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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®

October 2013

FDME820NZT

N-Channel PowerTrench® MOSFET

20 V, 9 A, 18 mΩ

Features

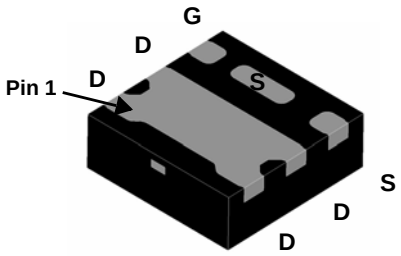
- Max $r_{DS(on)}$ = 18 mΩ at V_{GS} = 4.5 V, I_D = 9 A
- Max $r_{DS(on)}$ = 24 mΩ at V_{GS} = 2.5 V, I_D = 7.5 A
- Max $r_{DS(on)}$ = 32 mΩ at V_{GS} = 1.8 V, I_D = 7 A
- Low profile: 0.55 mm maximum in the new package MicroFET 1.6x1.6 **Thin**
- Free from halogenated compounds and antimony oxides
- HBM ESD protection level >2.5 kV (Note3)
- RoHS Compliant

General Description

This Single N-Channel MOSFET has been designed using Fairchild Semiconductor's advanced Power Trench process to optimize the $r_{DS(ON)}$ @ VGS = 1.8 V on special MicroFET leadframe.

Applications

- Li-Ion Battery Pack
- Baseband Switch
- Load Switch
- DC-DC Conversion



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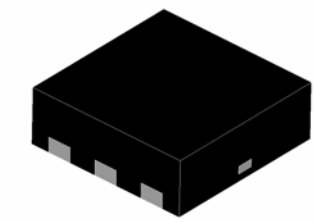

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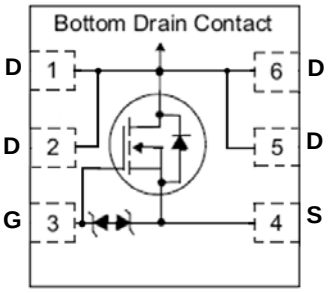


MicroFET 1.6x1.6 Thin

MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			20	V
V_{GS}	Gate to Source Voltage			±12	V
I_D	Drain Current -Continuous	T_A = 25 °C	(Note 1a)	9	A
	-Pulsed			40	
P_D	Power Dissipation for Single Operation	T_A = 25 °C	(Note 1a)	2.1	W
	Power Dissipation for Single Operation	T_A = 25 °C	(Note 1b)	0.7	
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 1a)	70	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1b)	190	

Package Marking and Ordering Information

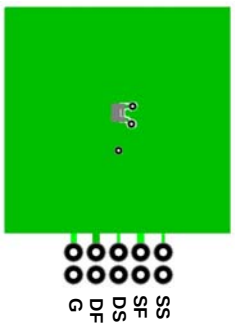
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
8T	FDME820NZT	MicroFET 1.6x1.6 **Thin**	7 ”	8 mm	5000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	20			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} = 16 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±12 V, V_{DS} = 0 V			±10	μA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	0.5	0.8	1.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25 °C		-3		mV/°C
$r_{DS(on)}$	Drain to Source On Resistance	V_{GS} = 4.5 V, I_D = 9 A		14	18	mΩ
		V_{GS} = 2.5 V, I_D = 7.5 A		17	24	
		V_{GS} = 1.8 V, I_D = 7 A		26	32	
		V_{GS} = 4.5 V, I_D = 9 A, T_J = 125 °C		19	24	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz		865		pF
C_{oss}	Output Capacitance			203		pF
C_{rss}	Reverse Transfer Capacitance			190		pF
R_g	Gate Resistance			1.0		Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 10 V, I_D = 4 A, V_{GS} = 4.5 V, R_{GEN} = 2 Ω		9		ns
t_r	Rise Time			5		ns
$t_{d(off)}$	Turn-Off Delay Time			19		ns
t_f	Fall Time			5		ns
Q_g	Total Gate Charge	V_{DD} = 4.2 V, I_D = 3 A, V_{GS} = 4.3 V		8.0		nC
Q_g	Total Gate Charge	V_{DD} = 4.2 V, I_D = 3 A, V_{GS} = 4.5 V		8.5		nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 10 V, I_D = 9 A		1.4		nC
Q_{gd}	Gate to Drain “Miller” Charge			3.2		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 1.6 A (Note 2)		0.7	1.2	V
		V_{GS} = 0 V, I_S = 9 A (Note 2)		0.8	1.2	V
t_{rr}	Reverse Recovery Time	I_F = 9 A, di/dt = 100 A/us		18		ns
Q_{rr}	Reverse Recovery Charge			4		nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a. 70 °C/W when mounted on a 1 in^2 pad of 2 oz copper.

