

N-Channel Power MOSFET

600V, 15A, 285mΩ

FEATURES

- Latest super-junction technology
- Low gate charge capacitance
- High gate noise immunity
- RoHS compliant
- Halogen-free

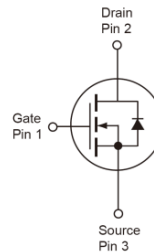
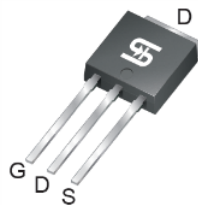
APPLICATIONS

- Switching applications
- Industrial

| KEY PERFORMANCE PARAMETERS | | |
|----------------------------|-------|------|
| PARAMETER | VALUE | UNIT |
| V_{DS} | 600 | V |
| $R_{DS(on)}$ (max) | 285 | mΩ |
| Q_g | 22 | nC |



TO-251 (IPAK)



| 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} | ± 30 | V |
| Continuous Drain Current | I_D | 15 | A |
| $T_C = 25^\circ\text{C}$ | | | |
| Pulsed Drain Current (Note 1) | I_{DM} | 60 | A |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ | P_D | 139 | W |
| Single Pulse Avalanche Energy (Note 2) | E_{AS} | 180 | mJ |
| Single Pulse Avalanche Current (Note 2) | I_{AS} | 2.7 | A |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | - 55 to +150 | $^\circ\text{C}$ |

| THERMAL PERFORMANCE | | | |
|---|-----------------|-------|--------------------|
| PARAMETER | SYMBOL | LIMIT | UNIT |
| Junction to Case Thermal Resistance | $R_{\theta JC}$ | 0.9 | $^\circ\text{C/W}$ |
| Junction to Ambient Thermal Resistance (Note 3) | $R_{\theta JA}$ | 50 | $^\circ\text{C/W}$ |

Notes:

1. Pulse Width $\leq 100\mu\text{s}$.
2. $L = 50\text{mH}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.
3. Device on a PCB FR4 with 1 in² (single layer, 2 oz thickness) copper area for drain connection.

| ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|---|---------------|------------|------------|------------|-------------|
| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNIT |
| Static (Note 4) | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 1mA$ | BV_{DSS} | 600 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 1.4mA$ | $V_{GS(TH)}$ | 4 | 4.8 | 6 | V |
| Gate Body Leakage | $V_{GS} = \pm 30V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 100 | nA |
| Zero Gate Voltage Drain Current | $V_{DS} = 600V, V_{GS} = 0V$ | I_{DSS} | -- | -- | 100 | μA |
| Drain-Source On-State Resistance | $V_{GS} = 10V, I_D = 5A$ | $R_{DS(on)}$ | -- | 259 | 285 | m Ω |
| | $V_{GS} = 12V, I_D = 5A$ | | -- | 247 | 274 | |
| Dynamic (Note 5) | | | | | | |
| Total Gate Charge | $V_{DS} = 480V, I_D = 15A, V_{GS} = 10V$ | Q_g | -- | 22 | -- | nC |
| Gate-Source Charge | | Q_{gs} | -- | 7.7 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 14 | -- | |
| Input Capacitance | $V_{DS} = 300V, V_{GS} = 0V, f = 100kHz$ | C_{iss} | -- | 884 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 30 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 8 | -- | |
| Gate Resistance | $f = 1.0MHz$ | R_g | -- | 1.2 | -- | Ω |
| Switching (Note 6) | | | | | | |
| Turn-On Delay Time | $V_{DD} = 300V, R_G = 3.3\Omega, I_D = 15A, V_{GS} = 10V$ | $t_{d(on)}$ | -- | 21 | -- | ns |
| Turn-On Rise Time | | t_r | -- | 26 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 32 | -- | |
| Turn-Off Fall Time | | t_f | -- | 3.4 | -- | |
| Source-Drain Diode | | | | | | |
| Forward Voltage (Note 4) | $I_S = 5A, V_{GS} = 0V$ | V_{SD} | -- | 0.8 | 1.5 | V |
| Reverse Recovery Time | $I_S = 7.5A$ | t_{rr} | -- | 274 | -- | ns |
| Reverse Recovery Charge | $di_f/dt = 100A/\mu s$ | Q_{rr} | -- | 3.5 | -- | μC |

Notes:

- Pulse test: Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- Defined by design. Not subject to production test.
- Switching time is essentially independent of operating temperature.

