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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

ON Semiconductor®

FDMC8010

N-Channel PowerTrench® MOSFET

30 V, 75 A, 1.3 mΩ

Features

- Max $r_{DS(on)}$ = 1.3 mΩ at V_{GS} = 10 V, I_D = 30 A
- Max $r_{DS(on)}$ = 1.8 mΩ at V_{GS} = 4.5 V, I_D = 25 A
- High performance technology for extremely low $r_{DS(on)}$
- Termination is Lead-free and RoHS Compliant

General Description

This N-Channel MOSFET is produced using ON Semiconductor's advanced PowerTrench® process that has been especially tailored to minimize the on-state resistance. This device is well suited for applications where ultra low $r_{DS(on)}$ is required in small spaces such as High performance VRM, POL and Oring functions.

Applications

- DC - DC Buck Converters
- Point of Load
- High Efficiency Load Switch and Low Side Switching
- Oring FET

Top   **Bottom**

Power 33
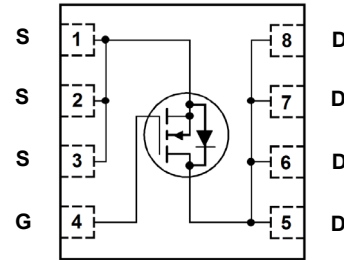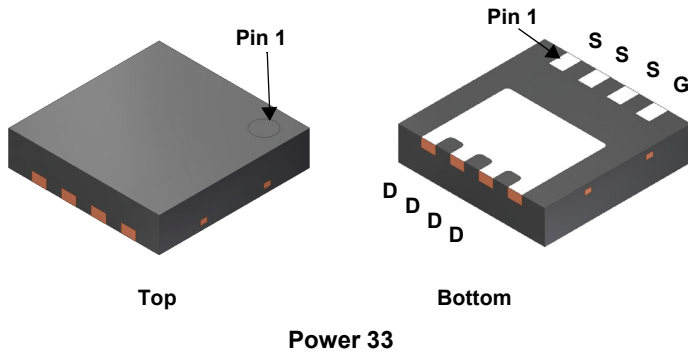
MOSFET Maximum Ratings T_A = 25 °C unless otherwise noted

Symbol	Parameter			Ratings	Units
V_{DS}	Drain to Source Voltage			30	V
V_{GS}	Gate to Source Volage		(Note 4)	±20	V
I_D	Drain Current -Continuous (Package limited)	T_C = 25 °C		75	A
	-Continuous (Silicon limited)	T_C = 25 °C		166	
	-Continuous	T_A = 25 °C	(Note 1a)	30	
	-Pulsed			120	
E_{AS}	Single Pulse Avalance Energy		(Note 3)	153	mJ
P_D	Power Dissipation	T_C = 25 °C		54	W
	Power Dissipation	T_A = 25 °C	(Note 1a)	2.4	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case			2.3	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		(Note 1a)	53	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC8010	FDMC8010	Power 33	13 "	12 mm	3000 units

Electrical Characteristics T_J = 25 °C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 1 mA, V_{GS} = 0 V	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 1 mA, referenced to 25 °C		15		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
On Characteristics						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 1 mA	1.2	1.5	2.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 1 mA, referenced to 25 °C		-5		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 30 A		0.9	1.3	mΩ
		V_{GS} = 4.5 V, I_D = 25 A		1.3	1.8	
		V_{GS} = 10 V, I_D = 30A, T_J = 125 °C		1.3	2	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 30 A		188		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1 MHz		4405	5860	pF
C_{oss}	Output Capacitance			1570	2090	pF
C_{rss}	Reverse Transfer Capacitance			167	250	pF
R_g	Gate Resistance		0.1	0.5	1.25	Ω
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 15 V, I_D = 30 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		15	27	ns
t_r	Rise Time			7.5	15	ns
$t_{d(off)}$	Turn-Off Delay Time			40	64	ns
t_f	Fall Time			5.3	11	ns
Q_g	Total Gate Charge	V_{GS} = 0 V to 10 V		67	94	nC
Q_g	Total Gate Charge	V_{GS} = 0 V to 4.5 V		32	45	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 15 V, I_D = 30 A		10		nC
Q_{gd}	Gate to Drain "Miller" Charge			9.5		nC
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2 A (Note 2)		0.6	1.2	V
		V_{GS} = 0 V, I_S = 30 A (Note 2)		0.7	1.2	
t_{rr}	Reverse Recovery Time	I_F = 30 A, di/dt = 100 A/μs		49	78	ns
Q_{rr}	Reverse Recovery Charge			29	46	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.
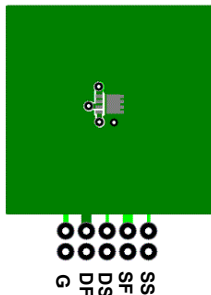
a. 53 °C/W when mounted on a 1 in^2 pad of 2 oz copper.

b. 125 °C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0 %.

