FAIRCHILD™

Is Now Part of

ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

FAIRCHILD
SEMICONDUCTOR®

March 2009

FDS6675BZ
P-Channel PowerTrench® MOSFET
## -30V, -11A, 13mΩ

General Description

This P-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance.

This device is well suited for Power Management and load switching applications common in Notebook Computers and Portable Battery Packs.

100% RoHS COMPLIANT

Features

- Max $r_{DS(on)}$ = 13mΩ at V_{GS} = -10V, I_D = -11A

- Max $r_{DS(on)}$ = 21.8mΩ at V_{GS} = -4.5V, I_D = -9A

- Extended V_{GS} range (-25V) for battery applications

- HBM ESD protection level of 5.4 KV typical (note 3)

- High performance trench technology for extremely low $r_{DS(on)}$

- High power and current handing capability

- RoHS Compliant

SO-8

D D D D S S S G

5 4
6 3
7 2
8 1
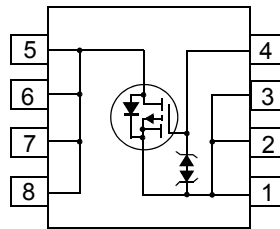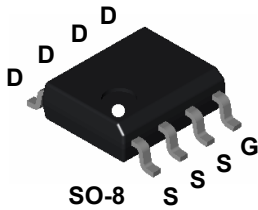
MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DS}	Drain to Source Voltage		-30	V
V_{GS}	Gate to Source Voltage		±25	V
I_D	Drain Current -Continuous	(Note 1a)	-11	A
	-Pulsed		-55	
P_D	Power Dissipation for Single Operation	(Note 1a)	2.5	W
		(Note 1b)	1.2	
		(Note 1c)	1.0	
T_J, T_{STG}	Operating and Storage Temperature		-55 to 150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance , Junction to Ambient (Note 1a)	50	°C/W
$R_{\theta JC}$	Thermal Resistance , Junction to Case (Note 1)	25	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
FDS6675BZ	FDS6675BZ	13"	12mm	2500 units

Electrical Characteristics T_J = 25°C unless otherwise noted

| Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = -250μA, V_{GS} = 0V	-30			V
$\frac{\Delta B_{VDSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = -250μA, referenced to 25°C		-20		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -24V, V_{GS} = 0V			-1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±25V, V_{DS} = 0V			±10	μA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = -250μA	-1	-2	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = -250μA, referenced to 25°C		15.7		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = -10V , I_D = -11A		10.8	13.0	mΩ
		V_{GS} = -4.5V, I_D = -9A		17.4	21.8	
		V_{GS} = -10V, I_D = -11A T_J = 125°C		15.0	18.8	
g_{FS}	Forward Transconductance	V_{DS} = -5V, I_D = -11A		34		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -15V, V_{GS} = 0V, f = 1MHz		1855	2470	pF
C_{oss}	Output Capacitance			335	450	pF
C_{rss}	Reverse Transfer Capacitance			330	500	pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -15V, I_D = -11A V_{GS} = -10V, R_{GS} = 6Ω		3.0	10	ns
t_r	Rise Time			7.8	16	ns
$t_{d(off)}$	Turn-Off Delay Time			120	200	ns
t_f	Fall Time			60	100	ns
Q_g	Total Gate Charge	V_{DS} = -15V, V_{GS} = -10V, I_D = -11A		44	62	nC
Q_g	Total Gate Charge	V_{DS} = -15V, V_{GS} = -5V, I_D = -11A		25	35	nC
Q_{gs}	Gate to Source Gate Charge			7.2		nC
Q_{gd}	Gate to Drain Charge			11.4		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = -2.1A		-0.7	-1.2	V
t_{rr}	Reverse Recovery Time	I_F = -11A, di/dt = 100A/μs			42	ns
Q_{rr}	Reverse Recovery Charge	I_F = -11A, di/dt = 100A/μs			30	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 $R_{\theta CA}$ is determined by the user's board design.
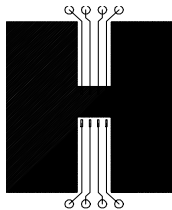
a) 50°C/W when mounted on a 1 in² pad of 2 oz copper
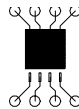
b) 105°C/W when mounted on a .04 in² pad of 2 oz copper
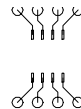
c) 125°C/W when mounted on a minimun pad

