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®

September 2003

FDG6332C

20V N & P-Channel PowerTrench® MOSFETs

General Description

The N & P-Channel MOSFETs are produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize on-state resistance and yet maintain superior switching performance.

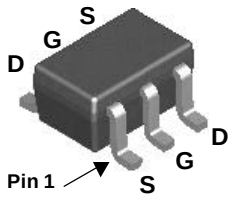
These devices have been designed to offer exceptional power dissipation in a very small footprint for applications where the bigger more expensive TSSOP-8 and SSOP-6 packages are impractical.

Applications

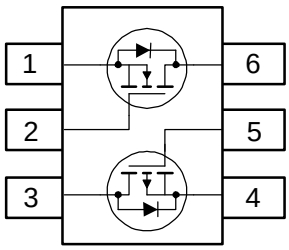
- DC/DC converter
- Load switch
- LCD display inverter

Features

- **Q1** 0.7 A, 20V. $R_{DS(ON)}$ = 300 mΩ @ V_{GS} = 4.5 V
  $R_{DS(ON)}$ = 400 mΩ @ V_{GS} = 2.5 V
- **Q2** –0.6 A, –20V. $R_{DS(ON)}$ = 420 mΩ @ V_{GS} = –4.5 V
  $R_{DS(ON)}$ = 630 mΩ @ V_{GS} = –2.5 V
- Low gate charge
- High performance trench technology for extremely low $R_{DS(ON)}$
- SC70-6 package: small footprint (51% smaller than SSOT-6); low profile (1mm thick)



SC70-6



Complementary

Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter	Q1	Q2	Units
V_{DSS}	Drain-Source Voltage	20	–20	V
V_{GSS}	Gate-Source Voltage	±12	±12	V
I_D	Drain Current – Continuous (Note 1)	0.7	–0.6	A
	– Pulsed	2.1	–2	
P_D	Power Dissipation for Single Operation (Note 1)	0.3		W
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 1)	415	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
.32	FDG6332C	7''	8mm	3000 units

Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter		Test Conditions		Min	Typ	Max	Units
Off Characteristics								
BV_{DSS}	Drain–Source Breakdown Voltage		V_{GS} = 0 V, I_D = 250 µA V_{GS} = 0 V, I_D = –250 µA	**Q1** **Q2**	20 –20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient		I_D = 250 µA,Ref. to 25°C I_D = –250 µA,Ref. to 25°C	**Q1** **Q2**		14 –14		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current		V_{DS} = 16 V, V_{GS} = 0 V V_{DS} = –16 V, V_{GS} = 0 V	**Q1** **Q2**			1 –1	µA
I_{GSSF} /I_{GSSR}	Gate–Body Leakage, Forward		V_{GS} = ± 12 V, V_{DS} = 0 V				±100	nA
I_{GSSF} /I_{GSSR}	Gate–Body Leakage, Reverse		V_{GS} = ± 12V , V_{DS} = 0 V				±100	nA
On Characteristics (Note 2)								
$V_{GS(th)}$	Gate Threshold Voltage	**Q1**	V_{DS} = V_{GS}, I_D = 250 µA		0.6	1.1	1.5	V
		Q2	V_{DS} = V_{GS}, I_D = –250 µA		-0.6	–1.2	–1.5	
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	**Q1** **Q2**	I_D = 250 µA,Ref. To 25°C I_D = –250 µA,Ref. to 25°C			–2.8 3		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	**Q1**	V_{GS} = 4.5 V, I_D =0.7 A V_{GS} = 2.5 V, I_D =0.6 A V_{GS} = 4.5 V, I_D =0.7A,T_J=125°C			180 293 247	300 400 442	mΩ
		Q2	V_{GS} = –4.5 V, I_D = –0.6 A V_{GS} = –2.5 V, I_D = –0.5 A V_{GS}=–4.5 V, I_D =–0.6 A,T_J=125°C			300 470 400	420 630 700	
g_{FS}	Forward Transconductance	**Q1**	V_{DS} = 5 V I_D = 0.7 A			2.8		S
		Q2	V_{DS} = –5 V I_D = –0.6A			1.8		
$I_{D(on)}$	On–State Drain Current	**Q1**	V_{GS} = 4.5 V, V_{DS} = 5 V		1			A
		Q2	V_{GS} = –4.5 V, V_{DS} = –5 V		–2			
Dynamic Characteristics								
C_{iss}	Input Capacitance	**Q1**	V_{DS}=10 V, V_{GS}= 0 V, f=1.0MHz			113		pF
		Q2	V_{DS}=–10 V, V_{GS}= 0 V, f=1.0MHz			114		
C_{oss}	Output Capacitance	**Q1**	V_{DS}=10 V, V_{GS}= 0 V, f=1.0MHz			34		pF
		Q2	V_{DS}=–10 V, V_{GS}= 0 V, f=1.0MHz			24		
C_{rss}	Reverse Transfer Capacitance	**Q1**	V_{DS}=10 V, V_{GS}= 0 V, f=1.0MHz			16		pF
		Q2	V_{DS}=–10 V, V_{GS}= 0 V, f=1.0MHz			9		
Switching Characteristics (Note 2)								
$t_{d(on)}$	Turn–On Delay Time	**Q1**	For **Q1**: V_{DS} =10 V, I_D= 1 A V_{GS}= 4.5 V, R_{GEN} = 6 Ω For **Q2**: V_{DS} =–10 V, I_D= –1 A V_{GS}= –4.5 V, R_{GEN} = 6 Ω			5	10	ns
		Q2				5.5	11	
t_r	Turn–On Rise Time	**Q1**				7	15	ns
		Q2				14	25	
$t_{d(off)}$	Turn–Off Delay Time	**Q1**				9	18	ns
		Q2				6	12	
t_f	Turn–Off Fall Time	**Q1**				1.5	3	ns
		Q2				1.7	3.4	
Q_g	Total Gate Charge	**Q1**	For **Q1**: V_{DS} =10 V, I_D= 0.7 A V_{GS}= 4.5 V, R_{GEN} = 6 Ω For **Q2**: V_{DS} =–10 V, I_D= –0.6 A V_{GS}= –4.5 V, R_{GEN} = 6 Ω			1.1	1.5	nC
		Q2				1.4	2	
Q_{gs}	Gate–Source Charge	**Q1**				0.24		nC
		Q2				0.3		
Q_{gd}	Gate–Drain Charge	**Q1**				0.3		nC
		Q2				0.4		

Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter		Test Conditions		Min	Typ	Max	Units
Drain–Source Diode Characteristics and Maximum Ratings								
I_S	Maximum Continuous Drain–Source Diode Forward Current			**Q1**			0.25	A
				Q2			–0.25	
V_{SD}	Drain–Source Diode Forward Voltage	**Q1**	V_{GS} = 0 V, I_S = 0.25 A (Note 2)			0.74	1.2	V
		Q2	V_{GS} = 0 V, I_S = –0.25 A (Note 2)			–0.77	–1.2	

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. $R_{\theta JA}$ = 415°C/W when mounted on a minimum pad of FR-4 PCB in a still air environment.

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

Typical Characteristics: N-Channel

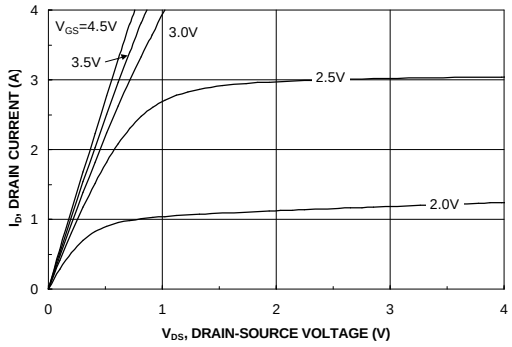


Figure 1. On-Region Characteristics.

