

FDB5800

N-Channel Logic Level PowerTrench® MOSFET

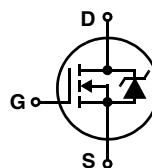
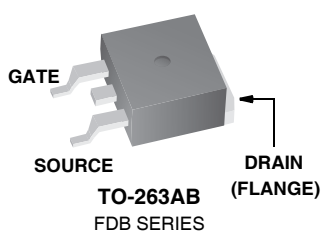
60V, 80A, 7mΩ

Features

- $r_{DS(ON)} = 5.5\text{m}\Omega$ (Typ.), $V_{GS} = 5\text{V}$, $I_D = 80\text{A}$
- High performance trench technology for extremely low $R_{DS(on)}$
- Low Gate Charge
- High power and current handling capability
- RoHS Compliant

Applications

- Motor Load Control
- DC-DC Converters and Off-Line UPS



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

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	60	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current		
	Continuous ($T_C < 102^\circ\text{C}$, $V_{GS} = 10\text{V}$)	80	A
	Continuous ($T_C < 90^\circ\text{C}$, $V_{GS} = 5\text{V}$)	80	A
	Continuous ($T_{amb} = 25^\circ\text{C}$, $V_{GS} = 10\text{V}$, with $R_{\theta JA} = 43^\circ\text{C/W}$)	14	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 1)	652	mJ
P_D	Power dissipation	242	W
	Derate above 25°C	1.61	$\text{W}/^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	$^\circ\text{C}$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case TO-263	0.62	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-263 (Note 2)	62.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-263, 1in ² copper pad area	43	$^\circ\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB5800	FDB5800	TO-263AB	330mm	24mm	800 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

B_{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 48\text{V}$ $V_{GS} = 0\text{V}$	-	-	1	μA
		$T_C = 150^\circ\text{C}$	-	-	250	
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	± 100	nA

On Characteristics

$V_{GS(TH)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$	1.0	-	2.5	V
$r_{DS(ON)}$	Drain to Source On Resistance	$I_D = 80\text{A}$, $V_{GS} = 10\text{V}$	-	4.6	6.0	m Ω
		$I_D = 80\text{A}$, $V_{GS} = 4.5\text{V}$	-	5.8	7.2	
		$I_D = 80\text{A}$, $V_{GS} = 5\text{V}$	-	5.5	7.0	
		$I_D = 80\text{A}$, $V_{GS} = 10\text{V}$, $T_J = 175^\circ\text{C}$	-	10	12.6	

Dynamic Characteristics

C_{ISS}	Input Capacitance	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$	-	6625	-	pF
C_{OSS}	Output Capacitance		-	628	-	pF
C_{RSS}	Reverse Transfer Capacitance		-	262	-	pF
R_G	Gate Resistance	$V_{GS} = 0.5\text{V}$, $f = 1\text{MHz}$	-	1.4	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V}$ to 10V	-	104	135	nC
$Q_{g(5)}$	Total Gate Charge at 5V	$V_{GS} = 0\text{V}$ to 5V	-	55	72	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V}$ to 1V	-	6.0	-	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = 30\text{V}$ $I_D = 80\text{A}$ $I_g = 1.0\text{mA}$	-	18.4	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	12.5	-	nC
Q_{gd}	Gate to Drain "Miller" Charge		-	20.1	-	nC
			-			

Switching Characteristics ($V_{GS} = 5V$)

t_{ON}	Turn-On Time	$V_{DD} = 30V, I_D = 80A$ $V_{GS} = 5V, R_{GS} = 2\Omega$	-	-	62.1	ns
$t_{d(ON)}$	Turn-On Delay Time		-	20.3	-	ns
t_r	Rise Time		-	22.0	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	27.1	-	ns
t_f	Fall Time		-	12.1	-	ns
t_{OFF}	Turn-Off Time		-	-	59.0	ns

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 80A$	-	-	1.25	V
		$I_{SD} = 40A$	-	-	1.0	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 60A, di_{SD}/dt = 100A/\mu s$	-	-	44	ns
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 60A, di_{SD}/dt = 100A/\mu s$	-	-	57	nC

Notes:1: Starting $T_J = 25^\circ C$, $L = 1mH$, $I_{AS} = 36A$, $V_{DD} = 54V$, $V_{GS} = 10V$.

2: Pulse width = 100s.

