FAIRCHILD SEMICONDUCTOR®

August 2006

FDY4001CZ

Complementary N & P-Channel PowerTrench® MOSFET

Features

Q1: N-Channel

- Max $r_{DS(on)}$ = 5Ω at V_{GS} = 4.5V, I_D = 200mA
- Max $r_{DS(on)}$ = 7Ω at V_{GS} = 2.5V, I_D = 175mA
- Max $r_{DS(on)}$ = 9Ω at V_{GS} = 1.8V, I_D = 150mA

Q2: P-Channel

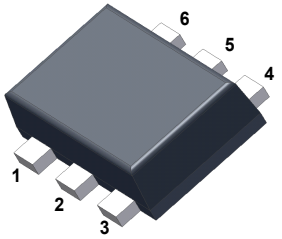
- Max $r_{DS(on)}$ = 8Ω at V_{GS} = -4.5V, I_D = -150mA
- Max $r_{DS(on)}$ = 12Ω at V_{GS} = -2.5V, I_D = -125mA
- Max $r_{DS(on)}$ = 15Ω at V_{GS} = -1.8V, I_D = -100mA
- ESD protection diode (note 3)
- RoHS Compliant

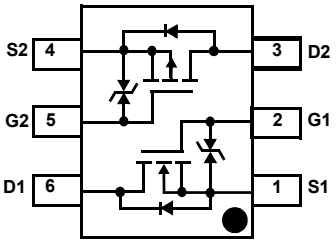
General Description

This Complementary N & P-Channel MOSFET has been designed using Fairchild Semiconductor's advanced Power Trench® process to optimize the $r_{DS(ON)}$ @ V_{GS}=2.5V and specify the $r_{DS(ON)}$ @ V_{GS} = 1.8V.

Applications

- Level shifting
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		Q1	Q2	Units
V_{DS}	Drain to Source Voltage		20	-20	V
V_{GS}	Gate to Source Voltage		±12	±8	V
I_D	Drain Current -Continuous	(Note 1a)	200	-150	mA
	-Pulsed		1000	-1000	
P_D	Power Dissipation (Steady State)	(Note 1a)	625		mW
		(Note 1b)	446		
T_J, T_{STG}	Operating and Storage Junction Temperature Range		-55 to 150		°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	200	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	280	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
F	FDY4001CZ	SC89-6	7”	8mm	3000units

©2006 Fairchild Semiconductor Corporation

Electrical Characteristics T_J = 25°C unlessotherwise noted

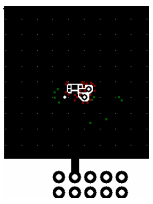
Symbol	Parameter	Test Conditions	Type	Min	Typ	Max	Units
Off Characteristics							
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V I_D = -250μA, V_{GS} = 0V	Q1 Q2	20 -20			V
$\frac{\Delta B_{VDSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C I_D = -250μA, referenced to 25°C	Q1 Q2		14 -15		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 16V, V_{DS} =0V V_{DS} = -16V, V_{DS} =0V	Q1 Q2			1 -3	μA
I_{GSS}	Gate-Body Leakage	V_{GS} = ±12V, V_{DS} = 0V V_{GS} = ±4.5V, V_{DS} = 0V V_{GS} = ±8V, V_{DS} = 0V	Q1 Q1 Q2			±10 ±1 ±10	μA
On Characteristics (note 2)							
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA V_{GS} = V_{DS}, I_D = -250μA	Q1 Q2	0.6 -0.65	 -1.0	1.5 -1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C I_D = -250μA, referenced to 25°C	Q1 Q2		2.8 -3		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 4.5V, I_D = 200mA V_{GS} = 2.5V, I_D = 175mA V_{GS} = 1.8V, I_D = 150mA V_{GS} = 1.5V, I_D = 20mA V_{GS} = 4.5V, I_D = 200mA,T_J = 125°C	Q1			5 7 9 10 7	Ω
		V_{GS} = -4.5V, I_D = --150mA V_{GS} = -2.5V, I_D = -125mA V_{GS} = -1.8V, I_D = -100mA V_{GS} = -1.5V, I_D = -30mA V_{GS} = -4.5V, I_D = -150mA,T_J =125°C	Q2			8 12 15 20 12	
g_{FS}	Forward Transconductance	V_{DS} = 5V, I_D = 200mA V_{DS} = -5V, I_D = -150mA	Q1 Q2		1.1 0.7		S
Dynamic Characteristics							
C_{iss}	Input Capacitance	Q1 V_{DS} = 10V, V_{GS} = 0V, f = 1MHz	Q1 Q2		60 100		pF
C_{oss}	Output Capacitance	Q2 V_{DS} = -10V, V_{GS} = 0V, f = 1MHz	Q1 Q2		20 30		pF
C_{rss}	Reverse Transfer Capacitance		Q1 Q2		10 15		pF
Switching Characteristics							
$t_{d(on)}$	Turn-On Delay Time	Q1 V_{DD}= 10V, I_D = 1A, V_{GS}= 4.5V, R_g = 6Ω	Q1 Q2		6 6	12 12	ns
t_r	Rise Time		Q1 Q2		8 13	16 23	ns
$t_{d(off)}$	Turn-Off Delay Time	Q2 V_{DD}= -10V, I_D = -0.5A, V_{GS}= -4.5V, R_g = 6Ω	Q1 Q2		8 8	16 16	ns
t_f	Fall Time		Q1 Q2		2.4 1	4.8 2	ns
Q_g	Total Gate Charge	Q1 V_{DS}= 10V, I_D = 200mA, V_{GS}= 4.5V	Q1 Q2		0.8 1.0	1.1 1.4	nC
Q_{gs}	Gate to Source Gate Charge		Q1 Q2		0.16 0.2		nC
Q_{gd}	Gate to Drain “Miller”Charge	Q2 V_{DS}= -10V, I_D = -150mA, V_{GS}= -4.5V	Q1 Q2		0.26 0.3		nC

