

## General Description

The AGM3400E combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ .

This device is ideal for load switch and battery protection applications.

## Features

- Advance high cell density Trench technology
- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance
- 100% Avalanche tested

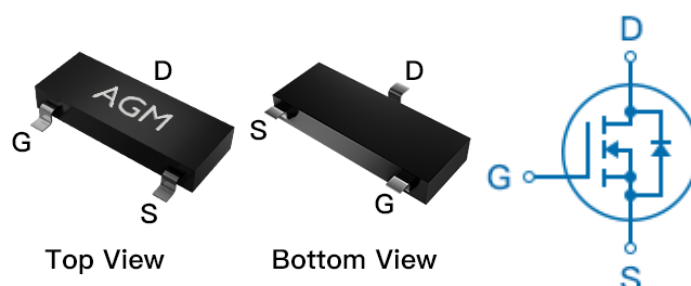
## Application

- MB/VGA Vcore
- SMPS 2<sup>nd</sup> Synchronous Rectifier
- POL application
- BLDC Motor driver

## Product Summary

| BVDSS | RDSON | ID   |
|-------|-------|------|
| 30V   | 20mΩ  | 5.8A |

## SOT23-3 Pin Configuration



## Package Marking and Ordering Information

| Device Marking | Device   | Device Package | Reel Size | Tape width | Quantity |
|----------------|----------|----------------|-----------|------------|----------|
| 3400           | AGM3400E | SOT23-3        | 178mm     | 8mm        | 3000     |

**Table 1. Absolute Maximum Ratings (TA=25°C)**

| Symbol      | Parameter                                         | Value      | Unit |
|-------------|---------------------------------------------------|------------|------|
| VDS         | Drain-Source Voltage (VGS=0V)                     | 30         | V    |
| VGS         | Gate-Source Voltage (VDS=0V)                      | ±12        | V    |
| ID          | Drain Current-Continuous(TA=25°C) <b>(Note 1)</b> | 5.6        | A    |
|             | Drain Current-Continuous(TA=70°C)                 | 4.5        | A    |
| IDM (pluse) | Drain Current-Pulsed <b>(Note 2)</b>              | 23         | A    |
| PD          | Maximum Power Dissipation(TA=25°C)                | 1.2        | w    |
|             | Maximum Power Dissipation(TA=70°C)                | 0.8        | w    |
| EAS         | Avalanche energy <b>(Note 3)</b>                  | 18         | mJ   |
| TJ,TSTG     | Operating Junction and Storage Temperature Range  | -55 To 150 | °C   |

**Table 2. Thermal Characteristic**

| Symbol | Parameter                                                       | Typ | Max | Unit |
|--------|-----------------------------------------------------------------|-----|-----|------|
| RθJA   | Thermal Resistance Junction-ambient (Steady State) <sup>1</sup> | --- | 104 | °C/W |

