

## B296L-VB Datasheet

### N-Channel 100-V (D-S) MOSFET

#### PRODUCT SUMMARY

| $V_{DS}$ (V) | $R_{DS(on)}$ ( $\Omega$ ) | $I_D$ (A) |
|--------------|---------------------------|-----------|
| 100          | 0.010 at $V_{GS} = 10$ V  | 100       |
|              | 0.023 at $V_{GS} = 4.5$ V | 85        |

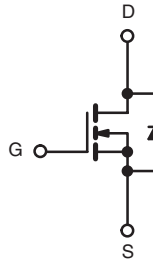
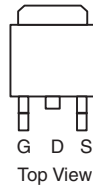
#### FEATURES

- Trench Power MOSFET
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC



**RoHS**  
COMPLIANT

TO-263



N-Channel MOSFET

#### ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

| Parameter                                          |                                              | Symbol                            | Limit            | Unit |
|----------------------------------------------------|----------------------------------------------|-----------------------------------|------------------|------|
| Drain-Source Voltage                               |                                              | V <sub>DS</sub>                   | 100              | V    |
| Gate-Source Voltage                                |                                              | V <sub>GS</sub>                   | ± 20             |      |
| Continuous Drain Current (T <sub>J</sub> = 150 °C) | T <sub>C</sub> = 25 °C                       | I <sub>D</sub>                    | 100              | A    |
|                                                    | T <sub>C</sub> = 125 °C                      |                                   | 75 <sup>a</sup>  |      |
| Pulsed Drain Current                               |                                              | I <sub>DM</sub>                   | 300              |      |
| Avalanche Current                                  | L = 0.1 mH                                   | I <sub>AS</sub>                   | 75               |      |
| Single Pulse Avalanche Energy <sup>b</sup>         |                                              | E <sub>AS</sub>                   | 280              | mJ   |
| Maximum Power Dissipation <sup>b</sup>             | T <sub>C</sub> = 25 °C (TO-220AB and TO-263) | P <sub>D</sub>                    | 250 <sup>c</sup> | W    |
|                                                    | T <sub>A</sub> = 25 °C (TO-263) <sup>d</sup> |                                   | 3.75             |      |
| Operating Junction and Storage Temperature Range   |                                              | T <sub>J</sub> , T <sub>stg</sub> | - 55 to 175      | °C   |

#### THERMAL RESISTANCE RATINGS

| Parameter           | Symbol     | Limit | Unit |
|---------------------|------------|-------|------|
| Junction-to-Ambient | $R_{thJA}$ | 40    | °C/W |
|                     |            | 62.5  |      |
| Junction-to-Case    | $R_{thJC}$ | 0.6   |      |

Notes:

- Pulse test; pulse width  $\leq 300$   $\mu$ s, duty cycle  $\leq 2$  %.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

