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FQB19N20C

N-Channel QFET® MOSFET

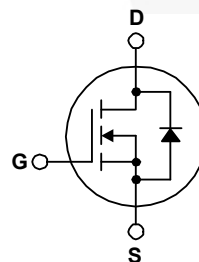
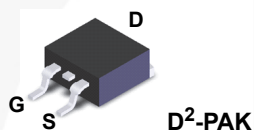
200 V, 19 A, 170 mΩ

Description

This N-Channel enhancement mode power MOSFET is produced using Fairchild Semiconductor's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, active power factor correction (PFC), and electronic lamp ballasts.

Features

- 19.0 A, 200 V, $R_{DS(on)} = 170 \text{ m}\Omega$ (Max.) @ $V_{GS} = 10 \text{ V}$, $I_D = 9.5 \text{ A}$
- Low Gate Charge (Typ. 40.5 nC)
- Low C_{rss} (Typ. 85 pF)
- 100% Avalanche Tested
- RoHS Compliant



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	FQB19N20CTM	Unit
V_{DSS}	Drain-Source Voltage	200	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$)	19.0	A
	- Continuous ($T_C = 100^\circ\text{C}$)	12.1	A
I_{DM}	Drain Current - Pulsed (Note 1)	76.0	A
V_{GSS}	Gate-Source voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	433	mJ
I_{AR}	Avalanche Current (Note 1)	19.0	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	13.9	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P_D	Power Dissipation ($T_A = 25^\circ\text{C}$)*	3.13	W
	Power Dissipation ($T_C = 25^\circ\text{C}$)	139	W
	- Derate above 25°C	1.11	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	FQB19N20CTM	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.9	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max.	62.5	
	Thermal Resistance, Junction to Ambient (*1 in ² Pad of 2-oz Copper), Max.	40	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FQB19N20C	FQB19N20CTM	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	--	0.24	--	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 = 9.5 A	--	0.14	0.17	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 9.5 A	--	10.8	--	S
Dynamic Characteristics						
C _{iSS}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	830	1080	pF
C _{oss}	Output Capacitance		--	195	255	pF
C _{rSS}	Reverse Transfer Capacitance		--	85	110	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 100 V, I _D = 19.0 A R _G = 25 Ω	--	10	40	ns
t _r	Turn-On Rise Time		--	150	310	ns
t _{d(off)}	Turn-Off Delay Time		--	135	280	ns
t _f	Turn-Off Fall Time		(Note 4)	--	115	240
Q _g	Total Gate Charge	V _{DS} = 160 V, I _D = 19.0 A V _{GS} = 10 V	--	40.5	53	nC
Q _{gs}	Gate-Source Charge		--	6.0	--	nC
Q _{gd}	Gate-Drain Charge		(Note 4)	--	22.5	--
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	19.0	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	76.0	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 19.0 A	--	--	1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 19.0 A di/dt = 100 A/μs	--	208	--	ns
Q _{rr}	Reverse Recovery Charge		--	1.63	--	μC

Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. L = 1.8 mH, I_{AS} = 19.0 A, V_{DD} = 50 V, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 19.0 A, di/dt ≤ 300 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J = 25°C.
4. Essentially independent of operating temperature.

