

• General Description

The AGM409D 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

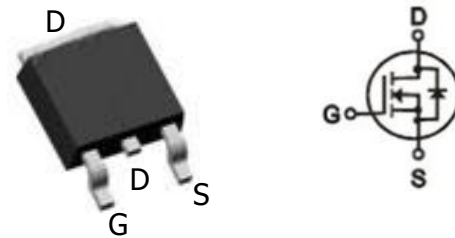
- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

• Application

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

Product Summary

BVDSS	RDSON	ID
40V	6.4mΩ	63A

TO-252 Pin Configuration


Package Marking and Ordering Information

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM409D	AGM409D	TO-252	325mm	16mm	2500

Maximum ratings, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	40	V
I_S	Diode continuous forward current	$T_C=25\text{ }^\circ\text{C}$ 63	A
I_D	Continuous drain current@VGS=10V	$T_C=25\text{ }^\circ\text{C}$ 63	A
		$T_C=100\text{ }^\circ\text{C}$ 41	A
I_{DM}	Pulse drain current tested ①	$T_C=25\text{ }^\circ\text{C}$ 190	A
P_D	Maximum power dissipation	$T_C=25\text{ }^\circ\text{C}$ 65	W
VGS	Gate-Source voltage	±20	V
$T_{STG} T_J$	Storage and operating temperature range	-55 to 175	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.3	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient	40	°C/W

Drain-Source Avalanche Ratings

EAS	Avalanche Energy, Single Pulsed ②	141	mJ
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Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	--	--	1	μA
	Zero Gate Voltage Drain Current($T_j=125^\circ\text{C}$)	$V_{DS}=40V, V_{GS}=0V$	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ^③	$V_{GS}=10V, I_D=25A$	--	6.4	8.9	m Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance ^③	$V_{GS}=4.5V, I_D=15A$	--	8.5	12.0	m Ω
Dynamic Electrical Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated)						
C_{iss}	Input Capacitance	$V_{DS}=30V, V_{GS}=0V,$ $f=1\text{MHz}$	--	1490	--	pF
C_{oss}	Output Capacitance		--	170	--	pF
C_{rss}	Reverse Transfer Capacitance		--	125	--	pF
R_g	Gate Resistance	$f=1\text{MHz}$		2.3		Ω
Q_g	Total Gate Charge	$V_{DS}=20V, I_D=20A,$ $V_{GS}=10V$	--	28.5	--	nC
Q_{gs}	Gate-Source Charge		--	5.8	--	nC
Q_{gd}	Gate-Drain Charge		--	7.3	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=20V,$ $I_D=10A,$ $R_G=3.5\Omega,$ $V_{GS}=10V$	--	8	--	nS
t_r	Turn-on Rise Time		--	21	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	34	--	nS
t_f	Turn-Off Fall Time		--	19	--	nS
Source- Drain Diode Characteristics @ $T_j = 25^\circ\text{C}$ (unless otherwise stated)						
V_{SD}	Forward on voltage	$I_{SD}=25A, V_{GS}=0V$	--	0.86	1.2	V
t_{rr}	Reverse Recovery Time	$T_j=25^\circ\text{C}, I_{sd}=20A,$ $di/dt=500A/\mu s$	--	38	--	nS
Q_{rr}	Reverse Recovery Charge				26	

NOTE:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by T_{jmax} , starting $T_j = 25^\circ\text{C}$, $L = 0.5\text{mH}$, $R_G = 25\Omega$, $I_{AS} = 24A$, $V_{GS} = 10V$. Part not recommended for use above this value
- ③ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.