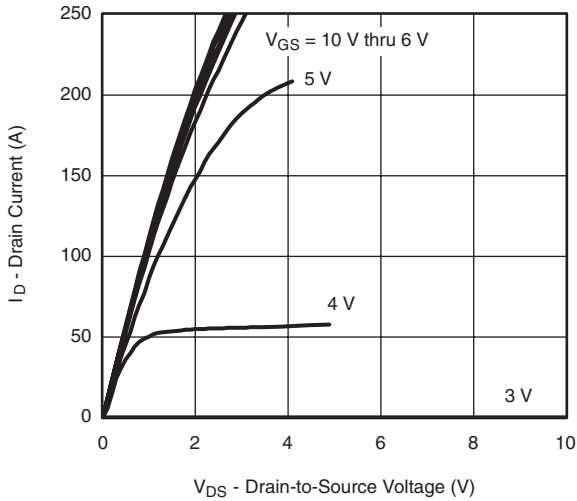
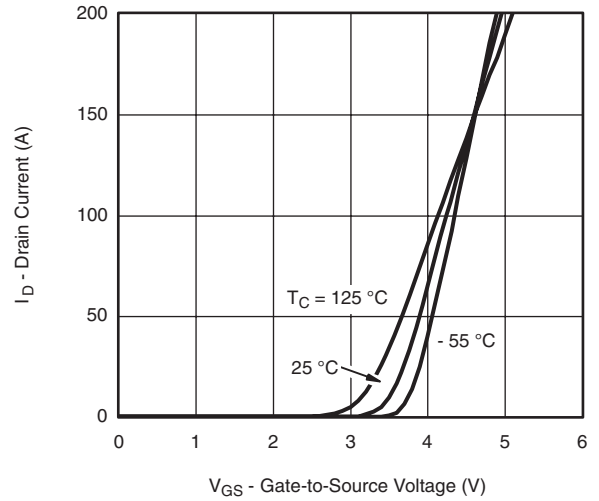
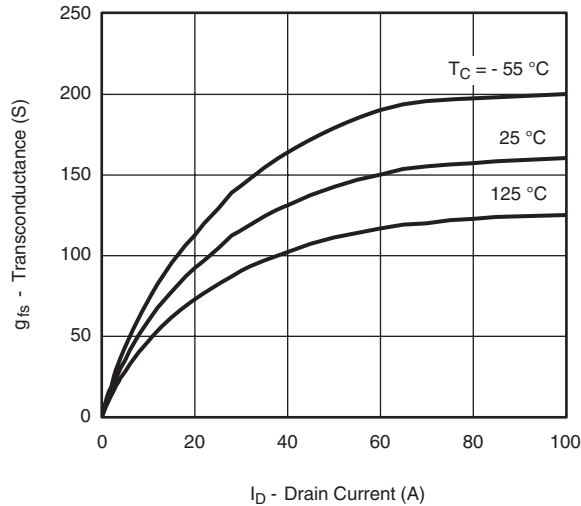
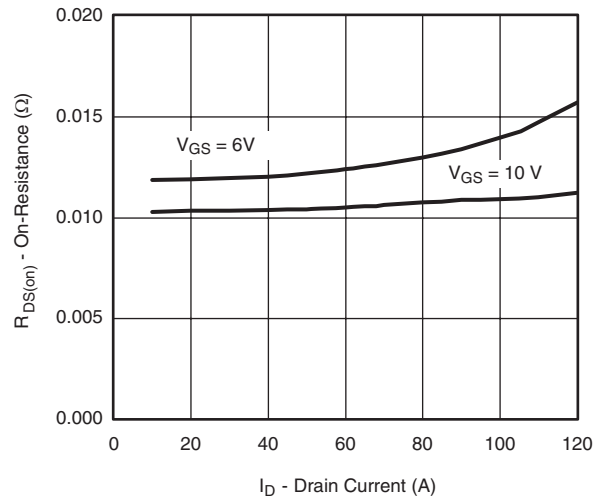
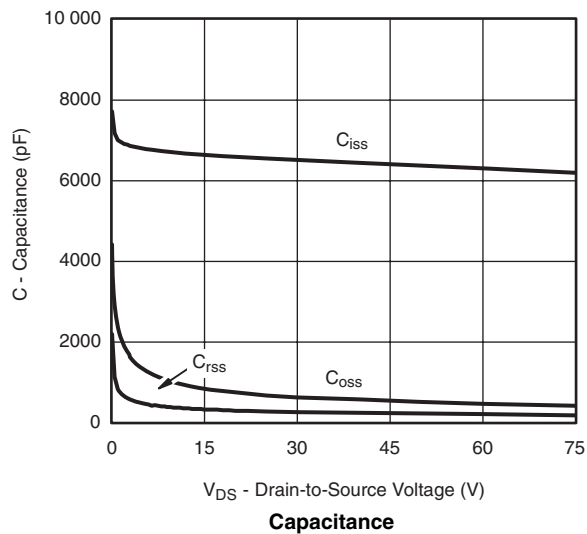
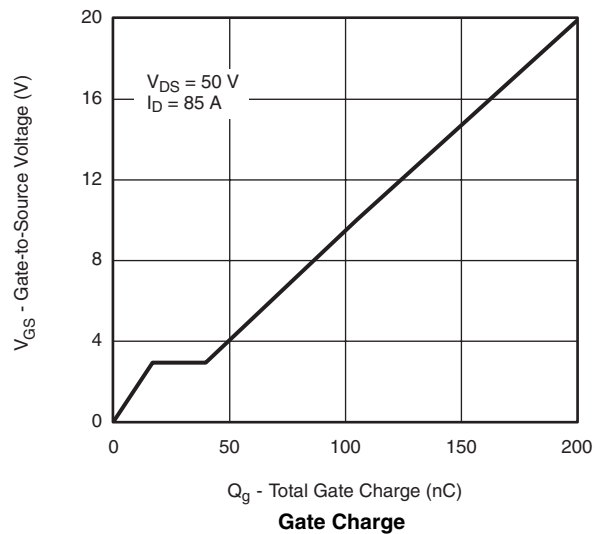
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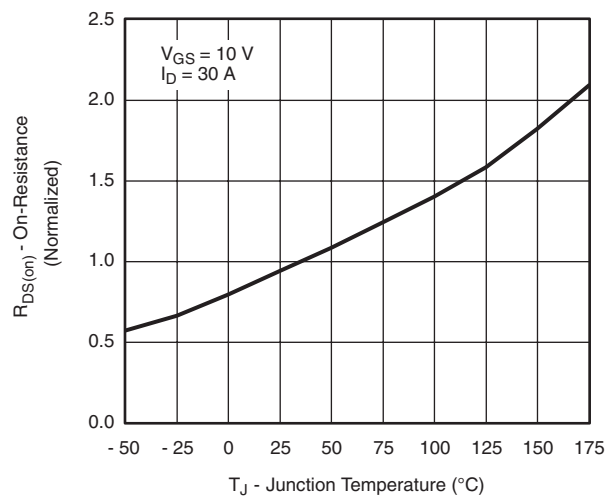
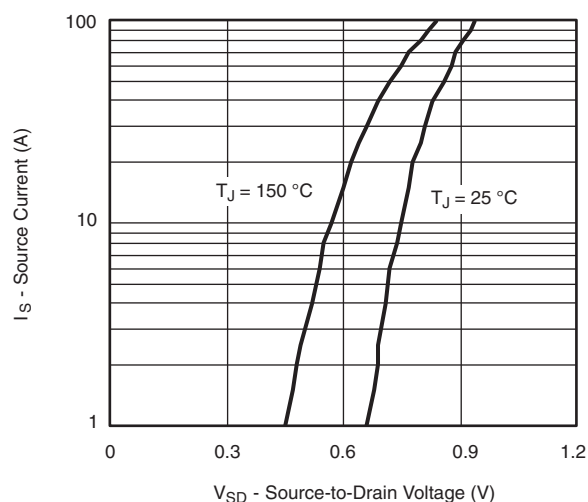
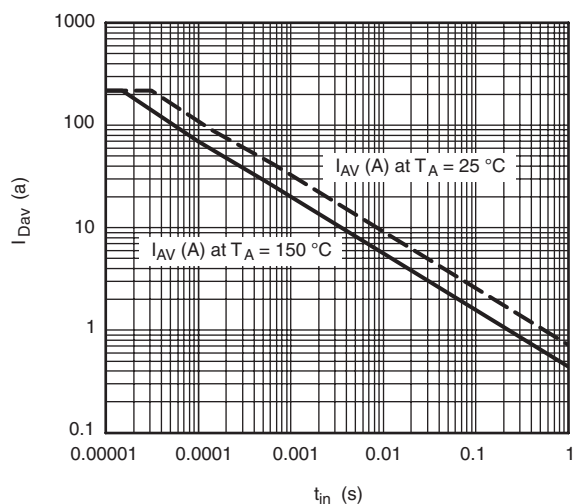
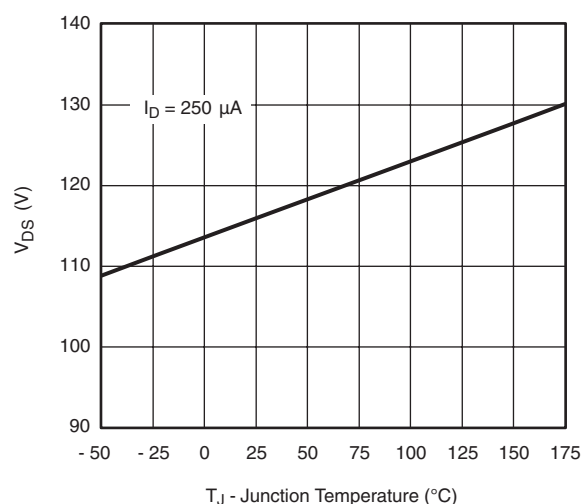
| SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted                     |               |                                                                                                                            |      |       |           |               |
|------------------------------------------------------------------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------|------|-------|-----------|---------------|
| Parameter                                                                                      | Symbol        | Test Conditions                                                                                                            | Min. | Typ.  | Max.      | Unit          |
| Static                                                                                         |               |                                                                                                                            |      |       |           |               |
| Drain-Source Breakdown Voltage                                                                 | $V_{DS}$      | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$                                                                        | 100  |       |           | V             |
| Gate-Threshold Voltage                                                                         | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$                                                                            | 2    |       | 4         |               |
| Gate-Body Leakage                                                                              | $I_{GSS}$     | $V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$                                                                            |      |       | $\pm 100$ | nA            |
| Zero Gate Voltage Drain Current                                                                | $I_{DSS}$     | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$                                                                               |      |       | 1         | $\mu\text{A}$ |
|                                                                                                |               | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$                                            |      |       | 50        |               |
|                                                                                                |               | $V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^{\circ}\text{C}$                                            |      |       | 250       |               |
| On-State Drain Current <sup>a</sup>                                                            | $I_{D(on)}$   | $V_{DS} = \geq 5\text{ V}, V_{GS} = 10\text{ V}$                                                                           | 120  |       |           | A             |
