# MOSFET - Power, Single N-Channel, D²PAK7

## 80 V, 1.34 mΩ, 290 A

# NVBGS1D2N08H

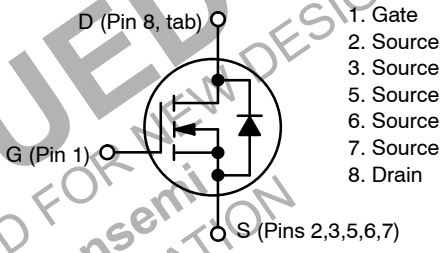
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### Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low $Q_G$ and Capacitance to Minimize Driver Losses
- AEC−Q101 Qualification
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ MAX | $I_D$ MAX |
|---|---|---|
| 80 V | 1.34 mΩ @ 10 V | 290 A |




**N−CHANNEL MOSFET**

### MAXIMUM RATINGS ($T_J$ = 25°C unless otherwise noted)

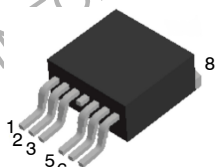
| Parameter | | | Symbol | Value | Unit |
|---|---|---|---|---|---|
| Drain−to−Source Voltage | | | $V_{DSS}$ | 80 | V |
| Gate−to−Source Voltage | | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current $R_{\theta JC}$ (Note 2) | Steady State | $T_C$ = 25°C | $I_D$ | 290 | A |
| | | $T_C$ = 100°C | | 205 | |
| Power Dissipation $R_{\theta JC}$ (Note 2) | | $T_C$ = 25°C | $P_D$ | 259 | W |
| | | $T_C$ = 100°C | | 130 | |
| Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2) | Steady State | $T_A$ = 25°C | $I_D$ | 43 | A |
| | | $T_A$ = 100°C | | 31 | |
| Power Dissipation $R_{\theta JA}$ (Notes 1, 2) | | $T_A$ = 25°C | $P_D$ | 5.7 | W |
| | | $T_A$ = 100°C | | 2.9 | |
| Pulsed Drain Current | $T_A$ = 25°C, $t_p$ = 100 μs | | $I_{DM}$ | 900 | A |
| Operating Junction and Storage Temperature Range | | | $T_J$, $T_{stg}$ | −55 to +175 | °C |
| Source Current (Body Diode) | | | $I_S$ | 199 | A |
| Single Pulse Drain−to−Source Avalanche Energy ($I_L$ = 32 $A_{pk}$) | | | $E_{AS}$ | 1500 | mJ |
| Lead Temperature for Soldering Purposes (1/8″ from case for 10 s) | | | $T_L$ | 260 | °C |

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 RESISTANCE MAXIMUM RATINGS

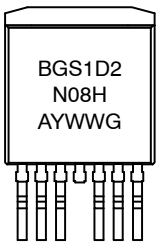
| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Junction−to−Case − Steady State (Note 2) | $R_{\theta JC}$ | 0.58 | °C/W |
| Junction−to−Ambient − Steady State (Note 1) | $R_{\theta JA}$ | 26.2 | |

1. Surface−mounted on FR4 board using a 1 $in^2$ pad size, 2 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.




**D²PAK7**
**CASE 221BP**

**MARKING DIAGRAM**




BGS1D2N08H = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

### ORDERING INFORMATION

| Device | Package | Shipping† |
|---|---|---|
| NVBGS1D2N08H | D²PAK7 (Pb−Free) | 800 / Tape & Reel |

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

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**ELECTRICAL CHARACTERISTICS** ($T_J$ = 25°C unless otherwise specified)

