

20V P-Channel Enhancement Mode MOSFET

Description

The HM2307MR uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.

General Features

- ◆ $V_{DS} = -20V$, $I_D = -6A$
 $R_{DS(ON)}(Typ.) = 25m\Omega$ @ $V_{GS} = -2.5V$
 $R_{DS(ON)}(Typ.) = 20m\Omega$ @ $V_{GS} = -4.5V$
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

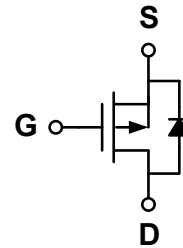
Application

- ◆ PWM applications
- ◆ Load switch

Package

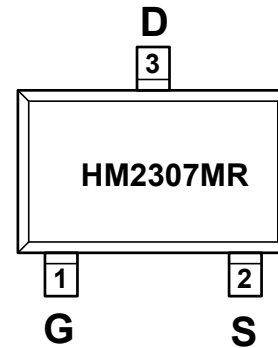
- ◆ SOT-23-3L

Schematic diagram



Marking and pin assignment

SOT-23-3L
(TOP VIEW)



Ordering Information

| Part Number | Storage Temperature | Package | Devices Per Reel |
|-------------|---------------------|-----------|------------------|
| HM2307MR | -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} | -20 | V |
| Gate-source voltage | V_{GS} | ±12 | V |
| Drain current-continuous ^a @ $T_j = 125^\circ C$ -pulse d^b | I_D | -6 | A |
| | I_{DM} | -24 | A |
| Drain-source Diode forward current | I_S | -6 | A |
| Maximum power dissipation | P_D | 1.2 | 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 |
|------------------------------------|--------------|---|------|-------|-----------|------------|
| OFF Characteristics | | | | | | |
| Drain-source breakdown voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -20 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS}=-20V, V_{GS}=0V$ | - | - | -1 | μA |
| Gate-body leakage | I_{GSS} | $V_{DS}=0V, V_{GS}=\pm 12V$ | - | - | ± 100 | nA |
| ON Characteristics | | | | | | |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.5 | -0.7 | -1.0 | V |
| Drain-source on-state resistance | $R_{DS(ON)}$ | $V_{GS}=-4.5V, I_D=-6A$ | - | 20 | 25 | m Ω |
| | | $V_{GS}=-2.5V, I_D=-5A$ | - | 25 | 30 | |
| | | $V_{GS}=-1.8V, I_D=-3A$ | | 38 | 45 | |
| Forward transconductance | gfs | $V_{GS}=-5V, I_D=-6A$ | - | 5 | - | S |
| Dynamic Characteristics | | | | | | |
| Input capacitance | C_{ISS} | $V_{DS}=-10V, V_{GS}=0V$ $f=1.0MHz$ | - | 2100 | - | pF |
| Output capacitance | C_{OSS} | | - | 498 | - | |
| Reverse transfer capacitance | C_{RSS} | | - | 300 | - | |
| Switching Characteristics | | | | | | |
| Turn-on delay time | $t_{D(ON)}$ | $V_{DD}=-10V$ $I_D=-2.8A$ $V_{GEN}=-4.5V$ $R_L=10ohm$ $R_{GEN}=-6ohm$ | - | 25 | - | ns |
| Rise time | t_r | | - | 30 | - | |
| Turn-off delay time | $t_{D(OFF)}$ | | - | 70 | - | |
| Fall time | t_f | | - | 50 | - | |
| Total gate charge | Qg | $V_{DS}=-10V, I_D=-6A$ $V_{GS}=-4.5V$ | - | 17 | - | nC |
| Gate-source charge | Qgs | | - | 4.1 | - | |
| Gate-drain charge | Qgd | | - | 4.3 | - | |
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode forward voltage | V_{SD} | $V_{GS}=0V, I_S=-1.25A$ | - | -0.81 | -1.2 | V |

Notes:

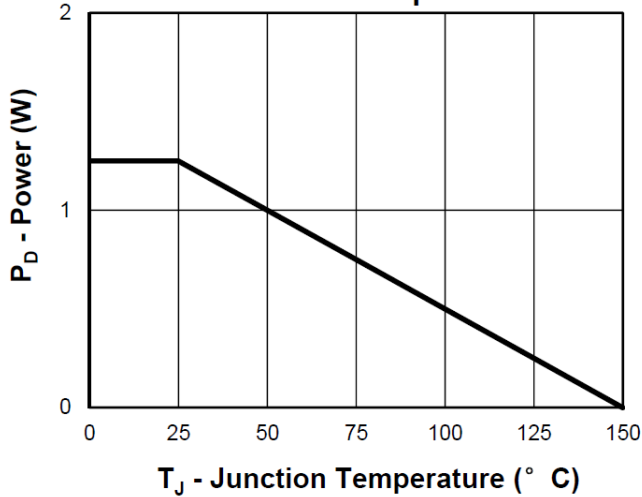
- surface mounted on FR4 board, $t \leq 10sec$
- pulse test: pulse width $\leq 300\mu s$, duty $\leq 2\%$
- guaranteed by design, not subject to production testing

Thermal Characteristics

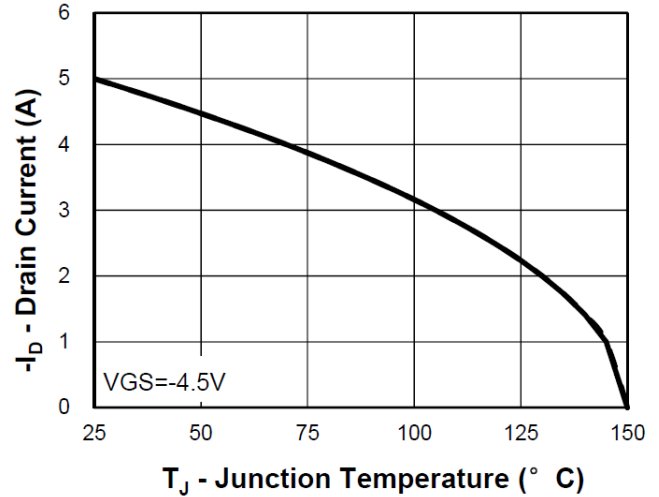
| | | | |
|--|--------|-----|---------------|
| Thermal Resistance junction-to ambient | Rth JA | 100 | $^{\circ}C/W$ |
|--|--------|-----|---------------|

