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February 2004

FDS7079ZN3

30 Volt P-Channel PowerTrench[®] MOSFET

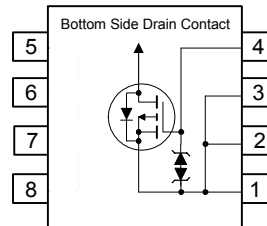
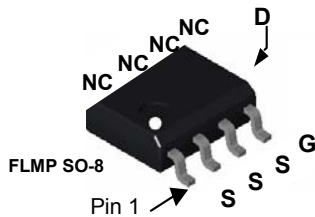
General Description

Advanced P Channel MOSFET combined with Advanced SO8 FLMP package providing a device with extremely low thermal impedance and improved electrical performance.

Applications for this device include multi-cell battery protection and charging, including protection and load switching in notebook computer and notebook battery packs.

Features

- -16 A, -30 V. $R_{DS(ON)} = 7.5 \text{ m}\Omega @ V_{GS} = -10 \text{ V}$
 $R_{DS(ON)} = 11.5 \text{ m}\Omega @ V_{GS} = -4.5 \text{ V}$
- ESD protection diode (note 3)
- ESD rating: 4kV
- High performance trench technology for extremely low $R_{DS(ON)}$
- FLMP SO-8 package for enhanced thermal performance in industry-standard package size



Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V _{DSS}	Drain-Source Voltage	-30	V
V _{GSS}	Gate-Source Voltage	±25	V
I _D	Drain Current – Continuous (Note 1a)	-16	A
	– Pulsed	-60	
P _D	Power Dissipation for Single Operation (Note 1a) (Note 1b)	3.13	W
		1.5	
T _J , T _{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

R _{θJA}	Thermal Resistance, Junction-to-Ambient (Note 1a)	40	°C/W
R _{θJC}	Thermal Resistance, Junction-to-Case (Note 1)	0.5	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
FDS7079ZN3	FDS7079ZN3	13"	12mm	2500 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	-30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I _D = -250 μA, Referenced to 25°C		-20		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -24 V, V _{GS} = 0 V			-1	μA
I _{GSS}	Gate-Body Leakage	V _{GS} = ±25 V, V _{DS} = 0 V			±10	μA

On Characteristics (Note 2)

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250 μA	-1	-1.5	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I _D = -250 μA, Referenced to 25°C		0.5		mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = -10 V, I _D = -16 A V _{GS} = -4.5 V, I _D = -13 A V _{GS} = -10 V, I _D = -16 A, T _J = 125°C		6.7 9.4 9.2	7.5 11.5	mΩ
g _{FS}	Forward Transconductance	V _{DS} = -10 V, I _D = -16 A		47		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = -15 V, V _{GS} = 0 V, f = 1.0 MHz		3630		pF
C _{oss}	Output Capacitance			985		pF
C _{rss}	Reverse Transfer Capacitance			490		pF
R _G	Gate Resistance	V _{GS} = 15 mV, f = 1.0 MHz		3.0		Ω

Switching Characteristics (Note 2)

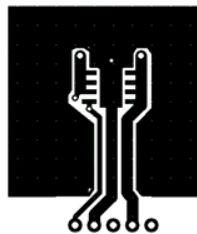
t _{d(on)}	Turn-On Delay Time	V _{DD} = -15 V, I _D = -1 A, V _{GS} = -10 V, R _{GEN} = 6 Ω		10	19	ns
t _r	Turn-On Rise Time			20	35	ns
t _{d(off)}	Turn-Off Delay Time			64	102	ns
t _f	Turn-Off Fall Time			98	157	ns
Q _g	Total Gate Charge	V _{DS} = -15 V, I _D = -16 A, V _{GS} = -5 V		39	55	nC
Q _{gs}	Gate-Source Charge			10		nC
Q _{gd}	Gate-Drain Charge			15		nC

Drain-Source Diode Characteristics and Maximum Ratings

I _S	Maximum Continuous Drain-Source Diode Forward Current				-2.5	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = -2.5 A (Note 2)		-0.7	-1.2	V
t _{RR}	Reverse Recovery Time	I _F = -16 A, d _I /d _t = 100 A/μs (Note 2)		38		ns
Q _{RR}	Reverse Recovery Charge			24		nC

