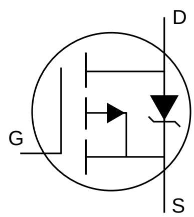
International
IOR Rectifier

PD - 9.1260D

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



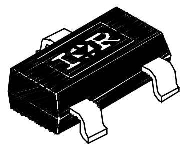
V_{DSS} = -30V

$R_{DS(on)}$ = 0.60Ω

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.



Micro3

Absolute Maximum Ratings

	Parameter	Max.	Units
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ -10V	-0.76	
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ -10V	-0.61	A
I_{DM}	Pulsed Drain Current ①	-4.8	
P_D @T_A = 25°C	Power Dissipation	540	mW
	Linear Derating Factor	4.3	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

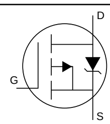
	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient ④	——	230	°C/W

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
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	——	-0.029	——	V/°C	Reference to 25°C, I_D = -1mA
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	——	——	0.60	Ω	V_{GS} = -10V, I_D = -0.60A ③
		——	——	1.0		V_{GS} = -4.5V, I_D = -0.30A ③
$V_{GS(th)}$	Gate Threshold Voltage	-1.0	——	——	V	V_{DS} = V_{GS}, I_D = -250µA
g_{fs}	Forward Transconductance	0.44	——	——	S	V_{DS} = -10V, I_D = -0.30A
I_{DSS}	Drain-to-Source Leakage Current	——	——	-1.0	µA	V_{DS} = -24V, V_{GS} = 0V
		——	——	-25		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	——	3.4	5.1	nC	I_D = -0.60A
Q_{gs}	Gate-to-Source Charge	——	0.52	0.78		V_{DS} = -24V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	1.1	1.7		V_{GS} = -10V, See Fig. 6 and 9 ③
$t_{d(on)}$	Turn-On Delay Time	——	10	——	ns	V_{DD} = -15V
t_r	Rise Time	——	8.2	——		I_D = -0.60A
$t_{d(off)}$	Turn-Off Delay Time	——	23	——		R_G = 6.2Ω
t_f	Fall Time	——	16	——		R_D = 25Ω, See Fig. 10 ③
C_{iss}	Input Capacitance	——	75	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	37	——		V_{DS} = -25V
C_{rss}	Reverse Transfer Capacitance	——	18	——		f = 1.0MHz, See Fig. 5

Source-Drain Ratings and Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	-0.54	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	-4.8		
V_{SD}	Diode Forward Voltage	——	——	-1.2	V	T_J = 25°C, I_S = -0.60A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	26	39	ns	T_J = 25°C, I_F = -0.60A
Q_{rr}	Reverse RecoveryCharge	——	20	30	nC	di/dt = 100A/µs ③



Notes:

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

② $I_{SD} \leq$ -0.60A, di/dt $\leq$ 110A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C

③ Pulse width ≤ 300µs; duty cycle ≤ 2%.

