

• General Description

The AGM402D 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

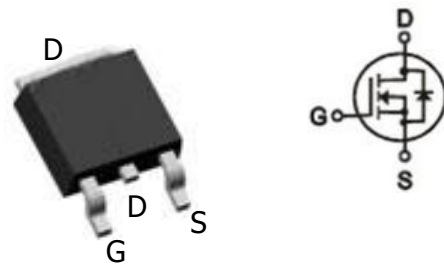
- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

• Application

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

Product Summary

BVDSS	RDSON	ID
40V	2.1mΩ	120A

TO-252 Pin Configuration

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM402D	AGM402D	TO-252	--mm	--mm	2500

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

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°C) ^(Note 1)	120	A
	Drain Current-Continuous(T _c =100°C)	68	A
I _{DM (pulse)}	Drain Current-Continuous@ Current-Pulsed (Note 2)	520	A
P _D	Maximum Power Dissipation(T _c =25°C)	125	W
	Maximum Power Dissipation(T _c =100°C)	62	W
E _{AS}	Avalanche energy ^(Note 3)	550	mJ
T _J , T _{STG}	Operating Junction and Storage Temperature Range	-55 To 175	°C

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
R _{θJA}	Thermal Resistance Junction-ambient (Steady State) ¹	---	62	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	---	1.2	°C/W

Table 3. Electrical Characteristics (TA=25°C 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°C)	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 Resistance ^③	V _{GS} =10V, I _D =40A	--	2.1	2.9	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance ^③	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		3040		pF
C _{oss}	Output Capacitance			395		pF
C _{rss}	Reverse Transfer Capacitance			320		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	--	12.7	--	nS
t _r	Turn-on Rise Time		-	6.3	--	nS
t _{d(off)}	Turn-Off Delay Time		-	51	--	nS
t _f	Turn-Off Fall Time		-	12	--	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°C, I _{SD} =30A, V _{GS} =0V	--	16	--	nS
Q _{rr}	Reverse Recovery Charge		di/dt=500A/μs		41	

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°C, V_{DD}=15V, V_G=10V, R_G=25Ω

