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# FDMD8630

## Dual N-Channel PowerTrench® MOSFET

30 V, 167 A, 1.0 mΩ

### Features

- Common Source Configuration to Eliminate PCB Routing
- Large Source Pad on Bottom of Package for Enhanced Thermals
- Max  $r_{DS(on)}$  = 1.0 mΩ at  $V_{GS} = 10$  V,  $I_D = 38$  A
- Max  $r_{DS(on)}$  = 1.3 mΩ at  $V_{GS} = 4.5$  V,  $I_D = 33$  A
- Ideal for Flexible Layout in Secondary Side Synchronous Rectification
- 100% UIL Tested
- Termination is Lead-free and RoHS Compliant

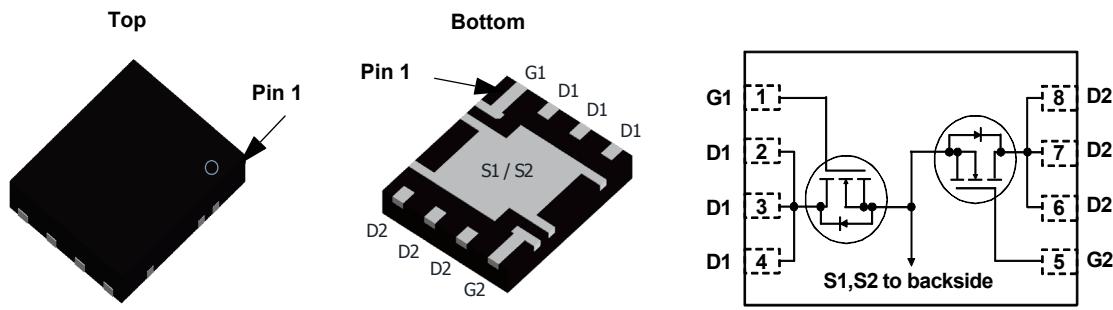


### General Description

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



### 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 Voltage	$\pm 20$	V
$I_D$	Drain Current -Continuous	$T_C = 25$ °C (Note 5)	167
	-Continuous	$T_C = 100$ °C (Note 5)	106
	Drain Current -Continuous	$T_A = 25$ °C (Note 1a)	38
	-Pulsed	(Note 4)	1178
$E_{AS}$	Single Pulse Avalanche Energy	(Note 3)	mJ
$P_D$	Power Dissipation	$T_C = 25$ °C	43
	Power Dissipation	$T_A = 25$ °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	2.9	°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
FDMD8630	FDMD8630	Power 5 x 6	13 "	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$ , referenced to $25^\circ\text{C}$		15		$\text{mV/}^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 24 \text{ V}, V_{GS} = 0 \text{ V}$			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

$V_{GS(\text{th})}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	1.0	1.6	3.0	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 $25^\circ\text{C}$		-6		$\text{mV/}^\circ\text{C}$
$r_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 38 \text{ A}$		0.6	1.0	$\text{m}\Omega$
		$V_{GS} = 4.5 \text{ V}, I_D = 33 \text{ A}$		0.8	1.3	
		$V_{GS} = 10 \text{ V}, I_D = 38 \text{ A}, T_J = 125^\circ\text{C}$		0.9	1.5	
$g_{FS}$	Forward Transconductance	$V_{DD} = 5 \text{ V}, I_D = 38 \text{ A}$		281		S

## Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}$ $f = 1 \text{ MHz}$		7090	9930	pF
$C_{oss}$	Output Capacitance			2025	2835	pF
$C_{rss}$	Reverse Transfer Capacitance			212	300	pF
$R_g$	Gate Resistance		0.1	1.9	3.8	$\Omega$

## Switching Characteristics

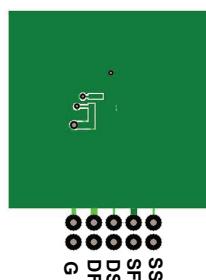
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15 \text{ V}, I_D = 38 \text{ A}$ $V_{GS} = 10 \text{ V}, R_{\text{GEN}} = 6 \Omega$		14	26	ns
$t_r$	Rise Time			15	27	ns
$t_{d(off)}$	Turn-Off Delay Time			66	105	ns
$t_f$	Fall Time			24	39	ns
$Q_{g(\text{TOT})}$	Total Gate Charge	$V_{GS} = 0 \text{ V} \text{ to } 10 \text{ V}$		97	142	nC
$Q_{g(\text{TOT})}$	Total Gate Charge		$V_{DD} = 15 \text{ V}$	46	74	nC
$Q_{gs}$	Gate to Source Charge	$I_D = 38 \text{ A}$		17		nC
$Q_{gd}$	Gate to Drain "Miller" Charge			12		nC

