

# FDS6673BZ

## P-Channel PowerTrench® MOSFET

-30V, -14.5A, 7.8mΩ

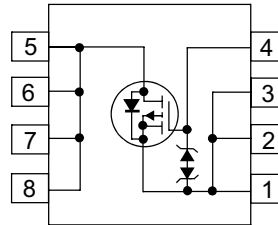
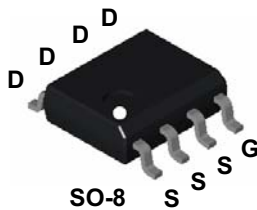
### General Description

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	$\pm 25$	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 $25^\circ\text{C}$		-20		$\text{mV}/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -24\text{V}, V_{GS} = 0\text{V}$			-1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 25\text{V}, V_{DS} = 0\text{V}$			$\pm 10$	$\mu\text{A}$

**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 $25^\circ\text{C}$		8.1		$\text{mV}/^\circ\text{C}$
$r_{DS(on)}$	Drain to Source On Resistance	$V_{GS} = -10\text{V}, I_D = -14.5\text{A}$		6.5	7.8	$\text{m}\Omega$
		$V_{GS} = -4.5\text{V}, I_D = -12\text{A}$		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	$\text{pF}$
$C_{oss}$	Output Capacitance			600	800	$\text{pF}$
$C_{rss}$	Reverse Transfer Capacitance			600	900	$\text{pF}$

**Switching Characteristics (Note 2)**

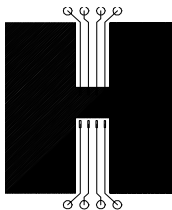
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -15\text{V}, I_D = -1\text{A}$ $V_{GS} = -10\text{V}, R_{GS} = 6\Omega$		14	26	ns
$t_r$	Rise Time			16	29	ns
$t_{d(off)}$	Turn-Off Delay Time			225	36	ns
$t_f$	Fall Time			105	167	ns
$Q_g$	Total Gate Charge	$V_{DS} = -15\text{V}, V_{GS} = -10\text{V}, I_D = -14.5\text{A}$		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

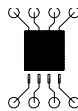
**Notes:**

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.

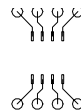


Scale 1 : 1 on letter size paper

a)  $50^\circ\text{C}/\text{W}$  (10 sec) when mounted on a  $1\text{ in}^2$  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

2: Pulse Test: Pulse Width <  $300\mu\text{s}$ , 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

