

## JMSL0603PE

### Features

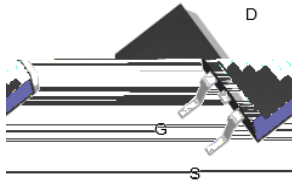
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- 100% UIS Tested
- 100%  $V_{DS}$  Tested
- Halogen-free; RoHS-compliant

### Applications

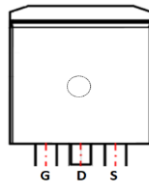
- Load Switch
- PWM Application
- Power Management

### Product Summary

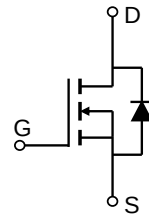
| Parameters                      | Value | Unit      |
|---------------------------------|-------|-----------|
| $V_{DSS}$                       | 60    | V         |
| $V_{GS(th\_Typ)}$               | 1.6   | V         |
| $I_D(@V_{GS}=10V)$              | 198   | A         |
| $R_{DS(ON\_Typ)}(@V_{GS}=10V)$  | 2.2   | $m\Omega$ |
| $R_{DS(ON\_Typ)}(@V_{GS}=4.5V)$ | 2.8   | $m\Omega$ |



TO-263-3L



Pin Assignment



Schematic Diagram

### Ordering Information

| Device        | Marking | MSL | Form      | Package   | Reel(pcs) | Per Carton (pcs) |
|---------------|---------|-----|-----------|-----------|-----------|------------------|
| JMSL0603PE-13 | SL0603P | 3   | Tape&Reel | TO-263-3L | 800       | 4000             |

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

| Symbol         | Parameter                                     | Value                     | Unit             |
|----------------|-----------------------------------------------|---------------------------|------------------|
| $V_{DS}$       | Drain-to-Source Voltage                       | 60                        | 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> | 324                       | 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      | Thermal Resistance, Junction to Ambient <sup>(3)</sup> | 41   | $^\circ\text{C/W}$ |
| R      | Thermal Resistance, Junction to Case                   | 0.67 |                    |

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

| Symbol               | Conditions                         | Min.                                         | Typ. | Max. | Unit |    |
|----------------------|------------------------------------|----------------------------------------------|------|------|------|----|
| Off Characteristics  |                                    |                                              |      |      |      |    |
| V <sub>(BR)DSS</sub> |                                    | 60                                           | -    | -    | V    |    |
| I <sub>DSS</sub>     |                                    | -                                            | -    | 1.0  | μA   |    |
| I <sub>GSS</sub>     |                                    | -                                            | -    | ±100 | nA   |    |
|                      |                                    |                                              |      |      |      |    |
| V <sub>GS(th)</sub>  |                                    | 1.1                                          | 1.6  | 2.4  | V    |    |
| R <sub>DS(ON)</sub>  |                                    | -                                            | 2.2  | 2.8  | mΩ   |    |
|                      |                                    | -                                            | 2.8  | 3.7  | mΩ   |    |
|                      |                                    |                                              |      |      |      |    |
| R <sub>g</sub>       | Gate Resistance                    | f = 1MHz                                     | -    | 2.1  | -    | Ω  |
| C <sub>iss</sub>     |                                    |                                              | -    | 3566 | 5349 | pF |
| C <sub>oss</sub>     |                                    |                                              | -    | 1749 | 2624 | pF |
| C <sub>rss</sub>     |                                    |                                              | -    | 103  | 207  | pF |
| Q <sub>g</sub>       |                                    |                                              | -    | 62   | -    | nC |
| Q <sub>gs</sub>      |                                    |                                              | -    | 10   | -    | nC |
| Q <sub>gd</sub>      |                                    |                                              | -    | 14   | -    | nC |
|                      |                                    |                                              |      |      |      |    |
| t <sub>d(on)</sub>   |                                    |                                              | -    | 11   | -    | ns |
| t <sub>r</sub>       |                                    | V <sub>GS</sub> = 10V, V <sub>DD</sub> = 30V | -    | 28   | -    | ns |
| t <sub>d(off)</sub>  |                                    | I <sub>D</sub> = 20A, R <sub>GEN</sub> = 3Ω  | -    | 54   | -    | ns |
| t <sub>f</sub>       |                                    |                                              | -    | 30   | -    | ns |
|                      |                                    |                                              |      |      |      |    |
| I <sub>S</sub>       |                                    |                                              | -    | -    | 198  | A  |
| I <sub>SM</sub>      |                                    |                                              | -    | -    | 793  | A  |
| V <sub>SD</sub>      |                                    |                                              | -    |      | 1.2  | V  |
| t <sub>rr</sub>      |                                    |                                              | 40   | 57   | 85   | ns |
| Q <sub>rr</sub>      | Body Diode Reverse Recovery Charge |                                              | -    | 69   | -    | nC |