b. 190 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.
3. The diode connected between the gate and source serves only as protection ESD. No gate overvoltage rating is implied.

Typical Characteristics T_J = 25 °C unless otherwise noted

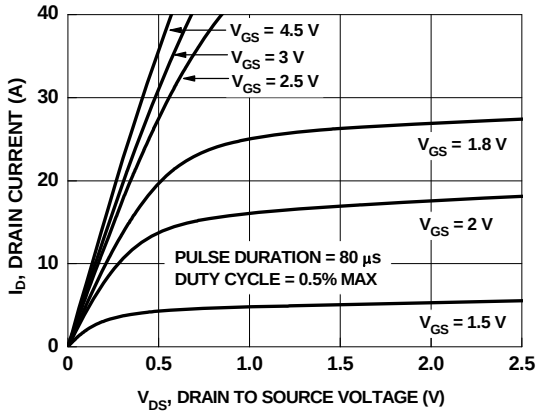


Figure 1. On Region Characteristics

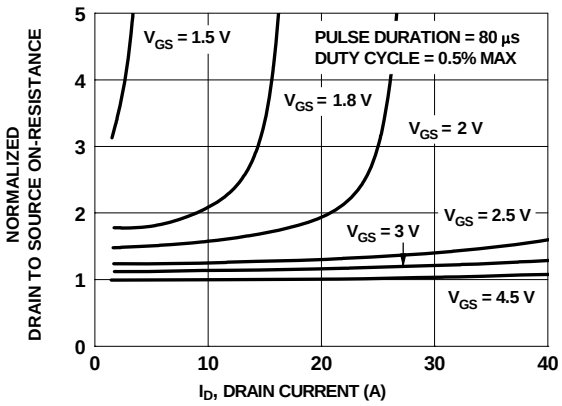


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

