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FDMC86340ET80

N-Channel Shielded Gate Power Trench® MOSFET

80 V, 68 A, 6.5 mΩ

Features

- Extended T_J rating to 175°C
- Shielded Gate MOSFET Technology
- Max $r_{DS(on)}$ = 6.5 mΩ at $V_{GS} = 10$ V, $I_D = 14$ A
- Max $r_{DS(on)}$ = 8.5 mΩ at $V_{GS} = 8$ V, $I_D = 12$ A
- High performance technology for extremely low $r_{DS(on)}$
- Termination is Lead-free
- RoHS Compliant

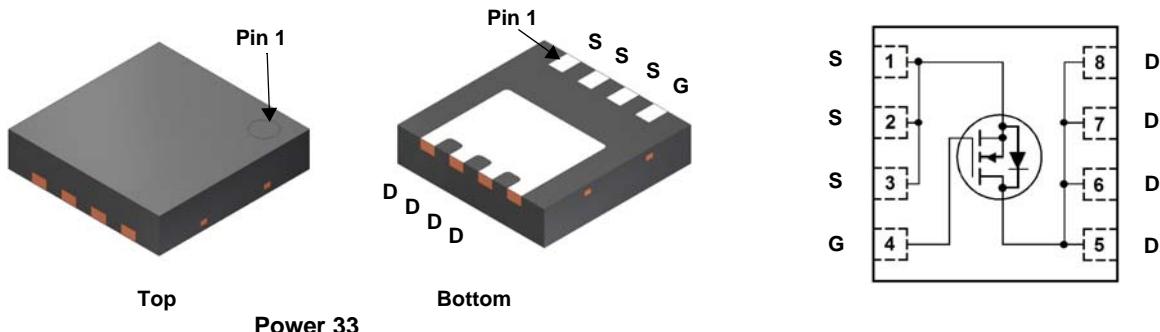


General Description

This N-Channel MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench® process that incorporates Shielded Gate technology. This process has been optimized for the on-state resistance and yet maintain superior switching performance.

Application

- DC-DC Conversion



MOSFET Maximum Ratings $T_A = 25$ °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	$T_C = 25$ °C	(Note 5)	68	A
	-Continuous	$T_C = 100$ °C	(Note 5)	48	
	-Continuous	$T_A = 25$ °C	(Note 1a)	14	
	-Pulsed		(Note 4)	316	
E_{AS}	Single Pulse Avalanche Energy		(Note 3)	216	mJ
P_D	Power Dissipation	$T_C = 25$ °C		65	W
	Power Dissipation	$T_A = 25$ °C	(Note 1a)	2.8	
T_J, T_{STG}	Operating and Storage Junction Temperature Range			-55 to +175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance, Junction to Case	(Note 1)	2.3	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	(Note 1a)	53	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDMC86340ET	FDMC86340ET80	Power33	13 "	12 mm	3000 units

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain to Source Breakdown Voltage	$I_D = 250 \mu\text{A}, V_{GS} = 0 \text{ V}$	80			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C		46		$\text{mV}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 64 \text{ V}, V_{GS} = 0 \text{ V}$			1	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$			± 100	nA

On Characteristics

$V_{GS(\text{th})}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	2.0	3.4	4.0	V
$\Delta V_{GS(\text{th})} / \Delta T_J$	Gate to Source Threshold Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, referenced to 25°C		-10		$\text{mV}/^\circ\text{C}$
$r_{DS(\text{on})}$	Static Drain to Source On Resistance	$V_{GS} = 10 \text{ V}, I_D = 14 \text{ A}$		5.0	6.5	$\text{m}\Omega$
		$V_{GS} = 8 \text{ V}, I_D = 12 \text{ A}$		6.0	8.5	
		$V_{GS} = 10 \text{ V}, I_D = 14 \text{ A}, T_J = 125^\circ\text{C}$		8.5	11	
g_{FS}	Forward Transconductance	$V_{DD} = 10 \text{ V}, I_D = 14 \text{ A}$		36		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 40 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		2775		pF
C_{oss}	Output Capacitance			468		pF
C_{rss}	Reverse Transfer Capacitance			15		pF
R_g	Gate Resistance		0.1	0.7	2.1	Ω

