

FQD17P06 / FQU17P06 P-Channel QFET® MOSFET

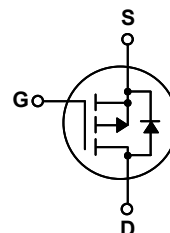
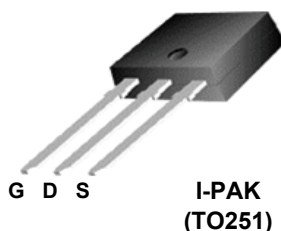
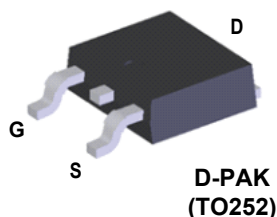
- 60 V, - 12 A, 135 mΩ

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

- -12 A, -60 V, $R_{DS(on)} = 135 \text{ m}\Omega$ (Max.) @ $V_{GS} = -10 \text{ V}$, $I_D = 6 \text{ A}$
- Low Gate Charge (Typ. 21 nC)
- Low C_{rss} (Typ. 80 pF)
- 100% Avalanche Tested



Absolute Maximum Ratings

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter			FQD17P06 / FQU17P06	Unit
V _{DSS}	Drain-Source Voltage			-60	V
I _D	Drain Current	- Continuous (T _C = 25°C)		-12	A
		- Continuous (T _C = 100°C)		-7.6	A
I _{DM}	Drain Current	- Pulsed	(Note 1)	-48	A
V _{GSS}	Gate-Source Voltage			± 25	V
E _{AS}	Single Pulsed Avalanche Energy		(Note 2)	300	mJ
I _{AR}	Avalanche Current		(Note 1)	-12	A
E _{AR}	Repetitive Avalanche Energy		(Note 1)	4.4	mJ
dv/dt	Peak Diode Recovery dv/dt		(Note 3)	-7.0	V/ns
P _D	Power Dissipation (T _A = 25°C) *			2.5	W
	Power Dissipation (T _C = 25°C)			44	W
		- Derate above 25°C		0.35	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range			-55 to +150	°C
T _L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds			300	°C

Thermal Characteristics

Symbol	Parameter	FQD17P06 / FQU17P06	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	2.85	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max. *	50	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	110	

* When mounted on the minimum pad size recommended (PCB Mount)

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = -250 μA	-60	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = -250 μA, Referenced to 25°C	--	-0.06	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -60 V, V _{GS} = 0 V	--	--	-1	μA
		V _{DS} = -48 V, T _C = 125°C	--	--	-10	μA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = -25 V, V _{DS} = 0 V	--	--	-100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = 25 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 = -6.0 A	--	0.11	0.135	Ω
g _{FS}	Forward Transconductance	V _{DS} = -30 V, I _D = -6.0 A	--	8.7	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -25 V, V _{GS} = 0 V, f = 1.0 MHz	--	690	900	pF
C _{oss}	Output Capacitance		--	325	420	pF
C _{rss}	Reverse Transfer Capacitance		--	80	105	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = -30 V, I _D = -8.5 A, R _G = 25 Ω (Note 4)	--	13	35	ns
t _r	Turn-On Rise Time		--	100	210	ns
t _{d(off)}	Turn-Off Delay Time		--	22	55	ns
t _f	Turn-Off Fall Time		--	60	130	ns
Q _g	Total Gate Charge	V _{DS} = -48 V, I _D = -17 A, V _{GS} = -10 V (Note 4)	--	21	27	nC
Q _{gs}	Gate-Source Charge		--	4.2	--	nC
Q _{gd}	Gate-Drain Charge		--	10	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	-12	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	-48	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -12 A	--	--	-4.0	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = -17 A,	--	92	--	ns
Q _{rr}	Reverse Recovery Charge	dl _F / dt = 100 A/μs	--	0.32	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 2.4\text{ mH}$, $I_{AS} = -12\text{ A}$, $V_{DD} = -25\text{ V}$, $R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq -17\text{ A}$, $di/dt \leq 300\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Essentially independent of operating temperature

