FAIRCHILD SEMICONDUCTOR TM

January 2009
QFET®

FQD3P50 / FQU3P50

500V P-Channel MOSFET

General Description

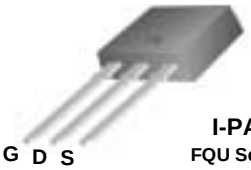
These P-Channel enhancement mode power field effect transistors are produced using Fairchild's proprietary, planar stripe, DMOS technology.
This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for electronic lamp ballast based on complimentary half bridge.

Features

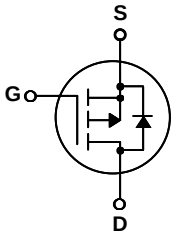
- -2.1A, -500V, $R_{DS(on)}$ = 4.9Ω @V_{GS} = -10 V
- Low gate charge (typical 18 nC)
- Low Crss (typical 9.5 pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS Compliant



D-PAK
FQD Series



I-PAK
FQU Series



Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		FQD3P50 / FQU3P50	Units
V_{DSS}	Drain-Source Voltage		-500	V
I_D	Drain Current - Continuous (T_C = 25°C)		-2.1	A
	- Continuous (T_C = 100°C)		-1.33	A
I_{DM}	Drain Current - Pulsed	(Note 1)	-8.4	A
V_{GSS}	Gate-Source Voltage		± 30	V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	250	mJ
I_{AR}	Avalanche Current	(Note 1)	-2.1	A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	5.0	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	-4.5	V/ns
P_D	Power Dissipation (T_A = 25°C) *		2.5	W
	Power Dissipation (T_C = 25°C)		50	W
	- Derate above 25°C		0.4	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	--	2.5	°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)

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Elerical 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	-500	--	--	V
ΔBV_{DSS} / ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = -250 μA, Referenced to 25°C	--	0.42	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -500 V, V_{GS} = 0 V	--	--	-1	μA
		V_{DS} = -400 V, T_C = 125°C	--	--	-10	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	-3.0	--	-5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = -10 V, I_D = -1.05 A	--	3.9	4.9	Ω
g_{FS}	Forward Transconductance	V_{DS} = -50 V, I_D = -1.05 A (Note 4)	--	2.1	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -25 V, V_{GS} = 0 V, f = 1.0 MHz	--	510	660	pF
C_{oss}	Output Capacitance		--	70	90	pF
C_{rss}	Reverse Transfer Capacitance		--	9.5	12	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -250 V, I_D = -2.7 A, R_G = 25 Ω (Note 4, 5)	--	12	35	ns
t_r	Turn-On Rise Time		--	56	120	ns
$t_{d(off)}$	Turn-Off Delay Time		--	35	80	ns
t_f	Turn-Off Fall Time		--	45	100	ns
Q_g	Total Gate Charge	V_{DS} = -400 V, I_D = -2.7 A, V_{GS} = -10 V (Note 4, 5)	--	18	23	nC
Q_{gs}	Gate-Source Charge		--	3.6	--	nC
Q_{gd}	Gate-Drain Charge		--	9.2	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	-2.1	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	-8.4	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = -2.1 A	--	--	-5.0	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = -2.7 A, dI_F / dt = 100 A/μs (Note 4)	--	270	--	ns
Q_{rr}	Reverse Recovery Charge		--	1.5	--	μC

Notes:
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 102mH, I_{AS} = -2.1A, V_{DD} = -50V, R_G = 25 Ω, Starting T_J = 25°C
3. I_{SD} ≤ -2.7A, di/dt ≤ 200A/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