Typical Characteristics

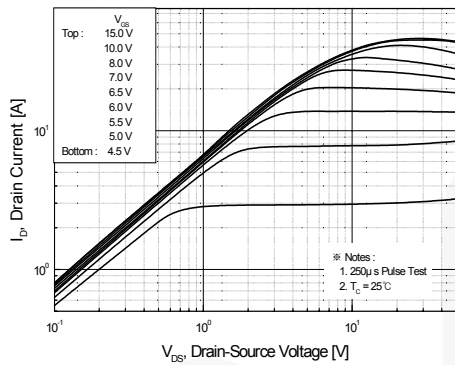


Figure 1. On-Region Characteristics

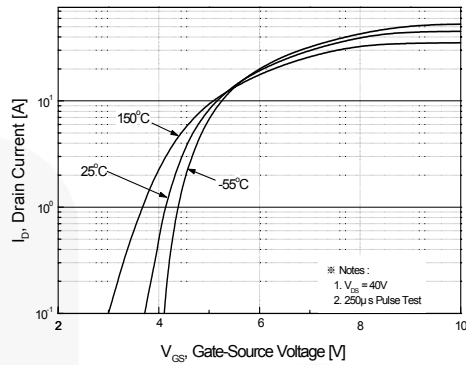


Figure 2. Transfer Characteristics

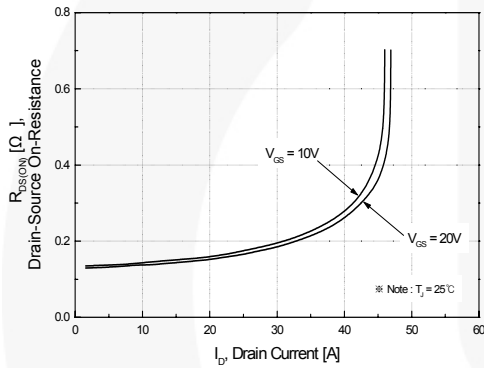


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

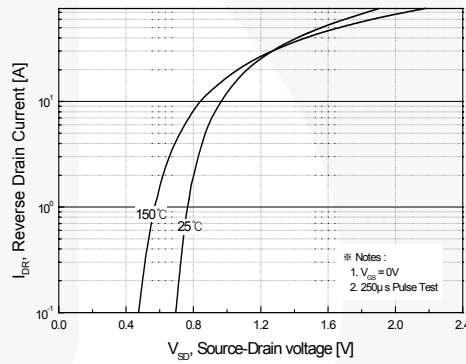


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

