● General Description

The AGM420MA 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

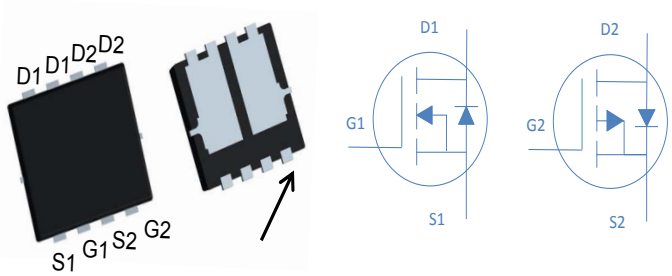
●Application

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

Product Summary

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

PDFN5*6 Pin Configuration



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM420MA	AGM420MA	DFN5*6	325mm	16mm	3000

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

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℃) (Note 1)	18	-20	A
	Drain Current-Continuous(Tc=100℃)	15	-16	A
IDM (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 2)	50	-40	A
P_D	Total Power Dissipation(T_C=25℃)	25	31	W
	Total Power Dissipation(TA=100℃)	4	5	W
EAS	Avalanche energy (Note 3)	31	58	mJ
TJ,TSTG	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	℃

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]	---	5	℃/W

Electrical 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	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current(Tj=25℃)	V_{DS}=40V,V_{GS}=0V	--	--	1	μA
	Zero Gate Voltage Drain Current(Tj=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	1.2	1.7	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ④	V_{GS}=10V, I_D=25A	--	18	23	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance ④	V_{GS}=4.5V, I_D=20A	--	25	36	mΩ
Dynamic Electrical Characteristics @ T_j= 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=20V,V_{GS}=0V, f=1MHz	970	1130	1230	pF
C_{oss}	Output Capacitance		95	100	120	pF
C_{rss}	Reverse Transfer Capacitance		80	90	105	pF
R_g	Gate Resistance	f=1MHz	--	2.2	--	Ω
Q_g	Total Gate Charge	V_{DS}=20V,I_D=20A, V_{GS}=10V	--	20.5	--	nC
Q_{gs}	Gate-Source Charge		--	4.9	--	nC
Q_{gd}	Gate-Drain Charge		--	4.1	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=20V, I_D=20A, R_G=3Ω, V_{GS}=10V				
t_r	Turn-on Rise Time		--	44.5	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	19	--	ns
t_f	Turn-Off Fall Time		--	9.2	--	ns
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=25A,V_{GS}=0V	--	0.9	1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=20A, V_{GS}=0V di/dt=100A/μs	--	6.8	--	ns
Q_{rr}	Reverse Recovery Charge		--	1.6	--	nC

NOTE:

① Repetitive rating; pulse width limited by max junction temperature.

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 6A, V_{GS} =10V. Part not recommended for use above this value

③ The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 300μs; duty cycle≤ 2%.

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	--	--	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 Resistance ②	V_{GS}=-10V, I_D=-15A	--	26	34	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance ②	V_{GS}=-4.5V, I_D=-5A	--	34	46	mΩ
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=-30V,V_{GS}=0V, f=1MHz	--	1112	--	pF
C_{oss}	Output Capacitance		--	135	--	pF
C_{rss}	Reverse Transfer Capacitance		--	95	--	pF
Q_g	Total Gate Charge	V_{DS}=-20V,I_D=-10A, V_{GS}=-10V	--	27	--	nC
Q_{gs}	Gate-Source Charge		--	7.3	--	nC
Q_{gd}	Gate-Drain Charge		--	5.6	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-20V, I_D=-10A, R_G=6.8Ω, V_{GS}=-10V	--	13	--	nS
t_r	Turn-on Rise Time		--	18	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	36	--	nS
t_f	Turn-Off Fall Time		--	25	--	nS
Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)						
V_{SD}	Forward on voltage	I_{SD}=-15A,V_{GS}=0V	--	-0.89	-1.2	V
t_{rr}	Reverse Recovery Time	T_j=25℃,I_{sd}=-10A, V_{GS}=0V di/dt=-100A/μs	--	34	--	nS
Q_{rr}	Reverse Recovery Charge			30		nC

NOTE:

① Repetitive rating; pulse width limited by max. junction temperature.

