                                          |
| Register 1                                   | Description                 | Trigger Support | R/W                         | Default  | Notes                                                              |                                          |
| [7:0]                                        | Primary PA Bias             | Trigger0        | R/W                         | 00000000 | See Lookup Table for appropriate bias words for each band and mode |                                          |
| Register 2, Address 0x02 (HB_Switch_RX_CTRL) |                             |                 |                             |          |                                                                    |                                          |
| Register 2                                   | Description                 | Trigger Support | R/W                         | Default  | Notes                                                              |                                          |
| [7:4]                                        | Spare                       | Trigger0        | R/W                         | 0000     | Spare                                                              |                                          |
| [3:0]                                        | HB_Switch_RX_CTRL           |                 | R/W                         | 0000     | Control Mode                                                       |                                          |
|                                              |                             |                 | 0000 = Switch Off (Standby) |          |                                                                    |                                          |
|                                              |                             |                 | 0001 = HB1 → HBRX2          |          |                                                                    |                                          |
|                                              |                             |                 | 0010 = HB2 → HBRX2          |          |                                                                    |                                          |
|                                              |                             |                 | 0011 = HB3 → HBRX1          |          |                                                                    |                                          |
|                                              |                             |                 | 0100 = HB4 → HBRX2          |          |                                                                    |                                          |
| Other States = High Isolation                |                             |                 |                             |          |                                                                    |                                          |
| Register 3, Address 0x03 (BIAS_CTRL3)        |                             |                 |                             |          |                                                                    |                                          |
| Register 3                                   | Description                 | Trigger Support | R/W                         | Default  | Notes                                                              |                                          |
| [7]                                          | Bias Mode                   | Trigger0        | R/W                         | 0        | 0 = Limited Bias                                                   |                                          |
|                                              |                             |                 |                             |          | 1 = Standard Bias                                                  |                                          |
| [6:4]                                        | Temperature Compensation    |                 | R/W                         | 000      | Bias Temperature Compensation                                      |                                          |
| [3:0]                                        | Secondary PA Bias           |                 | R/W                         | 0000     | Secondary PA Bias Adjustment                                       |                                          |

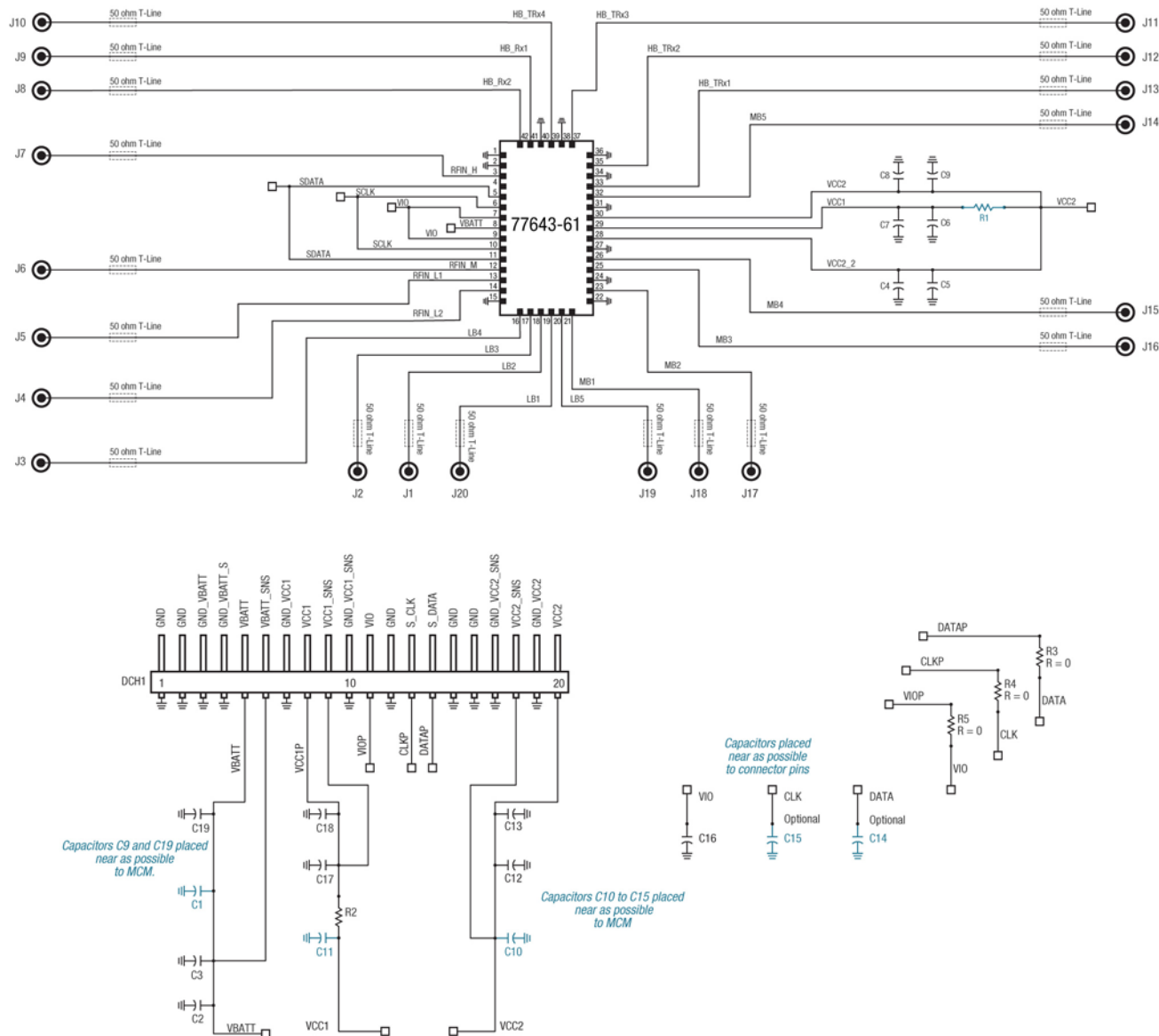
**Table 21-2. MIPI RFFE Standard Register Map**

