



## UTM6016

Power MOSFET

### 8.0A, 60V N-CHANNEL FAST SWITCHING MOSFET

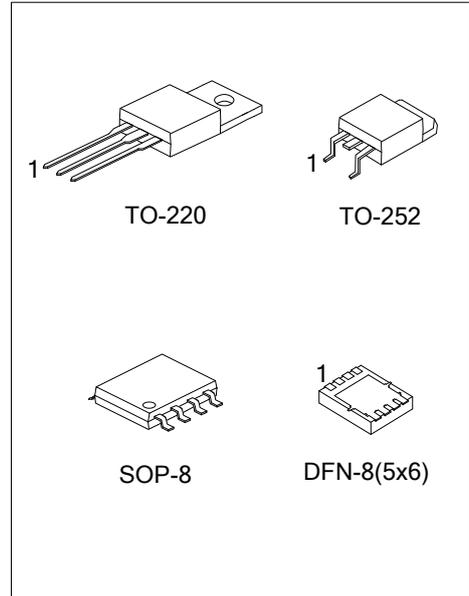
#### DESCRIPTION

The UTC **UTM6016** is an N-Channel MOSFET, it uses UTC's advanced technology to provide customers with a minimum on-state resistance, high switching speed and low gate charge.

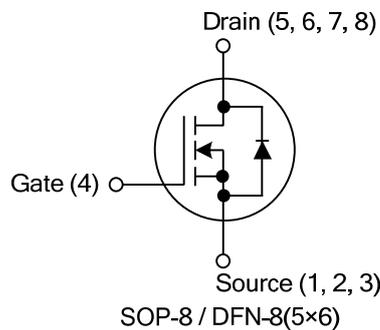
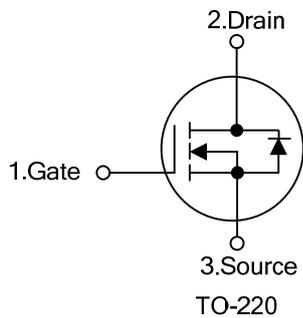
The UTC **UTM6016** is suitable for application in networking DC-DC power system and LCD/LED back light, etc.

#### FEATURES

- \*  $R_{DS(ON)} < 12\text{ m}\Omega$  @  $V_{GS} = 10\text{V}$ ,  $I_D = 8\text{A}$
- \*  $R_{DS(ON)} < 15\text{ m}\Omega$  @  $V_{GS} = 4.5\text{V}$ ,  $I_D = 6\text{A}$
- \* Low gate charge
- \* Excellent  $CdV/dt$  effect decline
- \* High switching speed



#### SYMBOL



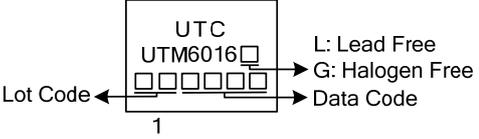
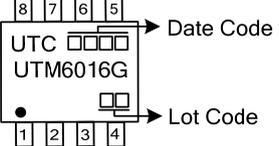
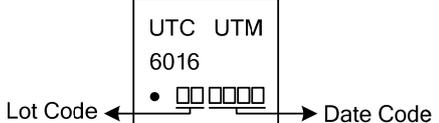
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTM6016L-TA3-T	UTM6016G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTM6016L-TN3-R	UTM6016G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
-	UTM6016G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
-	UTM6016G-K08-5060-R	DFN-8(5x6)	S	S	S	G	D	D	D	D	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>UTM6016L-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TN3: TO-252, S08: SOP-8, K08-5060: DFN-8(5x6)</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING

Package	Marking
TO-220 / TO-252	 <p>UTC UTM6016 1</p> <p>Lot Code ← → Data Code</p> <p>L: Lead Free G: Halogen Free</p>
SOP-8	 <p>8 7 6 5 → Date Code</p> <p>UTC UTM6016G</p> <p>← Lot Code</p> <p>1 2 3 4</p>
DFN-8(5×6)	 <p>UTC UTM 6016</p> <p>Lot Code ← → Date Code</p>

