

## General Description

The AGM20P16MBP 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   |
|-------|-------|------|
| -20V  | 16mΩ  | -10A |

## PDFN3.3\*3.3 Pin Configuration

## Package Marking and Ordering Information

| Device Marking | Device      | Device Package | Reel Size | Tape width | Quantity |
|----------------|-------------|----------------|-----------|------------|----------|
| AGM20P16MB     | AGM20P16MBP | PDFN3.3*3.3    | 330mm     | 12mm       | 5000     |

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

| Symbol      | Parameter                                         | Value      | Unit |
|-------------|---------------------------------------------------|------------|------|
| VDS         | Drain-Source Voltage (VGS=0V)                     | -20        | V    |
| VGS         | Gate-Source Voltage (VDS=0V)                      | ±12        | V    |
| ID          | Drain Current-Continuous(TC=25°C) <b>(Note 1)</b> | -10        | A    |
|             | Drain Current-Continuous(TC=100°C)                | -6.8       | A    |
| IDM (pulse) | Drain Current-Pulsed <b>(Note 2)</b>              | -40        | A    |
| PD          | Maximum Power Dissipation(TC=25°C)                | 29         | w    |
|             | Maximum Power Dissipation(TC=100°C)               | 12         | w    |
| EAS         | Avalanche energy <b>(Note 3)</b>                  | --         | 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>                   | --- | 4.2 | °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                      | -20   | --   | --   | V    |
| IDSS                               | Zero Gate Voltage Drain Current  | VDS=-20V,VGS=0V                       | --    | --   | -1   | μA   |
| IGSS                               | Gate-Body Leakage Current        | VGS=±12V,VDS=0V                       | --    | --   | ±100 | nA   |
| VGS(th)                            | Gate Threshold Voltage           | VDS=VGS,ID=-250μA                     | -0.45 | -0.6 | -1.0 | V    |
| gFS                                | Forward Transconductance         | VDS=-5V,ID=-3A                        | --    | 3    | --   | S    |
| RDS(on)                            | Drain-Source On-State Resistance | VGS=-4.5V, ID=-4A                     | --    | 16   | 21   | mΩ   |
|                                    |                                  | VGS=-2.5V, ID=-3A                     | --    | 20   | 26   | mΩ   |
| Dynamic Characteristics            |                                  |                                       |       |      |      |      |
| Ciss                               | Input Capacitance                | VDS=-10V,VGS=0V,<br>VDS=0V,f=1.0MHz   | --    | 980  | --   | pF   |
| Coss                               | Output Capacitance               |                                       | --    | 450  | --   | pF   |
| Crss                               | Reverse Transfer Capacitance     |                                       | --    | 250  | --   | Ω    |
| Rg                                 | Gate resistance                  | VGS=0V, VDS=0V,<br>f=1.0MHz           | --    | --   | --   | Ω    |
| Switching Times                    |                                  |                                       |       |      |      |      |
| td(on)                             | Turn-on Delay Time               | VGS=-4V, VDS=-4.5V,<br>ID=-3.3A,RG=1Ω | --    | 12   | --   | nS   |
| tr                                 | Turn-on Rise Time                |                                       | --    | 35   | --   | nS   |
| td(off)                            | Turn-Off Delay Time              |                                       | --    | 30   | --   | nS   |
| tf                                 | Turn-Off Fall Time               |                                       | --    | 10   | --   | nC   |
| Qg                                 | Total Gate Charge                | VGS=-4V,<br>VDS=-4.5V,ID=-4.1A        | --    | 7.8  | --   | nC   |
| Qgs                                | Gate-Source Charge               |                                       | --    | 1.2  | --   | nC   |
| Qgd                                | Gate-Drain Charge                |                                       | --    | 1.6  | --   | nC   |
| Source-Drain Diode Characteristics |                                  |                                       |       |      |      |      |
| ISD                                | Source-Drain Current(Body Diode) | VGS=0V,IS=-4A                         | --    | --   | -10  | A    |
| VSD                                | Forward on Voltage               | IF=-4A ,<br>dI/dt=100A/μs ,TJ=25℃     | --    | --   | -1.2 | V    |
| trr                                | Reverse Recovery Time            |                                       | --    | --   | --   | ns   |
| Qrr                                | Reverse Recovery Charge          |                                       | --    | --   | --   | nc   |