3. E_{AS} of 153 mJ is based on starting T_J = 25 °C, L = 0.3 mH, I_{AS} = 32 A, V_{DD} = 27 V, V_{GS} = 10 V. 100% test at L = 0.1 mH, I_{AS} = 47 A.

4. As an N-ch device, the negative Vgs rating is for low duty cycle pulse occurrence only. No continuous rating is implied.

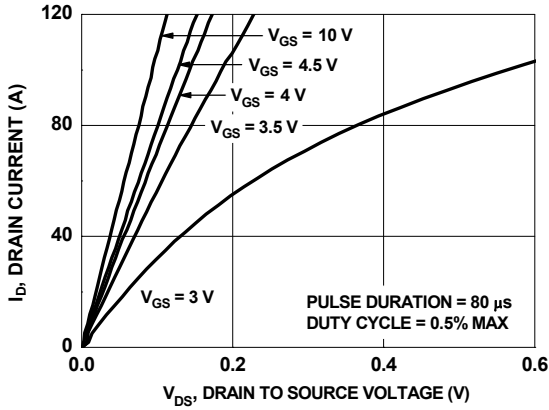**Typical Characteristics** T_J = 25°C unless otherwise noted

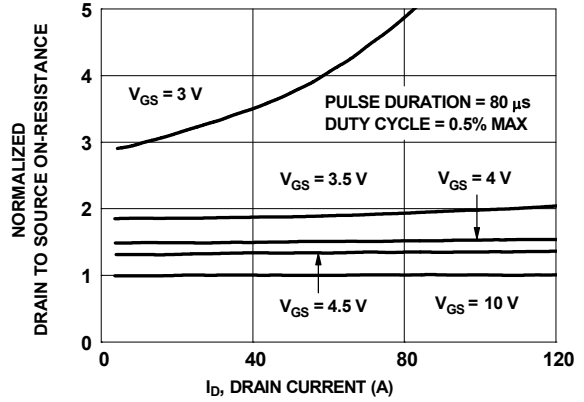Figure 1. On Region Characteristics

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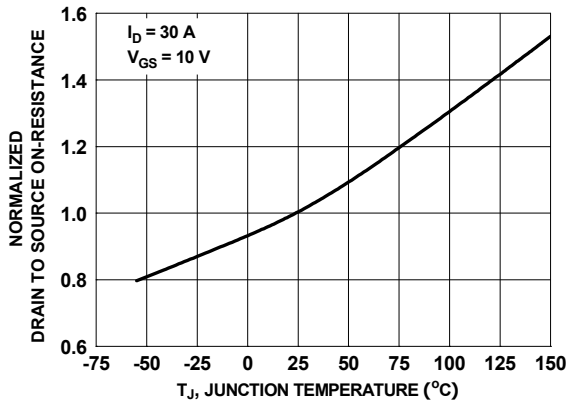vs Drain Current and Gate Voltage

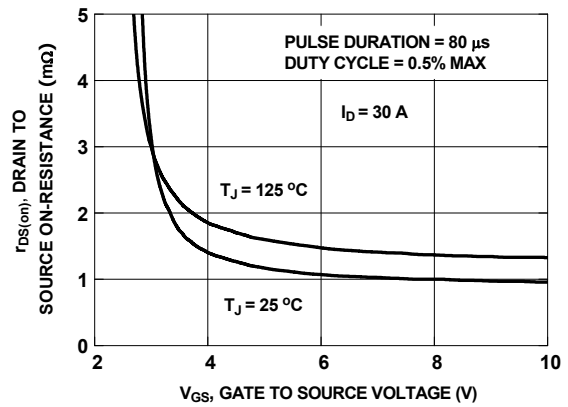Figure 3. Normalized On Resistance
vs Junction Temperature

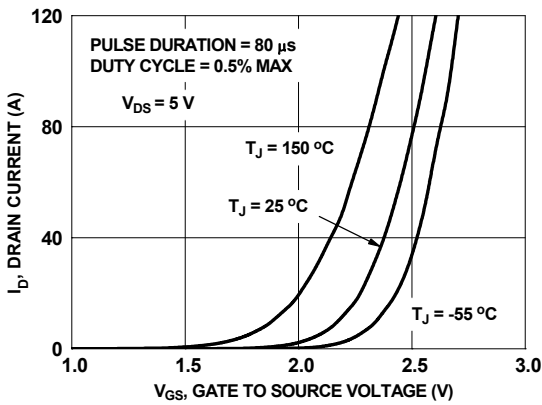Figure 4. On-Resistance vs Gate to
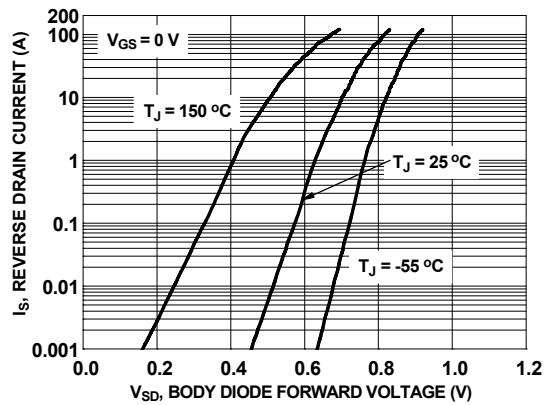Source Voltage

