

## Features

- Uses Geener advanced MOS technology
- Extremely low on-resistance  $R_{DS(on)}$
- Excellent  $Q_g \times R_{DS(on)}$  product(FOM)
- Qualified according to JEDEC criteria

## Applications

- Motor control and drive
- Battery management
- UPS (Uninterruptible Power Supplies)

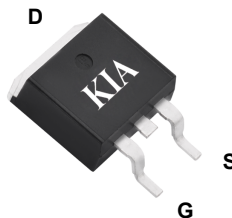
## Product Summary

|              |               |
|--------------|---------------|
| $V_{DS}$     | 85V           |
| $R_{DS(on)}$ | 4.6m $\Omega$ |
| $I_D$        | 120A          |

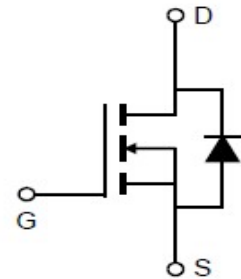
**100% DVDS Tested**  
**100% Avalanche Tested**



TOLL



TO-263



## Package Marking and Ordering Information

| Part #     | Marking    | Package | Packing | Reel Size | Tape Width | Qty     |
|------------|------------|---------|---------|-----------|------------|---------|
| KCB050N08N | KCB050N08N | TO-263  | Tape    | N/A       | N/A        | 1000pcs |
| KCT050N08N | KCT050N08N | TOLL    | Tape    | N/A       | N/A        | 2000pcs |

## Absolute Maximum Ratings

| Parameter                                                                       | Symbol                | Value      | Unit             |
|---------------------------------------------------------------------------------|-----------------------|------------|------------------|
| Drain-source voltage                                                            | $V_{DS}$              | 85         | V                |
| Continuous drain current                                                        | $I_D$                 | 135        | A                |
| $T_C = 25^\circ\text{C}$                                                        |                       | 120        |                  |
| $T_C = 25^\circ\text{C}$                                                        |                       | 86         |                  |
| $T_C = 100^\circ\text{C}$                                                       |                       |            |                  |
| Pulsed drain current ( $T_C = 25^\circ\text{C}$ , $t_p$ limited by $T_{jmax}$ ) | $I_{D \text{ pulse}}$ | 480        | A                |
| Avalanche energy, single pulse ( $L=0.5\text{mH}$ , $R_g=25\Omega$ )            | $E_{AS}$              | 144        | mJ               |
| Gate-Source voltage                                                             | $V_{GS}$              | $\pm 20$   | V                |
| Power dissipation ( $T_C = 25^\circ\text{C}$ )                                  | $P_{tot}$             | 174        | W                |
| Operating junction and storage temperature                                      | $T_j, T_{stg}$        | -55...+150 | $^\circ\text{C}$ |

## Thermal Resistance

| Parameter                                              | Symbol     | Max  | Unit |
|--------------------------------------------------------|------------|------|------|
| Thermal resistance, junction – case.                   | $R_{thJC}$ | 0.72 | °C/W |
| Thermal resistance, junction – ambient(min. footprint) | $R_{thJA}$ | 62   |      |

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

| Parameter | Symbol | Value |      |      | Unit | Test Condition |
|-----------|--------|-------|------|------|------|----------------|
|           |        | min.  | typ. | max. |      |                |

## Static Characteristic

|                                  |              |    |      |     |            |                                                     |
|----------------------------------|--------------|----|------|-----|------------|-----------------------------------------------------|
| Drain-source breakdown voltage   | $BV_{DSS}$   | 85 | 97   | -   | V          | $V_{GS}=0V, I_D=250\mu A$                           |
| Gate threshold voltage           | $V_{GS(th)}$ | 2  | 3    | 4   | V          | $V_{DS}=V_{GS}, I_D=250\mu A$                       |
| Zero gate voltage drain current  | $I_{DSS}$    | -  | 0.05 | 1   | $\mu A$    | $V_{DS}=80V, V_{GS}=0V$<br>$T_j=25^{\circ}\text{C}$ |
|                                  |              | -  | -    | 5   |            | $T_j=125^{\circ}\text{C}$                           |
| Gate-source leakage current      | $I_{GSS}$    | -  | 10   | 100 | nA         | $V_{GS}=\pm 20V, V_{DS}=0V$                         |
| Drain-source on-state resistance | $R_{DS(on)}$ | -  | 4.3  | 5.2 | m $\Omega$ | $V_{GS}=10V, I_D=50A$<br>TO-263                     |
|                                  |              | -  | 4.1  | 5.0 |            | TOLL                                                |
| Transconductance                 | $g_{fs}$     | -  | 84.2 | -   | S          | $V_{DS}=5V, I_D=50A$                                |