Typical Characteristics

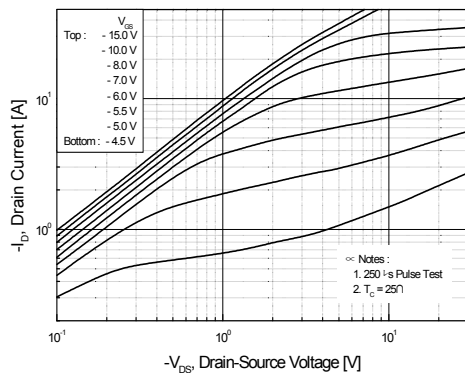


Figure 1. On-Region Characteristics

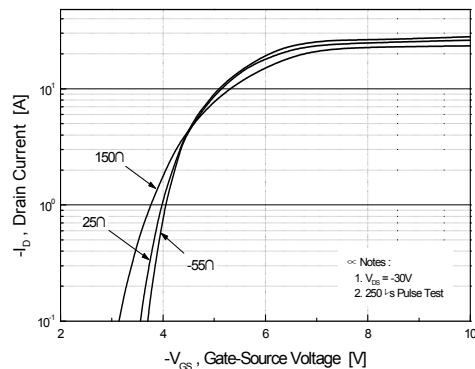


Figure 2. Transfer Characteristics

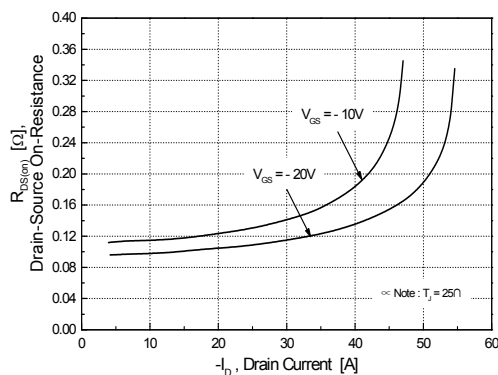


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

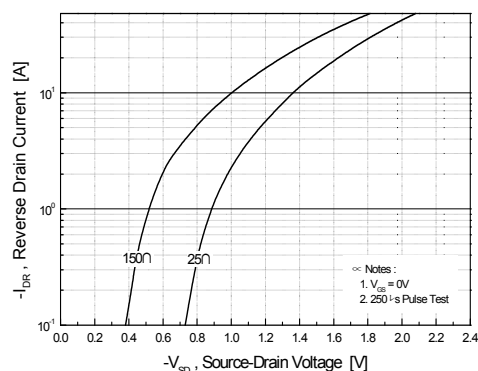


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

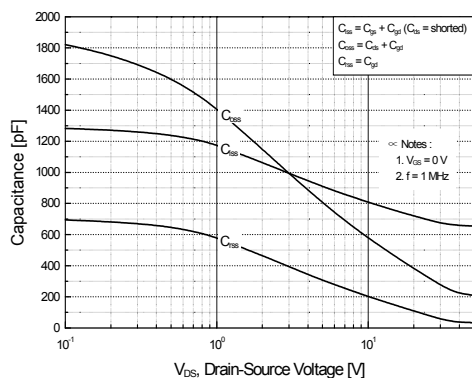


Figure 5. Capacitance Characteristics

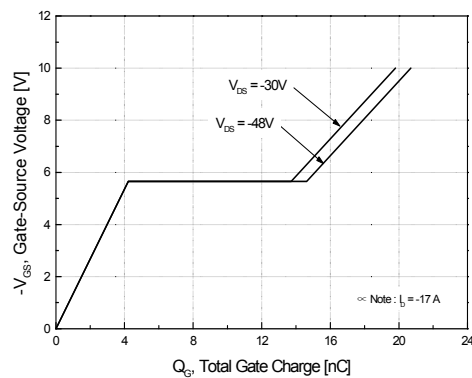


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