Typical Characteristics

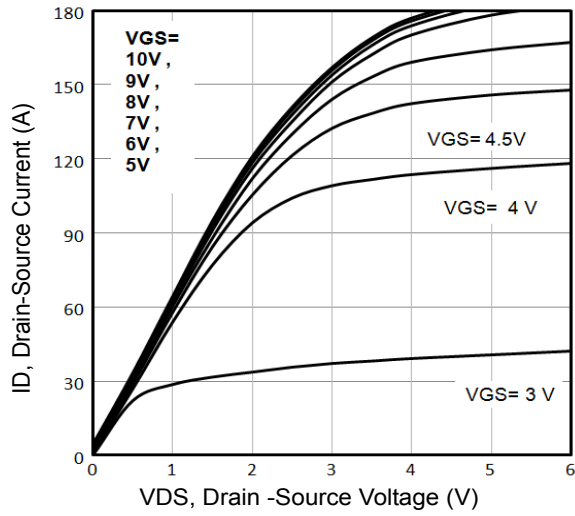


Fig1. Typical Output Characteristics

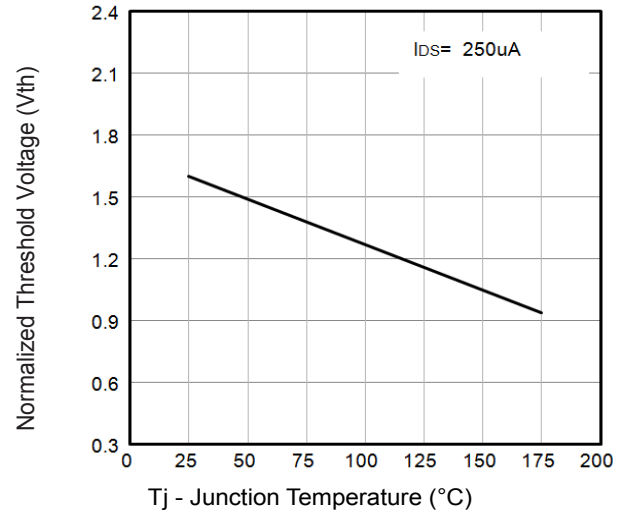


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

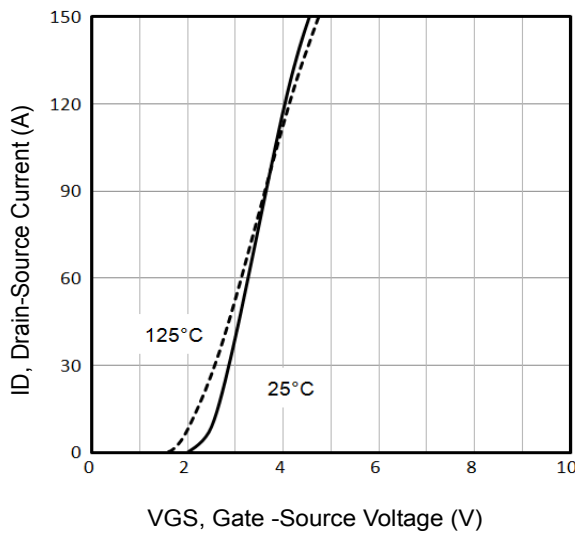


Fig3. Typical Transfer Characteristics

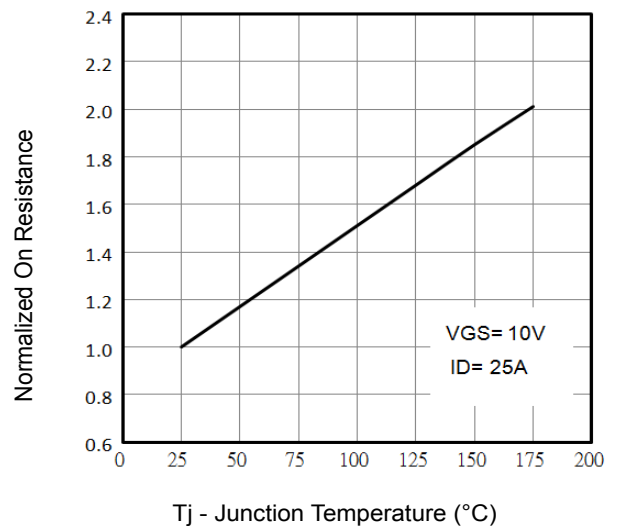


Fig4. Normalized On-Resistance Vs. T_j

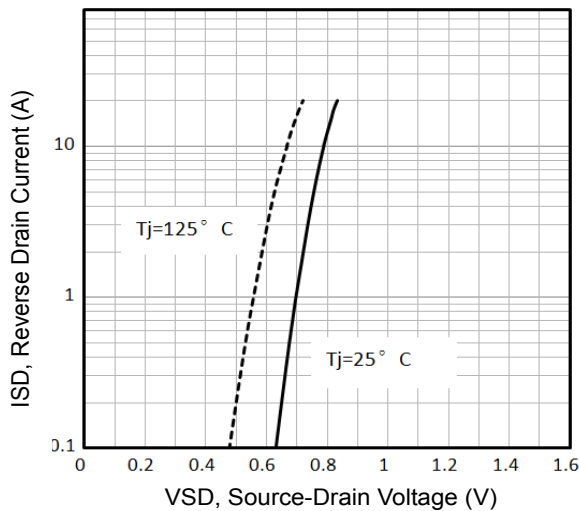


