

## General Description

The AGM401A combines advanced [Super Trench II](#) 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

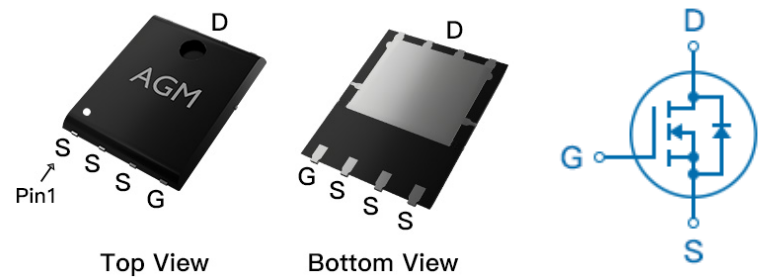
## Application

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

## Product Summary

| BVDSS | RDSON  | ID   |
|-------|--------|------|
| 40V   | 0.65mΩ | 290A |

## PDFN5\*6 Pin Configuration



## Package Marking and Ordering Information

| Device Marking | Device  | Device Package | Reel Size | Tape width | Quantity |
|----------------|---------|----------------|-----------|------------|----------|
| AGM401A        | AGM401A | PDFN5*6        | 330mm     | 12mm       | 3000     |

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

| Symbol      | Parameter                                         | Value      | Unit |
|-------------|---------------------------------------------------|------------|------|
| VDS         | Drain-Source Voltage (VGS=0V)                     | 40         | V    |
| VGS         | Gate-Source Voltage (VDS=0V)                      | ±20        | V    |
| ID          | Drain Current-Continuous(Tc=25°C) <b>(Note 1)</b> | 290        | A    |
|             | Drain Current-Continuous(Tc=100°C)                | 184        | A    |
| IDM (pluse) | Drain Current-Pulsed <b>(Note 2)</b>              | 1160       | A    |
| PD          | Maximum Power Dissipation(Tc=25°C)                | 119        | w    |
|             | Maximum Power Dissipation(Tc=100°C)               | 48         | w    |
| EAS         | Avalanche energy <b>(Note 3)</b>                  | 992        | 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> | --- | 20   | °C/W |
| RθJC   | Thermal Resistance Junction-Case <sup>1</sup>                   | --- | 1.05 | °C/W |

**Table 3. Electrical Characteristics (TJ=25°C unless otherwise noted)**

| Symbol                             | Parameter                        | Conditions                         | Min | Typ  | Max  | Unit |
|------------------------------------|----------------------------------|------------------------------------|-----|------|------|------|
| On/Off States                      |                                  |                                    |     |      |      |      |
| BVDSS                              | Drain-Source Breakdown Voltage   | VGS=0V ID=250μA                    | 40  | --   | --   | V    |
| IDSS                               | Zero Gate Voltage Drain Current  | VDS=40V,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 | --   | 2.2  | V    |
| gFS                                | Forward Transconductance         | VDS=5V,ID=10A                      | --  | 30   | --   | S    |
| RDS(on)                            | Drain-Source On-State Resistance | VGS=10V, ID=30A                    | --  | 0.65 | 0.83 | mΩ   |
|                                    |                                  | VGS=4.5V, ID=20A                   | --  | 0.9  | 1.5  | mΩ   |
| Dynamic Characteristics            |                                  |                                    |     |      |      |      |
| Ciss                               | Input Capacitance                | VDS=20V,VGS=0V,<br>F=1MHZ          | --  | 5750 | --   | pF   |
| Coss                               | Output Capacitance               |                                    | --  | 2301 | --   | pF   |
| Crss                               | Reverse Transfer Capacitance     |                                    | --  | 242  | --   | pF   |
| Rg                                 | Gate resistance                  | VGS=0V,<br>VDS=0V,f=1.0MHz         | --  | 3.5  | --   | Ω    |
| Switching Times                    |                                  |                                    |     |      |      |      |
| td(on)                             | Turn-on Delay Time               | VGS=10V,VDS=20V,<br>ID=50A,RGEN=3Ω | --  | 18   | --   | nS   |
| tr                                 | Turn-on Rise Time                |                                    | --  | 100  | --   | nS   |
| td(off)                            | Turn-Off Delay Time              |                                    | --  | 204  | --   | nS   |
| tf                                 | Turn-Off Fall Time               |                                    | --  | 73   | --   | nS   |
| Qg                                 | Total Gate Charge                | VGS=10V, VDS=20V,<br>ID=50A        | --  | 103  | --   | nC   |
| Qgs                                | Gate-Source Charge               |                                    | --  | 51   | --   | nC   |
| Qgd                                | Gate-Drain Charge                |                                    | --  | 10   | --   | nC   |
| Source-Drain Diode Characteristics |                                  |                                    |     |      |      |      |
| ISD                                | Source-Drain Current(Body Diode) |                                    | --  | --   | 290  | A    |
| VSD                                | Forward on Voltage               | VGS=0V,IS=30A                      | --  | --   | 1.2  | V    |
| trr                                | Reverse Recovery Time            | IF=50A , dI/dt=100A/μs ,<br>TJ=25℃ | --  | 64   | --   | ns   |
| Qrr                                | Reverse Recovery Charge          |                                    | --  | 98   | --   | 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: TJ=25°C,VDD=25V,Vgs=10V,ID=63A,L=0.5mH, RG=25ohm