Scale 1 : 1 on letter size paper

2: Pulse Test:Pulse Width <300 us, 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 T_J = 25°C unless otherwise noted
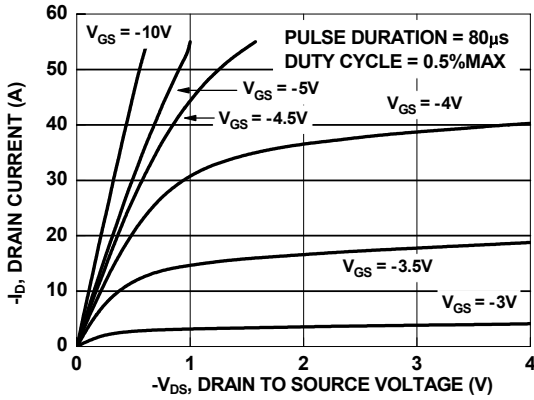
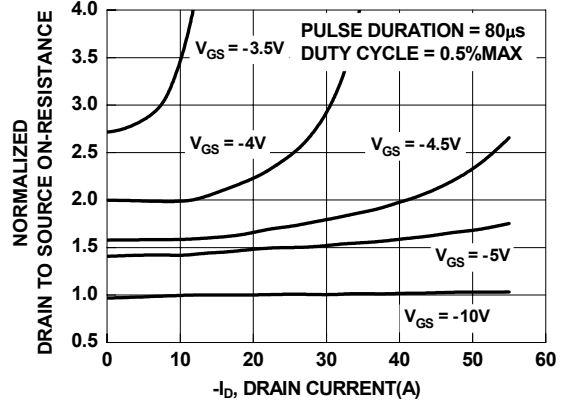Figure 1. On Region Characteristics

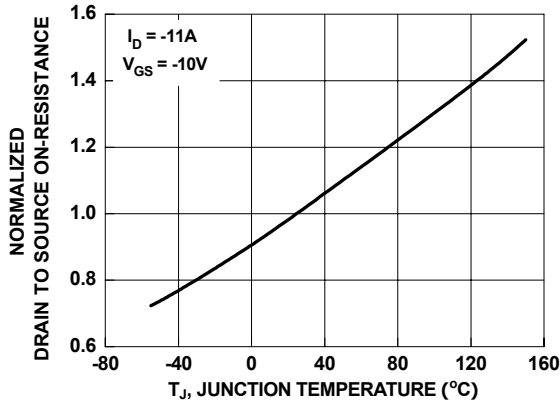Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

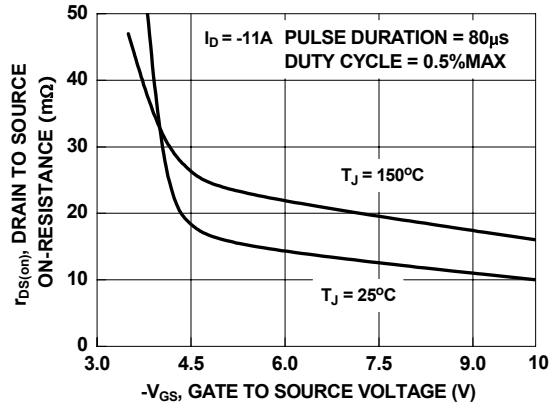Figure 3. Normalized On Resistance vs Junction Temperature

