

## 150V N-Ch Power MOSFET

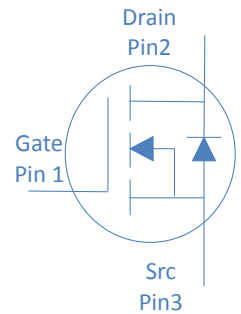
### Feature

- ◇ Optimized for high speed smooth switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free, Halogen Free

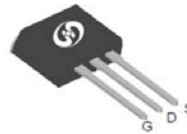
### Application

- ◇ DC-DC Conversion
- ◇ Hard Switching and High Speed Circuit
- ◇ Power Tools
- ◇ UPS
- ◇ SSR

|                         |        |     |    |
|-------------------------|--------|-----|----|
| $V_{DS}$                |        | 150 | V  |
| $R_{DS(on),typ}$        | TO-262 | 16  | mΩ |
| $I_D$ (Silicon Limited) |        | 79  | A  |



TO-262



| Part Number | Package | Marking   |
|-------------|---------|-----------|
| HGW190N15S  | TO-262  | GW190N15S |

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

| Parameter                         | Symbol         | Conditions                             | Value      | Unit             |
|-----------------------------------|----------------|--|------------|------------------|
| Continuous Drain Current          | $I_D$          | $T_C=25^\circ\text{C}$                 | 79         | A                |
|                                   |                | $T_C=100^\circ\text{C}$                | 56         |                  |
| Drain to Source Voltage           | $V_{DS}$       | -                                      | 150        | V                |
| Gate to Source Voltage            | $V_{GS}$       | -                                      | $\pm 20$   | V                |
| Pulsed Drain Current              | $I_{DM}$       | -                                      | 240        | A                |
| Avalanche Energy, Single Pulse    | $E_{AS}$       | $L=0.3\text{mH}, T_C=25^\circ\text{C}$ | 184        | mJ               |
| Power Dissipation                 | $P_D$          | $T_C=25^\circ\text{C}$                 | 214        | 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    | $R_{\theta JC}$ | 0.7 | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-Ambient | $R_{\theta JA}$ | 60  | $^\circ\text{C/W}$ |

## 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 | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                         | 150   | -   | -         | V         |
| Gate Threshold Voltage            | $V_{GS(th)}$  | $V_{GS}=V_{DS}, I_D=250\mu A$                     | 2     | 3   | 4         |           |
| Zero Gate Voltage Drain Current   | $I_{DSS}$     | $V_{GS}=0V, V_{DS}=150V, T_J=25^{\circ}\text{C}$  | -     | -   | 1         | $\mu A$   |
|                                   |               | $V_{GS}=0V, V_{DS}=150V, T_J=100^{\circ}\text{C}$ | -     | -   | 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-262                      | -     | 16  | 19        | $m\Omega$ |
| Transconductance                  | $g_{fs}$      | $V_{DS}=5V, I_D=20A$                              | -     | 50  | -         | S         |
| Gate Resistance                   | $R_G$         | $V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$         | -     | 3.5 | -         | $\Omega$  |

### Dynamic Characteristics

|                               |              |  |   |      |   |      |
|-------------------------------|--------------|--|---|------|---|------|
| Input Capacitance             | $C_{iss}$    | $V_{GS}=0V, V_{DS}=75V, f=1\text{MHz}$           | - | 2275 | - | $pF$ |
| Output Capacitance            | $C_{oss}$    |  | - | 165  | - |      |
| Reverse Transfer Capacitance  | $C_{rss}$    |  | - | 5.5  | - |      |
| Total Gate Charge             | $Q_g$        | $V_{DD}=75V, I_D=20A, V_{GS}=10V$                | - | 27   | - | $nC$ |
| Gate to Source Charge         | $Q_{gs}$     |  | - | 9    | - |      |
| Gate to Drain (Miller) Charge | $Q_{gd}$     |  | - | 2    | - |      |
| Turn on Delay Time            | $t_{d(on)}$  | $V_{DD}=75V, I_D=20A, V_{GS}=10V, R_G=10\Omega,$ | - | 10   | - | $ns$ |
| Rise time                     | $t_r$        |  | - | 29   | - |      |
| Turn off Delay Time           | $t_{d(off)}$ |  | - | 16   | - |      |
| Fall Time                     | $t_f$        |  | - | 15   | - |      |

