

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

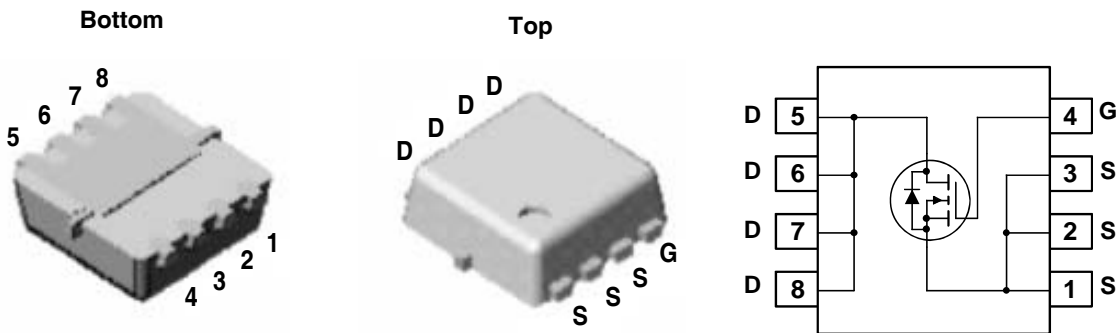


General Description

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.

Application

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



Power 33

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 | |
| P_D | Power Dissipation | 2.1 | W |
| | Power Dissipation | 0.9 | |
| T_J, T_{STG} | Operating and Storage Junction Temperature Range | -55 to +150 | °C |

Thermal Characteristics

| | | | | |
|-----------------|---|-----------|-----|------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | (Note 1) | 3.0 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | (Note 1a) | 60 | |

Package Marking and Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|----------------|---------|----------|-----------|------------|------------|
| FDM3622 | FDM3622 | Power 33 | 7" | 8mm | 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 | $I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$ | 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 | $V_{DS} = 15\text{mV}, f = 1\text{MHz}$ | | 3.1 | | 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 | $V_{DD} = 50\text{V}$ | | 3.6 | | |
| Q_{gd} | Gate to Drain "Miller" Charge | $I_D = 4.4\text{A}$ | | 3.4 | | |

Drain-Source Diode Characteristics

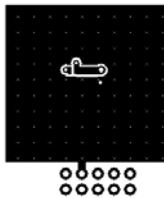
| | | | | | | |
|----------|---------------------------------------|--|--|--|------|----|
| V_{SD} | Source to Drain Diode Forward Voltage | $V_{GS} = 0\text{V}, I_S = 4.4\text{A}$ | | | 1.25 | V |
| | | $V_{GS} = 0\text{V}, I_S = 2.2\text{A}$ | | | 1.0 | V |
| t_{rr} | Reverse Recovery Time | $I_F =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

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, 1.5'x1.5'x0.062' 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%.

