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PD - 93938B

International
IOR Rectifier

SMPS MOSFET

IRF3708
IRF3708S
IRF3708L

HEXFET® Power MOSFET

V_{DSS}	$R_{DS(on)}$ max	I_D
30V	12mΩ	62A

Applications

- High Frequency DC-DC Isolated Converters with Synchronous Rectification for Telecom and Industrial Use
- High Frequency Buck Converters for Computer Processor Power

Benefits

- Ultra-Low Gate Impedance
- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- Fully Characterized Avalanche Voltage and Current

TO-220AB IRF3708 | D²Pak IRF3708S | TO-262 IRF3708L

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	±12	V
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	62	A
I_D @ T_C = 70°C	Continuous Drain Current, V_{GS} @ 10V	52	
I_{DM}	Pulsed Drain Current①	248	
P_D @T_C = 25°C	Maximum Power Dissipation③	87	W
P_D @T_C = 70°C	Maximum Power Dissipation③	61	W
	Linear Derating Factor	0.58	W/°C
T_J , T_{STG}	Junction and Storage Temperature Range	-55 to + 175	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	——	1.73	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface ④	0.50	——	
$R_{\theta JA}$	Junction-to-Ambient④	——	62	
$R_{\theta JA}$	Junction-to-Ambient (PCB mount)*	——	40	

* When mounted on 1" square PCB (FR-4 or G-10 Material) .
For recommended footprint and soldering techniques refer to application note #AN-994

Notes ① through ④ are on page 10

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Static @ 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	——	0.028	——	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	——	8	12.0	mΩ	V_{GS} = 10V, I_D = 15A ③
		——	9.5	13.5		V_{GS} = 4.5V, I_D = 12A ③
		——	14.5	29		V_{GS} = 2.8V, I_D = 7.5A ③
$V_{GS(th)}$	Gate Threshold Voltage	0.6	——	2.0	V	V_{DS} = V_{GS}, I_D = 250µA
I_{DSS}	Drain-to-Source Leakage Current	——	——	20	µA	V_{DS} = 24V, V_{GS} = 0V
		——	——	100		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	——	——	200	nA	V_{GS} = 12V
	Gate-to-Source Reverse Leakage	——	——	-200		V_{GS} = -12V

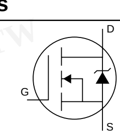
Dynamic @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	49	——	——	S	V_{DS} = 15V, I_D = 50A
Q_g	Total Gate Charge	——	24	——	nC	I_D = 24.8A
Q_{gs}	Gate-to-Source Charge	——	6.7	——		V_{DS} = 15V
Q_{gd}	Gate-to-Drain ("Miller") Charge	——	5.8	——		V_{GS} = 4.5V ③
Q_{oss}	Output Gate Charge	——	14	21		V_{GS} = 0V, I_D = 24.8A, V_{DS} = 15V
$t_{d(on)}$	Turn-On Delay Time	——	7.2	——	ns	V_{DD} = 15V
t_r	Rise Time	——	50	——		I_D = 24.8A
$t_{d(off)}$	Turn-Off Delay Time	——	17.6	——		R_G = 0.6Ω
t_f	Fall Time	——	3.7	——		V_{GS} = 4.5V ③
C_{iss}	Input Capacitance	——	2417	——	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	——	707	——		V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance	——	52	——		f = 1.0MHz

Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	——	213	mJ
I_{AR}	Avalanche Current①	——	62	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	——	——	62	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	——	——	248		
V_{SD}	Diode Forward Voltage	——	0.88	1.3	V	T_J = 25°C, I_S = 31A, V_{GS} = 0V ③
		——	0.80	——		T_J = 125°C, I_S = 31A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	——	41	62	ns	T_J = 25°C, I_F = 31A, V_R=20V
Q_{rr}	Reverse Recovery Charge	——	64	96	nC	di/dt = 100A/µs ③
t_{rr}	Reverse Recovery Time	——	43	65	ns	T_J = 125°C, I_F = 31A, V_R=20V
Q_{rr}	Reverse Recovery Charge	——	70	105	nC	di/dt = 100A/µs ③

