

# International IR Rectifier

PD - 93997

## IRF5806

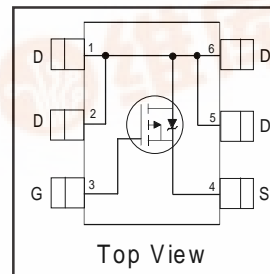
HEXFET® Power MOSFET

- Trench Technology
- Ultra Low On-Resistance
- P-Channel MOSFET
- Available in Tape & Reel

V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>
-20V	86mΩ@V <sub>GS</sub> = -4.5V	-4.0A
	147mΩ@V <sub>GS</sub> = -2.5V	-3.0A

### Description

New trench HEXFET® Power MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the 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 applications.



### Absolute Maximum Ratings

	Parameter	Max.	Units
V <sub>DS</sub>	Drain-Source Voltage	-20	V
I <sub>D</sub> @ T <sub>A</sub> = 25°C	Continuous Drain Current, V <sub>GS</sub> @ -4.5V	-4.0	A
I <sub>D</sub> @ T <sub>A</sub> = 70°C	Continuous Drain Current, V <sub>GS</sub> @ -4.5V	-3.3	
I <sub>DM</sub>	Pulsed Drain Current <sup>①</sup>	-16.5	
P <sub>D</sub> @ T <sub>A</sub> = 25°C	Maximum Power Dissipation <sup>③</sup>	2.0	W
P <sub>D</sub> @ T <sub>A</sub> = 70°C	Maximum Power Dissipation <sup>③</sup>	1.3	W
	Linear Derating Factor	0.02	W/°C
V <sub>GS</sub>	Gate-to-Source Voltage	± 20	V
T <sub>J</sub> , T <sub>STG</sub>	Junction and Storage Temperature Range	-55 to + 150	°C

### Thermal Resistance

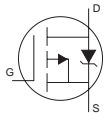
	Parameter	Max.	Units
R <sub>θJA</sub>	Maximum Junction-to-Ambient <sup>③</sup>	62.5	°C/W



## 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	—	0.011	—	V/°C	Reference to $25^\circ\text{C}, I_D = -1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	47.1	86	mΩ	$V_{GS} = -4.5V, I_D = -4.0A$ ②
		—	67.5	147		$V_{GS} = -2.5V, I_D = -3.0A$ ②
$V_{GS(th)}$	Gate Threshold Voltage	-0.45	—	-1.2	V	$V_{DS} = V_{GS}, I_D = -250\mu A$
$g_{fs}$	Forward Transconductance	6.4	—	—	S	$V_{DS} = -10V, I_D = -4.0A$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	-15	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	—	8.3	11.4	nC	$I_D = -4.0A$
$Q_{gs}$	Gate-to-Source Charge	—	1.2	—		$V_{DS} = -16V$
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	—	2.6	—		$V_{GS} = -4.5V$
$t_{d(on)}$	Turn-On Delay Time	—	6.2	9.3	ns	$V_{DD} = -10V, V_{GS} = -4.5V$
$t_r$	Rise Time	—	27	41		$I_D = -1.0A$
$t_{d(off)}$	Turn-Off Delay Time	—	94	140		$R_G = 6.0\Omega$
$t_f$	Fall Time	—	126	190		$R_D = 10\Omega$ ②
$C_{iss}$	Input Capacitance	—	594	—	pF	$V_{GS} = 0V$
$C_{oss}$	Output Capacitance	—	114	—		$V_{DS} = -15V$
$C_{riss}$	Reverse Transfer Capacitance	—	87	—		$f = 1.0\text{MHz}$

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode)	—	—	-2.0	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) ①	—	—	-16.5		
$V_{SD}$	Diode Forward Voltage	—	—	-1.2	V	$T_J = 25^\circ\text{C}, I_S = -2.0A, V_{GS} = 0V$ ②
$t_{rr}$	Reverse Recovery Time	—	116	174	ns	$T_J = 25^\circ\text{C}, I_F = -2.0A$
$Q_{rr}$	Reverse Recovery Charge	—	90	135	nC	$di/dt = -100A/\mu s$ ②

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.  
② Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .

- ③ When mounted on 1 inch square Copper board,  $t \leq 10\text{sec}$ .

