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ON Semiconductor®

FDB86563-F085

N-Channel PowerTrench® MOSFET **60 V, 110 A, 1.8 m**Ω

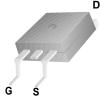
Features

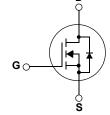
- Typical $R_{DS(on)}$ = 1.6 m Ω at V_{GS} = 10V, I_D = 80 A
- Typical $Q_{g(tot)}$ = 126 nC at V_{GS} = 10V, I_D = 80 A
- UIS Capability
- RoHS Compliant
- Qualified to AEC Q101

Applications

- Automotive Engine Control
- PowerTrain Management
- Solenoid and Motor Drivers
- Integrated Starter/Alternator
- Primary Switch for 12V Systems







TO-263 **FDB SERIES**

MOSFET Maximum Ratings $T_J = 25$ °C unless otherwise noted.

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-to-Source Voltage		60	V
V_{GS}	Gate-to-Source Voltage		±20	V
	Drain Current - Continuous (V _{GS} =10) (Note 1)	in Current - Continuous (V_{GS} =10) (Note 1) T_C = 25°C		Δ.
ID	Pulsed Drain Current	T _C = 25°C	See Figure 4	Α
E _{AS}	Single Pulse Avalanche Energy	(Note 2)	614	mJ
D	Power Dissipation		333	W
P_D	Derate Above 25°C		2.22	W/°C
T _J , T _{STG}	Operating and Storage Temperature		-55 to + 175	°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case		0.45	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	(Note 3)	43	°C/W

- 1: Current is limited by bondwire configuration.
- 2: Starting T_J = 25°C, L = 0.3mH, I_{AS} = 64A, V_{DD} = 60V during inductor charging and V_{DD} = 0V during time in avalanche.

 3: R_{0,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 $R_{\theta JA}$ is determined by the board design. The maximum rating presented here is based on mounting on a 1 in² pad of 2oz copper.

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB86563	FDB86563-F085	D2-PAK(TO-263)	330mm	24mm	800units

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

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
Off Cha	racteristics					

Off Characteristics

B _{VDSS}	Drain-to-Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$		60	-	-	V
1	Drain-to-Source Leakage Current	V_{DS} =60 V ,	$T_{\rm J} = 25^{\rm o}{\rm C}$	-	-	1	μΑ
IDSS	Dialii-to-Source Leakage Current	$V_{GS} = 0V$	$T_J = 175^{\circ}C \text{ (Note 4)}$	-	-	1	mA
I_{GSS}	Gate-to-Source Leakage Current	$V_{GS} = \pm 20V$		ı	-	±100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$		2.0	2.9	4.0	V
D	(on) Drain to Source On Resistance	I _D = 80A,	$T_{\rm J} = 25^{\rm o}{\rm C}$	-	1.6	1.8	mΩ
R _{DS(on)}		V _{GS} = 10V	$T_{J} = 175^{\circ}C \text{ (Note 4)}$	-	2.8	3.2	$m\Omega$

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz		-	10100	-	pF
C _{oss}	Output Capacitance			-	2355	-	pF
C _{rss}	Reverse Transfer Capacitance			-	186	-	pF
R_{g}	Gate Resistance	f = 1MHz		-	4.5	-	Ω
$Q_{g(ToT)}$	Total Gate Charge	$V_{GS} = 0$ to 10V	V _{DD} = 48V	-	126	163	nC
Q _{g(th)}	Threshold Gate Charge	$V_{GS} = 0$ to 2V	I _D = 80A	-	19	-	nC
Q_{gs}	Gate-to-Source Gate Charge		_	-	48	-	nC
Q_{gd}	Gate-to-Drain "Miller" Charge			-	18	-	nC

Switching Characteristics

t _{on}	Turn-On Time		-	-	213	ns
t _{d(on)}	Turn-On Delay		-	28	1	ns
t _r	Rise Time	$V_{DD} = 30V, I_D = 80A,$ $V_{GS} = 10V, R_{GEN} = 6\Omega$	-	110	-	ns
$t_{d(off)}$	Turn-Off Delay		-	79	-	ns
t _f	Fall Time		-	60	-	ns
t _{off}	Turn-Off Time		-	ı	250	ns

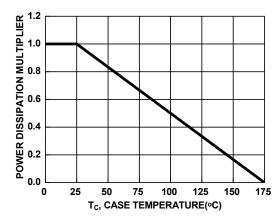
Drain-Source Diode Characteristics

V	Vob Source-to-Drain Diode Voltage	I _{SD} =80A, V _{GS} = 0V	-	-	1.25	V
V SD		I_{SD} = 40A, V_{GS} = 0V	-	-	1.2	٧
t _{rr}	Reverse-Recovery Time	$I_F = 80A$, $dI_{SD}/dt = 100A/\mu s$	-	98	129	ns
Q _{rr}	Reverse-Recovery Charge	V _{DD} = 48V	-	150	230	nC

Note:

4: The maximum value is specified by design at T_J = 175°C. Product is not tested to this condition in production.