**Table 3. Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

| Symbol                             | Parameter                        | Conditions                          | Min | Typ  | Max  | Unit |
|------------------------------------|----------------------------------|-------------------------------------|-----|------|------|------|
| On/Off States                      |                                  |                                     |     |      |      |      |
| BVDSS                              | Drain-Source Breakdown Voltage   | VGS=0V ID=250μA                     | 30  | --   | --   | V    |
| IDSS                               | Zero Gate Voltage Drain Current  | VDS=30V,VGS=0V                      | --  | --   | 1    | μA   |
| IGSS                               | Gate-Body Leakage Current        | VGS=±12V,VDS=0V                     | --  | --   | ±100 | nA   |
| VGS(th)                            | Gate Threshold Voltage           | VDS=VGS,ID=250μA                    | 0.5 | 0.9  | 1.3  | V    |
| gfs                                | Forward Transconductance         | VDS=5V,ID=3A                        | --  | 2    | --   | S    |
| RDS(on)                            | Drain-Source On-State Resistance | VGS=10V, ID=4A                      | --  | 20   | 25   | mΩ   |
|                                    |                                  | VGS=4.5V, ID=3A                     | --  | 22   | 31   | mΩ   |
|                                    |                                  | VGS=2.5V, ID=2A                     | --  | 27   | 45   | mΩ   |
| Dynamic Characteristics            |                                  |                                     |     |      |      |      |
| Ciss                               | Input Capacitance                | VDS=15V,VGS=0V,<br>F=1MHZ           | --  | 780  | --   | pF   |
| Coss                               | Output Capacitance               |                                     | --  | 229  | --   | pF   |
| Crss                               | Reverse Transfer Capacitance     |                                     | --  | 167  | --   | pF   |
| Rg                                 | Gate resistance                  | VGS=0V,<br>VDS=0V,f=1.0MHz          | --  | 8.1  | --   | Ω    |
| Switching Times                    |                                  |                                     |     |      |      |      |
| td(on)                             | Turn-on Delay Time               | VGS=10V,VDS=15V,<br>RGEN=3Ω,ID=5.6A | --  | 4.4  | --   | nS   |
| tr                                 | Turn-on Rise Time                |                                     | --  | 28   | --   | nS   |
| td(off)                            | Turn-Off Delay Time              |                                     | --  | 16   | --   | nS   |
| tf                                 | Turn-Off Fall Time               |                                     | --  | 26   | --   | nS   |
| Qg                                 | Total Gate Charge                | VGS=10V, VDS=15V,<br>ID=5.6A        | --  | 17   | --   | nC   |
| Qgs                                | Gate-Source Charge               |                                     | --  | 2.1  | --   | nC   |
| Qgd                                | Gate-Drain Charge                |                                     | --  | 2.0  | --   | nC   |
| Source-Drain Diode Characteristics |                                  |                                     |     |      |      |      |
| ISD                                | Source-Drain Current(Body Diode) |                                     | --  | --   | 5.8  | A    |
| VSD                                | Forward on Voltage               | VGS=0V,IS=4A                        | --  | --   | 1.2  | V    |
| trr                                | Reverse Recovery Time            | IF=4A , dl/dt=100A/μs ,<br>TJ=25℃   | --  | 1.1  | --   | ns   |
| Qrr                                | Reverse Recovery Charge          |                                     | --  | 13.1 | --   | nc   |

Notes 1.The maximum current rating is package limited.

Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=15V, V<sub>gs</sub>=10V, I<sub>D</sub>=19A, L=0.1mH, R<sub>G</sub>=25ohm