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

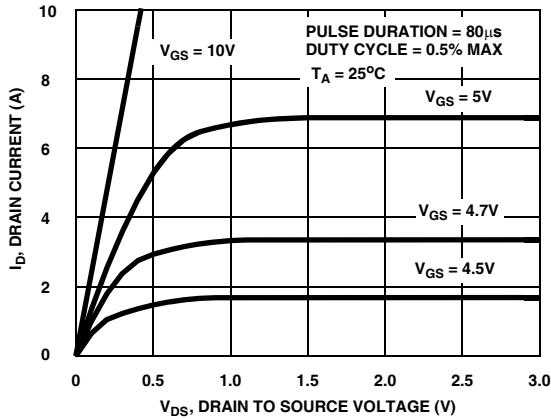


Figure 1. On-Region Characteristics

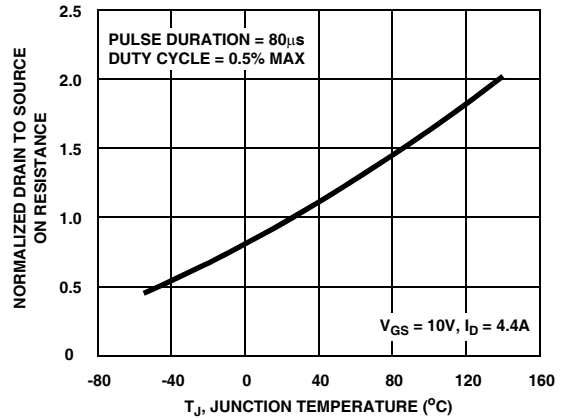


Figure 2. Normalized On-Resistance vs Junction Temperature

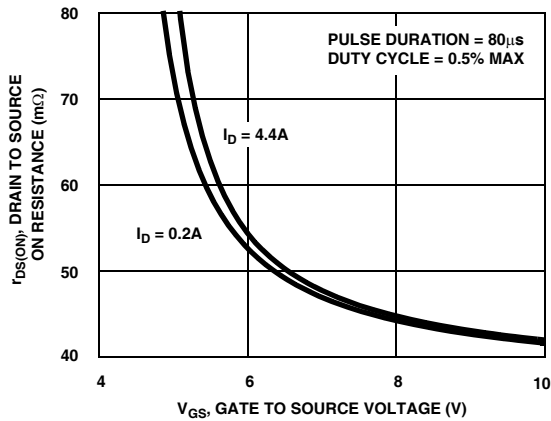


Figure 3. On-Resistance vs Gate to Source Voltage

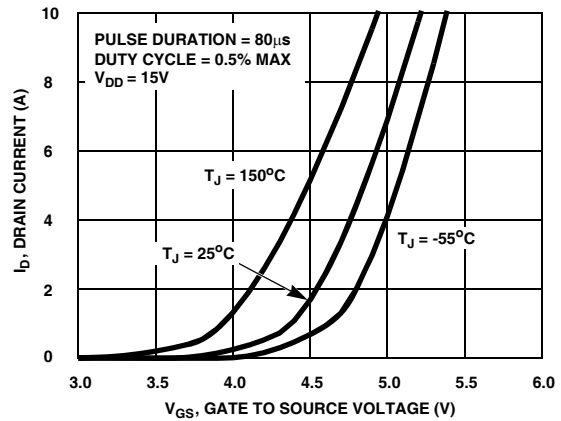


Figure 4. Transfer Characteristics

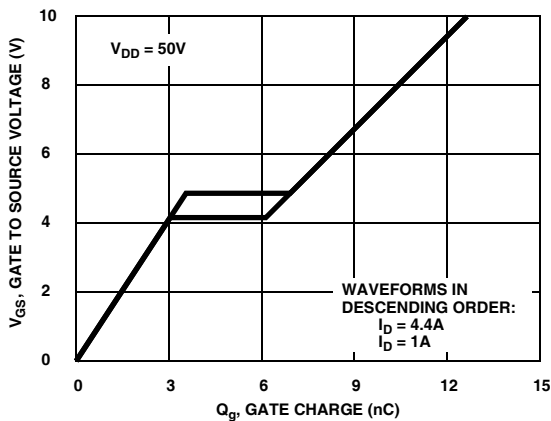


