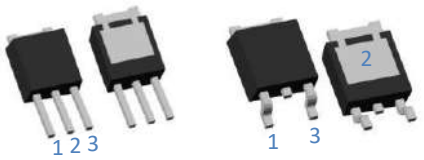
# 100V N-Ch Power MOSFET

## Features:

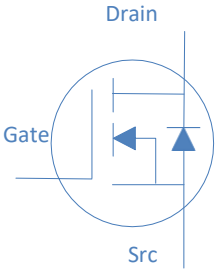
◇ High Speed Power Switching
◇ Enhanced Body diode dv/dt capability
◇ Enhanced Avalanche Ruggedness
◇ 100% UIS Tested, 100% Rg Tested
◇ Lead Free, Halogen Free

TO-251 TO-252




## Application：

◇ Synchronous Rectification in SMPS
◇ Hard Switching and High Speed Circuit
◇ DC/DC in Telecoms and Industrial




| | | |
|---|---|---|
| $V_{DS}$ | 100 | V |
| $R_{DS(on),typ}$ | 12.0 | mΩ |
| $I_D$ | 59 | A |

| Part Number | Package | Marking |
|---|---|---|
| KWGI120N10A | TO-251 | GI120N10A |
| KWGD120N10A | TO-252 | GD120N10A |

**Absolute Maximum Ratings at $T_j$=25℃ (unless otherwise specified)**

| Parameter | Symbol | Conditions | Value | Unit |
|---|---|---|---|---|
| Continuous Drain Current (Silicon Limited) | $I_D$ | $T_C$=25℃ | 59 | A |
| | | $T_C$=100℃ | 42 | |
| Drain to Source Voltage | $V_{DS}$ | - | 100 | V |
| Gate to Source Voltage | $V_{GS}$ | - | ±20 | V |
| Pulsed Drain Current | $I_{DM}$ | - | 150 | A |
| Avalanche Energy, Single Pulse | $E_{AS}$ | L=0.1mH, $T_C$=25℃ | 20 | mJ |
| Power Dissipation | $P_D$ | $T_C$=25℃ | 100 | W |
| Operating and Storage Temperature | $T_J$, $T_{stg}$ | - | -55 to 175 | ℃ |

**Absolute Maximum Ratings**

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance Junction-Ambient | $R_{\theta JA}$ | 60 | ℃/W |
| Thermal Resistance Junction-Case | $R_{\theta JC}$ | 1.5 | ℃/W |

## Electrical Characteristics at $T_j$=25℃ (unless otherwise specified)

### Static Characteristics

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min | typ | max | |
| Drain to Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 100 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 2.0 | 3.0 | 4.0 | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{GS}$=0V, $V_{DS}$=100V, $T_j$=25℃ | - | - | 1 | μA |
| | | $V_{GS}$=0V, $V_{DS}$=100V, $T_j$=100℃ | - | - | 100 | |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±20V, $V_{DS}$=0V | - | - | ±100 | nA |
| Drain to Source on Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=20A | - | 12 | 13 | mΩ |
| Transconductance | $g_{fs}$ | $V_{DS}$=5V, $I_D$=20A | - | 37 | - | S |
| Gate Resistance | $R_G$ | $V_{GS}$=0V, $V_{DS}$ Open, f=1MHz | - | 1.4 | - | Ω |

### Dynamic Characteristics

| | | | | | | |
|---|---|---|---|---|---|---|
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=50V, f=1MHz | - | 1360 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 200 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 7.5 | - | |
| Total Gate Charge | $Q_g$(10V) | $V_{DD}$=50V, $I_D$=20A, $V_{GS}$=10V | - | 20 | - | nC |
| Gate to Source Charge | $Q_{gs}$ | | - | 7 | - | |
| Gate to Drain (Miller) Charge | $Q_{gd}$ | | - | 3.5 | - | |
| Turn on Delay Time | $t_{d(on)}$ | $V_{DD}$=50V, $I_D$=20A, $V_{GS}$=10V, $R_G$=10Ω, | - | 6 | - | ns |
| Rise time | $t_r$ | | - | 3 | - | |
| Turn off Delay Time | $t_{d(off)}$ | | - | 17 | - | |
| Fall Time | $t_f$ | | - | 3 | - | |