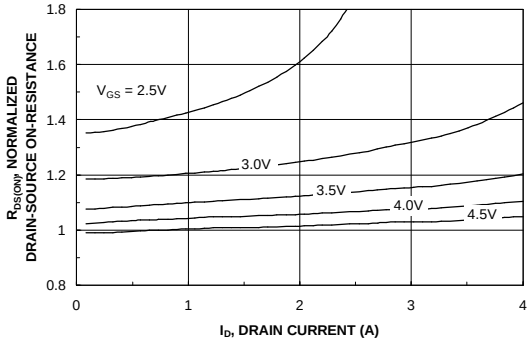


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

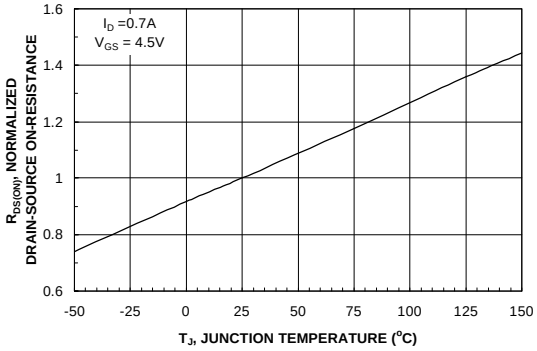


Figure 3. On-Resistance Variation with Temperature.

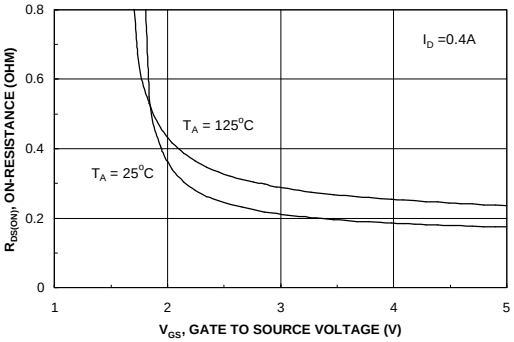


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

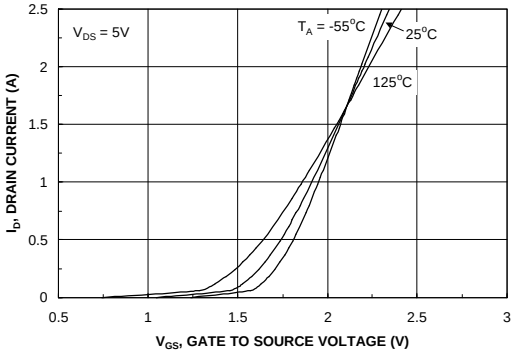


Figure 5. Transfer Characteristics.

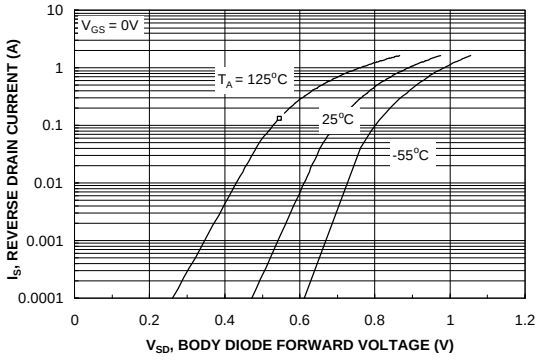


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics: N-Channel

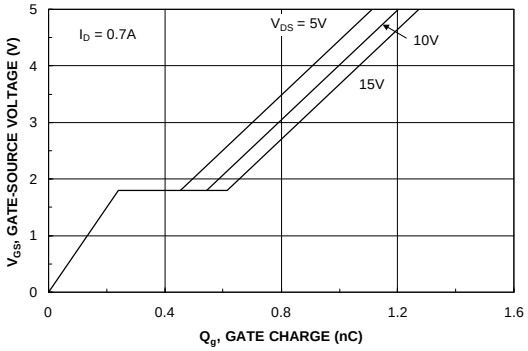


Figure 7. Gate Charge Characteristics.

