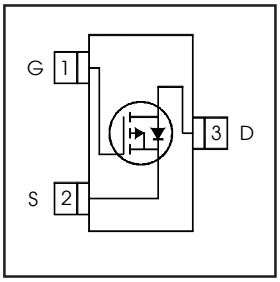
International
IOR Rectifier

IRLML5203PbF

- Ultra Low On-Resistance
- P-Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- Low Gate Charge
- Lead-Free
- RoHS Compliant, Halogen-Free

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max (mΩ)	I_D
-30V	98@V_{GS} = -10V	-3.0A
	165@V_{GS} = -4.5V	-2.6A



Description

These P-channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve the extremely low on-resistance per silicon area. This benefit provides the designer with an extremely efficient device for use in battery and load management applications.

A thermally enhanced large pad leadframe has been incorporated into the standard SOT-23 package to produce a HEXFET Power MOSFET with the industry's smallest footprint. This package, dubbed the Micro3™, is ideal for applications where printed circuit board space is at a premium. The low profile (<1.1mm) of the Micro3 allows it to fit easily into extremely thin application environments such as portable electronics and PCMCIA cards. The thermal resistance and power dissipation are the best available.

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRLML5203TRPbF	Micro3™ (SOT-23)	Tape and Reel	3000	IRLML5203TRPbF

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain- Source Voltage	-30	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ -10V	-3.0	A
I_D @ T_A= 70°C	Continuous Drain Current, V_{GS} @ -10V	-2.4	
I_{DM}	Pulsed Drain Current ①	-24	
P_D @T_A = 25°C	Power Dissipation	1.25	W
P_D @T_A = 70°C	Power Dissipation	0.80	
	Linear Derating Factor	10	mW/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

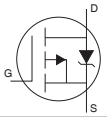
	Parameter	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient③	100	°C/W

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	-30	–––	–––	V	V_{GS} = 0V, I_D = -250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	–––	0.019	–––	V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	–––	–––	98	mΩ	V_{GS} = -10V, I_D = -3.0A ②
		–––	–––	165		V_{GS} = -4.5V, I_D = -2.6A ②
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	–––	-2.5	V	V_{DS} = V_{GS}, I_D = -250µA
g_{fs}	Forward Transconductance	3.1	–––	–––	S	V_{DS} = -10V, I_D = -3.0A
I_{DSS}	Drain-to-Source Leakage Current	–––	–––	-1.0	µA	V_{DS} = -24V, V_{GS} = 0V
		–––	–––	-5.0		V_{DS} = -24V, V_{GS} = 0V, T_J = 70°C
I_{GSS}	Gate-to-Source Forward Leakage	–––	–––	-100	nA	V_{GS} = -20V
	Gate-to-Source Reverse Leakage	–––	–––	100		V_{GS} = 20V
Q_g	Total Gate Charge	–––	9.5	14	nC	I_D = -3.0A
Q_{gs}	Gate-to-Source Charge	–––	2.3	3.5		V_{DS} = -24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	–––	1.6	2.4		V_{GS} = -10V ②
$t_{d(on)}$	Turn-On Delay Time	–––	12	–––	ns	V_{DD} = -15V ②
t_r	Rise Time	–––	18	–––		I_D = -1.0A
$t_{d(off)}$	Turn-Off Delay Time	–––	88	–––		R_G = 6.0Ω
t_f	Fall Time	–––	52	–––		V_{GS} = -10V
C_{iss}	Input Capacitance	–––	510	–––	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	–––	71	–––		V_{DS} = -25V
C_{rss}	Reverse Transfer Capacitance	–––	43	–––		f = 1.0MHz

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	–––	–––	-1.3	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	–––	–––	-24		
V_{SD}	Diode Forward Voltage	–––	–––	-1.2	V	T_J = 25°C, I_S = -1.3A, V_{GS} = 0V ②
t_{rr}	Reverse Recovery Time	–––	17	26	ns	T_J = 25°C, I_F = -1.3A
Q_{rr}	Reverse Recovery Charge	–––	12	18	nC	di/dt = -100A/µs ②



Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Pulse width ≤ 400µs; duty cycle ≤ 2%.

