● General Description

The AGM310MAR 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
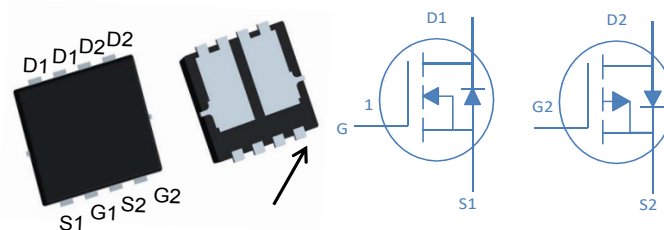
■ 100% Avalanche tested

■ 100% DVDS tested

● Application

■ MB/VGA Vcore

■ SMPS 2nd Synchronous Rectifier

■ POL application

■ BLDC Motor driver

Product Summary

BVDSS	RDSON	ID
30V	11mΩ	23A
-30V	18mΩ	-25A

PDFN5*6 Pin Configuration

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM310MAR	AGM310MAR	PDFN5*6	330mm	12mm	3000

Table 1. Absolute Maximum Ratings (TA=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)	23	-25	A
	Drain Current-Continuous(TC=100℃)	15	-16	A
IDM (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 2)	92	-100	A
P_D	Total Power Dissipation(TC=25℃)	3.6	3.6	W
	Total Power Dissipation(TC=100℃)	1.5	1.5	W
EAS	Avalanche energy (Note 3)	35	42	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]	---	180	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	34	℃/W

Table 3. N- Channel Electrical Characteristics (TJ=25℃unless otherwisenoted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250µA	30	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=30V,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	2.5	V
gFS	Forward Transconductance	VDS=5V,ID=10A	--	10	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=20A	--	11	14	mΩ
		VGS=4.5V, ID=10A	--	16	25	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=15V,VGS=0V, F=1MHZ	--	850	--	pF
Coss	Output Capacitance		--	130	--	pF
Crss	Reverse Transfer Capacitance		--	98	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	1.9	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=10V,VDS=15V, RL=0.75Ω,RGEN=3.3Ω	--	4.7	--	nS
tr	Turn-on Rise Time		--	11	--	nS
td(off)	Turn-Off Delay Time		--	17	--	nS
tf	Turn-Off Fall Time		--	5.6	--	nS
Qg	Total Gate Charge	VGS=10V, VDS=15V, ID=10A	--	16	--	nC
Qgs	Gate-Source Charge		--	3	--	nC
Qgd	Gate-Drain Charge		--	3.8	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	23	A
VSD	Forward on Voltage	VGS=0V,IS=20A	--	--	1.2	V
trr	Reverse Recovery Time	IF=20A , dI/dt=100A/µs , TJ=25℃	--	--	--	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: TJ=25℃

Table 3. P-Channel Electrical Characteristics (TJ=25℃unless otherwisenoted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=-250µA	-30	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=-24V,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	-1.5	-2.5	V
gFS	Forward Transconductance	VDS=-10V,ID=-10A	--	8	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=-10V, ID=-20A	--	18	23	mΩ
		VGS=-4.5V, ID=-10A	--	24	32	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=-15V,VGS=0V, F=1MHZ	--	1380	--	pF
Coss	Output Capacitance		--	310	--	pF
Crss	Reverse Transfer Capacitance		--	237	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	9	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=-10V,VDS=-15V, ID=-15A,RGEN=3.3Ω	--	8	--	nS
tr	Turn-on Rise Time		--	18	--	nS
td(off)	Turn-Off Delay Time		--	31.8	--	nS
tf	Turn-Off Fall Time		--	18.4	--	nS
Qg	Total Gate Charge	VGS=-10V, VDS=-25V, ID=-12A	--	45	--	nC
Qgs	Gate-Source Charge		--	6.4	--	nC
Qgd	Gate-Drain Charge		--	9.0	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	-25	A
VSD	Forward on Voltage	VGS=0V,IS=-20A	--	--	-1.2	V
trr	Reverse Recovery Time	IF=-20A , dI/dt=100A/µs , TJ=25℃	--	--	--	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: TJ=25℃

●**N Channel characteristics curve**
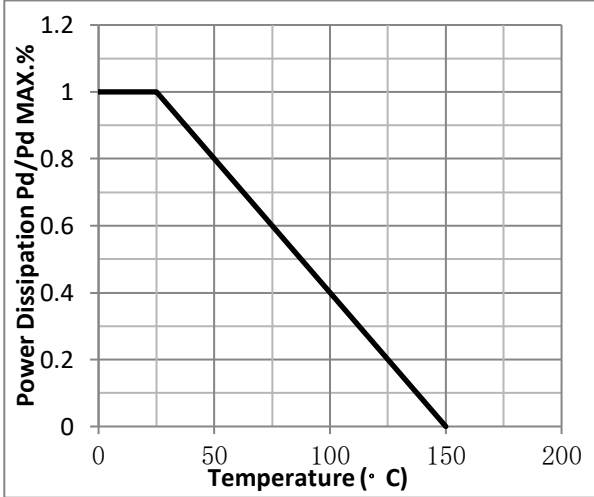
Fig.1 Power Dissipation Derating Curve
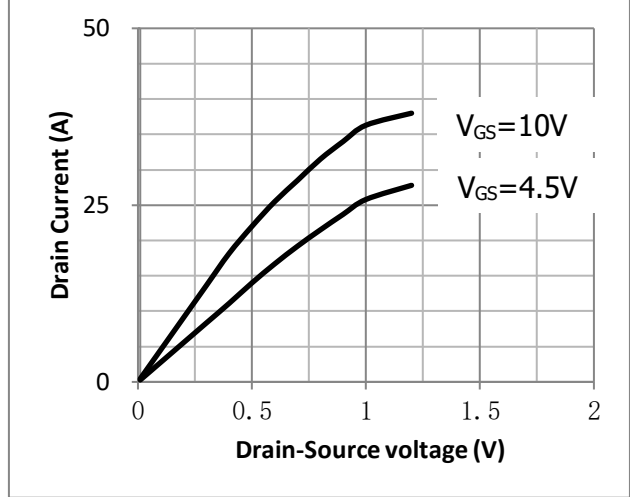
Fig.2 Typical output Characteristics

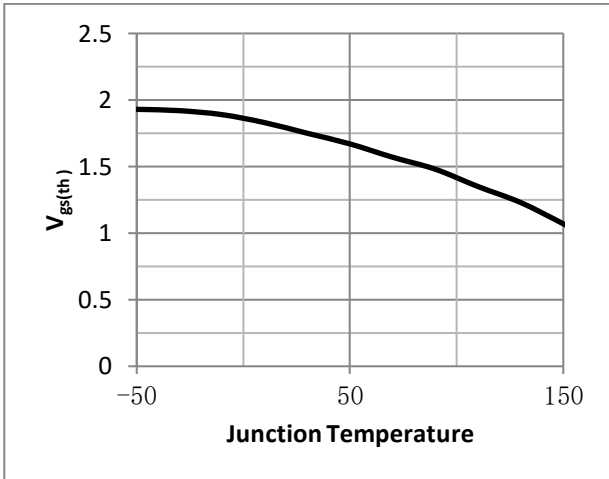Fig.3 Threshold Voltage V.S Junction Temperature
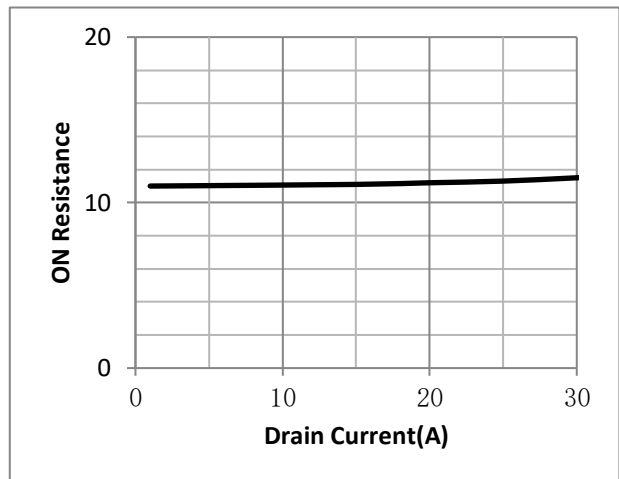
Fig.4 Resistance V.S Drain Current