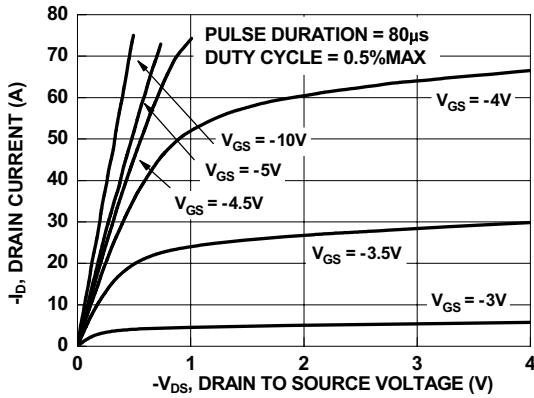


Figure 1. On Region Characteristics

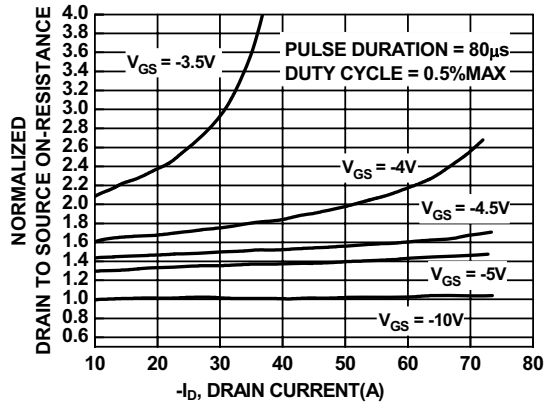


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

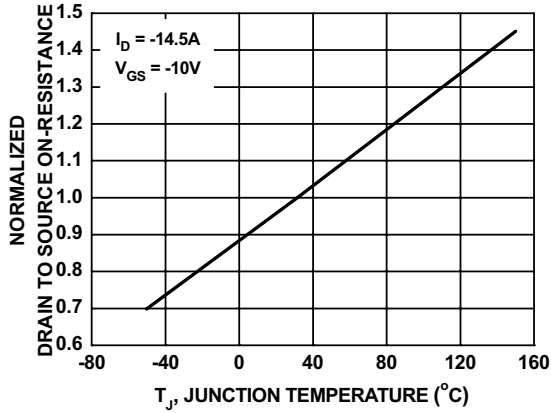


Figure 3. Normalized On Resistance vs Junction Temperature

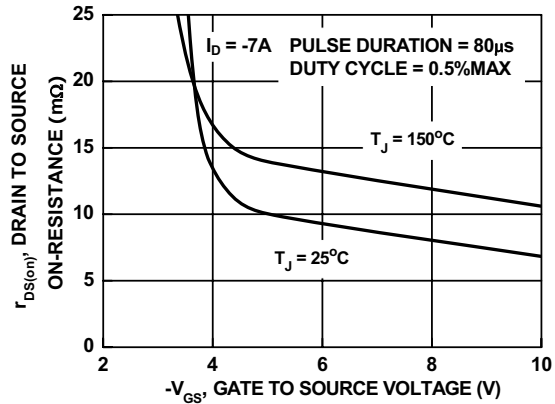


Figure 4. On-Resistance vs Gate to Source Voltage

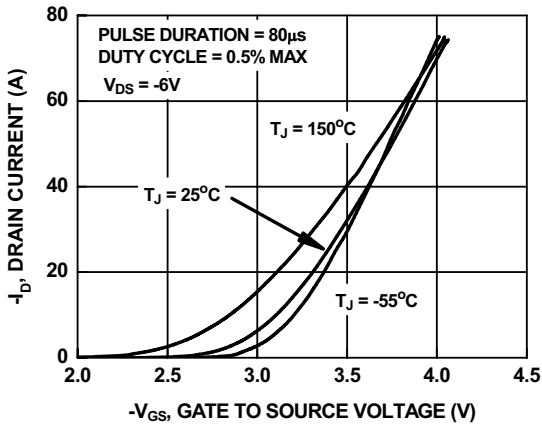


