

# **FDS7064N**

# 30V N-Channel PowerTrench® MOSFET

## **General Description**

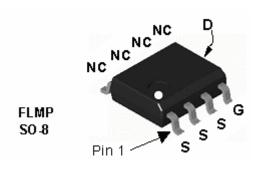
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for "low side" synchronous rectifier operation, providing an extremely low  $R_{\text{DS(ON)}}$  in a small package.

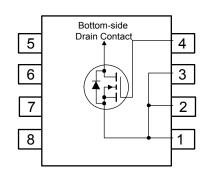
## **Applications**

- · Synchronous rectifier
- DC/DC converter

#### **Features**

- 16 A, 30 V  $R_{DS(ON)} = 7.5 \text{ m}\Omega \text{ @ } V_{GS} = 4.5 \text{ V}$
- High performance trench technology for extremely low  $R_{\mbox{\scriptsize DS(ON)}}$
- High power and current handling capability
- · Fast switching
- FLMP SO-8 package: Enhanced thermal performance in industry-standard package size





**Absolute Maximum Ratings** T<sub>A</sub>=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V <sub>DSS</sub>	Drain-Source Voltage		30	V
V <sub>GSS</sub>	Gate-Source Voltage		± 12	V
I <sub>D</sub>	Drain Current - Continuous	(Note 1a)	16	Α
	– Pulsed		60	
P <sub>D</sub>	Power Dissipation for Single Operation	(Note 1a)	3.0	W
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Junction Temperature Range		-55 to +150	°C

## **Thermal Characteristics**

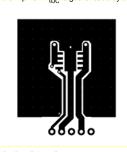
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	40	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case		0.5	°C/W

**Package Marking and Ordering Information** 

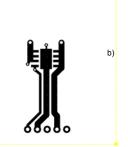
Device Marking	Device	Reel Size	Tape width	Quantity
FDS7064N	FDS7064N	13"	12mm	2500 units

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Char	acteristics		•			
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	30			V
<u>ΔBV<sub>DSS</sub></u> ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250 μA, Referenced to 25°C		23		mV/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V			1	μΑ
I <sub>GSSF</sub>	Gate-Body Leakage, Forward	V <sub>GS</sub> = 12 V, V <sub>DS</sub> = 0 V			100	nA
I <sub>GSSR</sub>	Gate-Body Leakage, Reverse	V <sub>GS</sub> = -12 V , V <sub>DS</sub> = 0 V			-100	nA
On Char	acteristics (Note 2)					
V <sub>GS(th)</sub>	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	0.8	1.2	2	V
$\Delta V_{GS(th)} \over \Delta T_J$	Gate Threshold Voltage Temperature Coefficient	$I_D$ = 250 $\mu$ A, Referenced to 25°C		-4.3		mV/°C
R <sub>DS(on)</sub>	Static Drain–Source On–Resistance	$V_{GS}$ = 4.5 V, $I_{D}$ = 16 A $V_{GS}$ = 4.5 V, $I_{D}$ = 16 A, $T_{J}$ = 125°C		6.2 9.0	7.5 11.0	mΩ
<b>g</b> <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 16 A		112		S
Dynamic	Characteristics					
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 15 V, V <sub>GS</sub> = 0 V,		3355		pF
C <sub>oss</sub>	Output Capacitance	f = 1.0 MHz		522		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			209		pF
Switchin	ng Characteristics (Note 2)					
t <sub>d(on)</sub>	Turn-On Delay Time	$V_{DD} = 15 \text{ V},  I_D = 1 \text{ A},$		17	30	ns
t <sub>r</sub>	Turn-On Rise Time	$V_{GS} = 4.5 \text{ V}, R_{GEN} = 6 \Omega$		13	23	ns
t <sub>d(off)</sub>	Turn-Off Delay Time			54	86	ns
t <sub>f</sub>	Turn-Off Fall Time			26	42	ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 16 A,		30	48	nC
Q <sub>gs</sub>	Gate-Source Charge	V <sub>GS</sub> = 4.5 V		6.3		nC
$Q_{gd}$	Gate-Drain Charge			7.7		nC
Drain-S	ource Diode Characteristics	and Maximum Ratings	•	•	•	•
I <sub>s</sub>	Maximum Continuous Drain-Sourc				2.5	Α
V <sub>SD</sub>	Drain-Source Diode Forward	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 2.5 A (Note 2)			1.2	V

<sup>1.</sup> R<sub>0JA</sub> 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.



40°C/W when mounted on a 1in<sup>2</sup> pad of 2 oz copper



85°C/W when mounted on a minimum pad of 2 oz copper

Scale 1:1 on letter size paper

**2.** Pulse Test: Pulse Width <  $300\mu$ s, Duty Cycle < 2.0%

# **Typical Characteristics**

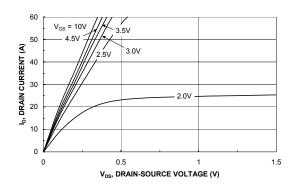


Figure 1. On-Region Characteristics.

