

### • General Description

The AGM405MNA 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

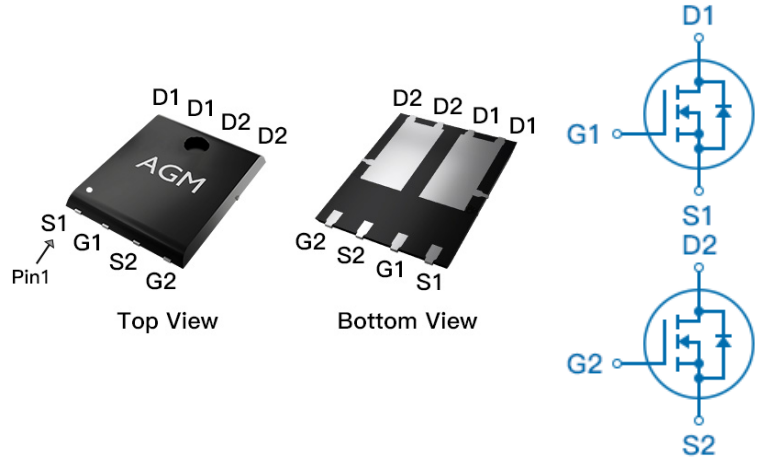
### • Application

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

### Product Summary

BVDSS	RDSON	ID
40V	5.7mΩ	45A

### PDFN5\*6 Pin Configuration



### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM405MNA	AGM405MNA	PDFN5*6	330mm	12mm	3000

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) (Note 1)	45	A
	Drain Current-Continuous(Tc=100°C)	29	A
IDM (pluse)	Drain Current-Pulsed (Note 2)	180	A
PD	Maximum Power Dissipation(Tc=25°C)	27	w
	Maximum Power Dissipation(Tc=100°C)	11	w
EAS	Avalanche energy (Note 3)	72	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>	---	20	°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)**

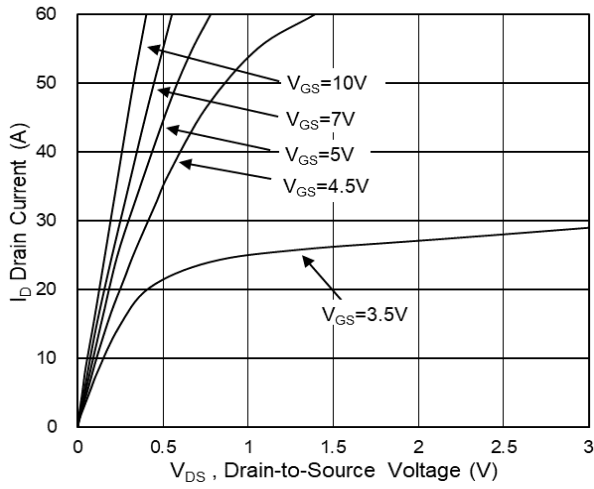
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	40	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=40V,VGS=0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=250μA	1.2	1.6	2.2	V
gFS	Forward Transconductance	VDS=5V,ID=15A	--	10	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=20A	--	5.7	8.0	mΩ
		VGS=4.5V, ID=15A	--	9.5	14	mΩ
<b>Dynamic Characteristics</b>						
Ciss	Input Capacitance	VDS=20V,VGS=0V ,F=1MHZ	--	685	--	pF
Coss	Output Capacitance		--	190	--	pF
Crss	Reverse Transfer Capacitance		--	37	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	1.7	--	Ω
<b>Switching Times</b>						
td(on)	Turn-on Delay Time	VGS=10V,VDS=15V, RL=0.75Ω,RGEN=3.3Ω	--	13.9	--	nS
tr	Turn-on Rise Time		--	5.7	--	nS
td(off)	Turn-Off Delay Time		--	20	--	nS
tf	Turn-Off Fall Time		--	11	--	nS
Qg	Total Gate Charge	VGS=10V, VDS=25V, ID=12A	--	5.7	--	nC
Qgs	Gate-Source Charge		--	3.0	--	nC
Qgd	Gate-Drain Charge		--	1.2	--	nC
<b>Source-Drain Diode Characteristics</b>						
ISD	Source-Drain Current(Body Diode)		--	--	45	A
VSD	Forward on Voltage	VGS=0V,IS=20A	--	--	1.2	V
trr	Reverse Recovery Time	IF=20A , dl/dt=100A/μs , TJ=25°C	--	--	--	ns
Qrr	Reverse Recovery Charge		--	--	--	nc

Notes 1.The maximum current rating is package limited.

