

**• General Description**

The AGM405A 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

**• Application**

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

**Product Summary**

BVDSS	RDSON	ID
40V	5.1mΩ	72A

**PRPAK5X6 Pin Configuration**

**Package Marking and Ordering Information**

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM405A	AGM405A	PDFN5*6	325mm	16mm	2500/3000

**Table 1. Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$ )**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage ( $V_{GS}=0V$ )	40	V
$V_{GS}$	Gate-Source Voltage ( $V_{DS}=0V$ )	$\pm 20$	V
$I_D$	Drain Current-Continuous( $T_c=25^{\circ}\text{C}$ ) (Note 1)	72	A
	Drain Current-Continuous( $T_c=100^{\circ}\text{C}$ )	52	A
$I_{DM (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 2)	220	A
$P_D$	Maximum Power Dissipation( $T_c=25^{\circ}\text{C}$ )	64	W
	Maximum Power Dissipation( $T_c=100^{\circ}\text{C}$ )	27	W
$E_{AS}$	Avalanche energy (Note 3)	200	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 150	$^{\circ}\text{C}$

**Table 2. Thermal Characteristic**

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	60	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	4.5	$^{\circ}\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V			1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.6	2.5	V
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		10		S
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		5.1	6.8	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A		7.0	10	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1MHZ		1380		pF
C <sub>oss</sub>	Output Capacitance			190		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			37		pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1.0MHz		1.7		Ω
<b>Switching Times</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω, R <sub>GEN</sub> =3.3Ω		6.9		nS
t <sub>r</sub>	Turn-on Rise Time			1.7		nS
t <sub>d(off)</sub>	Turn-Off Delay Time			30		nS
t <sub>f</sub>	Turn-Off Fall Time			15		nS
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =30V, V <sub>DS</sub> =20V, I <sub>D</sub> =12A		29		nC
Q <sub>gs</sub>	Gate-Source Charge			4.5		nC
Q <sub>gd</sub>	Gate-Drain Charge			6.4		nC
<b>Source-Drain Diode Characteristics</b>						
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current			100	A
V <sub>SD</sub>	Forward on Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =20A			1.2	V

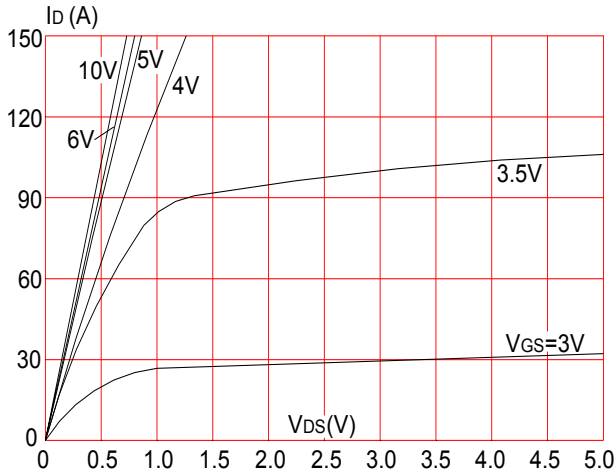
Notes 1.The maximum current rating is package limited.

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

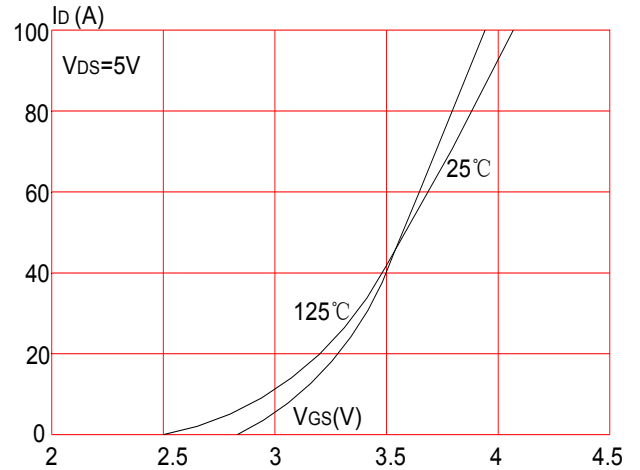
Notes 3.EAS condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=15V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω

## Typical Performance Characteristics

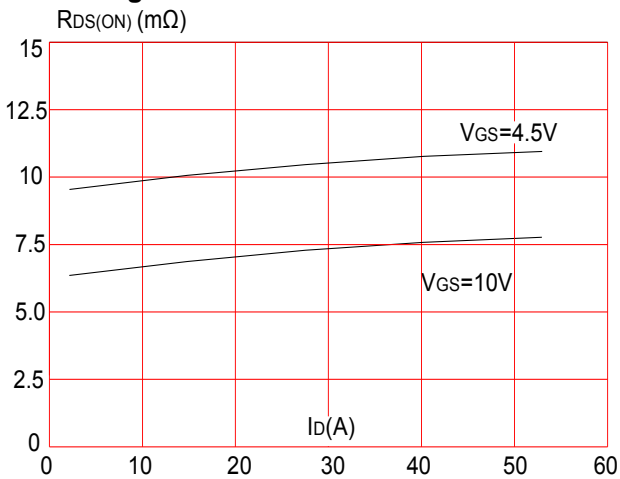
**Figure 1: Output Characteristics**



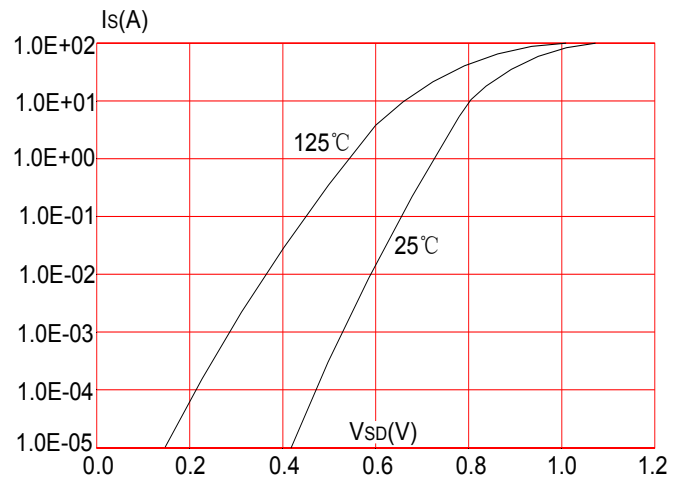
**Figure 2: Typical Transfer Characteristics**



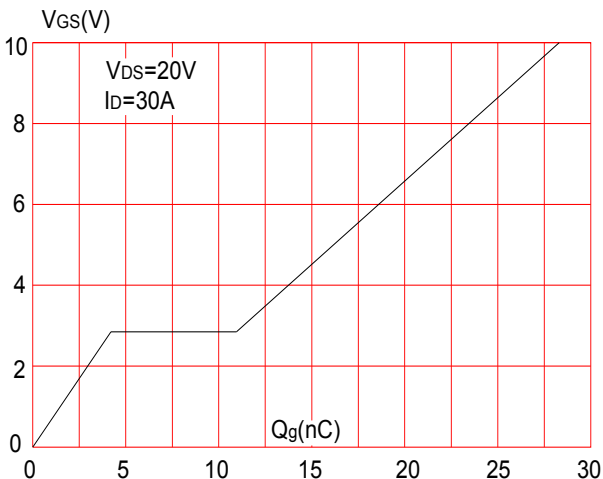
**Figure 3: On-resistance vs. Drain Current**



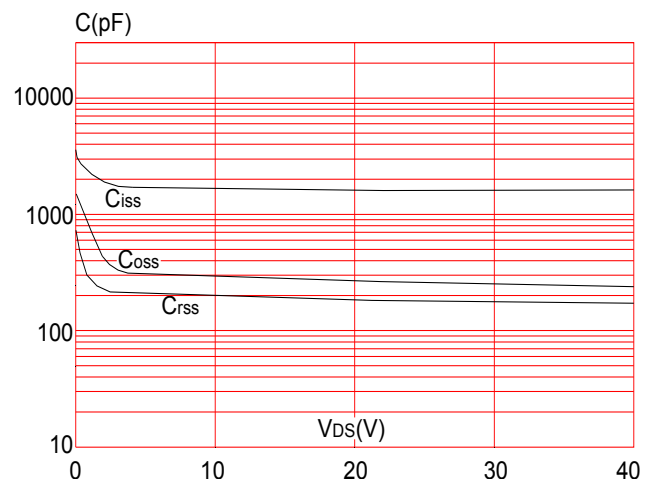
**Figure 4: Body Diode Characteristics**



