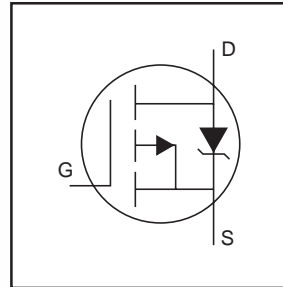


# IRLML5103

HEXFET® Power MOSFET

- Generation V Technology
- Ultra Low On-Resistance
- P-Channel MOSFET
- SOT-23 Footprint
- Low Profile (<1.1mm)
- Available in Tape and Reel
- Fast Switching

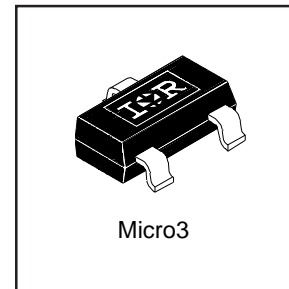


$V_{DSS} = -30V$
$R_{DS(on)} = 0.60\Omega$

## Description

Fifth Generation HEXFETs 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.

A customized 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.



## Absolute Maximum Ratings

	Parameter	Max.	Units
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-0.76	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -10V$	-0.61	
$I_{DM}$	Pulsed Drain Current ①	-4.8	
$P_D @ T_A = 25^\circ C$	Power Dissipation	540	mW
	Linear Derating Factor	4.3	mW/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	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

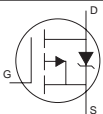
## Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ④	—	230	°C/W

## Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source Breakdown Voltage	-30	---	---	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temp. Coefficient	---	-0.029	---	V/°C	Reference to 25°C, I <sub>D</sub> = -1mA
R <sub>DS(ON)</sub>	Static Drain-to-Source On-Resistance	---	---	0.60	Ω	V <sub>GS</sub> = -10V, I <sub>D</sub> = -0.60A ③
		---	---	1.0		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -0.30A ③
V <sub>GS(th)</sub>	Gate Threshold Voltage	-1.0	---	---	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA
g <sub>fs</sub>	Forward Transconductance	0.44	---	---	S	V <sub>DS</sub> = -10V, I <sub>D</sub> = -0.30A
I <sub>DSS</sub>	Drain-to-Source Leakage Current	---	---	-1.0	μA	V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V
		---	---	-25		V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	---	---	-100	nA	V <sub>GS</sub> = -20V
	Gate-to-Source Reverse Leakage	---	---	100		V <sub>GS</sub> = 20V
Q <sub>g</sub>	Total Gate Charge	---	3.4	5.1	nC	I <sub>D</sub> = -0.60A
Q <sub>gs</sub>	Gate-to-Source Charge	---	0.52	0.78		V <sub>DS</sub> = -24V
Q <sub>gd</sub>	Gate-to-Drain ("Miller") Charge	---	1.1	1.7		V <sub>GS</sub> = -10V, See Fig. 6 and 9 ③
t <sub>d(on)</sub>	Turn-On Delay Time	---	10	---	ns	V <sub>DD</sub> = -15V
t <sub>r</sub>	Rise Time	---	8.2	---		I <sub>D</sub> = -0.60A
t <sub>d(off)</sub>	Turn-Off Delay Time	---	23	---		R <sub>G</sub> = 6.2Ω
t <sub>f</sub>	Fall Time	---	16	---		R <sub>D</sub> = 25Ω, See Fig. 10 ③
C <sub>iss</sub>	Input Capacitance	---	75	---	pF	V <sub>GS</sub> = 0V
C <sub>oss</sub>	Output Capacitance	---	37	---		V <sub>DS</sub> = -25V
C <sub>rss</sub>	Reverse Transfer Capacitance	---	18	---		f = 1.0MHz, See Fig. 5

## Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	---	---	-0.54	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode) ①	---	---	-4.8		
V <sub>SD</sub>	Diode Forward Voltage	---	---	-1.2	V	T <sub>J</sub> = 25°C, I <sub>S</sub> = -0.60A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	Reverse Recovery Time	---	26	39	ns	T <sub>J</sub> = 25°C, I <sub>F</sub> = -0.60A
Q <sub>rr</sub>	Reverse Recovery Charge	---	20	30	nC	di/dt = 100A/μs ③

### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 11 )
- ② I<sub>SD</sub> ≤ -0.60A, di/dt ≤ 110A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 150°C
- ③ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ④ Surface mounted on FR-4 board, t ≤ 5sec.