Electrical Characteristics T_J = 25°C unless otherwise noted

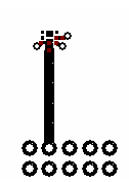
Symbol	Parameter	Test Conditions	Type	Min	Typ	Max	Units
Drain-Source Diode Characteristics							
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = 150mA (Note 2) V_{GS} = 0V, I_S = -150mA (Note 2)	Q1 Q2		0.7 -0.8	1.2 -1.2	V
t_{rr}	Reverse Recovery Time	Q1 I_F = 200mA, di/dt = 100A/µs	Q1 Q2		12 11		ns
Q_{rr}	Reverse Recovery Charge	Q2 I_F = -150mA, di/dt = 100A/µs	Q1 Q2		3 2		nC

Notes:

1: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.



a) 200°C/W when mounted on a 1 in^2 pad of 2 oz copper



b) 280°C/W when mounted on a minimum pad of 2 oz copper

Scale 1:1 on letter size paper

2: Pulse Test : Pulse Width < 300us, Duty Cycle < 2.0%

3: The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

Typical Characteristics Q1 (N-Channel)

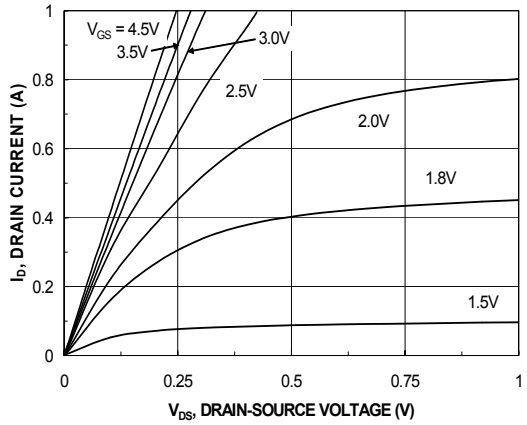


Figure 1. On-Region Characteristics.

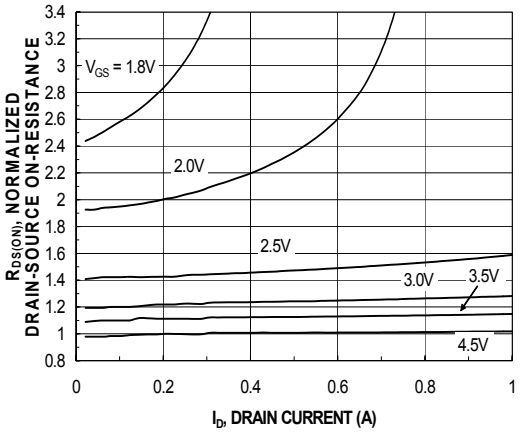


Figure 2. Normalized on-Resistance vs. Drain Current and Gate Voltage.

