● General Description

The AGM312M 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

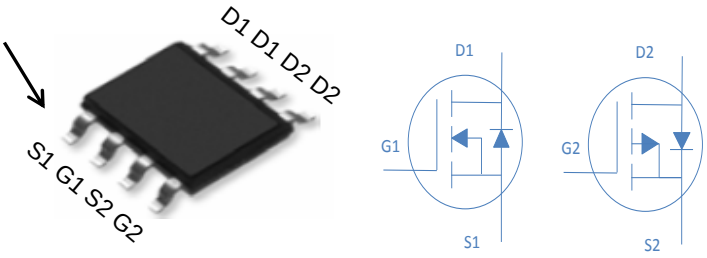
●Application

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

Product Summary

BVDSS	RDSON	ID
30V	10mΩ	11A
-30V	28mΩ	-7.2A

SOP-8 Pin Configuration



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM312M	AGM312M	SOP-8	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)	30	-30	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±20	±20	V
I_D	Drain Current-Continuous(Tc=25℃) (Note 1)	11	-7.2	A
	Drain Current-Continuous(Tc=100℃)	6.5	-4.7	A
IDM (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 2)	28	-19	A
P_D	Total Power Dissipation(Tc=25℃)	5	5	W
	Total Power Dissipation(TA=100℃)	0.2	0.2	W
EAS	Avalanche energy (Note 3)	25	25	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]	---	24	℃/W

ELECTRICAL SPECIFICATIONS (T_A = 25°C unless otherwise noted)						
PARAMETER	**CONDITIONS**	**SYMBOL**	**MIN**	**TYP**	**MAX**	**UNIT**
Static (Note 4)						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	30	--	--	V
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(TH)}$	1.2	1.5	2.5	V
Gate Body Leakage	V_{GS} = ±20V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V_{DS} = 30V, V_{GS} = 0V	I_{DSS}	--	--	1	μA
	V_{DS} = 24V, Tc = 125ºC		--	--	10	
Drain-Source On-State Resistance	V_{GS} = 10V, I_D = 10A	$R_{DS(on)}$	--	10	14	mΩ
	V_{GS} = 4.5V, I_D = 6A		--	14	21	
Forward Transconductance	V_{DS} = 5V, I_D = 6A	g_{fs}	--	8.0	--	S
Dynamic (Note 5)						
Total Gate Charge	V_{DS} = 15V, I_D = 8A, V_{GS} = 4.5V	Q_g	--	12	--	nC
Gate-Source Charge		Q_{gs}	--	4	--	
Gate-Drain Charge		Q_{gd}	--	6.0	--	
Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	800	--	pF
Output Capacitance		C_{oss}	--	75	--	
Reverse Transfer Capacitance		C_{rss}	--	90	--	
Switching (Note 6)						
Turn-On Delay Time	V_{DD} = 15V, I_D = 2A, R_{GEN} =3.3Ω	$t_{d(on)}$	--	7.0	--	ns
Turn-On Rise Time		t_r	--	14	--	
Turn-Off Delay Time		$t_{d(off)}$	--	22	--	
Turn-Off Fall Time		t_f	--	8	--	

Notes:

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. L = 0.1mH, I_{AS} = 17A, V_{DD} = 25V, R_G = 25Ω, Starting T_J = 25°C
4. Pulse test: PW ≤ 300μs, duty cycle ≤ 2%
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

N- Channel Typical Electrical and Thermal Characteristics (Curves)

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	34	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	180	°C/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	°C

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V,I_D =-250uA	-30			V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} =V_{DS}, I_D =-250uA	-1.2		-2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-30V, V_{GS} =0V			-1.0	uA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=±12V ,V_{DS} =0V			±100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-20A		27	34	mΩ
		V_{GS}=-4.5V, I_D=-10A		35	45	mΩ
Forward Transconductance	g_{FS}	V_{DS} =-10V, I_D=-5A		6		s
Source-drain voltage	V_{SD}	Is=-20A			1.28	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C_{iss}	f = 1MHz	-	850	-	pF
Output capacitance	C_{oss}		-	140	-	
Reverse transfer capacitance	C_{rss}		-	103	-	

●Gate Charge characteristics(T_a = 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Q_g	V_{DD} =25V	-	13	-	nC
Gate - Source charge	Q_{gs}	I_D = 2A	-	7	-	
Gate - Drain charge	Q_{gd}	V_{GS} = 10V	-	2	-	

