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May 2016

# FDMD8680

## Dual N-Channel PowerTrench<sup>®</sup> MOSFET

80 V, 66 A, 4.7 mΩ

### Features

- Common Source Configuration to Eliminate PCB Routing
- Large Source Pad on Bottom of Package for Enhanced Thermals
- Max  $r_{DS(on)}$  = 4.7 mΩ at  $V_{GS} = 10\text{ V}$ ,  $I_D = 16\text{ A}$
- Max  $r_{DS(on)}$  = 6.4 mΩ at  $V_{GS} = 8\text{ V}$ ,  $I_D = 14\text{ A}$
- Ideal for Flexible Layout in Secondary Side Synchronous Rectification
- 100% UIL Tested
- Termination is Lead-free and RoHS Compliant

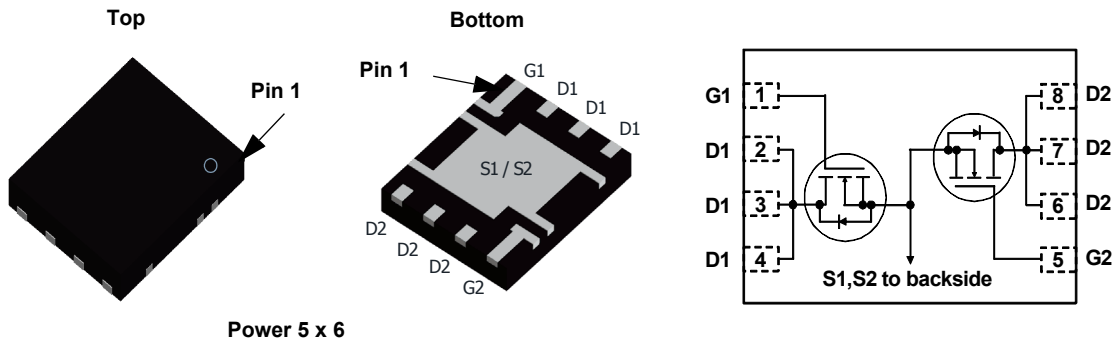


### General Description

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 (5 x 6 mm) for higher power density.

### Applications

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



Power 5 x 6

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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain to Source Voltage	80	V
$V_{GS}$	Gate to Source Voltage	±20	V
$I_D$	Drain Current -Continuous	$T_C = 25\text{ °C}$ (Note 5)	66
	-Continuous	$T_C = 100\text{ °C}$ (Note 5)	42
	-Continuous	$T_A = 25\text{ °C}$ (Note 1a)	16
	-Pulsed	(Note 4)	487
$E_{AS}$	Single Pulse Avalanche Energy	(Note 3)	337
$P_D$	Power Dissipation	$T_C = 25\text{ °C}$	39
	Power Dissipation	$T_A = 25\text{ °C}$ (Note 1a)	2.3
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	°C

### Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	3.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	55	

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMD8680	FDMD8680	Power 5 x 6	13 "	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$ , $V_{GS} = 0\text{ V}$	80			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$		50		mV/ $^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 64\text{ V}$ , $V_{GS} = 0\text{ V}$			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	$V_{GS} = V_{DS}$ , $I_D = 250\text{ }\mu\text{A}$	2.0	3.0	4.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , referenced to $25\text{ }^\circ\text{C}$		-10		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$ , $I_D = 16\text{ A}$		3.3	4.7	m $\Omega$
		$V_{GS} = 8\text{ V}$ , $I_D = 14\text{ A}$		3.9	6.4	
		$V_{GS} = 10\text{ V}$ , $I_D = 16\text{ A}$ , $T_J = 125\text{ }^\circ\text{C}$		5.6	8.0	
$g_{FS}$	Forward Transconductance	$V_{DD} = 10\text{ V}$ , $I_D = 16\text{ A}$		49		S

## Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 40\text{ V}$ , $V_{GS} = 0\text{ V}$ $f = 1\text{ MHz}$		3805	5330	pF
$C_{oss}$	Output Capacitance			657	920	pF
$C_{rss}$	Reverse Transfer Capacitance			26	77	pF
$R_g$	Gate Resistance		0.1	1.7	3.4	$\Omega$

## Switching Characteristics

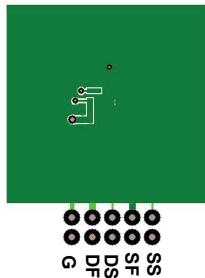
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 40\text{ V}$ , $I_D = 16\text{ A}$ $V_{GS} = 10\text{ V}$ , $R_{GEN} = 6\text{ }\Omega$		20	32	ns
$t_r$	Rise Time			18	32	ns
$t_{d(off)}$	Turn-Off Delay Time			30	48	ns
$t_f$	Fall Time			10	20	ns
$Q_{g(TOT)}$	Total Gate Charge		$V_{GS} = 0\text{ V to }10\text{ V}$		53	73
$Q_{gs}$	Gate to Source Charge	$V_{DD} = 40\text{ V}$ $I_D = 16\text{ A}$		17		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			10		nC

## Drain-Source Diode Characteristics

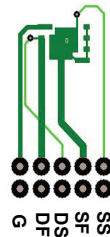
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 16\text{ A}$ (Note 2)		0.8	1.3	V
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$ , $I_S = 2\text{ A}$ (Note 2)		0.7	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 16\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		48	77	ns
$Q_{rr}$	Reverse Recovery Charge			39	62	nC

### NOTES:

1.  $R_{\theta JA}$  is determined with the device mounted on a  $1\text{ in}^2$  pad 2 oz copper pad on a  $1.5 \times 1.5\text{ in.}$  board of FR-4 material.  $R_{\theta CA}$  is determined by the user's board design.



a.  $55\text{ }^\circ\text{C/W}$  when mounted on a  $1\text{ in}^2$  pad of 2 oz copper



b.  $125\text{ }^\circ\text{C/W}$  when mounted on a minimum pad of 2 oz copper

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

3.  $E_{AS}$  of  $337\text{ mJ}$  is based on starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $L = 3\text{ mH}$ ,  $I_{AS} = 15\text{ A}$ ,  $V_{DD} = 80\text{ V}$ ,  $V_{GS} = 10\text{ V}$ . 100% tested at  $L = 0.1\text{ mH}$ ,  $I_{AS} = 49\text{ A}$ .

4. Pulsed  $I_D$  please refer to Fig 11 SOA graph 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**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted.

