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FDS6675BZ

P-Channel PowerTrench® MOSFET

-30V, -11A, 13mΩ

General Description

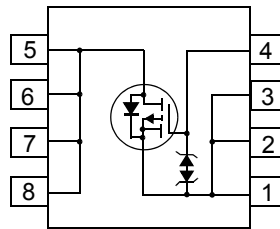
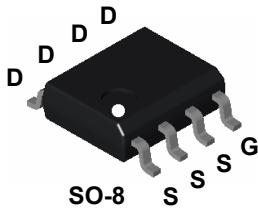
This P-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance.

This device is well suited for Power Management and load switching applications common in Notebook Computers and Portable Battery Packs.



Features

- Max $r_{DS(on)}$ = 13mΩ at $V_{GS} = -10V$, $I_D = -11A$
- Max $r_{DS(on)}$ = 21.8mΩ at $V_{GS} = -4.5V$, $I_D = -9A$
- Extended V_{GS} range (-25V) for battery applications
- HBM ESD protection level of 5.4 KV typical (note 3)
- High performance trench technology for extremely low $r_{DS(on)}$
- High power and current handling capability
- RoHS Compliant



MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	-30	V
V_{GS}	Gate to Source Voltage	±25	V
I_D	Drain Current -Continuous (Note 1a)	-11	A
	-Pulsed	-55	
P_D	Power Dissipation for Single Operation (Note 1a)	2.5	W
	(Note 1b)	1.2	
	(Note 1c)	1.0	
T_J, T_{STG}	Operating and Storage Temperature	-55 to 150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	50	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case (Note 1)	25	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
FDS6675BZ	FDS6675BZ	13"	12mm	2500 units

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
B_{VDSS}	Drain to Source Breakdown Voltage	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-30			V
$\frac{\Delta B_{VDSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250\mu\text{A}$, referenced to 25°C		-20		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -24\text{V}, V_{GS} = 0\text{V}$			-1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 25\text{V}, V_{DS} = 0\text{V}$			± 10	μA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-1	-2	-3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = -250\mu\text{A}$, referenced to 25°C		15.7		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -10\text{V}, I_D = -11\text{A}$		10.8	13.0	m Ω
		$V_{GS} = -4.5\text{V}, I_D = -9\text{A}$		17.4	21.8	
		$V_{GS} = -10\text{V}, I_D = -11\text{A}$ $T_J = 125^\circ\text{C}$		15.0	18.8	
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{V}, I_D = -11\text{A}$		34		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -15\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$		1855	2470	pF
C_{oss}	Output Capacitance			335	450	pF
C_{rss}	Reverse Transfer Capacitance			330	500	pF

Switching Characteristics (Note 2)

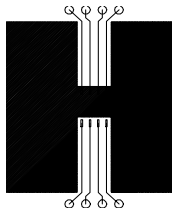
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -15\text{V}, I_D = -11\text{A}$ $V_{GS} = -10\text{V}, R_{GS} = 6\Omega$		3.0	10	ns
t_r	Rise Time			7.8	16	ns
$t_{d(off)}$	Turn-Off Delay Time			120	200	ns
t_f	Fall Time			60	100	ns
Q_g	Total Gate Charge	$V_{DS} = -15\text{V}, V_{GS} = -10\text{V}, I_D = -11\text{A}$		44	62	nC
Q_g	Total Gate Charge	$V_{DS} = -15\text{V}, V_{GS} = -5\text{V}, I_D = -11\text{A}$		25	35	nC
Q_{gs}	Gate to Source Gate Charge			7.2		nC
Q_{gd}	Gate to Drain Charge			11.4		nC

Drain-Source Diode Characteristics

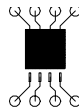
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -2.1\text{A}$		-0.7	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F = -11\text{A}, di/dt = 100\text{A}/\mu\text{s}$			42	ns
Q_{rr}	Reverse Recovery Charge	$I_F = -11\text{A}, di/dt = 100\text{A}/\mu\text{s}$			30	nC

Notes:

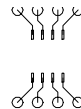
1: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) $50^\circ\text{C}/\text{W}$ when mounted on a 1 in^2 pad of 2 oz copper



b) $105^\circ\text{C}/\text{W}$ when mounted on a $.04\text{ in}^2$ pad of 2 oz copper



c) $125^\circ\text{C}/\text{W}$ when mounted on a minimum pad

Scale 1 : 1 on letter size paper

2: Pulse Test: Pulse Width <300 us, 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 $T_J = 25^\circ\text{C}$ unless otherwise noted