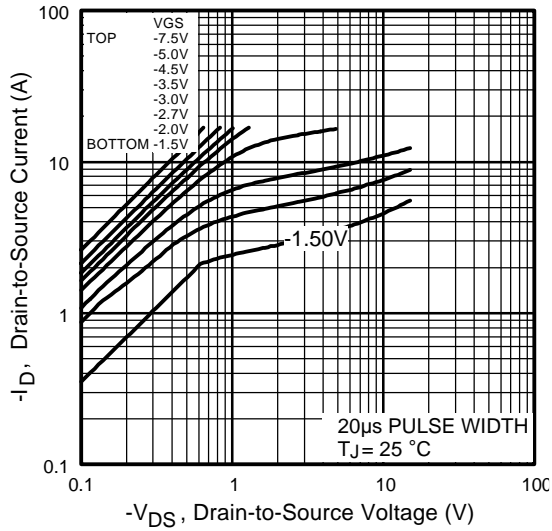


Fig 1. Typical Output Characteristics

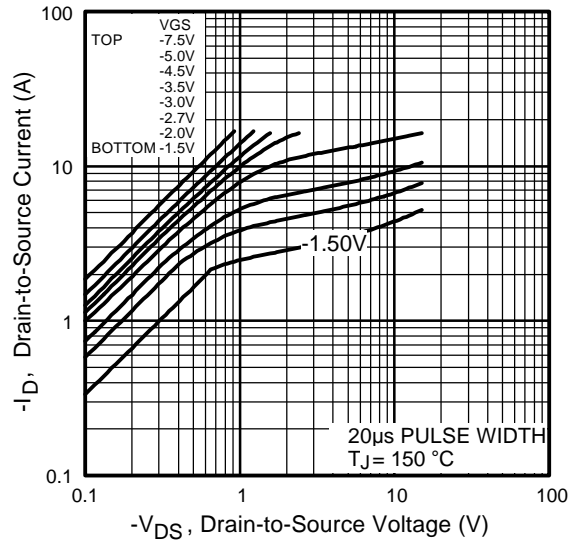


Fig 2. Typical Output Characteristics

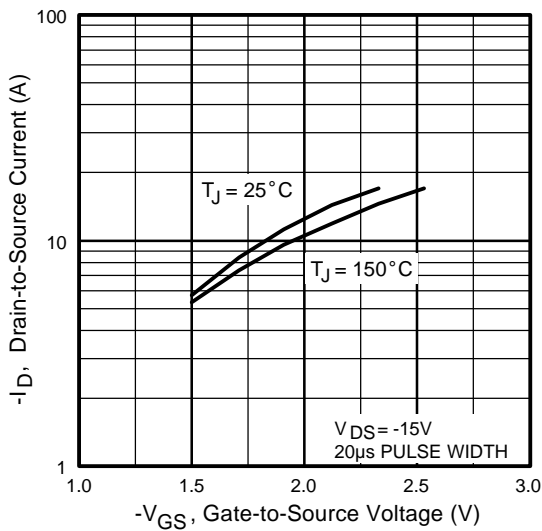


Fig 3. Typical Transfer Characteristics

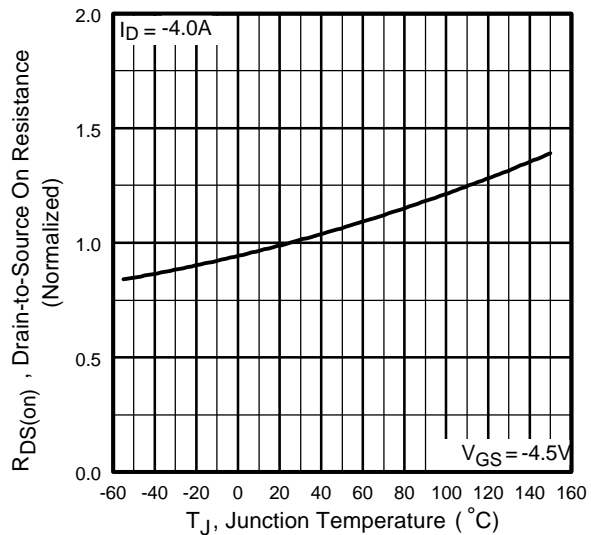
