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FDMS8050

N-Channel PowerTrench[®] MOSFET

30 V, 200 A, 0.65 mΩ

Features

- Max $r_{DS(on)}$ = 0.65 mΩ at $V_{GS} = 10\text{ V}$, $I_D = 55\text{ A}$
- Max $r_{DS(on)}$ = 0.9 mΩ at $V_{GS} = 4.5\text{ V}$, $I_D = 47\text{ A}$
- Advanced Package and Silicon combination for low $r_{DS(on)}$ and high efficiency
- MSL1 robust package design
- 100% UIL tested
- RoHS Compliant

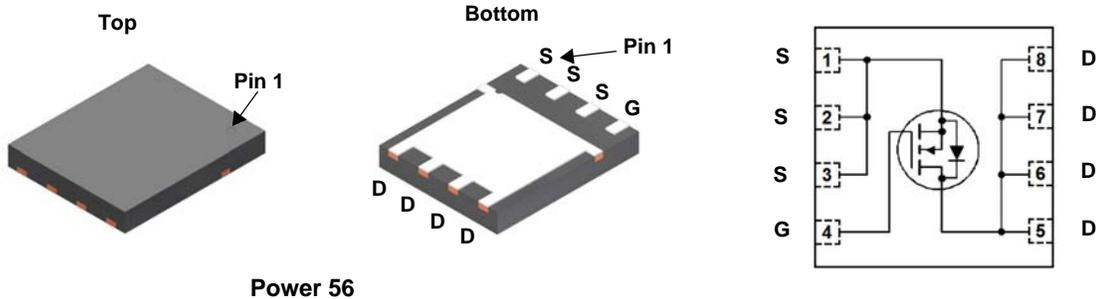


General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency and to minimize switch node ringing of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge and extremely low $r_{DS(on)}$.

Applications

- OringFET
- Synchronous Rectifier



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

Symbol	Parameter	Rated	Units
V_{DS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage (Note 4)	±20	V
I_D	Drain Current -Continuous $T_C = 25\text{ °C}$	200	A
	-Continuous $T_A = 25\text{ °C}$ (Note 1a)	55	
	-Pulsed (Note 5)	400	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	1536	mJ
P_D	Power Dissipation $T_C = 25\text{ °C}$	156	W
	Power Dissipation $T_A = 25\text{ °C}$ (Note 1a)	2.7	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.83	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	45	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMS8050	FDMS8050	Power 56	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
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 750\text{ }\mu\text{A}$, $V_{GS} = 0\text{ V}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 750\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$		20		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{ V}$, $V_{GS} = 0\text{ V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$			100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 750\text{ }\mu\text{A}$	1.0	1.8	3.0	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 750\text{ }\mu\text{A}$, referenced to $25\text{ }^\circ\text{C}$		-6		mV/ $^\circ\text{C}$
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}$, $I_D = 55\text{ A}$		0.5	0.65	m Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 47\text{ A}$		0.7	0.9	
		$V_{GS} = 10\text{ V}$, $I_D = 55\text{ A}$, $T_J = 125\text{ }^\circ\text{C}$		0.7	0.9	
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}$, $I_D = 55\text{ A}$		333		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$		16150	22610	pF
C_{oss}	Output Capacitance			4455	6240	pF
C_{rss}	Reverse Transfer Capacitance			220	310	pF
R_g	Gate Resistance			1.0	3.0	Ω