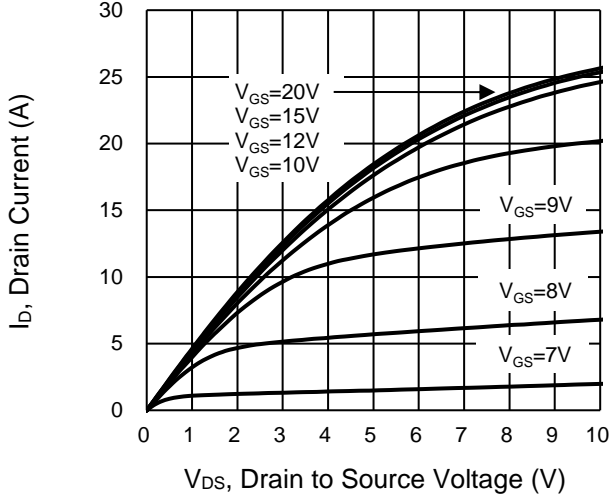
ORDERING INFORMATION

| ORDERING CODE | PACKAGE | PACKING |
|----------------------|----------------|----------------|
| TSM60NE285CH C5G | TO-251 (IPAK) | 75pcs / Tube |

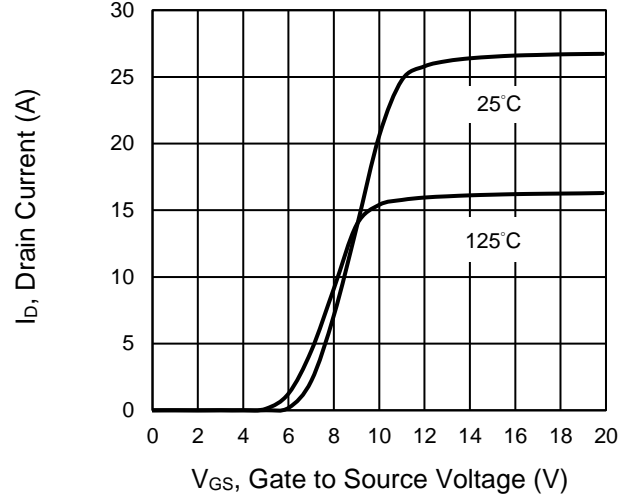
CHARACTERISTICS CURVES

(T_c = 25°C unless otherwise noted)