| Parameter | Symbol | Test Condition | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | | |
| Drain−to−Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 μA | | 80 | | | V |
| Drain−to−Source Breakdown Voltage Temperature Coefficient | $V_{(BR)DSS}/T_J$ | $I_D$ = 250 μA, ref to 25°C | | | 56 | | mV/°C |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 80 V | $T_J$ = 25°C | | | 10 | μA |
| | | | $T_J$ = 125°C | | | 250 | μA |
| Gate−to−Source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V | | | | ±100 | nA |
| **ON CHARACTERISTICS** (Note 3) | | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 650 μA | | 2.0 | 2.9 | 4.0 | V |
| Negative Threshold Temperature Coefficient | $V_{GS(TH)}/T_J$ | $I_D$ = 650 μA, ref to 25°C | | | −7.5 | | mV/°C |
| Drain−to−Source On Resistance | $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 50 A | | | 1.1 | 1.34 | mΩ |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 5 V, $I_D$ = 50 A | | | 213 | | S |
| Gate−Resistance | $R_G$ | | | | 0.5 | | Ω |
| **CHARGES, CAPACITANCES & GATE RESISTANCE** | | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 40 V, f = 1 MHz | | | 10830 | | pF |
| Output Capacitance | $C_{OSS}$ | | | | 1605 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | | 45 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 40 V; $I_D$ = 50 A | | | 160 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | | 28 | | |
| Gate−to−Source Charge | $Q_{GS}$ | | | | 43 | | |
| Gate−to−Drain Charge | $Q_{GD}$ | | | | 33 | | |
| Plateau Voltage | $V_{GP}$ | | | | 4.3 | | V |
| **SWITCHING CHARACTERISTICS** | | | | | | | |
| Turn−On Delay Time | $t_{d(ON)}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 64 V, $I_D$ = 50 A, $R_G$ = 6 Ω | | | 40 | | ns |
| Rise Time | $t_r$ | | | | 34 | | |
| Turn−Off Delay Time | $t_{d(OFF)}$ | | | | 134 | | |
| Fall Time | $t_f$ | | | | 45 | | |
| **DRAIN−SOURCE DIODE CHARACTERISTICS** | | | | | | | |
| Forward Diode Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = 50 A | $T_J$ = 25°C | | 0.8 | 1.3 | V |
| | | | $T_J$ = 125°C | | 0.65 | | |
| Reverse Recovery Time | $t_{RR}$ | $V_{GS}$ = 0 V, $dI_S/dt$ = 100 A/μs, $I_S$ = 50 A | | | 78 | | ns |
| Reverse Recovery Charge | $Q_{RR}$ | | | | 122 | | nC |

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.