③ Surface mounted on FR-4 board, t ≤ 5sec.

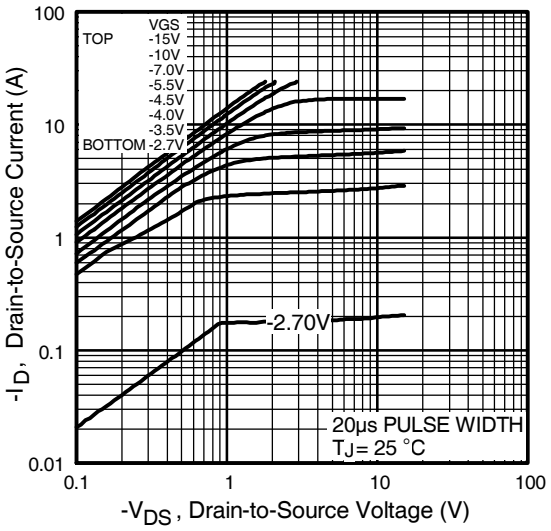


Fig 1. Typical Output Characteristics

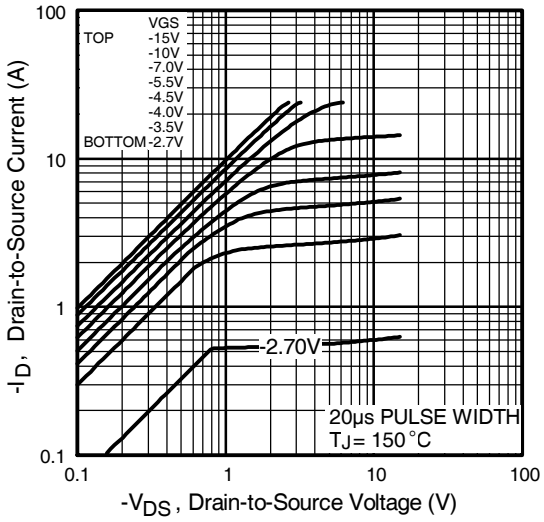


Fig 2. Typical Output Characteristics

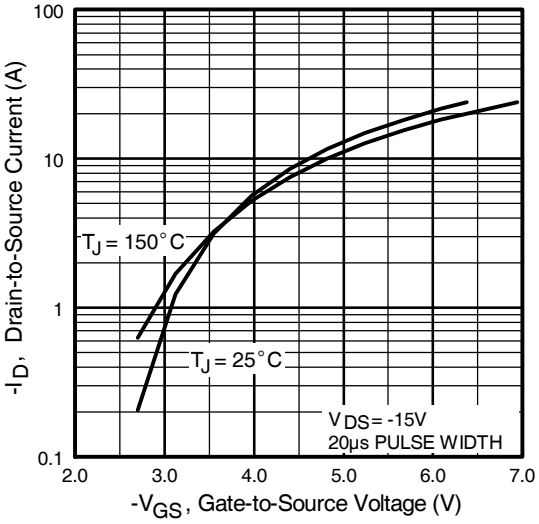


Fig 3. Typical Transfer Characteristics

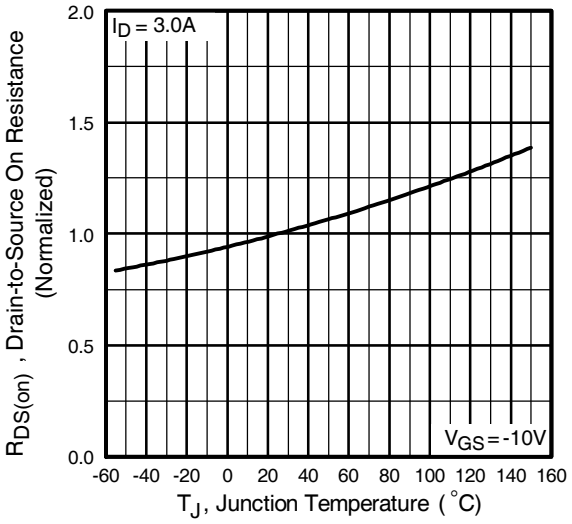


Fig 4. Normalized On-Resistance Vs. Temperature

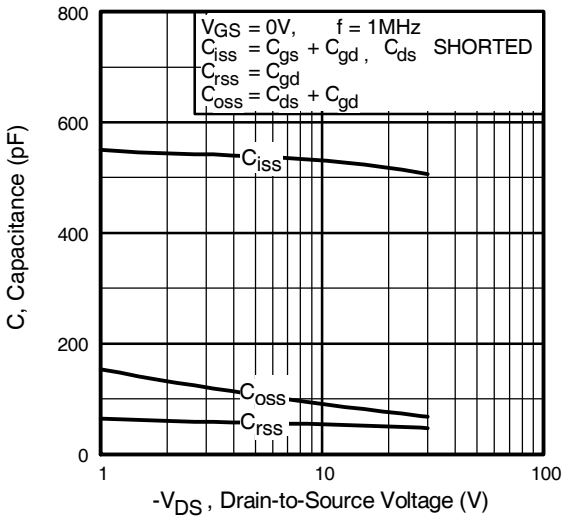


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

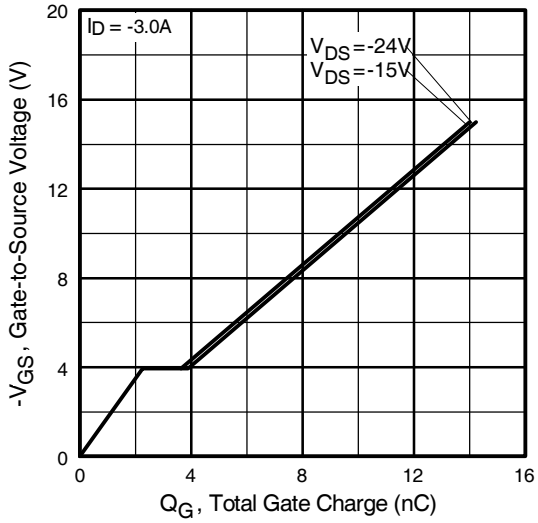