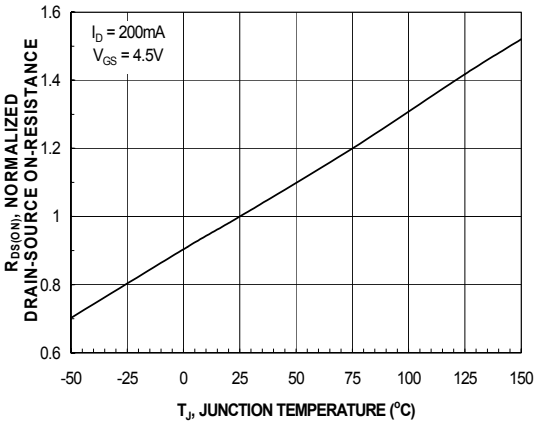


Figure 3. Normalized on-Resistance vs. Temperature.

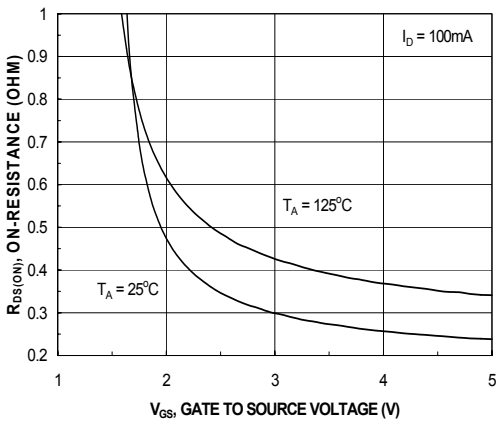


Figure 4. On-Resistance vs. Gate-to-Source Votlage.

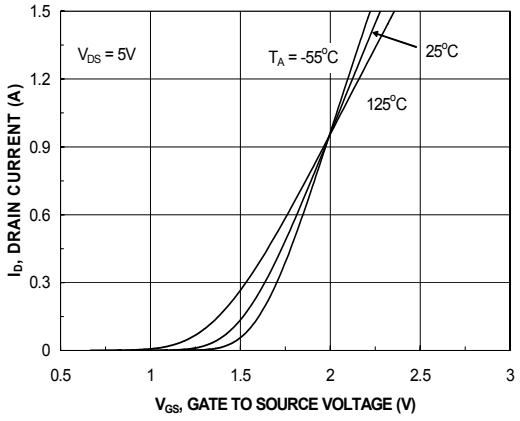


Figure 5. Transfer Characteristics.

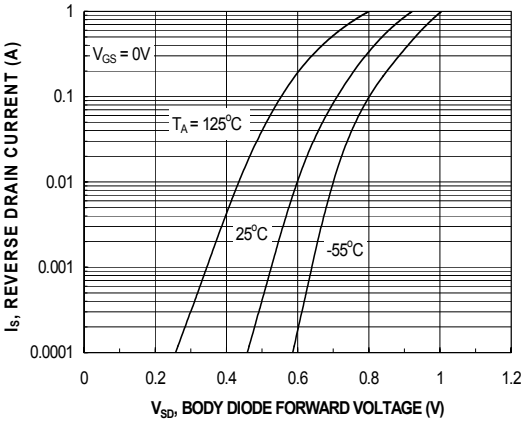


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current and Temperature.

Typical Characteristics Q1 (N-Channel)

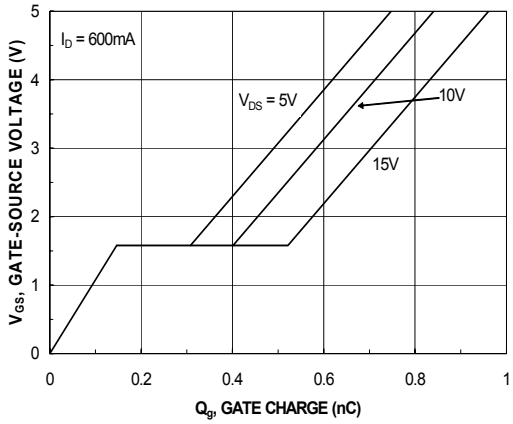


Figure 7. Gate Charge Characteristics.

