## ● General Description

The AGM314MA 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

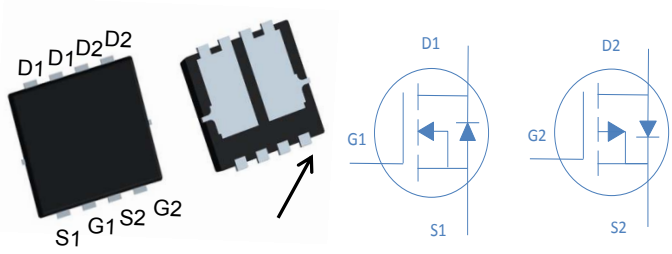
## ● Application

- ■MB/VGA Vcore
- ■SMPS 2nd Synchronous Rectifier
- ■POL application
- ■BLDC Motor driver

**Product Summary**

| BVDSS | RDSON | ID |
|---|---|---|
| 30V | 9mΩ | 30A |
| -30V | 21mΩ | -20A |

**PDFN5*6 Pin Configuration**




## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|---|---|---|---|---|---|
| AGM314MA | AGM314MA | PDFN5*6 | 330mm | 12mm | 3000 |

## Table 1. Absolute Maximum Ratings ($T_A$=25°C)

| Symbol | Parameter | Rating | | Units |
|---|---|---|---|---|
| | | N-Ch | P-Ch | |
| $V_{DS}$ | Drain-Source Voltage ($V_{GS}$=0V) | 30 | -30 | V |
| $V_{GS}$ | Gate-Source Voltage ($V_{DS}$=0V) | ±20 | ±20 | V |
| $I_D$ | Drain Current-Continuous($T_C$=25℃) (Note 1) | 30 | -20 | A |
| | Drain Current-Continuous(TC=100℃) | 21 | -14 | A |
| IDM (pluse) | Drain Current-Continuous@ Current-Pulsed (Note 2) | 120 | -80 | A |
| $P_D$ | Total Power Dissipation($T_C$=25℃) | 29.7 | 29.7 | W |
| | Total Power Dissipation(TC=100℃) | 11.9 | 11.9 | W |
| EAS | Avalanche energy (Note 3) | 56 | 56 | mJ |
| TJ,TSTG | Operating Junction and Storage Temperature Range | -55 To 150 | -55 To 150 | ℃ |

## Table 2. Thermal Characteristic

| Symbol | Parameter | Typ | Max | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient (Steady State)[1] | --- | 70 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | --- | 4.2 | ℃/W |

## Table 3. N- Channel Electrical Characteristics (TJ=25℃unless otherwisenoted)

| 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=±20V,VDS=0V | -- | -- | ±100 | nA |
| VGS(th) | Gate Threshold Voltage | VDS=VGS,ID=250μA | 1.2 | 1.6 | 2.2 | V |
| gFS | Forward Transconductance | VDS=5V,ID=5A | -- | 7 | -- | S |
| RDS(on) | Drain-Source On-State Resistance | VGS=10V, ID=10A | -- | 9 | 13 | mΩ |
| | | VGS=4.5V, ID=5A | -- | 14 | 24 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| Ciss | Input Capacitance | VDS=15V,VGS=0V, F=1MHZ | -- | 618 | -- | pF |
| Coss | Output Capacitance | | -- | 95 | -- | pF |
| Crss | Reverse Transfer Capacitance | | -- | 85 | -- | pF |
| Rg | Gate resistance | VGS=0V, VDS=0V,f=1.0MHz | -- | 2.7 | -- | Ω |
| **Switching Times** | | | | | | |
| td(on) | Turn-on Delay Time | VDS=15V,VGS=10V, RGEN=6.8Ω, RL=3.5Ω | -- | 12 | -- | nS |
| tr | Turn-on Rise Time | | -- | 25 | -- | nS |
| td(off) | Turn-Off Delay Time | | -- | 38 | -- | nS |
| tf | Turn-Off Fall Time | | -- | 16 | -- | nS |
| Qg | Total Gate Charge | VGS=10V, VDS=15V, ID=15A | -- | 11.7 | -- | nC |
| Qgs | Gate-Source Charge | | -- | 3.8 | -- | nC |
| Qgd | Gate-Drain Charge | | -- | 2.3 | -- | nC |
| **Source-Drain Diode Characteristics** | | | | | | |
| ISD | Source-Drain Current(Body Diode) | | -- | -- | 30 | A |
| VSD | Forward on Voltage | VGS=0V,IS=10A | -- | -- | 1.2 | V |
| trr | Reverse Recovery Time | IF=10A , dI/dt=100A/μs , TJ=25℃ | -- | 17 | -- | ns |
| Qrr | Reverse Recovery Charge | | -- | 31 | -- | 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℃ , VDD=15V,Vgs=10V,ID=15A,L=0.5mH,RG=25ohm