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

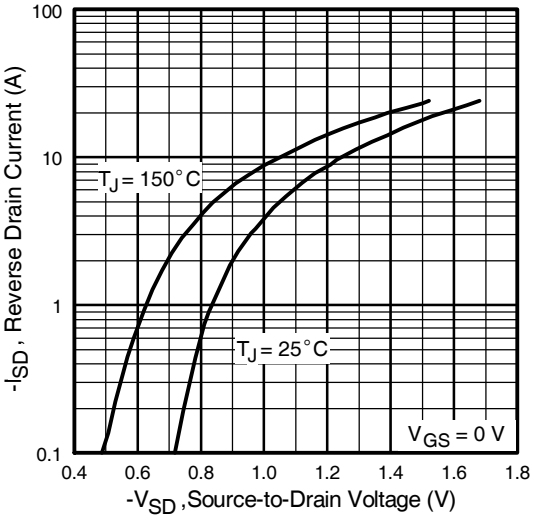


Fig 7. Typical Source-Drain Diode Forward Voltage

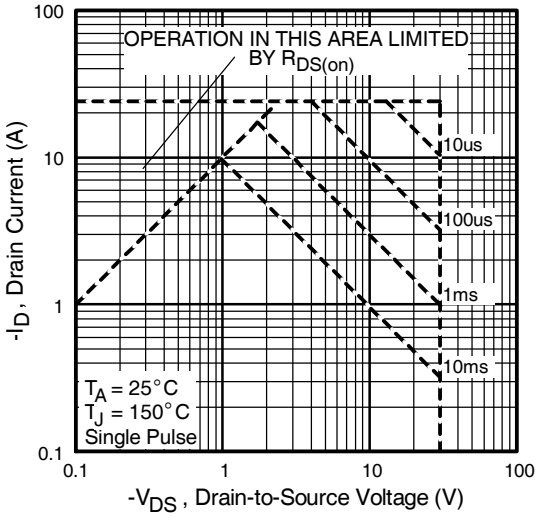


Fig 8. Maximum Safe Operating Area

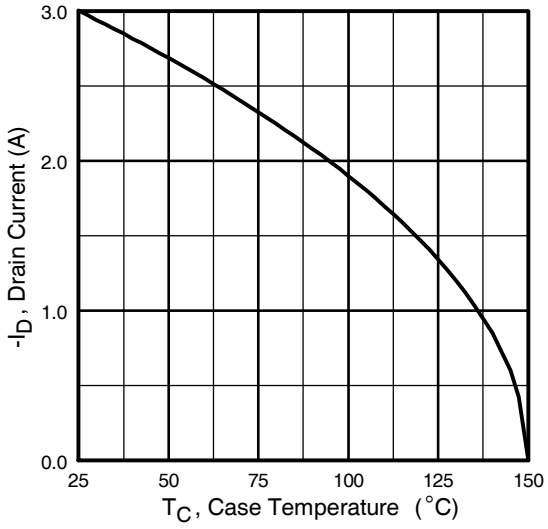


Fig 9. Maximum Drain Current Vs. Case Temperature

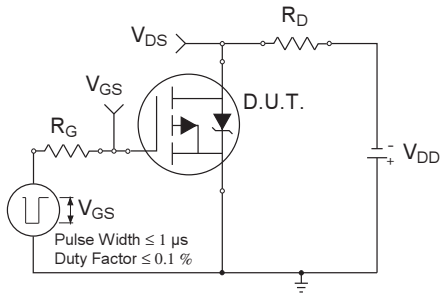


Fig 10a. Switching Time Test Circuit

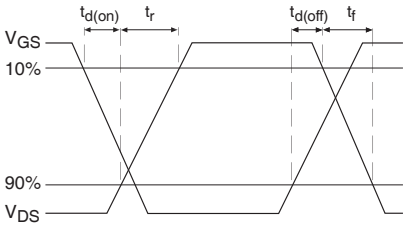


Fig 10b. Switching Time Waveforms

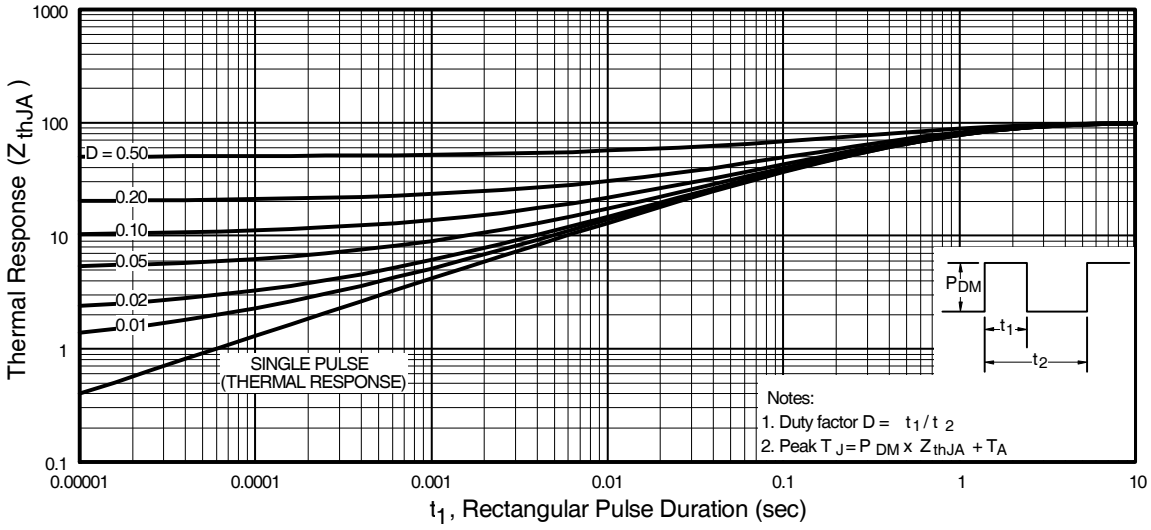


