

Is Now Part of



To a arr 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.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.



May 2024

FDI030N06

N-Channel PowerTrench $^{\mbox{\it le}}$ MOSFET 60 V, 193 A, 3.2 m $_{\mbox{\it le}}$

Features

- $R_{DS(on)}$ = 2.6 m Ω (Typ.) @ V_{GS} = 10 V, I_D = 75 A
- · Fast Switching Speed
- · Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(\text{on})}$
- · High Power and Current Handling Capability
- · RoHS Compliant

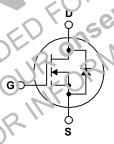
Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that has been tailored to minimize the on-state resistance while maintaining superior switching performance.

Applications

- Synchronous Rectific ... on for A. 1/5 ver / Telecom PSU
- Battery Protectic Circ
- Motor Driv. and Uniter puble Fower Supplies
- Ponewa a S, Sam





MOSFET Max mir Russigs in = 25°C unless otherwise note.

Symbol	70	Parameter Parameter	FDI030N06	Unit
V _{DSS}	air. Source Vortage	CXA	60	V
V _{GSS}	C te to Source Voltage	- NI	±20	V
	COVA	· Continuous (T _C = 25°C, Silicon Limited)	193*	
l _D	Drain Current	- Continuous (T _C = 100°C, Silicon Limited)	136*	Α
	K ORL	- Continuous (T _C = 25°C, Package Limited	120	
рм С	Drain Current	- Pulsed (Note 1	772	Α
E _{AS}	Single Pulsed A.valanche Energy	(Note 2	2) 1434	mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3	6	V/ns
	Power Dissipation	$(T_C = 25^{\circ}C)$	231	W
P_{D}	Power Dissipation	- Derate Above 25°C	1.54	W/°C
T _J , T _{STG}	Operating and Storage Tempera	-55 to +175	°C	
T _L	Maximum Lead Temperature for 1/8" from Case for 5 Seconds	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds		

^{*}Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 120A.

Thermal Characteristics

Symbol	Parameter	FDI030N06	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.65	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	*C/VV

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FDI030N06	FDI030N06	I ² -PAK	Tube	N/A	N/A	50 units

Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Unit
Off Charac	cteristics					
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V, T_C = 25^{\circ} C$	60	-	-	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 1 mA, Referenced to 25°C	-	0.05	-	V/°C
_	Zero Gate Voltage Drain Current	V _{DS} = 48 V, V _{GS} = 0 V	-	-	1	
I _{DSS} Zero Gate Voltage Drain Current	$V_{DS} = 48 \text{ V}, T_{C} = 150^{\circ}\text{C}$	-	-	500	μΑ	
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±100	nA

On Characteristics

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu\text{A}$	7.5	.5	4.5	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 75 A		2.6	3.2	$m\Omega$
9 _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 75 A		154	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	- 7380 9815	pF
C _{oss}	Output Capacitance	V _D 2t V _C = 0 v, 1095 1455	pF
C _{rss}	Reverse Transfer Capacitance	415 625	pF
Q _{g(tot)}	Total Gate Charge at 10V	V _{DS} = 3 V, I _D = 75 A, - 116 151	nC
Q_{gs}	Gate to Source Gate Charge	3 _{3S} = 10 V - 40 -	nC
Q_{gd}	Gate to Drain "Miller" Char	(Note 4) - 35 -	nC

Switching Characteristics

t _{d(on)}	Turn-On Delay me	-	39	87	ns
t _r	Turn-Or \Rightarrow T ₁ \Rightarrow $V_{DD} = 30 \text{ V, I}_{D} = 75 \text{ A},$	-	178	366	ns
t _{d(off)}	Turn- $\neq D$ - Time $V_{CS} = 10 \text{ V}, R_C = 4.7 \Omega$	-	54	118	ns
t _f	TuOff Fall T le (No	e 4) -	33	76	ns

