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December 2015

FDB0165N807L

N-Channel PowerTrench® MOSFET **80 V, 310 A, 1.6 m** Ω

Features

- Max $r_{DS(on)}$ = 1.6 m Ω at V_{GS} = 10 V, I_D = 36 A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extremely Low
- High Power and Current Handling Capability
- RoHS Compliant

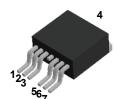


General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advance PowerTrench® process that has been especially tailored to minimize the on-state resistance while maintaining superior ruggedness and switching performance for industrial applications.

Applications

- Industrial Motor Drive
- Industrial Power Supply
- Industrial Automation
- Battery Operated Tools
- Battery Protection
- Solar Inverters
- UPS and Energy Inverters
- Energy Storage
- Load Switch



1. Gate

2. Source/Kelvin Sense

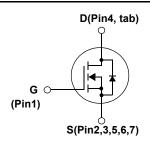
3. Source/Kelvin Sense

4. Drain

5. Source

6. Source 7. Source

D2-PAK (TO263)



MOSFET Maximum Ratings T_C = 25 °C unless otherwise noted.

Symbol	Param	eter		Ratings	Units
V_{DS}	Drain to Source Voltage			80	V
V_{GS}	Gate to Source Voltage			±20	V
	Drain Current -Continuous	T _C = 25°C	(Note 5)	310	
I_D	-Continuous	T _C = 100°C	(Note 5)	220	Α
	-Pulsed		(Note 4)	1780	
E _{AS}	Single Pulse Avalanche Energy		(Note 3)	1083	mJ
D	Power Dissipation	T _C = 25°C		300	W
P_{D}	Power Dissipation	T _A = 25°C	(Note 1a)	3.8	VV
T _J , T _{STG}	Operating and Storage Junction Tempera	ature Range		-55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Note 1)	0.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	40	C/VV

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDB0165N807L	FDB0165N807L	D2-PAK-7L	330mm	24mm	800 units

Electrical Characteristics T_J = 25 °C unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Тур.	Max.	Units
Off Chara	acteristics					
BV _{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu A, V_{GS} = 0 V$	80			V
$\frac{\Delta BV_{DSS}}{\Delta T_{J}}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C		38		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 64 V, V _{GS} = 0 V			1	μΑ
I _{GSS}	Gate to Source Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_{D} = 250 \mu A$	2	2.9	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 250 μ A, referenced to 25 °C		-13		mV/°C
_	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 36 \text{ A}$		1.2	1.6	mΩ
r _{DS(on)}	Static Drain to Source On Resistance	V_{GS} = 10 V, I_{D} = 36 A, T_{J} = 150°C		2.0	2.7	1115.2
9 _{FS}	Forward Transconductance	V _{DS} = 10 V, I _D = 36 A		136		S

Dynamic Characteristics

C _{iss}	Input Capacitance	V _{DS} = 40 V, V _{GS} = 0 V, f = 1 MHz	16900	23660	pF
C _{oss}	Output Capacitance		2350	3290	pF
C _{rss}	Reverse Transfer Capacitance		335	1050	pF
R_g	Gate Resistance		3.3		Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time	V _{DD} = 40 V, I _D = 36 A,	68	109	ns
t _r	Rise Time		104	166	ns
t _{d(off)}	Turn-Off Delay Time	V_{GS} = 10 V, R_{GEN} = 6 Ω	123	197	ns
t _f	Fall Time		64	102	ns
Q_g	Total Gate Charge	V 40.V 1 00.A	217	304	nC
Q_{gs}	Gate to Source Gate Charge	V_{DD} = 40 V, I_{D} = 36 A, V_{GS} = 10 V	75		nC
Q_{gd}	Gate to Drain "Miller" Charge	VGS 10 V	38		nC

Drain-Source Diode Characteristics

Is	Maximum Continuous Drain to Source Diode Forward Current			310	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current			1780	Α
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 36 \text{ A}$ (Note 2)	0.8	1.2	V
t _{rr}	Reverse Recovery Time	I _E = 36 A, di/dt = 100 A/μs	85	136	ns
Q _{rr}	Reverse Recovery Charge	1F = 36 A, αι/αι = 100 A/μs	90	144	nC

^{1.} R_{BJA} 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_{BJC} is guaranteed by design while R_{BCA} is determined by the user's board design.

a) 40 °C/W when mounted on a 1 in 2 pad of 2 oz copper. b) 62.5 °C/W when mounted on a minimum pad of 2 oz copper.

^{2.} Pulse Test: Pulse Width < 300 μ s, Duty cycle < 2.0 %.

^{3.} E_{AS} of 1083 mJ is based on starting T_J = 25 $^{\circ}C$, L = 0.3 mH, I_{AS} = 85 A, V_{DD} = 72 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 123 A.

^{4.} Pulsed Id please refer to Figure 10 "Forward Bias Safe Operating Area" for more details.

^{5.} Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro-mechanical application board design.

Typical Characteristics T_J = 25 °C unless otherwise noted.