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Typical Characteristics

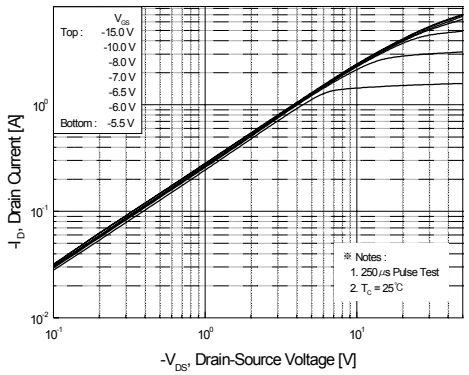


Figure 1. On-Region Characteristics

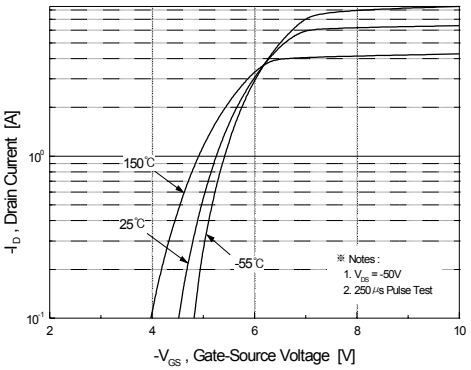


Figure 2. Transfer Characteristics

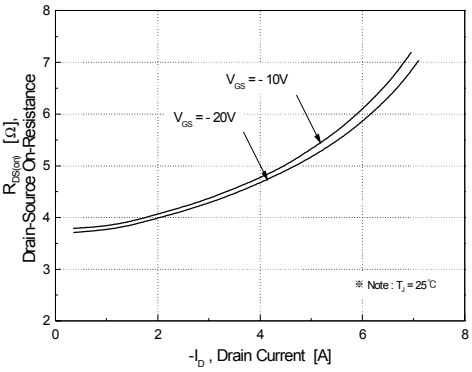


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

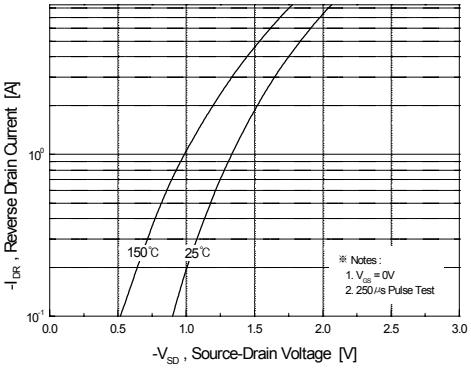


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

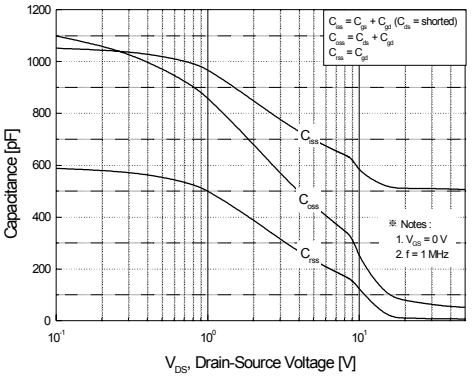


Figure 5. Capacitance Characteristics

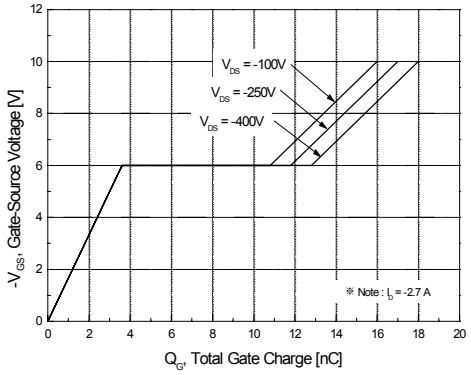


Figure 6. Gate Charge Characteristics

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Typical Characteristics (Continued)

