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IRFW630B

N-Channel MOSFET

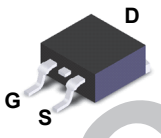
200 V, 9 A, 400 mΩ

Description

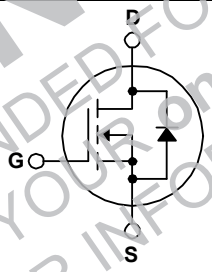
These N-Channel enhancement mode power field effect transistors are produced using ON Semiconductors proprietary, planar, DMOS technology.This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switching DC/DC converters, switch mode power supplies, DC-AC converters for uninterrupted power supply and motor control.

Features

- 9.0 A, 200 V, $R_{DS(on)}$ = 400 mΩ (Max.) @ V_{GS} = 10 V, I_D = 4.5 A
- Low Gate Charge (Typ. 22 nC)
- Low C_{rss} (Typ. 22 pF)
- 100% Avalanche Tested



D^2-PAK



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted.

Symbol	Parameter		IRFW630BTM_FP001	Unit
V_{DSS}	Drain-Source Voltage		200	V
I_D	Drain Current - Continuous (T_C = 25°C)		9.0	A
	- Continuous (T_C = 100°C)		5.7	A
I_{DM}	Drain Current - Pulsed	(Note 1)	36	A
V_{GSS}	Gate-Source voltage		± 30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	160	mJ
I_{AR}	Avalanche Current	(Note 1)	9.0	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	7.2	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	5.5	V/ns
P_D	Power Dissipation (T_A = 25°C)*		3.13	W
	Power Dissipation (T_C = 25°C)		72	W
	- Derate above 25°C		0.57	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		300	°C

Thermal Characteristics

Symbol	Parameter	IRFW630BTM_FP001	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	1.74	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Min. Pad of 2-oz Copper), Max.	62.5	
	Thermal Resistance, Junction to Ambient (*1 in^2 Pad of 2-oz Copper), Max.	40	

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Publication Order Number:
IRFW630BTM-FP001/D

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
IRFW630B	IRFW630BTM-FP001	D^2-PAK	330 mm	24 mm	800 units

Electrical Characteristics T_C = 25°C unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	200	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.2	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 200 V, V_{GS} = 0 V	--	--	10	μA
		V_{DS} = 160 V, T_C = 125°C	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 4.5 A	--	0.34	0.4	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 4.5 A	--	7.05	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	550	720	pF
C_{oss}	Output Capacitance		--	85	110	pF
C_{rss}	Reverse Transfer Capacitance		--	22	29	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 100 V, I_D = 9.0 A, R_G = 25 Ω (Note 4)	--	11	30	ns
t_r	Turn-On Rise Time		--	70	150	ns
$t_{d(off)}$	Turn-Off Delay Time		--	60	130	ns
t_f	Turn-Off Fall Time		--	65	140	ns
Q_g	Total Gate Charge	V_{DS} = 160 V, I_D = 9.0 A, V_{GS} = 10 V (Note 4)	--	22	29	nC
Q_{gs}	Gate-Source Charge		--	3.6	--	nC
Q_{gd}	Gate-Drain Charge		--	10.2	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	9.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	36	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 9.0 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 9.0 A, dI_F/dt =100 A/μs	--	140	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.87	--	μC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. L = 3 mH, I_{AS} = 9.0 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 9.0 A, di/dt ≤ 300 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature.

