

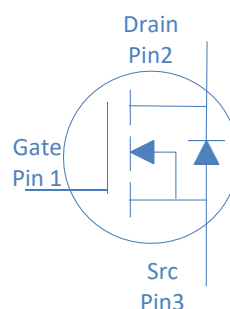
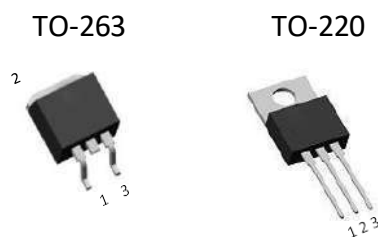
## 100V N-Ch Power MOSFET

### Features:

- ◇ High Speed Power Switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free

### Application:

- ◇ Synchronous Rectification in SMPS
- ◇ Hard Switching and High Speed Circuit
- ◇ Power Tools
- ◇ UPS
- ◇ Motor Control



|                  |        |     |    |
|------------------|--------|-----|----|
| $V_{DS}$         |        | 100 | V  |
| $R_{DS(on),typ}$ | TO-263 | 4.5 | mΩ |
| $R_{DS(on),typ}$ | TO-220 | 4.8 | mΩ |
| $I_D$            |        | 125 | A  |

| Part Number | Package | Marking   |
|-------------|---------|-----------|
| KUGB050N10A | TO-263  | GB050N10A |
| KEGP050N10A | TO-220  | GP050N10A |

### Absolute Maximum Ratings at $T_j=25^{\circ}\text{C}$ (unless otherwise specified)

| Parameter                         | Symbol         | Conditions                               | Value      | Unit               |
|-----------------------------------|----------------|------------------------------------------|------------|--------------------|
| Continuous Drain Current          | $I_D$          | $T_C=25^{\circ}\text{C}$                 | 125        | A                  |
|                                   |                | $T_C=100^{\circ}\text{C}$                | 89         |                    |
| Drain to Source Voltage           | $V_{DS}$       | -                                        | 100        | V                  |
| Gate to Source Voltage            | $V_{GS}$       | -                                        | $\pm 20$   | V                  |
| Pulsed Drain Current              | $I_{DM}$       | -                                        | 400        | A                  |
| Avalanche Energy, Single Pulse    | $E_{AS}$       | $L=0.1\text{mH}, T_C=25^{\circ}\text{C}$ | 80         | mJ                 |
| Power Dissipation                 | $P_D$          | $T_C=25^{\circ}\text{C}$                 | 179        | W                  |
| Operating and Storage Temperature | $T_J, T_{stg}$ | -                                        | -55 to 175 | $^{\circ}\text{C}$ |

### Absolute Maximum Ratings

| Parameter                           | Symbol          | Max  | Unit                        |
|-------------------------------------|-----------------|------|-----------------------------|
| Thermal Resistance Junction-Case    | $R_{\theta JC}$ | 0.84 | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance Junction-Ambient | $R_{\theta JA}$ | 60   | $^{\circ}\text{C}/\text{W}$ |

## Electrical Characteristics at $T_j=25^{\circ}\text{C}$ (unless otherwise specified)

### Static Characteristics

| Parameter                         | Symbol        | Conditions                                        | Value |     |           | Unit      |
|-----------------------------------|---------------|---------------------------------------------------|-------|-----|-----------|-----------|
|                                   |               |                                                   | min   | typ | max       |           |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                         | 100   | -   | -         | V         |
| Gate Threshold Voltage            | $V_{GS(th)}$  | $V_{GS}=V_{DS}, I_D=250\mu A$                     | 2     | 3   | 4         |           |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{GS}=0V, V_{DS}=100V, T_j=25^{\circ}\text{C}$  | -     | -   | 1         | $\mu A$   |
|                                   |               | $V_{GS}=0V, V_{DS}=100V, T_j=100^{\circ}\text{C}$ | -     | -   | 100       |           |
| Gate to Source Leakage Current    | $I_{GSS}$     | $V_{GS}=\pm 20V, V_{DS}=0V$                       | -     | -   | $\pm 100$ | nA        |
| Drain to Source on Resistance     | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$ TO-263                      | -     | 4.5 | 5         | $m\Omega$ |
| Drain to Source on Resistance     | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$ TO-220                      | -     | 4.8 | 5.3       | $m\Omega$ |
| Transconductance                  | $g_{fs}$      | $V_{DS}=5V, I_D=20A$                              | -     | 60  | -         | S         |
| Gate Resistance                   | $R_G$         | $V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$         | -     | 1.2 | -         | $\Omega$  |

