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August 2014

FDM3622

N-Channel PowerTrench[®] MOSFET

100V, 4.4A, 60mΩ

Features

- Max $r_{DS(on)}$ = 60mΩ at $V_{GS} = 10V$, $I_D = 4.4A$
- Max $r_{DS(on)}$ = 80mΩ at $V_{GS} = 6.0V$, $I_D = 3.8A$
- Low Miller Charge
- Low QRR Body Diode
- Optimized efficiency at high frequencies
- UIS Capability (Single Pulse and Repetitive Pulse)
- RoHS Compliant

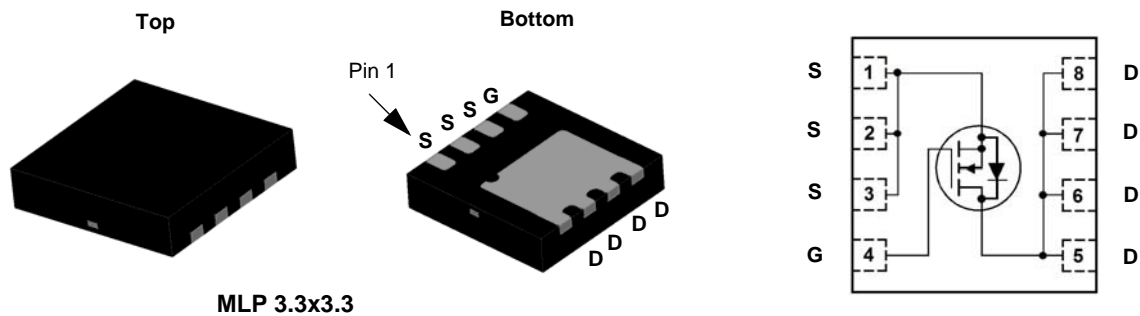


General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench[®] process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

Applications

- Distributed Power Architectures and VRMs.
- Primary Switch for 24V and 48V Systems
- High Voltage Synchronous Rectifier
- Formerly developmental type 82744



MOSFET Maximum Ratings $T_A = 25^\circ\text{C}$ 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	4.4	A
	-Pulsed	20	
E_{AS}	Single Pulse Avalanche Energy	54	mJ
P_D	Power Dissipation	2.1	W
	Power Dissipation	0.9	
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	(Note 1)	3.0	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	60	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDM3622	FDM3622	MLP 3.3x3.3	13"	12 mm	3000 units

FDM3622 N-Channel PowerTrench[®] MOSFET

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
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$ $T_J = 100^\circ\text{C}$			1	μA
					250	
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$			± 100	nA

On Characteristics

$V_{GS(th)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	2		4	V
$r_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{V}, I_D = 4.4\text{A}$		44	60	$\text{m}\Omega$
		$V_{GS} = 6.0\text{V}, I_D = 3.8\text{A}$		56	80	
		$V_{GS} = 10\text{V}, I_D = 4.4\text{A}, T_J = 150^\circ\text{C}$		92	120	

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V},$ $f = 1\text{MHz}$		820	1090	pF
C_{oss}	Output Capacitance			125	170	
C_{rss}	Reverse Transfer Capacitance			35	55	
R_g	Gate Resistance	$V_{DS} = 15\text{mV}, f = 1\text{MHz}$	0.1	3.1	6.2	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 50\text{V}, I_D = 4.4\text{A}$ $V_{GS} = 10\text{V}, R_{GEN} = 24\Omega$		11	20	ns
t_r	Rise Time			25	40	
$t_{d(off)}$	Turn-Off Delay Time			35	56	
t_f	Fall Time			26	42	
Q_g	Total Gate Charge	$V_{GS} = 10\text{V}$		13	17	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = 50\text{V}$ $I_D = 4.4\text{A}$		3.6		nC
Q_{gd}	Gate to Drain "Miller" Charge			3.4		nC

