

# 110V, 261A, 1.7mΩ N-channel Power SGT MOSFET

## JMSH1101PE7

### Features

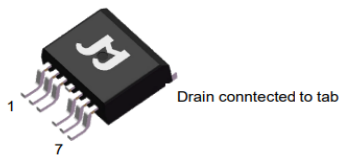
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS Tested
- 100%  $\Delta V_{ds}$  Tested
- Halogen-free; RoHS-compliant

### Applications

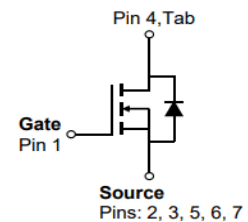
- Load Switch
- PWM Application
- Power Management

### Product Summary

| Parameters                      | Value | Unit |
|---------------------------------|-------|------|
| $V_{DSS}$                       | 110   | V    |
| $V_{GS(th)_{Typ}}$              | 2.8   | V    |
| $I_D(@V_{GS}=10V)$              | 261   | A    |
| $R_{DS(ON)_{Typ}}(@V_{GS}=10V)$ | 1.7   | mΩ   |



TO-263-7L



Schematic Diagram

### Ordering Information

| Device         | Marking | MSL | Form      | Package   | Reel(pcs) | Per Carton (pcs) |
|----------------|---------|-----|-----------|-----------|-----------|------------------|
| JMSH1101PE7-13 | SH1101P | 1   | Tape&Reel | TO-263-7L | 800       | 4000             |

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

| Symbol         | Parameter                                     | Value                     | Unit             |
|----------------|-----------------------------------------------|---------------------------|------------------|
| $V_{DS}$       | Drain-to-Source Voltage                       | 110                       | V                |
| $V_{GS}$       | Gate-to-Source Voltage                        | $\pm 20$                  | V                |
| $I_D$          | Continuous Drain Current                      | $T_C = 25^\circ\text{C}$  | A                |
|                |                                               | $T_C = 100^\circ\text{C}$ |                  |
| $I_{DM}$       | Pulsed Drain Current <sup>(1)</sup>           | Refer to Fig.4            | A                |
| $E_{AS}$       | Single Pulsed Avalanche Energy <sup>(2)</sup> | 1693                      | mJ               |
| $P_D$          | Power Dissipation                             | $T_C = 25^\circ\text{C}$  | W                |
|                |                                               | $T_C = 100^\circ\text{C}$ |                  |
| $T_J, T_{STG}$ | Junction & Storage Temperature Range          | -55 to 150                | $^\circ\text{C}$ |

### Thermal Characteristics

| Symbol          | Parameter                                              | Max | Unit               |
|-----------------|--------------------------------------------------------|-----|--------------------|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient <sup>(3)</sup> | 34  | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case                   | 0.4 |                    |

