FQD30N06TF Datasheet

https://www.DiGi-Electronics.com

DiGi Electronics Part Number	FQD30N06TF-DG
Manufacturer	onsemi
Manufacturer Product Number	FQD30N06TF
Description	MOSFET N-CH 60V 22.7A DPAK
Detailed Description	N-Channel 60 V 22.7A (Tc) 2.5W (Ta), 44W (Tc) Surface Mount TO-252AA

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
FQD30N06TF	onsemi
Series:	Product Status:
QFET®	Obsolete
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
60 V	22.7A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
10V	45mOhm @ 11.4A, 10V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
4V @ 250µA	25 nC @ 10 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±25V	945 pF @ 25 V
FET Feature:	Power Dissipation (Max):
-	2.5W (Ta), 44W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Surface Mount
Supplier Device Package:	Package / Case:
TO-252AA	TO-252-3, DPAK (2 Leads + Tab), SC-63
Base Product Number:	
FQD3	

Environmental & Export classification

Moisture Sensitivity Level (MSL):	REACH Status:
1 (Unlimited)	REACH Unaffected
ECCN:	HTSUS:
EAR99	8541.29.0095

FAIRCHILD SEMICONDUCTOR®

January 2009
QFET®

FQD30N06 / FQU30N06

60V N-Channel MOSFET

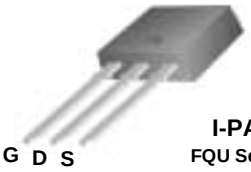
General Description

These N-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar stripe, 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 low voltage applications such as automotive, DC/DC converters, and high efficiency switching for power management in portable and battery operated products.

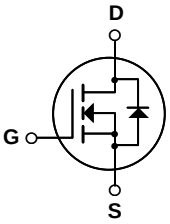
Features

- 22.7A, 60V, $R_{DS(on)}$ = 0.045Ω @ V_{GS} = 10V
- Low gate charge (typical 19 nC)
- Low Crss (typical 40 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- 150°C maximum junction temperature rating
- RoHS Compliant

D-PAK
FQD Series



I-PAK
FQU Series



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		FQD30N06 / FQU30N06	Units
V_{DSS}	Drain-Source Voltage		60	V
I_D	Drain Current - Continuous (T_C = 25°C)		22.7	A
	- Continuous (T_C = 100°C)		14.3	A
I_{DM}	Drain Current - Pulsed	(Note 1)	90.8	A
V_{GSS}	Gate-Source Voltage		± 25	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	280	mJ
I_{AR}	Avalanche Current	(Note 1)	22.7	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	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	2.85	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient *	--	50	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	110	°C/W

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

Electrical Characteristics

T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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 = 11.4 A	-- --	0.036	0.045	Ω
g_{FS}	Forward Transconductance	V_{DS} = 25 V, I_D = 11.4 A (Note 4)	--	15	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	725	945	pF
C_{oss}	Output Capacitance		--	270	350	pF
C_{rss}	Reverse Transfer Capacitance		--	40	52	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 30 V, I_D = 15 A, R_G = 25 Ω (Note 4, 5)	--	10	30	ns
t_r	Turn-On Rise Time		--	85	180	ns
$t_{d(off)}$	Turn-Off Delay Time		--	35	80	ns
t_f	Turn-Off Fall Time		--	40	90	ns
Q_g	Total Gate Charge	V_{DS} = 48 V, I_D = 30 A, V_{GS} = 10 V (Note 4, 5)	--	19	25	nC
Q_{gs}	Gate-Source Charge		--	5.4	--	nC
Q_{gd}	Gate-Drain Charge		--	8.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	22.7	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	90.8	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 22.7 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_F = 30 A, dI_F / dt = 100 A/μs (Note 4)	--	45	--	ns
Q_{rr}	Reverse Recovery Charge		--	65	--	nC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 630μH, I_{AS} = 22.7A, V_{DD} = 25V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ 30A, di/dt ≤ 300A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Characteristics