●N Channel characteristics curve

Fig.1 Power Dissipation

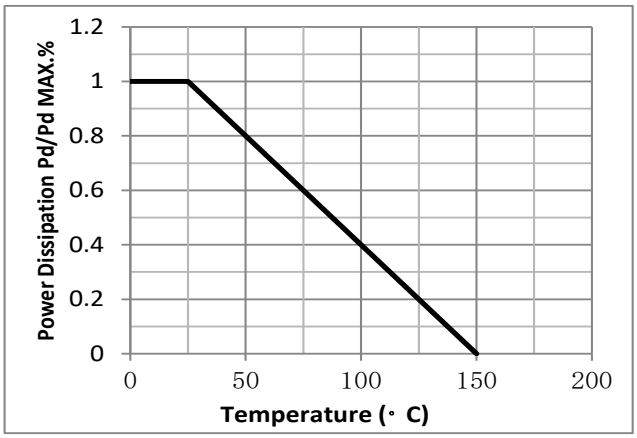


Fig.2 Typical output Characteristics

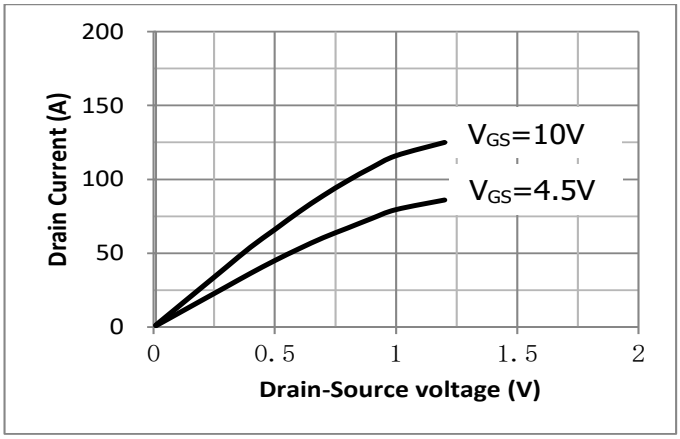


Fig.3 Threshold Voltage V.S Junction Temperature

