

FDS6673BZ

P-Channel PowerTrench® MOSFET

-30V, -14.5A, 7.8mΩ

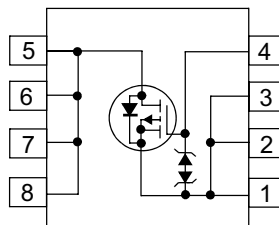
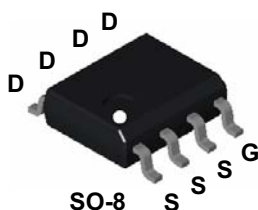
General Description

This P-Channel MOSFET is produced using Fairchild Semiconductor's advanced Power Trench 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 $r_{DS(on)}$ = 7.8mΩ, $V_{GS} = -10V$, $I_D = -14.5A$
- Max $r_{DS(on)}$ = 12mΩ, $V_{GS} = -4.5V$, $I_D = -12A$
- Extended V_{GS} range (-25V) for battery applications
- HBM ESD protection level of 6.5kV 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 (Note1a)	-14.5	A
	-Pulsed	-75	A
P_D	Power Dissipation for Single Operation (Note1a)	2.5	W
	(Note1b)	1.2	
	(Note1c)	1.0	
T_J, T_{STG}	Operating and Storage Temperature	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

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

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
FDS6673BZ	FDS6673BZ	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	-1.9	-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		8.1		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -10\text{V}$, $I_D = -14.5\text{A}$		6.5	7.8	m Ω
		$V_{GS} = -4.5\text{V}$, $I_D = -12\text{A}$		9.6	12	
		$V_{GS} = -10\text{V}$, $I_D = -14.5\text{A}$, $T_J = 125^\circ\text{C}$		9.7	12	
g_{FS}	Forward Transconductance	$V_{DS} = -5\text{V}$, $I_D = -14.5\text{A}$		60		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = -15\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$		3500	4700	pF
C_{oss}	Output Capacitance			600	800	pF
C_{rss}	Reverse Transfer Capacitance			600	900	pF

Switching Characteristics (Note 2)

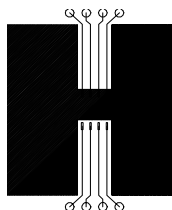
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -15\text{V}$, $I_D = -1\text{A}$ $V_{GS} = -10\text{V}$, $R_{GS} = 6\Omega$		14	26	ns
t_r	Rise Time			16	29	ns
$t_{d(off)}$	Turn-Off Delay Time			225	36	ns
t_f	Fall Time			105	167	ns
Q_g	Total Gate Charge	$V_{DS} = -15\text{V}$, $V_{GS} = -10\text{V}$, $I_D = -14.5\text{A}$		88	124	nC
Q_g	Total Gate Charge	$V_{DS} = -15\text{V}$, $V_{GS} = -5\text{V}$, $I_D = -14.5\text{A}$		46	65	nC
Q_{gs}	Gate to Source Gate Charge			8		nC
Q_{gd}	Gate to Drain Charge			23.5		nC

Drain-Source Diode Characteristics

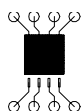
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}$, $I_S = -2.1\text{A}$		-0.7	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 14.5\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$			45	ns
Q_{rr}	Reverse Recovery Charge	$I_F = 14.5\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$			34	nC

Notes:

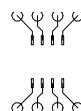
1: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 50 $^\circ\text{C}/\text{W}$ (10 sec)
when mounted on a 1 in²
pad of 2 oz copper



b) 105 $^\circ\text{C}/\text{W}$ when mounted
on a .04 in² 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 μs , 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