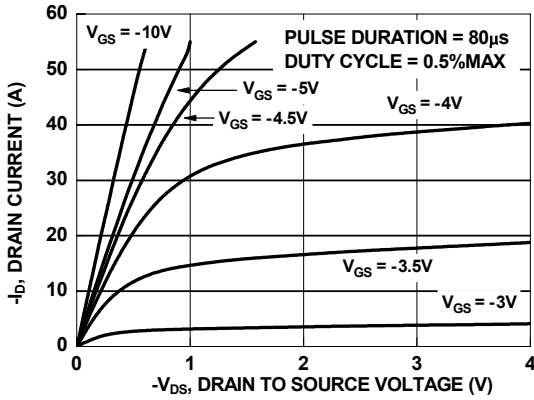


Figure 1. On Region Characteristics

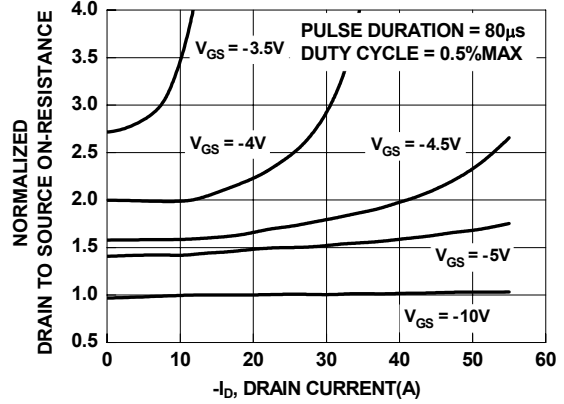


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

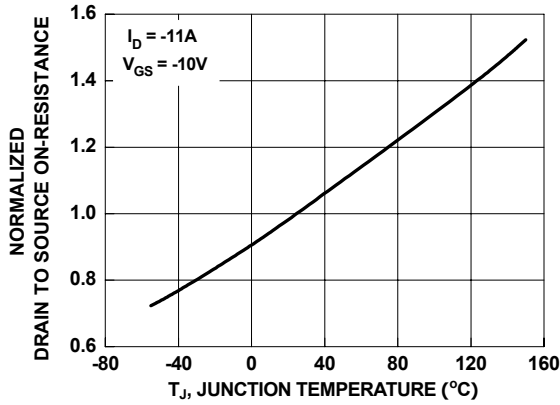


Figure 3. Normalized On Resistance vs Junction Temperature

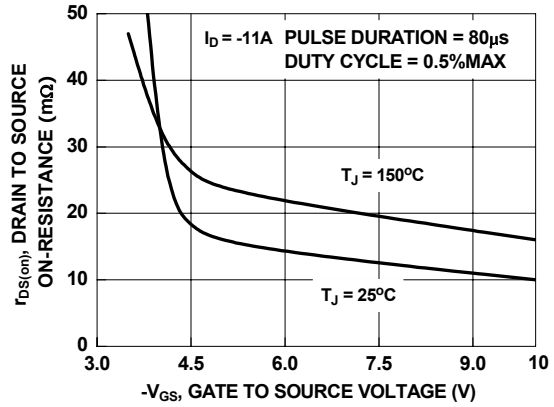


Figure 4. On-Resistance vs Gate to Source Voltage

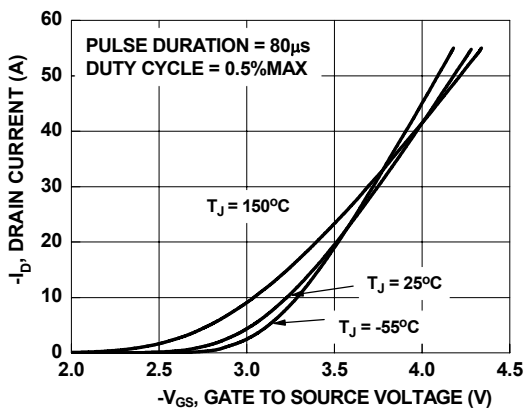


Figure 5. Transfer Characteristics