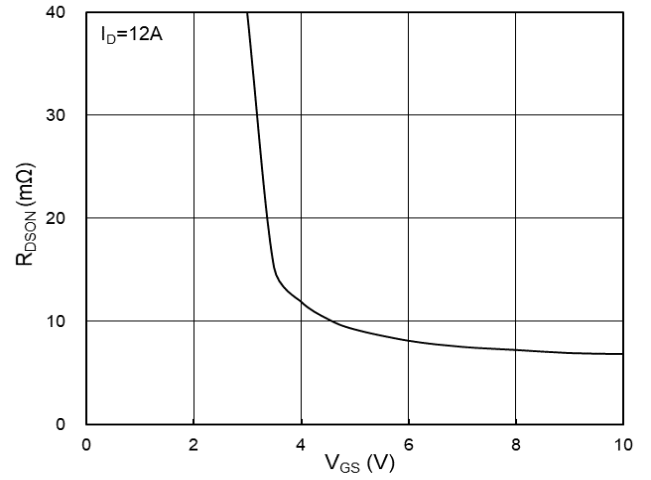
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T<sub>J</sub>=25°C,VDD=25V,Vgs=10V,ID=17A,L=0.5mH,RG=25ohm

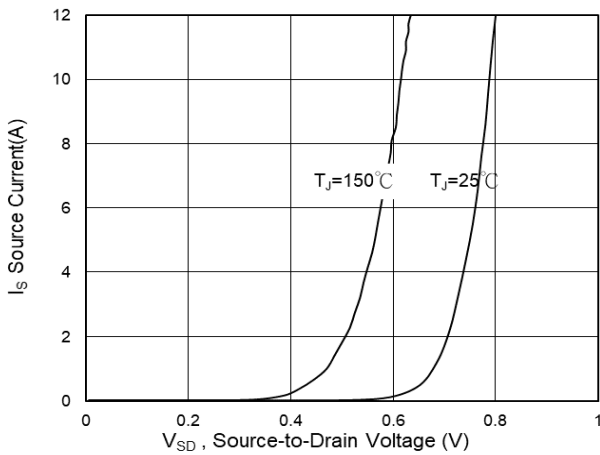
## Typical Characteristics



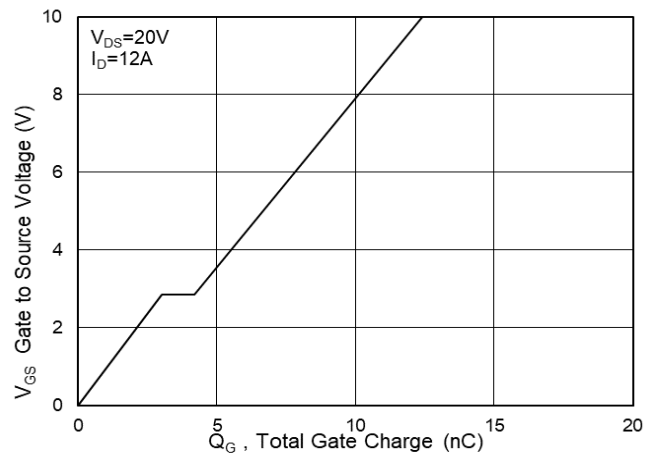
**Fig.1 Typical Output Characteristics**