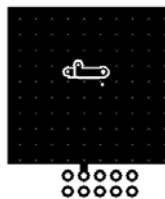
Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = 4.4\text{A}$			1.25	V
		$V_{GS} = 0\text{V}, I_S = 2.2\text{A}$			1.0	V
t_{rr}	Reverse Recovery Time	$I_F = 4.4\text{A}, di/dt = 100\text{A}/\mu\text{s}$			56	ns
Q_{rr}	Reverse Recovery Charge				108	nC

Notes:

1: $R_{\theta JA}$ is determined with the device mounted on a 1 in² oz copper pad on a 1.5 x 1.5 in. board of FR-4 material. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design.

- (a) $R_{\theta JA} = 60^\circ\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper, 1.5x1.5x0.062' thick PCB.
 (b) $R_{\theta JA} = 135^\circ\text{C}/\text{W}$ when mounted on a minimum pad of 2 oz copper.



a. $60^\circ\text{C}/\text{W}$ when mounted on a 1 in² pad of 2 oz copper



b. $135^\circ\text{C}/\text{W}$ 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 54 mJ is based on starting $T_J = 25^\circ\text{C}$; N-ch: $L = 3\text{ mH}, I_{AS} = 6\text{ A}, V_{DD} = 100\text{ V}, V_{GS} = 10\text{ V}$.