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

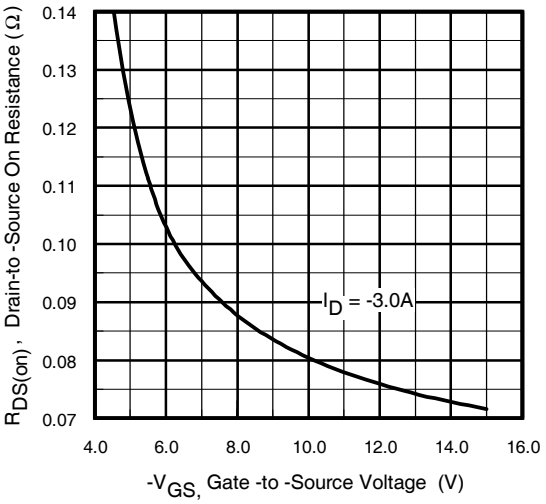


Fig 11. Typical On-Resistance Vs. Gate Voltage

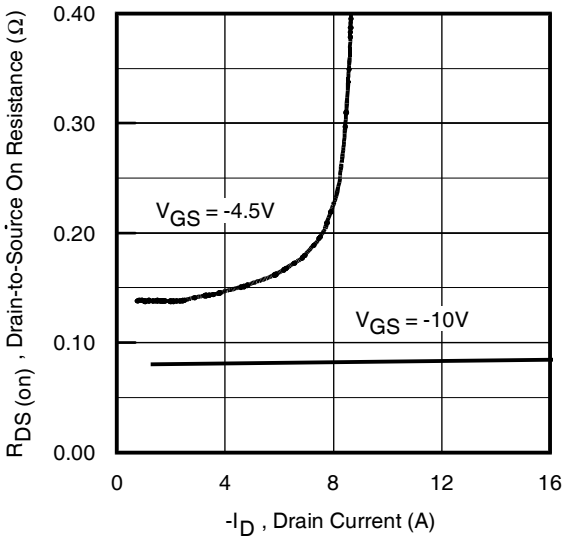


Fig 12. Typical On-Resistance Vs. Drain Current

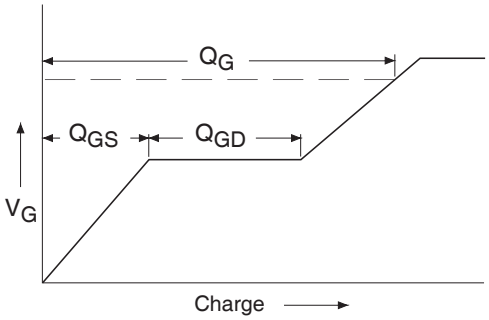


Fig 13a. Basic Gate Charge Waveform

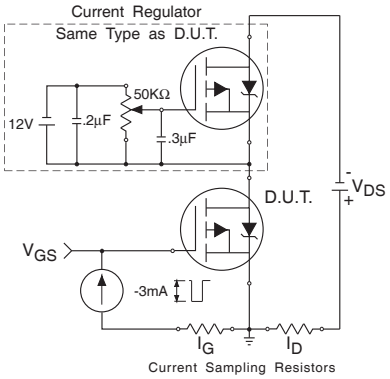


Fig 13b. Gate Charge Test Circuit

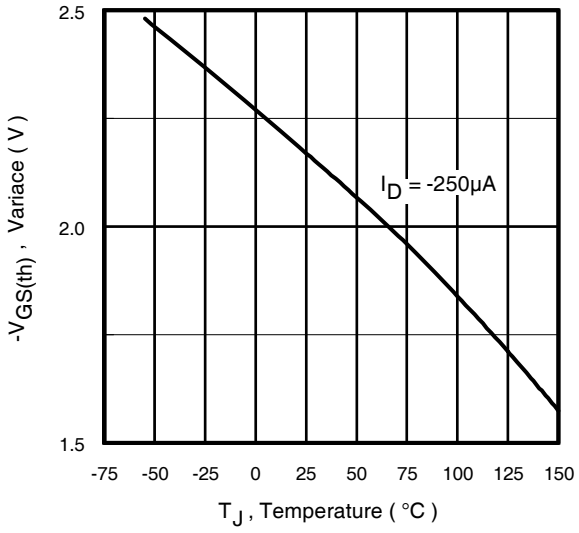


Fig 14. Threshold Voltage Vs. Temperature

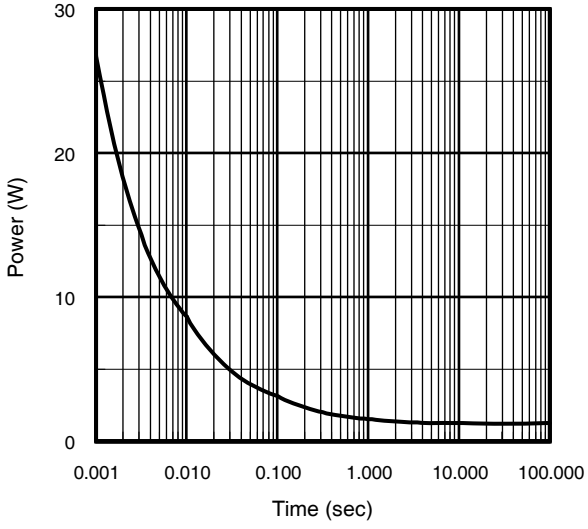
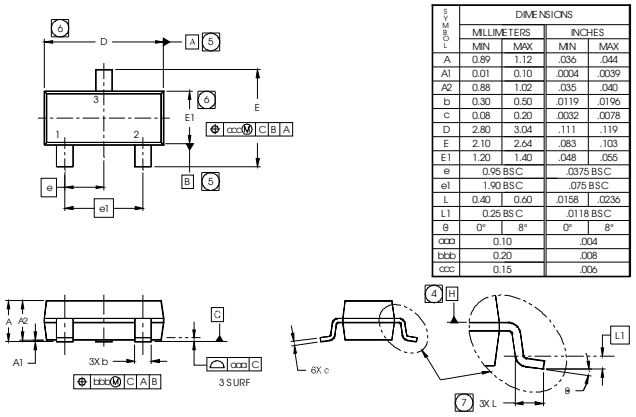