## Typical Performance Characteristics

Figure 1: Output Characteristics

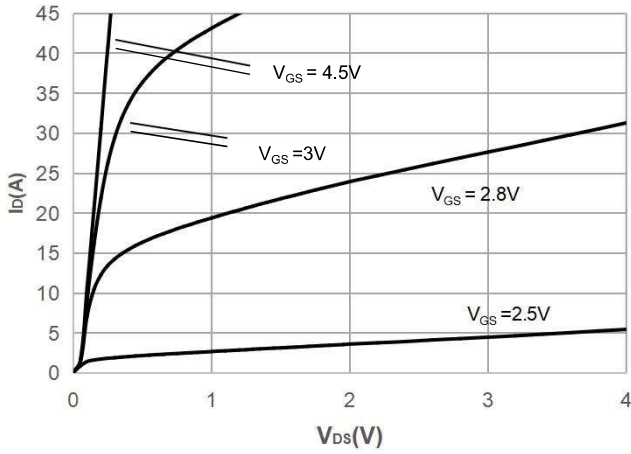


Figure 2: Typical Transfer Characteristics

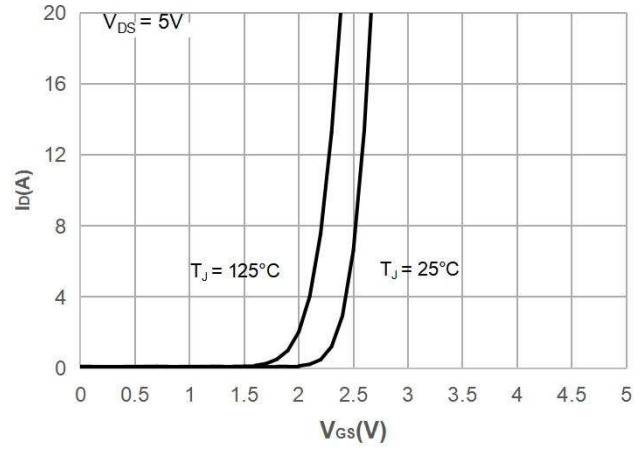


Figure 3: On-resistance vs. Drain Current