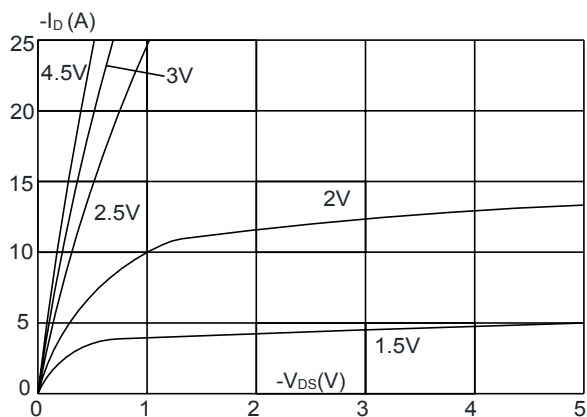
Notes 1.The maximum current rating is package limited.

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

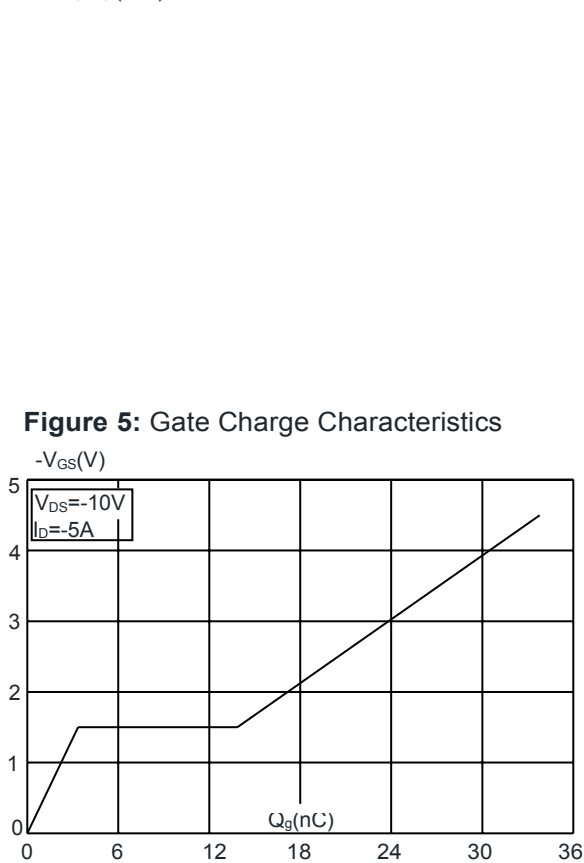
Notes 3.EAS condition: TJ=25°C

## Typical Performance Characteristics

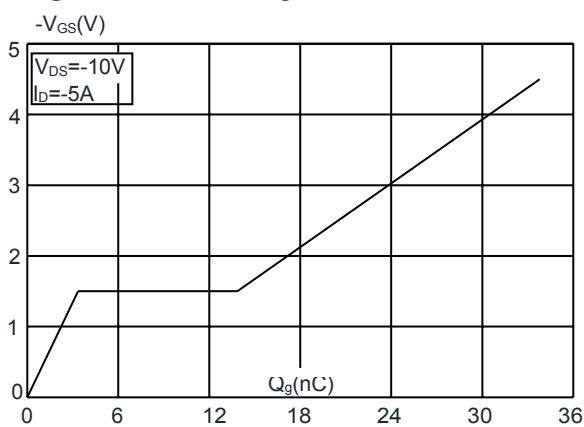
**Figure 1:** Output Characteristics



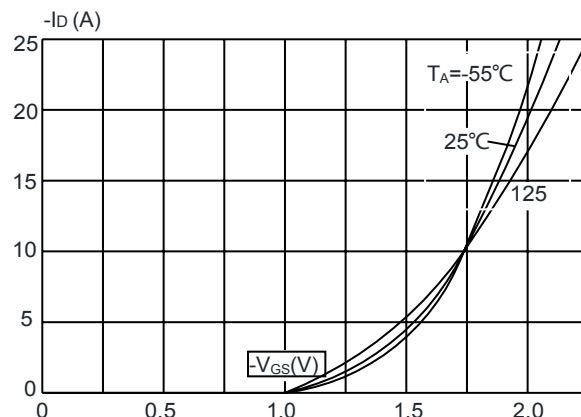
**Figure 3:** On-resistance vs. Drain Current  
 $R_{DS(ON)}$  (m $\Omega$ )



