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June 2014

# FDMD82100

## Dual N-Channel Power Trench<sup>®</sup> MOSFET

100 V, 25 A, 19 mΩ

### Features

- Max  $r_{DS(on)}$  = 19 mΩ at  $V_{GS} = 10\text{ V}$ ,  $I_D = 7\text{ A}$
- Max  $r_{DS(on)}$  = 33 mΩ at  $V_{GS} = 6\text{ V}$ ,  $I_D = 5.5\text{ A}$
- Ideal for flexible layout in primary side of bridge topology
- Termination is Lead-free and RoHS Compliant
- 100% UIL tested
- Kelvin High Side MOSFET drive pin-out capability

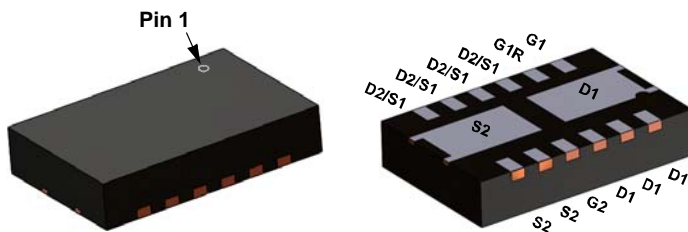


### General Description

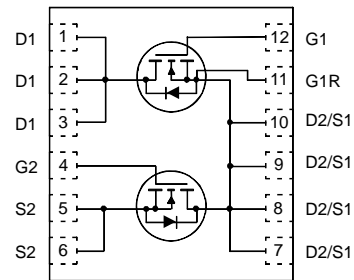
This device includes two 100V N-Channel MOSFETs in a dual Power (3.3 mm X 5 mm) package. HS source and LS Drain internally connected for half/full bridge, low source inductance package, low  $r_{DS(on)}$ /Qg FOM silicon.

### Applications

- Synchronous Buck : Primary Switch of Half / Full bridge converter for telecom
- Motor Bridge : Primary Switch of Half / Full bridge converter for BLDC motor
- MV POL : 48V Synchronous Buck Switch



Power 3.3 x 5



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

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

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.1	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	60	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1b)	130	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
82100	FDMD82100	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

$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\ \mu\text{A}, V_{GS} = 0\ \text{V}$	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , referenced to $25^\circ\text{C}$		70		mV/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 80\ \text{V}, V_{GS} = 0\ \text{V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate to Source Leakage Current	$V_{GS} = \pm 20\ \text{V}, V_{DS} = 0\ \text{V}$			$\pm 100$	nA

### On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	2	3.3	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , referenced to $25^\circ\text{C}$		-9		mV/°C
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\ \text{V}, I_D = 7\ \text{A}$		15	19	m $\Omega$
		$V_{GS} = 6\ \text{V}, I_D = 5.5\ \text{A}$		23	33	
		$V_{GS} = 10\ \text{V}, I_D = 7\ \text{A}, T_J = 125^\circ\text{C}$		27	35	
$g_{FS}$	Forward Transconductance	$V_{DD} = 5\ \text{V}, I_D = 7\ \text{A}$		18		S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 50\ \text{V}, V_{GS} = 0\ \text{V}$ $f = 1\ \text{MHz}$		805	1070	pF
$C_{oss}$	Output Capacitance			176	235	pF
$C_{rss}$	Reverse Transfer Capacitance			8	15	pF
$R_g$	Gate Resistance		0.1	1.8	3.6	$\Omega$

### Switching Characteristics

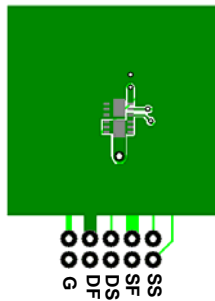
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\ \text{V}, I_D = 7\ \text{A}$ $V_{GS} = 10\ \text{V}, R_{GEN} = 6\ \Omega$		9.4	19	ns
$t_r$	Rise Time			3.2	10	ns
$t_{d(off)}$	Turn-Off Delay Time			15	27	ns
$t_f$	Fall Time			3.3	10	ns
$Q_{g(TOT)}$	Total Gate Charge		$V_{GS} = 0\ \text{V to } 10\ \text{V}$		12	17
	Total Gate Charge	$V_{GS} = 0\ \text{V to } 6\ \text{V}$		8	11	nC
$Q_{gs}$	Gate to Source Charge	$V_{DD} = 50\ \text{V}$ $I_D = 7\ \text{A}$		3.9		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			2.7		nC