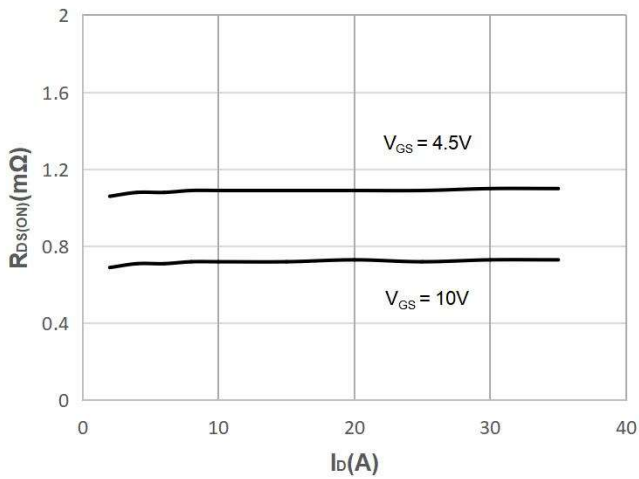


Figure 4: Body Diode Characteristics

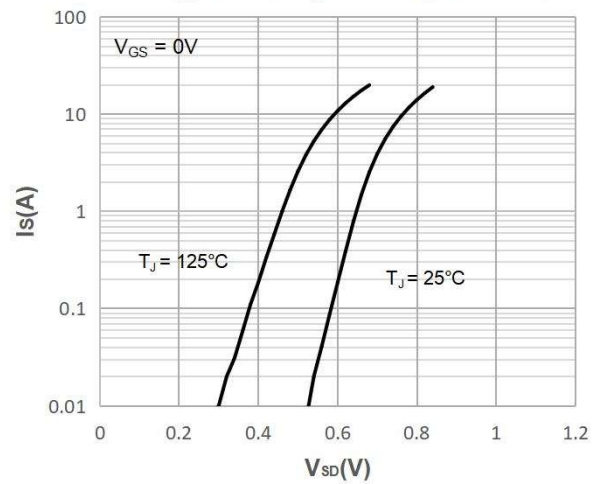


Figure 5: Gate Charge Characteristics

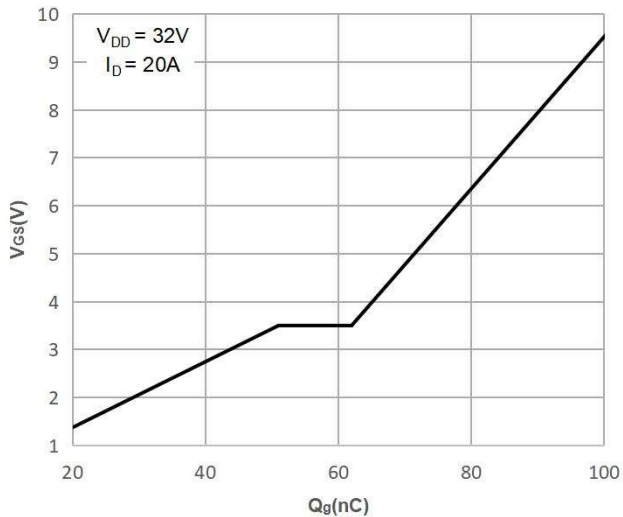
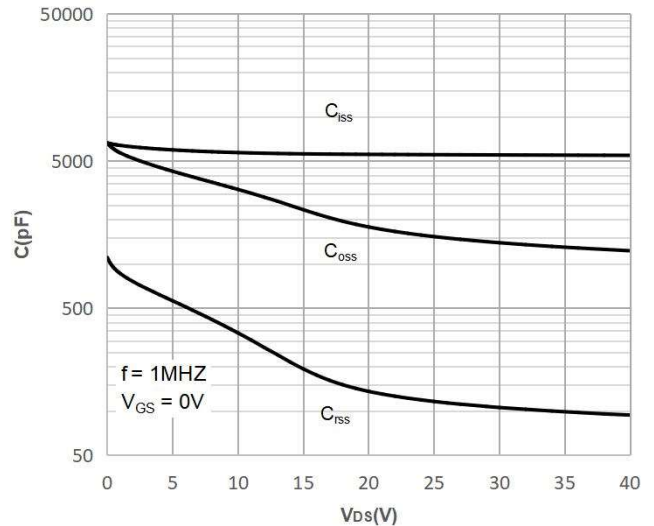