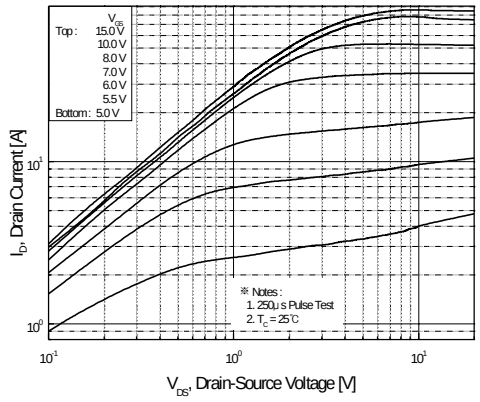


Figure 1. On-Region Characteristics

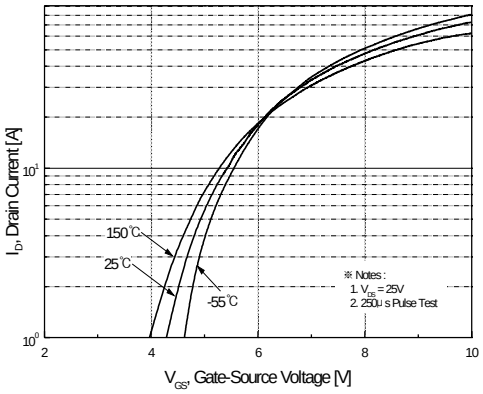


Figure 2. Transfer Characteristics

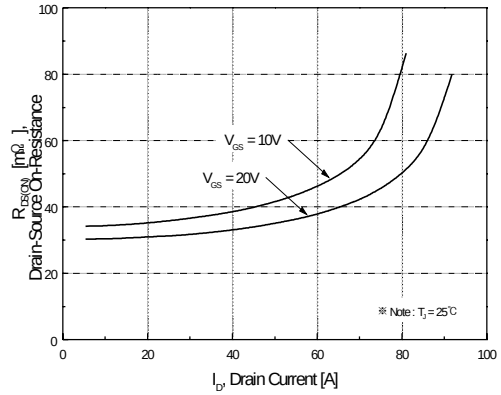


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

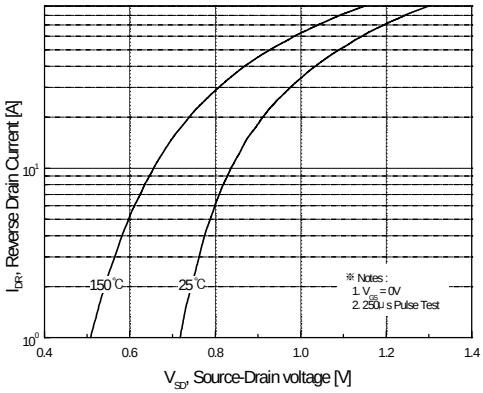


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