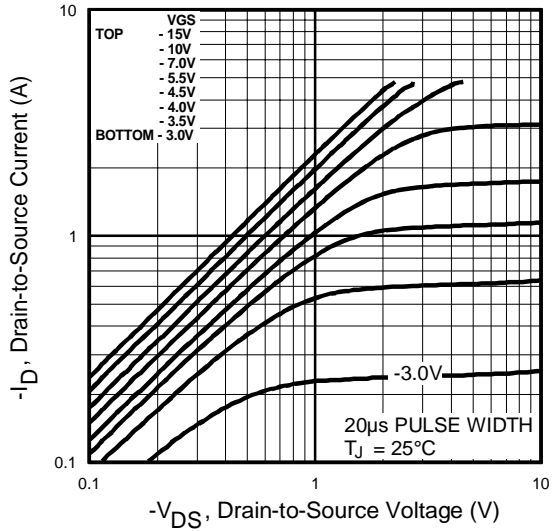


Fig 1. Typical Output Characteristics

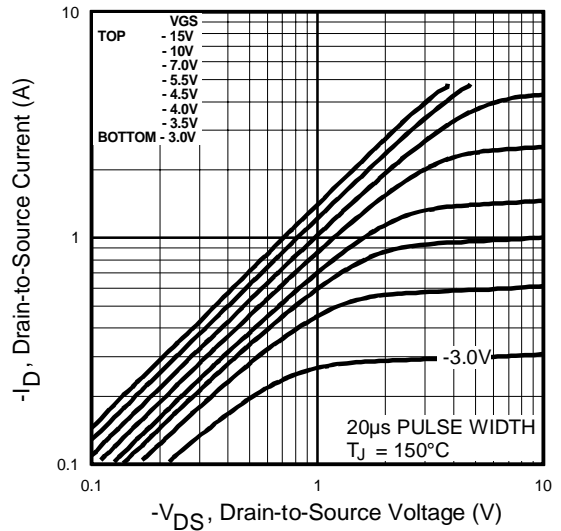


Fig 2. Typical Output Characteristics

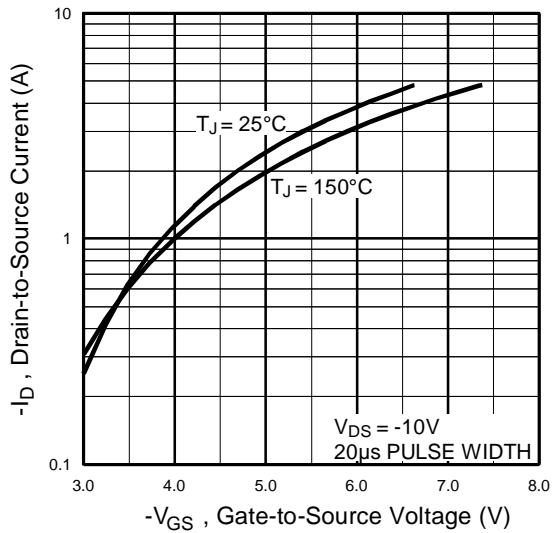


Fig 3. Typical Transfer Characteristics

