

### ● General Description

The AGM404AP1 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
- 100% Avalanche tested
- 100% DVDS tested

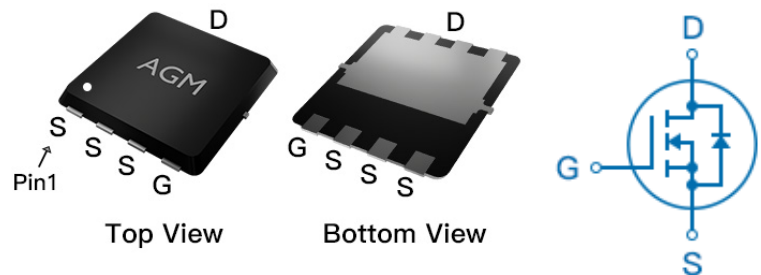
### ● Application

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

### Product Summary

BVDSS	RDSON	ID
40V	4.4mΩ	46A

### PDFN3.3\*3.3 Pin Configuration



### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM404AP1	AGM404AP1	PDFN3.3*3.3	330mm	12mm	5000

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

Symbol	Parameter	Value	Unit
VDS	Drain-Source Voltage (VGS=0V)	40	V
VGS	Gate-Source Voltage (VDS=0V)	±20	V
ID	Drain Current-Continuous(Tc=25°C) <b>(Note 1)</b>	46	A
	Drain Current-Continuous(Tc=100°C)	30	A
IDM (pluse)	Drain Current-Pulsed <b>(Note 2)</b>	184	A
PD	Maximum Power Dissipation(Tc=25°C)	28	w
	Maximum Power Dissipation(Tc=100°C)	11	w
EAS	Avalanche energy <b>(Note 3)</b>	81	mJ
TJ,TSTG	Operating Junction and Storage Temperature Range	-55 To 150	°C

**Table 2. Thermal Characteristic**

Symbol	Parameter	Typ	Max	Unit
RθJA	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	60	°C/W
RθJC	Thermal Resistance Junction-Case <sup>1</sup>	---	4.5	°C/W