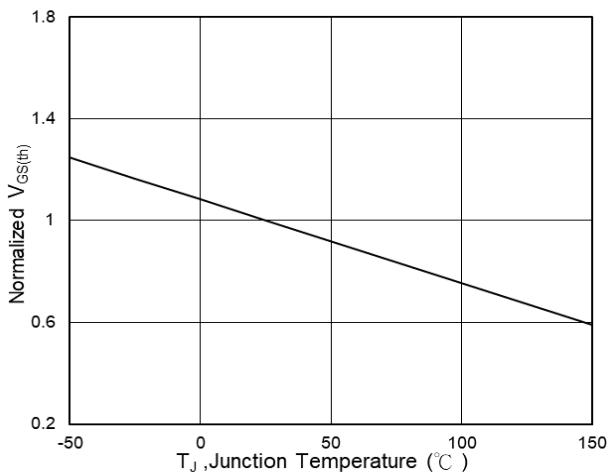
**Fig.2 On-Resistance vs. G-S Voltage**



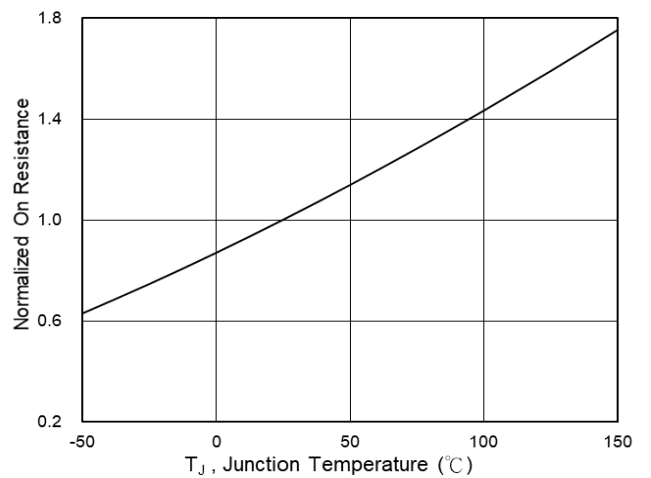
**Fig.3 Source Drain Forward Characteristics**