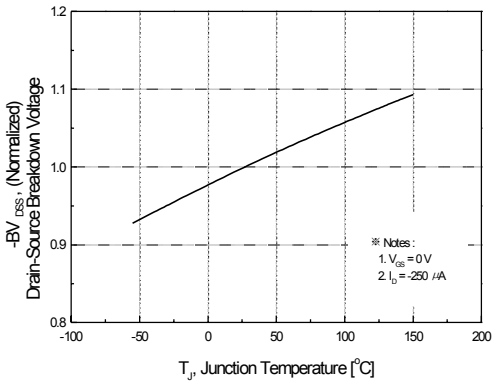


Figure 7. Breakdown Voltage Variation vs. Temperature

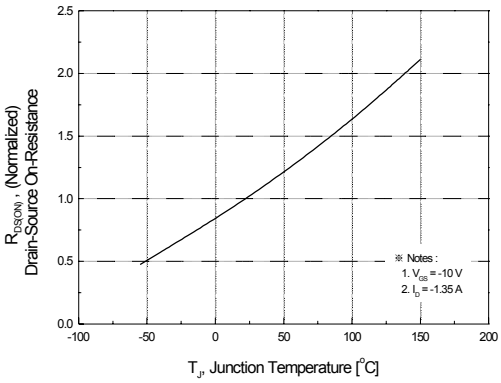


Figure 8. On-Resistance Variation vs. Temperature

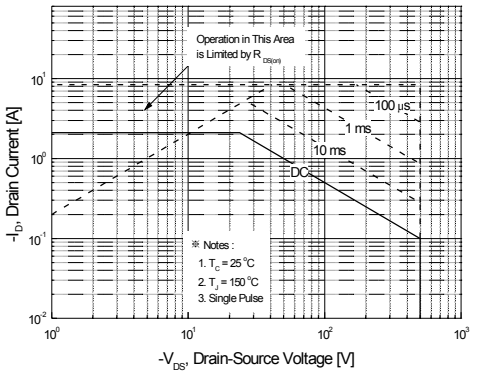


Figure 9. Maximum Safe Operating Area

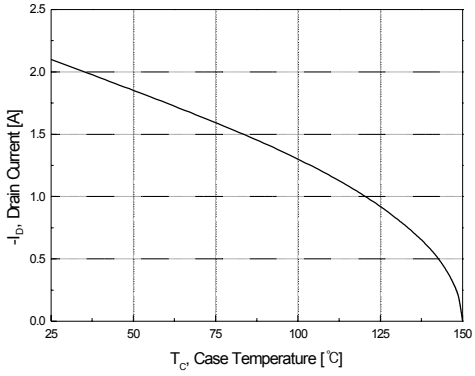


Figure 10. Maximum Drain Current vs. Case Temperature

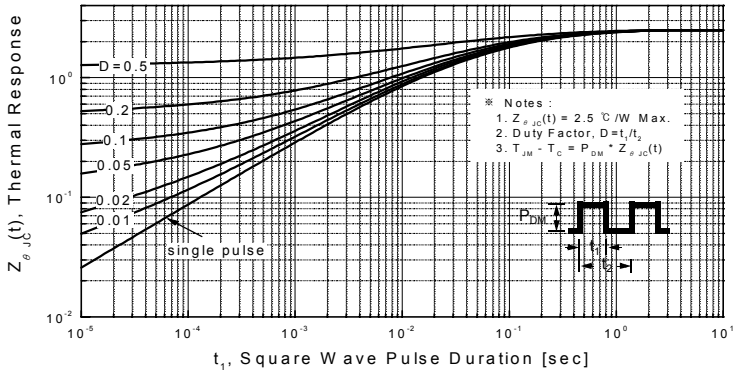
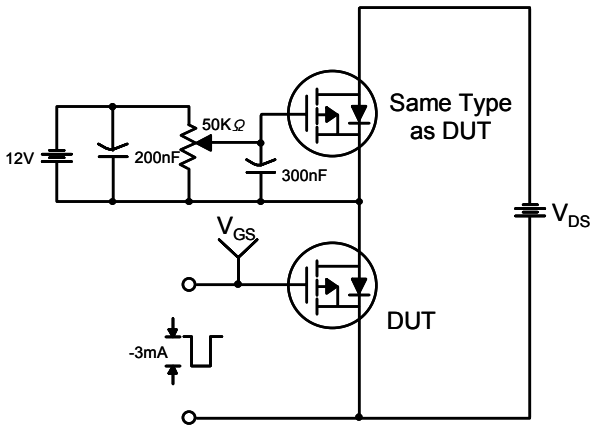
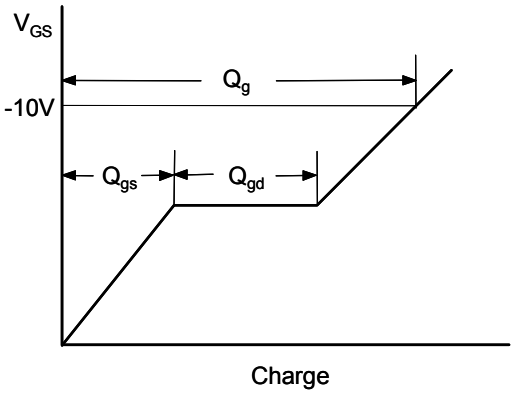