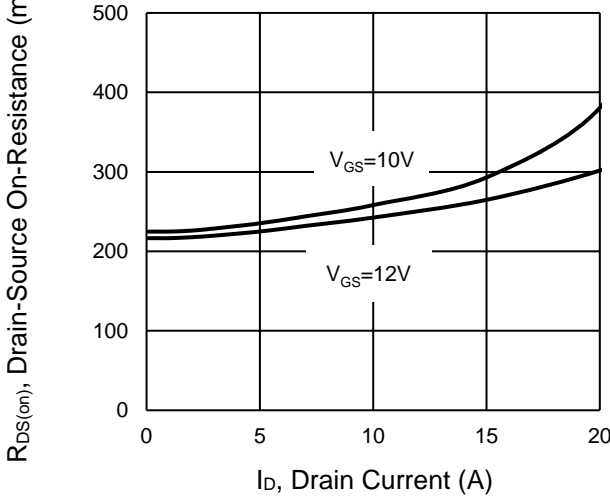
Output Characteristics



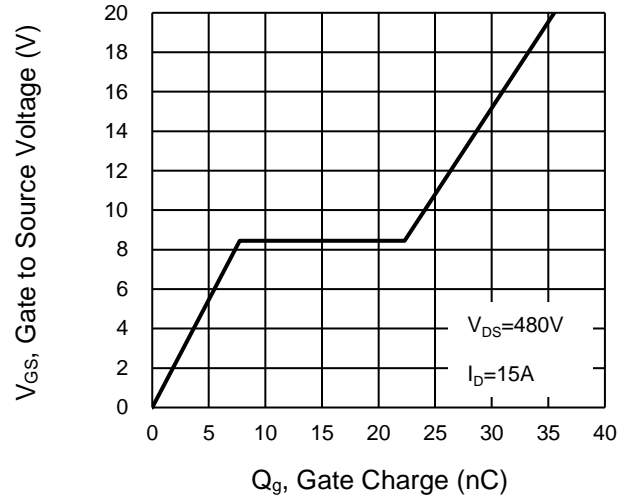
Transfer Characteristics



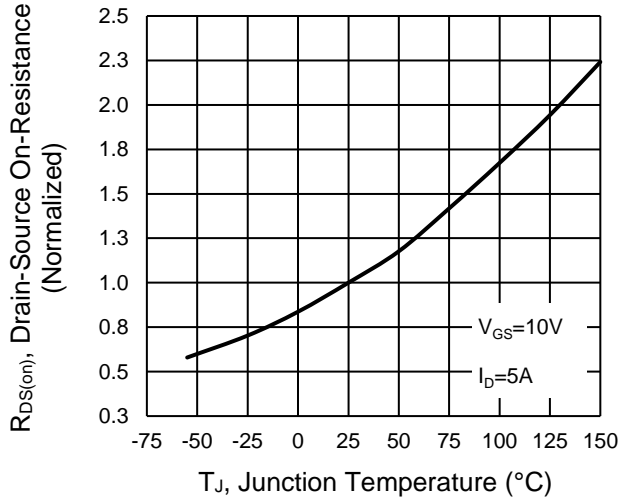
On-Resistance vs. Drain Current



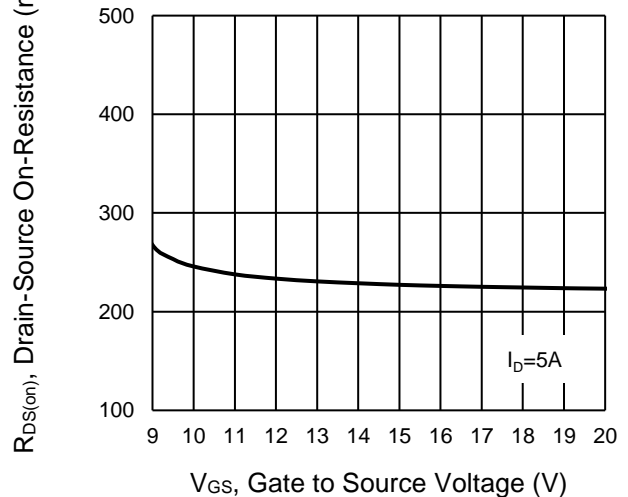
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