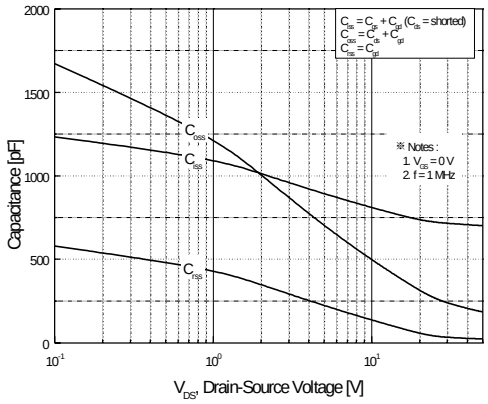


Figure 5. Capacitance Characteristics

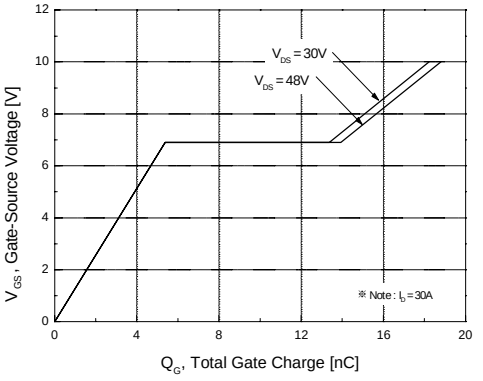


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

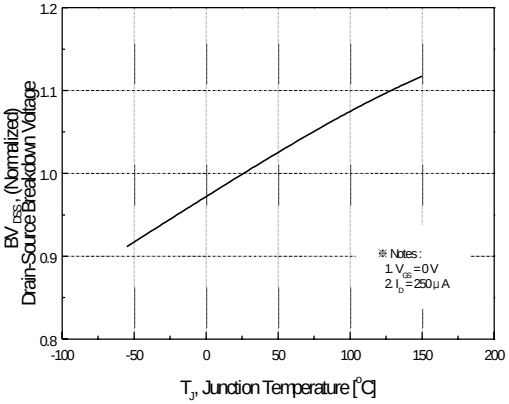


Figure 7. Breakdown Voltage Variation vs. Temperature

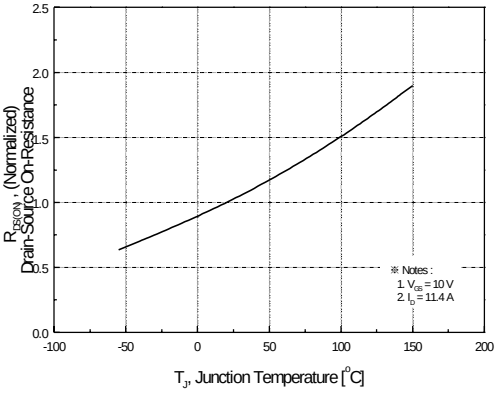