### Dynamic Characteristics

|                               |              |                                                  |   |      |   |    |
|-------------------------------|--------------|--------------------------------------------------|---|------|---|----|
| Input Capacitance             | $C_{iss}$    | $V_{GS}=0V, V_{DS}=50V, f=1\text{MHz}$           | - | 3490 | - | pF |
| Output Capacitance            | $C_{oss}$    |                                                  | - | 571  | - |    |
| Reverse Transfer Capacitance  | $C_{rss}$    |                                                  | - | 18   | - |    |
| Total Gate Charge             | $Q_g$        | $V_{DD}=50V, I_D=20A, V_{GS}=10V$                | - | 47   | - | nC |
| Gate to Source Charge         | $Q_{gs}$     |                                                  | - | 10   | - |    |
| Gate to Drain (Miller) Charge | $Q_{gd}$     |                                                  | - | 10   | - |    |
| Turn on Delay Time            | $t_{d(on)}$  | $V_{DD}=50V, I_D=20A, V_{GS}=10V, R_G=10\Omega,$ | - | 12   | - | ns |
| Rise time                     | $t_r$        |                                                  | - | 7    | - |    |
| Turn off Delay Time           | $t_{d(off)}$ |                                                  | - | 25   | - |    |
| Fall Time                     | $t_f$        |                                                  | - | 5    | - |    |

### Reverse Diode Characteristics

|                         |          |                                        |   |     |     |    |
|-------------------------|----------|----------------------------------------|---|-----|-----|----|
| Diode Forward Voltage   | $V_{SD}$ | $V_{GS}=0V, I_F=20A$                   | - | 0.9 | 1.2 | V  |
| Reverse Recovery Time   | $t_{rr}$ | $V_R=50V, I_F=20A, dI_F/dt=500A/\mu s$ | - | 50  | -   | ns |
| Reverse Recovery Charge | $Q_{rr}$ |                                        | - | 350 | -   | nC |

Fig 1. Typical Output Characteristics

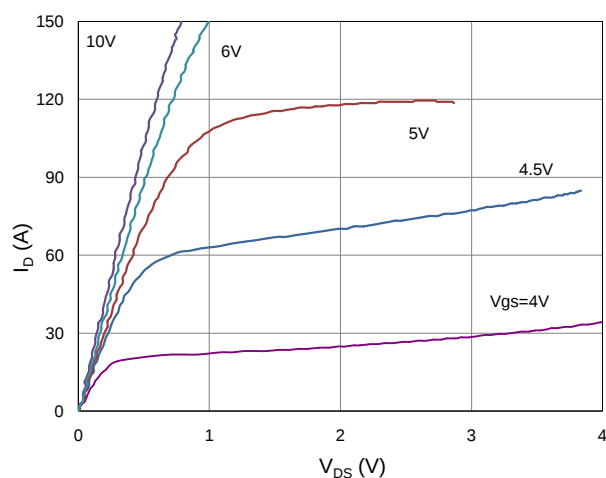


Figure 2. On-Resistance vs. Gate-Source Voltage

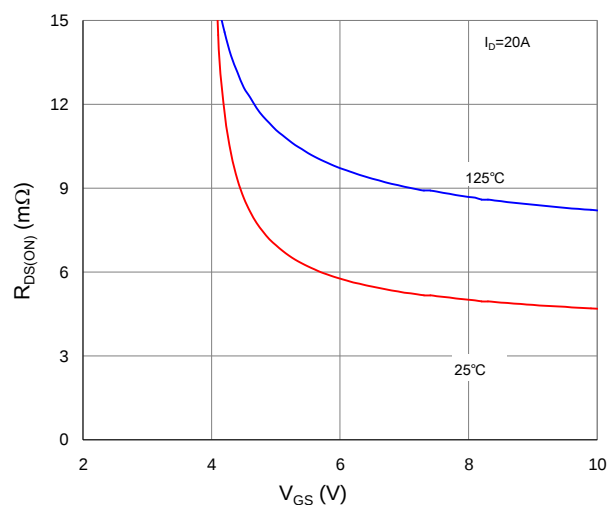


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

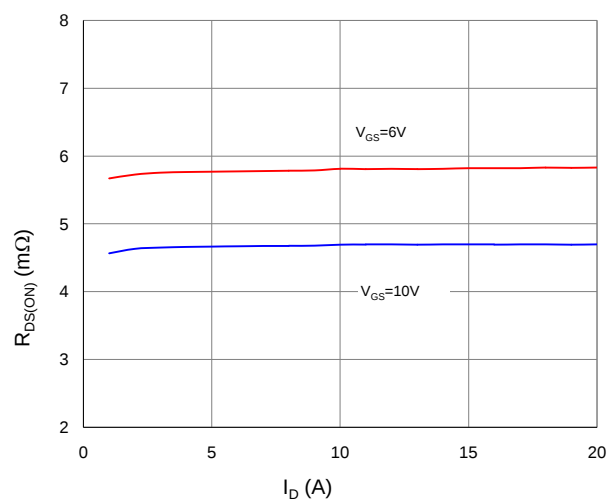


Figure 4. Normalized On-Resistance vs. Junction Temperature