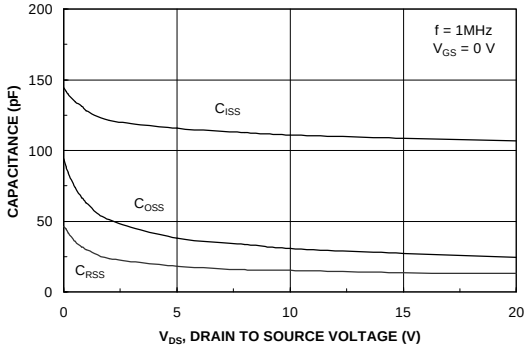


Figure 8. Capacitance Characteristics.

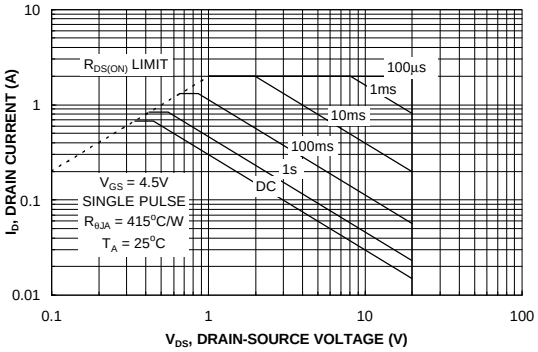


Figure 9. Maximum Safe Operating Area.

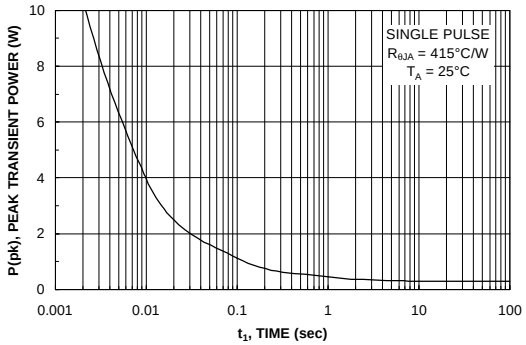


Figure 10. Single Pulse Maximum Power Dissipation.

Typical Characteristics: P-Channel

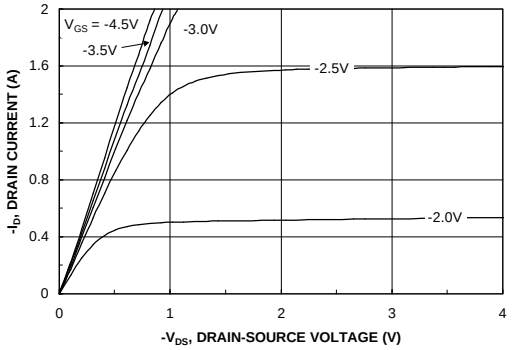


Figure 11. On-Region Characteristics.

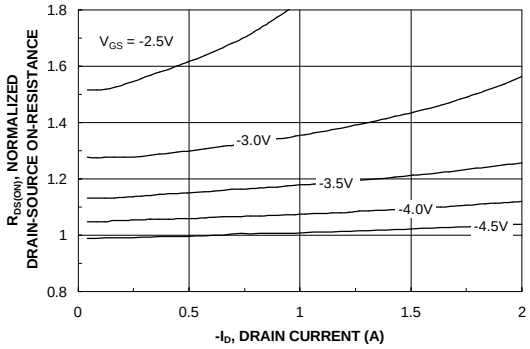


Figure 12. On-Resistance Variation with Drain Current and Gate Voltage.

