FAIRCHILD SEMICONDUCTOR®

July 2007

FDG332PZ

P-Channel PowerTrench® MOSFET

-20V, -2.6A, 97mΩ

Features

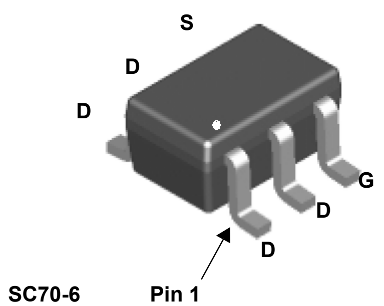
- Max $r_{DS(on)}$ = 95mΩ at V_{GS} = -4.5V, I_D = -2.6A
- Max $r_{DS(on)}$ = 115mΩ at V_{GS} = -2.5V, I_D = -2.2A
- Max $r_{DS(on)}$ = 160mΩ at V_{GS} = -1.8V, I_D = -1.9A
- Max $r_{DS(on)}$ = 330mΩ at V_{GS} = -1.5V, I_D = -1.0A
- Very low level gate drive requirements allowing operation in 1.5V circuits
- Very small package outline SC70-6
- RoHS Compliant

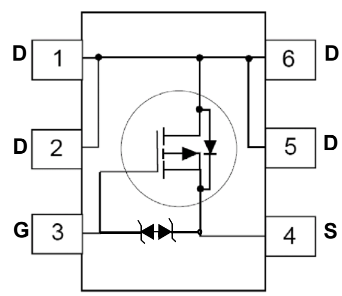
General Description

This P-Channel MOSFET uses Fairchild's advanced low voltage PowerTrench® process. It has been optimized for battery power management applications.

Applications

- Battery management
- Load switch





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		±8	V
I_D	Drain Current -Continuous		-2.6	A
	-Pulsed		-9	
P_D	Power Dissipation	(Note 1a)	0.75	W
	Power Dissipation	(Note 1b)	0.48	
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)	170	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient Single operation	(Note 1b)	260	

Package Marking and Ordering Information

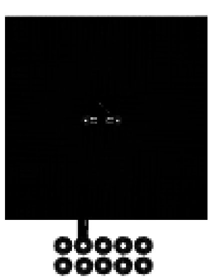
Device Marking	Device	Package	Reel Size	Tape Width	Quantity
.32	FDG332PZ	SC70-6	7"	8 mm	3000 units

Electrical Characteristics T_J = 25°C unless otherwise noted

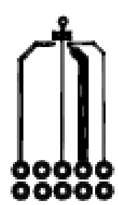
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = -250μA, V_{GS} = 0V	-20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = -250μA, referenced to 25°C		-13		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -16V, V_{GS} = 0V			-1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±8V, V_{DS}= 0V			±10	μA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = -250μA	-0.4	-0.7	-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		2.5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = -4.5V, I_D = -2.6A		73	95	mΩ
		V_{GS} = -2.5V, I_D = -2.2A		90	115	
		V_{GS} = -1.8V, I_D = -1.9A		117	160	
		V_{GS} = -1.5V, I_D = -1.0A		147	330	
		V_{GS} = -4.5V, I_D = -2.6A , T_J = 125°C		100	133	
g_{FS}	Forward Transconductance	V_{DD} = -5V, I_D = -2.6A		9		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -10V, V_{GS} = 0V, f = 1MHZ		420	560	pF
C_{oss}	Output Capacitance			85	115	pF
C_{rss}	Reverse Transfer Capacitance			75	115	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = -10V, I_D = -2.6A, V_{GS} = -4.5V, R_{GEN} = 6Ω		5.2	10	ns
t_r	Rise Time			4.8	10	ns
$t_{d(off)}$	Turn-Off Delay Time			59	95	ns
t_f	Fall Time			28	45	ns
Q_g	Total Gate Charge	V_{GS} = -4.5V, V_{DD} = -10V, I_D = -2.6A		7.6	10.8	nC
Q_{gs}	Gate to Source Charge			0.9		nC
Q_{gd}	Gate to Drain "Miller" Charge			1.9		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current				-0.6	A
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0V, I_S = -0.6A (Note 2)		-0.7	-1.2	V
t_{rr}	Reverse Recovery Time	I_F = 2.6A, di/dt = 100A/μs		28	45	ns
Q_{rr}	Reverse Recovery Charge			8	13	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1in^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. 170°C/W when mounted on a 1 in^2 pad of 2 oz copper .



b. 260°C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300μs, Duty cycle < 2.0%.

