

## 150V N-Ch Power MOSFET

|                  |      |    |
|------------------|------|----|
| $V_{DS}$         | 150  | V  |
| $R_{DS(on),typ}$ | 13.5 | mW |
|                  | 33   | A  |

|             |         |           |
|-------------|---------|-----------|
| Part Number | Package | Marking   |
| HGA155N15S  | TO-220F | GA155N15S |

| Absolute Maximum Ratings at $T_C$          | Symbol   | Value      | Unit |
|--|----------|------------|------|
| Continuous Drain Current (Silicon Limited) | $I_D$    | 33         | A    |
|  |          | 23         | A    |
| Drain to Source Voltage                    | $V_{DS}$ | 150        | V    |
| Gate to Source Voltage                     | $V_{GS}$ | 20         | V    |
| Pulsed Drain Current                       | $I_{DM}$ | 220        | A    |
| Avalanche Energy, Single Pulse             | $E_{AS}$ | 125        | mJ   |
|  |          | 42         | W    |
|  |          | -55 to 175 |      |

## Electrical Characteristics at T<sub>j</sub> = 25°C

### Static Characteristics

| Parameter                         | Symbol        | Conditions                          | Value |      |     | Unit |
|-----------------------------------|---------------|-------------------------------------|-------|------|-----|------|
|                                   |               |                                     | min   | typ  | max |      |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250mA$              | 150   | -    | -   | V    |
| Gate Threshold Voltage            | $V_{GS(th)}$  | $V_{GS}=V_{DS}, I_D=250mA$          | 2     | 2.9  | 4   |      |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{GS}=0V, V_{DS}=150V, T_j=25°C$  | -     | -    | 1   | mA   |
|                                   |               | $V_{GS}=0V, V_{DS}=150V, T_j=110°C$ | -     | -    | 100 |      |
| Gate to Source Leakage Current    | $I_{GSS}$     | $V_{GS}=1W, V_{DS}=0V$              | -     | -    | 100 | nA   |
| Drain to Source on Resistance     | $R_{DS(on)}$  | $V_{GS}=10V, I_D=20A$               | -     | 13.5 | 16  | mW   |
| Transconductance                  | $g_{fs}$      | $V_{DS}=5V, I_D=20A$                | -     | 58   | -   | S    |
| Gate Resistance                   | $R_G$         | $V_{GS}=0V, V_{DS}$ Open, $f=1MHz$  | -     | 1.0  | -   | W    |

### Dynamic Characteristics

|                               |              |   |   |      |   |    |
|-------------------------------|--------------|---|---|------|---|----|
| Input Capacitance             | $C_{iss}$    | $V_{GS}=0V, V_{DS}=75V, f=1MHz$             | - | 2500 | - | pF |
| Output Capacitance            | $C_{oss}$    |   | - | 183  | - |    |
| Reverse Transfer Capacitance  | $C_{rss}$    |   | - | 10   | - |    |
| Total Gate Charge             | $Q_g$        | $V_{DD}=75V, I_D=20A, V_{GS}=10V$           | - | 29   | - | nC |
| Gate to Source Charge         | $Q_{gs}$     |   | - | 9    | - |    |
| Gate to Drain (Miller) Charge | $Q_{gd}$     |   | - | 4    | - |    |
| Turn on Delay Time            | $t_{d(on)}$  | $V_{DD}=75V, I_D=20A, V_{GS}=10V, R_G=10W,$ | - | 12   | - | ns |
| Rise time                     | $t_r$        |   | - | 8    | - |    |
| Turn off Delay Time           | $t_{d(off)}$ |   | - | 20   | - |    |
| Fall Time                     | $t_f$        |   | - | 9    | - |    |

### Reverse Diode Characteristics

|                         |          |                                     |   |     |   |    |
|-------------------------|----------|-------------------------------------|---|-----|---|----|
| Diode Forward Voltage   | $V_{SD}$ | $V_{GS}=0V, I_F=20A$                | - | 0.9 | - | V  |
| Reverse Recovery Time   | $t_{rr}$ | $V_R=75V, I_F=20A, di_F/dt=100A/ms$ | - | 68  | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ |                                     | - | 116 | - | nC |

Fig 1. Typical Output Characteristics

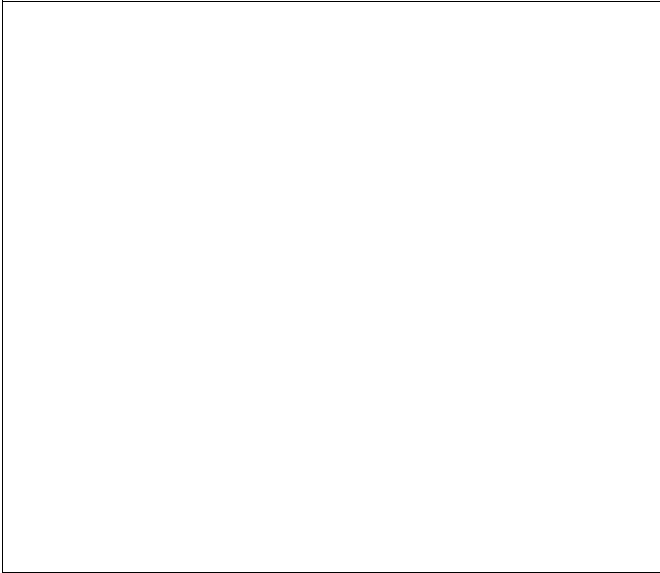


Figure 2. On-Resistance vs. Gate-Source Voltage

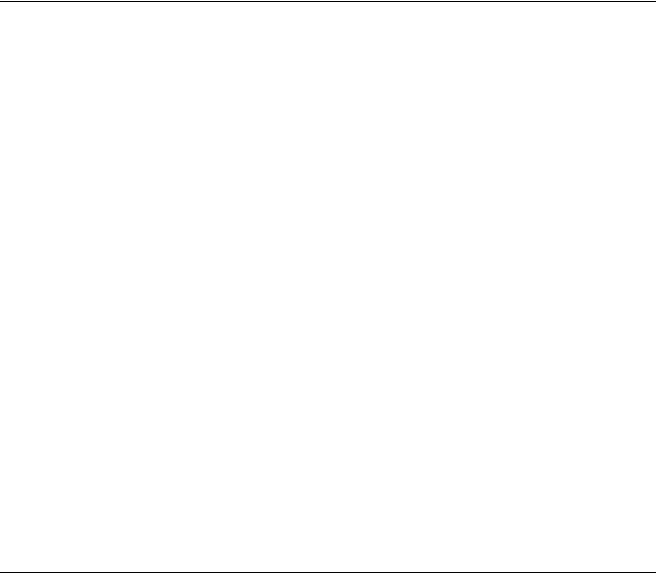


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

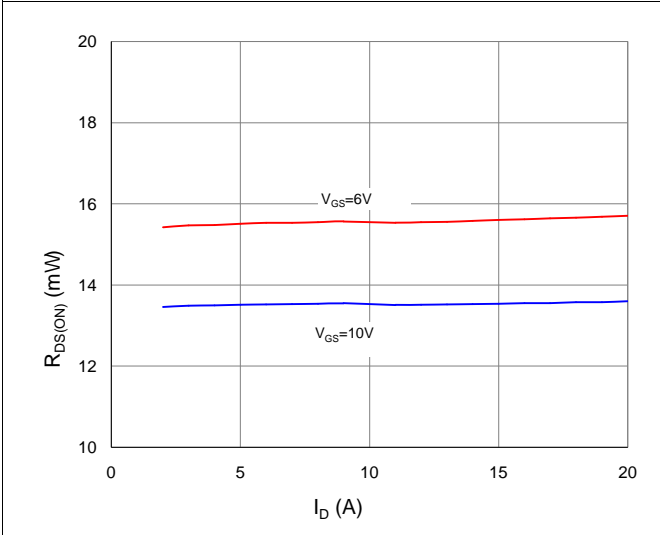


Figure 4. Normalized On-Resistance vs. Junction Temperature