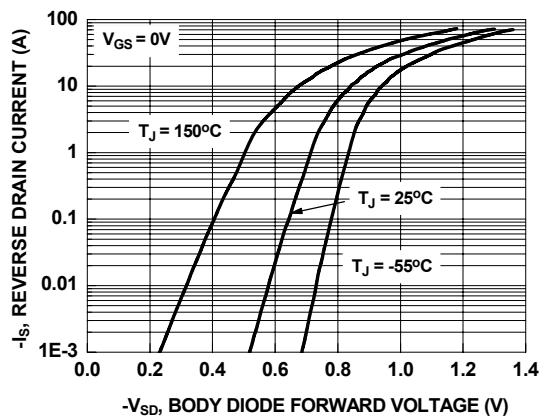


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

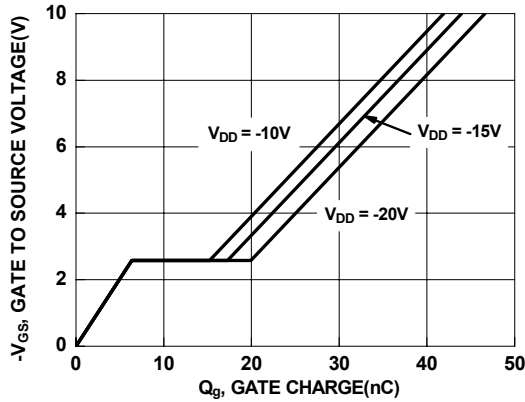


Figure 7. Gate Charge Characteristics

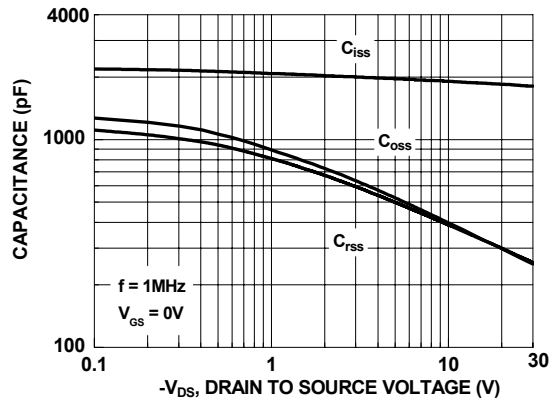


Figure 8. Capacitance vs Drain to Source Voltage

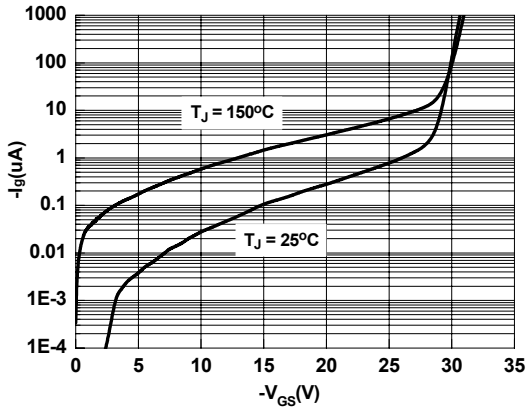


Figure 9. I_g vs V_{GS}

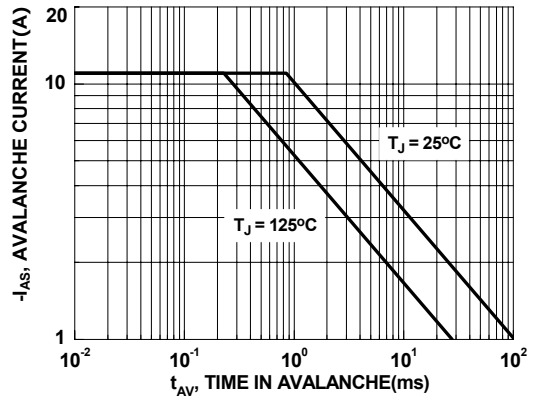


Figure 10. Unclamped Inductive Switching Capability

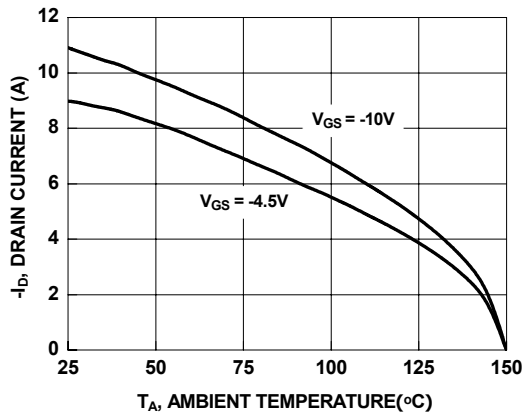


