

IRLMS1503

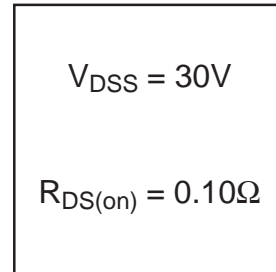
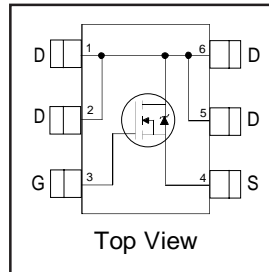
HEXFET® Power MOSFET

- Generation V Technology
- Micro6 Package Style
- Ultra Low $R_{DS(on)}$
- N-Channel MOSFET

Description

Fifth Generation HEXFET® power 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 a wide variety of applications.

The Micro6™ package with its customized leadframe produces a HEXFET® power MOSFET with $R_{DS(on)}$ 60% less than a similar size SOT-23. This package is ideal for applications where printed circuit board space is at a premium. It's unique thermal design and $R_{DS(on)}$ reduction enables a current-handling increase of nearly 300% compared to the SOT-23.



Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	3.2	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	2.6	
I_{DM}	Pulsed Drain Current ①	18	
$P_D @ T_A = 25^\circ C$	Power Dissipation	1.7	W
	Linear Derating Factor	13	mW/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
dv/dt	Peak Diode Recovery dv/dt ②	5.0	V/ns
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

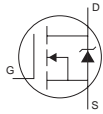
Thermal Resistance Ratings

	Parameter	Min.	Typ.	Max	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ④	—	—	75	°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
ΔV _{(BR)DSS/ΔT_J}	Breakdown Voltage Temp. Coefficient	—	0.037	—	V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance	—	—	0.100 0.20	Ω	V _{GS} = 10V, I _D = 2.2A ③ V _{GS} = 4.5V, I _D = 1.1A ③
V _{GS(th)}	Gate Threshold Voltage	1.0	—	—	V	V _{DS} = V _{GS} , I _D = 250μA
g _{fs}	Forward Transconductance	1.1	—	—	S	V _{DS} = 10V, I _D = 1.1A
I _{DSS}	Drain-to-Source Leakage Current	—	—	1.0 25	μA	V _{DS} = 24V, V _{GS} = 0V V _{DS} = 24V, V _{GS} = 0V, T _J = 125°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	—	6.4	9.6	nC	I _D = 2.2A
Q _{gs}	Gate-to-Source Charge	—	1.1	1.7		V _{DS} = 24V
Q _{gd}	Gate-to-Drain ("Miller") Charge	—	1.9	2.8		V _{GS} = 10V, See Fig. 6 and 9 ③
t _{d(on)}	Turn-On Delay Time	—	4.6	—		ns
t _r	Rise Time	—	4.4	—	I _D = 2.2A	
t _{d(off)}	Turn-Off Delay Time	—	10	—	R _G = 6.0Ω	
t _f	Fall Time	—	2.0	—	R _D = 6.7Ω, See Fig. 10 ③	
C _{iss}	Input Capacitance	—	210	—	pF	V _{GS} = 0V
C _{oss}	Output Capacitance	—	90	—		V _{DS} = 25V
C _{rss}	Reverse Transfer Capacitance	—	32	—		f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I _S	Continuous Source Current (Body Diode)	—	—	1.7	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I _{SM}	Pulsed Source Current (Body Diode) ①	—	—	18		
V _{SD}	Diode Forward Voltage	—	—	1.2	V	T _J = 25°C, I _S = 2.2A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time	—	36	54	ns	T _J = 25°C, I _F = 2.2A
Q _{rr}	Reverse Recovery Charge	—	39	58	nC	di/dt = 100A/μs ③

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)
- ② I_{SD} ≤ 2.2A, di/dt ≤ 150A/μs, V_{DD} ≤ V_{(BR)DSS}, T_J ≤ 150°C
- ③ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ④ Surface mounted on FR-4 board, t ≤ 5sec.