Typical Characteristics T_J = 25°C unless otherwise noted

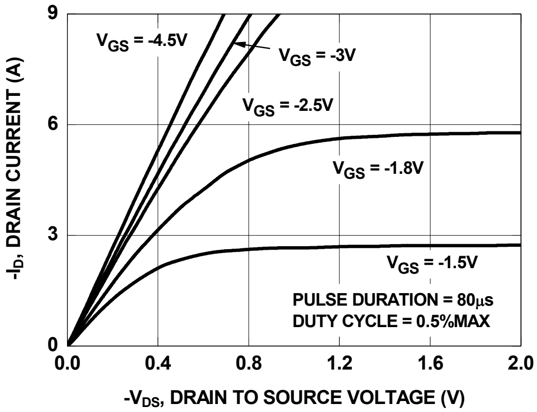


Figure 1. On-Region Characteristics

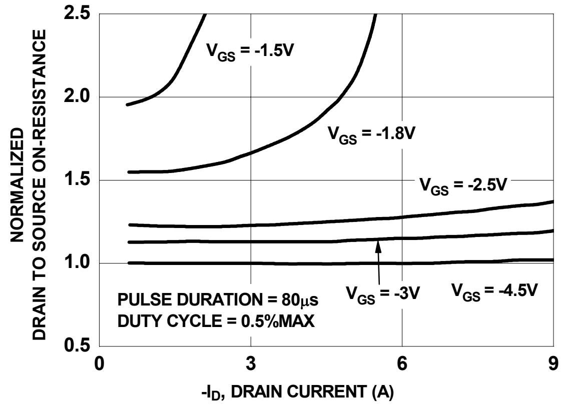


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

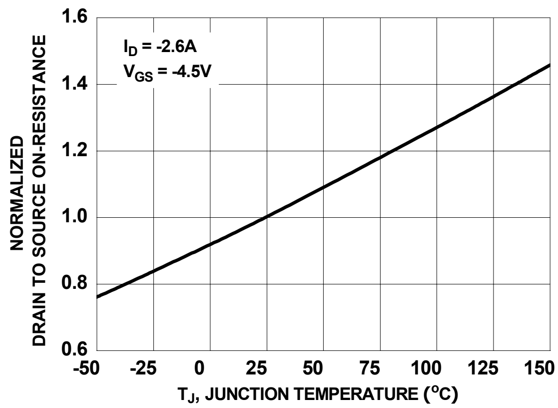


Figure 3. Normalized On-Resistance vs Junction Temperature

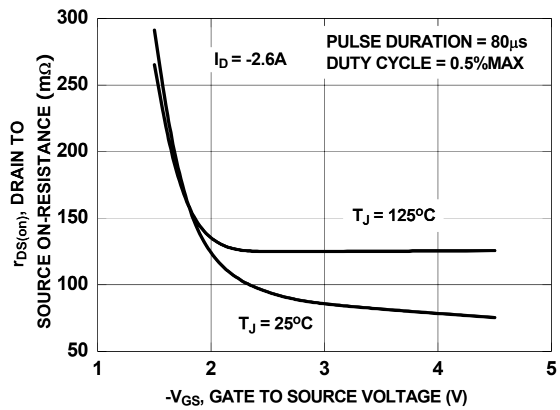


Figure 4. On-Resistance vs Gate to Source Voltage

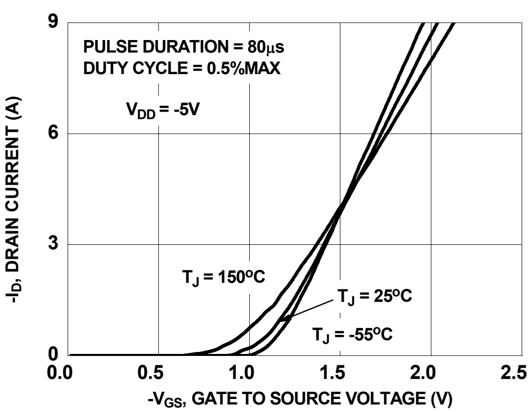


Figure 5. Transfer Characteristics

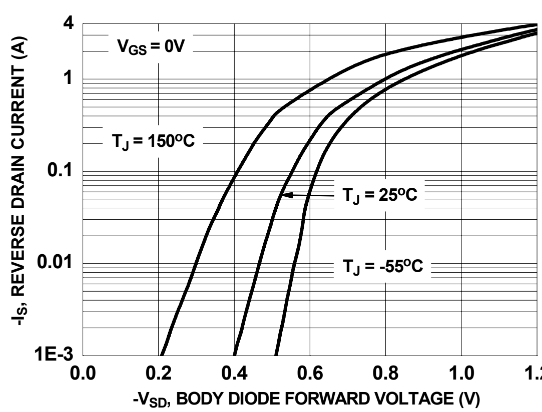


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics T_J = 25°C unless otherwise noted

