



# FDB5800

## N-Channel Logic Level PowerTrench® MOSFET

60V, 80A, 7mΩ

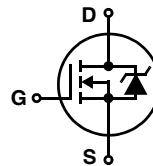
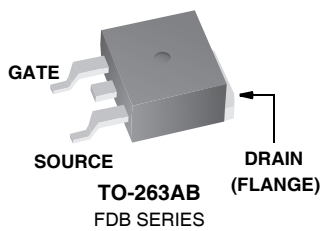
### Features

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

### Applications

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

FDB5800 N-Channel Logic Level PowerTrench® MOSFET



## 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	$\pm 20$	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 $25^\circ\text{C}$	1.61	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 <sup>2</sup> 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	$V_{DS} = 48\text{V}$	-	-	1	$\mu\text{A}$
		$V_{GS} = 0\text{V}$ , $T_C = 150^\circ\text{C}$	-	-	250	
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	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 $\Omega$
		$I_D = 80\text{A}$ , $V_{GS} = 4.5\text{V}$	-	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	-	$\Omega$	
$Q_g(TOT)$	Total Gate Charge at 10V	$V_{GS} = 0\text{V}$ to 10V	$V_{DD} = 30\text{V}$ $I_D = 80\text{A}$ $I_g = 1.0\text{mA}$	-	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			-	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

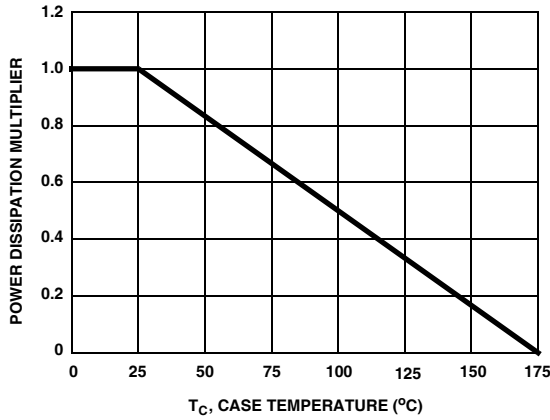
**Drain-Source Diode Characteristics**

$V_{SD}$	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

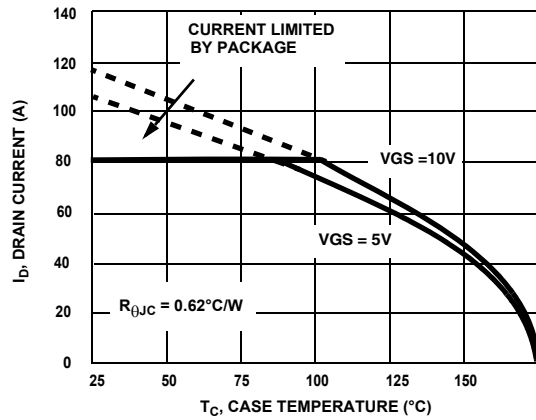
**Notes:**

- 1: Starting  $T_J = 25^\circ C$ ,  $L = 1mH$ ,  $I_{AS} = 36A$ ,  $V_{DD} = 54V$ ,  $V_{GS} = 10V$ .  
 2: Pulse width = 100s.

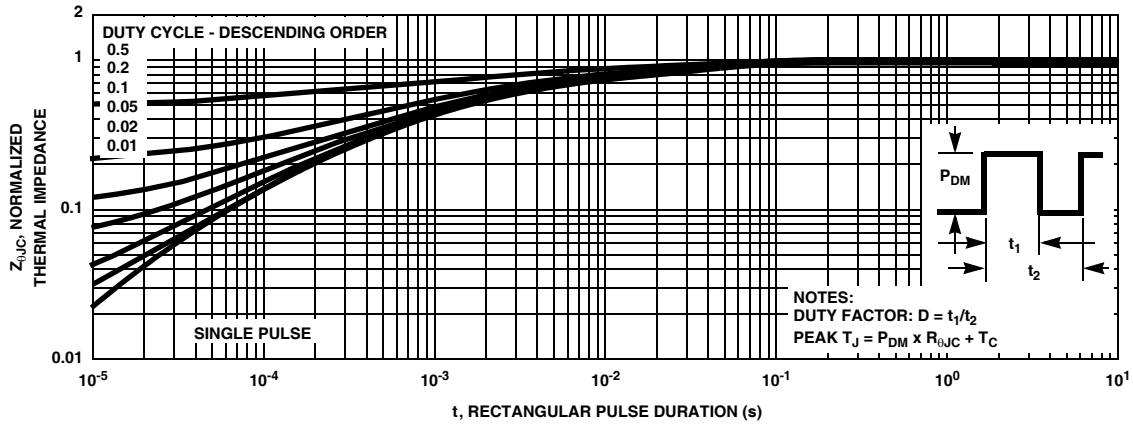
**Typical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted



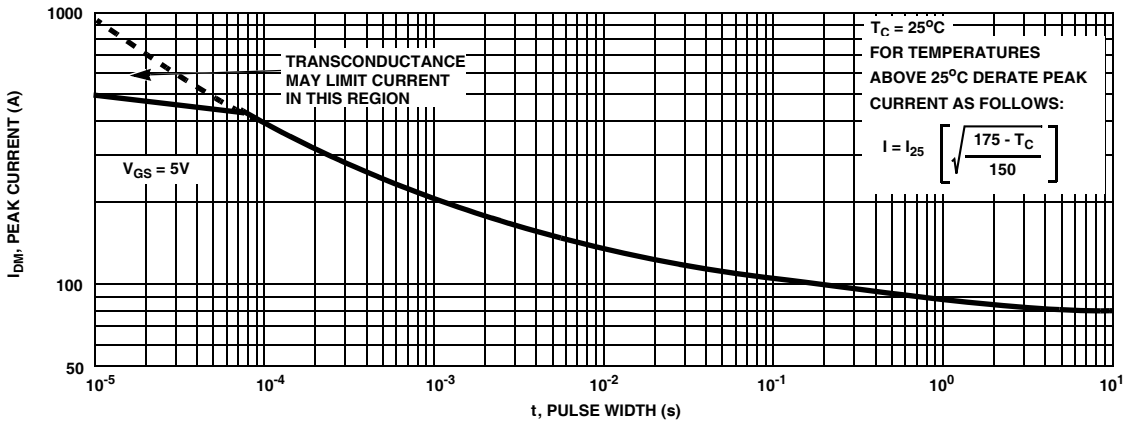
**Figure 1. Normalized Power Dissipation vs Case Temperature**



**Figure 2. Maximum Continuous Drain Current vs Case Temperature**

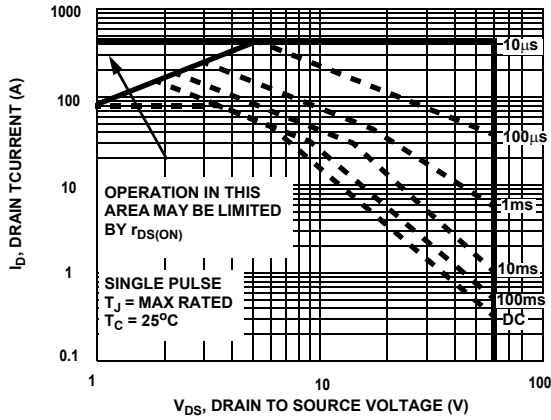


**Figure 3. Normalized Maximum Transient Thermal Impedance**

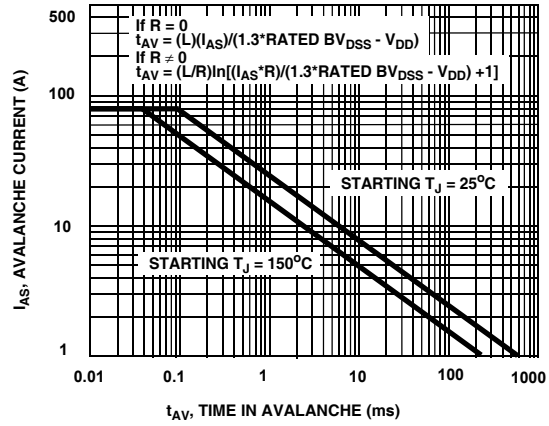


**Figure 4. Peak Current Capability**

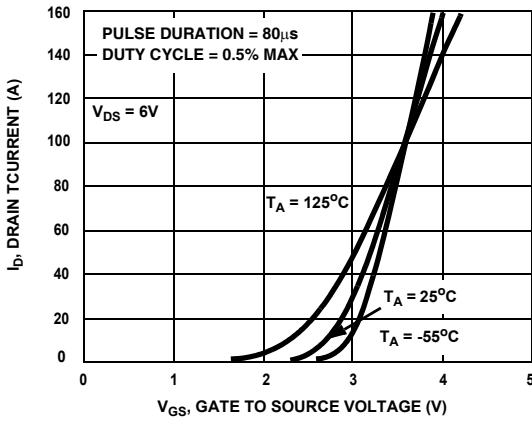
**Typical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted



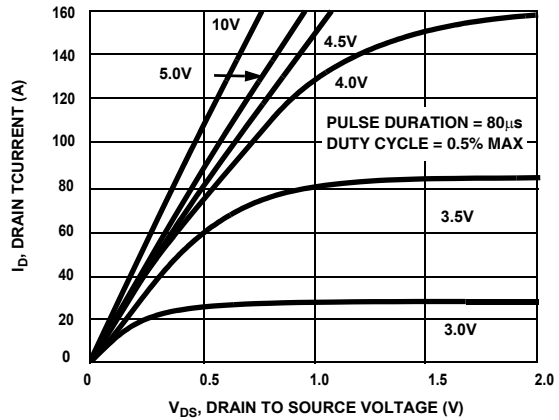
**Figure 5. Forward Bias Safe Operating Area**



