

### 30V N-Channel Enhancement Mode MOSFET

#### Description

The PECN3404MR uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and high device is suitable for use as a load switch or in PWM applications.

#### General Features

- ◆  $V_{DS} = 30V$ ,  $I_D = 5A$   
 $R_{DS(ON)}(Typ.) = 22m\Omega$  @  $V_{GS} = 10V$   
 $R_{DS(ON)}(Typ.) = 31m\Omega$  @  $V_{GS} = 4.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

#### Application

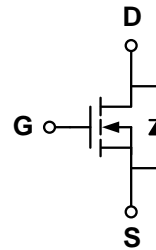
- ◆ PWM applications
- ◆ Load switch

#### Package

- ◆ SOT-23-3L

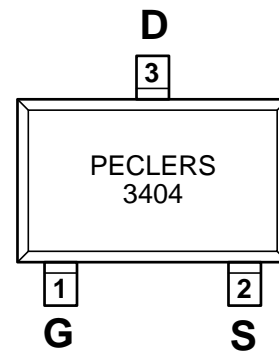


#### Schematic diagram



#### Marking and pin assignment

SOT-23-3L  
(TOP VIEW)



#### Ordering Information

| Part Number | Storage Temperature | Package   | Devices Per Reel |
|-------------|---------------------|-----------|------------------|
| PECN3404MR  | -55°C to +150°C     | SOT-23-3L | 3000             |

#### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| parameter  | symbol   | limit   | unit |
|--|----------|---------|------|
| Drain-source voltage   | $V_{DS}$ | 30      | V    |
| Gate-source voltage  | $V_{GS}$ | ±20     | V    |
| Drain current-continuous <sup>a</sup> @ $T_j = 125^\circ C$<br>-pulse <sup>b</sup> | $I_D$    | 5       | A    |
|  | $I_{DM}$ | 20      | A    |
| Drain-source Diode forward current   | $I_S$    | 5       | A    |
| Maximum power dissipation  | $P_D$    | 1.4     | W    |
| Operating junction Temperature range   | $T_j$    | -55—150 | °C   |

### Electrical Characteristics (TA=25°C unless otherwise noted)

| Parameter                                 | Symbol       | Condition  | Min | Typ  | Max       | Unit       |
|---|--------------|--|-----|------|-----------|------------|
| <b>OFF Characteristics</b>                |              |  |     |      |           |            |
| Drain-source breakdown voltage            | $BV_{DSS}$   | $V_{GS}=0V, I_D=250\mu A$  | 30  | -    | -         | V          |
| Zero gate voltage drain current           | $I_{DSS}$    | $V_{DS}=30V, V_{GS}=0V$  | -   | -    | 1         | $\mu A$    |
| Gate-body leakage                         | $I_{GSS}$    | $V_{DS}=0V, V_{GS}=\pm 20V$                                      | -   | -    | $\pm 100$ | nA         |
| <b>ON Characteristics</b>                 |              |  |     |      |           |            |
| Gate threshold voltage                    | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=250\mu A$                                    | 0.8 | 1.35 | 1.9       | V          |
| Drain-source on-state resistance          | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=5A$   | -   | 23   | 28        | m $\Omega$ |
|   |              | $V_{GS}=4.5V, I_D=4A$  | -   | 31   | 38        |            |
| Forward transconductance                  | $g_{fs}$     | $V_{DS}=5V, I_D=5A$  | -   | 33   | -         | S          |
| <b>Dynamic Characteristics</b>            |              |  |     |      |           |            |
| Input capacitance                         | $C_{ISS}$    | $V_{DS}=15V, V_{GS}=0V$<br>$f=1.0MHz$                            | -   | 255  | -         | pF         |
| Output capacitance                        | $C_{OSS}$    |  | -   | 45   | -         |            |
| Reverse transfer capacitance              | $C_{RSS}$    |  | -   | 35   | -         |            |
| <b>Switching Characteristics</b>          |              |  |     |      |           |            |
| Turn-on delay time                        | $t_{D(ON)}$  | $V_{DS}=15V$<br>$V_{GS}=10V$<br>$R_L=2.6\ ohm$<br>$R_{GEN}=3ohm$ | -   | 4.5  | -         | ns         |
| Rise time                                 | $t_r$        |  | -   | 2.5  | -         |            |
| Turn-off delay time                       | $t_{D(OFF)}$ |  | -   | 14.5 | -         |            |
| Fall time                                 | $t_f$        |  | -   | 3.5  | -         |            |
| Total gate charge                         | $Q_g$        | $V_{DS}=15V, I_D=5.8A$<br>$V_{GS}=10V$                           | -   | 5.2  | -         | nC         |
| Gate-source charge                        | $Q_{gs}$     |  | -   | 0.85 | -         |            |
| Gate-drain charge                         | $Q_{gd}$     |  | -   | 1.3  | -         |            |
| <b>DRAIN-SOURCE DIODE CHARACTERISTICS</b> |              |  |     |      |           |            |
| Diode forward voltage                     | $V_{SD}$     | $V_{GS}=0V, I_s=1A$  | -   | 0.76 | 1.16      | V          |