## Dynamic Characteristic

|                              |              |   |      |   |          |                                                     |
|------------------------------|--------------|---|------|---|----------|-----------------------------------------------------|
| Input Capacitance            | $C_{iss}$    | - | 3086 | - | pF       | $V_{GS}=0V, V_{DS}=40V,$<br>$f=1\text{MHz}$         |
| Output Capacitance           | $C_{oss}$    | - | 1057 | - |          |                                                     |
| Reverse Transfer Capacitance | $C_{rss}$    | - | 26   | - |          |                                                     |
| Gate Total Charge            | $Q_G$        | - | 55   | - | nC       | $V_{GS}=10V, V_{DS}=40V,$<br>$I_D=50A$              |
| Gate-Source charge           | $Q_{gs}$     | - | 15   | - |          |                                                     |
| Gate-Drain charge            | $Q_{gd}$     | - | 13   | - |          |                                                     |
| Turn-on delay time           | $t_{d(on)}$  | - | 20.1 | - | ns       | $V_{GS}=10V, V_{DD}=40V,$<br>$R_{G\_ext}=3.0\Omega$ |
| Rise time                    | $t_r$        | - | 38.9 | - |          |                                                     |
| Turn-off delay time          | $t_{d(off)}$ | - | 45.1 | - |          |                                                     |
| Fall time                    | $t_f$        | - | 22.8 | - |          |                                                     |
| Gate resistance              | $R_G$        | - | 3.3  | - | $\Omega$ | $V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$               |

### Body Diode Characteristic

| Parameter                          | Symbol   | Value |      |      | Unit | Test Condition                    |
|------------------------------------|----------|-------|------|------|------|-----------------------------------|
|                                    |          | min.  | typ. | max. |      |                                   |
| Body Diode Forward Voltage         | $V_{SD}$ | -     | 0.95 | 1.4  | V    | $V_{GS}=0V, I_{SD}=50A$           |
| Body Diode Reverse Recovery Time   | $t_{rr}$ | -     | 60   | -    | ns   | $I_F=20A,$<br>$dI/dt=500A/\mu s;$ |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | -     | 560  | -    | nC   |                                   |