Figure 5. Transfer Characteristics

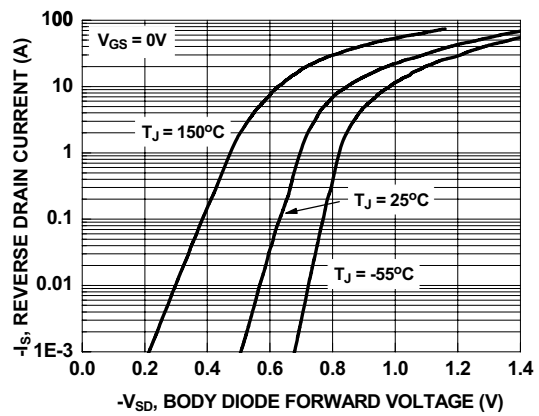


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

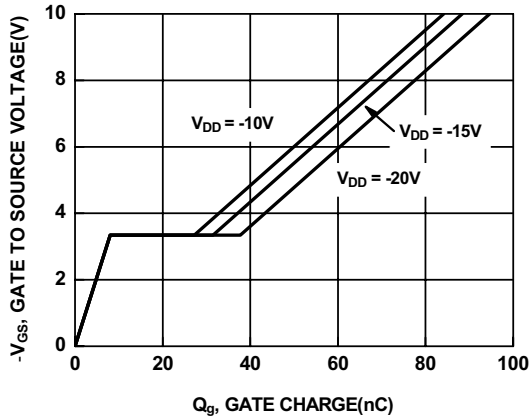


Figure 7. Gate Charge Characteristics

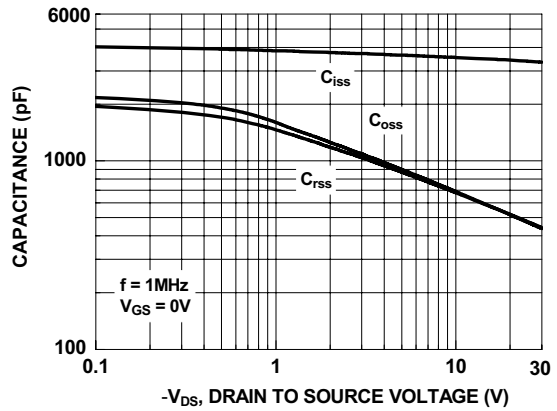


Figure 8. Capacitance vs Drain to Source Voltage

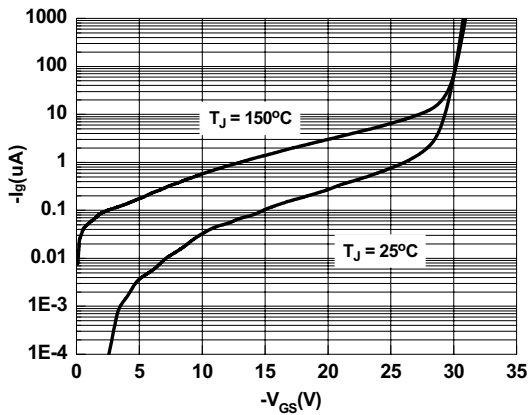


Figure 9.  $I_g$  vs  $V_{GS}$

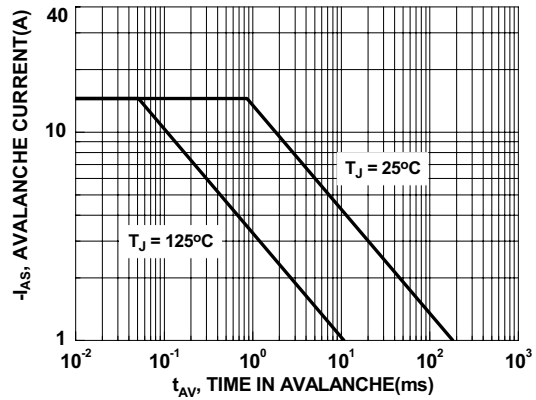