Figure 8. On-Resistance Variation vs. Temperature

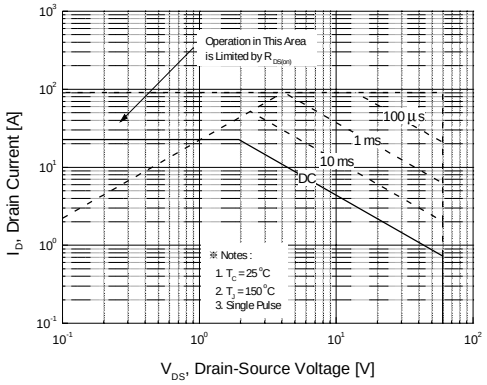


Figure 9. Maximum Safe Operating Area

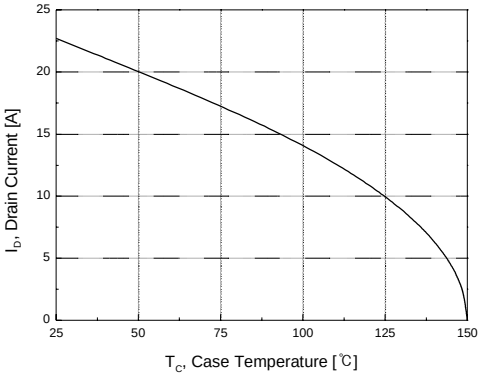


Figure 10. Maximum Drain Current vs. Case Temperature

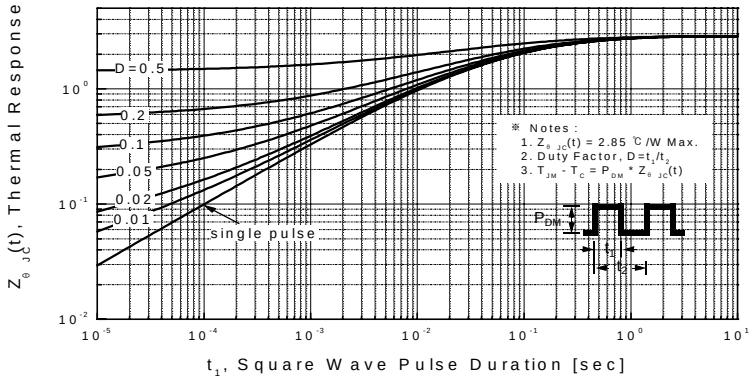
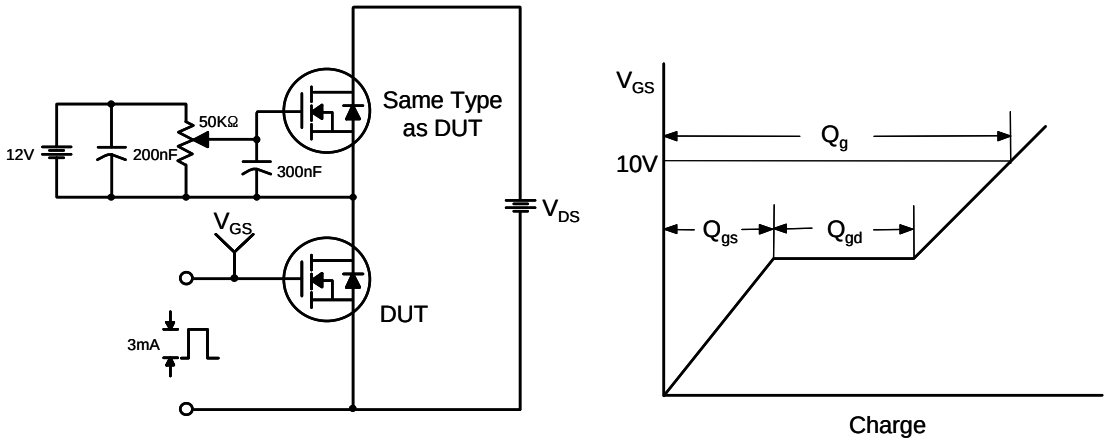
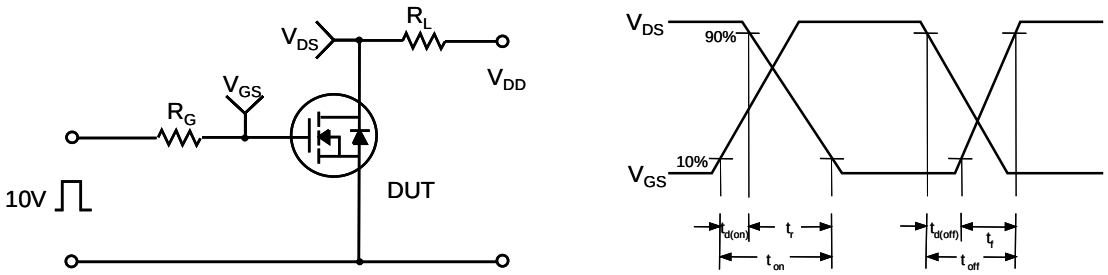