### Drain-Source Diode Characteristics

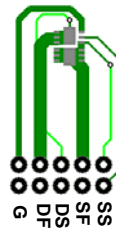
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\ \text{V}, I_S = 7\ \text{A}$ (Note 2)		0.8	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 7\ \text{A}, di/dt = 100\ \text{A}/\mu\text{s}$		46	74	ns
$Q_{rr}$	Reverse Recovery Charge			48	77	nC

#### NOTES:

1.  $R_{\theta JA}$  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.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  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. 130 °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**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted

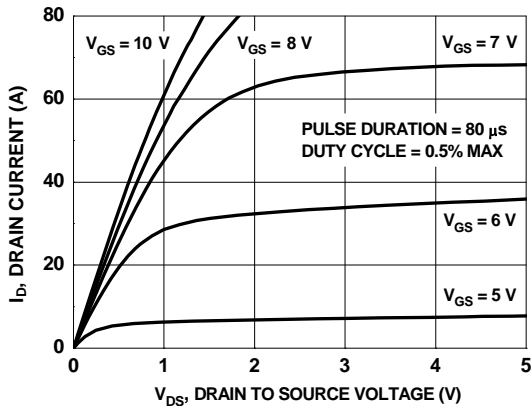


Figure 1. On Region Characteristics

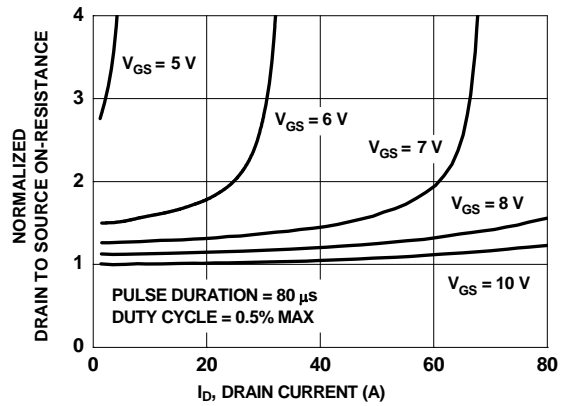


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

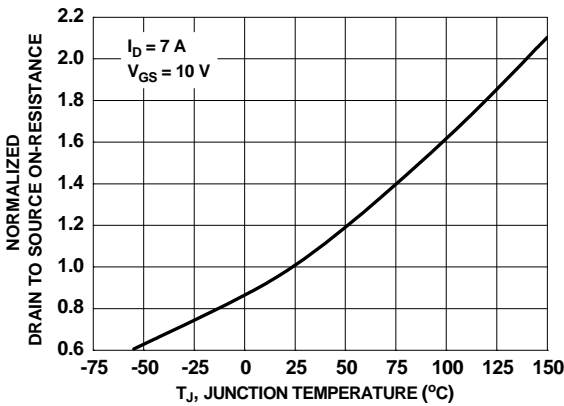


Figure 3. Normalized On Resistance vs Junction Temperature

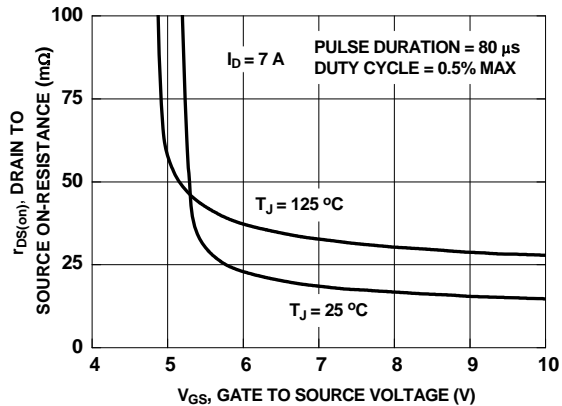


Figure 4. On-Resistance vs Gate to Source Voltage

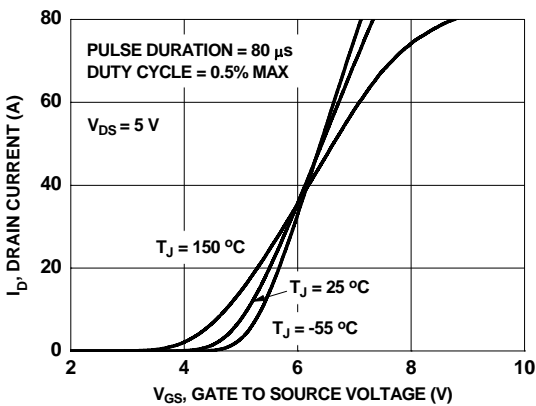


Figure 5. Transfer Characteristics

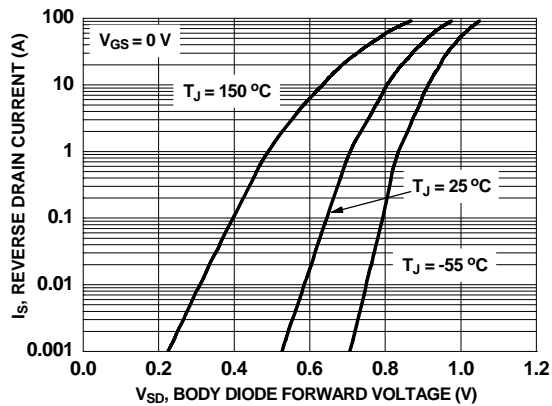
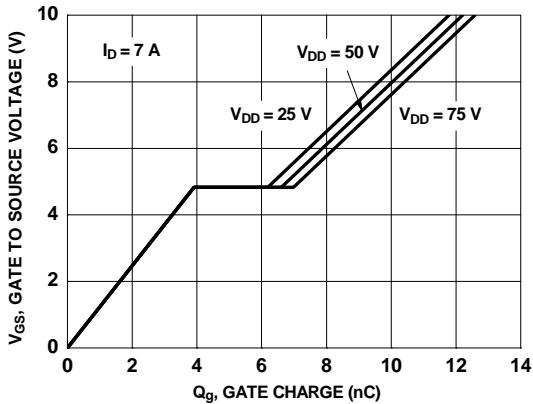
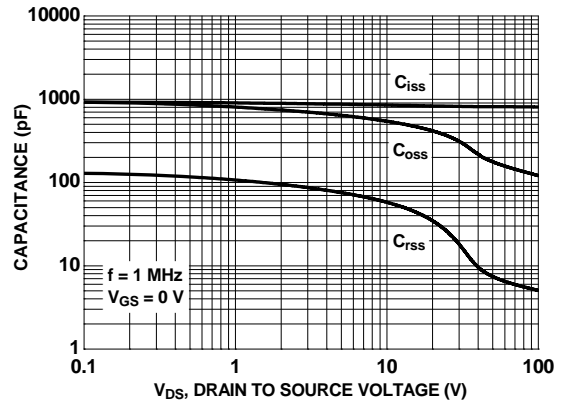


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

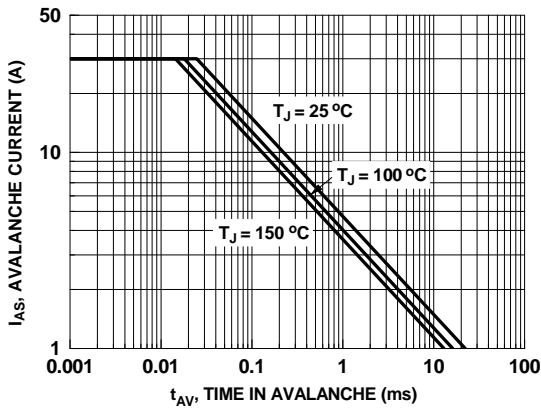
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