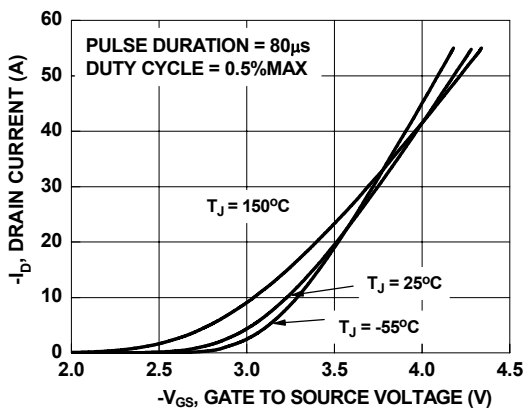Figure 4. On-Resistance vs Gate to Source Voltage
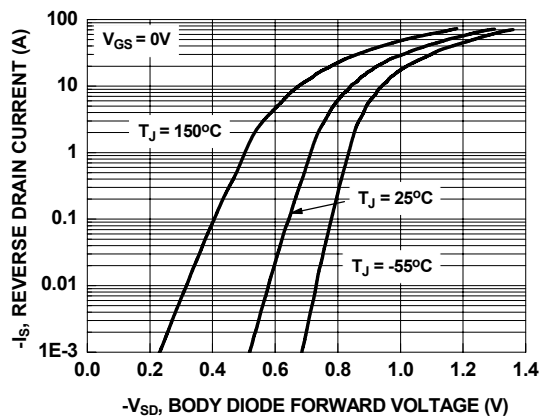

Figure 5. Transfer Characteristics

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

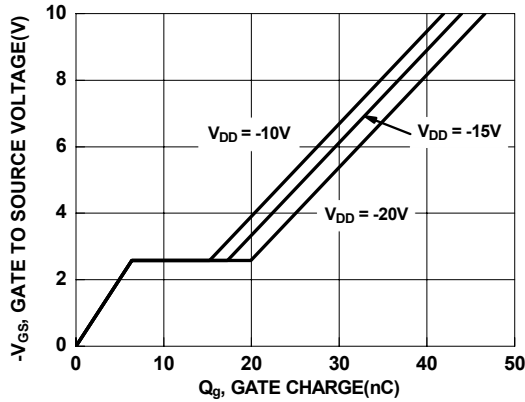## Typical Characteristics $T_J = 25°C$ unless otherwise noted

