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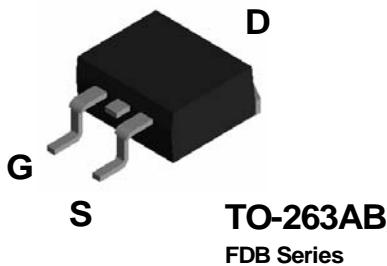
FDB8453LZ

N-Channel PowerTrench® MOSFET

40V, 50A, 7.0mΩ

Features

- Max $r_{DS(on)}$ = 7.0mΩ at $V_{GS} = 10V$, $I_D = 17.6A$
- Max $r_{DS(on)}$ = 9.0mΩ at $V_{GS} = 4.5V$, $I_D = 14.9A$
- HBM ESD protection level of 7.6kV typical (note 4)
- Fast Switching
- RoHS Compliant

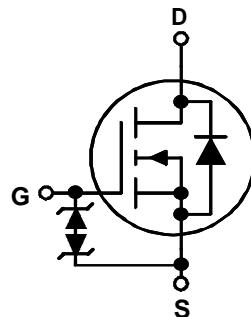


General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that has been especially tailored to minimize the on-state resistance and switching loss. G-S zener has been added to enhance ESD voltage level.

Applications

- Inverter
- Power Supplies



MOSFET Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DS}	Drain to Source Voltage	40	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current -Continuous (Package limited) $T_C = 25^\circ C$	50	A
	-Continuous (Silicon limited) $T_C = 25^\circ C$	74	
	-Continuous $T_A = 25^\circ C$ (Note 1a)	16.1	
	-Pulsed	100	
E_{AS}	Single Pulse Avalanche Energy	(Note 3)	mJ
P_D	Power Dissipation $T_C = 25^\circ C$	66	W
	Power Dissipation $T_A = 25^\circ C$ (Note 1a)	3.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.88	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	40	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB8453LZ	FDB8453LZ	TO-263AB	330mm	24mm	800 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	40			V
$\frac{\Delta \text{BV}_{\text{DSS}}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		36		$\text{mV/}^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 32\text{V}, V_{GS} = 0\text{V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 10	μA

On Characteristics

$V_{GS(\text{th})}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	1.0	1.8	3.0	V
$\frac{\Delta V_{GS(\text{th})}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\mu\text{A}$, referenced to 25°C		-6.0		$\text{mV/}^\circ\text{C}$
$r_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 17.6\text{A}$		6.3	7.0	$\text{m}\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 14.9\text{A}$		7.3	9.0	
		$V_{GS} = 10\text{V}, I_D = 17.6\text{A}, T_J = 125^\circ\text{C}$		9.9	11	
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{V}, I_D = 17.6\text{A}$		84		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 20\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$		2665	3545	pF
C_{oss}	Output Capacitance			325	430	pF
C_{rss}	Reverse Transfer Capacitance			200	295	pF
R_g	Gate Resistance	$f = 1\text{MHz}$		2.2		Ω

Switching Characteristics

$t_{d(\text{on})}$	Turn-On Delay Time	$V_{DD} = 20\text{V}, I_D = 17.6\text{A}, V_{GS} = 10\text{V}, R_{\text{GEN}} = 6\Omega$		11	20	ns	
t_r	Rise Time			6	13	ns	
$t_{d(\text{off})}$	Turn-Off Delay Time			37	60	ns	
t_f	Fall Time			5	11	ns	
Q_g	Total Gate Charge	$V_{GS} = 0\text{V} \text{ to } 10\text{V}$		47	66	nC	
Q_g	Total Gate Charge		$V_{GS} = 0\text{V} \text{ to } 5\text{V}$	$V_{DD} = 20\text{V}, I_D = 17.6\text{A}$	25	35	nC
Q_{gs}	Gate to Source Charge				7	nC	
Q_{gd}	Gate to Drain "Miller" Charge				9	nC	

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 2.6\text{A}$ (Note 2)		0.7	1.2	V
		$V_{GS} = 0\text{V}, I_S = 17.6\text{A}$ (Note 2)		0.8	1.3	
t_{rr}	Reverse Recovery Time	$I_F = 17.6\text{A}, di/dt = 100\text{A}/\mu\text{s}$		24	38	ns
				15	27	

Notes:

- 1: R_{QJA} 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_{QJC} is guaranteed by design while R_{QJA} is determined by the user's board design.
 - a. $40^\circ\text{C}/\text{W}$ when mounted on a 1 in^2 pad of 2 oz copper
 - b. $62.5^\circ\text{C}/\text{W}$ when mounted on a minimum pad.
- 2: Pulse Test: Pulse Width $< 300\mu\text{s}$, Duty cycle $< 2.0\%$.
- 3: Starting $T_J = 25^\circ\text{C}$, $L = 3\text{mH}$, $I_{AS} = 13\text{A}$, $V_{DD} = 40\text{V}$, $V_{GS} = 10\text{V}$.
- 4: 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

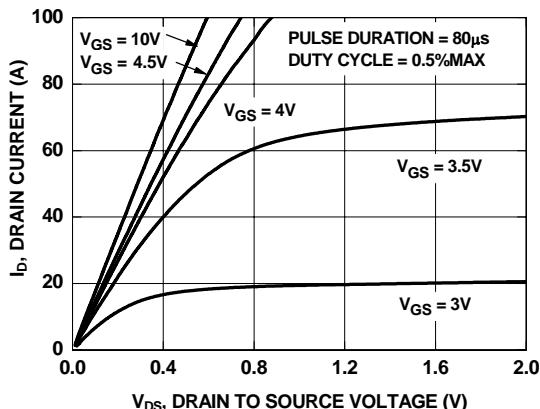


Figure 1. On-Region Characteristics

