

● General Description

The AGM310MAP 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

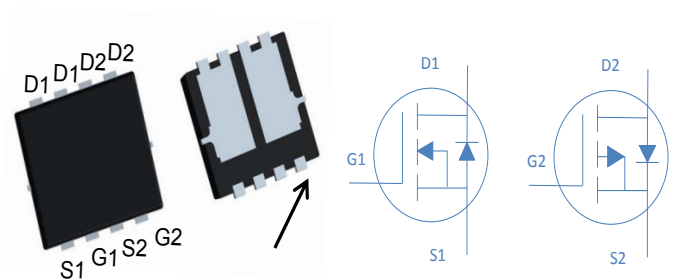
- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

● Application

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

Product Summary

BVDSS	RDSON	ID
30V	11mΩ	20A
-30V	17mΩ	-18A

PDFN3.3X3.3 Pin Configuration

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM310MAP	AGM310MAP	DFN3.3*3.3	325mm	16mm	5000

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

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	30	-30	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	±20	±20	V
I_D	Drain Current-Continuous($T_c=25^\circ C$) (Note 1)	20	-18	A
	Drain Current-Continuous($T_c=100^\circ C$)	15	-14	A
IDM (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 2)	35	-32	A
P_D	Total Power Dissipation($T_c=25^\circ C$)	3.6	3.6	W
	Total Power Dissipation($T_A=100^\circ C$)	0.7	0.7	W
EAS	Avalanche energy (Note 3)	45	65	mJ
TJ,TSTG	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	°C

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) ¹	---	180	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	34	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V			1	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	1.6	2.5	V
g _{FS}	Forward Transconductance	V _{DS} =10V, I _D =5A		10		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =10V, I _D =15A		11	14	mΩ
		V _{GS} =4.5V, I _D =15A		15	22	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, F=1MHZ		850		PF
C _{oss}	Output Capacitance			130		pF
C _{rss}	Reverse Transfer Capacitance			98		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		1.9		Ω
Switching Times						
t _{d(on)}	Turn-on Delay Time	V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3.3Ω		4.7		nS
t _r	Turn-on Rise Time			11		nS
t _{d(off)}	Turn-Off Delay Time			17		nS
t _f	Turn-Off Fall Time			5.6		nS
Q _g	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =10A		16		nC
Q _{gs}	Gate-Source Charge			3		nC
Q _{gd}	Gate-Drain Charge			3.8		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current(Body Diode)				18	A
V _{SD}	Forward on Voltage	V _{GS} =0V, I _s =20A			1.2	V

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

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-24V, V _{GS} =0V			-1	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	2.3	V
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-20A		30		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-20A		17	23.1	mΩ
		V _{GS} =-4.5V, I _D =-15A		26	32	mΩ
Dynamic Characteristics						
C _{iSS}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, F=1MHZ		1380		pF
C _{oss}	Output Capacitance			310		pF
C _{rSS}	Reverse Transfer Capacitance			237		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		9		Ω
Switching Times						
t _{d(on)}	Turn-on Delay Time	V _{GS} =-10V, V _{DD} =-15V, I _D =-15A, R _{GEN} =3.3Ω		8		nS
t _r	Turn-on Rise Time			18		nS
t _{d(off)}	Turn-Off Delay Time			31.8		nS
t _f	Turn-Off Fall Time			18.4		nS
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-25V, I _D =-12A		45		nC
Q _{gs}	Gate-Source Charge			6.4		nC
Q _{gd}	Gate-Drain Charge			9.0		nC
Source-Drain Diode Characteristics						
I _s	Continuous Source Current	V _G =V _D =0V, Force Current			-8	A
V _{SD}	Forward on Voltage	V _{GS} =0V, I _s =-1A			1.2	V