## ■ Typical Performance Characteristics

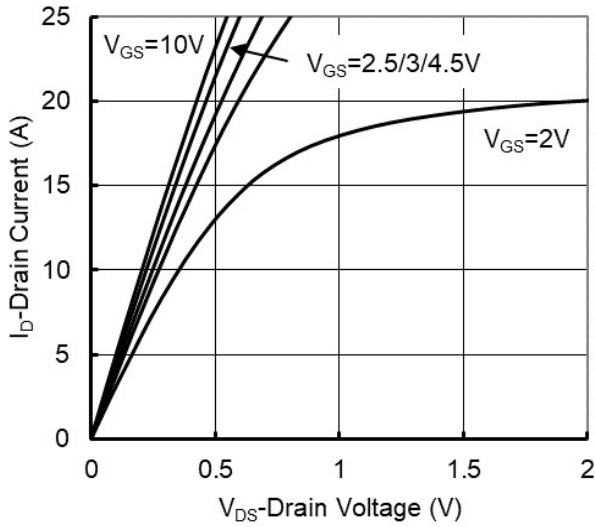


Figure1. Output Characteristics

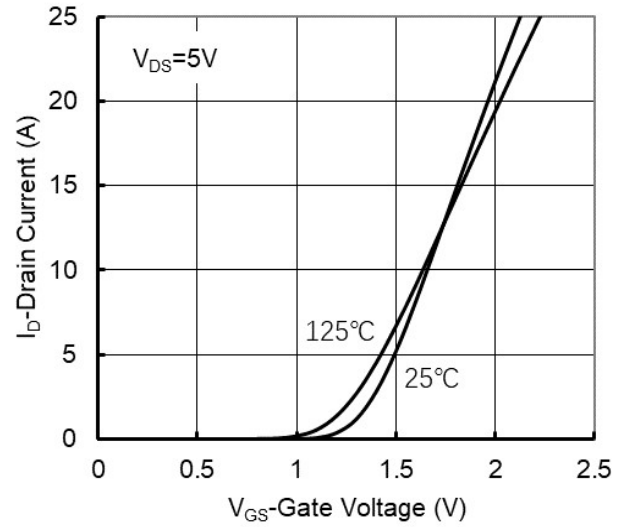


Figure2. Transfer Characteristics

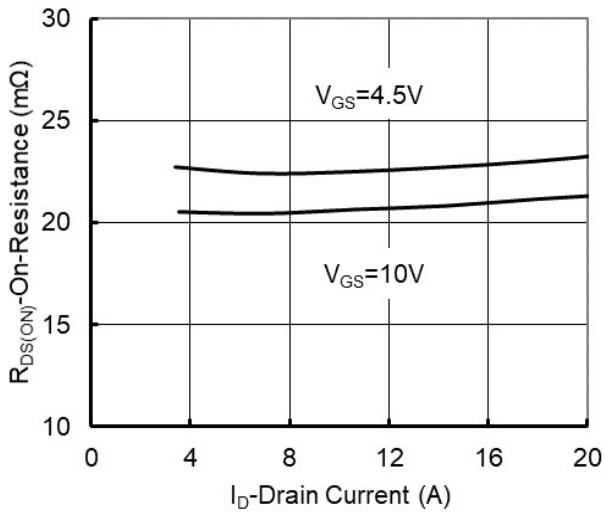


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

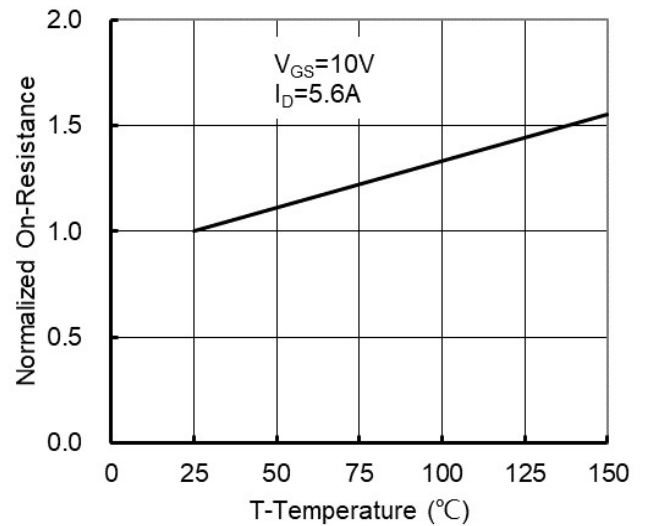


Figure 4: On-Resistance vs. Junction Temperature

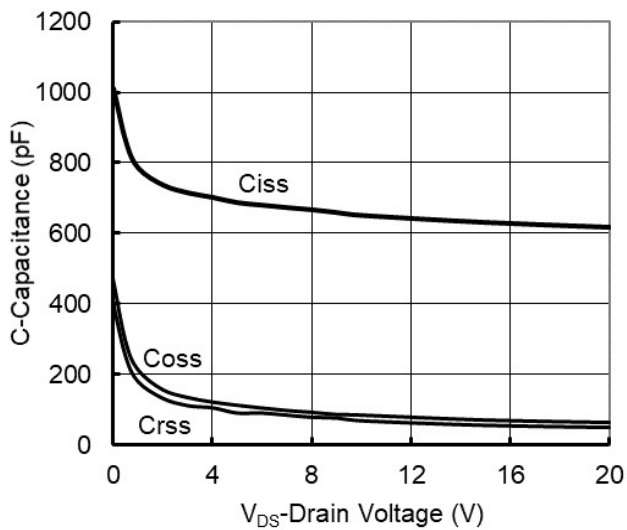


Figure5. Capacitance Characteristics

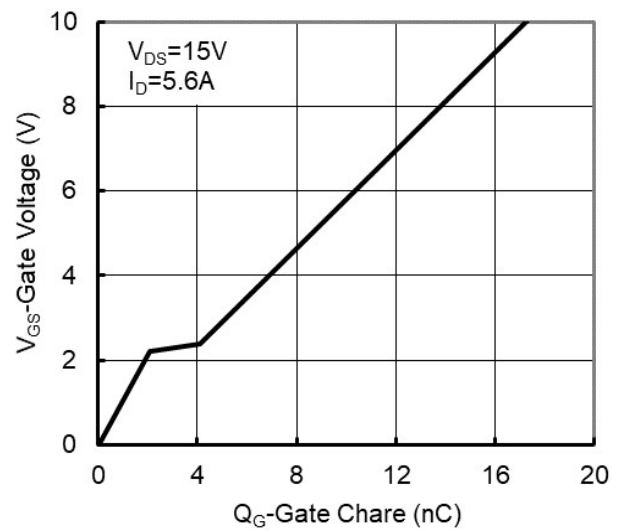


Figure6. Gate Charge

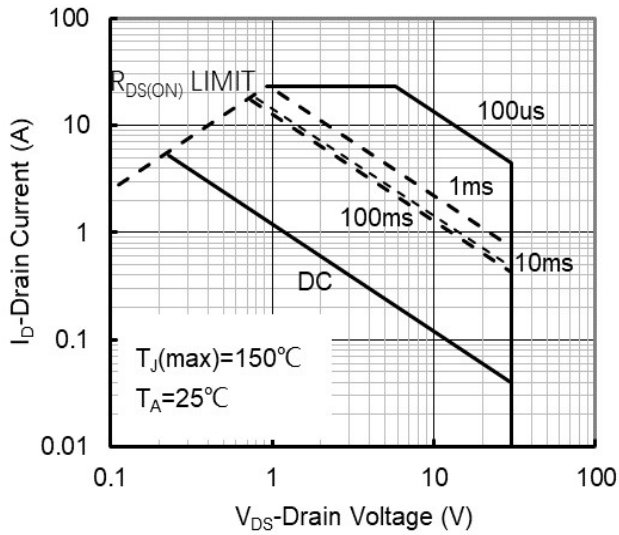


Figure7. Safe Operation Area

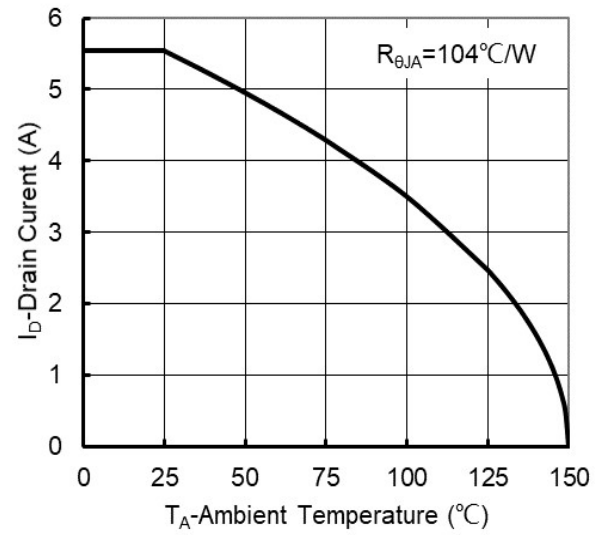


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