Figure 5. Transfer Characteristics

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

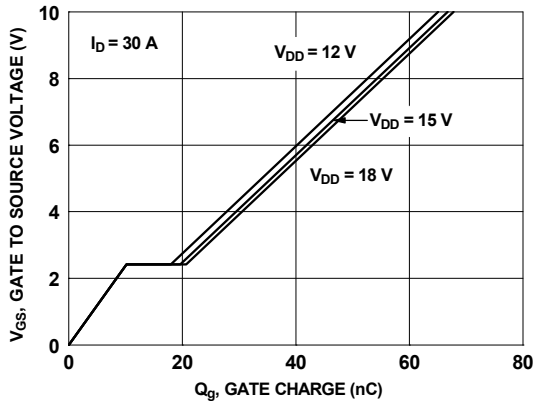## Typical Characteristics T$_J$ = 25°C unless otherwise noted

Figure 7. Gate Charge Characteristics
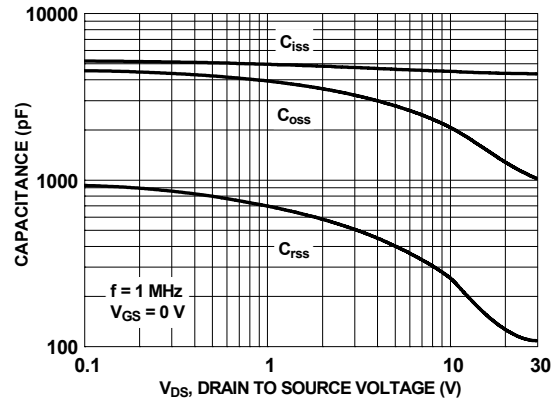
Figure 8. Capacitance vs Drain to Source Voltage
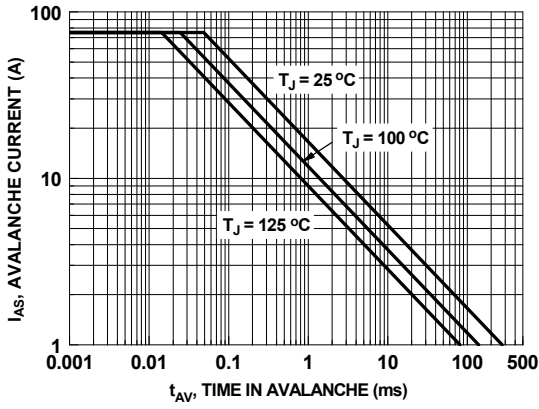
Figure 9. Unclamped Inductive Switching Capability
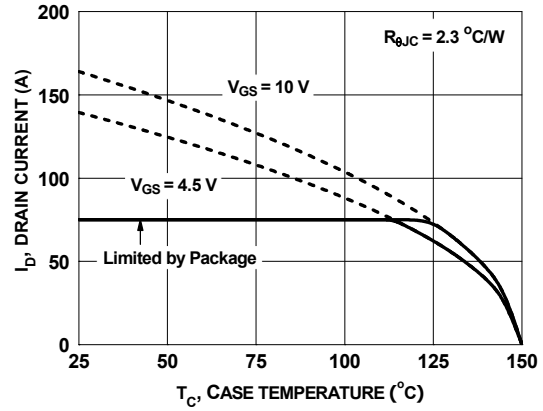
Figure 10. Maximum Continuous Drain Current vs Case Temperature
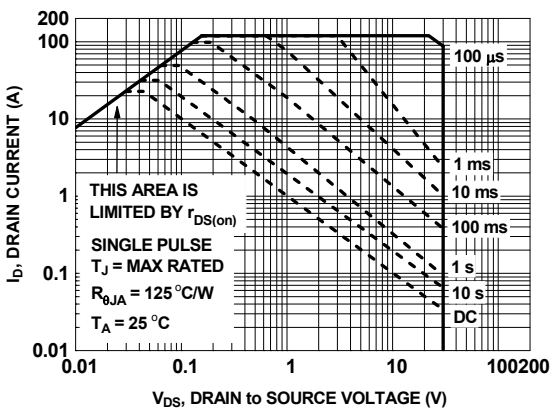
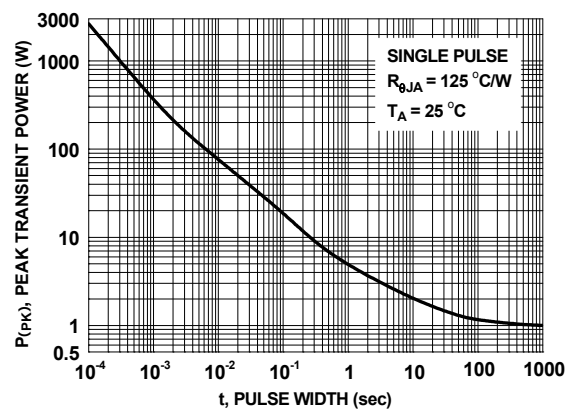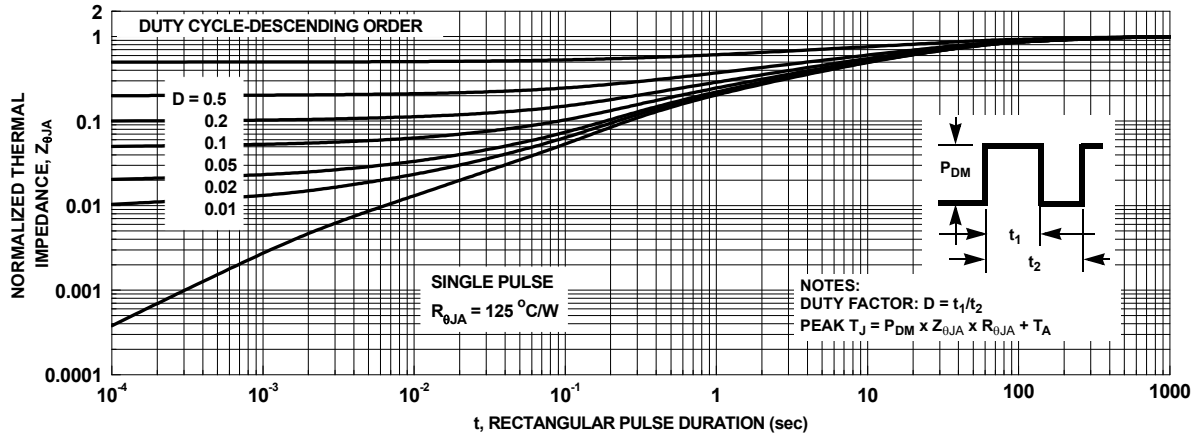
Figure 11. Forward Bias Safe Operating Area

