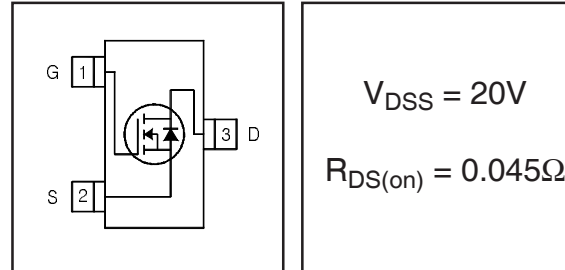


IRLML2502GPbF

HEXFET® Power MOSFET

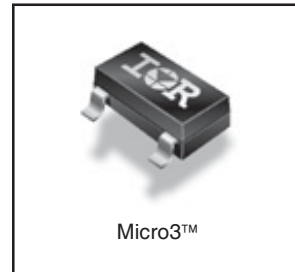
- Ultra Low On-Resistance
- N-Channel MOSFET
- SOT-23 Footprint
- Low Profile (<1.1mm)
- Available in Tape and Reel
- Fast Switching
- Lead-Free
- Halogen-Free



Description

These N-Channel MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET® power MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in battery and load management.

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.



Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain- Source Voltage	20	V
$I_D @ T_A = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5\text{V}$	4.2	A
$I_D @ T_A = 70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5\text{V}$	3.4	
I_{DM}	Pulsed Drain Current ①	33	
$P_D @ T_A = 25^\circ\text{C}$	Power Dissipation	1.25	W
$P_D @ T_A = 70^\circ\text{C}$	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

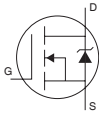
Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient②	75	100	°C/W

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	20	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.01	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	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	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	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		$V_{DS} = 16V, V_{GS} = 0V, T_J = 70^\circ\text{C}$
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	—		$R_G = 6\Omega$
t_f	Fall Time	—	26	—		$R_D = 10\Omega$ ②
C_{iss}	Input Capacitance	—	740	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	90	—		$V_{DS} = 15V$
C_{rss}	Reverse Transfer Capacitance	—	66	—		$f = 1.0\text{MHz}$

Source-Drain Ratings and Characteristics

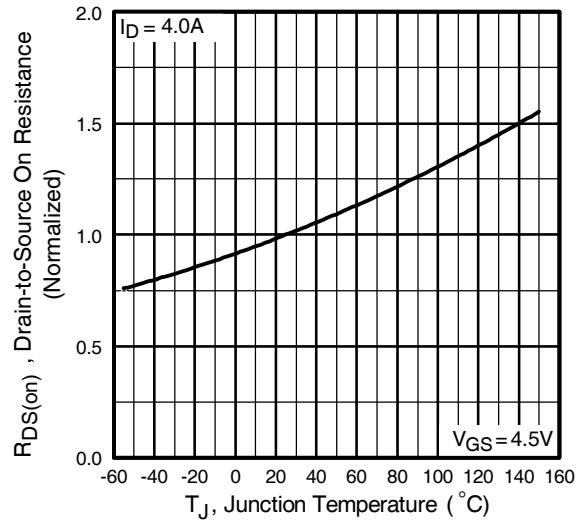
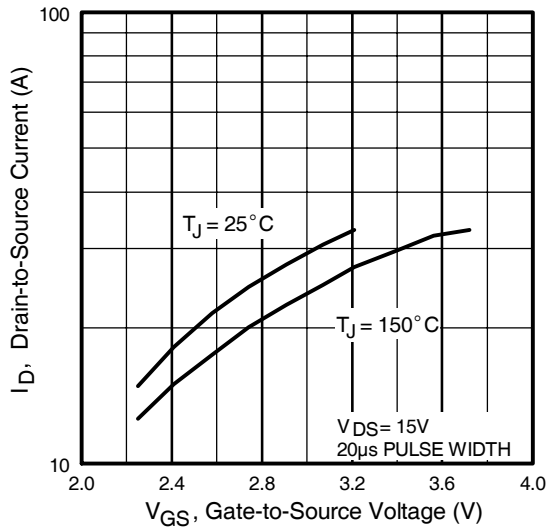
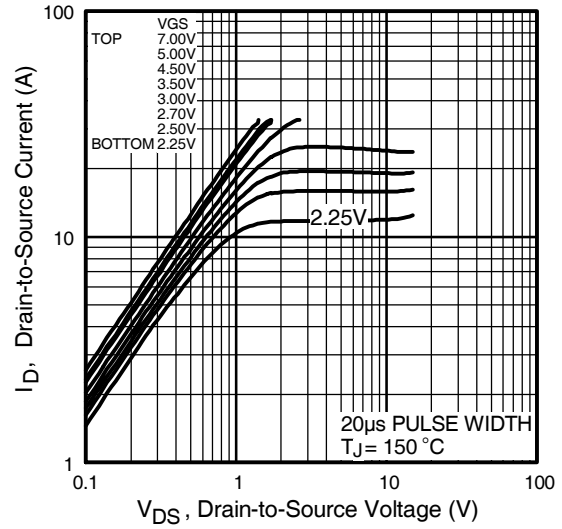
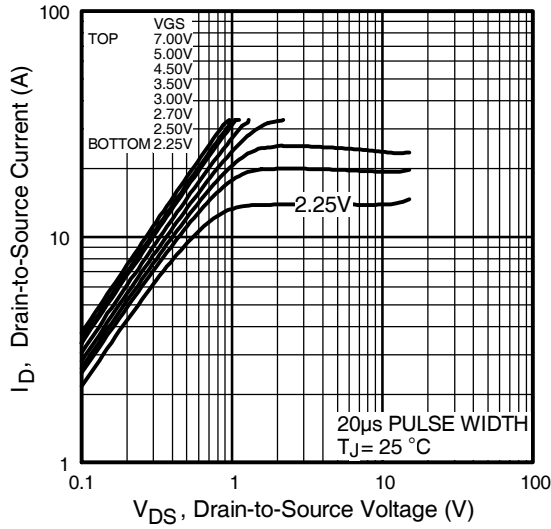
	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	1.3	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	33		
V_{SD}	Diode Forward Voltage	—	—	1.2	V	$T_J = 25^\circ\text{C}, I_S = 1.3A, V_{GS} = 0V$ ②
t_{rr}	Reverse Recovery Time	—	16	24	ns	$T_J = 25^\circ\text{C}, I_F = 1.3A$
Q_{rr}	Reverse Recovery Charge	—	8.6	13	nC	$di/dt = 100A/\mu s$ ②