Switching Characteristics

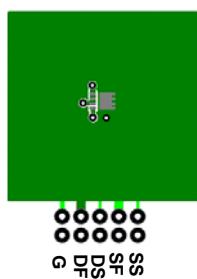
$t_{d(\text{on})}$	Turn-On Delay Time	$V_{DD} = 40 \text{ V}, I_D = 14 \text{ A}, V_{GS} = 10 \text{ V}, R_{\text{GEN}} = 6 \Omega$		20	32	ns
t_r	Rise Time			7.9	16	ns
$t_{d(\text{off})}$	Turn-Off Delay Time			23	37	ns
t_f	Fall Time			5.1	10	ns
$Q_{g(\text{TOT})}$	Total Gate Charge	$V_{GS} = 0 \text{ V to } 10 \text{ V}$	30	38	49	nC
$Q_{g(\text{TOT})}$	Total Gate Charge		20	31	44	nC
Q_{gs}	Gate to Source Charge			14		nC
Q_{gd}	Gate to Drain "Miller" Charge			8.0		nC
Q_{oss}	Output Charge	$V_{DD} = 40 \text{ V}, V_{GS} = 0 \text{ V}$		42		nC

Drain-Source Diode Characteristics

V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_S = 14 \text{ A}$	(Note 2)	0.8	1.3	V
		$V_{GS} = 0 \text{ V}, I_S = 1.9 \text{ A}$	(Note 2)	0.7	1.2	V
t_{rr}	Reverse Recovery Time	$I_F = 14 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$		41	66	ns
				25	40	nC

Notes:

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



a. $53^\circ\text{C}/\text{W}$ when mounted on a 1 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 216 mJ is based on starting $T_J = 25^\circ\text{C}$, $L = 3 \text{ mH}$, $I_{AS} = 12 \text{ A}$, $V_{DD} = 80 \text{ V}$, $V_{GS} = 10 \text{ V}$. 100% test at $L = 0.1 \text{ mH}$, $I_{AS} = 37 \text{ A}$.