Typical Characteristics

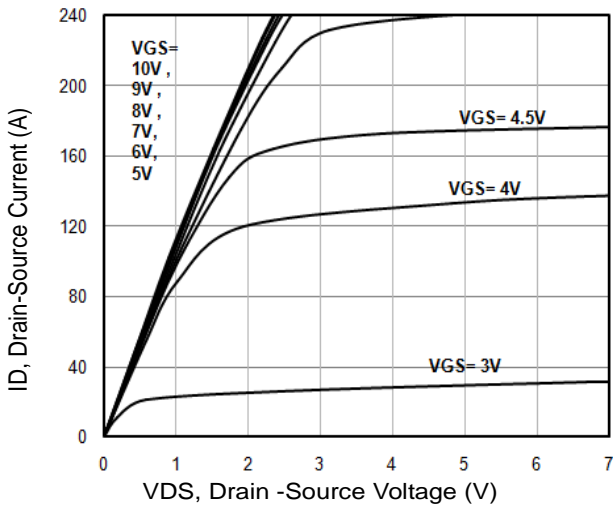


Fig1. Typical Output Characteristics

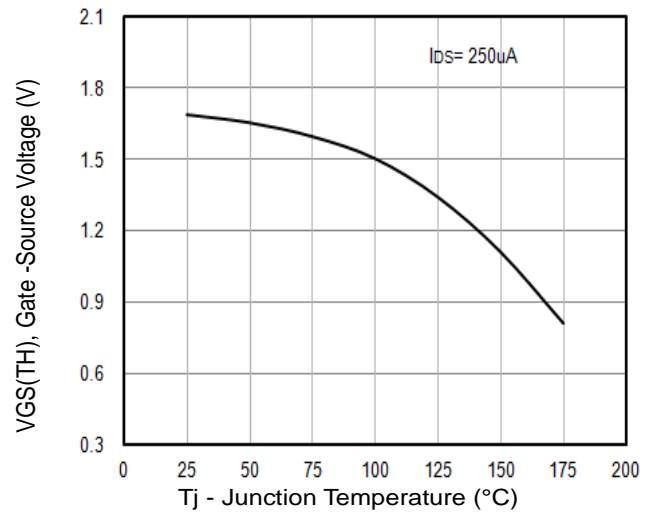


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

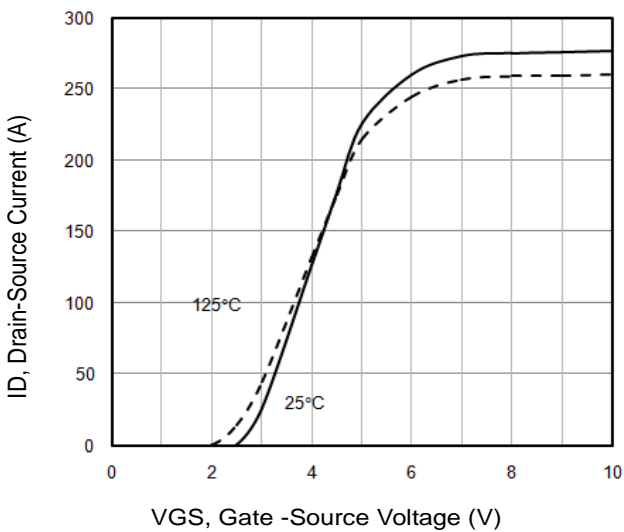


Fig3. Typical Transfer Characteristics

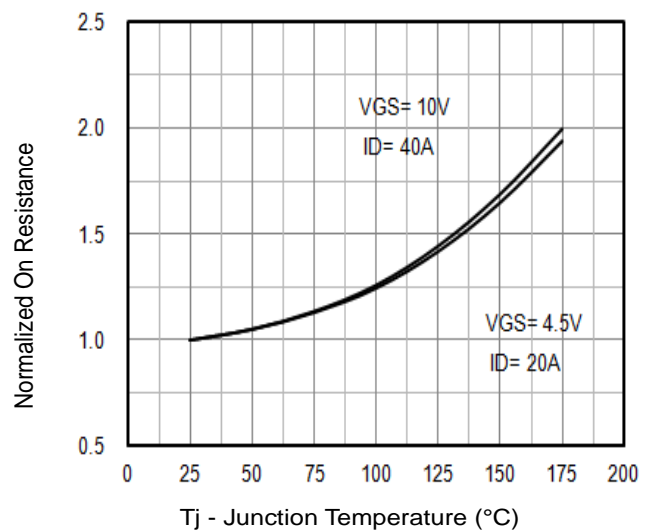


Fig4. Normalized On-Resistance Vs. Temperature

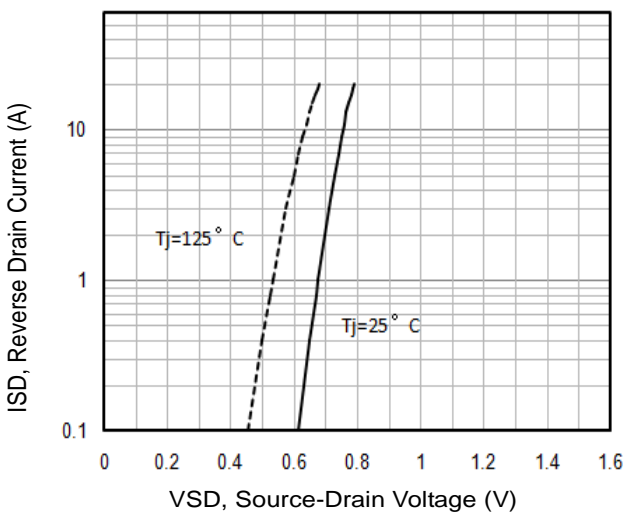


Fig5. Typical Source-Drain Diode Forward Voltage