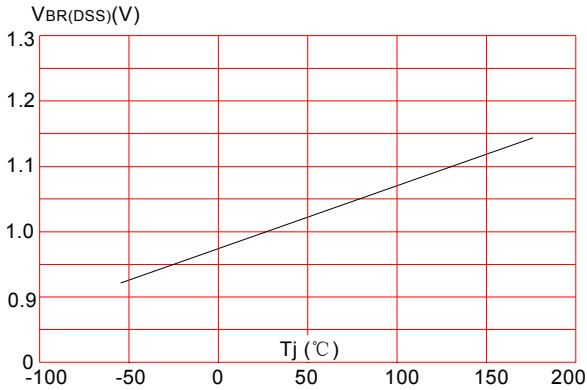
**Figure 5: Gate Charge Characteristics**



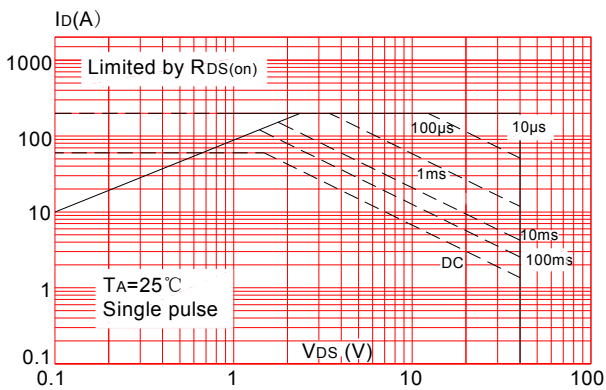
**Figure 6: Capacitance Characteristics**



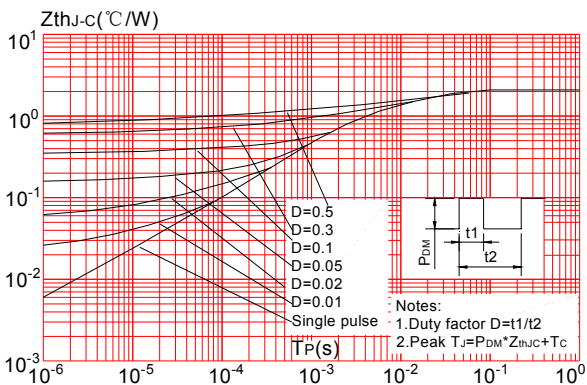
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



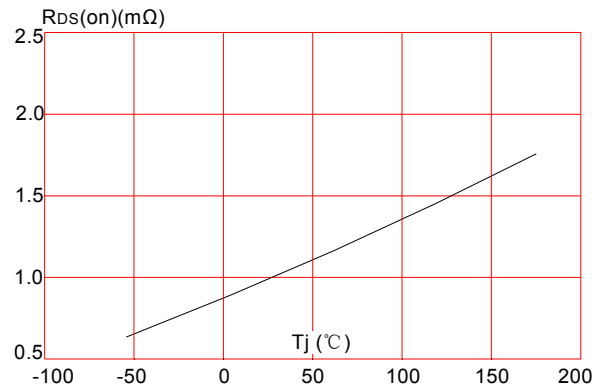
**Figure 9:** Maximum Safe Operating Area



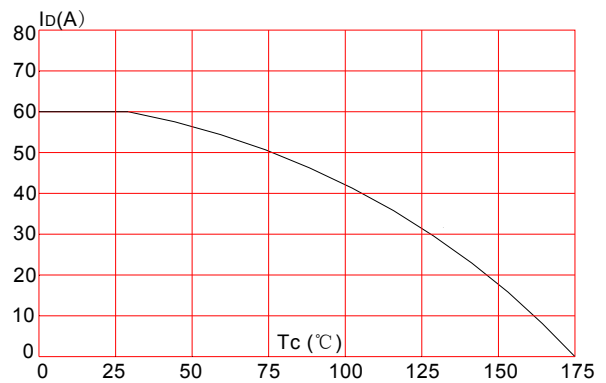
**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case (TO-251S,TO-252)