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

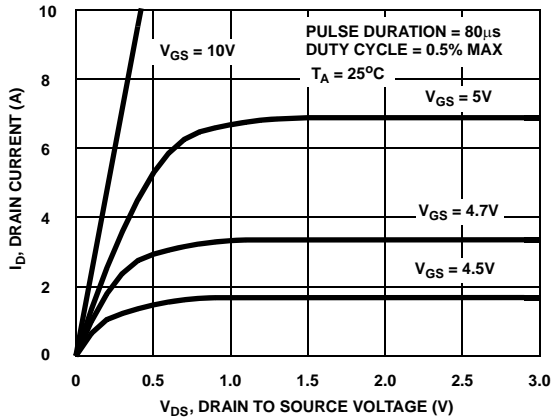


Figure 1. On-Region Characteristics

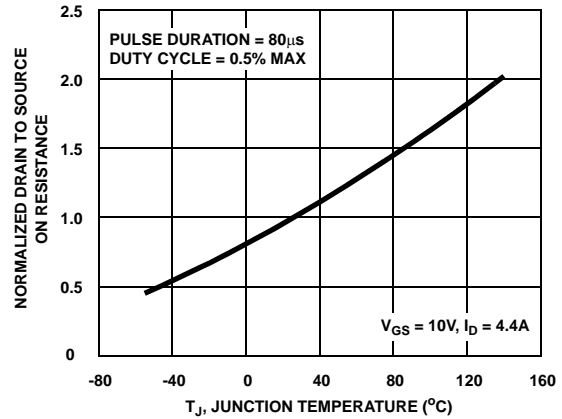


Figure 2. Normalized On-Resistance vs Junction Temperature

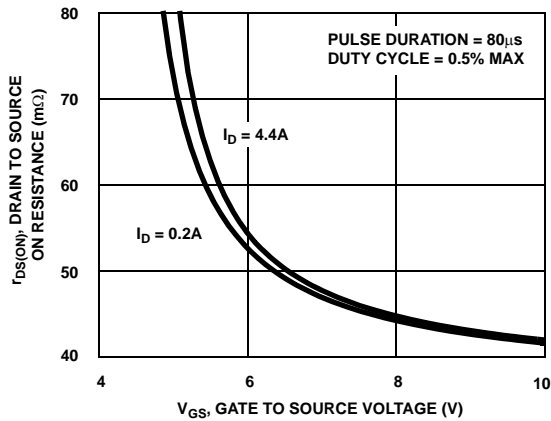


Figure 3. On-Resistance vs Gate to Source Voltage

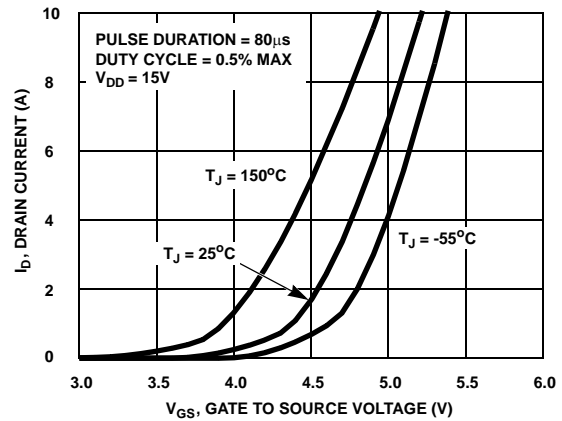


Figure 4. Transfer Characteristics

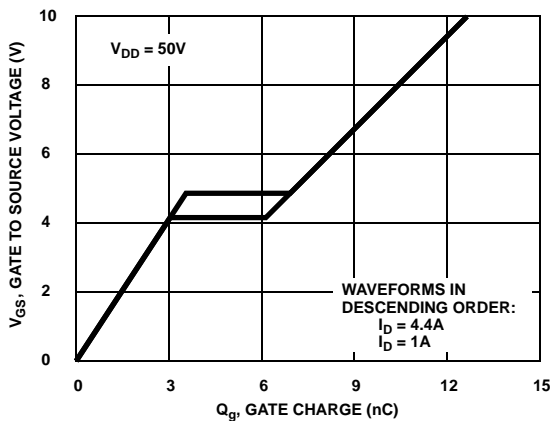


Figure 5. Gate Charge Characteristics