②Pulse width ≤ 300μs; duty cycle≤ 2%.

③Limited by TJmax, starting TJ = 25°C, L = 0.5mH,RG = 25Ω, IAS = -34A, VGS =-10V. Part not recommended for use above this value

P-Channel Typical Characteristics

Typical Characteristics

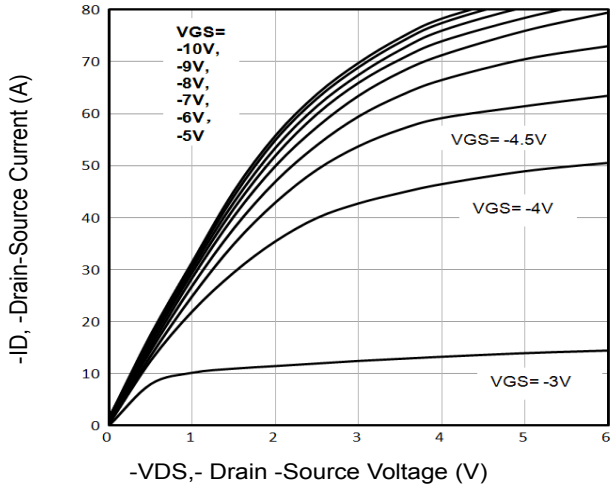


Fig1. Typical Output Characteristics

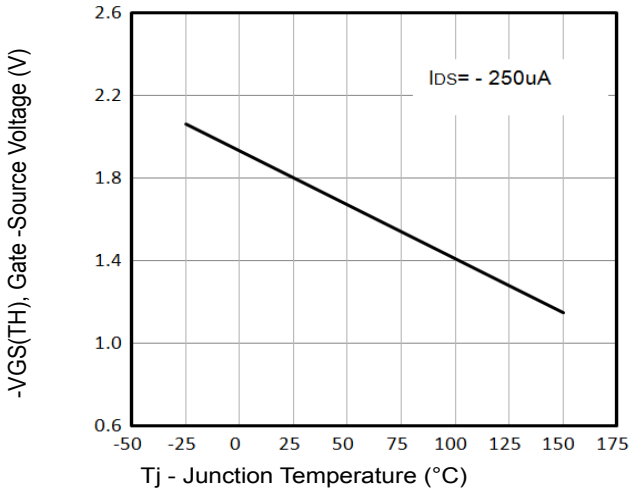


Fig2. $-V_{GS(TH)}$ Gate -Source Voltage Vs.Tj