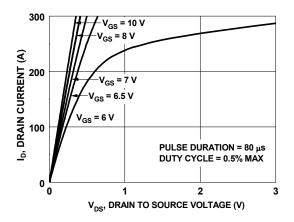


Figure 1. On Region Characteristics

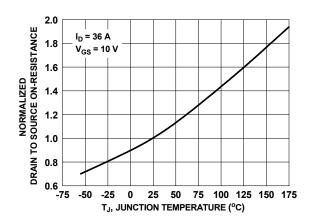


Figure 3. Normalized On Resistance vs. Junction Temperature

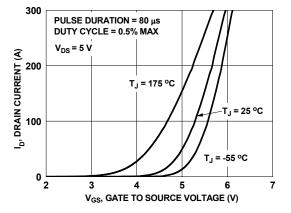


Figure 5. Transfer Characteristics

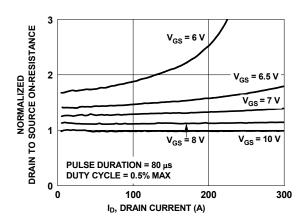


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

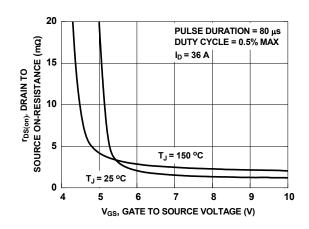


Figure 4. On-Resistance vs. Gate to Source Voltage

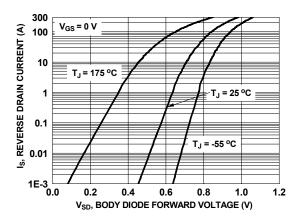


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

Typical Characteristics $T_J = 25$ °C unless otherwise noted.

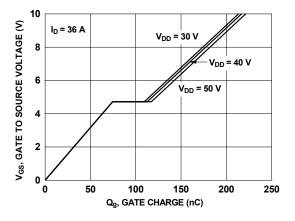


Figure 7. Gate Charge Characteristics

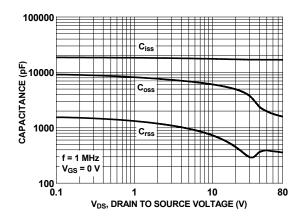


Figure 8. Capacitance vs. Drain to Source Voltage

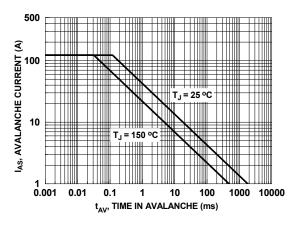


Figure 9. Unclamped Inductive Switching Capability

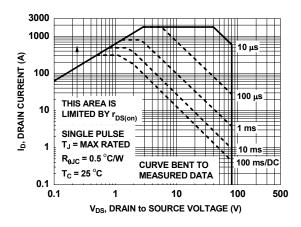


Figure 10. Forward Bias Safe Operating Area

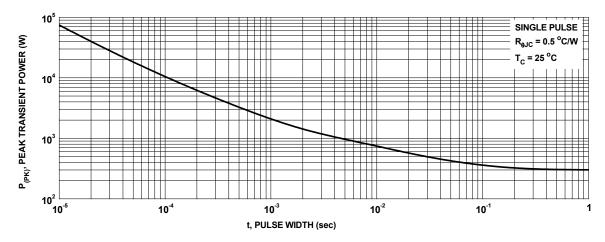


Figure 11. Single Pulse Maximum Power Dissipation

Typical Characteristics $T_J = 25$ °C unless otherwise noted.

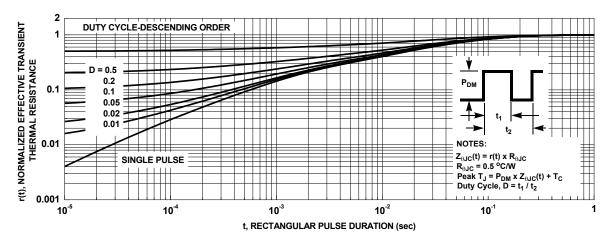
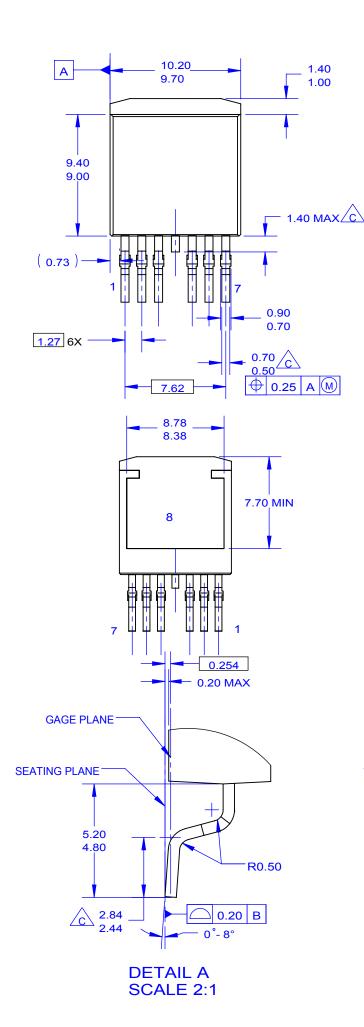
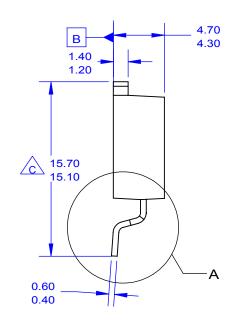


Figure 12. Junction-to-Case Transient Thermal Response Curve



(10.50) (8.40) (10,20) (3.45)(0.95) (1.27) 6X (7.62)

LAND PATTERN RECOMMENDATION



NOTES:

- A. PACKAGE CONFORMS TO JEDEC TO-263 VARIATION CB EXCEPT WHERE NOTED. B. ALL DIMENSIONS ARE IN MILLIMETERS.
- OUT OF JEDEC STANDARD VALUE.
 D. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
- E. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
- F. LAND PATTERN RECOMMENDATION PER IPC. TO127P1524X465-8N.
- G. DRAWING FILE NAME: TO263A07REV5.

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