Notes:

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

② Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

③ Surface mounted on FR-4 board, $t \leq 5\text{sec}$.



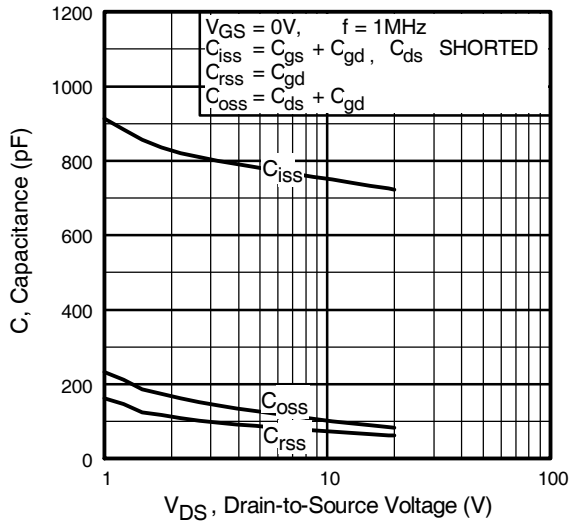


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

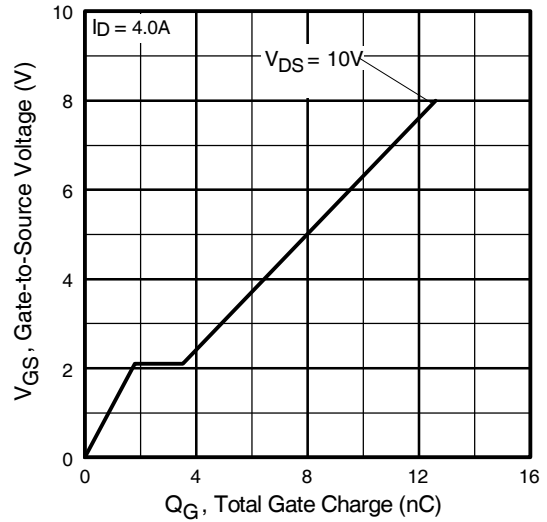


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

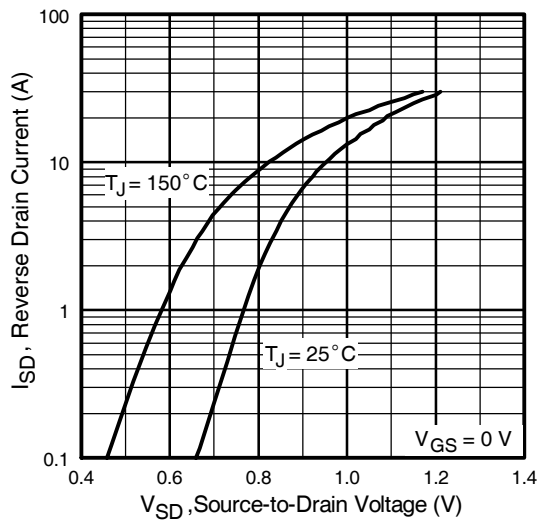


Fig 7. Typical Source-Drain Diode Forward Voltage