Drain ourc Di le Characteristics

Is ximum Continuous Dra no Source D.o.	M ximum Continuous Dra no Source Dode Forward Current			193	Α
Maximum Fulsed Crain to Sou ce Diode F	Maxim in Fulsed Crain to Sou ce Diode Forward Current			772	Α
V _{SD} Drain to Source Finde Forward voltage	$V_{GS} = 0 \text{ V}, I_{SD} = 75 \text{ A}$	-	1	1.3	V
t _{rr} Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 75 A,	-	46	-	ns
Q _{rr} Reverse Recovery Charge	$dI_F/dt = 100 A/\mu s$	-	50	-	nC

Mote :

- 1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. L = 0.51 mH, I $_{AS}$ = 75 A, V $_{DD}$ = 50 V, R $_{G}$ = 25 $\!\Omega$, starting T $_{J}$ = 25 $\!^{\circ}$ C.
- 3. I_{SD} \leq 75 A, di/dt \leq 450 A/ μ s, V_{DD} \leq BV_{DSS}, starting T_J = 25°C.
- 4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

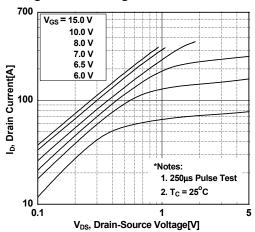


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

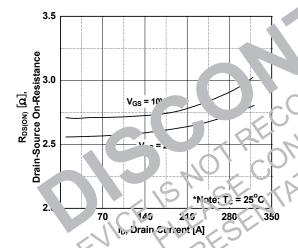


Figure 5. Capacitance Characteristics

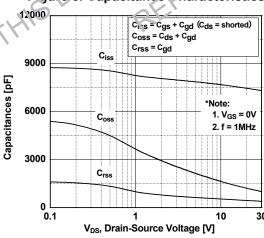
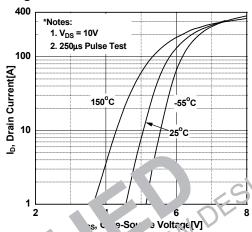


Figure 2. Transfer Characteristics



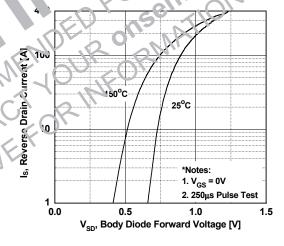
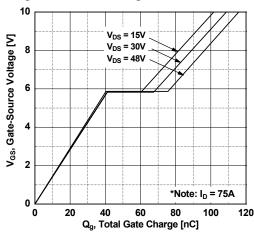


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

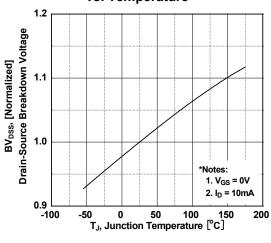


Figure 8. On-Resistance Variation vs. Temperature

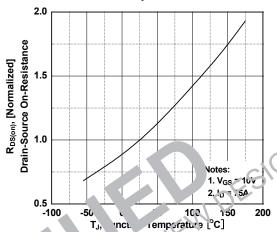
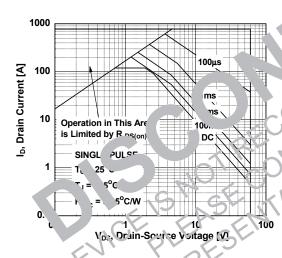


Figure 9. Maximum Safe Operating Area



າດ ໄປ...aximum Drain Current vs. Case Temperature

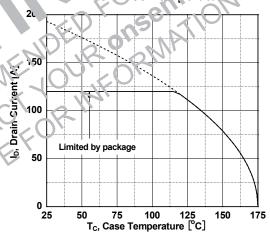
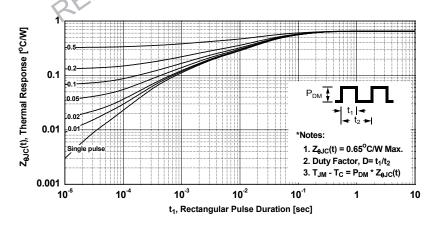