Figure 10. Unclamped Inductive Switching Capability

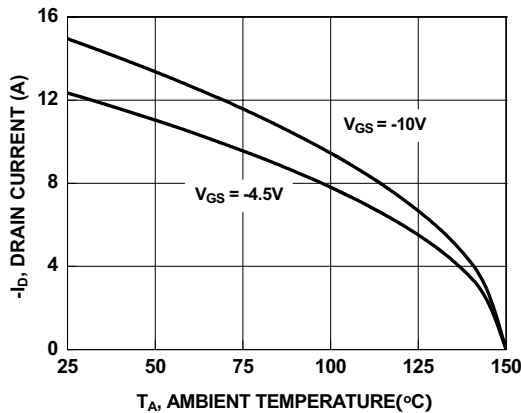


Figure 11. Maximum Continuous Drain Current vs Ambient Temperature

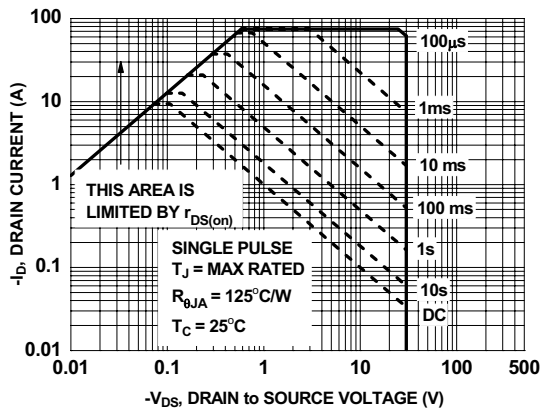
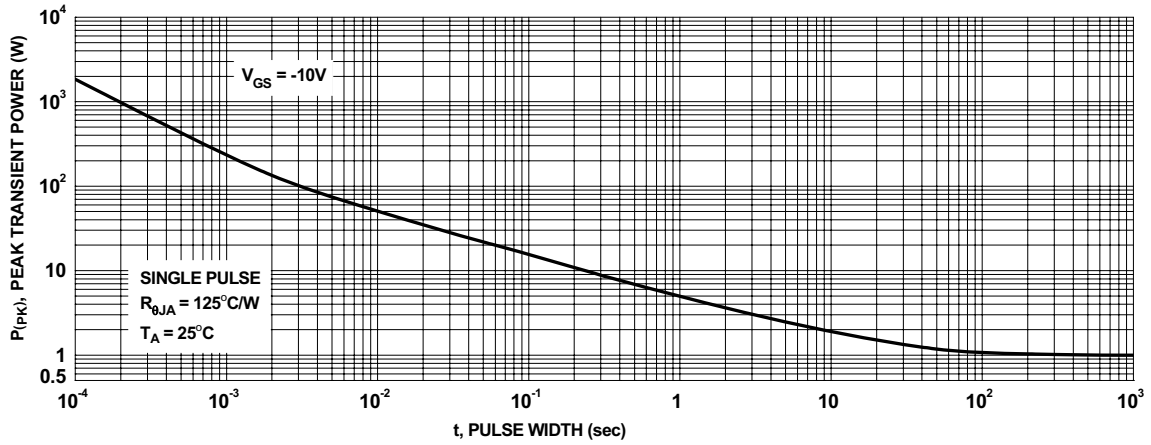
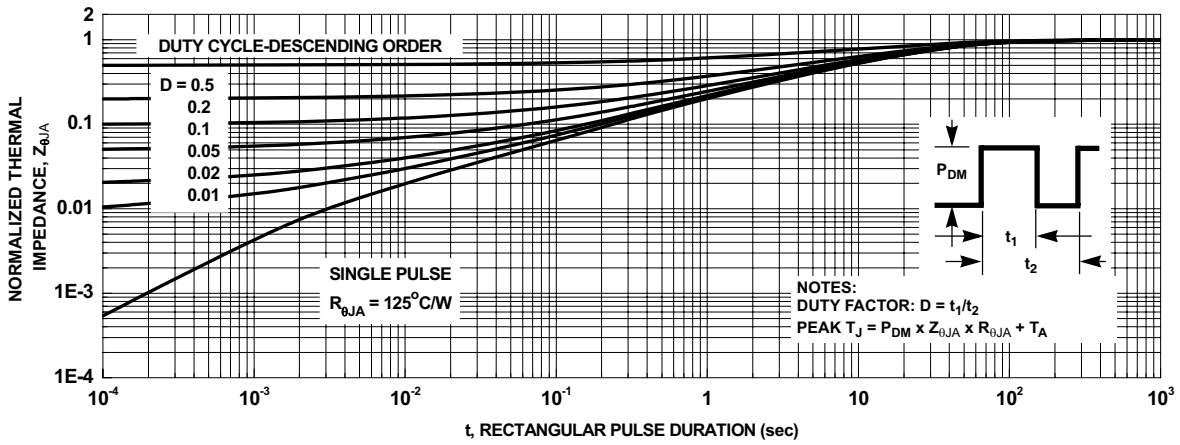


Figure 12. Forward Bias Safe Operating Area

**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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