

## Description

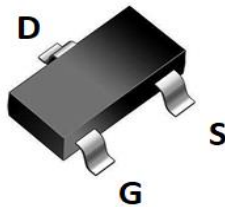
### JMT N-channel Enhancement Mode Power MOSFET

#### Features

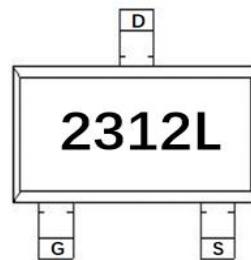
- 20V, 6A
- $R_{DS(ON)} < 21m\Omega @ V_{GS} = 4.5V$
- $R_{DS(ON)} < 25m\Omega @ V_{GS} = 2.5V$
- Advanced Trench Technology
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead Free

#### Applications

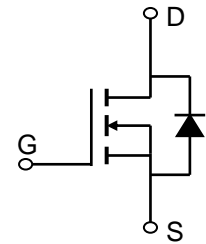
- Load Switch
- PWM Application
- Power Management



SOT-23 Top View



Marking and Pin Assignment



Schematic Diagram

### Package Marking and Ordering Information

| Device Marking | Device    | Outline | Package | Reel Size | Reel(pcs) | Per Carton (pcs) |
|----------------|-----------|---------|---------|-----------|-----------|------------------|
| 2312L          | JMTL2312L | TAPING  | SOT-23  | 7"        | 3000      | 120000           |

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

| Symbol          | Parameter  | Value                     | Units              |
|-----------------|--|---------------------------|--------------------|
| $V_{DS}$        | Drain-to-Source Voltage                                | 20                        | V                  |
| $V_{GS}$        | Gate-to-Source Voltage                                 | $\pm 12$                  | V                  |
| $I_D$           | Continuous Drain Current                               | $T_A = 25^\circ\text{C}$  | 6                  |
|                 |  | $T_A = 100^\circ\text{C}$ | 4                  |
| $I_{DM}$        | Pulsed Drain Current <sup>(1)</sup>                    | 24                        | A                  |
| $P_D$           | Power Dissipation                                      | $T_A = 25^\circ\text{C}$  | 1.3                |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient <sup>(2)</sup> | 94                        | $^\circ\text{C/W}$ |
| $T_J, T_{STG}$  | Junction & Storage Temperature Range                   | -55 to 150                | $^\circ\text{C}$   |