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

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## TYPICAL CHARACTERISTICS

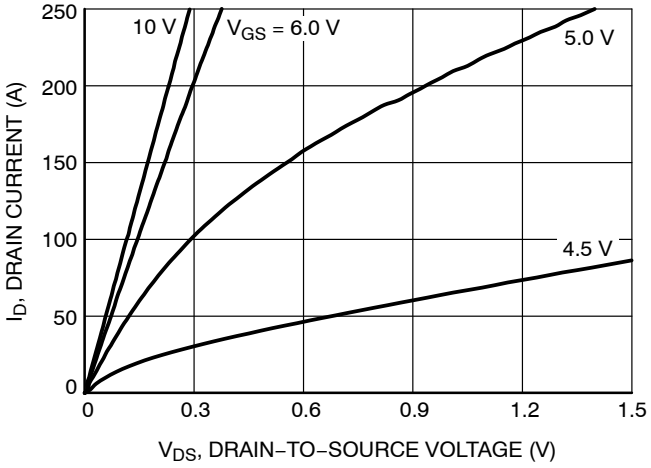



**Figure 1. On−Region Characteristics**

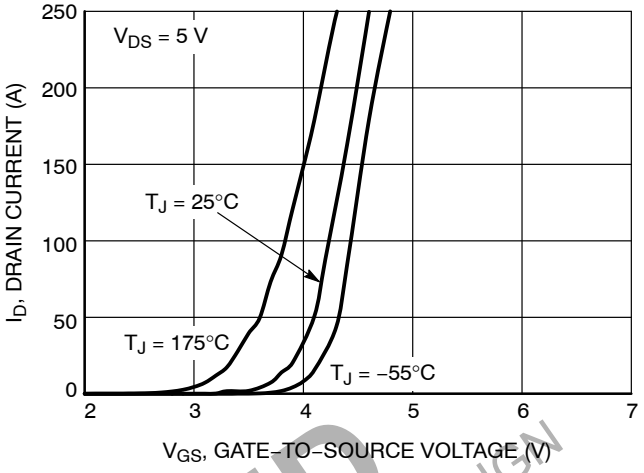



**Figure 2. Transfer Characteristics**

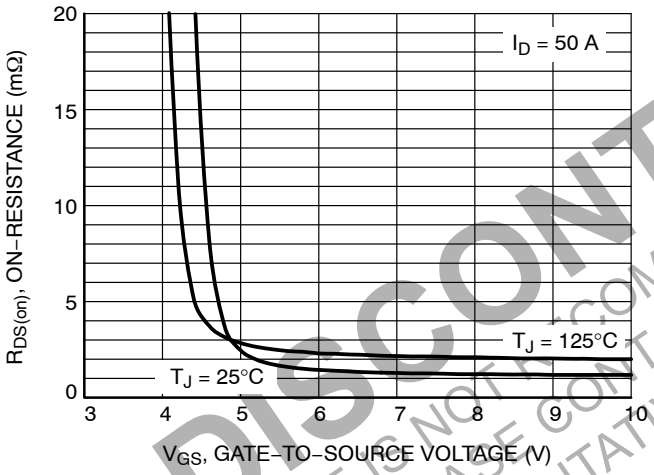



**Figure 3. On−Resistance vs. Gate−to−Source Voltage**

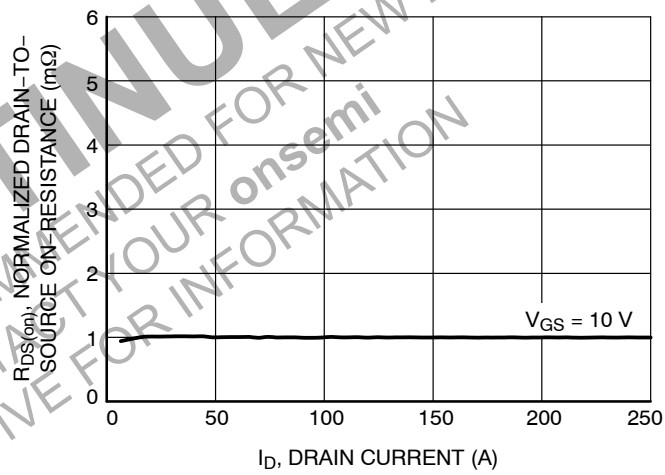



**Figure 4. On−Resistance vs. Drain Current and Gate Voltage**

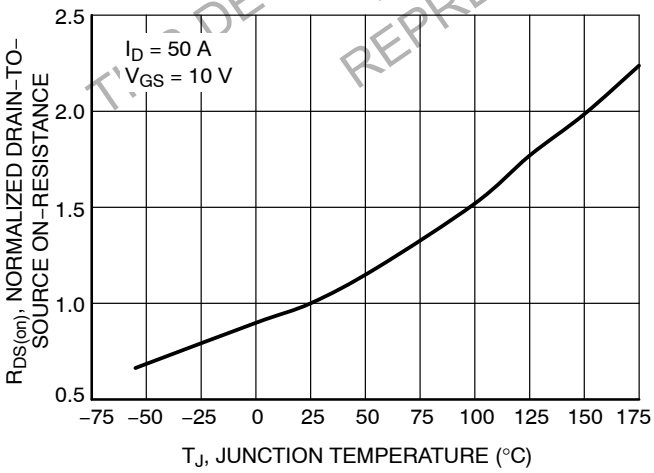