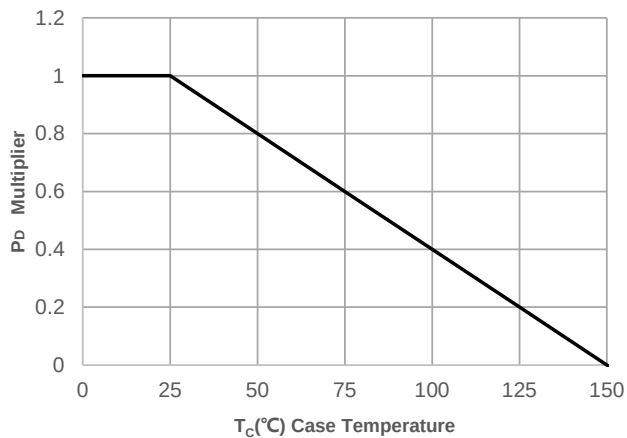
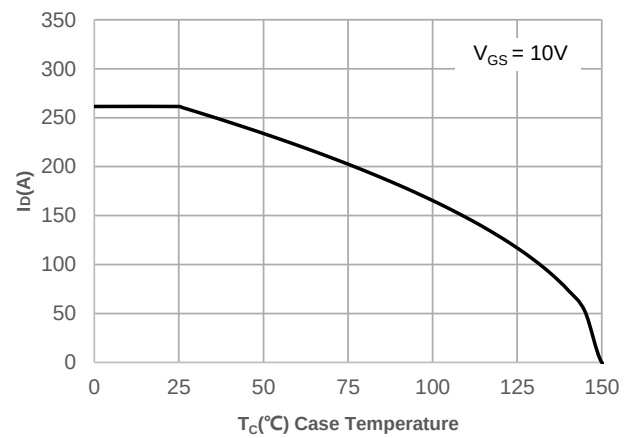
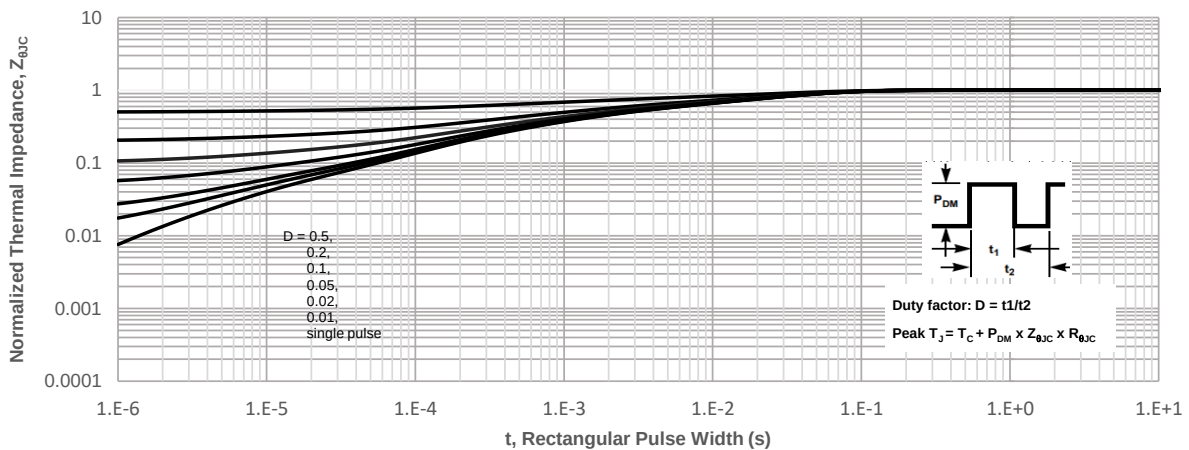
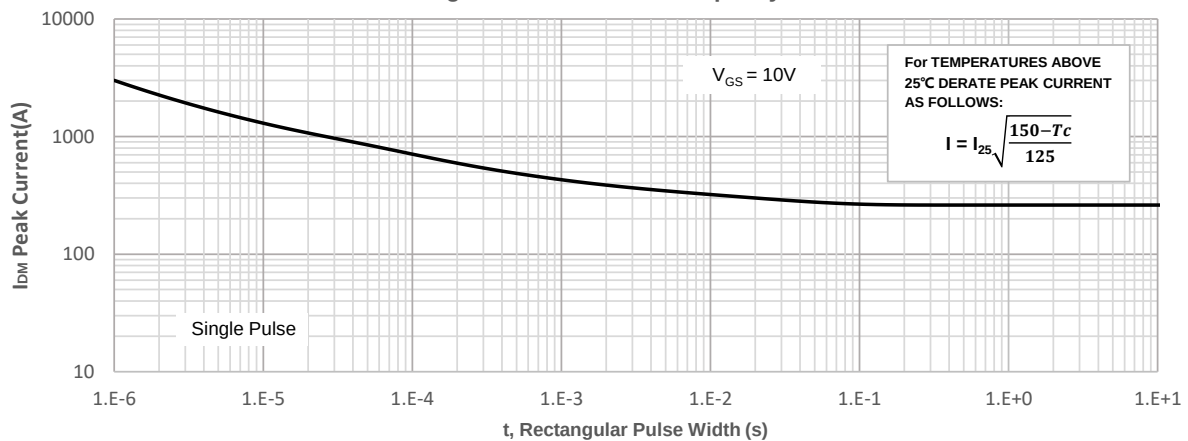
**Electrical Characteristics** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

