

Is Now Part of



ON Semiconductor®

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

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 <u>www.onsemi.com</u>. Please email any questions regarding the system integration to <u>Fairchild_questions@onsemi.com</u>.

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 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 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 applications, 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 ad experson



November 2013

FDPF085N10A N-Channel PowerTrench[®] MOSFET 100 V, 40 A, 8.5 m Ω

Features

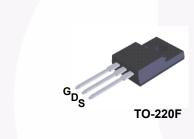
- $R_{DS(on)} = 6.5 \text{ m}\Omega \text{ (Typ.)} @ V_{GS} = 10 \text{ V}, I_D = 40 \text{ A}$
- · Fast Switching Speed
- Low Gate Charge, Q_G = 31 nC (Typ.)
- High Performance Trench Technology for Extremely Low $R_{\text{DS}(\text{on})}$
- High Power and Current Handling Capability
- RoHS Compliant

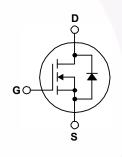
Description

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

- Consumer Appliances
- LED TV
- · Synchronous Rectification for ATX / Sever / Telecom PSU
- · Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter





Absolute Maximum Ratings T_C = 25°C unless otherwise noted.

Symbol	Parameter			FDPF085N10A	Unit
V _{DSS}	Drain to Source Voltage			100	V
V _{GSS}	Gate to Source Voltage			±20	V
ID	Drain Current	- Continuous (T _C = 25°C)		40	•
	Drain Current	- Continuous (T _C = 100 ^o C)		28	— A
I _{DM}	Drain Current	- Pulsed	(Note 1)	160	A
E _{AS}	Single Pulsed Avalanche Energy (Note 2)			269	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		6.0	V/ns	
P _D	Dawar Diasination	(T _C = 25 ^o C)		33.3	W
	Power Dissipation	- Derate Above 25°C		0.22	W/ºC
T _J , T _{STG}	Operating and Storage Temperature Range			-55 to +175	°C
TL	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		conds	300	°C

Thermal Characteristics

Symbol	Parameter	FDPF085N10A	Unit
R _{0JC} Thermal Resistance, Junction to Case, Max.		4.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	°C/W

· · · · ·		Package	Packing N	lethod	Reel Size)	Tape Width	ו Qu	antity	
		TO-220F	- Tube	9	N/A		N/A	50	50 units	
Electrica	l Chara	acteristics T _C = 25	^o C unless c	otherwise noted.						
Symbol		Parameter		Test	Conditions	>	Min.	Тур.	Max.	Unit
Off Charac	teristics									
BV _{DSS}	Drain to Source Breakdown Voltage		200	I _D = 250 μA, V _C	- = 0 V		100	_	-	V
ΔBV _{DSS}		wn Voltage Temperature	0				100		_	-
ΔDV _{DSS} /ΔTJ	Coefficie	0 1		I _D = 250 μA, Re	eferenced to	o 25ºC	-	0.07	-	V/ºC
				V _{DS} = 80 V, V _G	s=0V		-	-	1	
DSS	Zero Gat	te Voltage Drain Current		$V_{DS} = 80 \text{ V}, T_{C} = 150^{\circ}\text{C}$			-	-	500	μA
I _{GSS}	Gate to F	Body Leakage Current		V _{GS} = ±20 V, V			-	-	±100	nA
										_
On Charac	teristics	İ								
V _{GS(th)}	Gate The	reshold Voltage		$V_{GS} = V_{DS}, I_D =$			2.0	-	4.0	V
R _{DS(on)}	Static Dr	ain to Source On Resista	ance	V_{GS} = 10 V, I_{D} =			-	6.5	8.5	mΩ
9 _{FS}	Forward	Transconductance		V_{DS} = 10 V, I_{D} =	= 96 A		-	76	-	S
Dynamic C	haracte	ristics								
C _{iss}	Input Ca	pacitance		V _{DS} = 50 V, V _{GS} = 0 V, f = 1 MHz			-	2025	2695	pF
C _{oss}	Output C	Capacitance				-	468	620	pF	
C _{rss}		Transfer Capacitance				-	20	-	pF	
C _{oss} (er)		elated Output Capacitand	ce	V _{DS} = 50 V, V _{GS} = 0 V		-	752	-	pF	
Q _{g(tot)}		te Charge at 10V			5		-	31	40	nC
Q _{gs}		Source Gate Charge		V _{GS} = 10 V, V _{DS} = 50 V,		-	9.7	-	nC	
Q _{gs2}		arge Threshoid to Platea	iu	$I_{\rm D} = 96 {\rm A}$	5 00 .,	F	-	5.0	-	nC
Q _{gd}		Drain "Miller" Charge	-	(Note 4)		-	7.5	-	nC	
ESR		ent Series Resistance (G-	-S)	f = 1 MHz		· · ·	-	0.97	-	Ω
-				1				•		
Switching	Charact	eristics								
t _{d(on)}	Turn-On	Delay Time		$V_{DD} = 50$ V, $I_D = 96$ A, V _{GS} = 10 V, R _G = 4.7 Ω (Note 4)			-	18	46	ns
t _r	Turn-On	Rise Time					-	22	54	ns
t _{d(off)}	Turn-Off	Delay Time				-	29	68	ns	
t _f	Turn-Off	Fall Time				-	8	26	ns	
Drain Sou	roo Diod	e Characteristics								
ls	Maximum Continuous Drain to Source Dio					-	-	40	A	
ISM	Maximum Pulsed Drain to Source Diode F					-	-	160	A	
V _{SD}				V _{GS} = 0 V, I _{SD} = 96 A			-	-	1.3	V
t _{rr}		Recovery Time		V_{DD} = 50 V, V_{GS} = 0 V, I _{SD} = 96 A, dI _F /dt = 100 A/µs		-	59	-	ns	
Q _{rr}	Reverse	Recovery Charge				-	80	-	nC	