## Typical Performance Characteristics

Fig 1: Output Characteristics

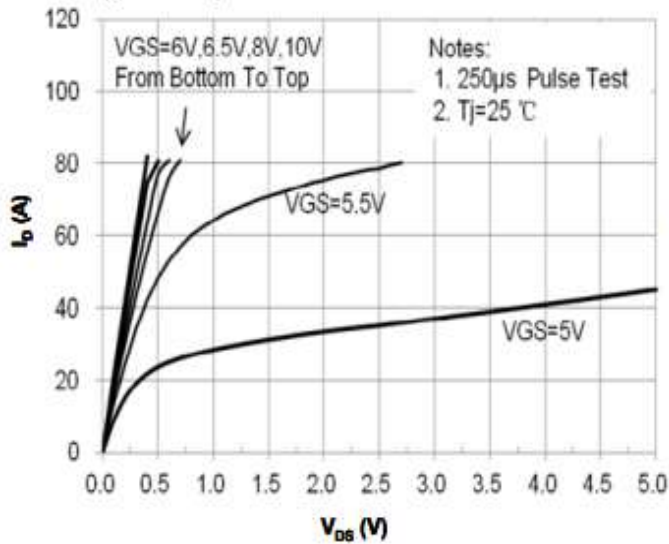


Fig 2: Transfer Characteristics

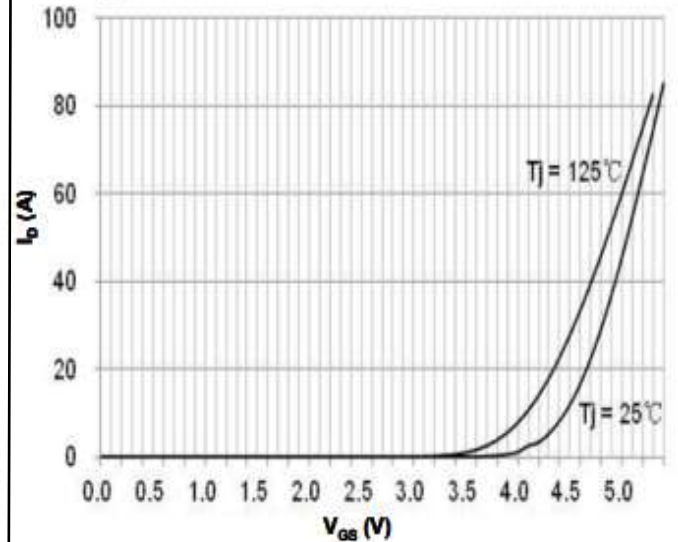


Fig 3: R<sub>ds(on)</sub> vs Drain Current and Gate Voltage

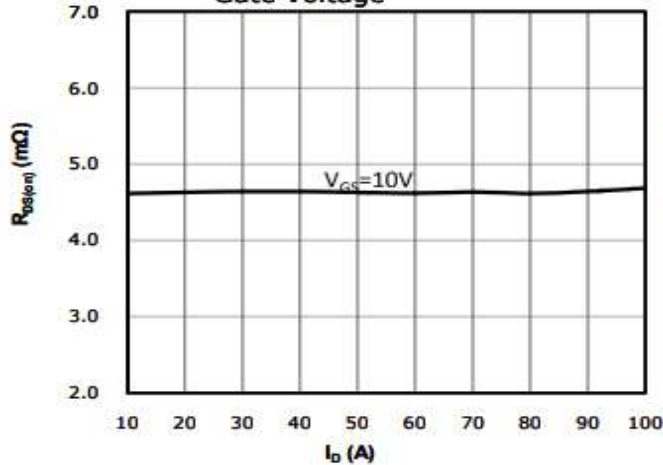


Fig 4: R<sub>ds(on)</sub> vs Gate Voltage