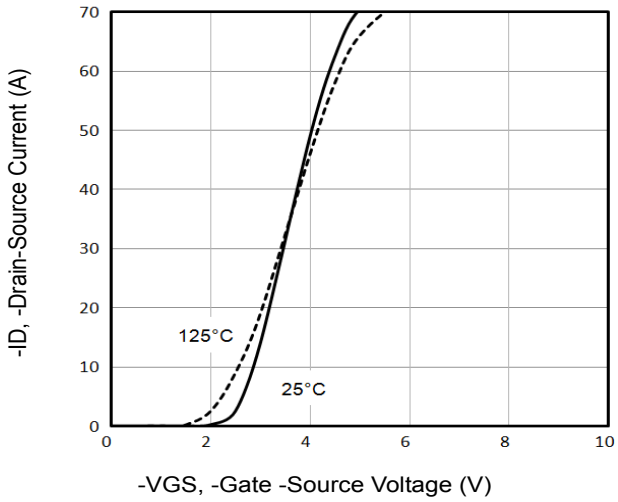


Fig3. Typical Transfer Characteristics

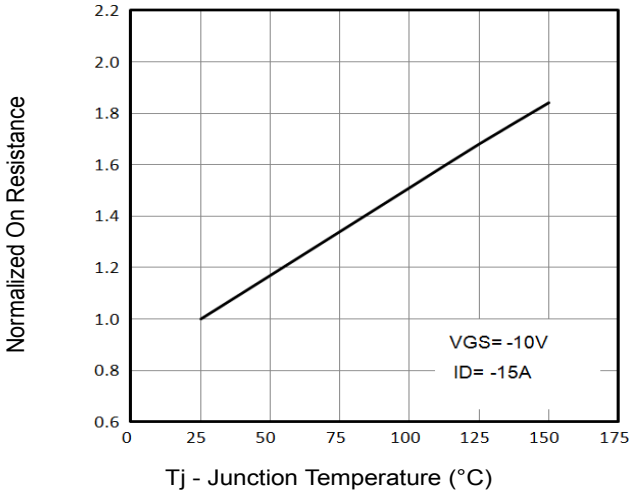


Fig4. Normalized On-Resistance Vs. Tj

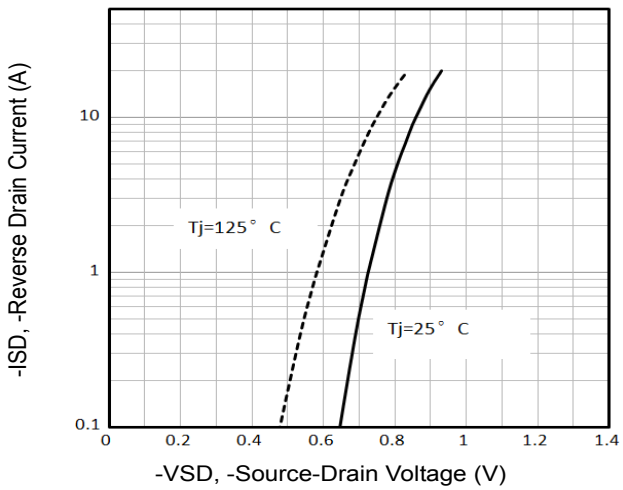


Fig5. Typical Source-Drain Diode Forward Voltage

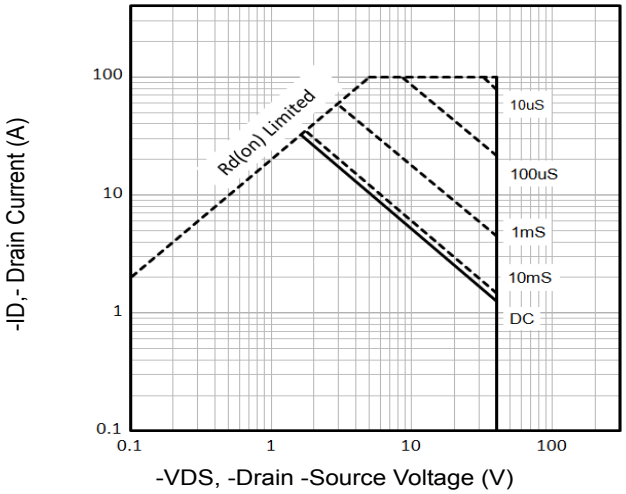


Fig6. Maximum Safe Operating Area

Typical Characteristics

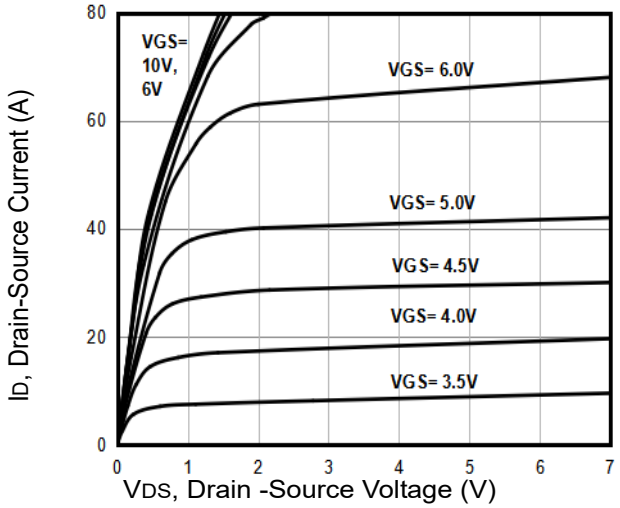