| Register 28, Address 0x1C (PM_TRIG)        |                      |                 |     |          |                                                                   |                                             |
|--------------------------------------------|----------------------|-----------------|-----|----------|-------------------------------------------------------------------|---------------------------------------------|
| Register 28                                | Description          | Trigger Support | R/W | Default  | Notes                                                             |                                             |
| [7:6]                                      | PWR_MODE[1:0]        | No              | R/W | 10       | 00 = Normal Operation (ACTIVE)<br>01 = Default Settings (STARTUP) | 10 = Low Power (LOW POWER)<br>11 = Reserved |
| [5]                                        | TRIGGER_MASK_2       |                 |     | 0        | 0 = Trigger Enable                                                | 1 = Trigger Disable                         |
| [4]                                        | TRIGGER_MASK_1       |                 |     | 0        | 0 = Trigger Enable                                                | 1 = Trigger Disable                         |
| [3]                                        | TRIGGER_MASK_0       |                 |     | 0        | 0 = Trigger Enable                                                | 1 = Trigger Disable                         |
| [2]                                        | TRIGGER_2            |                 |     | 0        | 1 = Load Trigger 2 registers                                      |                                             |
| [1]                                        | TRIGGER_1            |                 |     | 0        | 1 = Load Trigger 1 registers                                      |                                             |
| [0]                                        | TRIGGER_0            |                 |     | 0        | 1 = Load Trigger 0 registers                                      |                                             |
| Register 29, Address 0x1D (PROD_ID)        |                      |                 |     |          |                                                                   |                                             |
| Register 29                                | Description          | Trigger Support | R/W | Default  | Notes                                                             |                                             |
| [7:0]                                      | Product ID           | No              | R   | 00101101 | Product ID = 0x2D                                                 |                                             |
| Register 30, Address 0x1E (MAN_ID)         |                      |                 |     |          |                                                                   |                                             |
| Register 30                                | Description          | Trigger Support | R/W | Default  | Notes                                                             |                                             |
| [7:0]                                      | Manufacturer ID      | No              | R   | 10100101 | Manufacturer ID = 0xA5                                            |                                             |
| Register 31, Address 0x01F (USID)          |                      |                 |     |          |                                                                   |                                             |
| Register 31                                | Description          | Trigger Support | R/W | Default  | Notes                                                             |                                             |
| [7:6]                                      | Reserved             | No              | R   | 00       |                                                                   |                                             |
| [5:4]                                      | MANUFACTURER_ID[9:8] |                 | R   | 01       |                                                                   |                                             |
| [3:0]                                      | USID                 |                 | R/W | 1111     | USID = 0xF                                                        |                                             |
| Register 32, Address 0x20 (EXT_PRODUCT_ID) |                      |                 |     |          |                                                                   |                                             |
| Register 32                                | Description          | Trigger Support | R/W | Default  | Notes                                                             |                                             |
| [7:0]                                      | EXT_PRODUCT_ID       | No              | R   | 00000000 | Extended Product ID = 0X00                                        |                                             |
| Register 33, Address 0x021 (REVISION_ID)   |                      |                 |     |          |                                                                   |                                             |
| Register 33                                | Description          | Trigger Support | R/W | Default  | Notes                                                             |                                             |
| [7:6]                                      | MAJOR REV            | No              | R   | 00       |                                                                   |                                             |
| [5:4]                                      | MINOR REV            |                 | R   | 00       |                                                                   |                                             |
| [3:0]                                      | MISC VARIANTS        |                 | R   | 0000     |                                                                   |                                             |
| Register 34, Address 0x22 (GROUP_SID)      |                      |                 |     |          |                                                                   |                                             |
| Register 34                                | Description          | Trigger Support | R/W | Default  | Notes                                                             |                                             |
| [7:4]                                      | Group SID            | No              | R/W | 0000     | Group Slave ID                                                    |                                             |
| [3:0]                                      | Reserved             |                 | R/W | 0000     | Reserved                                                          |                                             |
| Register 35, Address 0x23 (SW_RST)         |                      |                 |     |          |                                                                   |                                             |
| Register 35                                | Description          | Trigger Support | R/W | Default  | Notes                                                             |                                             |
| [7]                                        | SOFTWARE RESET       | No              | R/W | 0        |                                                                   |                                             |
| [6:0]                                      | Reserved             |                 | R   | 00000000 |                                                                   |                                             |