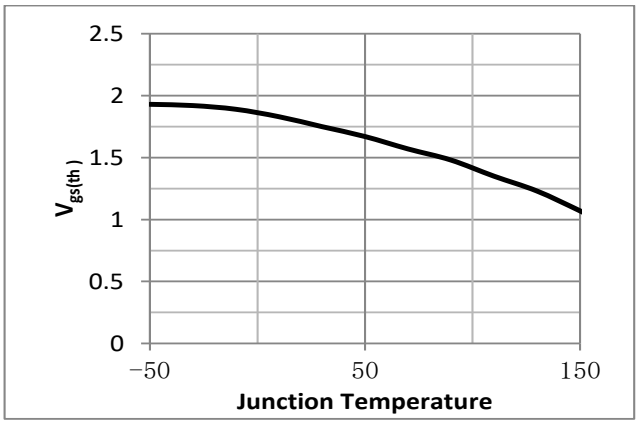


Fig.4 Resistance V.S Drain Current

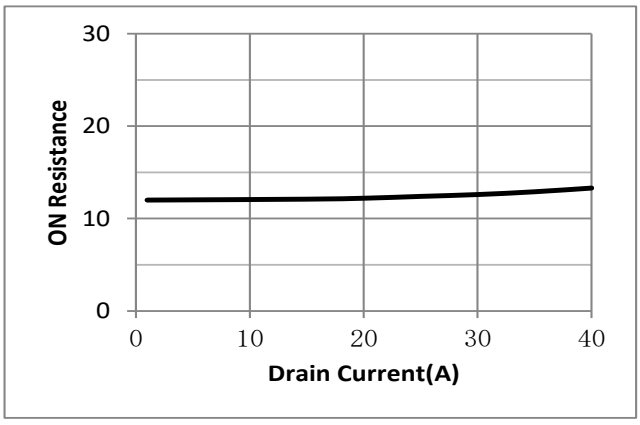


Fig.5 On-Resistance VS Gate Source Voltage

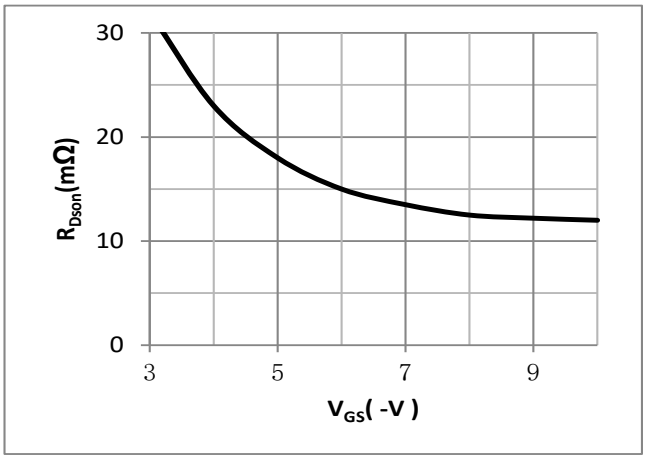
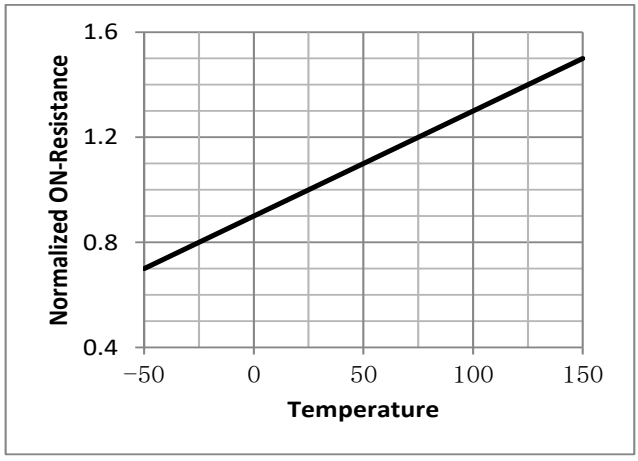