Switching Characteristics

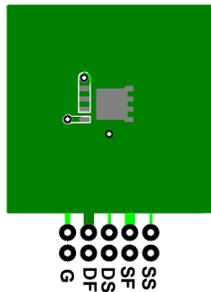
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15\text{ V}$, $I_D = 55\text{ A}$, $V_{GS} = 10\text{ V}$, $R_{GEN} = 6\text{ }\Omega$		29	47	ns	
t_r	Rise Time			22	36	ns	
$t_{d(off)}$	Turn-Off Delay Time			87	139	ns	
t_f	Fall Time			16	28	ns	
Q_g	Total Gate Charge		$V_{GS} = 0\text{ V to }10\text{ V}$		204	285	nC
Q_g	Total Gate Charge	$V_{GS} = 0\text{ V to }4.5\text{ V}$	$V_{DD} = 15\text{ V}$, $I_D = 55\text{ A}$		93	130	nC
Q_{gs}	Gate to Source Charge				41		nC
Q_{gd}	Gate to Drain "Miller" Charge				18		nC

Drain-Source Diode Characteristics

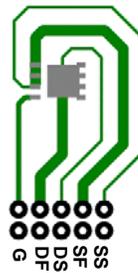
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}$, $I_S = 2.2\text{ A}$ (Note 2)		0.64	1.2	V
		$V_{GS} = 0\text{ V}$, $I_S = 55\text{ A}$ (Note 2)		0.74	1.2	
t_{rr}	Reverse Recovery Time	$I_F = 55\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$		77	124	ns
Q_{rr}	Reverse Recovery Charge			141	226	nC

Notes:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in² 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. $45\text{ }^\circ\text{C/W}$ when mounted on a 1 in² pad of 2 oz copper.



b. $115\text{ }^\circ\text{C/W}$ 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 1536 mJ is based on starting $T_J = 25\text{ }^\circ\text{C}$, $L = 3\text{ mH}$, $I_{AS} = 32\text{ A}$, $V_{DD} = 30\text{ V}$, $V_{GS} = 10\text{ V}$, 100% test at $L = 0.3\text{ mH}$, $I_{AS} = 69\text{ A}$.

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

5. Pulse Id limited by junction temperature, $t_d \leq 100\text{ }\mu\text{s}$. Please refer to SOA curve for more details.