Typical Performance Characteristics

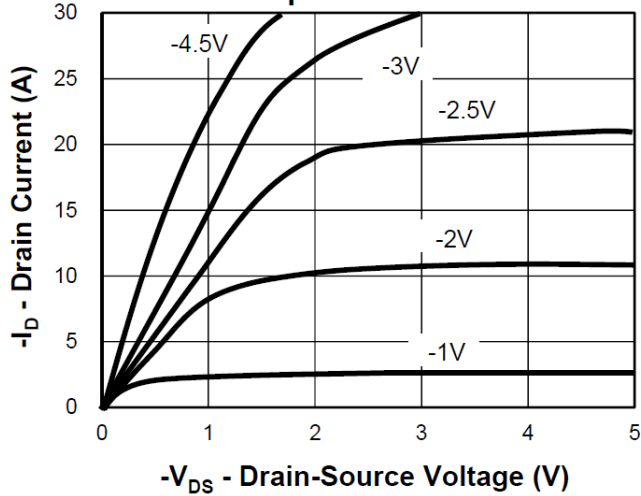
Power Dissipation



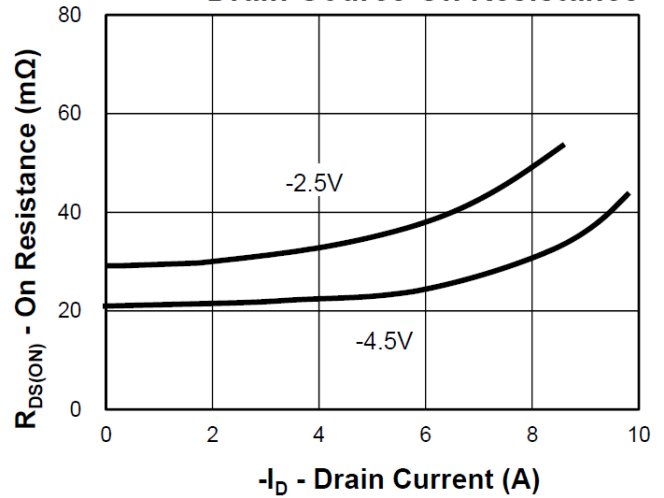
Drain Current



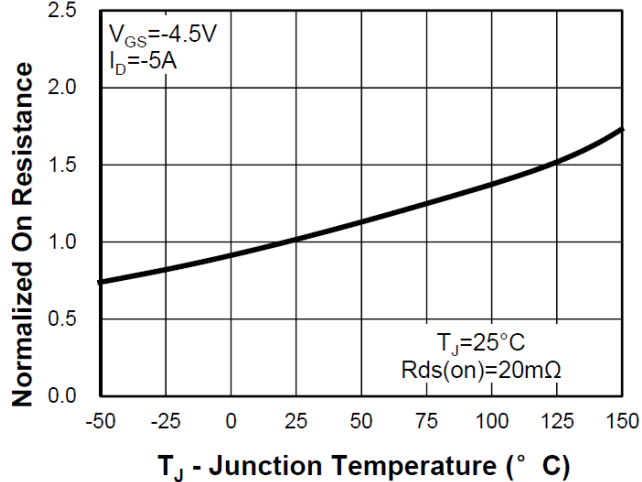
Output Characteristics



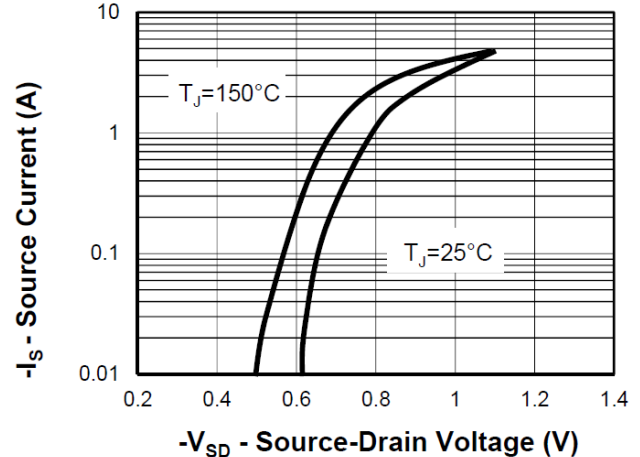