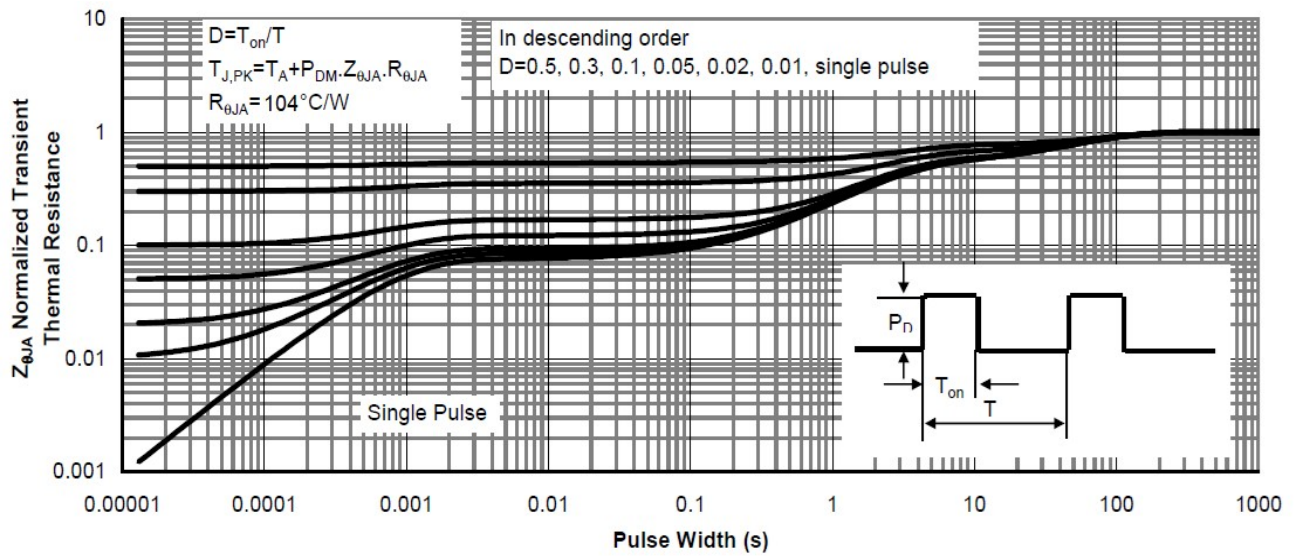
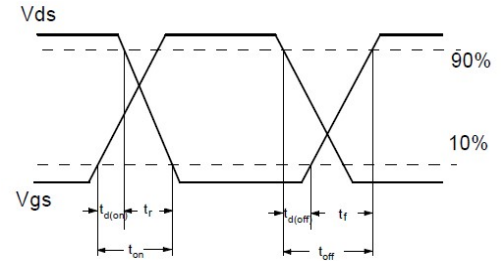
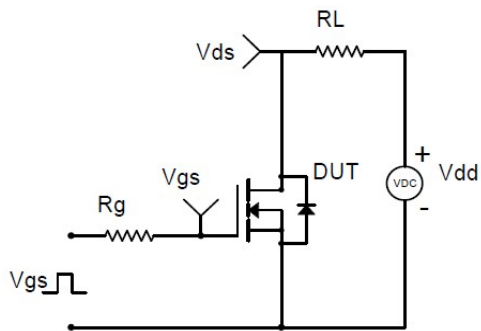
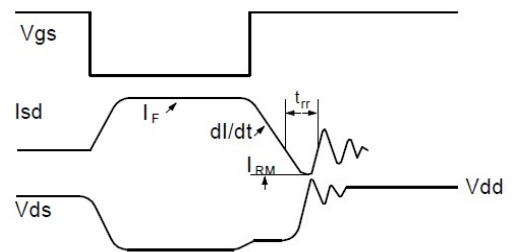
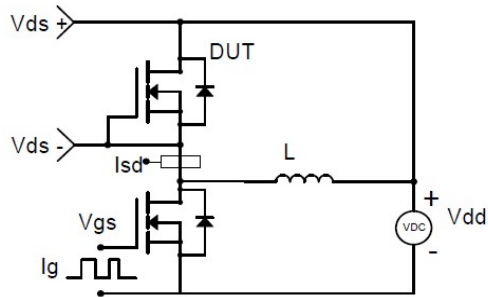


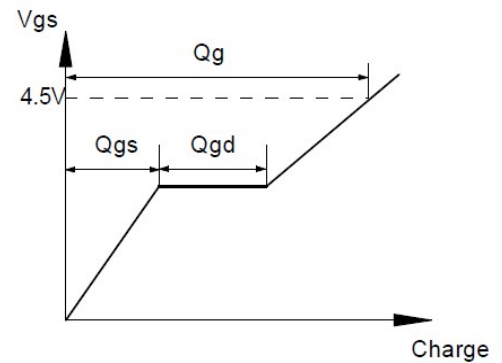
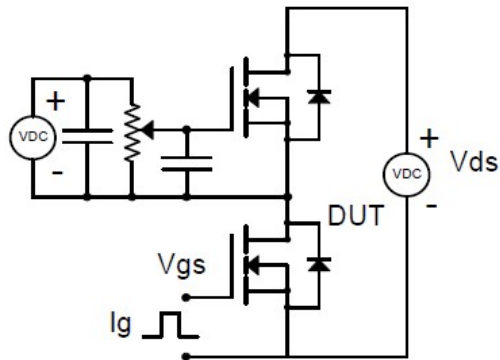
Figure9. Normalized Maximum Transient Thermal Impedance