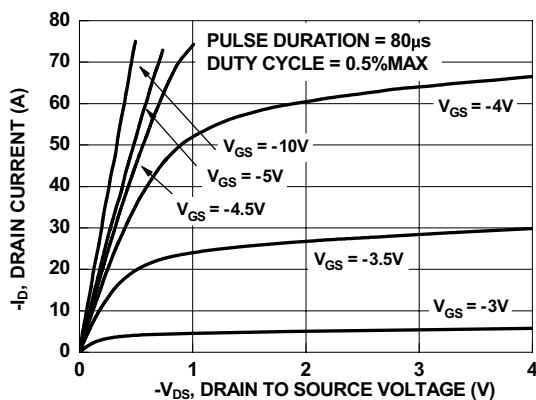


Figure 1. On Region Characteristics

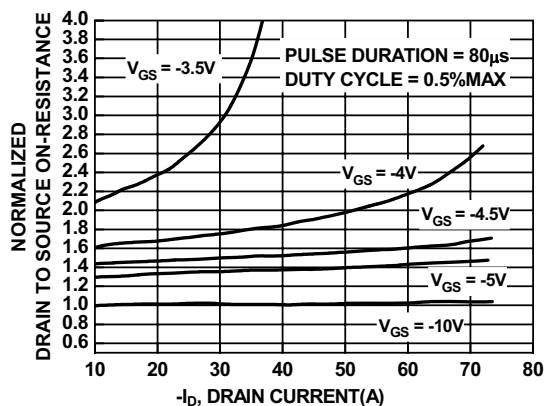


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

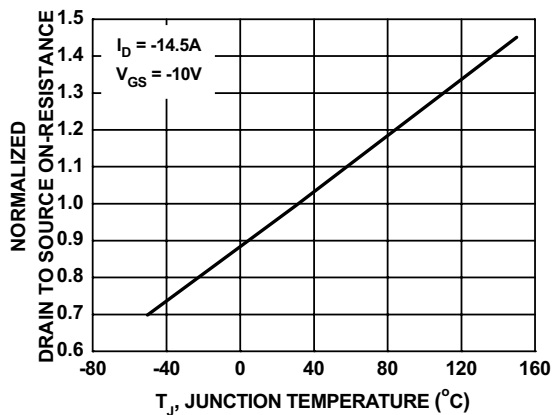


Figure 3. Normalized On Resistance vs Junction Temperature

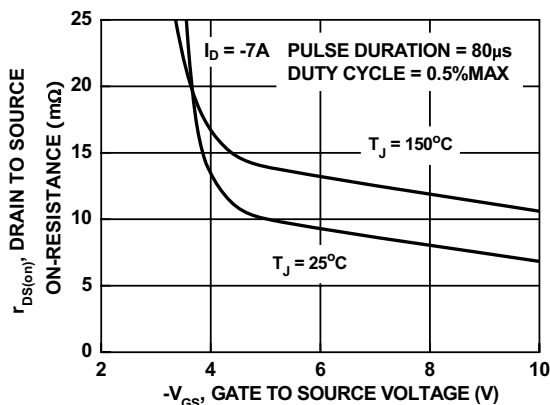


Figure 4. On-Resistance vs Gate to Source Voltage

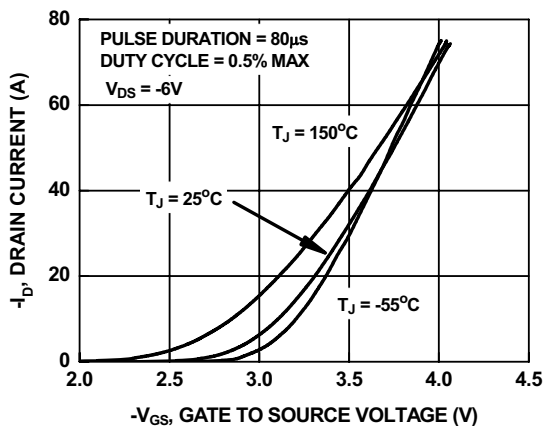


Figure 5. Transfer Characteristics

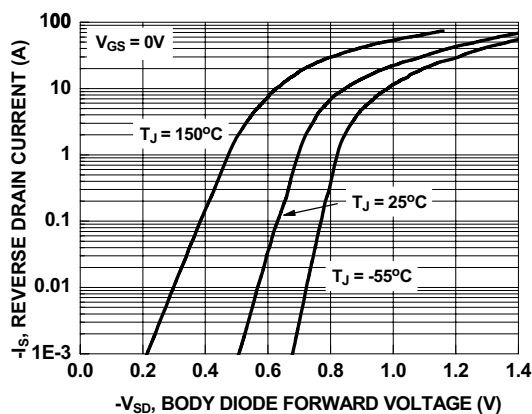