#### Notes:

- surface mounted on FR4 board,  $t \leq 10sec$
- pulse test: pulse width  $\leq 300\mu s$ , duty  $\leq 2\%$
- guaranteed by design, not subject to production testing

### Thermal Characteristics

|  |        |     |      |
|--|--------|-----|------|
| Thermal Resistance junction-to ambient | Rth JA | 100 | °C/W |
|--|--------|-----|------|

### Typical Performance Characteristics

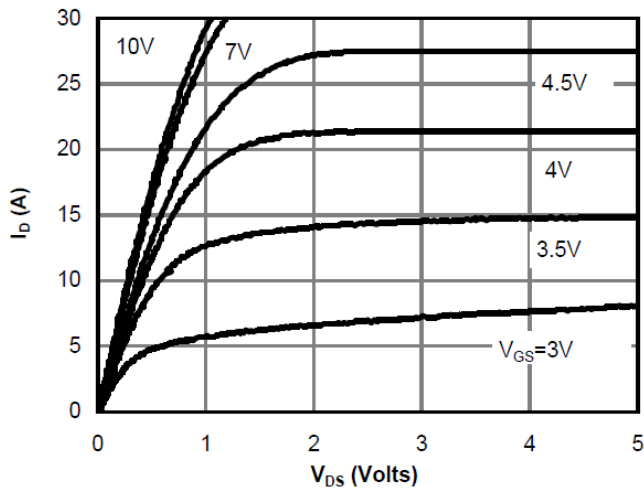


Fig 1: On-Region Characteristics

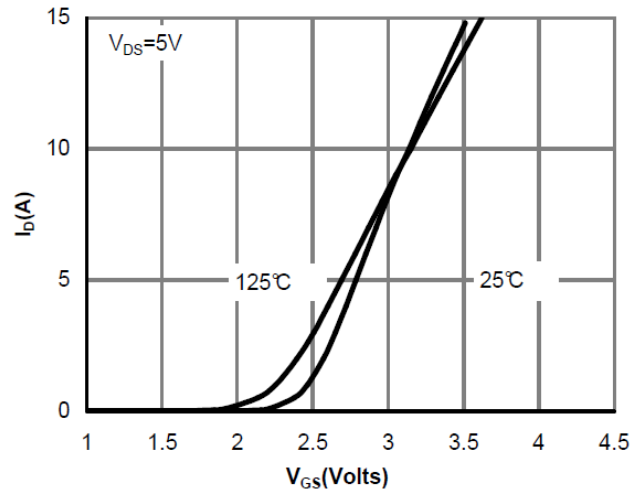


Figure 2: Transfer Characteristics

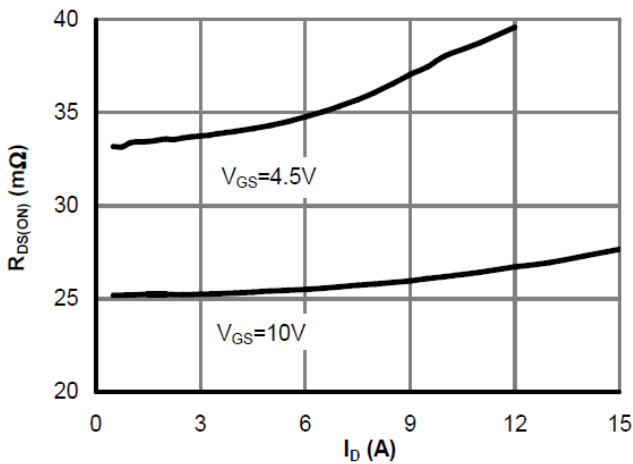


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

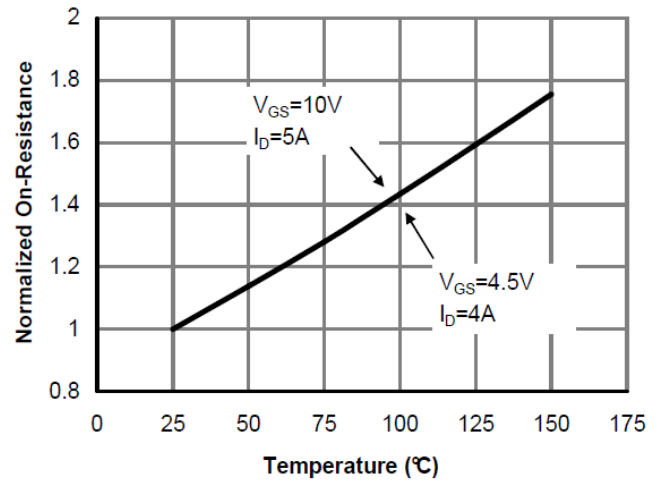


Figure 4: On-Resistance vs. Junction Temperature

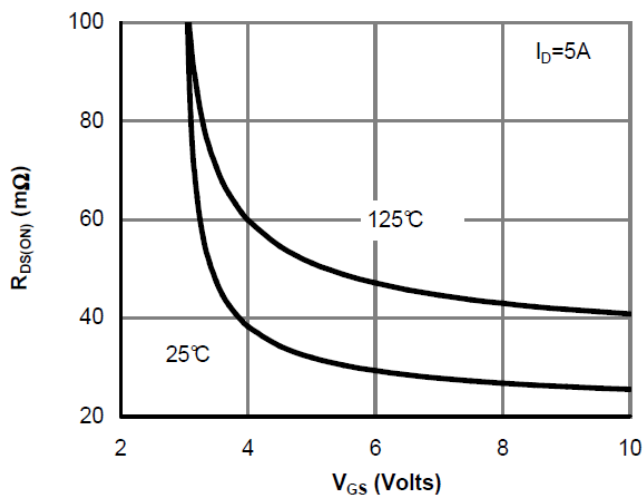


