



FDMA8884

Single N-Channel Power Trench[®] MOSFET

30 V, 6.5 A, 23 m Ω

Features

- Max $r_{DS(on)}$ = 23 m Ω at V_{GS} = 10 V, I_D = 6.5 A
- Max $r_{DS(on)}$ = 30 m Ω at V_{GS} = 4.5 V, I_D = 6.0 A
- High performance trench technology for extremely low $r_{DS(on)}$
- Fast switching speed
- RoHS Compliant

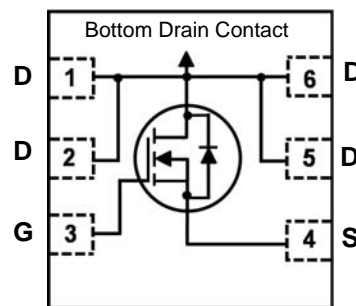
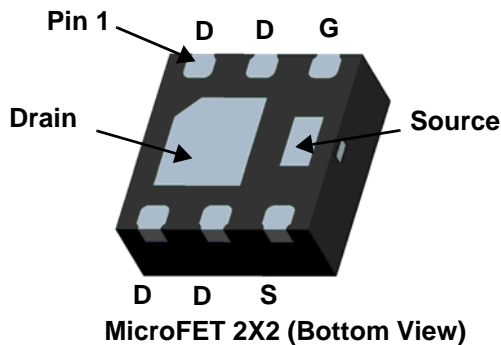


General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench[®] process that has been optimized for $r_{DS(on)}$ switching performance.

Application

- Primary Switch



MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

| Symbol | Parameter | Ratings | Units |
|----------------|--|-------------|------------------|
| V_{DS} | Drain to Source Voltage | 30 | V |
| V_{GS} | Gate to Source Voltage (Note 3) | ± 20 | V |
| I_D | Drain Current -Continuous (Package limited) $T_C = 25^\circ\text{C}$ | 8.0 | A |
| | -Continuous $T_A = 25^\circ\text{C}$ (Note 1a) | 6.5 | |
| | -Pulsed | 25 | |
| P_D | Power Dissipation (Note 1a) | 1.9 | W |
| | Power Dissipation (Note 1b) | 0.7 | |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to +150 | $^\circ\text{C}$ |

Thermal Characteristics

| | | | |
|-----------------|---|-----|--------------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1a) | 65 | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient (Note 1b) | 180 | |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|----------|--------------|-----------|------------|------------|
| 884 | FDMA8884 | MicroFET 2x2 | 7" | 8 mm | 3000 units |

May 2014

FDMA8884 N-Channel Power Trench[®] MOSFET

Electrical Characteristics $T_J = 25\text{ }^{\circ}\text{C}$ unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|--------|-----------|-----------------|-----|-----|-----|-------|
|--------|-----------|-----------------|-----|-----|-----|-------|

Off Characteristics

| | | | | | | |
|--------------------------------------|---|---|----|----|-----|------------------------|
| BV_{DSS} | Drain to Source Breakdown Voltage | $I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$ | 30 | | | V |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$ | Breakdown Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^{\circ}\text{C}$ | | 15 | | mV/ $^{\circ}\text{C}$ |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS} = 24\text{ V}$, $V_{GS} = 0\text{ V}$ | | | 1 | μA |
| I_{GSS} | Gate to Source Leakage Current, Forward | $V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$ | | | 100 | nA |

On Characteristics

| | | | | | | |
|--|--|---|-----|-----|-----|------------------------|
| $V_{GS(th)}$ | Gate to Source Threshold Voltage | $V_{GS} = V_{DS}$, $I_D = 250\text{ }\mu\text{A}$ | 1.2 | 1.8 | 3.0 | V |
| $\frac{\Delta V_{GS(th)}}{\Delta T_J}$ | Gate to Source Threshold Voltage Temperature Coefficient | $I_D = 250\text{ }\mu\text{A}$, referenced to $25\text{ }^{\circ}\text{C}$ | | -5 | | mV/ $^{\circ}\text{C}$ |
| $r_{DS(on)}$ | Static Drain to Source On Resistance | $V_{GS} = 10\text{ V}$, $I_D = 6.5\text{ A}$ | | 19 | 23 | m Ω |
| | | $V_{GS} = 4.5\text{ V}$, $I_D = 6.0\text{ A}$ | | 25 | 30 | |
| | | $V_{GS} = 10\text{ V}$, $I_D = 6.5\text{ A}$, $T_J = 125\text{ }^{\circ}\text{C}$ | | 25 | 30 | |
| g_{FS} | Forward Transconductance | $V_{DD} = 5\text{ V}$, $I_D = 6.5\text{ A}$ | | 26 | | S |