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

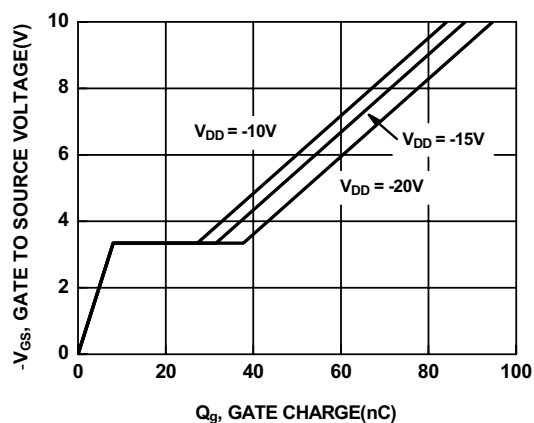


Figure 7. Gate Charge Characteristics

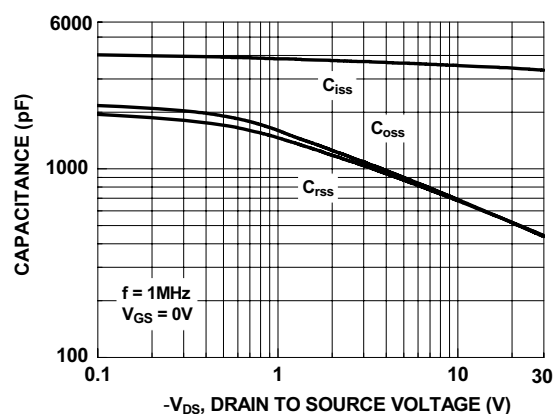


Figure 8. Capacitance vs Drain to Source Voltage

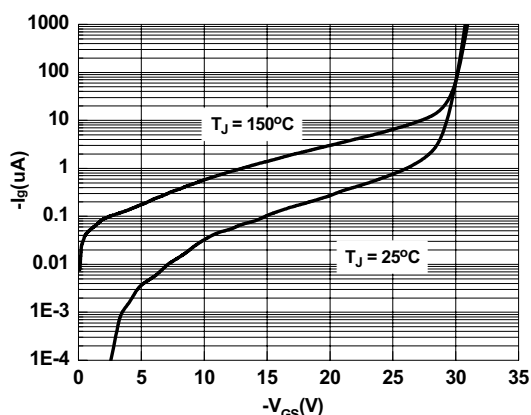


Figure 9. I_g vs V_{GS}

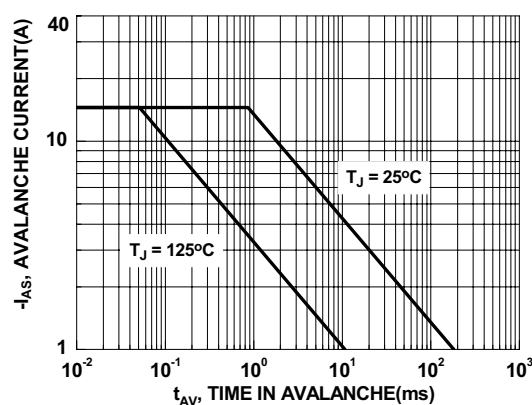


Figure 10. Unclamped Inductive Switching Capability

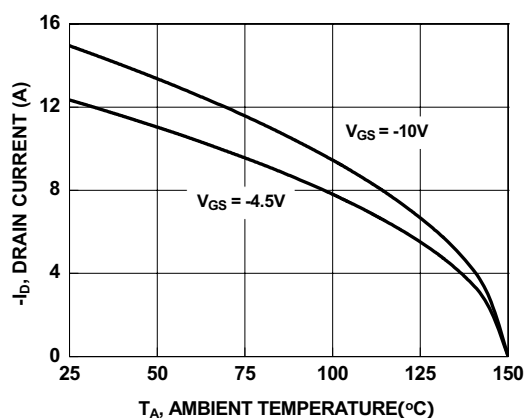


Figure 11. Maximum Continuous Drain Current vs Ambient Temperature