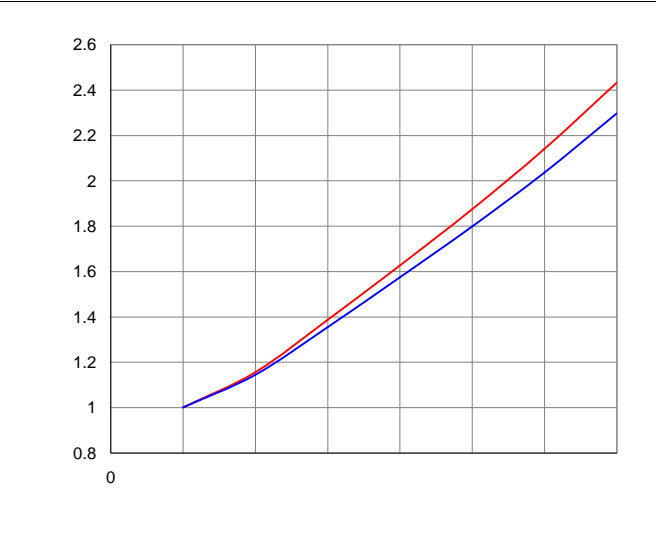


Figure 5. Typical Transfer Characteristics



Figure 6. Typical Source-Drain Diode Forward Voltage



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

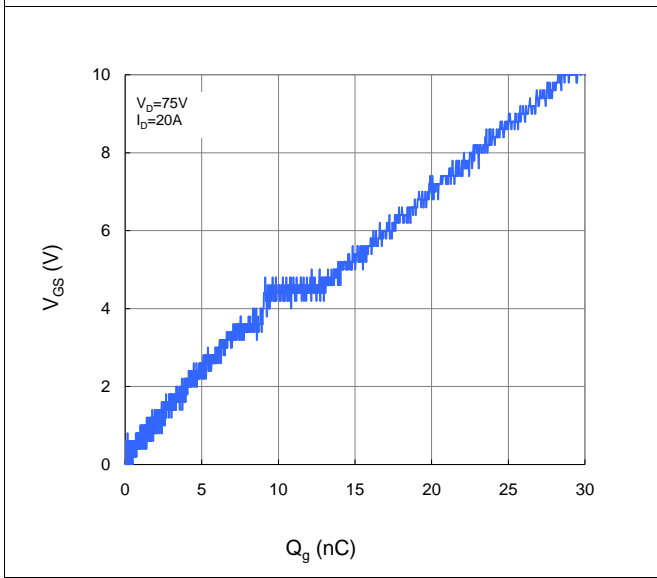


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