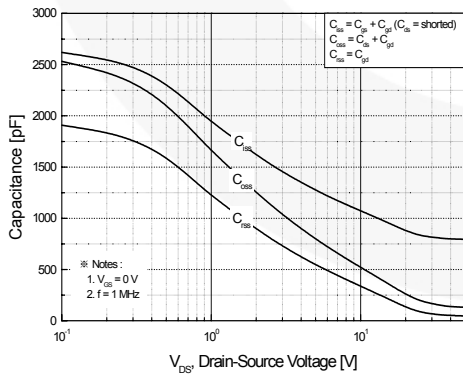


Figure 5. Capacitance Characteristics

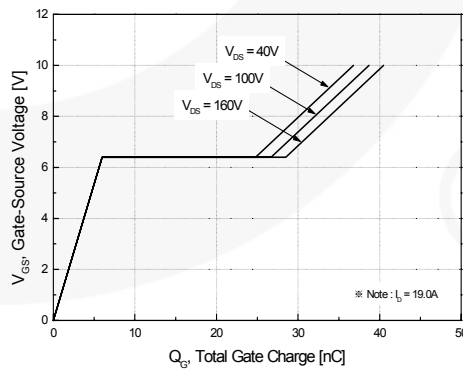


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

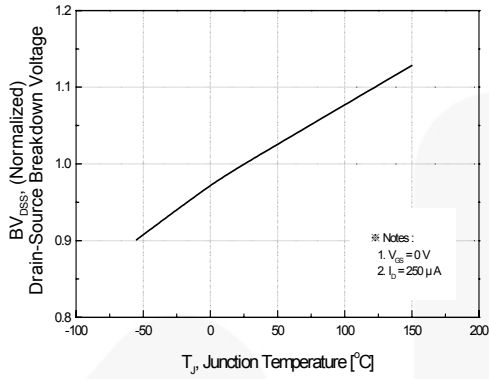


Figure 7. Breakdown Voltage Variation vs Temperature

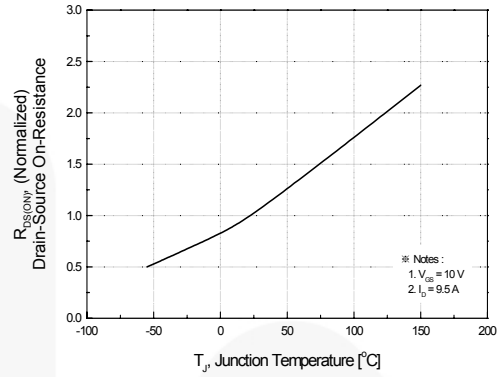


Figure 8. On-Resistance Variation vs Temperature

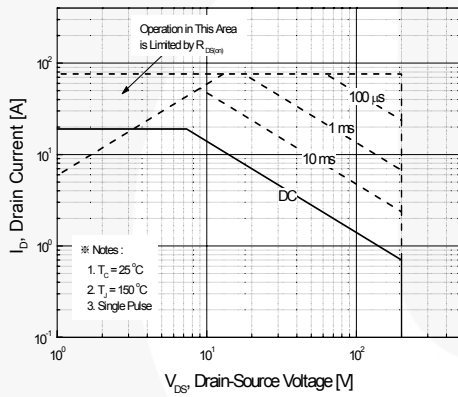