Figure 5: On-Resistance vs. Gate-Source Voltage

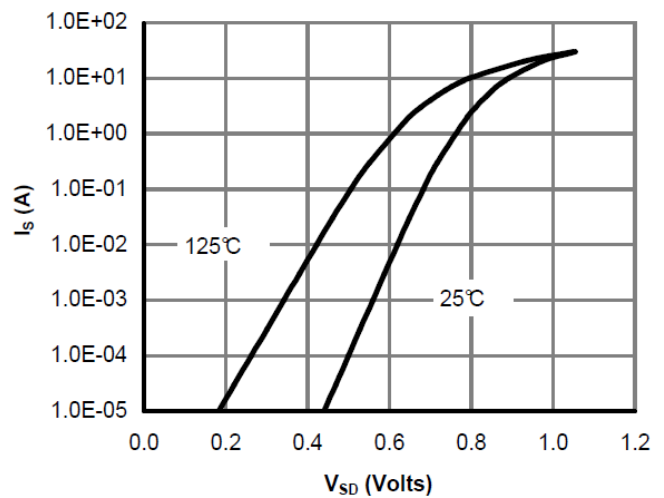


Figure 6: Body-Diode Characteristics

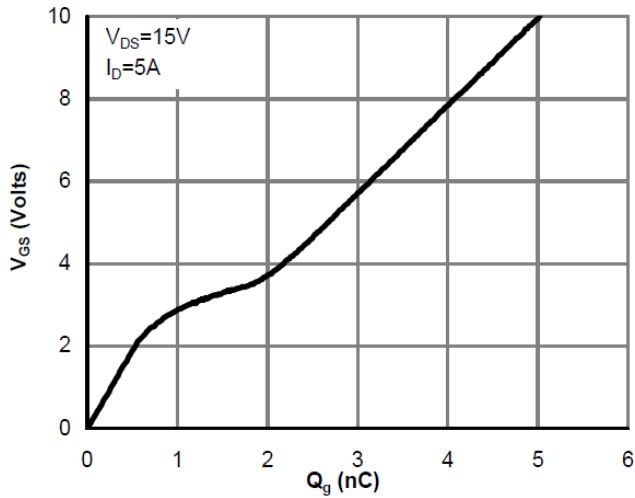


Figure 7: Gate-Charge Characteristics

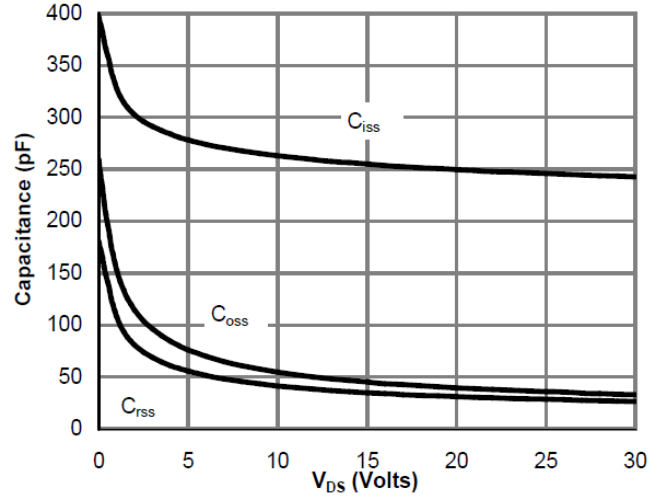


Figure 8: Capacitance Characteristics

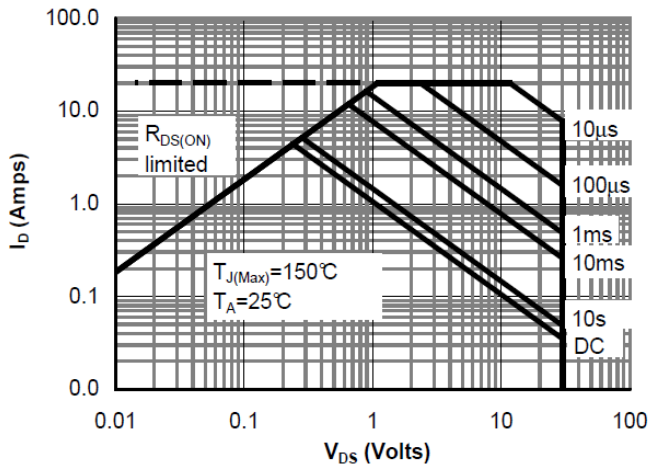


Figure 10: Maximum Forward Biased Safe Operating Area