Fig.6 On-Resistance V.S Junction Temperature



●Test Circuit CHANNEL-N

Fig.1 Switching Time Measurement Circuit

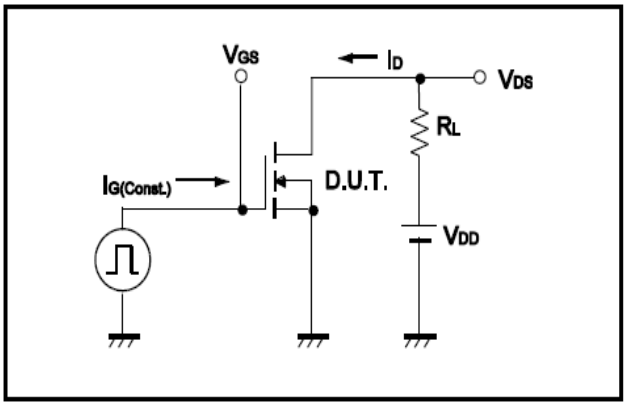


Fig.2 Gate Charge Waveform

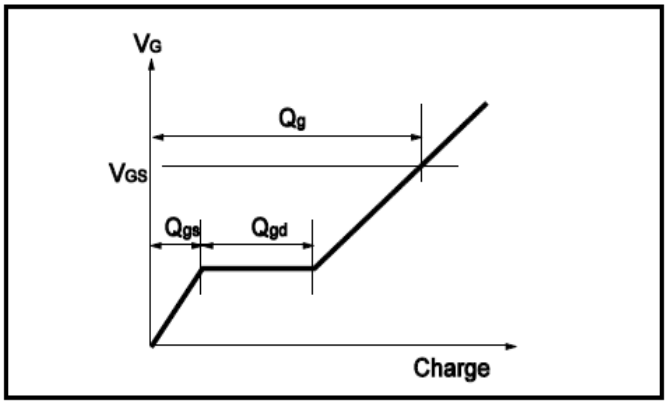


Fig.3 Switching Time Measurement Circuit

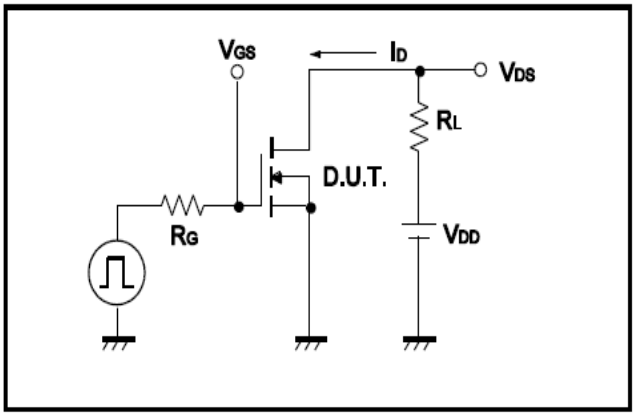


Fig.4 Gate Charge Waveform

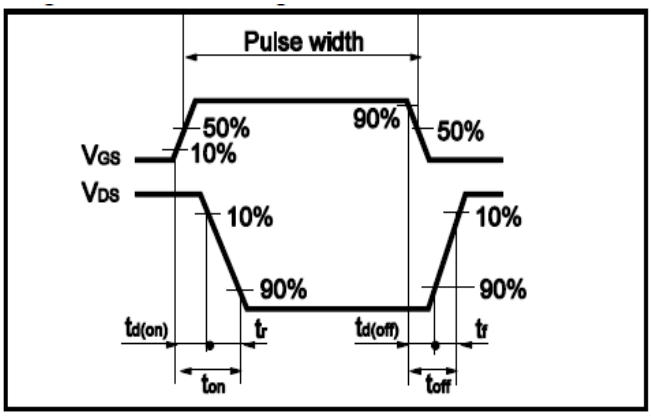


Fig.5 Avalanche Measurement Circuit

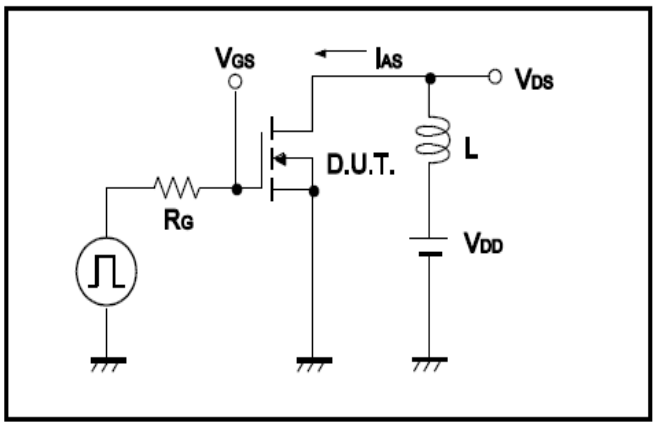
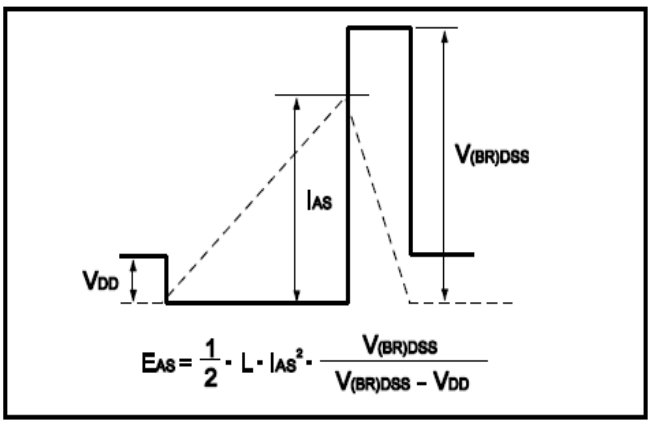


Fig.6 Avalanche Waveform



●P Channel characteristics curve

Fig.1 Power Dissipation Derating Curve

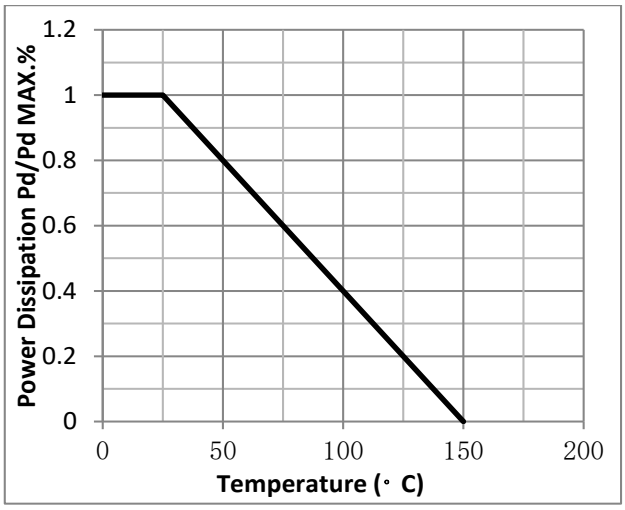
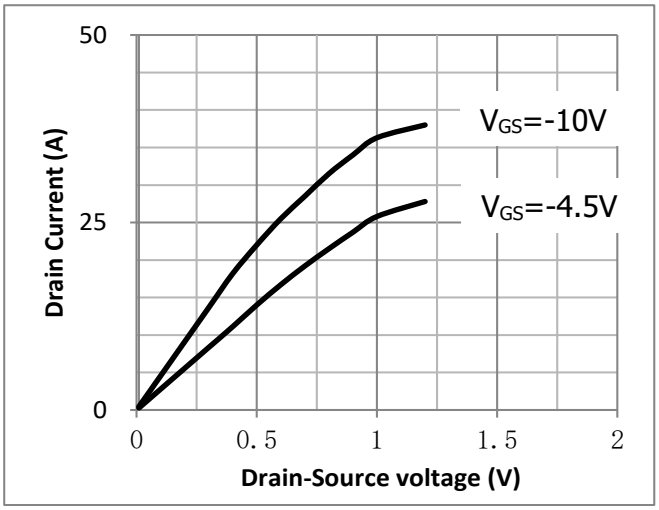


Fig.2 Typical output Characteristics



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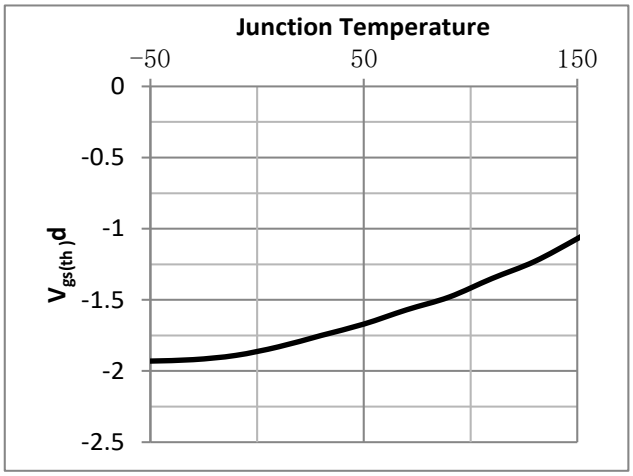


Fig.4 Resistance V.S Drain Current

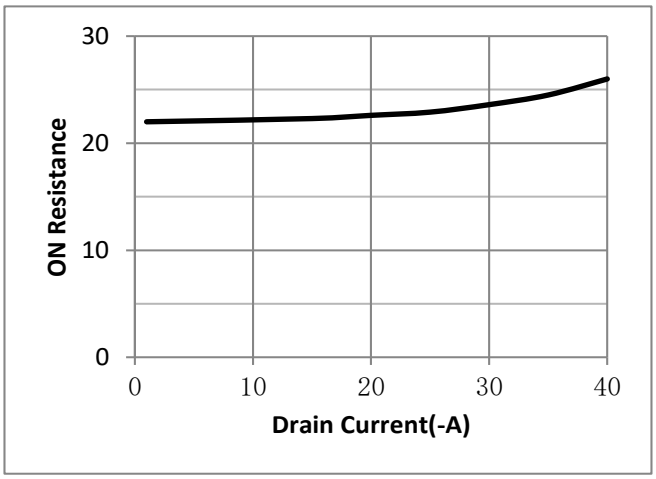
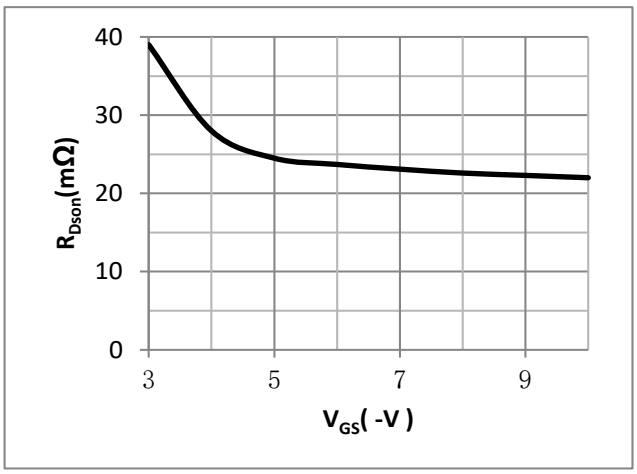