Figure 6: Capacitance Characteristics



## Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

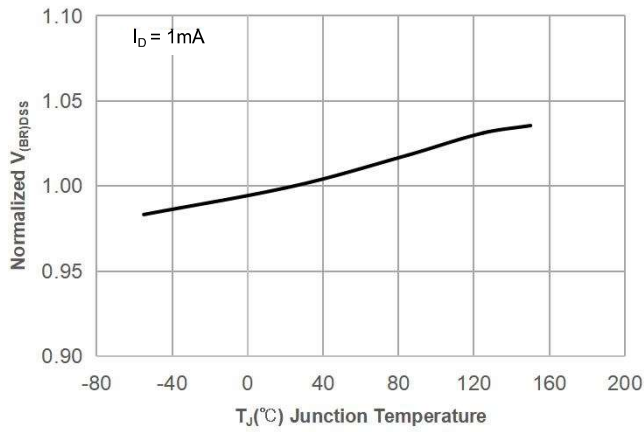


Figure 8: Normalized on Resistance vs. Junction Temperature

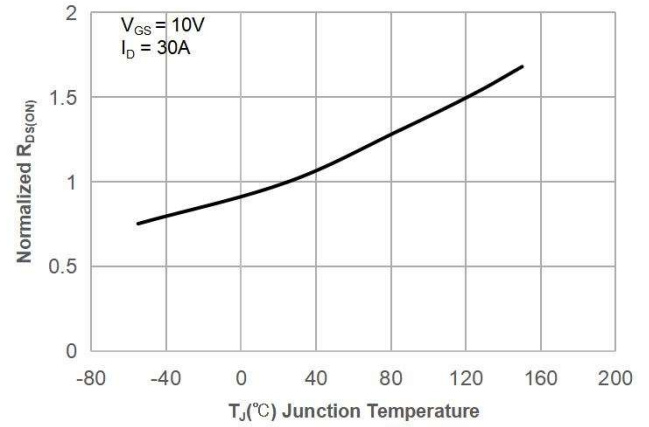


Figure 9: Maximum Safe Operating Area

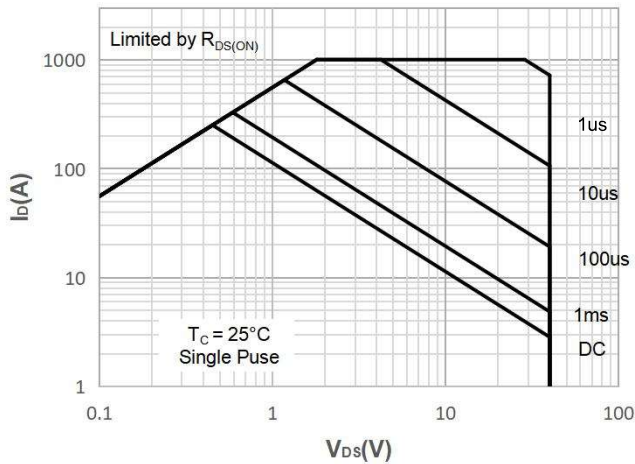


Figure 10: Current Derating

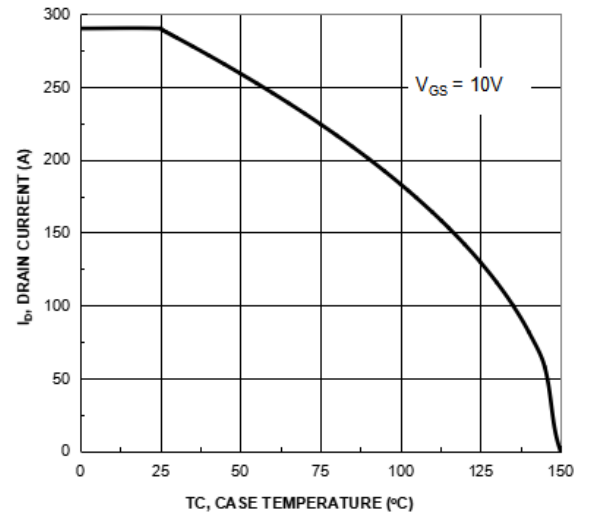


Figure 11: Normalized Maximum Transient Thermal Impedance

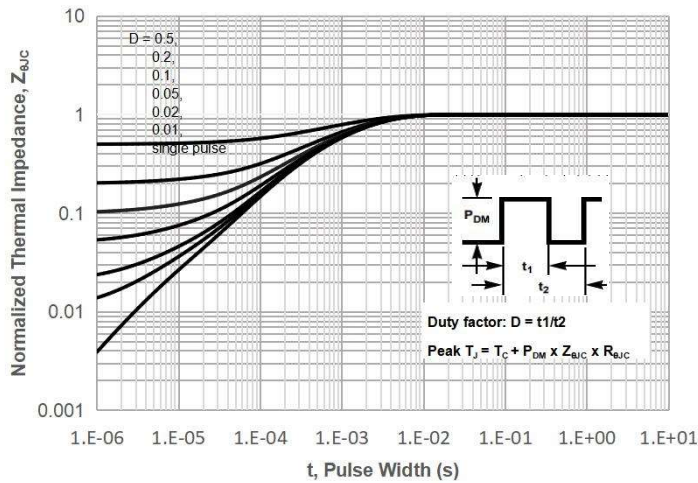
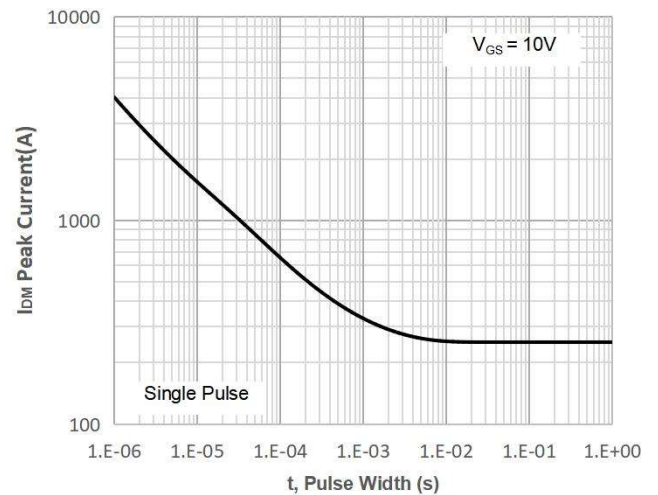