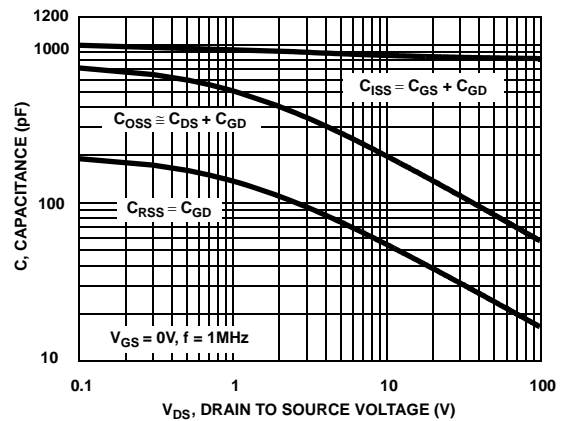


Figure 6. Capacitance vs Drain to Source Voltage

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

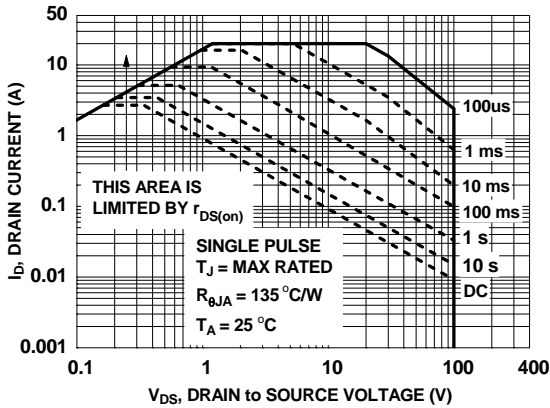


Figure 7. Forward Bias Safe Operating Area

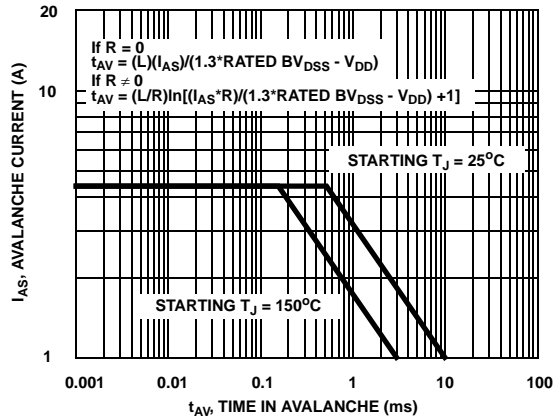


Figure 8. Unclassified Inductive Switching Capability

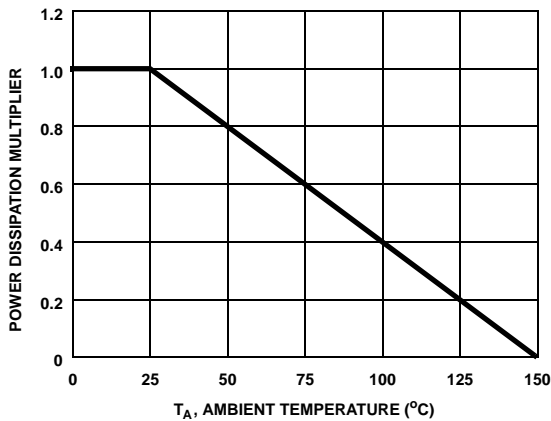


Figure 9. Normalized Power dissipation vs Ambient Temperature

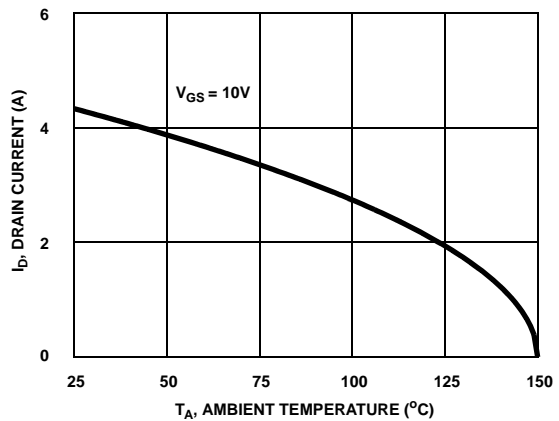