## Table 3. P-Channel Electrical Characteristics (TJ=25℃unless otherwisenoted)

| 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=±20V,VDS=0V | -- | -- | ±100 | nA |
| VGS(th) | Gate Threshold Voltage | VDS=VGS,ID=-250μA | -1.2 | -1.5 | -2.2 | V |
| gFS | Forward Transconductance | VDS=-10V,ID=-5A | -- | 6 | -- | S |
| RDS(on) | Drain-Source On-State Resistance | VGS=-10V, ID=-10A | -- | 21 | 26 | mΩ |
| | | VGS=-4.5V, ID=-5A | -- | 30 | 39 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| Ciss | Input Capacitance | VDS=-15V,VGS=0V, F=1MHZ | -- | 695 | -- | pF |
| Coss | Output Capacitance | | -- | 98 | -- | pF |
| Crss | Reverse Transfer Capacitance | | -- | 92 | -- | pF |
| Rg | Gate resistance | VGS=0V, VDS=0V,f=1.0MHz | -- | 11.5 | -- | Ω |
| **Switching Times** | | | | | | |
| td(on) | Turn-on Delay Time | VGS=-10V,VDS=-15V, RL=1Ω,RGEN=3Ω | -- | 9 | -- | nS |
| tr | Turn-on Rise Time | | -- | 5 | -- | nS |
| td(off) | Turn-Off Delay Time | | -- | 21 | -- | nS |
| tf | Turn-Off Fall Time | | -- | 3.3 | -- | nS |
| Qg | Total Gate Charge | VGS=-10V, VDS=-25V, ID=-5A | -- | 13.2 | -- | nC |
| Qgs | Gate-Source Charge | | -- | 26 | -- | nC |
| Qgd | Gate-Drain Charge | | -- | 3.3 | -- | nC |
| **Source-Drain Diode Characteristics** | | | | | | |
| ISD | Source-Drain Current(Body Diode) | | -- | -- | -20 | A |
| VSD | Forward on Voltage | VGS=0V,IS=-10A | -- | -- | -1.2 | V |
| trr | Reverse Recovery Time | IF=-10A , dI/dt=100A/μs , TJ=25℃ | -- | 13 | -- | ns |
| Qrr | Reverse Recovery Charge | | -- | 8.5 | -- | 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℃ , VDD=-15V,Vgs=-10V,ID=-15A,L=0.5mH,RG=25ohm