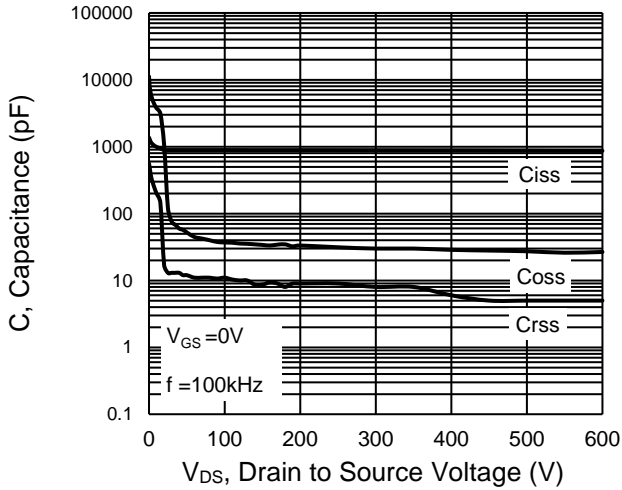
On-Resistance vs. Gate-Source Voltage



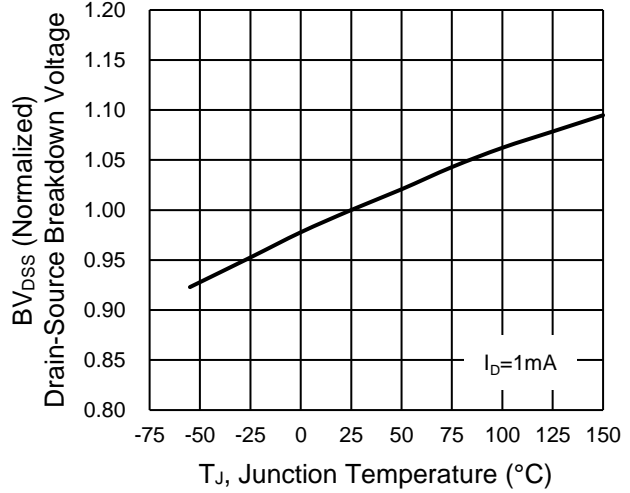
CHARACTERISTICS CURVES

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

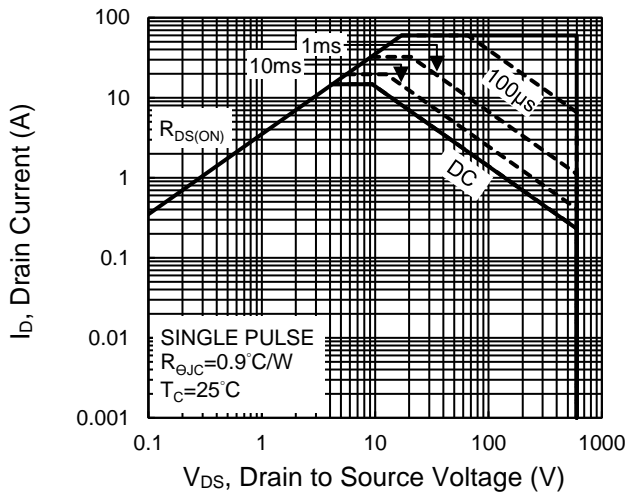
Capacitance vs. Drain-Source Voltage



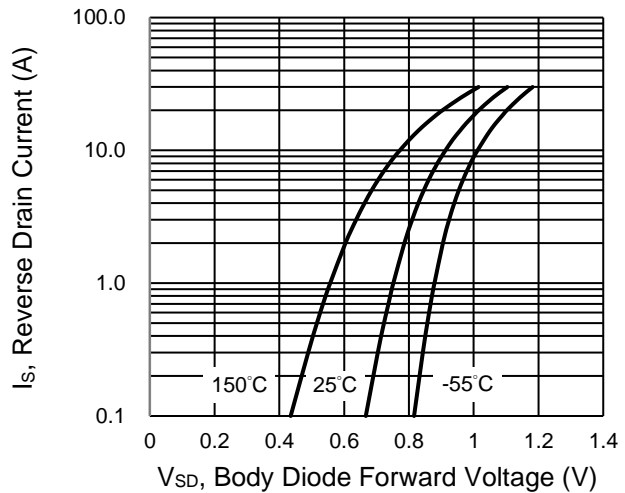
BV_{DSS} vs. Junction Temperature



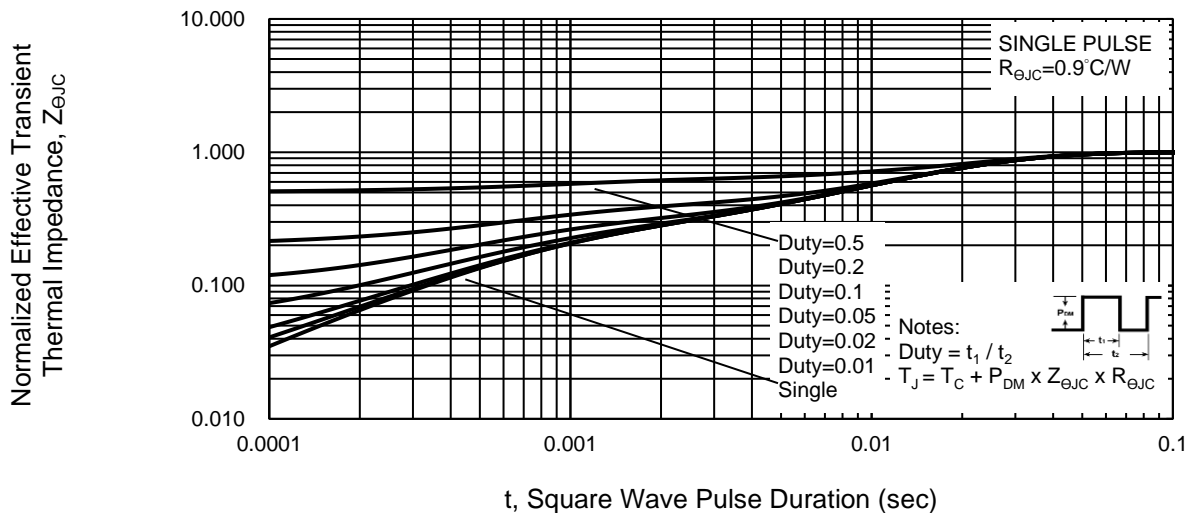
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage



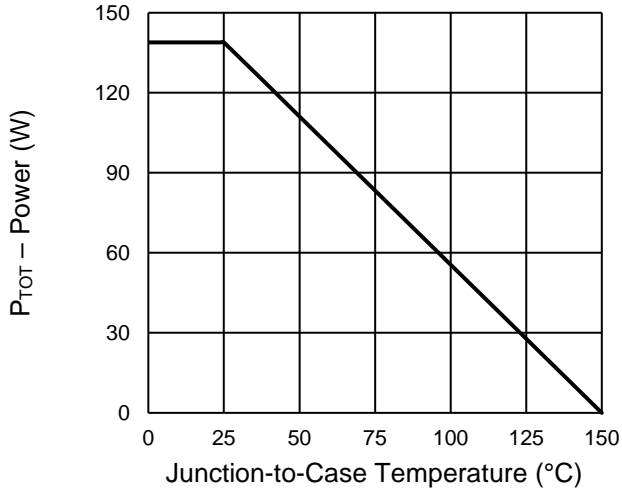
Normalized Thermal Transient Impedance, Junction-to-Case



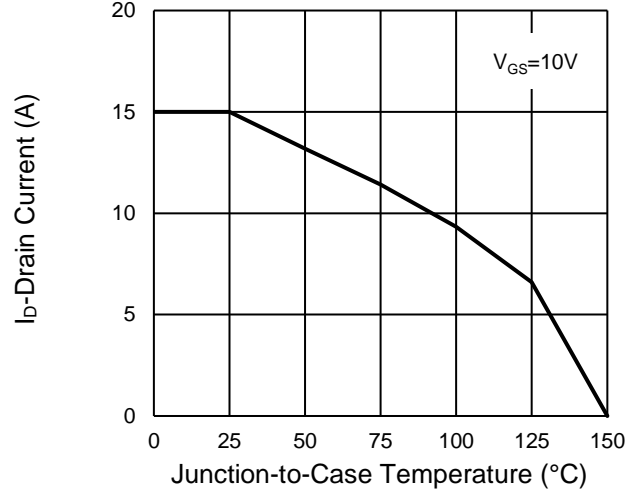
CHARACTERISTICS CURVES

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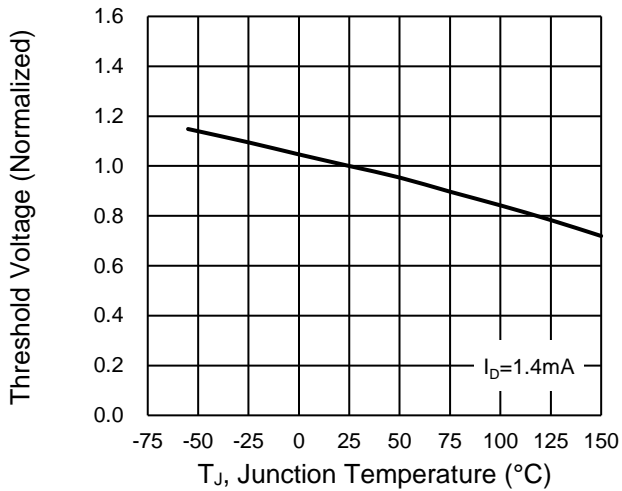
Power Dissipation



