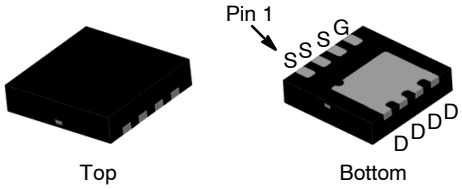
MOSFET – P-Channel, QFET

-150 V, -3 A, 1.5 Ω

FDMC2523P



WDFN8 3.3x3.3, 0.65P
CASE 511DH

General Description

These P−Channel MOSFET enhancement mode power field effect transistors are produced using **onsemi**'s proprietary, planar stripe, DMOS technology. This advanced technology has been especially tailored to minimize on−state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for low voltage applications such as audio amplifier, high efficiency switching DC−DC converters, and DC motor control.

Features

- Max $R_{DS(on)}$ = 1.5 Ω at V_{GS} = −10 V, I_D = −1.5 A
- Low C_{rss} (Typical 10 pF)
- Fast Switching
- Low Gate Charge (Typical 6.2 nC)
- Improved dv / dt Capability
- This Device is Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

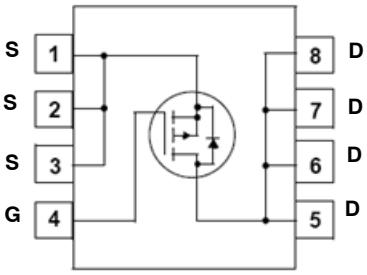
Applications

- Active Clamp Switch

MARKING DIAGRAM



Z	=	Assembly Plant Code
XY	=	Date Code (Year &Week)
KK	=	Lot Traceability Code
2523P	=	Specific Device Code



ORDERING INFORMATION

Device	Package	Shipping†
FDMC2523P	WDFN8 (Pb−Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

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MOSFET MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter			Ratings	Unit
V_{DS}	Drain to Source Voltage			−150	V
V_{GS}	Gate to Source Voltage			±30	V
I_D	Drain Current	Continuous	T_C = 25°C	−3	A
		Continuous	T_C = 100°C	−1.8	
		Pulsed	−	−12	
P_D	Power Dissipation (Steady State)		T_C = 25°C	42	W
E_{AS}	Single Pulse Avalanche Energy (Note 5)			3.3	mJ
T_J, T_{STG}	Operating and Storage Junction Temperature Range			−55 to +150	°C
T_L	Maximum lead temperature for soldering purposes, 1/8” from case for 5 seconds			300	°C
dv/dt	Peak Diode Recovery dv/dt (Note 2)			−5	V/ns

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case (Note 1)	3.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient (Note 1a)	60	

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain−to−Source Breakdown Voltage	I_D = −250 μA, V_{GS} = 0 V	−150	−	−	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = −250 μA, referenced to 25°C	−	−138	−	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = −150 V, V_{GS} = 0 V	−	−	−1	μA
		V_{DS} = −150 V, V_{GS} = 0 V, T_J = 125 °C	−	−	−10	μA
I_{GSS}	Gate−to−Source Leakage Current	V_{GS} = ±30 V, V_{DS} = 0 V	−	−	±100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate−to−Source Threshold Voltage	V_{GS} = V_{DS}, I_D = −250 μA	−3	−3.8	−5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate−to−Source Threshold Voltage Temperature Coefficient	I_D = −250 μA, referenced to 25°C	−	6	−	mV/°C
$R_{DS(on)}$	Static Drain−to−Source On Resistance	V_{GS} = −10 V, I_D = −1.5 A	−	1.1	1.5	Ω
		V_{GS} = −10 V, I_D = −1.5 A, T_J = 125°C	−	2.0	3.6	
g_{FS}	Forward Transconductance	V_{DS} = −40 V, I_D = −1.5 A (Note 4)	−	1.4	−	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = −25 V, V_{GS} = 0 V, f = 1 MHz	−	200	270	pF
C_{oss}	Output Capacitance		−	60	80	
C_{rss}	Reverse Transfer Capacitance		−	10	15	
R_g	Gate Resistance	f = 1 MHz	0.1	7.5	15	Ω