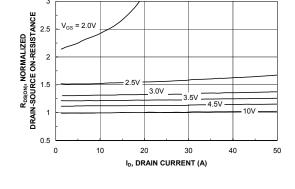


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

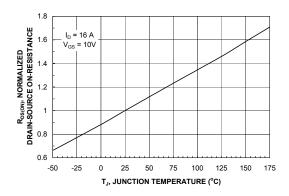


Figure 3. On-Resistance Variation withTemperature.

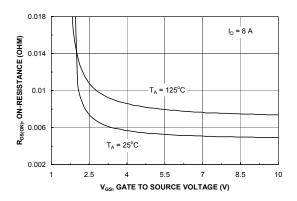


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

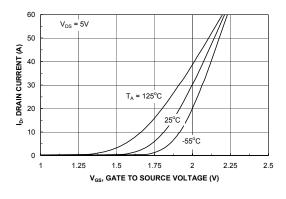


Figure 5. Transfer Characteristics.

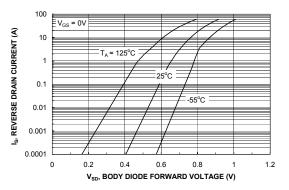
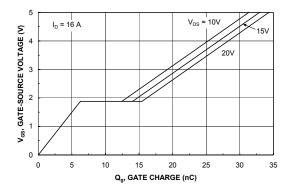


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

# **Typical Characteristics**



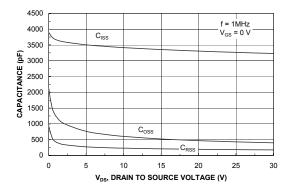
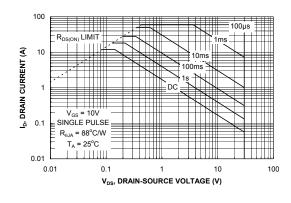


Figure 7. Gate Charge Characteristics.





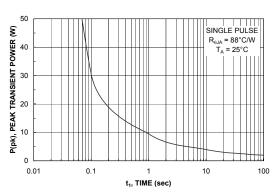


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

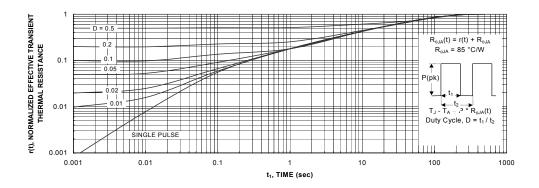
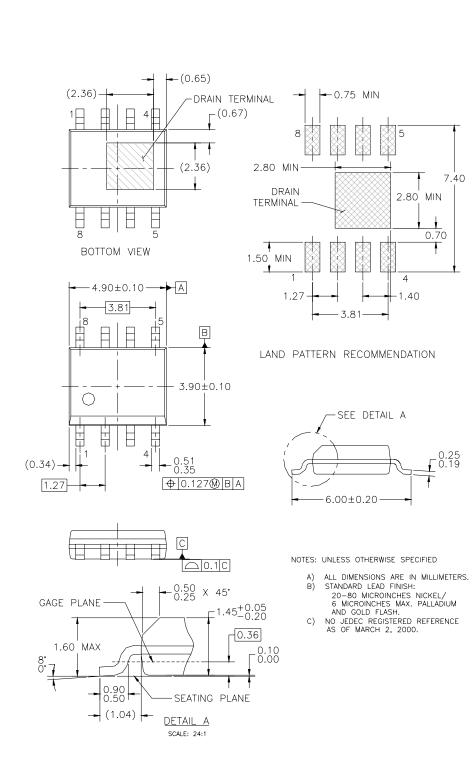


Figure 11. Transient Thermal Response Curve.

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

# **Dimensional Outline and Pad Layout**



#### **TRADEMARKS**

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

$ACEx^{TM}$	FACT Quiet Series™	ISOPLANAR™	$POP^{\mathsf{TM}}$	Stealth™
ActiveArray™	FAST®	LittleFET™	Power247™	SuperFET™
Bottomless™	FASTr™	MICROCOUPLER™	PowerSaver™	SuperSOT™-3
CoolFET™	FPS™	MicroFET™	PowerTrench®	SuperSOT™-6
CROSSVOLT™	FRFET™	MicroPak™	QFET®	SuperSOT™-8
DOME™	GlobalOptoisolator™	MICROWIRE™	$QS^{TM}$	SyncFET™
EcoSPARK™	GTO™ .	MSXTM	QT Optoelectronics™	TinyLogic <sup>®</sup>
E <sup>2</sup> CMOS <sup>TM</sup>	HiSeC™	MSXPro™	Quiet Series™	TINYOPTO™
EnSigna™	I <sup>2</sup> C <sup>TM</sup>	$OCX^{TM}$	RapidConfigure™	TruTranslation™
FACT™	ImpliedDisconnect™	OCXPro™	RapidConnect™	UHC™
Across the boar	d. Around the world.™	OPTOLOGIC®	SILENT SWITCHER®	UltraFET®
The Power Franchise™		OPTOPLANAR™	SMART START™	VCX <sup>TM</sup>
Programmable Active Droop™		PACMAN™	SPM™	

#### 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.

#### 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 herein:

- 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, or (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 significant injury to the
- 2. A critical component is 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.

## PRODUCT STATUS DEFINITIONS

### **Definition of Terms**

Datasheet Identification	Product Status	Definition		
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.		
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.		
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.		
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.		