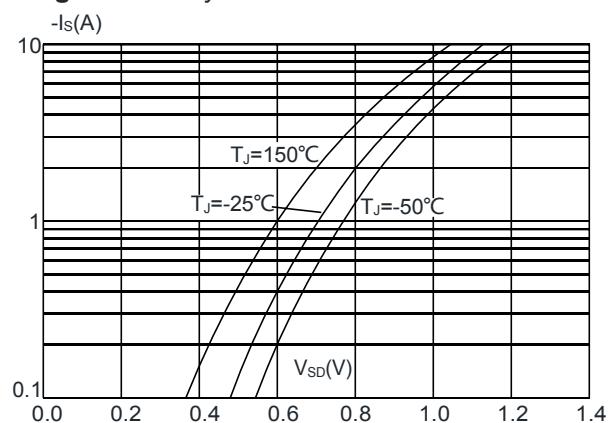
**Figure 5:** Gate Charge Characteristics



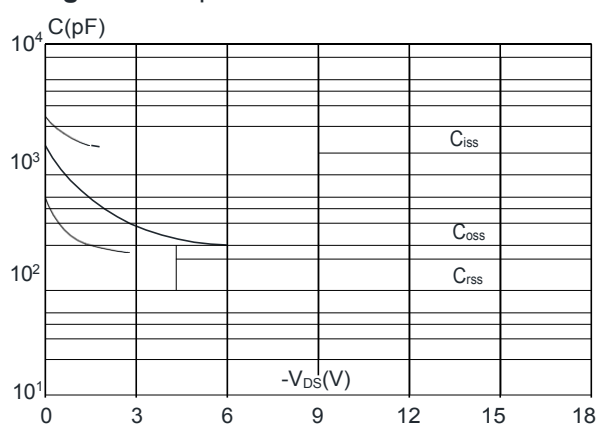
**Figure 2:** Typical Transfer Characteristics



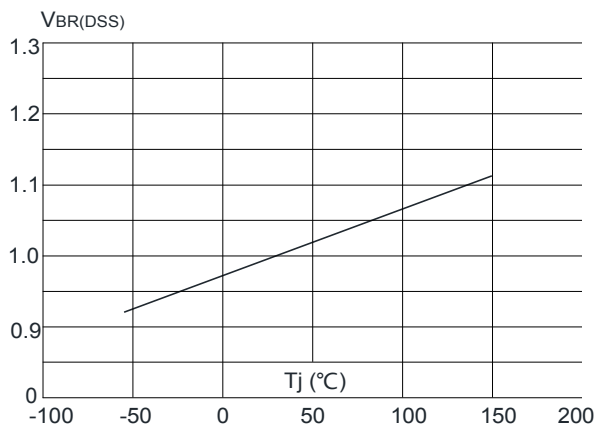
**Figure 4:** Body Diode Characteristics



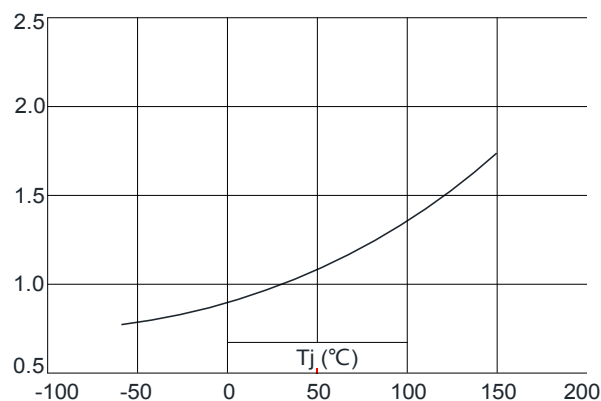
**Figure 6:** Capacitance Characteristics