Figure 5. Gate Charge Characteristics

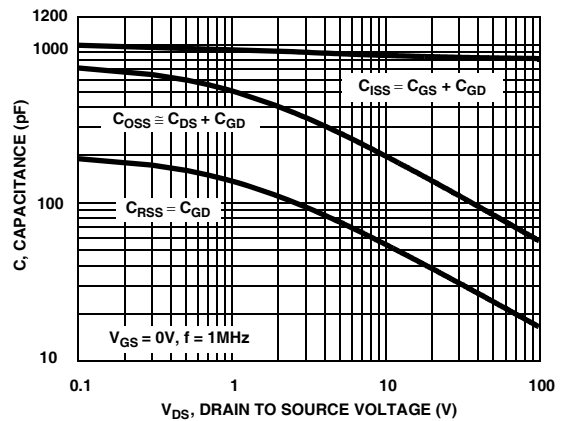


Figure 6. Capacitance vs Drain to Source Voltage

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

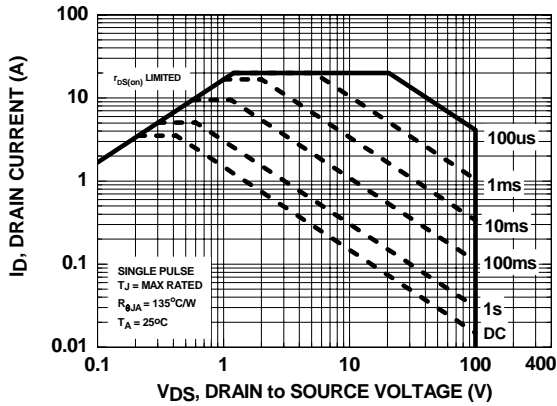


Figure 7. Forward Bias Safe Operating Area

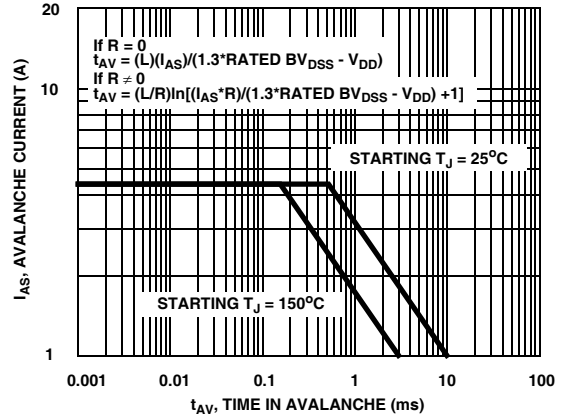


Figure 8. Uncalamped Inductive Switching Capability

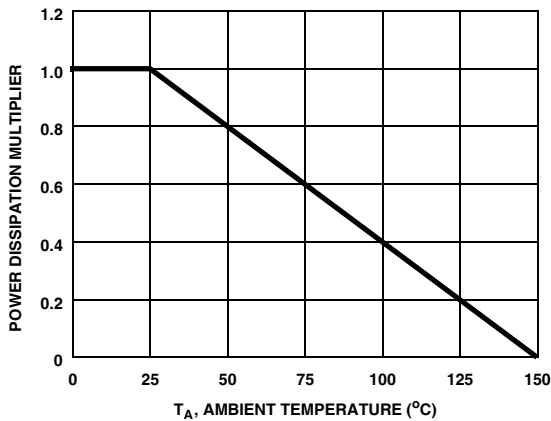


