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FQD11P06 / FQU11P06

P-Channel QFET MOSFET

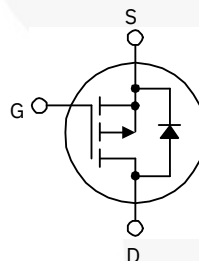
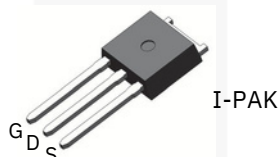
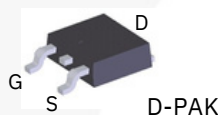
-60 V, -9.4 A, 185mΩ

Description

This P-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, audio amplifier, DC motor control, and variable switching power applications..

Features

- 9.4 A, -60 V, RDS(on) = 185 mΩ (Max.) @ V_{GS} = -10 V, ID = -4.7 A
- Low Gate Charge (Typ. 13 nC)
- Low Crss (Typ. 45 pF)
- 100% Avalanche Tested



Absolute Maximum Ratings

TC = 25°C unless otherwise noted.

Symbol	Parameter	FQD11P06TM / FQU11P06TU	Unit
VDSS	Drain-Source Voltage	-60	V
ID	Drain Current- Continuous (TC = 25°C)	-9.4	A
	- Continuous (TC = 100°C)	-5.95	A
IDM	Drain Current- Pulsed (Note 1)	-37.6	A
V _{GSS}	Gate-Source Voltage	± 30	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	160	mJ
I _{AR}	Avalanche Current	-9.4	A
E _{AR}	Repetitive Avalanche Energy (Note 1)	3.8	mJ
dv/dt	Peak Diode Recovery dv/dt	-7.0	V/ns
PD	Power Dissipation (TA = 25°C) *	2.5	W
	Power Dissipation (TC = 25°C)	38	W
	- Derate above 25°C	0.3	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C
TL	Maximum lead temperature for soldering, 1/8" from case for 5 seconds	300	°C

Thermal Characteristics

Symbol	Parameter	FQD11P06TM / FQU11P06TU	Unit
R _{θJC}	Thermal Resistance, Junction to Case, Max.	3.28	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max.	110	°C/W
	Thermal Resistance, Junction to Ambient (*1 in2 Pad of 2-oz Copper), Max.	50	°C/W

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
	FQD11P06	D-PAK	Tape and Reel	330 mm	16 mm	2500 units
FQD11P06TM	FQU11P06	I-PAK	Tube	N/A	N/A	70 units
FQU11P06TU						

Electrical Characteristics

TC = 25°C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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Off Characteristics

$B_{V_{DS}}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-6	--	--	V
$\Delta B_{V_{DS}} / \Delta T$	Breakdown Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, Referenced to	0	-0.07	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	25°C $V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$	--	--	-1	μA
		$V_{DS} = -48\text{ V}, TC = 125^\circ\text{C}$	--	--	-10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = -25\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = 25\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250$	-2.0	--	-4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{ V}, I_D =$	--	0.15	0.185	Ω
g_{FS}	Forward Transconductance	$V_{DS} = -4.7\text{ A}$	--	4.9	--	S
		$= -30\text{ V}, I_D = -4.7\text{ A}$				

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V},$	-	42	55	pF
C_{oss}	Output Capacitance	$f = 1.0\text{ MHz}$	-	0	0	pF
C_{rss}	Reverse Transfer Capacitance		-	19	25	pF
			-	5	0	
			-	45	60	

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -30\text{ V}, I_D = -5.7\text{ A},$	-	6.	25	ns
t_{r}	Turn-On Rise Time	$I_{RG} = 25\text{ }\Omega$	-	5	90	ns
$t_{d(off)}$	Turn-Off Delay Time	(Note 4)	-	40	40	ns
t_{f}	Turn-Off Fall Time		-	15	10	ns
Q_g	Total Gate Charge	$V_{DS} = -48\text{ V}, I_D = -11.4\text{ A},$	-	45	0	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = -10\text{ V}$	-	13	17	nC
Q_{gd}	Gate-Drain Charge	(Note 4)	-	2.	--	nC
			-	0	--	
			-	6.		