### 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/μs | - | 45 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 175 | - | nC |

Fig 1. Typical Output Characteristics

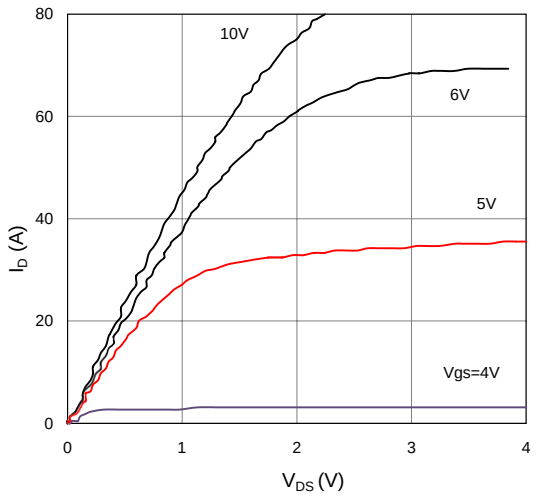



Figure 2. On-Resistance vs. Gate-Source Voltage

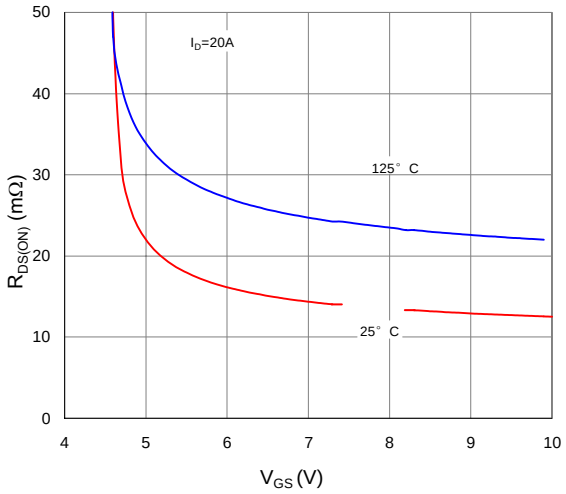



Figure 3. On-Resistance vs. Drain Current and Gate Voltage