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

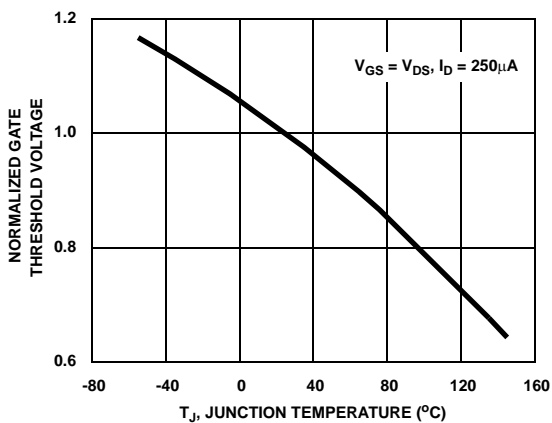


Figure 11. Normalized Gate Threshold voltage vs Junction Temperature

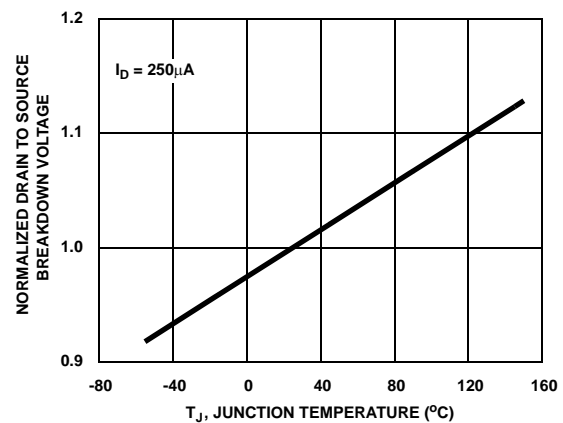


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

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

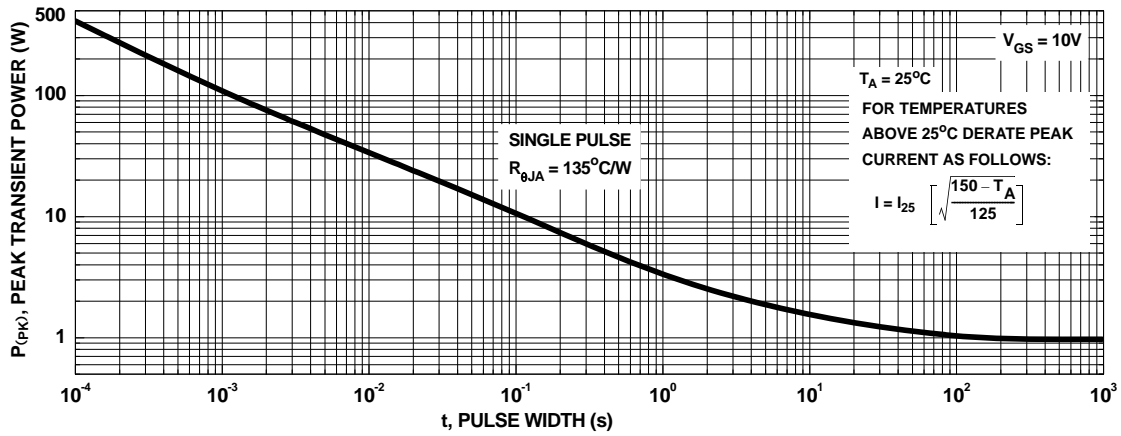


Figure 13. Peak Current Capability

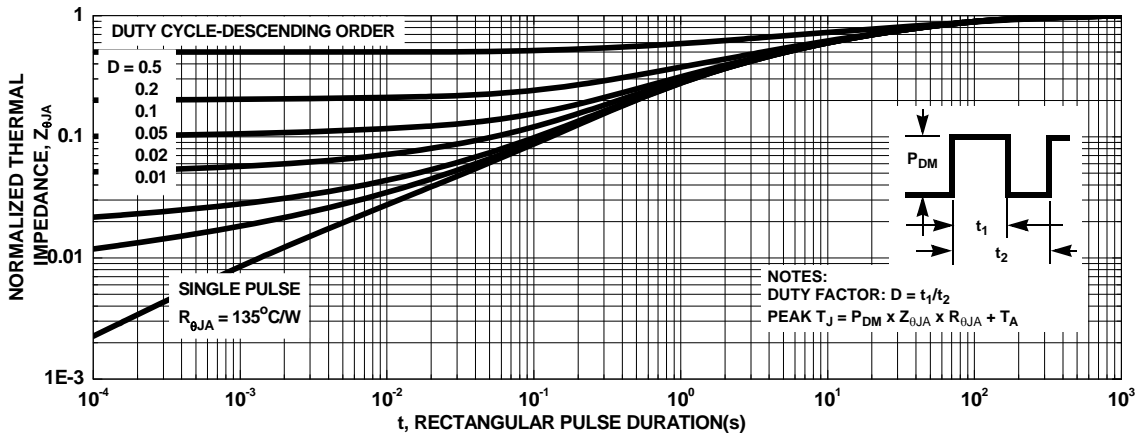