- Notes:
- 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
  - 2. E<sub>AS</sub> condition: Starting T<sub>J</sub>=25C, V<sub>DD</sub>=30V, V<sub>G</sub>=10V, R<sub>G</sub>=25ohm, L=3mH, I<sub>AS</sub>=14.7A, V<sub>DD</sub>=0V during time in avalanche.
  - 3. R is measured with the device mounted on a 1inch<sup>2</sup> pad of 2oz copper FR4 PCB.
  - 4. Pulse Test: Pulse Width ≤ 0.5%.

## Typical Performance Characteristics

Figure 1: Power De-rating

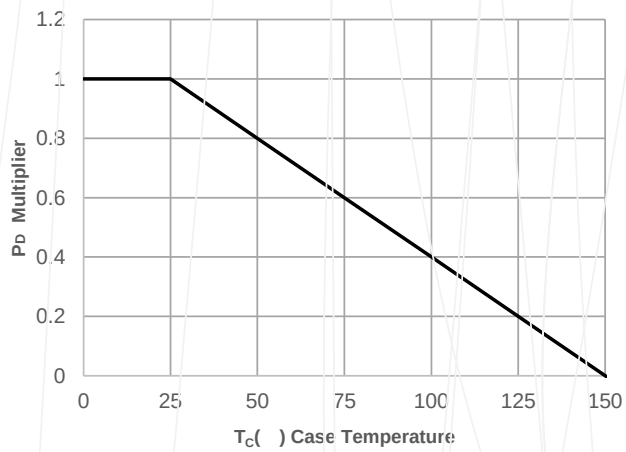
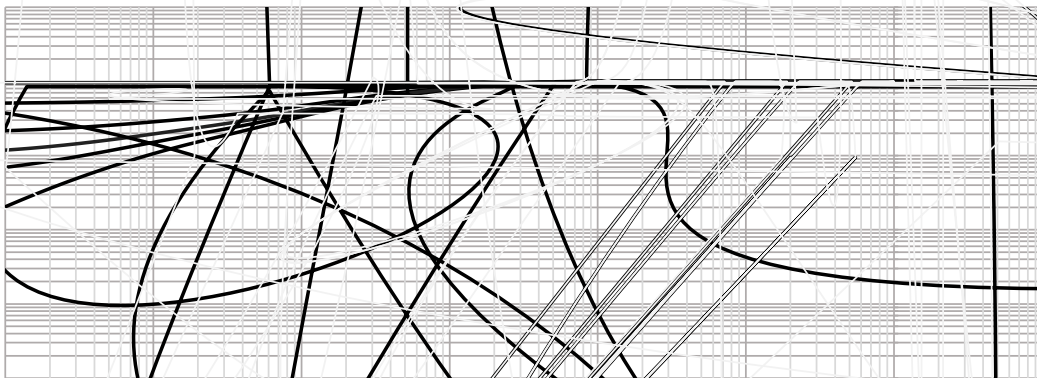
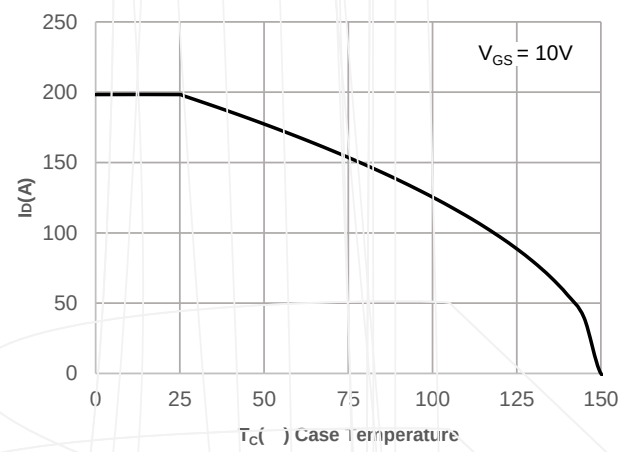
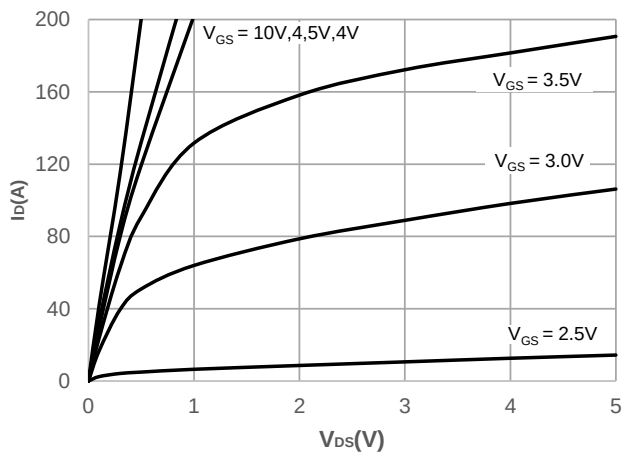
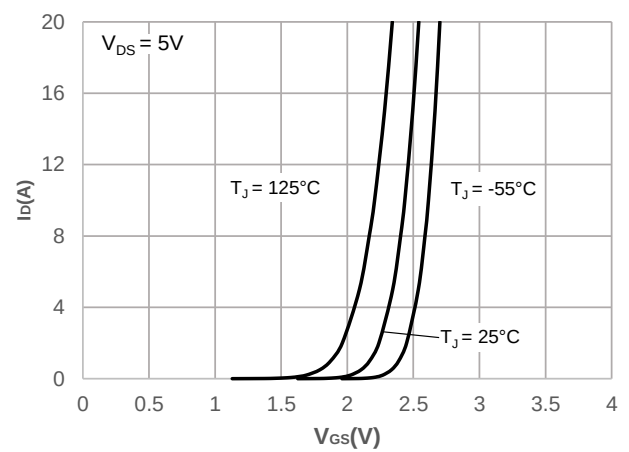
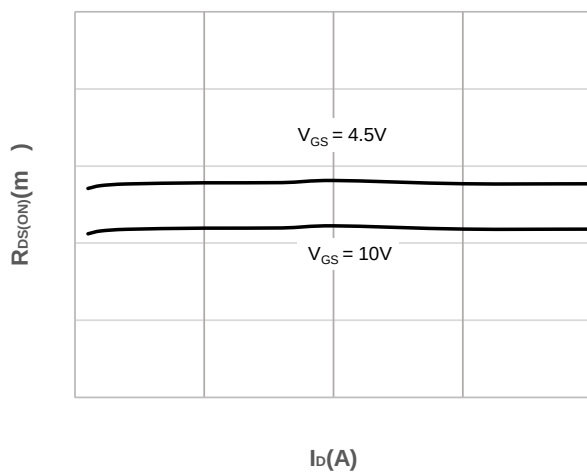
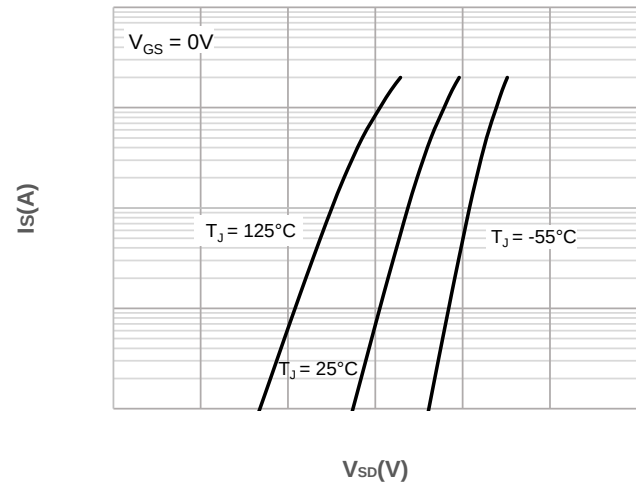
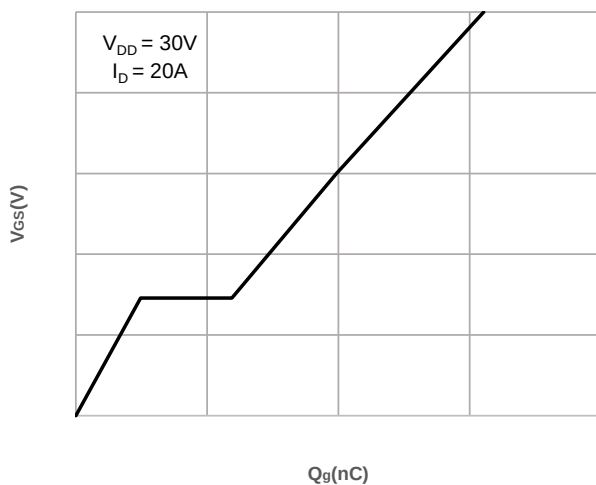
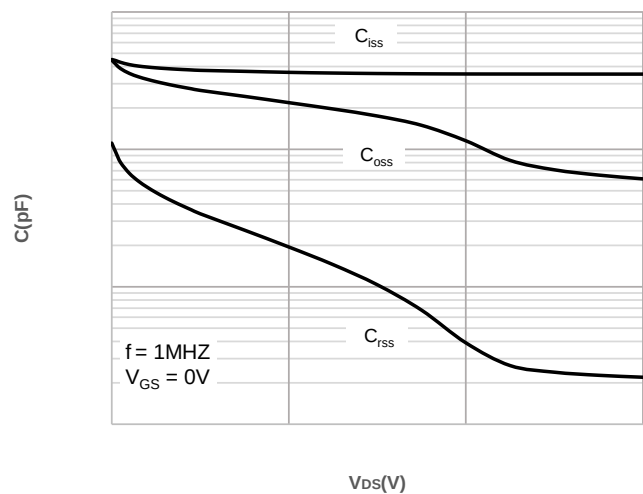