## Drain-Source Diode Characteristics

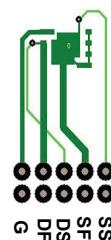
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 38 \text{ A}$	(Note 2)		0.8	1.3	V
$V_{SD}$	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 2 \text{ A}$	(Note 2)		0.7	1.2	V
$t_{rr}$	Reverse Recovery Time				64	103	ns
$Q_{rr}$	Reverse Recovery Charge	$I_F = 38 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$			56	90	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.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



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



b.  $125^\circ\text{C}/\text{W}$  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 726 mJ is based on starting  $T_J = 25^\circ\text{C}$ ,  $L = 3 \text{ mH}$ ,  $I_{AS} = 22 \text{ A}$ ,  $V_{DD} = 30 \text{ V}$ ,  $V_{GS} = 10 \text{ V}$ . 100% tested at  $L = 0.1 \text{ mH}$ ,  $I_{AS} = 70 \text{ A}$

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

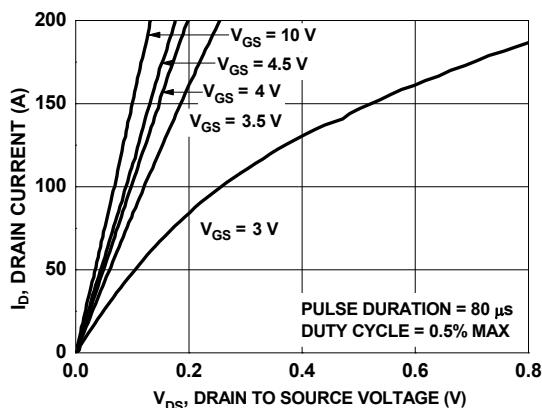


Figure 1. On-Region Characteristics

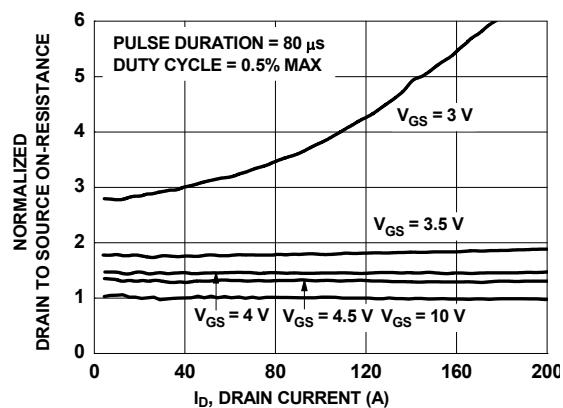


Figure 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

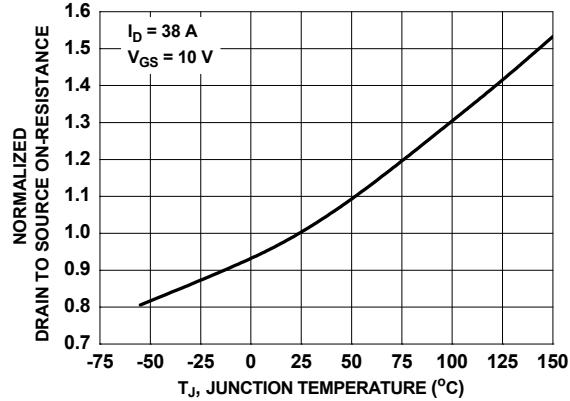


Figure 3. Normalized On Resistance vs. Junction Temperature

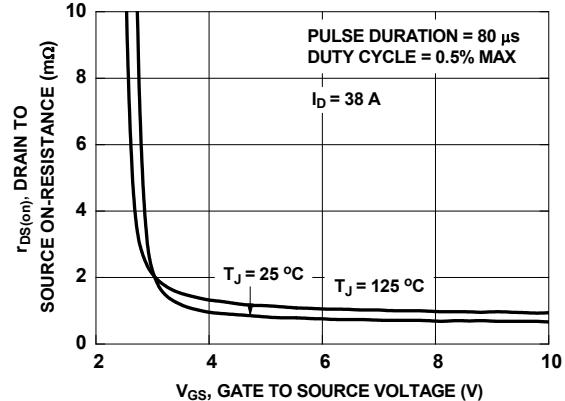


Figure 4. On Resistance vs. Gate to Source Voltage

