

### ● General Description

The AGM665D 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
- 100% DVDS tested

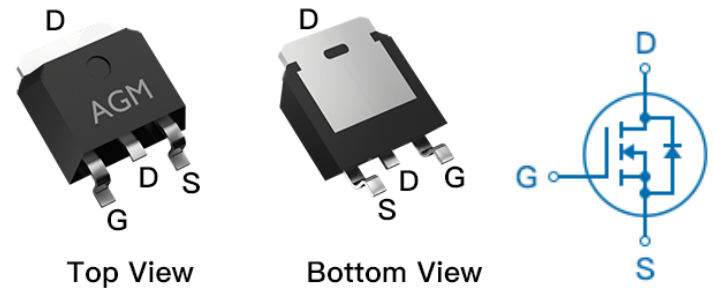
### ● Application

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

### Product Summary

| BVDSS | RDSON | ID  |
|-------|-------|-----|
| 60V   | 60mΩ  | 15A |

### TO-252 Pin Configuration



### Package Marking and Ordering Information

| Device Marking | Device  | Device Package | Reel Size | Tape width | Quantity |
|----------------|---------|----------------|-----------|------------|----------|
| AGM665D        | AGM665D | TO-252         | 330mm     | 16mm       | 2500     |

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

| Symbol      | Parameter                                         | Value      | Unit |
|-------------|---------------------------------------------------|------------|------|
| VDS         | Drain-Source Voltage (VGS=0V)                     | 60         | V    |
| VGS         | Gate-Source Voltage (VDS=0V)                      | ±20        | V    |
| ID          | Drain Current-Continuous(TC=25°C) <b>(Note 1)</b> | 15         | A    |
|             | Drain Current-Continuous(TC=100°C)                | 9.5        | A    |
| IDM (pluse) | Drain Current-Pulsed <b>(Note 2)</b>              | 60         | A    |
| PD          | Maximum Power Dissipation(TC=25°C)                | 28         | w    |
|             | Maximum Power Dissipation(TC=100°C)               | 11         | w    |
| EAS         | Avalanche energy <b>(Note 3)</b>                  | 25         | 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> | --  | 50  | °C/W |
| RθJC   | Thermal Resistance Junction-Case <sup>1</sup>                   | --- | 4.4 | °C/W |

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

| Symbol                                    | Parameter                        | Conditions                          | Min | Typ  | Max  | Unit |
|-------------------------------------------|----------------------------------|-------------------------------------|-----|------|------|------|
| <b>On/Off States</b>                      |                                  |                                     |     |      |      |      |
| BVDSS                                     | Drain-Source Breakdown Voltage   | VGS=0V ID=250μA                     | 60  | --   | --   | V    |
| IDSS                                      | Zero Gate Voltage Drain Current  | VDS=60V,VGS=0V                      | --  | --   | 1    | μA   |
| IGSS                                      | Gate-Body Leakage Current        | VGS=±20V,VDS=0V                     | --  | --   | ±100 | nA   |
| VGS(th)                                   | Gate Threshold Voltage           | VDS=VGS,ID=250μA                    | 1.2 | --   | 2.1  | V    |
| gFS                                       | Forward Transconductance         | VDS=5V,ID=2A                        | --  | 5    | --   | S    |
| RDS(on)                                   | Drain-Source On-State Resistance | VGS=10V, ID=3A                      | --  | 60   | 80   | mΩ   |
|                                           |                                  | VGS=4.5V, ID=2A                     | --  | 70   | 95   | mΩ   |
| <b>Dynamic Characteristics</b>            |                                  |                                     |     |      |      |      |
| Ciss                                      | Input Capacitance                | VDS=30V,VGS=0V,<br>F=1MHZ           | --  | 400  | --   | pF   |
| Coss                                      | Output Capacitance               |                                     | --  | 28   | --   | pF   |
| Crss                                      | Reverse Transfer Capacitance     |                                     | --  | 23   | --   | pF   |
| Rg                                        | Gate resistance                  | VGS=0V,<br>VDS=0V,f=1.0MHz          | --  | 2.8  | --   | Ω    |
| <b>Switching Times</b>                    |                                  |                                     |     |      |      |      |
| td(on)                                    | Turn-on Delay Time               | VGS=10V,VDS=30V,<br>ID=5A,RGEN=2.3Ω | --  | 4.5  | --   | nS   |
| tr                                        | Turn-on Rise Time                |                                     | --  | 10   | --   | nS   |
| td(off)                                   | Turn-Off Delay Time              |                                     | --  | 12.5 | --   | nS   |
| tf                                        | Turn-Off Fall Time               |                                     | --  | 1.5  | --   | nS   |
| Qg                                        | Total Gate Charge                | VGS=10V, VDS=30V,<br>ID=5A          | --  | 8.8  | --   | nC   |
| Qgs                                       | Gate-Source Charge               |                                     | --  | 1.0  | --   | nC   |
| Qgd                                       | Gate-Drain Charge                |                                     | --  | 2.5  | --   | nC   |
| <b>Source-Drain Diode Characteristics</b> |                                  |                                     |     |      |      |      |
| ISD                                       | Source-Drain Current(Body Diode) |                                     | --  | --   | 15   | A    |
| VSD                                       | Forward on Voltage               | VGS=0V,IS=3A                        | --  | --   | 1.2  | V    |
| trr                                       | Reverse Recovery Time            | IF=3A , dl/dt=100A/μs ,<br>TJ=25°C  | --  | 24   | --   | ns   |
| Qrr                                       | Reverse Recovery Charge          |                                     | --  | 12   | --   | 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 , VDD=30V,Vgs=10V,ID=10A, L=0.5mH,RG=25ohm