Fig.5 On-Resistance VS Gate Source Voltage



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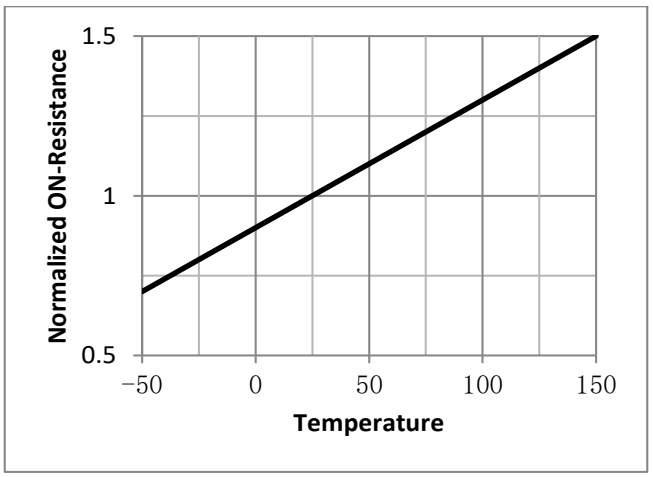

●Test Circuit

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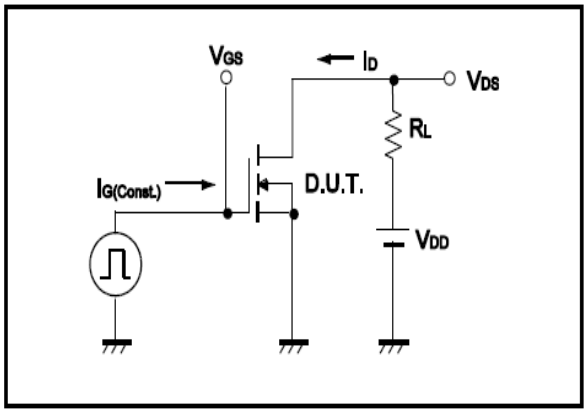


Fig.2 Gate Charge Waveform

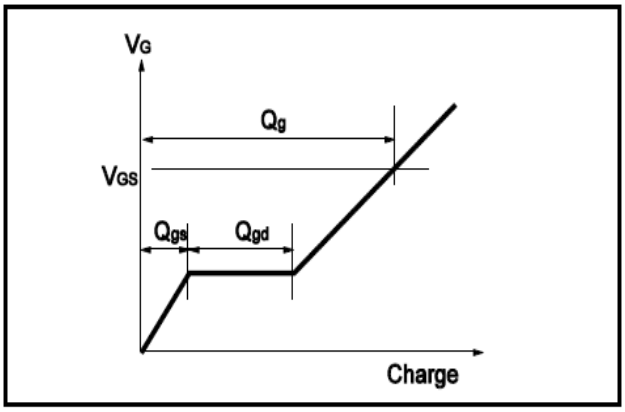
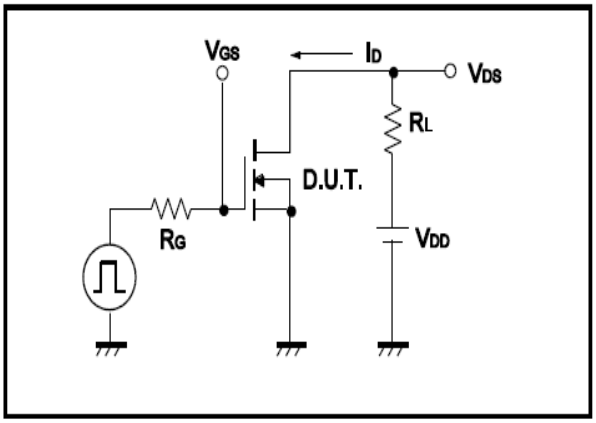