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

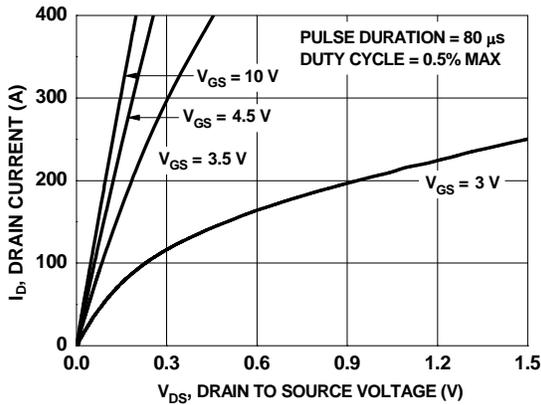


Figure 1. On-Region Characteristics

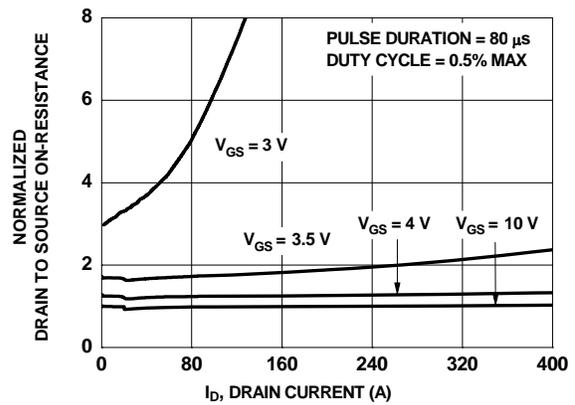


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

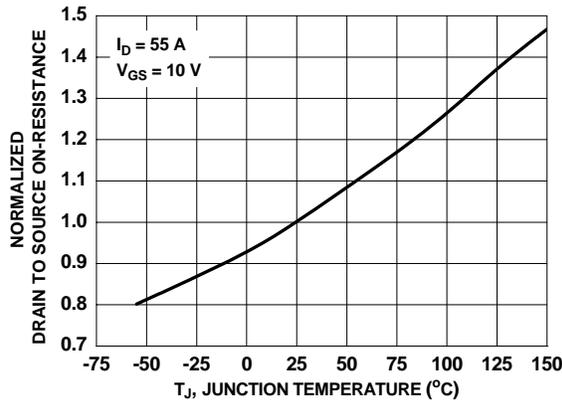


Figure 3. Normalized On-Resistance vs Junction Temperature

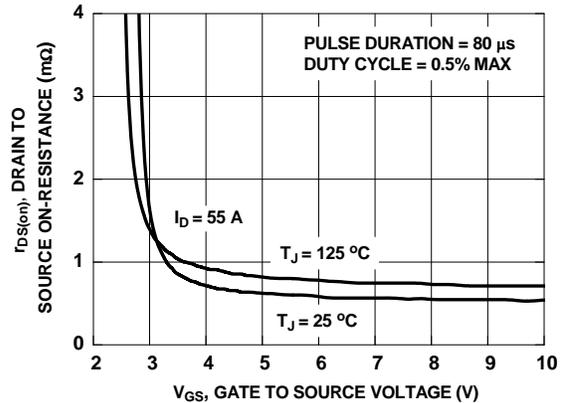


Figure 4. On-Resistance vs Gate to Source Voltage

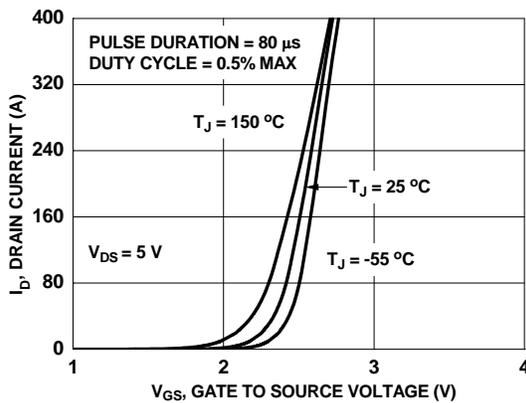


Figure 5. Transfer Characteristics

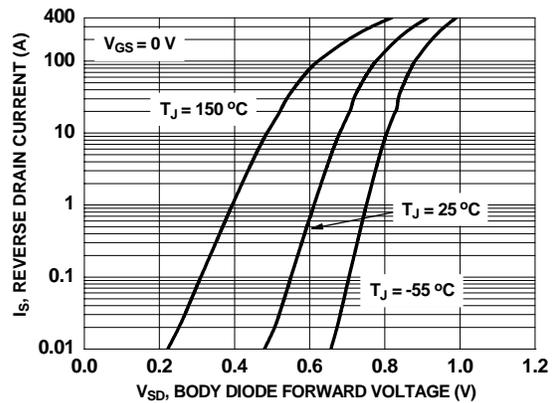


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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

