● General Description

The AGM402A1 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 2nd Synchronous Rectifier

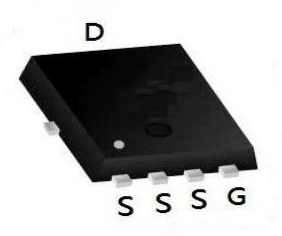
■POL application

■BLDC Motor driver

Product Summary

BVDSS	RDSON	ID
40V	2.3mΩ	140A

PRPAK5X6 Pin Configuration



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM402A1	AGM402A1	PDFN5*6	--mm	--mm	3000

Table 1. Absolute Maximum Ratings (T_A=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V)	40	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±20	V
I_D	Drain Current-Continuous(T_C=25℃) (Note 1)	140	A
	Drain Current-Continuous(T_C=100℃)	98	A
$I_{DM (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 2)	570	A
P_D	Maximum Power Dissipation(T_C=25℃)	125	W
	Maximum Power Dissipation(T_C=100℃)	62	W
E_{AS}	Avalanche energy (Note 3)	550	mJ
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	℃

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State)[1]	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	1.2	℃/W

Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

Typical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	40	45	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=40V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T_j=125℃)	V_{DS}=40V,V_{GS}=0V	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.0	1.7	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=10V, I_D=40A	--	2.3	3.1	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance③	V_{GS}=4.5V, I_D=20A	--	3.1	5	mΩ
Dynamic Electrical Characteristics @ T_j= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz		4140		pF
C_{oss}	Output Capacitance			405		pF
C_{rss}	Reverse Transfer Capacitance			360		pF
R_g	Gate Resistance	f=1MHz		2		Ω
Q_g	Total Gate Charge	V_{DS}=20V,I_D=40A, V_{GS}=10V	--	73	--	nC
Q_{gs}	Gate-Source Charge		-	15	--	nC
Q_{gd}	Gate-Drain Charge		-	15	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=40A, R_G=3Ω, V_{GS}=10V	--	13.7	--	nS
t_r	Turn-on Rise Time		-	6.1	--	nS
$t_{d(off)}$	Turn-Off Delay Time		-	50	--	nS
t_f	Turn-Off Fall Time		-	10	--	nS
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=40A,V_{GS}=0V	--	0.8	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=30A, V_{GS}=0V di/dt=500A/μs	--	18	--	nS
Q_{rr}	Reverse Recovery Charge			40		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_J=25℃,VDD=15V,V_G=10V, RG=25Ω