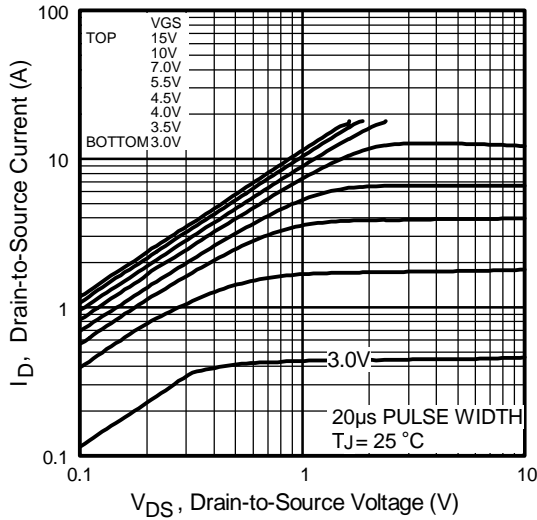


Fig 1. Typical Output Characteristics

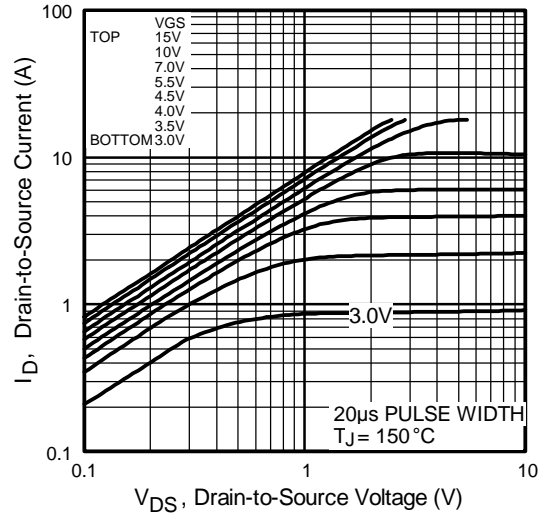


Fig 2. Typical Output Characteristics

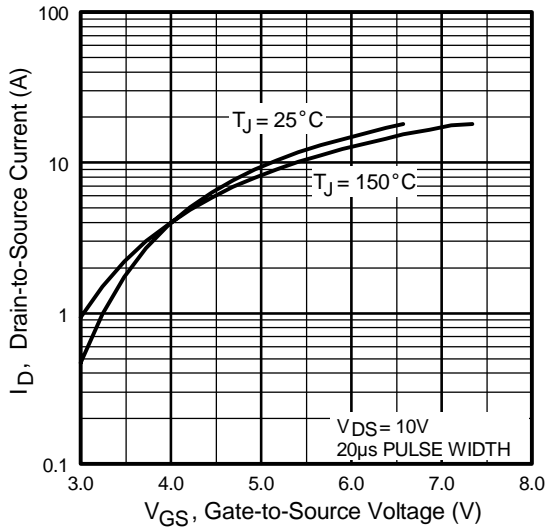


Fig 3. Typical Transfer Characteristics

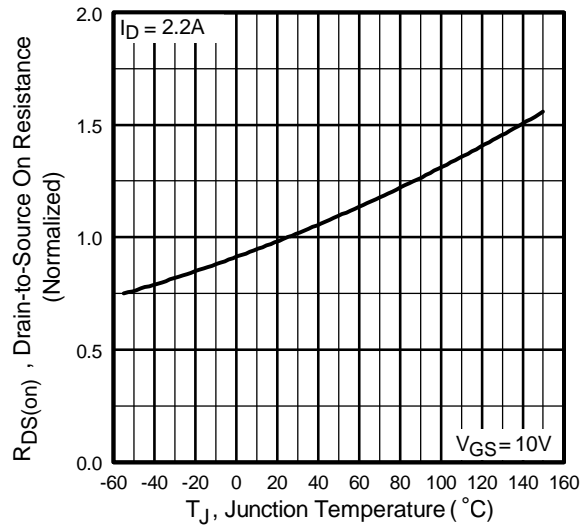


Fig 4. Normalized On-Resistance Vs. Temperature

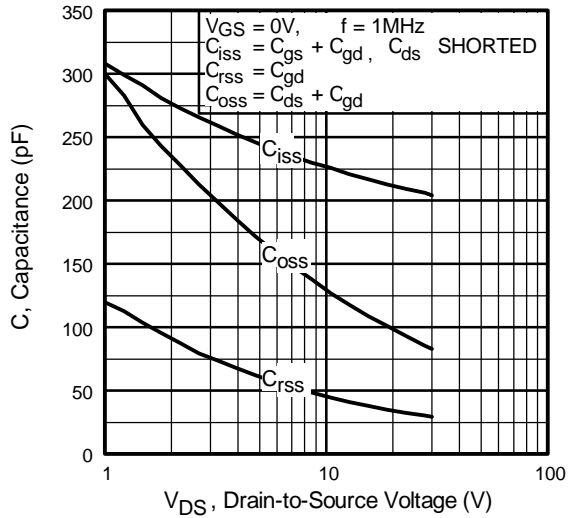


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

