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June 2016

# FDMD84100

## Dual N-Channel PowerTrench® MOSFET

100 V, 21 A, 20 mΩ

### Features

- Max  $r_{DS(on)} = 20 \text{ m}\Omega$  at  $V_{GS} = 10 \text{ V}$ ,  $I_D = 7 \text{ A}$
- Max  $r_{DS(on)} = 32 \text{ m}\Omega$  at  $V_{GS} = 6 \text{ V}$ ,  $I_D = 5.5 \text{ A}$
- Ideal for flexible layout in secondary side synchronous rectification
- Termination is Lead-free and RoHS Compliant
- 100% UIL tested

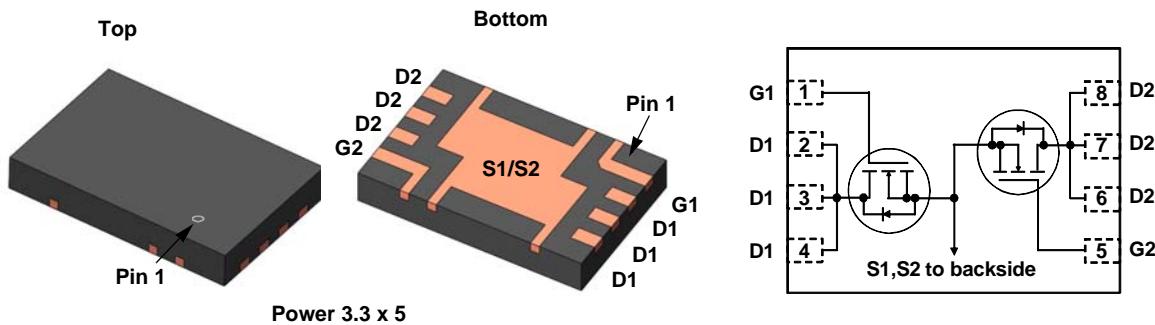


### General Description

This package integrates two N-Channel devices connected internally in common-source configuration. This enables very low package parasitics and optimized thermal path to the common source pad on the bottom. Provides a very small footprint (3.3 x 5 mm) for higher power density.

### Applications

- Isolated DC-DC Synchronous Rectifiers
- Common Ground Load Switches



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	100	V
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous $T_C = 25 \text{ }^\circ\text{C}$	21	A
	-Continuous $T_A = 25 \text{ }^\circ\text{C}$ (Note 1a)	7	
	-Pulsed (Note 4)	80	
$E_{AS}$	Single Pulse Avalanche Energy (Note 3)	121	mJ
$P_D$	Power Dissipation $T_C = 25 \text{ }^\circ\text{C}$	23	W
	Power Dissipation $T_A = 25 \text{ }^\circ\text{C}$ (Note 1a)	2.1	
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	5.3	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
84100	FDMD84100	Power 3.3 x 5	13 "	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Off Characteristics

$\text{BV}_{\text{DSS}}$	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	100			V
$\frac{\Delta \text{BV}_{\text{DSS}}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$ , referenced to $25^\circ\text{C}$		74		$\text{mV}/^\circ\text{C}$
$I_{\text{DSS}}$	Zero Gate Voltage Drain Current	$V_{DS} = 80 \text{ V}, V_{GS} = 0 \text{ V}$			1	$\mu\text{A}$
$I_{\text{GSS}}$	Gate to Source Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			$\pm 100$	nA

### On Characteristics

$V_{GS(\text{th})}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	2	3.1	4	V
$\frac{\Delta V_{GS(\text{th})}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$ , referenced to $25^\circ\text{C}$		-9		$\text{mV}/^\circ\text{C}$
$r_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 7 \text{ A}$		16	20	$\text{m}\Omega$
		$V_{GS} = 6 \text{ V}, I_D = 5.5 \text{ A}$		24	32	
		$V_{GS} = 10 \text{ V}, I_D = 7 \text{ A}, T_J = 125^\circ\text{C}$		30	38	
$g_{\text{FS}}$	Forward Transconductance	$V_{DD} = 5 \text{ V}, I_D = 7 \text{ A}$		17		S

### Dynamic Characteristics

$C_{\text{iss}}$	Input Capacitance	$V_{DS} = 50 \text{ V}, V_{GS} = 0 \text{ V}$ $f = 1 \text{ MHz}$		734	980	pF
$C_{\text{oss}}$	Output Capacitance			168	225	pF
$C_{\text{rss}}$	Reverse Transfer Capacitance			6.6	15	pF
$R_g$	Gate Resistance		0.1	1.3	3	$\Omega$