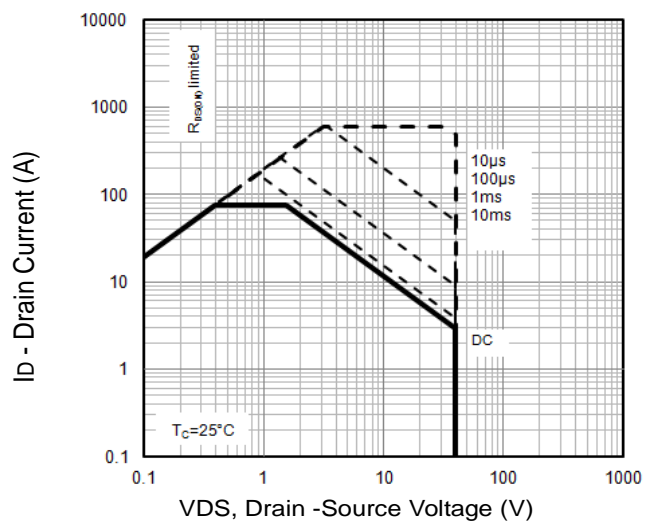


Fig6. Maximum Safe Operating Area

Typical Characteristics

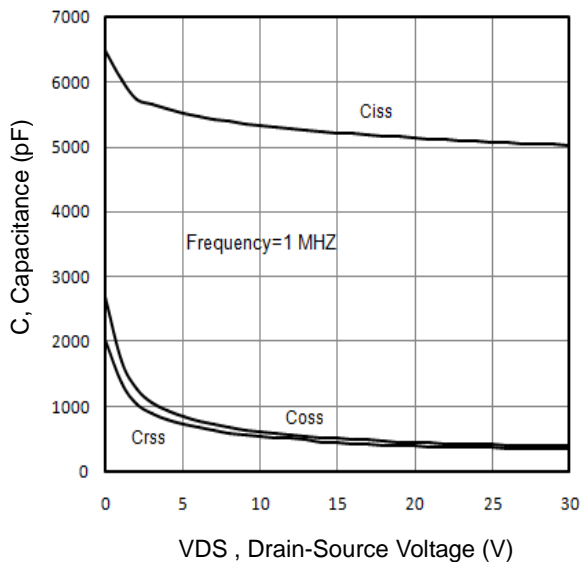


Fig7. Typical Capacitance Vs.Drain-Source Voltage

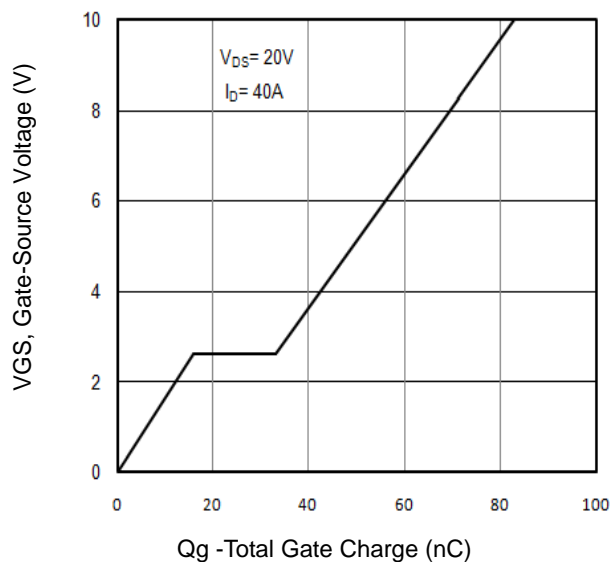


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

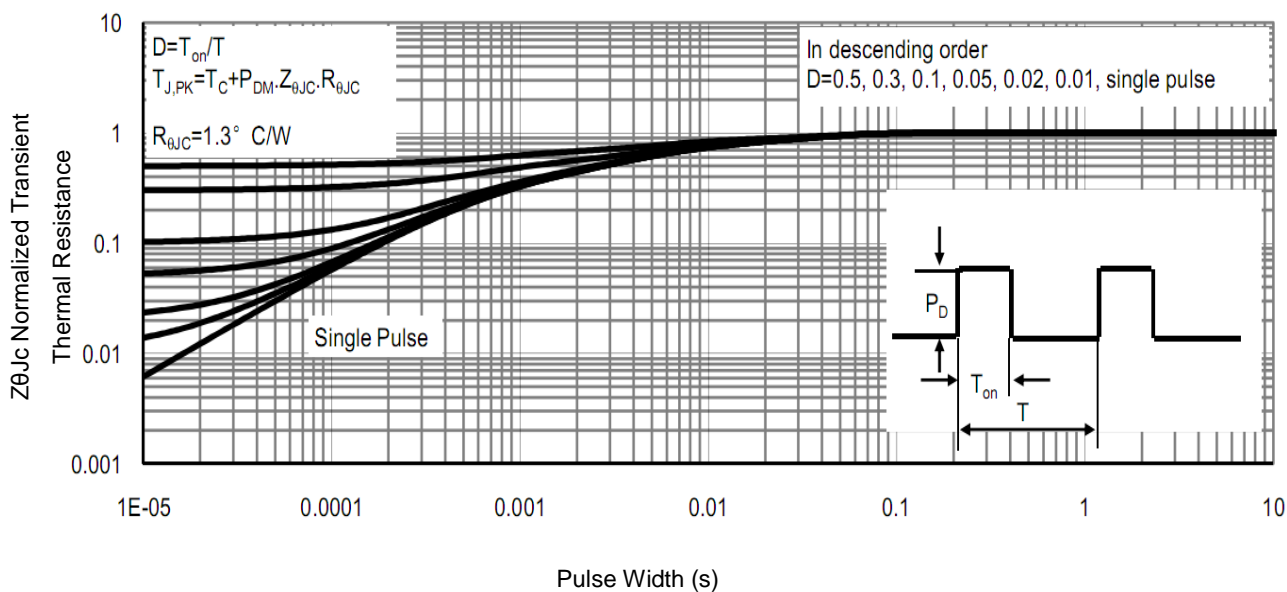


Fig9 . Normalized Maximum Transient Thermal Impedance

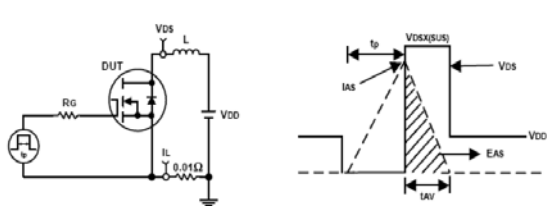