### Typical Electrical and Thermal Characteristics Diagrams

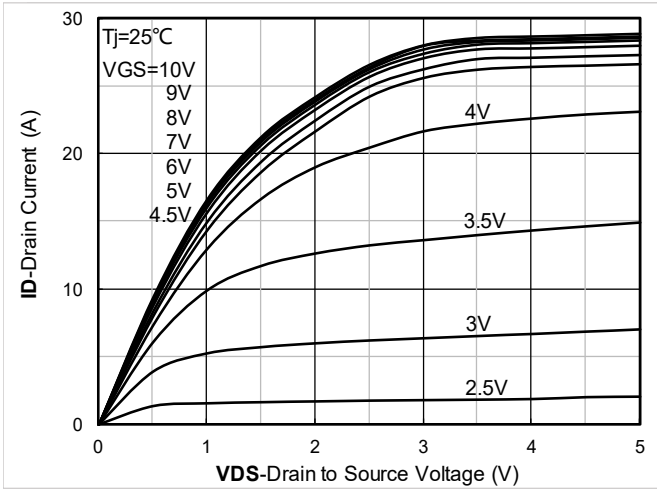


Figure 1. Output Characteristics

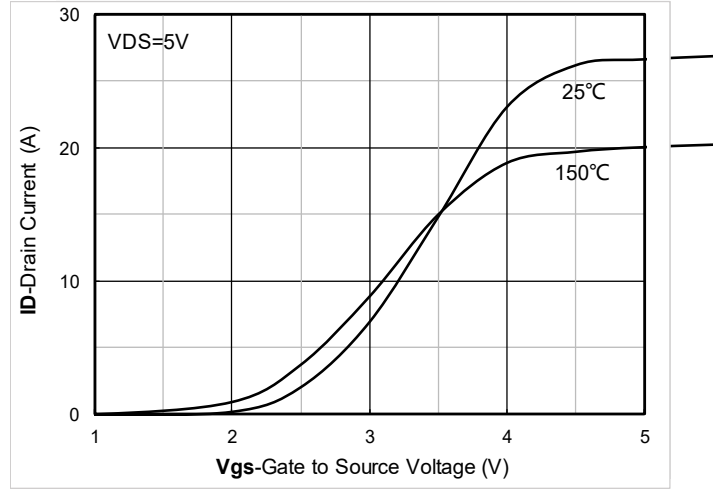


Figure 2. Transfer Characteristics

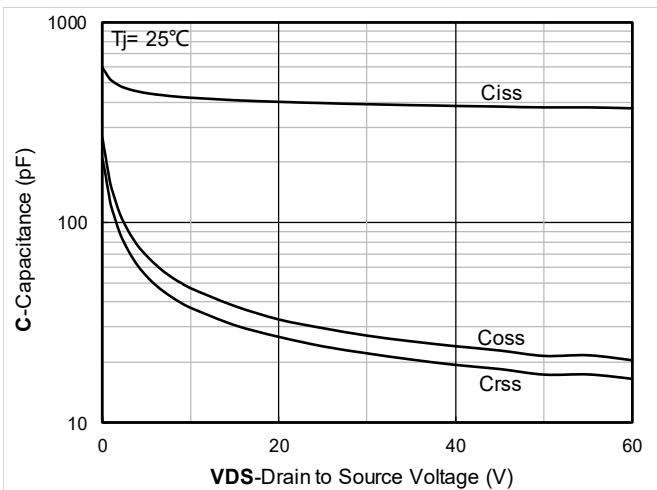


Figure 3. Capacitance Characteristics

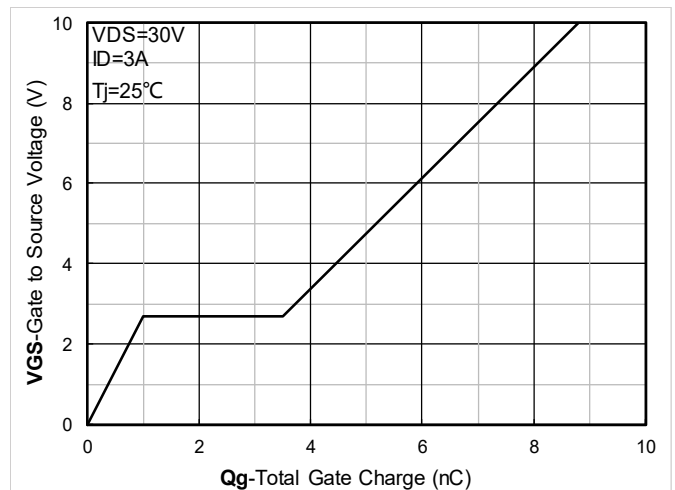