Fig5. Typical Source-Drain Diode Forward Voltage

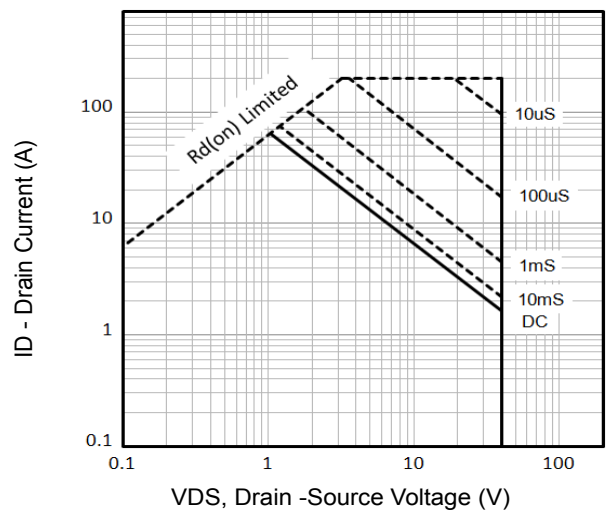


Fig6. Maximum Safe Operating Area

Typical Characteristics

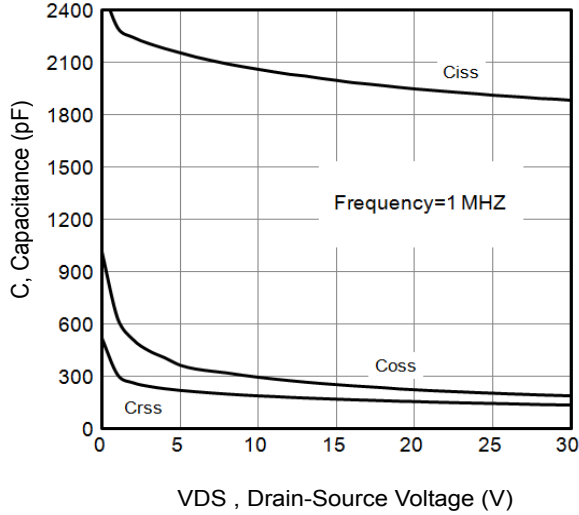


Fig7. Typical Capacitance Vs. Drain-Source Voltage

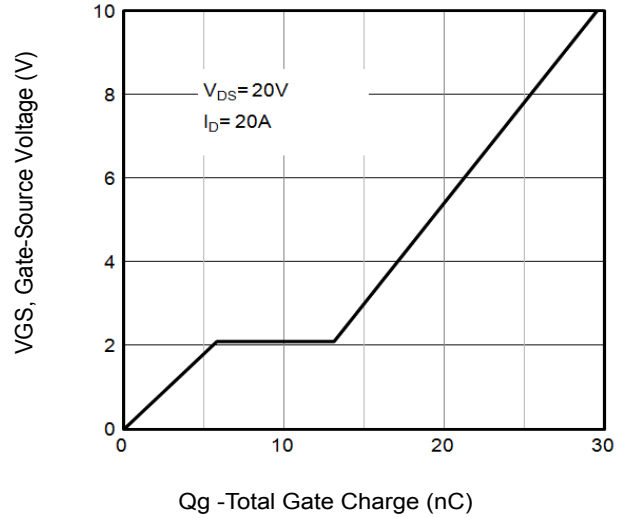


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

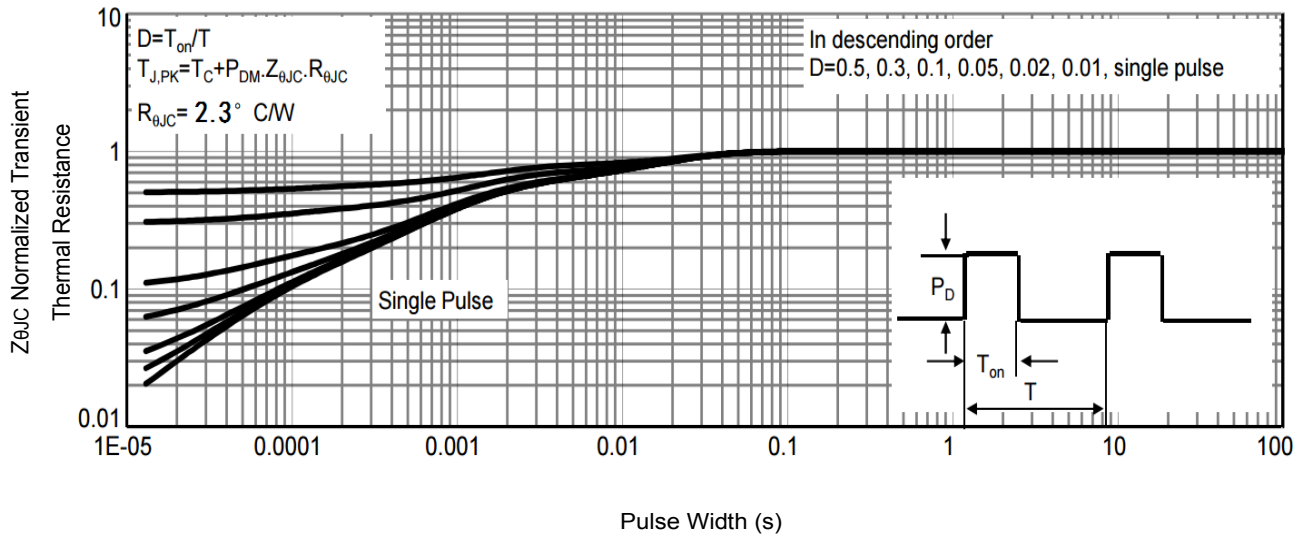


Fig9 . Normalized Maximum Transient Thermal Impedance

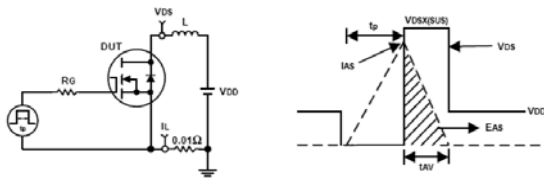


Fig10. Unclamped Inductive Test Circuit and waveforms

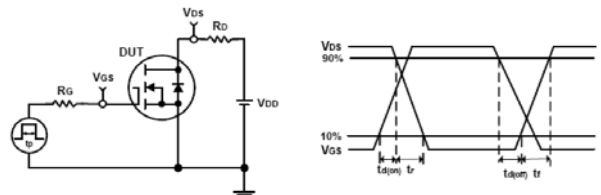
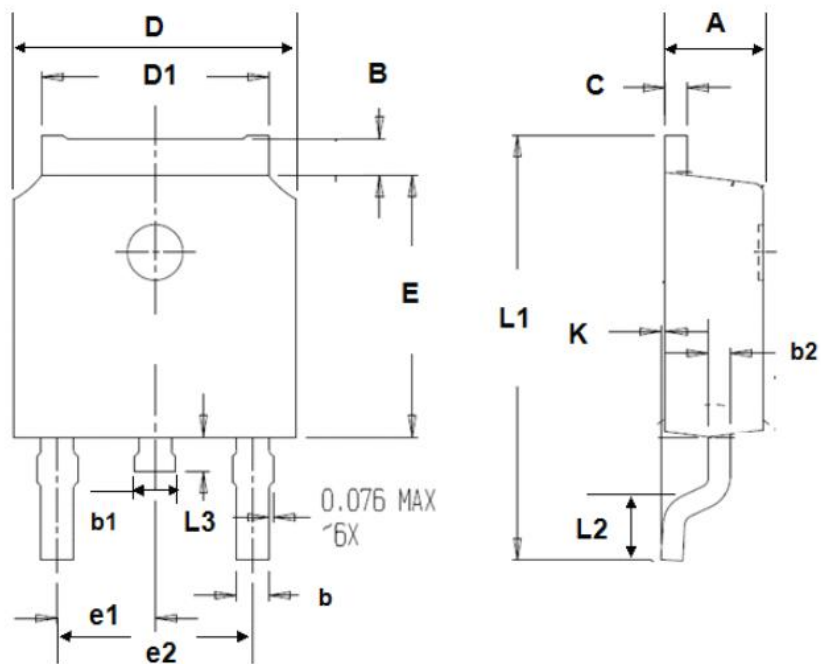


Fig11. Switching Time Test Circuit and waveforms

•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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