## Evaluation Board Description

The evaluation board is a platform for testing and interfacing design circuitry. To accommodate the interface testing of the SKY77643-61, the evaluation board schematic and assembly

diagrams are included for preliminary analysis and design. The basic EVB schematic is shown in Figure 2 and the assembly diagram in Figure 3. Table 22 is the Bill of Material list.



### NOTES:

1. DEVICE PINS 4, 9, 10, AND 11 ARE NC (NOT CONNECTED)
2. HIGHLIGHTED COMPONENTS ARE DNP (DO NOT PLACE).
3. SEE TABLE 22, BILL OF MATERIAL, FOR COMPONENT VALUES.
4. UNLESS OTHERWISE SPECIFIED: ALL DISCRETE COMPONENTS ARE 0402.

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**Figure 2. SKY77643-61 Evaluation Board Schematic Diagram**

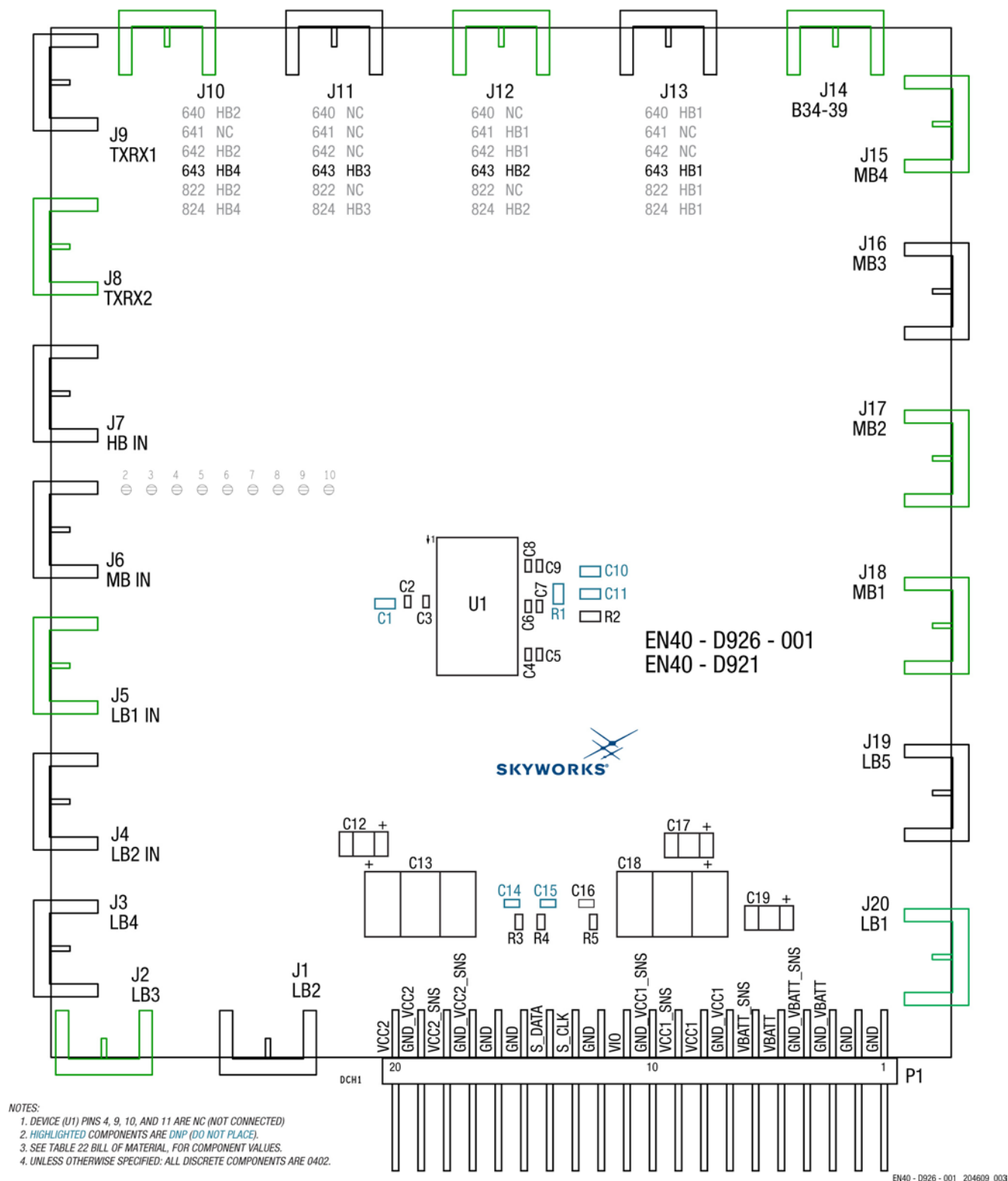


Figure 3. SKY77643-61 Evaluation Board Assembly Diagram



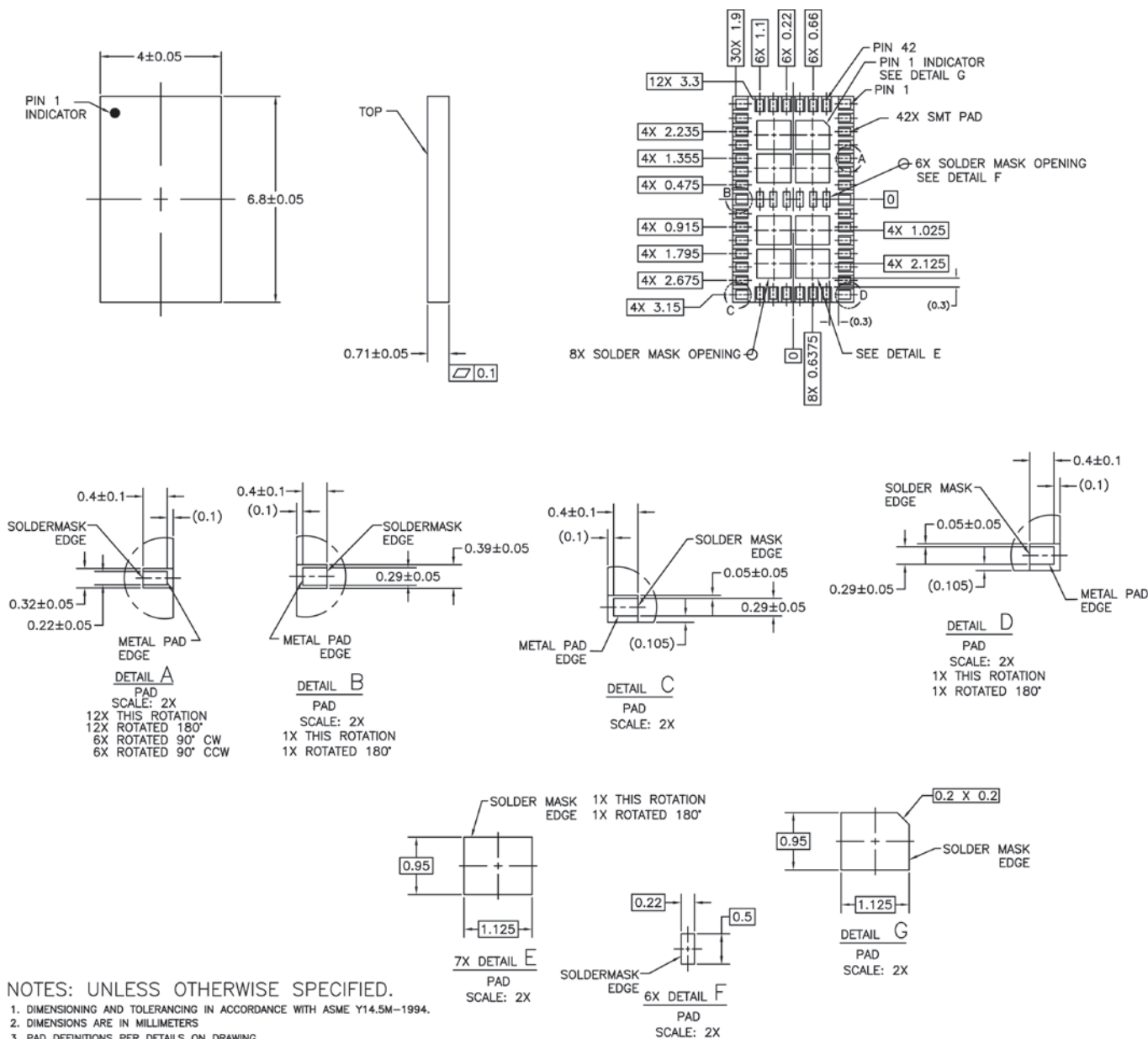
**Table 22. SKY77643-61 Evaluation Board Bill of Material**