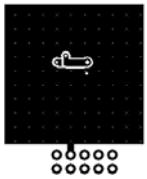
ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn−On Delay Time	V_{DD} = −75 V, I_D = −3 A, V_{GS} = −10 V, R_{GEN} = 25 Ω (Note 3, 4)	–	15	27	ns
t_r	Rise Time		–	11	20	
$t_{d(off)}$	Turn−Off Delay Time		–	19	35	
t_f	Fall Time		–	13	24	
Q_g	Total Gate Charge	V_{GS} = −10 V, V_{DD} = −75 V, I_D = −3 A (Note 3, 4)	–	6.2	9	nC
Q_{gs}	Gate−to−Source Charge		–	1.4	–	
Q_{gd}	Gate−to−Drain “Miller” Charge		–	3.3	–	
DRAIN−SOURCE DIODE CHARACTERISTICS						
I_S	Maximum Continuous Drain − Source Diode Forward Current		–	–	−3	A
I_{SM}	Maximum Pulse Drain − Source Doide Forward Current		–	–	−12	
V_{SD}	Source−to−Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = −3.0 A	–	−1.8	−5	V
t_{rr}	Reverse Recovery Time	I_F = −3.0 A, di/dt = 100 A/μs (Note 3)	–	93	–	ns
Q_{rr}	Reverse Recovery Charge		–	0.27	–	μC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

NOTES:

1. $R_{\theta JA}$ is the sum of the junction−to−case and case−to− ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ 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^2 pad of 2 oz copper



b) 135°C/W when mounted on a minimum pad of 2 oz copper

2. I_{SD} ≤ −3 A, dI/dt ≤ 300 A/μs, V_{DD} ≤ B_{VDSS}, Starting T_J = 25°C.
3. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
4. Essentially independent of operating temperature.
5. E_{AS} of 3.3 mJ is based on starting T_J = 25°C, P−ch: L = 3 mH, I_{AS} = −1.5 A, V_{DD} = −150 V, V_{GS} = −10 V.

TYPICAL CHARACTERISTICS

(T_J = 25°C unless otherwise noted)

