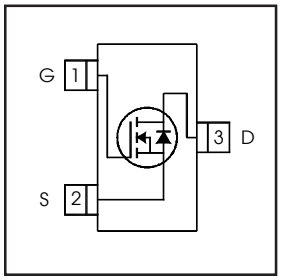
International
IOR Rectifier

IRLML2502PbF-1

HEXFET® Power MOSFET

V_{DS}	20	V
$R_{DS(on)\ max}$ ($@V_{GS}$ = 4.5V)	0.045	Ω
$Q_{g\ (typical)}$	8.0	nC
I_D ($@T_A$ = 25°C)	4.2	A



Micro3™(SOT-23)

Features	⇒	Benefits
Industry-standard pinout SOT-23 Package	⇒	Multi-Vendor Compatibility
Compatible with Existing Surface Mount Techniques	⇒	Easier Manufacturing
RoHS Compliant, Halogen-Free	⇒	Environmentally Friendlier
MSL1, Industrial qualification	⇒	Increased Reliability

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRLML2502TRPbF-1	Micro3™ (SOT-23)	Tape and Reel	3000	IRLML2502TRPbF-1

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain- Source Voltage	20	V
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 4.5V	4.2	A
I_D @ T_A= 70°C	Continuous Drain Current, V_{GS} @ 4.5V	3.4	
I_{DM}	Pulsed Drain Current ①	33	
P_D @T_A = 25°C	Power Dissipation	1.25	W
P_D @T_A = 70°C	Power Dissipation	0.8	
	Linear Derating Factor	0.01	W/°C
V_{GS}	Gate-to-Source Voltage	± 12	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

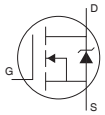
	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient③	75	100	°C/W

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	20	—	—	V	V_{GS} = 0V, I_D = 250uA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.01	—	V/°C	Reference to 25°C, I_D = 1.0mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	0.035	0.045	Ω	V_{GS} = 4.5V, I_D = 4.2A ②
		—	0.050	0.080		V_{GS} = 2.5V, I_D = 3.6A ②
$V_{GS(th)}$	Gate Threshold Voltage	0.60	—	1.2	V	V_{DS} = V_{GS}, I_D = 250µA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	—	-3.2	—	mV/°C	
gfs	Forward Transconductance	5.8	—	—	S	V_{DS} = 10V, I_D = 4.0A
I_{DSS}	Drain-to-Source Leakage Current	—	—	1.0	µA	V_{DS} = 16V, V_{GS} = 0V
		—	—	25		V_{DS} = 16V, V_{GS} = 0V, T_J = 70°C
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage	—	—	-100		V_{GS} = -12V
Q_g	Total Gate Charge	—	8.0	12	nC	I_D = 4.0A
Q_{gs}	Gate-to-Source Charge	—	1.8	2.7		V_{DS} = 10V
Q_{gd}	Gate-to-Drain ("Miller") Charge	—	1.7	2.6		V_{GS} = 5.0V ②
$t_{d(on)}$	Turn-On Delay Time	—	7.5	—	ns	V_{DD} = 10V
t_r	Rise Time	—	10	—		I_D = 1.0A
$t_{d(off)}$	Turn-Off Delay Time	—	54	—		R_G = 6Ω
t_f	Fall Time	—	26	—		R_D = 10Ω ②
C_{iss}	Input Capacitance	—	740	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	90	—		V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance	—	66	—		f = 1.0MHz

Source-Drain Rating 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	—	—	33		
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	—	16	24	ns	T_J = 25°C, I_F = 1.3A
Q_{rr}	Reverse Recovery Charge	—	8.6	13	nC	di/dt = 100A/µs ②



Notes:

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② Pulse width ≤ 300µs; duty cycle ≤ 2%.