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

●N Channel characteristics curve

Fig.1 Power Dissipation

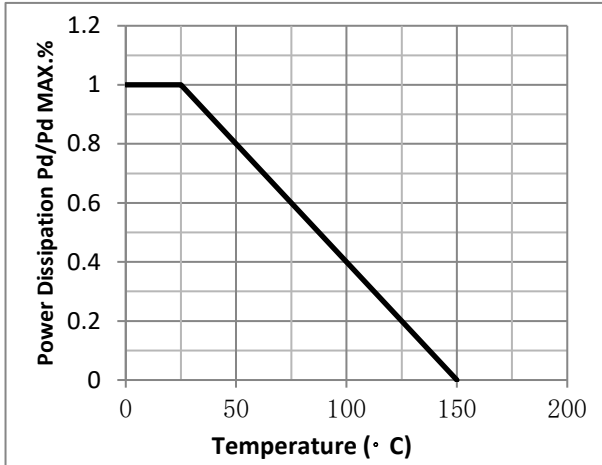


Fig.2 Typical output Characteristics

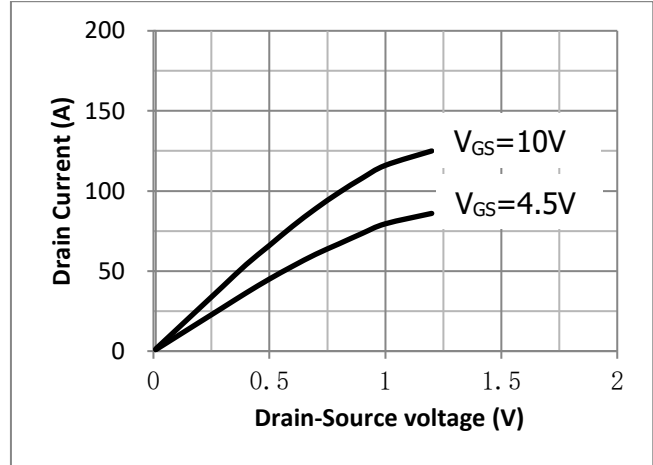


Fig.3 Threshold Voltage V.S Junction Temperature

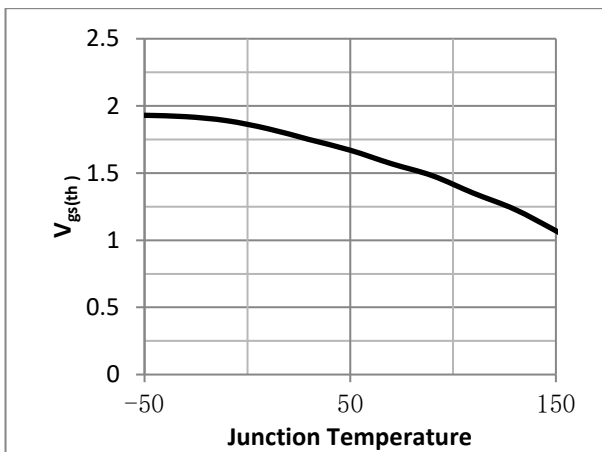


Fig.4 Resistance V.S Drain Current

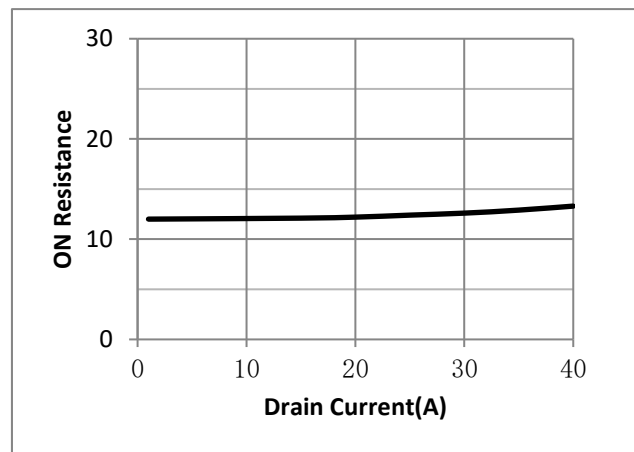


Fig.5 On-Resistance VS Gate Source Voltage

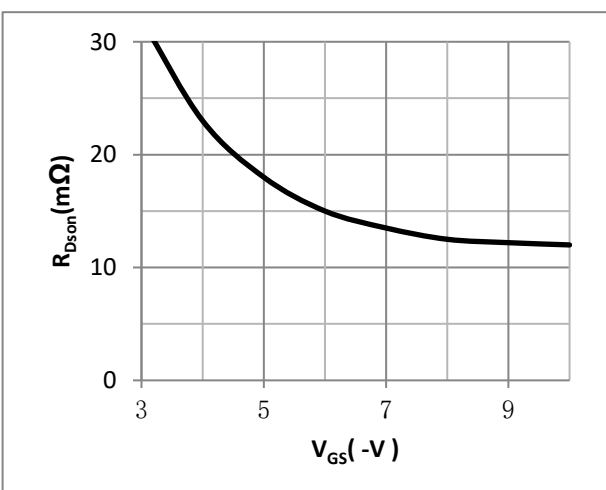
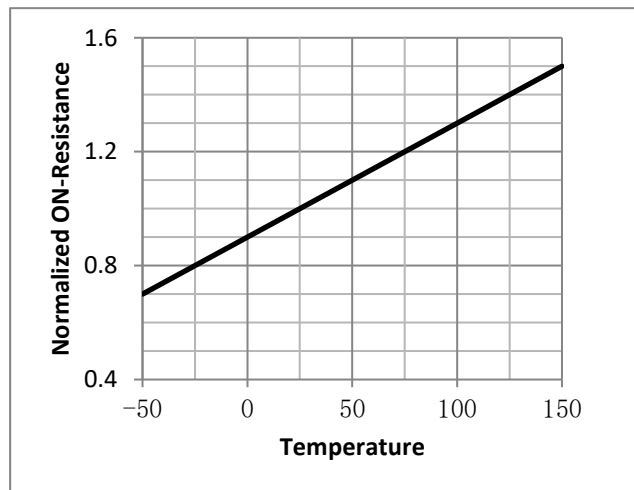