| Symbol                     | Parameter                                        | Conditions                                                                                  | Min. | Typ.  | Max.  | Unit |
|----------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------|------|-------|-------|------|
| Off Characteristics        |                                                  |                                                                                             |      |       |       |      |
| V <sub>(BR)DSS</sub>       | Drain-Source Breakdown Voltage                   | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V                                                | 110  | -     | -     | V    |
| I <sub>DSS</sub>           | Zero Gate Voltage Drain Current                  | V <sub>DS</sub> = 88V, 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> = ±20V                                                | -    | -     | ±100  | nA   |
| On Characteristics         |                                                  |                                                                                             |      |       |       |      |
| V <sub>GS(th)</sub>        | Gate Threshold Voltage                           | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                  | 1.9  | 2.8   | 3.6   | V    |
| R <sub>DS(ON)</sub>        | Static Drain-Source ON-Resistance <sup>(4)</sup> | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                                 | -    | 1.7   | 2.2   | mΩ   |
| Dynamic Characteristics    |                                                  |                                                                                             |      |       |       |      |
| R <sub>g</sub>             | Gate Resistance                                  | f = 1MHz                                                                                    | -    | 3.0   | -     | Ω    |
| C <sub>iss</sub>           | Input Capacitance                                | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 55V,<br>f = 1MHz                                    | -    | 12318 | 16629 | pF   |
| C <sub>oss</sub>           | Output Capacitance                               |                                                                                             | -    | 1579  | 2132  | pF   |
| C <sub>rss</sub>           | Reverse Transfer Capacitance                     |                                                                                             | -    | 33    | 45    | pF   |
| Q <sub>g</sub>             | Total Gate Charge                                | V <sub>GS</sub> = 0 to 10V<br>V <sub>DS</sub> = 55V, I <sub>D</sub> = 20A                   | -    | 176   | -     | nC   |
| Q <sub>gs</sub>            | Gate Source Charge                               |                                                                                             | -    | 60    | -     | nC   |
| Q <sub>gd</sub>            | Gate Drain("Miller") Charge                      |                                                                                             | -    | 32    | -     | nC   |
|                            |                                                  |                                                                                             |      |       |       |      |
| Switching Characteristics  |                                                  |                                                                                             |      |       |       |      |
| t <sub>d(on)</sub>         | Turn-On DelayTime                                | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 55V<br>I <sub>D</sub> = 20A, R <sub>GEN</sub> = 3Ω | -    | 51    | -     | ns   |
| t <sub>r</sub>             | Turn-On Rise Time                                |                                                                                             | -    | 67    | -     | ns   |
| t <sub>d(off)</sub>        | Turn-Off DelayTime                               |                                                                                             | -    | 160   | -     | ns   |
| t <sub>f</sub>             | Turn-Off Fall Time                               |                                                                                             | -    | 83    | -     | ns   |
| Body Diode Characteristics |                                                  |                                                                                             |      |       |       |      |
| I <sub>S</sub>             | Maximum Continuous Body Diode Forward Current    |                                                                                             | -    | -     | 261   | A    |
| I <sub>SM</sub>            | Maximum Pulsed Body Diode Forward Current        |                                                                                             | -    | -     | 1046  | A    |
| V <sub>SD</sub>            | Body Diode Forward Voltage                       | V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A                                                  | -    |       | 1.2   | V    |
| trr                        | Body Diode Reverse Recovery Time                 | I <sub>F</sub> = 20A, di/dt = 100A/us                                                       | -    | 100   | -     | ns   |
| Qrr                        | Body Diode Reverse Recovery Charge               |                                                                                             | -    | 295   | -     | nC   |