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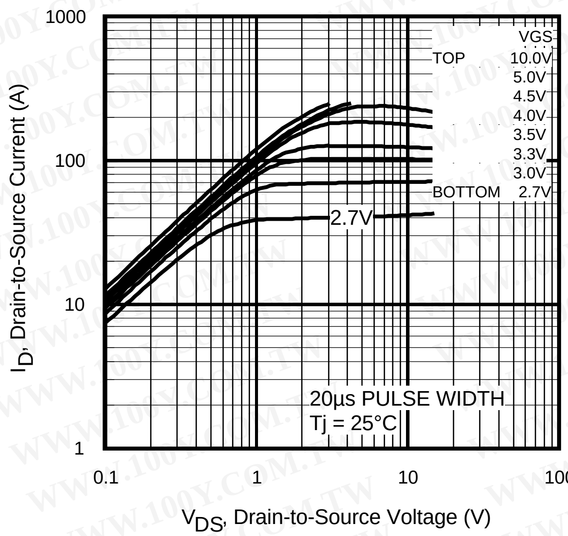

Fig 1. Typical Output Characteristics

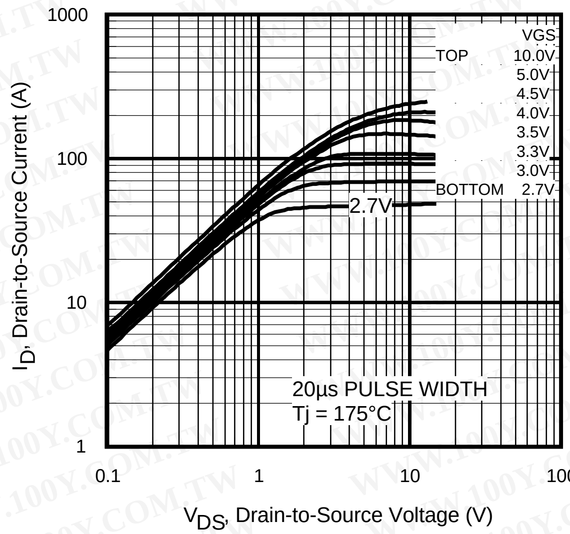

Fig 2. Typical Output Characteristics

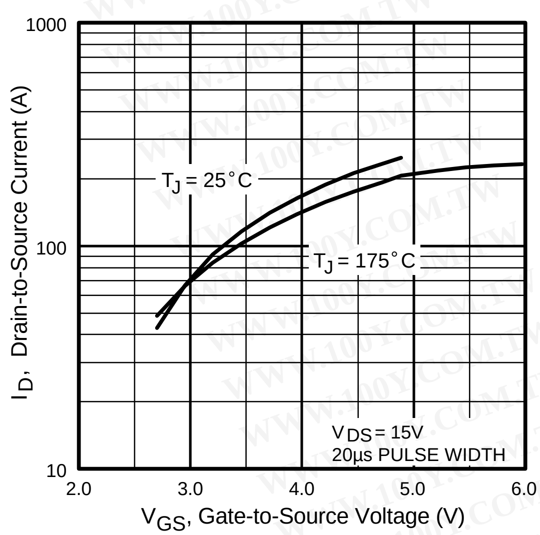

Fig 3. Typical Transfer Characteristics

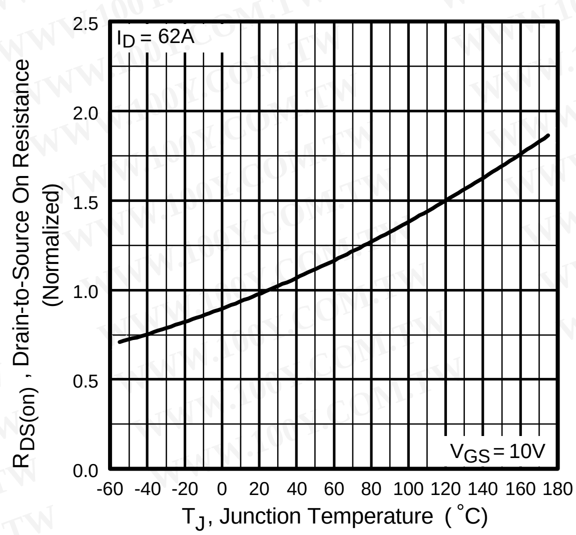

Fig 4. Normalized On-Resistance
Vs. Temperature

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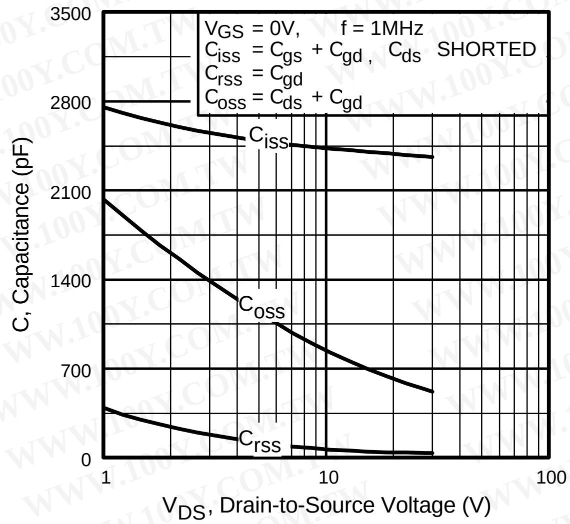

Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

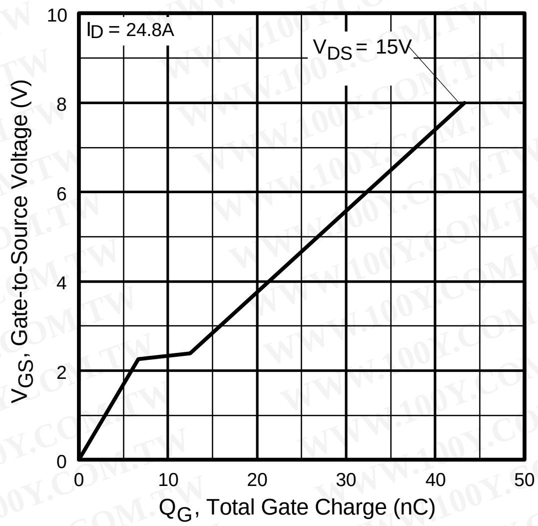

Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

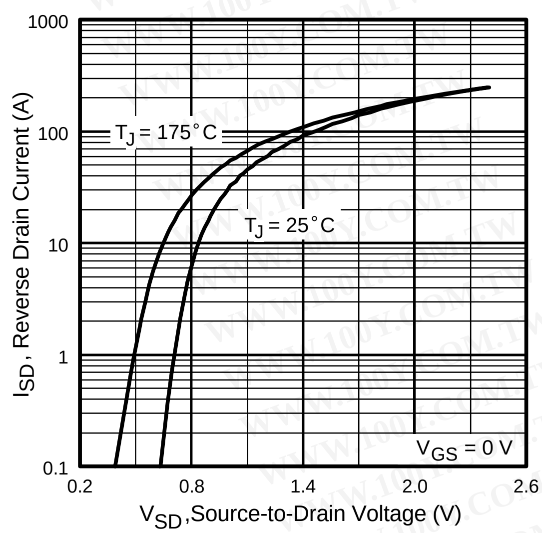

Fig 7. Typical Source-Drain Diode Forward Voltage

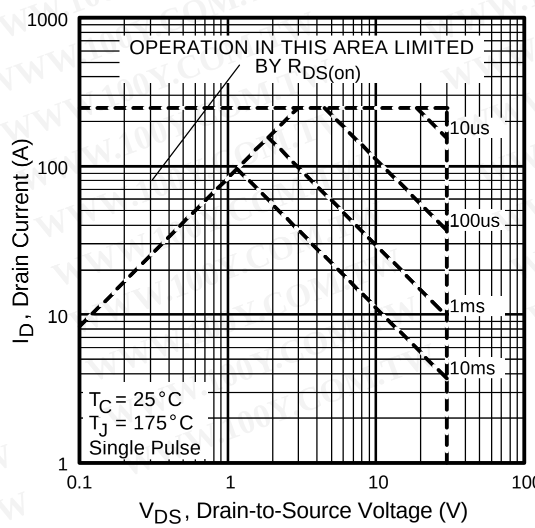

Fig 8. Maximum Safe Operating Area

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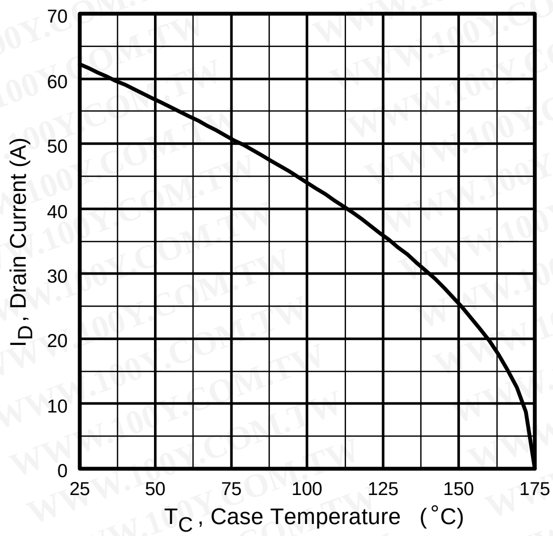

