

N-Channel Power MOSFET

600V, 7A, 0.62Ω

FEATURES

- Super-Junction technology
- High performance due to small figure-of-merit
- High commutation performance
- 100% UIS & Rg tested
- RoHS Compliant
- Halogen-free

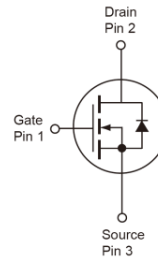
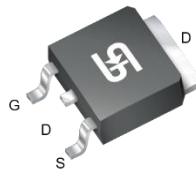
| KEY PERFORMANCE PARAMETERS | | |
|----------------------------|-------|------|
| PARAMETER | VALUE | UNIT |
| V_{DS} | 600 | V |
| $R_{DS(on)}$ (max) | 0.62 | Ω |
| Q_g | 15 | nC |

APPLICATIONS

- Switching Power Supply
- Lighting



TO-252 (D-PAK)



Note: MSL 3 (Moisture Sensitivity Level) per J-STD-020

| ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | |
|---|----------------|--------------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Drain-Source Voltage | V_{DS} | 600 | V |
| Gate-Source Voltage | V_{GS} | static | ±20 |
| | | AC(f>1Hz) | ±30 |
| Continuous Drain Current (Note 1) | I_D | 7 | A |
| Pulsed Drain Current (Note 1) | I_{DM} | 21 | A |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ | P_D | 78 | W |
| Single Pulse Avalanche Energy (Note 2) | E_{AS} | 113 | mJ |
| Single Pulse Avalanche Current (Note 2) | I_{AS} | 2.1 | A |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | - 55 to +150 | °C |

| THERMAL PERFORMANCE | | | |
|--|-----------------|-------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Junction to Case Thermal Resistance | $R_{\theta JC}$ | 1.6 | °C/W |
| Junction to Ambient Thermal Resistance | $R_{\theta JA}$ | 50 | °C/W |

Note: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case-thermal reference is defined at the solder mounting surface of the drain pins. The $R_{\theta JA}$ limit presented here is based on mounting on a 1 in² pad of 2 oz copper.

| ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|--|--------------|-----|------|-----------|----------|
| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNIT |
| Static (Note 3) | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 1mA$ | BV_{DSS} | 600 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 1mA$ | $V_{GS(TH)}$ | 3 | 4.5 | 5 | V |
| Gate Body Leakage | $V_{GS} = \pm 20V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 100 | nA |
| Zero Gate Voltage Drain Current | $V_{DS} = 600V, V_{GS} = 0V$ | I_{DSS} | -- | -- | 100 | μA |
| Drain-Source On-State Resistance | $V_{GS} = 10V, I_D = 2.4A$ | $R_{DS(on)}$ | -- | 0.57 | 0.62 | Ω |
| Dynamic (Note 4) | | | | | | |
| Total Gate Charge | $V_{DS} = 300V, I_D = 7A,$ $V_{GS} = 10V$ | Q_g | -- | 15 | -- | nC |
| Gate-Source Charge | | Q_{gs} | -- | 4.3 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 5.8 | -- | |
| Input Capacitance | $V_{DS} = 300V, V_{GS} = 0V,$ $f = 1.0MHz$ | C_{iss} | -- | 498 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 20 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 11 | -- | |
| Gate Resistance | $f = 1.0MHz$ | R_g | -- | 3 | -- | Ω |
| Switching (Note 5) | | | | | | |
| Turn-On Delay Time | $V_{DD} = 300V, R_G = 10\Omega,$ $I_D = 3.5A, V_{GS} = 10V$ | $t_{d(on)}$ | -- | 16 | -- | ns |
| Turn-On Rise Time | | t_r | -- | 17 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 36 | -- | |
| Turn-Off Fall Time | | t_f | -- | 10 | -- | |
| Source-Drain Diode | | | | | | |
| Body-Diode Continuous Forward Current | | I_S | -- | -- | 7 | A |
| Body-Diode Pulsed Current (Note 1) | | I_{SM} | -- | -- | 21 | A |
| Forward Voltage (Note 3) | $I_S = 2.4A, V_{GS} = 0V$ | V_{SD} | -- | -- | 1.5 | V |
| Reverse Recovery Time (Note 4) | $I_S = 7A$ | t_{rr} | -- | 270 | -- | ns |
| Reverse Recovery Charge (Note 4) | $dI_F/dt = 100A/\mu s$ | Q_{rr} | -- | 3.4 | -- | μC |

Notes:

1. Pulse width limited by the maximum junction temperature.
2. $L = 50mH, V_{DD} = 50V, R_G = 25\Omega, \text{Starting } T_J = 25^\circ\text{C}$
3. Pulse test: $PW \leq 300\mu s, \text{duty cycle} \leq 2\%$.
4. Defined by design. Not subject to production test.
5. Switching time is essentially independent of operating temperature.