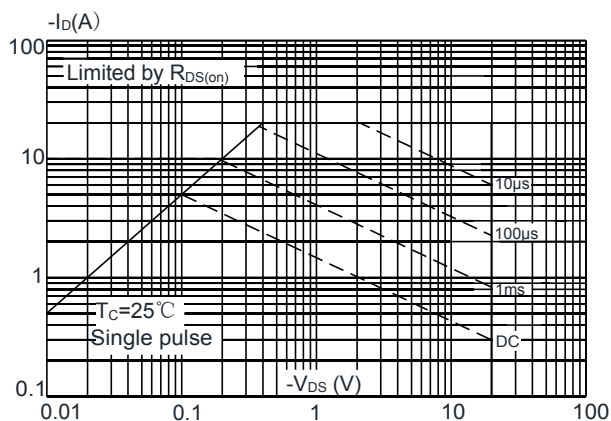
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



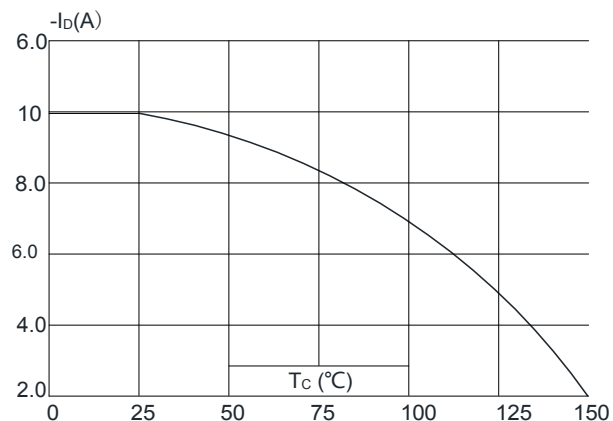
**Figure 8:** Normalized on Resistance vs. Junction Temperature

 $R_{DS(on)}$ 


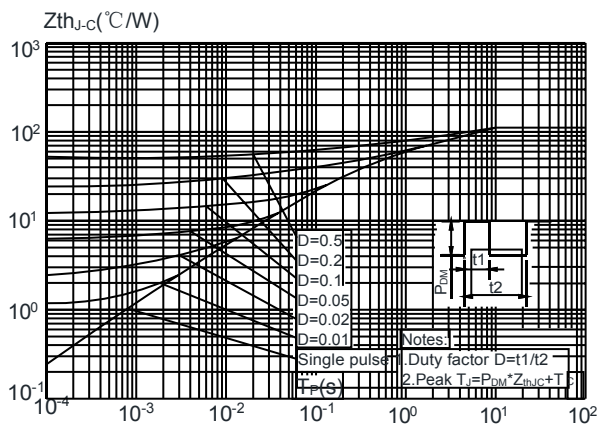
**Figure 9:** Maximum Safe Operating Area



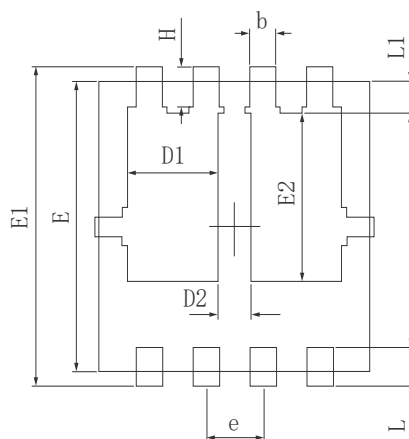
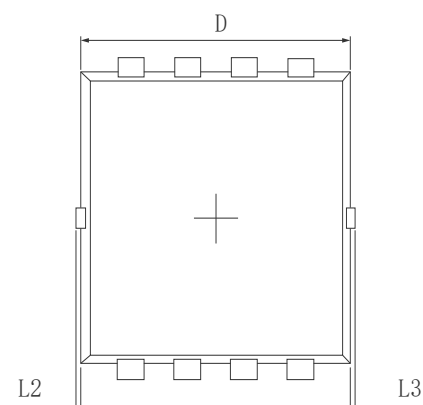
**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