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Typical Characteristics

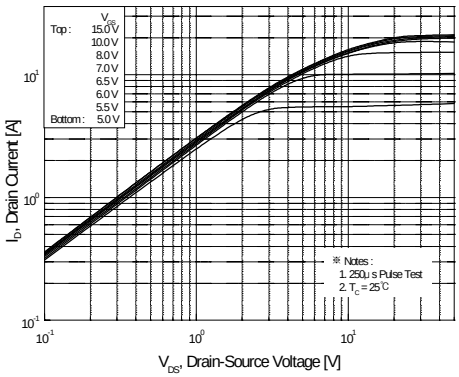

Figure 1. On-Region Characteristics

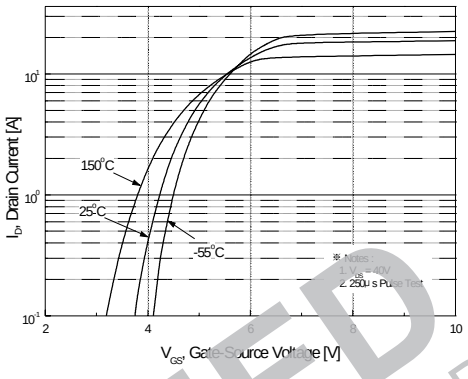

Figure 2. Transfer Characteristics

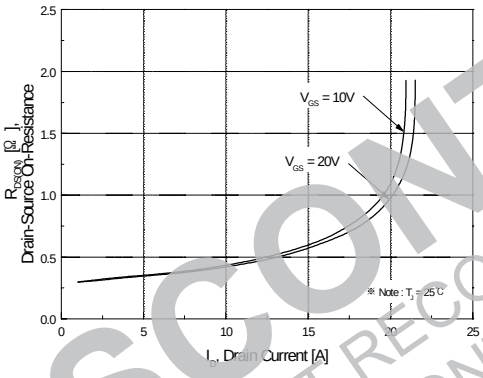

Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

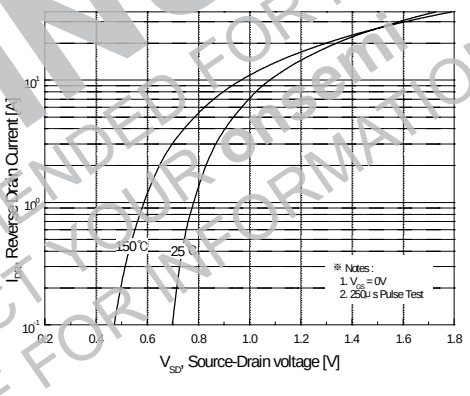

Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

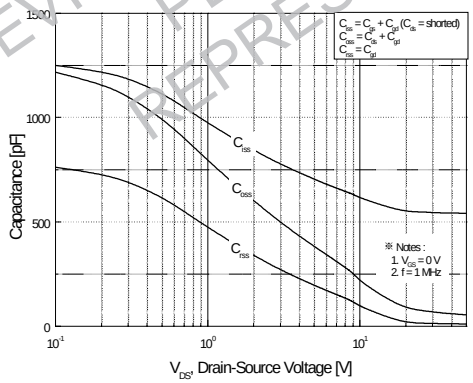

Figure 5. Capacitance Characteristics

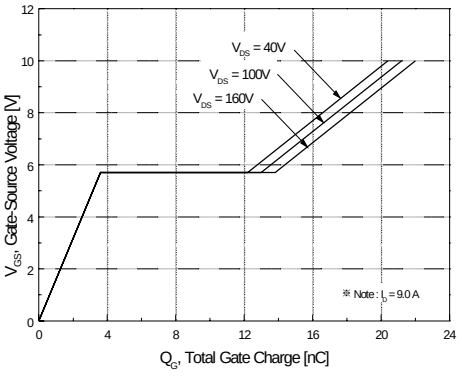

Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

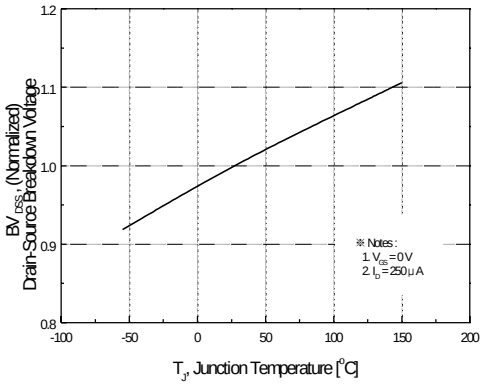

Figure 7. Breakdown Voltage Variation vs. Temperature

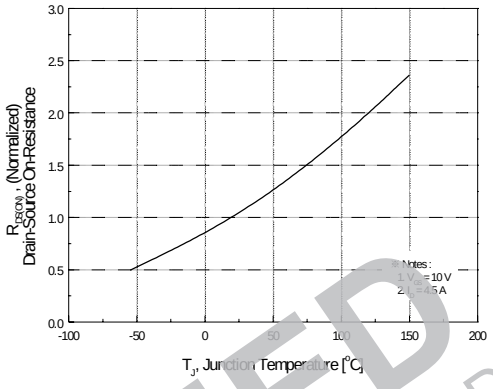

Figure 8. On-Resistance Variation vs. Temperature

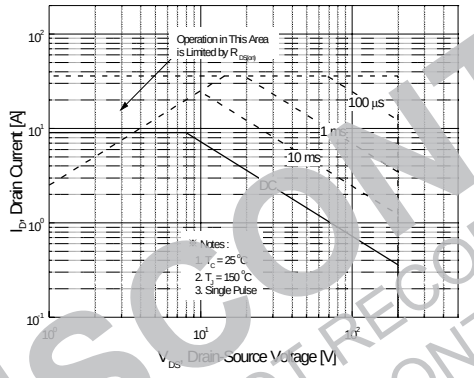

Figure 9. Maximum Safe Operating Area

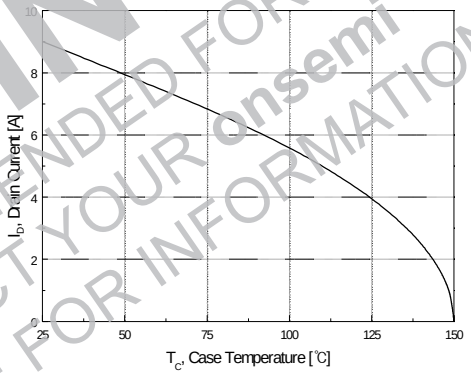

Figure 10. Maximum Drain Current vs. Case Temperature

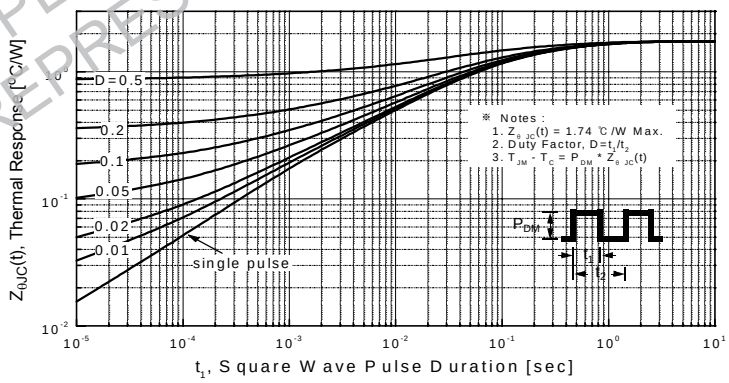

Figure 11. Transient Thermal Response Curve

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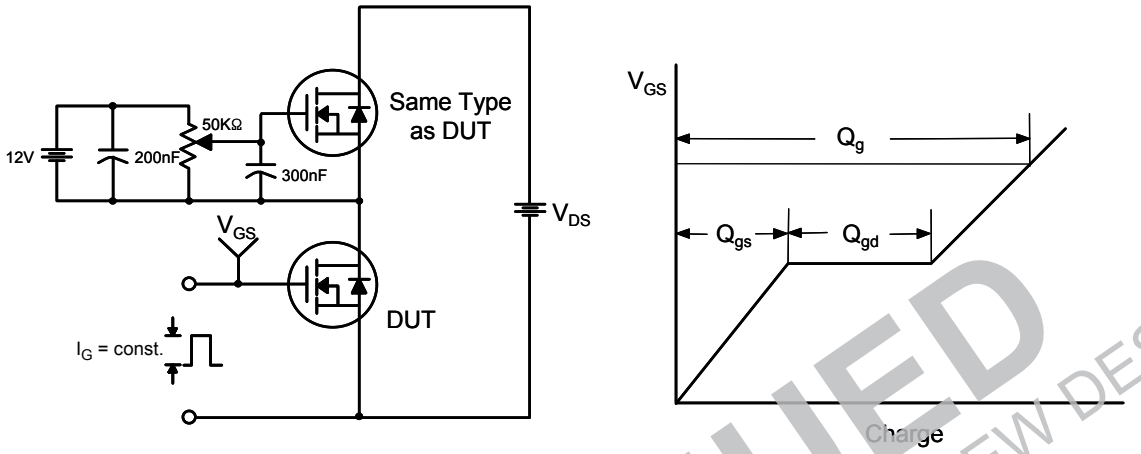