**Fig.4 Gate-Charge Characteristics**



**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**

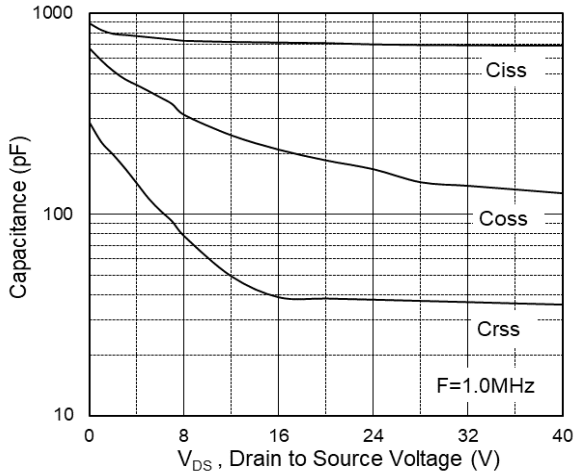


Fig.7 Capacitance

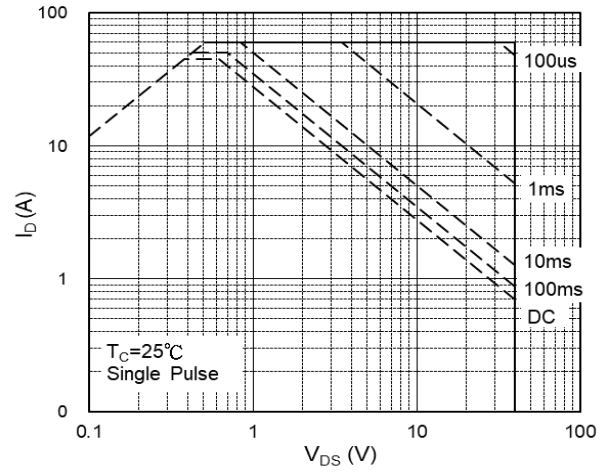


Fig.8 Safe Operating Area

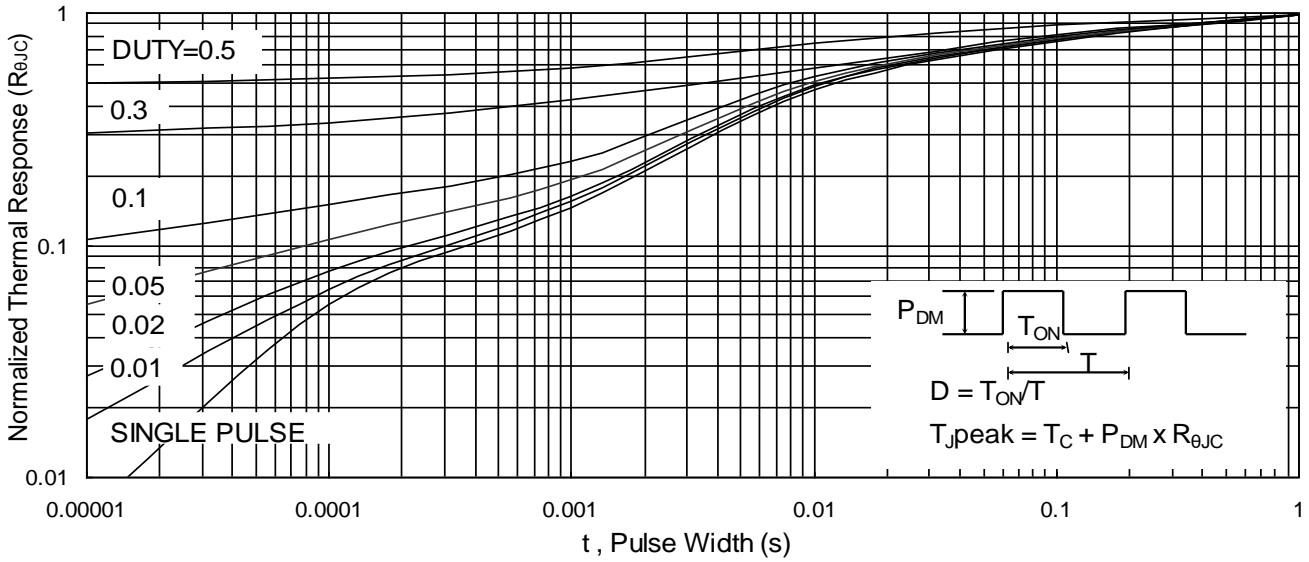


Fig.9 Normalized Maximum Transient Thermal Impedance

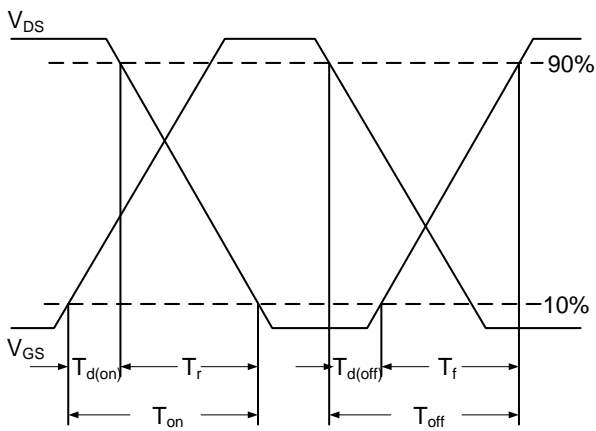


Fig.10 Switching Time Waveform

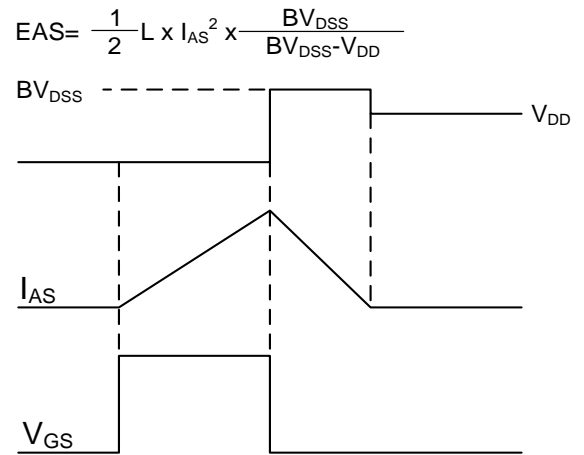
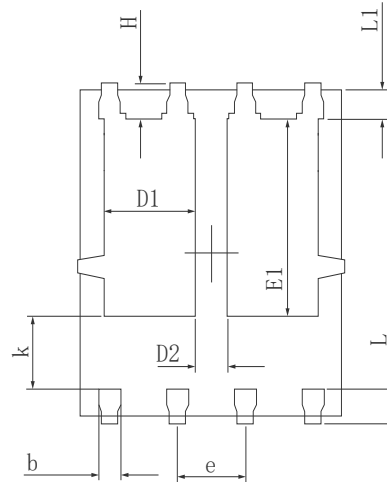
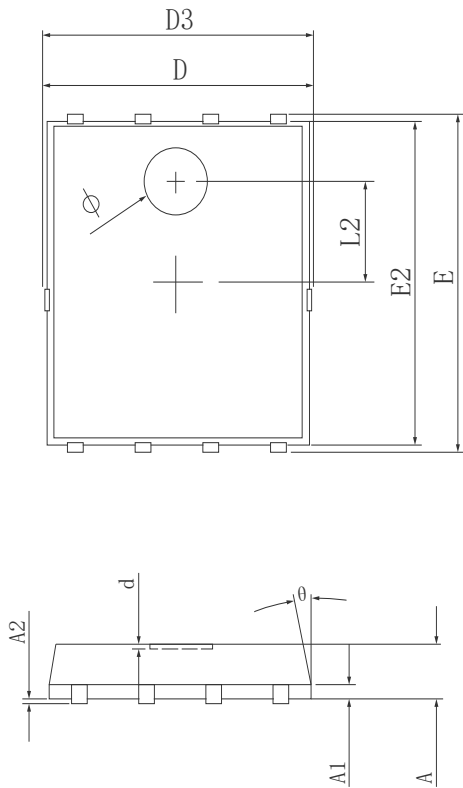
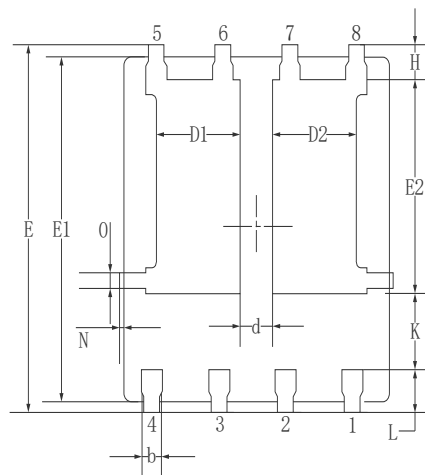