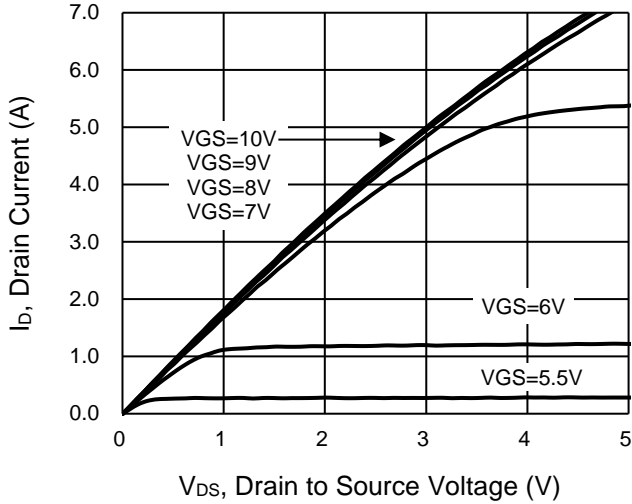
ORDERING INFORMATION

| ORDERING CODE | PACKAGE | PACKING |
|------------------|---------------|--------------------|
| TSM60NC620CP ROG | TO-252 (DPAK) | 2500pcs / 13" Reel |

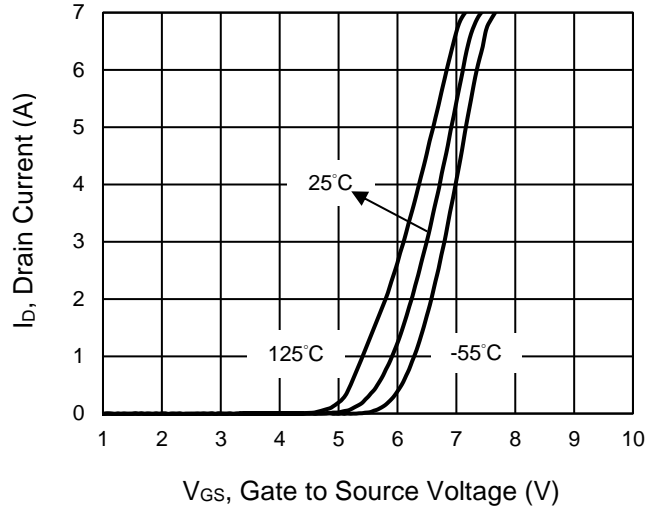
CHARACTERISTICS CURVES

($T_c = 25^\circ\text{C}$ unless otherwise noted)