### Switching Characteristics

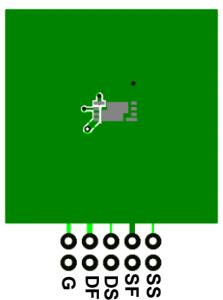
$t_{d(\text{on})}$	Turn-On Delay Time	$V_{DD} = 50 \text{ V}, I_D = 7 \text{ A}$ $V_{GS} = 10 \text{ V}, R_{\text{GEN}} = 6 \Omega$		8.4	17	ns
$t_r$	Rise Time			2.6	10	ns
$t_{d(\text{off})}$	Turn-Off Delay Time			14	25	ns
$t_f$	Fall Time			2.8	10	ns
$Q_{g(\text{TOT})}$	Total Gate Charge	$V_{GS} = 0 \text{ V} \text{ to } 10 \text{ V}$		11	16	nC
	Total Gate Charge	$V_{GS} = 0 \text{ V} \text{ to } 6 \text{ V}$	$V_{DD} = 50 \text{ V}$	7.3	11	nC
$Q_{gs}$	Gate to Source Charge	$I_D = 7 \text{ A}$		3.4		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			2.5		nC

### Drain-Source Diode Characteristics

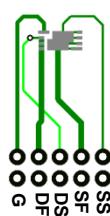
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 7 \text{ A}$	(Note 2)	0.8	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 7 \text{ A}, \text{di/dt} = 100 \text{ A}/\mu\text{s}$		43	70	ns
$Q_{rr}$	Reverse Recovery Charge			44	71	nC

#### NOTES:

1.  $R_{\text{thJA}}$  is determined with the device mounted on a 1 in<sup>2</sup> pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR-4 material.  $R_{\text{thJC}}$  is guaranteed by design while  $R_{\text{thCA}}$  is determined by the user's board design.



a. 60 °C/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b. 160 °C/W when mounted on a minimum pad of 2 oz copper

2. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty cycle < 2.0 %.

3.  $E_{AS}$  of 121 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 3 \text{ mH}$ ,  $I_{AS} = 9 \text{ A}$ ,  $V_{DD} = 100 \text{ V}$ ,  $V_{GS} = 10 \text{ V}$ . 100% tested at  $L = 0.1 \text{ mH}$ ,  $I_{AS} = 30 \text{ A}$ .

