

• General Description

The AGM420MD 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

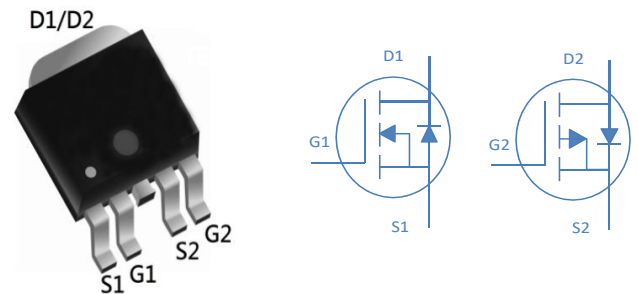
• Application

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

Product Summary

BVDSS	RDSON	ID
40V	18mΩ	20A
-40V	26mΩ	-18A

TO-254-4 Pin Configuration



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM420MD	AGM420MD	TO-252-4	--mm	--mm	2500

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

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	40	-40	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	± 20	V
I_D	Drain Current-Continuous($T_c=25^\circ\text{C}$) (Note 1)	20	-18	A
	Drain Current-Continuous($T_c=100^\circ\text{C}$)	15	-16	A
IDM (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 2)	50	-40	A
P_D	Total Power Dissipation($T_c=25^\circ\text{C}$)	25	25	W
	Total Power Dissipation($T_A=100^\circ\text{C}$)	10	10	W
EAS	Avalanche energy (Note 3)	31	58	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	$^\circ\text{C}$

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) ¹	---	62	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	5	$^\circ\text{C/W}$

Table 3. N- Channel Electrical Characteristics (TA=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	40	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=40V,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	1.7	2.5	V
gFS	Forward Transconductance	VDS=40V,ID=25A	--	--	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=25A	--	18	23	mΩ
		VGS=4.5V, ID=20A	--	25	36	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=20V,VGS=0V, F=1MHZ	--	660	--	pF
Coss	Output Capacitance		--	92	--	pF
Crss	Reverse Transfer Capacitance		--	33	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	2.2	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=10V,VDS=20V, ID=20A,RGEN=3Ω	--	--	--	nS
tr	Turn-on Rise Time		--	44.5	--	nS
td(off)	Turn-Off Delay Time		--	19	--	nS
tf	Turn-Off Fall Time		--	9.2	--	nS
Qg	Total Gate Charge	VGS=10V, VDS=20V, ID=20A	--	20.5	--	nC
Qgs	Gate-Source Charge		--	4.9	--	nC
Qgd	Gate-Drain Charge		--	4.1	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	20	A
VSD	Forward on Voltage	VGS=0V,IS=20A	--	0.9	1.2	V
trr	Reverse Recovery Time	IF=20A , dI/dt=100A/μs ,	--	6.8	--	ns
Qrr	Reverse Recovery Charge	TJ=25°C	--	1.6	--	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°C

Table 3. P-Channel Electrical Characteristics (TA=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=-250μA	-40	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=-40V,VGS=0V	--	--	-1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=-250μA	-1.0	-1.7	-2.5	V
gFS	Forward Transconductance	VDS=-10V,ID=-5A	--	--	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=-10V, ID=-15A	--	26	34	mΩ
		VGS=-4.5V, ID=-5A	--	37	46	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=-30V,VGS=0V, F=1MHZ	--	1112	--	pF
Coss	Output Capacitance		--	135	--	pF
Crss	Reverse Transfer Capacitance		--	95	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	--	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=-10V,VDS=-20V, ID=-10A,RGEN=6.8Ω	--	13	--	nS
tr	Turn-on Rise Time		--	18	--	nS
td(off)	Turn-Off Delay Time		--	36	--	nS
tf	Turn-Off Fall Time		--	25	--	nS
Qg	Total Gate Charge	VGS=-10V, VDS=-20V, ID=-10A	--	27	--	nC
Qgs	Gate-Source Charge		--	7.3	--	nC
Qgd	Gate-Drain Charge		--	5.6	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	-18	A
VSD	Forward on Voltage	VGS=0V,IS=-15A	--	-0.89	-1.2	V
trr	Reverse Recovery Time	IF=-10A , dl/dt=100A/μs , TJ=25°C	--	34	--	ns
Qrr	Reverse Recovery Charge		--	30	--	nc

Notes 1.The maximum current rating is package limited.