Drain-Source On Resistance



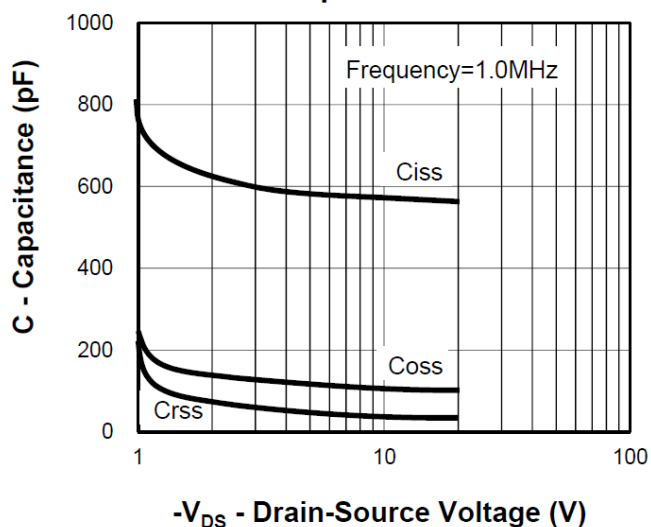
Drain-Source On Resistance



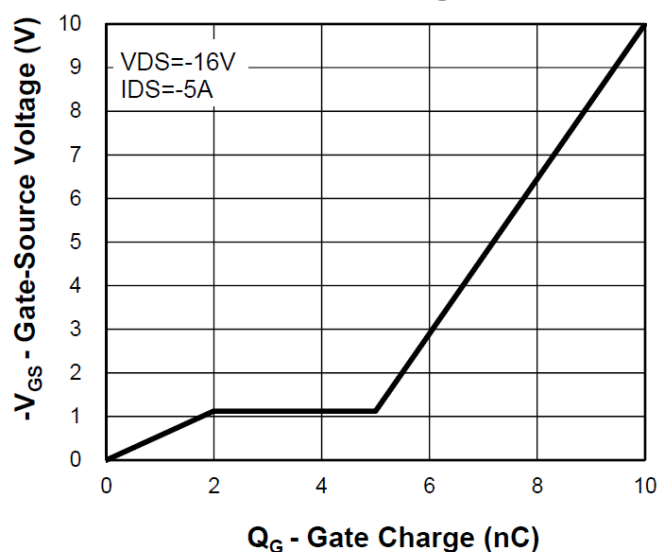
Source-Drain Diode Forward



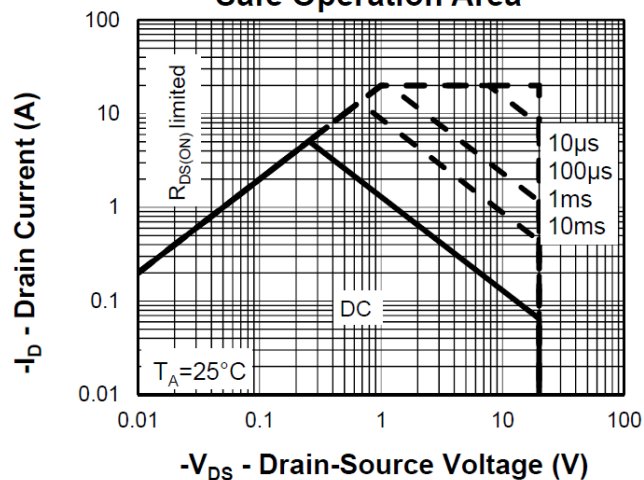
Capacitance



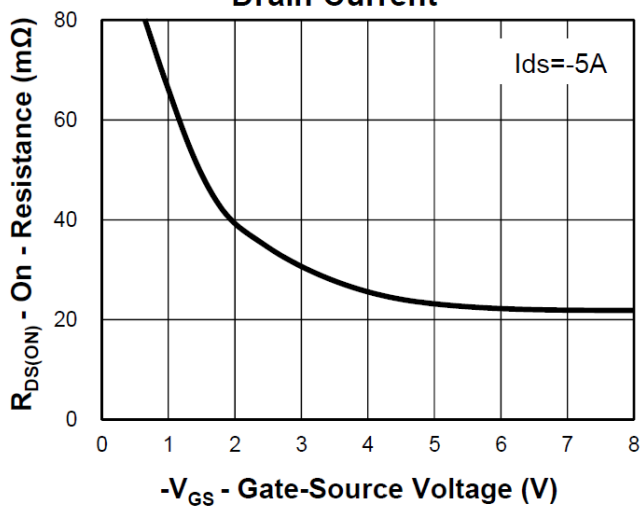
Gate Charge