Fig1. Typical Output Characteristics

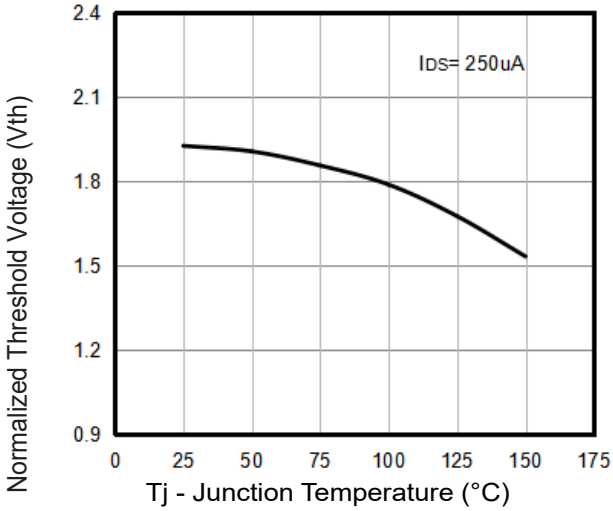


Fig2. Normalized Threshold Voltage Vs. Temperature

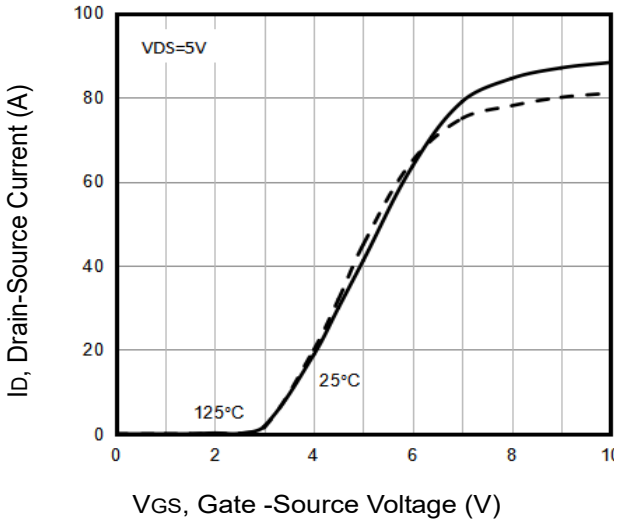


Fig3. Typical Transfer Characteristics

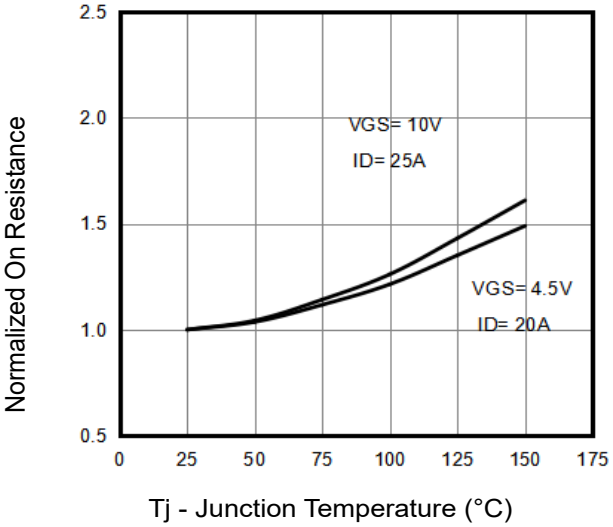


Fig4. Normalized On-Resistance Vs. Temperature

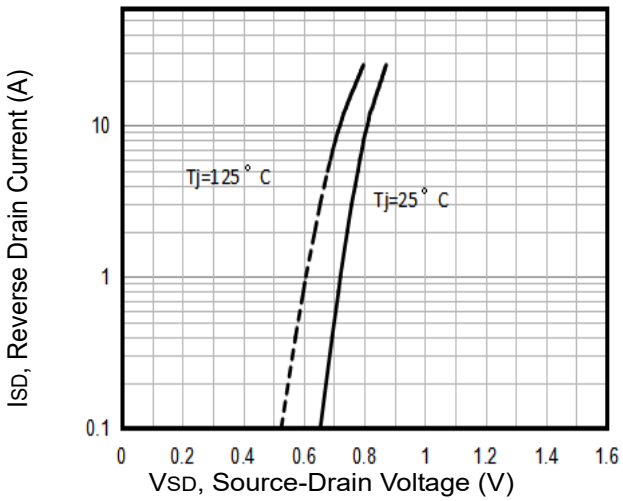


Fig5. Typical Source-Drain Diode Forward Voltage