Notes2.Repetitive Rating: Pulse width limited by maximum junction temperature Notes

3.EAS condition: TJ=25°C

P-Channel Typical Characteristics

Typical Characteristics

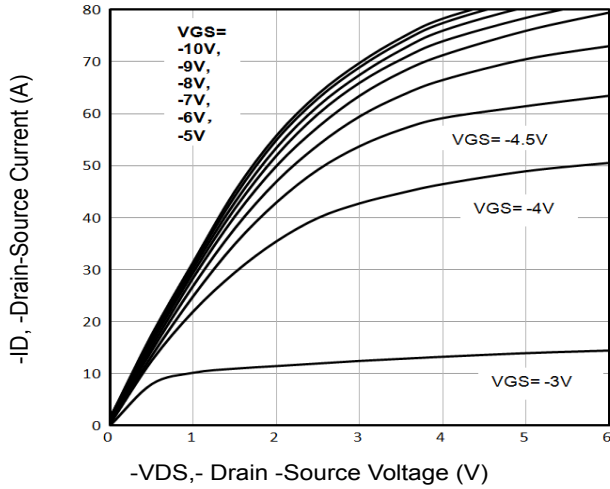


Fig1. Typical Output Characteristics

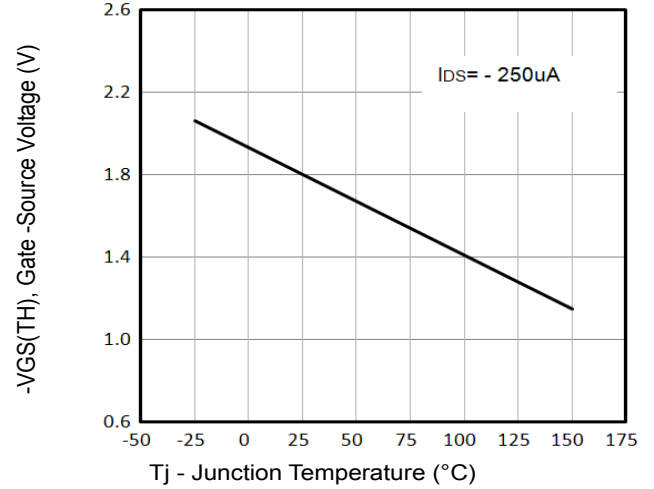


Fig2. $-V_{GS(TH)}$ Gate -Source Voltage Vs. T_j

