

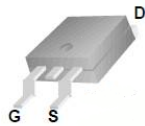
## Features

- Low gate charge
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant
- Halogen free package
- JEDEC Qualification
- Improved ESD performance

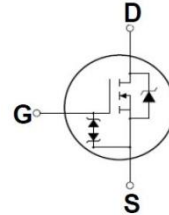
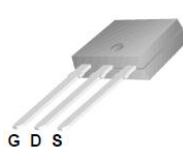
N-channel MOSFET

| $BV_{DSS}$ | $I_D$ | $R_{DS(on)}$ |
|------------|-------|--------------|
| 600V       | 2.0A  | < 4.0Ω       |

D-PAK



I-PAK



| Device                  | Package     | Marking                 | Remark       |
|-------------------------|-------------|-------------------------|--------------|
| TMD2N60AZ / TMU2N60AZ   | D-PAK/I-PAK | TMD2N60AZ / TMU2N60AZ   | RoHS         |
| TMD2N60AZG / TMU2N60AZG | D-PAK/I-PAK | TMD2N60AZG / TMU2N60AZG | Halogen Free |

## Absolute Maximum Ratings

| Parameter                                                                     | Symbol         | TMD2N60AZ(G)/TMU2N60AZ(G)           | Unit |
|-------------------------------------------------------------------------------|----------------|-------------------------------------|------|
| Drain-Source Voltage                                                          | $V_{DSS}$      | 600                                 | V    |
| Gate-Source Voltage                                                           | $V_{GS}$       | ±30                                 | V    |
| Continuous Drain Current                                                      | $I_D$          | $T_C = 25\text{ }^{\circ}\text{C}$  | A    |
|                                                                               |                | $T_C = 100\text{ }^{\circ}\text{C}$ | A    |
| Pulsed Drain Current (Note 1)                                                 | $I_{DM}$       | 8                                   | A    |
| Single Pulse Avalanche Energy (Note 2)                                        | $E_{AS}$       | 66                                  | mJ   |
| Repetitive Avalanche Current (Note 1)                                         | $I_{AR}$       | 2.0                                 | A    |
| Repetitive Avalanche Energy (Note 1)                                          | $E_{AR}$       | 5.2                                 | mJ   |
| Power Dissipation                                                             | $P_D$          | $T_C = 25\text{ }^{\circ}\text{C}$  | W    |
|                                                                               |                | Derate above 25 °C                  | W/°C |
| Peak Diode Recovery dv/dt (Note 3)                                            | dv/dt          | 4.5                                 | V/ns |
| Operating Junction and Storage Temperature Range                              | $T_J, T_{STG}$ | -55~150                             | °C   |
| Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | $T_L$          | 300                                 | °C   |

\* Limited only by maximum junction temperature

## Thermal Characteristics

| Parameter                                       | Symbol          | TMD2N60AZ(G)/TMU2N60AZ(G) | Unit |
|-------------------------------------------------|-----------------|---------------------------|------|
| Maximum Thermal resistance, Junction-to-Case    | $R_{\theta JC}$ | 2.4                       | °C/W |
| Maximum Thermal resistance, Junction-to-Ambient | $R_{\theta JA}$ | 110                       | °C/W |

**Electrical Characteristics :  $T_C=25^{\circ}\text{C}$ , unless otherwise noted**

| Parameter                           | Symbol     | Test condition                                      | Min | Typ | Max  | Units         |
|-------------------------------------|------------|-----------------------------------------------------|-----|-----|------|---------------|
| <b>OFF</b>                          |            |                                                     |     |     |      |               |
| Drain-Source Breakdown Voltage      | $BV_{DSS}$ | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 600 | --  | --   | V             |
| Zero Gate Voltage Drain Current     | $I_{DSS}$  | $V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$        | --  | --  | 1    | $\mu\text{A}$ |
|                                     |            | $V_{DS} = 480\text{ V}, T_C = 125^{\circ}\text{C}$  | --  | --  | 10   | $\mu\text{A}$ |
| Forward Gate-Source Leakage Current | $I_{GSSF}$ | $V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$         | --  | --  | 100  | $\mu\text{A}$ |
| Reverse Gate-Source Leakage Current | $I_{GSSR}$ | $V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$        | --  | --  | -100 | $\mu\text{A}$ |