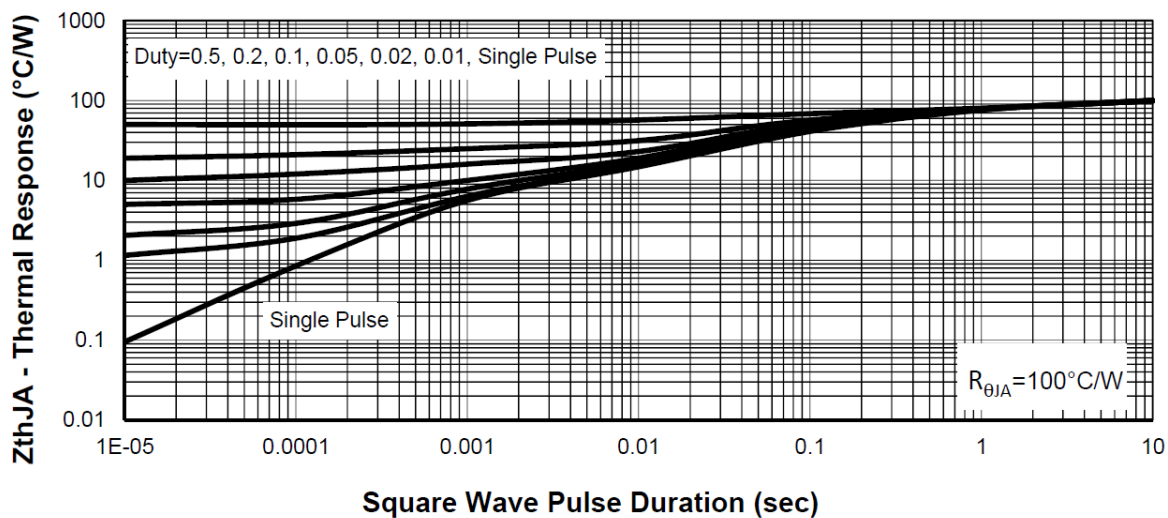
Safe Operation Area



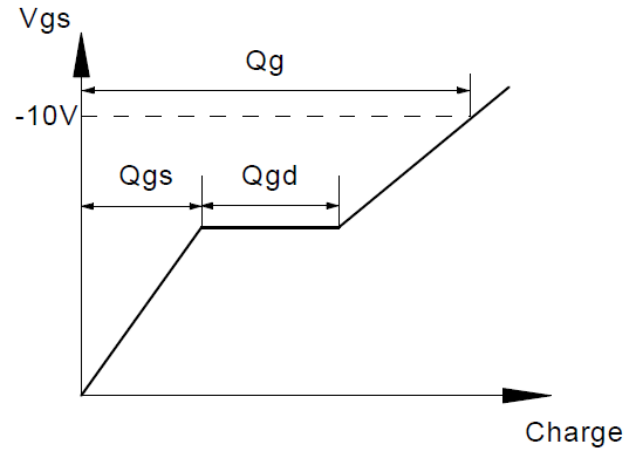
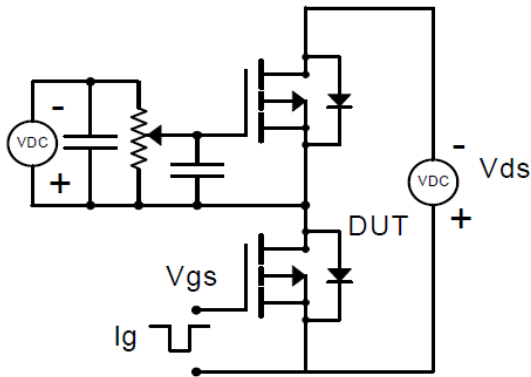
Drain Current



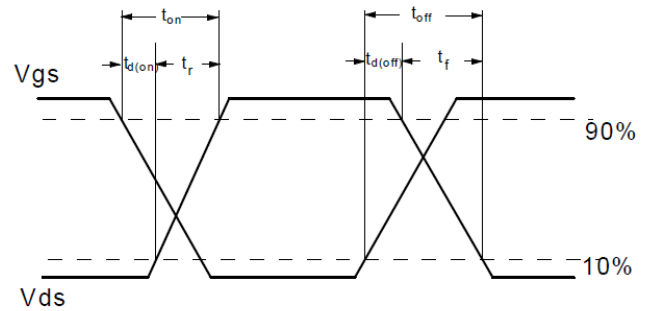
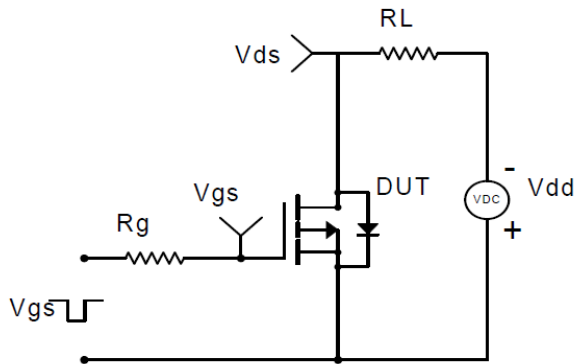
Thermal Transient Impedance