# N-Channel Electrical Characteristics Diagrames

**Figure 1. On-Regin Characteristics**

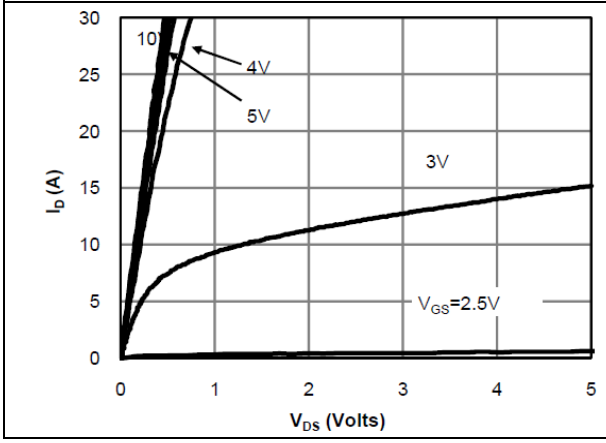



**Figure 2. Transfer Characteristics**

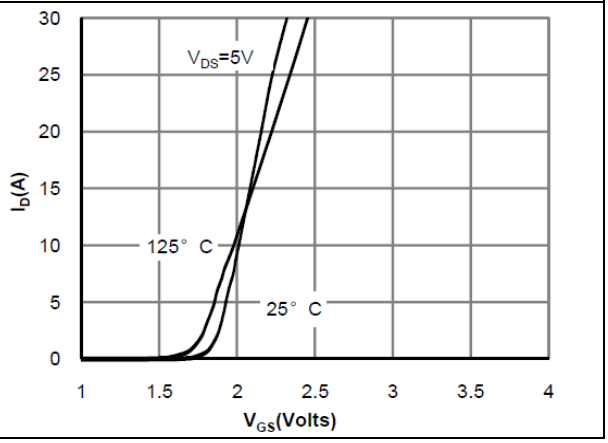



**Figure 3. On-Resistance vs. Drain Current and Gate Voltage**

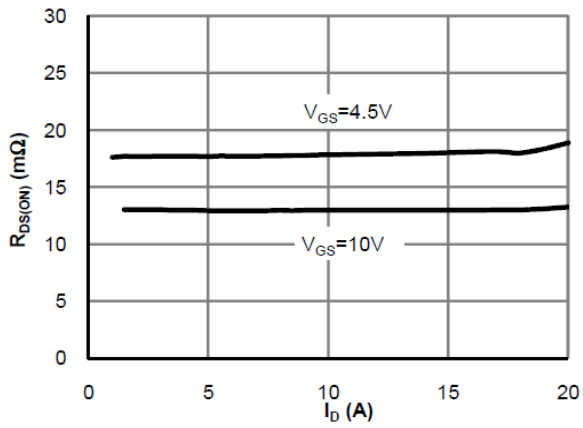



**Figure 4. On-Resistance vs. Junction Temperature**

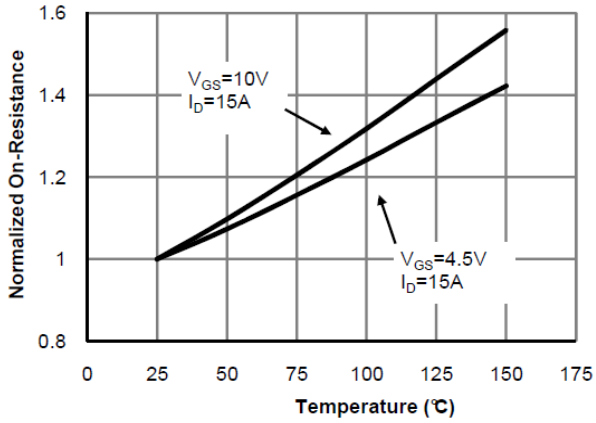



**Figure 5. On-Resistance vs. Gate-Source Voltage**

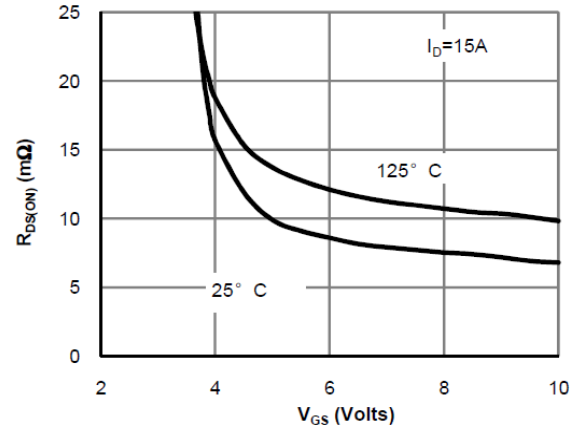
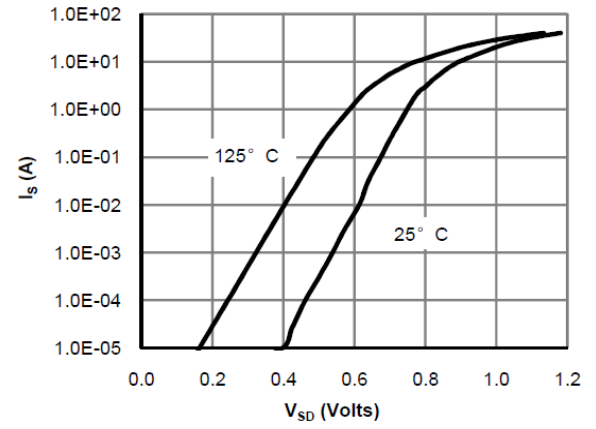
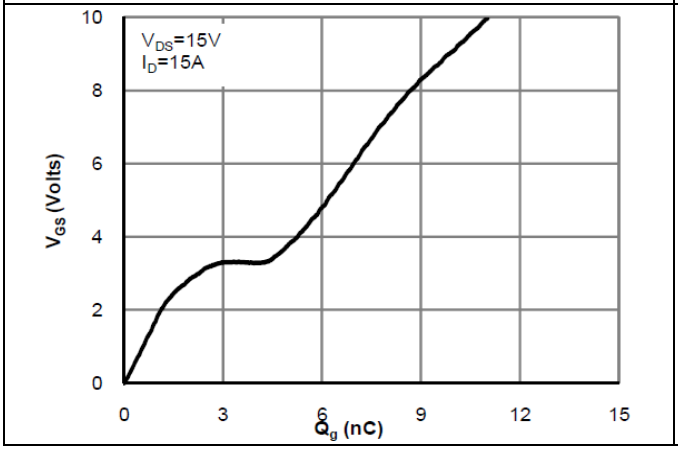