Figure 2: Current De-rating



## 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

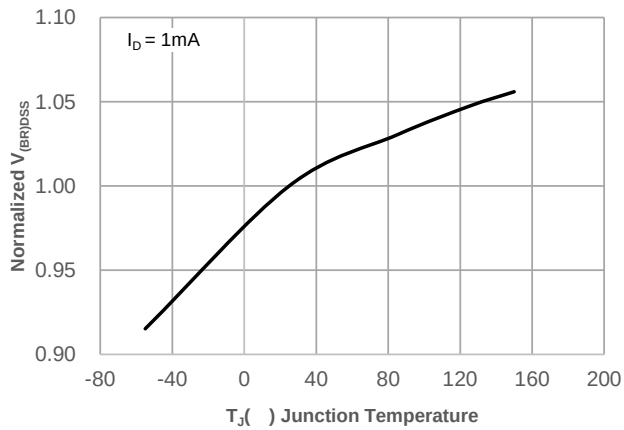


Figure 12: Normalized on Resistance vs. Junction Temperature

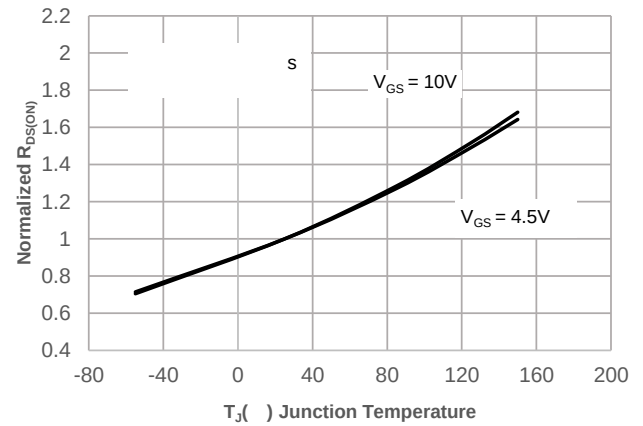


Figure 14:  $R_{DS(ON)}$  vs.  $V_{GS}$

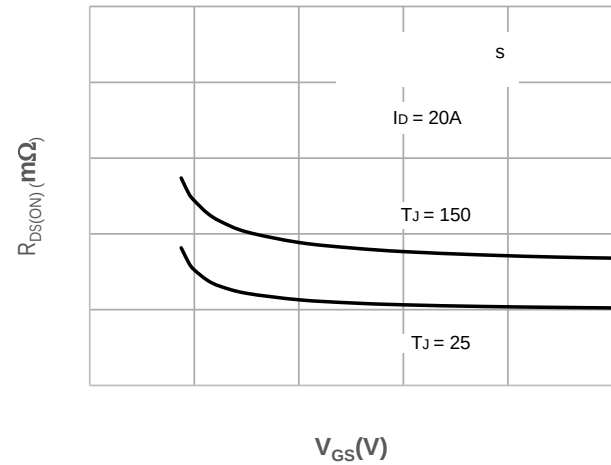
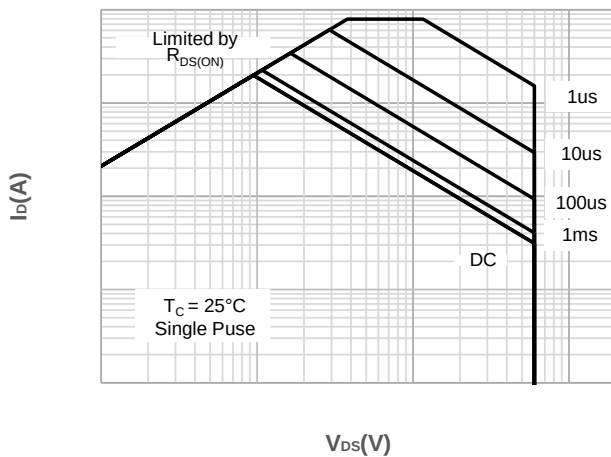