Figure 11. Transient Thermal Response Curve

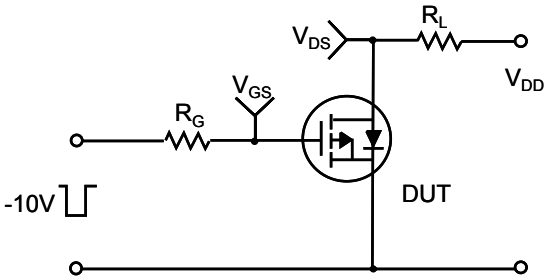
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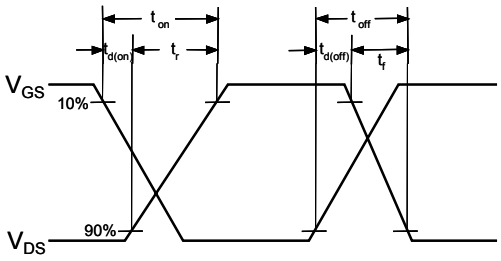
Gate Charge Test Circuit & Waveform



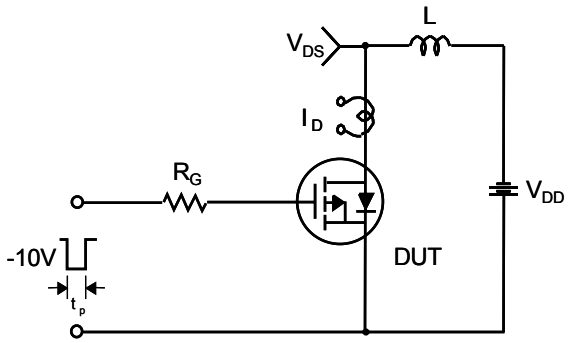


Resistive Switching Test Circuit & Waveforms

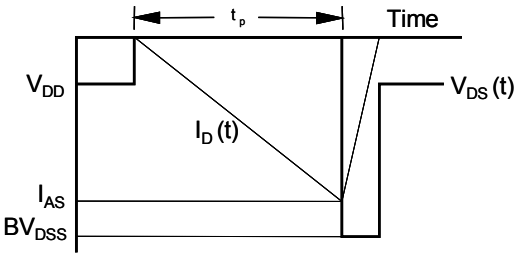




Unclamped Inductive Switching Test Circuit & Waveforms

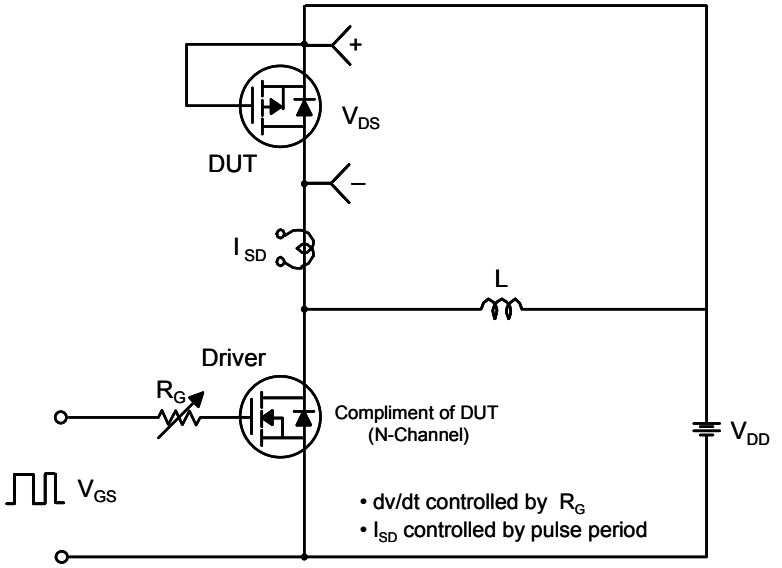


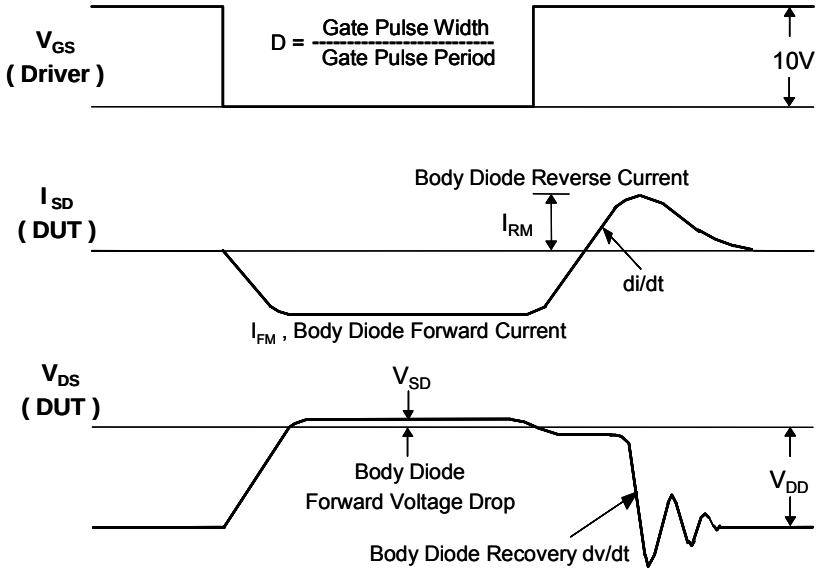
$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



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Peak Diode Recovery dv/dt Test Circuit & Waveforms