| Drain-Source On-State Resistance <sup>a</sup>                                                  | $R_{DS(on)}$  | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}$                                                                                  |      | 0.010 |           | $\Omega$      |
|                                                                                                |               | $V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$                                                                                 |      | 0.023 |           |               |
|                                                                                                |               | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$                                               |      | 0.020 |           |               |
|                                                                                                |               | $V_{GS} = 10\text{ V}, I_D = 30\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$                                               |      | 0.030 |           |               |
| Forward Transconductance <sup>a</sup>                                                          | $g_{fs}$      | $V_{DS} = 15\text{ V}, I_D = 30\text{ A}$                                                                                  | 25   |       |           | S             |
| Dynamic <sup>b</sup>                                                                           |               |                                                                                                                            |      |       |           |               |
| Input Capacitance                                                                              | $C_{iss}$     | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                                              |      | 6550  |           | pF            |
| Output Capacitance                                                                             | $C_{oss}$     |                                                                                                                            |      | 665   |           |               |
| Reverse Transfer Capacitance                                                                   | $C_{rss}$     |                                                                                                                            |      | 265   |           |               |
| Total Gate Charge <sup>c</sup>                                                                 | $Q_g$         | $V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 85\text{ A}$                                                            |      | 105   | 160       | nC            |
| Gate-Source Charge <sup>c</sup>                                                                | $Q_{gs}$      |                                                                                                                            |      | 17    |           |               |