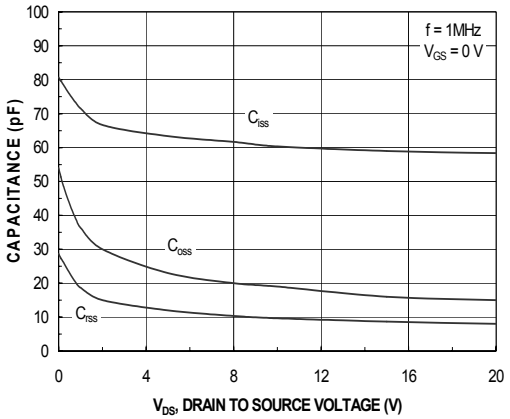


Figure 8. Capacitance vs. Drain to source voltage.

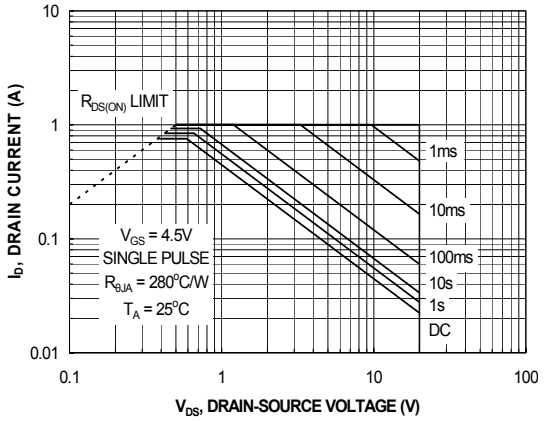


Figure 9. Maximum Safe Operating Area.

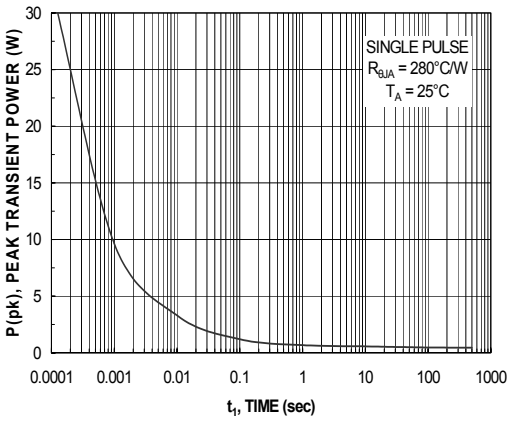


Figure 10. Single Pulse Maximum Power Dissipation.

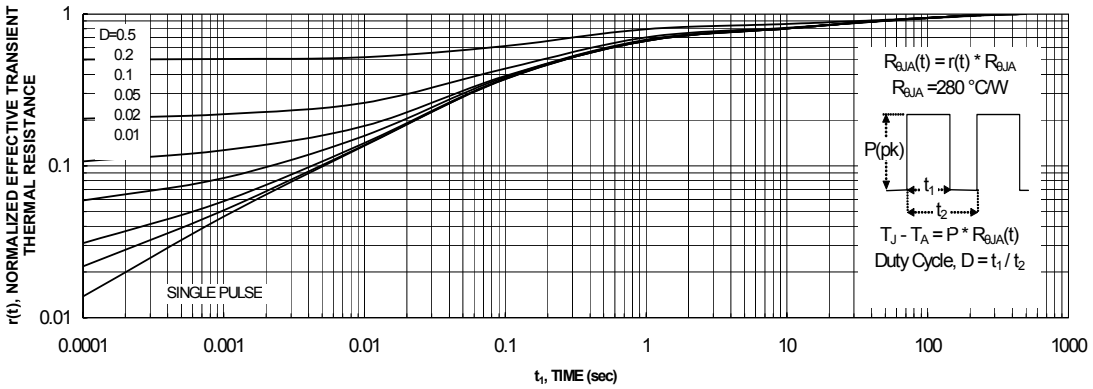


Figure 11. Transient Thermal Response Curve.
Thermal characterization performed using the conditions described in Note 1b.
Transient thermal response will change depending on the circuit board design.

Typical Characteristics Q2 (P-Channel)

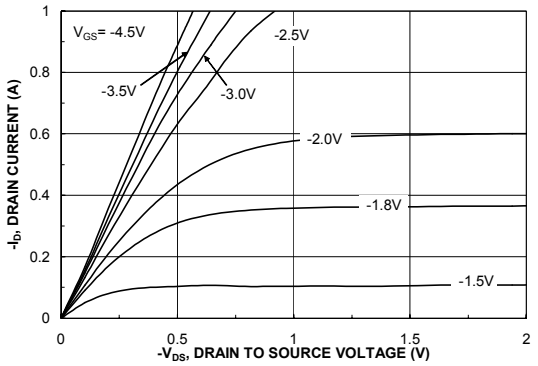


Figure 1. On-Region Characteristics.