| ITEM | QTY | REFERENCE DESIGNATORS                                                                     | PART DESCRIPTION                                       |
|------|-----|-------------------------------------------------------------------------------------------|--------------------------------------------------------|
| 1    | 1   | P1                                                                                        | CONNECTOR, 20 PINPOST LENGTH = 0.53 »                  |
| 2    | 20  | J1, J2, J3, J4, J5, J6, J7, J8, J9, J10, J11, J12, J13, J14, J15, J16, J17, J18, J19, J20 | CONN SMA END LAUNCH JACK TAB CONTACT GOLD .062         |
| 3    | 3   | C12, C17, C19                                                                             | CAPACITOR TANTALUM MOLDED 10 µF, 16 V, ±10%, 1206      |
| 4    | 2   | C13, C18                                                                                  | CAPACITOR 220 µF, TANT, LOW ESR, CASE D, AVX           |
| 5    | 4   | C3, C5, C7, C9                                                                            | CAPACITOR, CERAMIC, 0.1 µF, 10%, X5R, 10 V, 0201 (RSI) |
| 6    | 4   | C2, C4, C6, C8                                                                            | CAPACITOR, CERAMIC, 100 pF, 10%, X7R, 16 V, 0201 (RSI) |
| 7    | 1   | C16,                                                                                      | CAPACITOR, CERAMIC, 270 pF, 10%, X7R, 50 V, 0402       |
| 8    | 4   | R2, R3, R4, R5                                                                            | RESISTOR, 0 OHM, JUMPER, 0.063 W, 0402                 |
| 9    | 7   | C1, C10, C11, C14, C15, R1                                                                | DNP (Do Not Place)                                     |