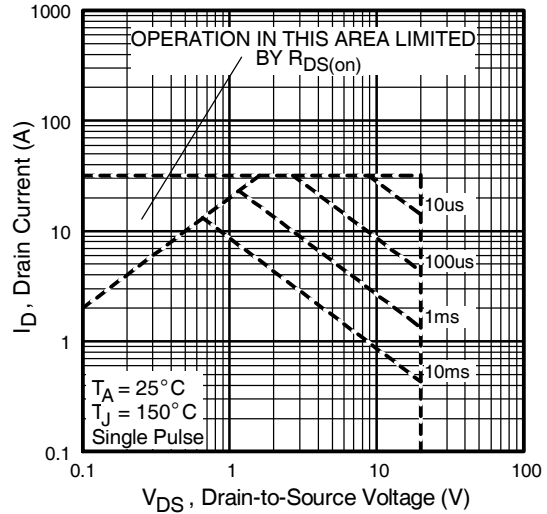


Fig 8. Maximum Safe Operating Area

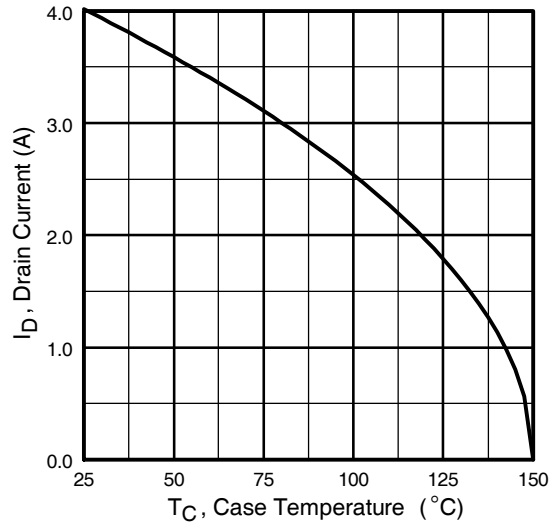


Fig 9. Maximum Drain Current Vs. Case Temperature

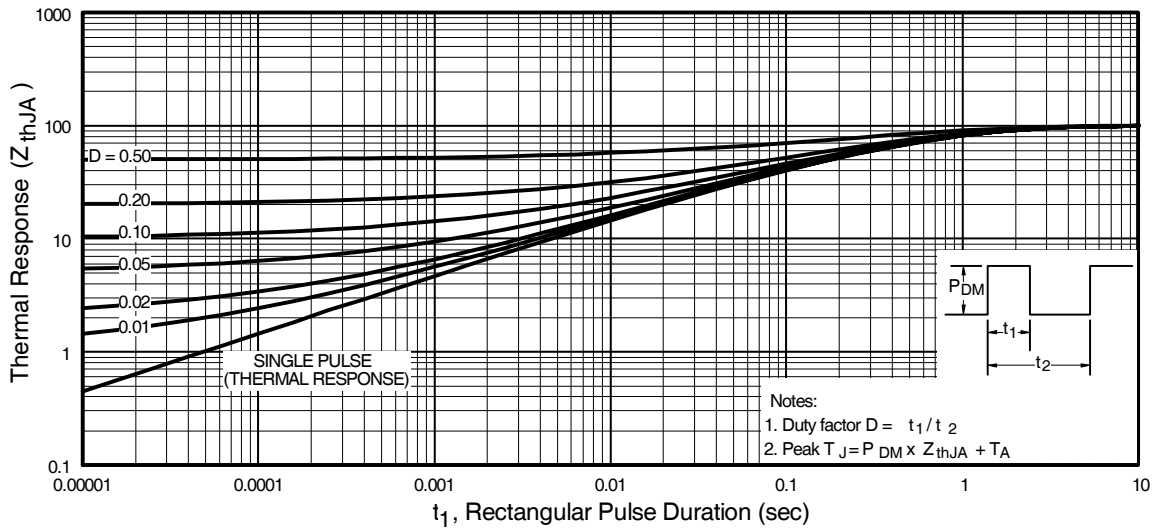


Fig 10. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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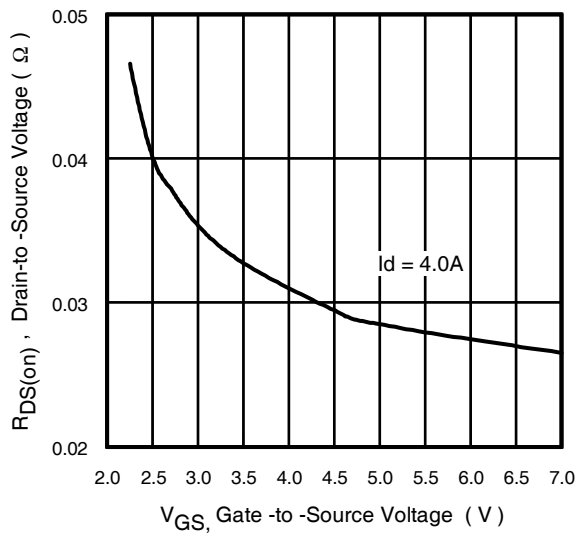


Fig 11. On-Resistance Vs. Gate Voltage

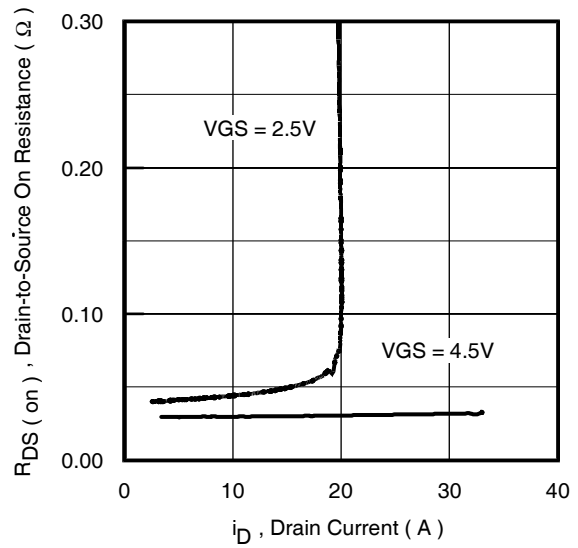
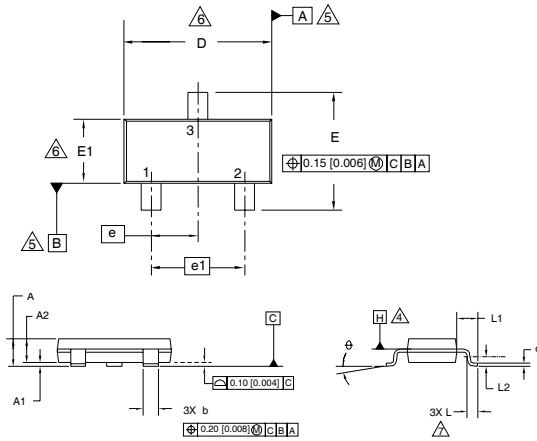


Fig 12. On-Resistance Vs. Drain Current

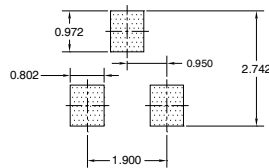
Micro3 (SOT-23) (Lead-Free) Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.89	1.12	0.035	0.044
A1	0.01	0.10	0.0004	0.004
A2	0.88	1.02	0.035	0.040
b	0.30	0.50	0.012	0.020
c	0.08	0.20	0.003	0.008
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E1	1.20	1.40	0.047	0.055
e	0.95	BSC	0.037	BSC
e1	1.90	BSC	0.075	BSC
L	0.40	0.60	0.016	0.024
L1	0.54	REF	0.021	REF
L2	0.25	BSC	0.010	BSC
⌀	0	8	0	8