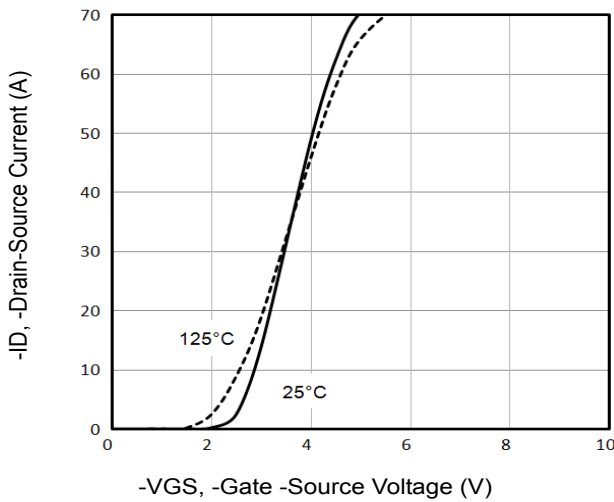


Fig3. Typical Transfer Characteristics

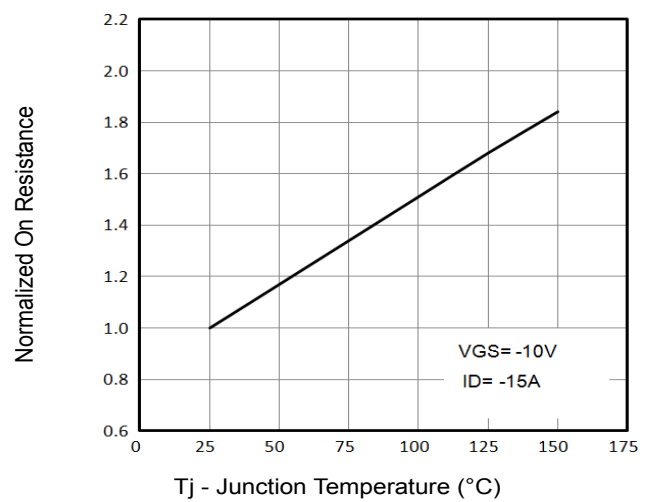


Fig4. Normalized On-Resistance Vs. T_j

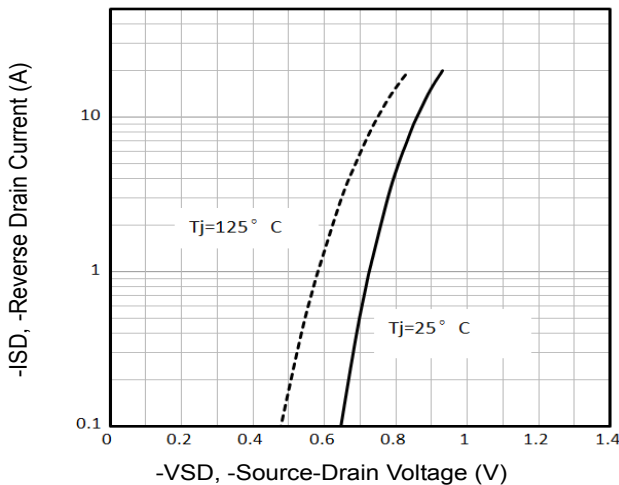


Fig5. Typical Source-Drain Diode Forward Voltage

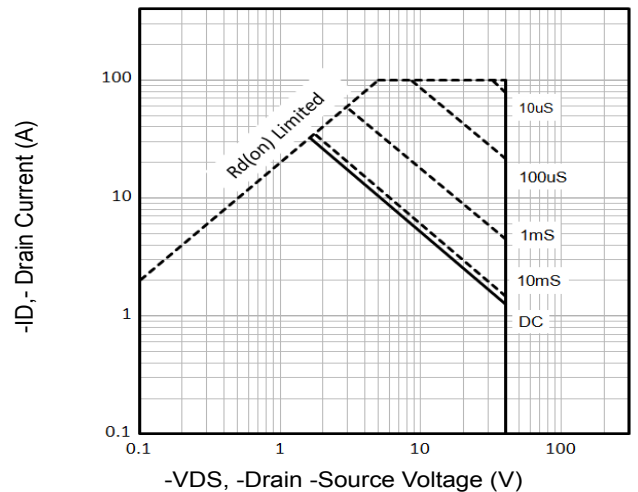


Fig6. Maximum Safe Operating Area

Typical Characteristics