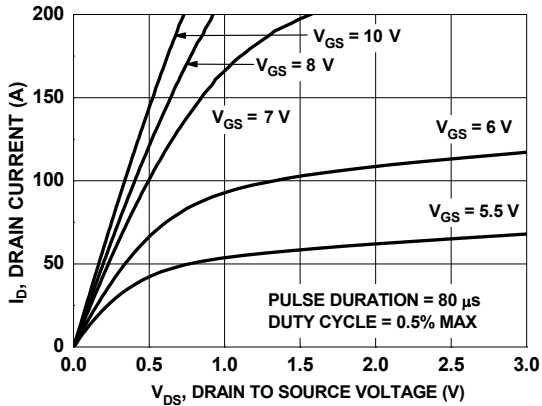


Figure 1. On-Region Characteristics

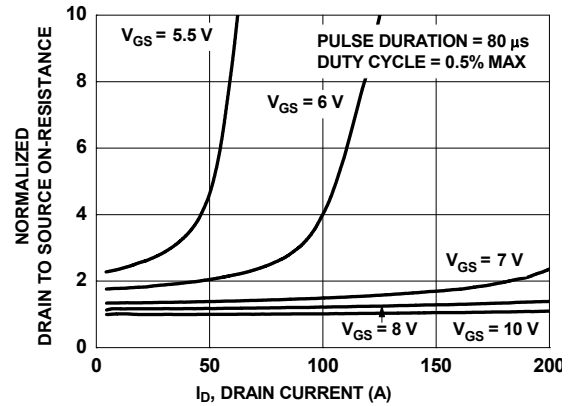


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

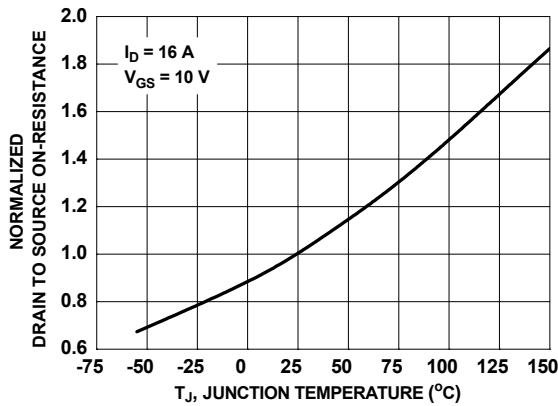


Figure 3. Normalized On Resistance vs. Junction Temperature

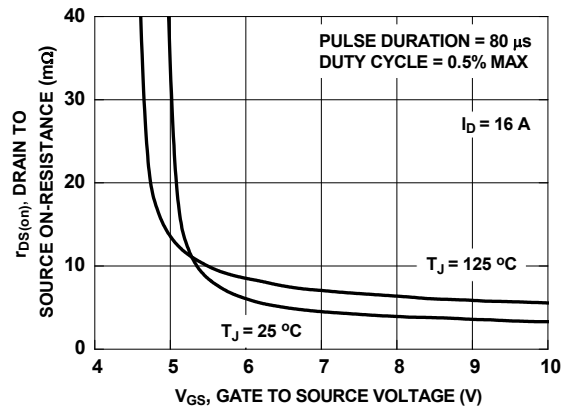


Figure 4. On Resistance vs. Gate to Source Voltage

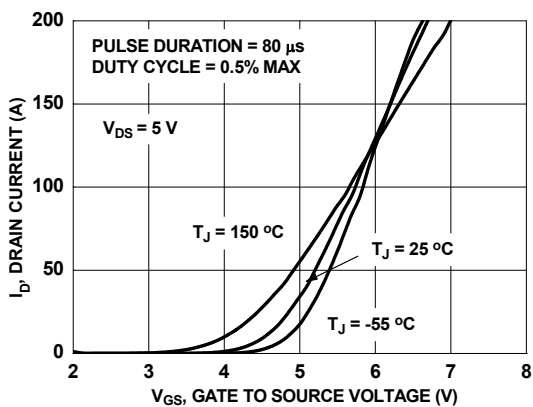


Figure 5. Transfer Characteristics

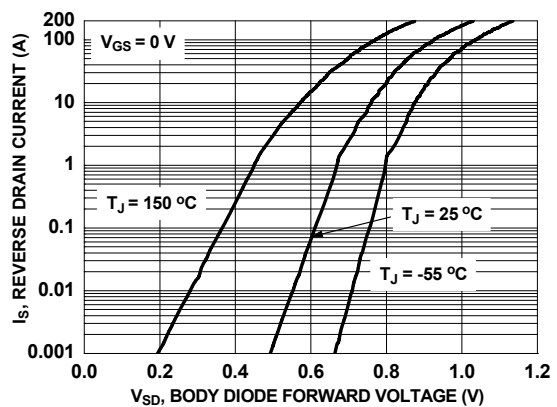
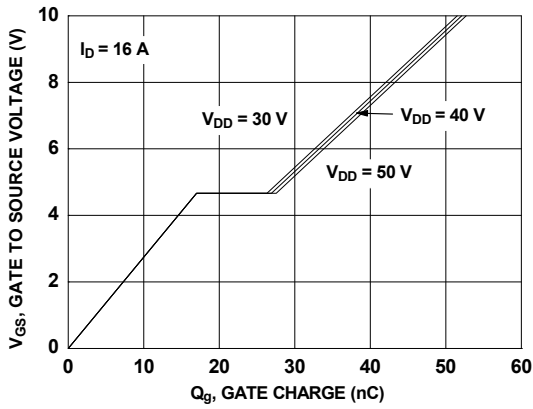
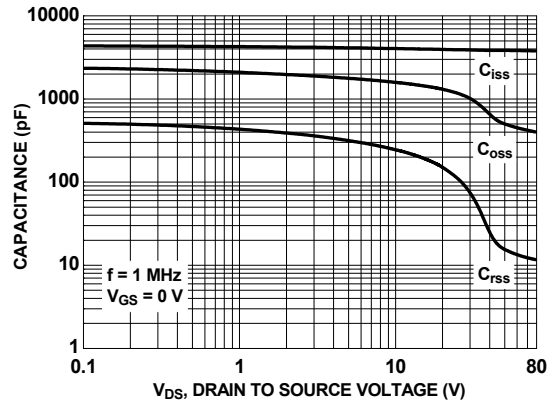