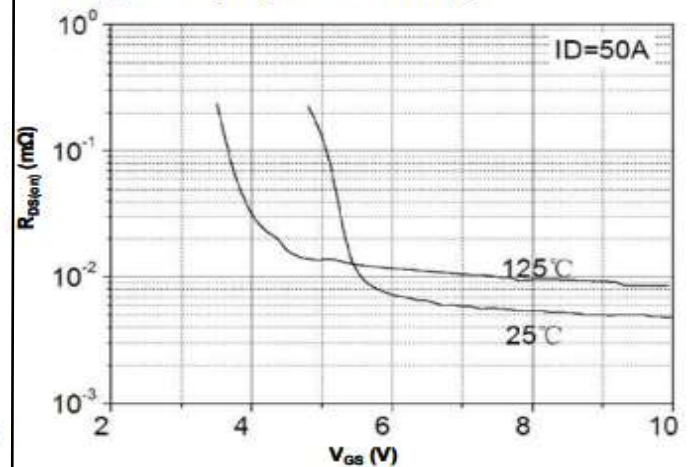


Fig 5: R<sub>ds(on)</sub> vs. Temperature

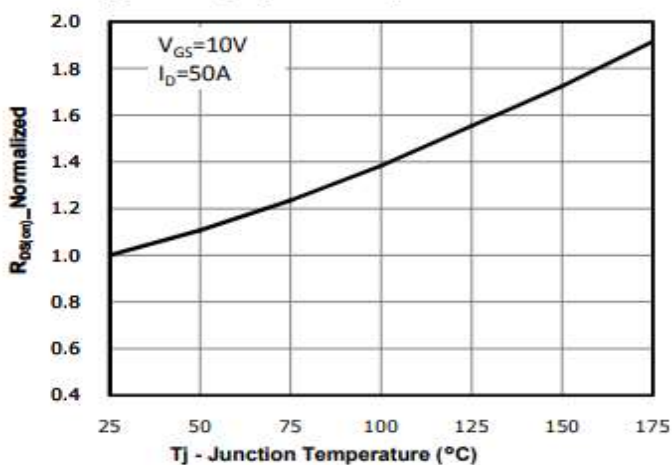


Fig 6: Capacitance Characteristics

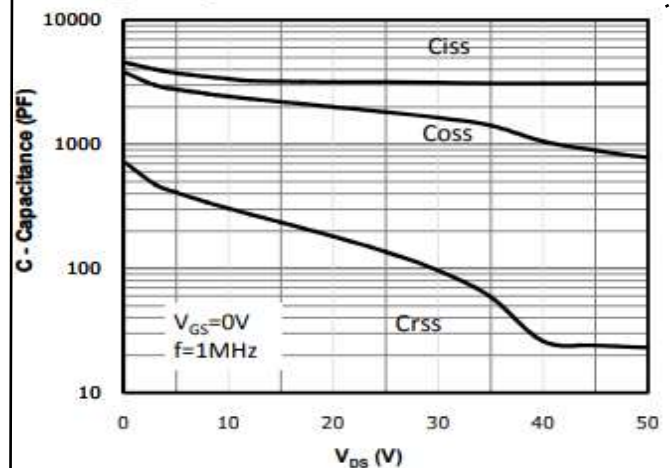


Fig 7: Gate Charge Characteristics

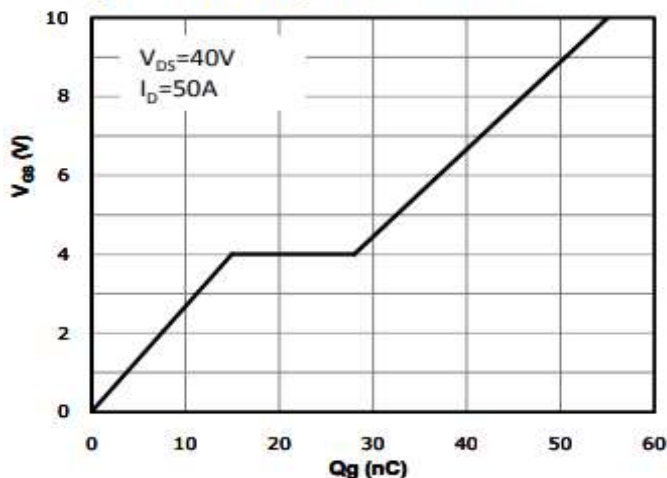


Fig 8: Body-diode Forward Characteristics

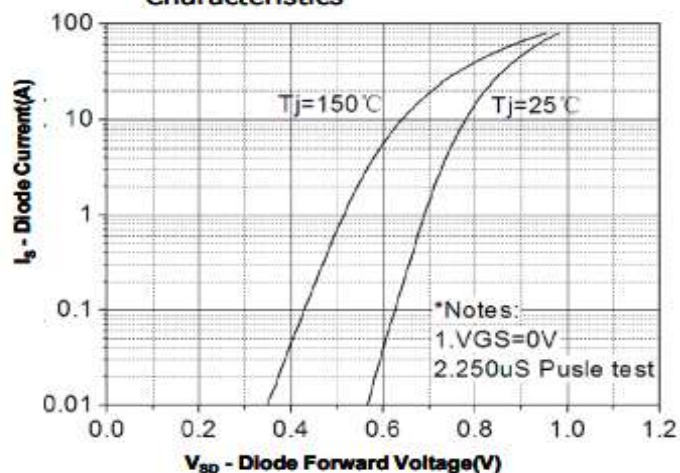