Figure 15: Maximum Safe Operating Area



## Test Circuit



Figure 1: Gate Charge Test Circuit & Waveform

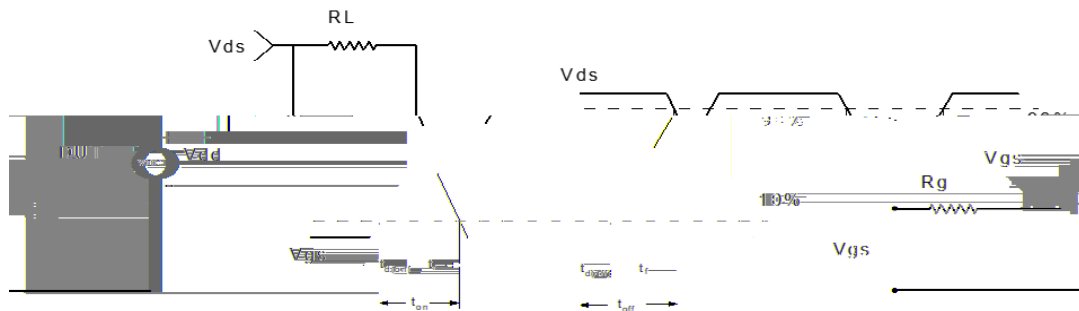


Figure 2: Resistive Switching Test Circuit & Waveform

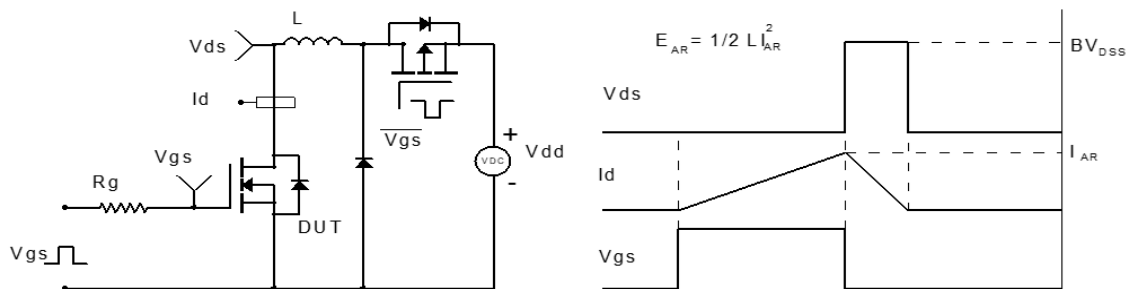


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

