



FQT13N06L — N-Channel QFET[®] MOSFET

FQT13N06L

N-Channel QFET[®] MOSFET

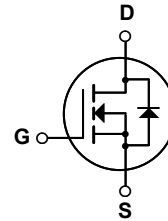
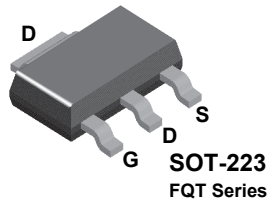
60 V, 2.8 A, 110 mΩ

General 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, audio amplifier, DC motor control, and variable switching power applications.

Features

- 2.8 A, 60 V, $R_{DS(on)} = 110 \text{ m}\Omega$ (Max.) @ $V_{GS} = 10 \text{ V}$, $I_D = 1.4 \text{ A}$
- Low Gate Charge (Typ. 4.8 nC)
- Low C_{rss} (Typ. 17 pF)
- 100% Avalanche Tested



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

Symbol	Parameter	FQT13N06L	Unit
V_{DSS}	Drain-Source Voltage	60	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 70^\circ\text{C}$)	2.8	A
		2.24	A
I_{DM}	Drain Current - Pulsed (Note 1)	11.2	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	85	mJ
I_{AR}	Avalanche Current (Note 1)	2.8	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	0.21	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	7.0	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	2.1	W
		0.017	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, 1/8" from Case for 5 Seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient *	--	60	$^\circ\text{C}/\text{W}$

* 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	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$, Referenced to 25°C	--	0.05	--	V/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 48\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1.0	--	2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 1.4\text{ A}$	--	0.088	0.11	Ω
		$V_{GS} = 5\text{ V}, I_D = 1.4\text{ A}$	--	0.110	0.14	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 25\text{ V}, I_D = 1.4\text{ A}$ (Note 4)	--	4.1	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	270	350	pF
C_{oss}	Output Capacitance		--	95	125	pF
C_{rss}	Reverse Transfer Capacitance		--	17	23	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}, I_D = 6.8\text{ A},$ $R_G = 25\ \Omega$	--	8	25	ns	
t_r	Turn-On Rise Time		--	90	190	ns	
$t_{d(off)}$	Turn-Off Delay Time		--	20	50	ns	
t_f	Turn-Off Fall Time		(Note 4, 5)	--	40	90	ns
Q_g	Total Gate Charge		$V_{DS} = 48\text{ V}, I_D = 13.6\text{ A},$ $V_{GS} = 5\text{ V}$	--	4.8	6.4	nC
Q_{gs}	Gate-Source Charge	--		1.6	--	nC	
Q_{gd}	Gate-Drain Charge	(Note 4, 5)		--	2.7	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	2.8	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	11.2	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 2.8\text{ A}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 13.6\text{ A},$ $di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	45	--	ns
Q_{rr}	Reverse Recovery Charge		--	45	--	nC

Notes:

1. Repetitive rating : pulse-width limited by maximum junction temperature.
2. $L = 12.6\text{ mH}, I_{AS} = 2.8\text{ A}, V_{DD} = 25\text{ V}, R_G = 25\ \Omega$, starting $T_J = 25^\circ\text{C}$.
3. $I_{SD} \leq 13.6\text{ A}, di/dt \leq 300\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, starting $T_J = 25^\circ\text{C}$.
4. Pulse test : pulse width $\leq 300\ \mu\text{s}$, Duty cycle $\leq 2\%$.
5. Essentially independent of operating temperature.