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

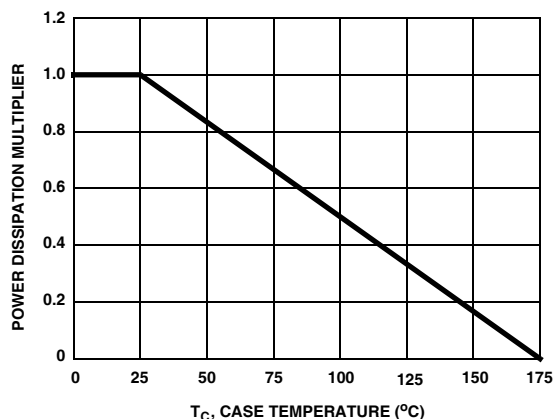


Figure 1. Normalized Power Dissipation vs Case Temperature

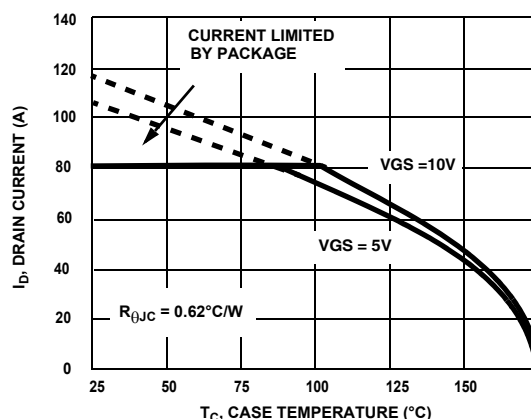


Figure 2. Maximum Continuous Drain Current vs Case Temperature

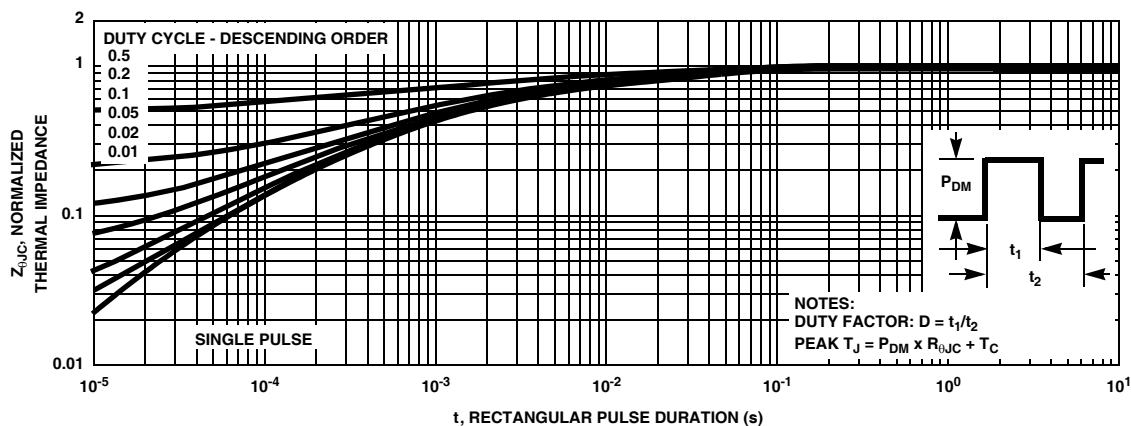


Figure 3. Normalized Maximum Transient Thermal Impedance

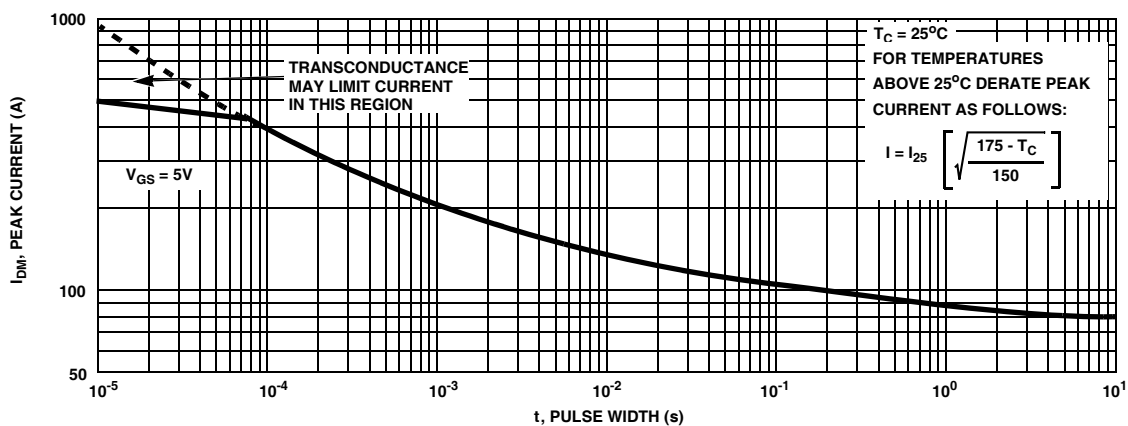


Figure 4. Peak Current Capability

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

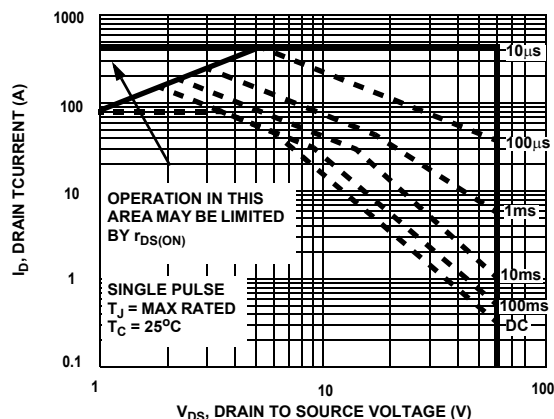
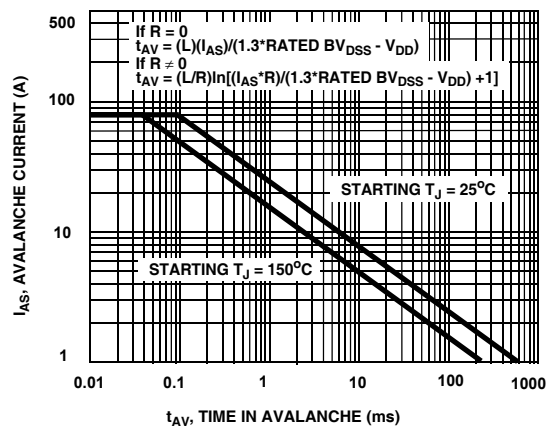


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to Fairchild Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