2. L = 3 mH, I_{AS} = 13.4 A, R_G = 25 Ω , starting I_J = 25°C. 3. $I_{SD} \le 40$ A, di/dt $\le 200 \text{ A/}\mu\text{s}$, $V_{DD} \le BV_{DSS}$, starting T_J = 25°C. 4. Essentially independent of operating temperature typical characteristics.

6

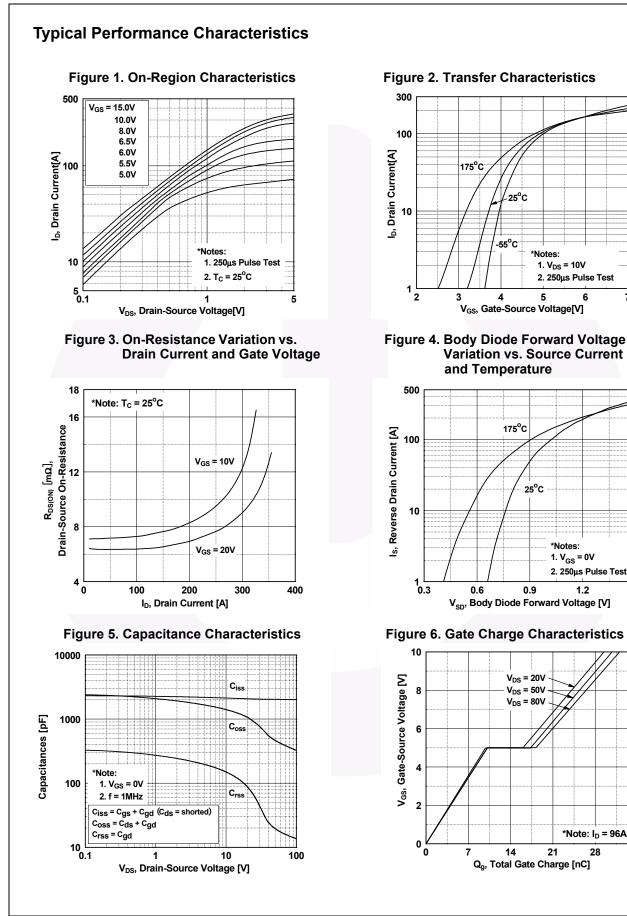
*Notes:

1. V_{GS} = 0V 2. 250µs Pulse Test

1.2

1.5

7



www.fairchildsemi.com

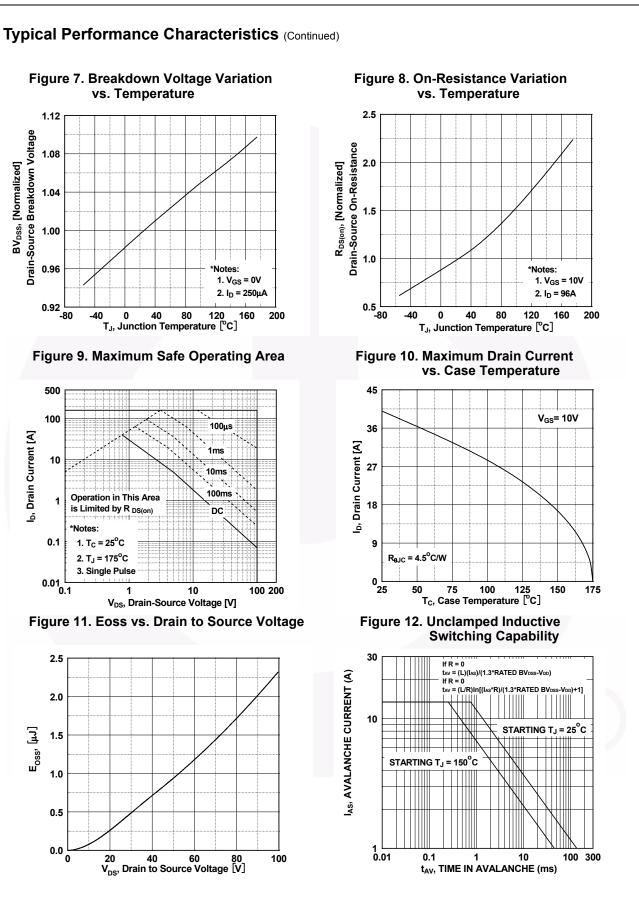
*Note: I_D = 96A

28

35

21

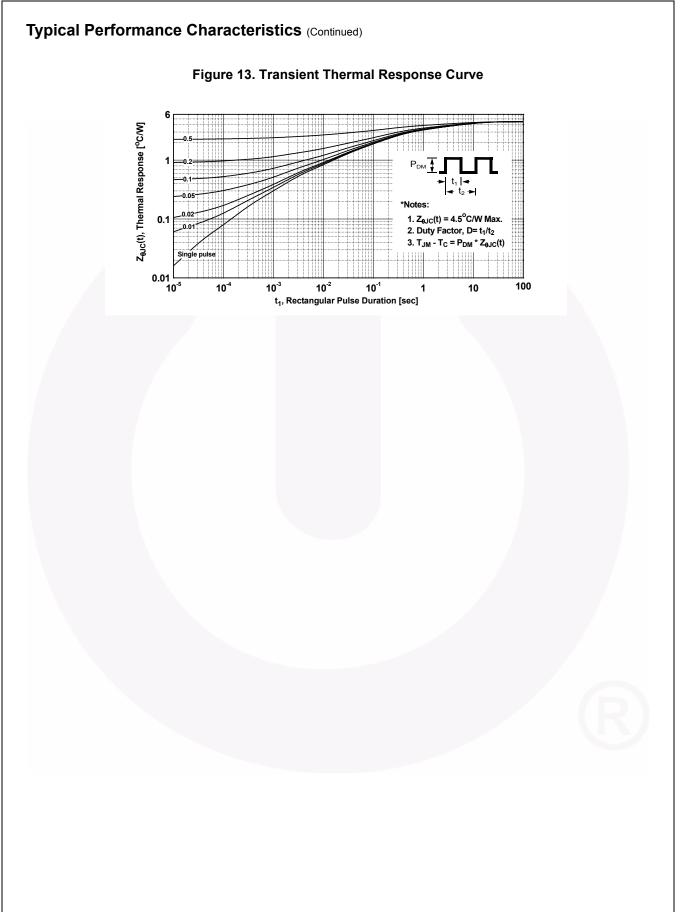
©2011 Fairchild Semiconductor Corporation FDPF085N10A Rev. C1