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

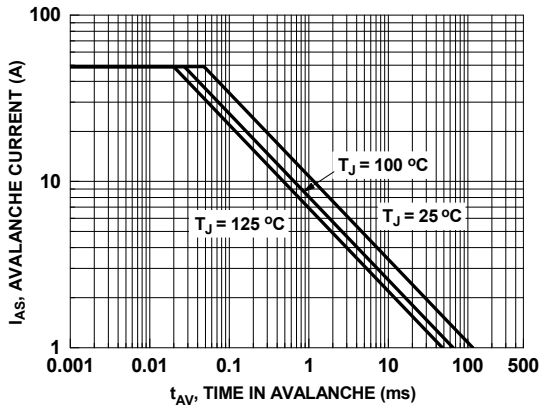
**Typical Characteristics**  $T_J = 25^\circ\text{C}$  unless otherwise noted.



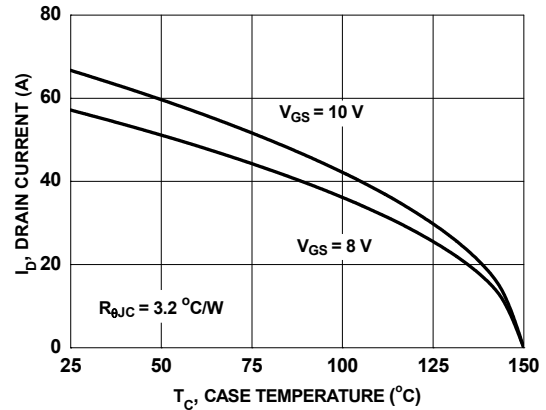
**Figure 7. Gate Charge Characteristics**



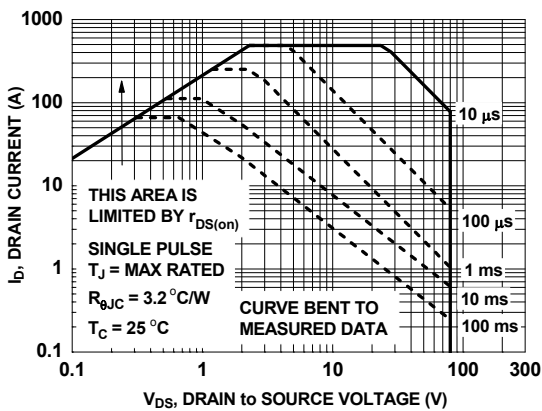
**Figure 8. Capacitance vs. Drain to Source Voltage**



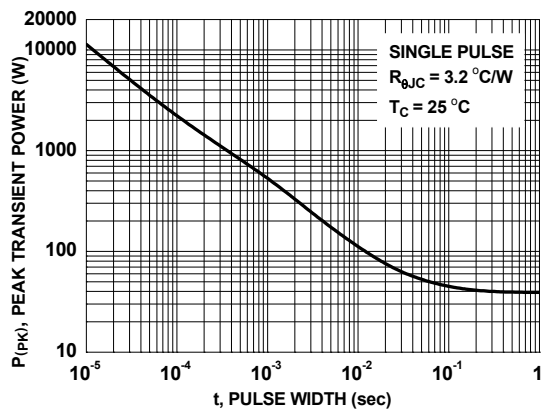
**Figure 9. Unclamped Inductive Switching Capability**