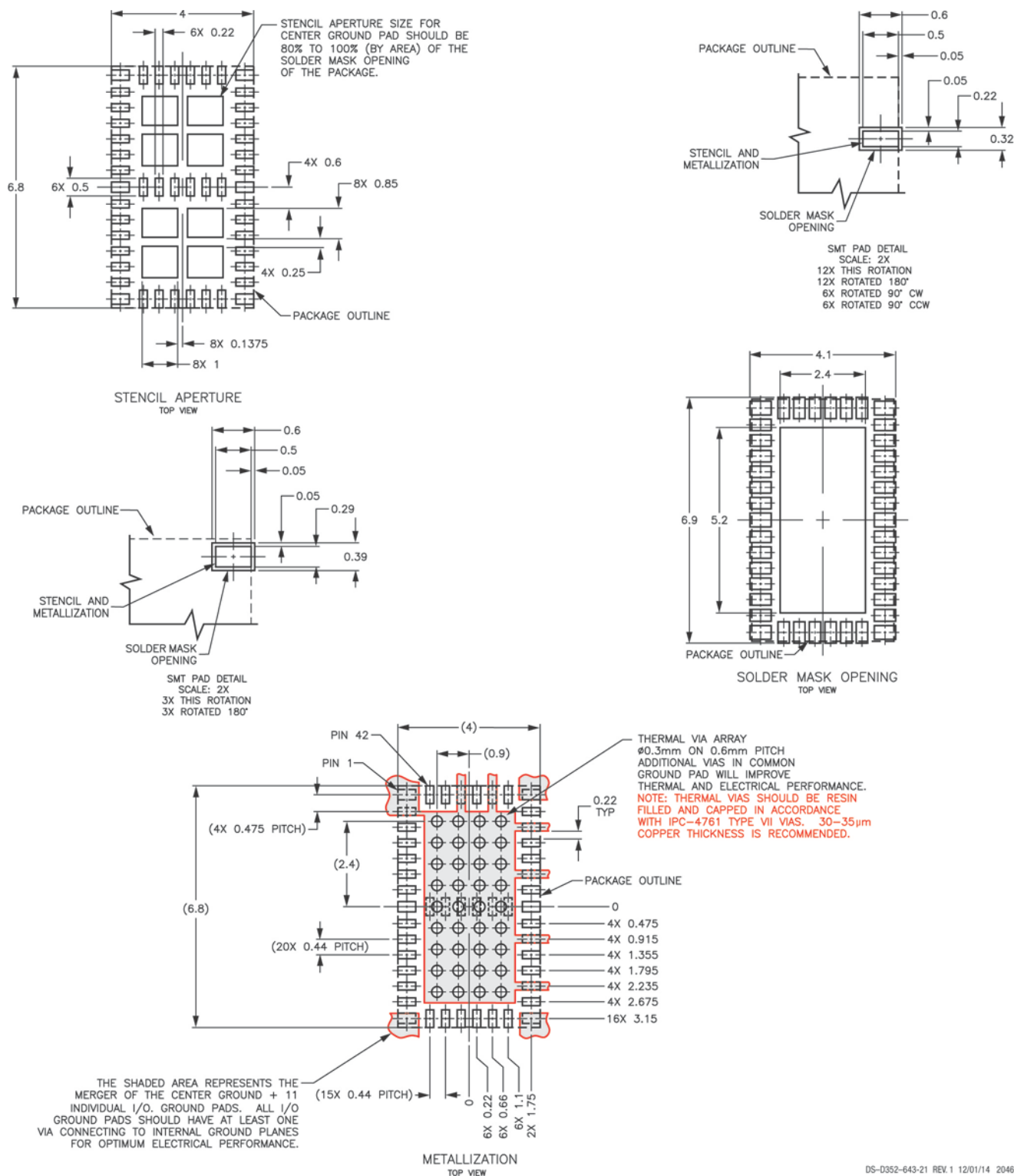
## Package Dimensions

Figure 4 is a mechanical drawing of the pad layout for the SKY77643-61, a 42-pad leadless quad-band power amplifier module. Figure 5 provides a recommended PC board layout

footprint of the module to help the designer attain optimum thermal conductivity, good grounding, and minimum RF discontinuity for the 50-ohm terminals.



**Figure 4. Dimensional Diagram for 4.0 mm x 6.8 mm x 0.71 mm, 42-Pad MCM Package – SKY77643-61**

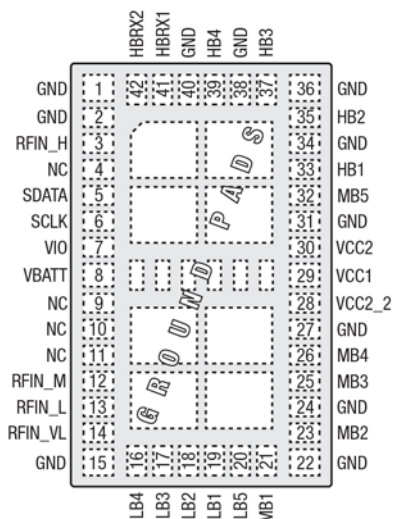


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**Figure 5. PCB Layout Footprint for 4.0 mm x 6.8 mm, 42-Pad Package – SKY77643-61**

## Package Description

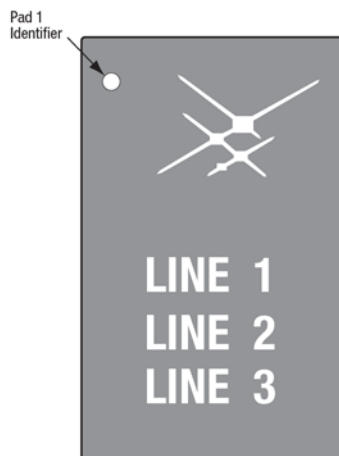
Figure 6 shows the device pad configuration and the pad numbering convention, which starts with pad 1 in the upper left corner and increments counter-clockwise around the package. Table 23 lists the pad names and signal descriptions. Figure 7 shows typical case markings for the SKY77643-61.