**ON**

|                                              |              |                                                 |    |     |     |          |
|----------------------------------------------|--------------|-------------------------------------------------|----|-----|-----|----------|
| Gate Threshold Voltage                       | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 3  | --  | 5   | V        |
| Drain-Source On-Resistance                   | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 1.0\text{ A}$      | -- | 3.2 | 4.0 | $\Omega$ |
| Forward Transconductance <sup>(Note 4)</sup> | $g_{FS}$     | $V_{DS} = 30\text{ V}, I_D = 1.0\text{ A}$      | -- | 3   | --  | S        |

**DYNAMIC**

|                              |           |                                                                      |    |     |    |    |
|------------------------------|-----------|----------------------------------------------------------------------|----|-----|----|----|
| Input Capacitance            | $C_{iss}$ | $V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$<br>$f = 1.0\text{ MHz}$ | -- | 360 | -- | pF |
| Output Capacitance           | $C_{oss}$ |                                                                      | -- | 41  | -- | pF |
| Reverse Transfer Capacitance | $C_{rss}$ |                                                                      | -- | 7   | -- | pF |

**SWITCHING**

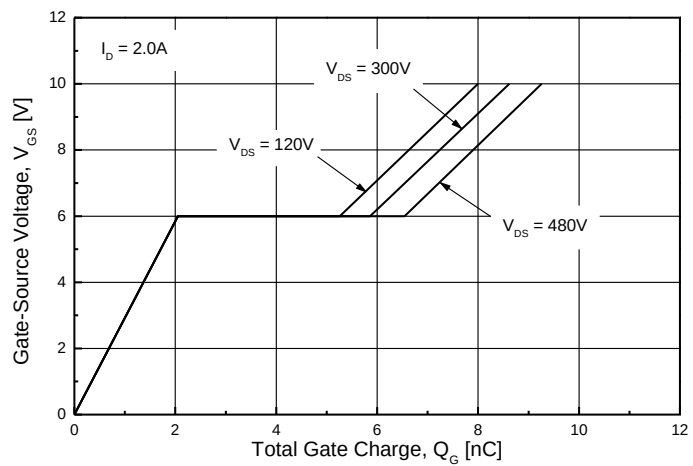
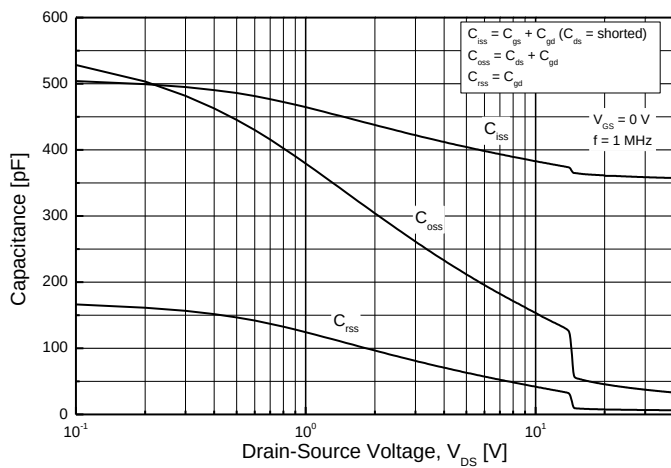
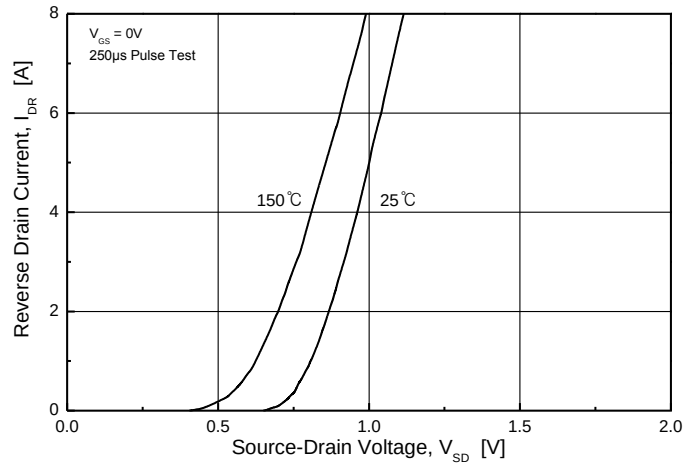