**Table 3. Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

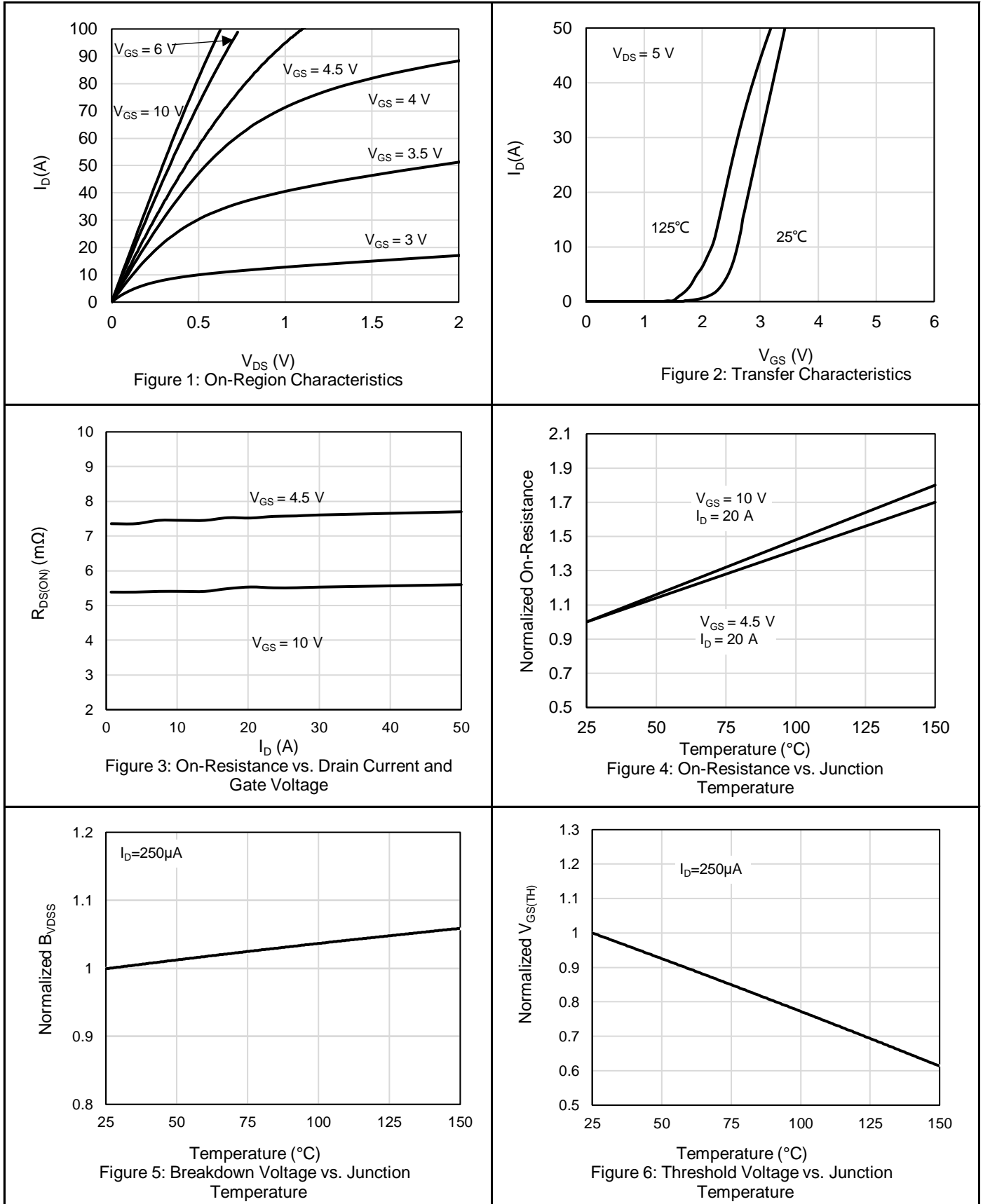
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	40	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=40V,VGS=0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=250μA	1.2	1.6	2.2	V
gFS	Forward Transconductance	VDS=5V,ID=10A	--	20	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=20A	--	4.4	6.0	mΩ
		VGS=4.5V, ID=15A	--	6.6	8.5	mΩ
<b>Dynamic Characteristics</b>						
Ciss	Input Capacitance	VDS=20V,VGS=0V, F=1MHZ	--	842	--	pF
Coss	Output Capacitance		--	321	--	pF
Crss	Reverse Transfer Capacitance		--	13	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	3.7	--	Ω
<b>Switching Times</b>						
td(on)	Turn-on Delay Time	VGS=10V,VDS=20V, RL=1Ω,RGEN=1.6Ω	--	5.5	--	nS
tr	Turn-on Rise Time		--	49.5	--	nS
td(off)	Turn-Off Delay Time		--	18.0	--	nS
tf	Turn-Off Fall Time		--	5.5	--	nS
Qg	Total Gate Charge	VGS=10V, VDS=20V, ID=20A	--	13.5	--	nC
Qgs	Gate-Source Charge		--	2.4	--	nC
Qgd	Gate-Drain Charge		--	2.6	--	nC
<b>Source-Drain Diode Characteristics</b>						
ISD	Source-Drain Current(Body Diode)		--	--	46	A
VSD	Forward on Voltage	VGS=0V,IS=20A	--	--	1.2	V
trr	Reverse Recovery Time	ID=20A ,VDD=20V dI/dt=100A/μs , TJ=25°C	--	28.6	--	ns
Qrr	Reverse Recovery Charge		--	15.0	--	nc