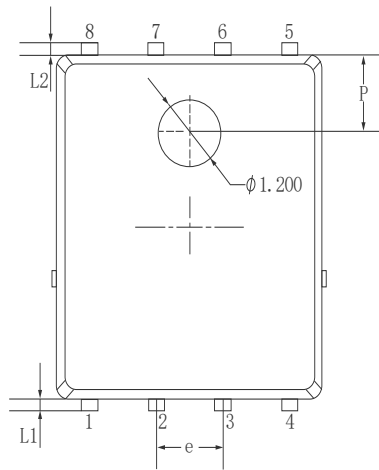


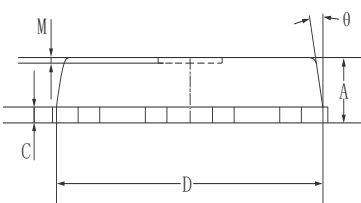
Fig.11 Unclamped Inductive Waveform

**•Dimensions (PDFN5\*6)**


SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	0.900	1.000	1.100
A1	0.254 REF.		
A2	0°0.05		
D	4.824	4.900	4.976
D1	1.605	1.705	1.805
D2	0.500	0.600	0.700
D3	4.924	5.000	5.076
E	5.924	6.000	6.076
E1	3.375	3.475	3.575
E2	5.674	5.750	5.826
b	0.350	0.400	0.450
e	1.270 TYP.		
L	0.534	0.610	0.686
L1	0.424	0.500	0.576
L2	1.800 REF.		
k	1.190	1.290	1.390
H	0.549	0.625	0.701
θ	8°	10°	12°
φ	1.100	1.200	1.300
d			0.100