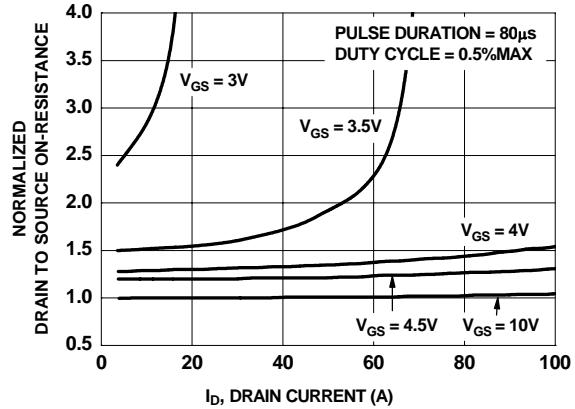


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

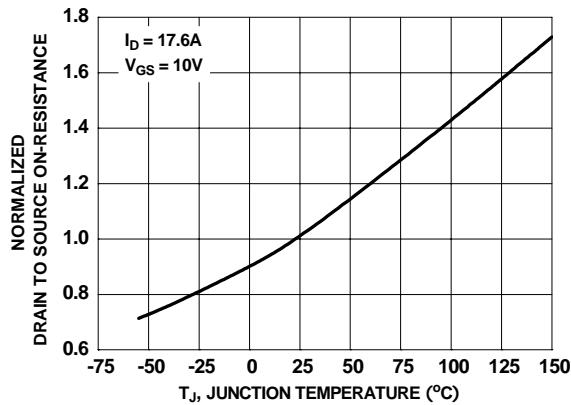


Figure 3. Normalized On-Resistance vs Junction Temperature

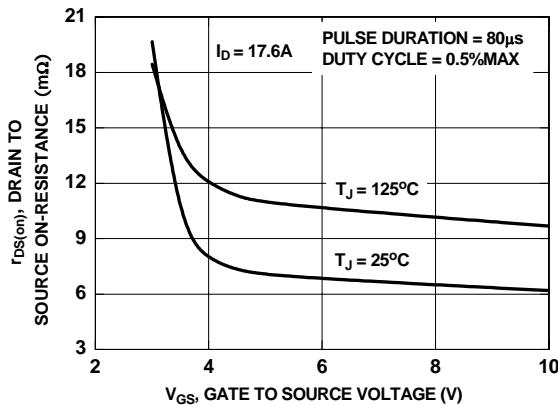


Figure 4. On-Resistance vs Gate to Source Voltage

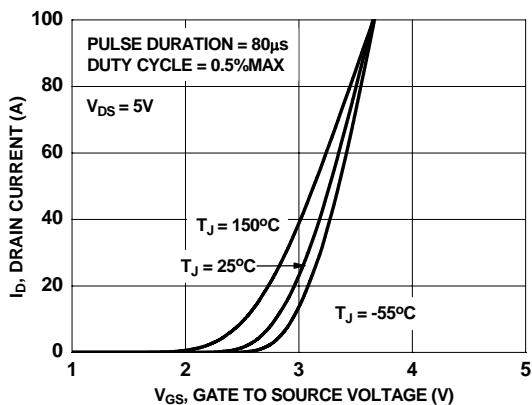


Figure 5. Transfer Characteristics

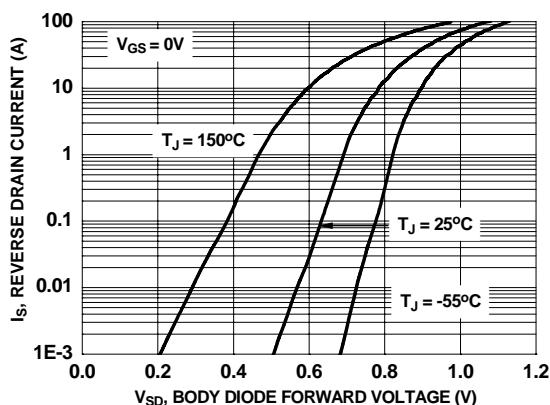
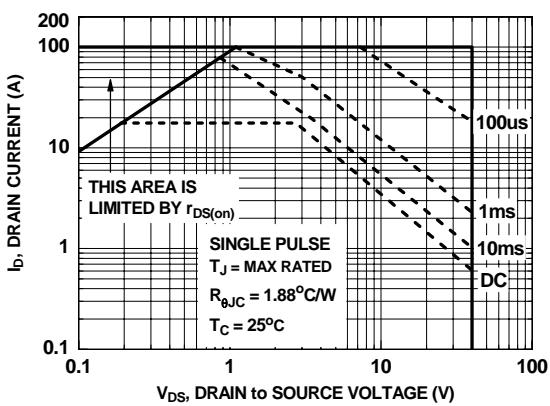
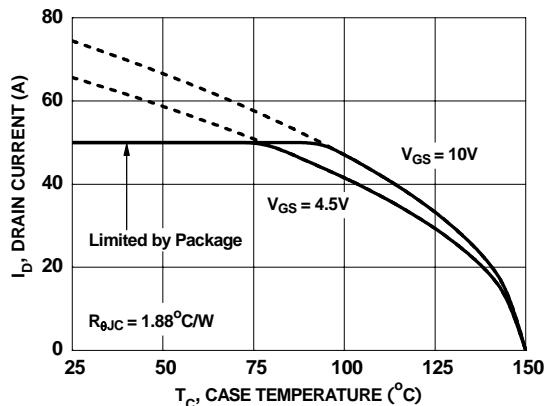
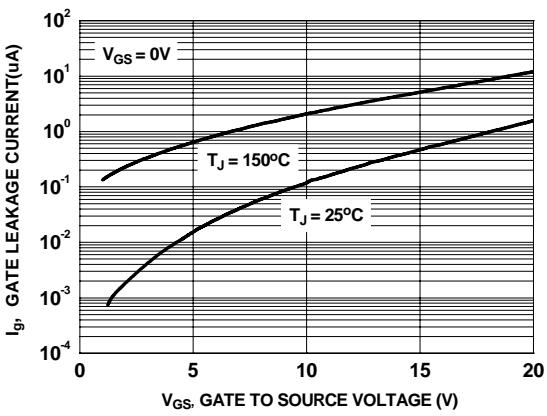
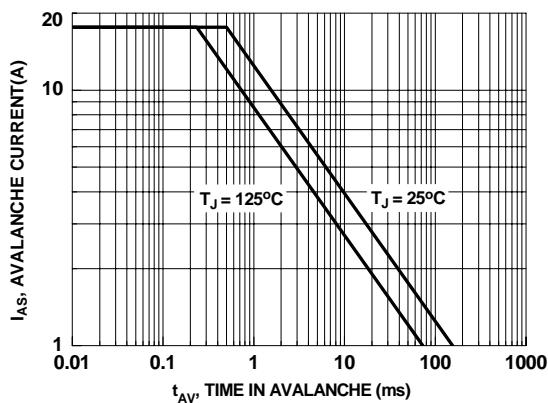
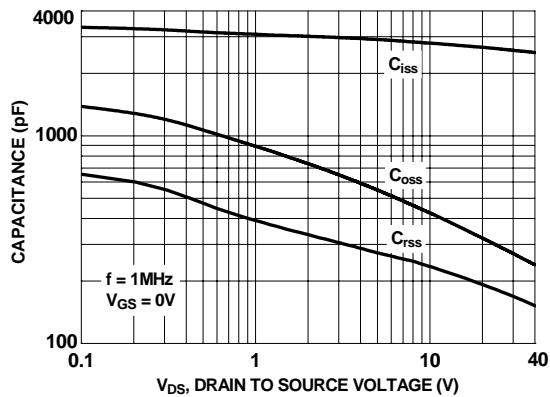
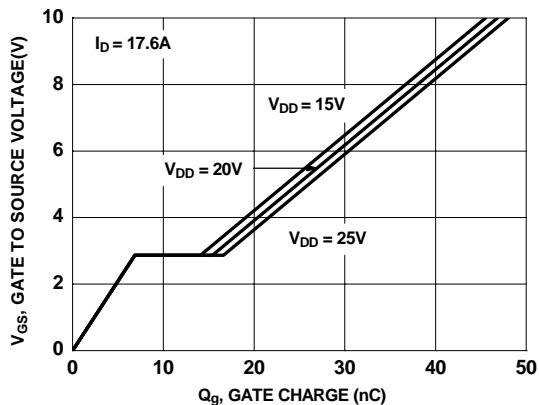