Fig 9: Power Dissipation

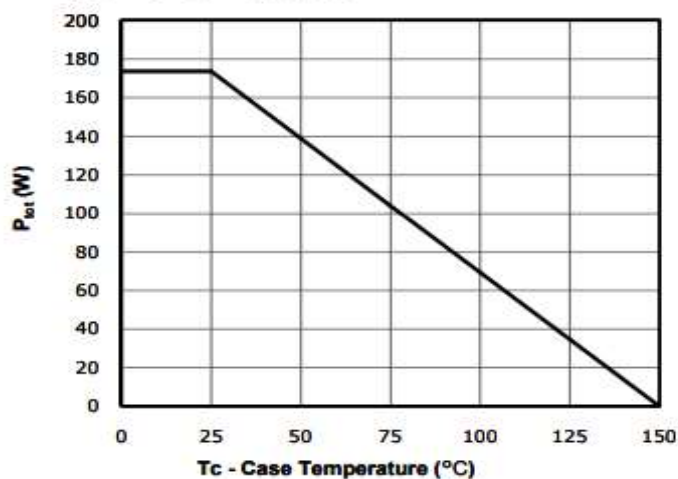


Fig 10: Drain Current Derating

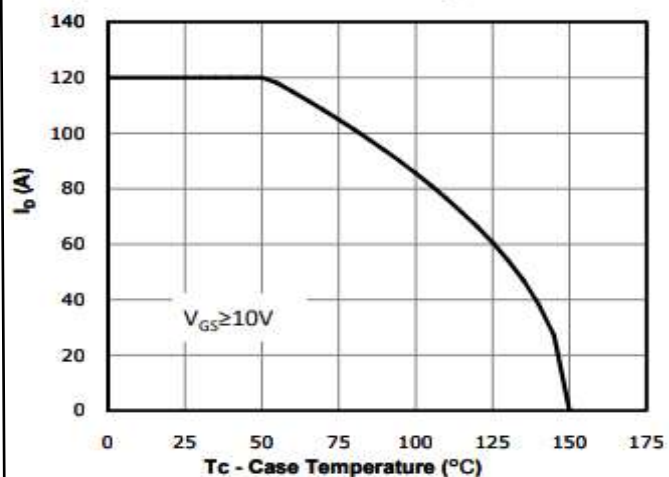


Fig 11: Safe Operating Area

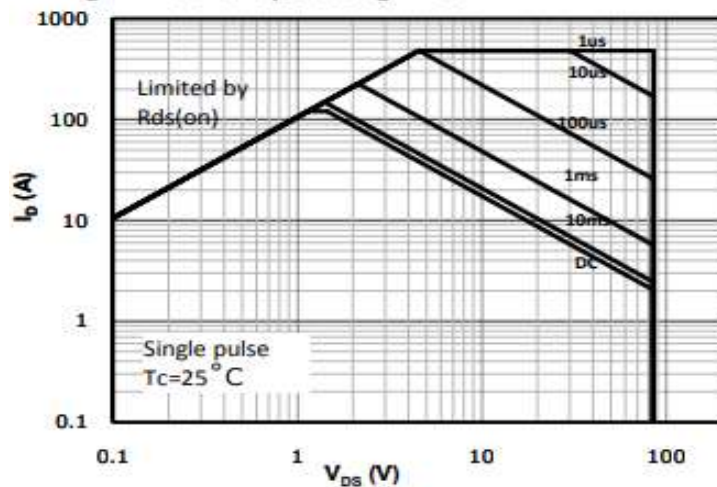
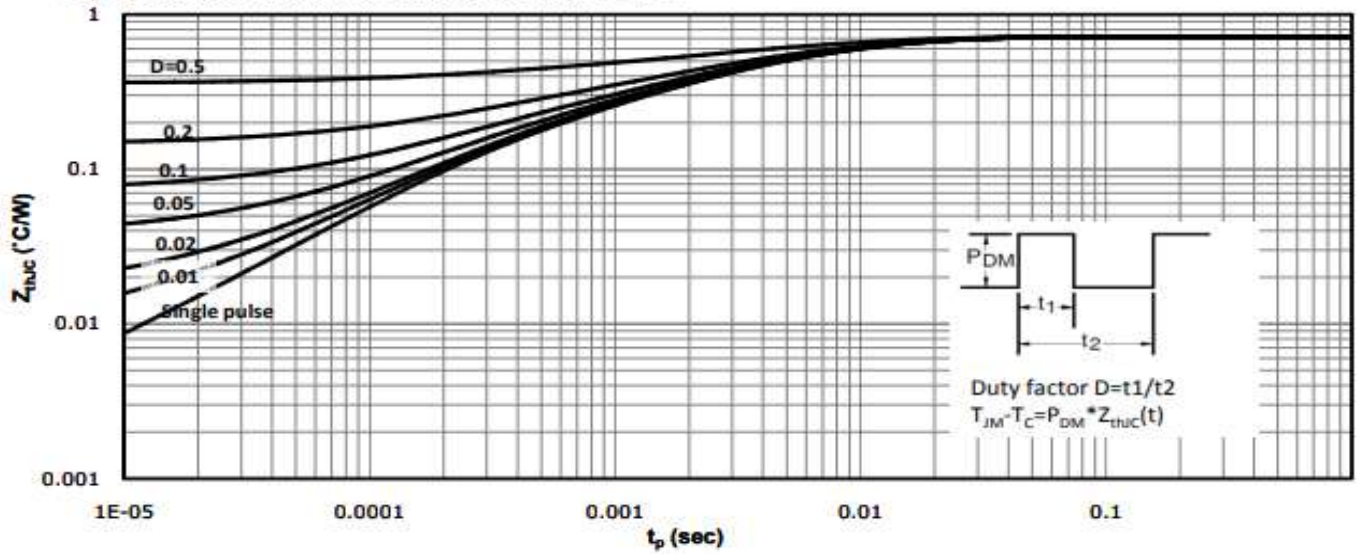
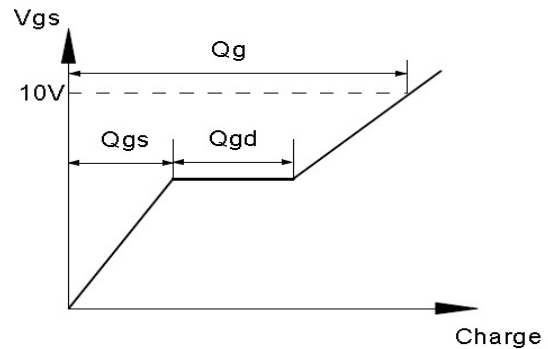
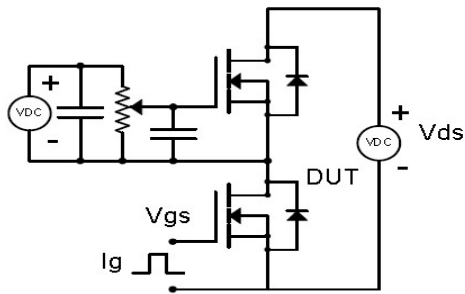