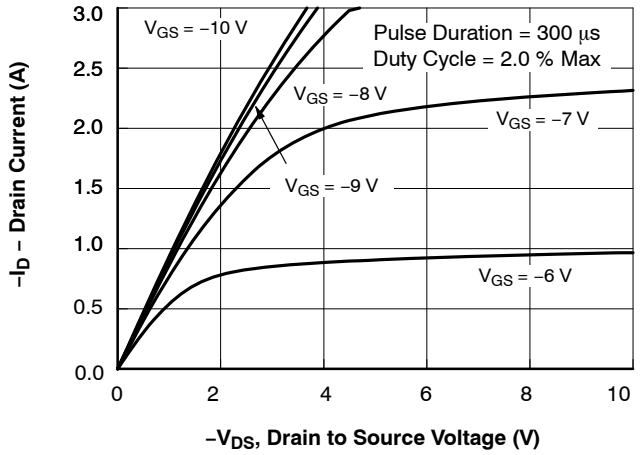


Figure 1. On−Region Characteristics

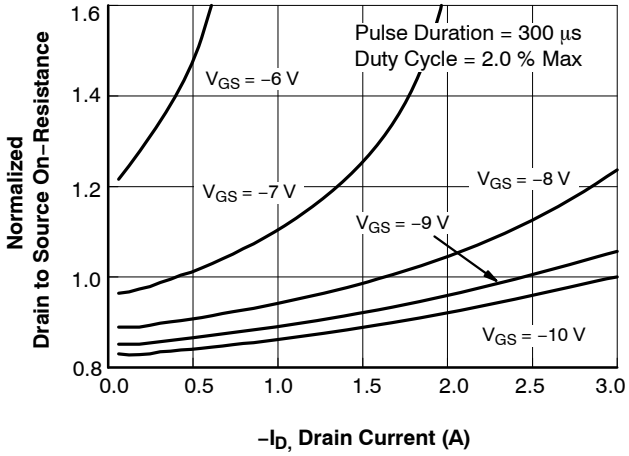


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

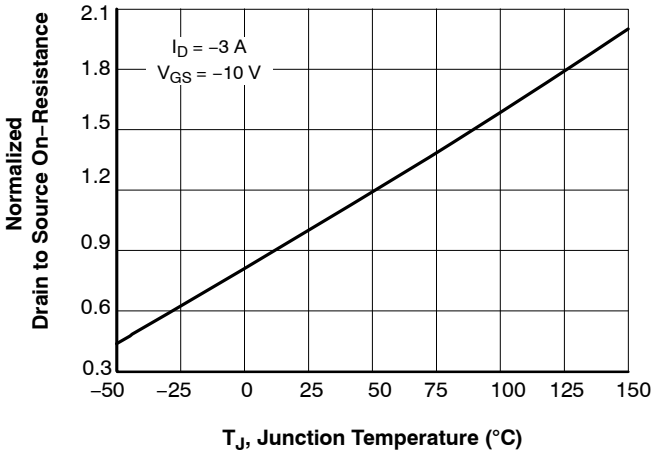


Figure 3. Normalized On−Resistance vs. Junction Temperature

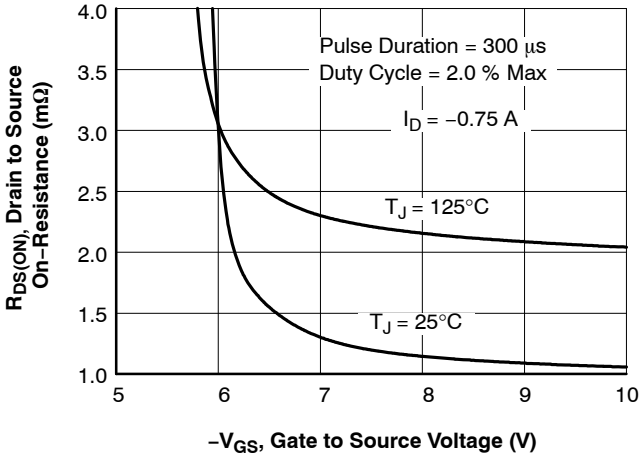


Figure 4. On−Resistance vs. Gate to Source Voltage