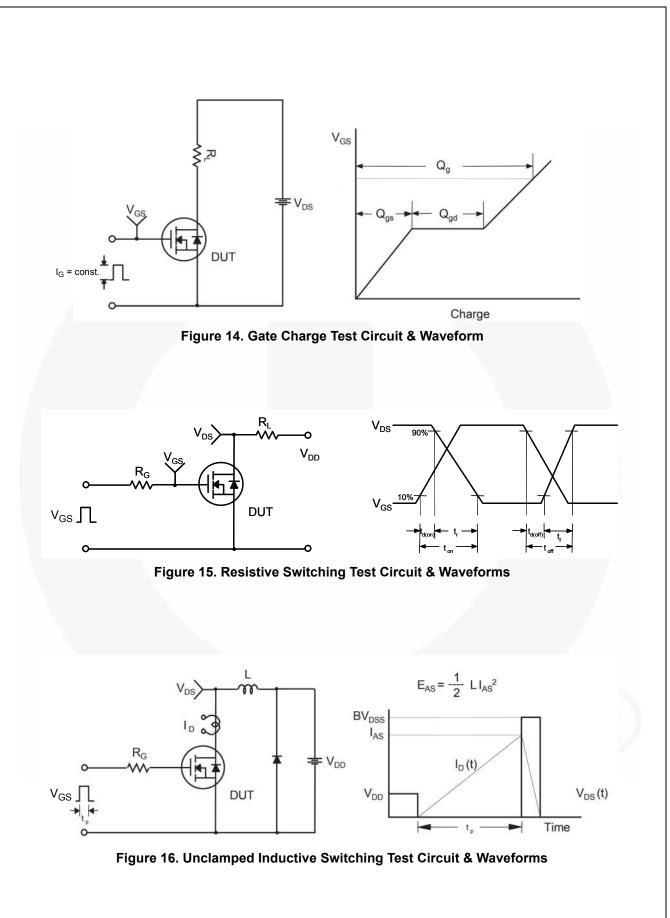


©2011 Fairchild Semiconductor Corporation FDPF085N10A Rev. C1

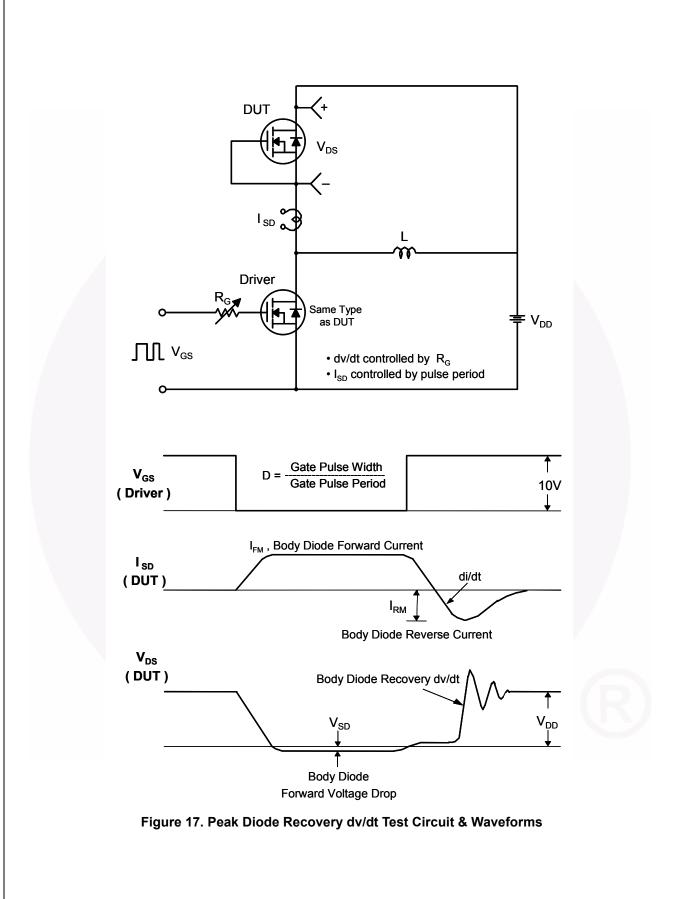
4

www.fairchildsemi.com

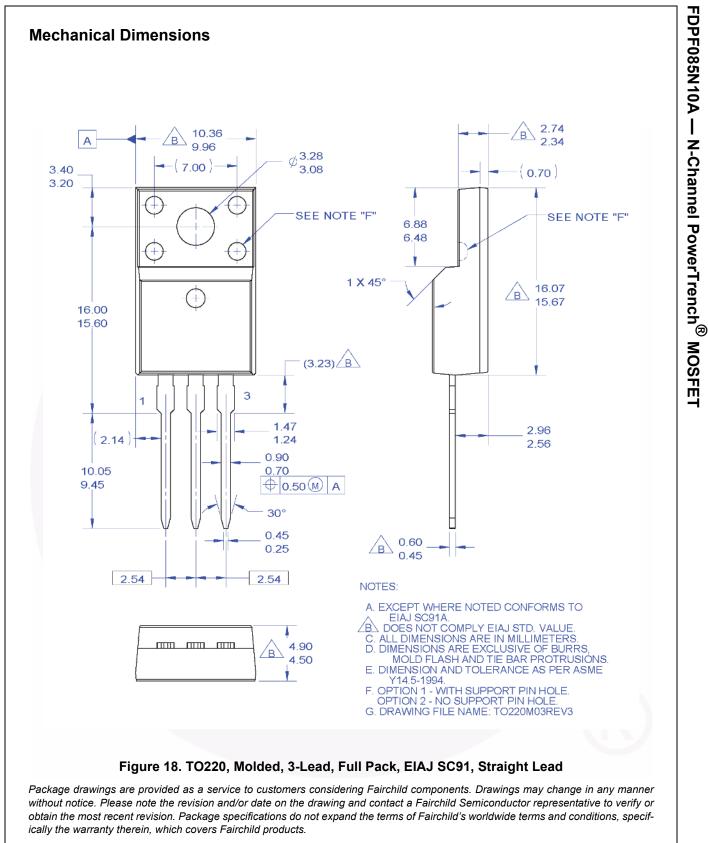




FDPF085N10A — N-Channel PowerTrench[®] MOSFET



FDPF085N10A — N-Channel PowerTrench[®] MOSFET



Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:

http://www.fairchildsemi.com/package/packageDetails.html?id=PN_TF22S-003



SEMICONDUCTOR

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.

AX-CAP®*FFBitSiC™GiBuild it Now™GrCorePOWER™GrCorePOWER™GrCOREPOWER™GrCUrrent Transfer Logic™IntDeuXPEED®ISIDual Cool™MaEcoSPARK®anEfficentMax™MiESBC™MiFairchild®MiFairchild Semiconductor®MiFACT Quiet Series™MoFAST®OpFastyCore™Op	-PFS [™] RFET [®] Ilobal Power Resource SM ireenBridge [™] ireen FPS [™] e-Series [™] imax [™] iTO [™] totelliMAX [™] SOPLANAR [™] larking Small Speakers Sound Louder nd Better [™] legaBuck [™] IICROCOUPLER [™] IICROCOUPLER [™] IICROFET [™] IICROFET [™]	CUS PowerTrench® PowerXS™ Programmable Active Droop™ CFET® QS™ Quiet Series™ RapidConfigure™ O T Saving our world, 1mW/W/kW at a time™ SignalWise™ Smart Start™ Solutions for Your Success™ SPM® STEALTH™ SuperFET® SuperSOT™-6 SuperSOT™-8 SupreMOS® SyncFET™	Sync-Lock [™] ECENERAL TinyBoost [®] TinyBoost [®] TinyCalc [™] TinyColc [™] TinyColc [™] TinyPOwer [®] TinyPower [™] TinyPower [™] TinyPower [®] TinyPower [™] TinyPower [™] TinyPower [™] TinyPower [™] TinyPower [™] TinyPower [®] TinyPower [™] TinyPower [™] TinyPo
---	--	--	--

*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:

- Life support devices or systems are devices or systems which, (a) are 1. 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.

FDPF085N10A — N-Channel PowerTrench[®] MOSFE1

ON Semiconductor and 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 <u>www.onsemi.com/site/pdf/Patent-Marking.pdf</u>. 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 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 has against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death ass

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

© Semiconductor Components Industries, LLC