Dynamic Characteristics

| | | | | | | |
|-----------|------------------------------|--|--|-----|-----|----------|
| C_{iss} | Input Capacitance | $V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$ | | 339 | 450 | pF |
| C_{oss} | Output Capacitance | | | 132 | 175 | pF |
| C_{rss} | Reverse Transfer Capacitance | | | 18 | 28 | pF |
| R_g | Gate Resistance | | | 1.1 | | Ω |

Switching Characteristics

| | | | | | | |
|--------------|-------------------------------|---|--|-----|-----|----|
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD} = 15\text{ V}$, $I_D = 6.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_{GEN} = 6\text{ }\Omega$ | | 5 | 10 | ns |
| t_r | Rise Time | | | 1 | 10 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 11 | 20 | ns |
| t_f | Fall Time | | | 1 | 10 | ns |
| $Q_{g(TOT)}$ | Total Gate Charge | $V_{GS} = 0\text{ V to }10\text{ V}$ | $V_{DD} = 15\text{ V}$, $I_D = 6.5\text{ A}$ | 5.4 | 7.5 | nC |
| | Total Gate Charge | $V_{GS} = 0\text{ V to }4.5\text{ V}$ | | 2.7 | 3.7 | nC |
| Q_{gs} | Total Gate Charge | | | 1.0 | | nC |
| Q_{gd} | Gate to Drain "Miller" Charge | | | 0.9 | | nC |

Drain-Source Diode Characteristics

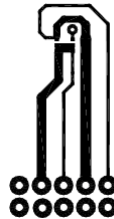
| | | | | | | |
|----------|---------------------------------------|---|--|------|-----|----|
| V_{SD} | Source to Drain Diode Forward Voltage | $V_{GS} = 0\text{ V}$, $I_S = 6.5\text{ A}$ (Note 2) | | 0.86 | 1.2 | V |
| t_{rr} | Reverse Recovery Time | $I_F = 6.5\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ | | 16 | 28 | ns |
| Q_{rr} | Reverse Recovery Charge | | | 4 | 10 | 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. $65\text{ }^{\circ}\text{C/W}$ when mounted on a 1 in^2 pad of 2 oz copper.



b. $180\text{ }^{\circ}\text{C/W}$ when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width $< 300\text{ }\mu\text{s}$, Duty cycle $< 2.0\%$.

3. As an N-ch device, the negative V_{gs} rating is for low duty cycle pulse occurrence only. No continuous rating is implied.