Fig 9. Maximum Drain Current Vs. Case Temperature

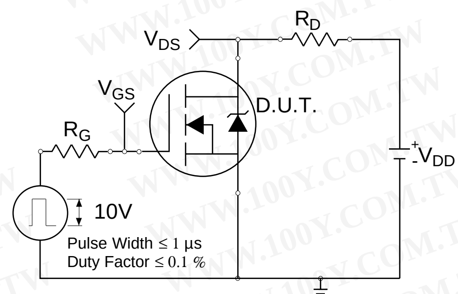

Fig 10a. Switching Time Test Circuit

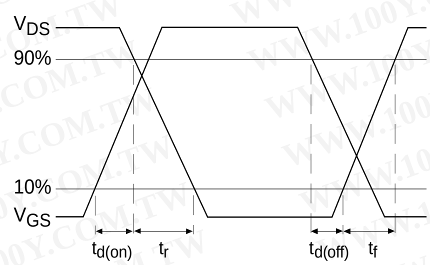

Fig 10b. Switching Time Waveforms

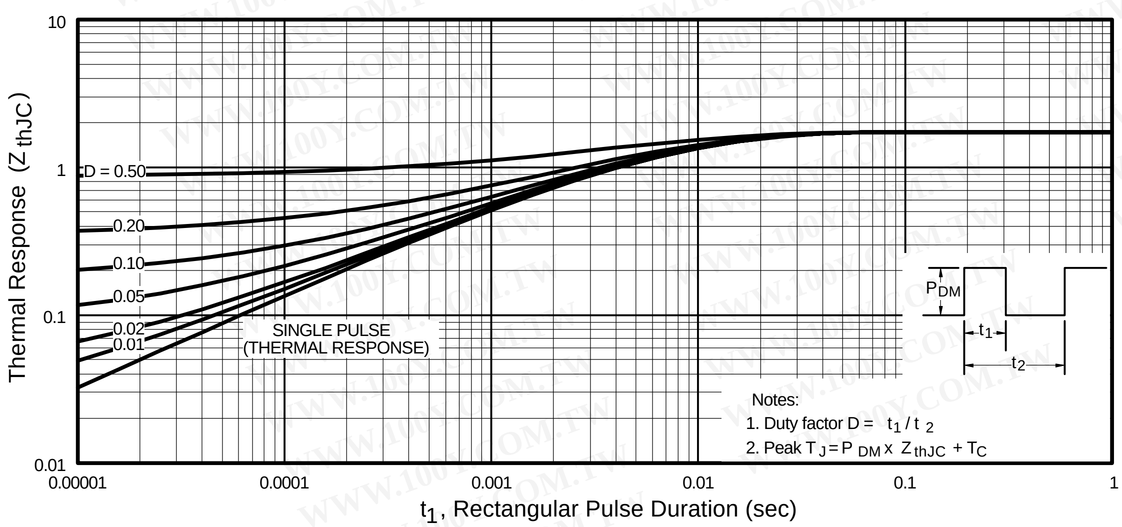

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

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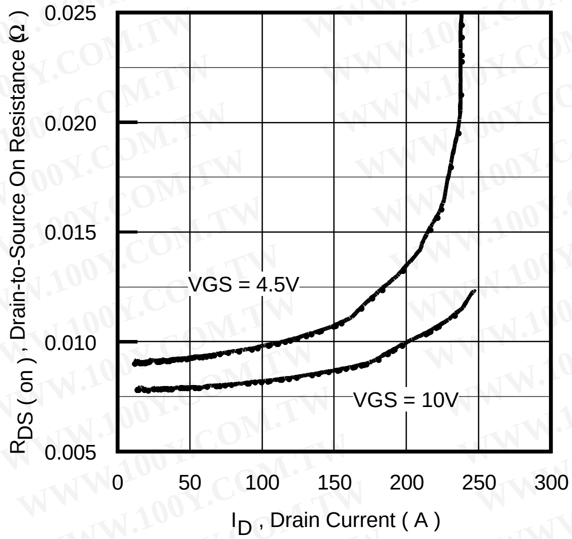