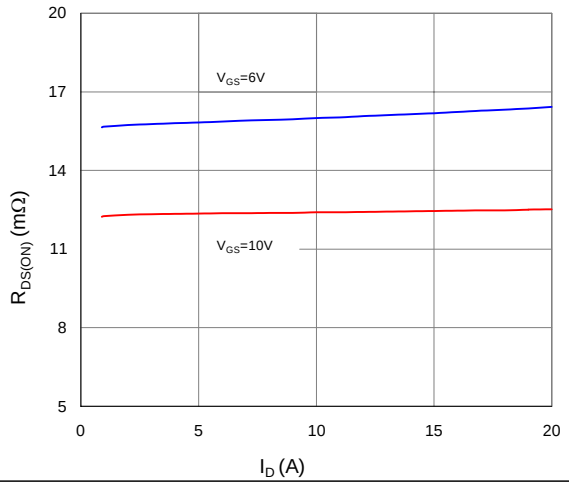



Figure 4. Normalized On-Resistance vs. Junction Temperature

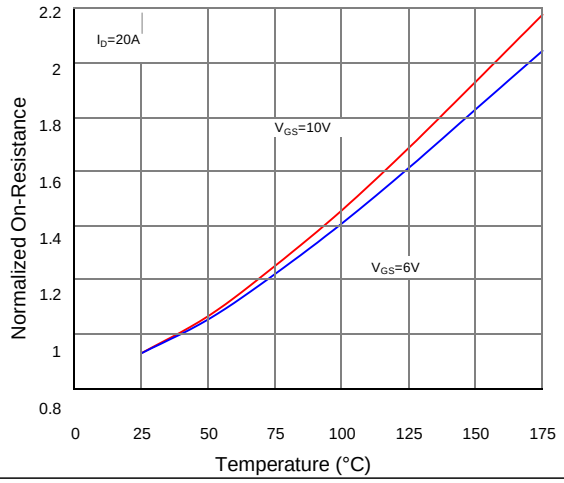



Figure 5. Typical Transfer Characteristics

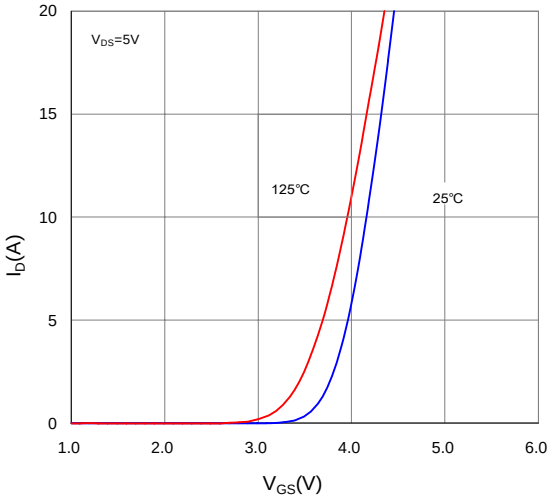



Figure 6. Typical Source-Drain Diode Forward Voltage

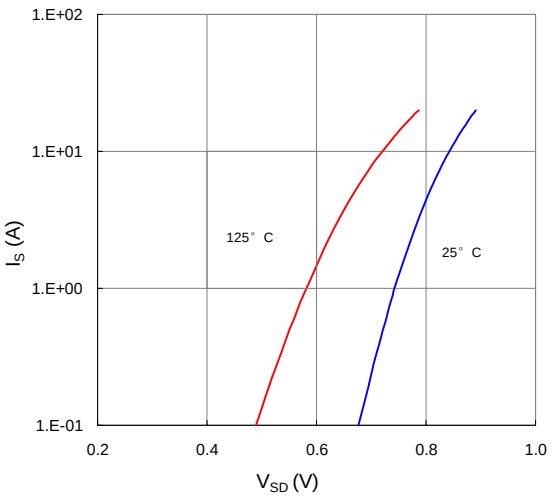


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