Figure 4. Gate Charge

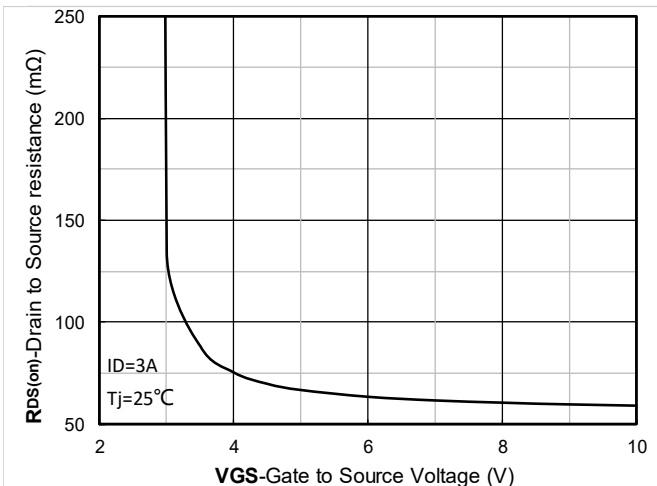


Figure 5. On-Resistance vs Gate to Source Voltage

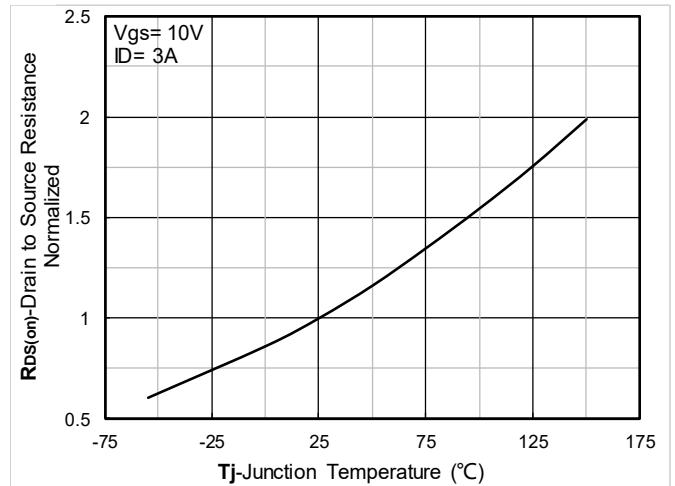


Figure 6. Normalized On-Resistance

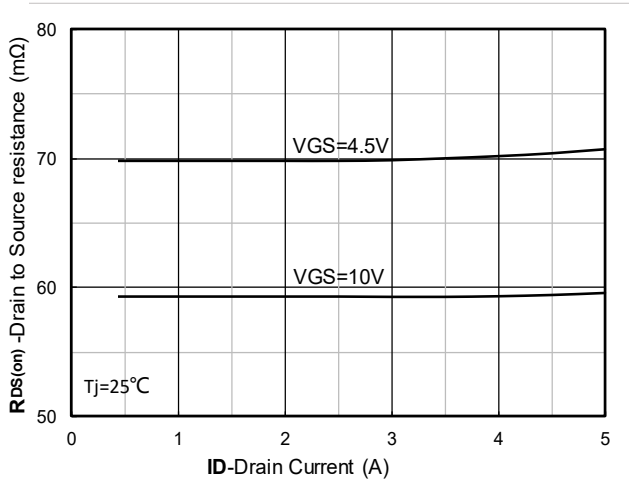


Figure 7.  $R_{DS(on)}$  VS Drain Current

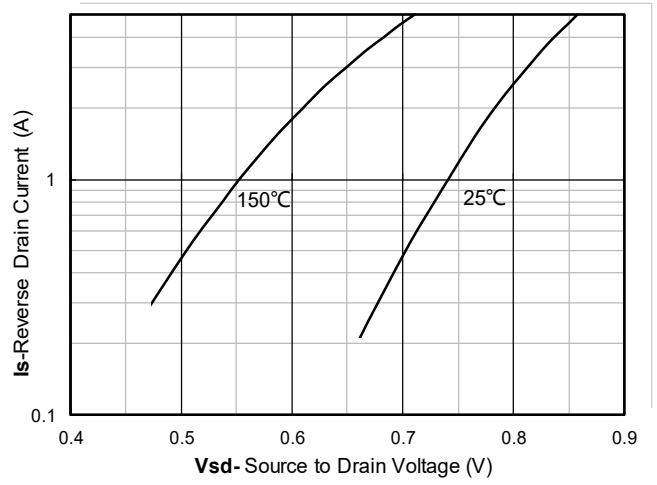