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

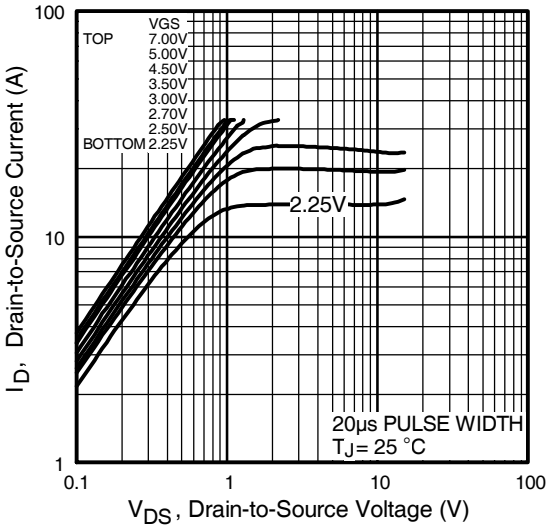


Fig 1. Typical Output Characteristics

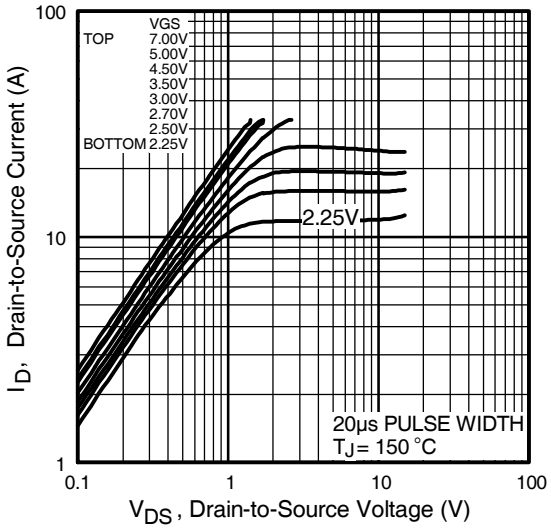


Fig 2. Typical Output Characteristics

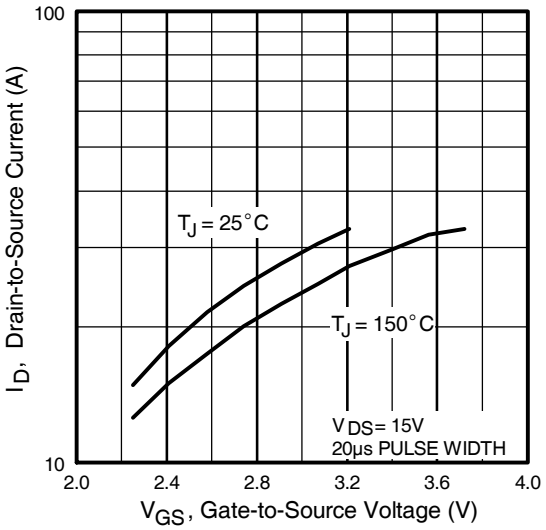


Fig 3. Typical Transfer Characteristics

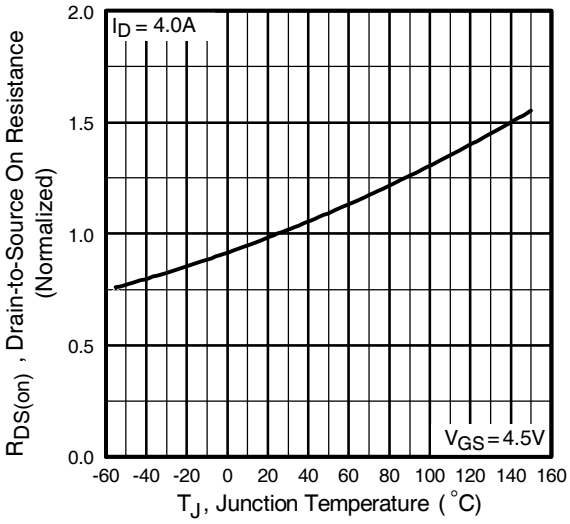


Fig 4. Normalized On-Resistance Vs. Temperature

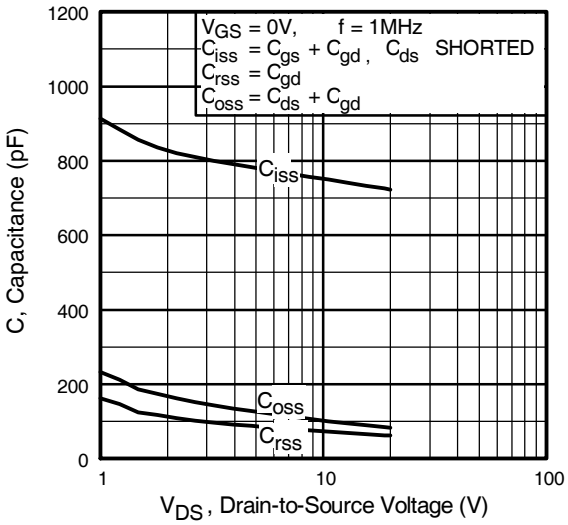


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

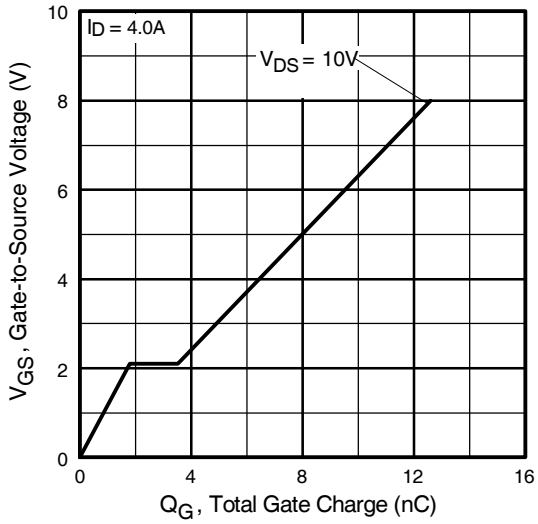


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