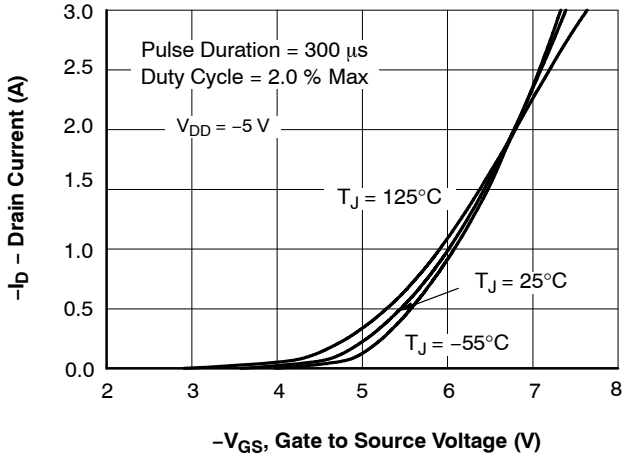


Figure 5. Transfer Characteristics

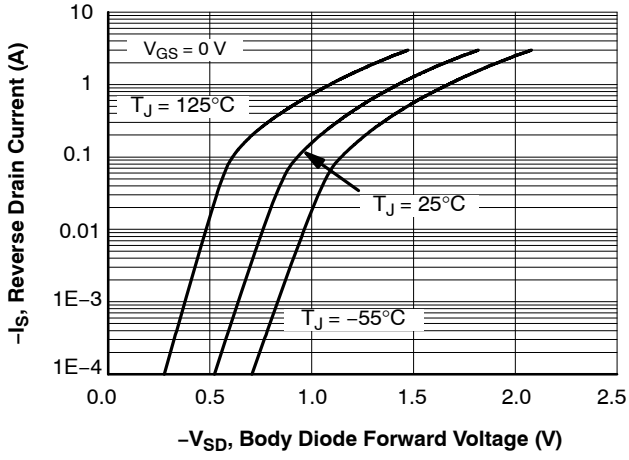


Figure 6. Source to Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

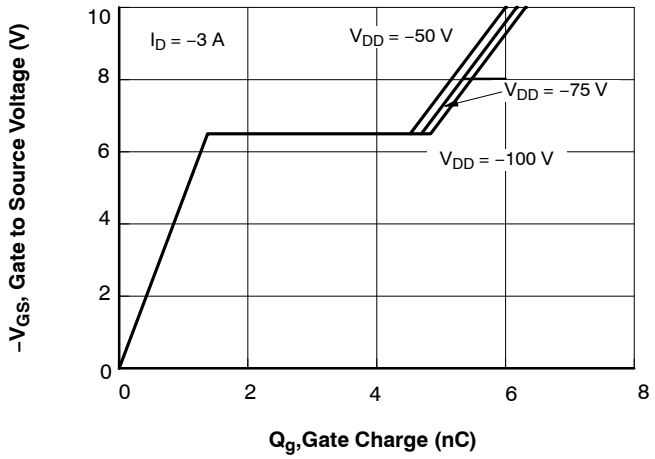


Figure 7. Gate Charge Characteristics

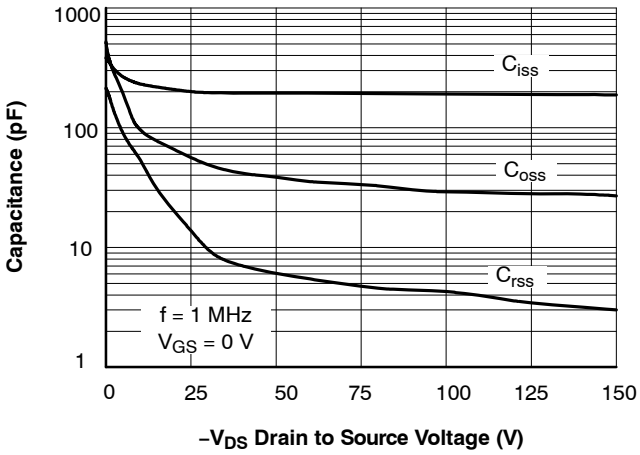


Figure 8. Capacitance vs Drain to Source Voltage