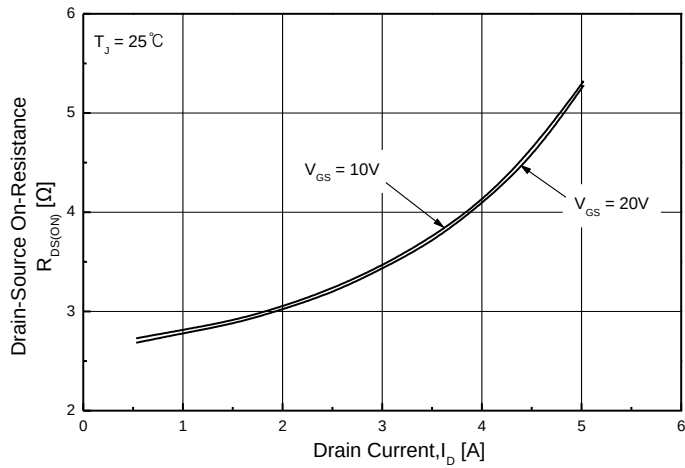
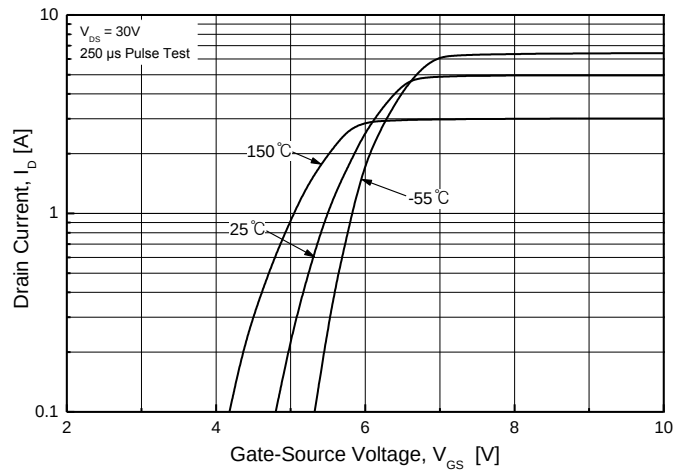
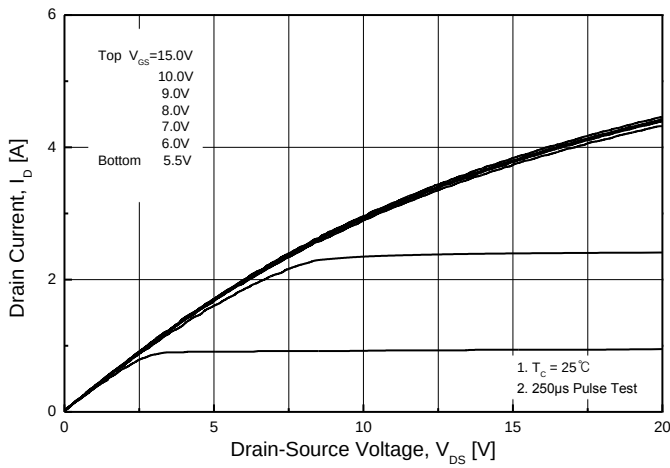
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|-------------------------------------------|--------------|------------------------------------------------------------------------------------------------|----|----|----|----|
| Turn-On Delay Time <sup>(Note 4,5)</sup>  | $t_{d(on)}$  | $V_{DD} = 300\text{ V}, I_D = 2.0\text{ A},$<br>$R_G = 25\text{ }\Omega, V_{GS} = 10\text{ V}$ | -- | 20 | -- | ns |
| Turn-On Rise Time <sup>(Note 4,5)</sup>   | $t_r$        |                                                                                                | -- | 23 | -- | ns |
| Turn-Off Delay Time <sup>(Note 4,5)</sup> | $t_{d(off)}$ |                                                                                                | -- | 42 | -- | ns |
| Turn-Off Fall Time <sup>(Note 4,5)</sup>  | $t_f$        |                                                                                                | -- | 20 | -- | ns |
| Total Gate Charge <sup>(Note 4,5)</sup>   | $Q_g$        | $V_{DS} = 480\text{ V}, I_D = 2.0\text{ A},$<br>$V_{GS} = 10\text{ V}$                         | -- | 9  | -- | nC |
| Gate-Source Charge <sup>(Note 4,5)</sup>  | $Q_{gs}$     |                                                                                                | -- | 2  | -- | nC |
| Gate-Drain Charge <sup>(Note 4,5)</sup>   | $Q_{gd}$     |                                                                                                | -- | 4  | -- | nC |