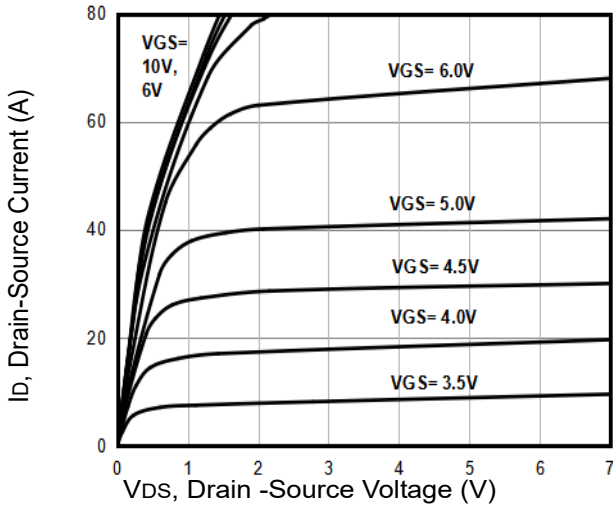


Fig1. Typical Output Characteristics

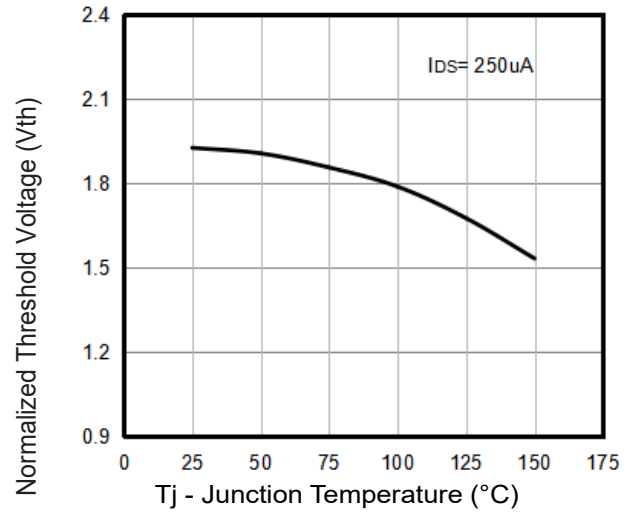


Fig2. Normalized Threshold Voltage Vs. Temperature

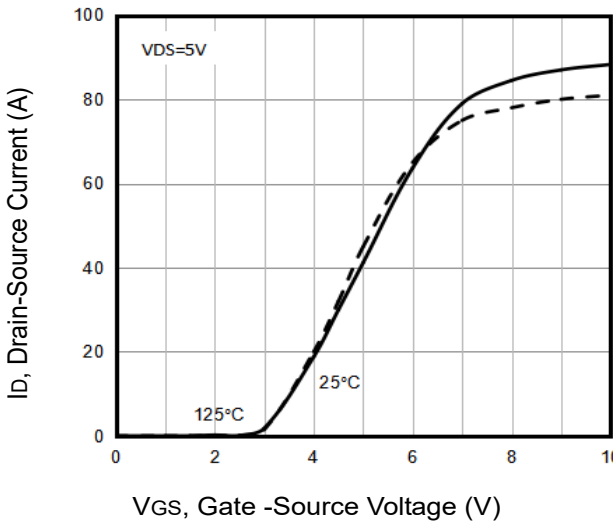


Fig3. Typical Transfer Characteristics

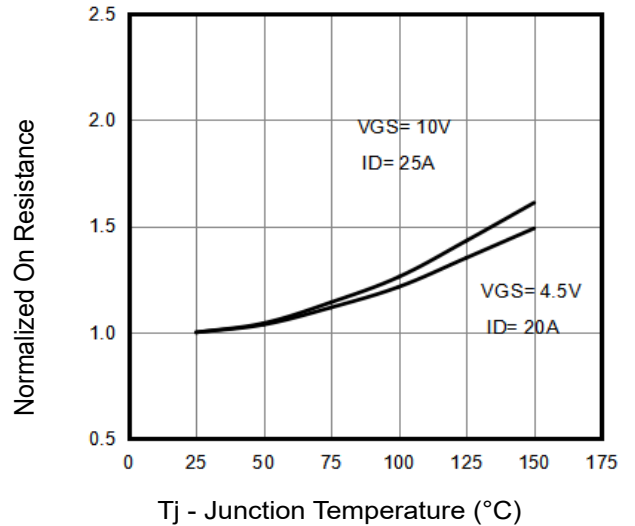


Fig4. Normalized On-Resistance Vs. Temperature