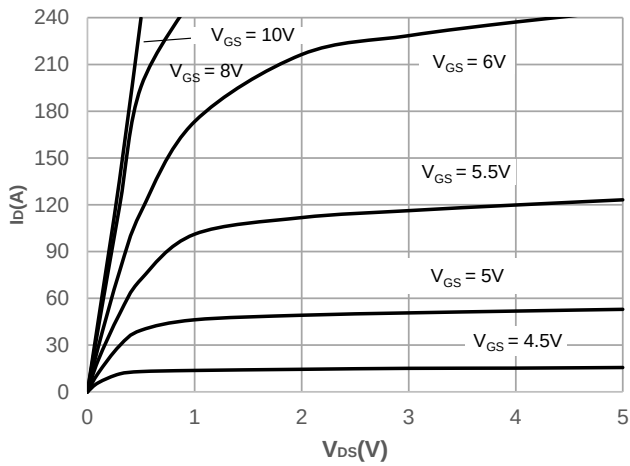
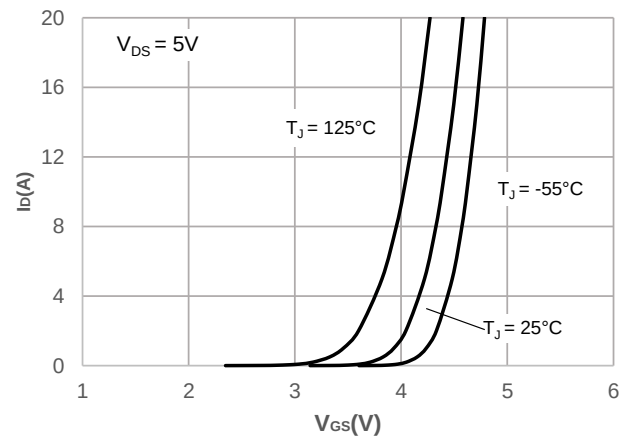
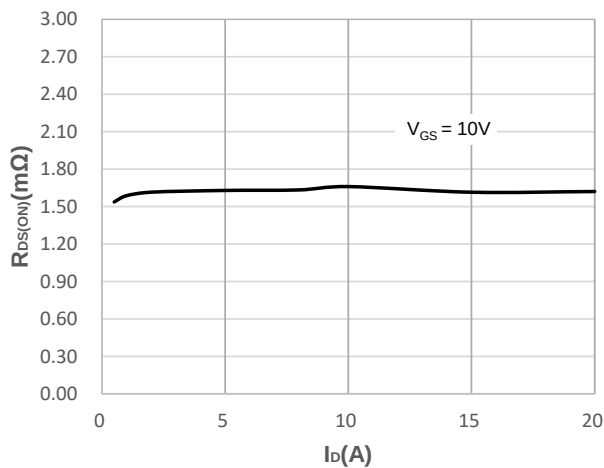
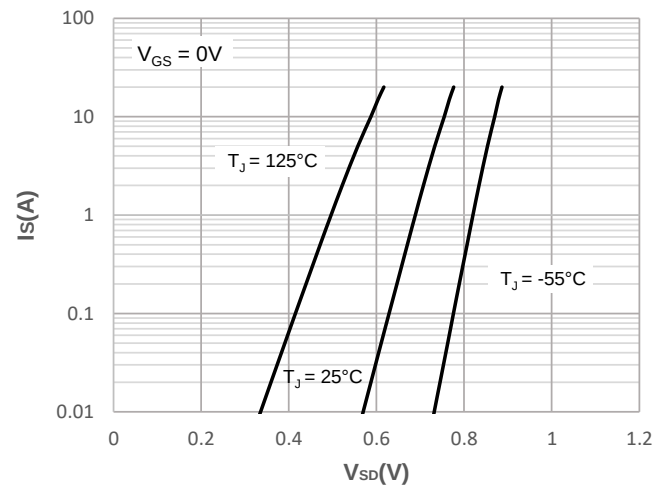
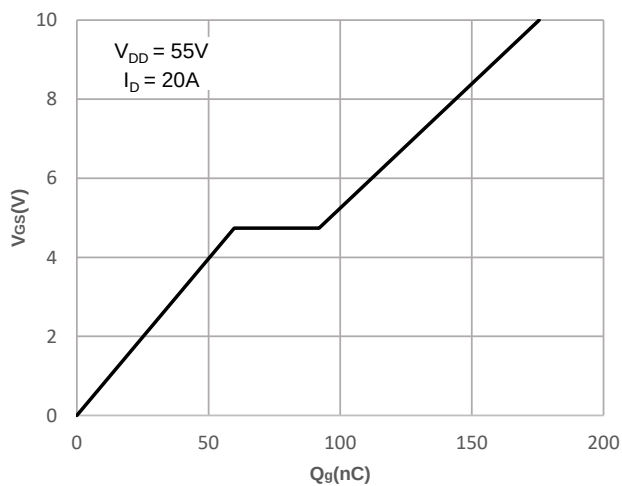
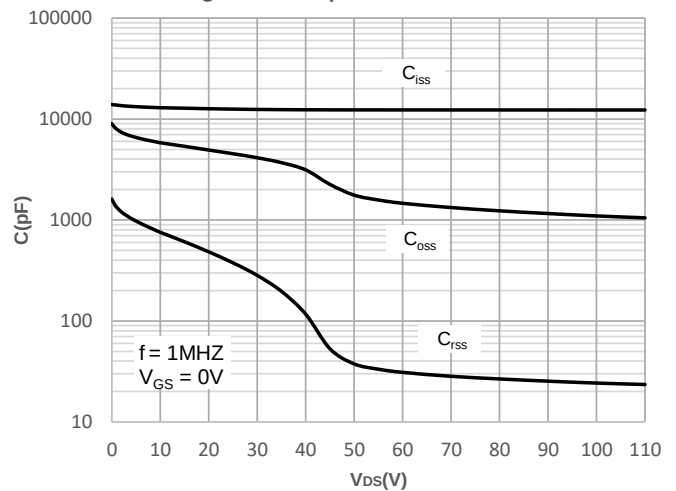
- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  2.  $E_{AS}$  condition: Starting  $T_J = 25^\circ\text{C}$ ,  $V_{DD} = 55\text{V}$ ,  $V_{GS} = 10\text{V}$ ,  $R_G = 25\text{ohm}$ ,  $L = 3\text{mH}$ ,  $I_{AS} = 33.6\text{A}$ ,  $V_{DD} = 0\text{V}$  during time in avalanche.
  3.  $R_{\theta JA}$  is measured with the device mounted on a  $1\text{inch}^2$  pad of 2oz copper FR4 PCB.
  4. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$ .