## Electrical Characteristics (T<sub>J</sub> = 25°C unless otherwise specified)

| Symbol  | Parameter  | Conditions  | Min. | Typ. | Max. | Unit |
|---|--|---|------|------|------|------|
| <b>Off Characteristics</b>                                |  |   |      |      |      |      |
| V <sub>(BR)DSS</sub>                                      | Drain-Source Breakdown Voltage                           | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V  | 20   | -    | -    | V    |
| I <sub>DSS</sub>  | Zero Gate Voltage Drain Current                          | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V   | -    | -    | 1.0  | μA   |
| I <sub>GSS</sub>  | Gate-Body Leakage Current                                | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±12V  | -    | -    | ±100 | nA   |
| <b>On Characteristics</b>                                 |  |   |      |      |      |      |
| V <sub>GS(th)</sub>                                       | Gate Threshold Voltage                                   | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                  | 0.5  | 0.7  | 1.0  | V    |
| R <sub>DS(ON)</sub>                                       | Static Drain-Source ON-Resistance <sup>(3)</sup>         | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A   | -    | 16   | 21   | mΩ   |
|   |  | V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 4A   | -    | 19   | 25   | mΩ   |
| <b>Dynamic Characteristics</b>                            |  |   |      |      |      |      |
| C <sub>iss</sub>  | Input Capacitance  | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 10V,<br>f = 1MHz                                    | -    | 754  | -    | pF   |
| C <sub>oss</sub>  | Output Capacitance                                       |   | -    | 94   | -    | pF   |
| C <sub>rss</sub>  | Reverse Transfer Capacitance                             |   | -    | 83   | -    | pF   |
| Q <sub>g</sub>  | Total Gate Charge  | V <sub>GS</sub> = 0 to 4.5V<br>V <sub>DD</sub> = 10V, I <sub>D</sub> = 3A                   | -    | 9.3  | -    | nC   |
| Q <sub>gs</sub>   | Gate Source Charge                                       |   | -    | 1.5  | -    | nC   |
| Q <sub>gd</sub>   | Gate Drain("Miller") Charge                              |   | -    | 2    | -    | nC   |
| <b>Switching Characteristics</b>                          |  |   |      |      |      |      |
| t <sub>d(on)</sub>  | Turn-On DelayTime  | V <sub>GS</sub> = 4.5V, V <sub>DD</sub> = 10V<br>I <sub>D</sub> = 3A, R <sub>GEN</sub> = 3Ω | -    | 4    | -    | ns   |
| t <sub>r</sub>  | Turn-On Rise Time  |   | -    | 18   | -    | ns   |
| t <sub>d(off)</sub>                                       | Turn-Off DelayTime                                       |   | -    | 106  | -    | ns   |
| t <sub>f</sub>  | Turn-Off Fall Time                                       |   | -    | 64   | -    | ns   |
| <b>Drain-Source Diode Characteristics and Max Ratings</b> |  |   |      |      |      |      |
| I <sub>S</sub>  | Maximum Continuous Drain to Source Diode Forward Current |   | -    | -    | 6    | A    |
| I <sub>SM</sub>   | Maximum Pulsed Drain to Source Diode Forward Current     |   | -    | -    | 24   | A    |
| V <sub>SD</sub>   | Drain to Source Diode Forward Voltage                    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 6A   | -    | -    | 1.2  | V    |
| t <sub>rr</sub>   | Body Diode Reverse Recovery Time                         | I <sub>F</sub> = 3A, di/dt = 100A/us  | -    | 30   | -    | ns   |
| Q <sub>rr</sub>   | Body Diode Reverse Recovery Charge                       |   | -    | 7    | -    | nC   |

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2. R<sub>θJA</sub> is measured with the device mounted on a 1inch<sup>2</sup> pad of 2oz copper FR4 PCB
  3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