Figure 12: Peak Current Capacity



## Test Circuit

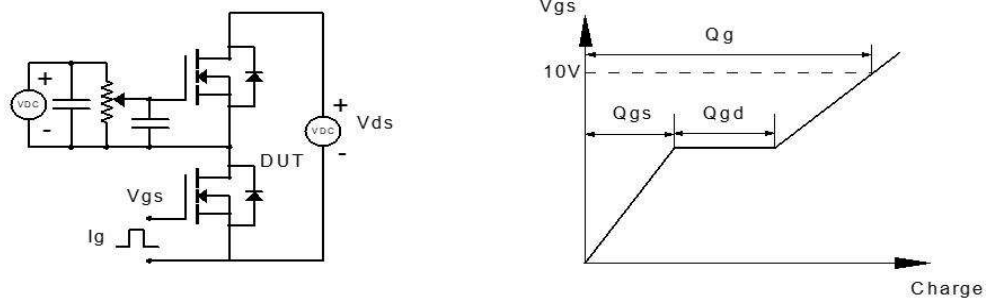


Figure 1: Gate Charge Test Circuit & Waveform

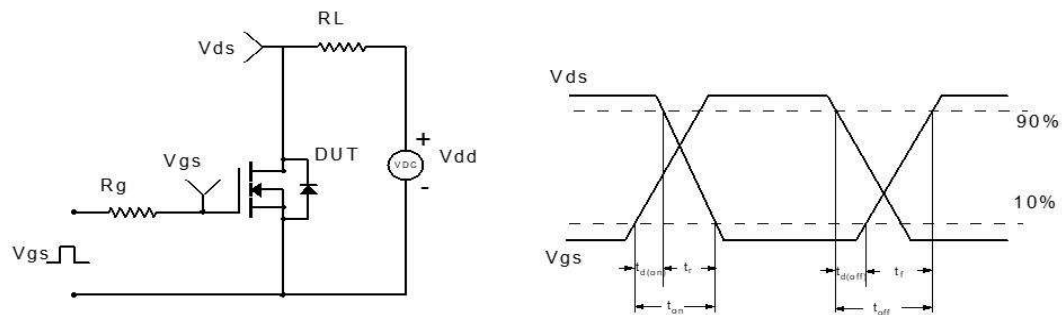


Figure 2: Resistive Switching Test Circuit & Waveform

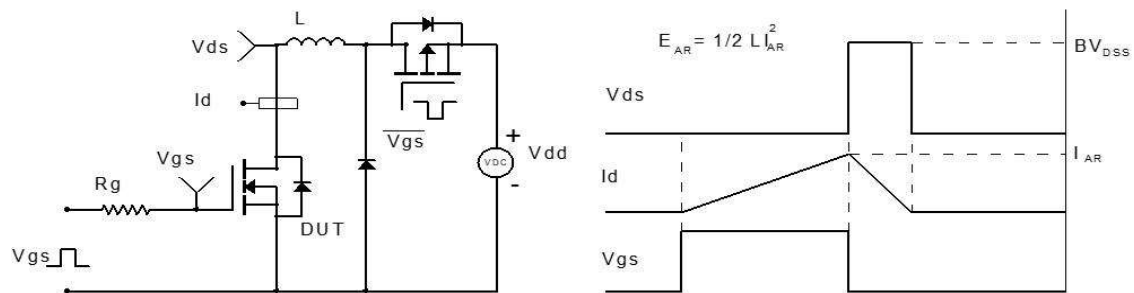


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

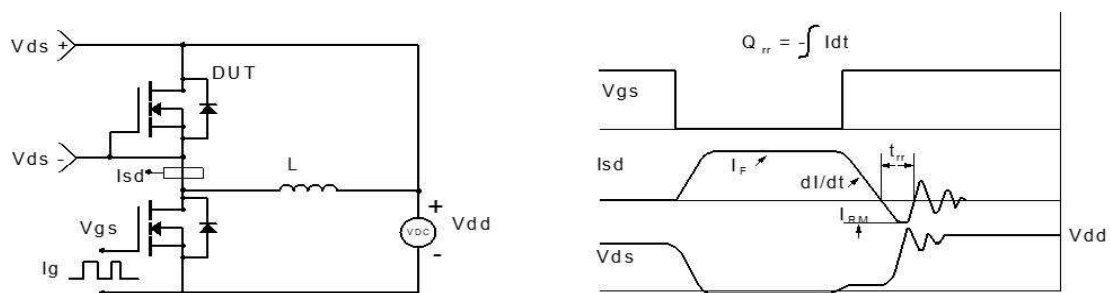
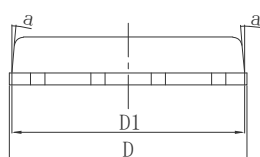
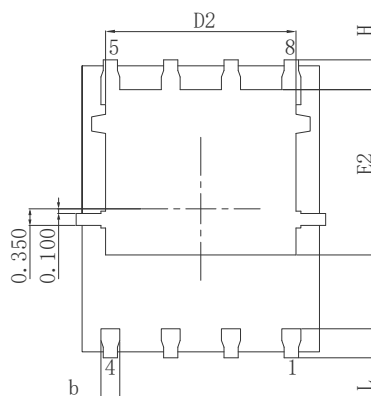
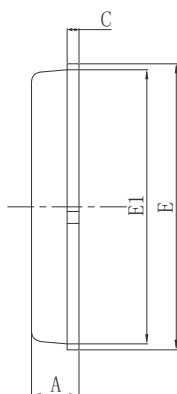
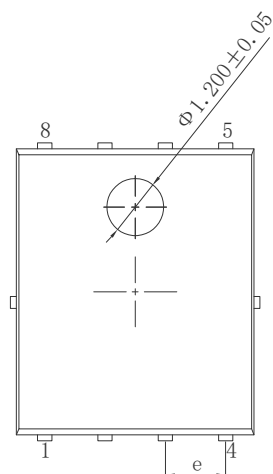


Figure 4: Diode Recovery Test Circuit & Waveform

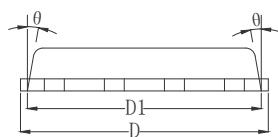
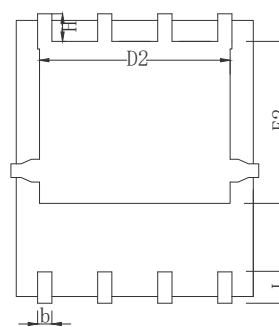
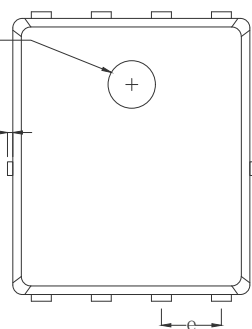
# Dimensions (PDFN5\*6)



| SYMBOL | MILLIMETER |       |       |
|--------|------------|-------|-------|
|        | MIN.       | NOM.  | MAX.  |
| A      | 0.900      | 1.000 | 1.100 |
| b      | 0.330      | 0.400 | 0.510 |
| c      | 0.200      | 0.250 | 0.300 |
| D      | 4.820      | 5.020 | 5.220 |
| D2     | 3.910      | 4.010 | 4.110 |
| E      | 5.900      | 6.000 | 6.100 |
| E1     | 5.700      | 5.750 | 5.800 |
| E2     | 3.370      | 3.470 | 3.570 |
| e      | —          | 1.270 | —     |
| H      | 0.520      | 0.625 | 0.720 |
| D1     | 4.800      | 4.900 | 5.000 |
| L      | 0.510      | 0.610 | 0.710 |
| a      | 0°         | —     | 10°   |
| N      | 8          |       |       |