## Typical Performance Characteristics

**Figure 1: Power De-rating**

**Figure 2: Current De-rating**

**Figure 3: Normalized Maximum Transient Thermal Impedance**

**Figure 4: Peak Current Capacity**


## Typical Performance Characteristics

**Figure 5: Output Characteristics**

**Figure 6: Typical Transfer Characteristics**

**Figure 7: On-resistance vs. Drain Current**

**Figure 8: Body Diode Characteristics**

**Figure 9: Gate Charge Characteristics**

**Figure 10: Capacitance Characteristics**


## Typical Performance Characteristics

**Figure 11: Normalized Breakdown voltage vs. Junction Temperature**

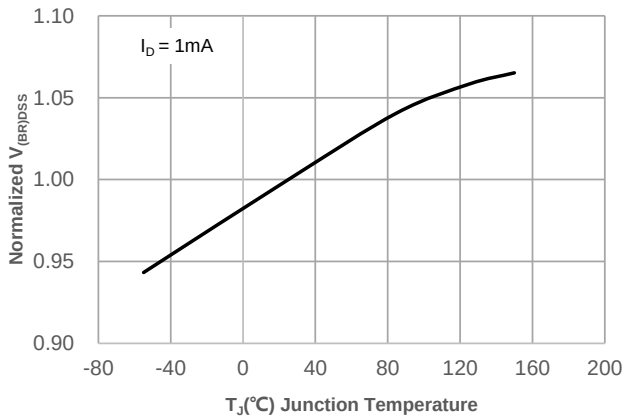


**Figure 12: Normalized on Resistance vs. Junction Temperature**

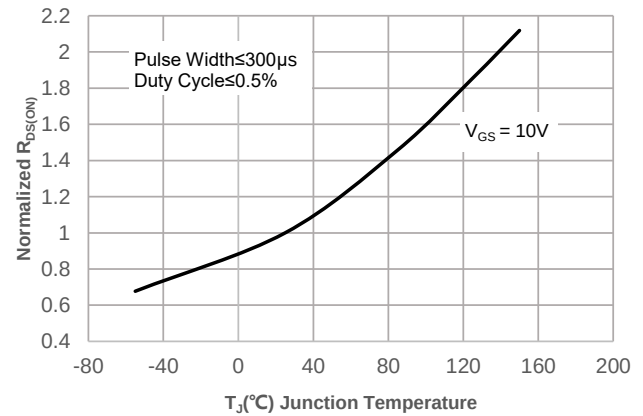


**Figure 13: Normalized Threshold Voltage vs. Junction Temperature**

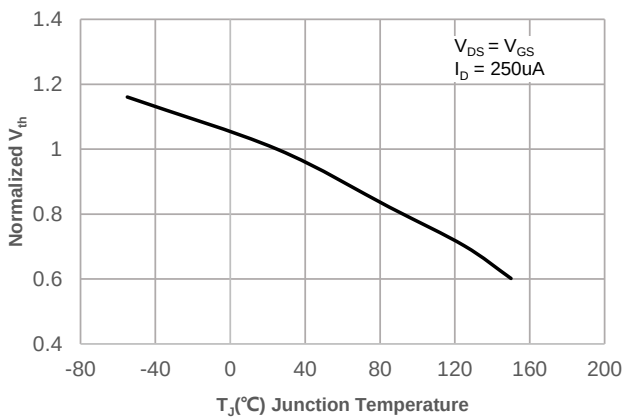


**Figure 14:  $R_{DS(ON)}$  vs.  $V_{GS}$**

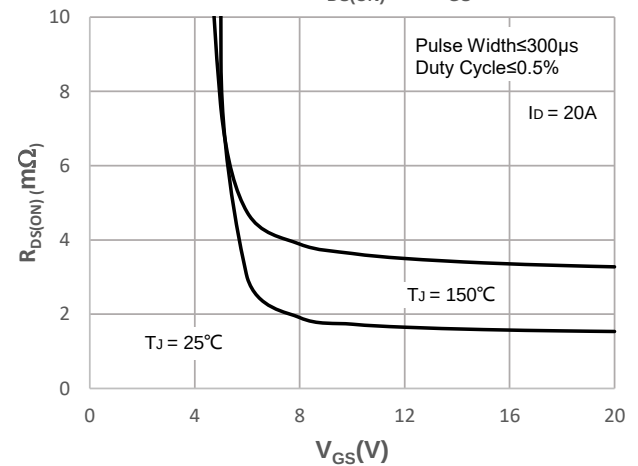
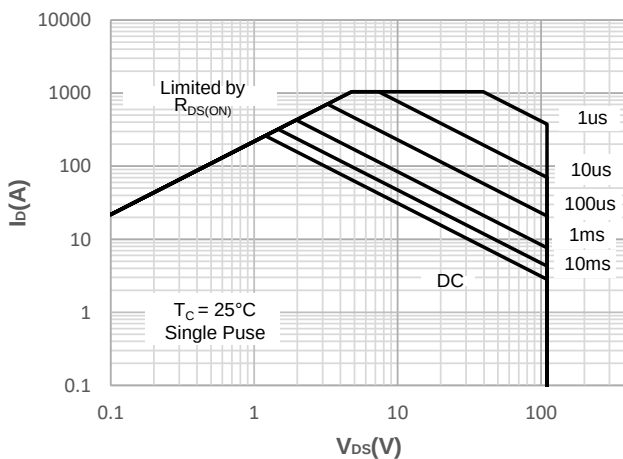