Fig 12: Max. Transient Thermal Impedance

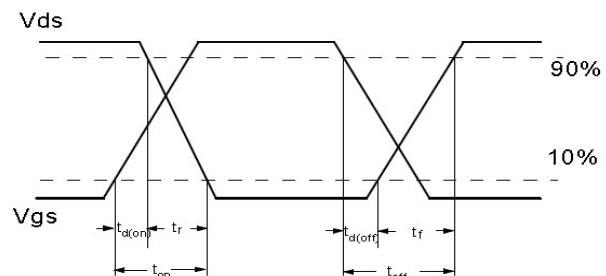
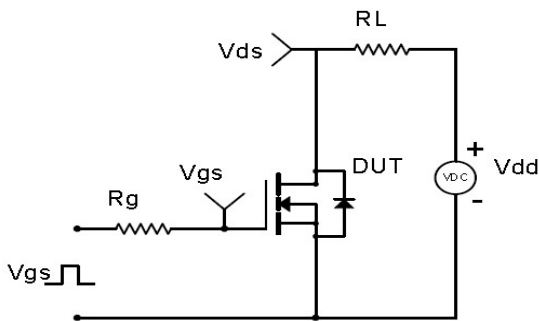


## Test Circuit & Waveform

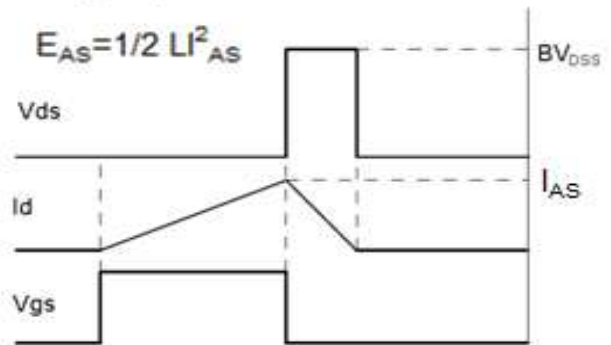
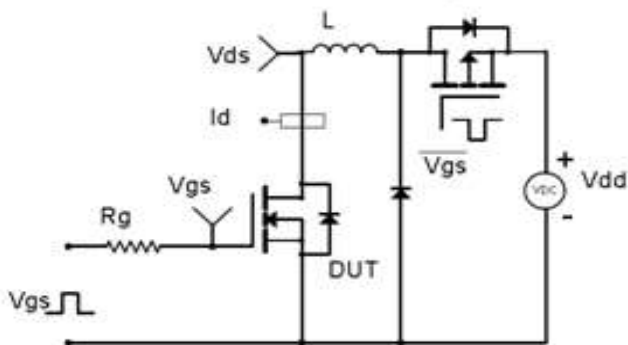
Gate Charge Test Circuit & Waveform



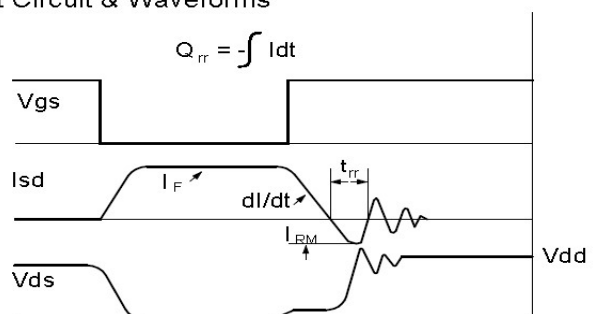
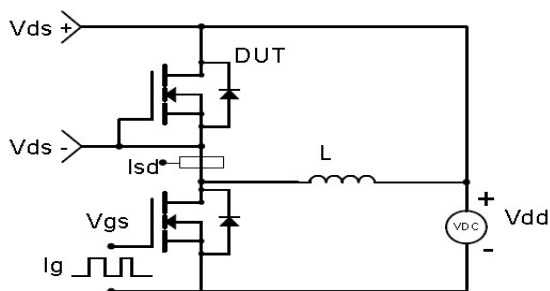
Resistive Switching Test Circuit & Waveforms