Fig 12. On-Resistance Vs. Drain Current

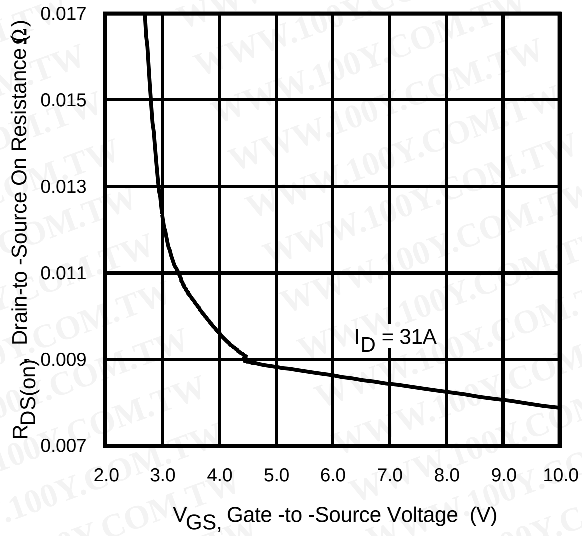

Fig 13. On-Resistance Vs. Gate Voltage

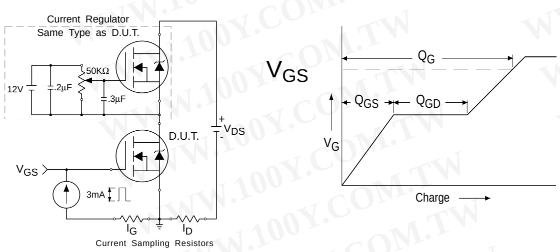

Fig 14a&b. Gate Charge Test Circuit and Waveform

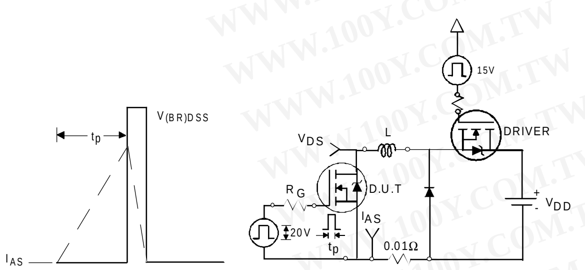

Fig 15a&b. Unclamped Inductive Test circuit and Waveforms

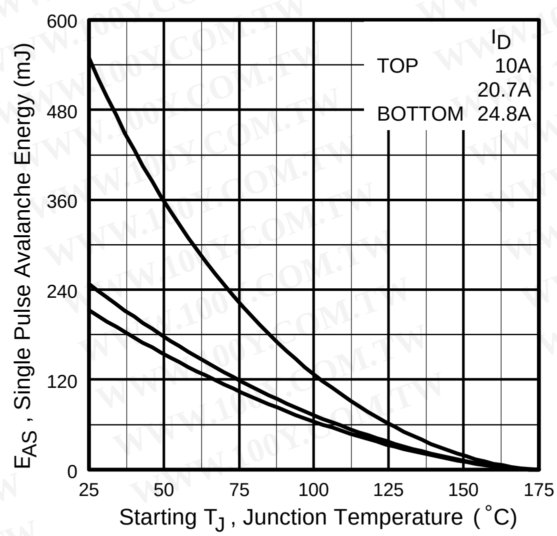

Fig 15c. Maximum Avalanche Energy Vs. Drain Current