### Reverse Diode Characteristics

|                         |          |  |   |     |     |    |
|-------------------------|----------|--|---|-----|-----|----|
| Diode Forward Voltage   | $V_{SD}$ | $V_{GS}=0V, I_F=20A$                   | - | 0.9 | 1.2 | V  |
| Reverse Recovery Time   | $t_{rr}$ | $V_R=75V, I_F=20A, di_F/dt=100A/\mu s$ | - | 90  | -   | ns |
| Reverse Recovery Charge | $Q_{rr}$ |  | - | 234 | -   | nC |

Fig 1. Typical Output Characteristics

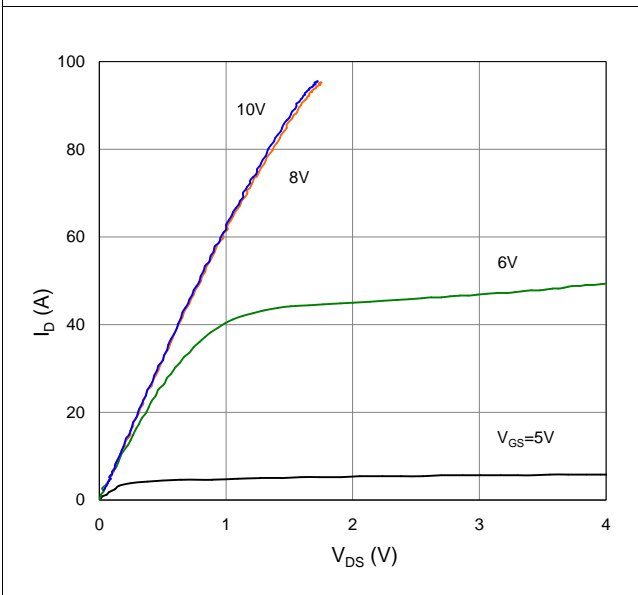


Figure 2. On-Resistance vs. Gate-Source Voltage

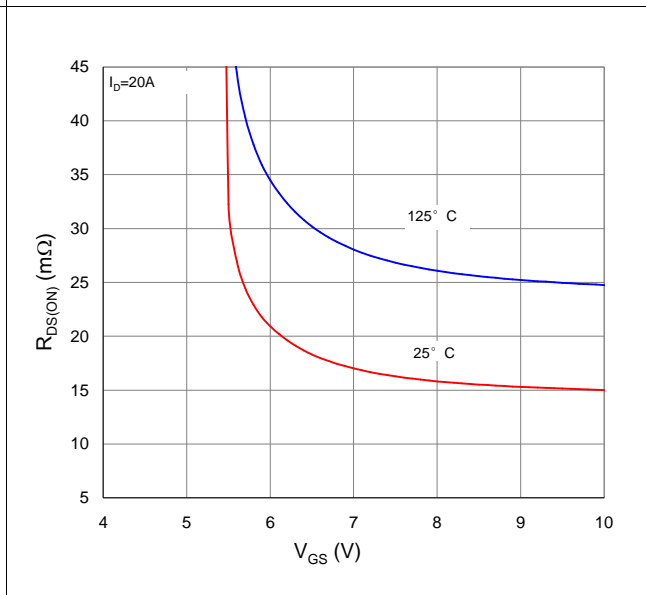


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

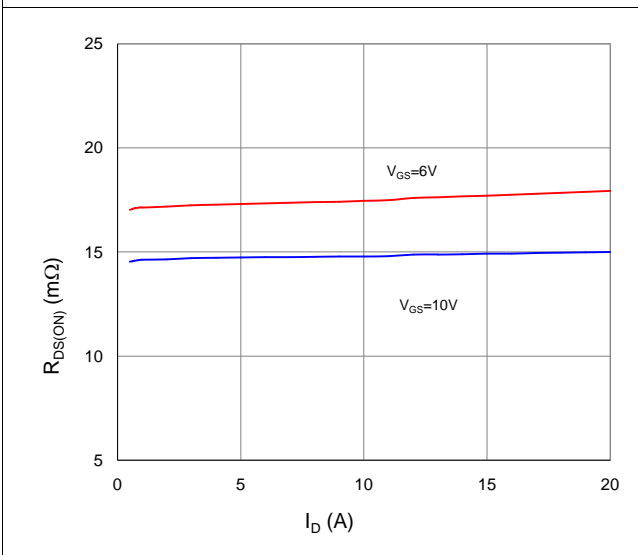


Figure 4. Normalized On-Resistance vs. Junction Temperature