Figure 9. Normalized Power dissipation vs Ambient Temperature

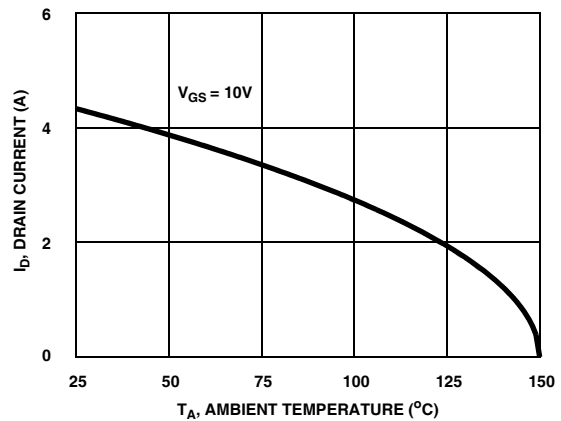


Figure 10. Maximum Continuous Drain Current vs Ambient Temperature

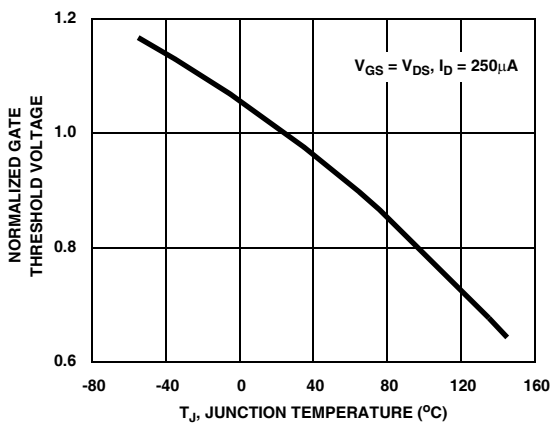


Figure 11. Normalized Gate Threshold voltage vs Junction Temperature

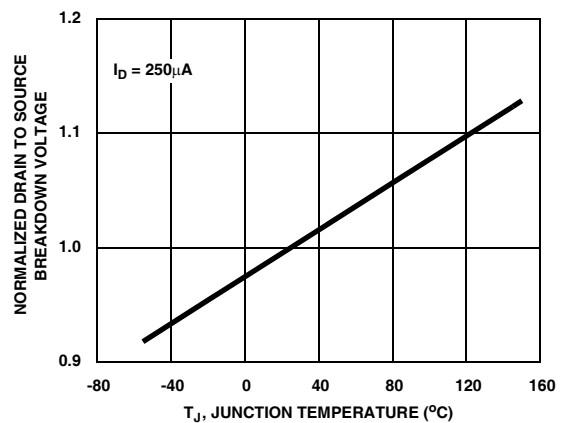


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

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

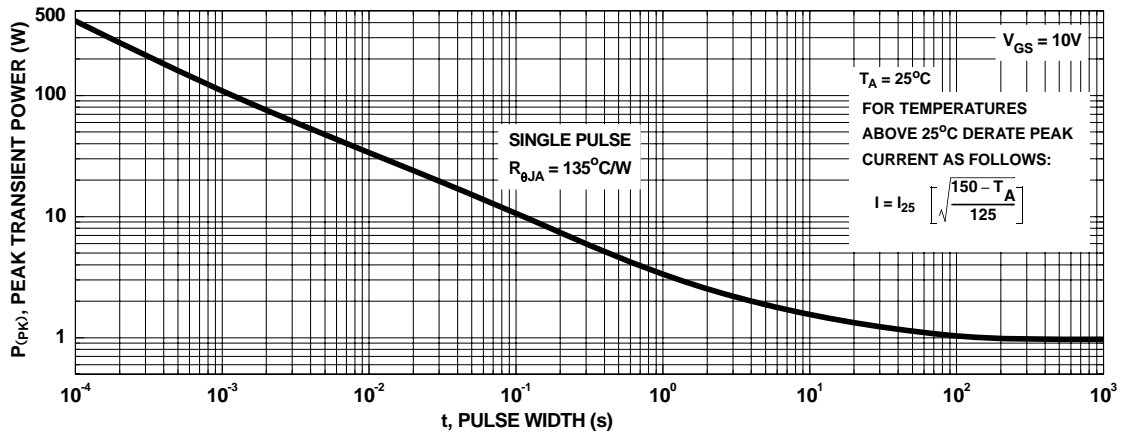