Typical Characteristics

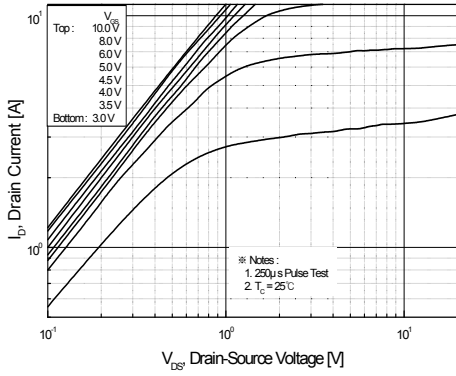


Figure 1. On-Region Characteristics

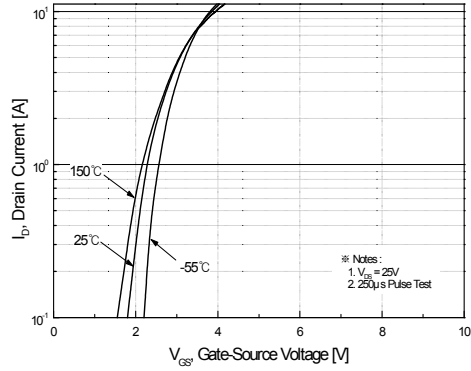


Figure 2. Transfer Characteristics

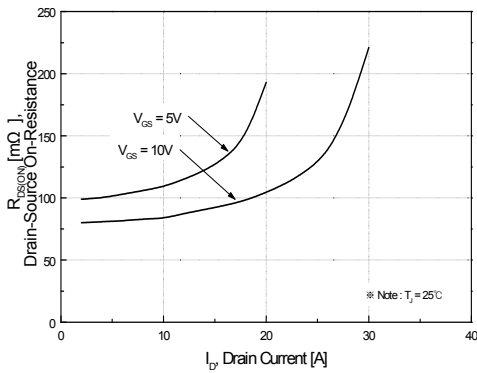


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

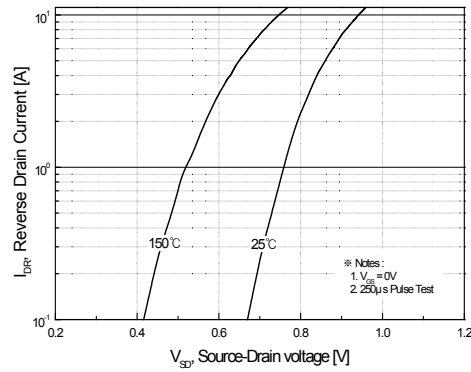


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

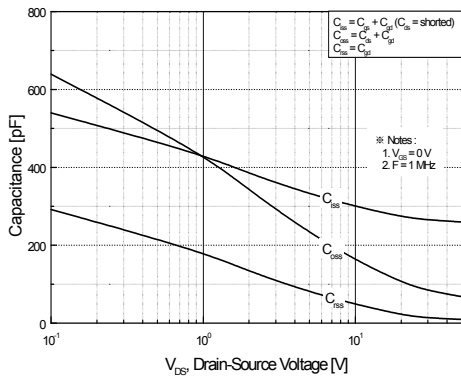


Figure 5. Capacitance Characteristics