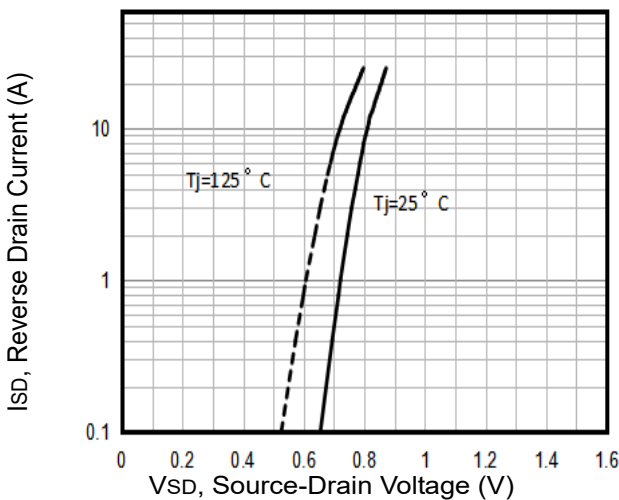


Fig5. Typical Source-Drain Diode Forward Voltage

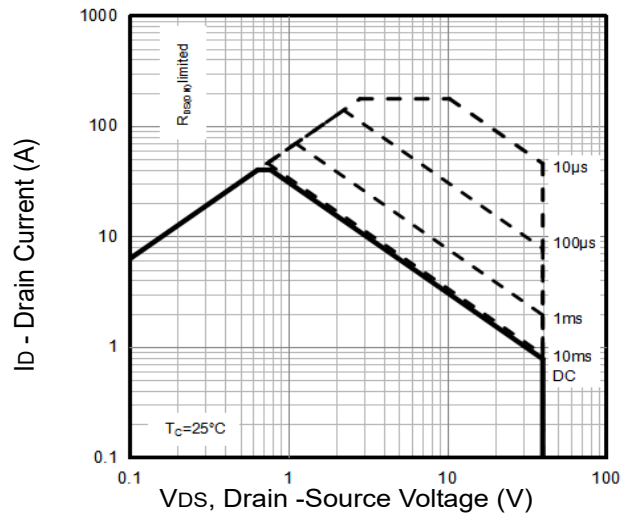


Fig6. Maximum Safe Operating Area

N-Channel Typical Characteristics

Typical Characteristics

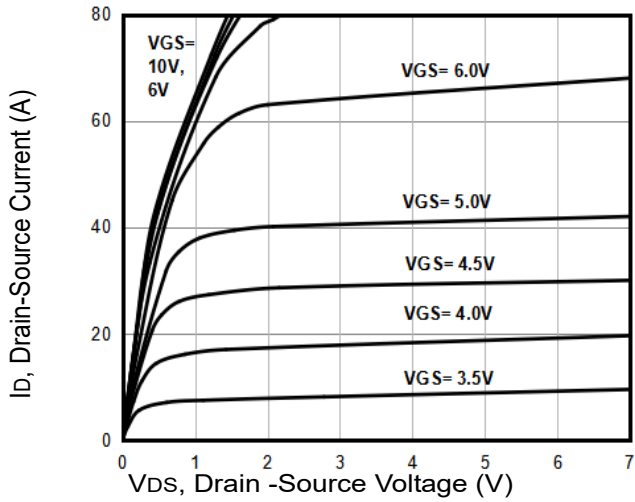


Fig1. Typical Output Characteristics

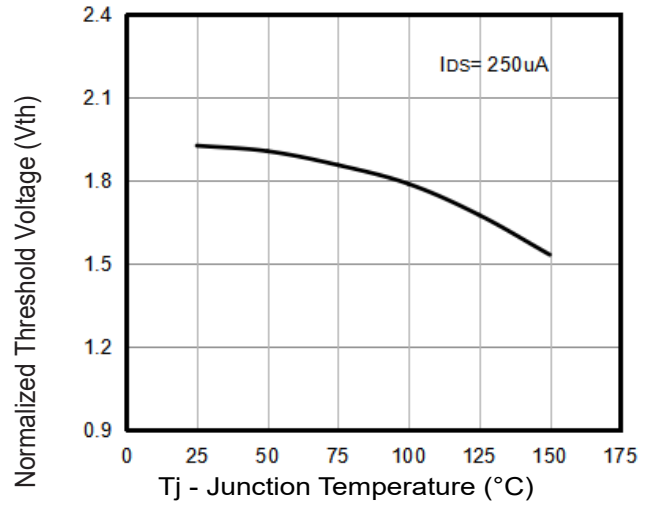