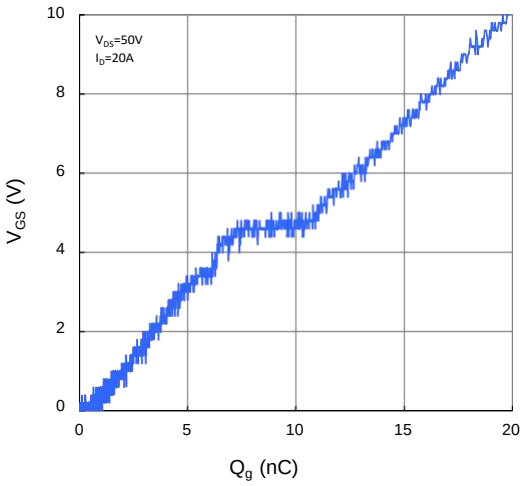



Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

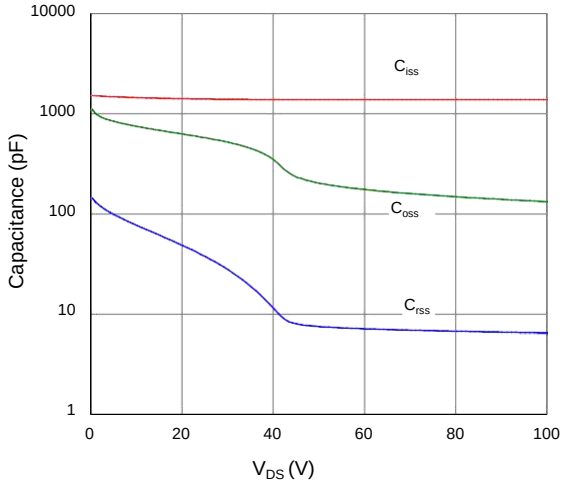



Figure 9. Maximum Safe Operating Area

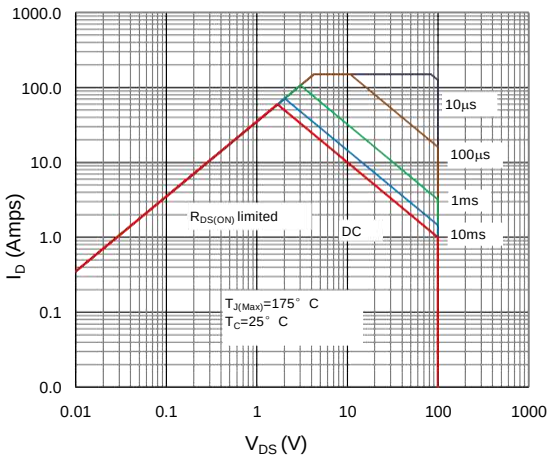



Figure 10. Maximun Drain Current vs. Case Temperature

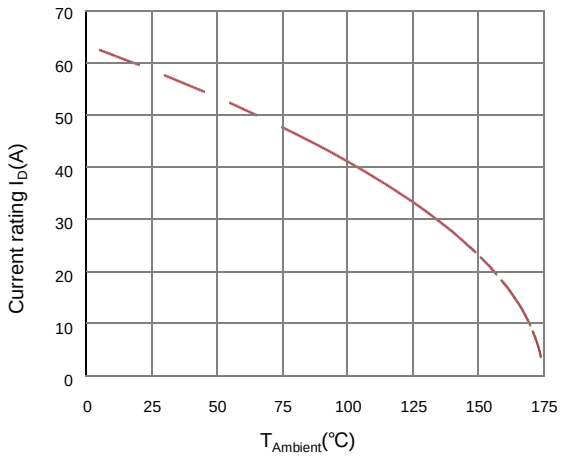
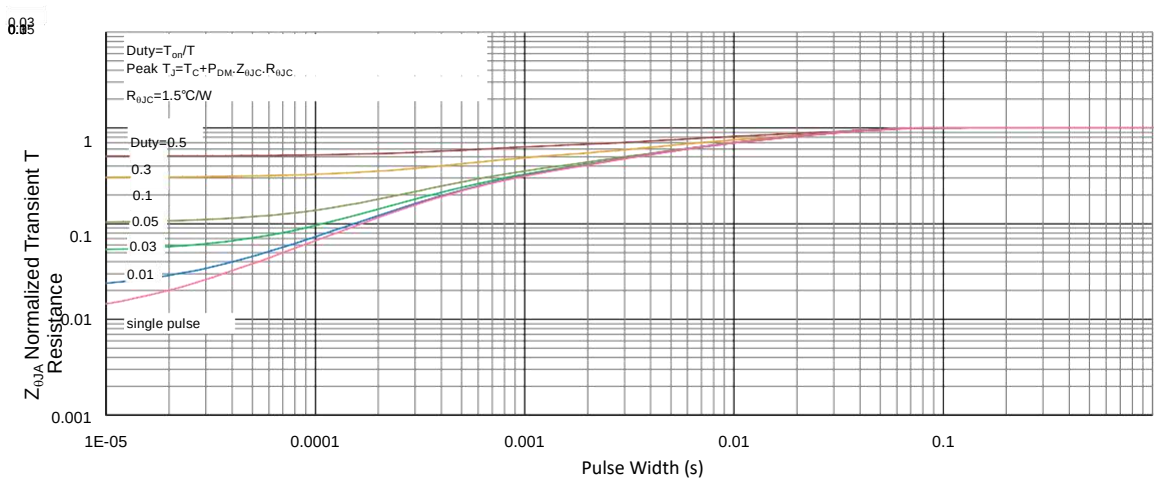
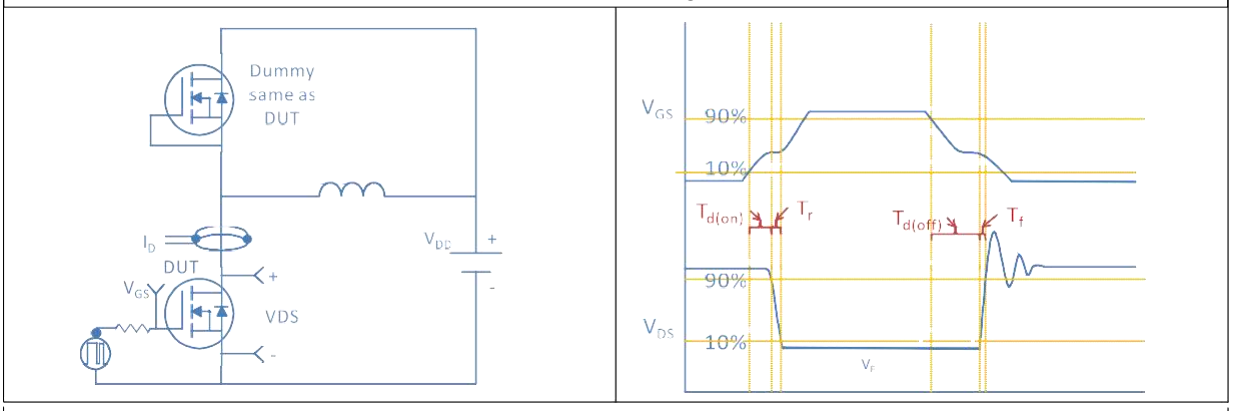