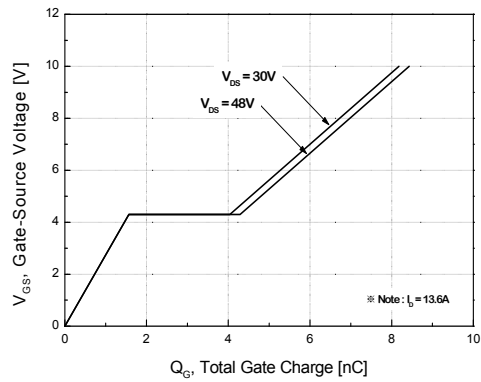


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

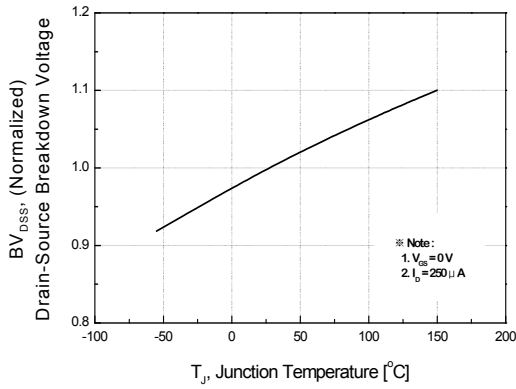


Figure 7. Breakdown Voltage Variation vs Temperature

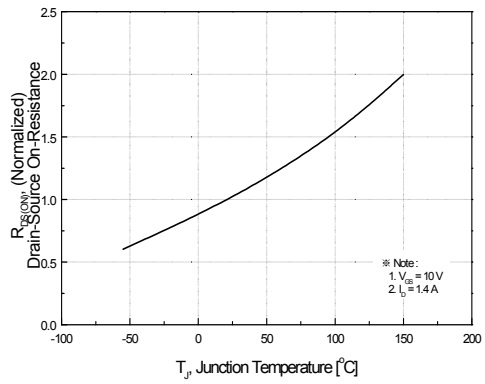


Figure 8. On-Resistance Variation vs Temperature

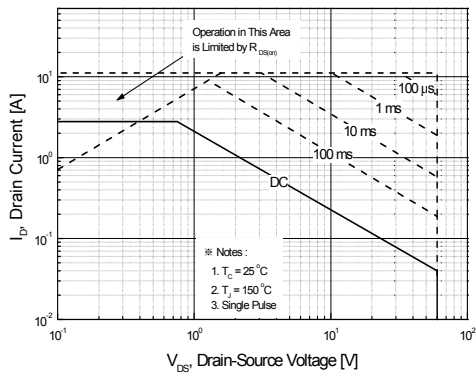


Figure 9. Maximum Safe Operating Area

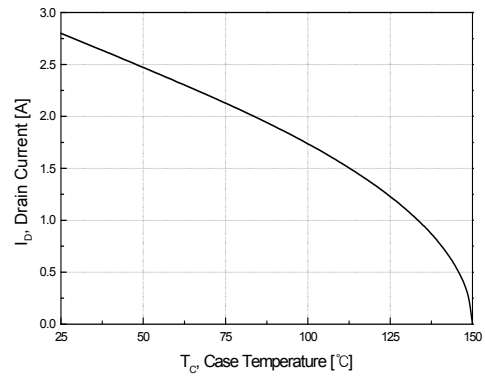


Figure 10. Maximum Drain Current vs Case Temperature