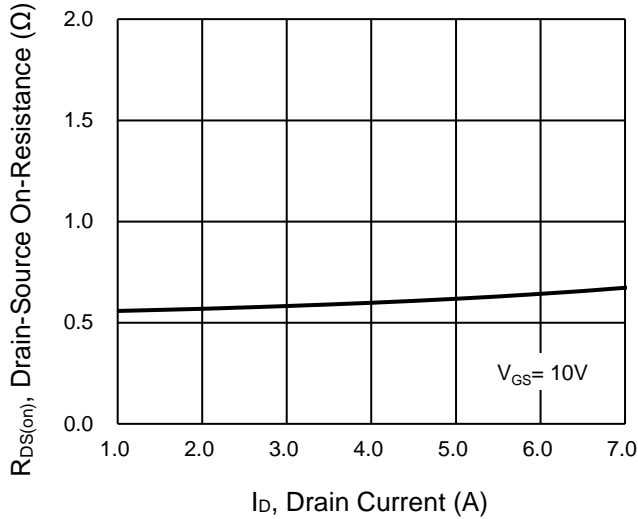
Output Characteristics



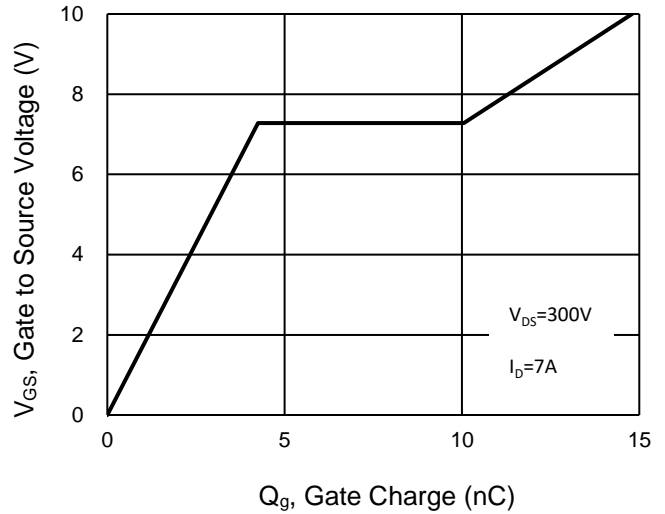
Transfer Characteristics



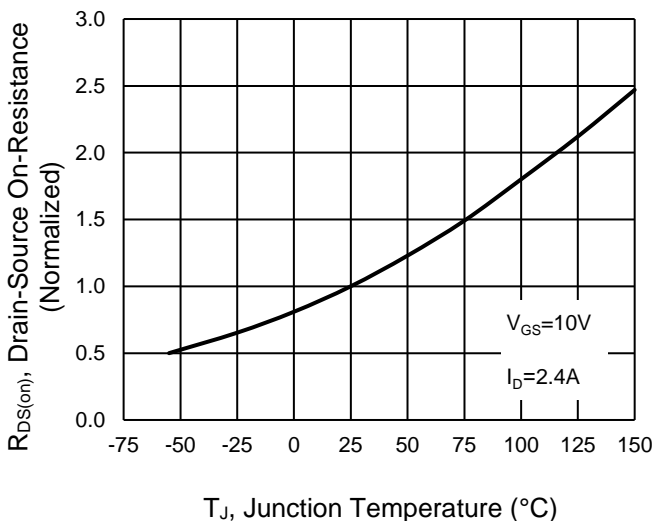
On-Resistance vs. Drain Current



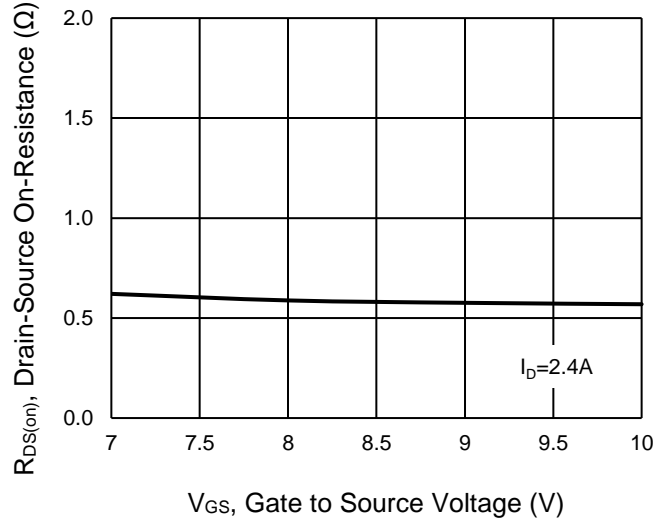
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