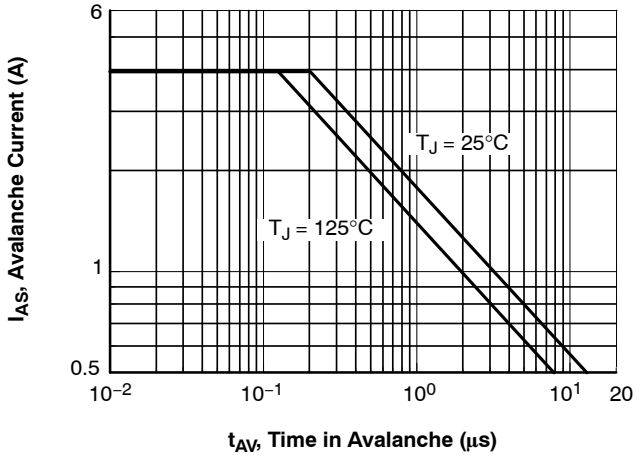


Figure 9. Unclamped Inductive Switching Capability

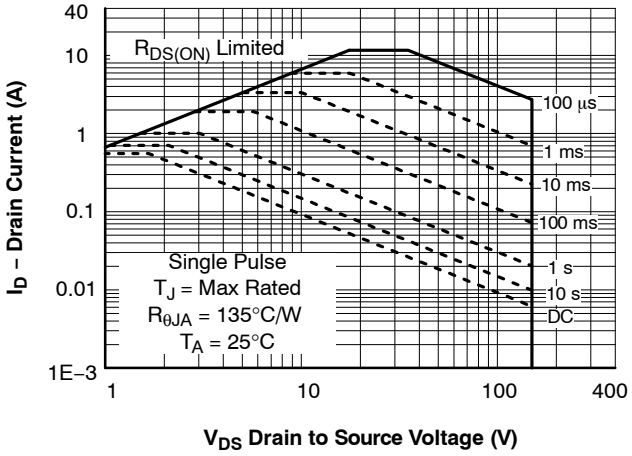


Figure 10. Forward Bias Safe Operating Area

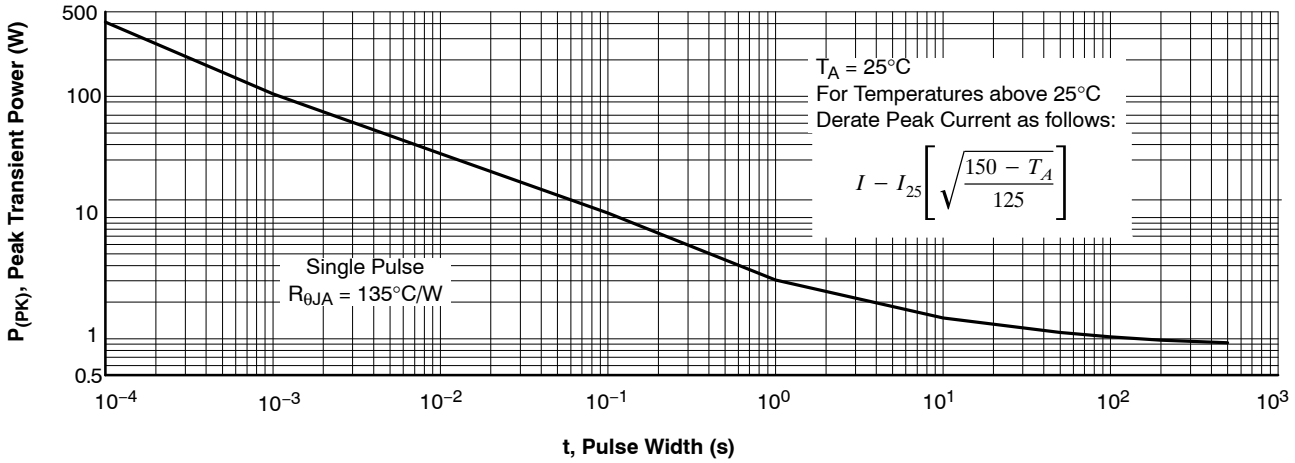


Figure 11. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

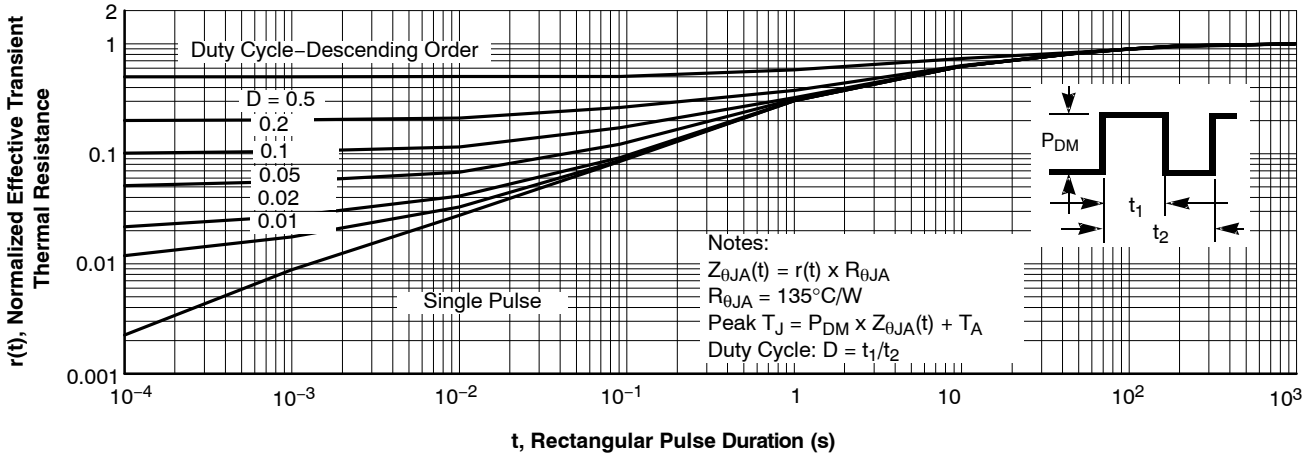
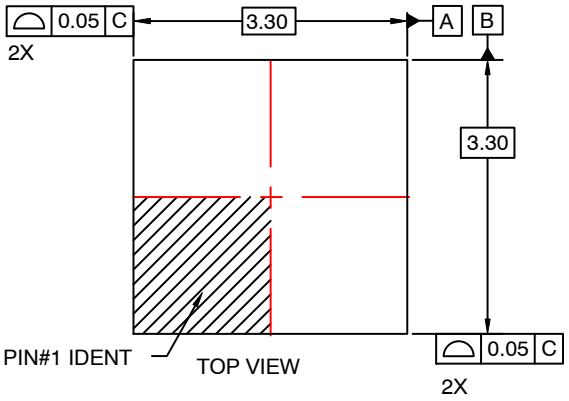