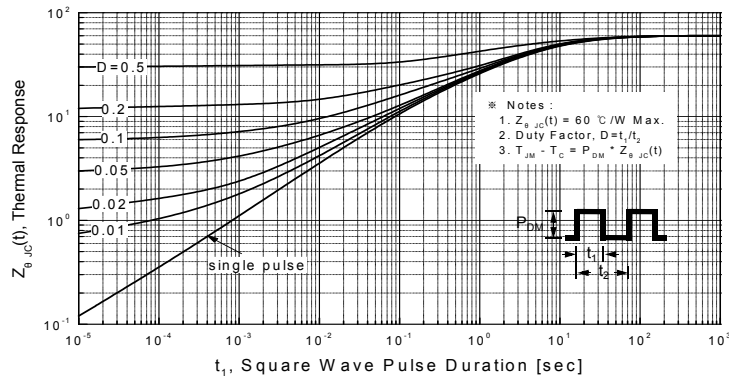


Figure 11. Transient Thermal Response Curve

Figure 12. Gate Charge Test Circuit & Waveform

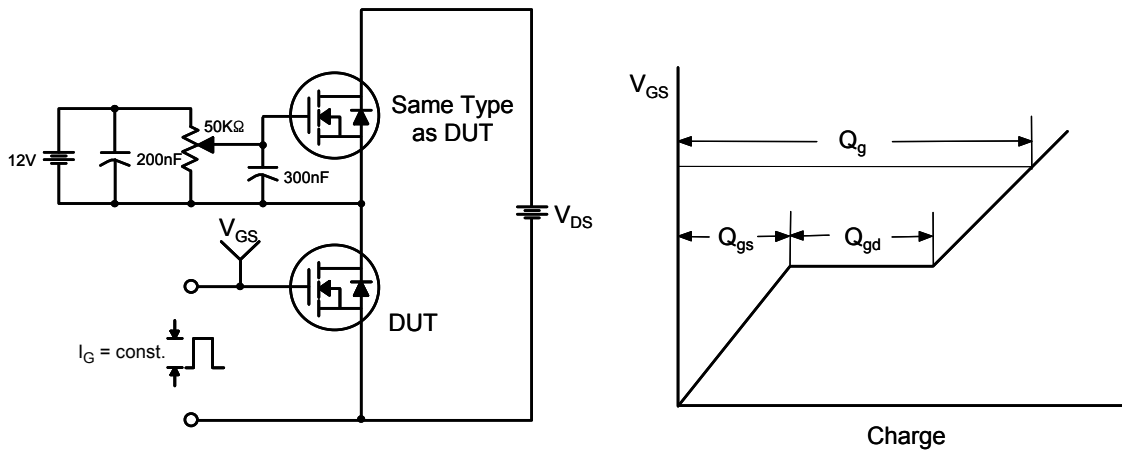


Figure 13. Resistive Switching Test Circuit & Waveforms

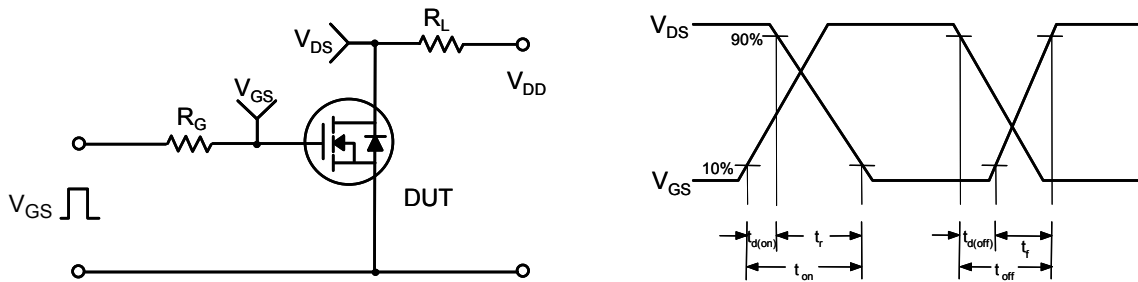


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

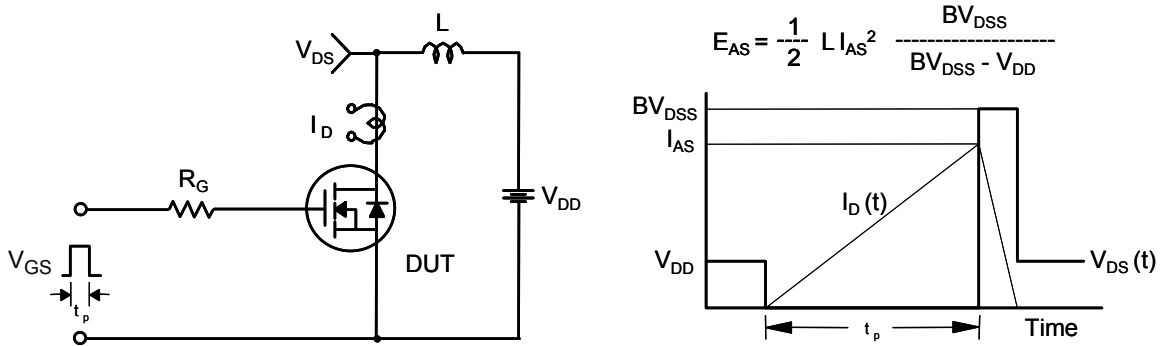
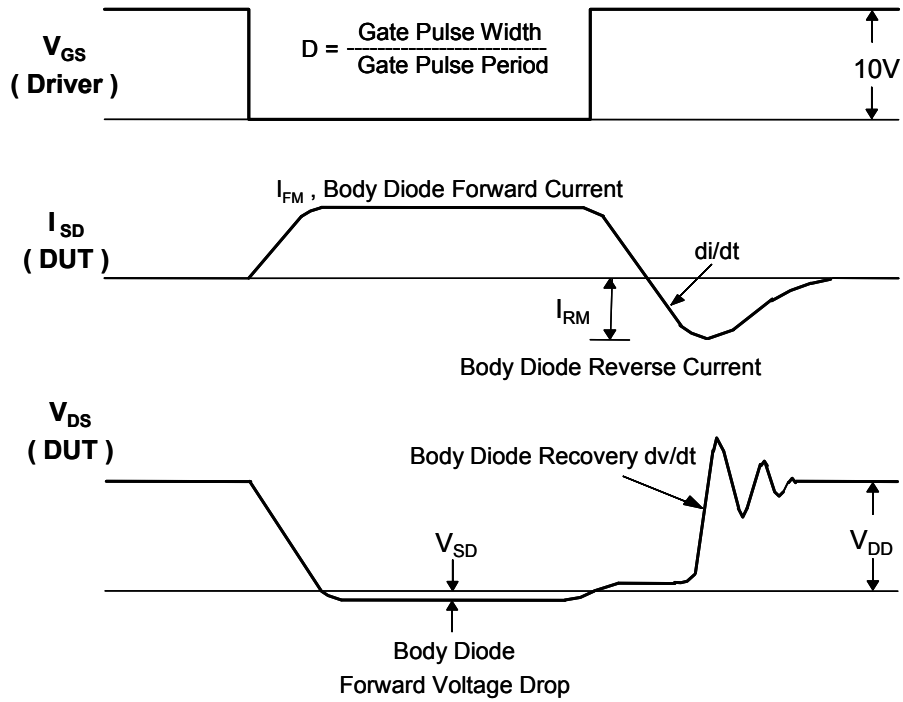
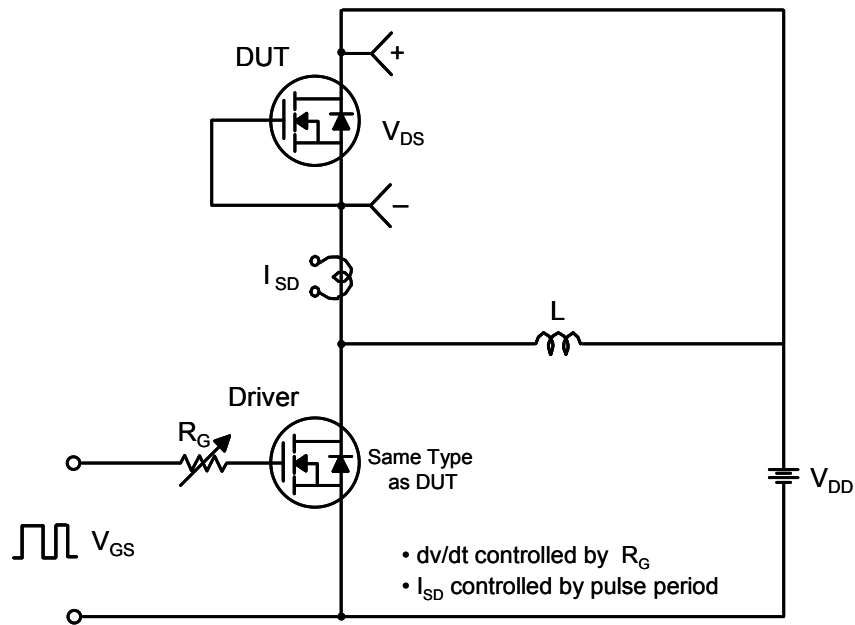