Figure 11. Transient Thermal Response Curve

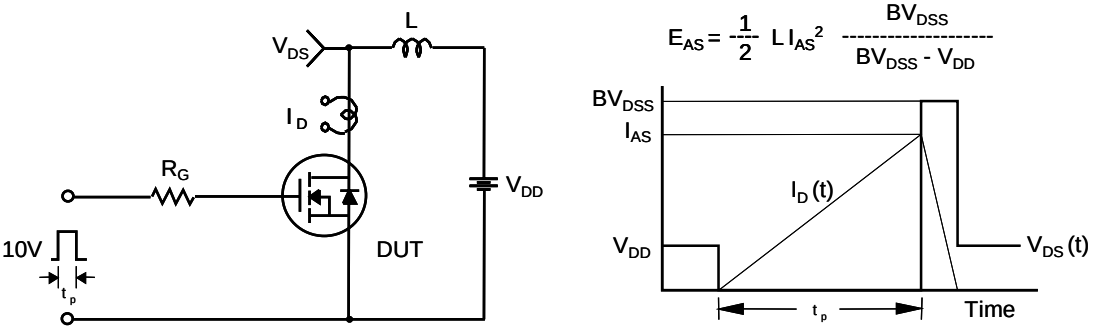
Gate Charge Test Circuit & Waveform



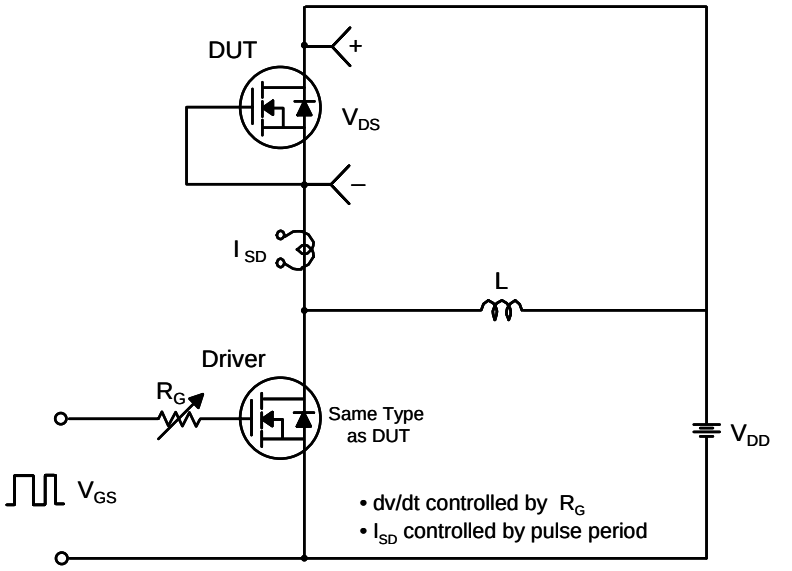
Resistive Switching Test Circuit & Waveforms

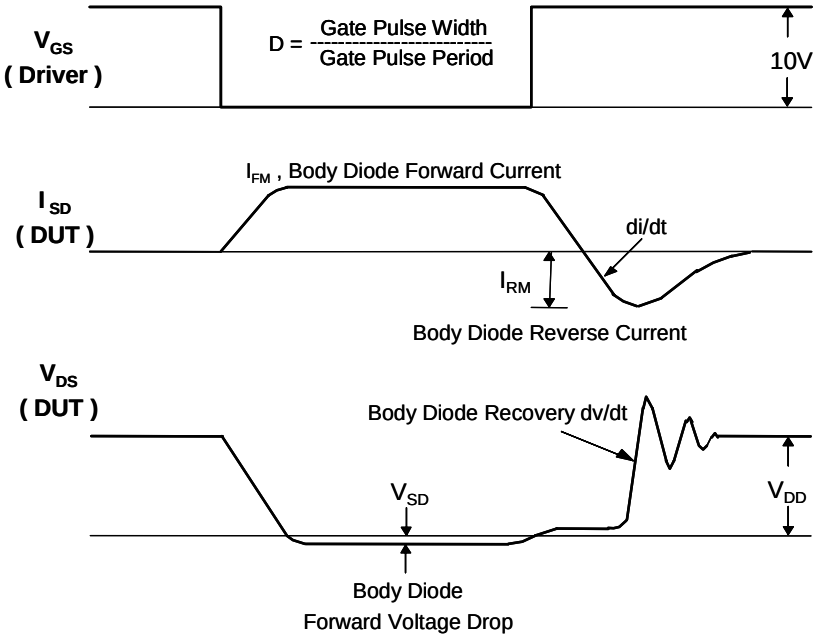


Unclamped Inductive Switching Test Circuit & Waveforms



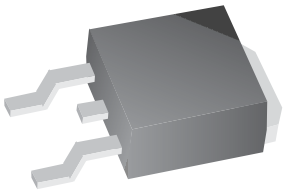
Peak Diode Recovery dv/dt Test Circuit & Waveforms

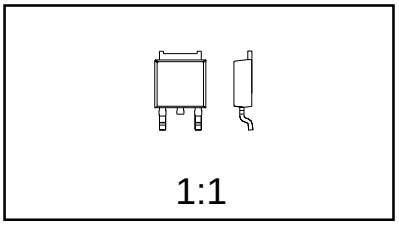




Mechanical Dimensions

TO-252 (DPAK) (FS PKG Code 36)