4. Pulse Id refers to Figure.11 Forward Bias Safe Operation Area.

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

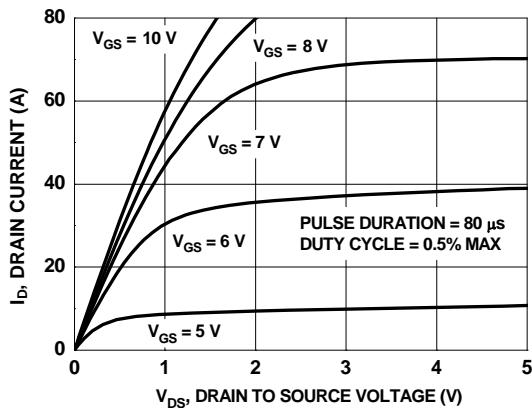


Figure 1. On-Region Characteristics

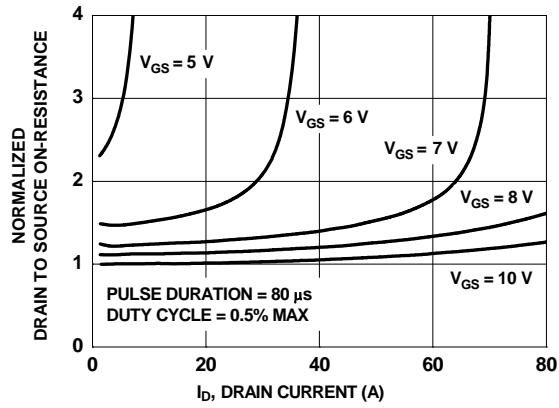


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

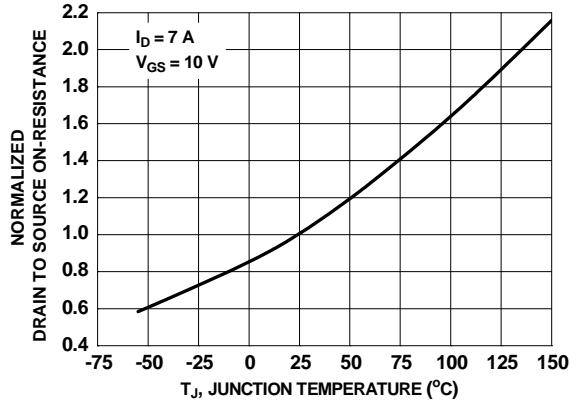


Figure 3. Normalized On-Resistance vs Junction Temperature

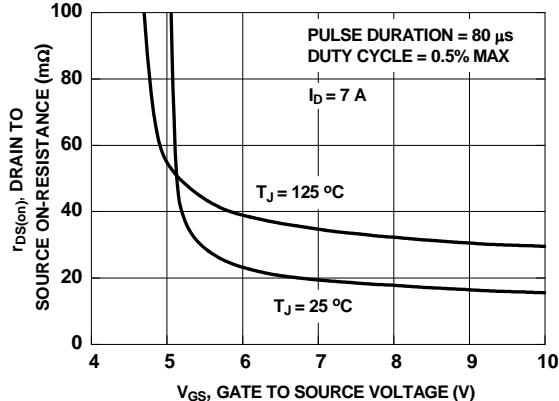


Figure 4. On-Resistance vs Gate to Source Voltage

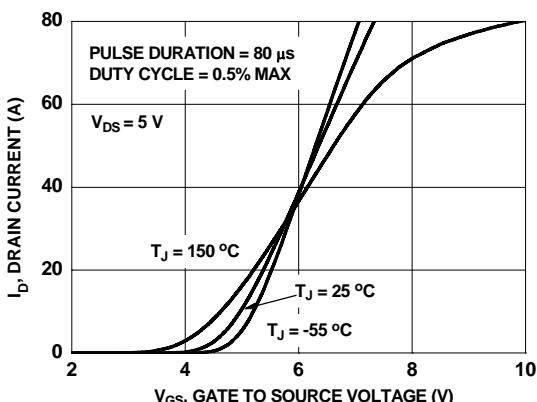


Figure 5. Transfer Characteristics