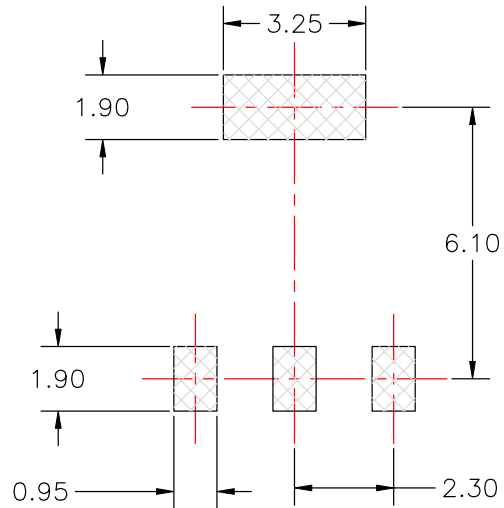
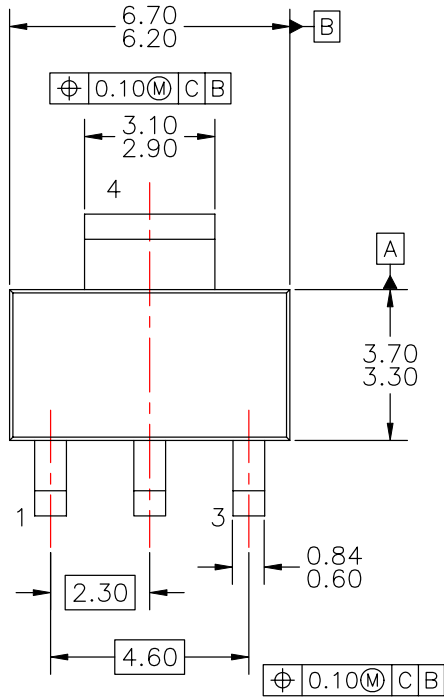
Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