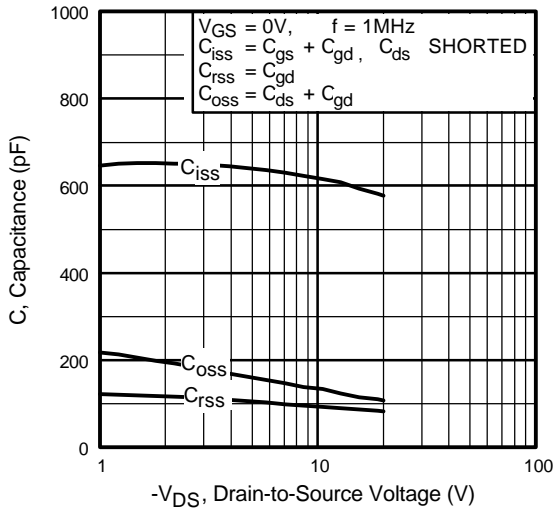
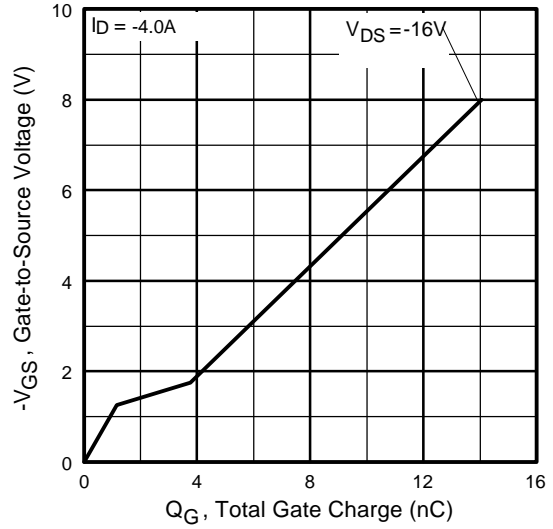


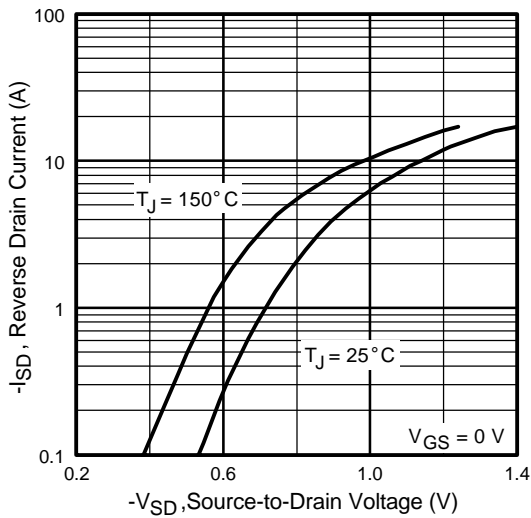
Fig 4. Normalized On-Resistance Vs. Temperature



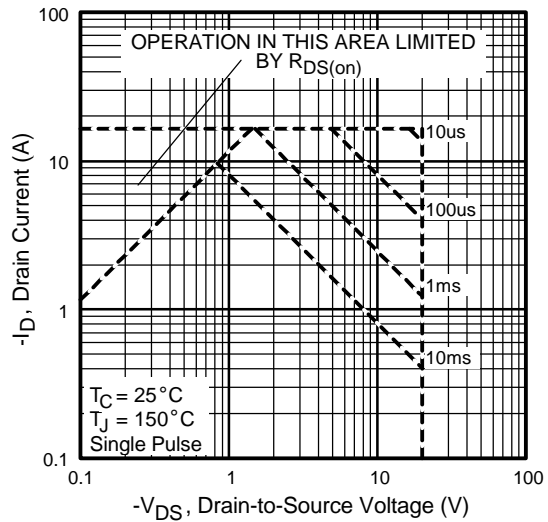
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