| Gate-Drain Charge <sup>c</sup>                                                                 | $Q_{gd}$      |                                                                                                                            |      | 23    |           |               |
| Turn-On Delay Time <sup>c</sup>                                                                | $t_{d(on)}$   | $V_{DD} = 50\text{ V}, R_L = 0.6\text{ }\Omega$<br>$I_D \cong 85\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$ |      | 12    | 25        | ns            |
| Rise Time <sup>c</sup>                                                                         | $t_r$         |                                                                                                                            |      | 90    | 135       |               |
| Turn-Off DelayTime <sup>c</sup>                                                                | $t_{d(off)}$  |                                                                                                                            |      | 55    | 85        |               |
| Fall Time <sup>c</sup>                                                                         | $t_f$         |                                                                                                                            |      | 130   | 195       |               |
| Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^{\circ}\text{C}$ <sup>b</sup> |               |                                                                                                                            |      |       |           |               |
| Continuous Current                                                                             | $I_S$         |                                                                                                                            |      |       | 85        | A             |
| Pulsed Current                                                                                 | $I_{SM}$      |                                                                                                                            |      |       | 240       |               |
| Forward Voltage <sup>a</sup>                                                                   | $V_{SD}$      | $I_F = 85\text{ A}, V_{GS} = 0\text{ V}$                                                                                   |      | 1.0   | 1.5       | V             |
| Reverse Recovery Time                                                                          | $t_{rr}$      | $I_F = 50\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$                                                                      |      | 85    | 140       | ns            |
| Peak Reverse Recovery Current                                                                  | $I_{RM(REC)}$ |                                                                                                                            |      | 4.5   | 7         | A             |
| Reverse Recovery Charge                                                                        | $Q_{rr}$      |                                                                                                                            |      | 0.17  | 0.35      | $\mu\text{C}$ |