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

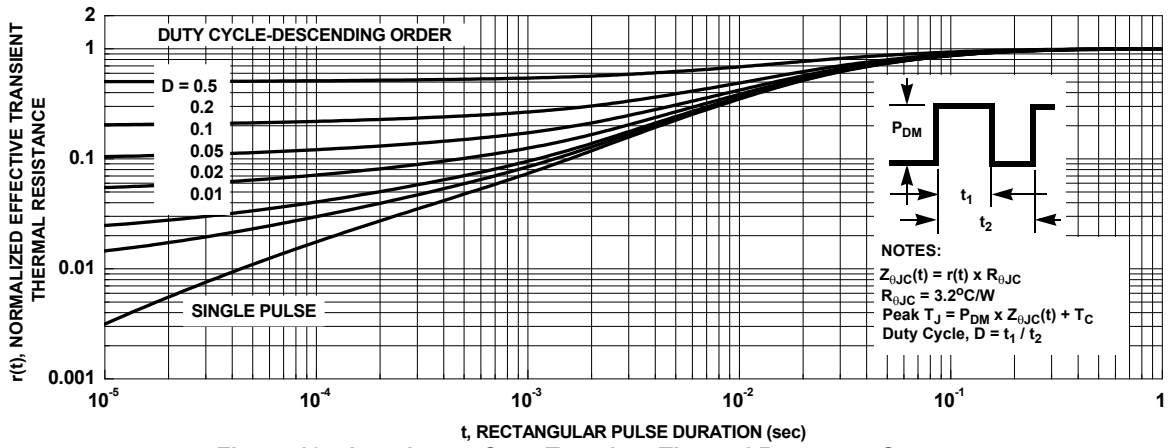


**Figure 11. Forward Bias Safe Operating Area**

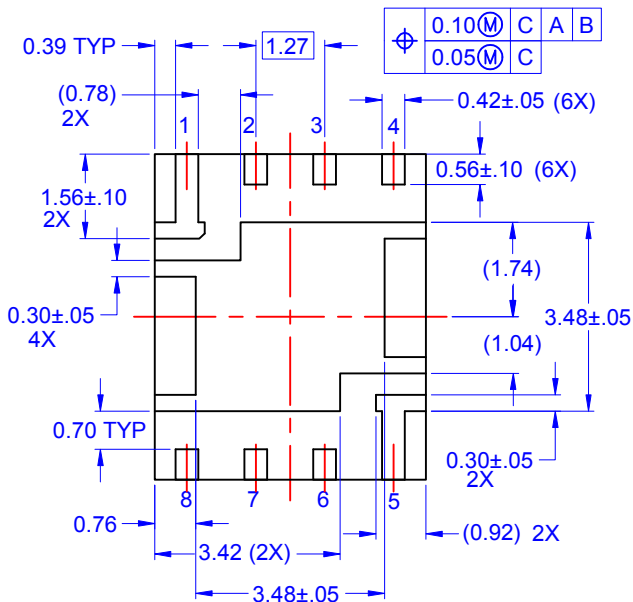
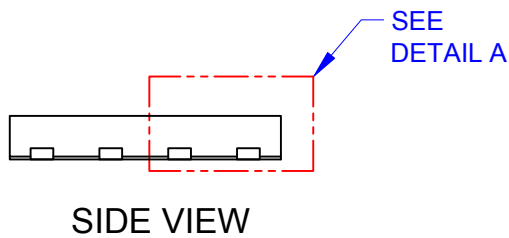
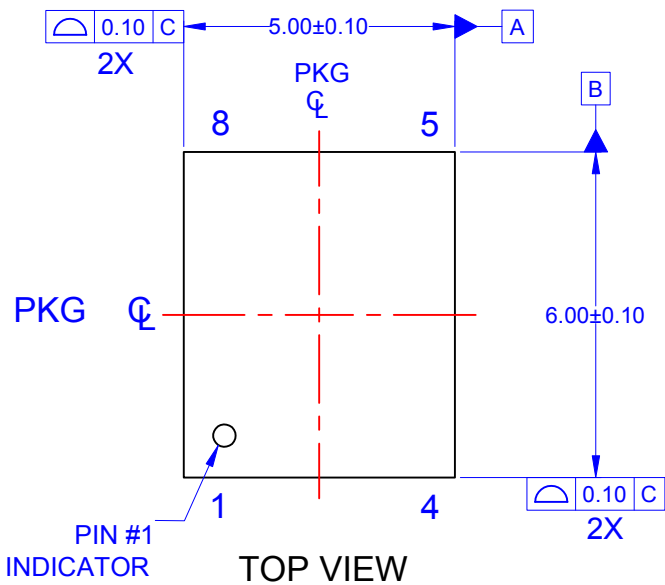