Figure 11. Transient Thermal Response Curve



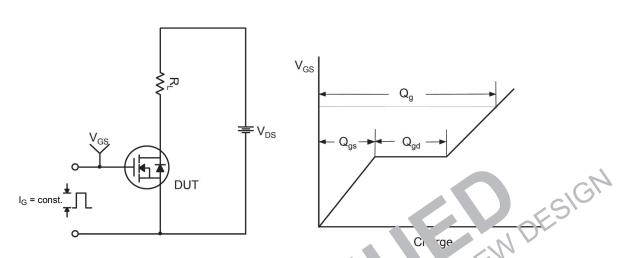


Figure 12. Gate Charge Test Circ it Wave orm

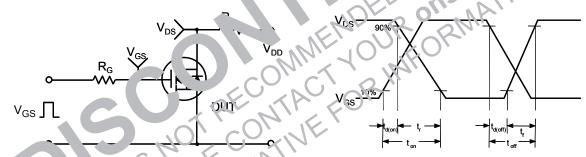


Figure 13 Resistive Switching Test Circuit & Waveforms

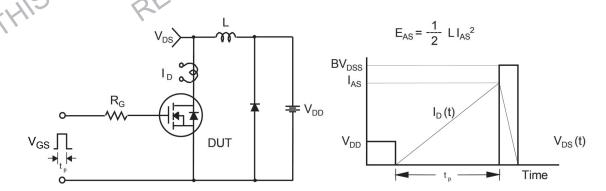
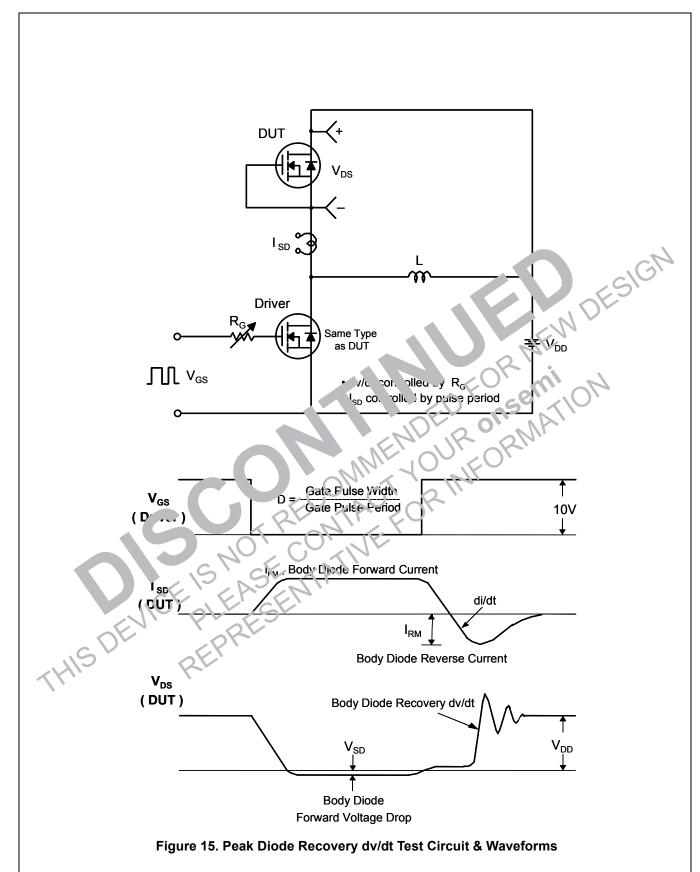