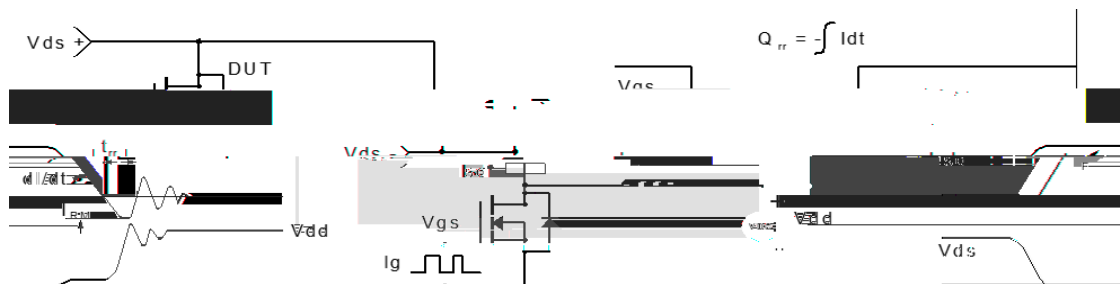
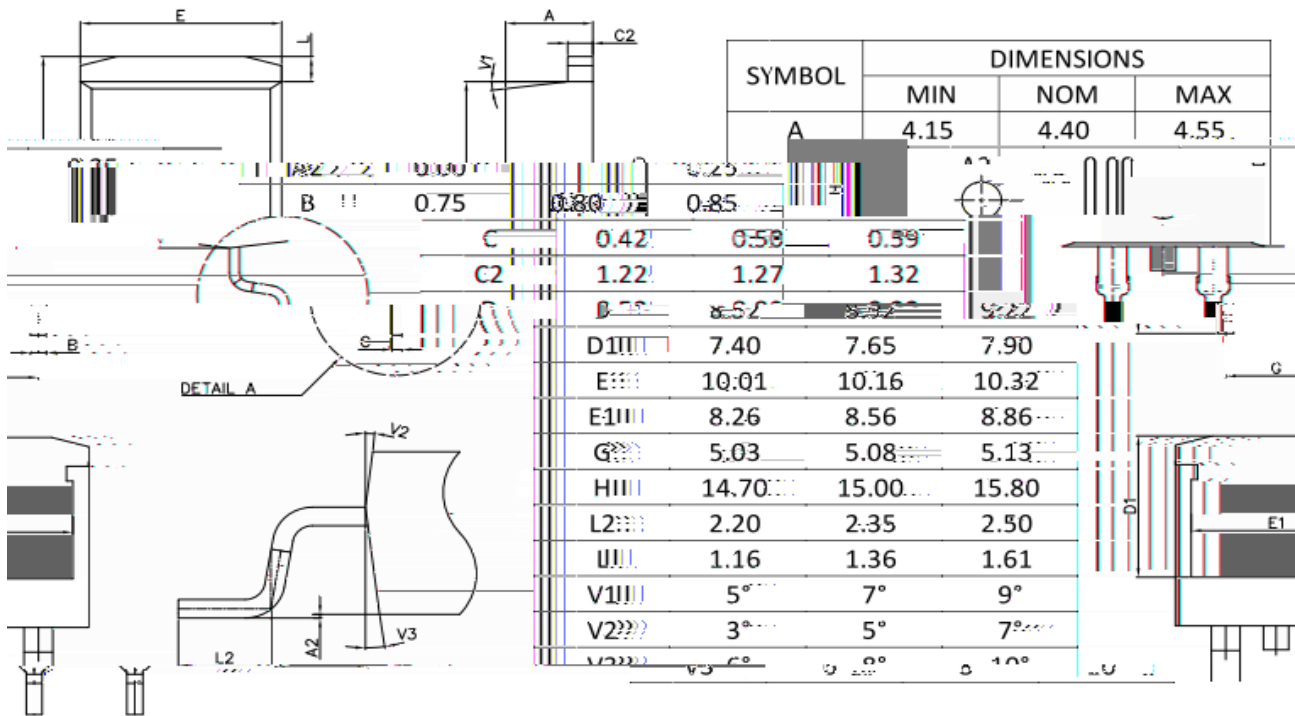


Figure 4: Diode Recovery Test Circuit & Waveform

## Package Mechanical Data(TO-25263-3L)

### Package Outline



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