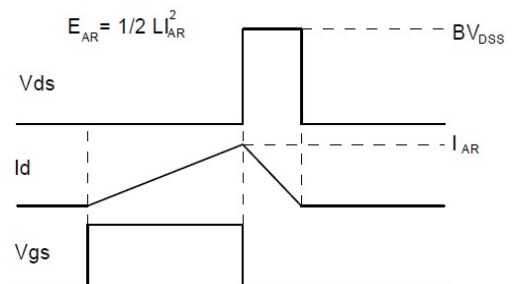
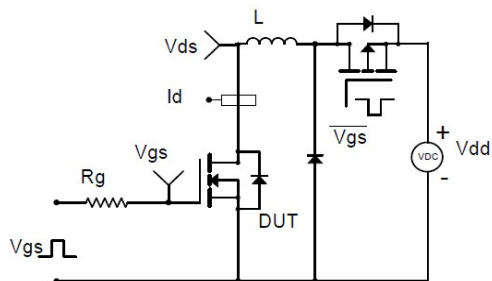
Resistive Switching Test Circuit &amp; Waveforms



Diode Recovery Test Circuit &amp; Waveforms

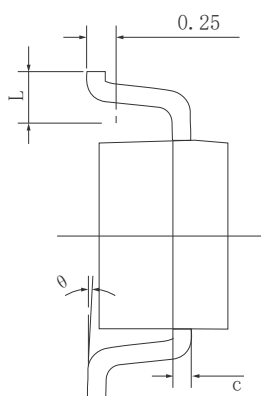
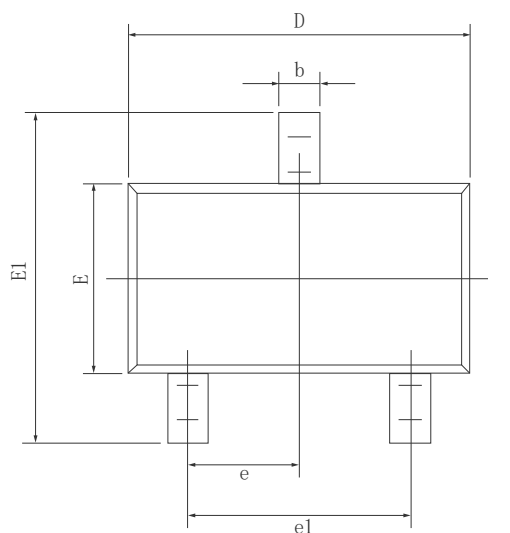


Gate Charge Test Circuit &amp; Waveform

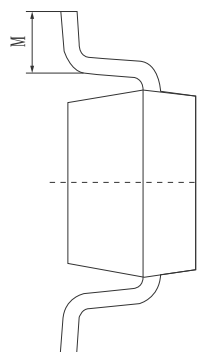
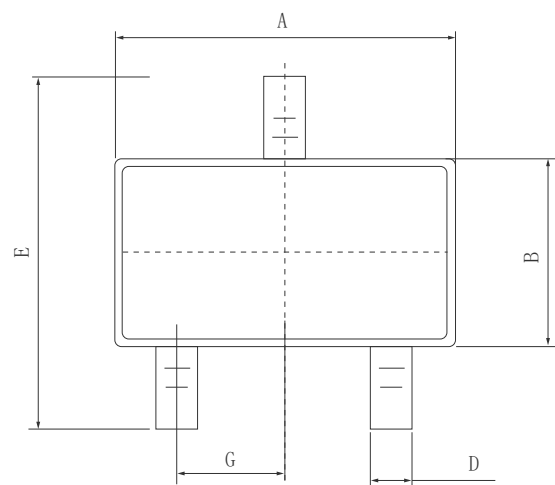
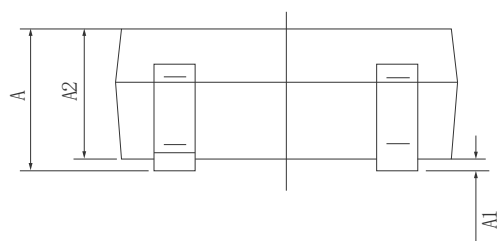