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current		-	3.	-9.4	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	--	-37.	A
V_D	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = -9.4\text{ A}$	-	--	6	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = -11.4\text{ A}$, Reverse	-	83	-4.0	ns
Q_{rr}	Recovery Charged	$IF / dt = 100\text{ A}/\mu\text{s}$	-	0.2	--	μC
			-	6	--	
			-			
			-			
			-			

Notes:

1. Repetitive rating : pulse-width limited by maximum junction temperature.
2. $L = 2.1\text{ mH}$, $I_{AS} = -9.4\text{ A}$, $V_{DD} = -25\text{ V}$, $R_G = 25\text{ }\Omega$, starting $T_J = 25^\circ\text{C}$.
3. $I_{SD} \leq -11.4\text{ A}$, $di/dt \leq 300\text{ A}/\mu\text{s}$, $V_{DD} \leq B_{V_{DS}}$, starting $T_J = 25^\circ\text{C}$.
4. Essentially independent of operating temperature.

Typical Characteristics

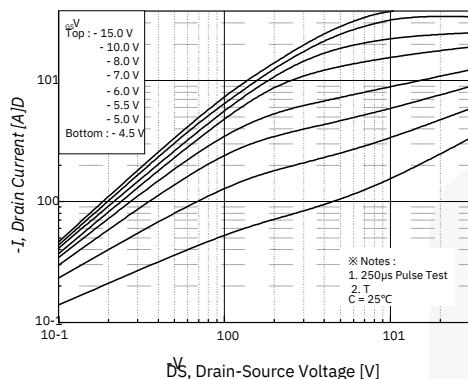


Figure 1. On-Region Characteristics

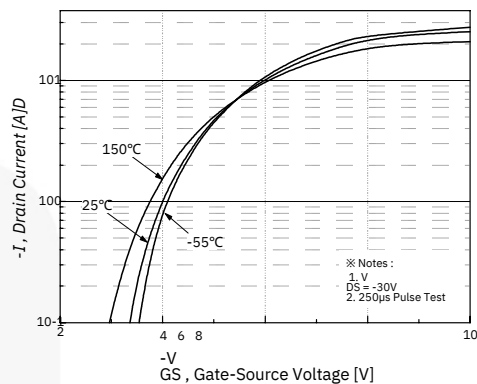