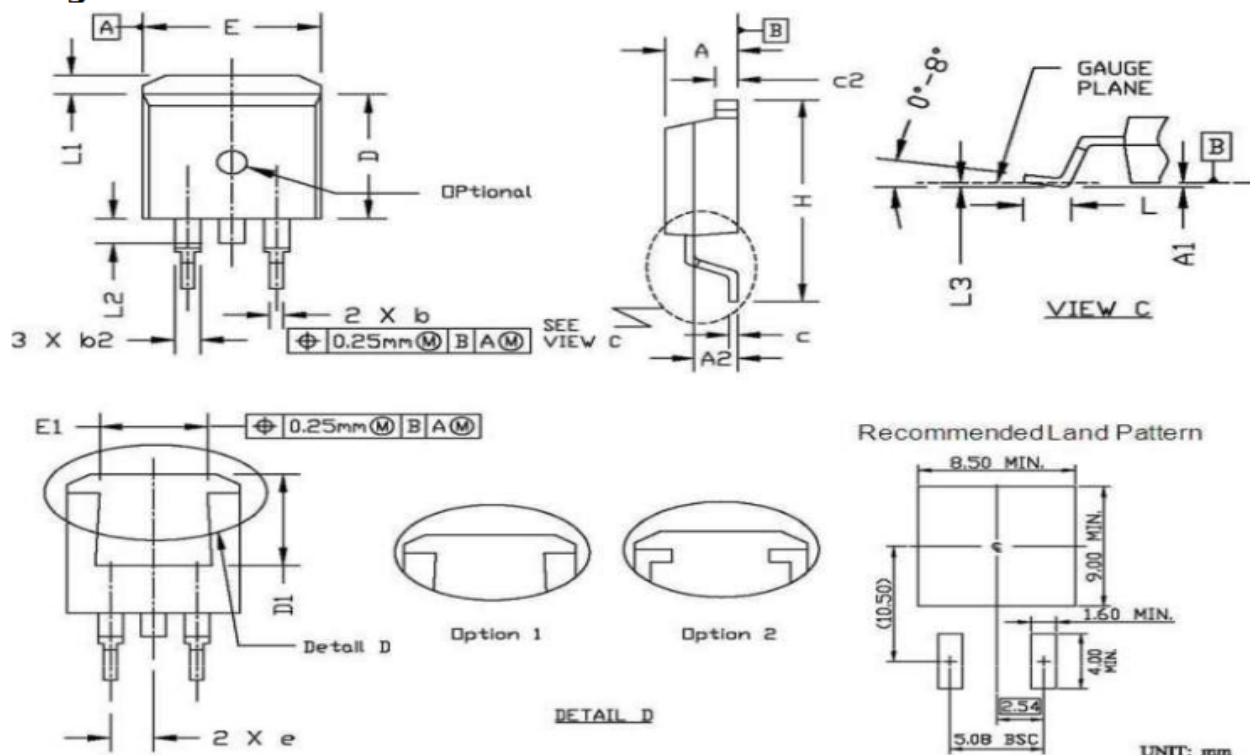
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