Figure 11. Maximum Continuous Drain Current vs Ambient Temperature

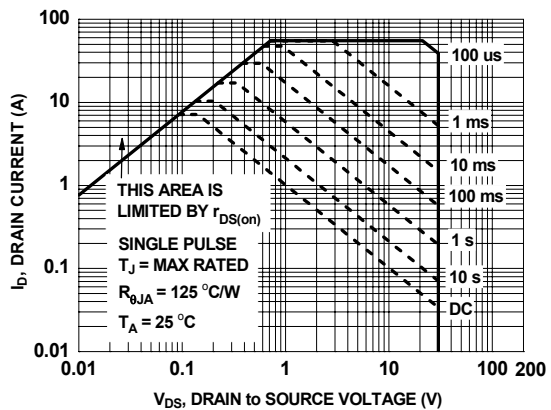


Figure 12. Forward Bias Safe Operating Area

Typical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

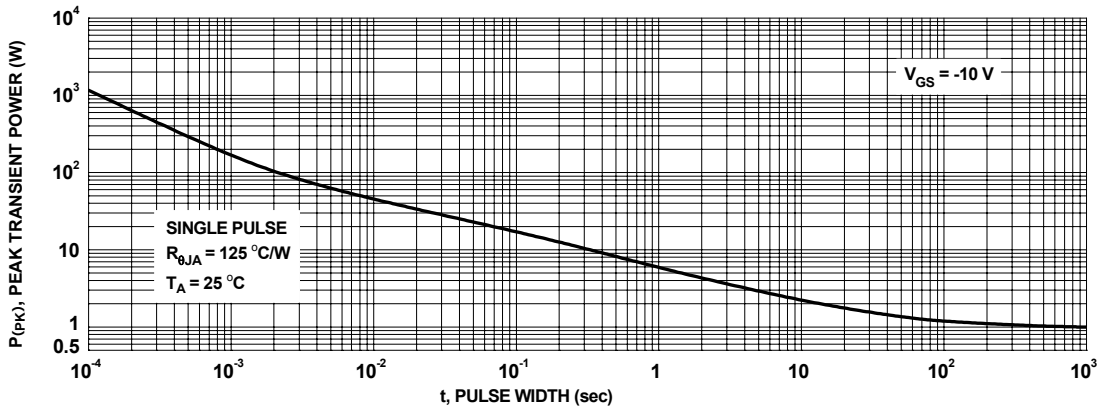


Figure 13. Single Pulse Maximum Power Dissipation

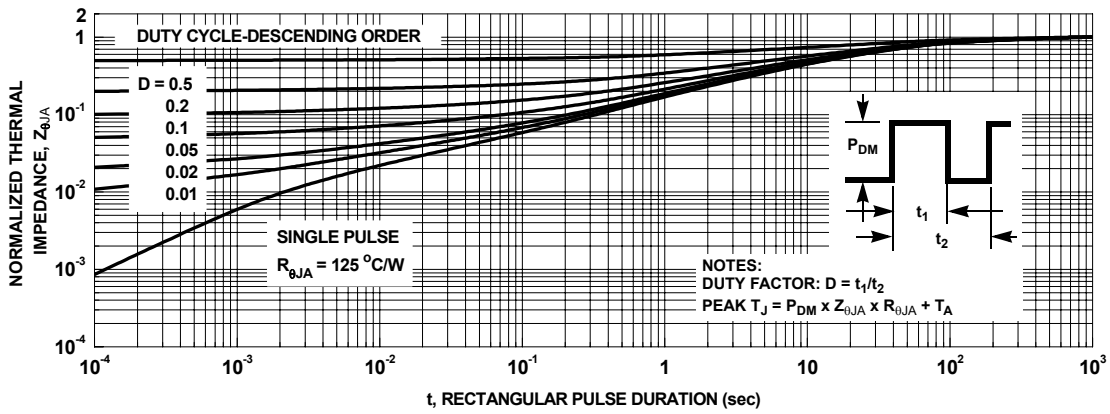







Figure 14. Junction-to-Ambient Transient Thermal Response Curve



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