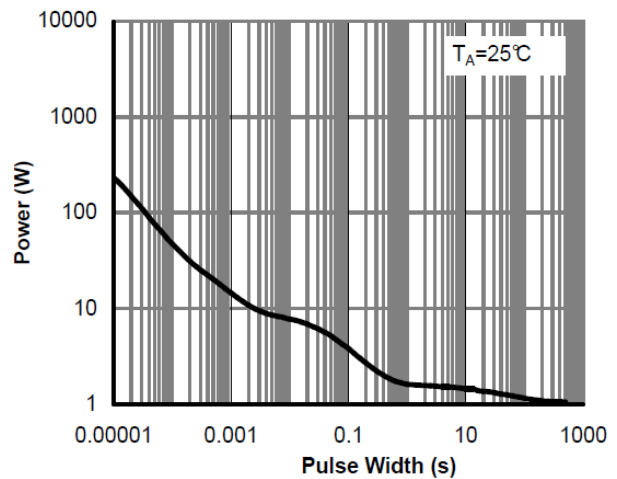


Figure 11: Single Pulse Power Rating Junction-to-Ambient

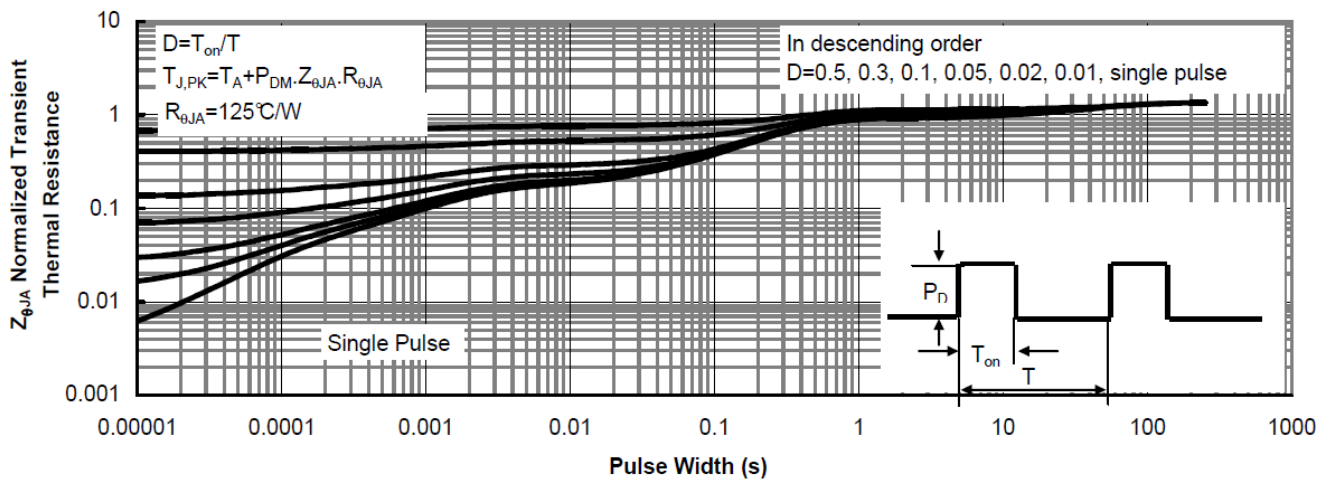
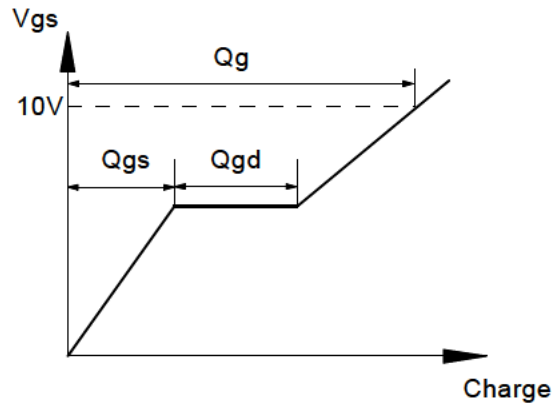
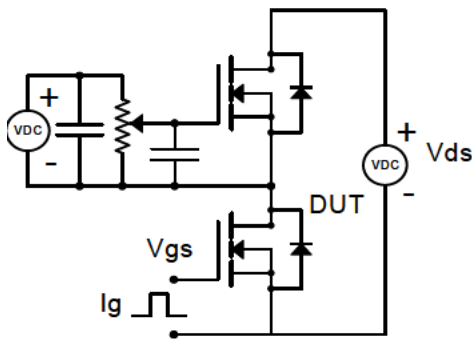


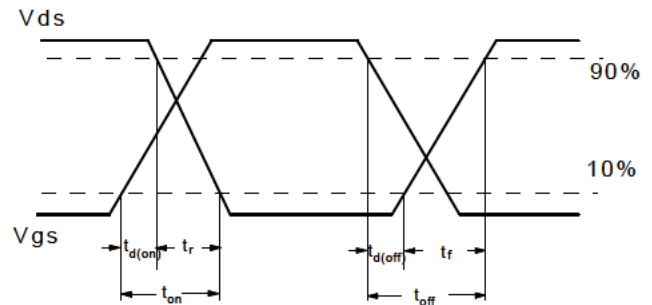
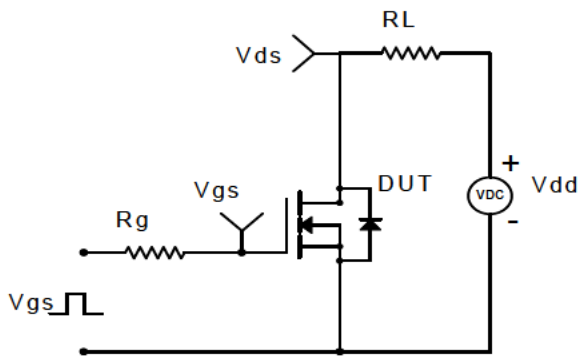
Figure 12: Normalized Maximum Transient Thermal Impedance