Typical Characteristics

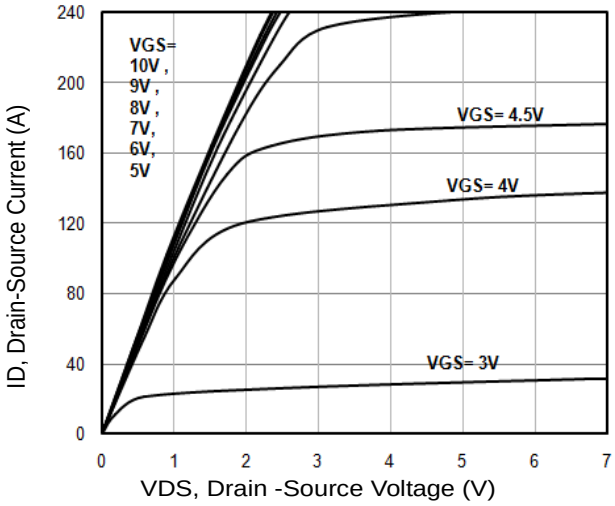


Fig1. Typical Output Characteristics

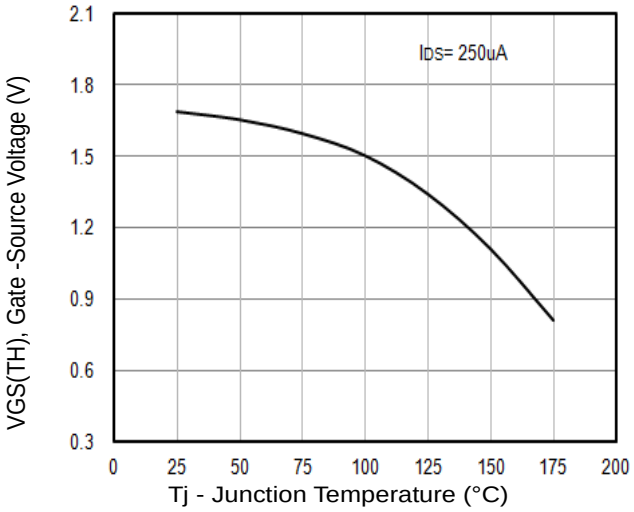


Fig2. $V_{GS(TH)}$ Gate -Source Voltage Vs. Tj

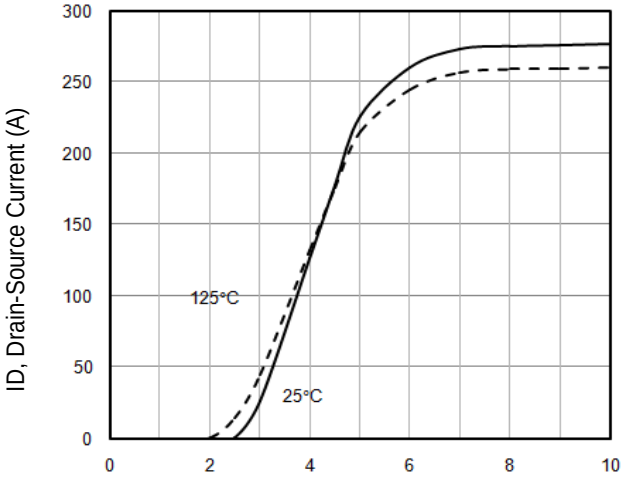


Fig3. Typical Transfer Characteristics

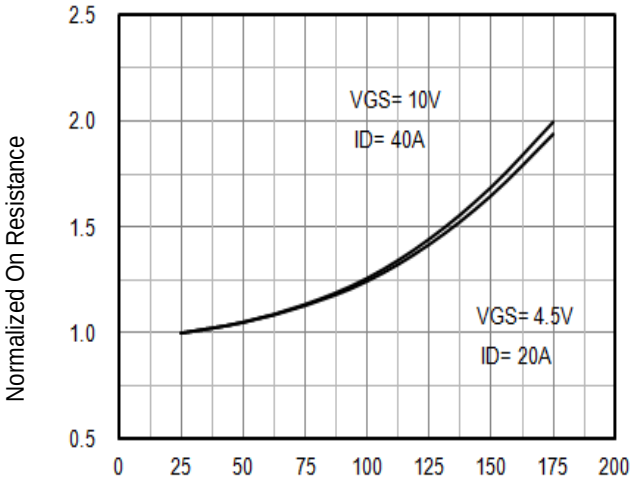


Fig4. Normalized On-Resistance Vs. Temperature

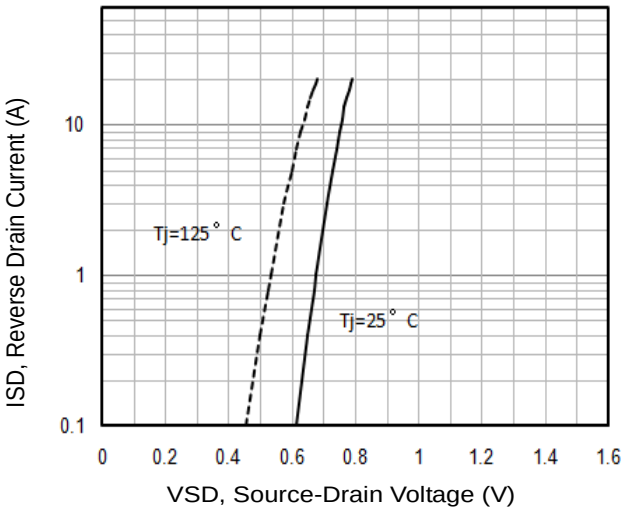