Figure 2. Transfer Characteristics

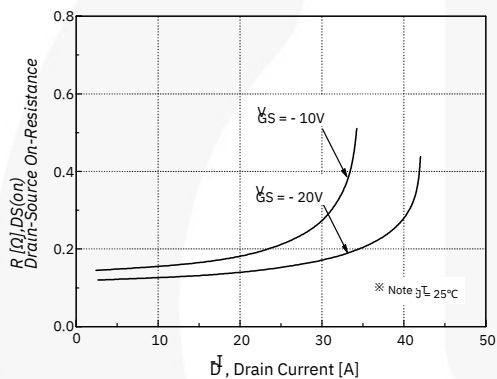


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

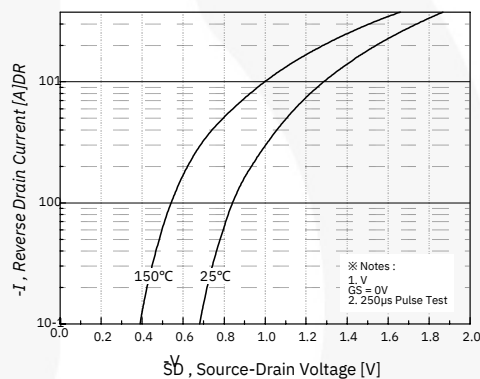


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

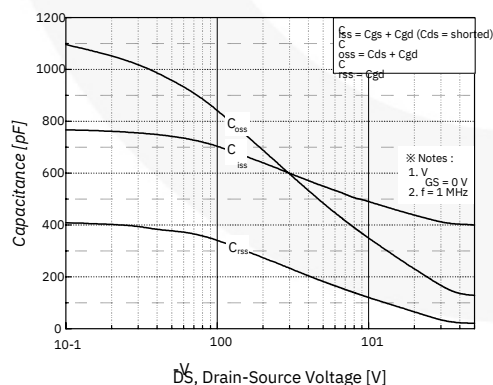


Figure 5. Capacitance Characteristics

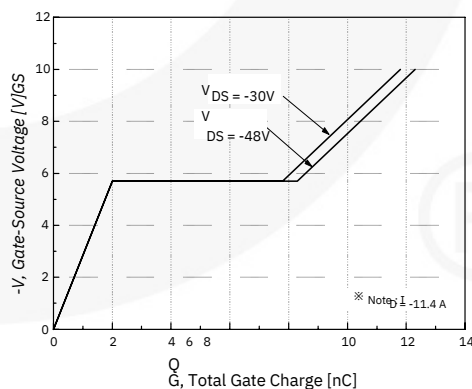


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

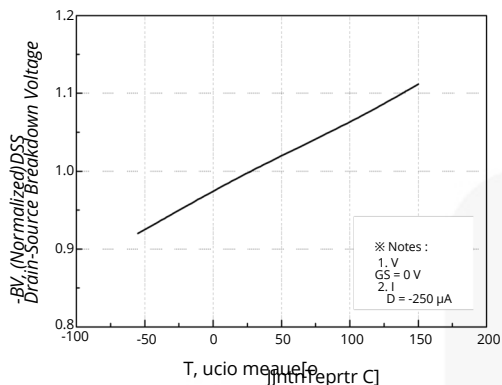