**Figure 12. Single Pulse Maximum Power Dissipation**

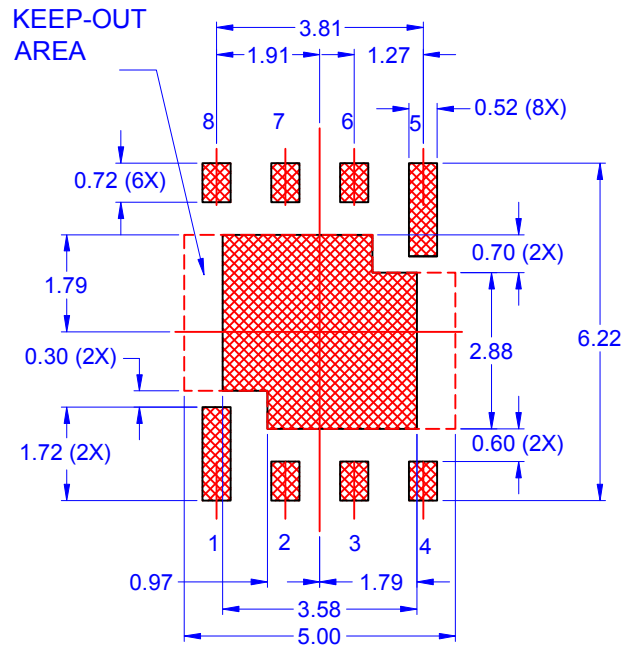
**Typical Characteristics**  $T_J = 25\text{ }^\circ\text{C}$  unless otherwise noted.



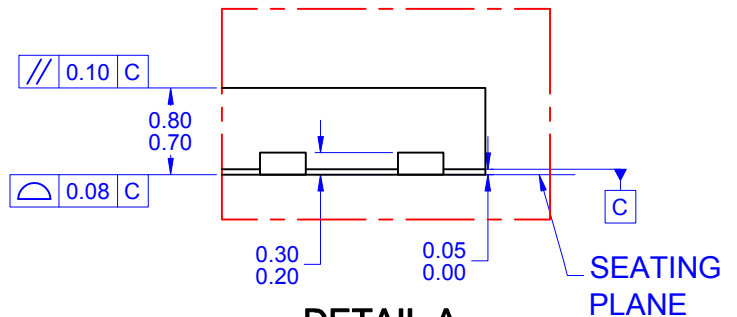
**Figure 13. Junction-to-Case Transient Thermal Response Curve**



**BOTTOM VIEW**



**RECOMMENDED LAND PATTERN**



**DETAIL A**  
(SCALE: 2X)

**NOTES:**

- A) PACKAGE REFERENCE : TO JEDEC REGISTRATION, MO-240B, VARIATION AA.
- 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-2009
- E) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP-OUT AREA
- F) DRAWING FILE NAME: PQFN08OREV1



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