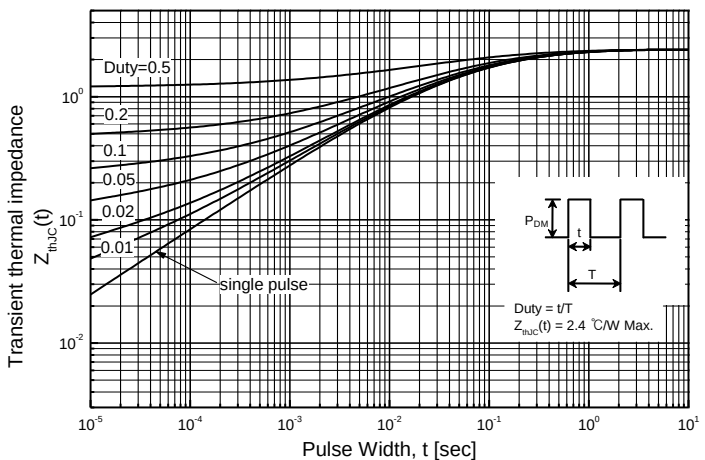
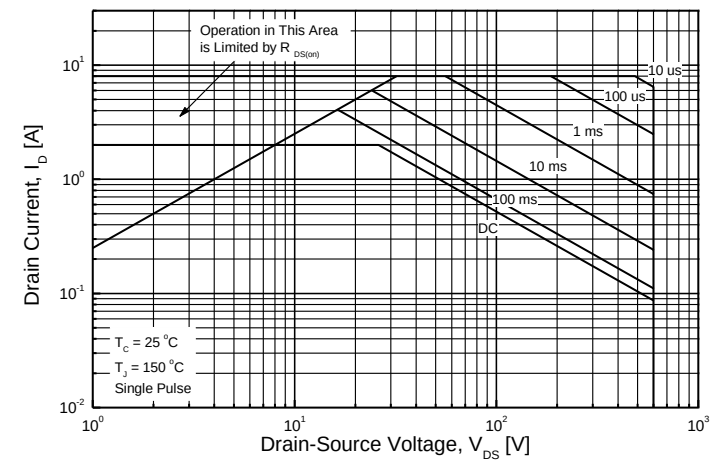
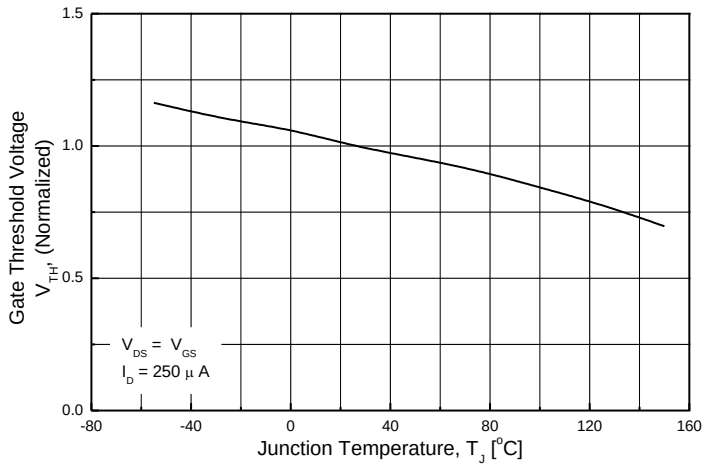