## Typical Performance Characteristics

Figure 1: Output Characteristics

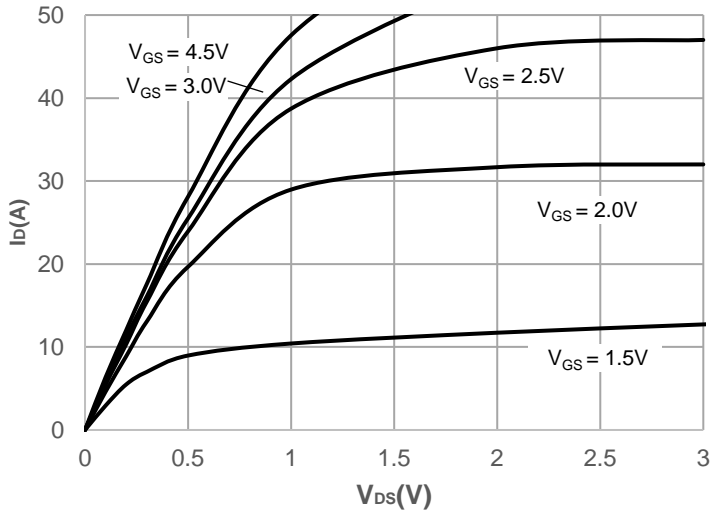


Figure 2: Typical Transfer Characteristics

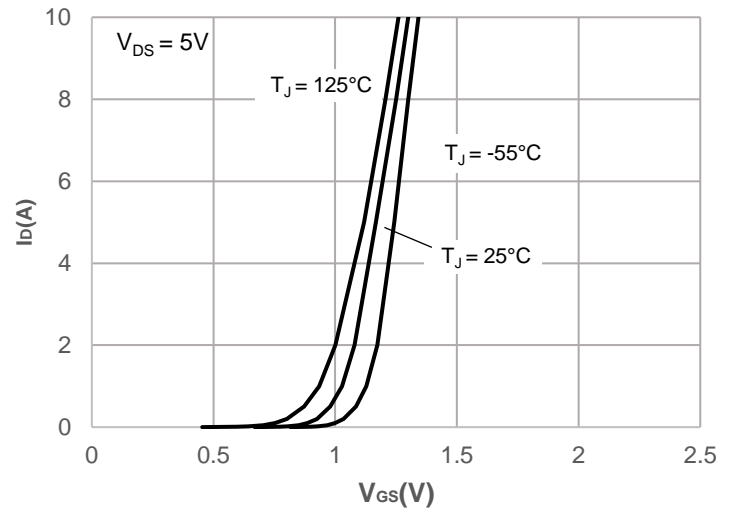


Figure 3: On-resistance vs. Drain Current

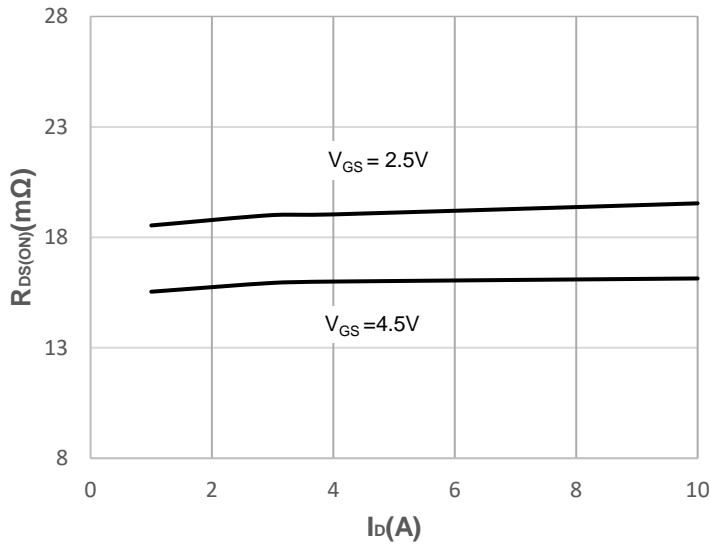


Figure 4: Body Diode Characteristics

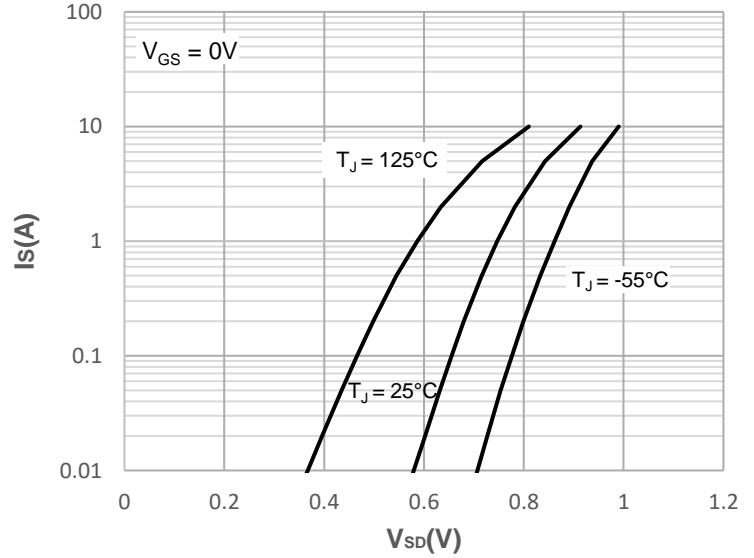


Figure 5: Gate Charge Characteristics

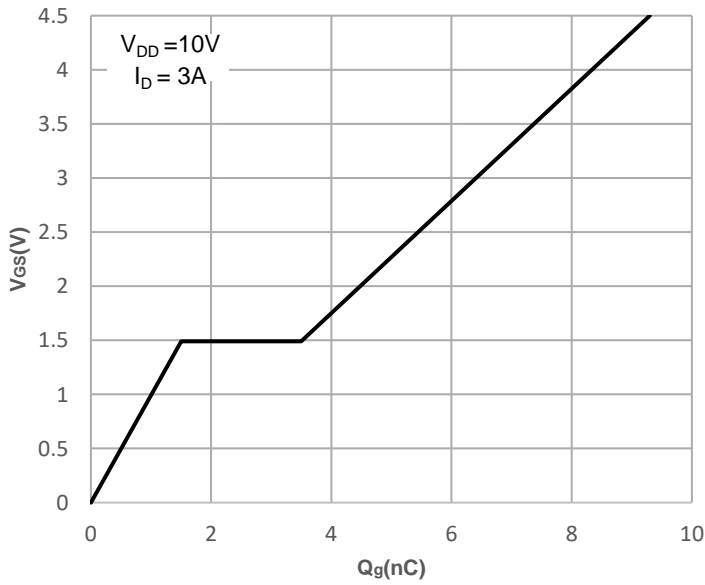
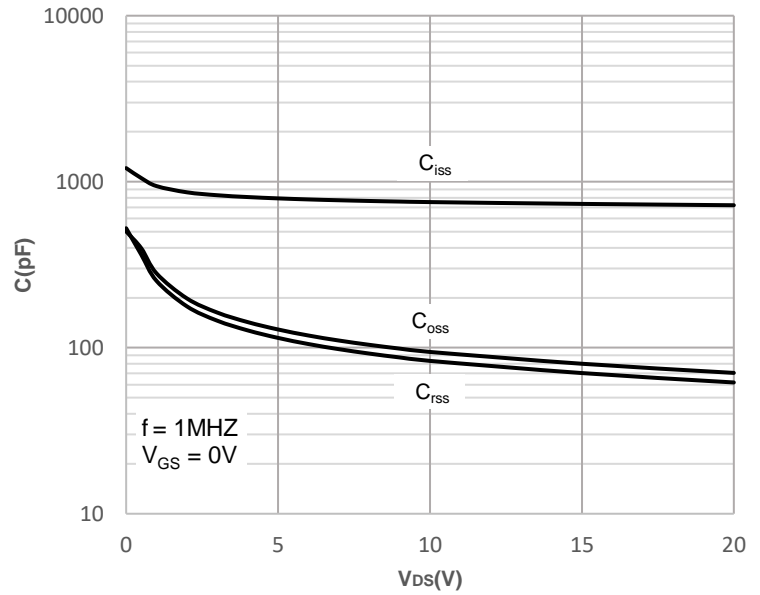