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

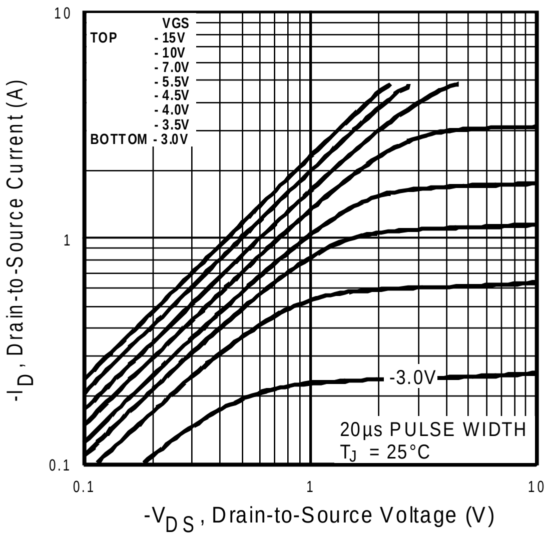


Fig 1. Typical Output Characteristics

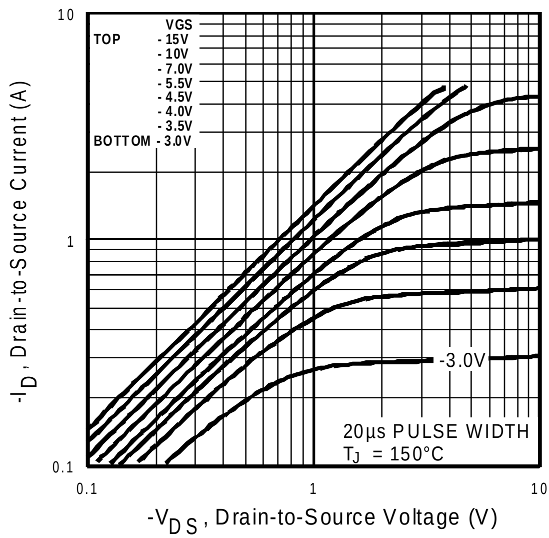


Fig 2. Typical Output Characteristics

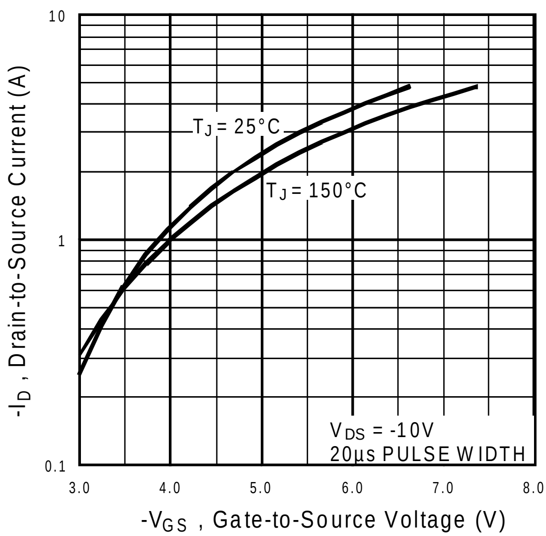


Fig 3. Typical Transfer Characteristics

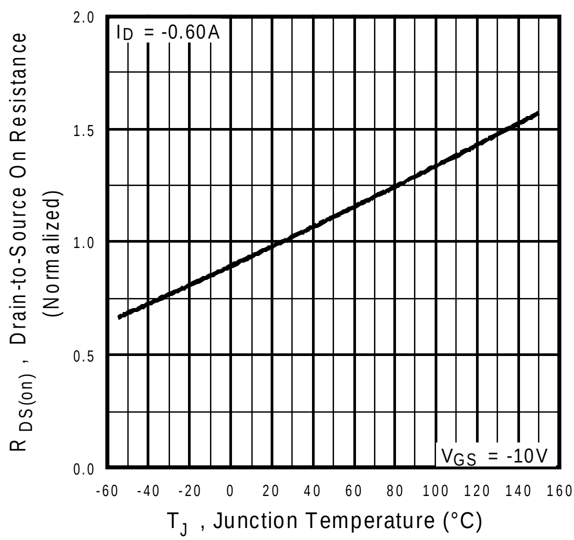


Fig 4. Normalized On-Resistance
Vs. Temperature