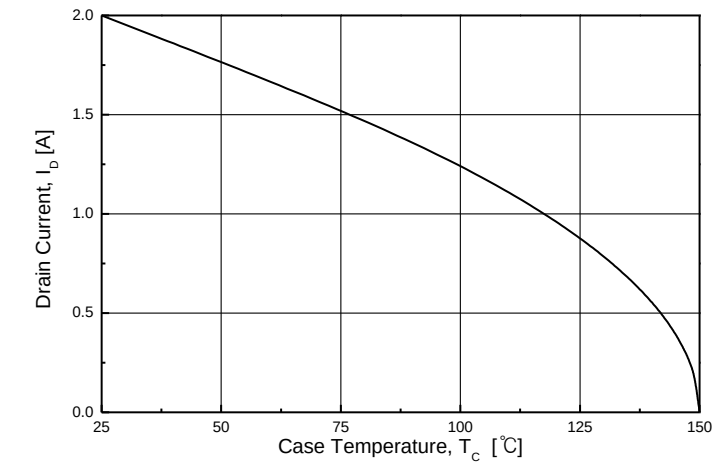
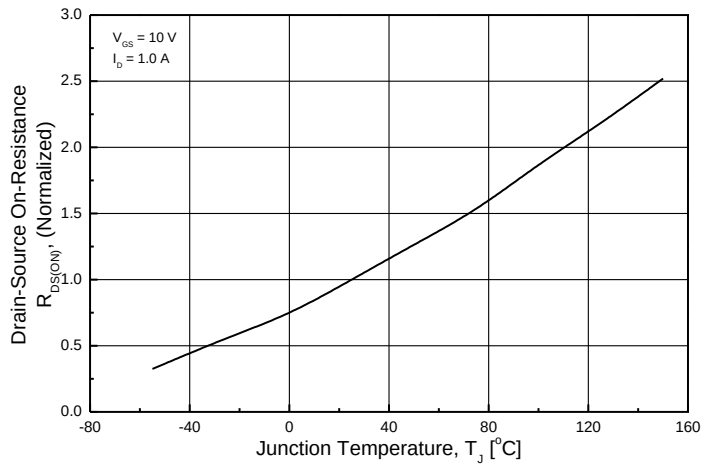
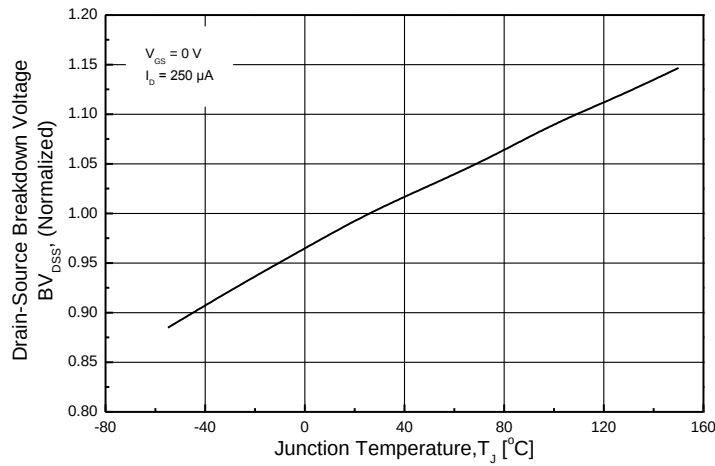
**SOURCE DRAIN DIODE**

|                                                       |          |                                                                                     |    |     |     |               |
|-------------------------------------------------------|----------|-------------------------------------------------------------------------------------|----|-----|-----|---------------|
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$    | ----                                                                                | -- | --  | 2.0 | A             |
| Maximum Pulsed Drain-Source Diode Forward Current     | $I_{SM}$ | ----                                                                                | -- | --  | 8   | A             |
| Drain-Source Diode Forward Voltage                    | $V_{SD}$ | $V_{GS} = 0\text{ V}, I_S = 2.0\text{ A}$                                           | -- | --  | 1.5 | V             |
| Reverse Recovery Time <sup>(Note 4)</sup>             | $t_{rr}$ | $V_{GS} = 0\text{ V}, I_S = 2.0\text{ A}$<br>$dI_F / dt = 100\text{ A}/\mu\text{s}$ | -- | 240 | --  | ns            |
| Reverse Recovery Charge <sup>(Note 4)</sup>           | $Q_{rr}$ |                                                                                     | -- | 0.8 | --  | $\mu\text{C}$ |

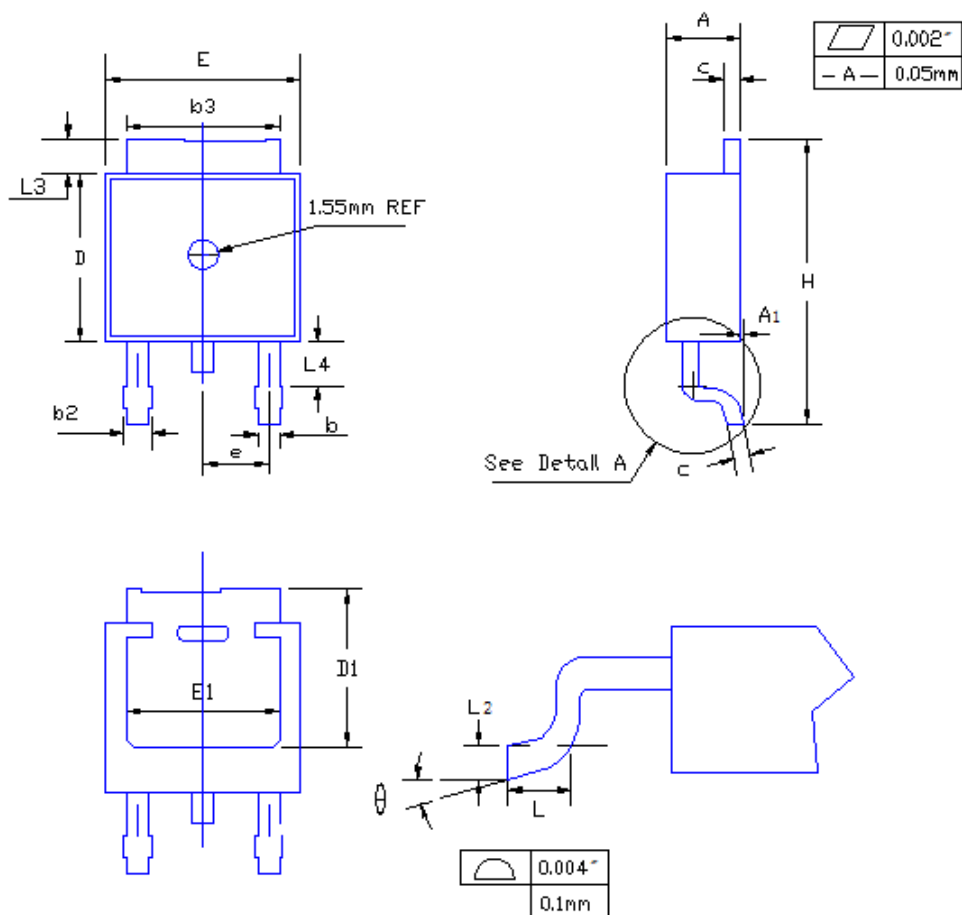
Note :

1. Repeated rating : Pulse width limited by safe operating area
2.  $L=30.5\text{mH}, I_{AS} = 2.0\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$
3.  $I_{SD} \leq 2.0\text{A}, dI/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DS}$ , Starting  $T_J = 25^{\circ}\text{C}$
4. Pulse Test : Pulse width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$
5. Essentially Independent of Operating Temperature Typical Characteristics