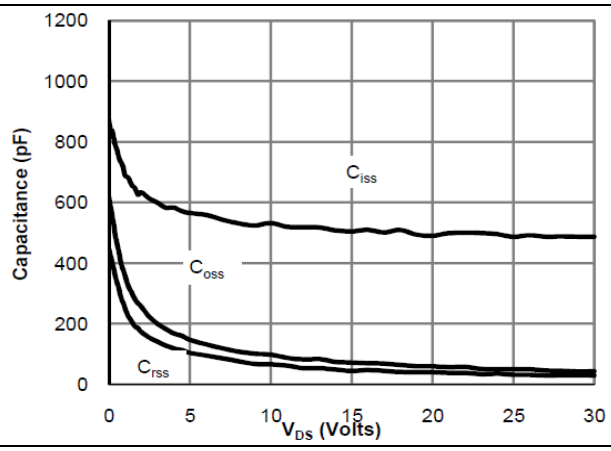

**Figure 6. Body-Diode Characteristics**



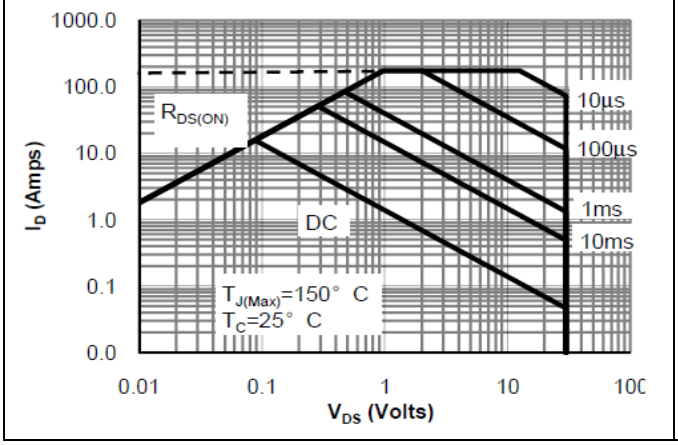
## Figure 7. Gate-Charge Characteristics