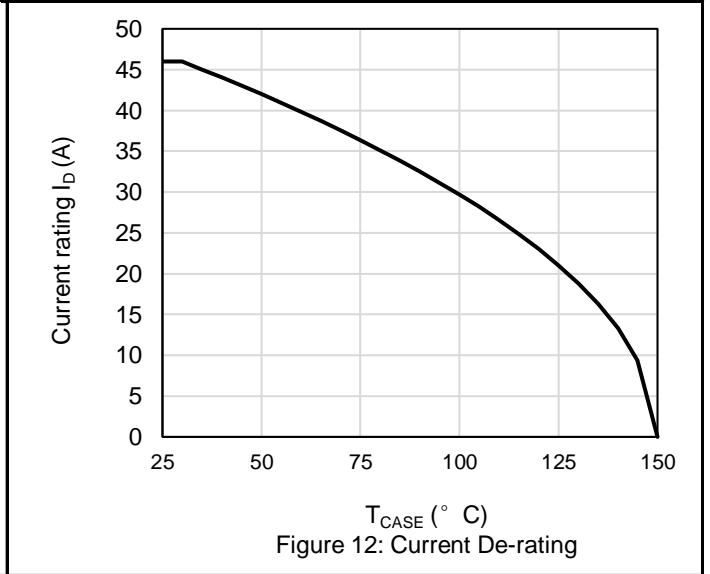
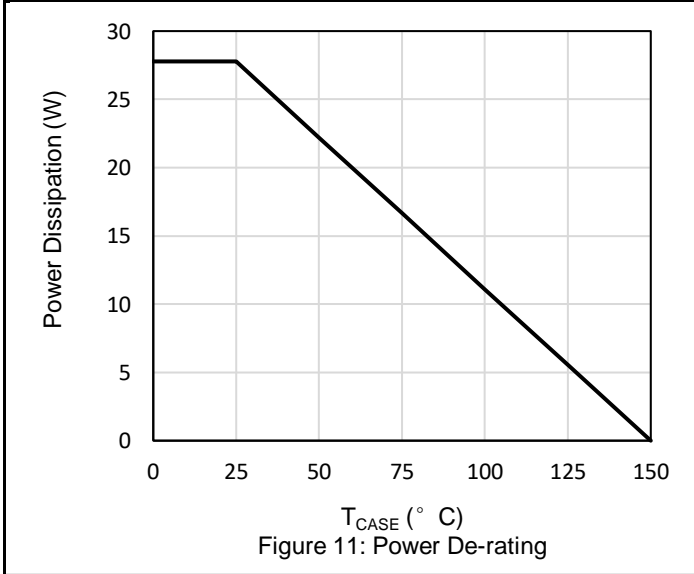
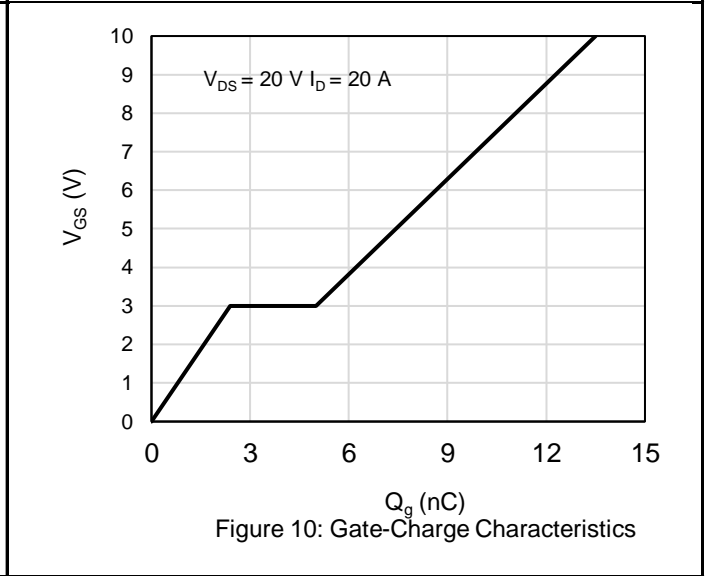
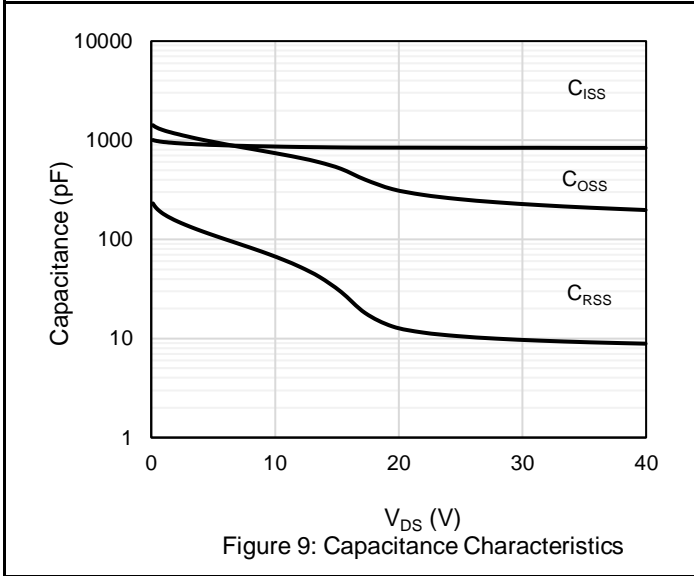