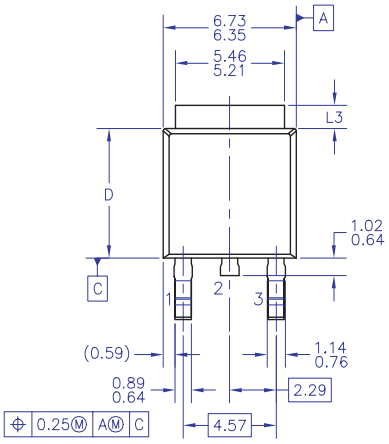


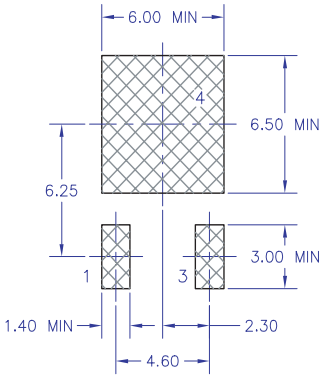


Scale 1:1 on letter size paper

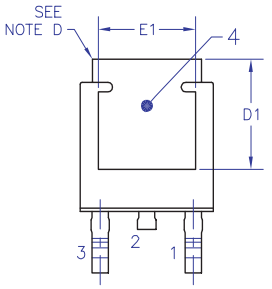
Dimensions shown below are in:
millimeters

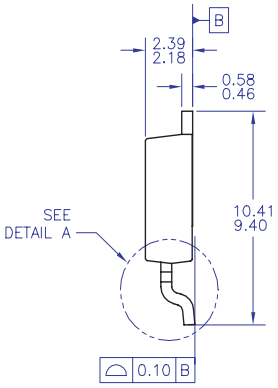
Part Weight per unit (gram): 0.33

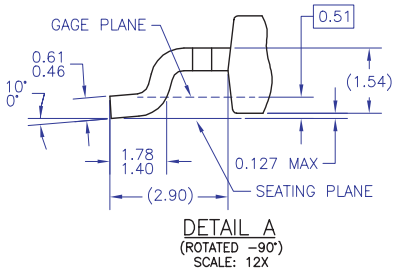




LAND PATTERN RECOMMENDATION







DETAIL A
(ROTATED −90°)
SCALE: 12X

NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.

B) THIS PACKAGE CONFORMS TO JEDEC, TO−252, ISSUE C, VARIATION AA & AB, DATED NOV. 1999.

C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M−1994.