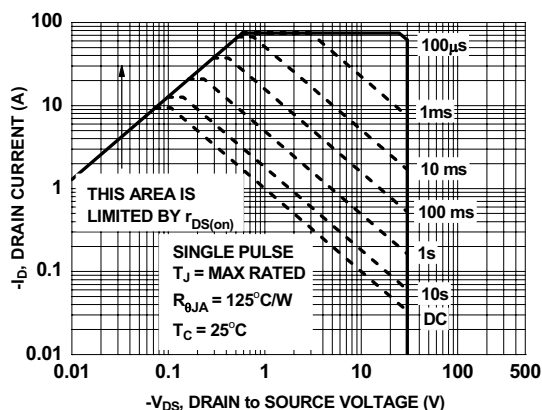


Figure 12. Forward Bias Safe Operating Area

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

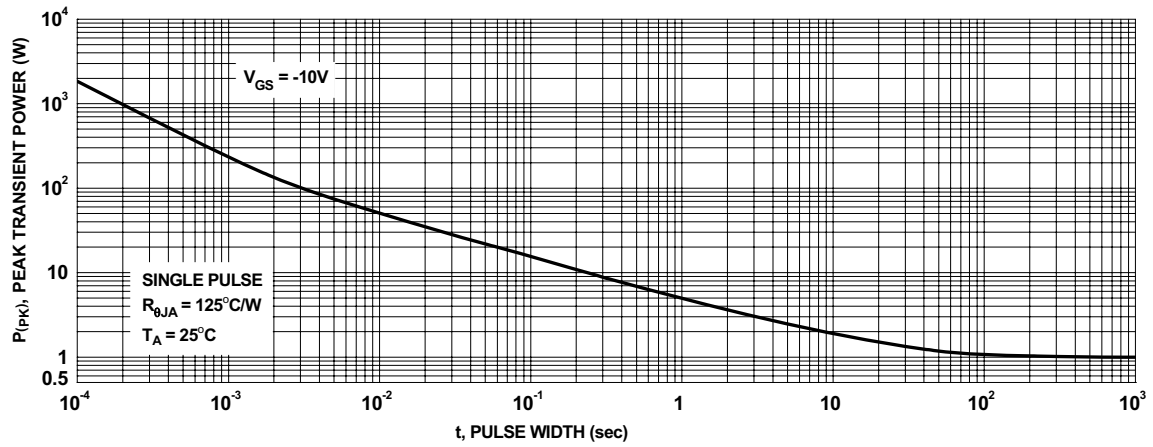


Figure 13. Single Pulse Maximum Power Dissipation

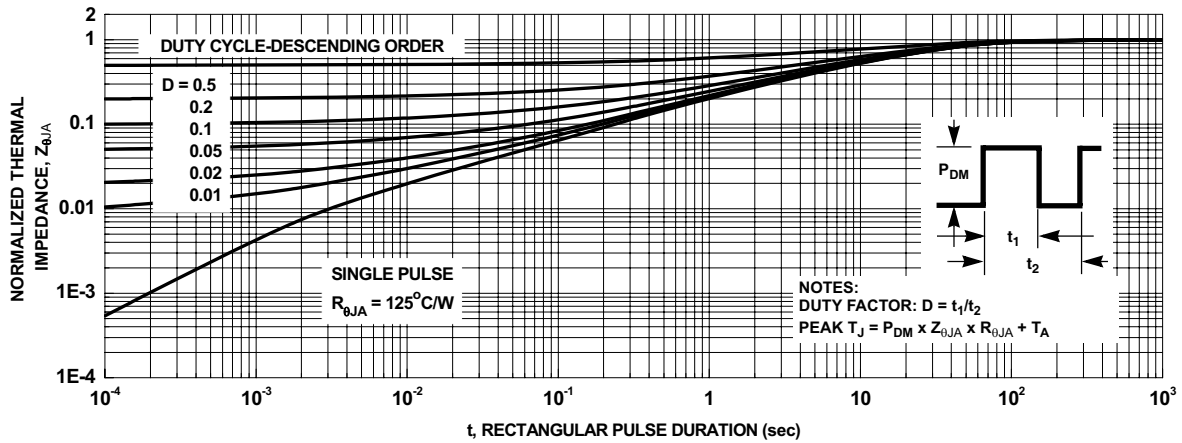


Figure 14. Junction-to-Ambient Transient Thermal Response Curve

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Rev. I39

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