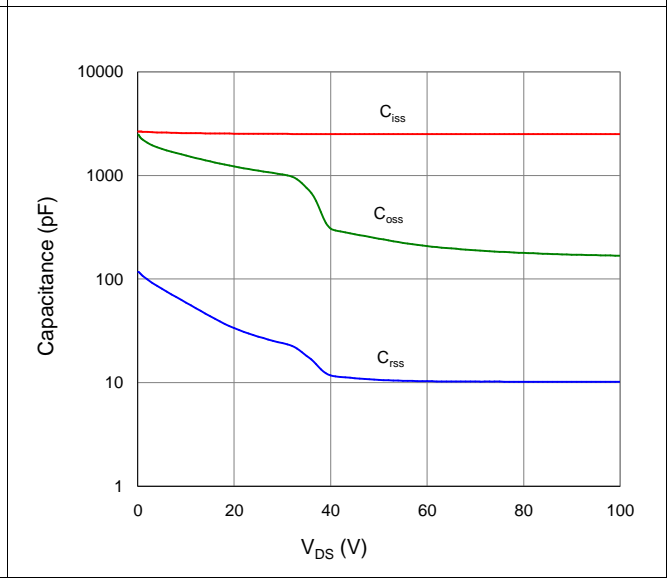


Figure 9. Maximum Safe Operating Area

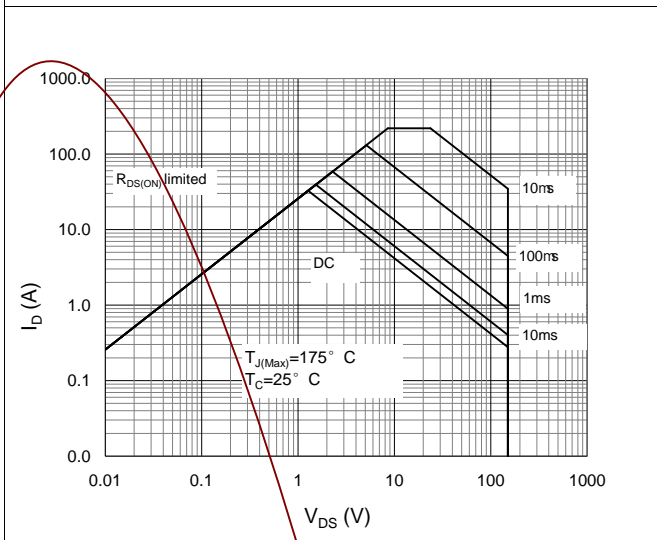


Figure 10. Maximum Drain Current vs. Case Temperature

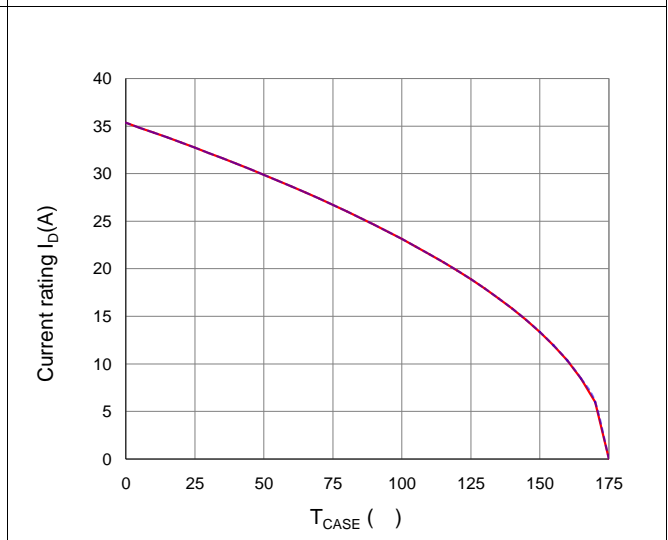
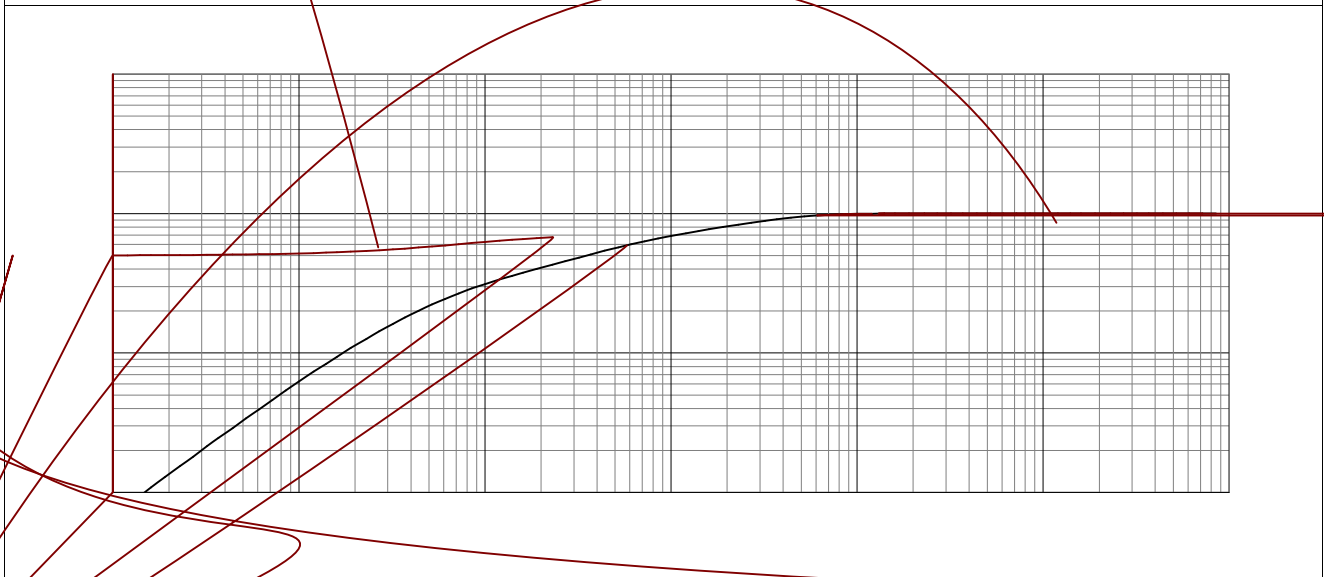
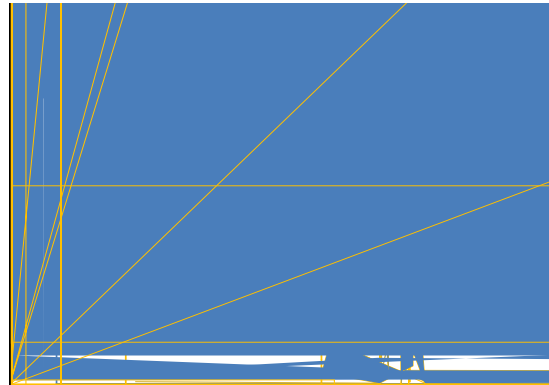
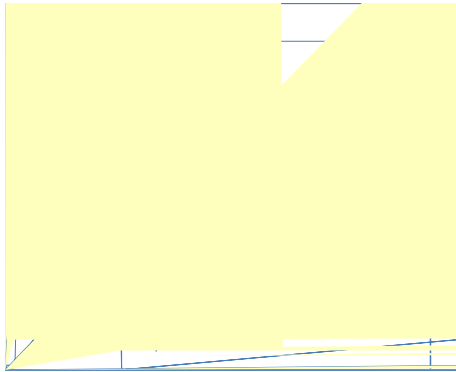