Notes:

- R_{θJA} 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_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design.



a) 40°C/W when mounted on a 1in² pad of 2 oz copper



b) 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 < 300μs, Duty Cycle < 2.0%

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

Typical Characteristics

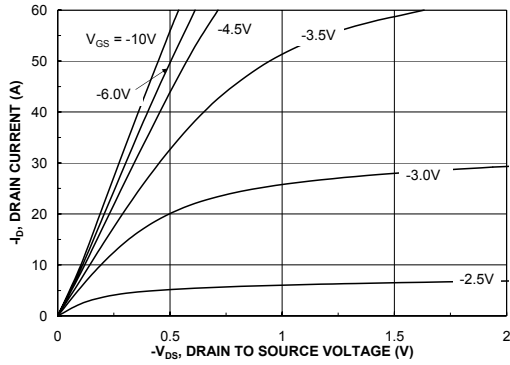


Figure 1. On-Region Characteristics.

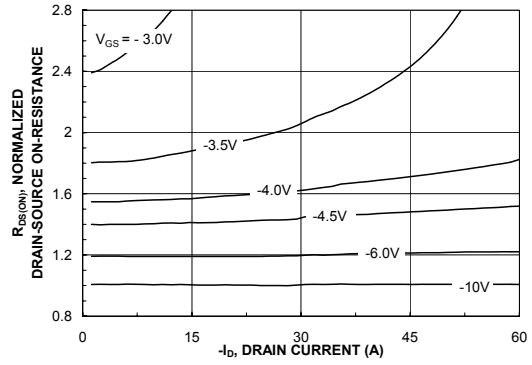


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

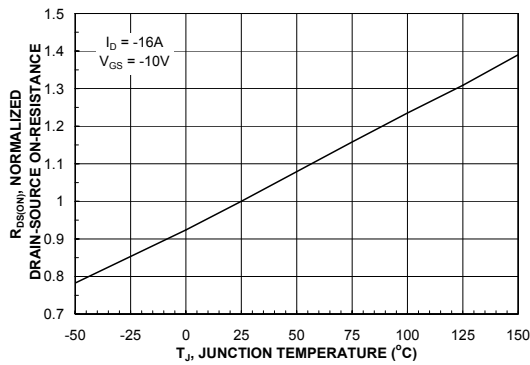


Figure 3. On-Resistance Variation with Temperature.

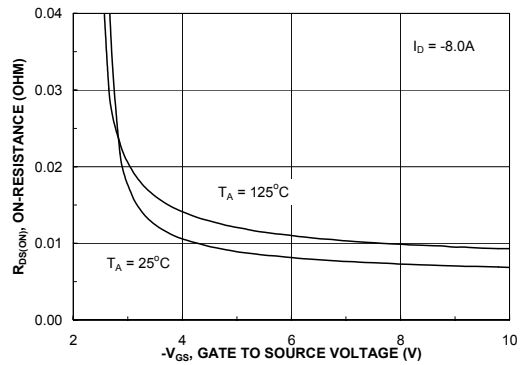


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

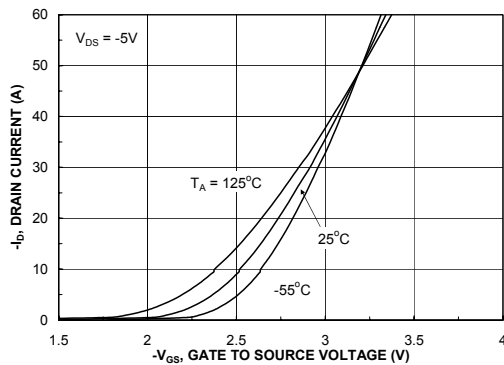


Figure 5. Transfer Characteristics.