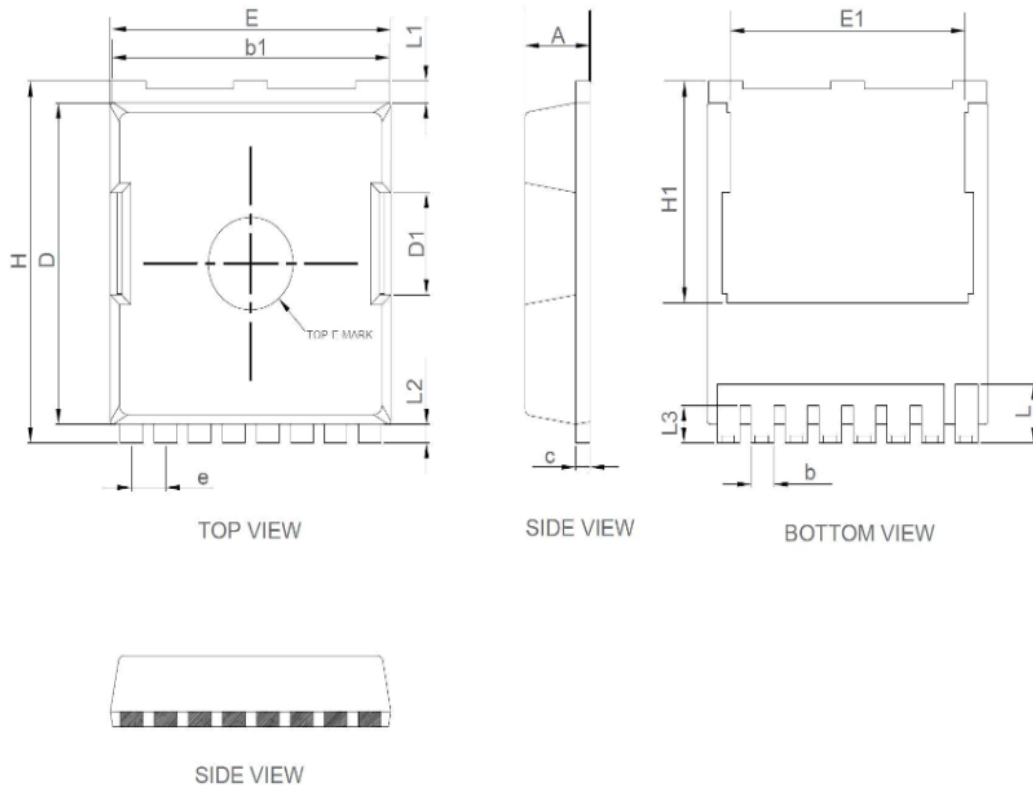


## Package Outline: TO-263



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 4.30                      | 4.86  | 0.169                | 0.191 |
| A1     | 0.00                      | 0.25  | 0.000                | 0.010 |
| A2     | 2.34                      | 2.79  | 0.092                | 0.110 |
| b      | 0.68                      | 0.94  | 0.027                | 0.037 |
| b2     | 1.15                      | 1.35  | 0.045                | 0.053 |
| c      | 0.33                      | 0.65  | 0.013                | 0.026 |
| c2     | 1.17                      | 1.40  | 0.046                | 0.055 |
| D      | 8.38                      | 9.45  | 0.330                | 0.372 |
| D1     | 6.90                      | 8.17  | 0.272                | 0.322 |
| e      | 2.54 BSC.                 |       | 0.100 BSC.           |       |
| E      | 9.78                      | 10.50 | 0.385                | 0.413 |
| E1     | 6.50                      | 8.60  | 0.256                | 0.339 |
| H      | 14.61                     | 15.88 | 0.575                | 0.625 |
| L      | 2.24                      | 3.00  | 0.088                | 0.118 |
| L1     | 0.70                      | 1.60  | 0.028                | 0.063 |
| L2     | 1.00                      | 1.78  | 0.039                | 0.070 |
| L3     | 0.00                      | 0.25  | 0.000                | 0.010 |

Package Outline: TOLL



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 2.15                      | 2.45  | 0.085                | 0.096 |
| b      | 0.60                      | 0.90  | 0.024                | 0.035 |
| b1     | 9.65                      | 9.95  | 0.380                | 0.392 |
| c      | 0.35                      | 0.65  | 0.014                | 0.026 |
| D      | 10.18                     | 10.70 | 0.401                | 0.421 |
| D1     | 3.15                      | 3.45  | 0.124                | 0.136 |
| E      | 9.70                      | 10.10 | 0.382                | 0.398 |
| E1     | 7.35                      | 8.45  | 0.289                | 0.333 |
| e      | 1.10                      | 1.30  | 0.043                | 0.051 |
| H      | 11.45                     | 11.95 | 0.451                | 0.470 |
| H1     | 6.55                      | 7.50  | 0.258                | 0.295 |
| L      | 1.35                      | 2.10  | 0.053                | 0.083 |
| L1     | 0.50                      | 0.90  | 0.020                | 0.035 |
| L2     | 0.40                      | 0.80  | 0.016                | 0.031 |
| L3     | 0.95                      | 1.35  | 0.037                | 0.053 |