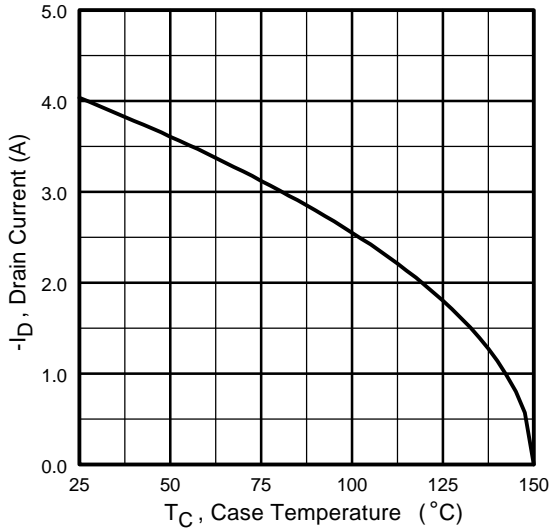
**Fig 6.** Typical Gate Charge Vs. Gate-to-Source Voltage



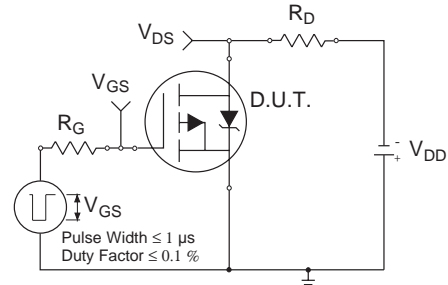
**Fig 7.** Typical Source-Drain Diode Forward Voltage



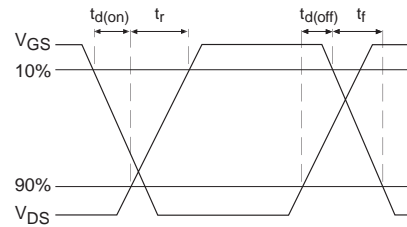
**Fig 8.** Maximum Safe Operating Area



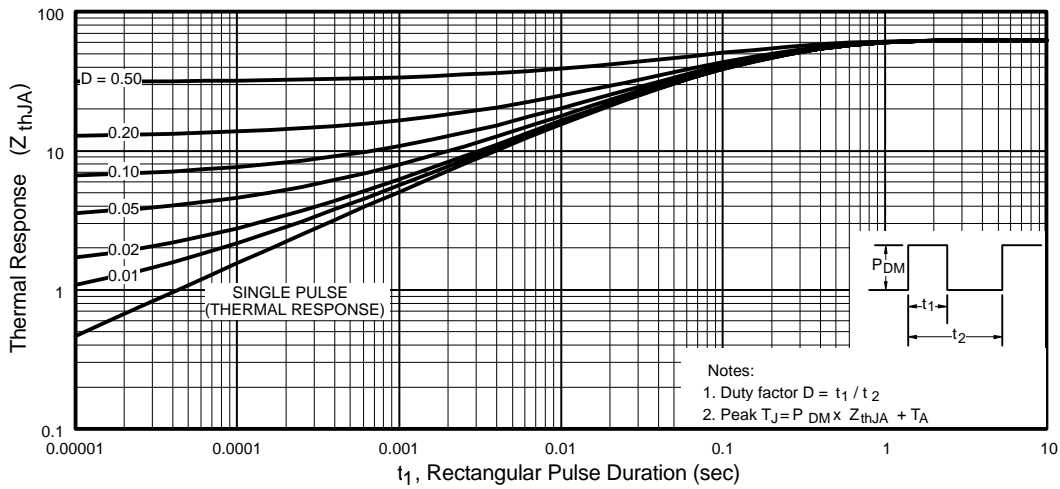
**Fig 9.** Maximum Drain Current Vs. Case Temperature