### Gate Charge Test Circuit & Waveform

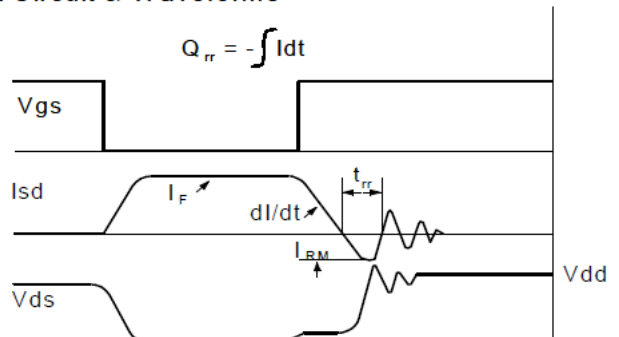
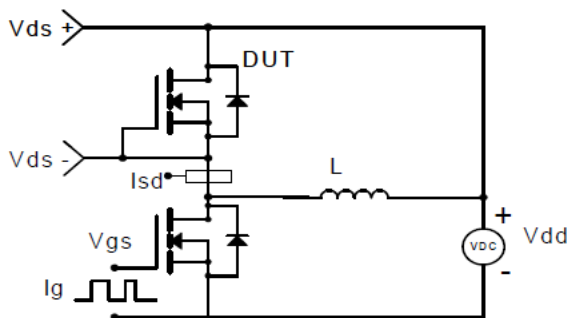


### Resistive Switching Test Circuit & Waveforms

#### Resistive Switching Test Circuit & Waveforms

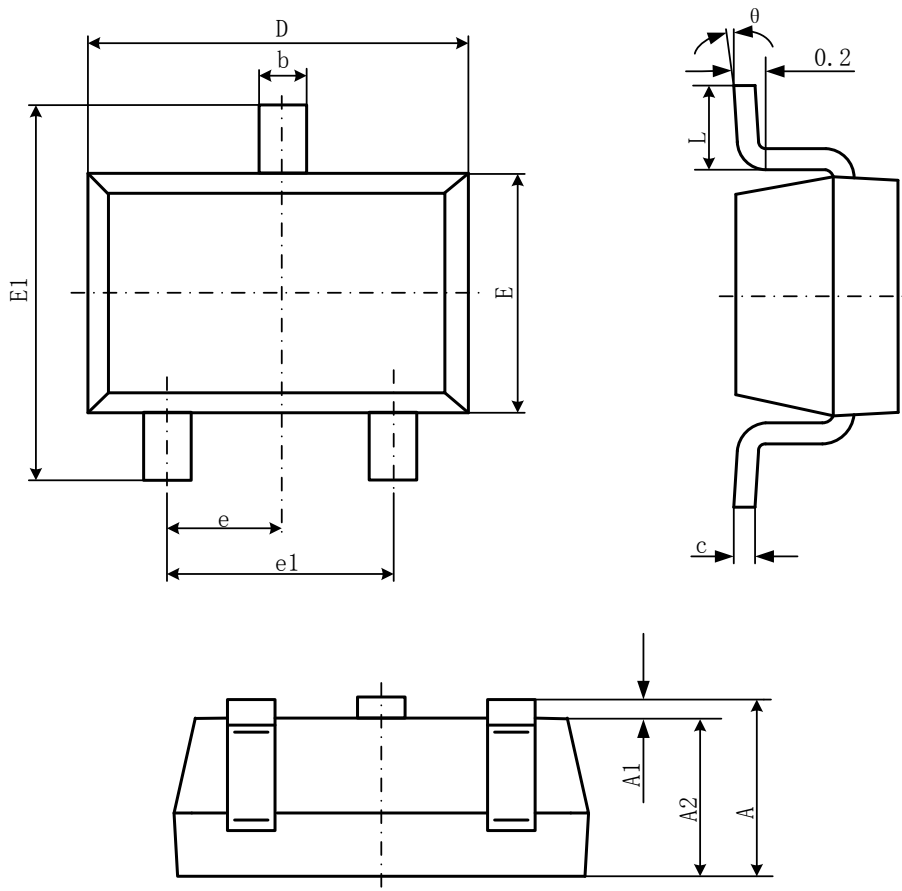


### Diode Recovery Test Circuit & Waveforms



### Package Information

- SOT-23-3L



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.050                     | 1.250 | 0.041                | 0.049 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 1.050                     | 1.150 | 0.041                | 0.045 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.100                     | 0.200 | 0.004                | 0.008 |
| D      | 2.820                     | 3.020 | 0.111                | 0.119 |
| E      | 1.500                     | 1.700 | 0.059                | 0.067 |
| E1     | 2.650                     | 2.950 | 0.104                | 0.116 |
| e      | 0.950(BSC)                |       | 0.037(BSC)           |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.300                     | 0.600 | 0.012                | 0.024 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |