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FAIRCHILD SEMICONDUCTOR®

April 2007

FDG8850NZ

Dual N-Channel PowerTrench® MOSFET

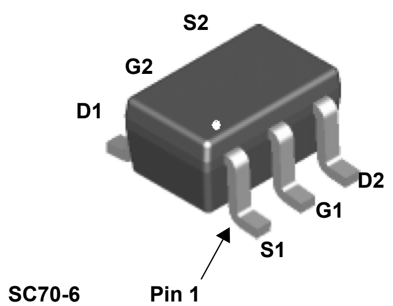
30V,0.75A,0.4Ω

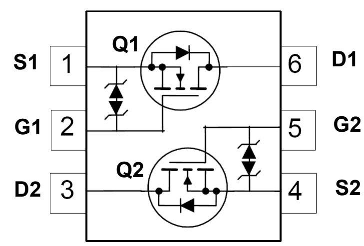
Features

- Max $r_{DS(on)}$ = 0.4Ω at V_{GS} = 4.5V, I_D = 0.75A
- Max $r_{DS(on)}$ = 0.5Ω at V_{GS} = 2.7V, I_D = 0.67A
- Very low level gate drive requirements allowing operation in 3V circuits($V_{GS(th)}$ <1.5V)
- Very small package outline SC70-6
- RoHS Compliant

General Description

This dual N-Channel logic level enhancement mode field effect transistors are produced using Fairchild's proprietary, high cell density, DMOS technology. This very high density process is especially tailored to minimize on-state resistance. This device has been designed especially for low voltage applications as a replacement for bipolar digital transistors and small signal MOSFETs. Since bias resistors are not required, this dual digital FET can replace several different digital transistors, with different bias resistor values.





MOSFET Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DS}	Drain to Source Voltage		30	V
V_{GS}	Gate to Source Voltage		±12	V
I_D	Drain Current -Continuous		0.75	A
	-Pulsed		2.2	
P_D	Power Dissipation for Single Operation	(Note 1a)	0.36	W
		(Note 1b)	0.30	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		–55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient Single operation	(Note 1a)	350	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient Single operation	(Note 1b)	415	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
.50	FDG8850NZ	7"	8mm	3000 units

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Electrical Characteristics T_J = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		25		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24V, V_{GS} = 0V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±12V, V_{DS}= 0V			±10	μA

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	0.65	1.0	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250μA, referenced to 25°C		–3.0		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 4.5V, I_D = 0.75A V_{GS} = 2.7V, I_D = 0.67A V_{GS} = 4.5V, I_D = 0.75A ,T_J = 125°C		0.25 0.29 0.36	0.4 0.5 0.6	Ω
g_{FS}	Forward Transconductance	V_{DS} = 5V, I_D = 0.75A		3		S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 10V, V_{GS} = 0V, f= 1MHZ		90	120	pF
C_{oss}	Output Capacitance			20	30	pF
C_{rss}	Reverse Transfer Capacitance			15	25	pF

Switching Characteristics (note 2)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 5V, I_D = 0.5A, V_{GS} = 4.5V,R_{GEN} = 6Ω		4	10	ns
t_r	Rise Time			1	10	ns
$t_{d(off)}$	Turn-Off Delay Time			9	18	ns
t_f	Fall Time			1	10	ns
Q_g	Total Gate Charge	V_{GS} =4.5V, V_{DD} = 5V, I_D = 0.75A		1.03	1.44	nC
Q_{gs}	Gate to Source Charge			0.29		nC
Q_{gd}	Gate to Drain “Miller” Charge			0.17		nC

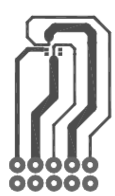
Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
I_S	Maximum Continuous Drain-Source Diode Forward Current				0.3	A
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = 0.3A (Note 2)		0.76	1.2	V

Notes:

1. $R_{\theta JA}$ 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 $R_{\theta JA}$ is determined by the user's board design.

a. 350°C/W when mounted on a 1 in^2 pad of 2 oz copper .



b. 415°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%.

Typical Characteristics T_J = 25°C unless otherwise noted

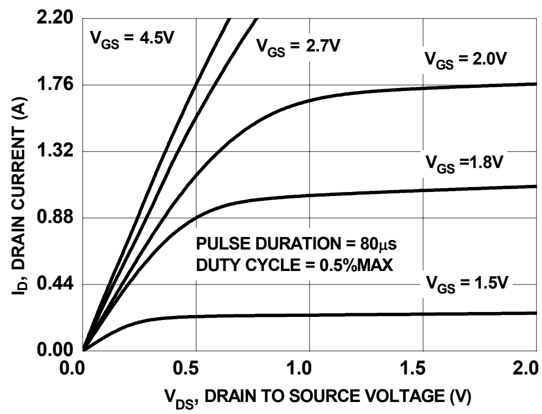


Figure 1. On-Region Characteristics

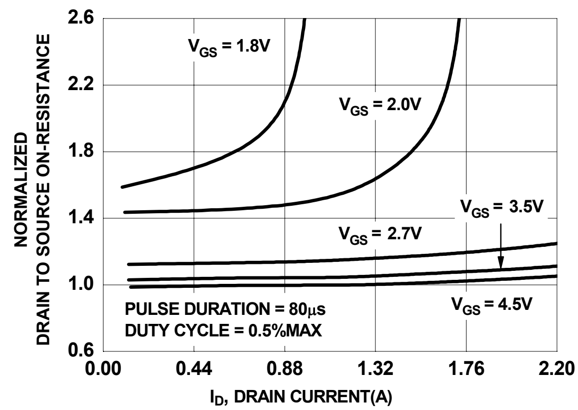


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

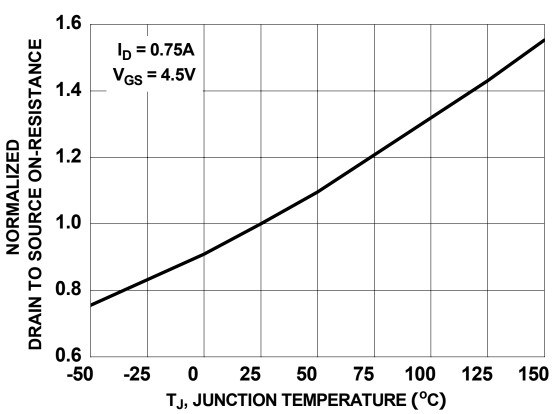


Figure 3. Normalized On-Resistance vs Junction Temperature

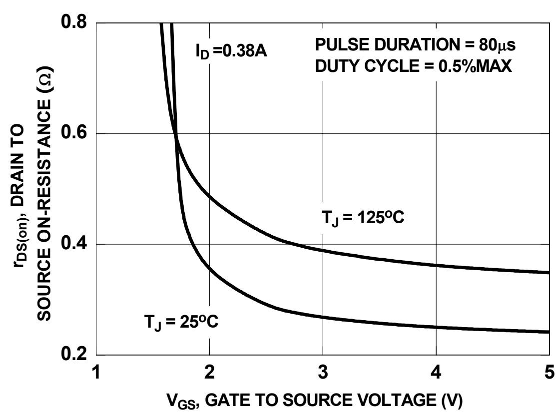


Figure 4. On-Resistance vs Gate to Source Voltage

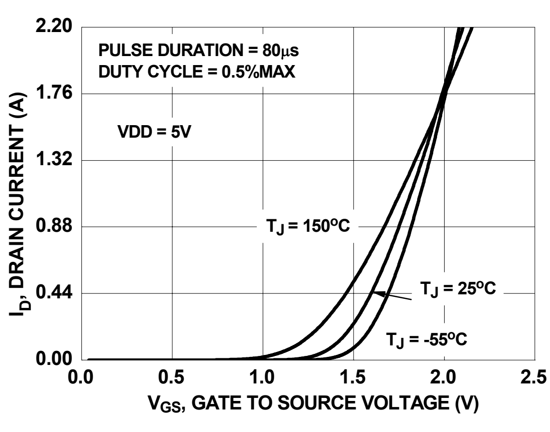


Figure 5. Transfer Characteristics

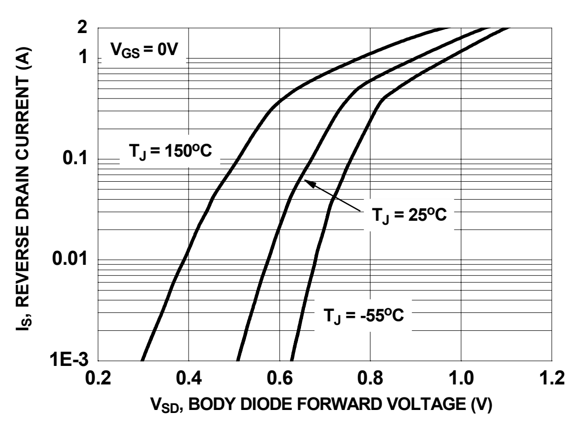


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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Typical Characteristics T_J = 25°C unless otherwise noted