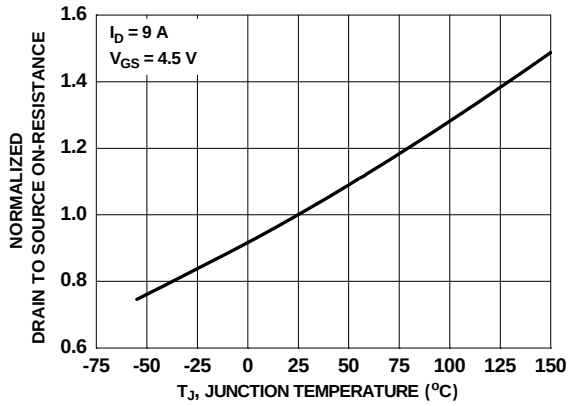


Figure 3. Normalized On Resistance vs Junction Temperature

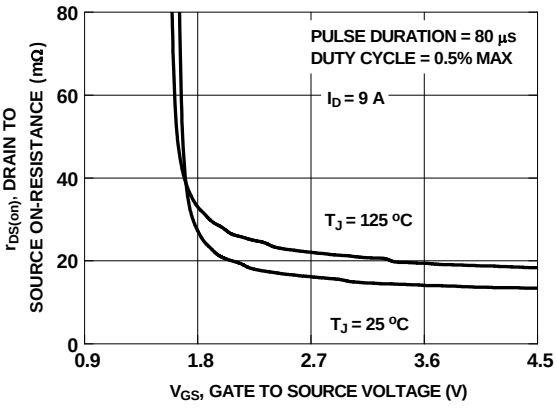


Figure 4. On-Resistance vs Gate to Source Voltage

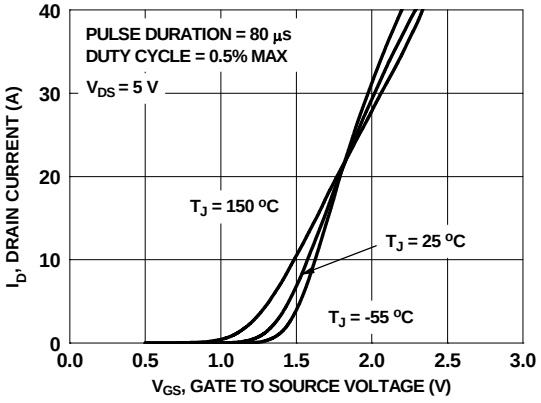


Figure 5. Transfer Characteristics

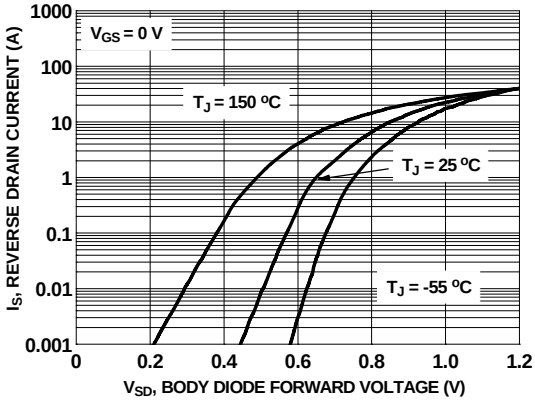


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25 °C unless otherwise noted