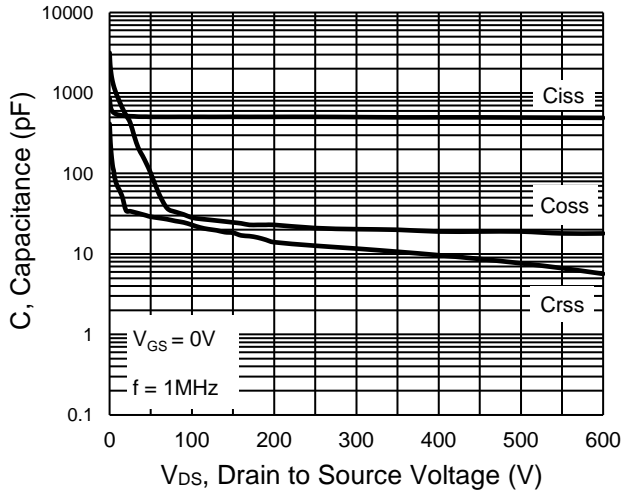
On-Resistance vs. Gate-Source Voltage



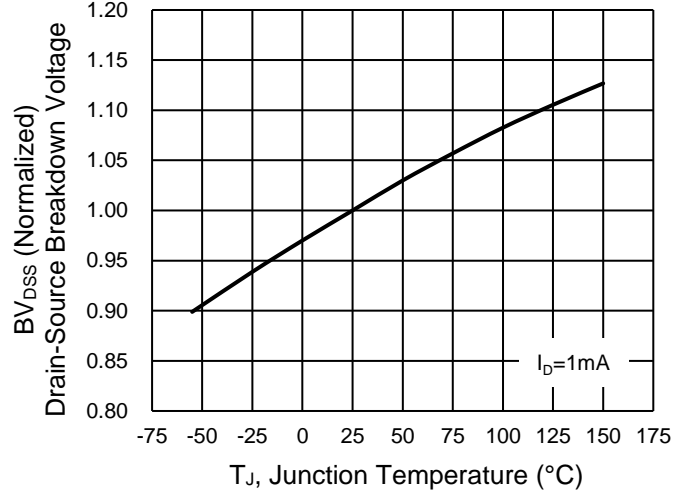
CHARACTERISTICS CURVES

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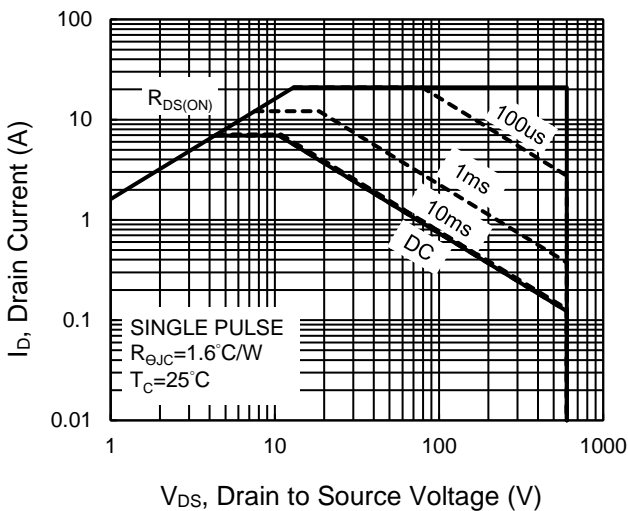
Capacitance vs. Drain-Source Voltage



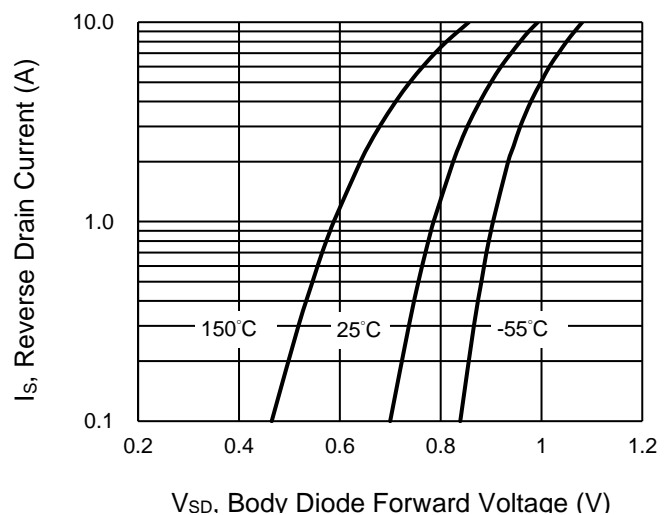
BV_{DSS} vs. Junction Temperature



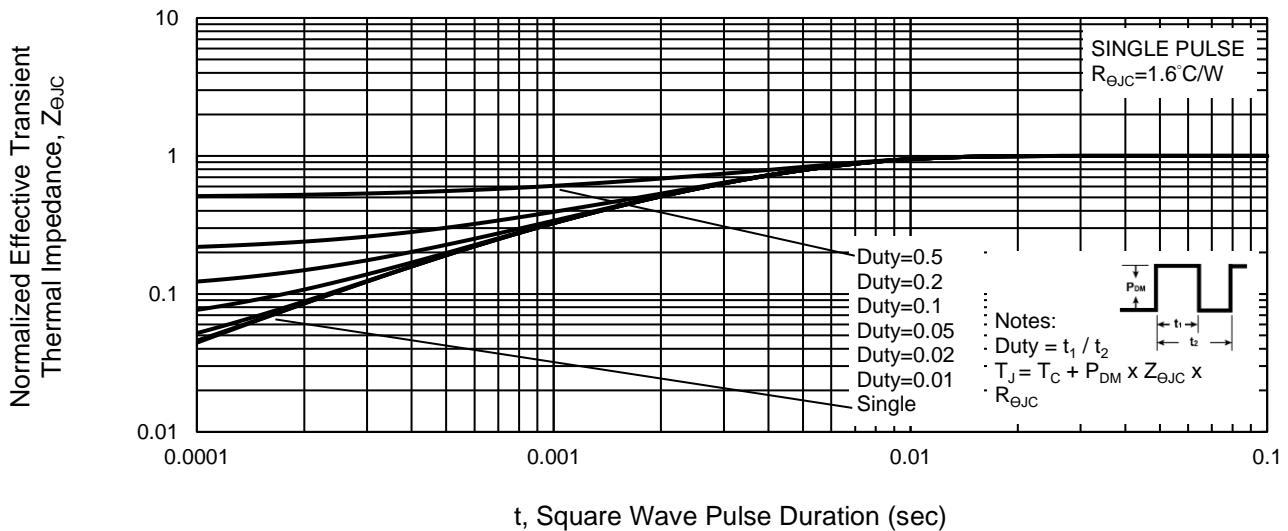
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage



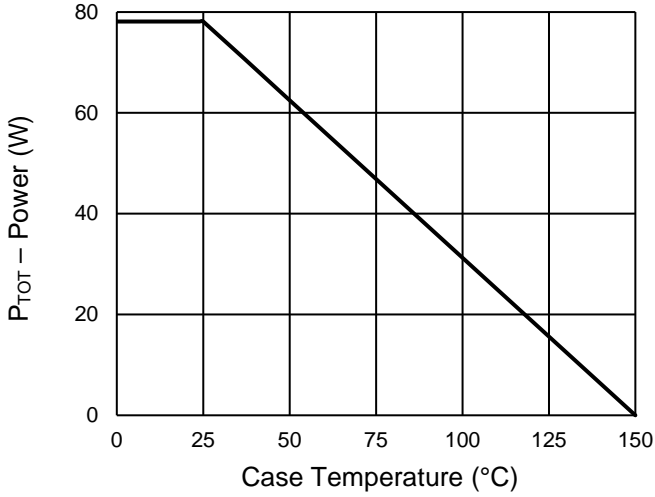
Normalized Thermal Transient Impedance, Junction-to-Case



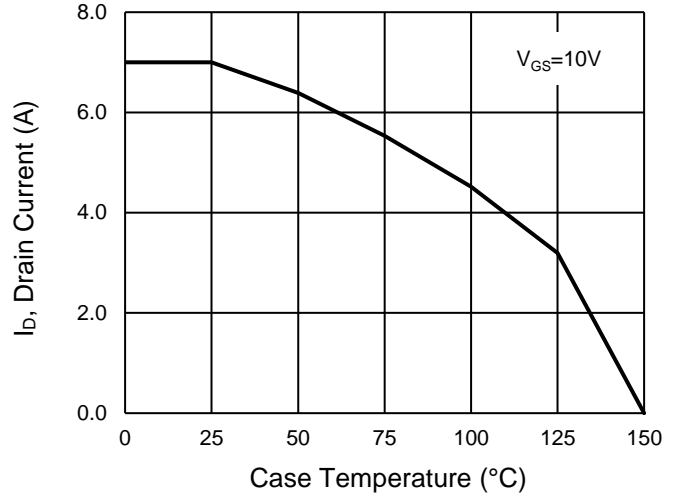
CHARACTERISTICS CURVES

($T_C = 25^\circ\text{C}$ unless otherwise noted)