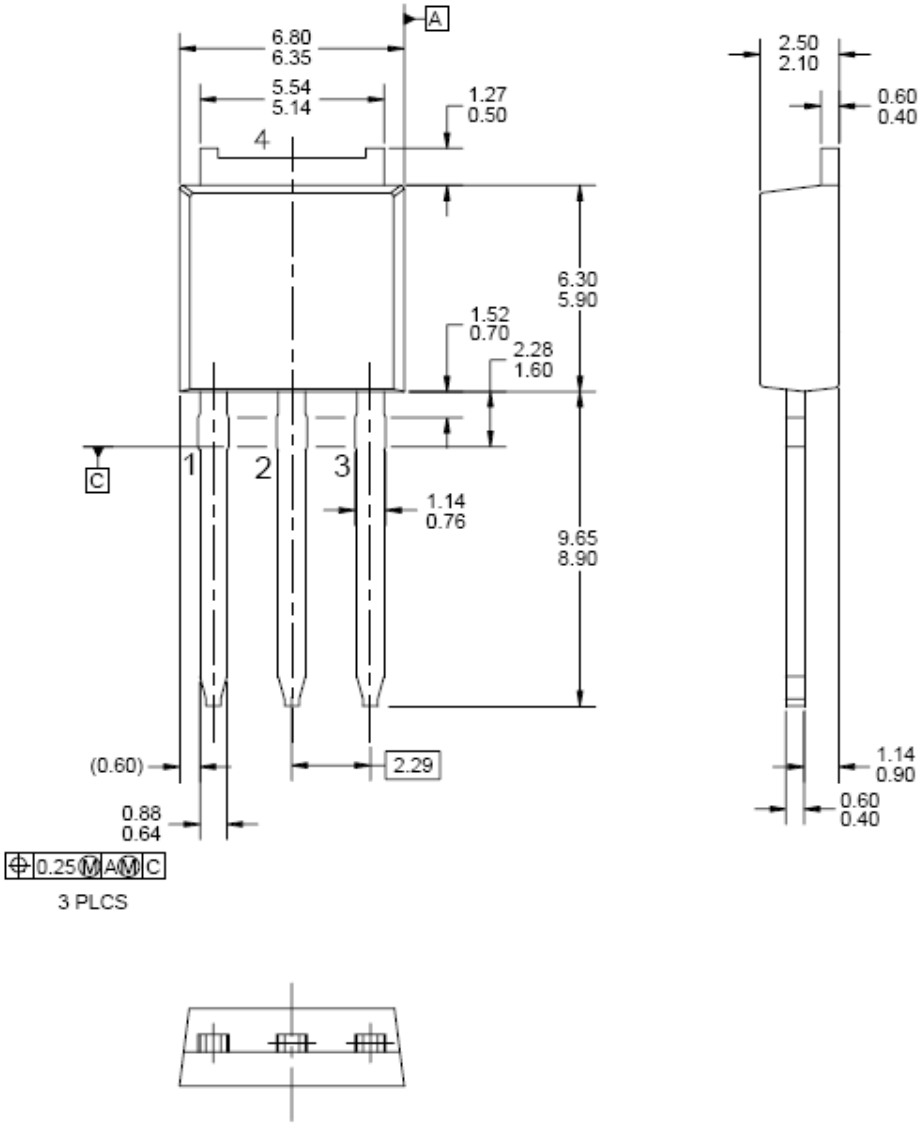
D) HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.

E) DIMENSIONS L3,D,E1&D1 TABLE:

	OPTION AA	OPTION AB
L3	0.89−1.27	1.52−2.03
D	5.97−6.22	5.33−5.59
E1	4.32 MIN	3.81 MIN
D1	5.21 MIN	4.57 MIN

Mechanical Dimensions

I - PAK



Dimensions in Millimeters

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2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I37

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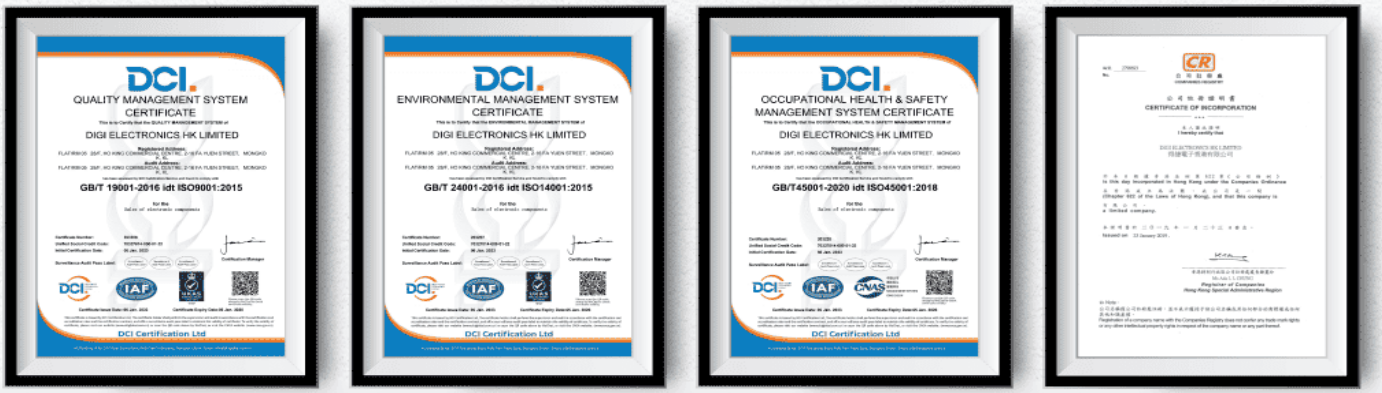

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