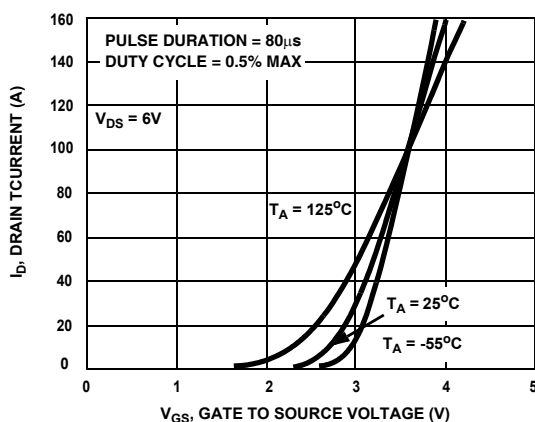


Figure 7. Transfer Characteristics

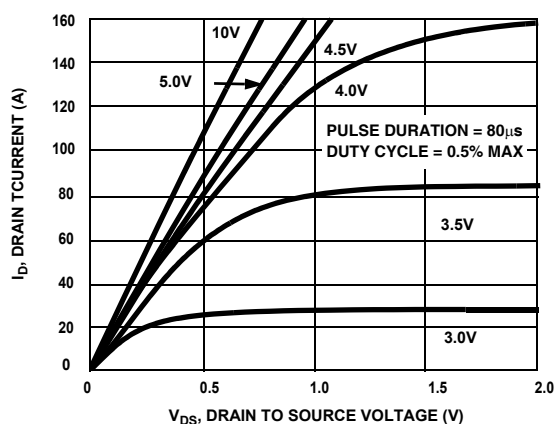


Figure 8. Saturation Characteristics

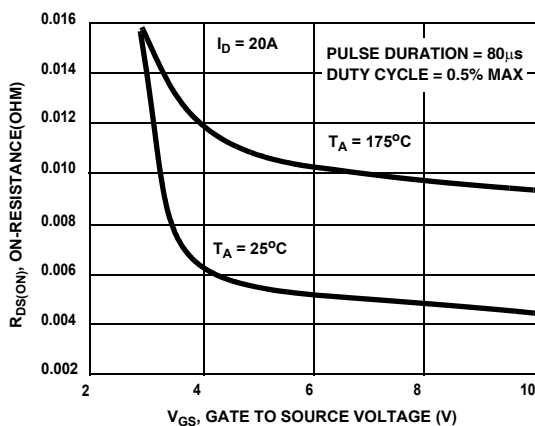


Figure 9. On-Resistance Variation vs Gate-to-Source Voltage

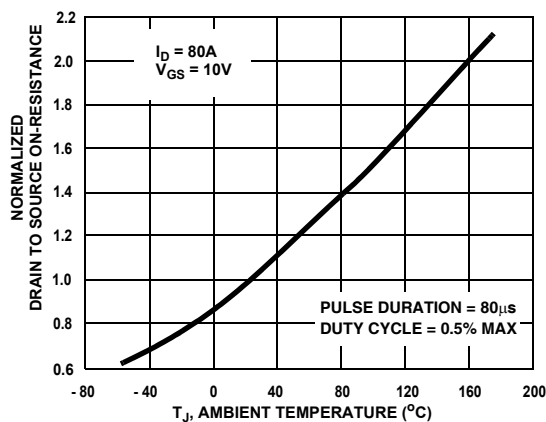


Figure 10. Normalized Drain to Source On-Resistance vs Junction Temperature

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