Fig5. Typical Source-Drain Diode Forward Voltage

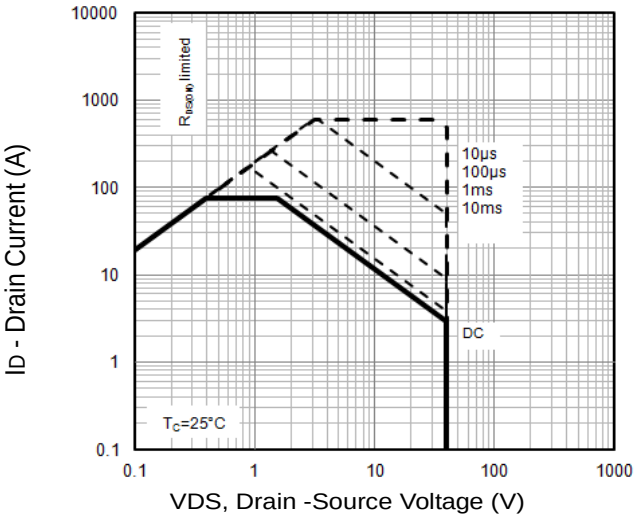


Fig6. Maximum Safe Operating Area

Typical Characteristics

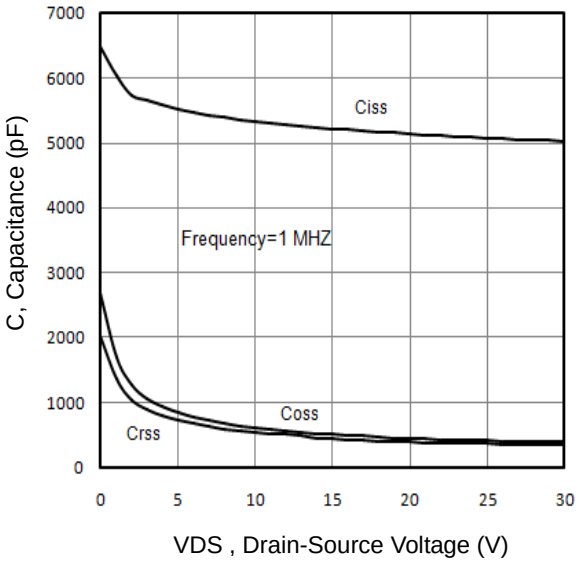


Fig7. Typical Capacitance Vs.Drain-Source Voltage

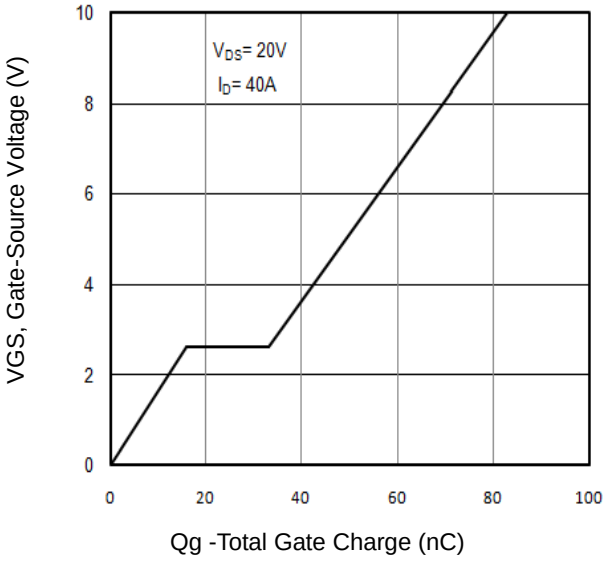


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

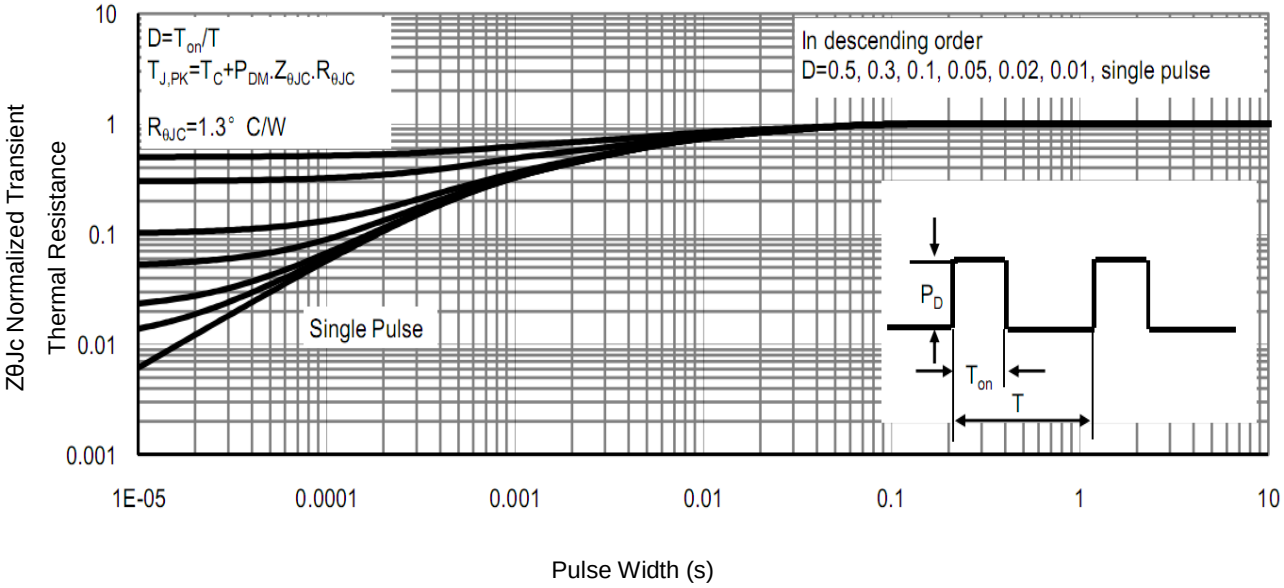


Fig9 . Normalized Maximum Transient Thermal Impedance