**Figure 5. On−Resistance Variation with Temperature**

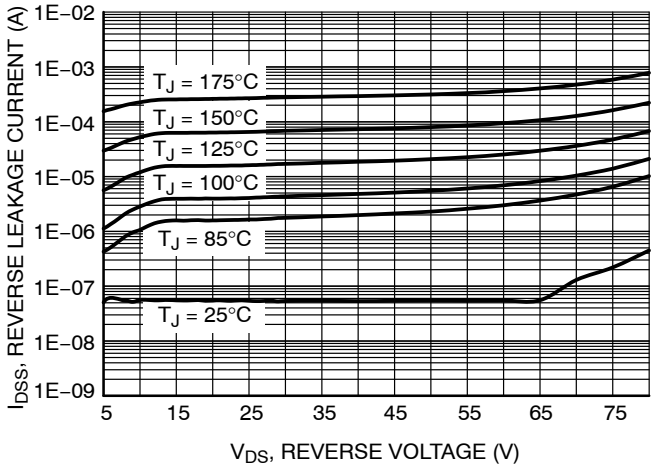



**Figure 6. Drain−to−Source Leakage Current vs. Voltage**

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## TYPICAL CHARACTERISTICS

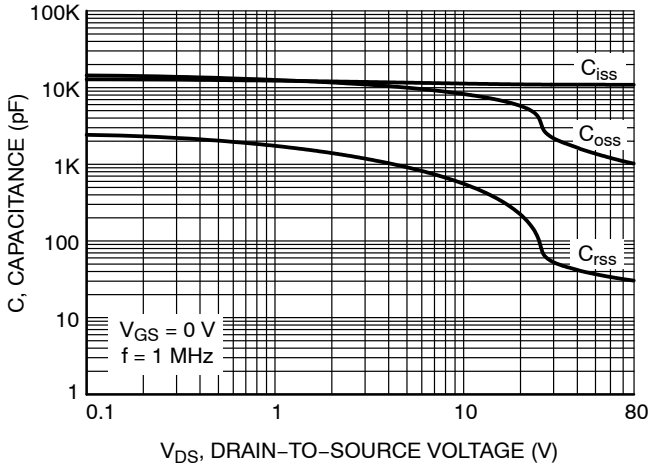



**Figure 7. Capacitance Variation**

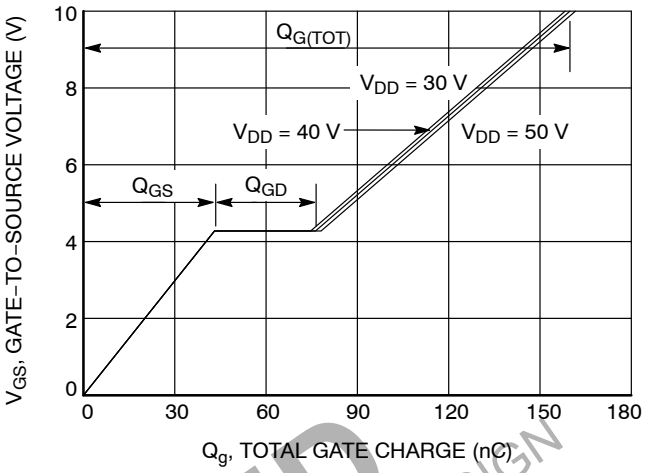



**Figure 8. Gate−to−Source vs. Total Charge**

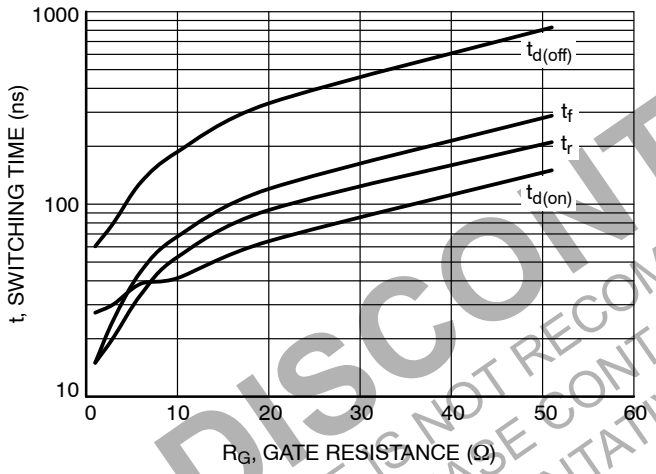