■ ABSOLUTE MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	60	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	Continuous	$I_D$	8.0	A
	Pulsed (Note 2)	$I_{DM}$	32	A
Avalanche Current (Note 2)		$I_{AR}$	23	A
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	26	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.6	V/ns
Power Dissipation (Note 4)	TO-220	$P_D$	28	W
	TO-252		40	W
	SOP-8		5.2	W
	DFN-8(5x6)		10.4	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3.  $L=0.1\text{mH}$ ,  $I_{AS}=23\text{A}$ ,  $V_{DD}=25\text{V}$ ,  $R_G=25\ \Omega$ , Starting  $T_J = 25^\circ\text{C}$

4.  $I_{SD}\leq 8.0\text{A}$ ,  $di/dt\leq 200\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

5. The power dissipation is limited by  $150^\circ\text{C}$  junction temperature.

■ THERMAL CHARACTERISTICS (Note 1)

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
	TO-252		110	
	SOP-8/DFN-8(5x6)		50	
Junction to Case	TO-220	$\theta_{JC}$	4.38	$^\circ\text{C}/\text{W}$
	TO-252		3.13	
	SOP-8		24	
	DFN-8(5x6)		12	

Notes: 1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

2. The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .

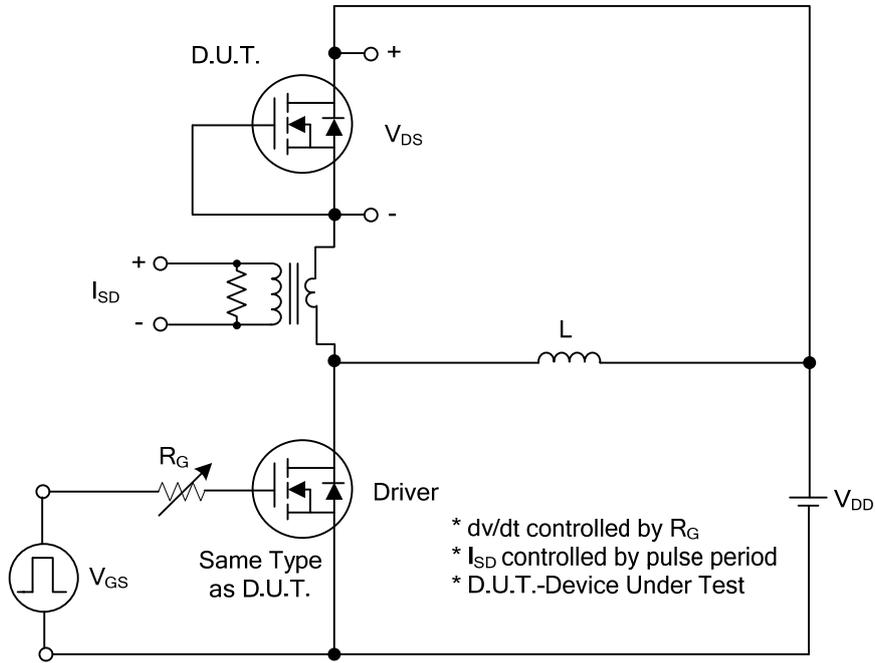
■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	60			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =48V, V <sub>GS</sub> =0V			1	μA
Gate-Source Leakage Current	Forward	V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V			+100	nA
	Reverse		V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V			-100
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2		2.5	V
Static Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =8A			12	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A			15	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =8A		45		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz		2880		pF
Output Capacitance	C <sub>OSS</sub>			208		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			167		pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge (Note 1)	Q <sub>G</sub>	V <sub>DS</sub> =50V, I <sub>D</sub> =1.3A, V <sub>GS</sub> =10V I <sub>G</sub> =100μA		160		nC
Gate to Source Charge	Q <sub>GS</sub>			9.0		nC
Gate to Drain Charge	Q <sub>GD</sub>			21		nC
Turn-ON Delay Time (Note 1)	t <sub>D(ON)</sub>	V <sub>DD</sub> =30V, I <sub>D</sub> =0.5A, R <sub>G</sub> =25Ω, V <sub>GS</sub> =0V		90		ns
Rise Time	t <sub>R</sub>			106		ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			938		ns
Fall-Time	t <sub>F</sub>			285		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	I <sub>S</sub>				8	A
Maximum Body-Diode Pulsed Current	I <sub>SM</sub>				32	A
Drain-Source Diode Forward Voltage (Note 1)	V <sub>SD</sub>	I <sub>S</sub> =8.0A, V <sub>GS</sub> =0V			1.2	V
Body Diode Reverse Recovery Time (Note 1)	t <sub>rr</sub>	I <sub>S</sub> =8.0A, V <sub>GS</sub> =0V,		210		nS
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	dI <sub>F</sub> /dt=100A/μs		430		nC