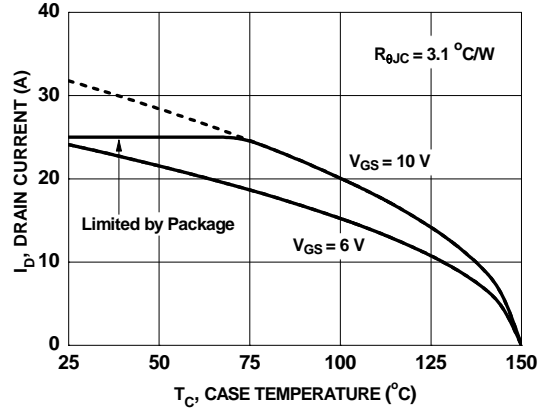
**Figure 7. Gate Charge Characteristics**



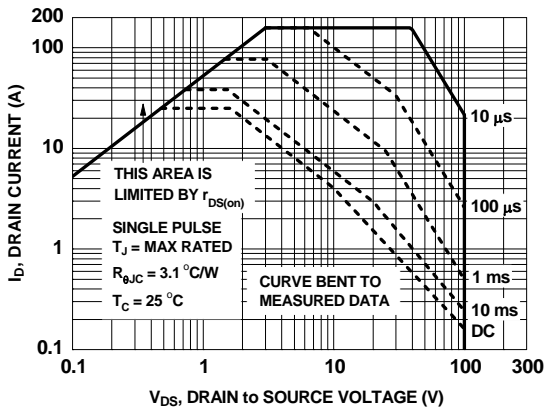
**Figure 8. Capacitance vs Drain to Source Voltage**



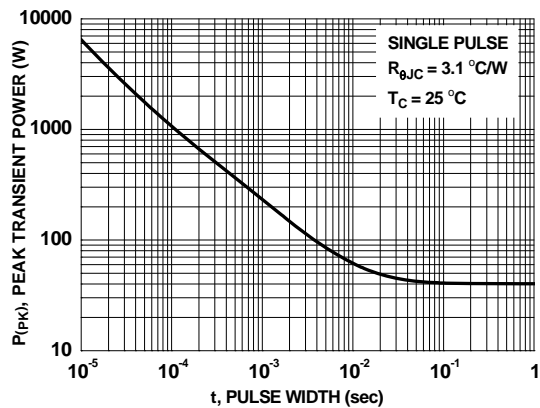
**Figure 9. Unclamped Inductive Switching Capability**