Fig.6 On-Resistance V.S Junction Temperature



•Test Circuit CHANNEL-N

Fig.1 Switching Time Measurement Circuit

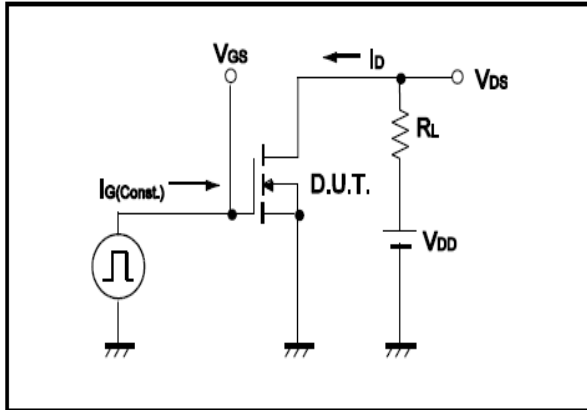


Fig.2 Gate Charge Waveform

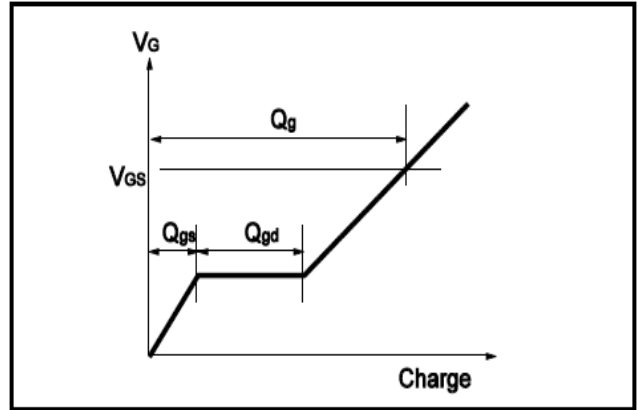


Fig.3 Switching Time Measurement Circuit

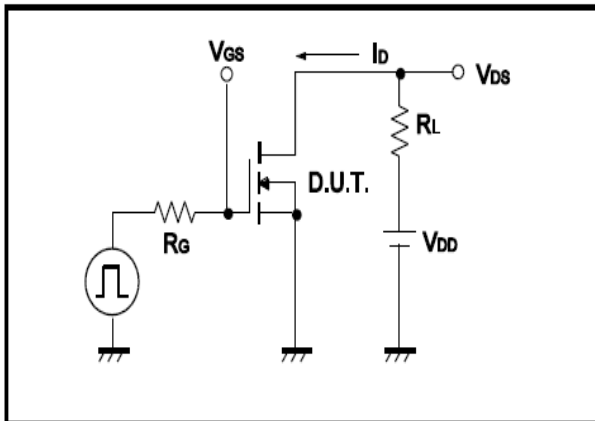


Fig.4 Gate Charge Waveform

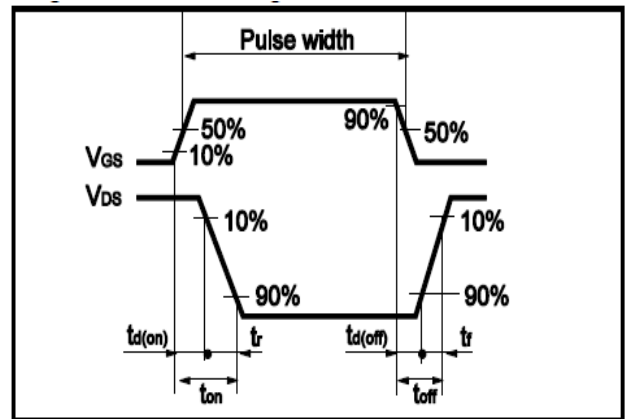


Fig.5 Avalanche Measurement Circuit

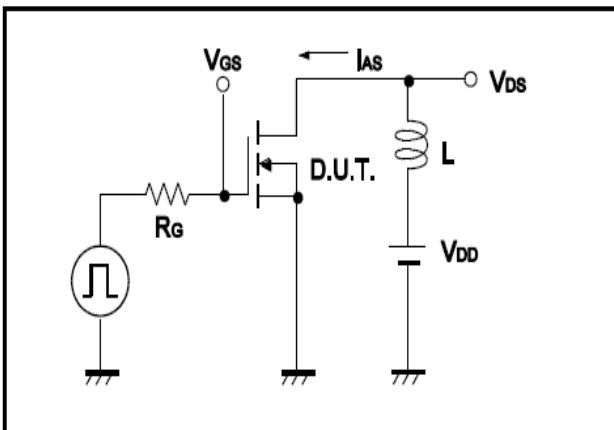
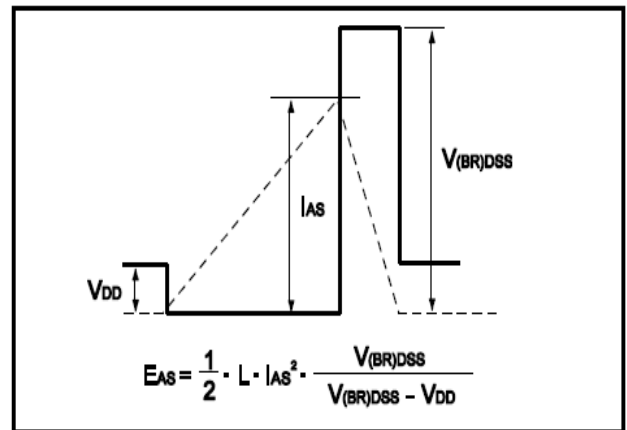