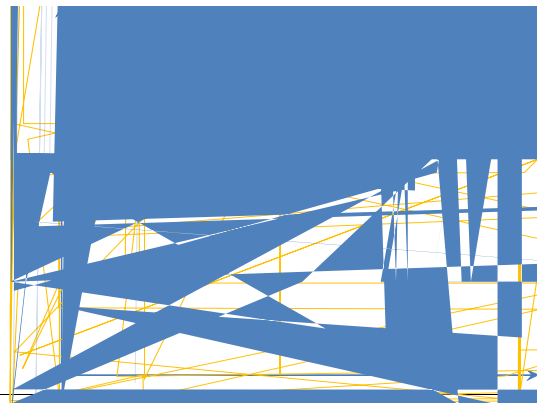
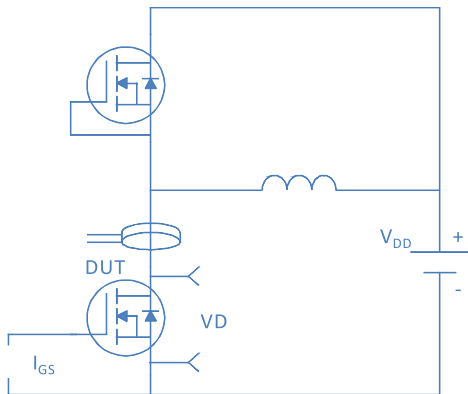
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



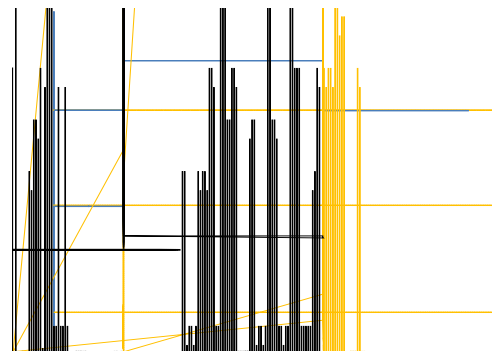
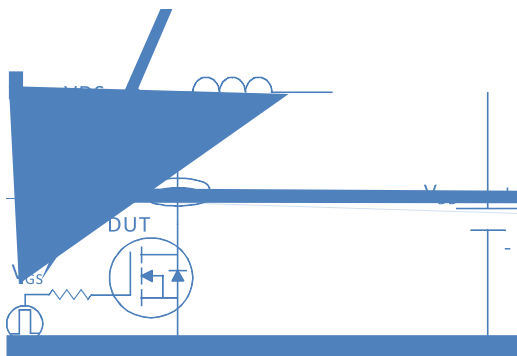
### Inductive switching Test



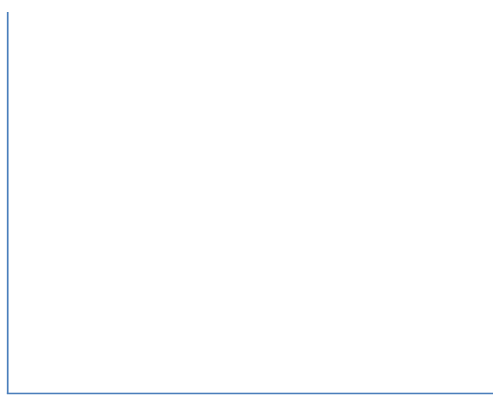
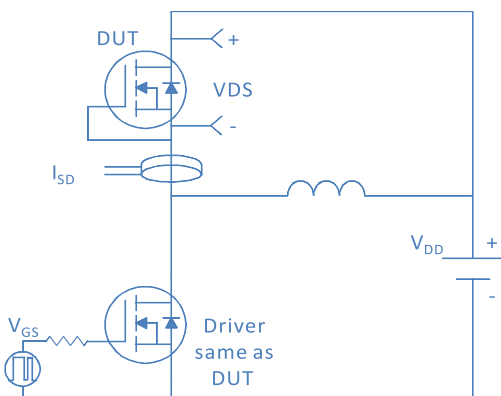
### Gate Charge Test