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

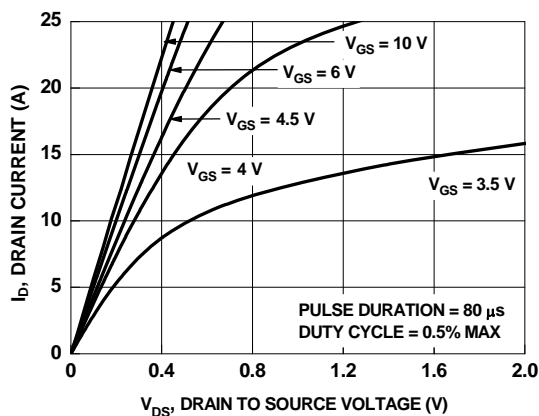


Figure 1. On Region Characteristics

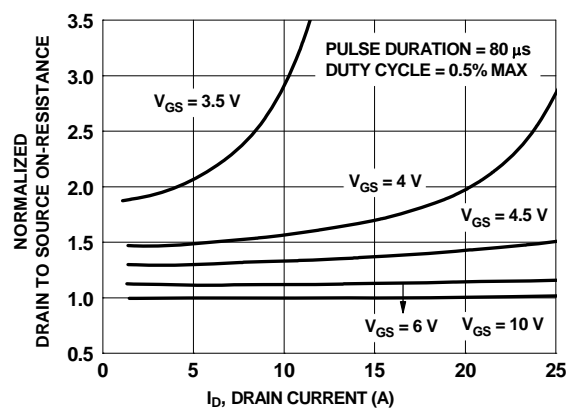


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

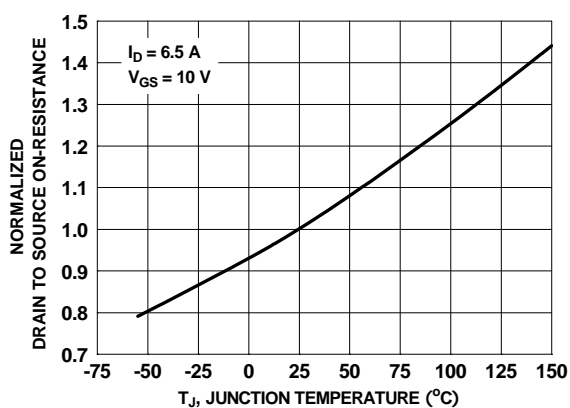


Figure 3. Normalized On Resistance vs Junction Temperature

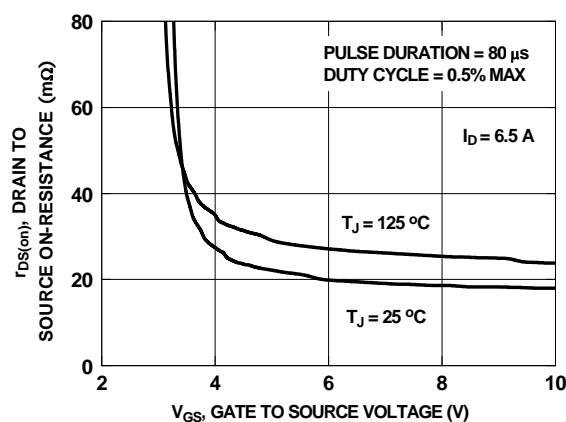


Figure 4. On-Resistance vs Gate to Source Voltage

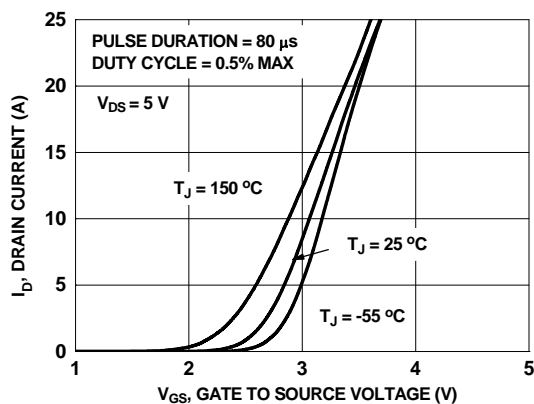


Figure 5. Transfer Characteristics

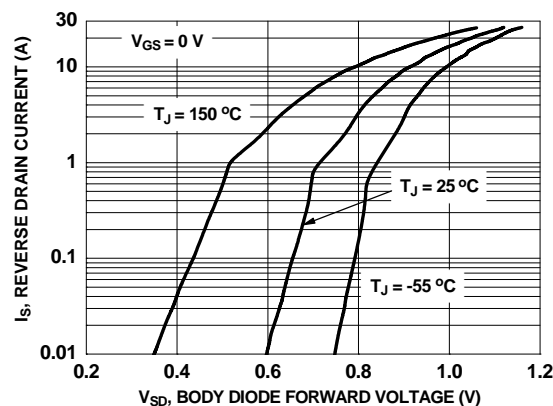


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

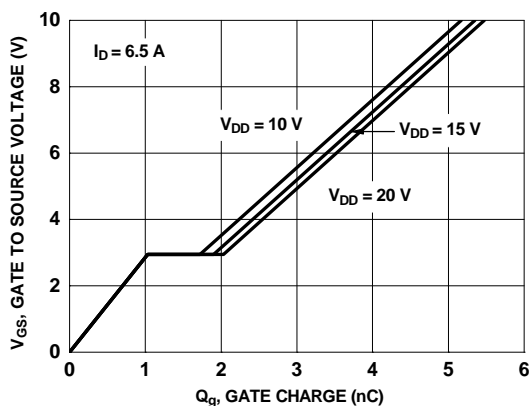