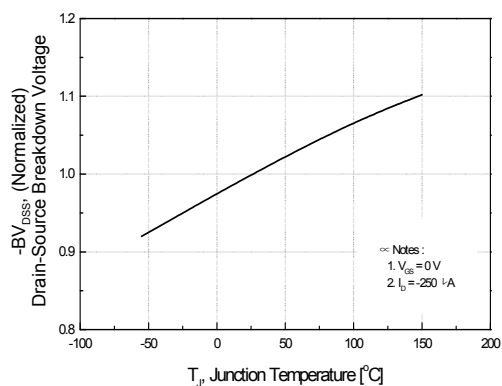


Figure 7. Breakdown Voltage Variation vs. Temperature

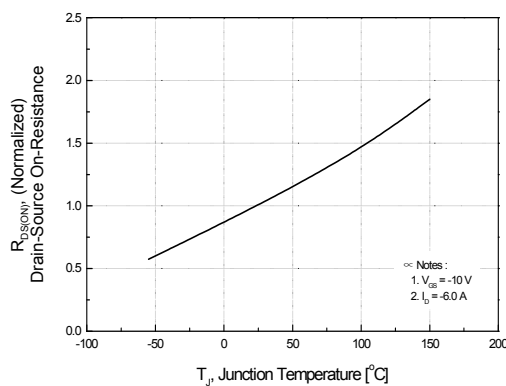


Figure 8. On-Resistance Variation vs. Temperature

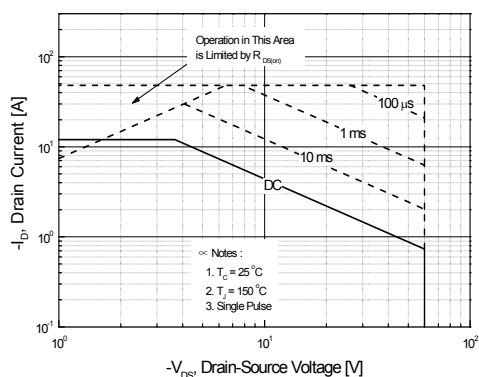


Figure 9. Maximum Safe Operating Area

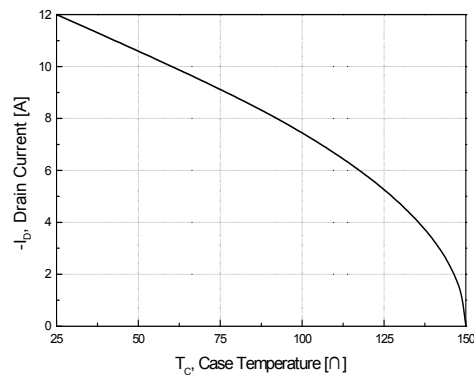


Figure 10. Maximum Drain Current vs. Case Temperature

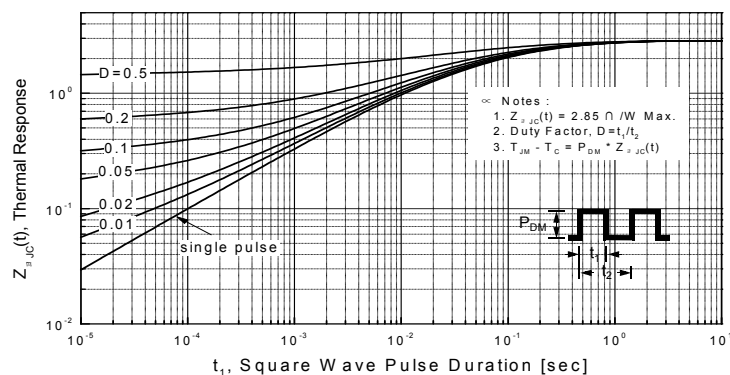
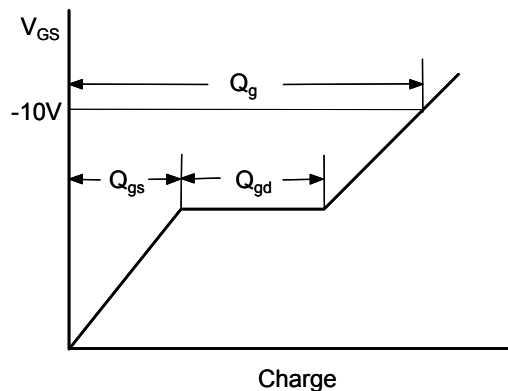
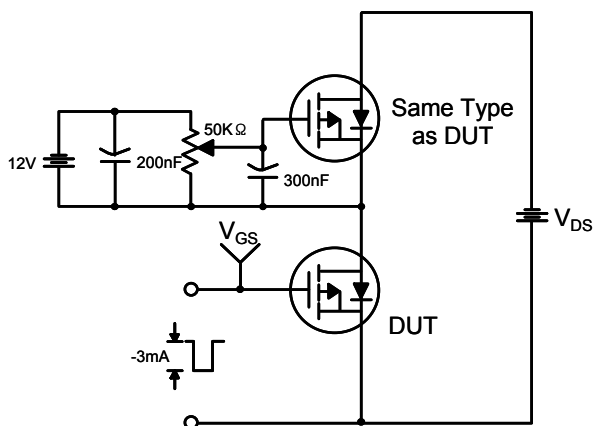
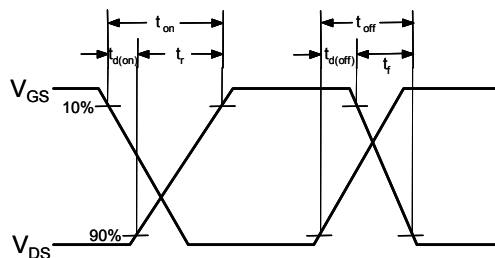
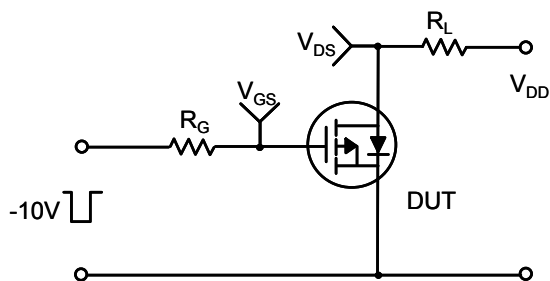