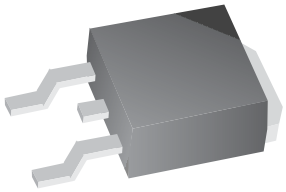


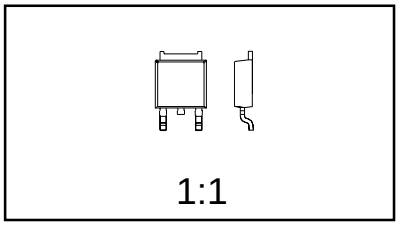


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Mechanical Dimensions

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

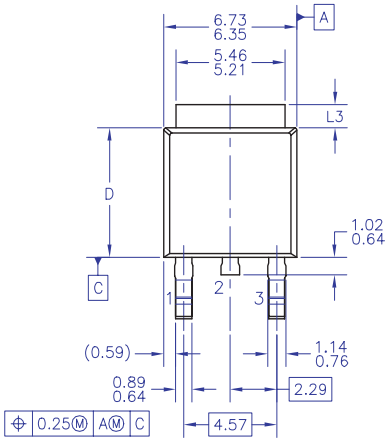


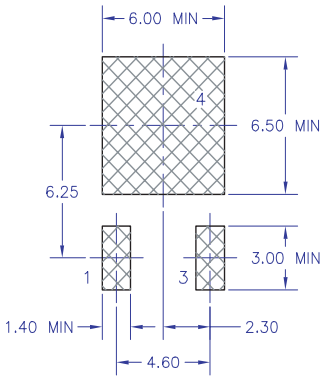


Scale 1:1 on letter size paper

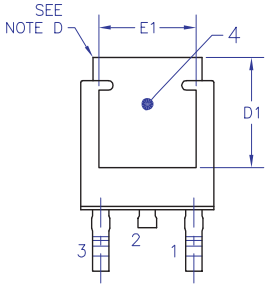
Dimensions shown below are in:
millimeters

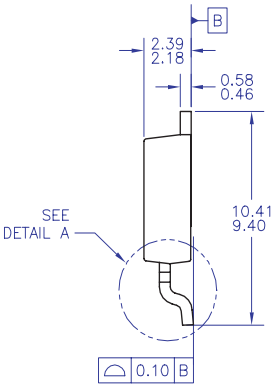
Part Weight per unit (gram): 0.33

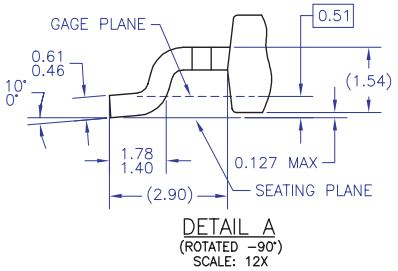




LAND PATTERN RECOMMENDATION







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.