Figure 8. Forward characteristics of reverse diode

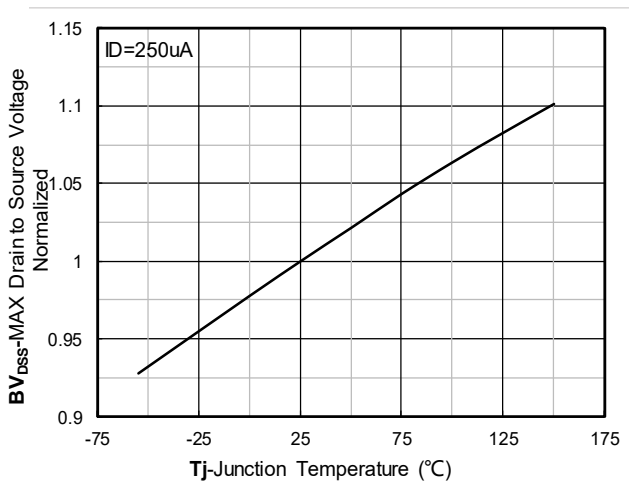


Figure 9. Normalized breakdown voltage

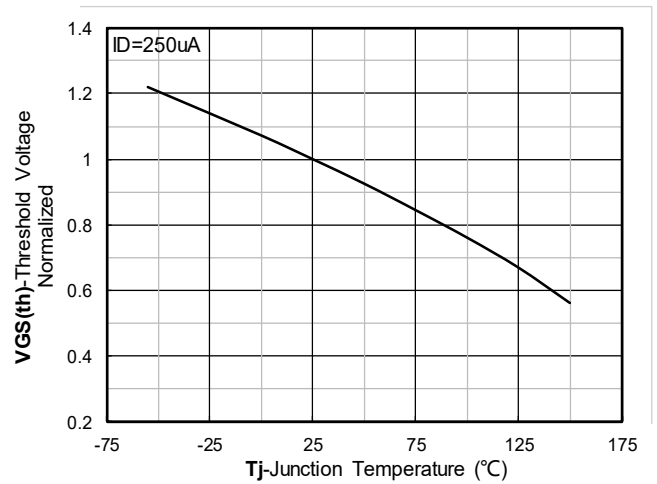


Figure 10. Normalized Threshold voltage

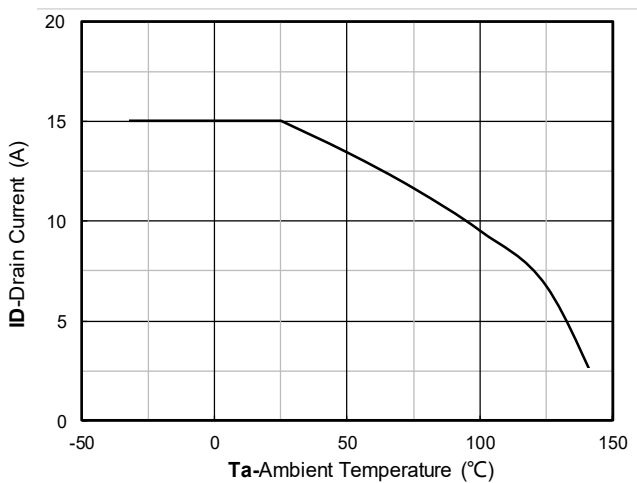


Figure 11. Current dissipation

