



September 2014

FDZ1323NZ

Common Drain N-Channel 2.5 V PowerTrench® WL-CSP MOSFET

20 V, 10 A, 13 mΩ

Features

- Max $r_{S1S2(on)}$ = 13 mΩ at $V_{GS} = 4.5$ V, $I_{S1S2} = 1$ A
- Max $r_{S1S2(on)}$ = 13 mΩ at $V_{GS} = 3.8$ V, $I_{S1S2} = 1$ A
- Max $r_{S1S2(on)}$ = 16 mΩ at $V_{GS} = 3.1$ V, $I_{S1S2} = 1$ A
- Max $r_{S1S2(on)}$ = 18 mΩ at $V_{GS} = 2.5$ V, $I_{S1S2} = 1$ A
- Occupies only 3 mm² of PCB area
- Ultra-thin package: less than 0.35 mm height when mounted to PCB
- High power and current handling capability
- HBM ESD protection level > 3.6 kV (Note 3)
- RoHS Compliant

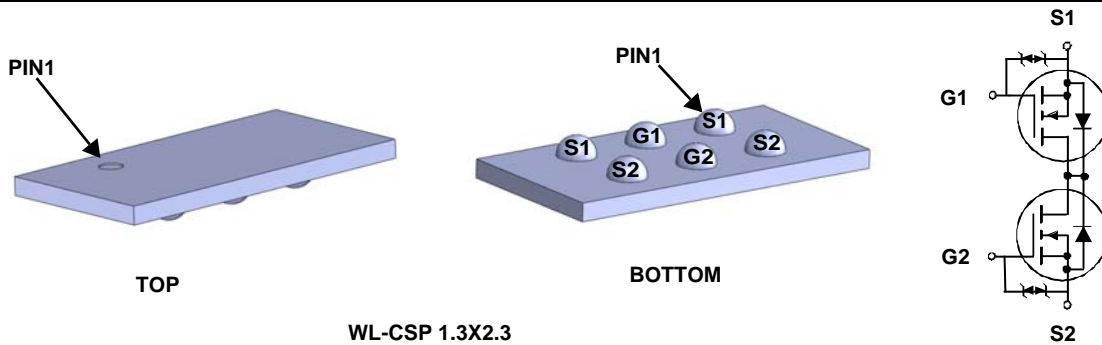


General Description

This device is designed specifically as a single package solution for Li-Ion battery pack protection circuit and other ultra-portable applications. It features two common drain N-channel MOSFETs, which enables bidirectional current flow, on Fairchild's advanced PowerTrench® process with state of the art "low pitch" WLCSP packaging process, the FDZ1323NZ minimizes both PCB space and $r_{S1S2(on)}$. This advanced WLCSP MOSFET embodies a breakthrough in packaging technology which enables the device to combine excellent thermal transfer characteristics, ultra-low profile packaging, low gate charge and low $r_{S1S2(on)}$.

Applications

- Battery management
- Load switch
- Battery protection



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

Symbol	Parameter	Ratings	Units
V_{S1S2}	Source1 to Source2 Voltage	20	V
V_{GS}	Gate to Source Voltage	± 12	V
I_{S1S2}	Source1 to Source2 Current -Continuous $T_A = 25^\circ\text{C}$ (Note 1a)	10	A
	-Pulsed	40	
P_D	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1a)	2	W
	Power Dissipation $T_A = 25^\circ\text{C}$ (Note 1b)	0.5	
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)	62	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1b)	257	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
EC	FDZ1323NZ	WL-CSP 1.3X2.3	7"	8 mm	5000 units