Pad layout as seen from Top View looking through package.  
GROUND PAD is package underside

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**Figure 6. SKY77643-61 Pad Configuration – 42-Pad MCM (Top View)**



NOTE: Lines 1, 2, 3 have a maximum of 12 characters  
Line 1 = Part Number and Version  
Line 2 = Lot Number  
Line 3 = Year-Week-Country Code (MX)

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**Figure 7. Typical Case Markings (Top View)**

**Table 23. SKY77643-61 Pad Names and Signal Descriptions**

| Pad No. | Name    | Description                                                 |
|---------|---------|-------------------------------------------------------------|
| 3       | RFIN_H  | High Band (HB) Input                                        |
| 4       | NC      | Not Used (float or connect to GND)                          |
| 5       | SDATA   | MIPI Data Bus                                               |
| 6       | SCLK    | MIPI Clock Bus                                              |
| 7       | VIO     | MIPI Supply                                                 |
| 8       | VBATT   | Battery Supply                                              |
| 9       | NC      | Not Used (float or connect to GND)                          |
| 10      | NC      | Not Used (float or connect to GND)                          |
| 11      | NC      | Not Used (float or connect to GND)                          |
| 12      | RFIN_M  | Mid Band (MB) Input                                         |
| 13      | RFIN_L  | Low Band (LB) Input                                         |
| 14      | RFIN_VL | Alternate Low Band (LB) input for Bands 12, 17, 13, 28, 71  |
| 16      | LB4     | Low Band (LB) 4 RF OUT                                      |
| 17      | LB3     | Low Band (LB) 3 RF OUT                                      |
| 18      | LB2     | Low Band (LB) 2 RF OUT                                      |
| 19      | LB1     | Low Band (LB) 1 RF OUT                                      |
| 20      | LB5     | Low Band (LB) 5 RF OUT                                      |
| 21      | MB1     | Mid Band (MB) 1 RF OUT                                      |
| 23      | MB2     | Mid Band (MB) 2 RF OUT                                      |
| 25      | MB3     | Mid Band (MB) 3 RF OUT                                      |
| 26      | MB4     | Mid Band (MB) 4 RF OUT                                      |
| 28      | VCC2_2  | Mid/Low Band 2 <sup>nd</sup> Stage PA Collector Supply      |
| 29      | VCC1    | High/Mid/Low Band 1 <sup>st</sup> Stage PA Collector Supply |
| 30      | VCC2    | High Band 2 <sup>nd</sup> Stage PA Collector Supply         |
| 32      | MB5     | Mid Band (MB) 5 RF OUT                                      |
| 33      | HB1     | High Band 1 RF OUT                                          |
| 35      | HB2     | High Band 2 RF OUT                                          |
| 37      | HB3     | High Band 3 RF OUT                                          |
| 39      | HB4     | High Band 4 RF OUT                                          |
| 41      | HBRX1   | High Band 3 RX OUT                                          |
| 42      | HBRX2   | High Bands 1, 2, 4 RX OUT                                   |

<sup>1</sup> Pads 1, 2, 15, 22, 24, 27, 31, 34, 36, 38, and 40 are GROUND pads.

## Package Handling Information

Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SKY77643-61 is rated to Moisture Sensitivity Level 3 (MSL3) at 260 °C. It can be used for lead or lead-free soldering. For additional information, refer to Skyworks Application Note, *PCB Design and SMT Assembly/Rework Guidelines for MCM-L Packages*, Document Number 101752.

Care must be taken when attaching this product, whether done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format (Figure 8).