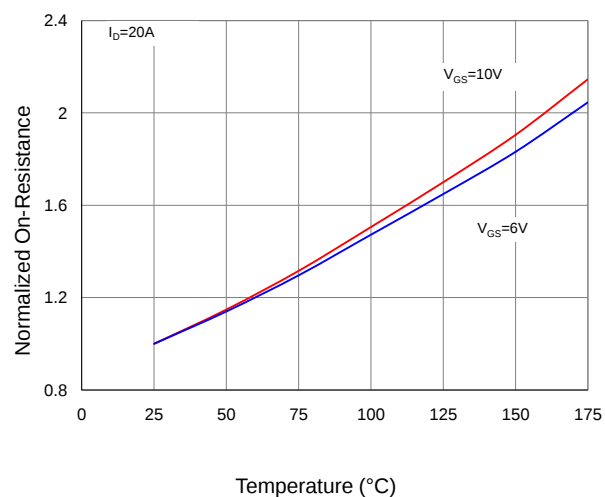


Figure 5. Typical Transfer Characteristics

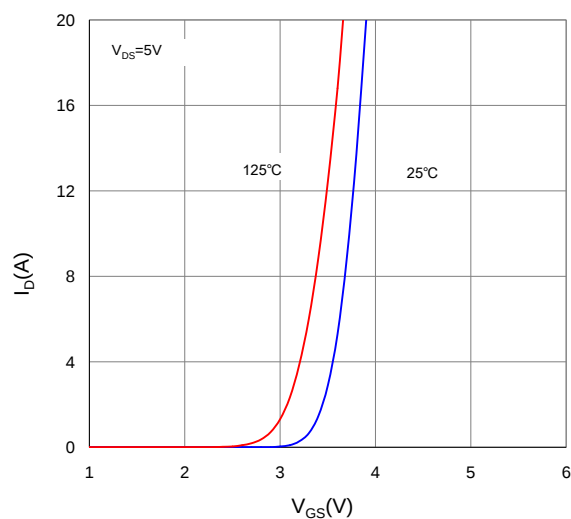


Figure 6. Typical Source-Drain Diode Forward Voltage

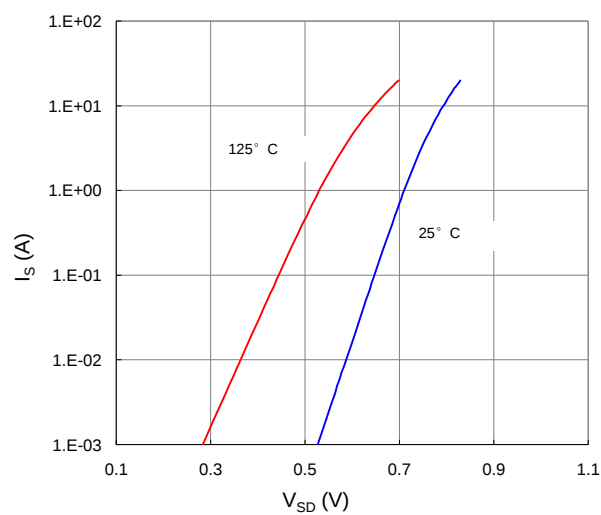


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

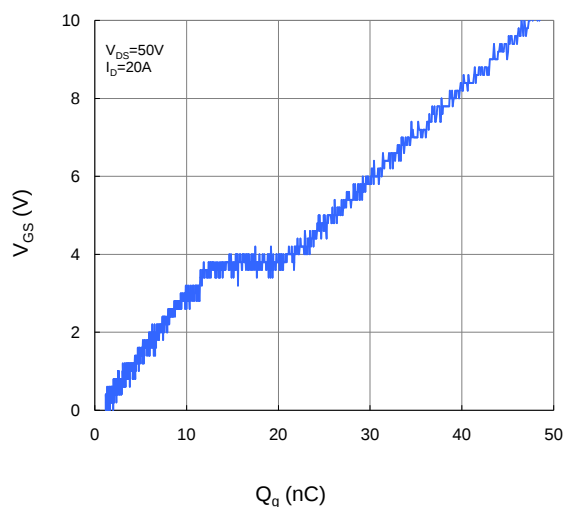


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