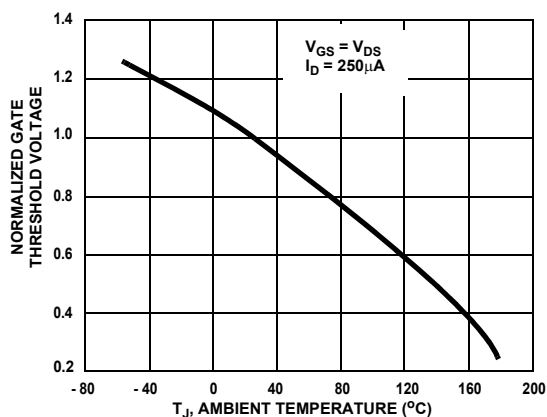


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

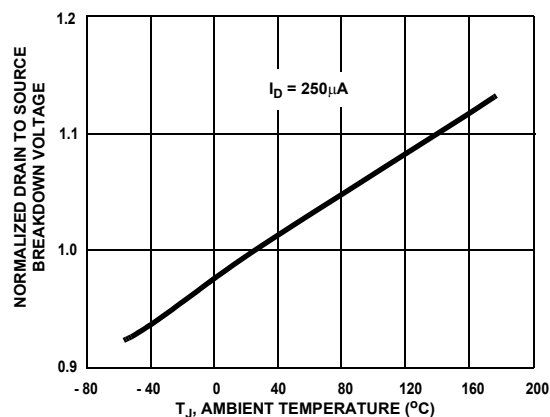


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

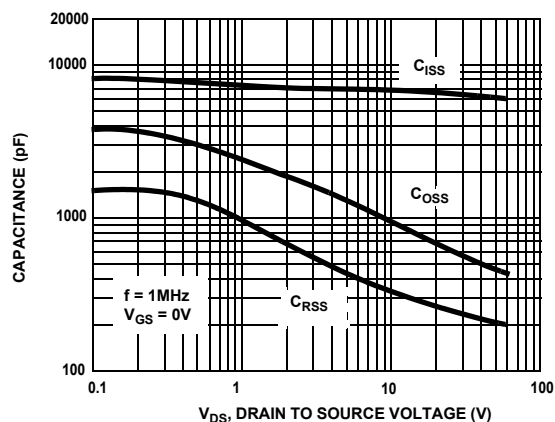


Figure 13. Capacitance vs Drain to Source Voltage

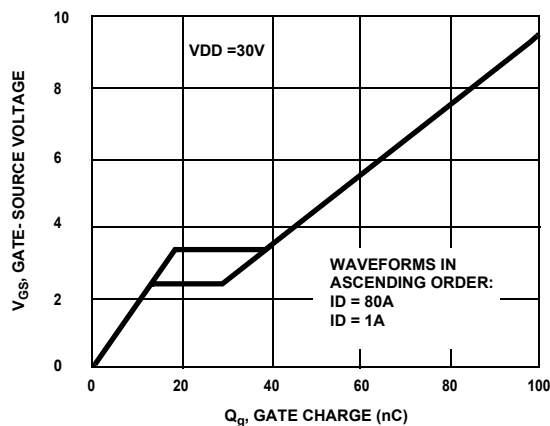


Figure 14. Gate Charge Waveforms for Constant Gate Current



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Rev. I61