Fig 15. Typical Power Vs. Time

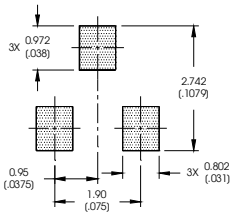
Micro3 (SOT-23) (Lead-Free) Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS			
	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.89	1.12	.036	.044
A1	0.01	0.10	.0004	.0039
A2	0.88	1.02	.035	.040
b	0.30	0.50	.0119	.0196
c	0.08	0.20	.0032	.0078
D	2.80	3.04	.111	.119
E	2.10	2.64	.083	.103
E1	1.20	1.40	.048	.055
e	0.95 BSC		.0375 BSC	
e1	1.90 BSC		.075 BSC	
L	0.40	0.60	.0158	.0236
L1	0.25 BSC		.0118 BSC	
θ	0°	8°	0°	8°
aaa	0.10		.004	
bbb	0.20		.008	
ccc	0.15		.006	

RECOMMENDED FOOTPRINT

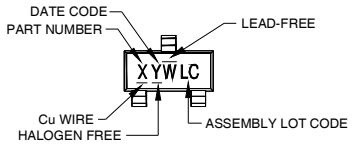


NOTES

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. DIMENSIONS ARE SHOWN IN MILLIMETERS AND INCHES.
3. CONTROLLING DIMENSION: MILLIMETER.
4. DATUM PLANE H IS LOCATED AT THE MOLD PARTING LINE.
5. DATUM A AND B TO BE DETERMINED AT DATUM PLANE H.
6. DIMENSIONS D AND E1 ARE MEASURED AT DATUM PLANE H.
7. DIMENSION L IS THE LEAD LENGTH FOR SOLDERING TO A SUBSTRATE.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-236AB.