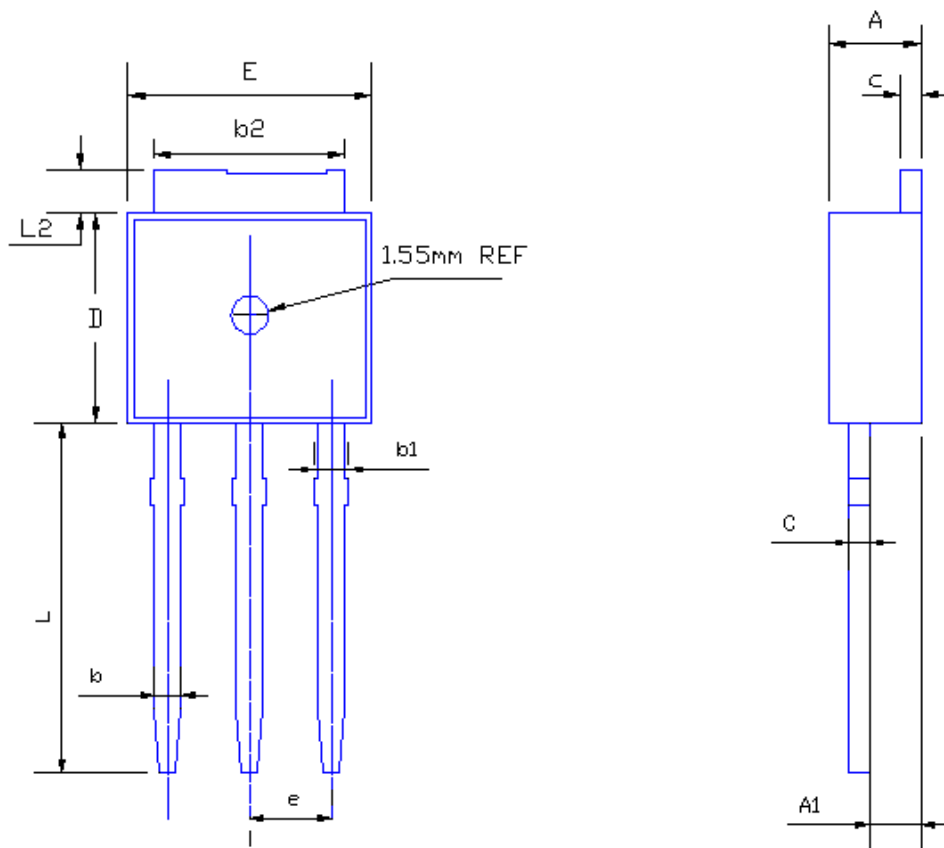


## TO-252 (D-PAK) MECHANICAL DATA



| SYMBOL   | MILLIMETERS |       |
|----------|-------------|-------|
|          | MIN         | MAX   |
| A        | 2.19        | 2.38  |
| A1       | —           | 0.13  |
| b        | 0.64        | 0.89  |
| b2       | 0.84        | 1.14  |
| b3       | 5.21        | 5.46  |
| c        | 0.46        | 0.61  |
| D        | 5.97        | 6.22  |
| D1       | 5.21        | —     |
| E        | 6.35        | 6.73  |
| E1       | 4.83        | —     |
| e        | 2.29BSC     |       |
| H        | 9.65        | 10.41 |
| L        | 1.40        | 1.78  |
| L2       | 0.51BSC     |       |
| L3       | 0.89        | 1.27  |
| L4       | 0.64        | 1.01  |
| $\theta$ | 0           | 8     |

**TO-251 (I-PAK) MECHANICAL DATA**



| SYMBOL | MILLIMETERS |      |
|--------|-------------|------|
|        | MIN         | MAX  |
| A      | 2.19        | 2.38 |
| A1     | 1.04        | 1.23 |
| b      | 0.64        | 0.89 |
| b1     | 0.84        | 1.14 |
| b2     | 5.23        | 5.48 |
| c      | 0.46        | 0.61 |
| D      | 5.91        | 6.28 |
| E      | 6.21        | 6.59 |
| e      | 2.28 TYP    |      |
| L      | 8.89        | 9.65 |
| L2     | 0.89        | 1.27 |