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

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

Off Characteristics

I_{S1S2}	Zero Gate Voltage Source1 to Source2 Current	$V_{S1S2} = 16\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 12\text{ V}, V_{S1S2} = 0\text{ V}$			± 10	μA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{S1S2}, I_{S1S2} = 250\ \mu\text{A}$	0.4	0.9	1.2	V
$r_{S1S2(on)}$	Static Source1 to Source2 On Resistance	$V_{GS} = 4.5\text{ V}, I_{S1S2} = 1\text{ A}$	4.5	9.7	13	m Ω
		$V_{GS} = 3.8\text{ V}, I_{S1S2} = 1\text{ A}$	5.5	10	13	
		$V_{GS} = 3.1\text{ V}, I_{S1S2} = 1\text{ A}$	7	11	16	
		$V_{GS} = 2.5\text{ V}, I_{S1S2} = 1\text{ A}$	8	13	18	
		$V_{GS} = 4.5\text{ V}, I_{S1S2} = 1\text{ A}, T_J = 125^\circ\text{C}$		13	20	
g_{FS}	Forward Transconductance	$V_{S1S2} = 5\text{ V}, I_{S1S2} = 1\text{ A}$		9		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{S1S2} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$		1545	2055	pF
C_{oss}	Output Capacitance			269	405	pF
C_{rss}	Reverse Transfer Capacitance			252	380	pF

Switching Characteristics

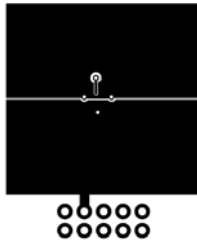
$t_{d(on)}$	Turn-On Delay Time	$V_{S1S2} = 10\text{ V}, I_{S1S2} = 1\text{ A},$ $V_{GS} = 4.5\text{ V}, R_{GEN} = 6\ \Omega$		12	22	ns
t_r	Rise Time			13	23	ns
$t_{d(off)}$	Turn-Off Delay Time			34	54	ns
t_f	Fall Time			13	23	ns
Q_g	Total Gate Charge			17	24	nC
Q_{gs}	Gate to Source1 Gate Charge	$V_{S1S2} = 10\text{ V}, I_{S1S2} = 1\text{ A},$ $V_{G1S1} = 4.5\text{ V}, V_{G2S2} = 0\text{ V}$		1.9		nC
Q_{gd}	Gate to Source2 "Miller" Charge			5.4		nC

Source1 to Source2 Diode Characteristics

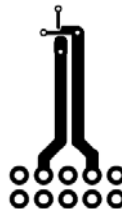
I_{fss}	Maximum Continuous Source1 to Source2 Diode Forward Current			1	A
V_{fss}	Source1 to Source2 Diode Forward Voltage	$V_{G1S1} = 0\text{ V}, V_{G2S2} = 4.5\text{ V},$ $I_{fss} = 1\text{ A}$ (Note 2)	0.6	1.2	V

Notes:

- $R_{\theta JA}$ is determined with the device mounted on a 1 in² pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 62 °C/W when mounted on a 1 in² pad of 2 oz copper.



b. 257 °C/W when mounted on a minimum pad of 2 oz copper.

- Pulse Test: Pulse Width < 300 μs , Duty cycle < 2.0%.