Figure 7. Breakdown Voltage Variation vs. Temperature

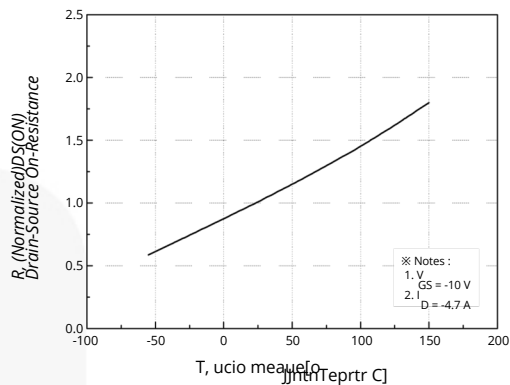


Figure 8. On-Resistance Variation vs. Temperature

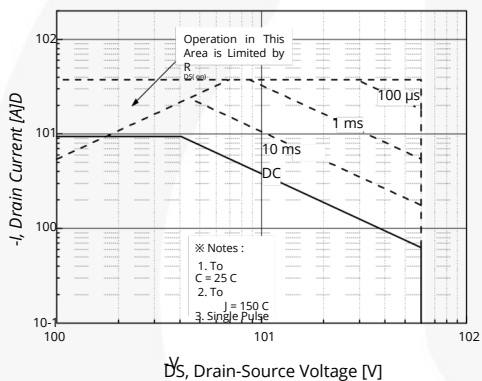


Figure 9. Maximum Safe Operating Area

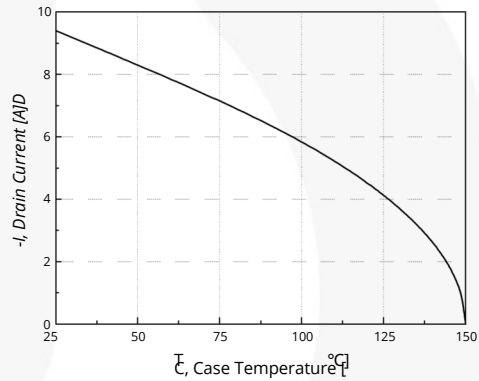


Figure 10. Maximum Drain Current vs. Case Temperature

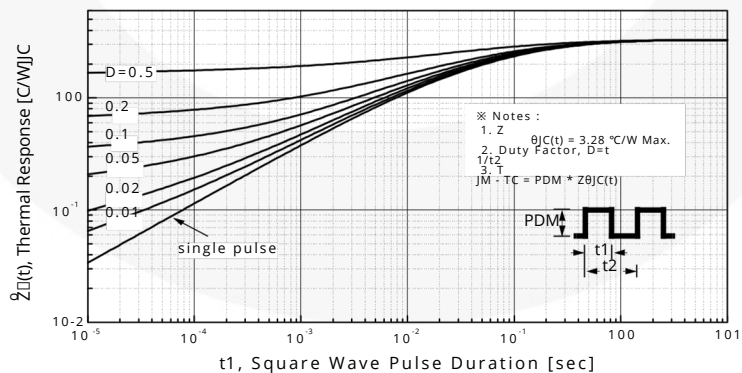


Figure 11. Transient Thermal Response Curve

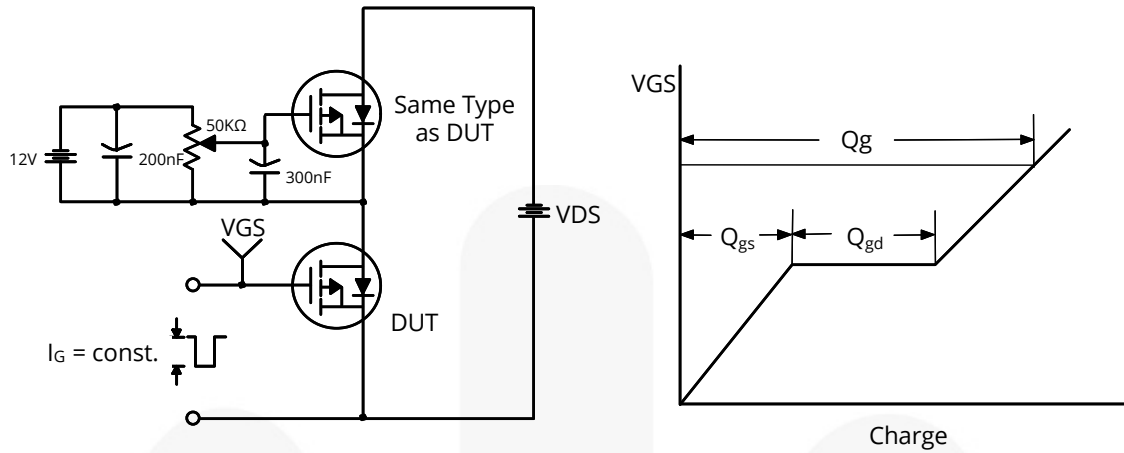