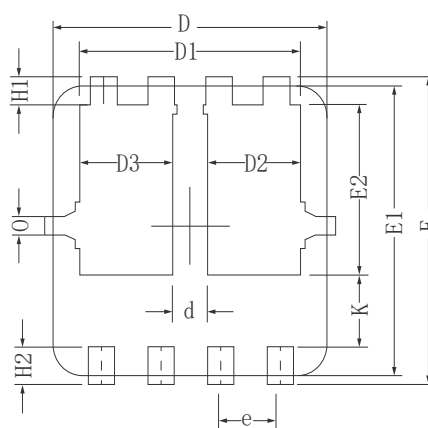
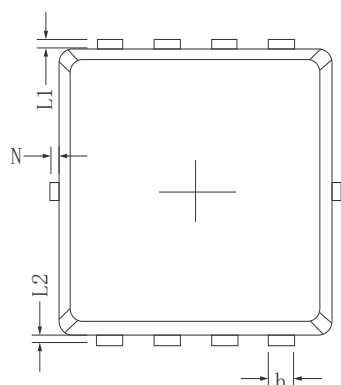
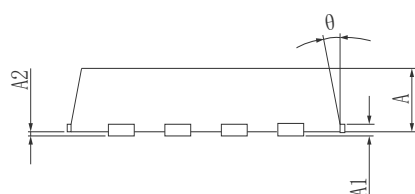
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



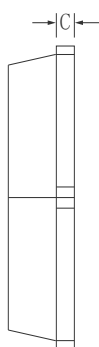
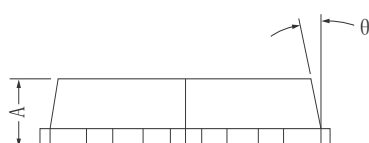
# Dimensions (PDFN3.3\*3.3)



| SYMBOL | MILLIMETER |       |
|--------|------------|-------|
|        | MIN        | MAX   |
| A      | 0.700      | 0.900 |
| A1     | 0.152REF.  |       |
| A2     | 0~0.05     |       |
| D      | 3.000      | 3.200 |
| D1     | 0.935      | 1.135 |
| D2     | 0.280      | 0.480 |
| E      | 2.900      | 3.100 |
| E1     | 3.150      | 3.450 |
| E2     | 1.535      | 1.935 |
| b      | 0.200      | 0.400 |
| e      | 0.550      | 0.750 |
| L      | 0.300      | 0.500 |
| L1     | 0.180      | 0.480 |
| L2     | 0~0.100    |       |
| L3     | 0~0.100    |       |
| H      | 0.315      | 0.515 |
| θ      | 8°         | 12°   |



| Symbols | Millimeters |      |      |
|---------|-------------|------|------|
|         | MIN.        | NOM. | MAX. |
| A       | 0.65        | 0.75 | 0.85 |
| b       | 0.25        | 0.30 | 0.35 |
| C       | 0.15        | 0.20 | 0.25 |
| D       | 3.00        | 3.10 | 3.20 |
| D1      | 2.40        | 2.50 | 2.60 |
| D2/D3   | 1.00        | 1.05 | 1.10 |
| d       | 0.30        | 0.40 | 0.50 |
| E       | 3.20        | 3.30 | 3.40 |
| E1      | 3.00        | 3.10 | 3.20 |
| E2      | 1.72        | 1.82 | 1.92 |
| e       | 0.65 BSC.   |      |      |
| H1      | 0.21        | 0.31 | 0.41 |
| H2      | 0.30        | 0.40 | 0.50 |
| K       | 0.67        | 0.77 | 0.87 |
| L1/L2   | 0.10 REF.   |      |      |
| θ       | 11°         | 12°  | 13°  |
| N       | 0           | -    | 0.15 |
| 0       | 0.2 REF.    |      |      |



PDFN3.3\*3.3

Marking Instructions:

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