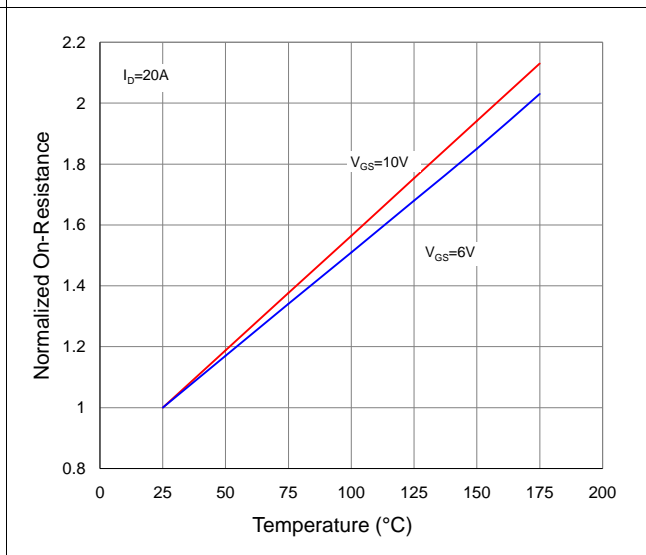


Figure 5. Typical Transfer Characteristics

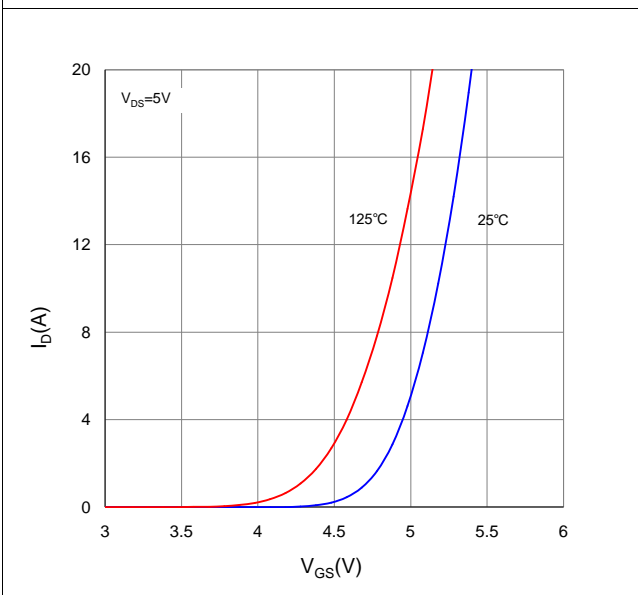


Figure 6. Typical Source-Drain Diode Forward Voltage

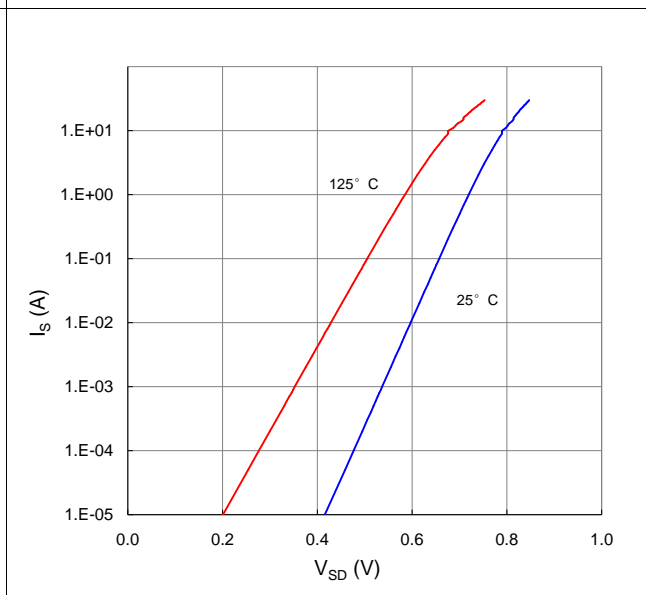


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

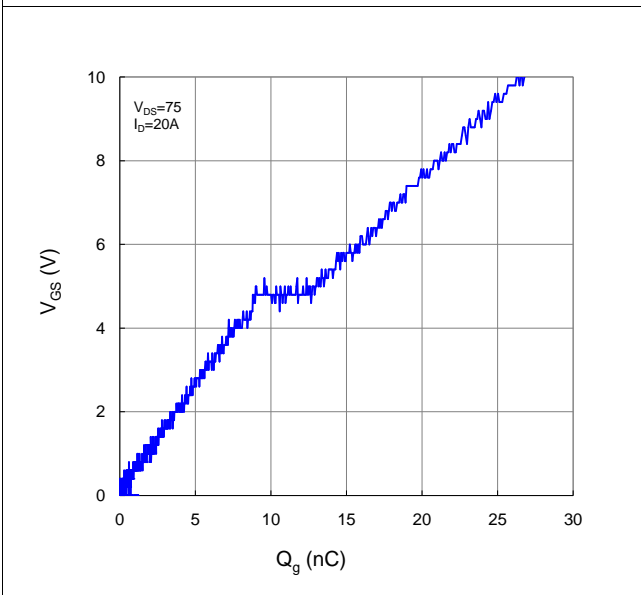


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