Figure 12. Gate Charge Test Circuit & Waveform

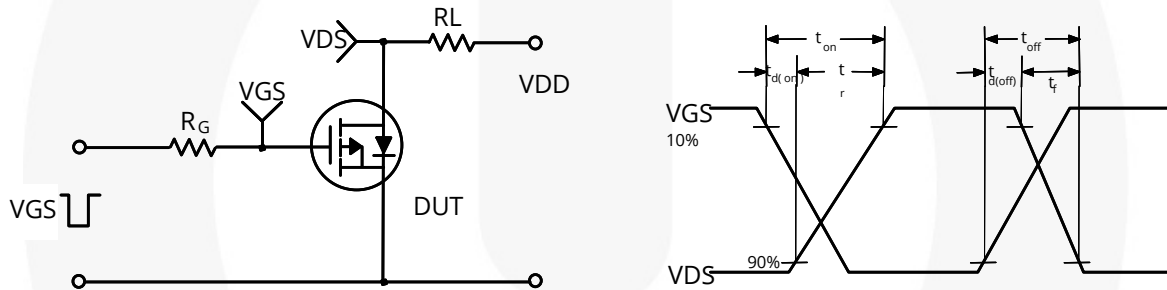


Figure 13. Resistive Switching Test Circuit & Waveforms

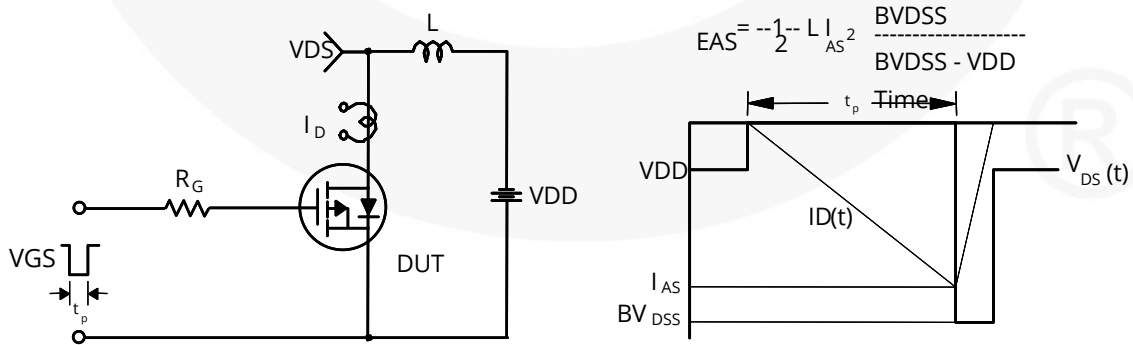


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

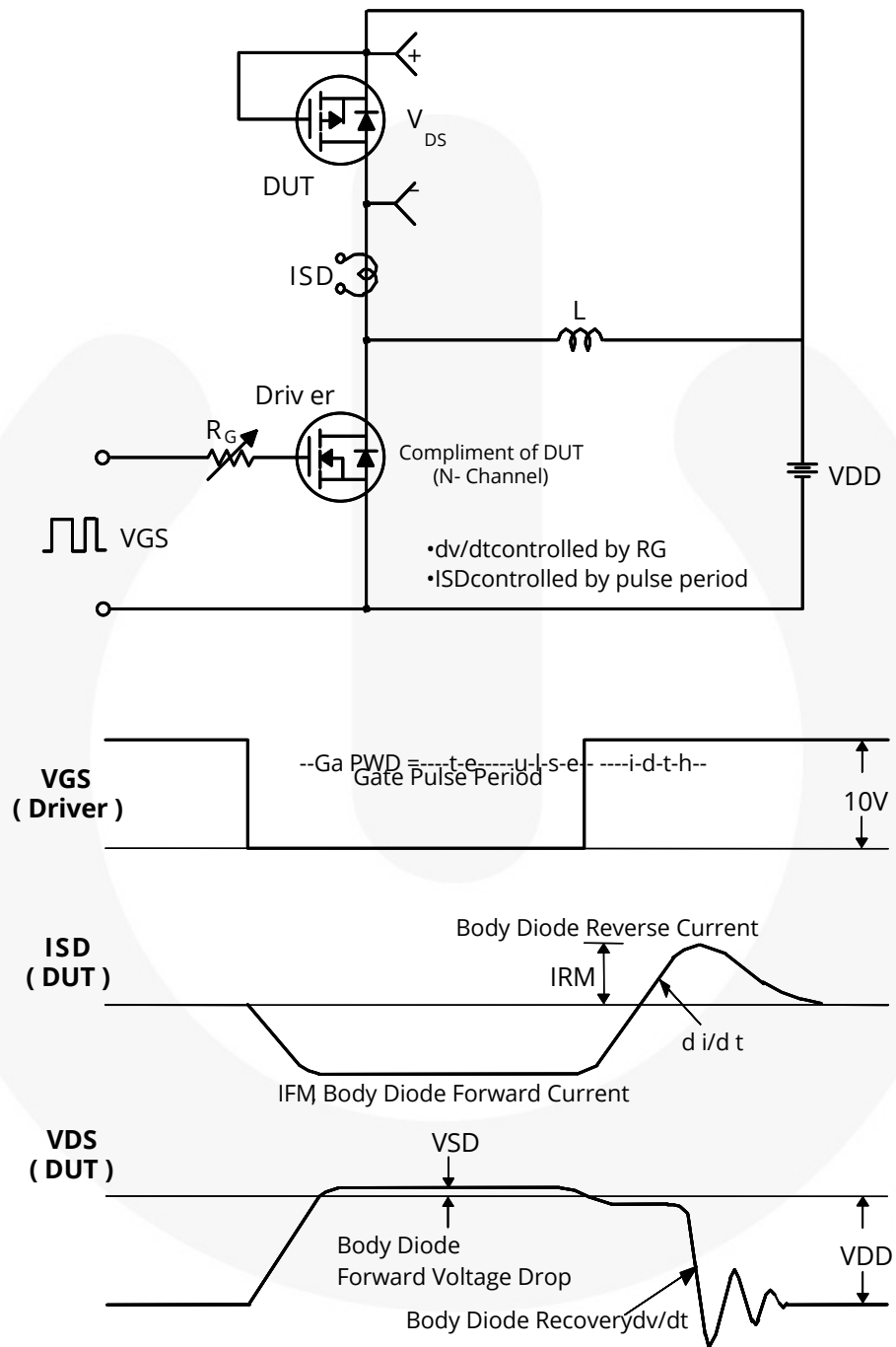


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions

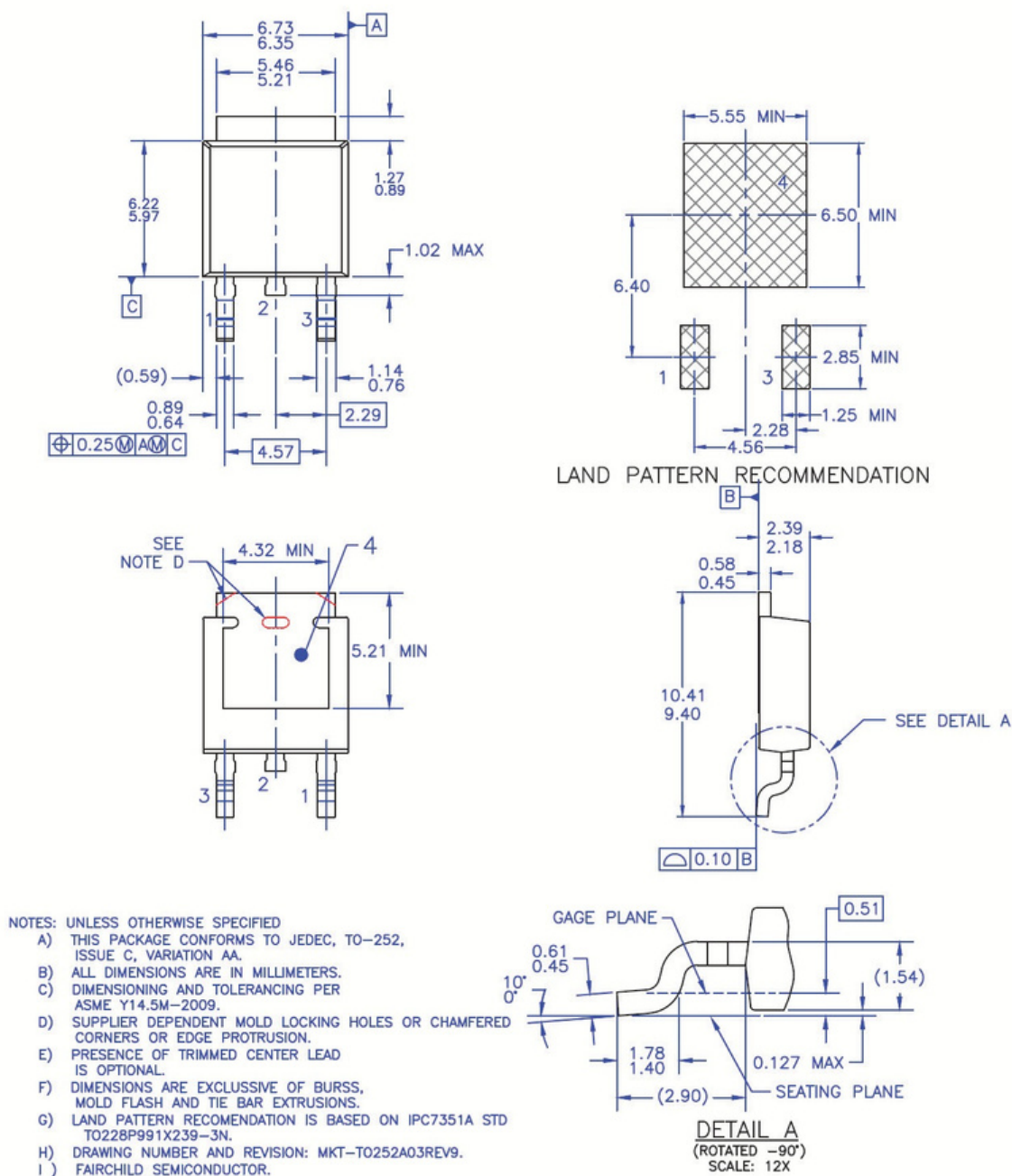


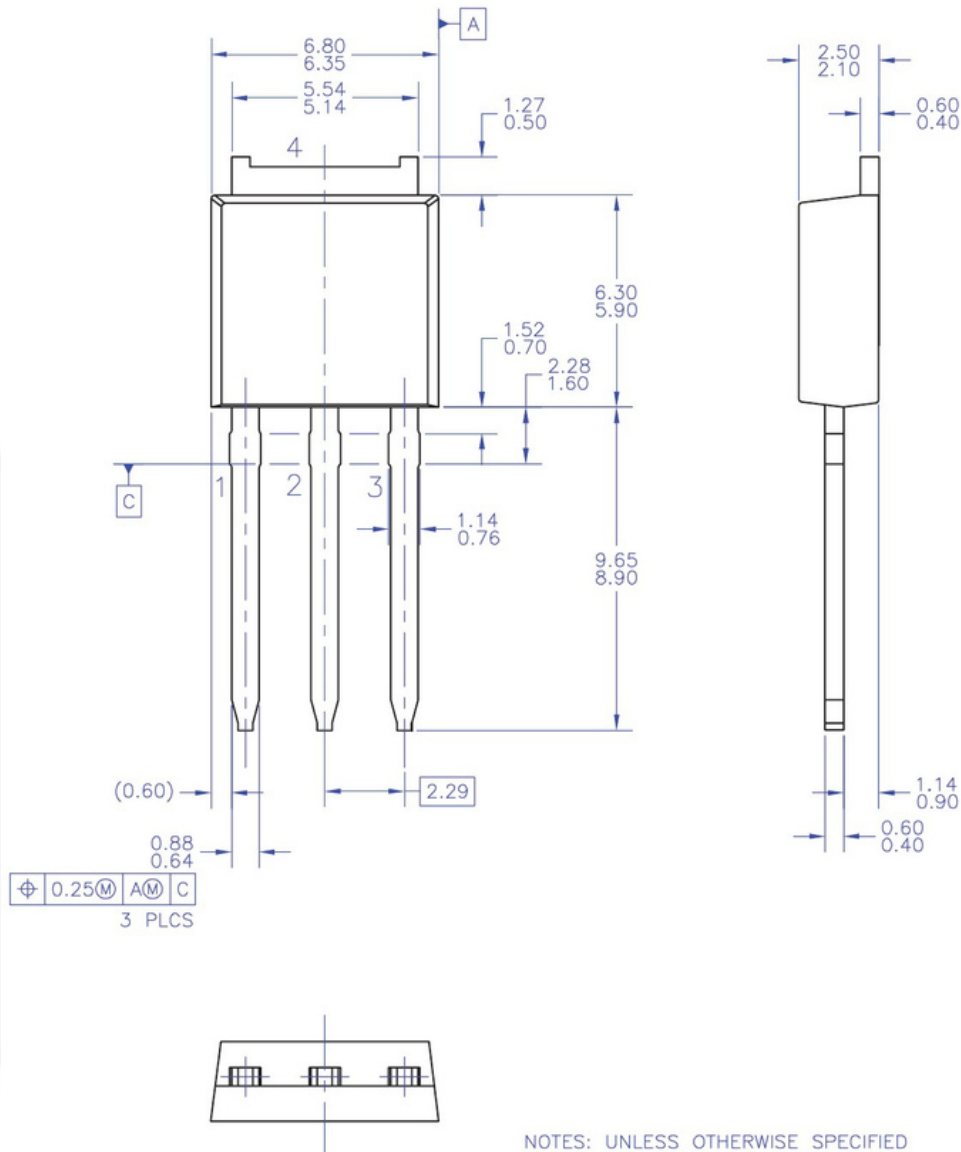
Figure 16. TO252 (D-PAK), Molded, 3-Lead, Option AA&AB

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Mechanical Dimensions



TO251A03REVA

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- B) THIS PACKAGE CONFORMS TO JEDEC, TO-251, ISSUE C, VARIATION AA, DATED SEP 1988.
- C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

Figure 17. TO251 (I-PAK), Molded, 3-Lead

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Datasheet Identification	Product Status	Definition
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