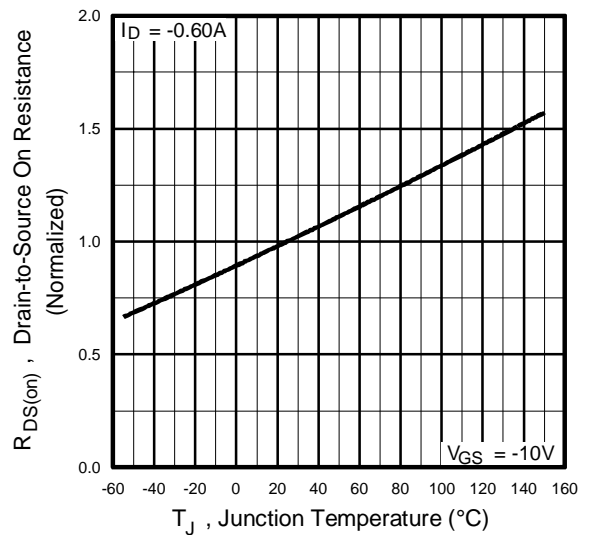
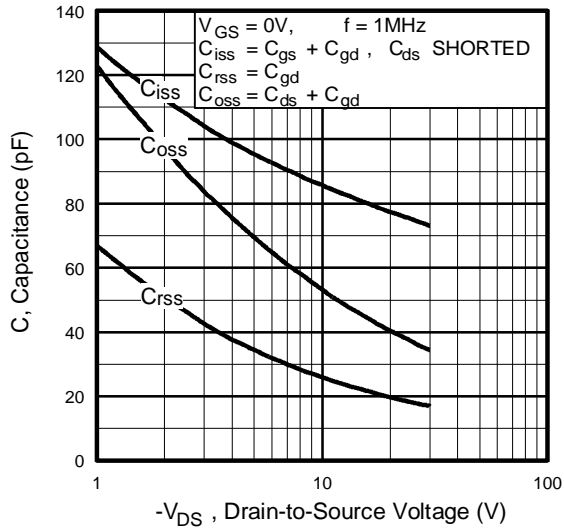
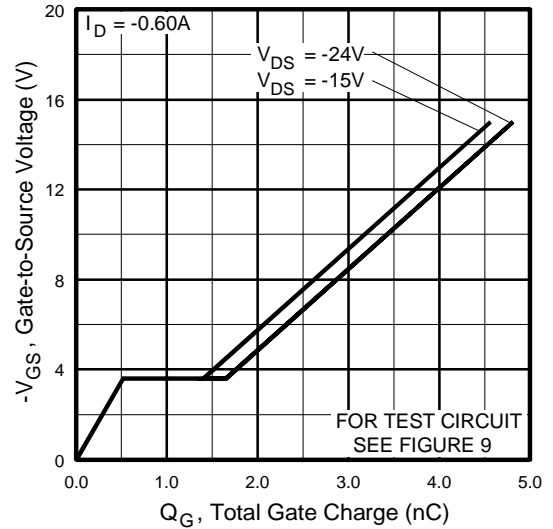


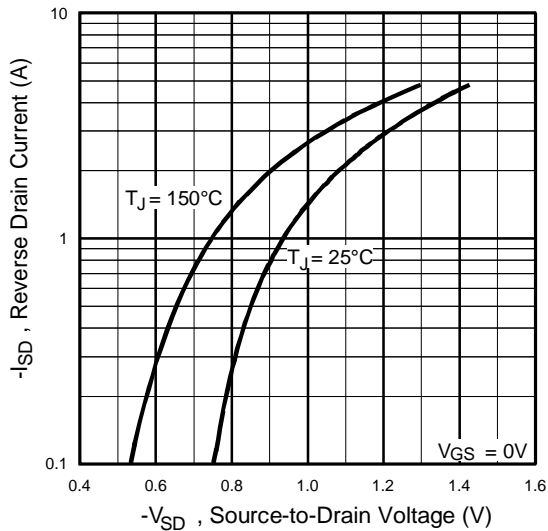
Fig 4. Normalized On-Resistance Vs. Temperature