Fig10. Unclamped Inductive Test Circuit and waveforms

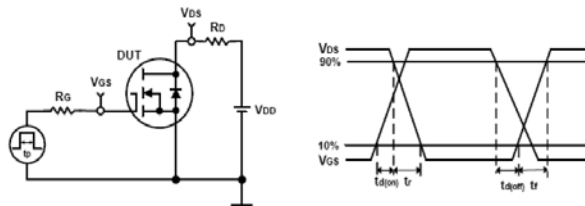
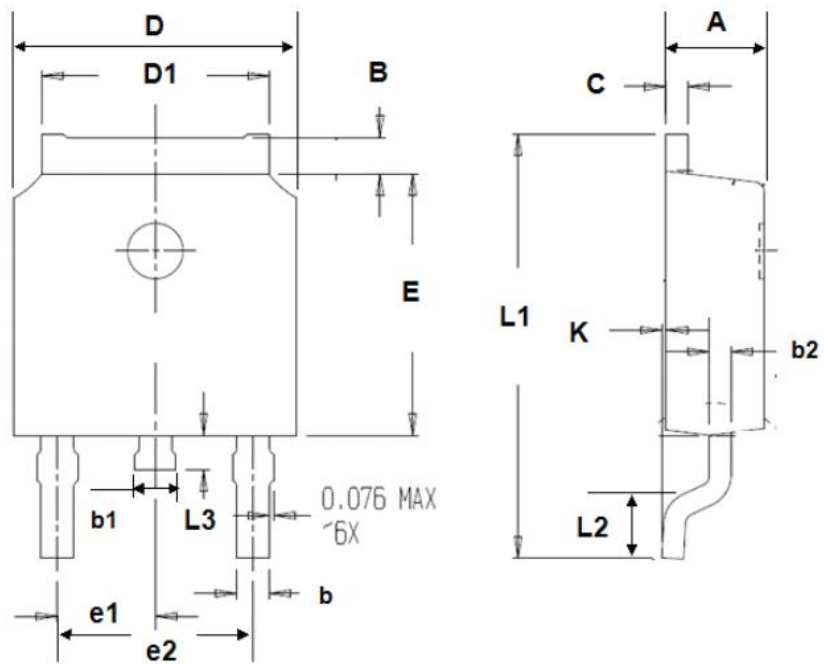


Fig11. Switching Time Test Circuit and waveforms

●Dimensions

SYMBOL	min	max	SYMBOL	min	max
A	2.10	2.50	B	0.85	1.25
b	0.50	0.80	b1	0.50	0.90
b2	0.45	0.70	C	0.45	0.70
D	6.30	6.75	D1	5.10	5.50
E	5.30	6.30	e1	2.25	2.35
L1	9.20	10.60	e2	4.45	4.75
L2	0.90	1.75	L3	0.60	1.10
K	0.00	0.23			




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