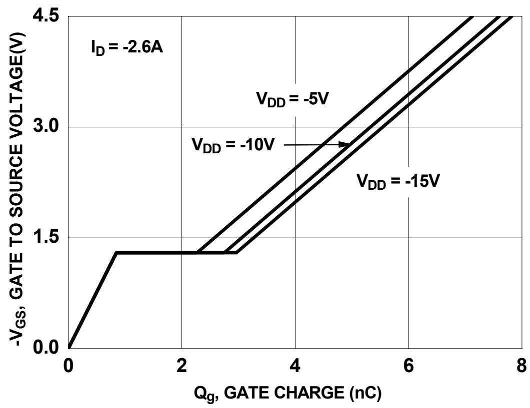


Figure 7. Gate Charge Characteristics

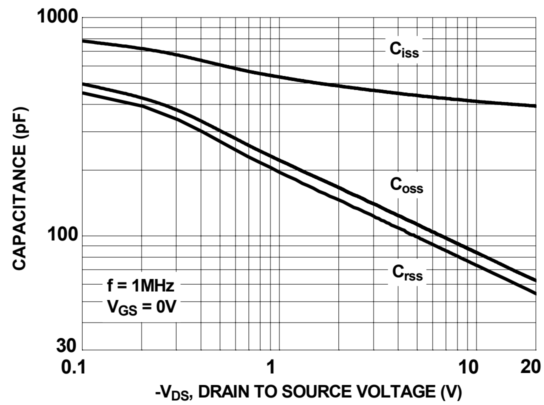


Figure 8. Capacitance vs Drain to Source Voltage

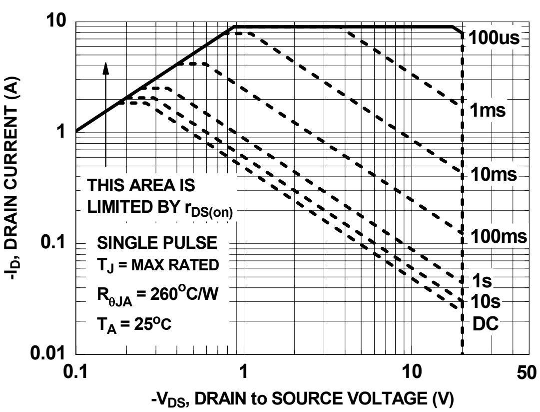


Figure 9. Forward Bias Safe Operating Area

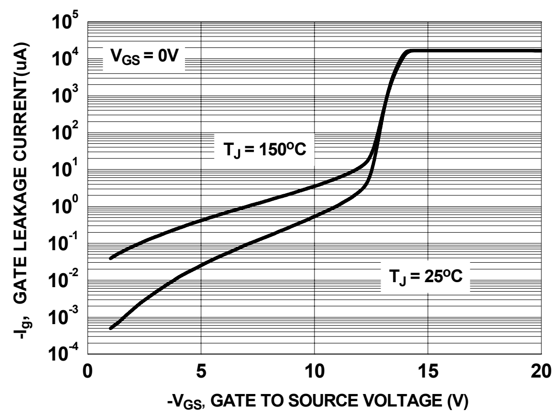


Figure 10. Gate Leakage Current vs Gate to Source Voltage

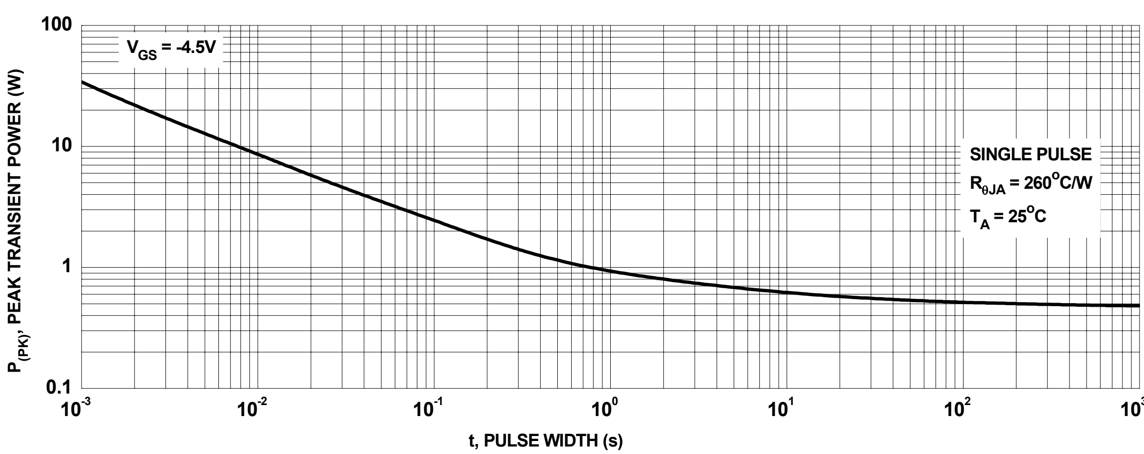


Figure 11. Transient Thermal Response Curve

Typical Characteristics T_J = 25°C unless otherwise noted

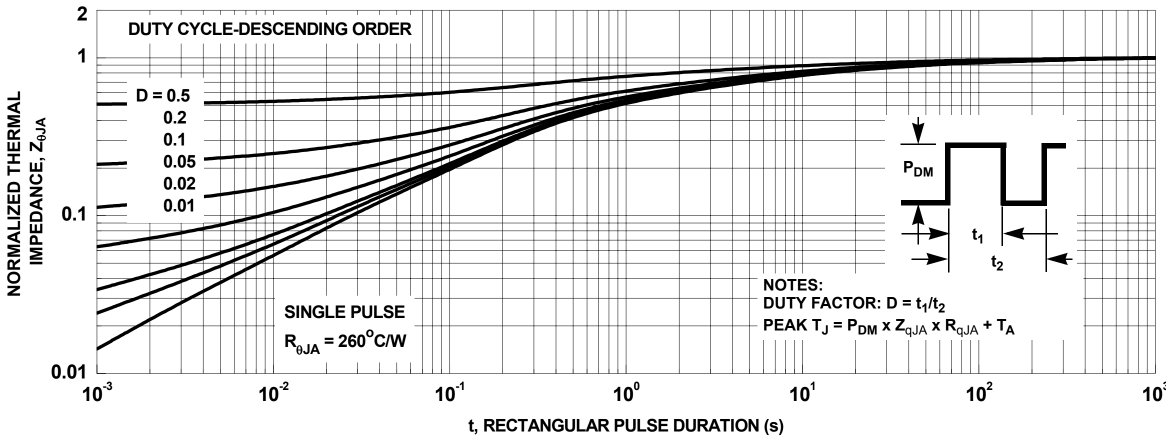


Figure 12. Transient Thermal Response Curve

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