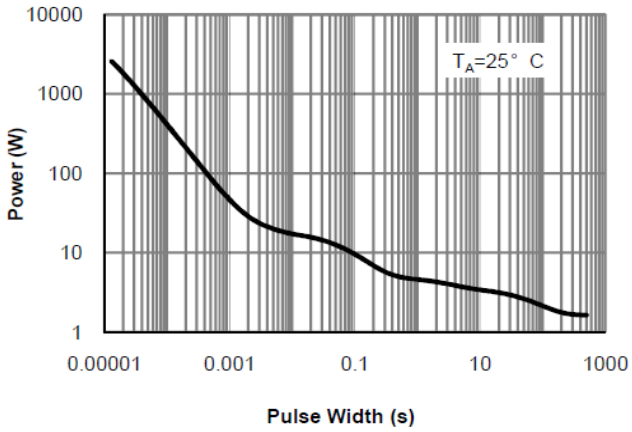

## Figure 8. Capacitance Characteristics



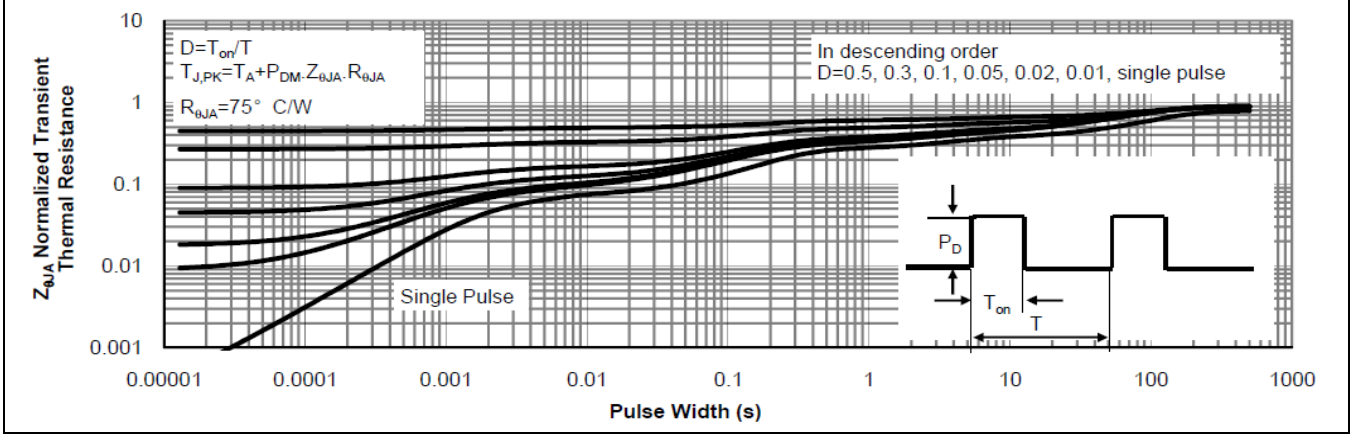

## Figure 9. Maximum Forward Biased Safe Operating Area




## Figure 10. Single Pulse Power Rating Junction-to-Ambient




## Figure 11. Normalized Maximum Transient Thermal Impedance



# P-Channel Electrical Characteristics Diagrames

**Figure 1. On-Regin Characteristics**

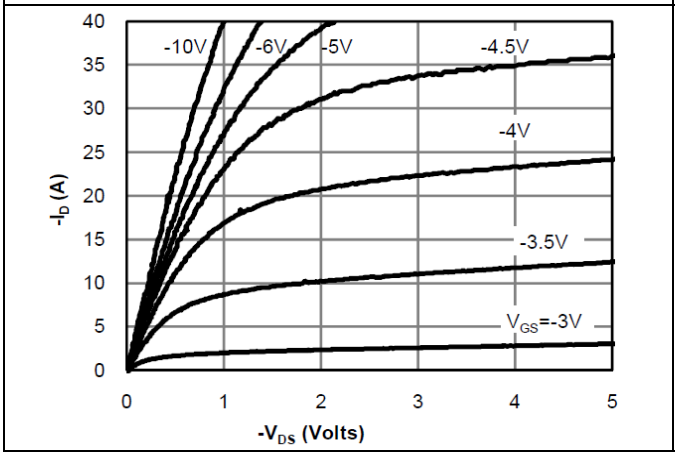



**Figure 2. Transfer Characteristics**

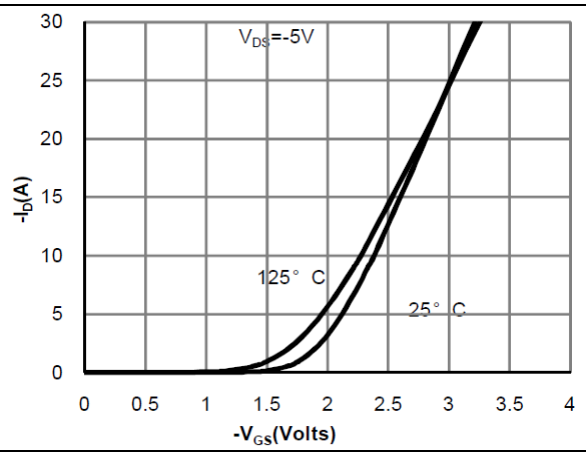