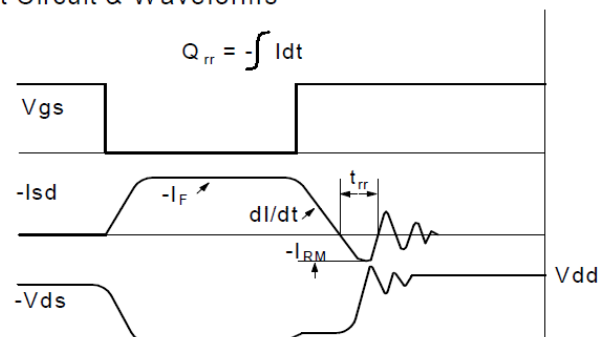
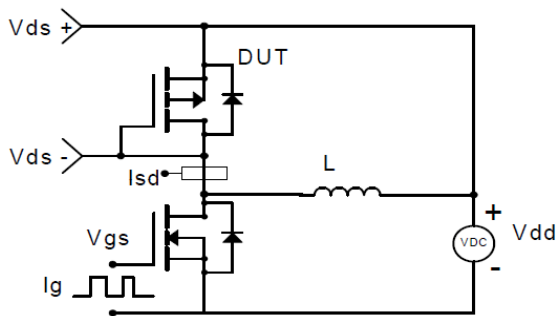
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

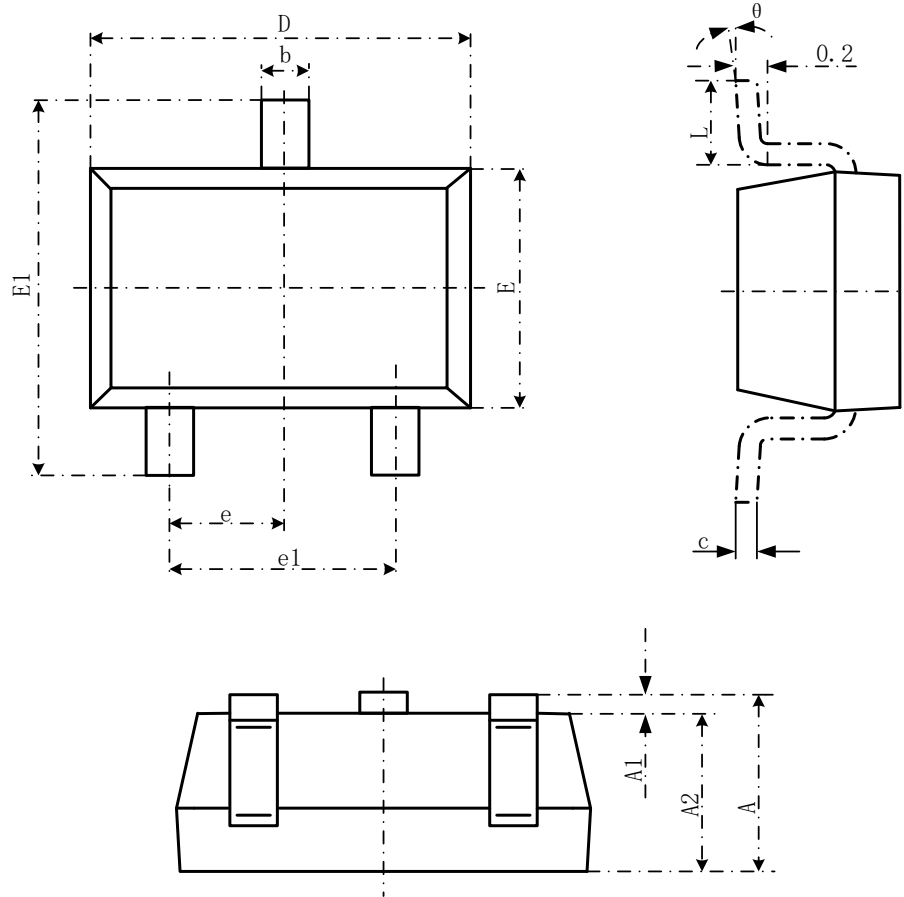


Diode Recovery Test Circuit & Waveforms



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° |