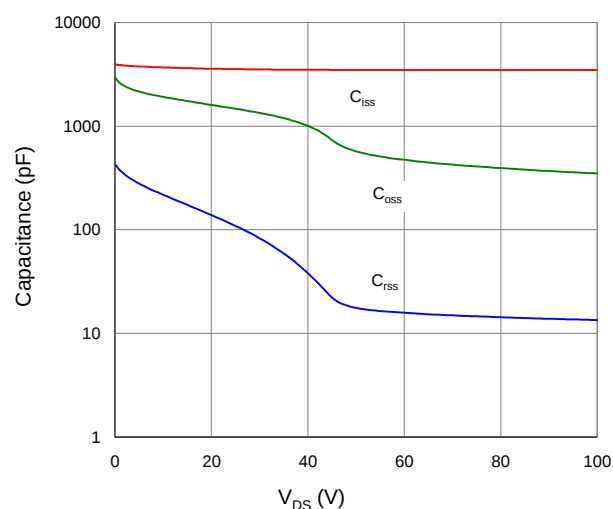


Figure 9. Maximum Safe Operating Area

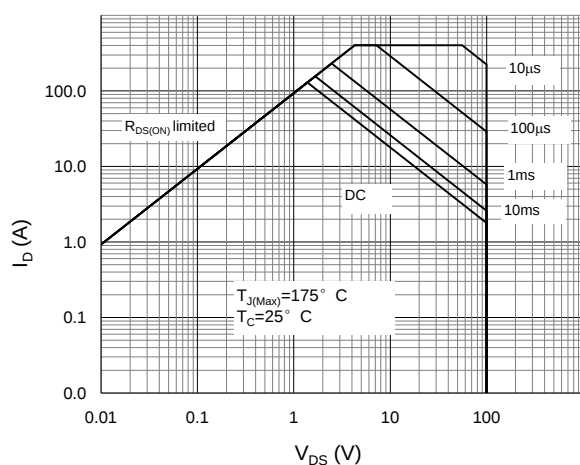


Figure 10. Maximum Drain Current vs. Case Temperature

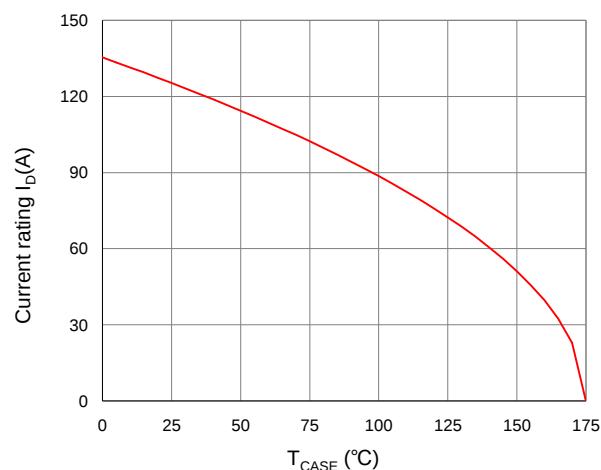
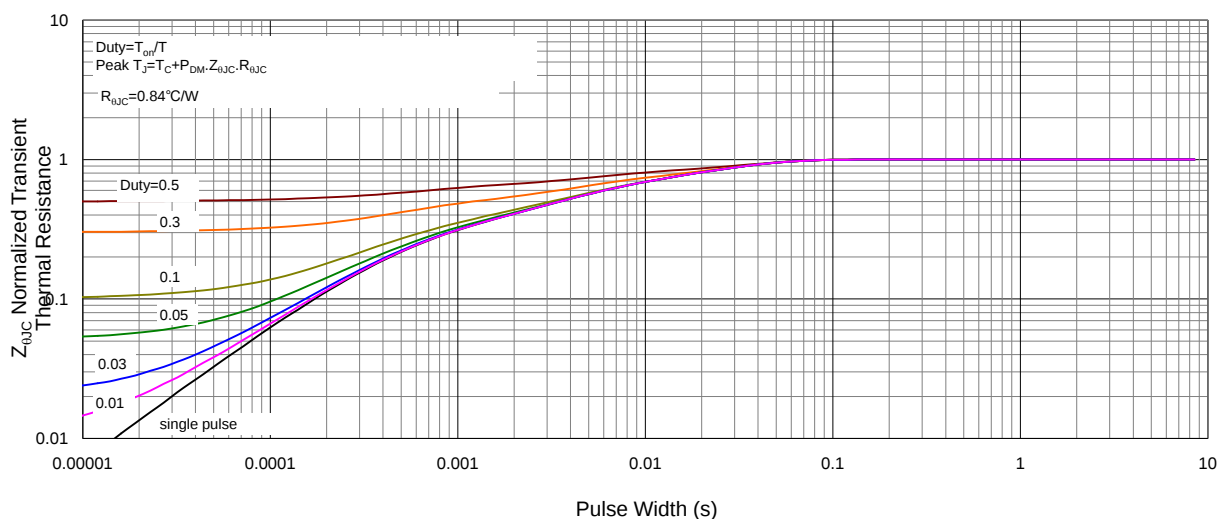
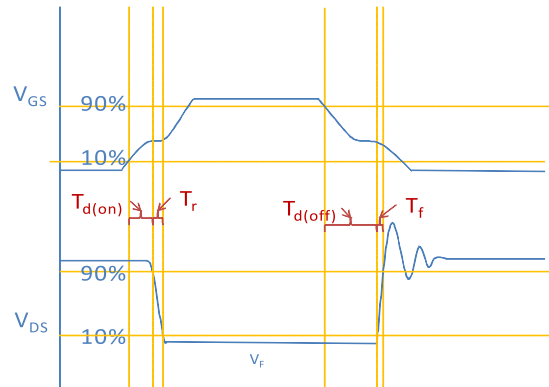
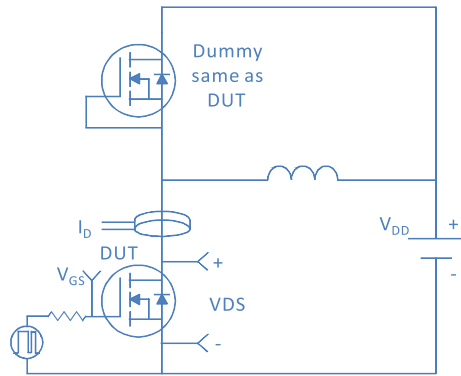