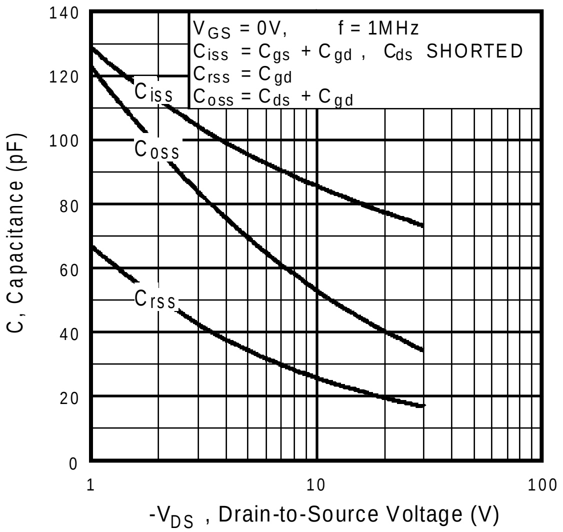


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

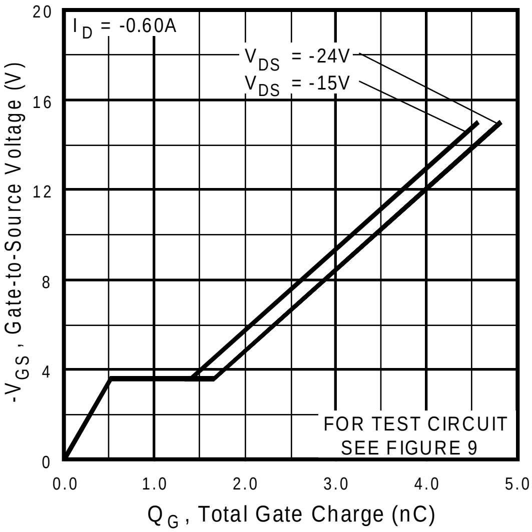


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

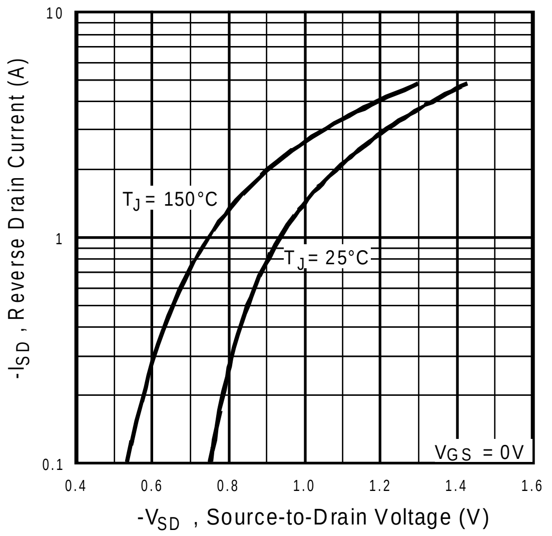


Fig 7. Typical Source-Drain Diode Forward Voltage

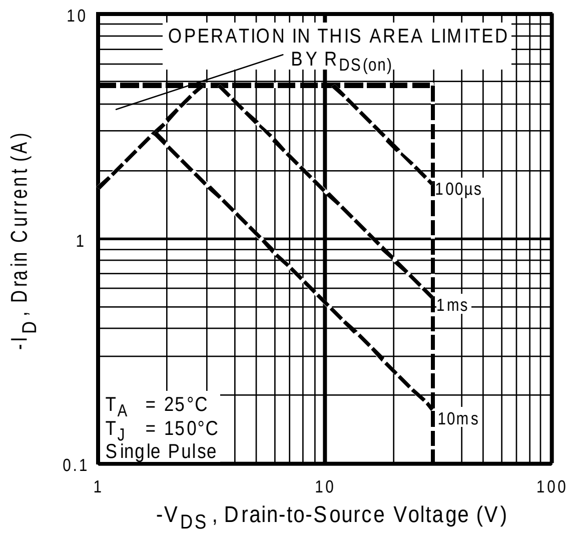


Fig 8. Maximum Safe Operating Area

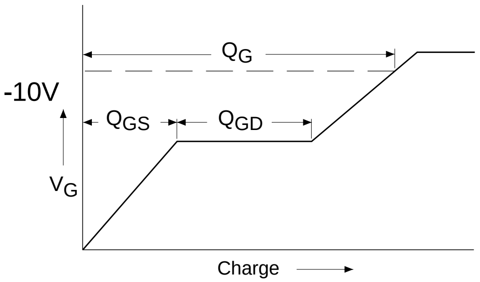