Typical Characteristics



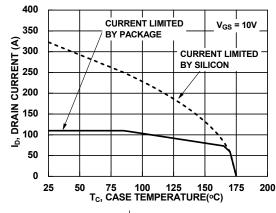


Figure 1. Normalized Power Dissipation vs. Case Temperature

Figure 2. Maximum Continuous Drain Current vs.
Case Temperature

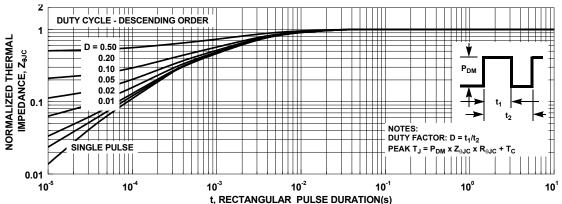


Figure 3. Normalized Maximum Transient Thermal Impedance

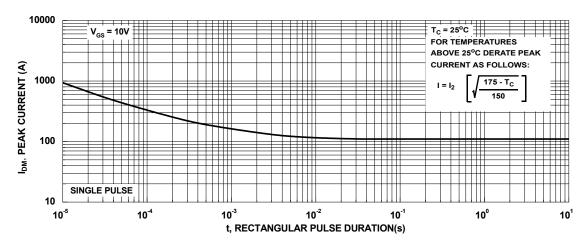


Figure 4. Peak Current Capability

Typical Characteristics

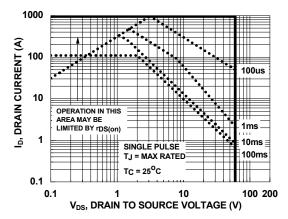
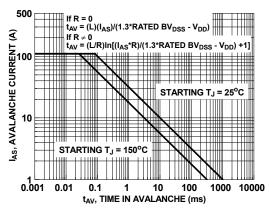


Figure 5. Forward Bias Safe Operating Area



NOTE: Refer to ON Semiconductor Application Notes AN7514 and AN7515

Figure 6. Unclamped Inductive Switching Capability

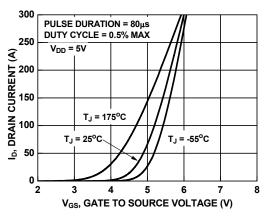


Figure 7. Transfer Characteristics

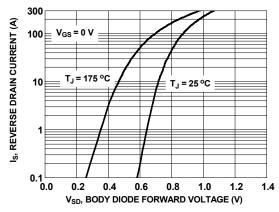


Figure 8. Forward Diode Characteristics

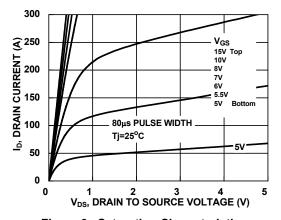


Figure 9. Saturation Characteristics

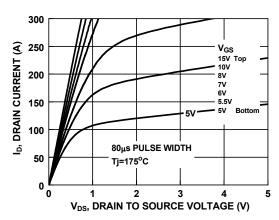


Figure 10. Saturation Characteristics

Typical Characteristics

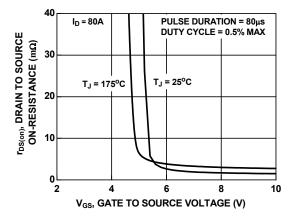


Figure 11. R_{DSON} vs. Gate Voltage

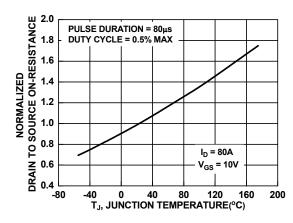


Figure 12. Normalized R_{DSON} vs. Junction Temperature

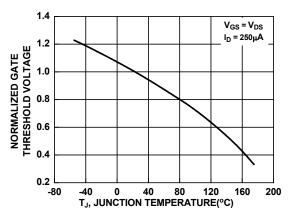


Figure 13. Normalized Gate Threshold Voltage vs. Temperature

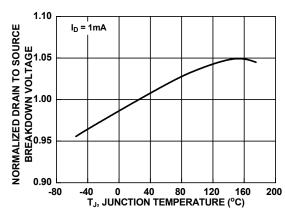


Figure 14. Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

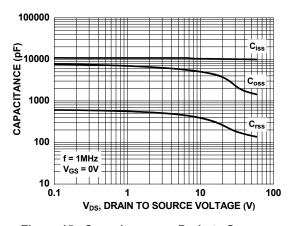


Figure 15. Capacitance vs. Drain to Source Voltage

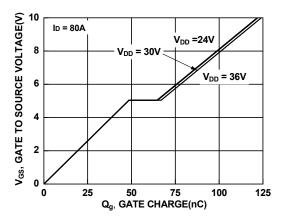


Figure 16. Gate Charge vs. Gate to Source Voltage

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