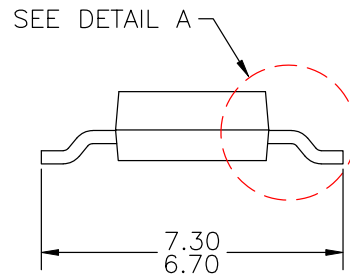
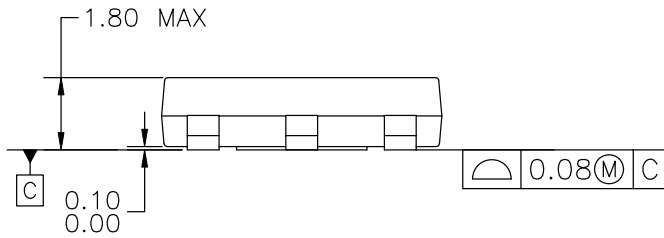
THIS DRAWING IS THE PROPERTY OF FAIRCHILD SEMICONDUCTOR CORPORATION. NO USE THEREOF SHALL BE MADE OTHER THAN AS A REFERENCE FOR PROPOSALS AS SUBMITTED TO FAIRCHILD SEMICONDUCTOR CORPORATION FOR OBS TO BE EXECUTED IN CONFORMANCE WITH SUCH PROPOSALS UNLESS THE CONSENT OF SAID FAIRCHILD SEMICONDUCTOR CORPORATION HAS PREVIOUSLY BEEN OBTAINED. NO PART OF THIS DRAWING SHALL BE COPIED OR DUPLICATED OR ITS CONTENTS DISCLOSED. THE INFORMATION CONTAINED ON THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY.

APPROVED
July-14-2008

REVISIONS			
LTR	DESCRIPTION	DATE	NAME/SITE
A	RELEASE TO DOCUMENT CONTROL	JAN.25,1996	TL/FSCP
2	CHG DWG TEMPLATE FR NATIONAL TO FAIRCHILD; CHG DIM STYLE FR DUAL INCH[MM] TO SINGLE, MM; CHG LD WID FR 0.74 ±0.03 TO 0.60-0.84; REMOVE PKG THICK DIM (1.6); CHG TOTAL PKG HT FR 1.8 ±0.05 TO 1.80 MAX; CHG FOOT LANDING DIM FR 0.91 MIN TO 0.60 MIN; CHG LD THICKNESS FR 0.35 ±0.03 TO 0.20-0.35; ADD DRAFT ANGLE OF MOLDED BODY TOP & BOT; CHG LD LGTH TO PKG EDGE DIM TO BASIC; CHG LD PITCH FR 2.29 BS TO 2.30 BS; CHG BODY WID FR 3.56 ±0.33 TO 3.3; CHG BODY LN FR 6.53 ±0.33 TO 6.3; CHG TOTAL PKG WID FR 6.94 ±0.33 TO 7.3; CHG PAD SIZE FR 0.99 MAX TO 0.95; CHG PAD PITCH FR 2.286 TO 2.30; CHG THERMAL TAB SIZE FR 3.28 MAX TO 3.25; CHG PAD SIZE FR 1.5 TO 1.90; CHG PAD SPACE FR 6.3 TO 6.10; CHG NOTE '2' TO 'A' W/O DATE; DEL NOTE ON LD FINISH; ADD NOTES B, C, D, E & F.	12FEB08	LZSC/FSCP