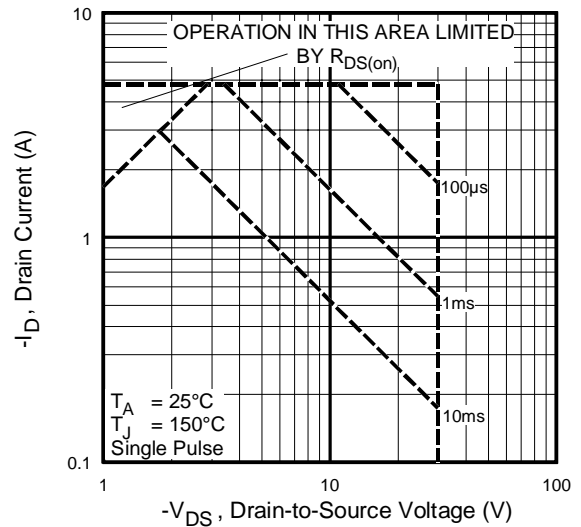
**Fig 5.** Typical Capacitance Vs. Drain-to-Source Voltage



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



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



**Fig 8.** Maximum Safe Operating Area

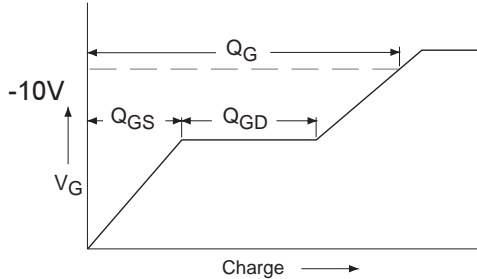


Fig 9a. Basic Gate Charge Waveform

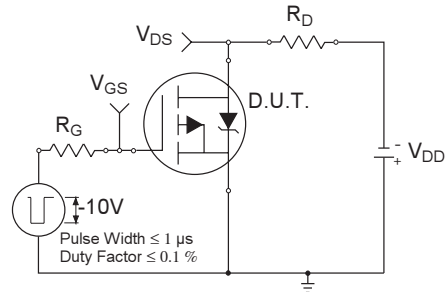