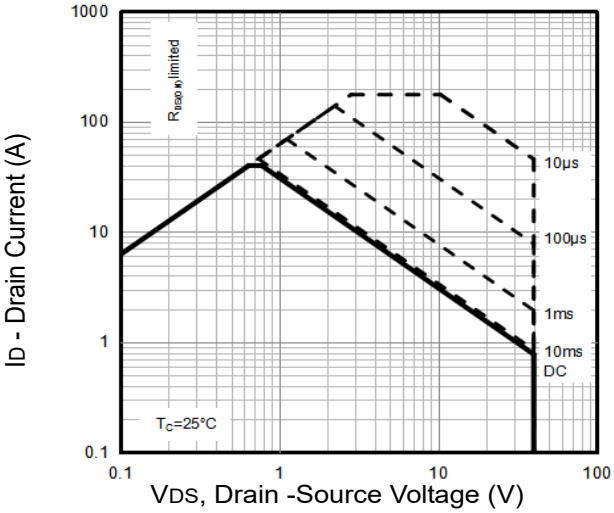


Fig6. Maximum Safe Operating Area

N-Channel Typical Characteristics

Typical Characteristics

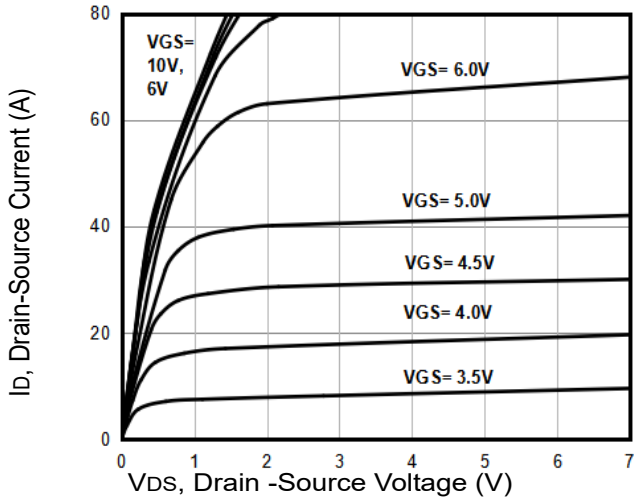


Fig1. Typical Output Characteristics

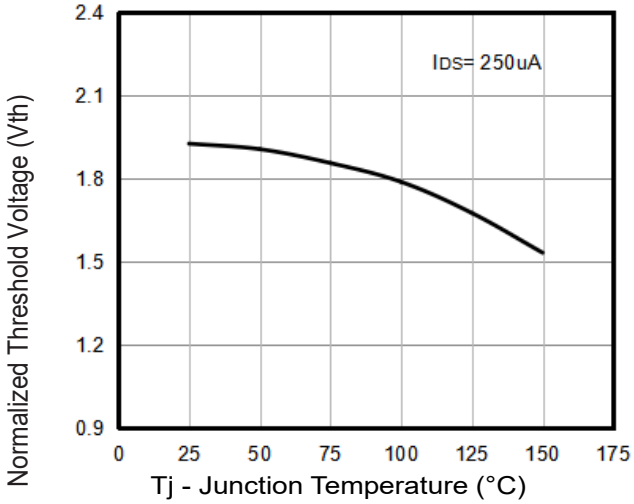


Fig2. Normalized Threshold Voltage Vs. Temperature

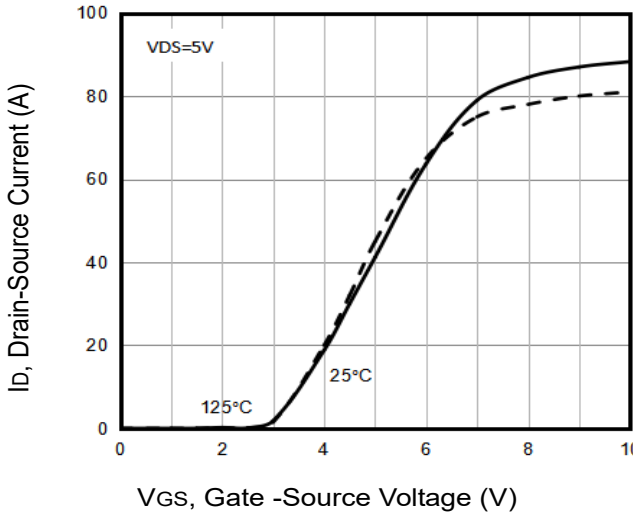


Fig3. Typical Transfer Characteristics