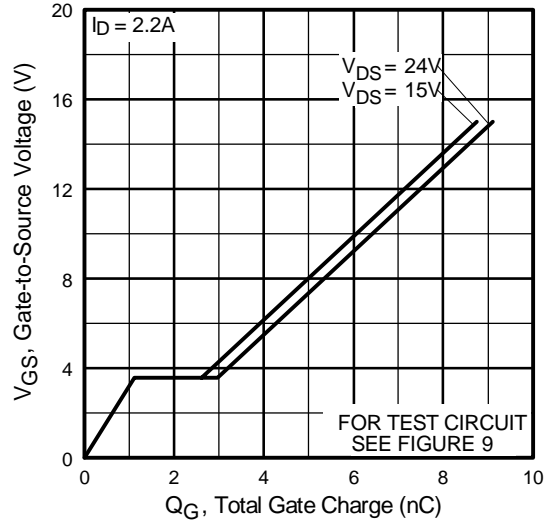


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

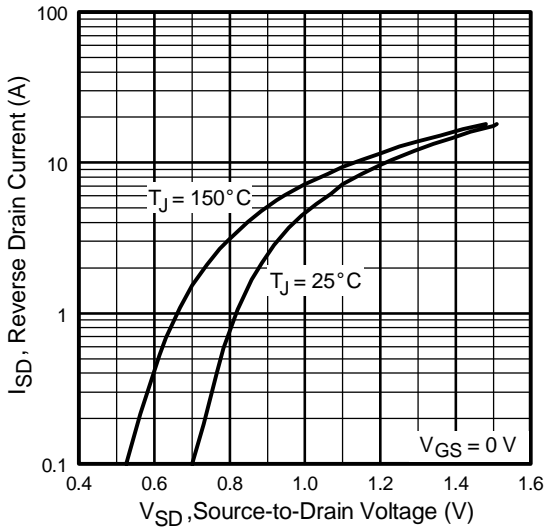


Fig 7. Typical Source-Drain Diode Forward Voltage

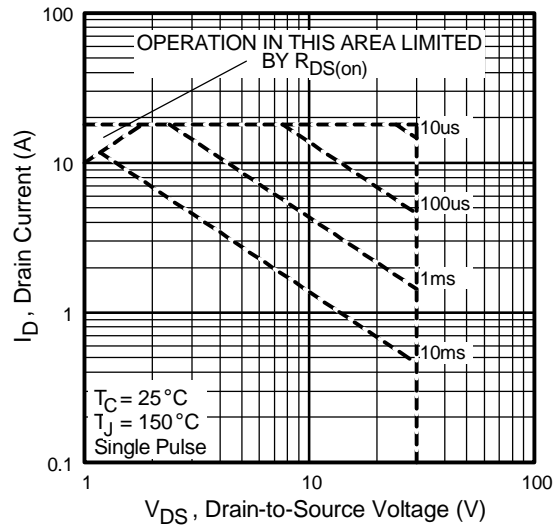


Fig 8. Maximum Safe Operating Area

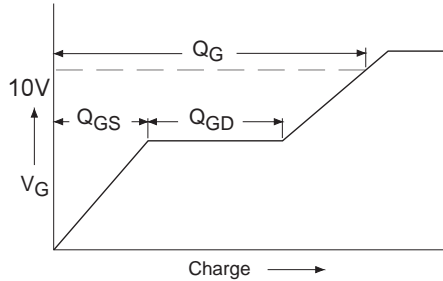


Fig 9a. Basic Gate Charge Waveform

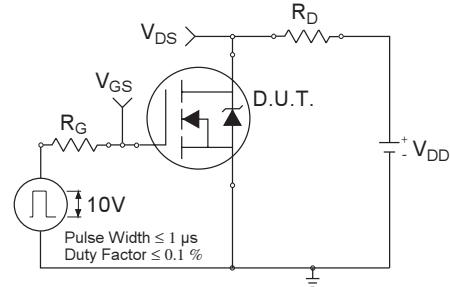


Fig 10a. Switching Time Test Circuit