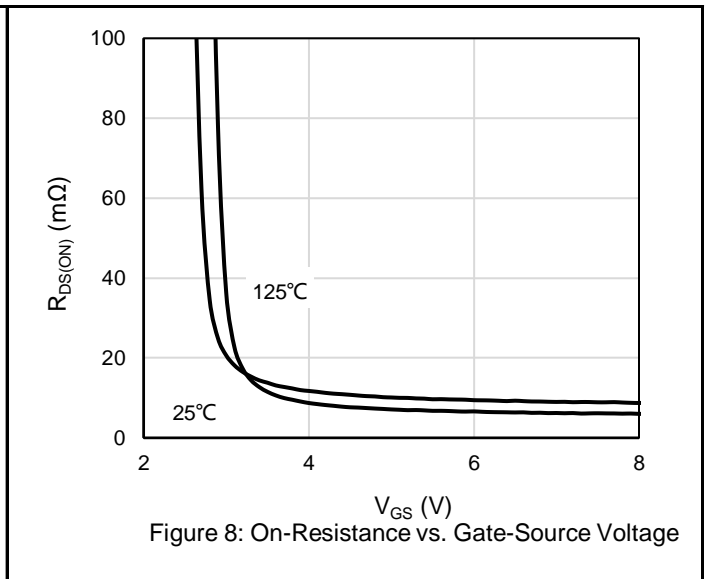
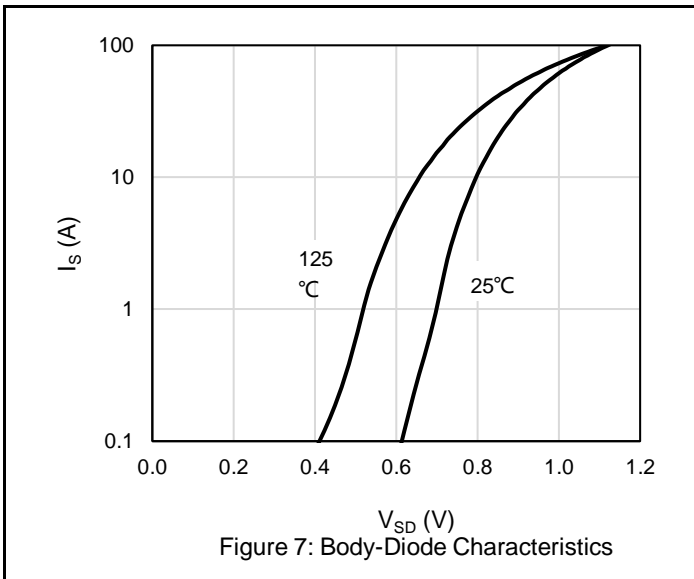
Notes 1.The maximum current rating is package limited.

Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T<sub>J</sub>=25°C, VDD=25V, Vgs=10V, ID=18A, L=0.5mH, RG=25ohm

## Electrical Characteristics Diagrams





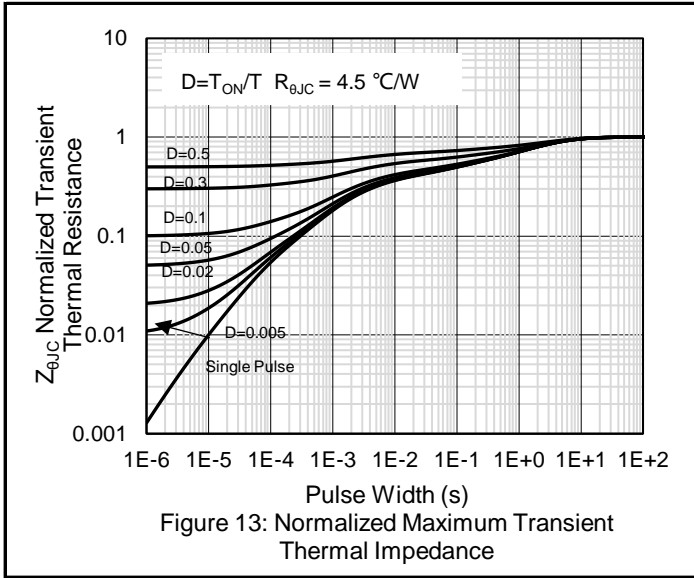


Figure 13: Normalized Maximum Transient Thermal Impedance

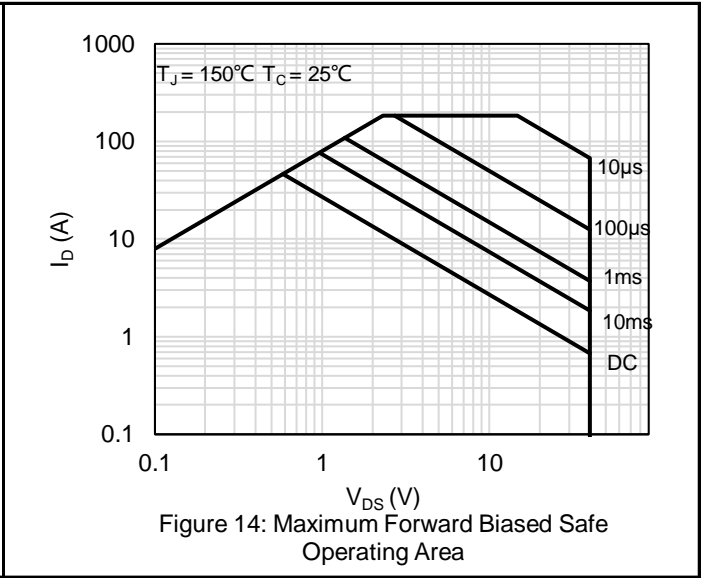
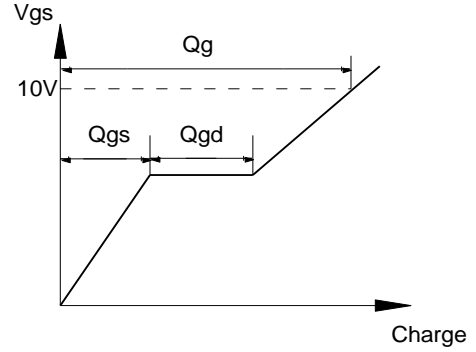
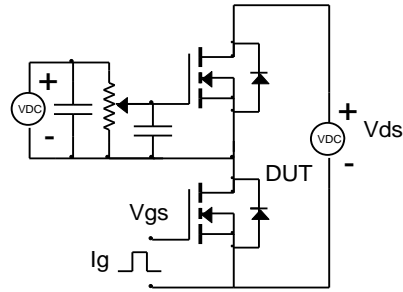