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

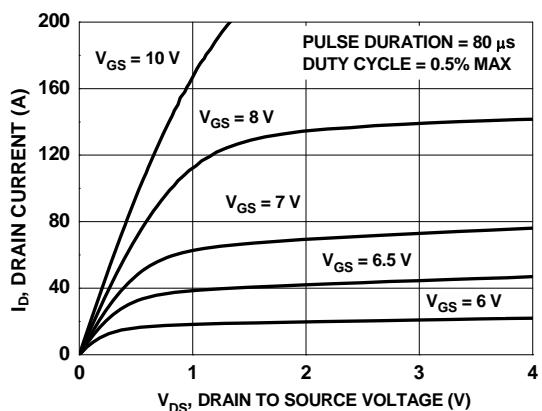


Figure 1. On-Region Characteristics

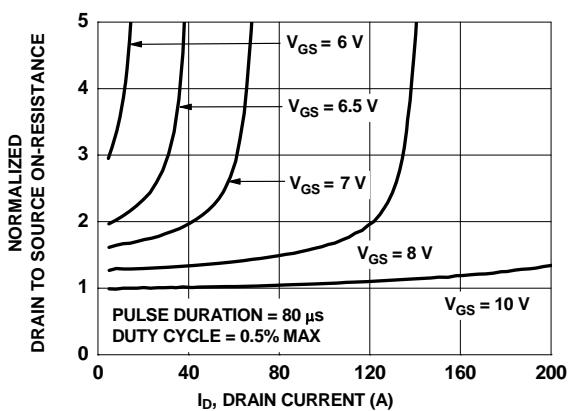


Figure 2. Normalized On-Resistance vs Drain Current and Gate Voltage

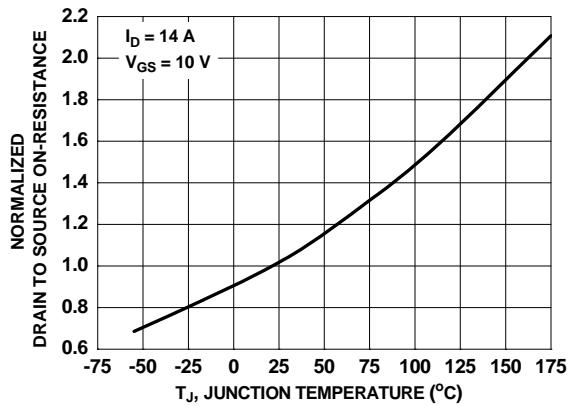


Figure 3. Normalized On-Resistance vs Junction Temperature

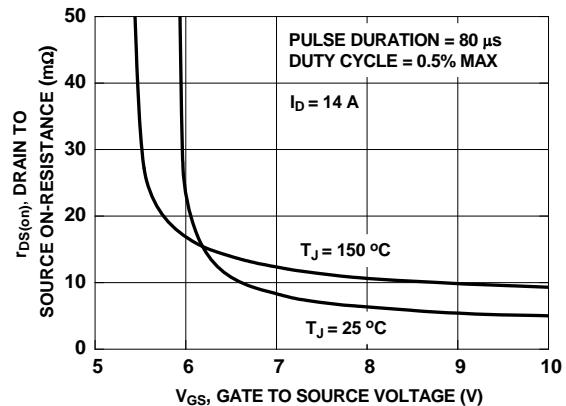