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

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

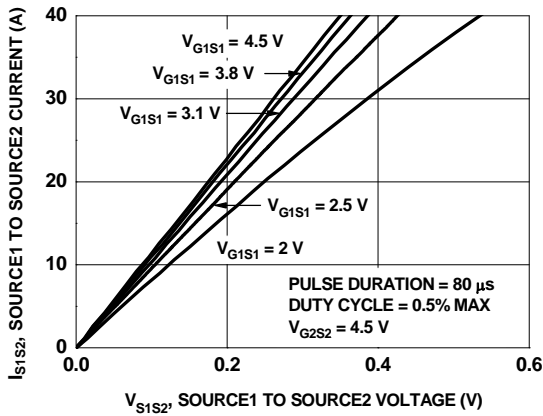


Figure 1. On-Region Characteristics

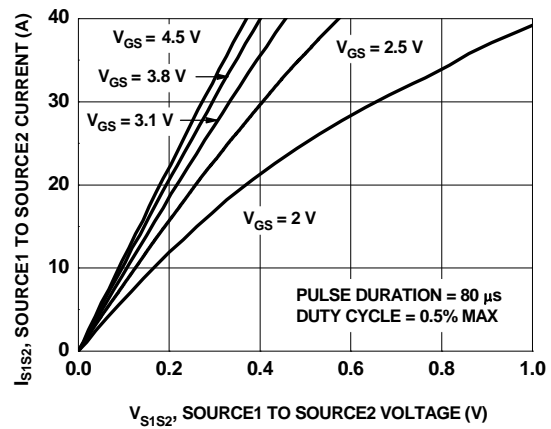


Figure 2. On-Region Characteristics

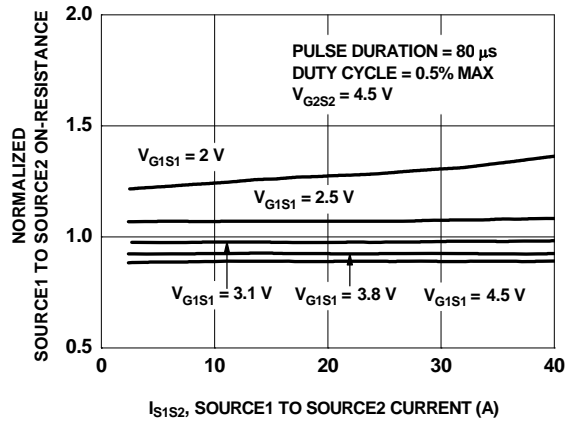


Figure 3. Normalized On-Resistance vs Source1 to Source2 Current and Gate Voltage

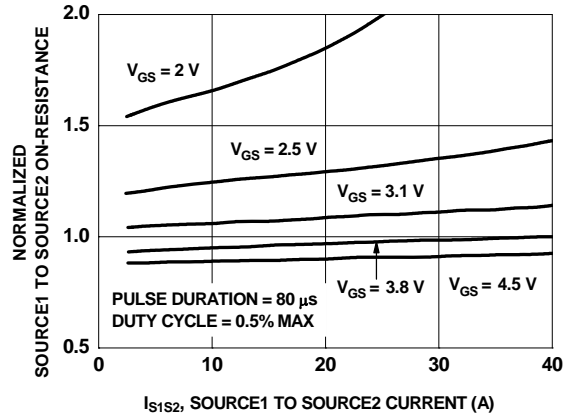


Figure 4. Normalized On-Resistance vs Source1 to Source2 Current and Gate Voltage