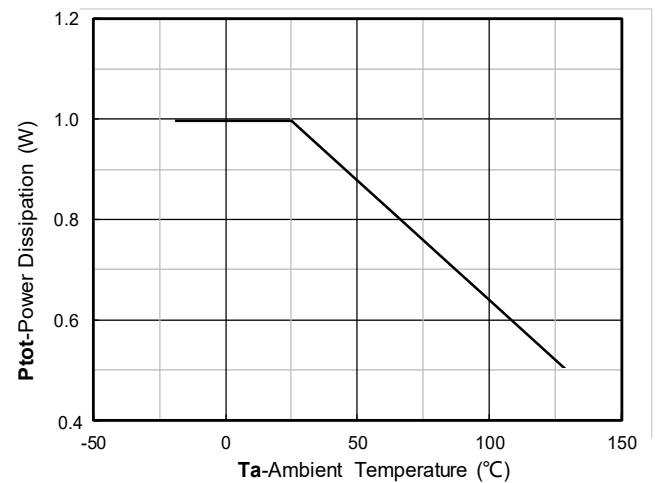


Figure 12. Power dissipation

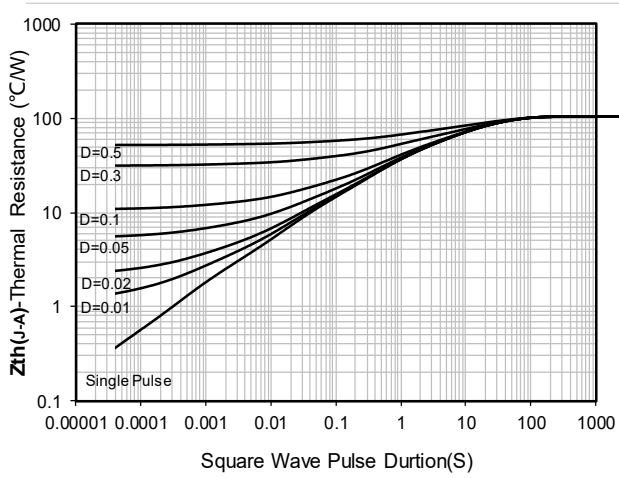


Figure 13. Maximum Transient Thermal Impedance

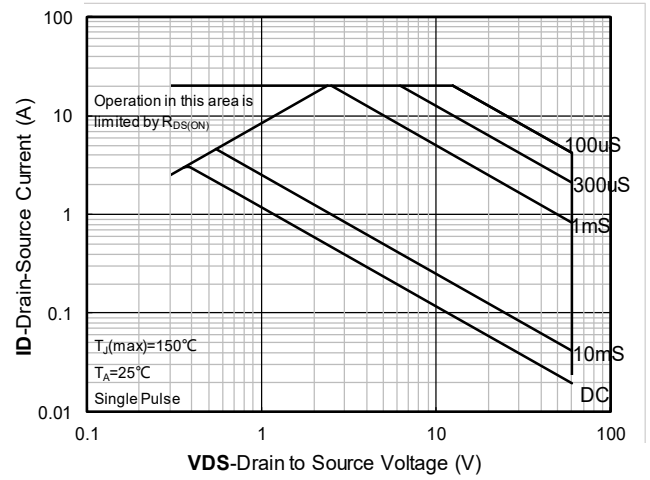


Figure 14. Safe Operation Area

### ■ Test Circuits & Waveforms

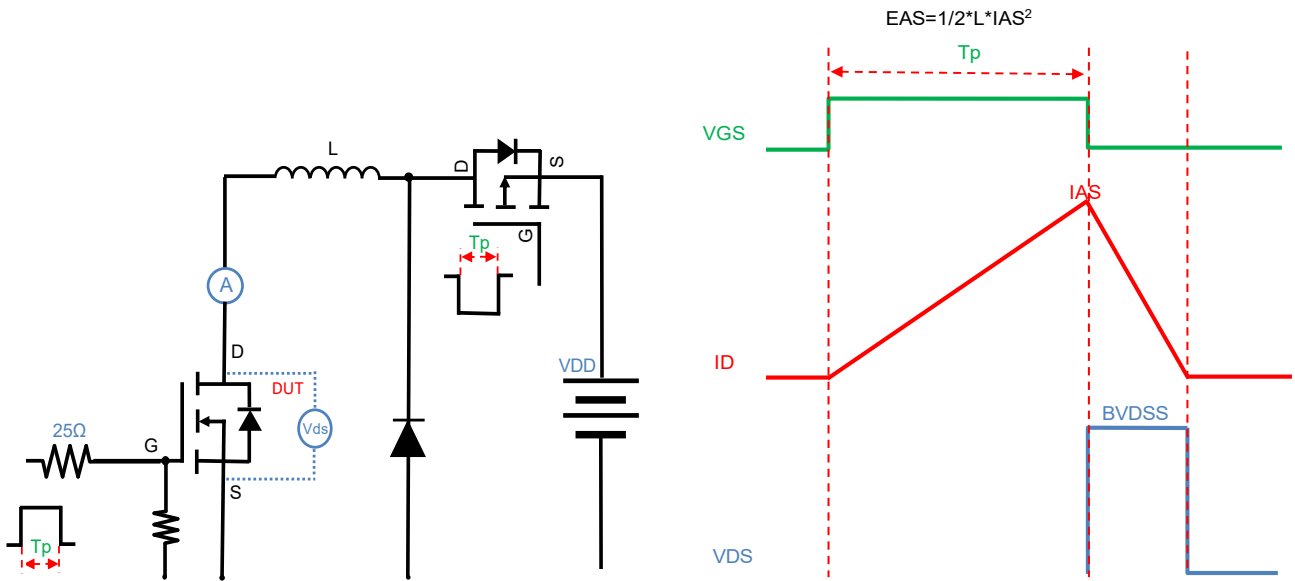