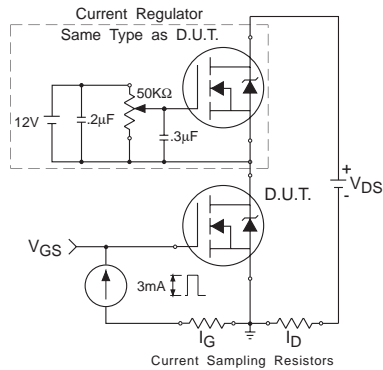


Fig 9b. Gate Charge Test Circuit

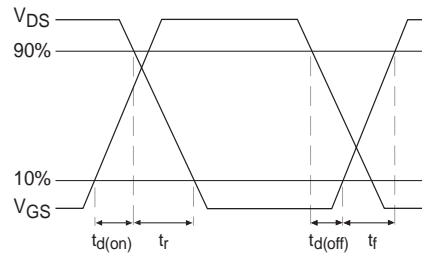


Fig 10b. Switching Time Waveforms

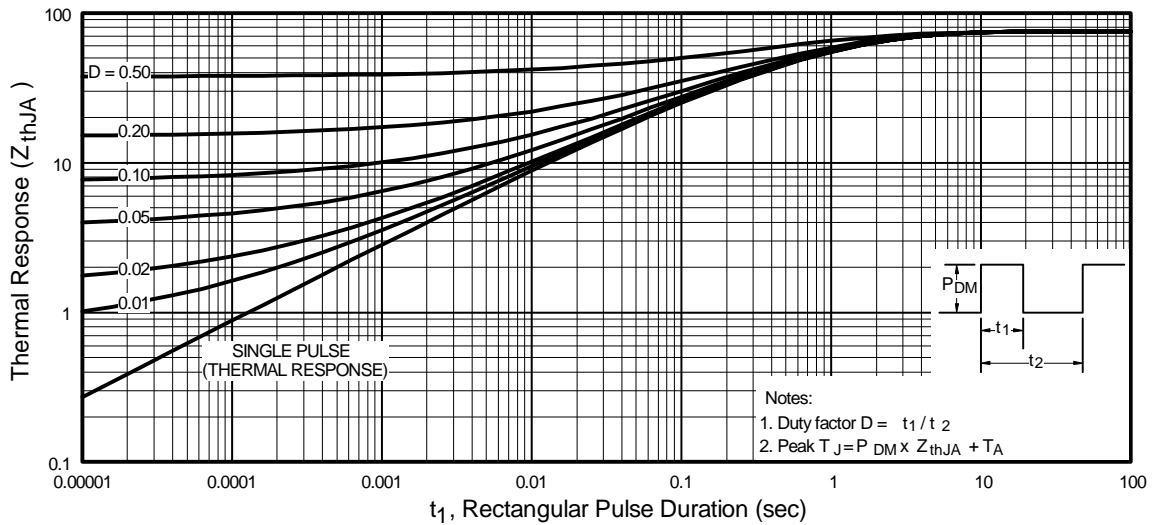
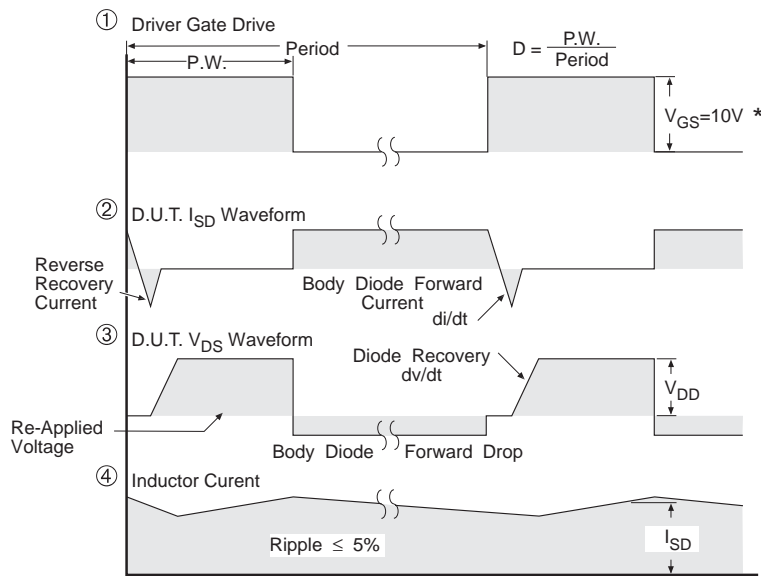
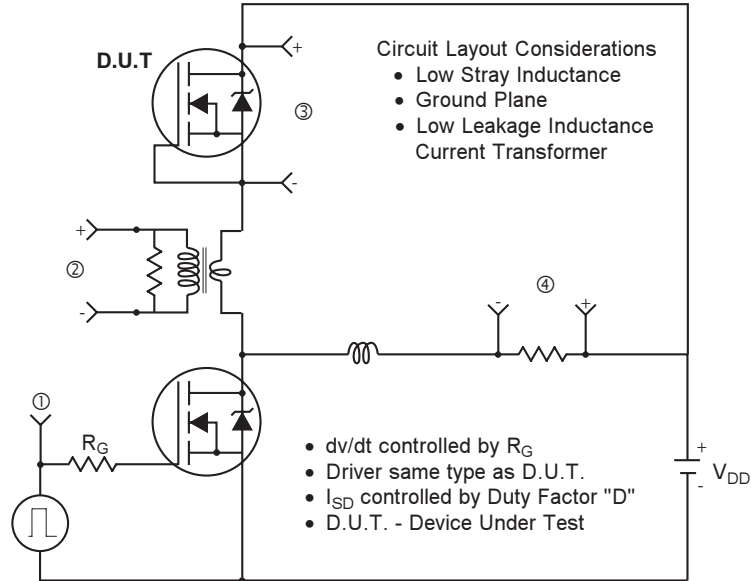


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

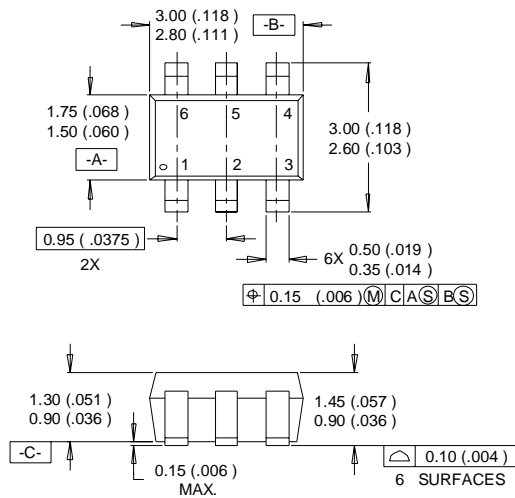
Peak Diode Recovery dv/dt Test Circuit



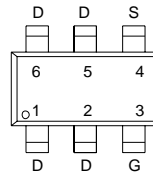
* $V_{GS} = 5V$ for Logic Level Devices

Fig 13. For N-channel HEXFET® power MOSFET s

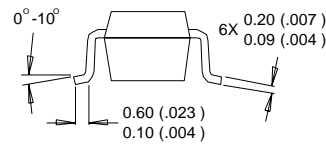
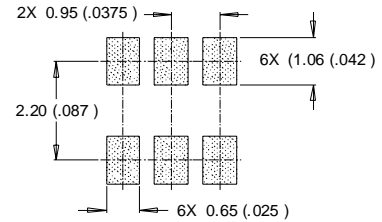
Package Outline Micro6™



LEAD ASSIGNMENTS



RECOMMENDED FOOTPRINT



NOTES :

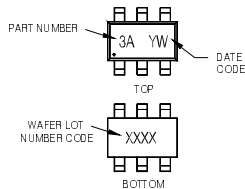
1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : MILLIMETER.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).