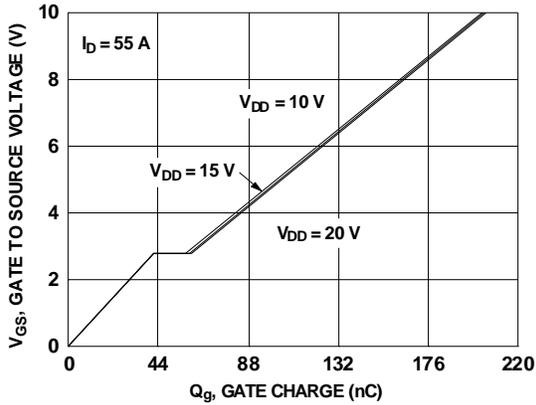


Figure 7. Gate Charge Characteristics

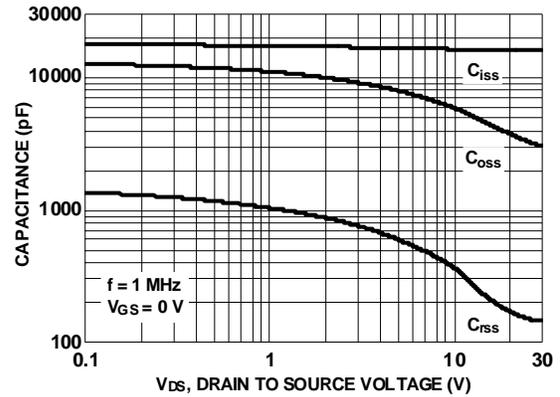


Figure 8. Capacitance vs Drain to Source Voltage

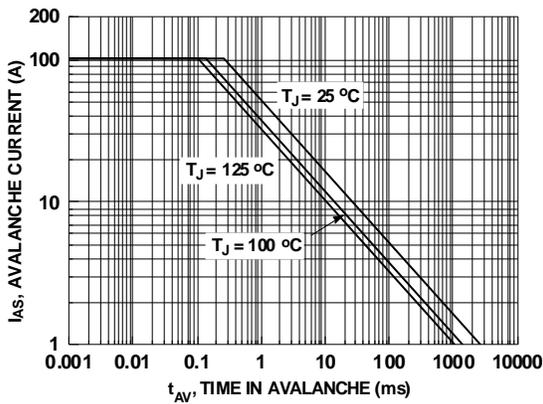


Figure 9. Unclamped Inductive Switching Capability

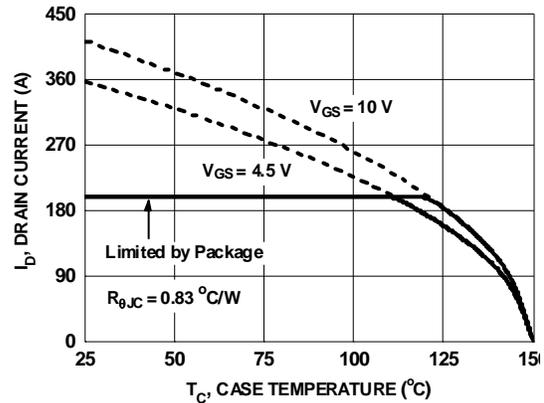


Figure 10. Maximum Continuous Drain Current vs Case Temperature