**Figure 10. Maximum Continuous Drain Current vs Case Temperature**

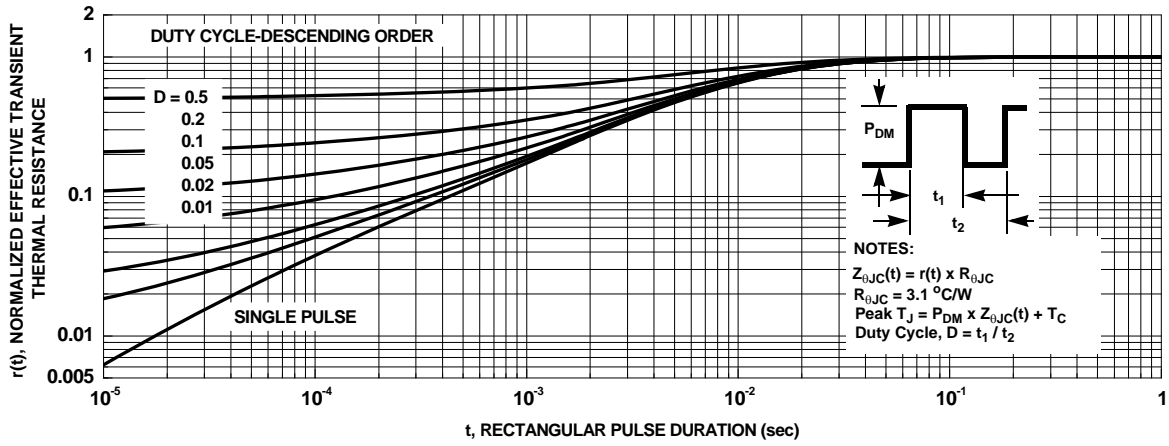


**Figure 11. Forward Bias Safe Operating Area**

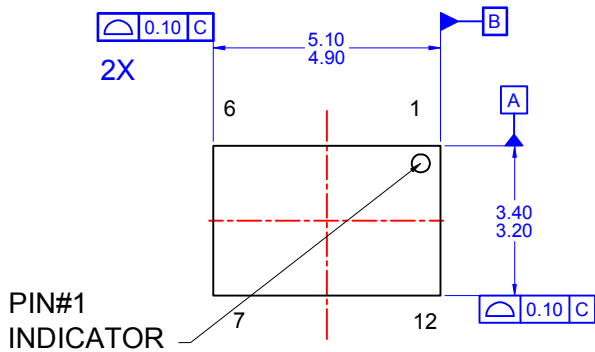


**Figure 12. Single Pulse Maximum Power Dissipation**

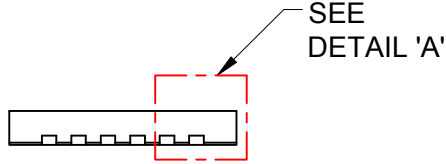
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted



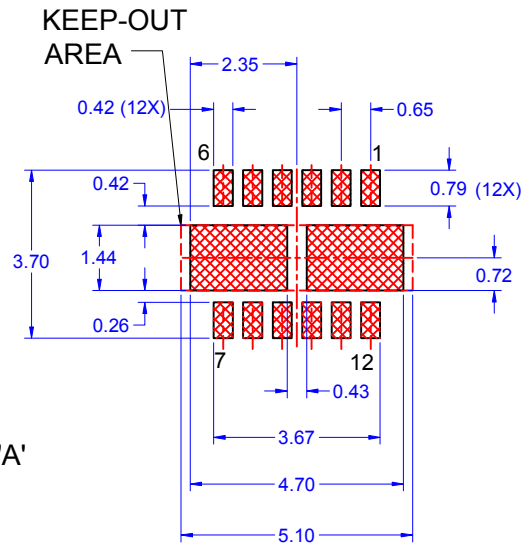
**Figure 13. Junction-to-Case Transient Thermal Response Curve**



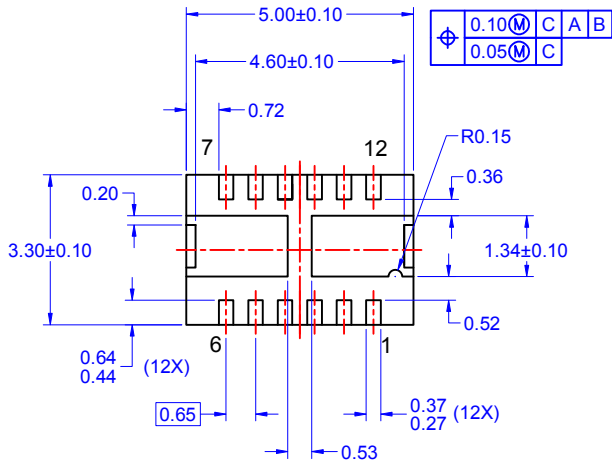
**TOP VIEW**



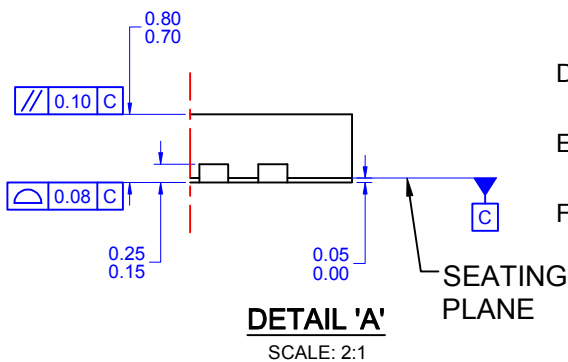
**FRONT VIEW**



**LAND PATTERN RECOMMENDATION**



**BOTTOM VIEW**



**DETAIL 'A'**

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  - 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) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.
  - F) DRAWING FILE NAME: MKT-PQFN12BREV1

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