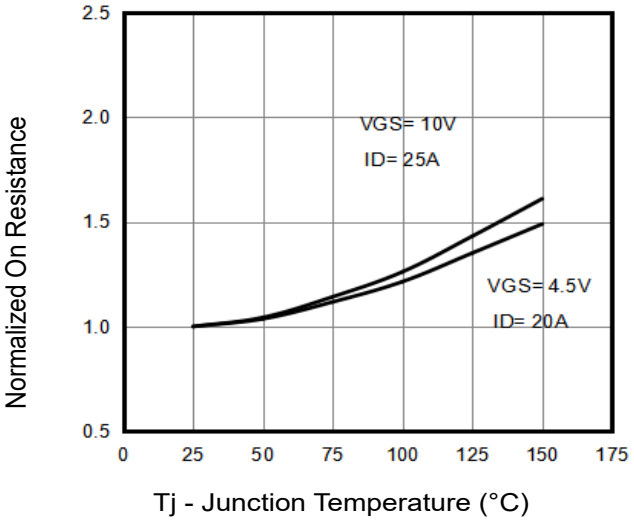


Fig4. Normalized On-Resistance Vs. Temperature

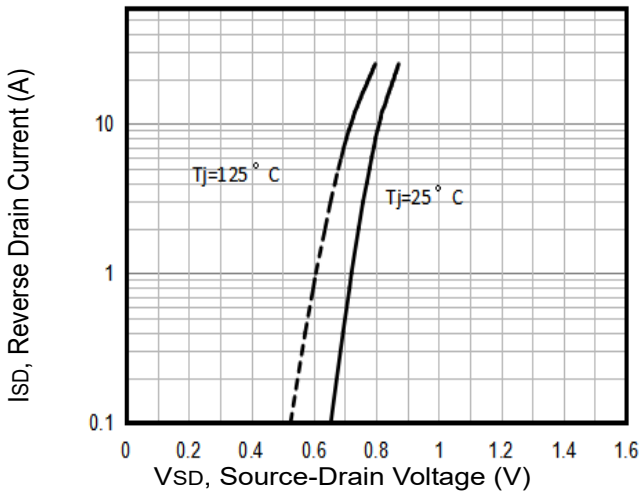


Fig5. Typical Source-Drain Diode Forward Voltage

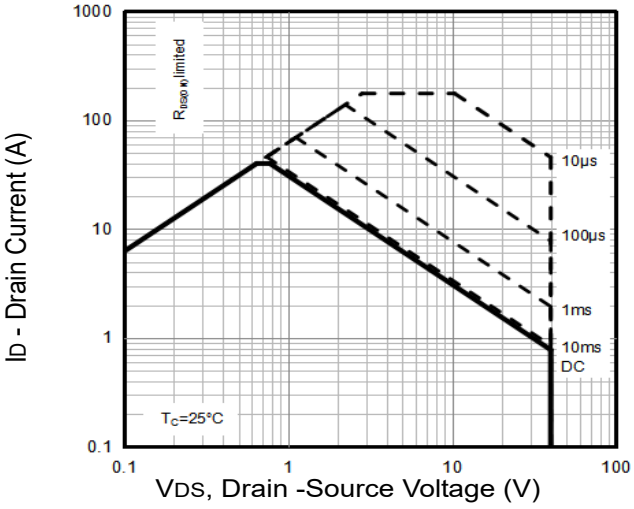


Fig6. Maximum Safe Operating Area

Typical Characteristics

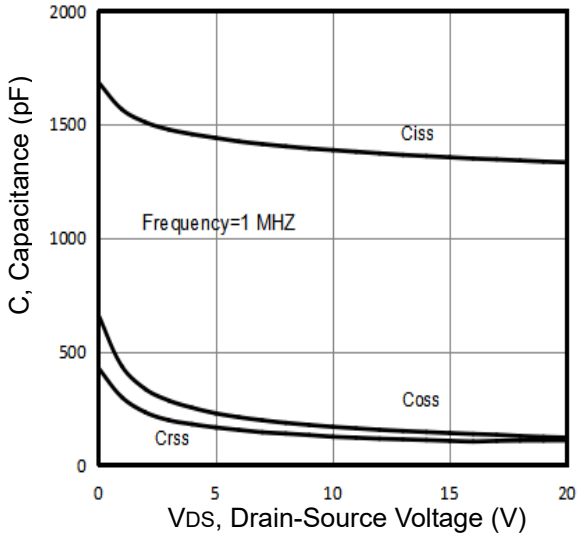


Fig7. Typical Capacitance Vs. Drain-Source Voltage