Figure 6: Capacitance Characteristics



## Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

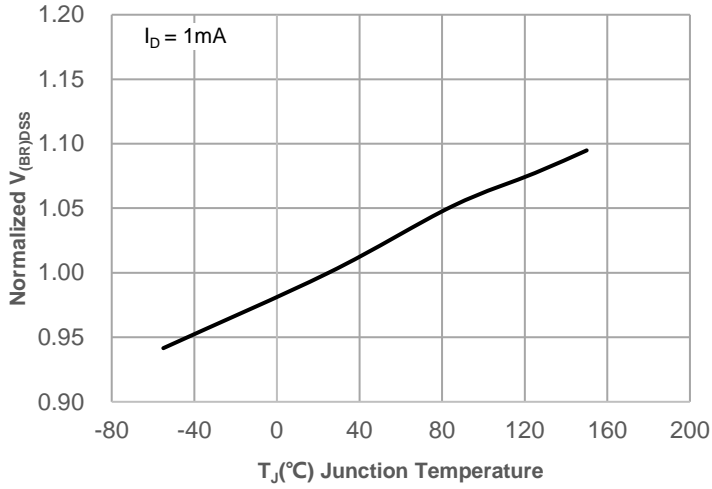


Figure 8: Normalized on Resistance vs. Junction Temperature

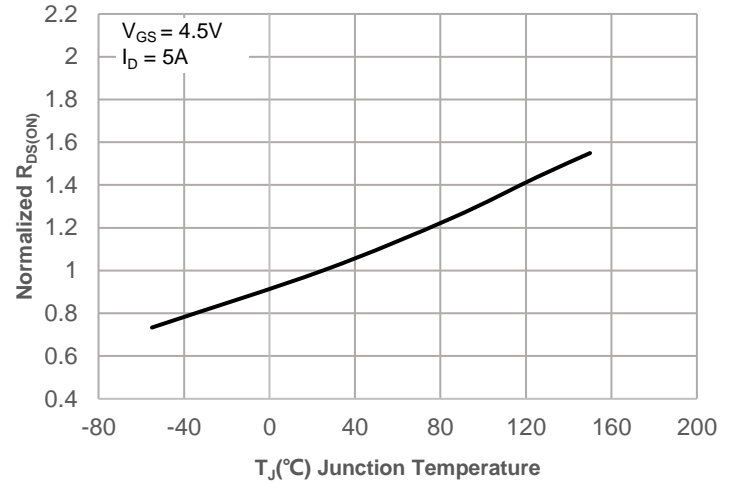


Figure 9: Maximum Safe Operating Area