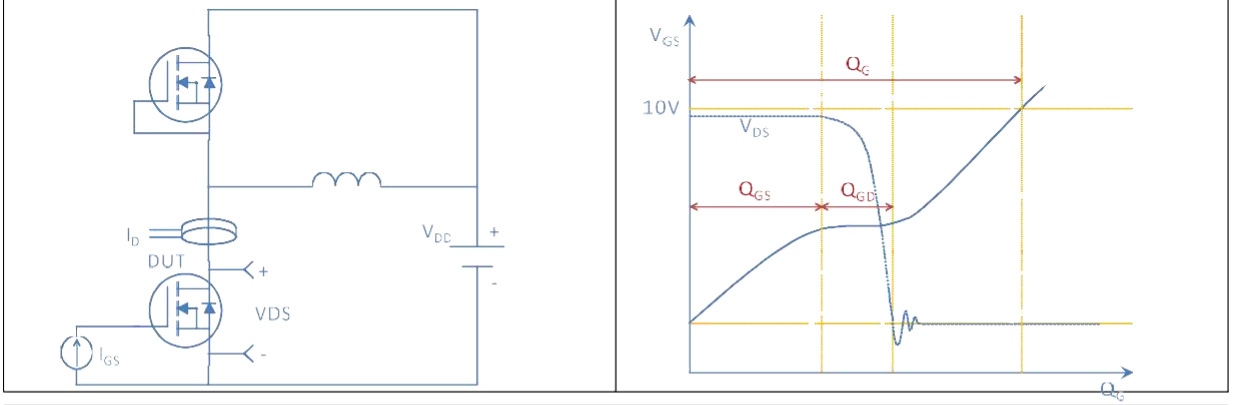

Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Ambient



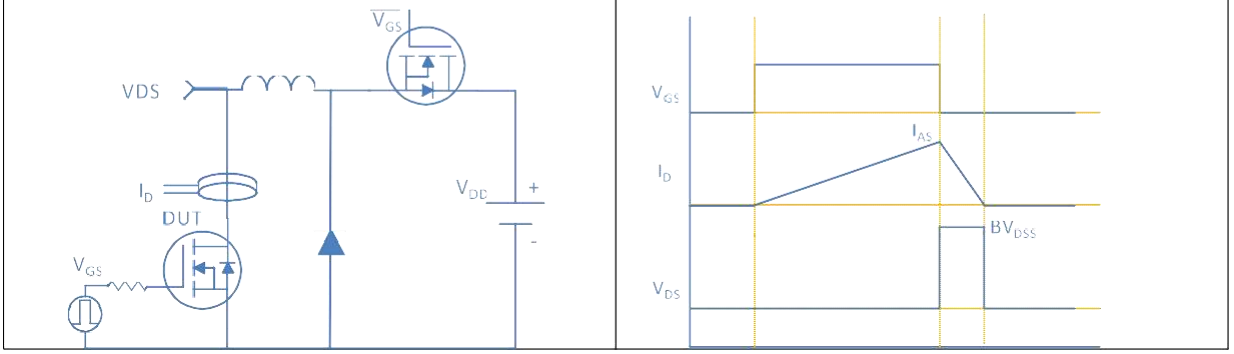
## Inductive switching Test



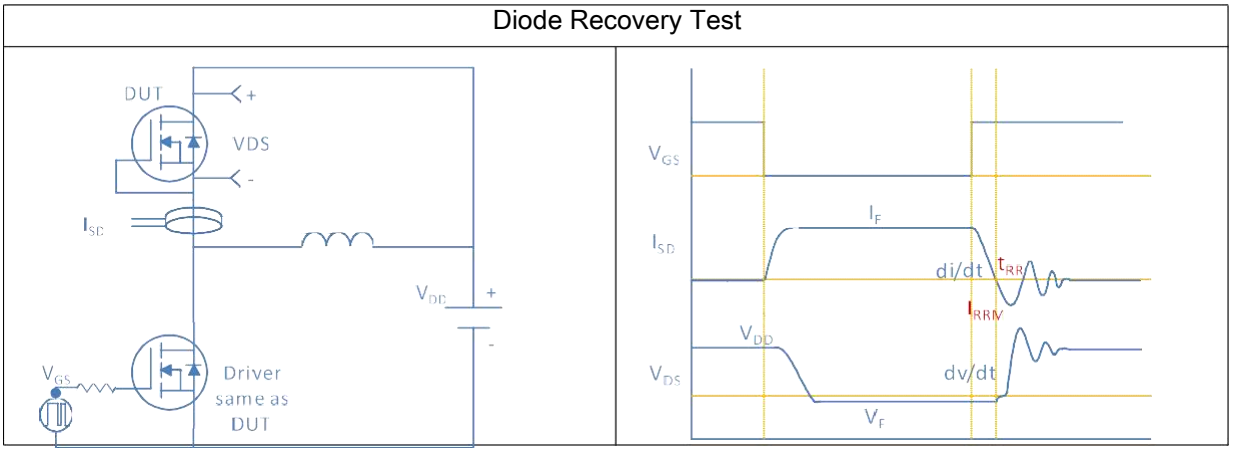

## Gate Charge Test




## Uclamped Inductive Switching (UIS) Test

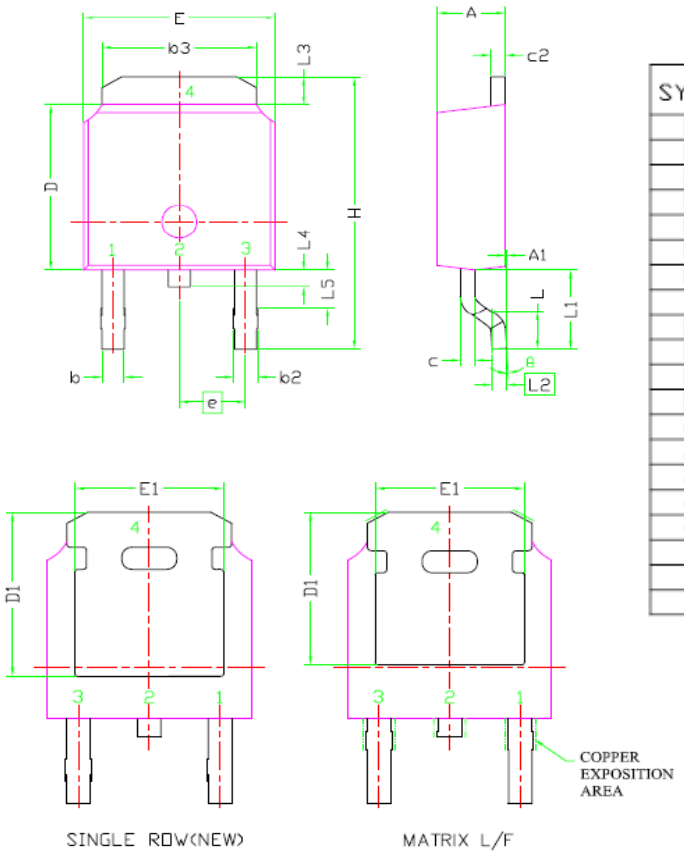



## Diode Recovery Test



Package Outline

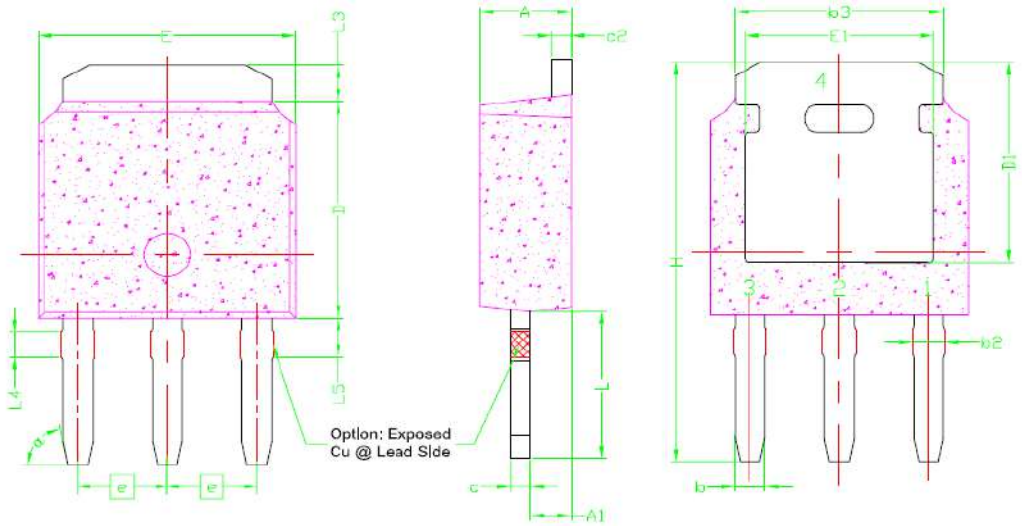
TO-252, 3 leads




| SYMBOL | DIMENSIONAL REQMTS | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| E | 6.40 | 6.60 | 6.731 |