Fig2. Normalized Threshold Voltage Vs. Temperature

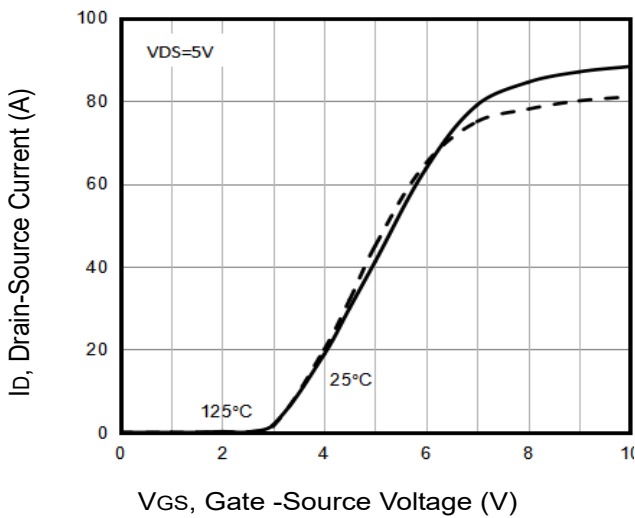


Fig3. Typical Transfer Characteristics

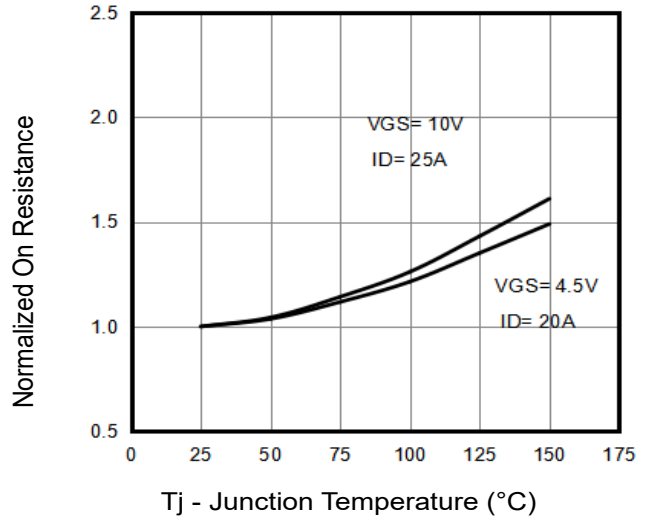


Fig4. Normalized On-Resistance Vs. Temperature

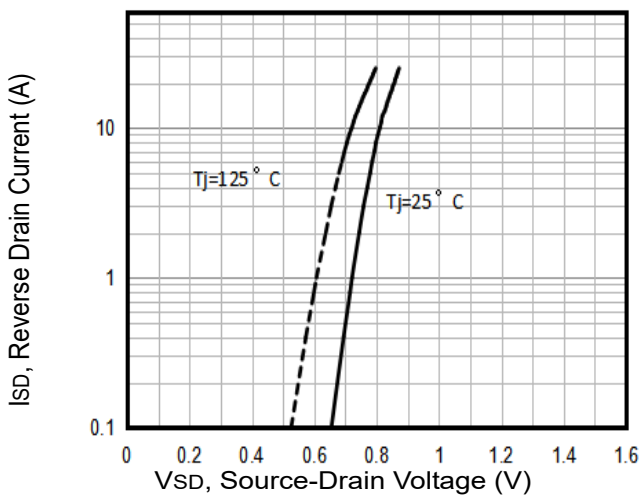


Fig5. Typical Source-Drain Diode Forward Voltage