Fig 9a. Basic Gate Charge Waveform

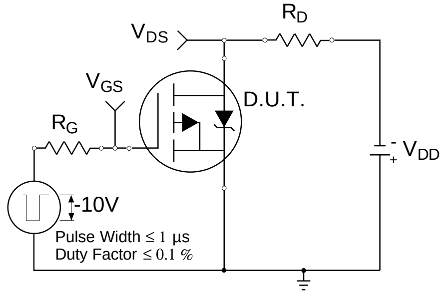


Fig 10a. Switching Time Test Circuit

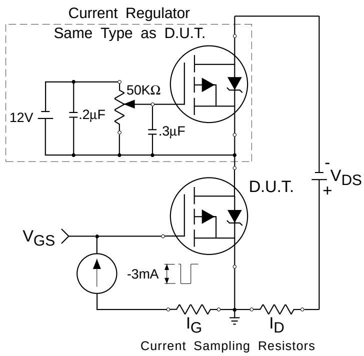


Fig 9b. Gate Charge Test Circuit

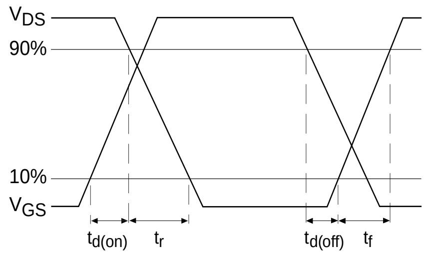


Fig 10b. Switching Time Waveforms

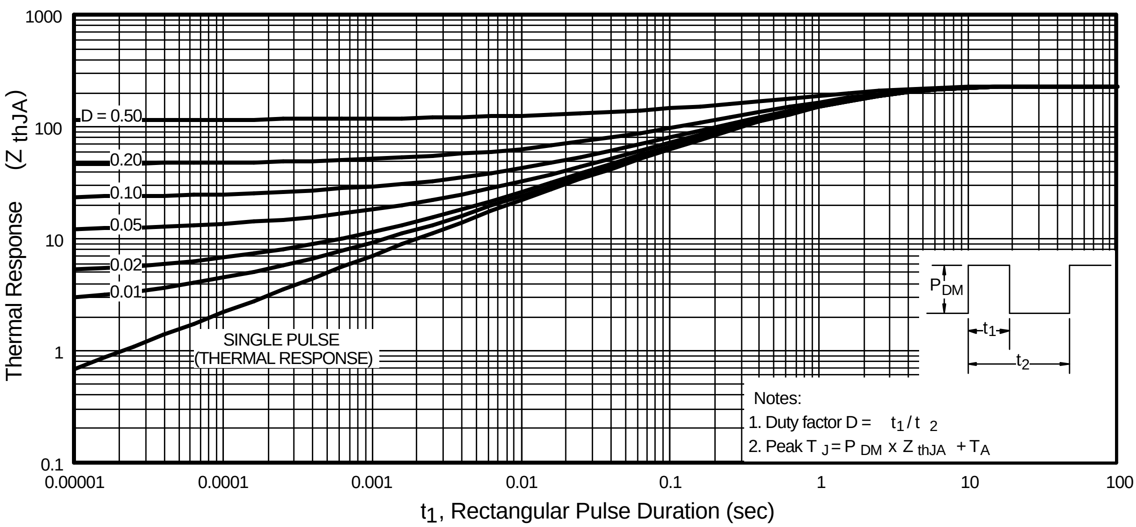
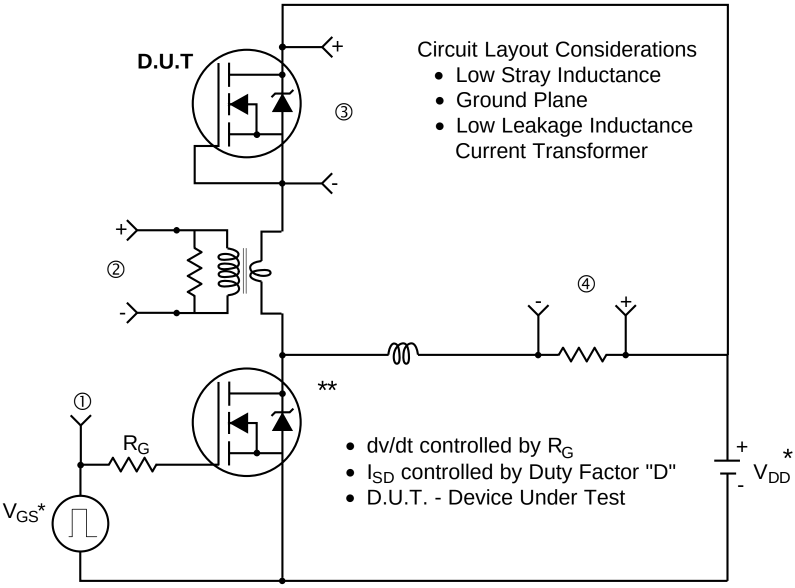
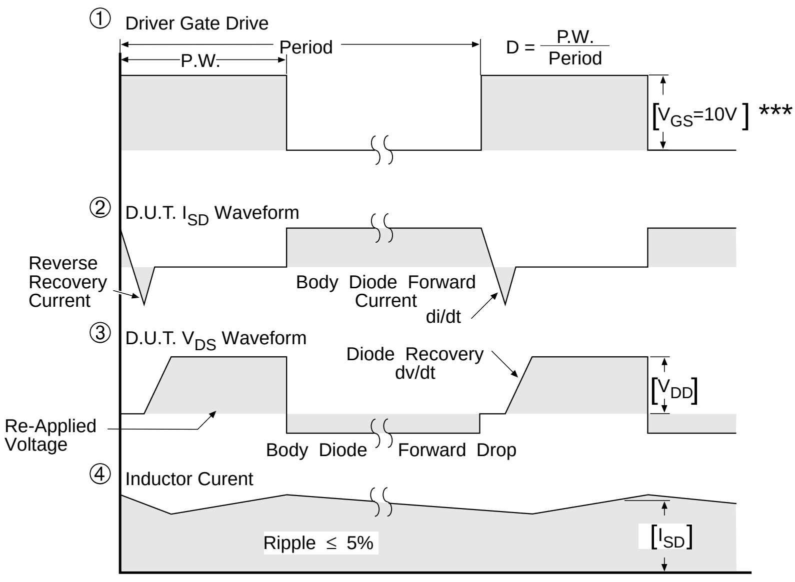