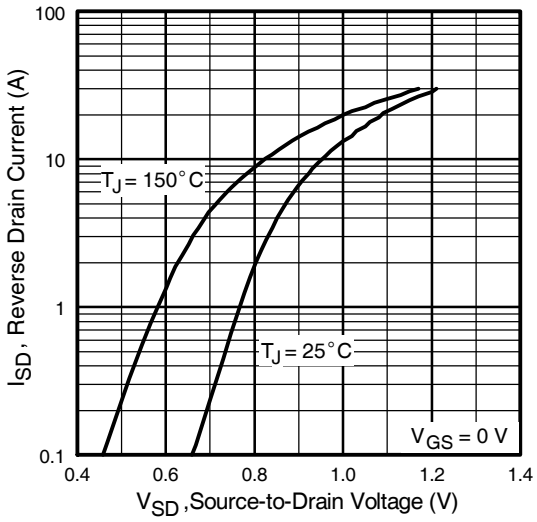


Fig 7. Typical Source-Drain Diode Forward Voltage

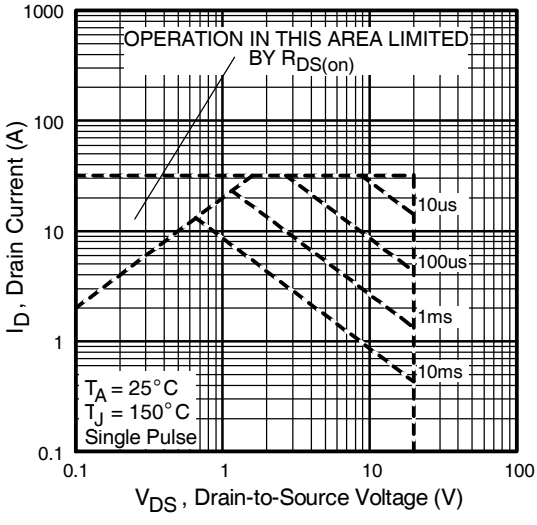


Fig 8. Maximum Safe Operating Area

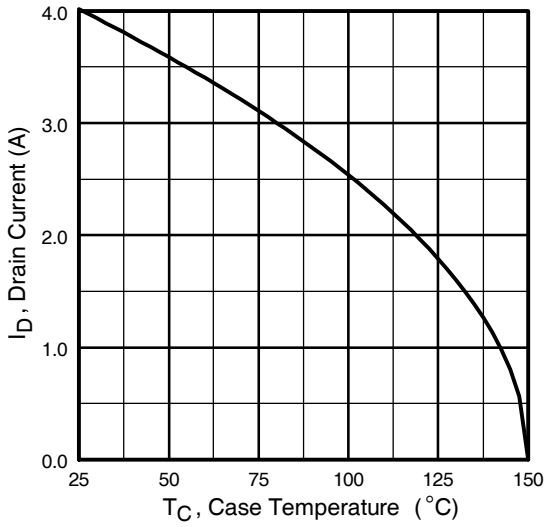


Fig 9. Maximum Drain Current Vs. Case Temperature

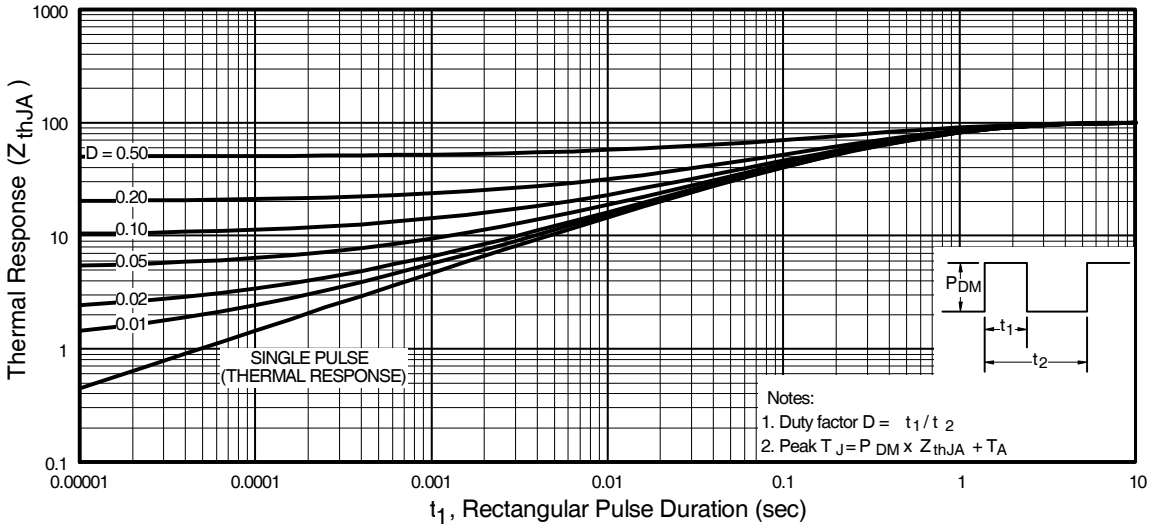


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

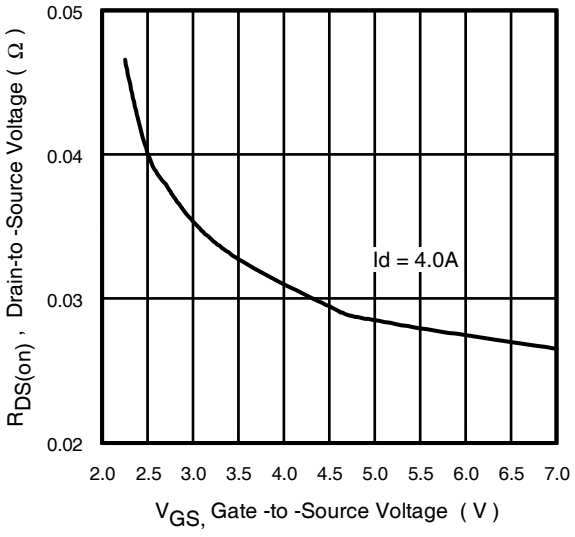


Fig 11. On-Resistance Vs. Gate Voltage

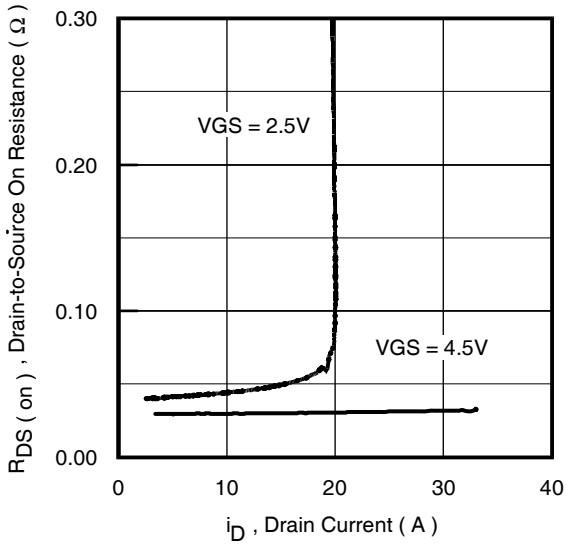


Fig 12. On-Resistance Vs. Drain Current

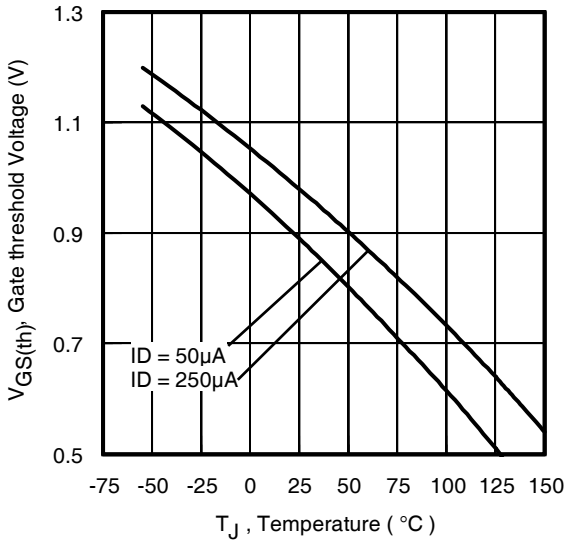