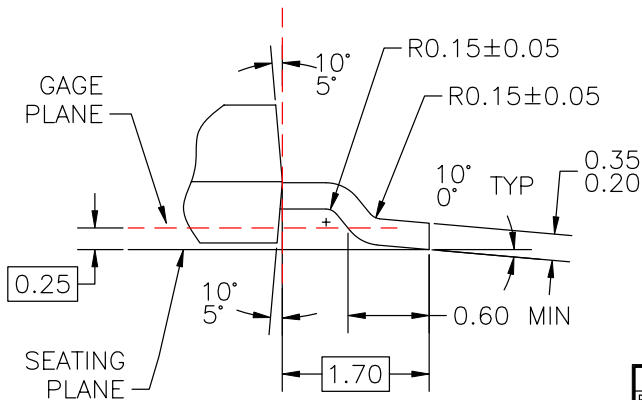


LAND PATTERN RECOMMENDATION



NOTES: UNLESS OTHERWISE SPECIFIED

- A) DRAWING BASED ON JEDEC REGISTRATION TO-261, VARIATION AA.
- B) DIMENSIONS ARE INCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- C) ALL DIMENSIONS ARE IN MILLIMETERS.
- D) DRAWING CONFORMS TO ASME Y14.5M-1994.
- E) LANDPATTERN NAME: SOT230P700X180-4BN
- F) DRAWING FILENAME: MKT-MA04AREV2








DETAIL A
SCALE: 2:1

APPROVALS	DATE	FAIRCHILD SEMICONDUCTOR™		
DRWN: J.U. COMPARATIVO JR.	26FEB2008			
CHECKED: L.Z. STA CRUZ				
APPROVED: M.R. GESTOLE				
G.S. BAJE		MOLDED PACKAGE SOT-223, 4 LEAD		
PROJECTION INCH ENGR	SCALE: 1:1	SIZE: A3	DRAWING NUMBER: MKT-MA04A	REV: 2
	FORMERLY: N/A			SHEET: 1 OF 1



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

- | | | | |
|---|--|---|---|
| AccuPower™ | F-PFS™ | OPTOPLANAR® |  SYSTEM GENERAL® |
| AttitudeEngine™ | FRFET® |  ® | TinyBoost® |
| Awinda® | Global Power Resource SM | Power Supply WebDesigner™ | TinyBuck® |
| AX-CAP®* | GreenBridge™ | PowerTrench® | TinyCalc™ |
| BitSiC™ | Green FPS™ | PowerXS™ | TinyLogic® |
| Build it Now™ | Green FPS™ e-Series™ | Programmable Active Droop™ | TINYOPTO™ |
| CorePLUS™ | Gmax™ | QFET® | TinyPower™ |
| CorePOWER™ | GTO™ | QS™ | TinyPWM™ |
| CROSSVOL™ | IntelliMAX™ | Quiet Series™ | TinyWire™ |
| CTL™ | ISOPLANAR™ | RapidConfigure™ | TranSiC™ |
| Current Transfer Logic™ | Making Small Speakers Sound Louder and Better™ |  ™ | TriFault Detect™ |
| DEUXPEED® | MegaBuck™ | Saving our world, 1mW/W/kW at a time™ | TRUECURRENT®* |
| Dual Cool™ | MICROCOUPLER™ | SignalWise™ | μSerDes™ |
| EcoSPARK® | MicroFET™ | SmartMax™ |  SerDes™ |
| EfficientMax™ | MicroPak™ | SMART START™ | UHC® |
| ESBC™ | MicroPak2™ | Solutions for Your Success™ | Ultra FRFET™ |
|  ® | MillerDrive™ | SPM® | UniFET™ |
| Fairchild® | MotionMax™ | STEALTH™ | VCX™ |
| Fairchild Semiconductor® | MotionGrid® | SuperFET® | VisualMax™ |
| FACT Quiet Series™ | MTI® | SuperSOT™-3 | VoltagePlus™ |
| FACT® | MTX® | SuperSOT™-6 | XS™ |
| FAST® | MVN® | SuperSOT™-8 | Xsens™ |
| FastvCore™ | mWSaver® | SupreMOS® | 仙童™ |
| FETBench™ | OptoHiT™ | SyncFET™ | |
| FPS™ | OPTOLOGIC® | Sync-Lock™ | |

* Trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. TO OBTAIN THE LATEST, MOST UP-TO-DATE DATASHEET AND PRODUCT INFORMATION, VISIT OUR WEBSITE AT [HTTP://WWW.FAIRCHILDSEMI.COM](http://www.fairchildsemi.com). FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
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.

ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.fairchildsemi.com, under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

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.

AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit www.ameya360.com

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692

Email amall@ameya360.com

QQ 800077892

Skype [ameyasales1](#) [ameyasales2](#)

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333

Email mkt@ameya360.com