Fig 10a. Switching Time Test Circuit

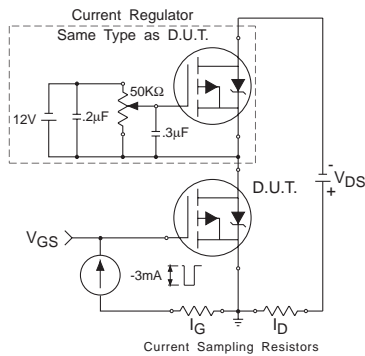


Fig 9b. Gate Charge Test Circuit

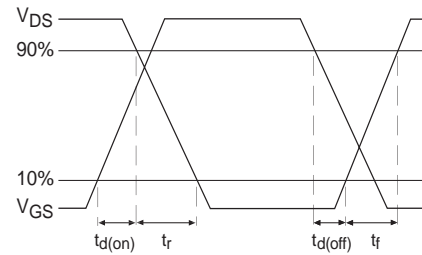


Fig 10b. Switching Time Waveforms

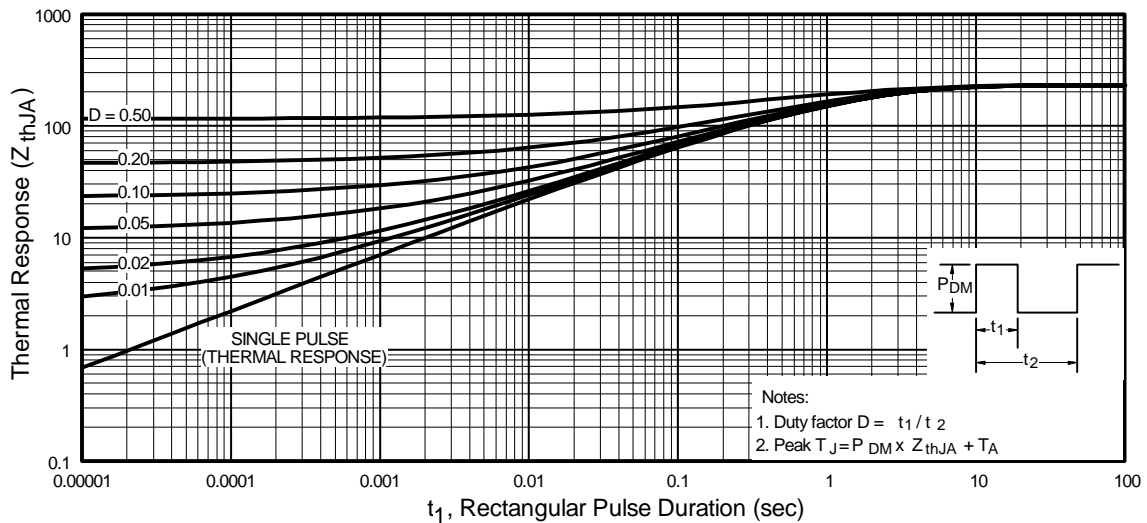
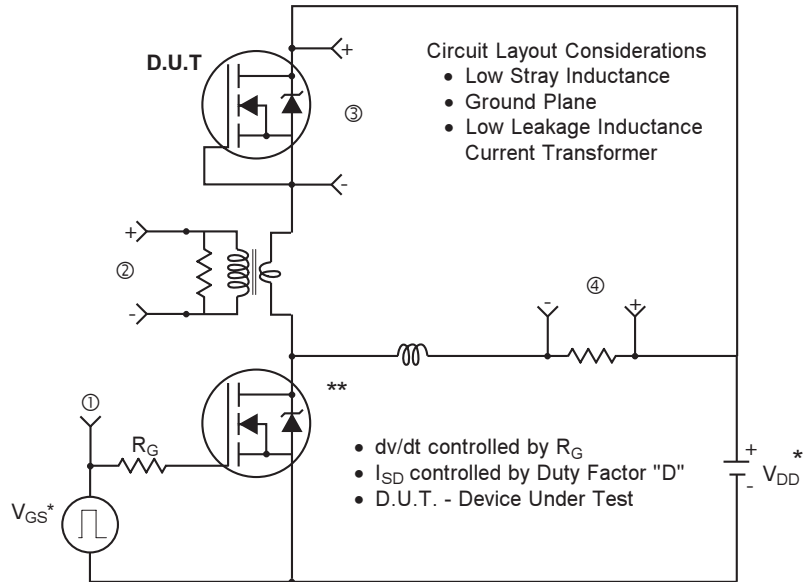


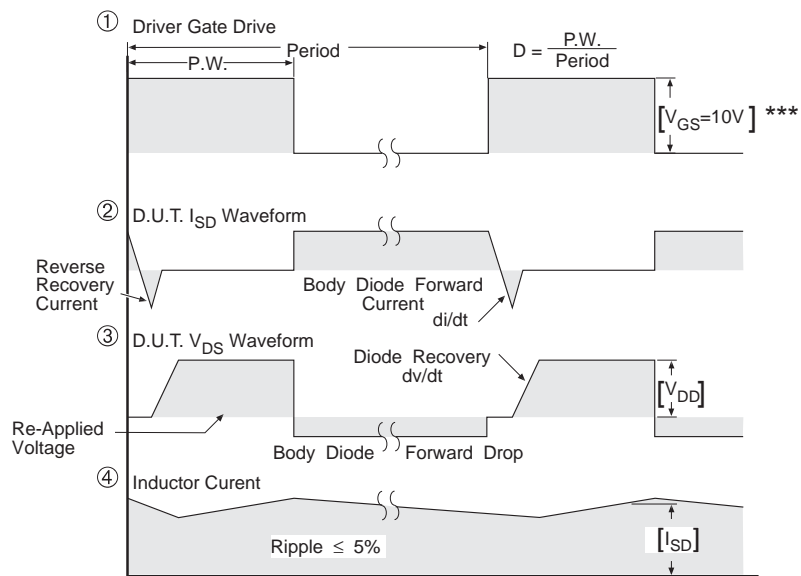
Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

## Peak Diode Recovery dv/dt Test Circuit



\* Reverse Polarity for P-Channel

\*\* Use P-Channel Driver for P-Channel Measurements



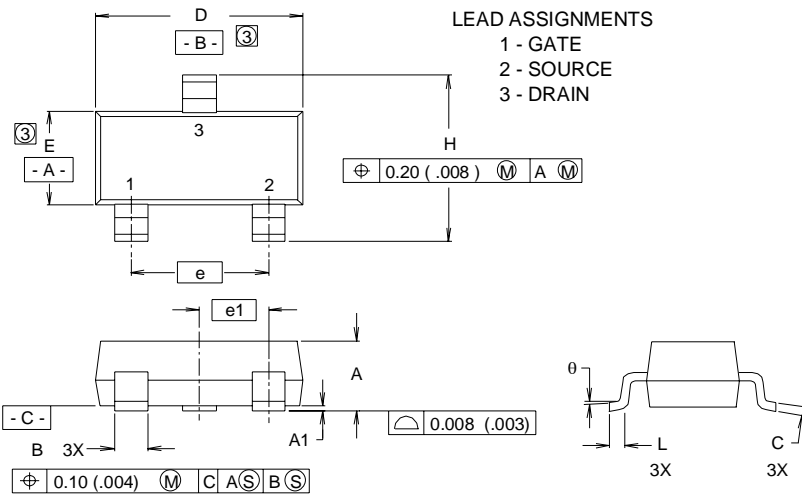
\*\*\*  $V_{GS} = 5.0V$  for Logic Level and 3V Drive Devices

**Fig 13. For P-Channel HEXFETS**

## Package Outline

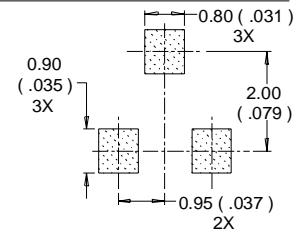
### SOT-23 Outline

Dimensions are shown in millimeters (inches)



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.032	.044	0.82	1.11
A1	.001	.004	0.02	0.10
B	.015	.021	0.38	0.54
C	.004	.006	0.10	0.15
D	.105	.120	2.67	3.05
e	.0750 BASIC		1.90 BASIC	
e1	.0375 BASIC		0.95 BASIC	
E	.047	.055	1.20	1.40
H	.083	.098	2.10	2.50
L	.005	.010	0.13	0.25
θ	0°	8°	0°	8°

#### MINIMUM RECOMMENDED FOOTPRINT



#### NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
- ③ DIMENSIONS DO NOT INCLUDE MOLD FLASH.

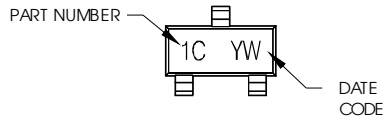
# IRLML5103

## Part Marking Information SOT-23

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

EXAMPLE: THIS IS AN IRLML6302

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



PART NUMBER CODE REFERENCE:

- 1A = IRLML2402
- 1B = IRLML2803
- 1C = IRLML6302
- 1D = IRLML5103
- 1E = IRLML6402
- 1F = IRLML6401
- 1G = IRLML2502
- 1H = IRLML5203

DATE CODE EXAMPLES:

- YWW = 9503 = 5C
- YWW = 9532 = EF

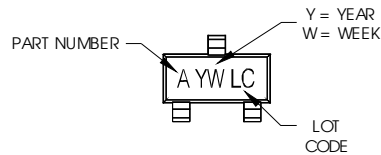
YEAR	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
1994	4	04	D
1995	5		
1996	6		
1997	7		
1998	8		
1999	9		
2000	0	24	X
		25	Y
		26	Z

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
1994	D	30	D
1995	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 = IRLML2402
- B = IRLML2803
- C = IRLML6302
- D = IRLML5103
- E = IRLML6402
- F = IRLML6401
- G = IRLML2502
- H = IRLML5203