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



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



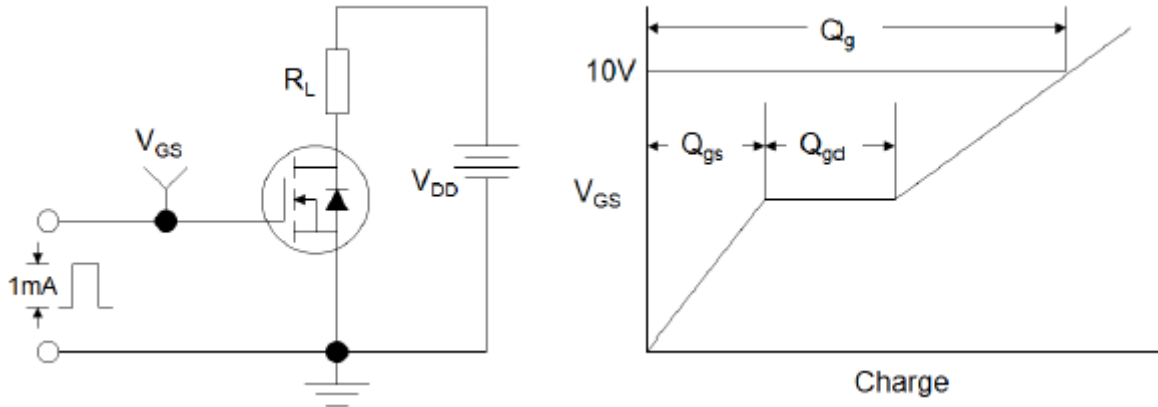


Figure1:Gate Charge Test Circuit &amp; Waveform

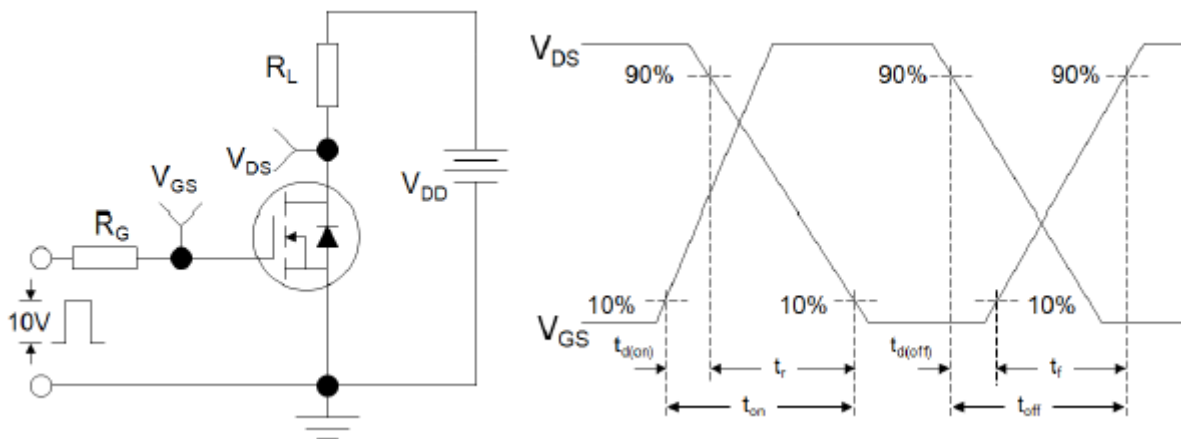


Figure 2: Resistive Switching Test Circuit &amp; Waveforms

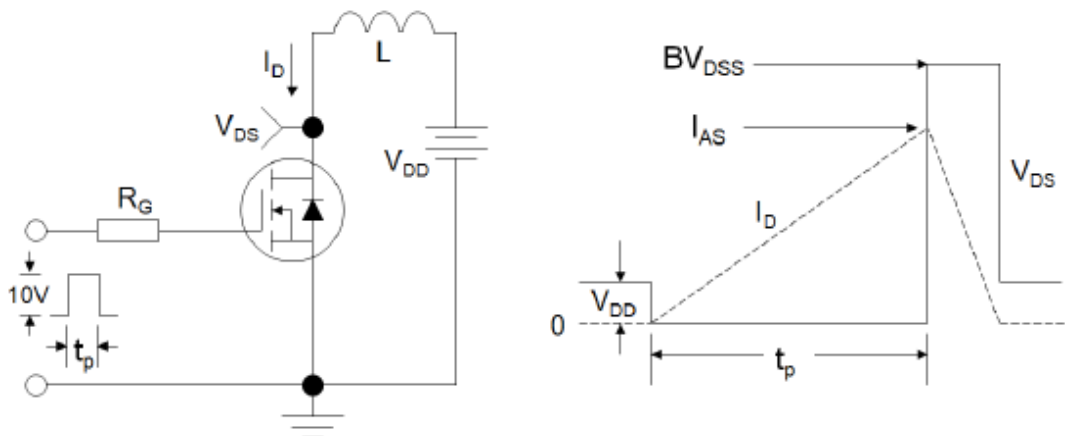