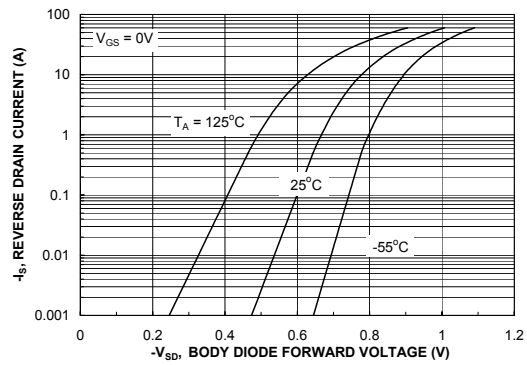


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

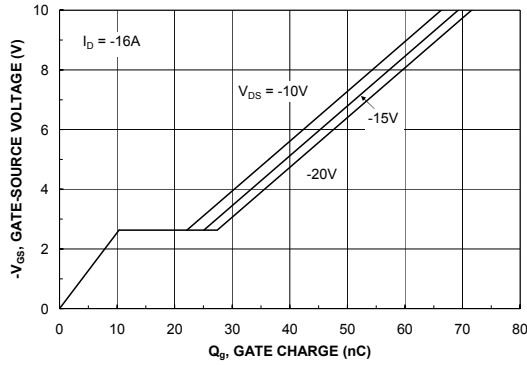


Figure 7. Gate Charge Characteristics.

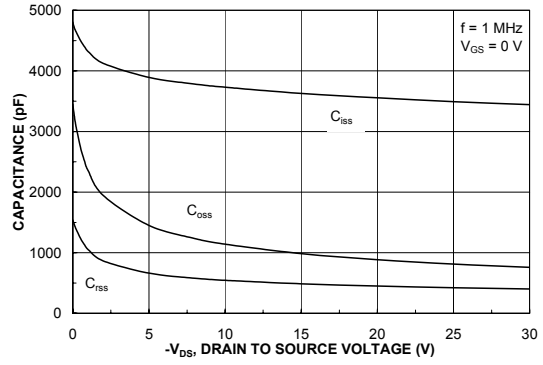


Figure 8. Capacitance Characteristics.

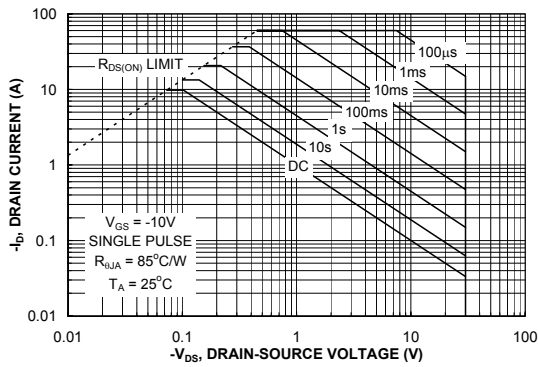


Figure 9. Maximum Safe Operating Area.

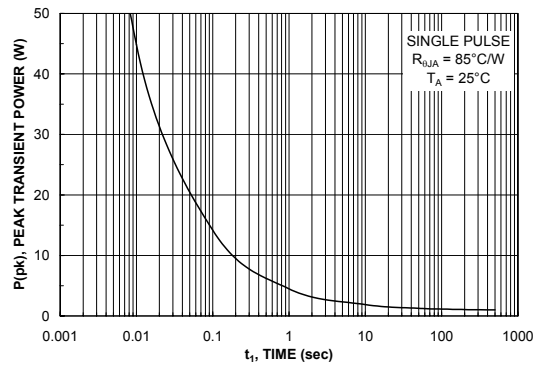


Figure 10. Single Pulse Maximum Power Dissipation.