Unclamped Inductive Switching (UIS) Test Circuit &amp; Waveforms

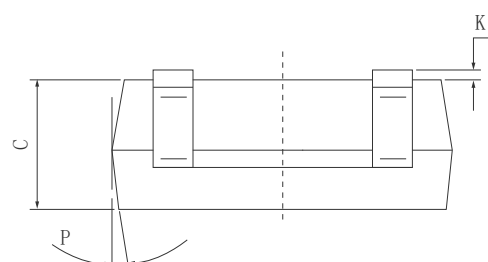
# Dimensions (SOT23-3)



| SYMBOL   | MILLIMETER |      |      |
|----------|------------|------|------|
|          | MIN        | NOM  | MAX  |
| A        | —          | —    | 1.25 |
| A1       | 0.03       | —    | 0.10 |
| A2       | 1.05       | 1.10 | 1.15 |
| b        | 0.30       | 0.35 | 0.40 |
| c        | 0.13       | —    | 0.17 |
| D        | 2.87       | 2.92 | 2.97 |
| E        | 1.55       | 1.60 | 1.65 |
| E1       | 2.70       | 2.85 | 3.00 |
| e        | 0.95 BSC.  |      |      |
| e1       | 1.80       | —    | 2.00 |
| L        | 0.35       | 0.45 | 0.55 |
| $\theta$ | 0°         | —    | 8°   |

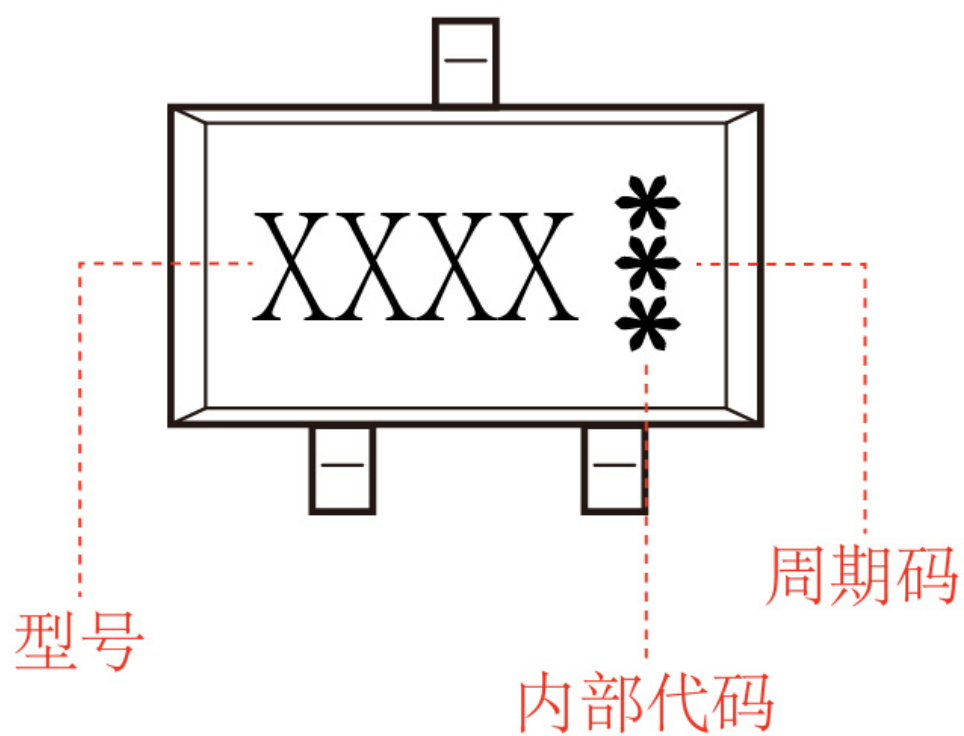


| DIM | MILLIMETERS |
|-----|-------------|
| A   | 2.82~3.02   |
| B   | 1.60±0.10   |
| C   | 1.10±0.05   |
| D   | 0.40±0.10   |
| E   | 2.65~2.95   |
| G   | 0.95typ     |
| K   | 0.00~0.10   |
| M   | 0.20MIN     |
| P   | 9±2°        |



SOT23-3

Marking Instructions:



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