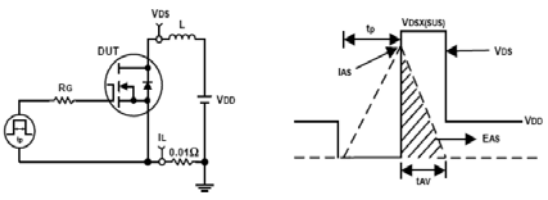


Fig10. Unclamped Inductive Test Circuit and waveforms

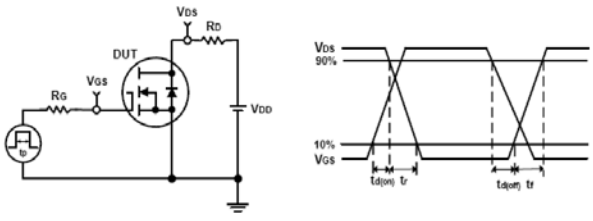
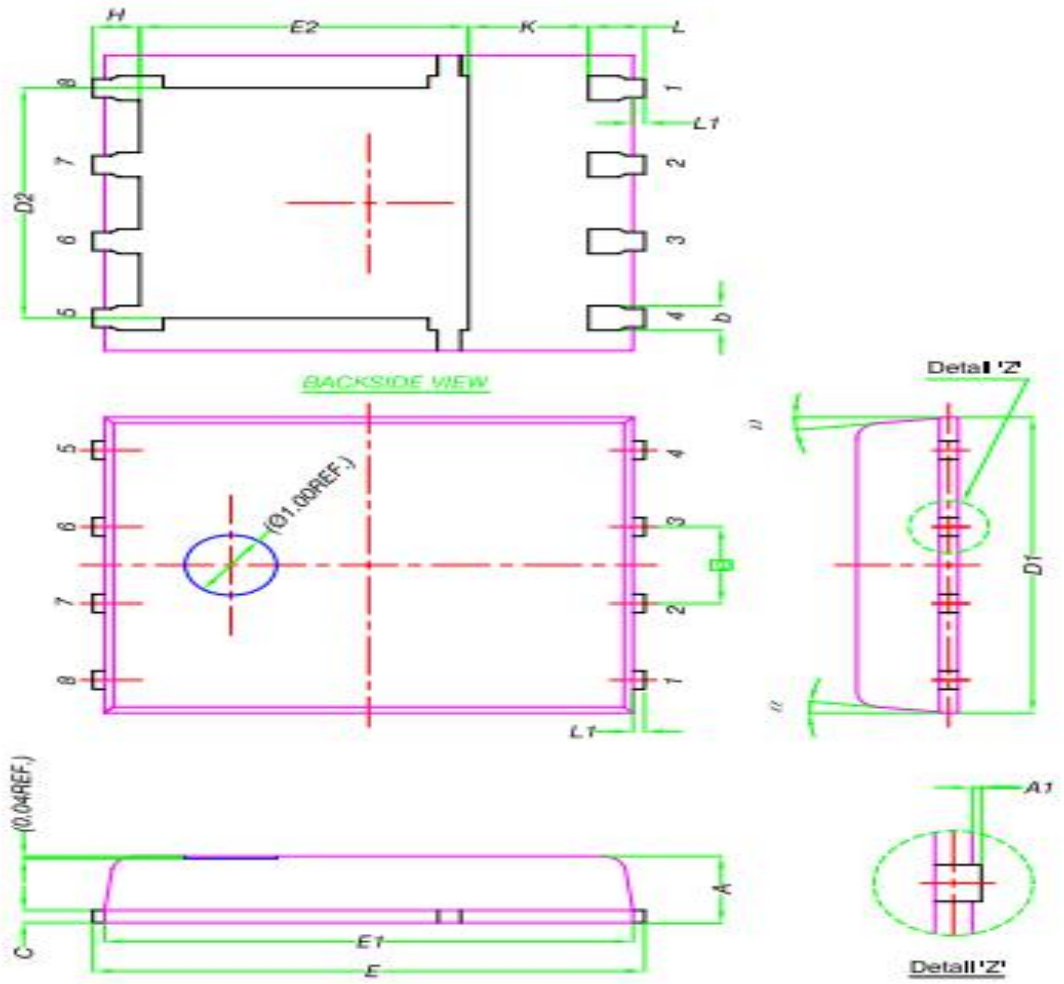


Fig11. Switching Time Test Circuit and waveforms

●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	3.39	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°

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