Figure 4. On-Resistance vs Gate to Source Voltage

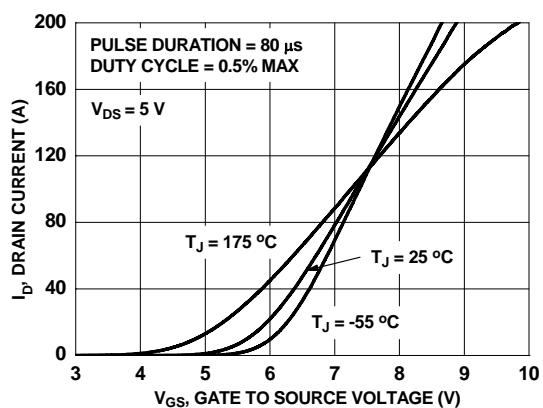


Figure 5. Transfer Characteristics

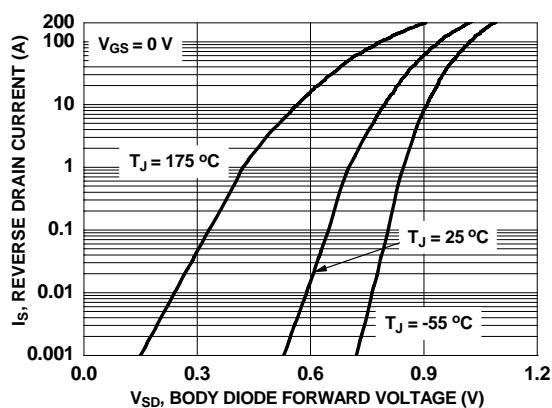
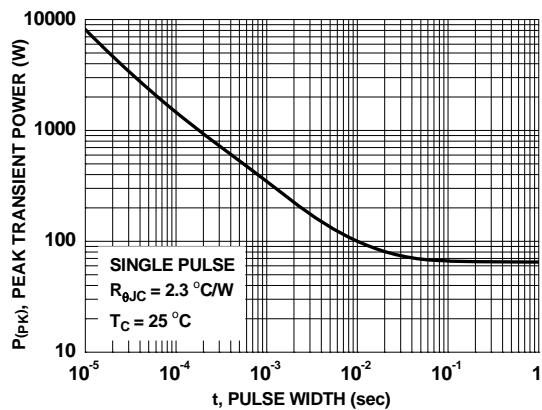
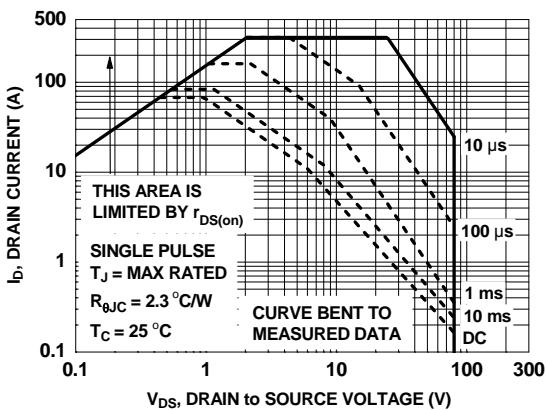
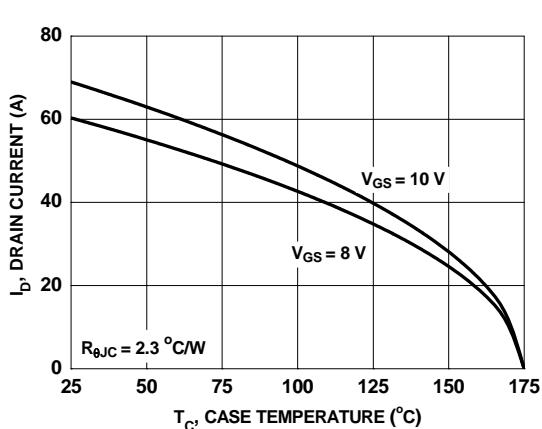
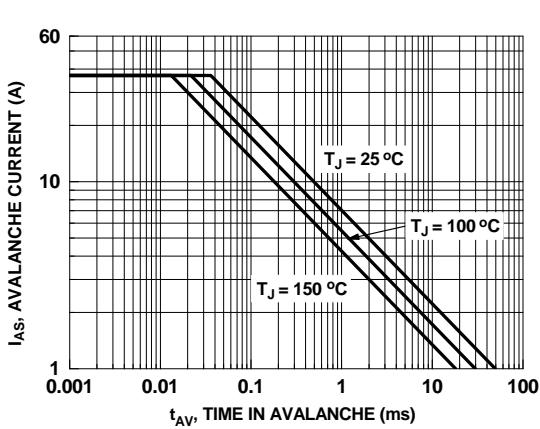
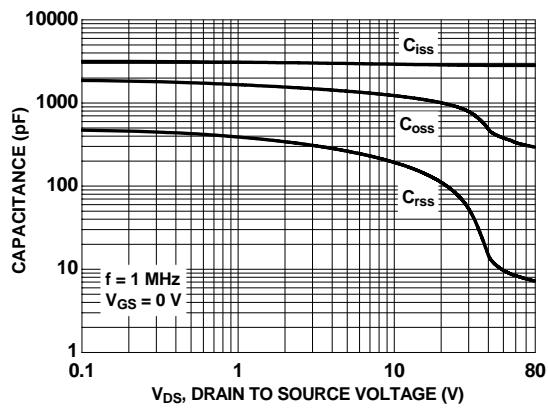
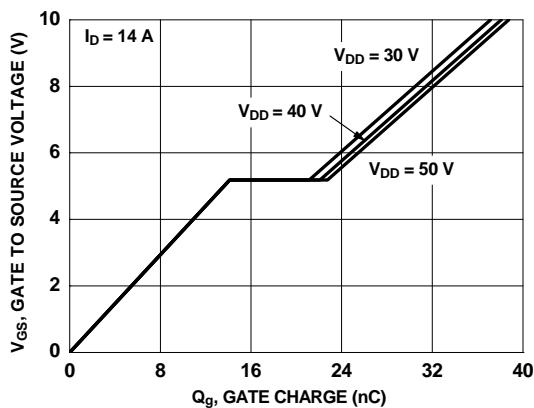