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

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

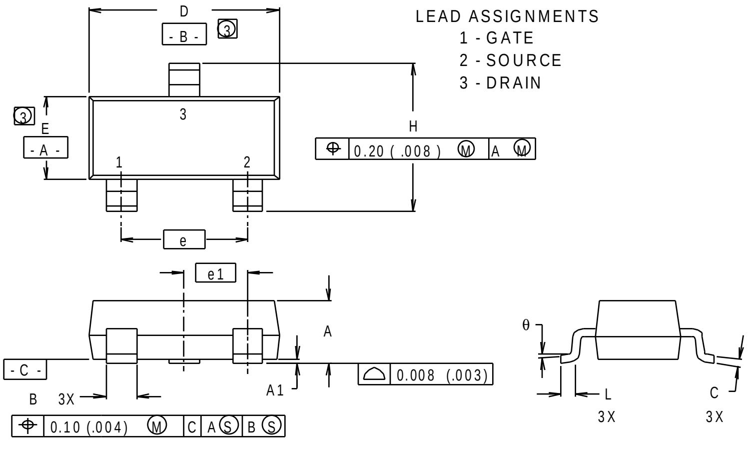
Fig 13. For P-Channel HEXFETS

Package Outline

SOT-23 Outline

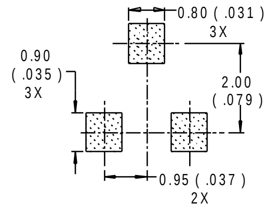
Dimensions are shown in millimeters (inches)

LEAD ASSIGNMENTS
1 - GATE
2 - SOURCE
3 - DRAIN



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

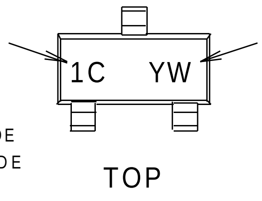


NOTES:
1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION : INCH.
3. DIMENSIONS DO NOT INCLUDE MOLD FLASH.