Fig.6 Avalanche Waveform



● P Channel characteristics curve

Fig.1 Power Dissipation Derating Curve

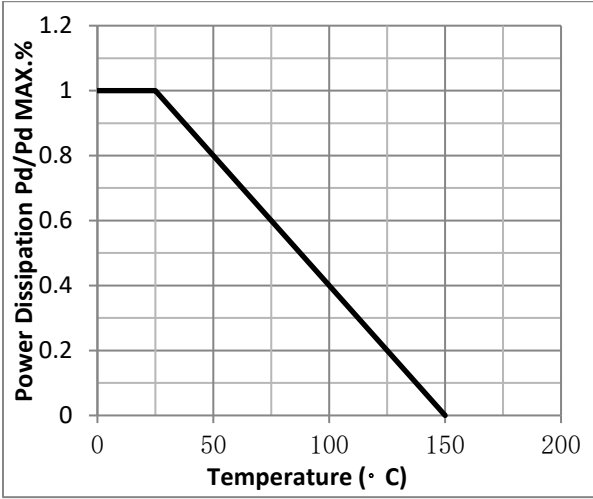


Fig.2 Typical output Characteristics

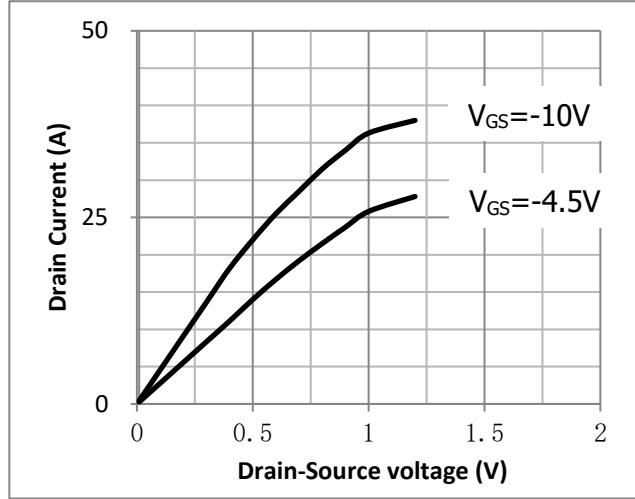


Fig.3 Threshold Voltage V.S Junction Temperature