Notes:

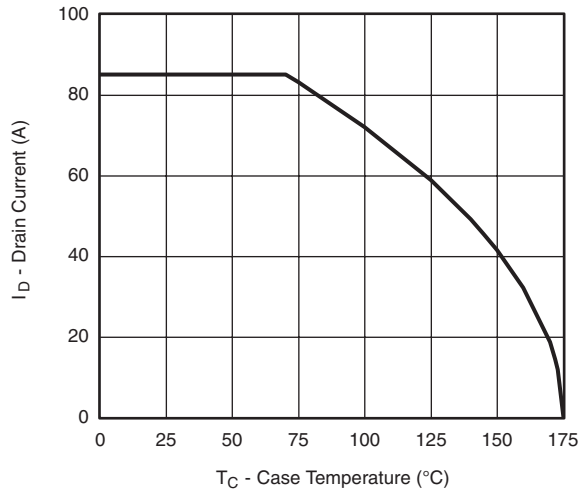
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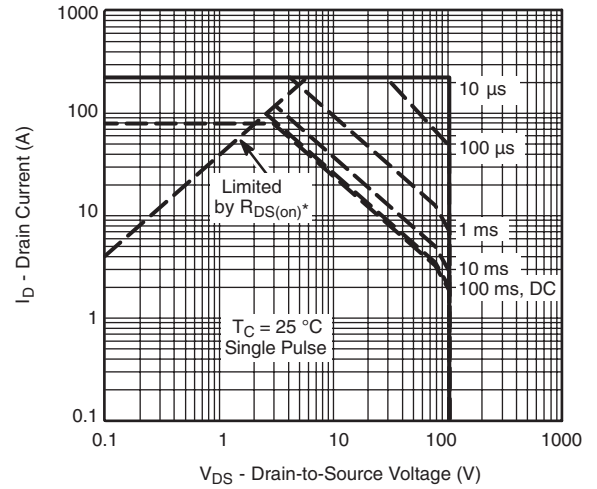
**TYPICAL CHARACTERISTICS**  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted

**Output Characteristics**

**Transfer Characteristics**

**Transconductance**

**On-Resistance vs. Drain Current**

**Capacitance**

**Gate Charge**

**TYPICAL CHARACTERISTICS**  $T_A = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted

**On-Resistance vs. Junction Temperature**

**Source-Drain Diode Forward Voltage**

**Avalanche Current vs. Time**

 **$T_J$  - Drain-Source Breakdown vs. Junction-Temperature**

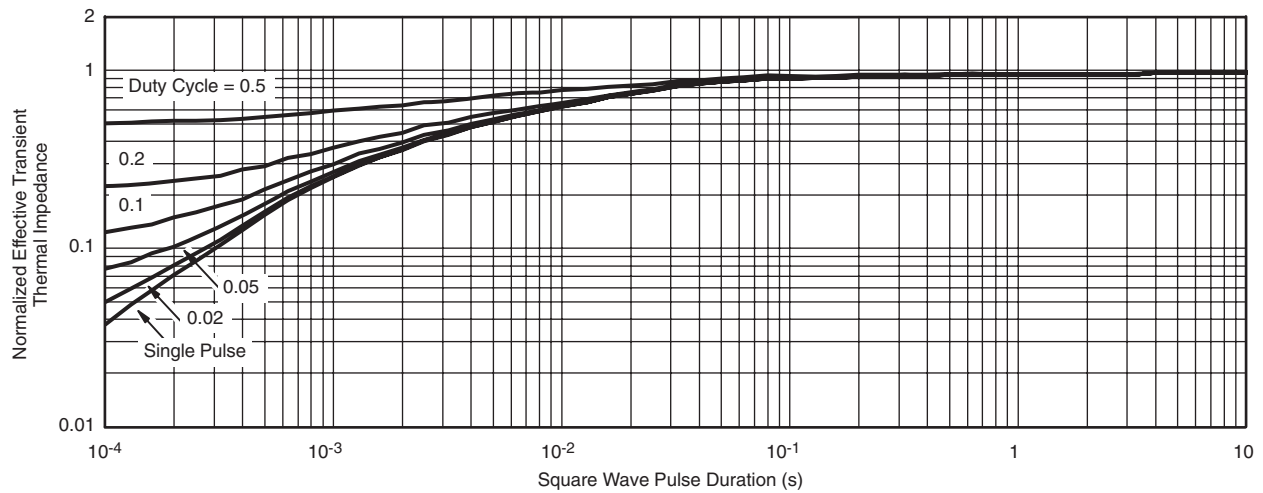
## THERMAL RATINGS



**Maximum Avalanche and Drain Current  
vs. Case Temperature**

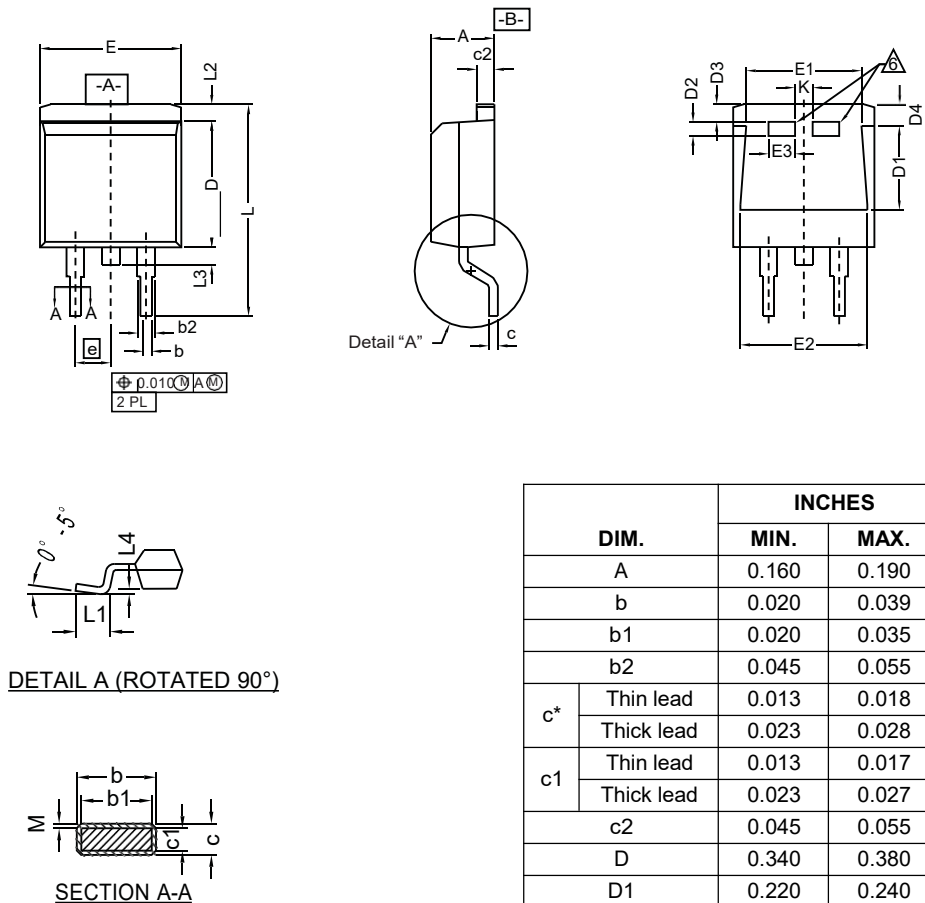


**\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified  
Safe Operating Area**



**Normalized Thermal Transient Impedance, Junction-to-Case**

# TO-263 (D<sup>2</sup>PAK): 3-LEAD



## Notes

- Plane B includes maximum features of heat sink tab and plastic.
- No more than 25 % of L1 can fall above seating plane by max. 8 mils.
- Pin-to-pin coplanarity max. 4 mils.
- \*: Thin lead is for SUB, SYB.  
Thick lead is for SUM, SYM, SQM.
- Use inches as the primary measurement.
-  This feature is for thick lead.

| DIM.                            |            | INCHES    |       | MILLIMETERS |        |
|---------------------------------|------------|-----------|-------|-------------|--------|
|                                 |            | MIN.      | MAX.  | MIN.        | MAX.   |
| A                               |            | 0.160     | 0.190 | 4.064       | 4.826  |
| b                               |            | 0.020     | 0.039 | 0.508       | 0.990  |
| b1                              |            | 0.020     | 0.035 | 0.508       | 0.889  |
| b2                              |            | 0.045     | 0.055 | 1.143       | 1.397  |
| c*                              | Thin lead  | 0.013     | 0.018 | 0.330       | 0.457  |
|                                 | Thick lead | 0.023     | 0.028 | 0.584       | 0.711  |
| c1                              | Thin lead  | 0.013     | 0.017 | 0.330       | 0.431  |