**Figure 15: Maximum Safe Operating Area**



## Test Circuit

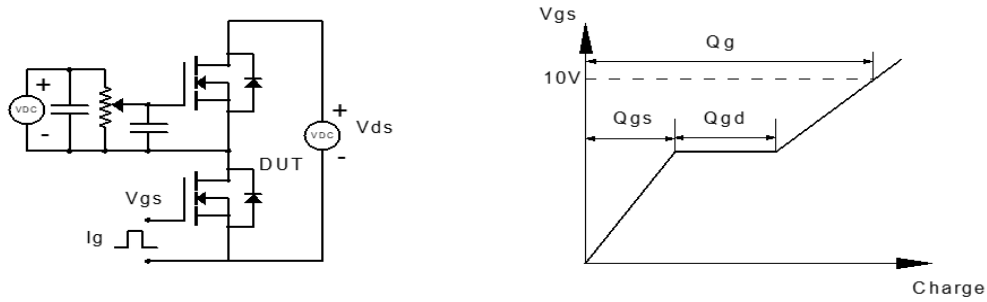


Figure 1: Gate Charge Test Circuit & Waveform

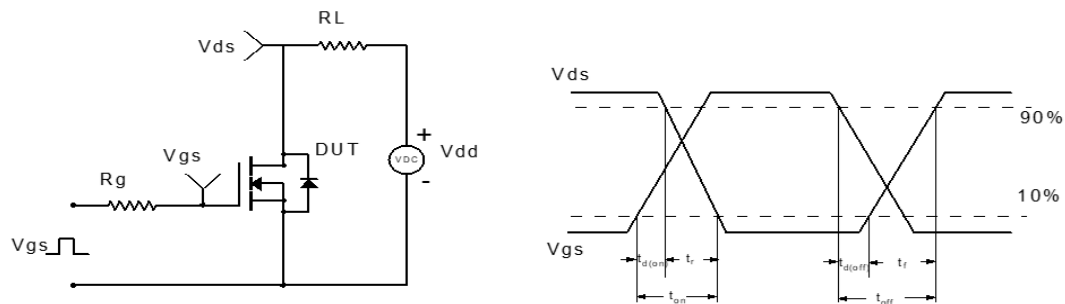


Figure 2: Resistive Switching Test Circuit & Waveform

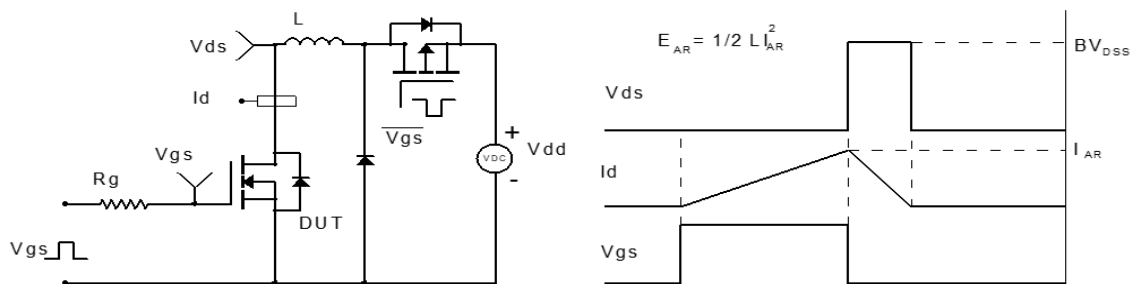


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

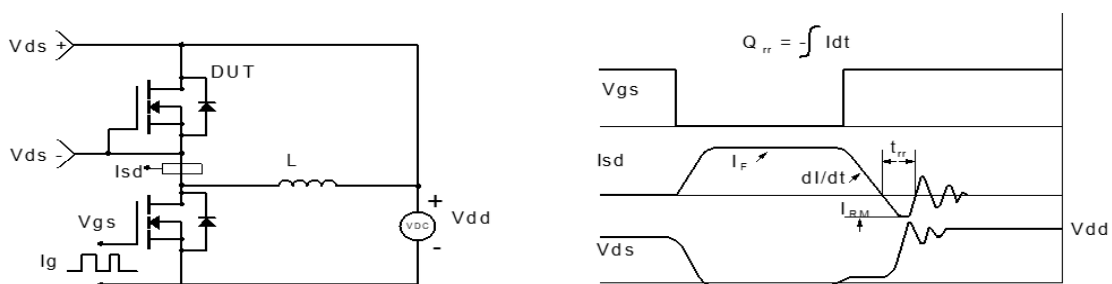
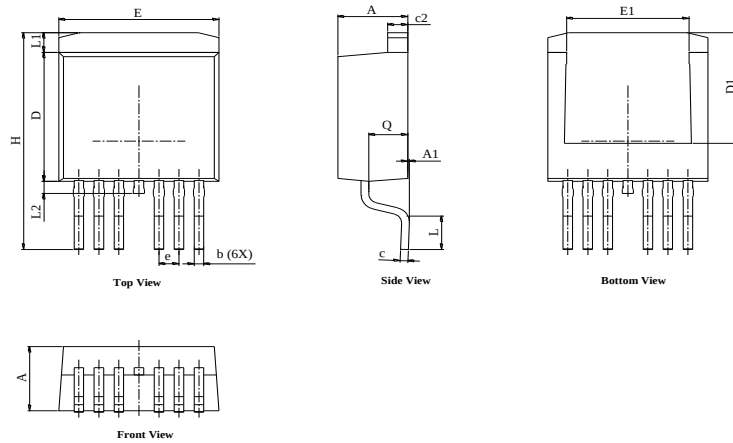


Figure 4: Diode Recovery Test Circuit & Waveform

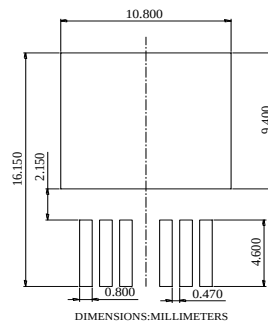
## Package Mechanical Data(TO-263-7L)

### Package Outline



| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | NOM.  | MAX.  |
| A    | 4.24       | 4.44  | 4.64  |
| A1   | 0.00       | 0.10  | 0.25  |
| b    | 0.50       | 0.60  | 0.70  |
| c    | 0.40       | 0.50  | 0.60  |
| c2   | 1.15       | 1.27  | 1.40  |
| D    | 8.82       | 8.92  | 9.02  |
| D1   | 7.65 REF.  |       |       |
| E    | 9.96       | 10.16 | 10.36 |
| E1   | 6.80       | 7.80  | 8.00  |
| e    | 1.27 BSC   |       |       |
| H    | 14.61      | 15.00 | 15.88 |
| L    | 1.78       | 2.32  | 2.80  |
| L1   | 1.36 REF.  |       |       |
| L2   | 1.20 REF.  |       |       |
| L3   | 0.25 BSC   |       |       |
| Q    | 2.30       | 2.48  | 2.70  |

### Recommended Soldering Footprint



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