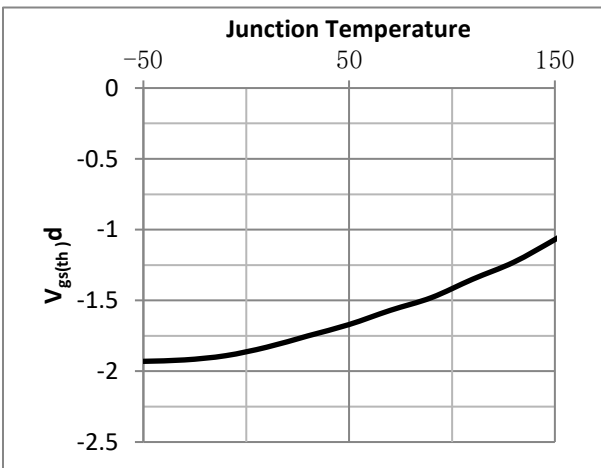


Fig.4 Resistance V.S Drain Current

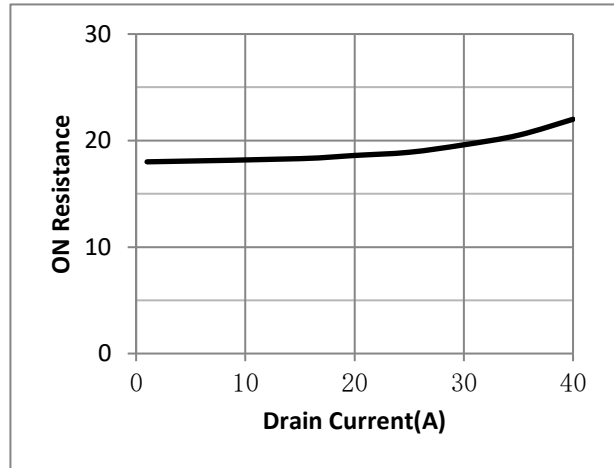


Fig.5 On-Resistance VS Gate Source Voltage

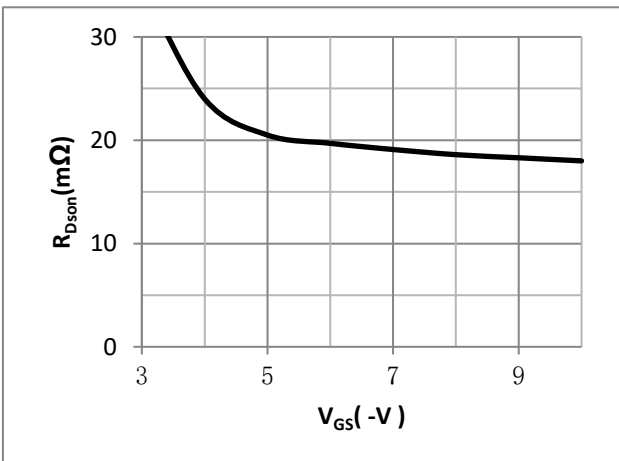
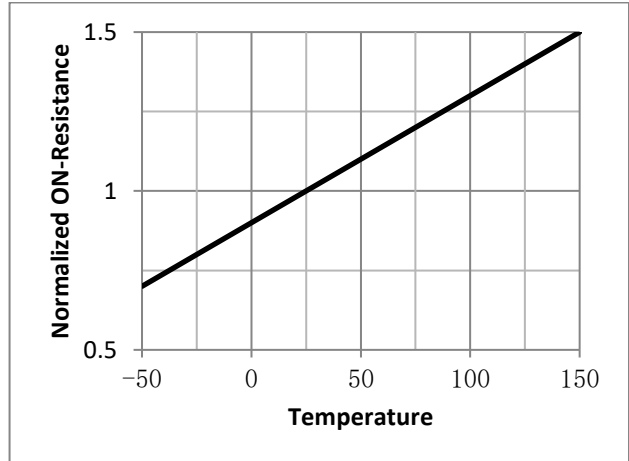