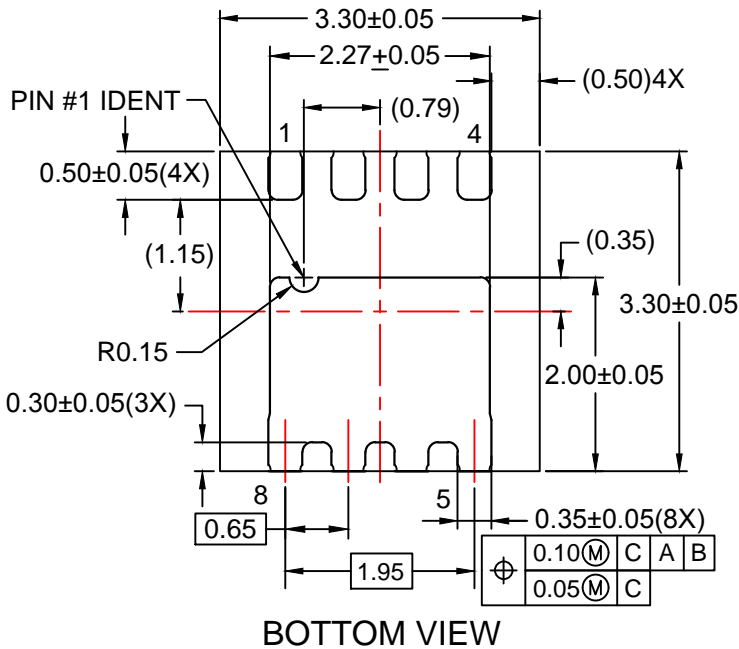
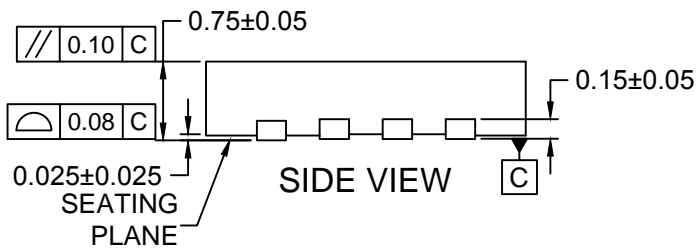
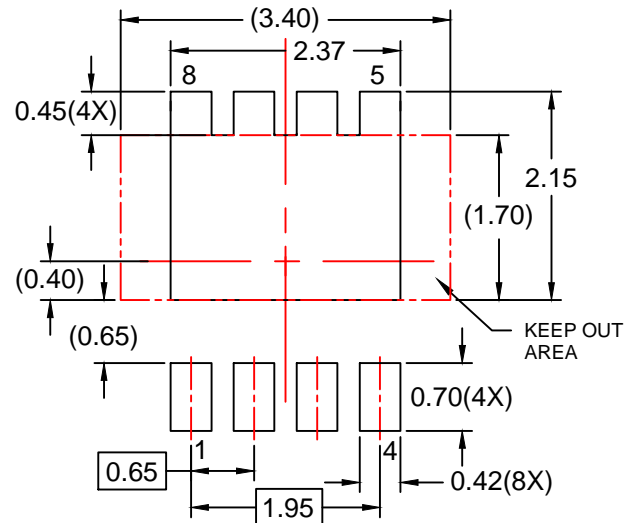
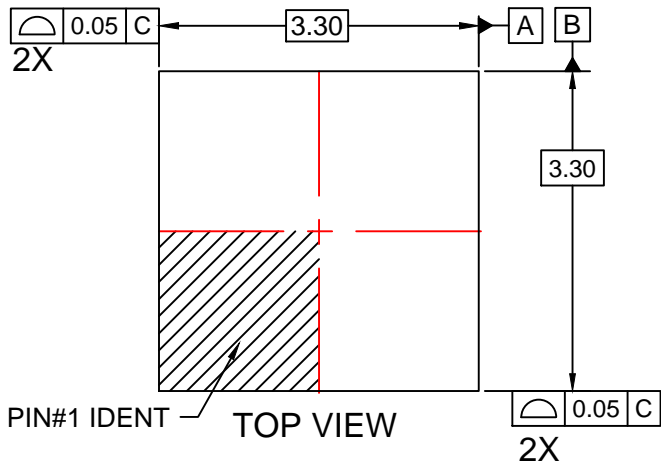


Figure 14. Transient Thermal Response Curve



NOTES:

- A. DOES NOT CONFORM TO JEDEC REGISTRATION MO-229
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 2009.
- D. LAND PATTERN RECOMMENDATION IS EXISTING INDUSTRY LAND PATTERN.
- E. DRAWING FILENAME: MKT-MLP08Srev3.



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