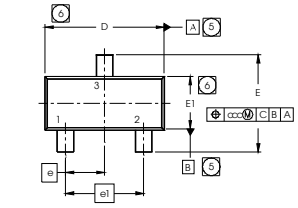


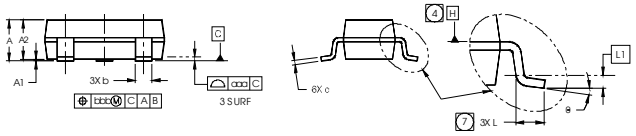
Fig 13. Threshold Voltage Vs. Temperature

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

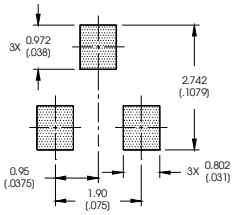
Dimensions are shown in millimeters (inches)



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	



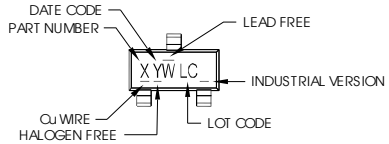
RECOMMENDED FOOTPRINT



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



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	

Note: A line above the work week (as shown here) indicates Lead - Free.

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

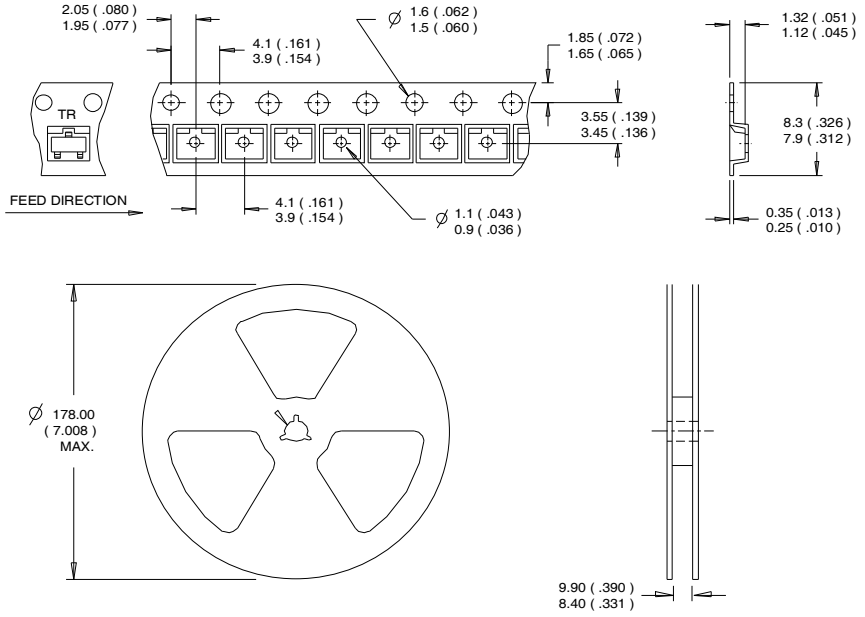
YEAR		Y	WORK WEEK	W
2011	2001	1	01	A
2012	2002	2	02	B
2013	2003	3	03	C
2014	2004	4	04	D
2015	2005	5		
2016	2006	6		
2017	2007	7		
2018	2008	8		
2019	2009	9		
2020	2010	0	24	X
			25	Y
			26	Z

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	Industrial (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
10/28/2014	• Updated partmarking to reflect Industrial partmarking on page 7.

International
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