**Fig 10a.** Switching Time Test Circuit



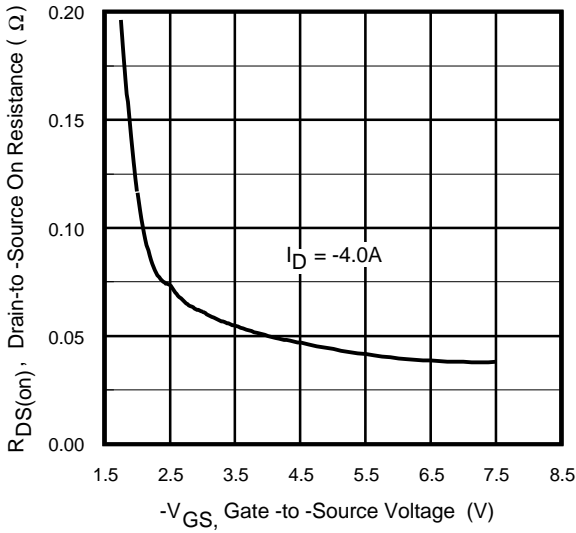
**Fig 10b.** Switching Time Waveforms



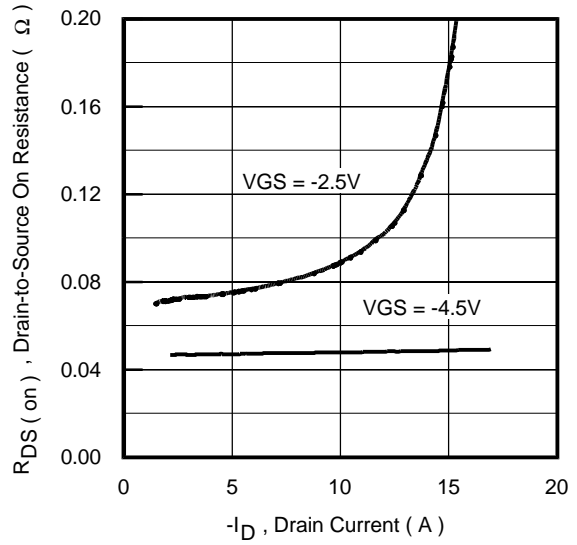
**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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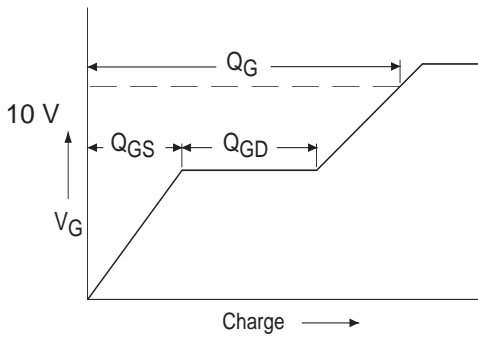
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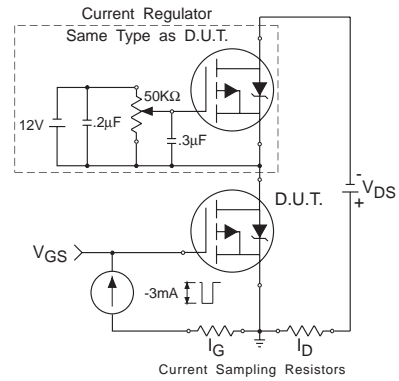
**Fig 12.** Typical On-Resistance Vs. Gate Voltage



**Fig 13.** Typical On-Resistance Vs. Drain Current

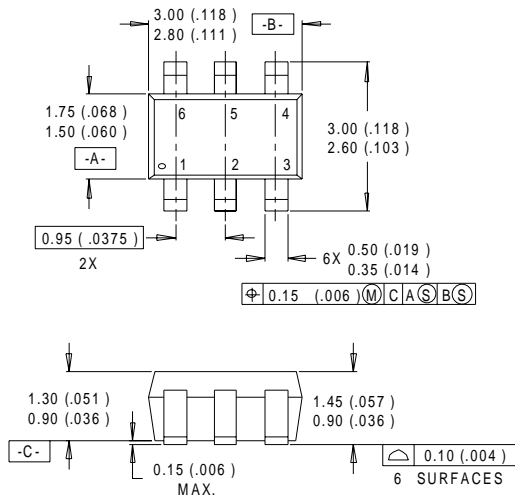


**Fig 14a.** Basic Gate Charge Waveform

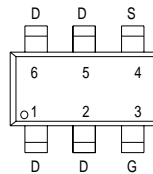


**Fig 14b.** Gate Charge Test Circuit

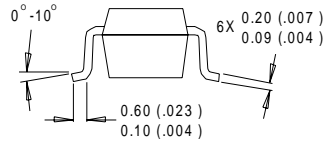
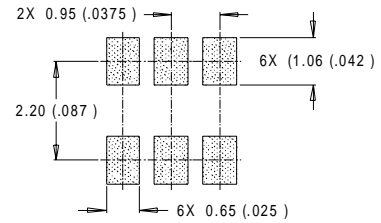
Package Outline  
Micro6™