**Figure 3. On-Resistance vs. Drain Current and Gate Voltage**

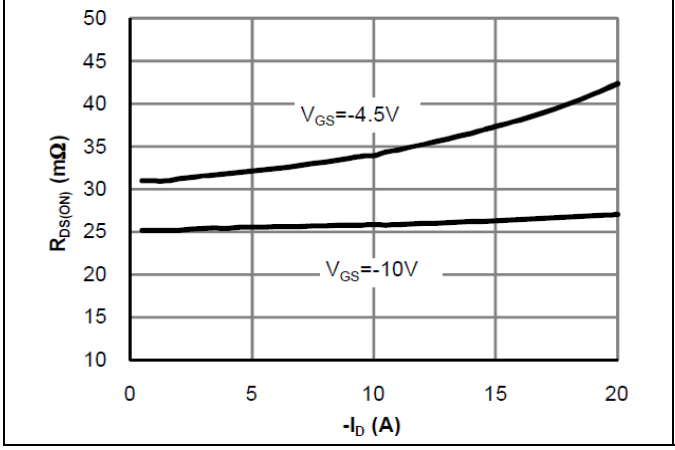



**Figure 4. On-Resistance vs. Junction Temperature**

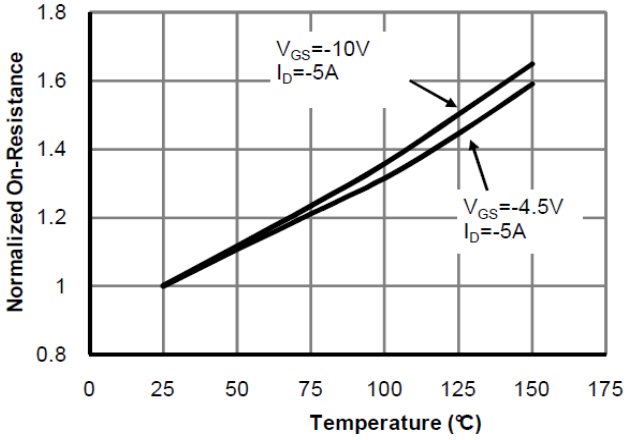



**Figure 5. On-Resistance vs. Gate-Source Voltage**

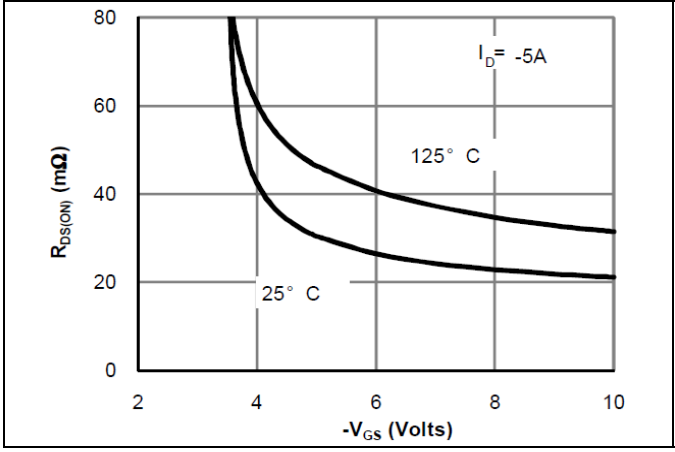
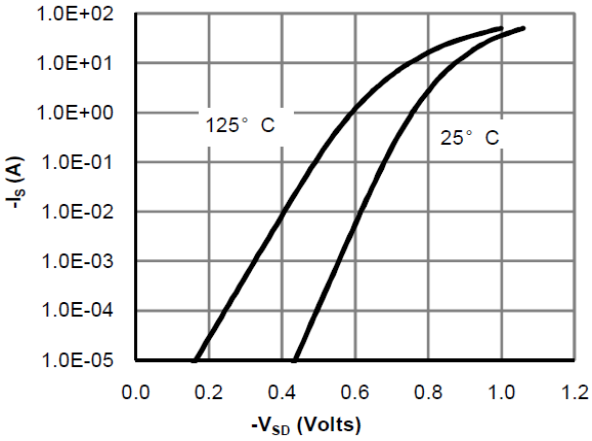
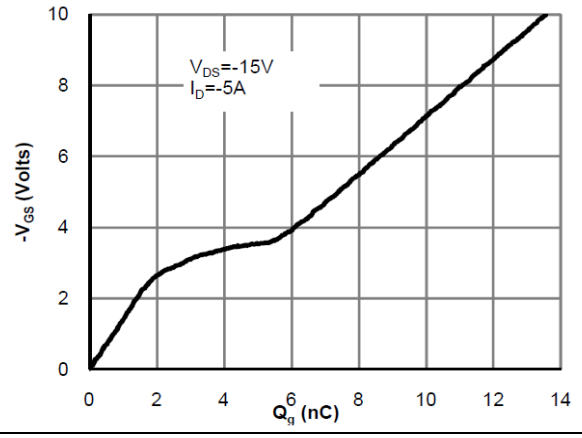



**Figure 6. Body-Diode Characteristics**



## Figure 7. Gate-Charge Characteristics

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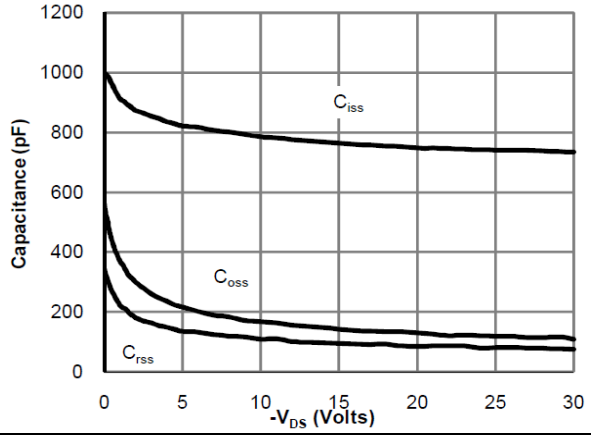
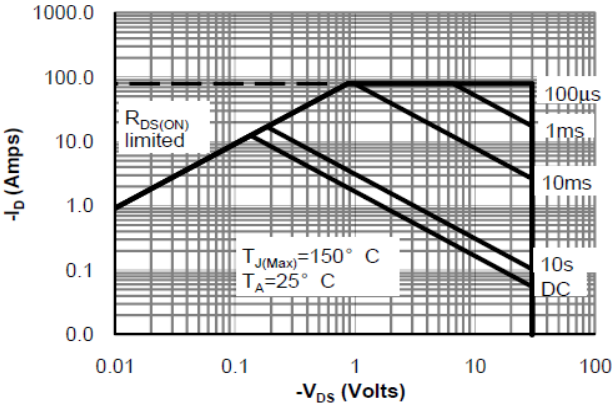