Figure 12. Gate Charge Test Circuit & Waveform

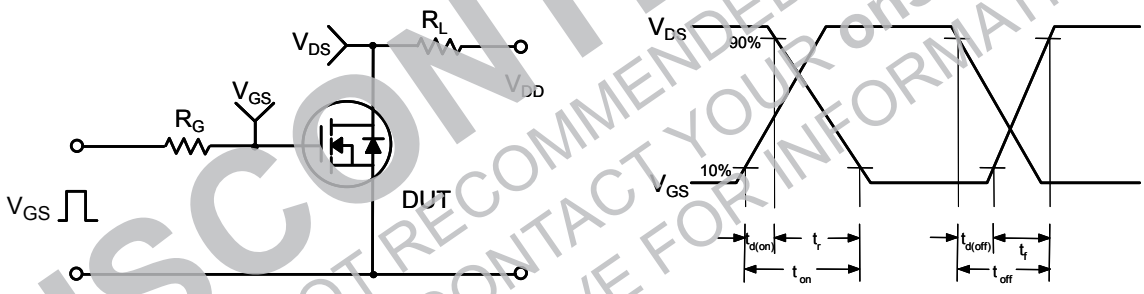

Figure 13. Resistive Switching Test Circuit & Waveforms

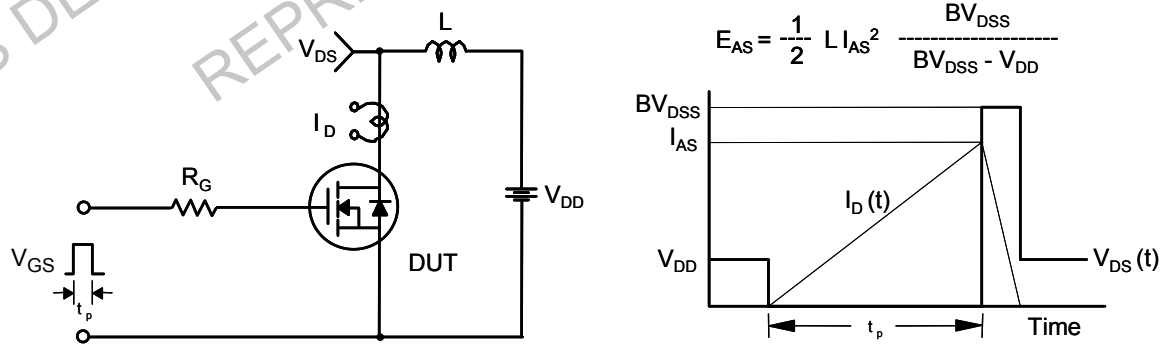

Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

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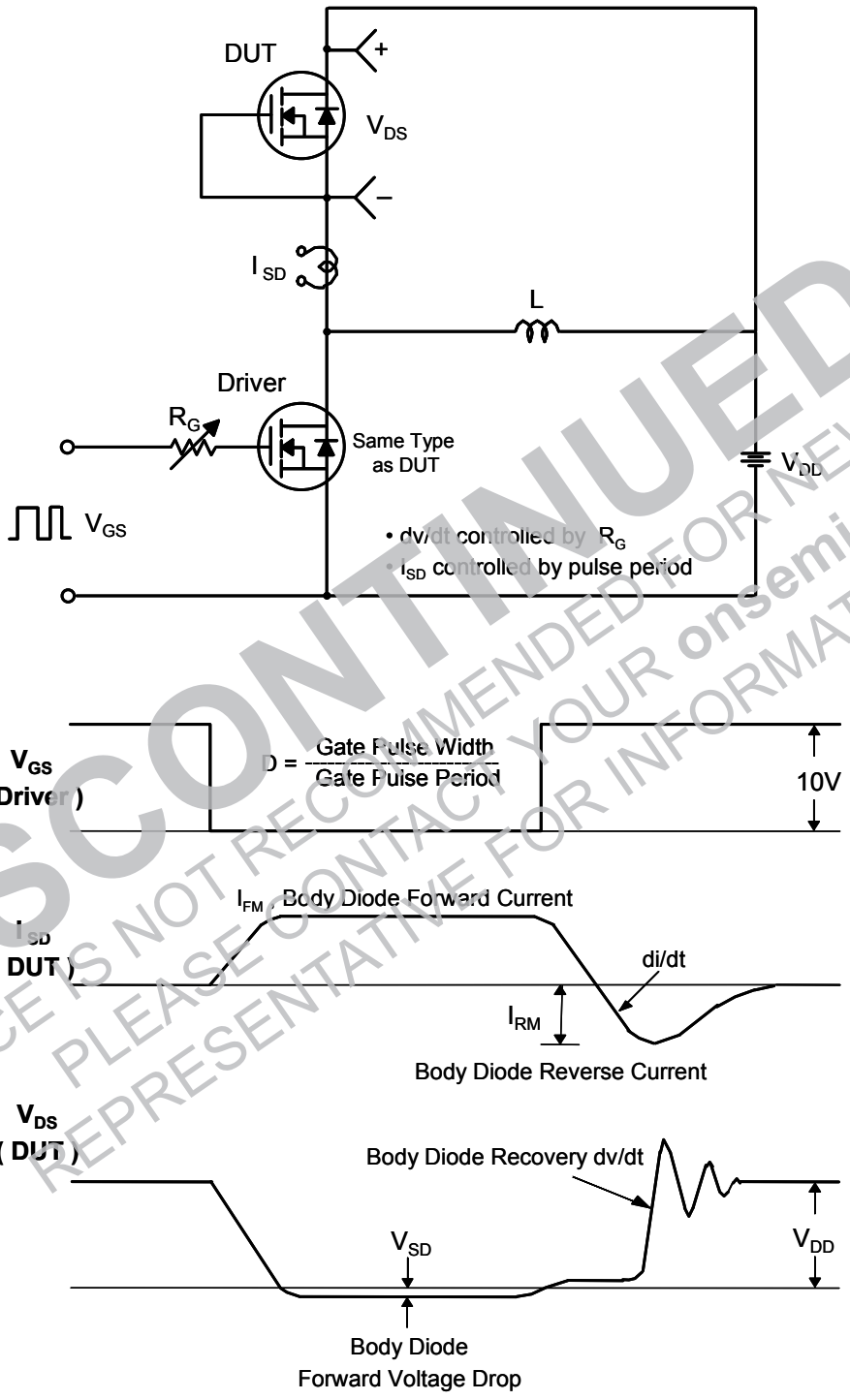

Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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Mechanical Dimensions

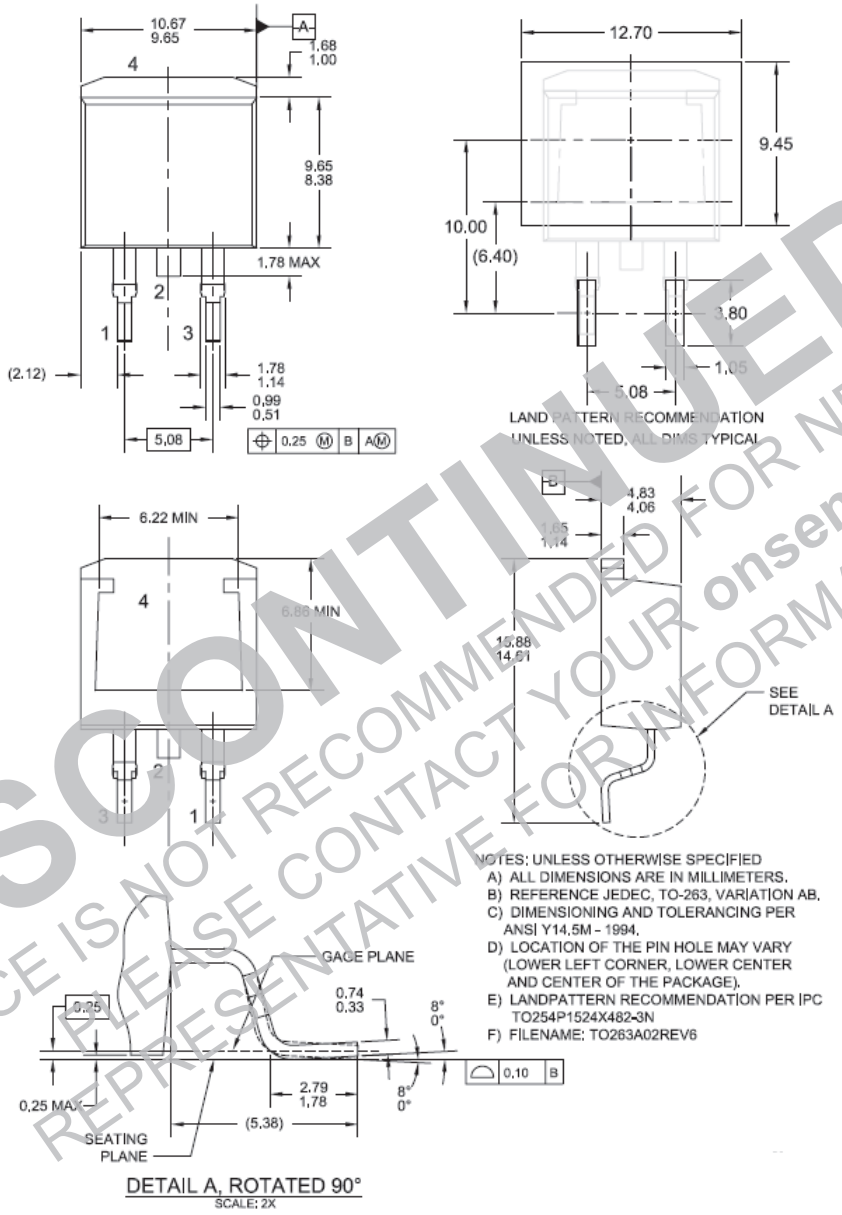

Figure 16. TO263 (D^2PAK), Molded, 2-Lead, Surface Mount

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