| L | 1.40 | 1.52 | 1.77 |
| L1 | 2.743 REF | | |
| L2 | 0.508 BSC | | |
| L3 | 0.89 | -- | 1.27 |
| L4 | 0.64 | -- | 1.01 |
| L5 | -- | -- | -- |
| D | 6.00 | 6.10 | 6.223 |
| H | 9.40 | 10.00 | 10.40 |
| b | 0.64 | 0.76 | 0.88 |
| b2 | 0.77 | 0.84 | 1.14 |
| b3 | 5.21 | 5.34 | 5.46 |
| e | 2.286 BSC | | |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0 | -- | 0.127 |
| c | 0.46 | 0.50 | 0.60 |
| c2 | 0.46 | 0.50 | 0.58 |
| D1 | 5.21 | -- | -- |
| E1 | 4.40 | -- | -- |
| θ | 0° | -- | 10° |

Package Outline

**TO-251, 3 leads**




| SYMBOL | DIMENSIONAL REQMTS | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| E | 6.40 | 6.60 | 6.731 |
| L | 3.98 | 4.13 | 4.28 |
| L3 | 0.89 | -- | 1.27 |
| L4 | 0.698 REF | | |
| L5 | 0.972 | 1.099 | 1.226 |
| D | 6.00 | 6.10 | 6.223 |
| H | 11.05 | 11.25 | 11.45 |
| b | 0.64 | 0.76 | 0.88 |
| b2 | 0.77 | 0.84 | 1.14 |
| b3 | 5.21 | 5.34 | 5.46 |
| e | 2.286 BSC | | |
| A | 2.20 | 2.30 | 2.38 |
| A1 | 0.89 | 1.04 | 1.15 |
| c | 0.46 | 0.50 | 0.60 |
| c2 | 0.46 | 0.50 | 0.60 |
| D1 | 5.10 | -- | -- |
| E1 | 4.40 | -- | -- |
| α | 79° REF | | |