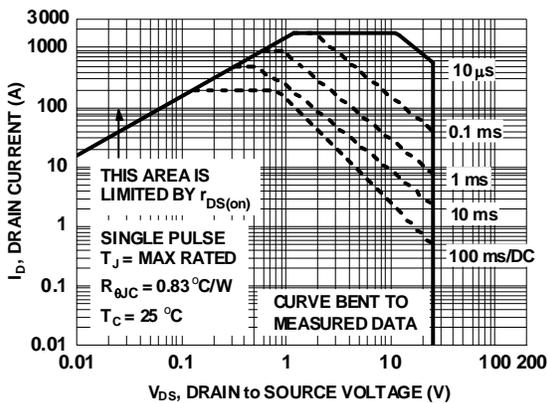


Figure 11. Forward Bias Safe Operating Area

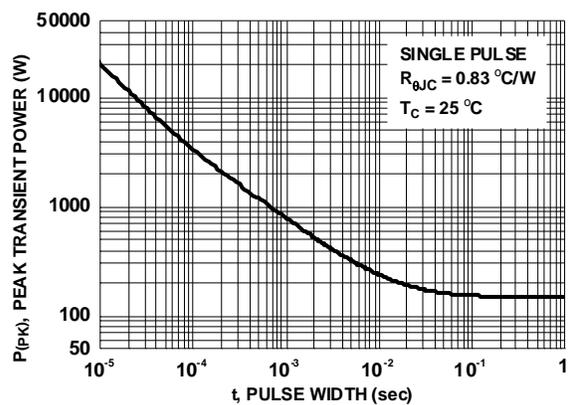


Figure 12. Single Pulse Maximum Power Dissipation

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

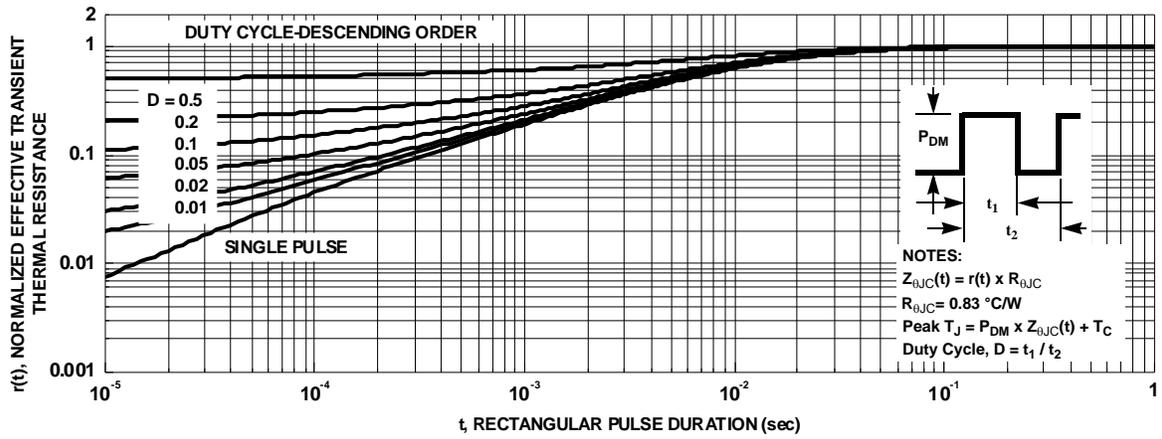
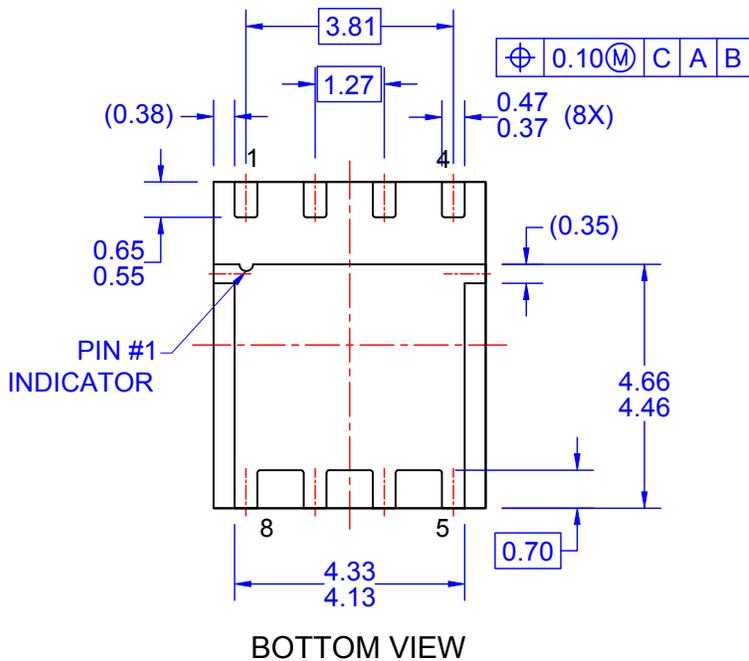
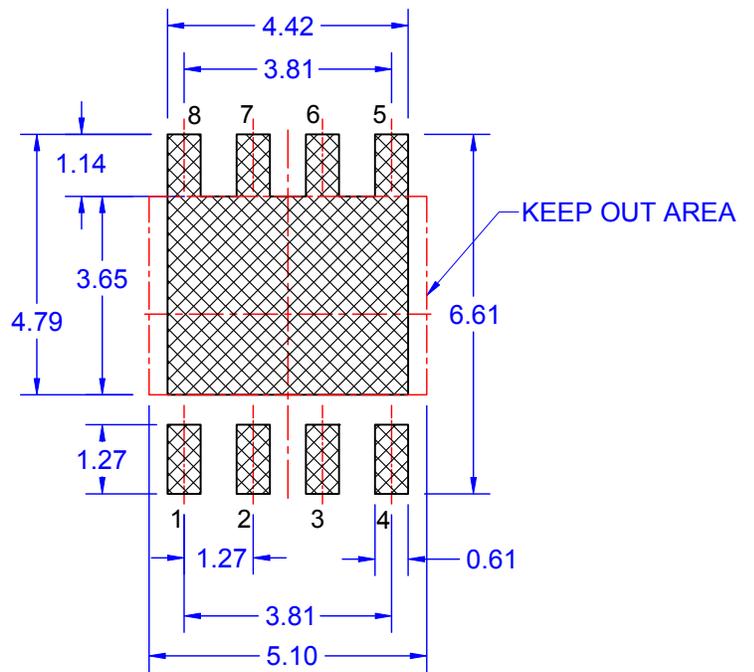