LEAD ASSIGNMENTS



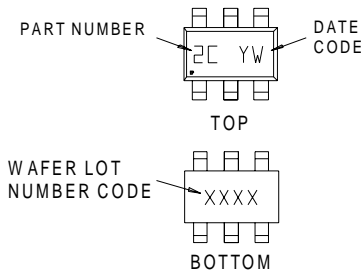
RECOMMENDED FOOTPRINT



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

Part Marking Information  
Micro6™

EXAMPLE : THIS IS AN IRLMS6702



- PART NUMBER EXAMPLES: DATE CODE EXAMPLES:
- 2A = IRLMS1902
  - 2B = IRLMS1503
  - 2C = IRLMS6702
  - 2D = IRLMS5703
  - YWW = 9603 = 6C
  - YWW = 9632 = FF

YEAR	Y	WORK WEEK	W	YEAR	Y	WORK WEEK	W
2001	1	01	A	2001	A	27	A
2002	2	02	B	2002	B	28	B
2003	3	03	C	2003	C	29	C
2004	4	04	D	2004	D	30	D
2005	5			2005	E		
1996	6			1996	F		
1997	7			1997	G		
1998	8			1998	H		
1999	9			1999	J		
2000	0	24	X	2000	K	50	X
		25	Y			51	Y
		26	Z			52	Z

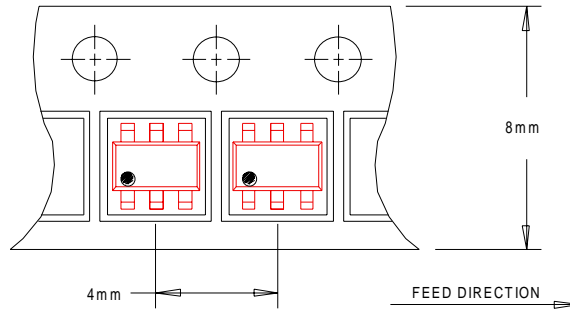
WORK WEEK = (1-26) IF PRECEDED BY LAST DIGIT OF CALENDER YEAR  
WORK WEEK = (27-52) IF PRECEDED BY A LETTER

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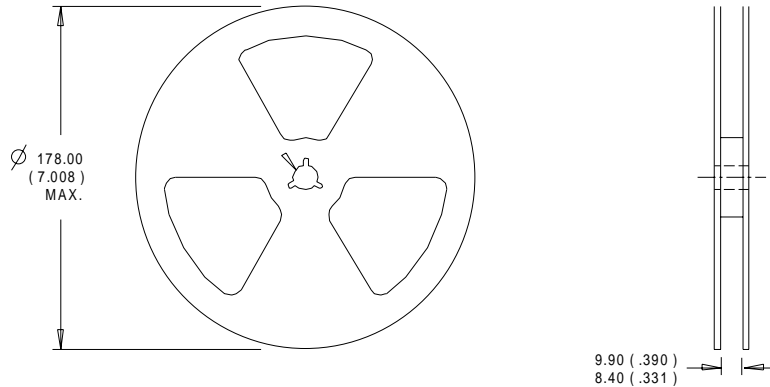
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## Tape & Reel Information

Micro6™



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



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

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**IR CANADA:** 15 Lincoln Court, Brampton, Ontario L6T3Z2, Tel: (905) 453 2200

**IR GERMANY:** Saalburgstrasse 157, 61350 Bad Homburg Tel: ++ 49 (0) 6172 96590

**IR ITALY:** Via Liguria 49, 10071 Borgaro, Torino Tel: ++ 39 011 451 0111

**IR JAPAN:** K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo 171 Tel: 81 (0)3 3983 0086

**IR SOUTHEAST ASIA:** 1 Kim Seng Promenade, Great World City West Tower, 13-11, Singapore 237994 Tel: ++ 65 (0)838 4630

**IR TAIWAN:** 16 Fl. Suite D. 207, Sec. 2, Tun Haw South Road, Taipei, 10673 Tel: 886-(0)2 2377 9936

*Data and specifications subject to change without notice. 10/00*