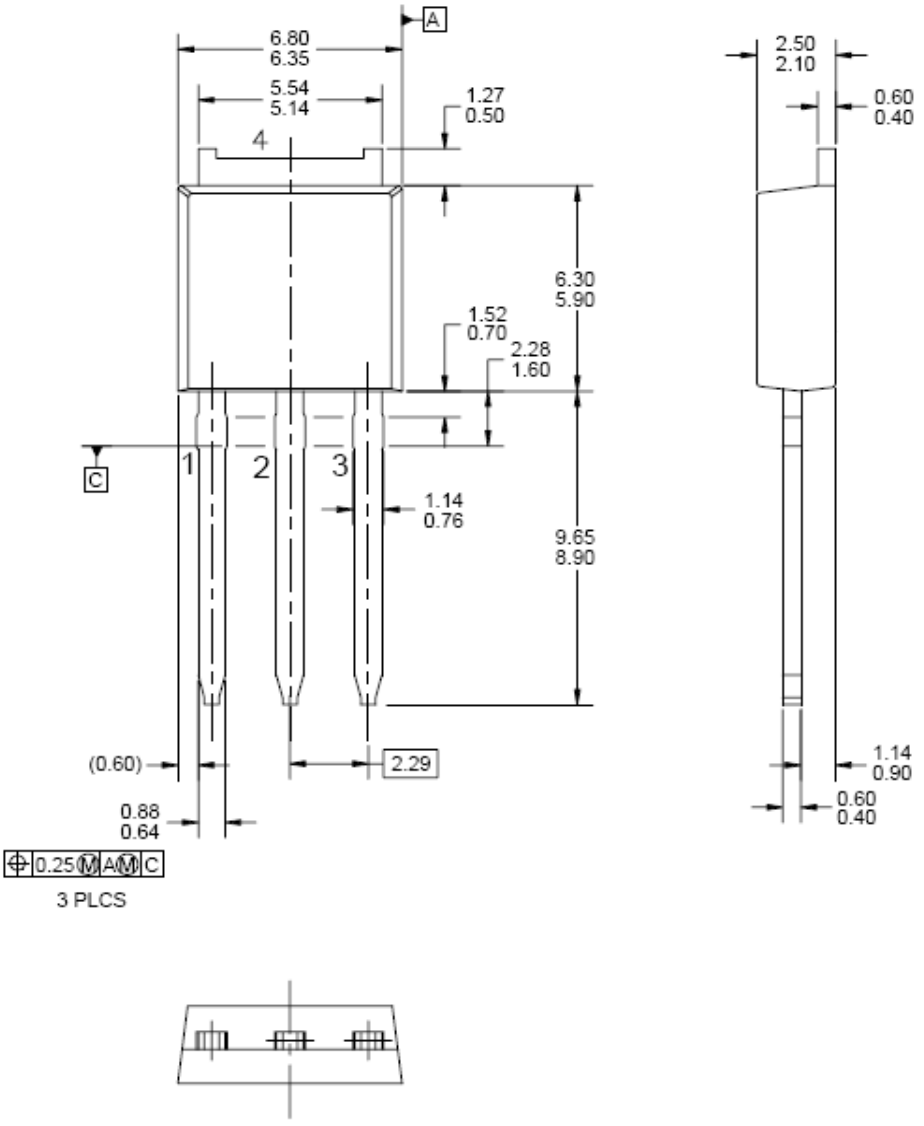
E) DIMENSIONS L3,D,E1&D1 TABLE:

	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

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Mechanical Dimensions

I - PAK



Dimensions in Millimeters

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F-PFS™
FRFET®
Global Power Resource℠
Green FPS™
Green FPS™ e-Series™
GTO™
IntelliMAX™
ISOPLANAR™
MegaBuck™
MICROCOUPLER™
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SuperSOT™-6
SuperSOT™-8
SupreMOS™
SyncFET™
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TinyBuck™
TinyLogic®
TINYOPTO™
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TinyPWM™
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VCX™
VisualMax™
XS™

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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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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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LifeElectronics
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ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- *Конкурентоспособные цены и скидки постоянным клиентам.*
- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

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