Fig.6 On-Resistance V.S Junction Temperature



•Test Circuit CHANNEL-P

Fig.7 Switching Time Measurement Circuit

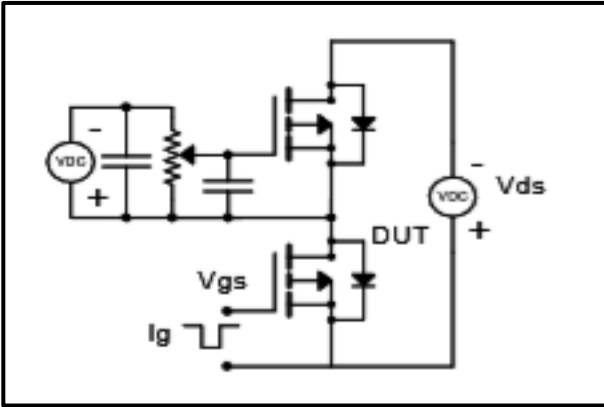


Fig.8 Gate Charge Waveform

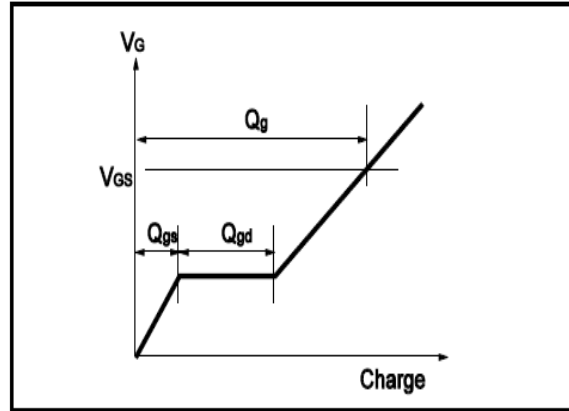


Fig.9 Switching Time Measurement Circuit

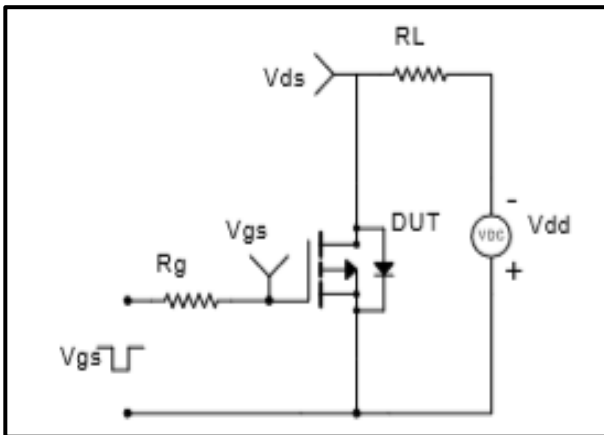


Fig.10 Gate Charge Waveform

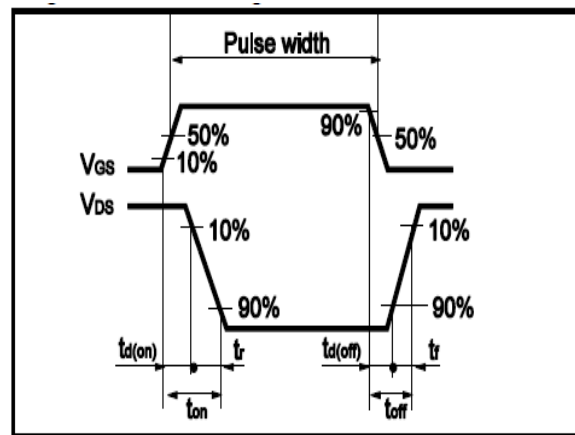


Fig.11 Avalanche Measurement Circuit

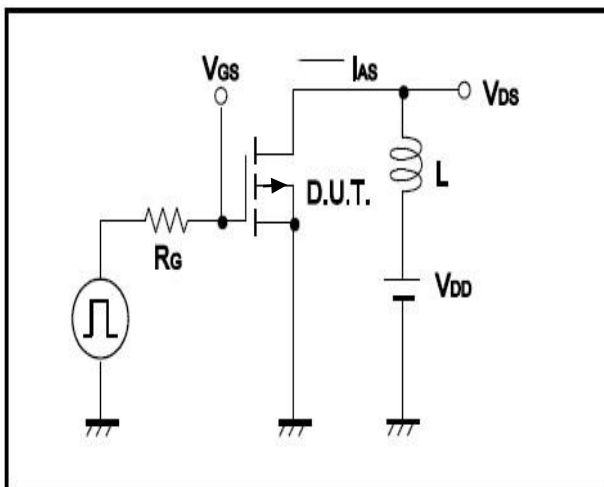