Figure A. Unclamped Inductive Switching (UIS) Test Circuit &amp; Waveform

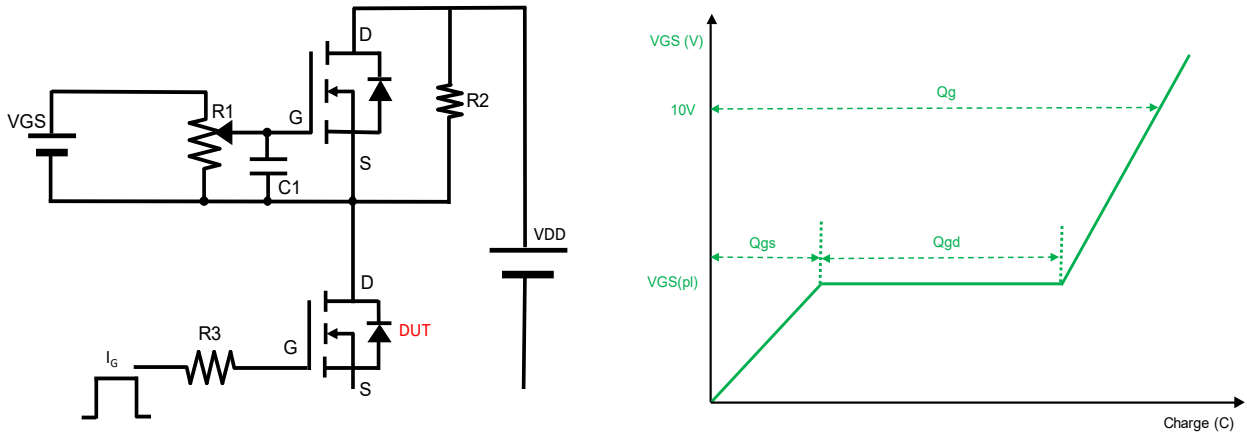


Figure B. Gate Charge Test Circuit & Waveform

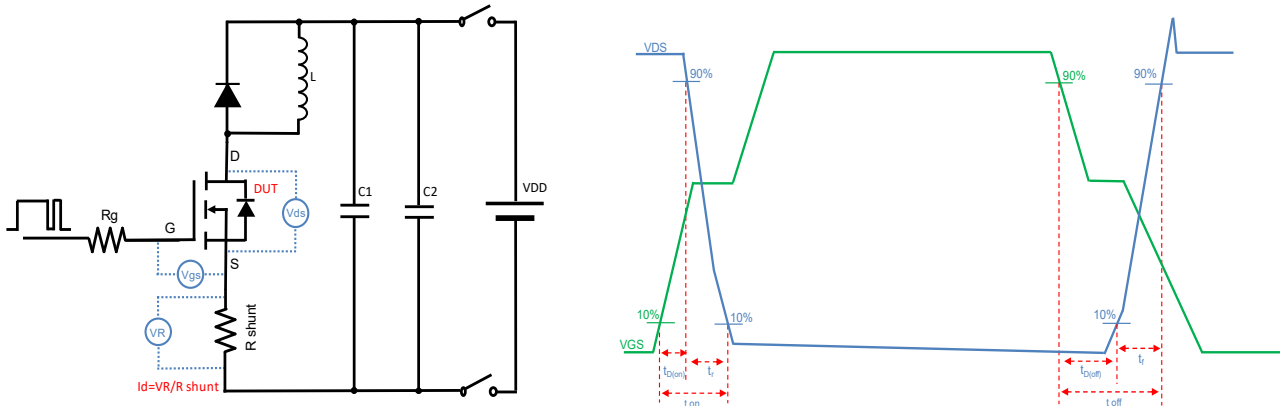


Figure C. Resistive Switching Test Circuit & Waveform

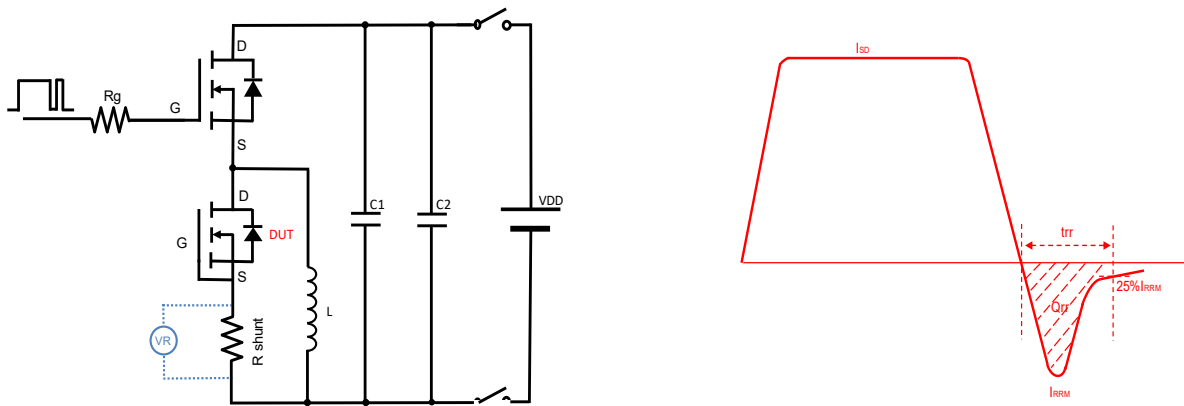
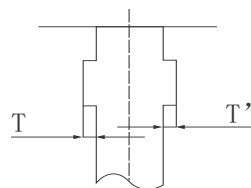