## Figure 9. Maximum Forward Biased Safe Operating Area

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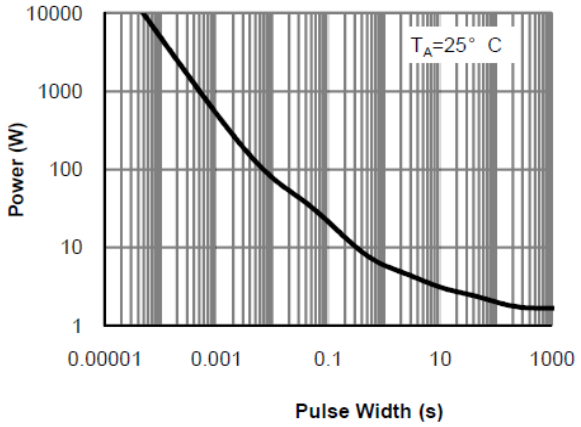
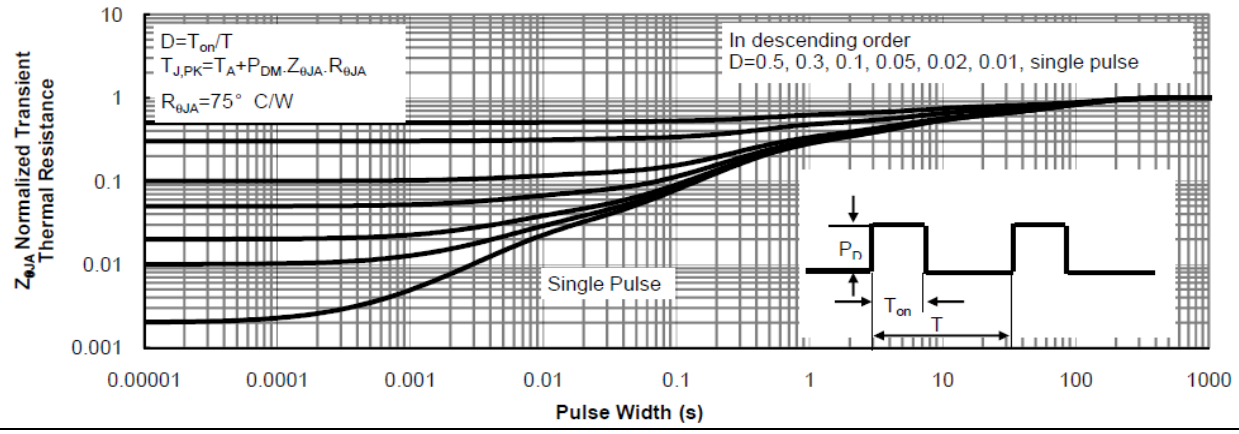
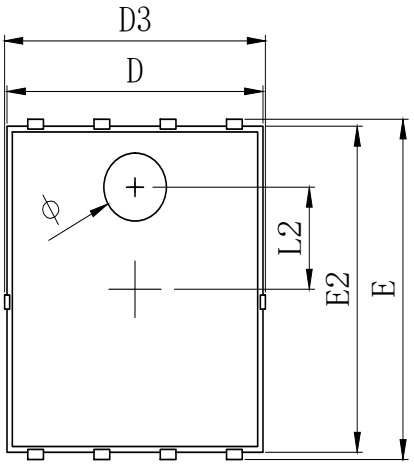
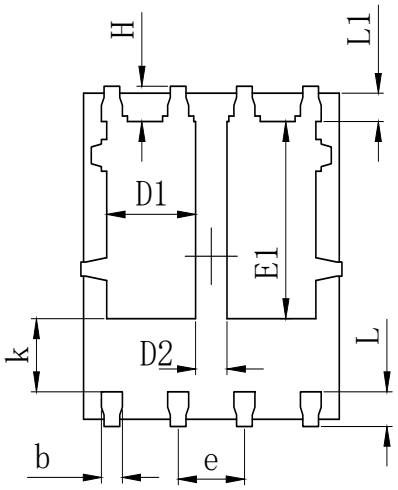