Part Marking Information

SOT-23

EXAMPLE : THIS IS AN IRLML6302



Y = YEAR CODE
W = WEEK CODE

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

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

PART NUMBER EXAMPLES:
1A = IRLML2402
1B = IRLML2803
1C = IRLML6302
1D = IRLML5103

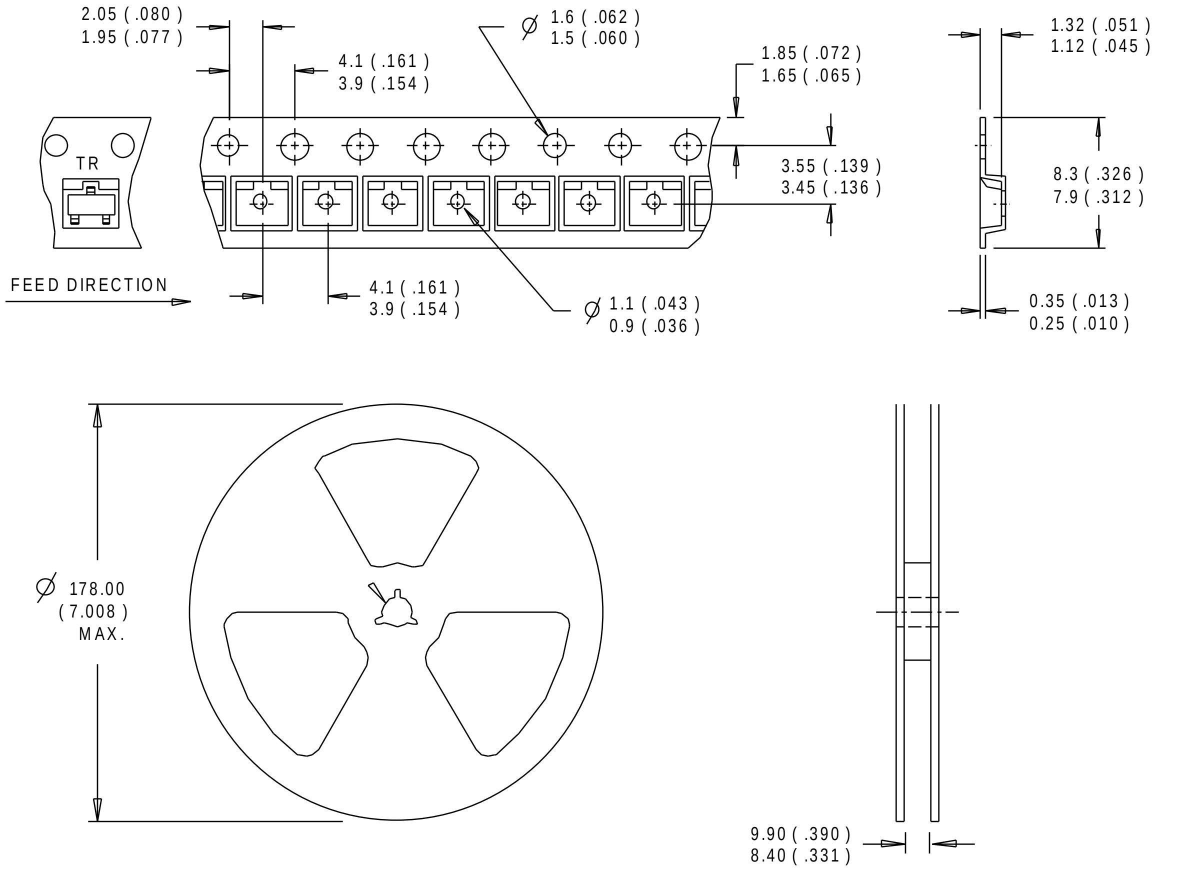
DATE CODE EXAMPLES:
YWW = 9503 = 5C
YWW = 9532 = EF

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

Tape & Reel Information

SOT-23

Dimensions are shown in millimeters (inches)



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

International IOR Rectifier

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