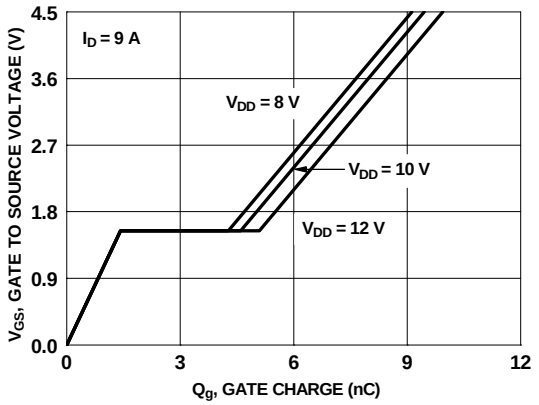


Figure 7. Gate Charge Characteristics

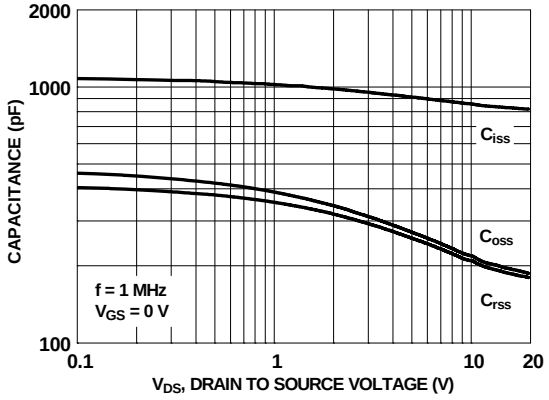


Figure 8. Capacitance vs Drain to Source Voltage

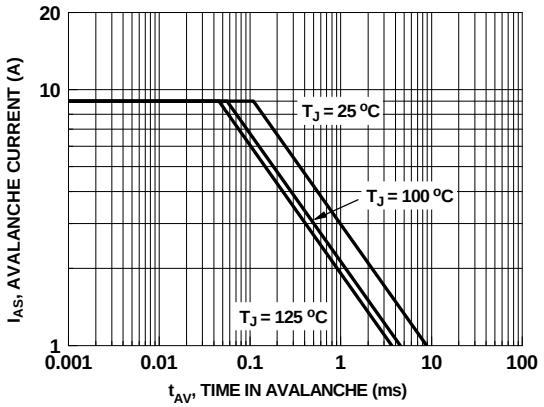


Figure 9. Unclamped Inductive Switching Capability

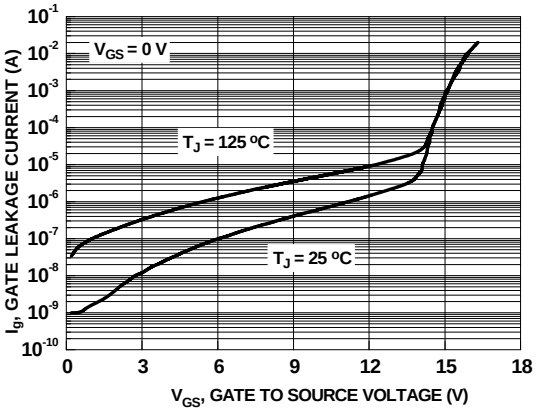


Figure 10. Gate Leakage Current vs Gate to Source Voltage

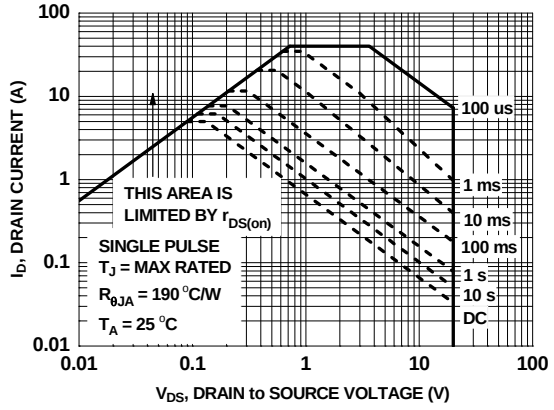


Figure 11. Forward Bias Safe Operating Area

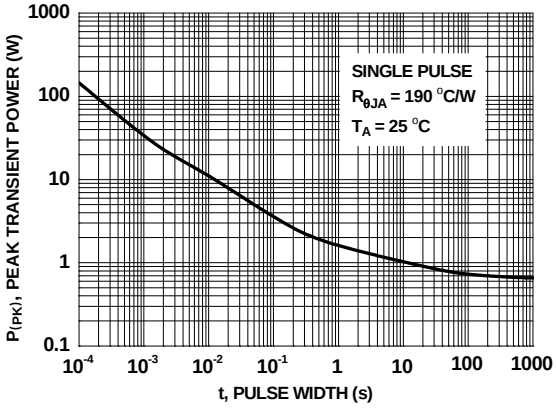


Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25 °C unless otherwise noted