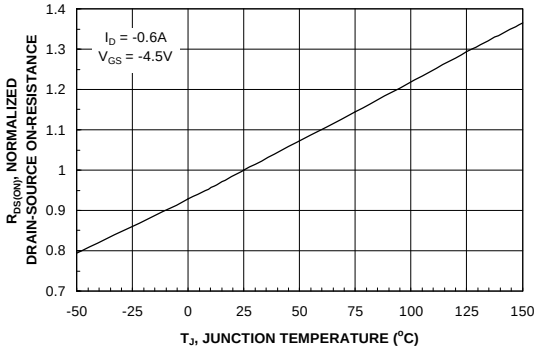


Figure 13. On-Resistance Variation with Temperature.

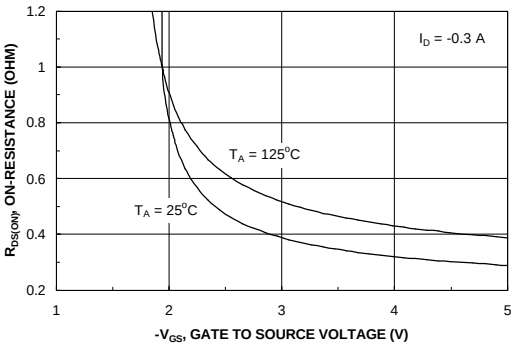


Figure 14. On-Resistance Variation with Gate-to-Source Voltage.

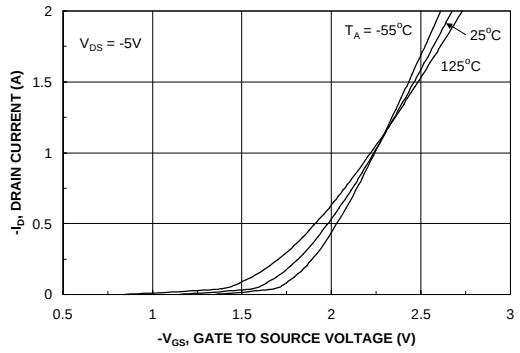


Figure 15. Transfer Characteristics.

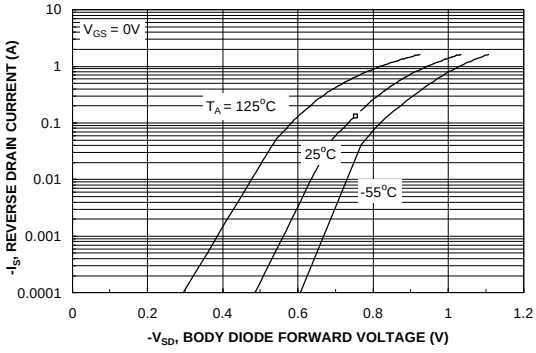


Figure 16. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics: P-Channel

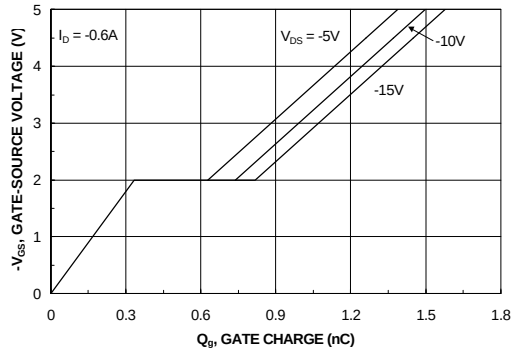


Figure 17. Gate Charge Characteristics.

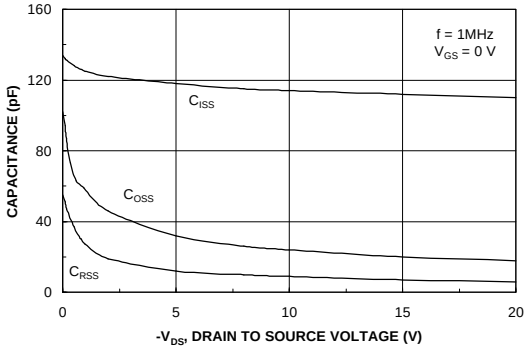


Figure 18. Capacitance Characteristics.