Part Marking Information Micro6™

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

EXAMPLE: THIS IS AN IRLMS6702

WW - [1-26] IF PRECEDED BY LAST DIGIT OF CALENDAR YEAR



PART NUMBER CODE REFERENCE:

- 2A - IRLMS1902
- 2B - IRLMS1503
- 2C - IRLMS6702
- 2D - IRLMS6703
- 2E - IRLMS6802
- 2F - IRLMS4502
- 2G - IRLMS2002
- 2H - IRLMS6803

DATE CODE EXAMPLES:

- YWW - 9603 - 6C
- YWW - 9632 - FF

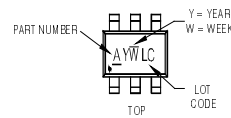
YEAR	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
2004	4	04	D
2005	5		
1996	6		
1997	7		
1998	8		
1999	9		
2000	0	24	X
		25	Y
		26	Z

WW - [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		
1996	F		
1997	G		
1998	H		
1999	J		
2000	K	50	X
		51	Y
		52	Z

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

W = [1-26] IF PRECEDED BY LAST DIGIT OF CALENDAR YEAR



PART NUMBER CODE REFERENCE:

- A - IRLMS1902
- B - IRLMS1503
- C - IRLMS6702
- D - IRLMS6703
- E - IRLMS6802
- F - IRLMS4502
- G - IRLMS2002
- H - IRLMS6803

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

YEAR	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
2004	4	04	D
2005	5		
1996	6		
1997	7		
1998	8		
1999	9		
2000	0	24	X
		25	Y
		26	Z

W = [27-52] IF PRECEDED BY A LETTER

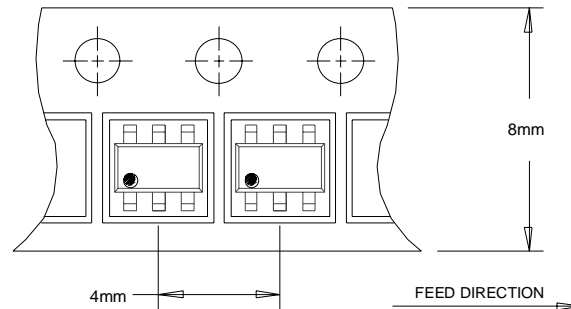
YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
2004	D	30	D
2005	E		
1996	F		
1997	G		
1998	H		
1999	J		
2000	K	50	X
		51	Y
		52	Z

IRLMS1503

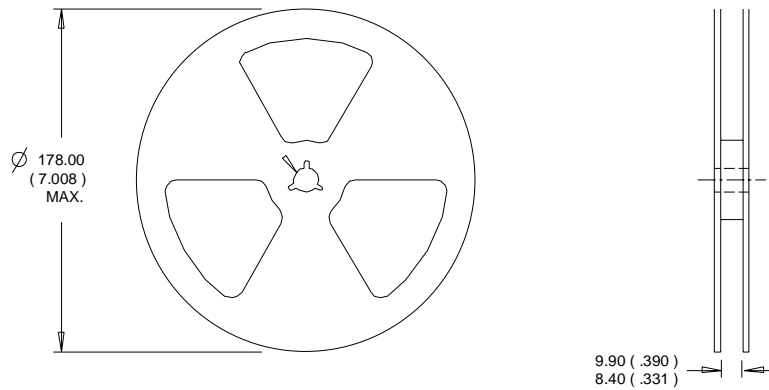
International
IR Rectifier

Tape & Reel Information

Micro6™



NOTES :
1. OUTLINE CONFORMS TO EIA-481 & EIA-541.



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

Data and specifications subject to change without notice.

International
IR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information. 03/04
www.irf.com