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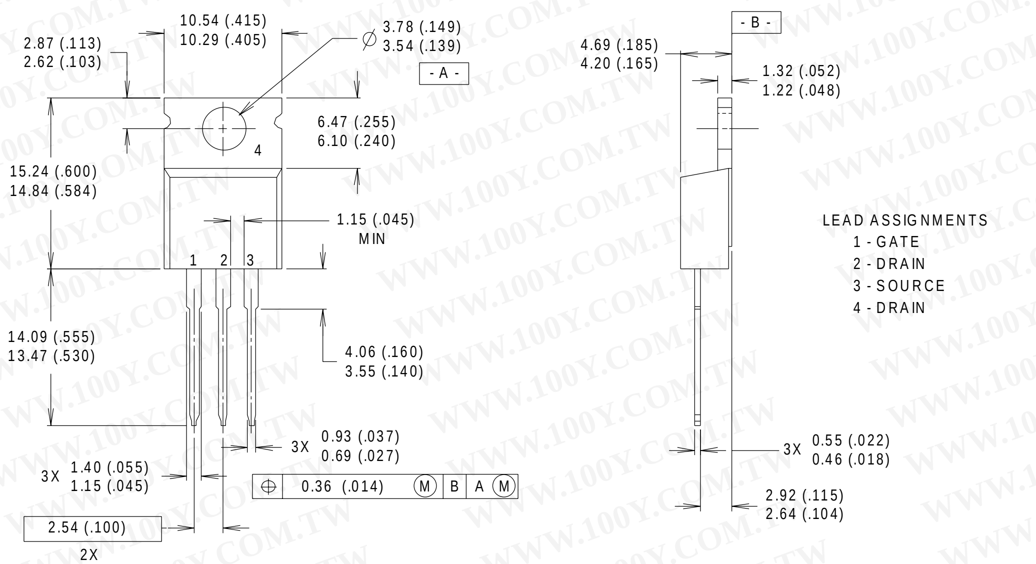
TO-220AB Package Outline

Dimensions are shown in millimeters (inches)

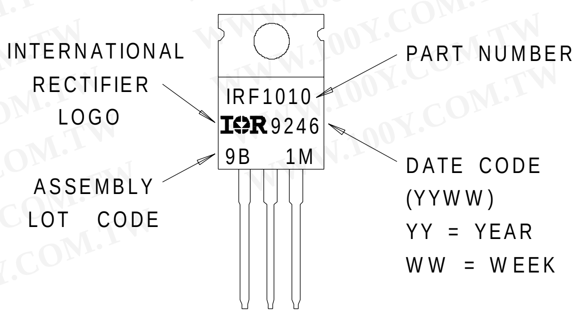


NOTES:

1 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
2 CONTROLLING DIMENSION : INCH
3 OUTLINE CONFORMS TO JEDEC OUTLINE TO-220AB.
4 HEATSINK & LEAD MEASUREMENTS DO NOT INCLUDE BURRS.