Micro3 (SOT-23 / TO-236AB) Part Marking Information

Notes: This part marking information applies to devices produced after 02/26/2001



X = PART NUMBER CODE REFERENCE:

A = IRLML2402	S = IRLML6244
B = IRLML2803	T = IRLML6246
C = IRLML6302	U = IRLML6344
D = IRLML5103	V = IRLML6346
E = IRLML6402	W = IRFML8244
F = IRLML6401	X = IRLML2244
G = IRLML2502	Y = IRLML2246
H = IRLML5203	Z = IRFML9244
I = IRLML0030	
J = IRLML2030	
K = IRLML0100	
L = IRLML0060	
M = IRLML0040	
N = IRLML2060	
P = IRLML9301	
R = IRLML9303	

DATE CODE EXAMPLE:
YWW = 432 = DF
YWW = 503 = 5C

W = (1-26) IF PRECEDED BY LAST DIGIT OF CALENDAR YEAR

YEAR		Y	WORK WEEK	W
2011	2001	1	01	A
2012	2002	2	02	B
2013	2003	3	03	C
2014	2004	4	04	D
2015	2005	5		
2016	2006	6		
2017	2007	7		
2018	2008	8		
2019	2009	9		
2020	2010	0	24	X
			25	Y
			26	Z

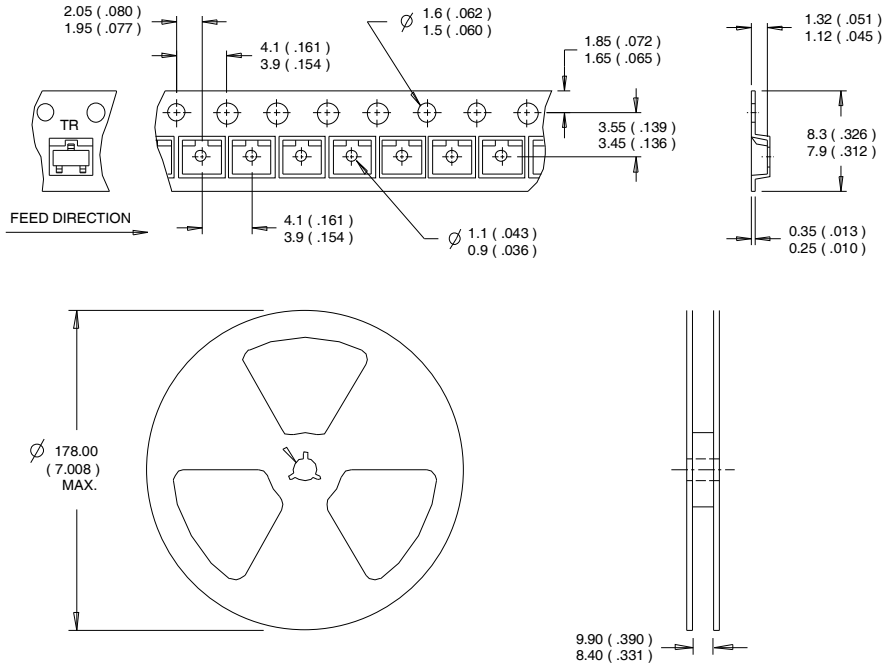
W = (27-52) IF PRECEDED BY A LETTER

YEAR		Y	WORK WEEK	W
2011	2001	A	27	A
2012	2002	B	28	B
2013	2003	C	29	C
2014	2004	D	30	D
2015	2005	E		
2016	2006	F		
2017	2007	G		
2018	2008	H		
2019	2009	J		
2020	2010	K	50	X
			51	Y
			52	Z

Note: For the most current drawing please refer to IR website at http://www.irf.com/package

Micro3™ Tape & Reel Information

Dimensions are shown in millimeters (inches)



NOTES:
1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Note: For the most current drawing please refer to IR website at http://www.irf.com/package

Qualification information†

Qualification level	Consumer (per JEDEC JESD47F†† guidelines)	
Moisture Sensitivity Level	Micro3™ (SOT-23)	MSL1 (per JEDEC J-STD-020D††)
RoHS compliant	Yes	

† Qualification standards can be found at International Rectifier's web site: http://www.irf.com/product-info/reliability
†† Applicable version of JEDEC standard at the time of product release

Revision History

Date	Comment
4/28/2014	• Updated data sheet with new IR corporate template. • Updated package outline & part marking on page 8. • Added Qualification table -Qual level "Consumer" on page 10. • Added bullet point in the Benefits "RoHS Compliant, Halogen -Free" on page 1.