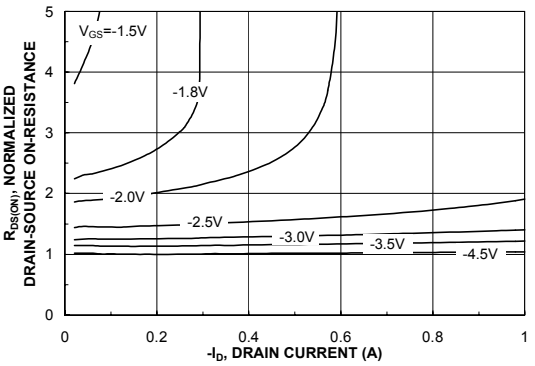


Figure 2. Normalized on-Resistance vs. Drain Current and Gate Voltage.

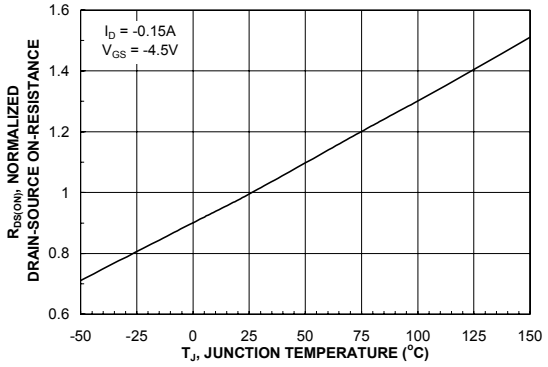


Figure 3. Normalized on-Resistance vs. Temperature.

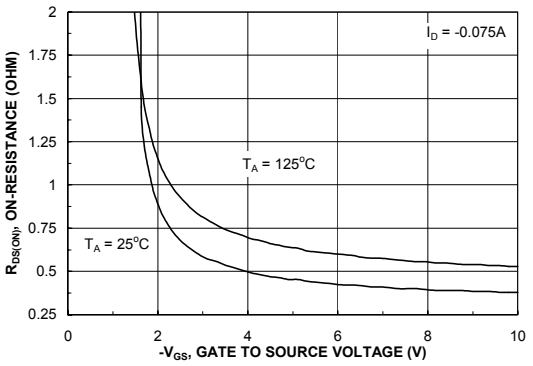


Figure 4. On-Resistance vs. Gate-to-Source Voltage.

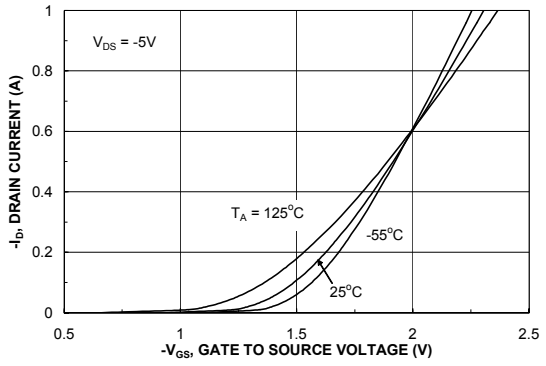


Figure 5. Transfer Characteristics.

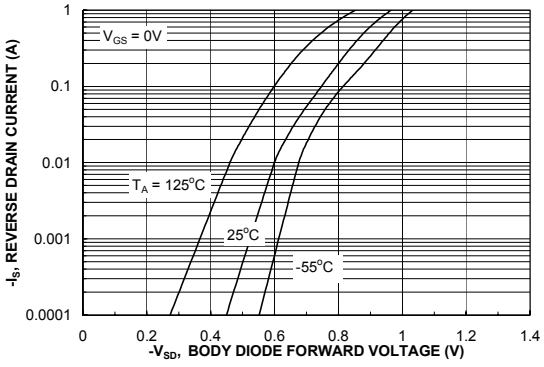


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current and Temperature.