Drain Current

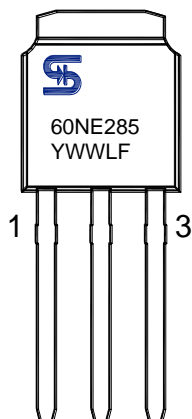
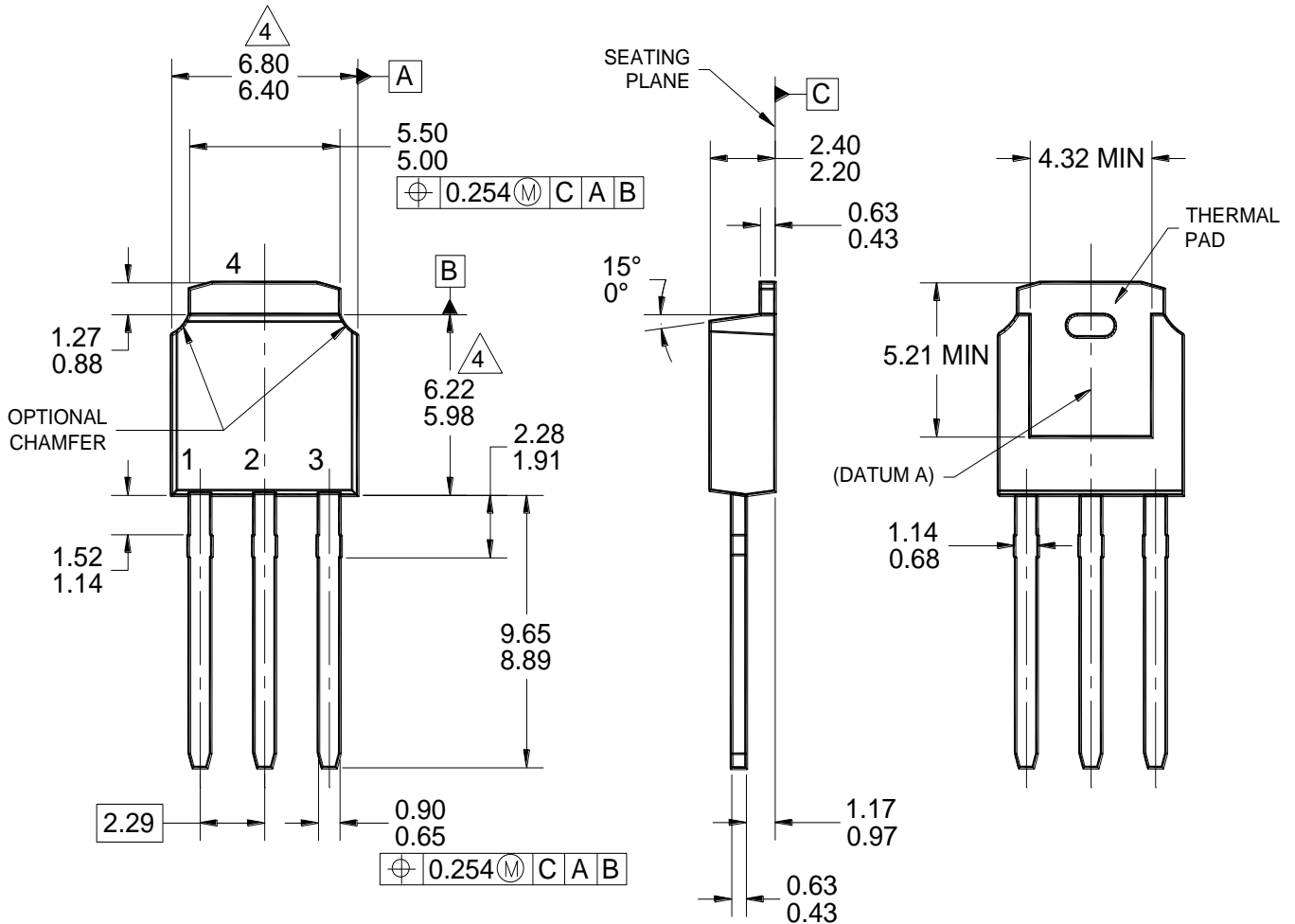


Normalized gate threshold voltage vs Temperature



PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-251 (IPAK)



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. THIS CONFORM TO JEDEC PACKAGE REGISTRATION TO-251, VARIATION AA.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
5. DWG NO REF: HQ2SD07-IPAK-005 REV A.

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