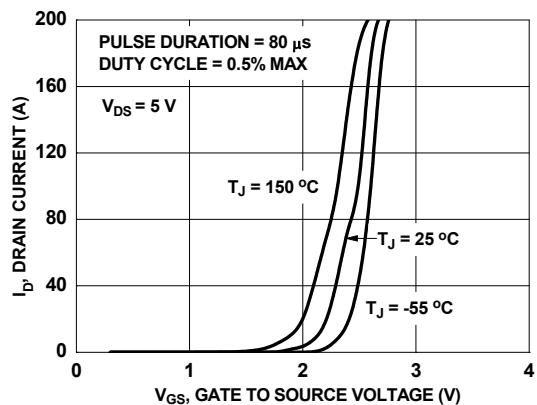


Figure 5. Transfer Characteristics

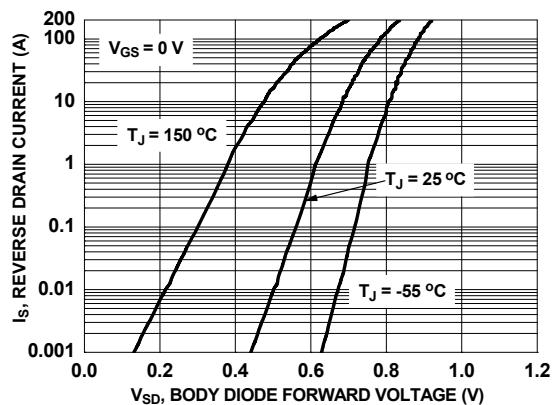


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

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

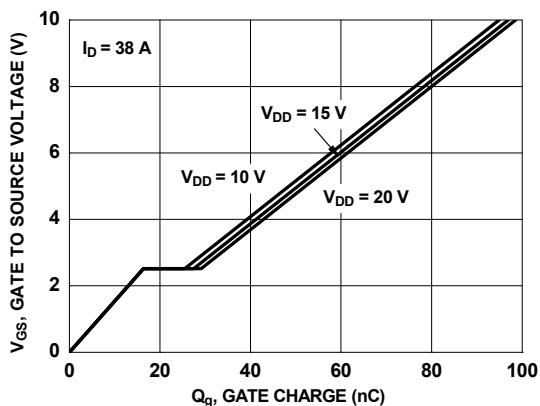


Figure 7. Gate Charge Characteristics

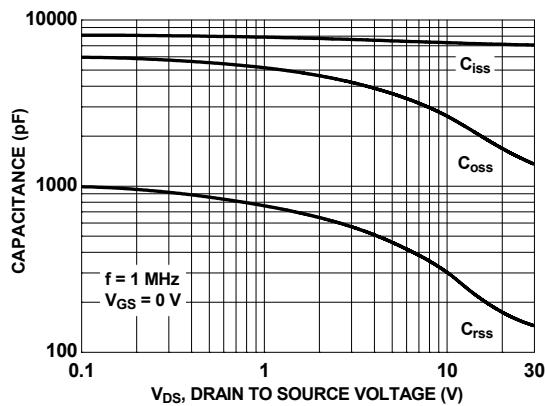


Figure 8. Capacitance vs. Drain to Source Voltage

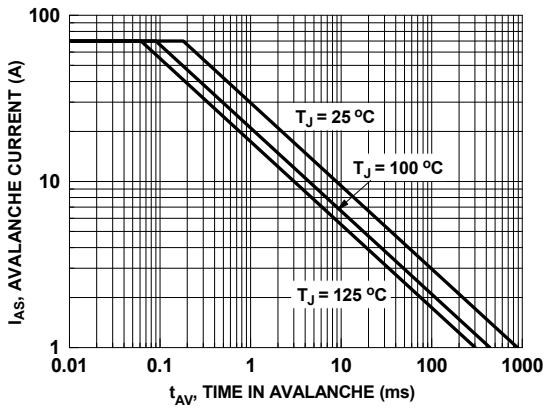


Figure 9. Unclamped Inductive Switching Capability

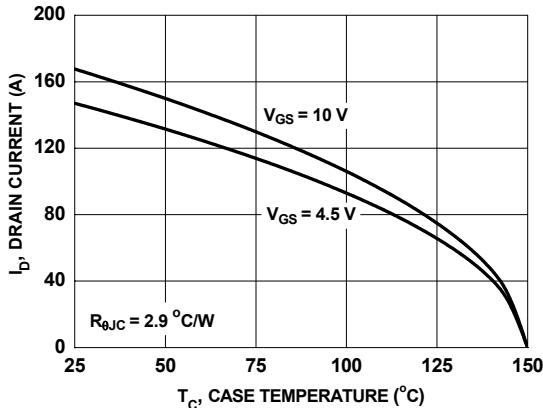


Figure 10. Maximum Continuous Drain Current vs. Case Temperature