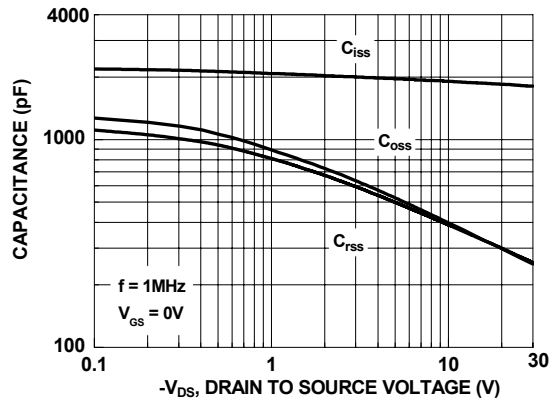Figure 7. Gate Charge Characteristics

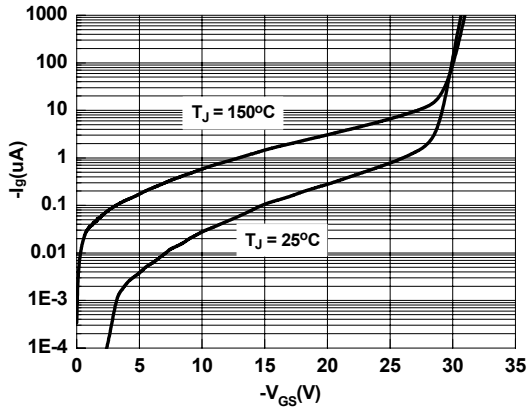Figure 8. Capacitance vs Drain to Source Voltage
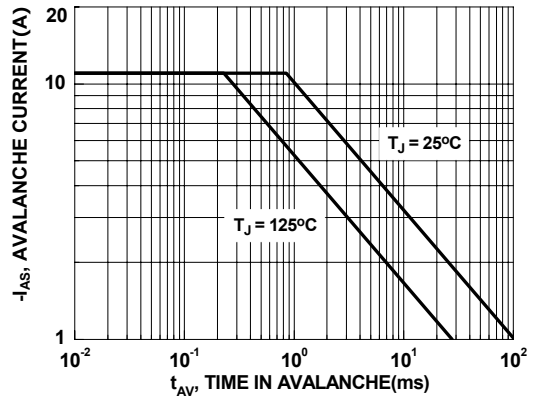
Figure 9. I_g vs V_{GS}
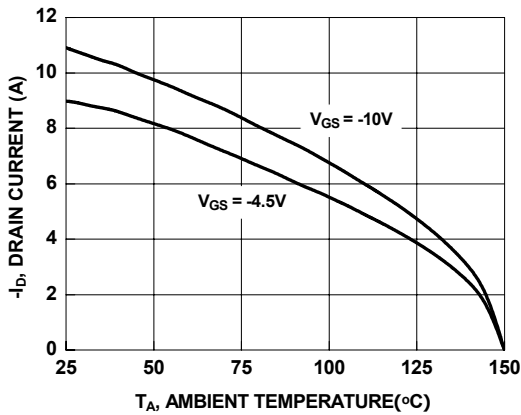
Figure 10. Unclamped Inductive Switching Capability

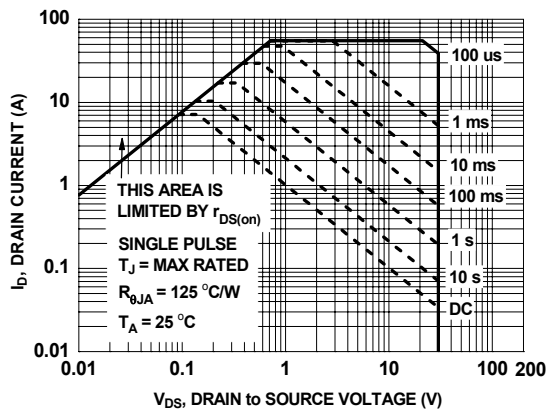Figure 11. Maximum Continuous Drain Current vs Ambient Temperature

Figure 12. Forward Bias Safe Operating Area

Typical Characteristics T_J = 25°C unless otherwise noted

V_{GS} = -10 V
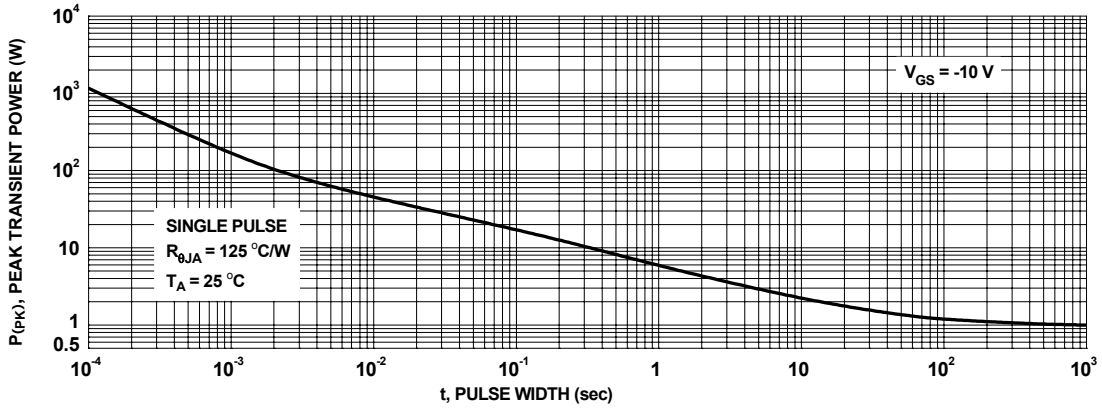
SINGLE PULSE
$R_{\theta JA}$ = 125 °C/W
T_A = 25 °C