**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**

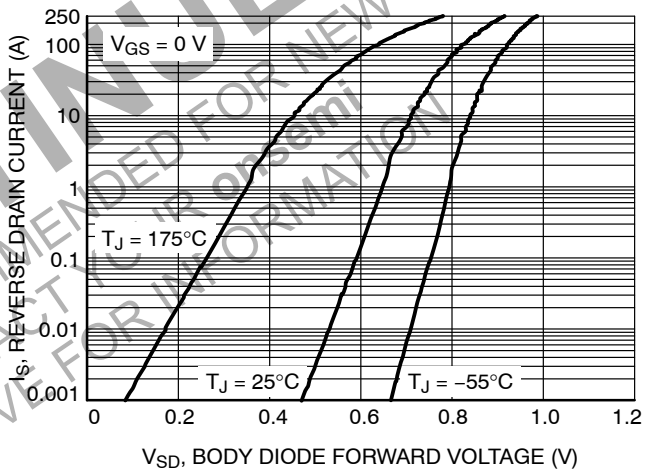



**Figure 10. Diode Forward Voltage vs. Current**

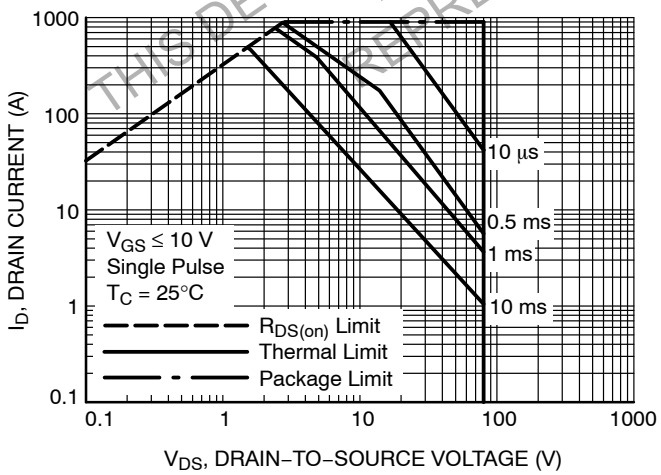



**Figure 11. Maximum Rated Forward Biased Safe Operating Area**

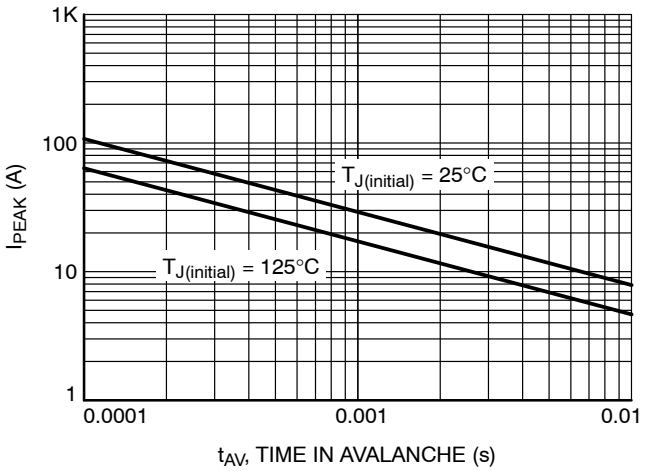



**Figure 12. Maximum Drain Current vs. Time in Avalanche**

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## TYPICAL CHARACTERISTICS

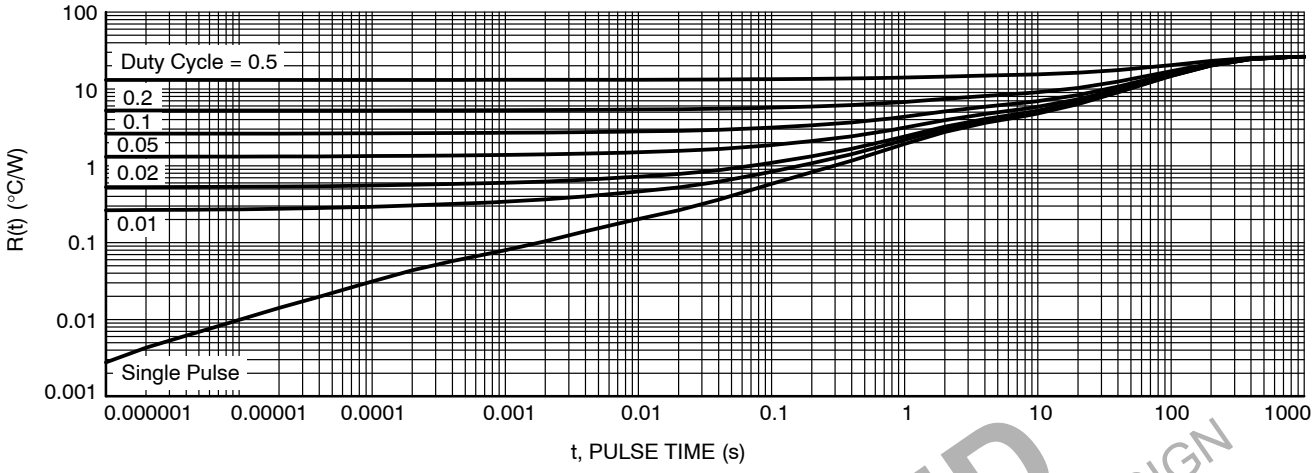
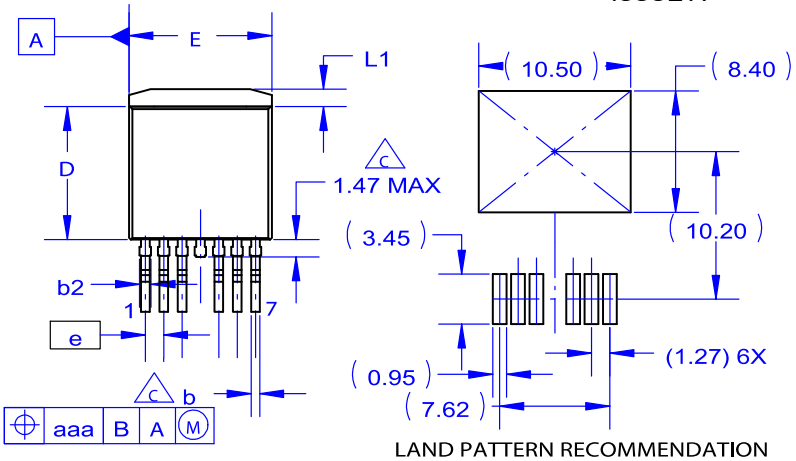