Figure 12. Single Pulse Maximum Power Dissipation

Typical Characteristics T_J = 25°C unless otherwise noted

DUTY CYCLE-DESCENDING ORDER

D = 0.5
0.2
0.1
0.05
0.02
0.01

NORMALIZED THERMAL IMPEDANCE, $Z_{\theta JA}$

SINGLE PULSE

$R_{\theta JA}$ = 125 °C/W

NOTES:
DUTY FACTOR: D = t_1/t_2
PEAK T_J = P_{DM} x $Z_{\theta JA}$ x $R_{\theta JA}$ + T_A

t, RECTANGULAR PULSE DURATION (sec)

Figure 13. Junction-to-Ambient Transient Thermal Response Curve

3.40
3.20
PKG ₵

A

B

8   5

PKG ₵

3.40
3.20

1   4

PIN 1
INDICATOR

SEE
DETAIL A

2.37 MIN

SYM ₵

8   5
(0.45)

PKG ₵
(0.40)

2.15 MIN

(0.65)

0.70 MIN

1   4

0.65

1.95

0.42 MIN
(8X)

LAND PATTERN
RECOMMENDATION

⊕ | 0.10 | C | A | B

0.37
0.27 (8X)

1.95

0.65

0.50
0.30

1   4

PKG ₵

2.05
1.85

(0.34)

8   5

(0.33) TYP

(0.52 TYP)

(2.27)

NOTES: UNLESS OTHERWISE SPECIFIED

A) PACKAGE STANDARD REFERENCE:
   JEDEC MO-240, ISSUE A, VAR. BA,
   DATED OCTOBER 2002.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE BURRS
   OR MOLD FLASH. MOLD FLASH OR
   BURRS DOES NOT EXCEED 0.10MM.
D) DIMENSIONING AND TOLERANCING PER
   ASME Y14.5M-1994.
E) DRAWING FILE NAME: PQFN08HREV1

// | 0.10 | C

0.80
0.70

⌒ | 0.08 | C

0.05
0.00

0.25
0.15

C

SEATING
PLANE

DETAIL A
SCALE: 2X

PUBLICATION ORDERING INFORMATION

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