Figure 13. Peak Current Capability

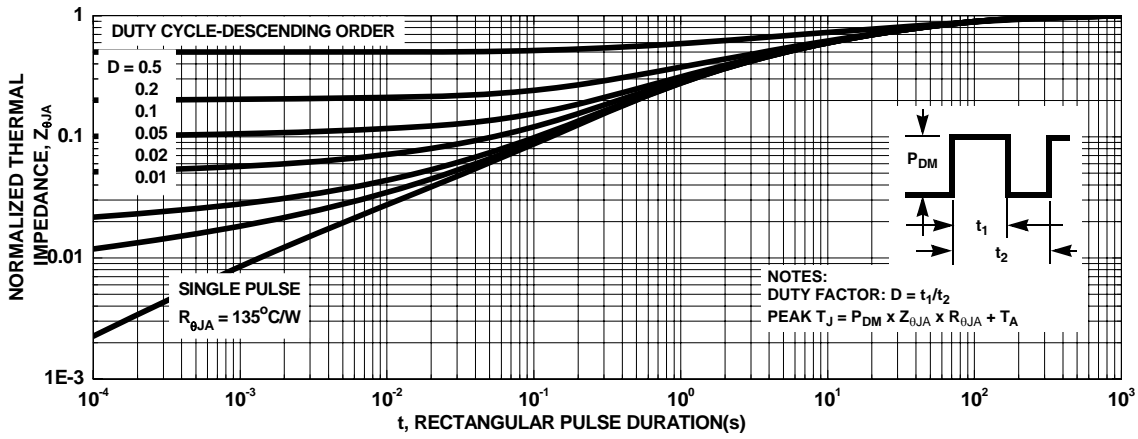
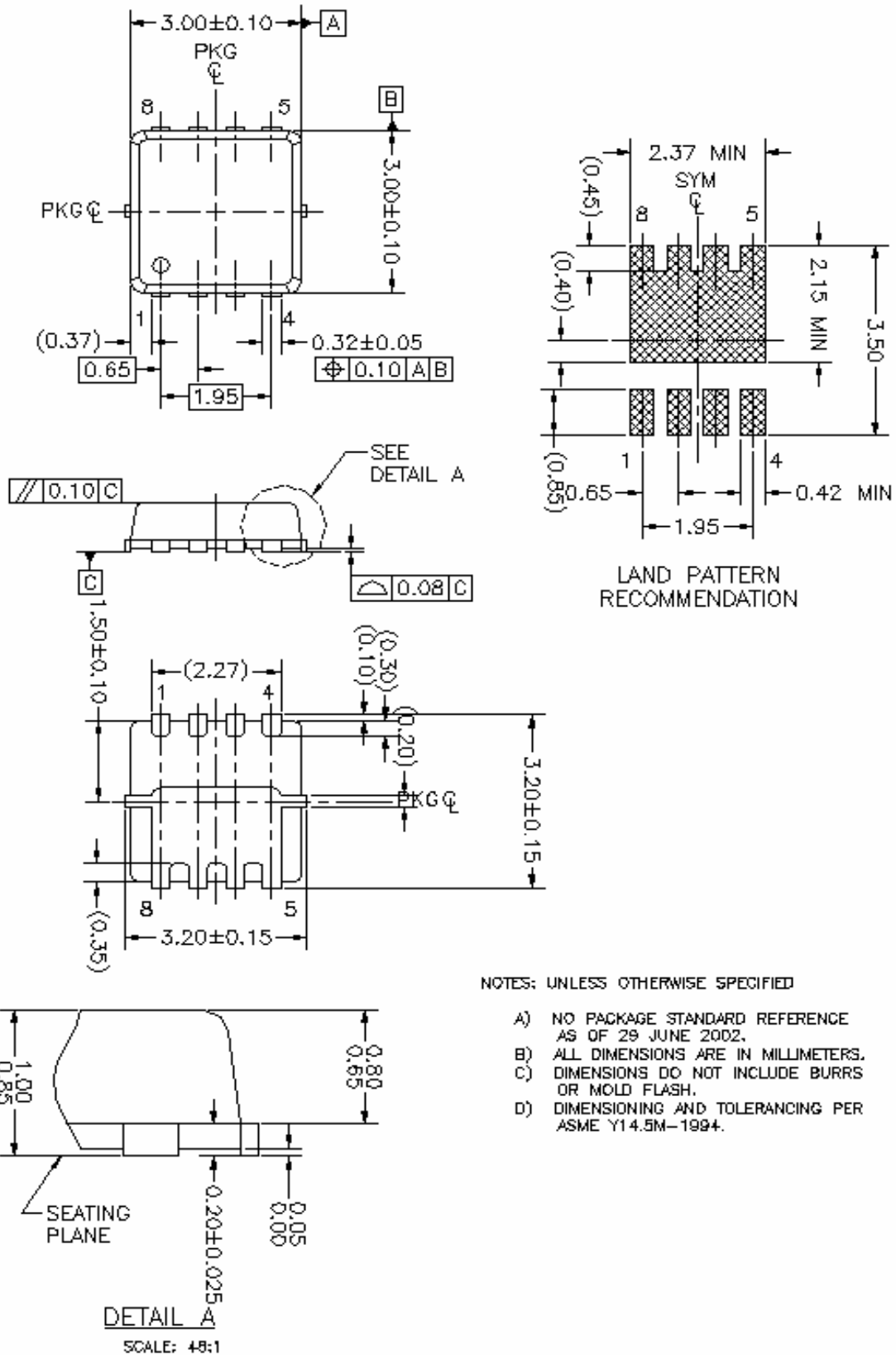


Figure 14. Transient Thermal Response Curve



NOTES: UNLESS OTHERWISE SPECIFIED

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- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.

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Rev. I22

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