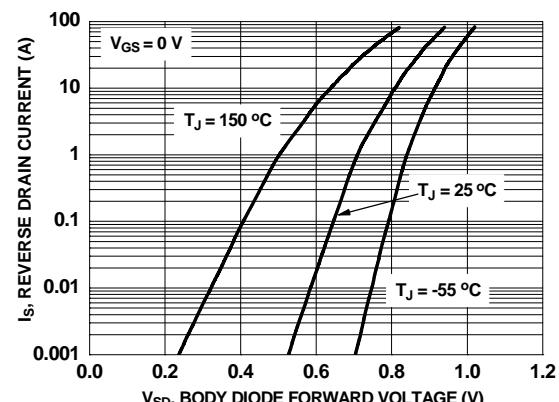


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

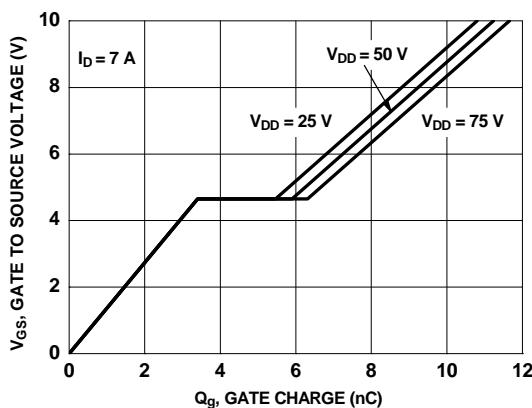


Figure 7. Gate Charge Characteristics

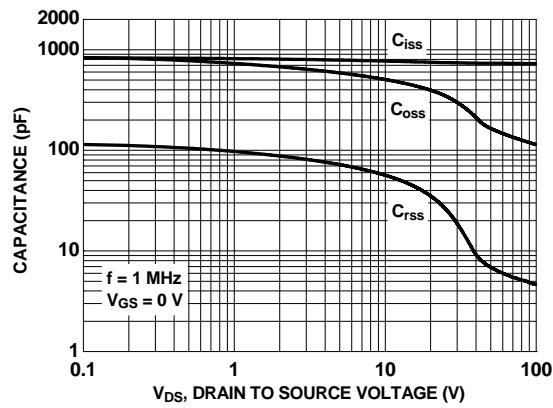


Figure 8. Capacitance vs Drain to Source Voltage

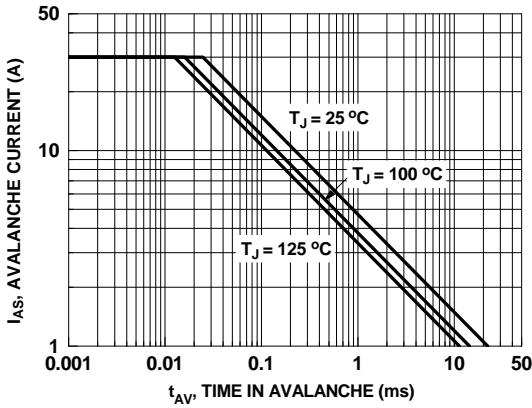


Figure 9. Unclamped Inductive Switching Capability

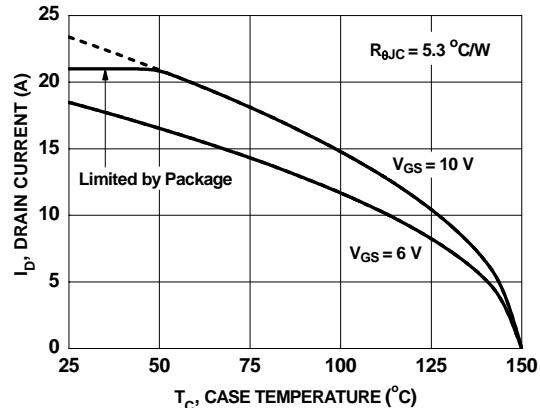


Figure 10. Maximum Continuous Drain Current vs Case Temperature

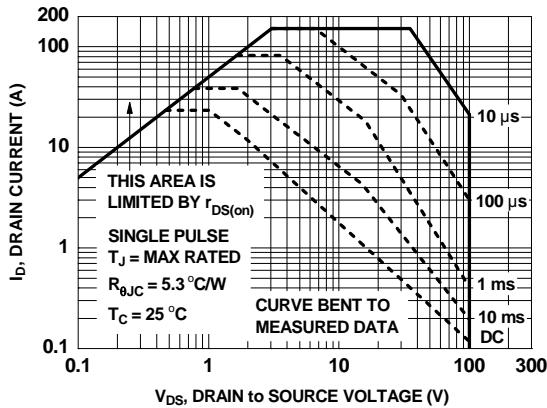


Figure 11. Forward Bias Safe Operating Area

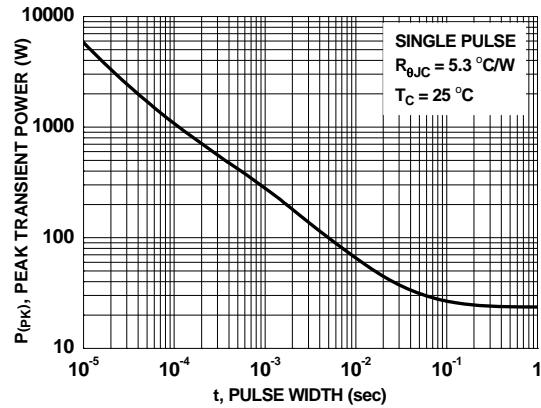