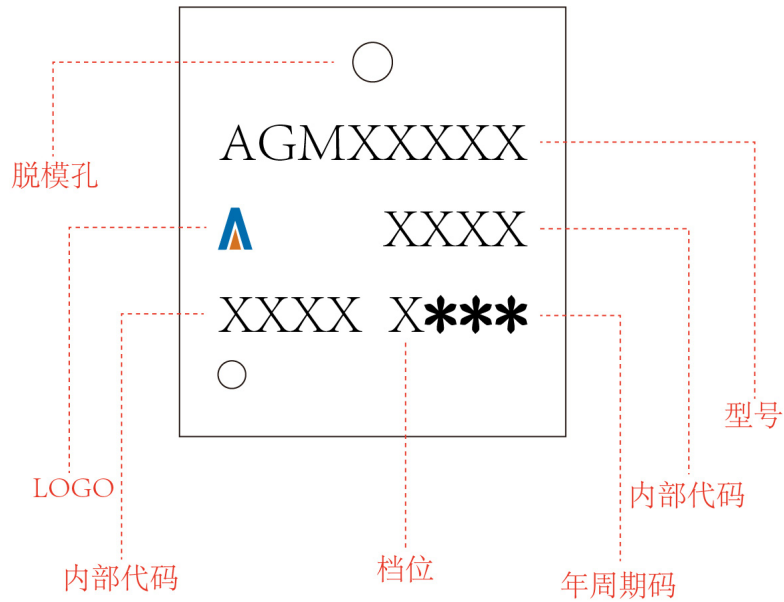


Symbol	Millimeters		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.35	0.40	0.50
C	0.20	0.25	0.35
D	4.90	5.05	5.20
D1/D2	1.51	1.61	1.71
d	0.50	0.60	0.70
E	6.00	6.15	6.30
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.74	0.84
L1/L2	0.20 REF.		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		

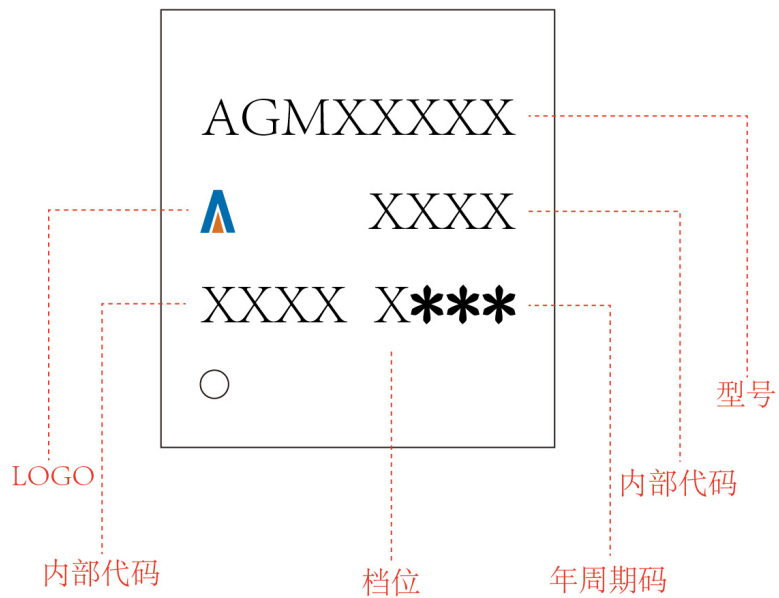


PDFN5\*6  
Marking Instructions:

Model1:



Model2:



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