Figure 7. Gate Charge Characteristics

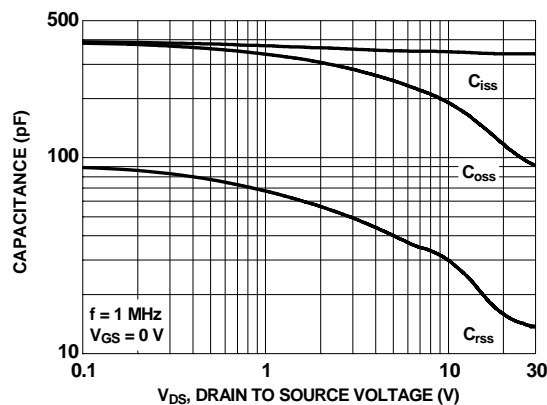


Figure 8. Capacitance vs Drain to Source Voltage

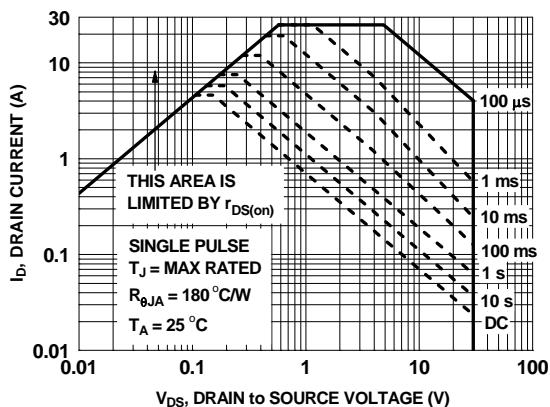


Figure 9. Forward Bias Safe Operating Area

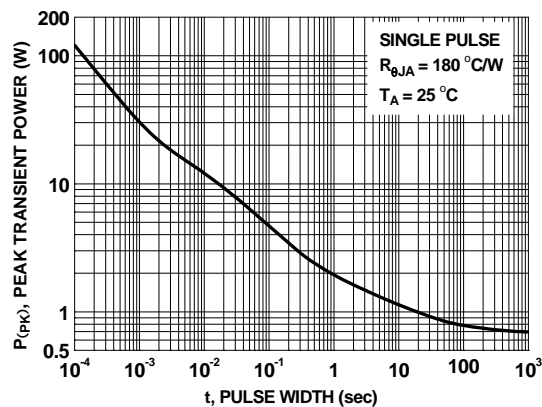


Figure 10. Single Pulse Maximum Power Dissipation

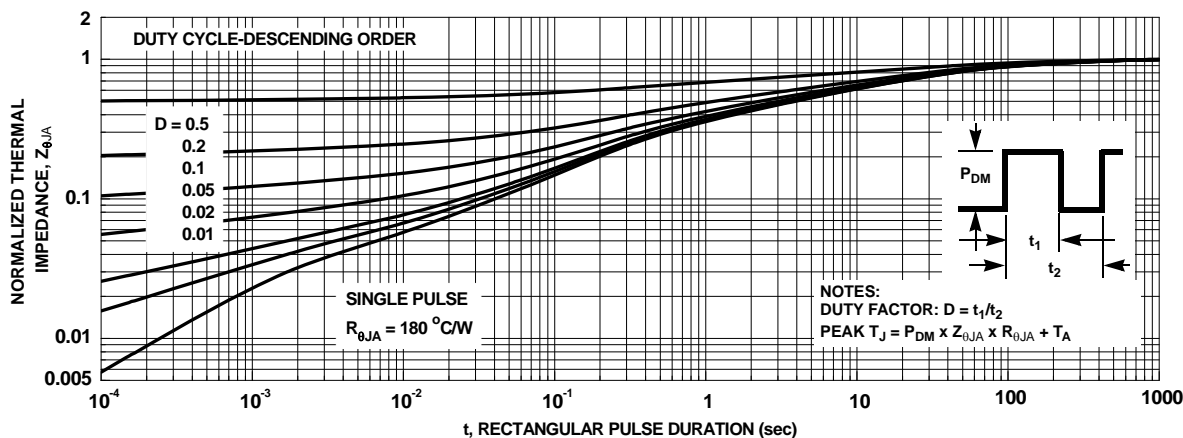
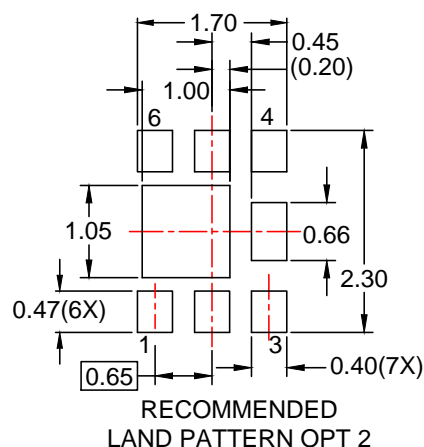
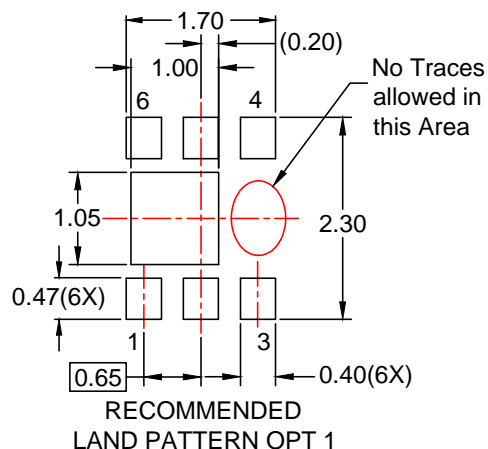
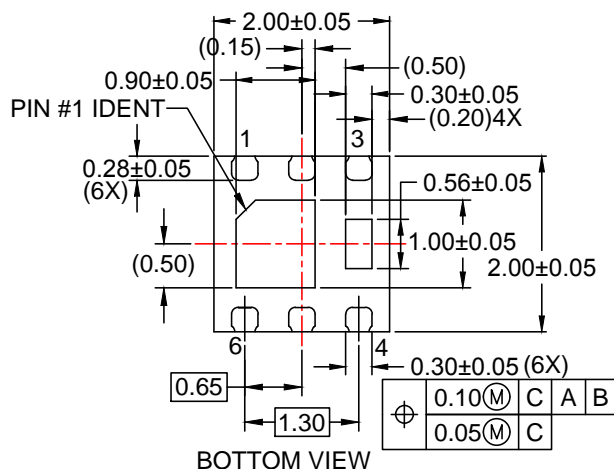
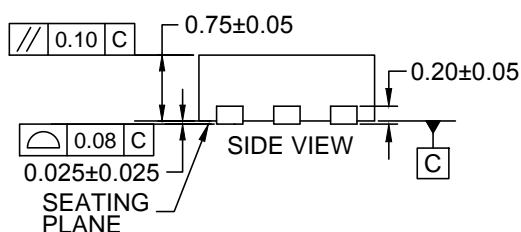
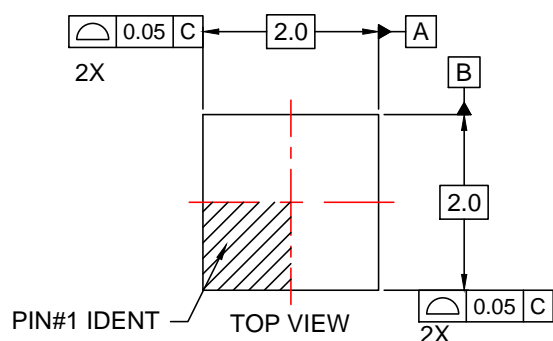


Figure 11. Junction-to-Ambient Transient Thermal Response Curve

Figure 12.

Dimensional Outline and Pad Layout



NOTES:

- PACKAGE DOES NOT FULLY CONFORM TO JEDEC MO-229 REGISTRATION
- DIMENSIONS ARE IN MILLIMETERS.
- DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
- DRAWING FILENAME: MKT-MLP06Lrev4.







Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:
http://www.fairchildsemi.com/package/packageDetails.html?id=PN_MLDEB-C06



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

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 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 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 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. I68