**Figure 13. Transient Thermal Impedance**

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## PACKAGE DIMENSIONS

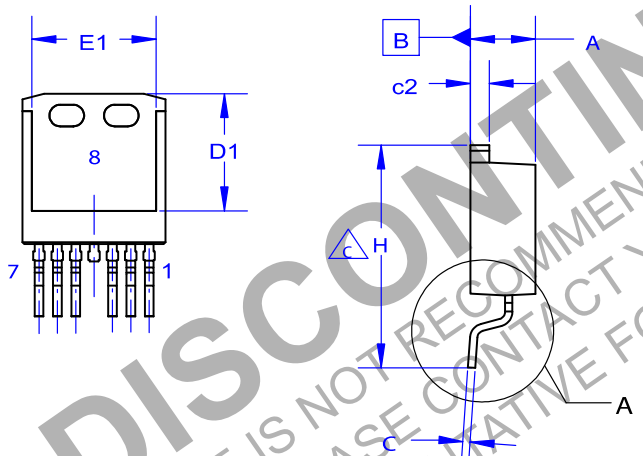
**D2PAK7 (TO−263−7LD) 15.4x9.9x4.5**
CASE 221BP
ISSUE A

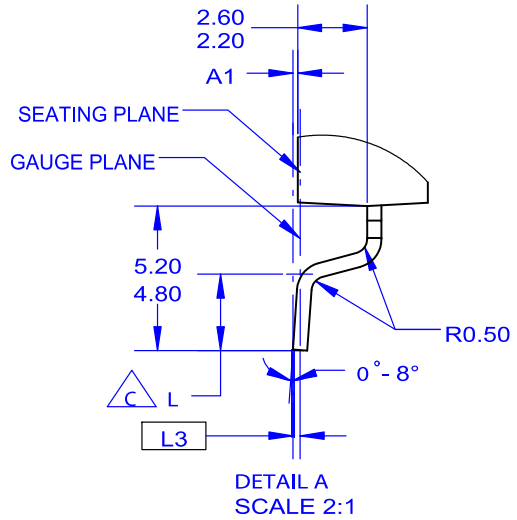



NOTES:

A. PACKAGE CONFORMS TO JEDEC TO-263 VARIATION CB EXCEPT WHERE NOTED.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. OUT OF JEDEC STANDARD VALUE.
D. DIMENSION AND TOLERANCE AS PER ASME Y14.5-2009.
E. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
F. LAND PATTERN RECOMMENDATION PER IPC. TO127P1524X465-8N.

| DIM | MILLIMETERS | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 4.30 | 4.50 | 4.70 |
| A1 | 0.00 | 0.10 | 0.20 |
| b2 | 0.60 | 0.70 | 0.80 |
| b | 0.50 | 0.60 | 0.70 |
| c | 0.40 | 0.50 | 0.60 |
| c2 | 1.20 | 1.30 | 1.40 |
| D | 9.00 | 9.20 | 9.40 |
| D1 | 7.30 | 7.80 | 8.20 |
| E | 9.70 | 9.90 | 10.20 |
| E1 | 7.15 | 8.05 | 8.55 |
| e | ~ | 1.27 | ~ |
| H | 15.10 | 15.40 | 15.70 |
| L | 2.44 | 2.64 | 2.84 |
| L1 | 1.00 | 1.20 | 1.40 |
| L3 | ~ | 0.25 | ~ |
| aaa | ~ | ~ | 0.25 |




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