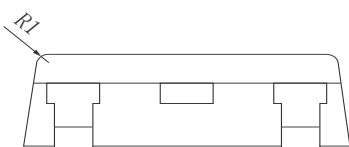
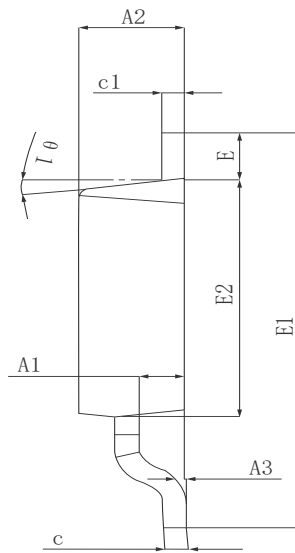
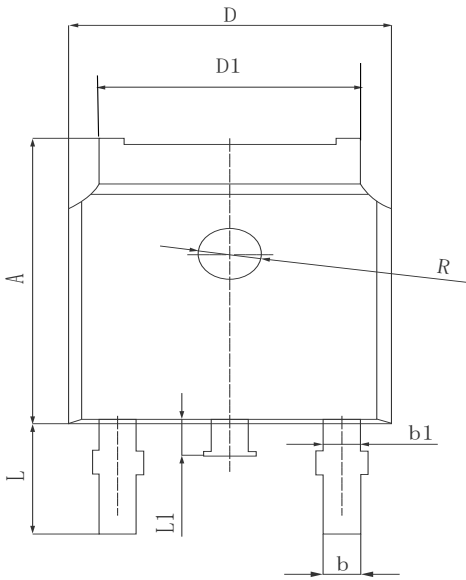
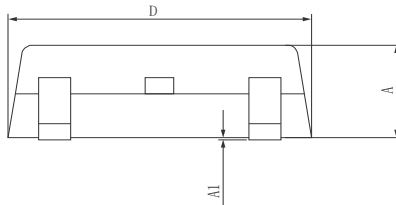
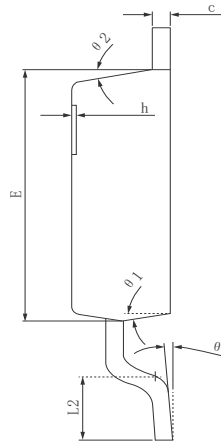
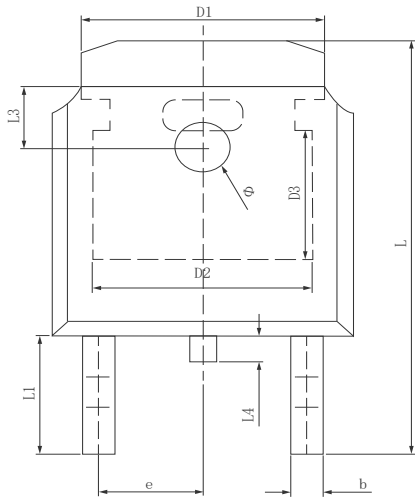


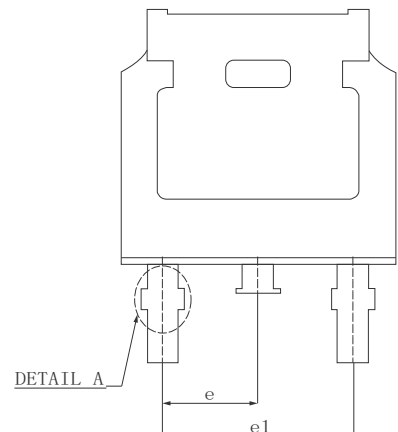
Figure D. Diode Recovery Test Circuit & Waveform