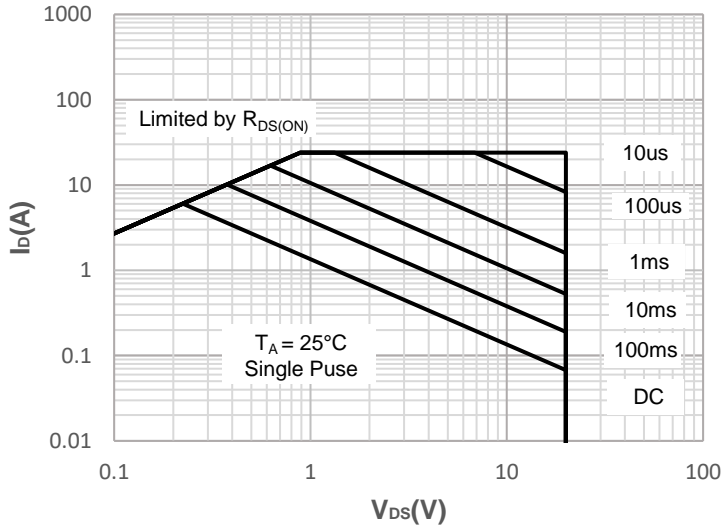


Figure 10: Maximum Continuous Driant Current vs. Ambient Temperature

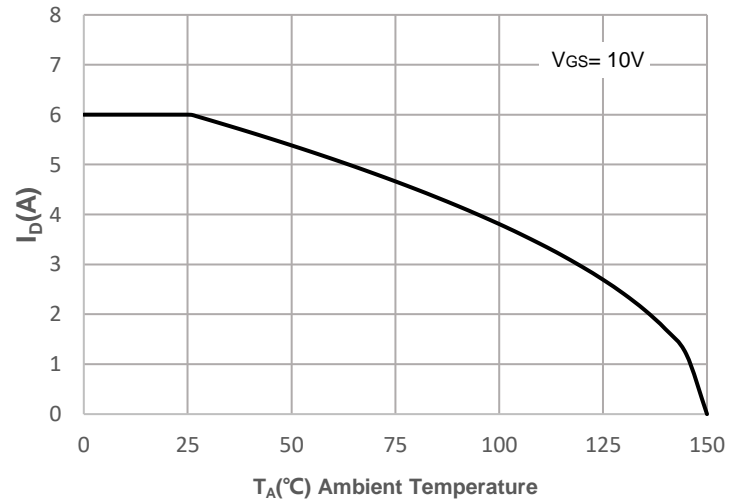


Figure 11: Normalized Maximum Transient Thermal Impedance

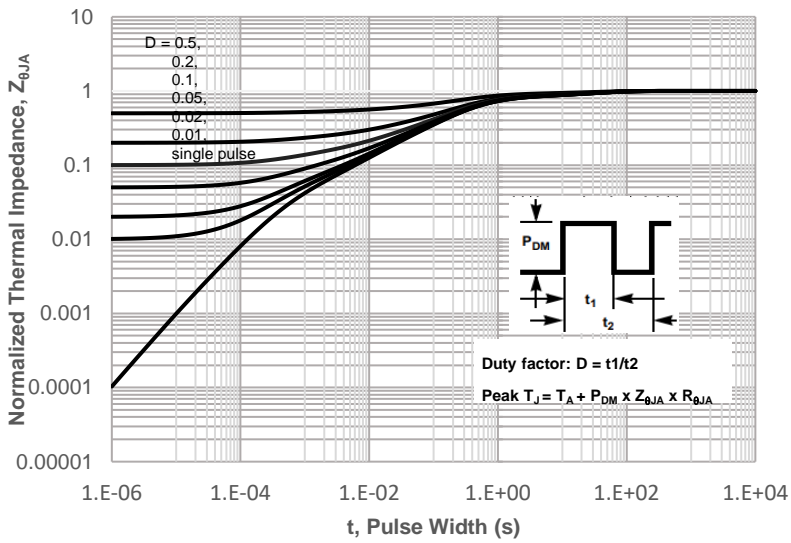
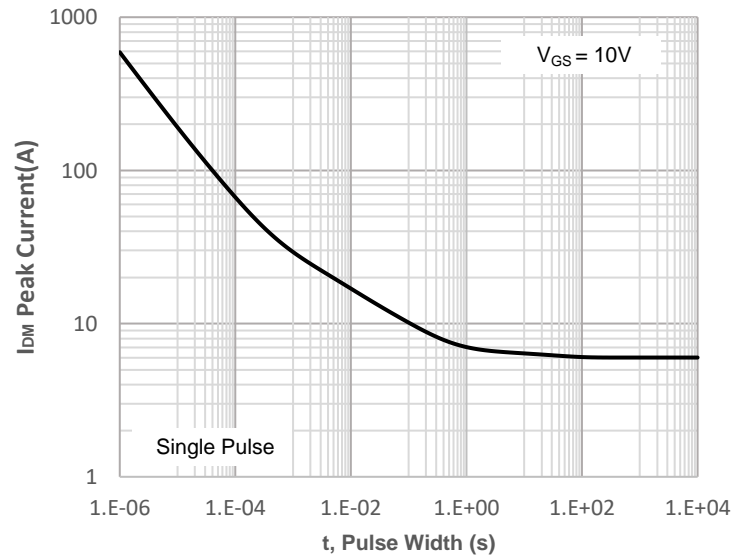