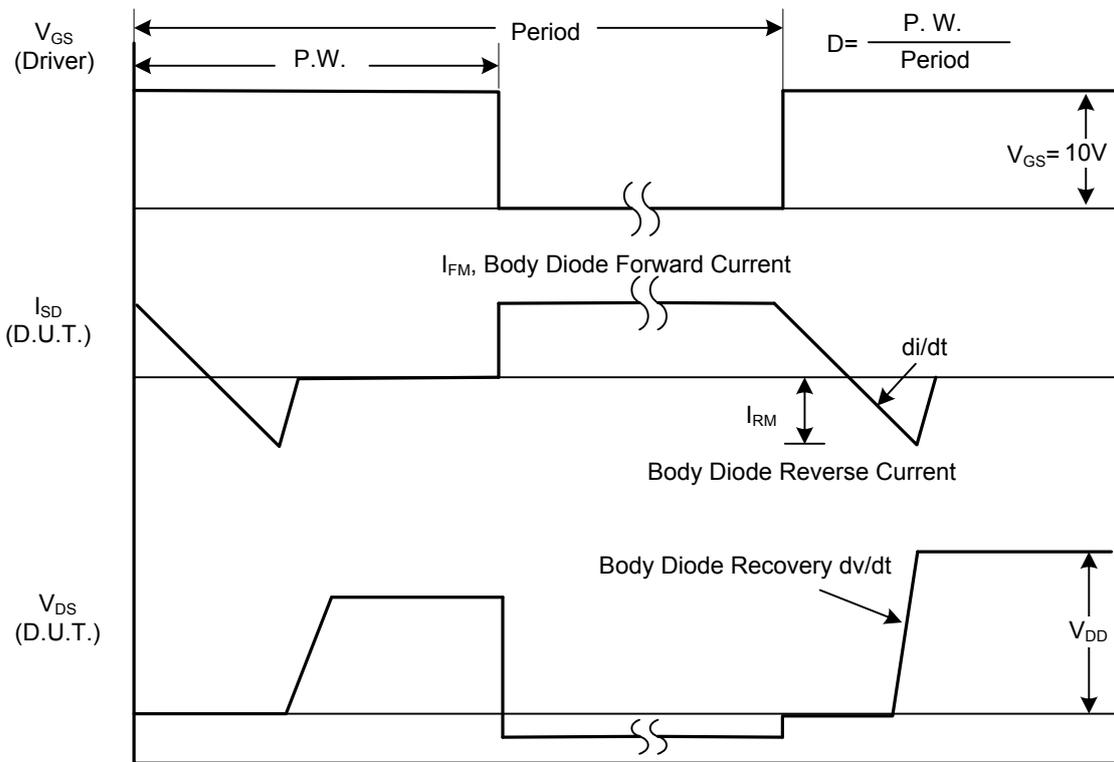
Notes: 1. The data tested by pulsed, pulse width≤300μs, duty cycles≤2%.