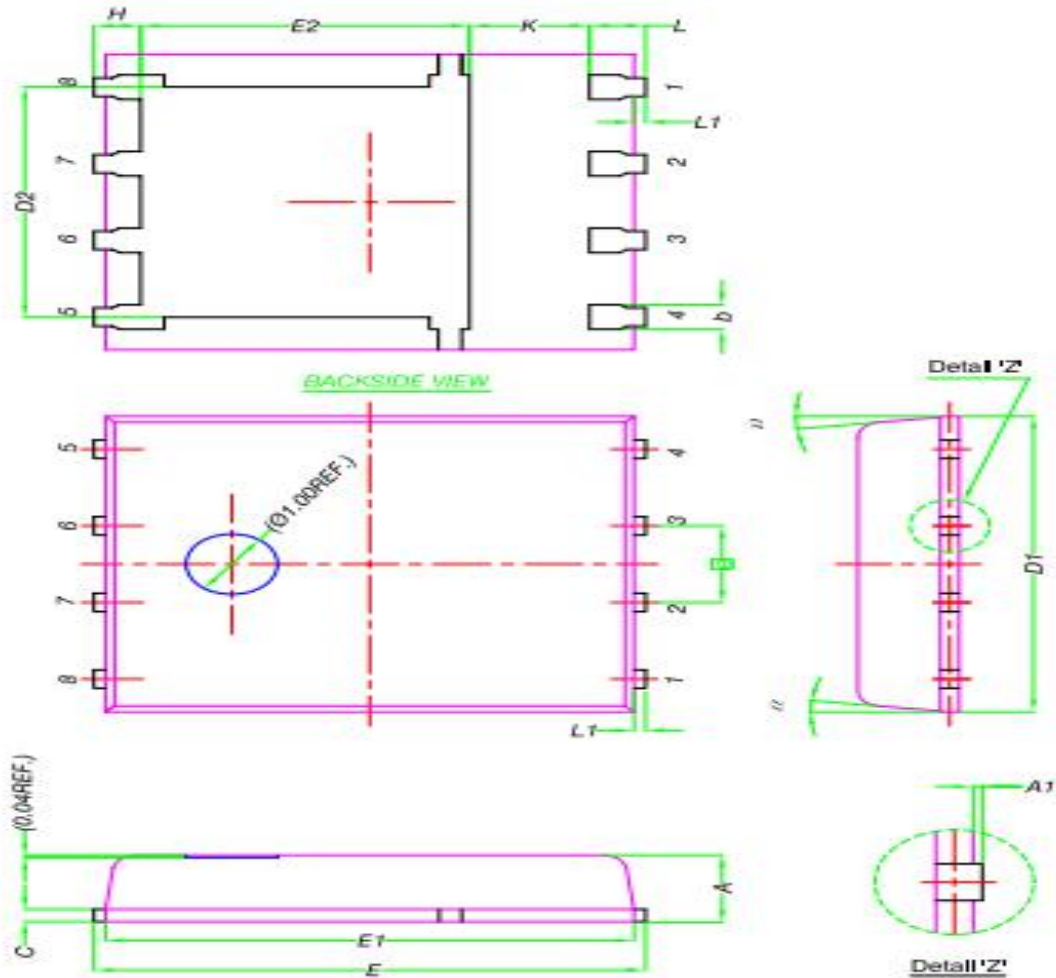


Figure 3:Unclamped Inductive Switching Test Circuit &amp; Waveforms

**•Dimensions (DFN5×6)**


DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.35	3.55	3.75
<b>[E]</b>	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.05	0.13	0.20
α	0°	-	12°


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