|                                 | Thick lead | 0.023     | 0.027 | 0.584       | 0.685  |
| c2                              |            | 0.045     | 0.055 | 1.143       | 1.397  |
| D                               |            | 0.340     | 0.380 | 8.636       | 9.652  |
| D1                              |            | 0.220     | 0.240 | 5.588       | 6.096  |
| D2                              |            | 0.038     | 0.042 | 0.965       | 1.067  |
| D3                              |            | 0.045     | 0.055 | 1.143       | 1.397  |
| D4                              |            | 0.044     | 0.052 | 1.118       | 1.321  |
| E                               |            | 0.380     | 0.410 | 9.652       | 10.414 |
| E1                              |            | 0.245     | -     | 6.223       | -      |
| E2                              |            | 0.355     | 0.375 | 9.017       | 9.525  |
| E3                              |            | 0.072     | 0.078 | 1.829       | 1.981  |
| e                               |            | 0.100 BSC |       | 2.54 BSC    |        |
| K                               |            | 0.045     | 0.055 | 1.143       | 1.397  |
| L                               |            | 0.575     | 0.625 | 14.605      | 15.875 |
| L1                              |            | 0.090     | 0.110 | 2.286       | 2.794  |
| L2                              |            | 0.040     | 0.055 | 1.016       | 1.397  |
| L3                              |            | 0.050     | 0.070 | 1.270       | 1.778  |
| L4                              |            | 0.010 BSC |       | 0.254 BSC   |        |
| M                               |            | -         | 0.002 | -           | 0.050  |
| ECN: T13-0707-Rev. K, 30-Sep-13 |            |           |       |             |        |
| DWG: 5843                       |            |           |       |             |        |

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DWG: 5843

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