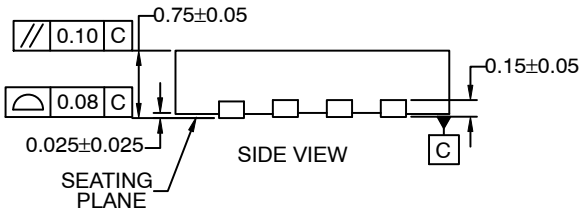


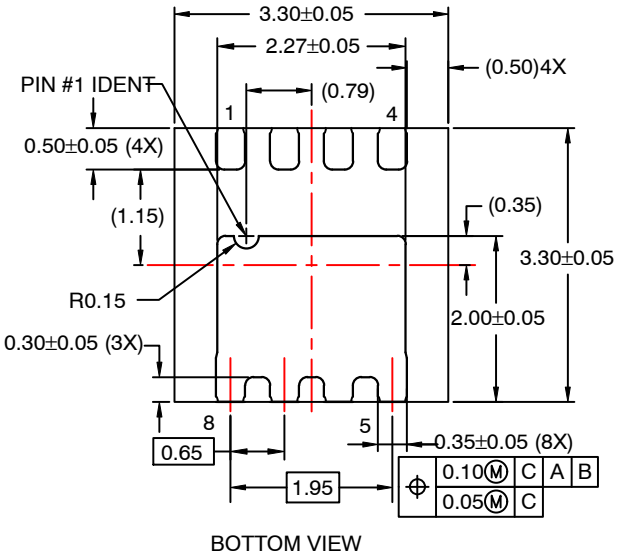
Figure 12. Transient Thermal Response Curve

WDFN8 3.3x3.3, 0.65P
CASE 511DH
ISSUE O

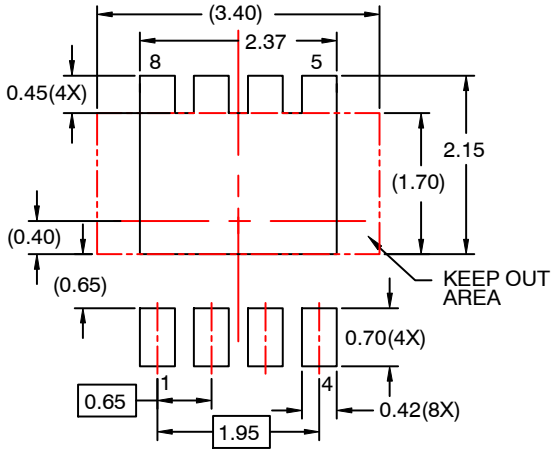
DATE 31 JUL 2016







BOTTOM VIEW



RECOMMENDED LAND PATTERN

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.

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