2. The power dissipation is limited by 150°C junction temperature.

■ TEST CIRCUITS AND WAVEFORMS

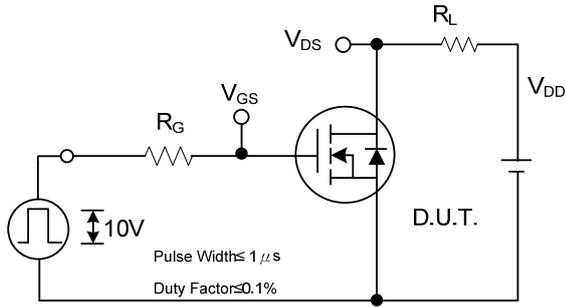


Peak Diode Recovery dv/dt Test Circuit

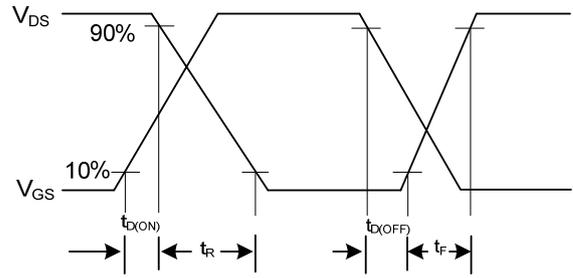


Peak Diode Recovery dv/dt Waveforms

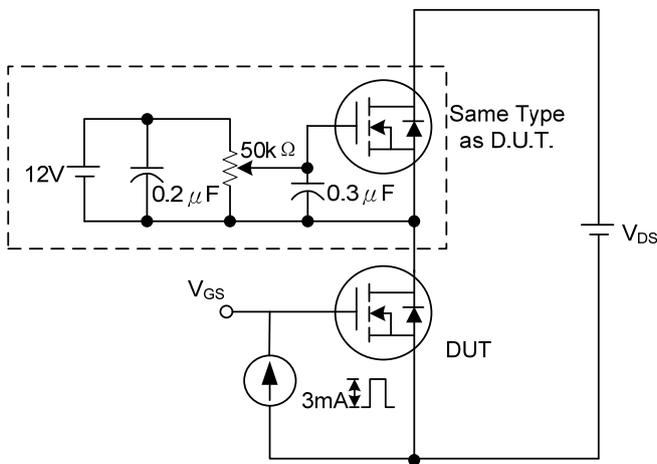
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



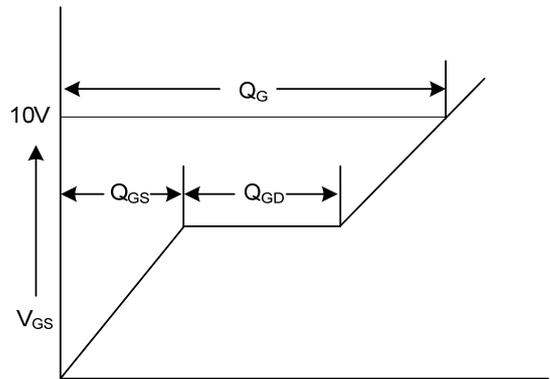
Switching Test Circuit



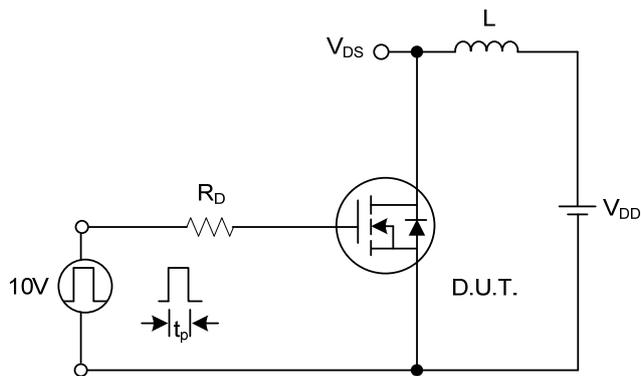
Switching Waveforms



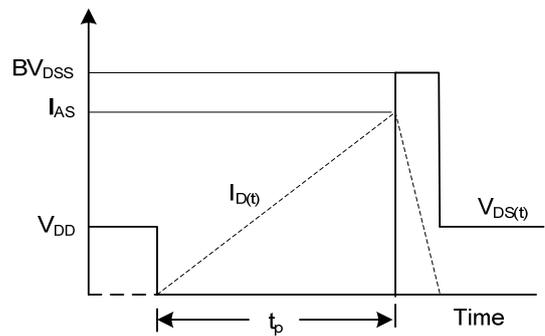
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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