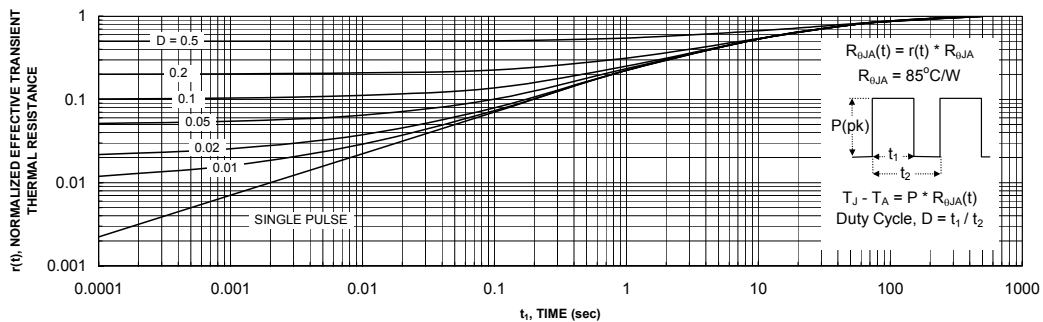
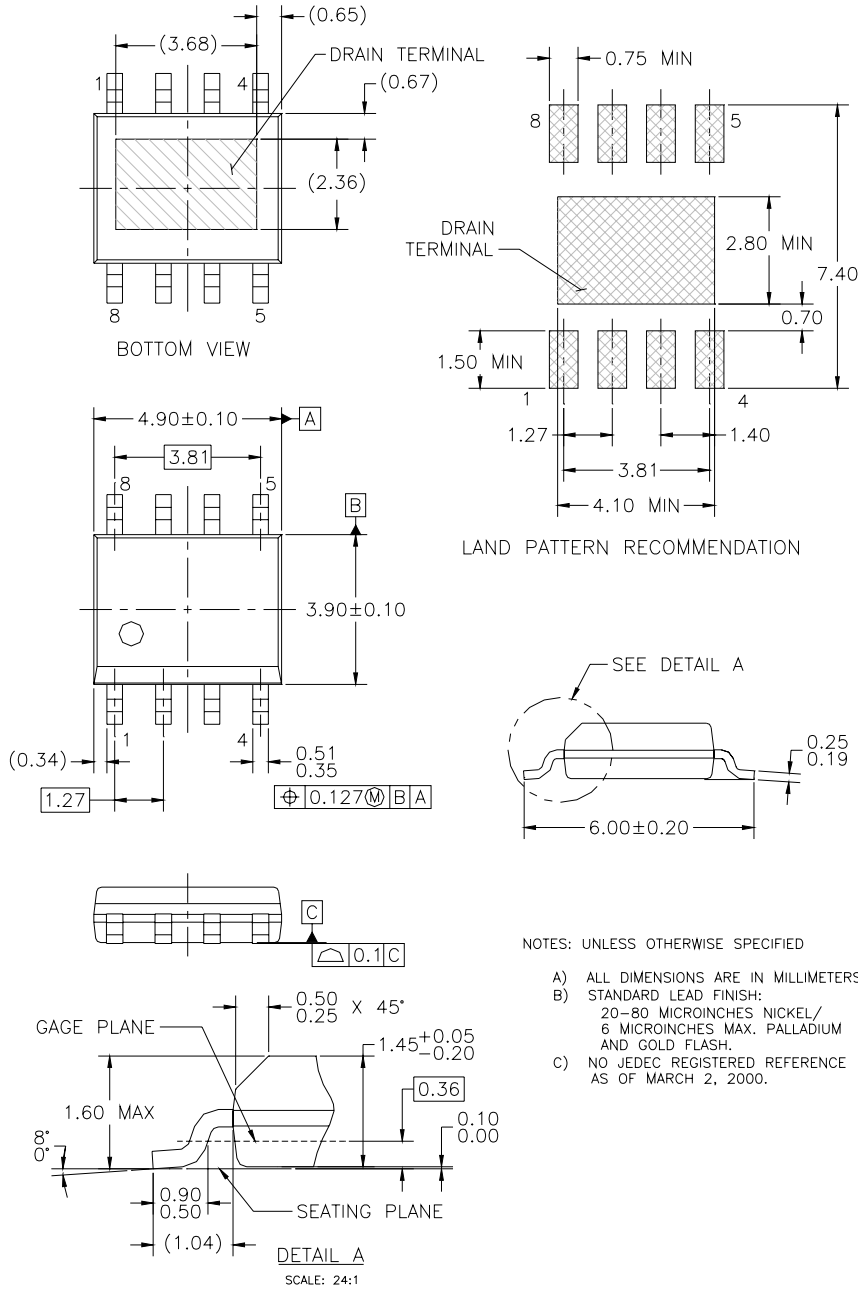


Figure 11. Transient Thermal Response Curve.

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

Dimensional Outline and Pad Layout



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CROSSVOLT™	FRFET™	MicroPak™	QFET®	SuperSOT™-8
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