Φ 1.00\*0.1 DP

0.150 MAX. (2X)

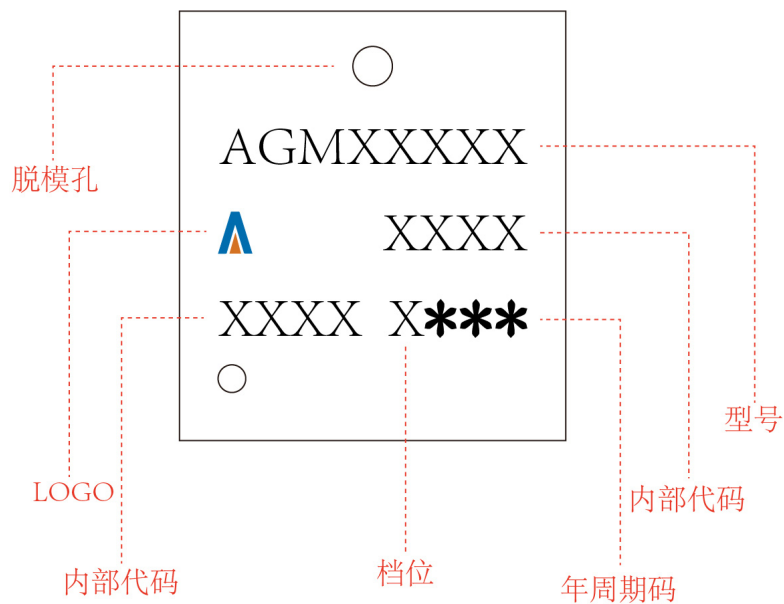


| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | TYP.  | MAX.  |
| * A  | 0.900      | 1.000 | 1.100 |
| b    | 0.310      | 0.410 | 0.510 |
| * c  | 0.210      | 0.250 | 0.340 |
| * D  | 5.050      | 5.200 | 5.400 |
| D1   | 4.950      | 5.050 | 5.150 |
| D2   | 4.000      | 4.100 | 4.200 |
| * E  | 6.300      | 6.400 | 6.500 |
| * E1 | 5.750      | 5.850 | 5.950 |
| E2   | 3.430      | 3.530 | 3.630 |
| e    | 1.27 BSC.  |       |       |
| H    | 0.730      | 0.830 | 0.930 |
| * L  | 0.610      | 0.710 | 0.810 |
| θ    | 0°         | —     | 12°   |

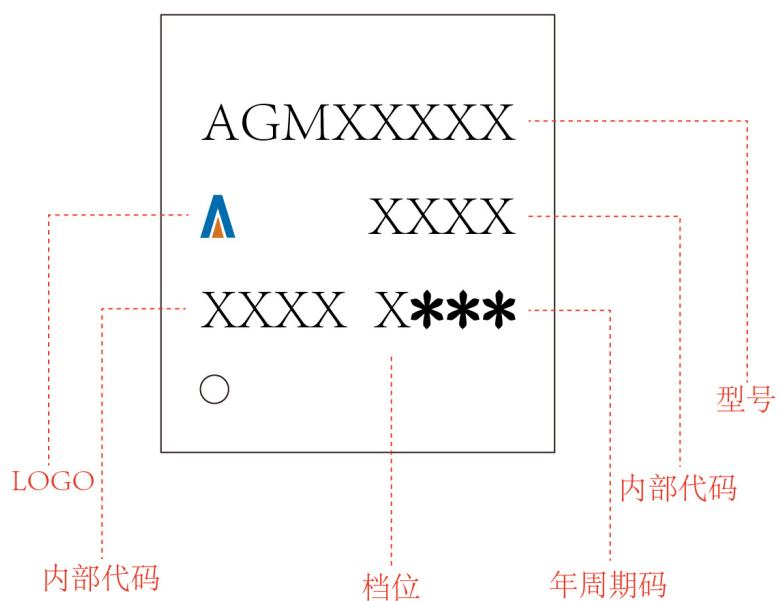
PDFN5\*6

Marking Instructions:

Model1:



Model2:



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