Figure 12: Peak Current Capacity



## Test Circuit

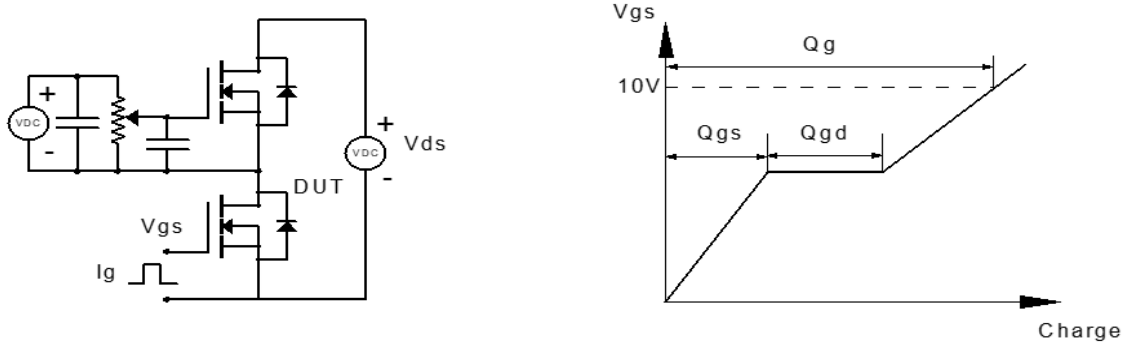


Figure 1: Gate Charge Test Circuit & Waveform

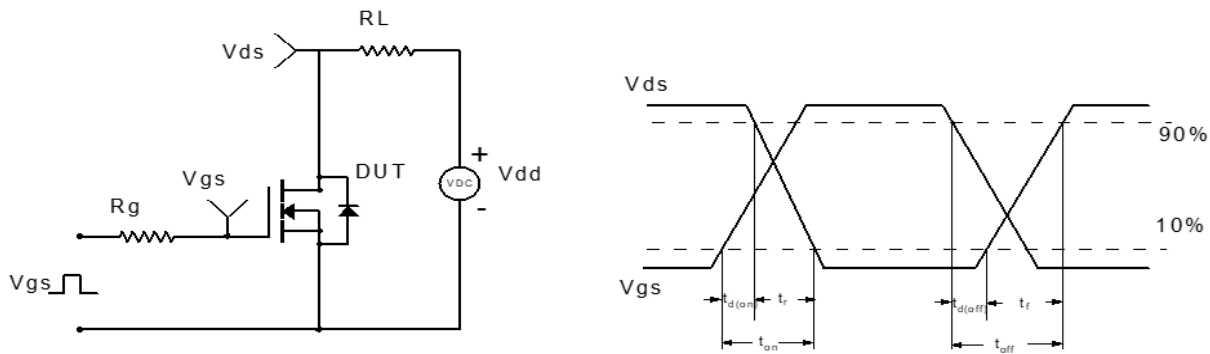


Figure 2: Resistive Switching Test Circuit & Waveform

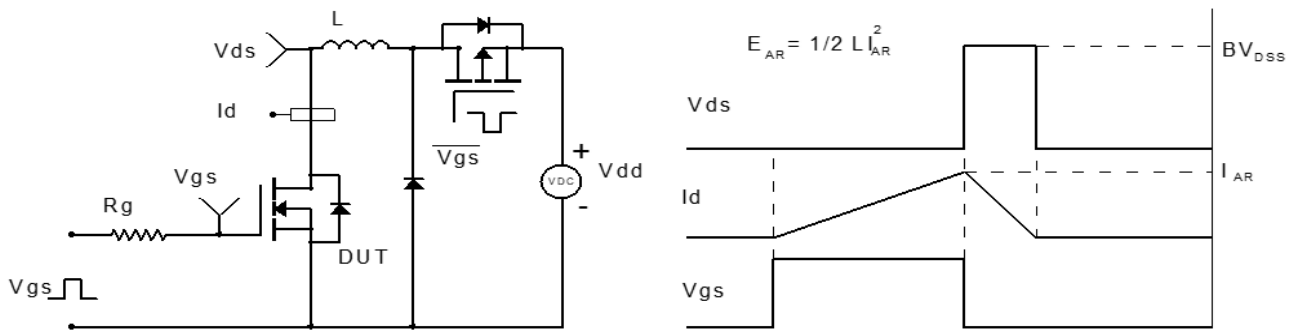


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

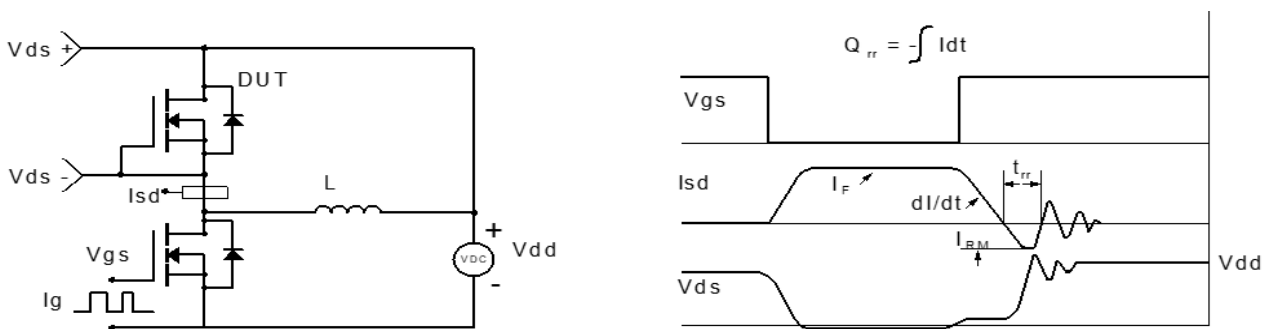
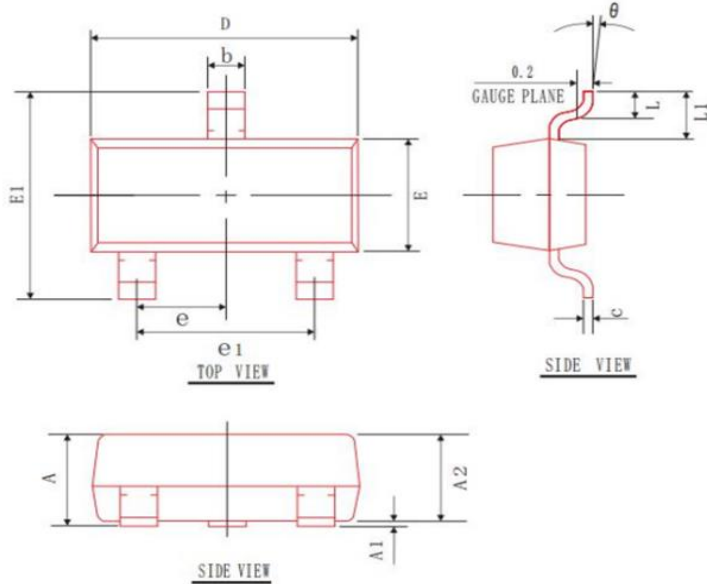


Figure 4: Diode Recovery Test Circuit & Waveform

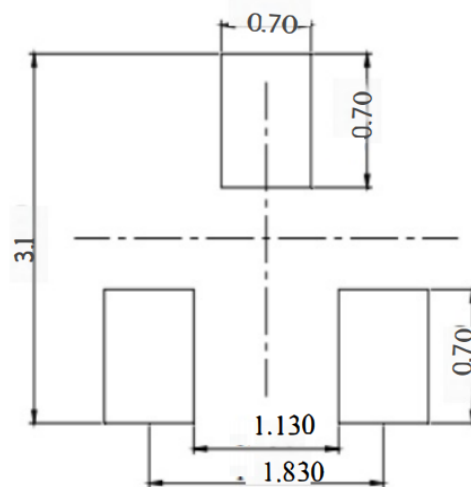
## Package Mechanical Data(SOT-23)



COMMON DIMENSIONS  
(UNITS OF MEASURE=mm)

| SYMBOL   | MIN      | NOM  | MAX  |
|----------|----------|------|------|
| A        | 0.90     | 1.05 | 1.20 |
| A1       | 0.00     | 0.05 | 0.10 |
| A2       | 0.90     | 1.00 | 1.10 |
| b        | 0.30     | 0.40 | 0.50 |
| c        | 0.08     | 0.10 | 0.15 |
| D        | 2.80     | 2.90 | 3.00 |
| E        | 1.20     | 1.30 | 1.40 |
| E1       | 2.30     | 2.40 | 2.50 |
| L        | 0.30     | 0.40 | 0.50 |
| $\theta$ | 0°       | 5°   | 10°  |
| L1       | 0.55 REF |      |      |
| e        | 0.95 BSC |      |      |
| e1       | 1.90 REF |      |      |

### Recommended Footprint



DIMENSIONS:MILLIMETERS

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