Typical Characteristics Q2 (P-Channel)

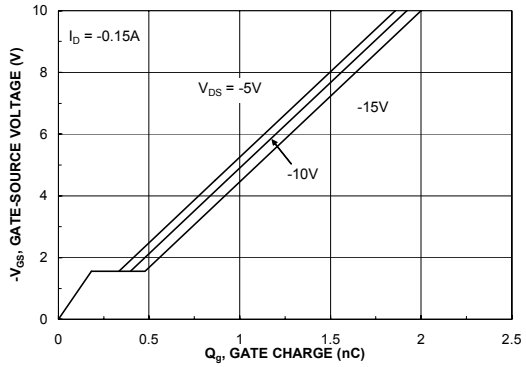


Figure 7. Gate Charge Characteristics.

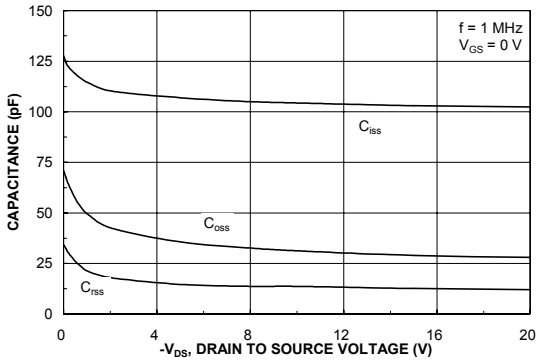


Figure 8. Capacitance vs. Drain to source voltage.

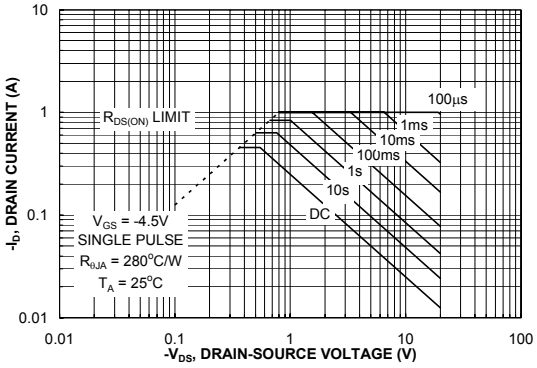


Figure 9. Maximum Safe Operating Area.

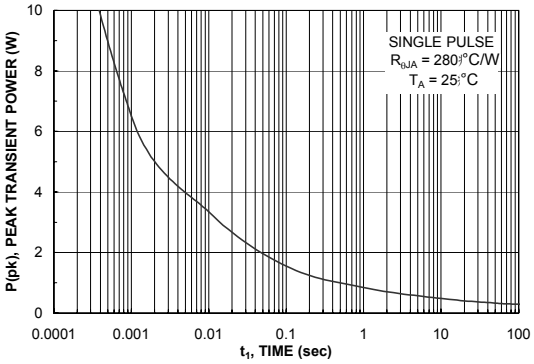


Figure 10. Single Pulse Maximum Power Dissipation.

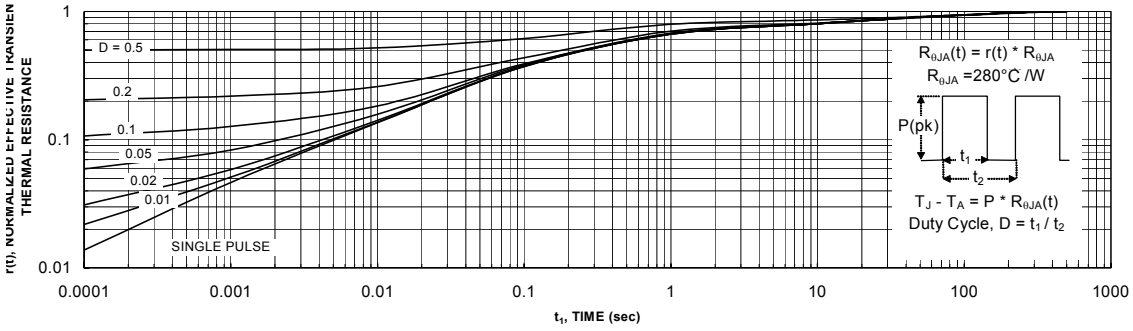
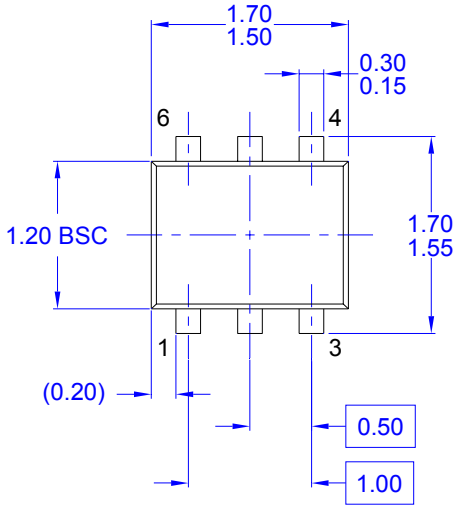
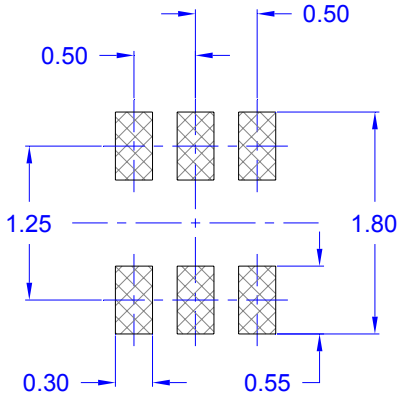