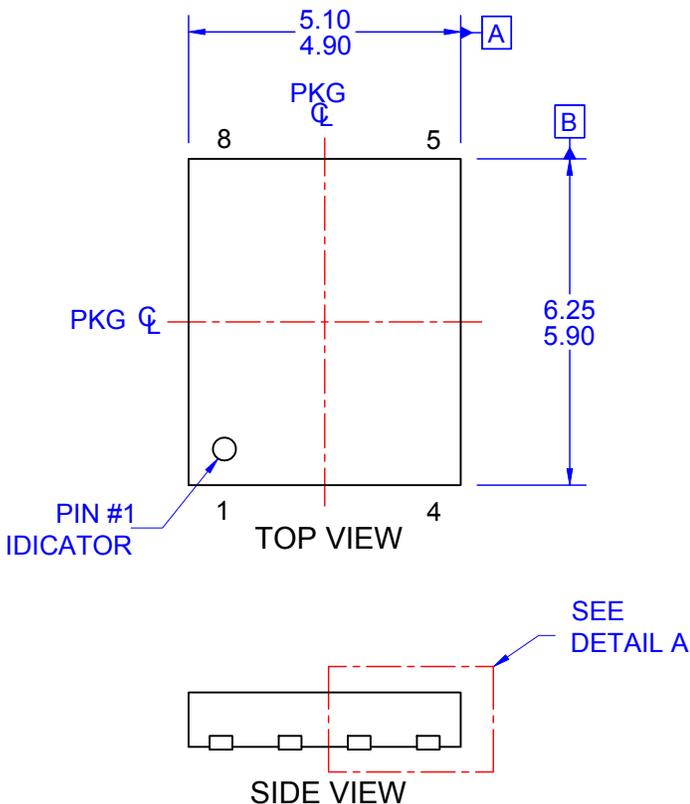
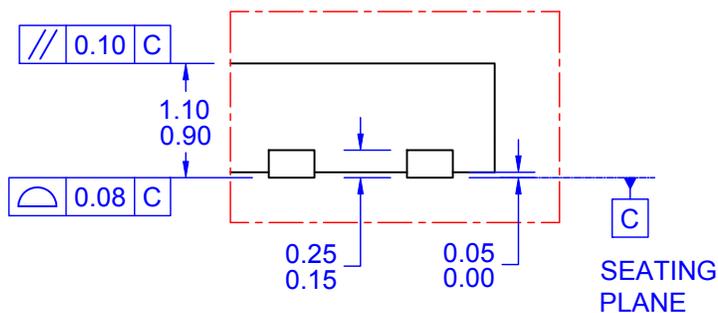


Figure 13. Junction-to-Ambient Transient Thermal Response Curve



- NOTES: UNLESS OTHERWISE SPECIFIED
- A) PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. 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: PQFN08JREV3.



DETAIL A
SCALE: 2:1



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