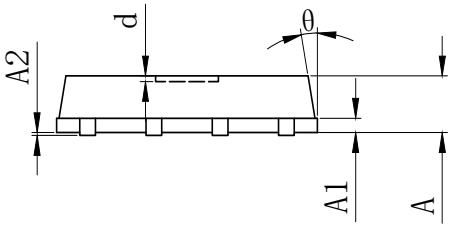

## Figure 11. Normalized Maximum Transient Thermal Impedance



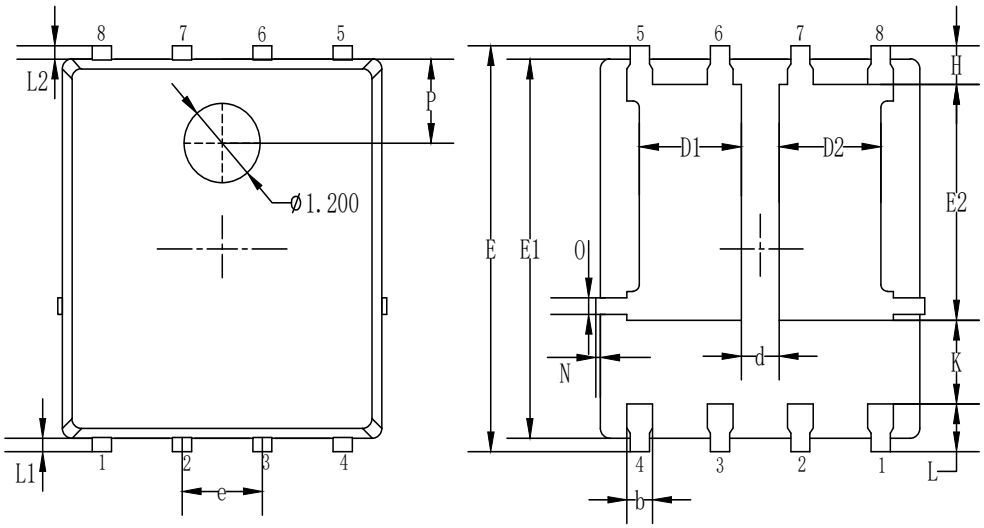
## ●Dimensions（PDFN5*6）

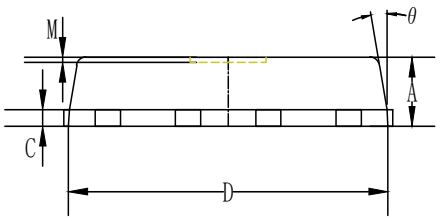



| SYMBOL | MILLIMETER | | |
|---|---|---|---|
| | MIN | Typ. | MAX |
| A | 0.900 | 1.000 | 1.100 |
| A1 | 0.254 REF. | | |
| A2 | 0~0.05 | | |
| D | 4.824 | 4.900 | 4.976 |
| D1 | 1.605 | 1.705 | 1.805 |
| D2 | 0.500 | 0.600 | 0.700 |
| D3 | 4.924 | 5.000 | 5.076 |
| E | 5.924 | 6.000 | 6.076 |
| E1 | 3.375 | 3.475 | 3.575 |
| E2 | 5.674 | 5.750 | 5.826 |
| b | 0.350 | 0.400 | 0.450 |
| e | 1.270 TYP. | | |
| L | 0.534 | 0.610 | 0.686 |
| L1 | 0.424 | 0.500 | 0.576 |
| L2 | 1.800 REF. | | |
| k | 1.190 | 1.290 | 1.390 |
| H | 0.549 | 0.625 | 0.701 |
| θ | 8° | 10° | 12° |
| ϕ | 1.100 | 1.200 | 1.300 |
| d | | | 0.100 |




| Symbols | Millimeters | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 0.90 | 1.05 | 1.20 |
| b | 0.35 | 0.40 | 0.50 |
| C | 0.20 | 0.25 | 0.35 |
| D | 4.90 | 5.05 | 5.20 |
| D1/D2 | 1.51 | 1.61 | 1.71 |
| d | 0.50 | 0.60 | 0.70 |
| E | 6.00 | 6.15 | 6.30 |
| E1 | 5.60 | 5.75 | 5.90 |
| E2 | 3.47 | 3.57 | 3.67 |
| e | 1.27 BSC. | | |
| H | 0.48 | 0.58 | 0.68 |
| K | 1.17 | 1.27 | 1.37 |
| L | 0.64 | 0.74 | 0.84 |
| L1/L2 | 0.20 REF. | | |
| θ | 8° | 10° | 12° |
| M | 0.08 REF. | | |
| N | 0 | - | 0.15 |
| O | 0.25 REF. | | |
| P | 1.28 REF. | | |

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This document is the first version issued on October 10th, 2023. This document replaces all previously provided information.