Figure 6. Source to Drain Diode Forward Voltage vs Source Current

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



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

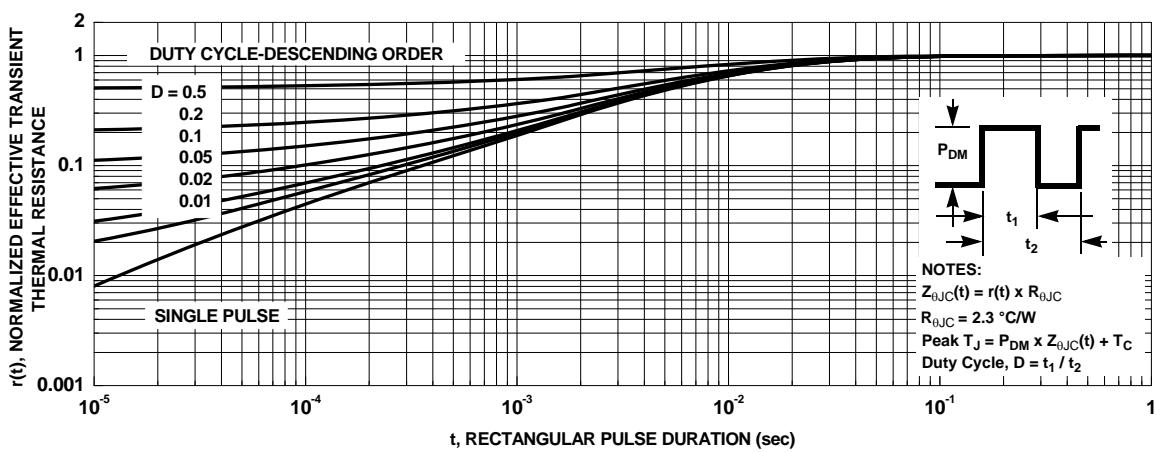
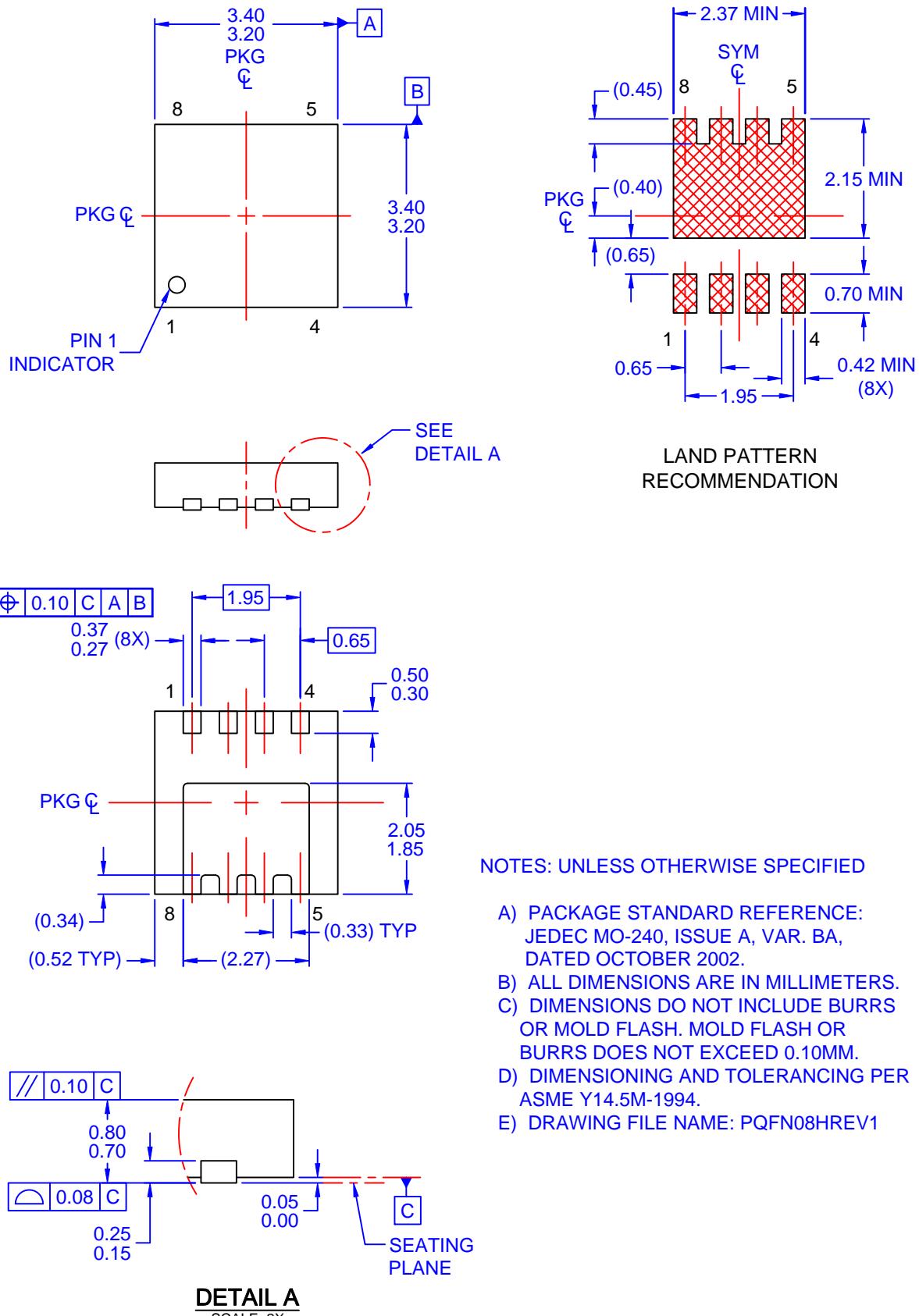


Figure 13. Junction-to-Case Transient Thermal Response Curve



NOTES: UNLESS OTHERWISE SPECIFIED

- A) PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. BA, DATED OCTOBER 2002.
- 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-1994.
- E) DRAWING FILE NAME: PQFN08HREV1

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