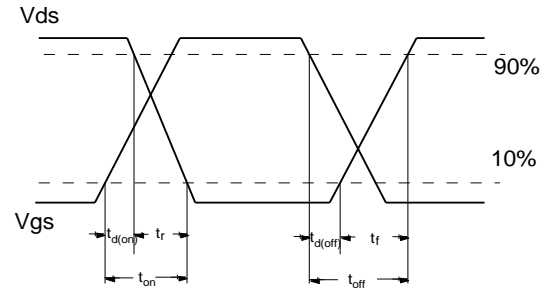
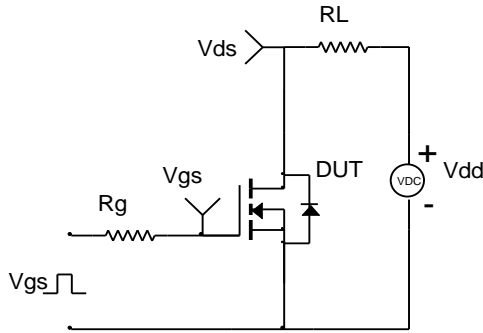
Figure 14: Maximum Forward Biased Safe Operating Area

# Test Circuit and Waveform

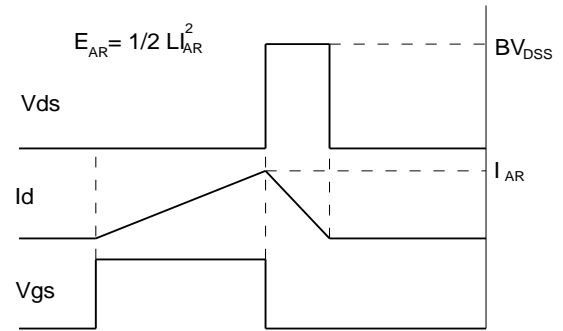
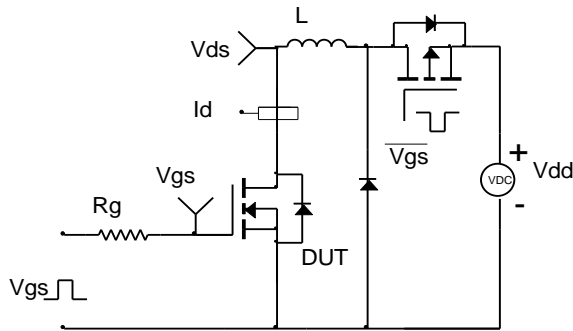
Gate Charge Test Circuit & Waveform



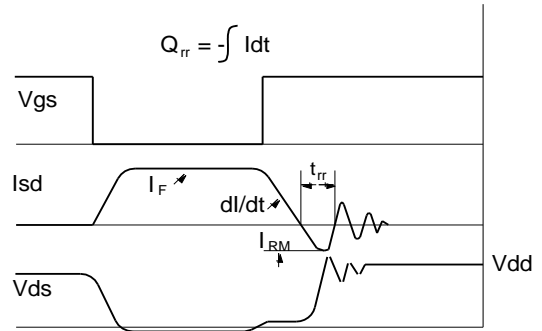
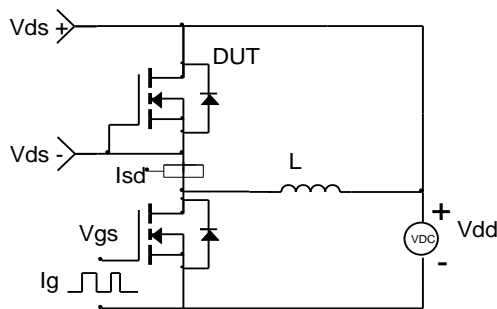
Resistive Switching Test Circuit & Waveforms