Figure 11. Transient Thermal Response Curve

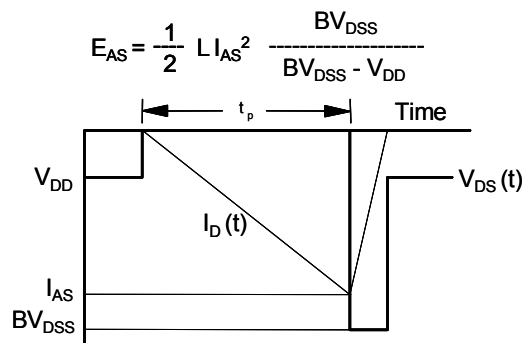
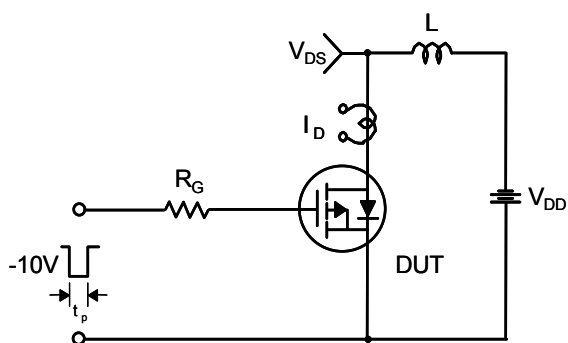
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

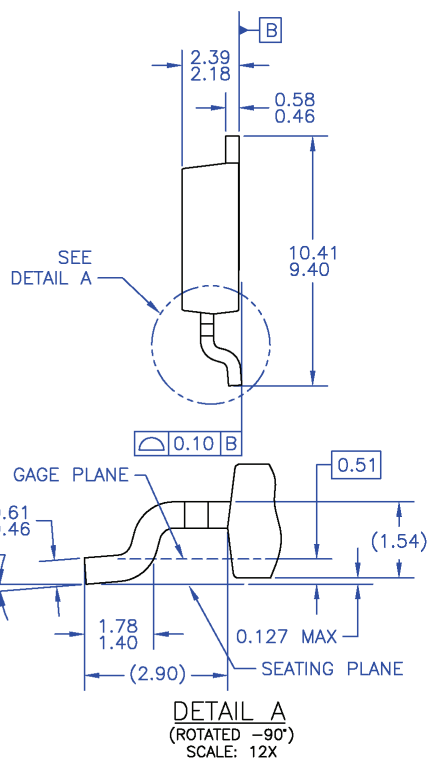
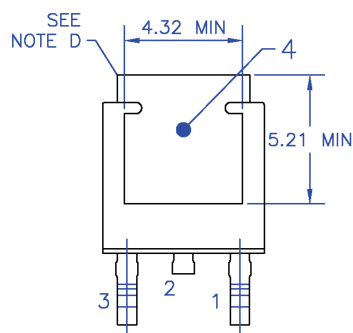
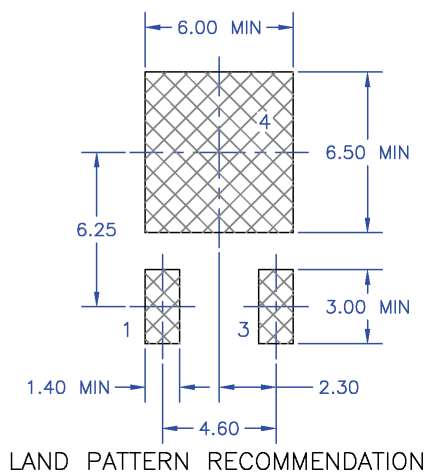
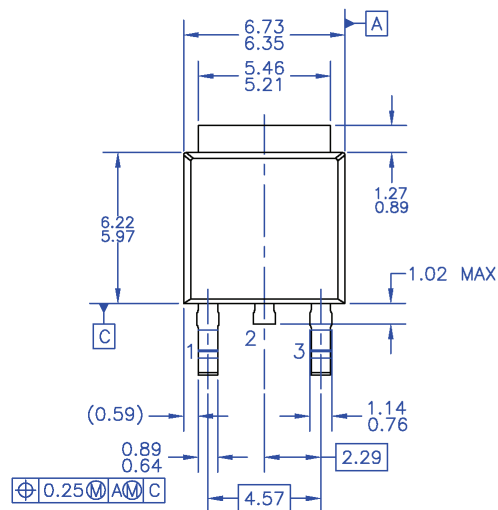