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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



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

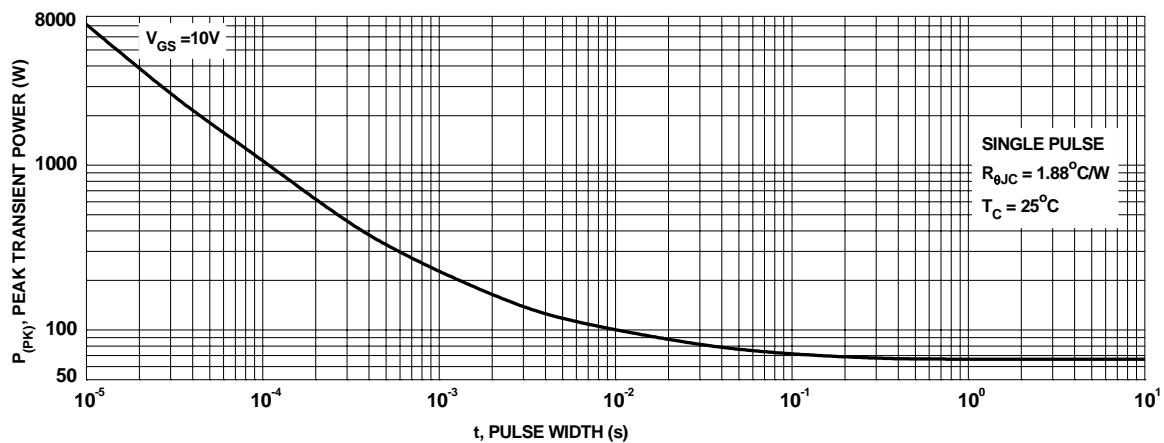


Figure 13. Single Pulse Maximum Power Dissipation

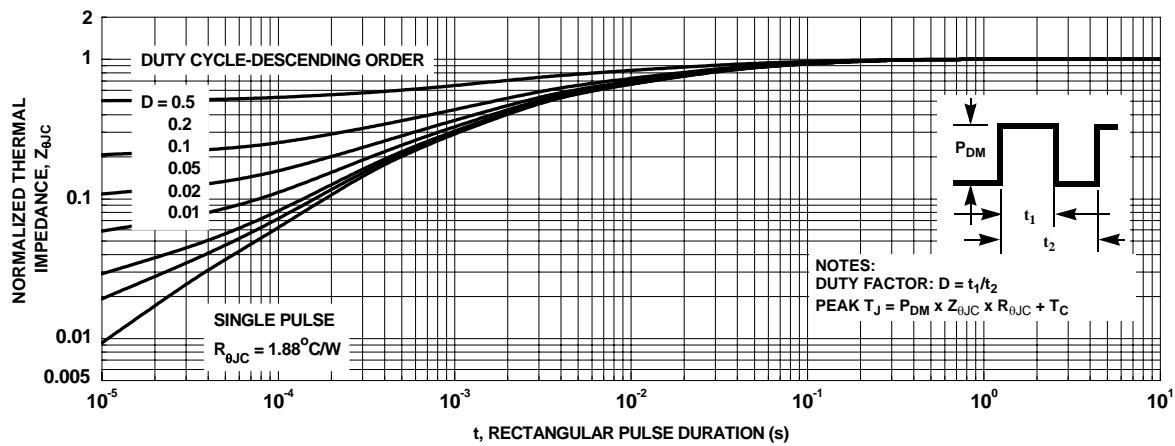


Figure 14. Transient Thermal Response Curve



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