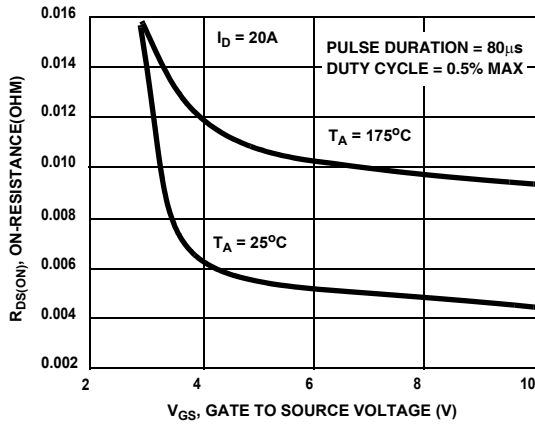
NOTE: Refer to Fairchild Application Notes AN7514 and AN7515  
**Figure 6. Unclamped Inductive Switching Capability**



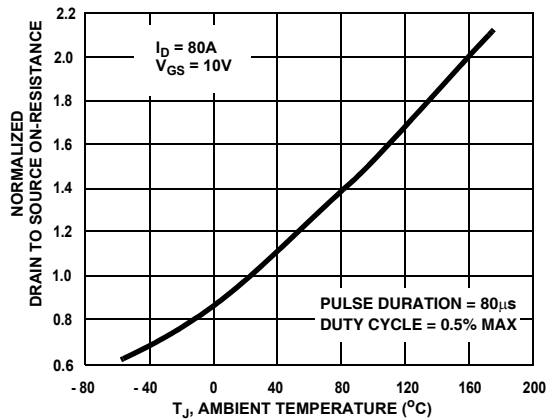
**Figure 7. Transfer Characteristics**



**Figure 8. Saturation Characteristics**

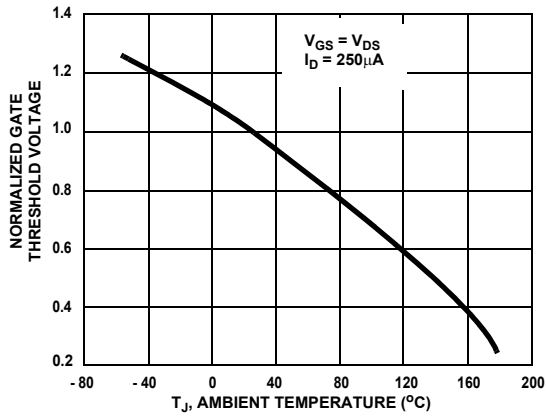


**Figure 9. On-Resistance Variation vs Gate-to-Source Voltage**

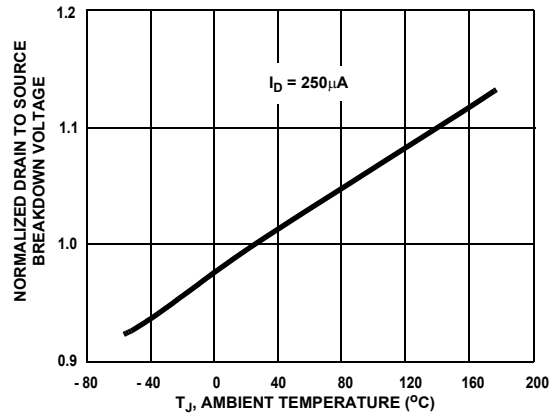


**Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature**

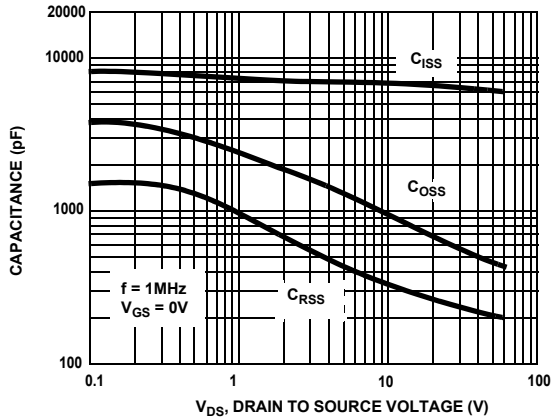
**Typical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted



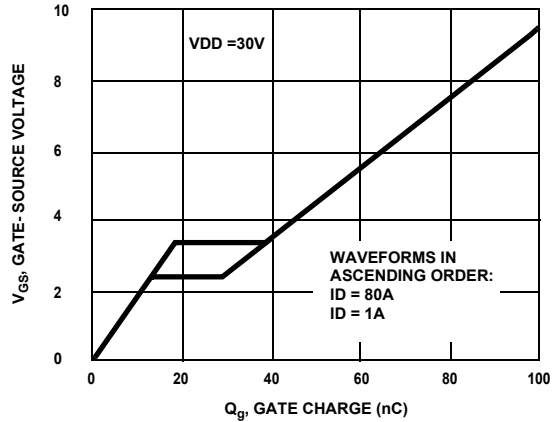
**Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature**



**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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