Fig.3 Switching Time Measurement Circuit



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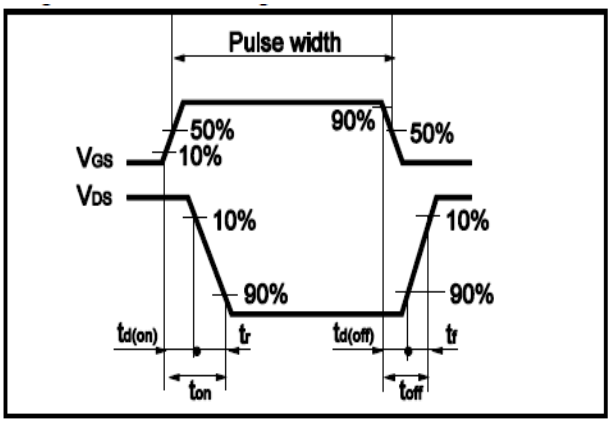


Fig.5 Avalanche Measurement Circuit

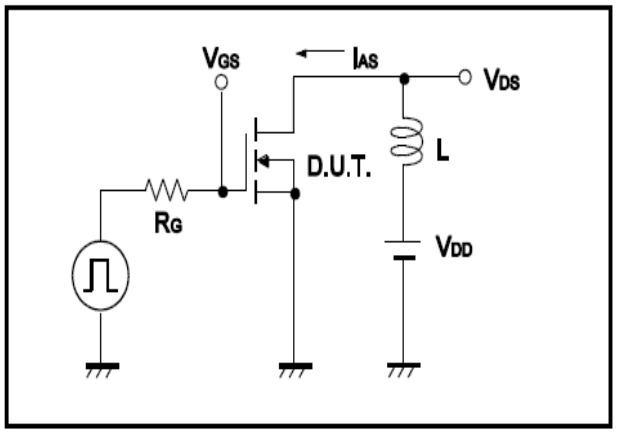
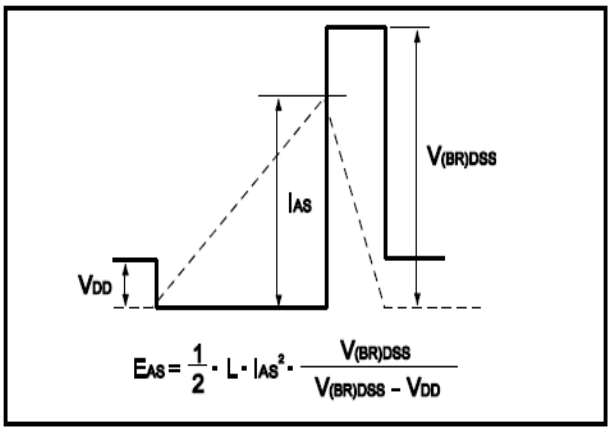
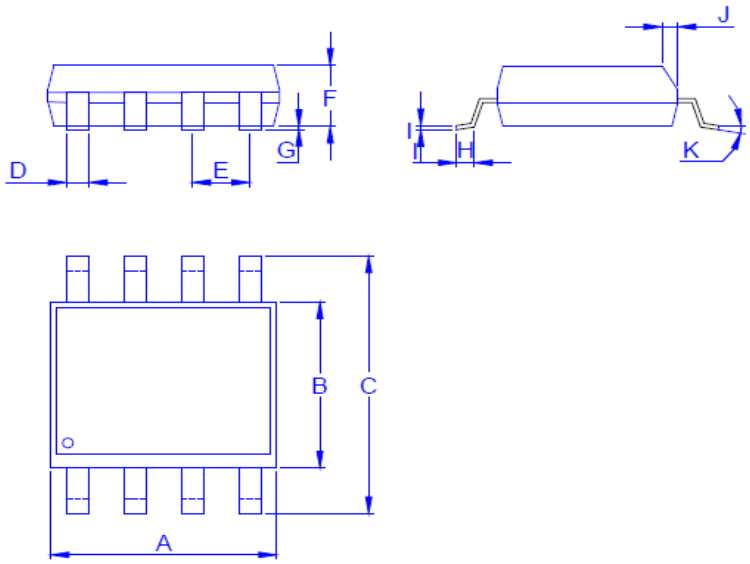


Fig.6 Avalanche Waveform



Package Outline

SOIC-8, 8leads



Dimension in mm

Dimension	A	B	C	D	E	F	G	H	I	J	K
Min.	4.70	3.70	5.80	0.33		1.20	0.08	0.40	0.19	0.25	0°
Typ.					1.27						
Max.	5.10	4.10	6.20	0.51		1.62	0.28	0.83	0.26	0.50	8°

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