Unclamped Inductive Switching Test Circuit & Waveforms



Mechanical Dimensions

D-PAK



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- A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.
 - B) ALL DIMENSIONS ARE IN MILLIMETERS.
 - C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
 - D) HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.
 - E) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.
 - F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
 - G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO220P1003X238-3N.
 - H) DRAWING NUMBER AND REVISION: MKT-TO252A03REV8

TO-252 (DPAK) MOLDED, 3 LEAD, OPTION AA

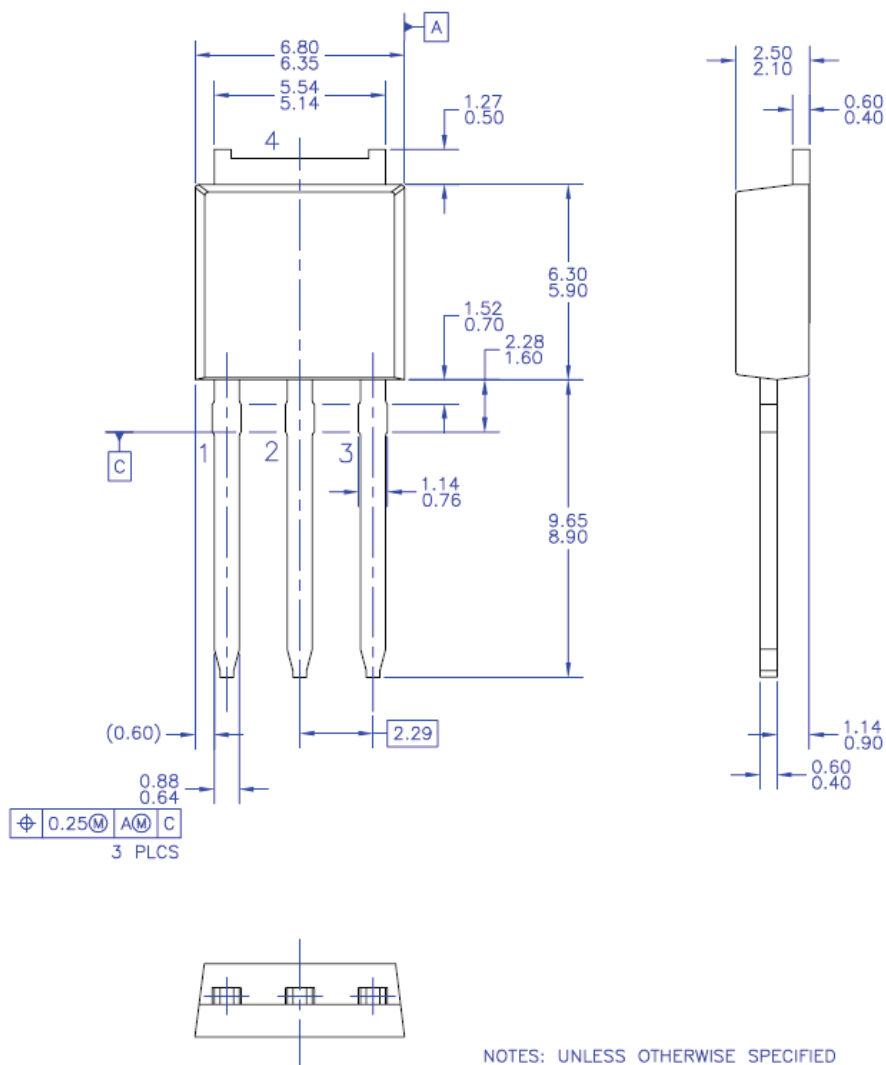
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Dimensions in Millimeters

Mechanical Dimensions (continued)

I-PAK



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Dimensions in Millimeters

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