Figure 13. Single Pulse Maximum Power Dissipation

DUTY CYCLE-DESCENDING ORDER

D = 0.5
0.2
0.1
0.05
0.02
0.01

SINGLE PULSE
$R_{\theta JA}$ = 125 °C/W

NOTES:
DUTY FACTOR: D = t_1/t_2
PEAK T_J = P_{DM} x $Z_{\theta JA}$ x $R_{\theta JA}$ + T_A
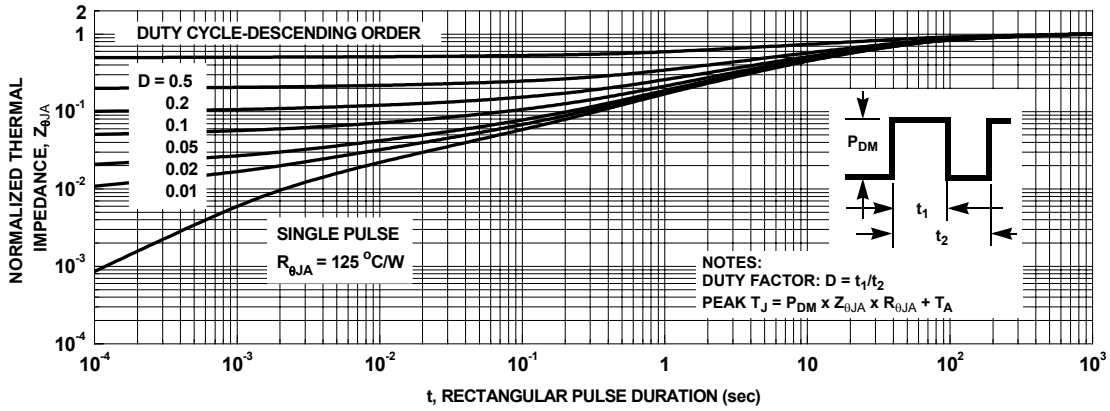
Figure 14. Junction-to-Ambient Transient Thermal Response Curve

www.fairchildsemi.com
FDS6675BZ Rev. B2

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.

Build it Now™
CorePLUS™
CorePOWER™
CROSSVOLT™
CTL™
Current Transfer Logic™
EcoSPARK®
EfficentMax™
EZSWITCH™ *

EZ™
F®
Fairchild®
Fairchild Semiconductor®
FACT Quiet Series™
FACT®
FAST®
FastvCore™
FlashWriter® *
FPS™
F-PFS™

FRFET®
Global Power Resource℠
Green FPS™
Green FPS™ e-Series™
GTO™
IntelliMAX™
ISOPLANAR™
MegaBuck™
MICROCOUPLER™
MicroFET™
MicroPak™
MillerDrive™
MotionMax™
Motion-SPM™
OPTOLOGIC®
OPTOPLANAR®
®
PDP SPM™
Power-SPM™
PowerTrench®
PowerXS™

Programmable Active Droop™
QFET®
QS™
Quiet Series™
RapidConfigure™

Saving our world, 1mW /W /kW at a time™
SmartMax™
SMART START™
SPM®
STEALTH™
SuperFET™
SuperSOT™-3
SuperSOT™-6
SuperSOT™-8
SupreMOS™
SyncFET™

SYSTEM GENERAL®
The Power Franchise®

the power franchise
TinyBoost™
TinyBuck™
TinyLogic®
TINYOPTO™
TinyPower™
TinyPWM™
TinyWire™
TriFault Detect™
TRUECURRENT™*
μSerDes™

μSerDes™
UHC®
Ultra FRFET™
UniFET™
VCX™
VisualMax™
XS™

*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. 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 manufactures 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 application, 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 handing 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 and 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.

Rev. I39

PUBLICATION ORDERING INFORMATION

© Semiconductor Components Industries, LLC

www.onsemi.com