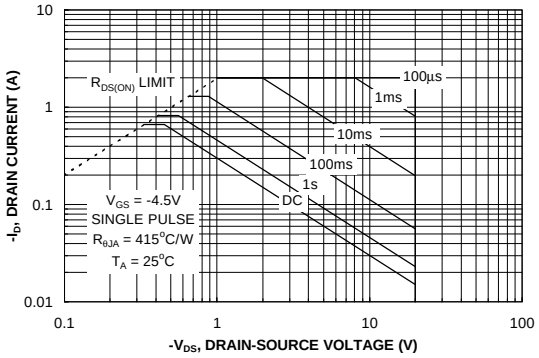


Figure 19. Maximum Safe Operating Area.

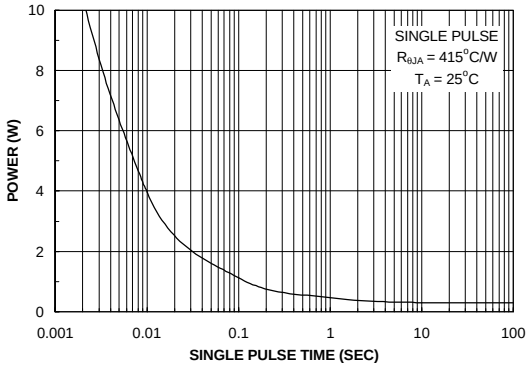


Figure 20. Single Pulse Maximum Power Dissipation.

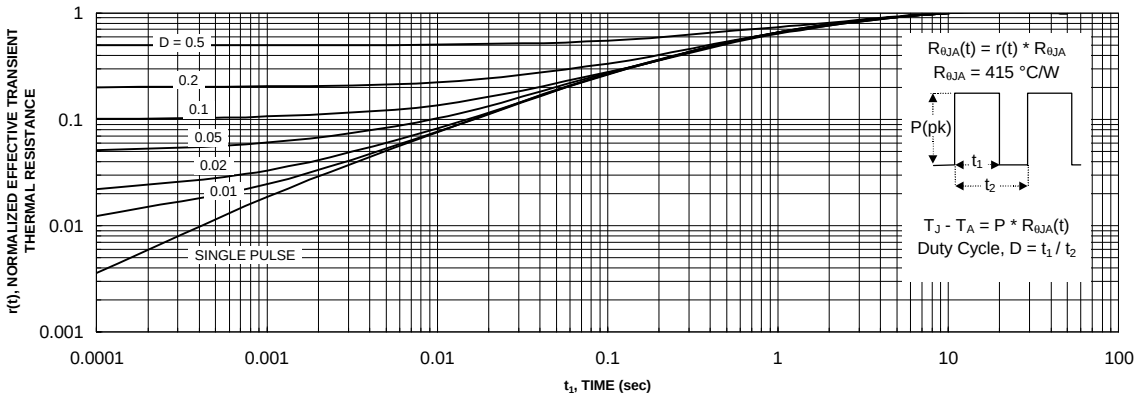


Figure 21. Transient Thermal Response Curve.

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

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

* 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. 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.

AUTHORIZED USE

Unless otherwise specified in this data sheet, this product is a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability. This product may not be used in the following applications, unless specifically approved in writing by a Fairchild officer: (1) automotive or other transportation, (2) military/aerospace, (3) any safety critical application – including life critical medical equipment – where the failure of the Fairchild product reasonably would be expected to result in personal injury, death or property damage. Customer's use of this product is subject to agreement of this Authorized Use policy. In the event of an unauthorized use of Fairchild's product, Fairchild accepts no liability in the event of product failure. In other respects, this product shall be subject to Fairchild's Worldwide Terms and Conditions of Sale, unless a separate agreement has been signed by both Parties.

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 Terms of Use

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.

Rev. I76

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

ON Semiconductor:

FDG6332C

Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург, Промышленная ул, дом № 19, литера Н, помещение 100-Н Офис 331