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



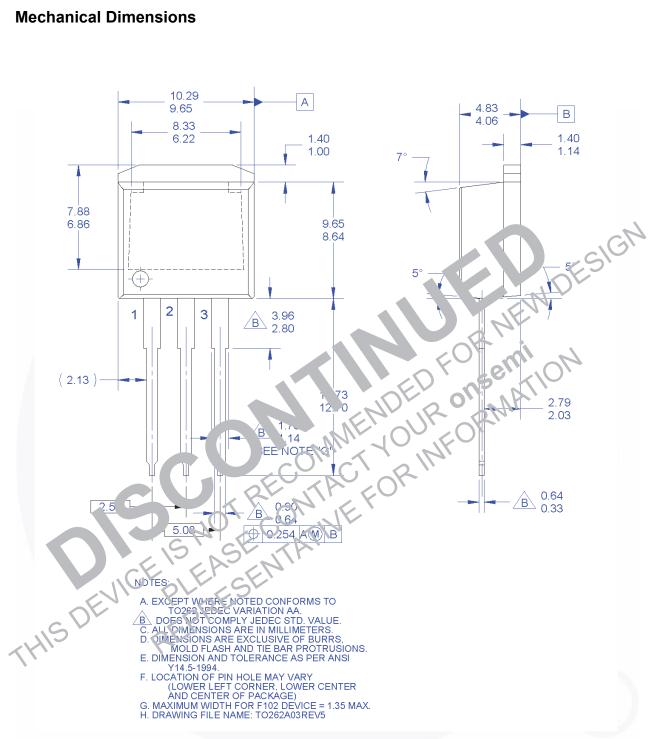


Figure 16. TO262 (I²PAK), Molded, 3-Lead, Jedec Variation AA

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_TT262_0R3





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™ AX-CAP® BitSiC™ Build it Now™ CorePLUS™ CorePOWER™ $CROSSVOLT^{\text{TM}}$

CTI ™ Current Transfer Logic™ DEUXPEED® Dual Cool™ EcoSPARK® EfficentMax™

Fairchild[®] Fairchild Semiconductor® FACT Quiet Series™ FACT[®] FAST® FastvCore™ FETBench™ FPS™

ESBC™

F-PFSTM FRFET® Global Power ResourceSM GreenBridge™ Green FPS™ Green FPS™ e-Series™

G*max*™ GTO™ IntelliMAX™ ISOPLANAR™ Marking Small Speakers Sound Louder

and Better™ MegaBuck™ MIČROCOUPLER™

MicroFET™ MicroPak™ MicroPak2™ MillerDrive™ MotionMax™ mWSaver® OptoHiT™ OPTOLOGIC® OPTOPLANAR® 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 Succr

STEALTH™ SuperFET® SuperSOT™--тм-6 Super Sr. PrS 3u_k MO Sync. T™

Sync-Lock™ SYSTEM ®*

TinyBoost[®] TinyBuck[®] TinyCalc™ TinvLogic[®] TINYOPTO™ TinvPower™ TinvPWM™ "re™ TM Tran TriFau Detect™

RUF JRRENT® Jes™

CHC® Uitra FRFET™ UniFFT™ VCX TN Wax™ si c'M VcltagePlus™ XSTM

*Trademarks of System General Corporation, used under li o by irchild ,niconducto

DISCLAIMER

M. F CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE NO. ASSUME MAY LIABLE TY ARISING OUT OF THE APPLICATION OR USE OF ANY FAIRCHILD SEMICONDUCTOR RESERVES THE JIGHT RELIABILITY, FUNCTION, OR DESIGN. FAIRC LD DOL PRODUCT OR CIRCUIT DESCRIBED HF ; N. THER D ES IT CONVEY ANY LICENSE UNDER 'TS FATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT F AND THE OF FAIRCH!!! D'S WORLDWIDE TER IS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE I ODUCTS

LIFE SUPPORT POLICY FAIRCHILD'S PROD' T

UTHORIZED FOR USE AS CHITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE FAIRCH!L.) SEMICONDUCTOR CORPORATION. EXPRESS WRITTEN , PROVAL O

As used here

- Life so nort devision vistems are devices or systems which, (a) and intende or surg all implant into the body or ich support or sustain life, and (c) w. left are to perform when preperly used in accordance with instructions use provided in the labeling, can be reasonably expected to result in a significant injury or 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 And-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, www.Fairchilds emi.com, under Sales Curiport.

Counter along 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
		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 166



ON Semiconductor and in are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hol

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: orderlitt@onsemi.com N. American Technical Support: 800-282-9855 Toll Free USA/Canada Europe, Middle East and Africa Technical Support:

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