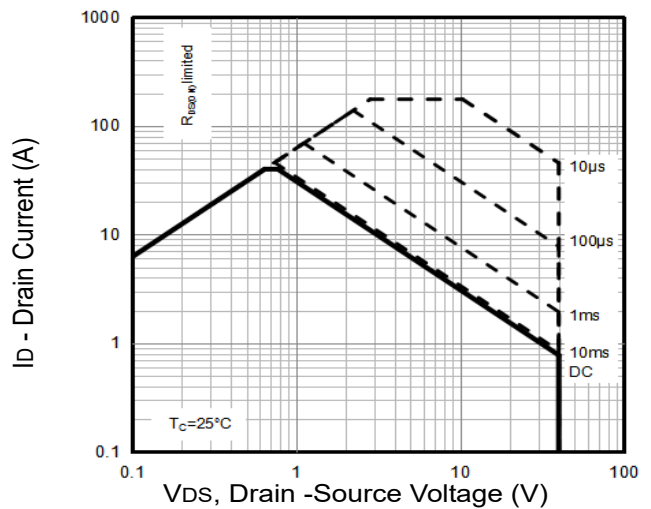


Fig6. Maximum Safe Operating Area

Typical Characteristics

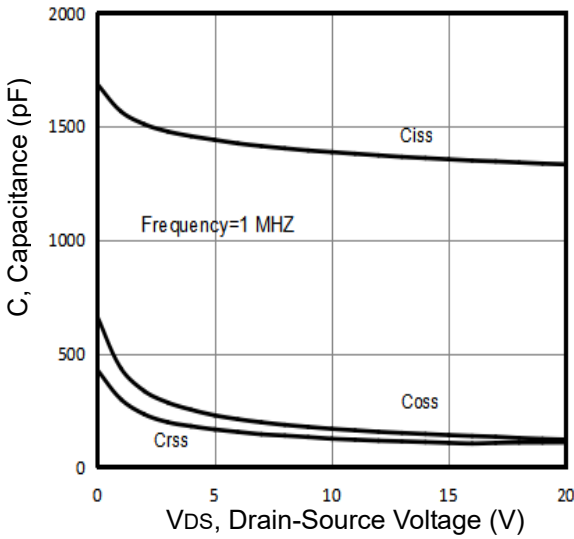


Fig7. Typical Capacitance Vs. Drain-Source Voltage

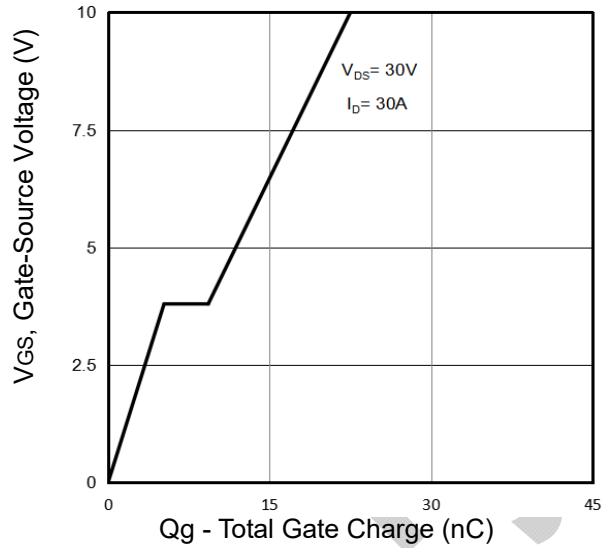


Fig8. Typical Gate Charge Vs. Gate-Source

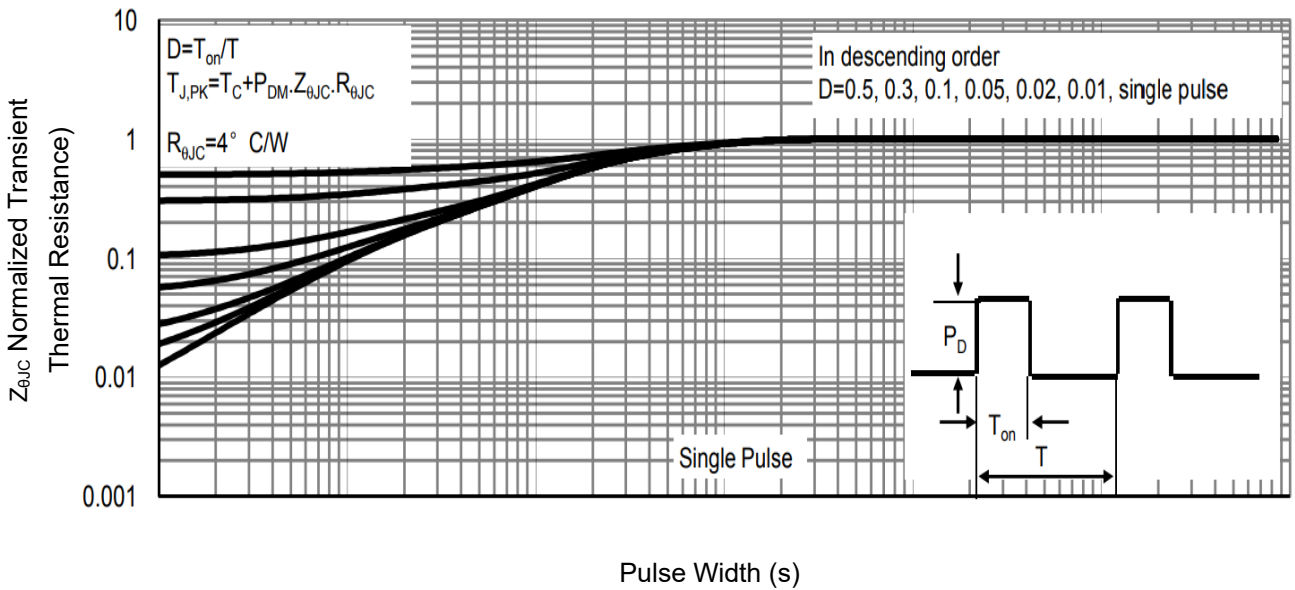


Fig9. Normalized Maximum Transient Thermal Impedance