## Electrostatic Discharge (ESD) Sensitivity

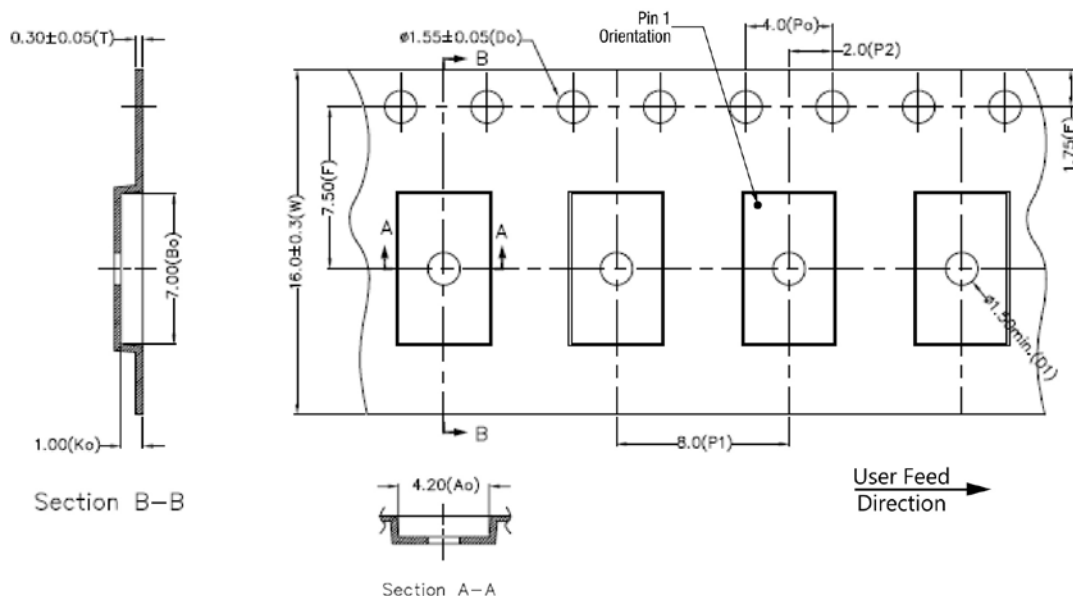


**Attention: Observe Precautions for Handling Electrostatic Sensitive Devices**  
 Electrostatic Discharge (ESD) can damage this device, which must be protected from ESD at all times. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

The SKY77643-61 is a static-sensitive electronic device. Do not operate or store near strong electrostatic fields. Take proper ESD precautions.

To avoid ESD damage, both latent and visible, it is very important that the product assembly and test areas follow the ESD handling precautions listed below.

- Personnel Grounding
  - Wrist Straps
  - Conductive Smocks, Gloves and Finger Cots
  - Antistatic ID Badges
- Protective Workstation
  - Dissipative Table Top
  - Protective Test Equipment (Properly Grounded)
  - Grounded Tip Soldering Irons
  - Solder Conductive Suckers
  - Static Sensors
- Facility
  - Relative Humidity Control and Air Ionizers
  - Dissipative Floors (less than 1,000 MΩ to GND)
- Protective Packaging and Transportation
  - Bags and Pouches (Faraday Shield)
  - Protective Tote Boxes (Conductive Static Shielding)
  - Protective Trays
  - Grounded Carts
  - Protective Work Order Holders



### NOTES:

1. MATERIAL: CONDUCTIVE POLYSTYRENE.
2. Po/P1 10 PITCHES CUMULATIVE TOLERANCE ON TAPE: ±0.20 mm.
3. Ao & Bo MEASUREMENT POINT TO BE 0.3 mm FROM BOTTOM POCKET.
4. ALLOWABLE CAMBER TO BE 1/100 mm, NON-CUMULATIVE OVER 250 mm.
5. SURFACE RESISTIVITY 10<sup>4</sup> TO 10<sup>11</sup> OHMS/SQ.

BODY SIZE 4.0 x 6.8 mm -164A

**Figure 8. Carrier Tape Dimensional Diagram for Body Size 4.0 mm x 6.8 mm x 0.85–1.05 mm – Overmold MCM**

## Ordering Information

| Product Name                                                    | Order Number | Evaluation Board Part Number |
|-----------------------------------------------------------------|--------------|------------------------------|
| SKY77643-61 SkyLITE™ Multimode Multiband Power Amplifier Module | SKY77643-61  | EN40-D926-001                |

## Revision History

| Revision | Date         | Description                                        |
|----------|--------------|----------------------------------------------------|
| A        | May 12, 2017 | Initial Release – Preliminary Information CN 14259 |

## References

Skyworks Application Note: *PCB Design and SMT Assembly/Rework*, Document Number 101752

Electrostatic Discharge Sensitivity (ESD) Testing: *JEDEC Standard, JESD22-A114 Human Body Model (HBM)*

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