**●Dimensions (TO-252)**


$0 \leq T, T' \leq 0.12$   
**DETAIL A**

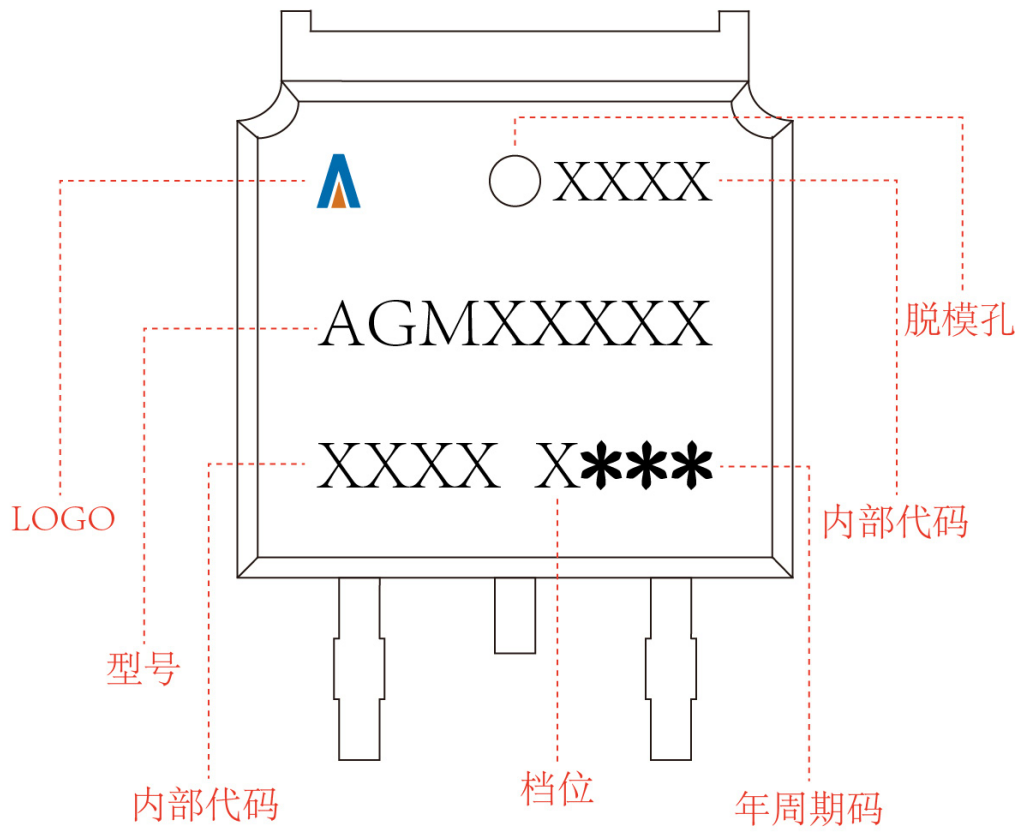
| SYMBOL  | MILLIMETER |        |        |
|---------|------------|--------|--------|
|         | MIN        | Typ.   | MAX    |
| A       | 2.200      | 2.300  | 2.400  |
| A1      | 0.000      |        | 0.127  |
| b       | 0.640      | 0.690  | 0.740  |
| c (电镀后) | 0.460      | 0.520  | 0.580  |
| D       | 6.500      | 6.600  | 6.700  |
| D1      | 5.334 REF  |        |        |
| D2      | 4.826 REF  |        |        |
| D3      | 3.166 REF  |        |        |
| E       | 6.000      | 6.100  | 6.200  |
| e       | 2.286 TYP  |        |        |
| h       | 0.000      | 0.100  | 0.200  |
| L       | 9.900      | 10.100 | 10.300 |
| L1      | 2.888 REF  |        |        |
| L2      | 1.400      | 1.550  | 1.700  |
| L3      | 1.600 REF  |        |        |
| L4      | 0.600      | 0.800  | 1.000  |
| Φ       | 1.100      | 1.200  | 1.300  |
| θ       | 0°         |        | 8°     |
| θ 1     | 9° TYP     |        |        |
| θ 2     | 9° TYP     |        |        |

| SYMBOL | MILLIMETER |       |        |
|--------|------------|-------|--------|
|        | MIN        | NOM   | MAX    |
| A      | 7.050      | 7.100 | 7.150  |
| A1     | 0.960      | 1.010 | 1.060  |
| A2     | 2.250      | 2.300 | 2.350  |
| A3     | 0.000      | 0.050 | 0.100  |
| b      | 0.760REF.  |       |        |
| b1     | 1.000REF.  |       |        |
| c      | 0.508REF.  |       |        |
| c1     | 0.508REF.  |       |        |
| D      | 6.550      | 6.600 | 6.650  |
| D1     | 5.220      | 5.320 | 5.420  |
| E      | 0.950      | 1.000 | 1.050  |
| E1     | 9.700      | 9.900 | 10.100 |
| E2     | 6.050      | 6.100 | 6.150  |
| e      | 2.286BSC   |       |        |
| e1     | 4.572REF.  |       |        |
| L      | 2.650      | 2.800 | 2.950  |
| L1     | 0.700      | 0.800 | 0.900  |
| θ 1    | 7° REF.    |       |        |
| R      | 1.300REF.  |       |        |
| R1     | 0.250REF.  |       |        |



TO-252

Marking Instructions:




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