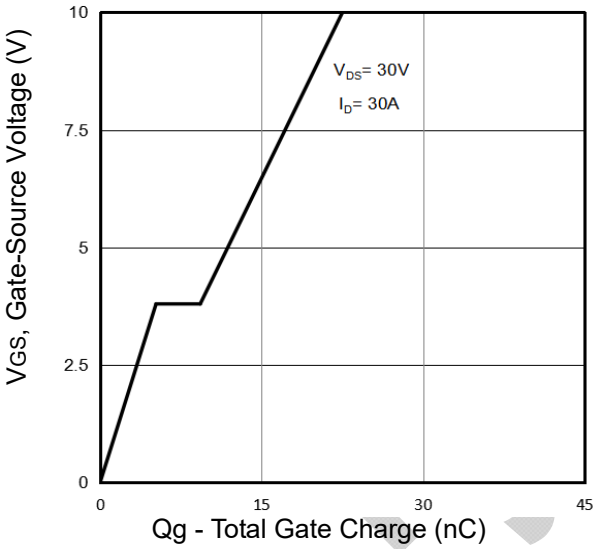


Fig8. Typical Gate Charge Vs. Gate-Source

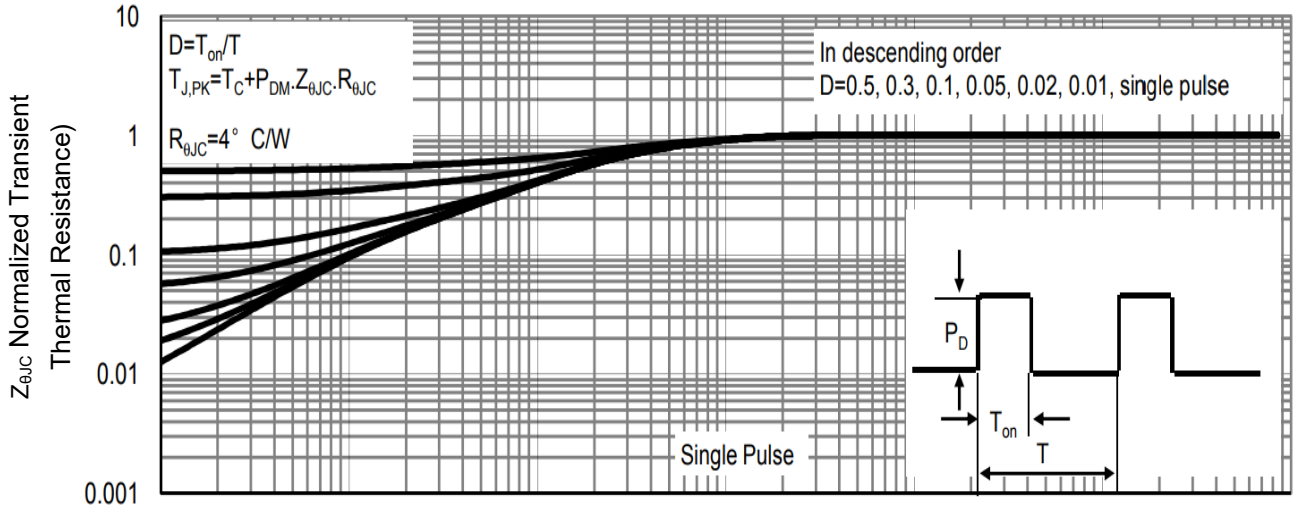


Fig9. Normalized Maximum Transient Thermal Impedance

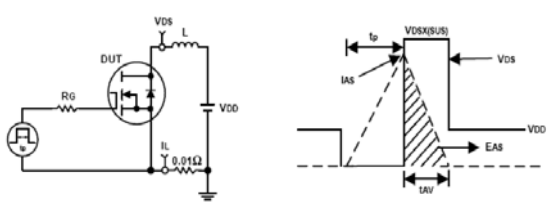


Fig10. Unclamped Inductive Test Circuit and waveforms

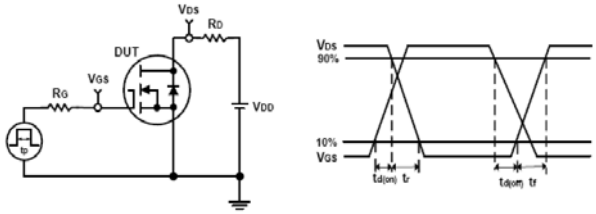
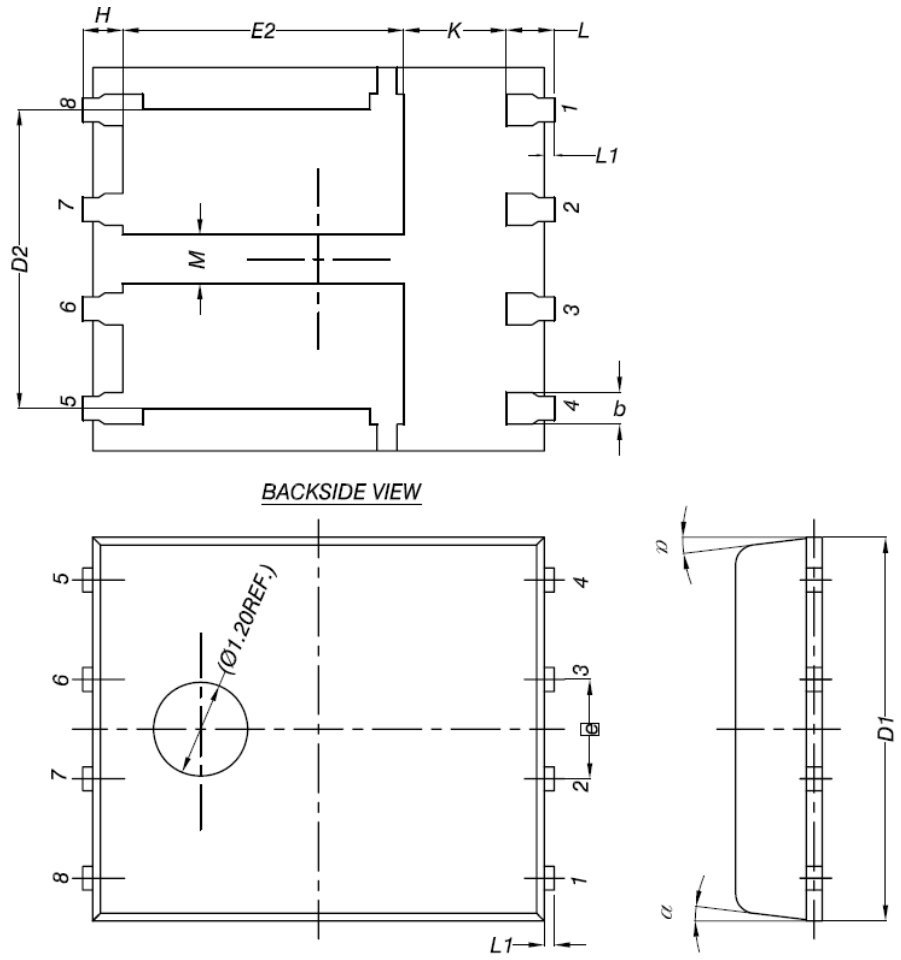


Fig11. Switching Time Test Circuit and waveforms

PDFN5x6 Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.00	1.10	**e**	1.27 BSC		
b	0.33	0.41	0.51	**H**	0.41	0.51	0.61
C	0.20	0.25	0.30	**K**	1.10	--	--
D1	4.80	4.90	5.00	**L**	0.51	0.61	0.71
D2	3.61	3.81	3.96	**L1**	0.06	0.13	0.20
E	5.90	6.00	6.10	**M**	0.50	--	--
E1	5.70	5.75	5.80	**α**	0°	--	12°
E2	3.38	3.58	3.78				

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