Figure 9. Maximum Safe Operating Area

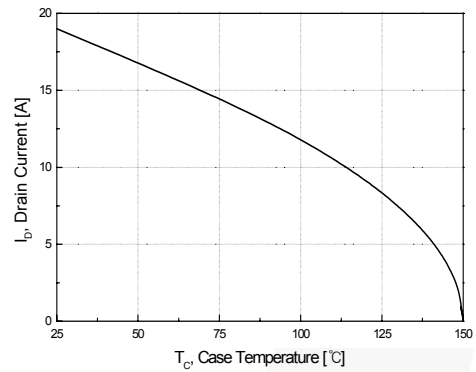


Figure 10. Maximum Drain Current vs Case Temperature

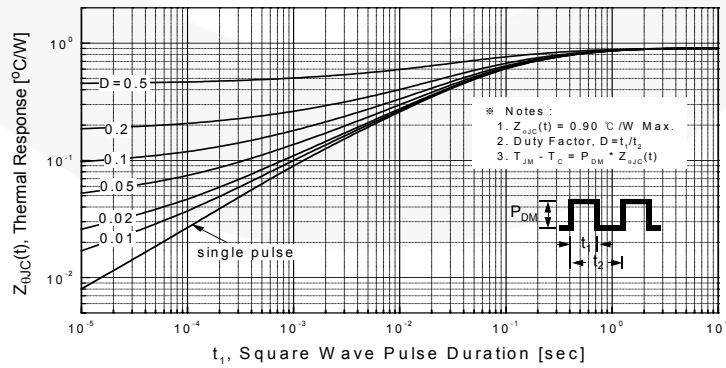


Figure 11. Transient Thermal Response Curve

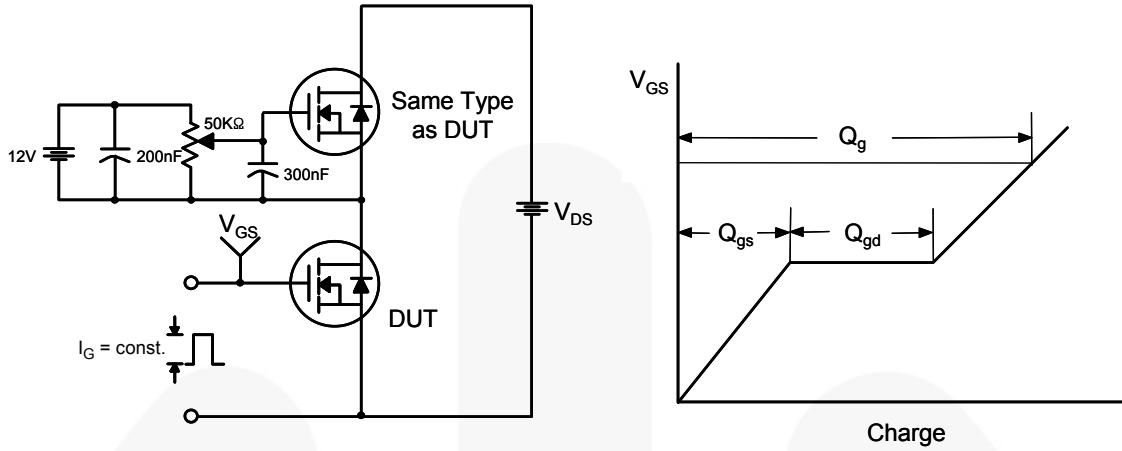


Figure 12. Gate Charge Test Circuit & Waveform

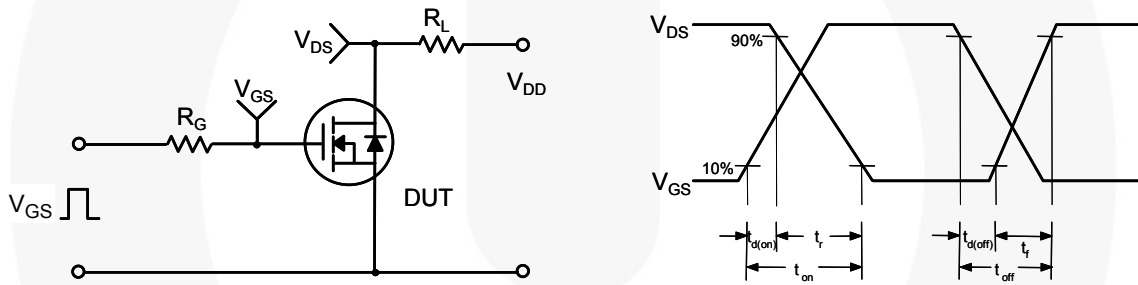