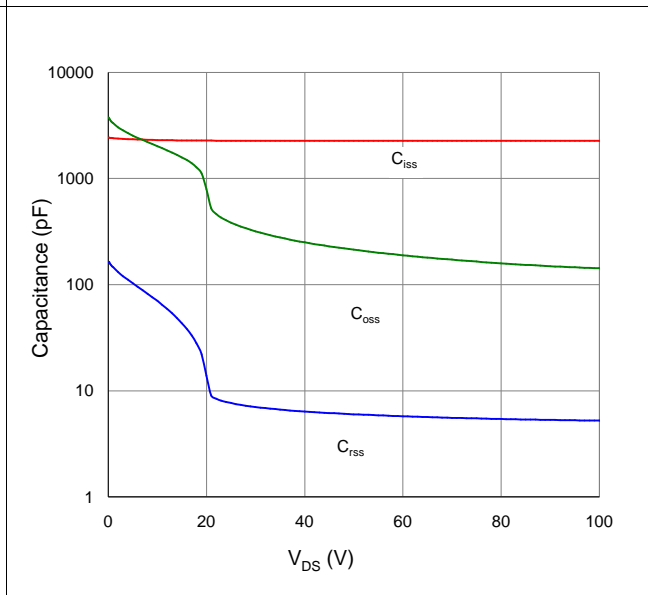


Figure 9. Maximum Safe Operating Area

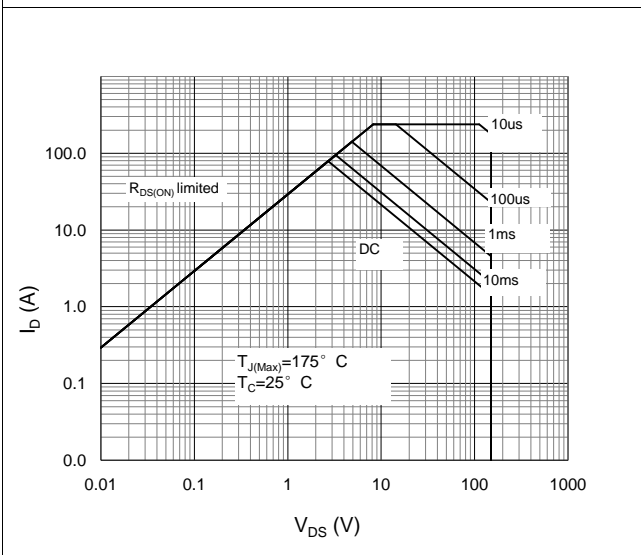


Figure 10. Maximum Drain Current vs. Case Temperature

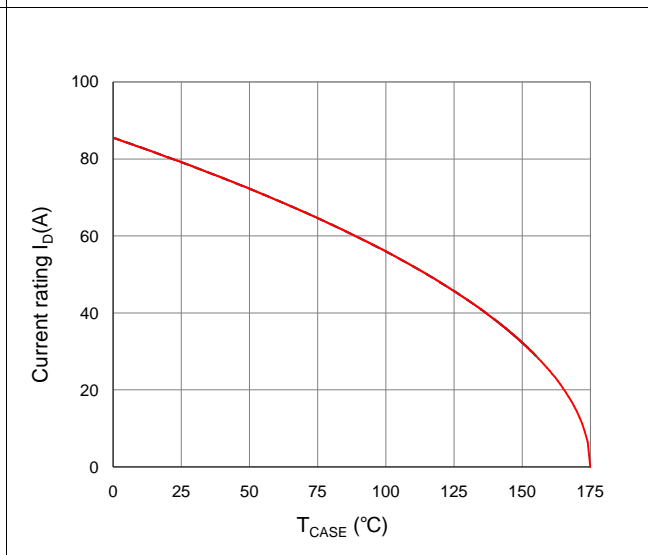
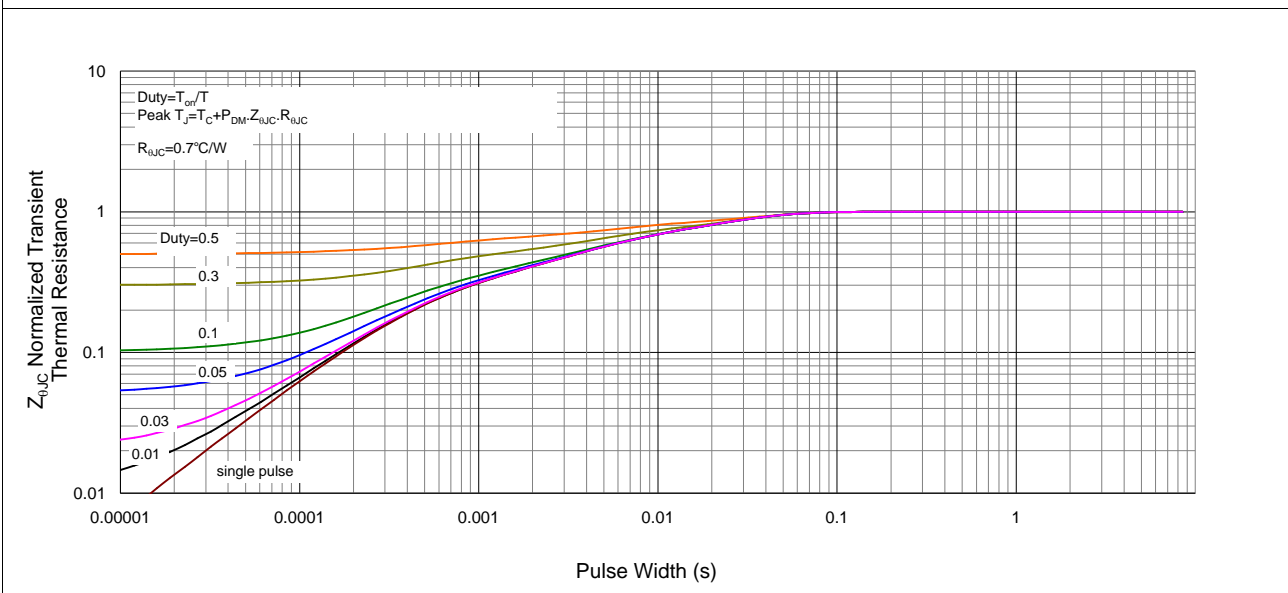
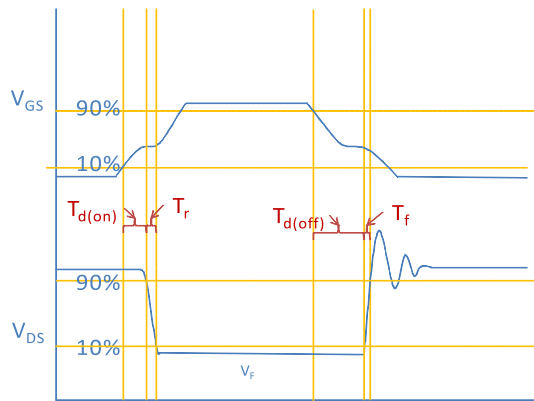


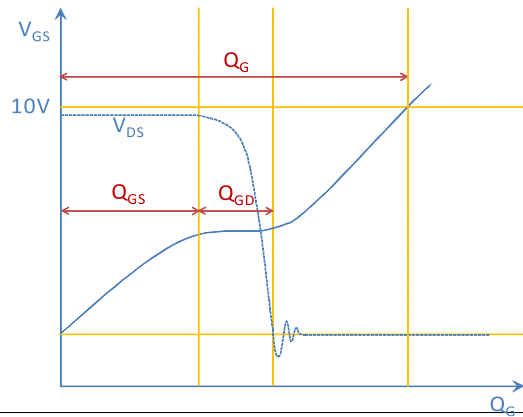
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