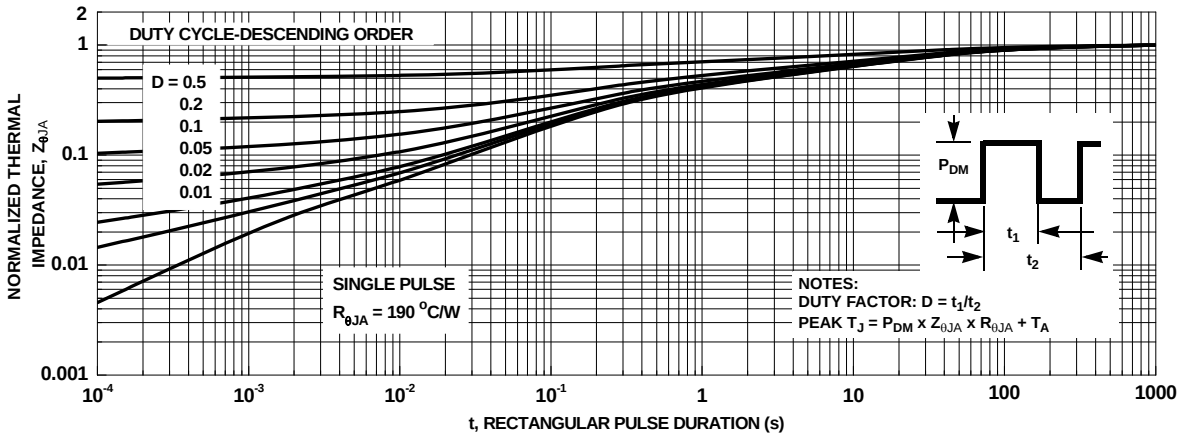
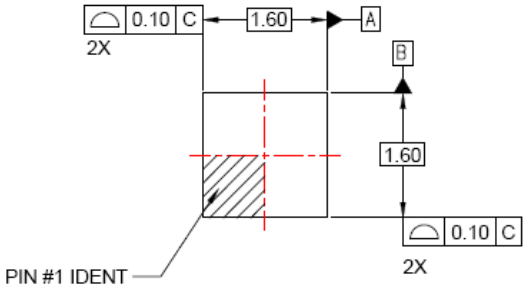
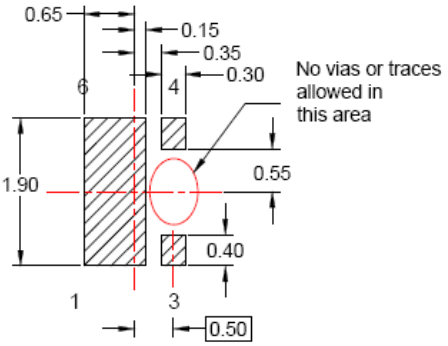


Figure 13. Junction-to-Ambient Transient Thermal Response Curve

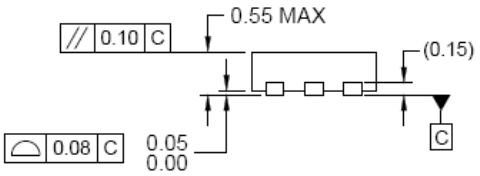
Dimensional Outline and Pad Layout



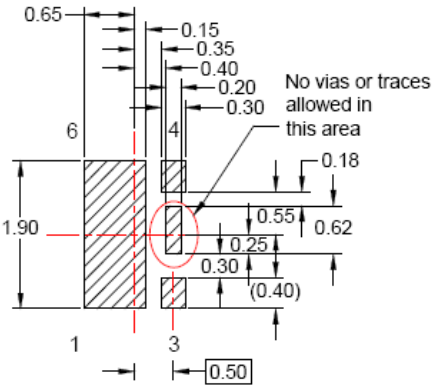
TOP VIEW



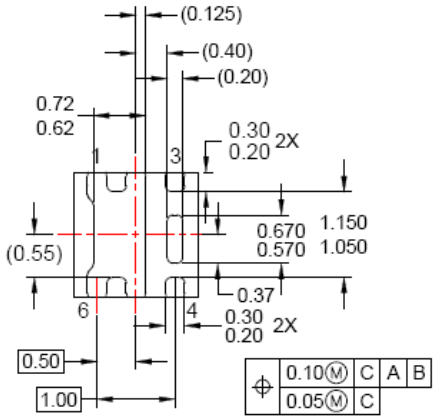
RECOMMENDED LAND PATTERN OPT 1



SIDE VIEW



RECOMMENDED LAND PATTERN OPT 2



NOTES:

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B. DIMENSIONS ARE IN MILLIMETERS.

C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.

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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. I66

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