Figure 11. Transient Thermal Response Curve.

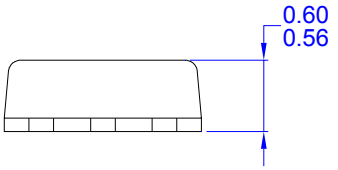
Thermal characterization performed using the conditions described in Note 1b.Transient thermal response will change depending on the circuit board design.

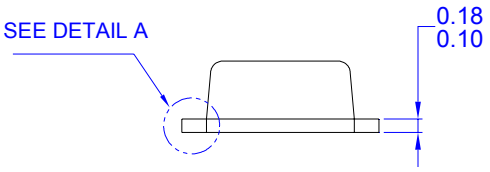
Dimensional Outline and Pad Layout

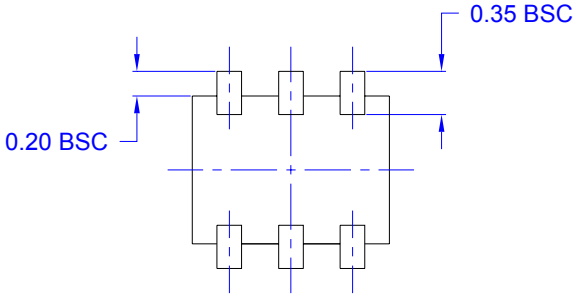


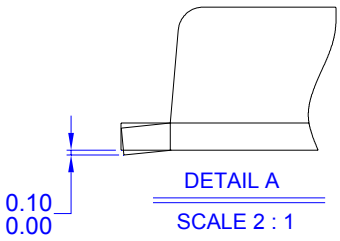


LAND PATTERN RECOMMENDATION









NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO EIAJ SC89 PACKAGING STANDARD.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™	FACT Quiet Series™	OCX™	SILENT SWITCHER®	UniFET™
ActiveArray™	GlobalOptoisolator™	OCXPro™	SMART START™	UltraFET®
Bottomless™	GTO™	OPTOLOGIC®	SPM™	VCX™
Build it Now™	HiSeC™	OPTOPLANAR™	Stealth™	Wire™
CoolFET™	I^2C™	PACMAN™	SuperFET™	
CROSSVOLT™	*i-Lo*™	POP™	SuperSOT™-3	
DOME™	ImpliedDisconnect™	Power247™	SuperSOT™-6	
EcoSPARK™	IntelliMAX™	PowerEdge™	SuperSOT™-8	
E^2CMOS™	ISOPLANAR™	PowerSaver™	SyncFET™	
EnSigna™	LittleFET™	PowerTrench®	TCM™	
FACT™	MICROCOUPLER™	QFET®	TinyBoost™	
FAST®	MicroFET™	QS™	TinyBuck™	
FASTr™	MicroPak™	QT Optoelectronics™	TinyPWM™	
FPS™	MICROWIRE™	Quiet Series™	TinyPower™	
FRFET™	MSX™	RapidConfigure™	TinyLogic®	
	MSXPro™	RapidConnect™	TINYOPTO™	
Across the board. Around the world.™		µSerDes™	TruTranslation™	
The Power Franchise®		ScalarPump™	UHC™	
Programmable Active Droop™				

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. 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, or (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 significant injury to the user.

2. A critical component is 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.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and 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	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.