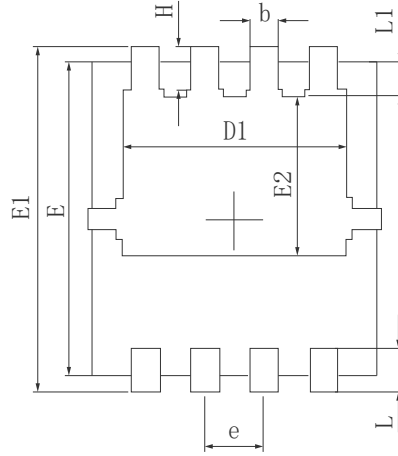
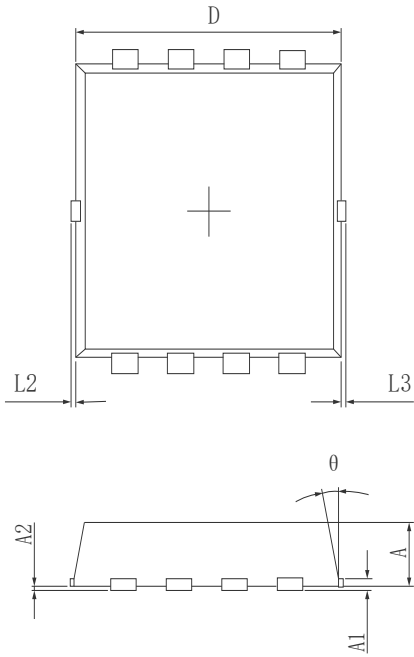


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

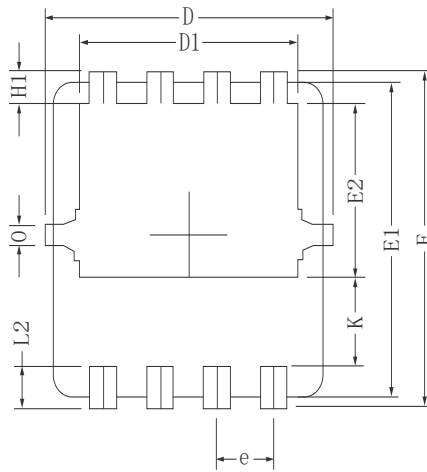
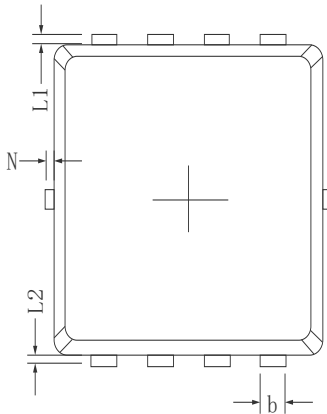


Diode Recovery Test Circuit & Waveforms

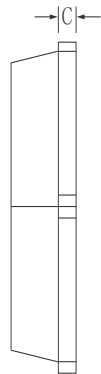
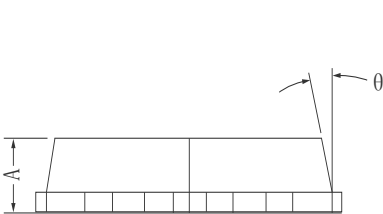


**●Dimensions (PDFN3.3\*3.3)**


SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	0.700	0.800	0.900
A1	0.152REF.		
A2	0~0.05		
D	3.000	3.100	3.200
D1	2.300	2.450	2.600
E	2.900	3.000	3.100
E1	3.150	3.300	3.450
E2	1.320	1.520	1.720
b	0.200	0.300	0.400
e	0.550	0.650	0.750
L	0.300	0.400	0.500
L1	0.180	0.330	0.480
L2	0~0.100		
L3	0~0.100		
H	0.315	0.415	0.515
θ	8°	10°	12°