Figure 13. Resistive Switching Test Circuit & Waveforms

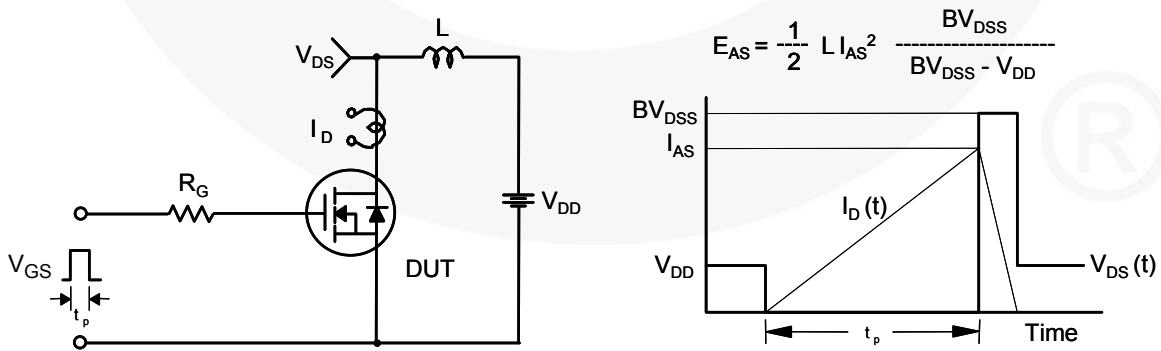


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

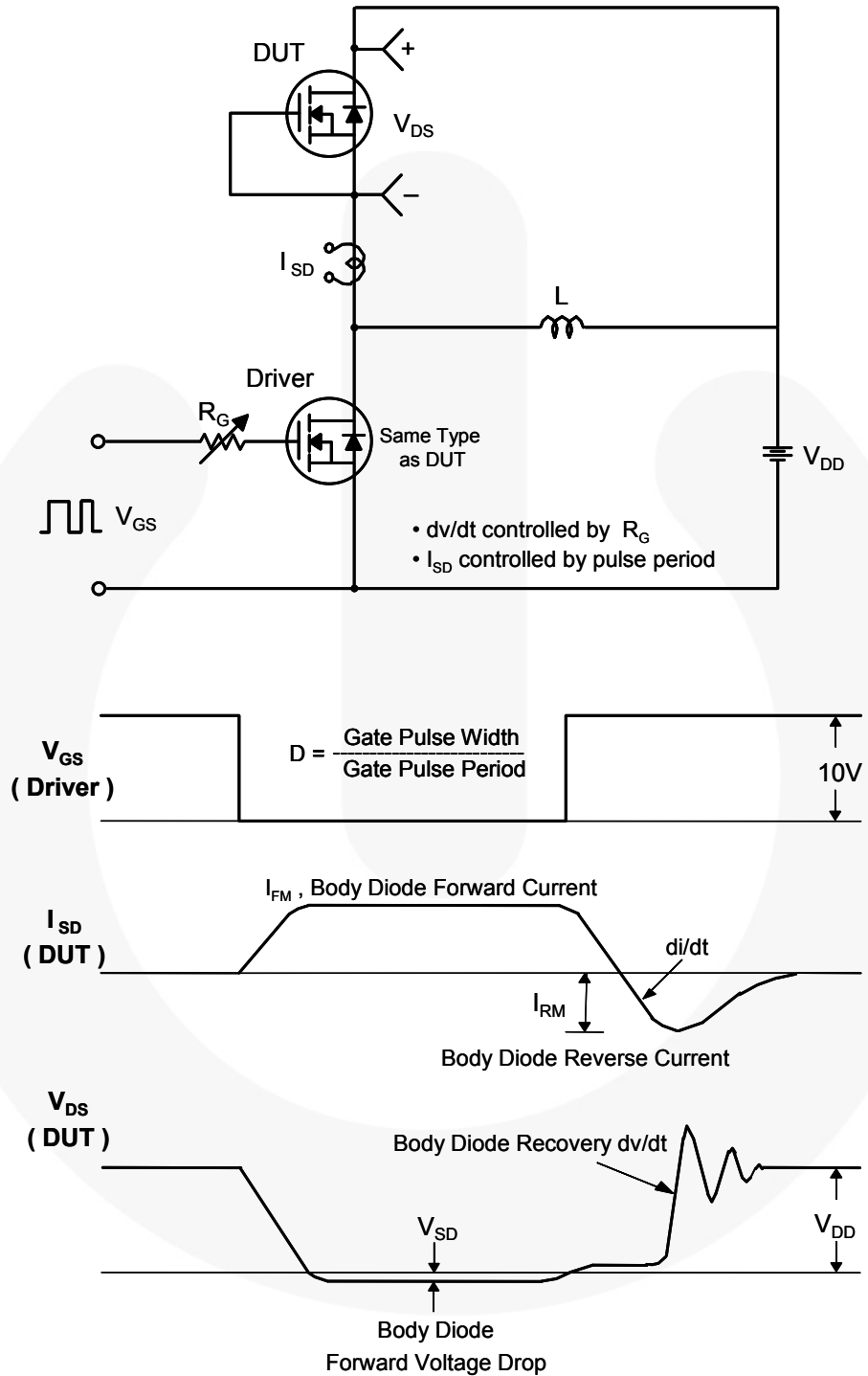


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

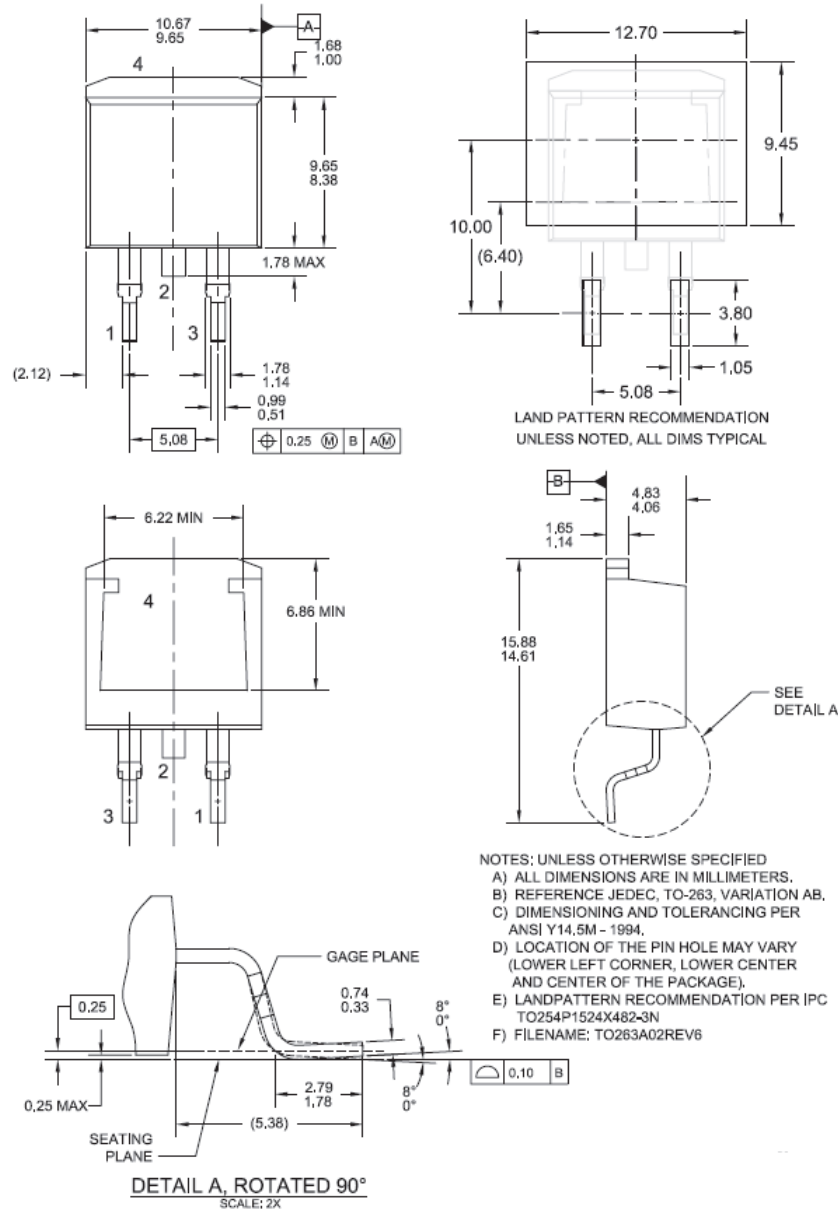


Figure 16. TO263 (D²PAK), Molded, 2-Lead, Surface Mount

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