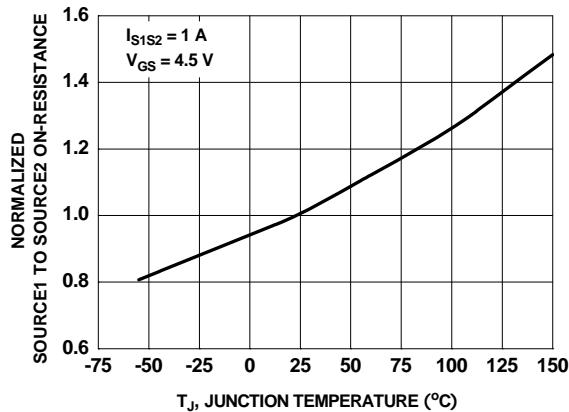


Figure 5. Normalized On Resistance vs Junction Temperature

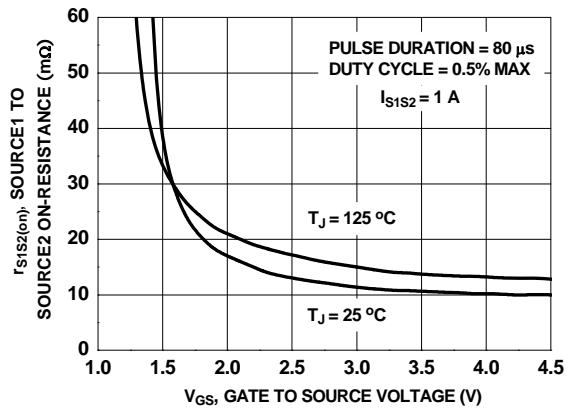


Figure 6. On Resistance vs Gate to Source Voltage

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

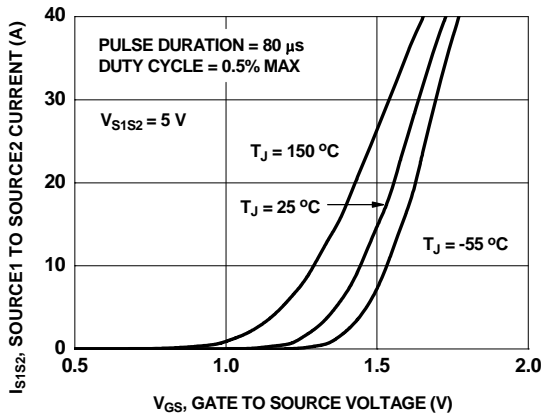


Figure 7. Transfer Characteristics

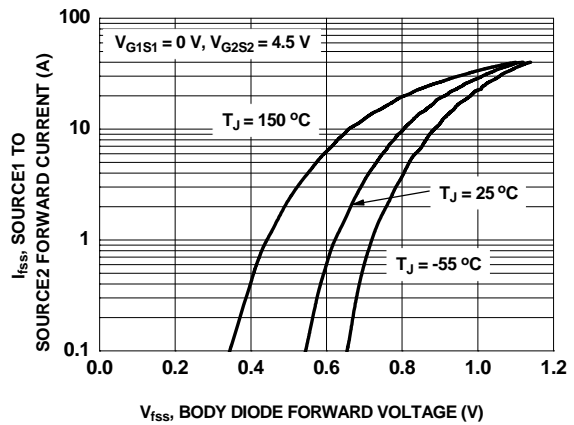


Figure 8. Source1 to Source2 Diode Forward Voltage vs Source Current

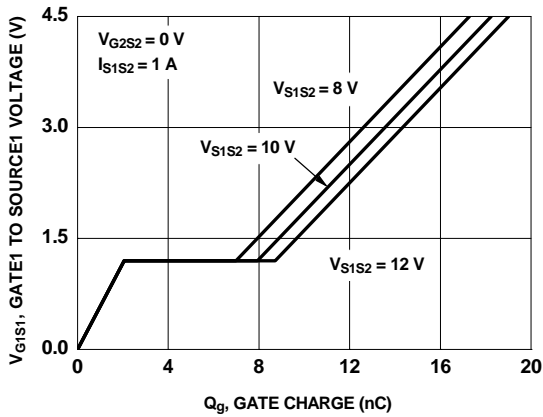


Figure 9. Gate Charge Characteristics

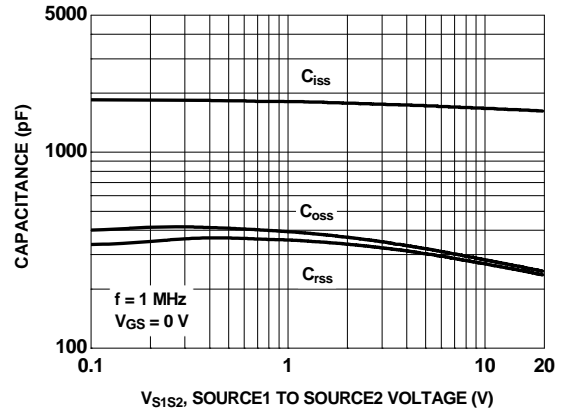


Figure 10. Capacitance vs Source1 to Source2 Voltage

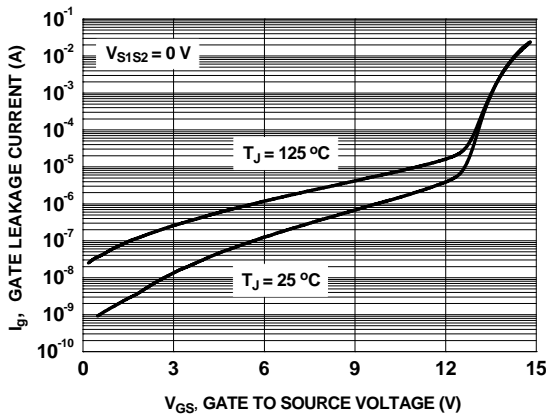