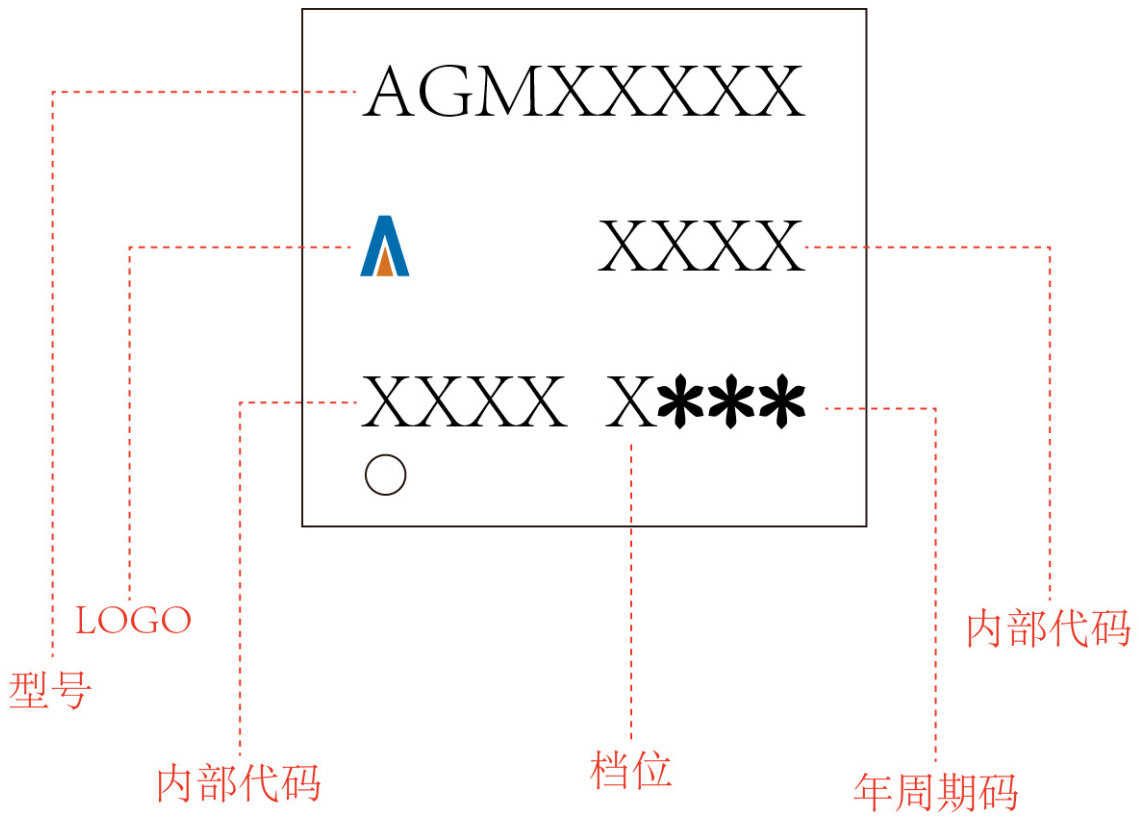


Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	0.65	0.75	0.85
b	0.25	0.30	0.35
C	0.15	0.20	0.25
D	3.00	3.10	3.20
D1	2.40	2.50	2.60
E	3.20	3.30	3.40
E1	3.00	3.10	3.20
E2	1.60	1.70	1.80
e	0.65 BSC.		
H1	0.21	0.31	0.41
H2	0.30	0.40	0.50
K	0.78	0.88	0.98
L1/L2	0.10 REF.		
θ	11°	12°	13°
N	0	-	0.15
0	0.2 REF.		



PDFN3.3\*3.3

Marking Instructions:




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