TO-220AB Part Marking Information

EXAMPLE : THIS IS AN IRF1010
WITH ASSEMBLY
LOT CODE 9B1M



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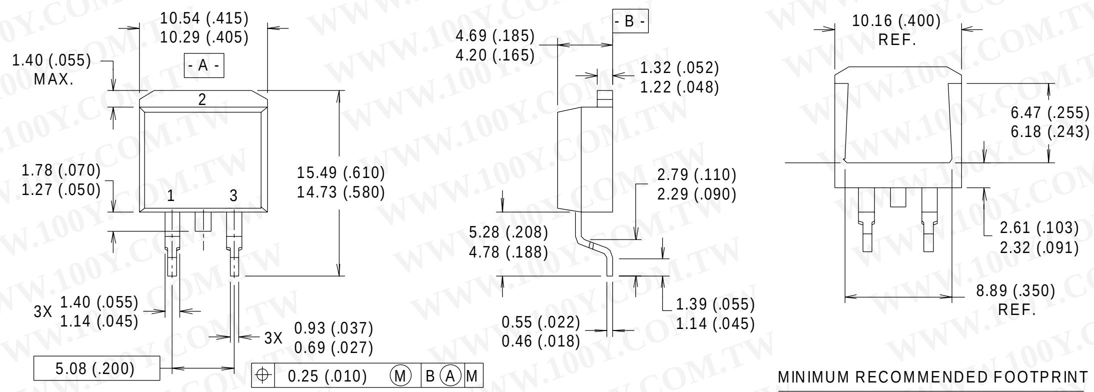
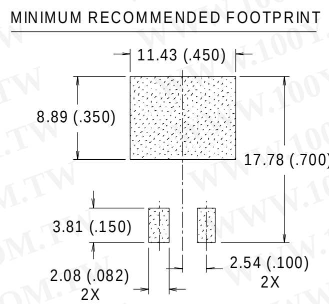
D^{2}Pak Package Outline

Dimensions are shown in millimeters (inches)

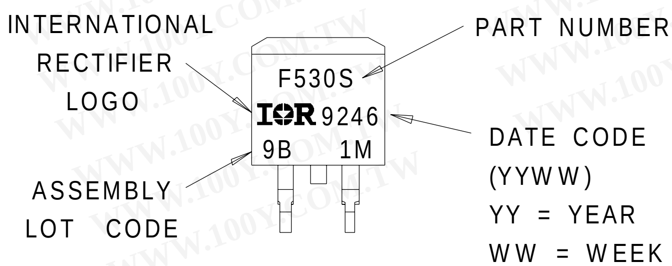




NOTES:
1 DIMENSIONS AFTER SOLDER DIP.
2 DIMENSIONING & TOLERANCING PER ANSI Y14.5M, 1982.
3 CONTROLLING DIMENSION : INCH.
4 HEATSINK & LEAD DIMENSIONS DO NOT INCLUDE BURRS.