YEAR	Y	WORK WEEK	W
2001	1	01	A
2002	2	02	B
2003	3	03	C
1994	4	04	D
1995	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

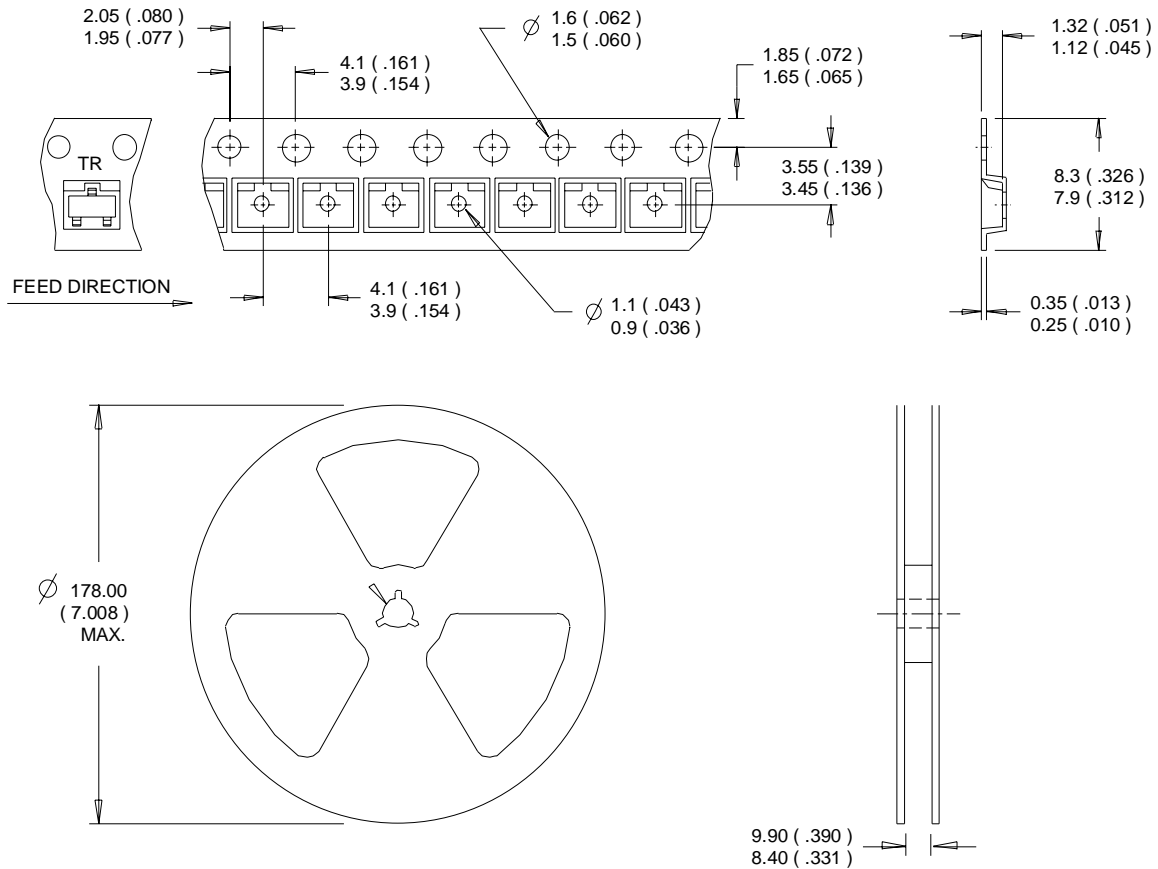
YEAR	Y	WORK WEEK	W
2001	A	27	A
2002	B	28	B
2003	C	29	C
1994	D	30	D
1995	E		
1996	F		
1997	G		
1998	H		
1999	J		
2000	K	50	X
		51	Y
		52	Z



**Tape & Reel Information**

**SOT-23**

Dimensions are shown in millimeters (inches)



**NOTES:**

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

Data and specifications subject to change without notice.