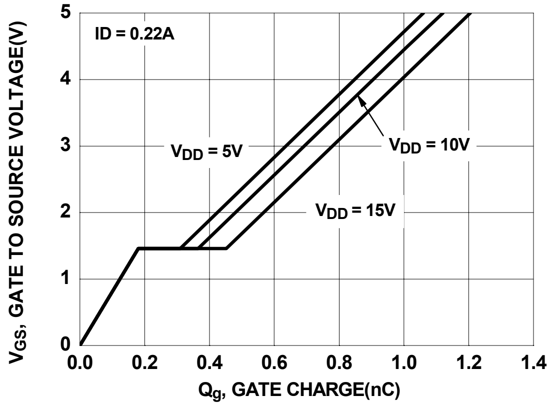

Figure 7. Gate Charge Characteristics

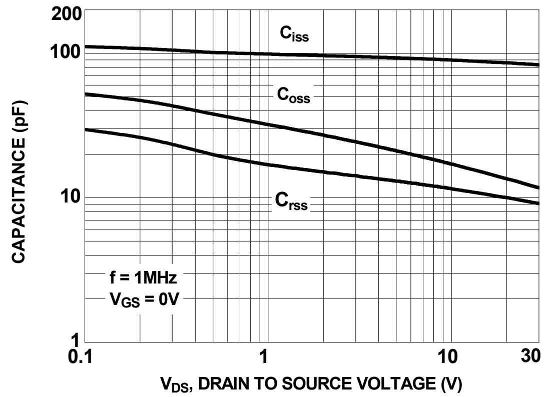

Figure 8. Capacitance vs Drain to Source Voltage

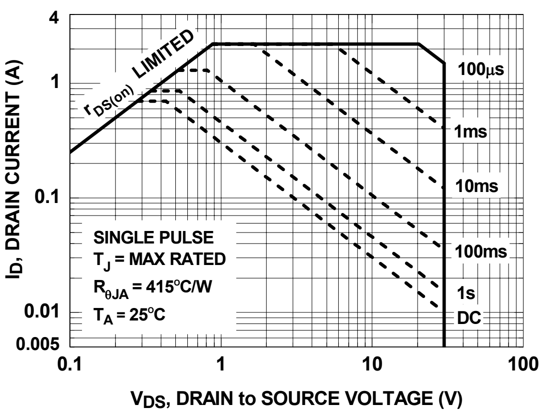

Figure 9. Forward Bias Safe Operating Area

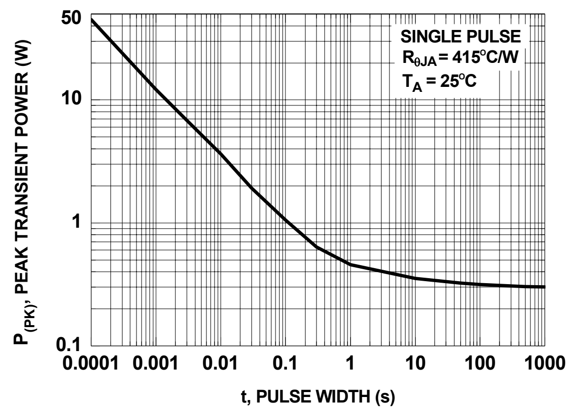

Figure 10. Single Pulse Maximum Power Dissipation

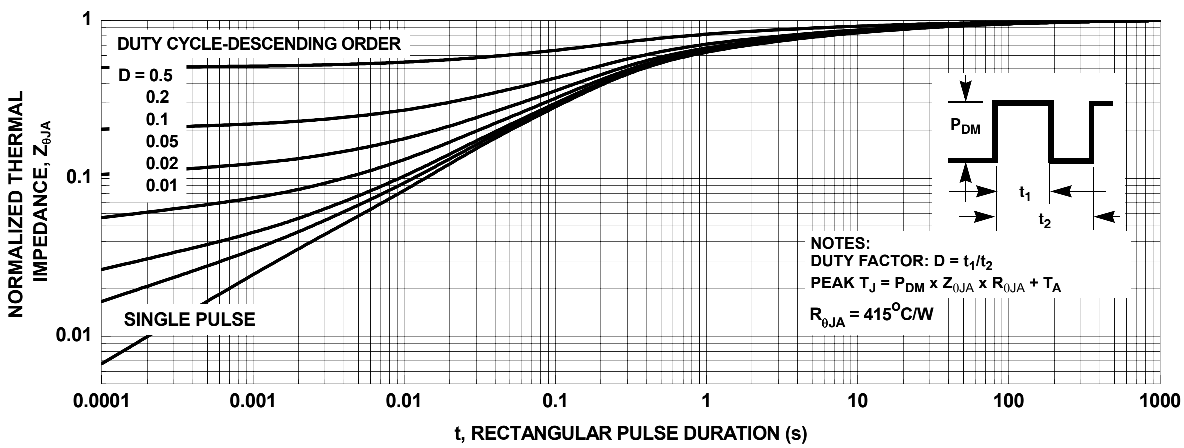

Figure 11. Transient Thermal Response Curve

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