LEAD ASSIGNMENTS
1 - GATE
2 - DRAIN
3 - SOURCE

D^{2}Pak Part Marking Information



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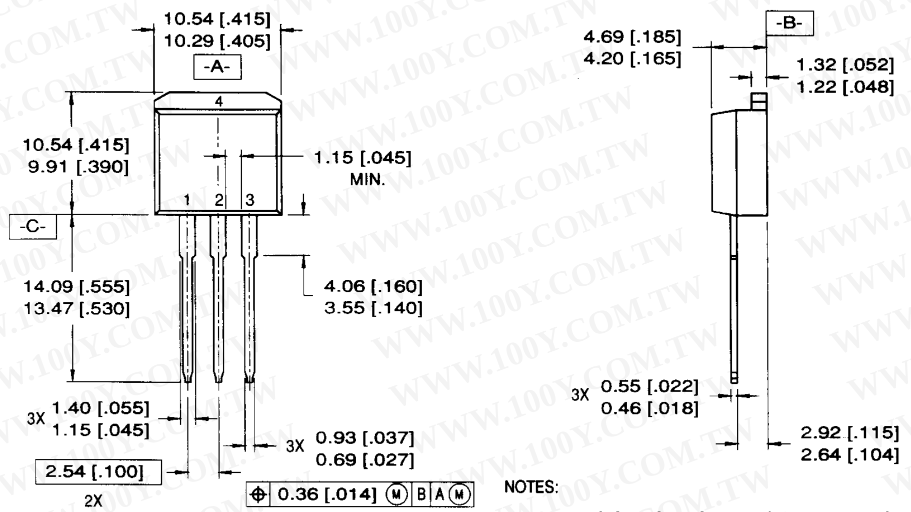
TO-262 Package Outline

Dimensions are shown in millimeters (inches)



LEAD ASSIGNMENTS

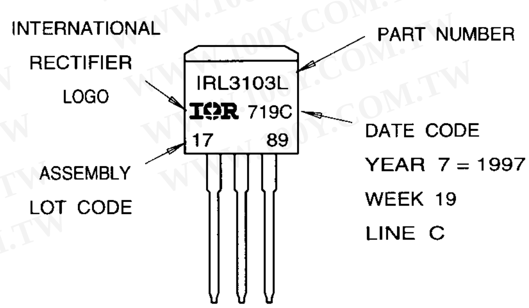
1 = GATE
2 = DRAIN
3 = SOURCE
4 = DRAIN

NOTES:

1. DIMENSIONING & TOLERANCING PER ANSI Y14.5M-1982
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
4. HEATSINK & LEAD DIMENSIONS DO NOT INCLUDE BURRS.

TO-262 Part Marking Information

EXAMPLE: THIS IS AN IRL3103L
LOT CODE 1789
ASSEMBLED ON WW 19, 1997
IN THE ASSEMBLY LINE "C"



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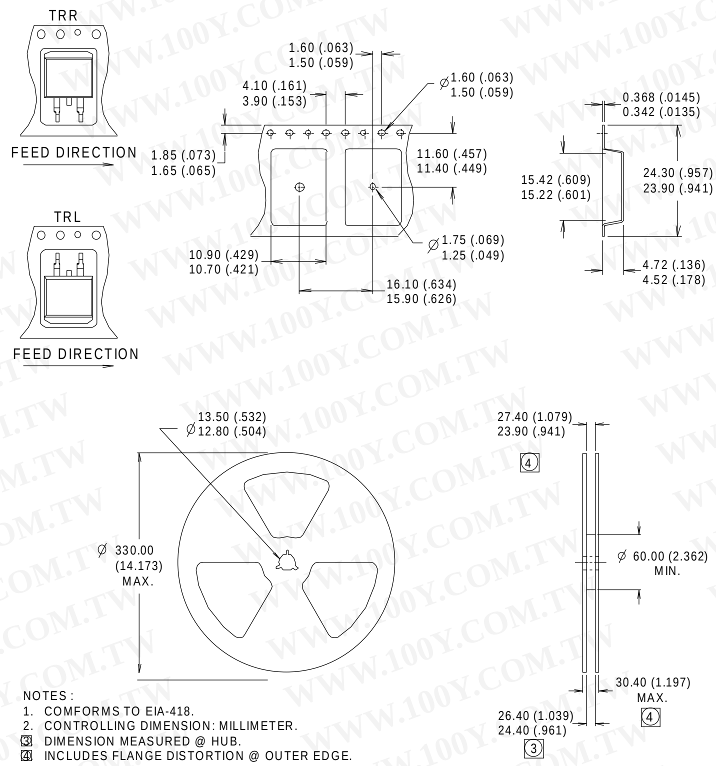
D²Pak Tape & Reel Information

Dimensions are shown in millimeters (inches)



Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 0.7 mH R_G = 25Ω, I_{AS} = 24.8 A.

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

④ This is only applied to TO-220AB package

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