Figure 11. Gate Leakage Current vs Gate to Source Voltage

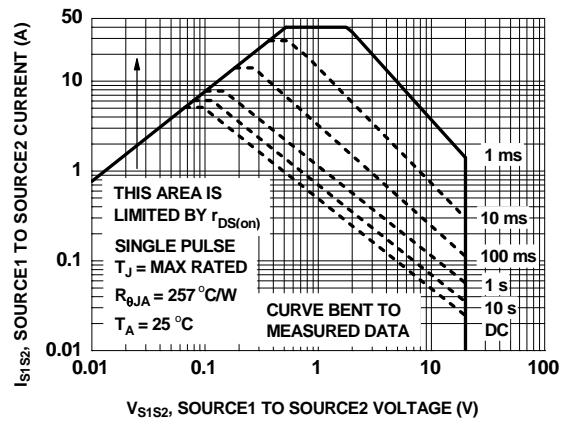
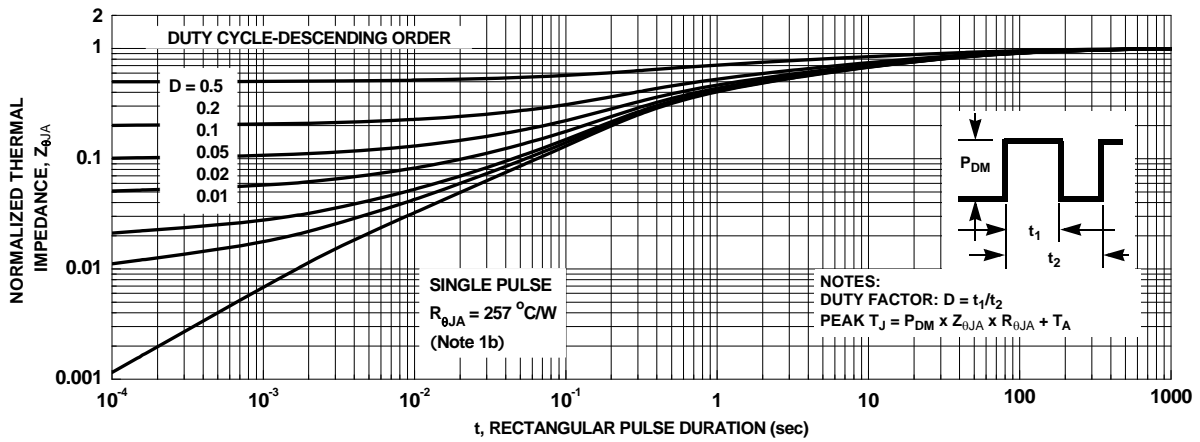
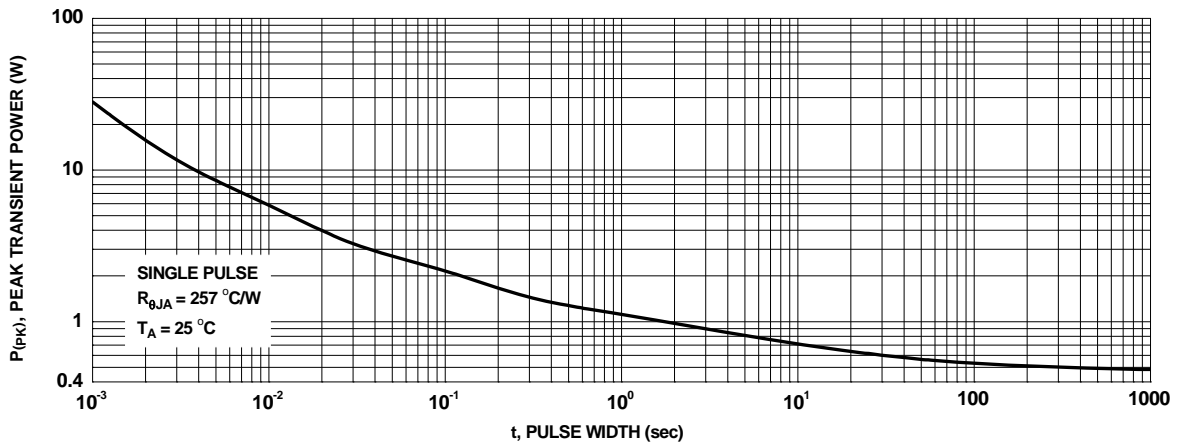
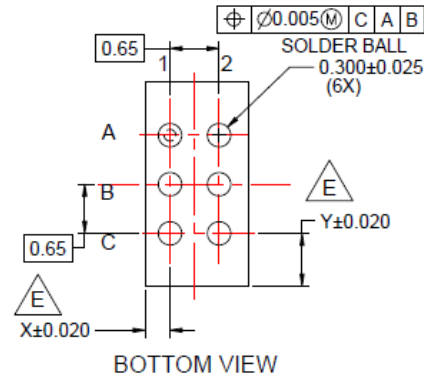
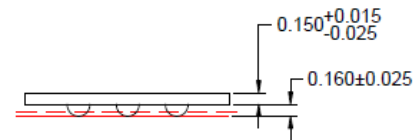
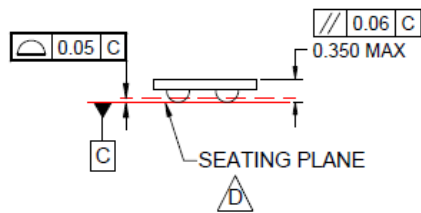
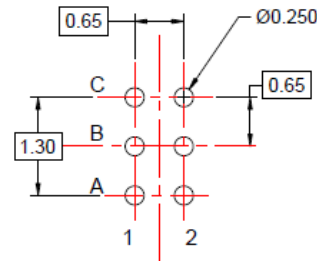
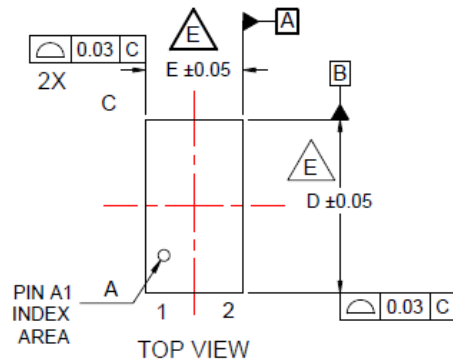


Figure 12. Forward Bias Safe Operating Area

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



Dimensional Outline and Pad Layout



NOTES:

- A. NO JEDEC REGISTRATION APPLIES.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCE PER ASME Y14.5M, 2009.
- D. DATUM C IS DEFINED BY THE SPHERICAL CROWNS OF THE BALLS.
- E. FOR DIMENSIONS D, E, X, AND Y SEE PRODUCT DATA SHEET.
- F. MKT-UC006ABREV2
- G. FOR PIN-OUT ASSIGNMENT, REFER TO DATA SHEET.



Pin Definitions:

Gate	Source1	Source2
B1, B2	A1, C1	A2, C2

Product Specific Dimensions:

D	E	X	Y
2.3 mm	1.3 mm	0.315 mm	0.49 mm



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_UCBEA-006



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

*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 here in:

- 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.
- 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 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.

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