Figure 12. Single Pulse Maximum Power Dissipation

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

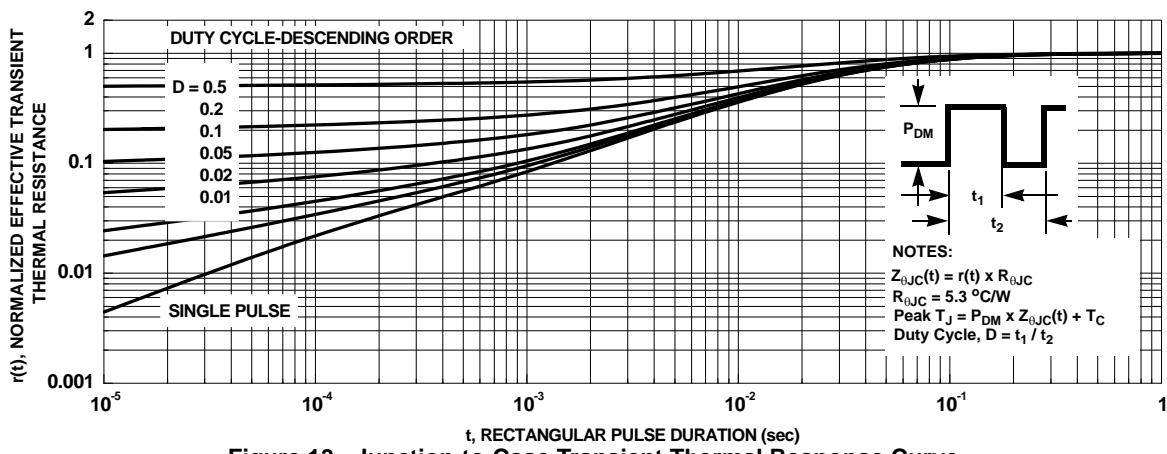
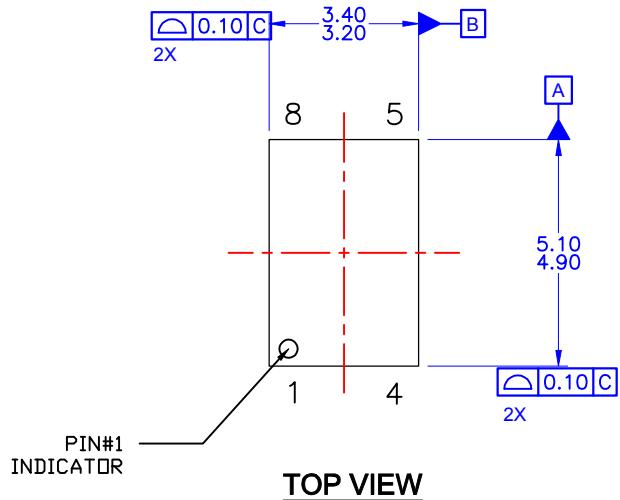
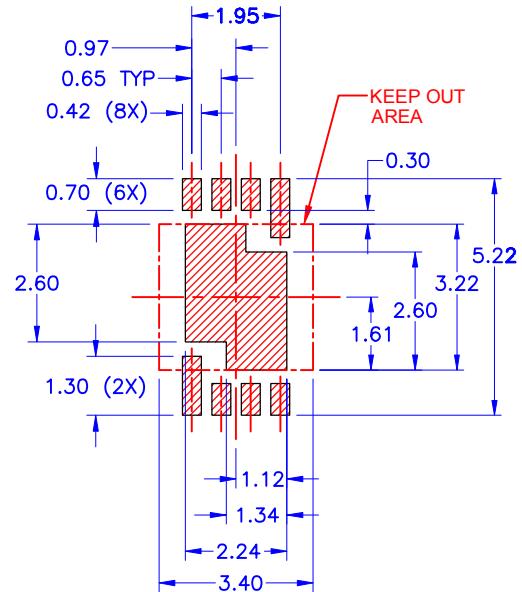


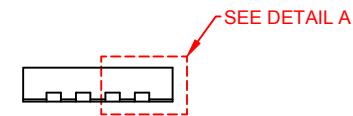
Figure 13. Junction-to-Case Transient Thermal Response Curve



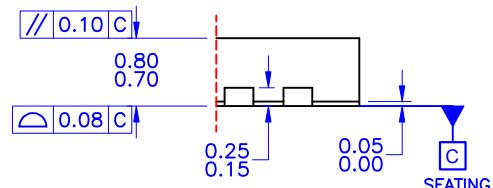
TOP VIEW



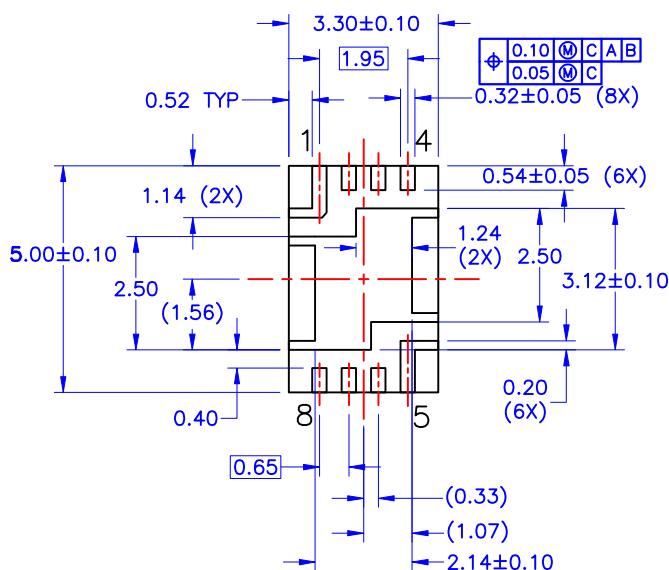
LAND PATTERN  
RECOMMENDATION



FRONT VIEW



DETAIL A  
SCALE: 2X



BOTTOM VIEW

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