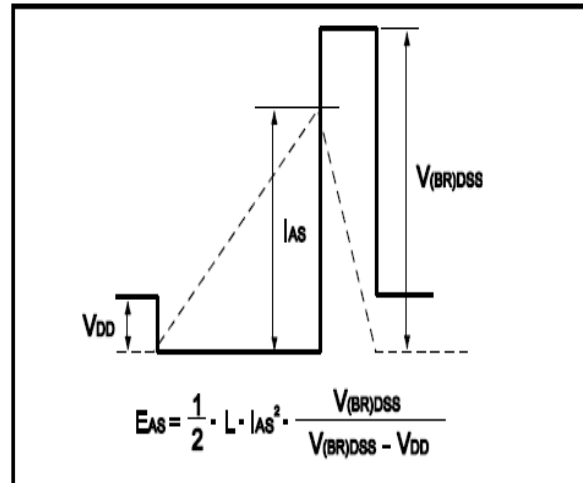
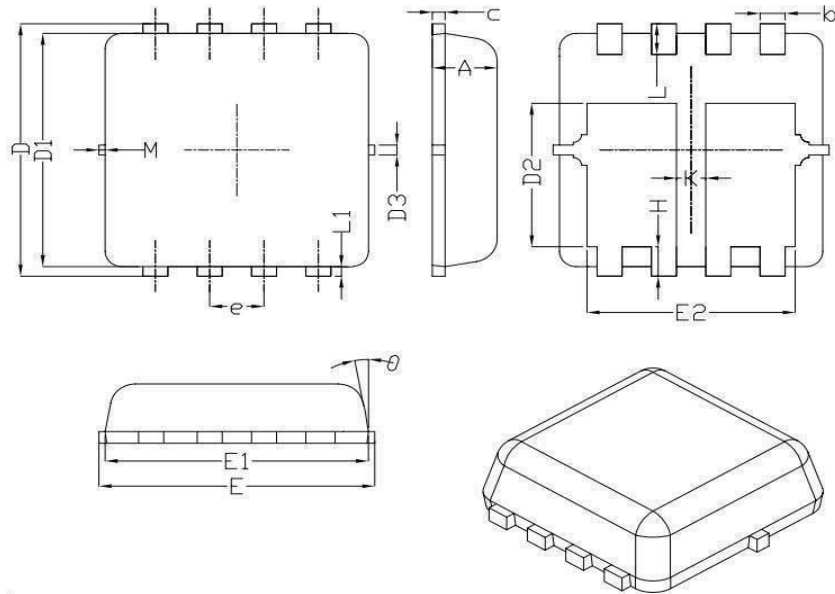


Fig.12 Avalanche Waveform



•Dimensions (DFN3.3×3.3)


Symbol	Dimensions (unit: mm)		
	Min	Typ	Max
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	--	0.13	--
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65 BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	--	0.13	--
K	0.30	--	--
θ	--	10°	12°
M	*	*	0.15

* Not Specified


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