Recommended Footprint

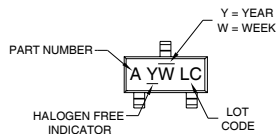


NOTES:

- DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1994
- DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
- CONTROLLING DIMENSION: MILLIMETER.
- DATUM PLANE H IS LOCATED AT THE MOLD PARTING LINE.
- DATUM A AND B TO BE DETERMINED AT DATUM PLANE H.
- DIMENSIONS D AND E1 ARE MEASURED AT DATUM PLANE H. DIMENSIONS DOES NOT INCLUDE MOLD PROTRUSIONS OR INTERLEAD FLASH. MOLD PROTRUSIONS OR INTERLEAD FLASH SHALL NOT EXCEED 0.25 MM (0.010 INCH) PER SIDE.
- DIMENSION L IS THE LEAD LENGTH FOR SOLDERING TO A SUBSTRATE.
- OUTLINE CONFORMS TO JEDEC OUTLINE TO-236 AB.

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

Micro3 / SOT-23 Package Marking



PART NUMBER CODE REFERENCE:

- A = IRLML2402
- B = IRLML2803
- C = IRLML2402
- D = IRLML5103
- E = IRLML6402
- F = IRLML6401
- G = IRLML2502
- H = IRLML5203

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
2001	1	01	A
2002	2	02	B
2003	3	03	C
2004	4	04	D
2005	5		
2006	6		
2007	7		
2008	8		
2009	9		
2010	0	24	X
		25	Y
		26	Z

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

YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
2004	D	30	D
2005	E		
2006	F		
2007	G		
2008	H		
2009	J		
2010	K	50	X
		51	Y
		52	Z

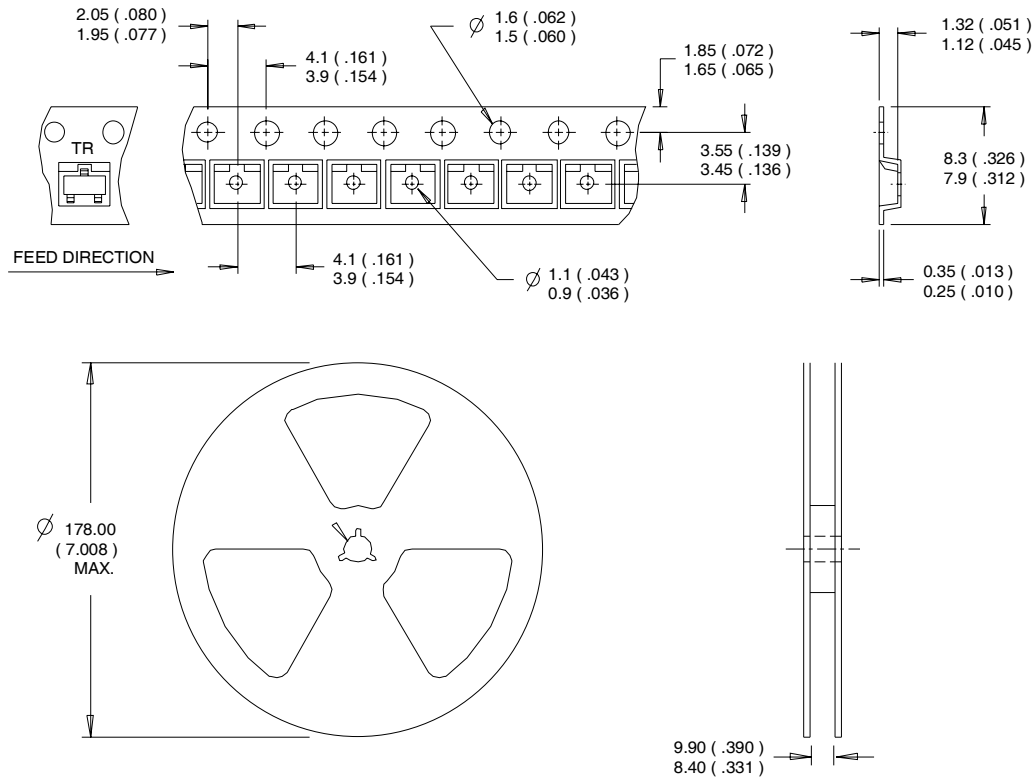
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package>
www.irf.com

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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>

Data and specifications subject to change without notice.

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 TAC Fax: (310) 252-7903

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