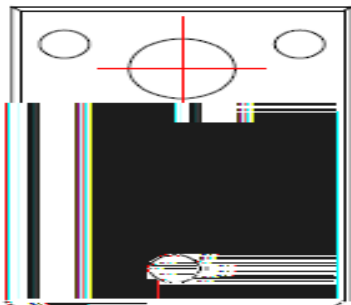
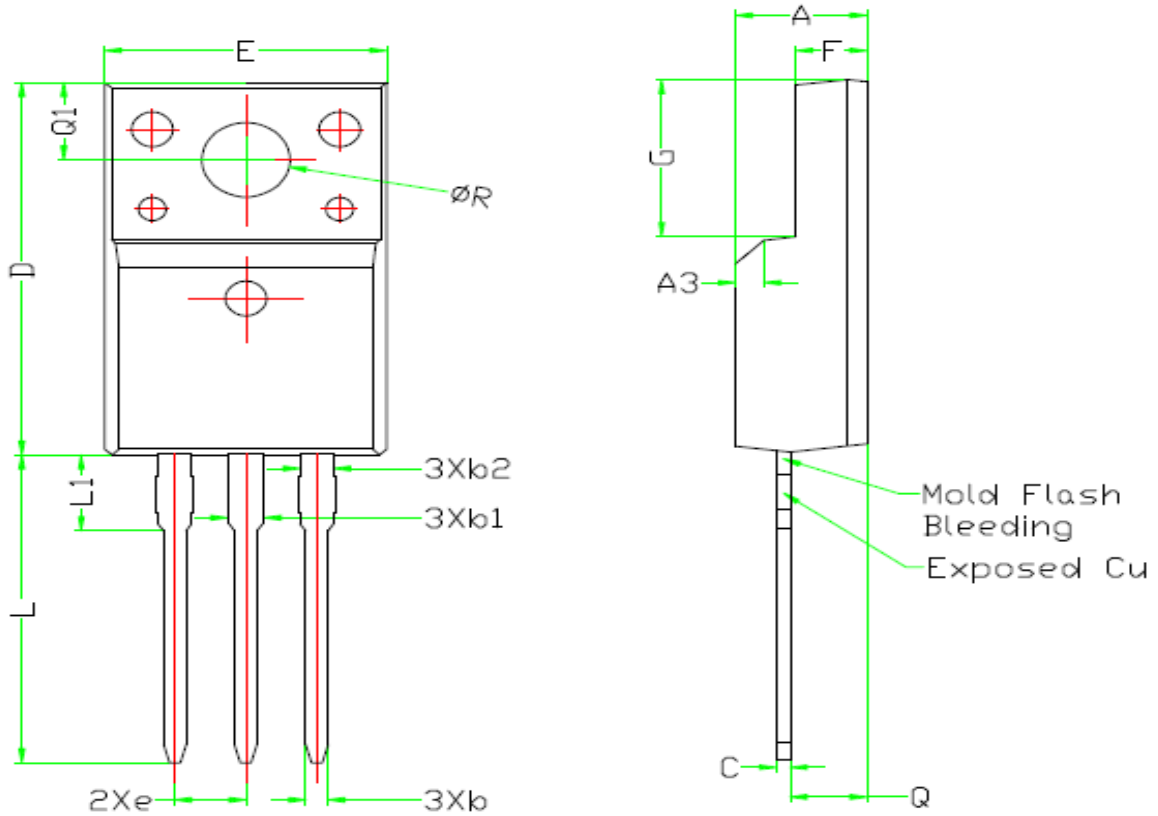
### Uclamped Inductive Switching (UIS) Test



### Diode Recovery Test



TO-220F, 3 leads



| SYMBOL | DIMENSIONS |       |       |
|--------|------------|-------|-------|
|        | Min.       | Nom.  | Max.  |
| A      | 4.60       | 4.70  | 4.80  |
| B      | 6.73       | 6.85  | 6.91  |
| C      | 0.45       | 0.50  | 0.55  |
| D      | 1.10       | 1.20  | 1.30  |
| E      | 10.00      | 10.10 | 10.30 |
| F      | 2.40       | 2.54  | 2.64  |
| G      | 6.50       | 6.70  | 6.90  |
| L      | 12.00      | 12.10 | 12.20 |
| L1     | 3.12       | 3.22  | 3.33  |
| Q      | 2.45       | 2.75  | 3.05  |
| R      | 2.54       |       |       |

**Note:**

1. All Dimension Are In mm.

2. Package Body Size Excludes Mold Flash.