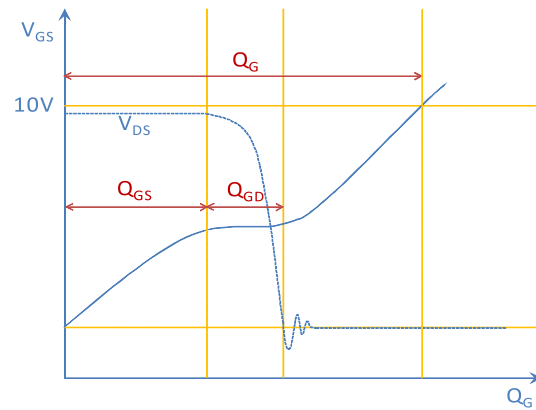
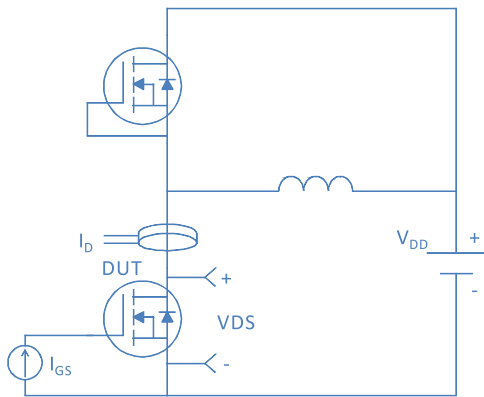
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



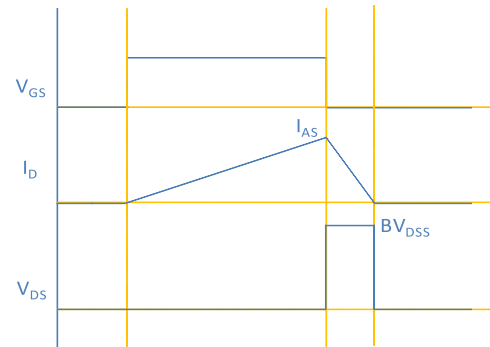
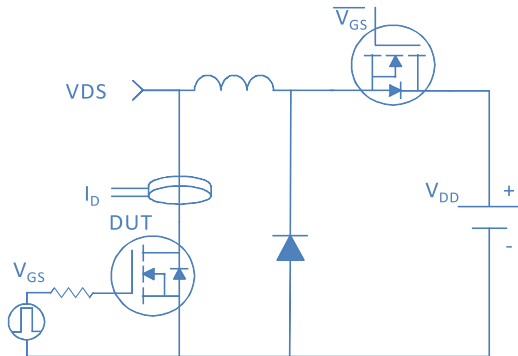
### Inductive switching Test



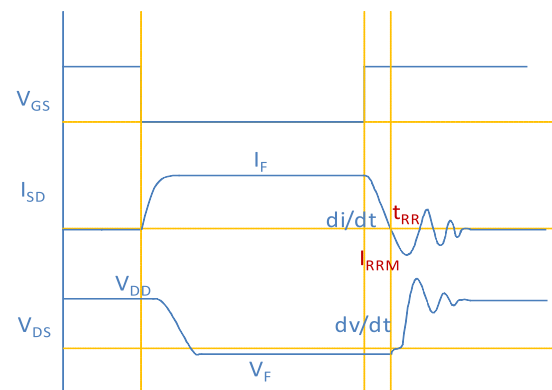
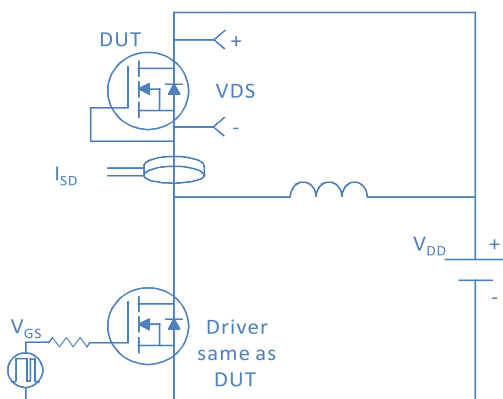
### Gate Charge Test



### Uclamped Inductive Switching (UIS) Test

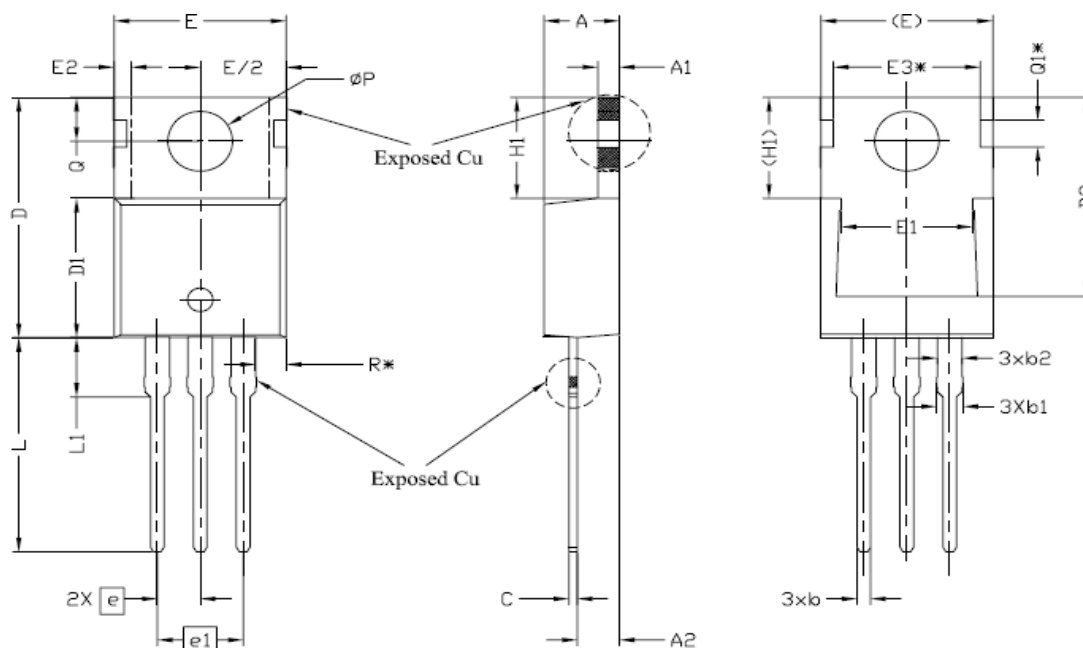


### Diode Recovery Test



Package Outline

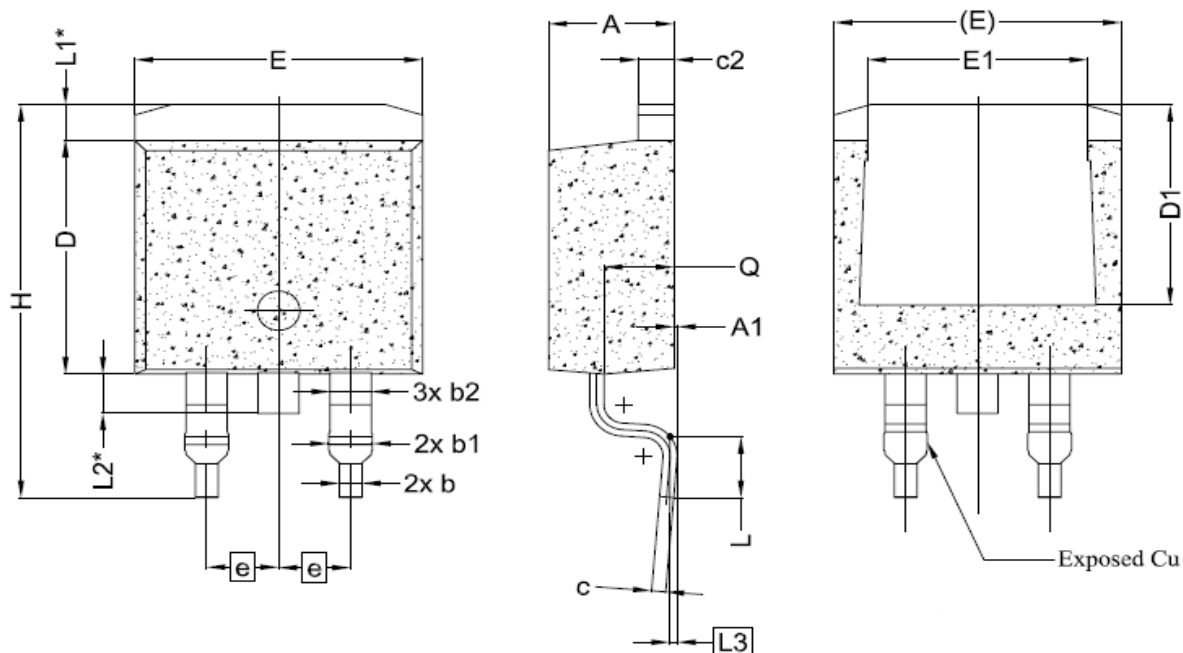
**TO-220, 3 leads**



| SYMBOL | DIMENSIONS |       |       | NOTES |
|--------|------------|-------|-------|-------|
|        | MIN.       | NOM.  | MAX.  |       |
| A      | 4,24       | 4,44  | 4,64  |       |
| A1     | 1,15       | 1,27  | 1,40  |       |
| A2     | 2,30       | 2,48  | 2,70  |       |
| b      | 0,70       | 0,80  | 0,90  |       |
| b1     | 1,20       | 1,55  | 1,75  |       |
| b2     | 1,20       | 1,45  | 1,70  |       |
| c      | 0,40       | 0,50  | 0,60  |       |
| D      | 14,70      | 15,37 | 16,00 | 4     |
| D1     | 8,82       | 8,92  | 9,02  |       |
| D2     | 12,63      | 12,73 | 12,83 | 5     |
| E      | 9,96       | 10,16 | 10,36 | 4,5   |
| E1     | 6,86       | 7,77  | 8,89  | 5     |
| E2     | -          | -     | 0,76  | 6     |
| E3*    | 8,70REF.   |       |       |       |
| e      | 2,54BSC    |       |       |       |
| e1     | 5,08BSC    |       |       |       |
| H1     | 6,30       | 6,45  | 6,60  | 5,6   |
| L      | 13,47      | 13,72 | 13,97 |       |
| L1     | 3,60       | 3,80  | 4,00  |       |
| øP     | 3,75       | 3,84  | 3,93  |       |
| Q      | 2,60       | 2,80  | 3,00  |       |
| Q1*    | 1,73REF.   |       |       |       |
| R*     | 1,82REF.   |       |       |       |

Package Outline

**T0-263, 3 leads**



| SYMBOL | DIMENSIONS |       |       |
|--------|------------|-------|-------|
|        | MIN.       | NOM.  | MAX.  |
| A      | 4.24       | 4.44  | 4.64  |
| A1     | 0.00       | 0.10  | 0.25  |
| b      | 0.70       | 0.80  | 0.90  |
| b1     | 1.20       | 1.55  | 1.75  |
| b2     | 1.20       | 1.45  | 1.70  |
| c      | 0.40       | 0.50  | 0.60  |
| c2     | 1.15       | 1.27  | 1.40  |
| D      | 8.82       | 8.92  | 9.02  |
| D1     | 6.86       | 7.65  | —     |
| E      | 9.96       | 10.16 | 10.36 |
| E1     | 6.89       | 7.77  | 7.89  |
| e      | 2.54 BSC   |       |       |
| H      | 14.61      | 15.00 | 15.88 |
| L      | 1.78       | 2.32  | 2.79  |
| L1     | 1.36 REF.  |       |       |
| L2     | 1.50 REF.  |       |       |
| L3     | 0.25 BSC   |       |       |
| Q      | 2.30       | 2.48  | 2.70  |