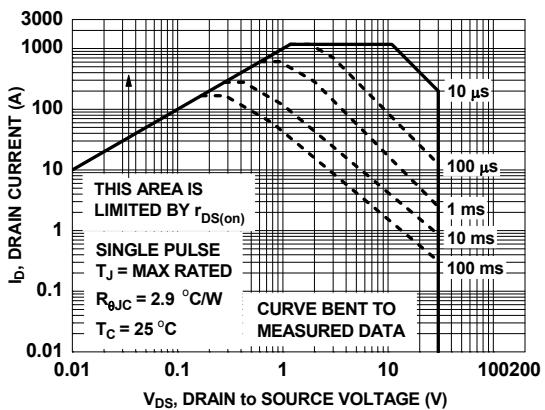


Figure 11. Forward Bias Safe Operating Area

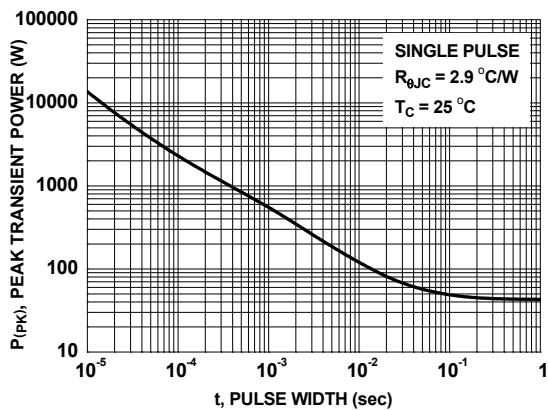


Figure 12. Single Pulse Maximum Power Dissipation

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

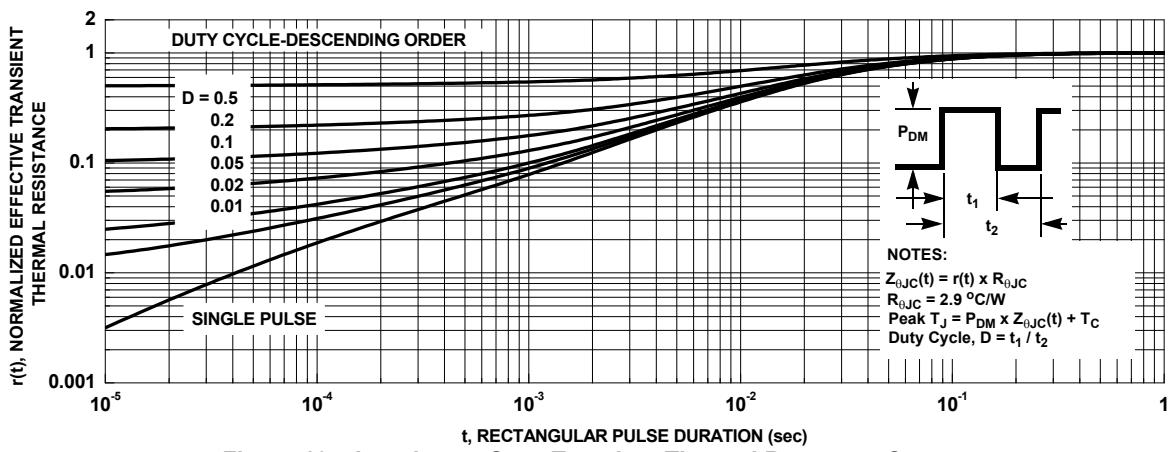
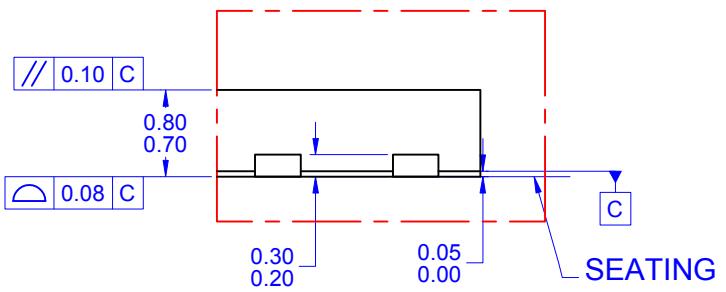
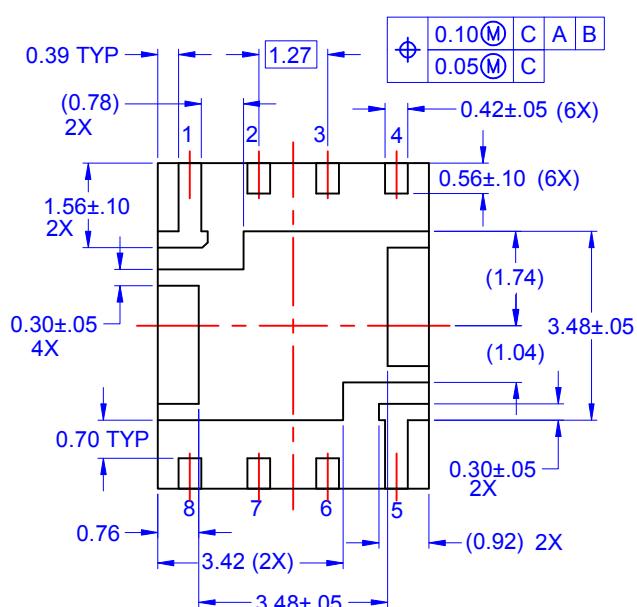
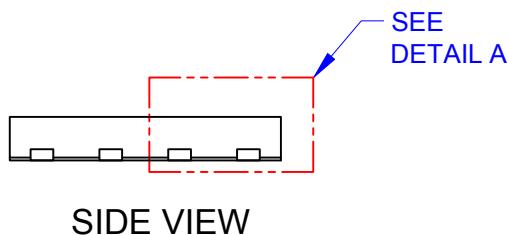
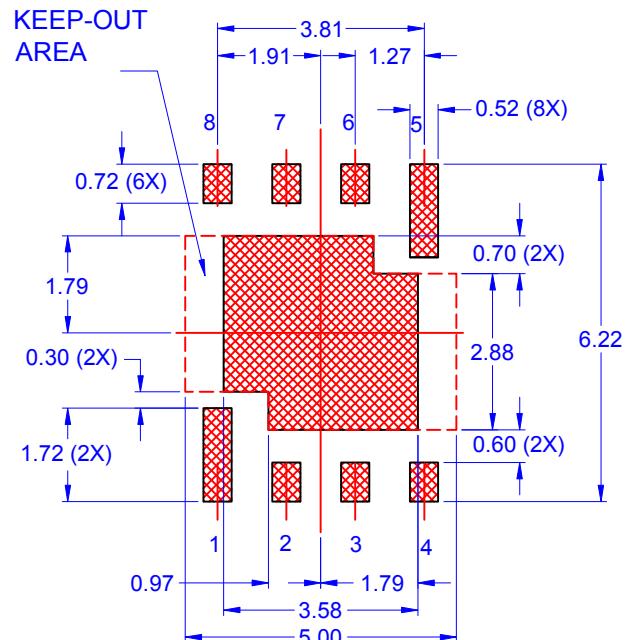
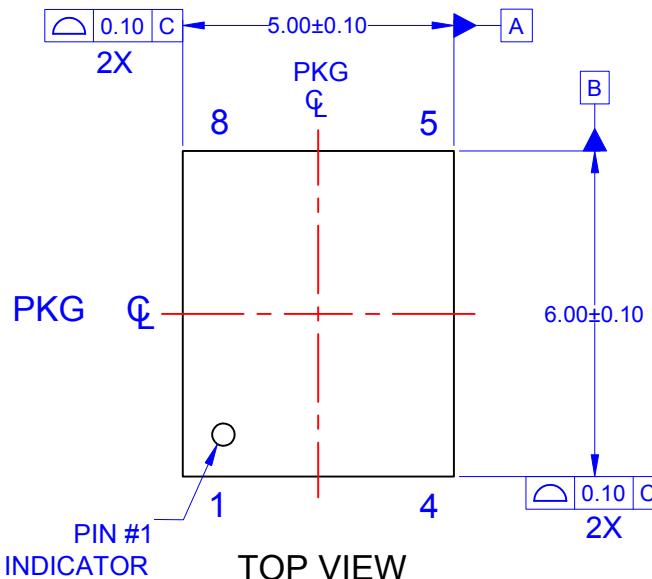


Figure 13. Junction-to-Case Transient Thermal Response Curve



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: PQFN080REV1

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