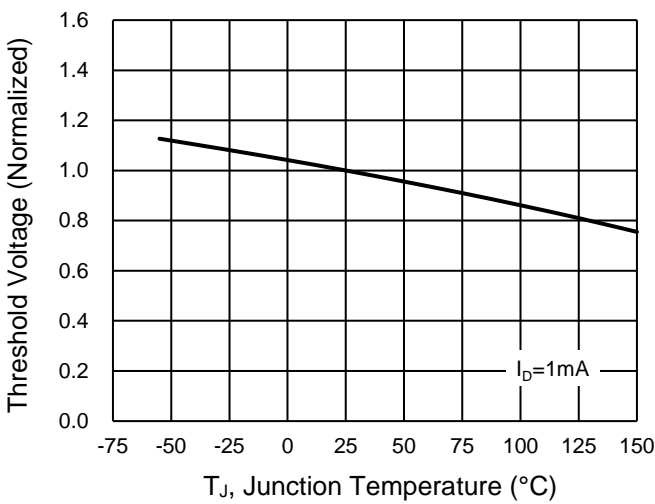
Power Dissipation



Drain Current

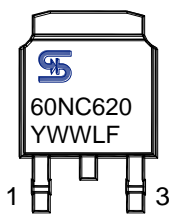
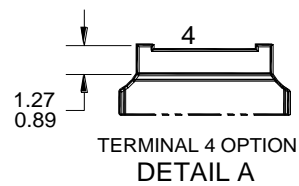
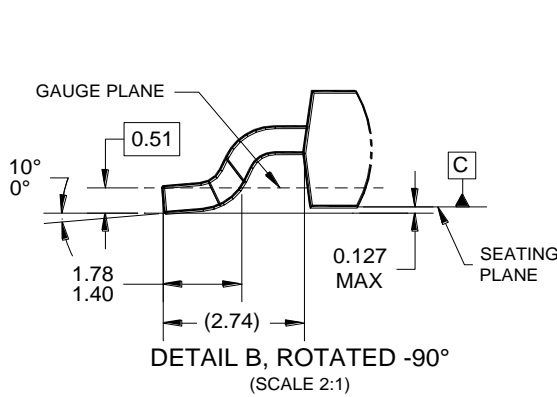
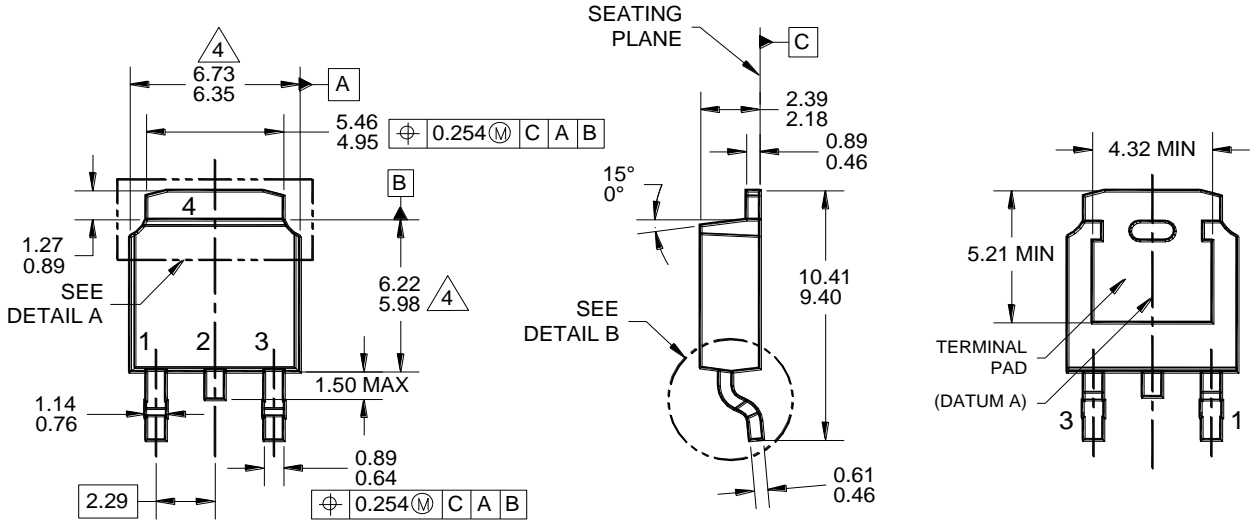


Normalized gate threshold voltage vs Temperature



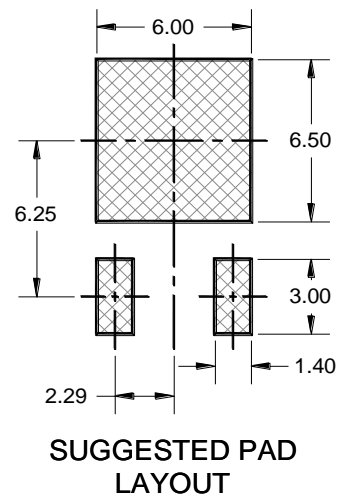
PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-252



MARKING DIAGRAM

- Y = YEAR CODE
- WW = WEEK CODE (01 ~ 52)
- L = LOT CODE (1~9, A~Z)
- F = FACTORY CODE



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: JEDEC TO-252, VARIATION AA, ISSUE F.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION, OR GATE BURRS.
5. DWG NO. REF: HQ2SD07-TO252AA-013 REV A.

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