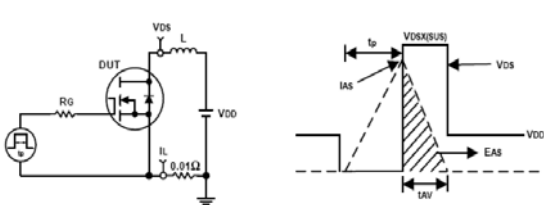


Fig10. Unclamped Inductive Test Circuit and waveforms

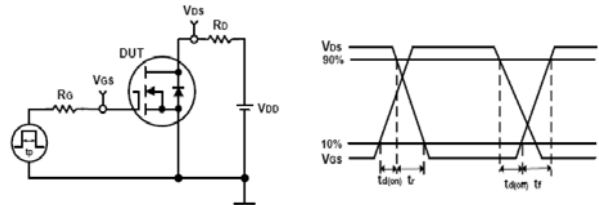
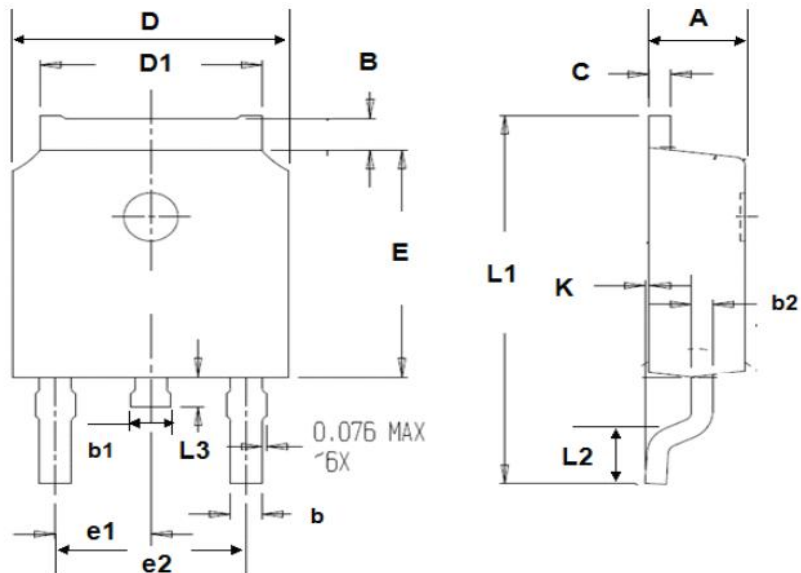


Fig11. Switching Time Test Circuit and waveforms

• 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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