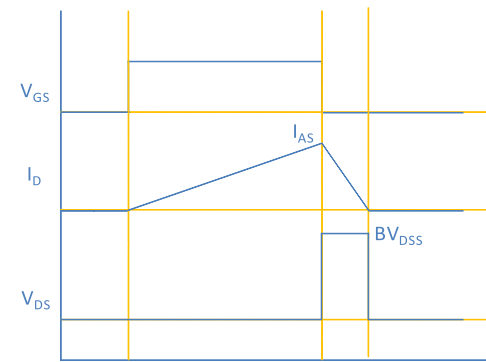
### Inductive switching Test



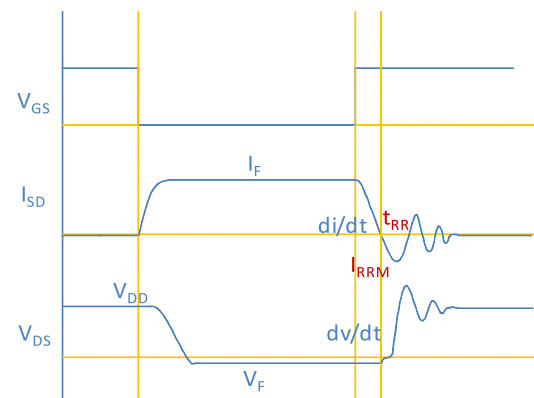
### Gate Charge Test



### Uclamped Inductive Switching (UIS) Test

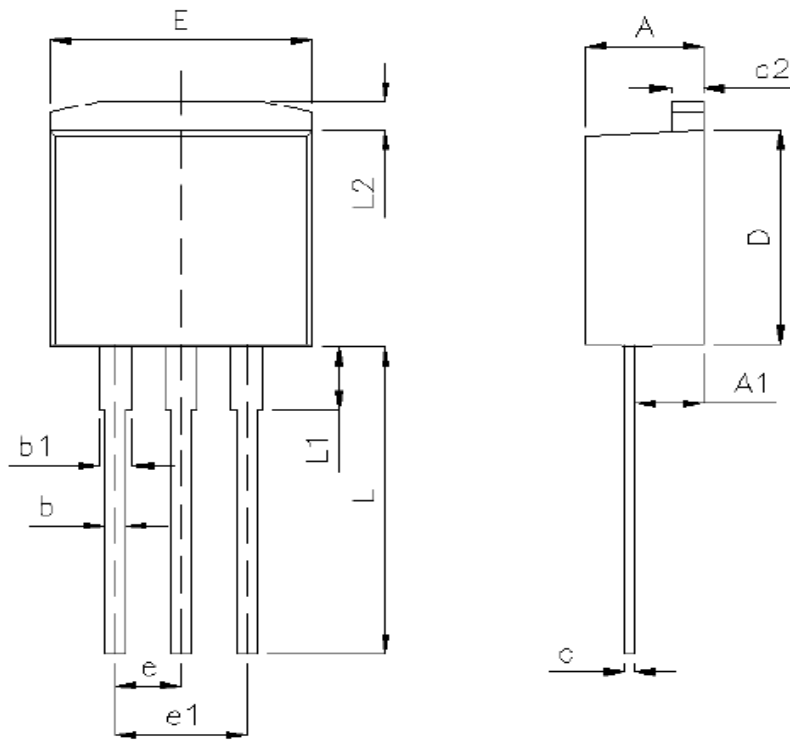


### Diode Recovery Test



## Package Outline

TO-262, 3 leads



UNIT: mm

| SYMBOL | MIN  | NOM | MAX  | SYMBOL | MIN   | NOM  | MAX   |
|--------|------|-----|------|--------|-------|------|-------|
| A      | 4.42 |     | 4.72 | e      | 2.44  | 2.54 | 2.64  |
| A1     | 2.40 |     | 2.80 | e1     | 4.98  |      | 5.18  |
| b      | 0.76 |     | 0.86 | E      | 9.95  |      | 10.25 |
| b1     | 1.22 |     | 1.40 | L      | 12.50 |      | 13.60 |
| c      | 0.33 |     | 0.43 | L1     | 3.30  | 3.50 | 3.80  |
| c2     | 1.22 |     | 1.35 | L2     | 1.22  |      | 1.40  |
| D      | 8.99 |     | 9.29 |        |       |      |       |