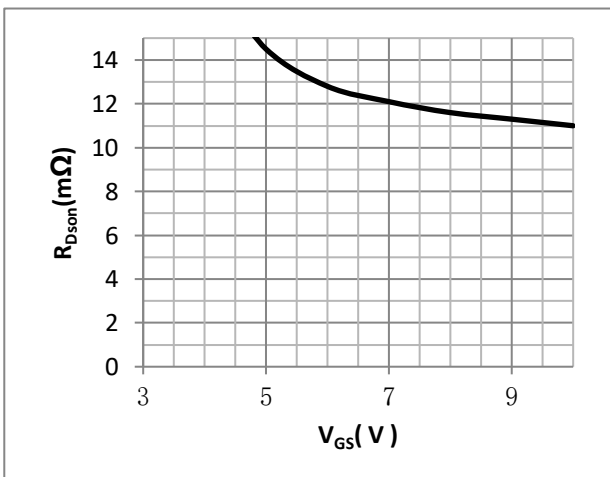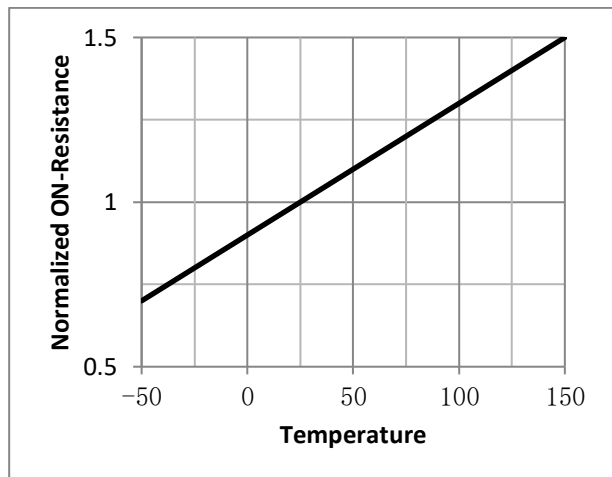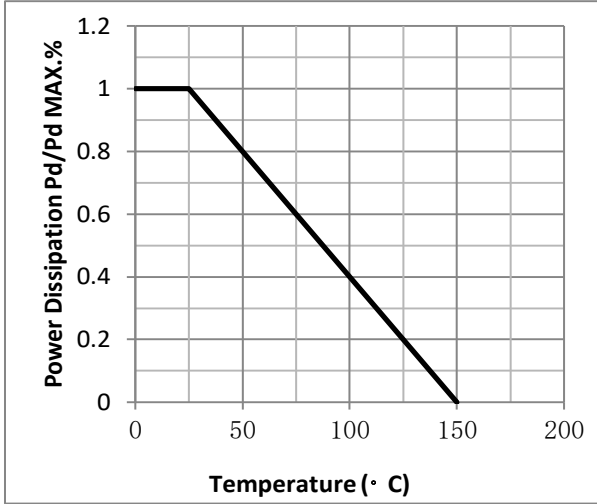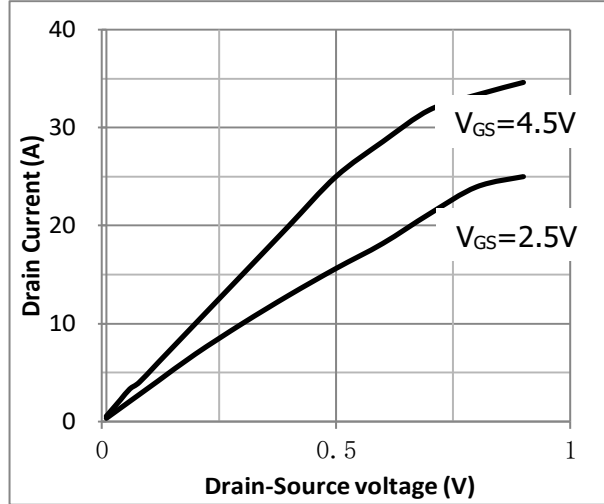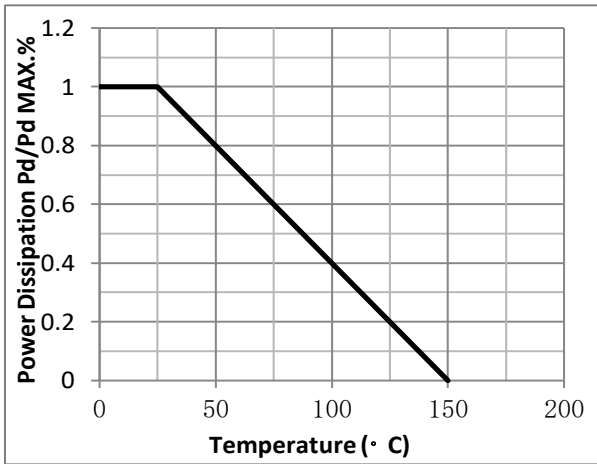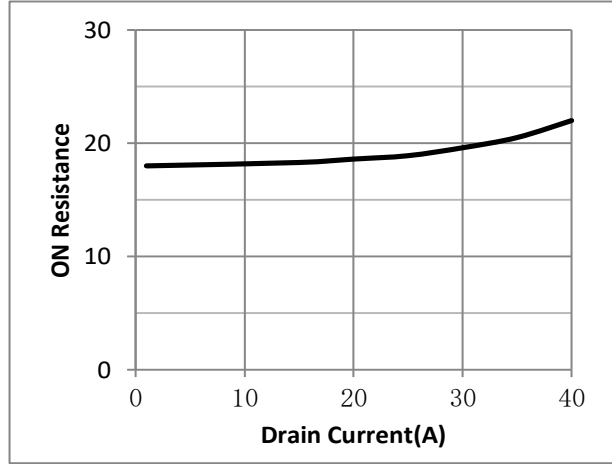Fig.5 On-Resistance VS Gate Source Voltage

Fig.6 On-Resistance V.S Junction Temperature

●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

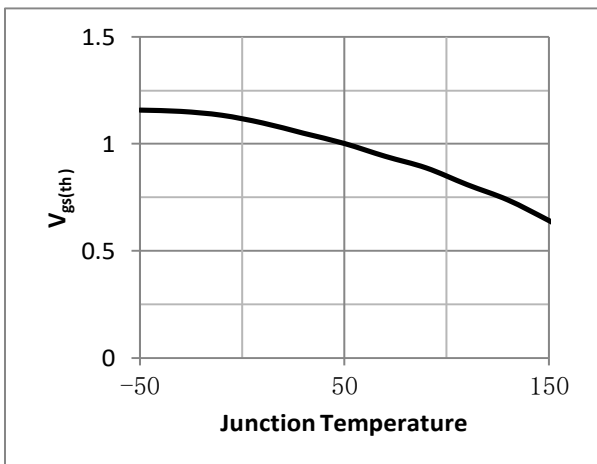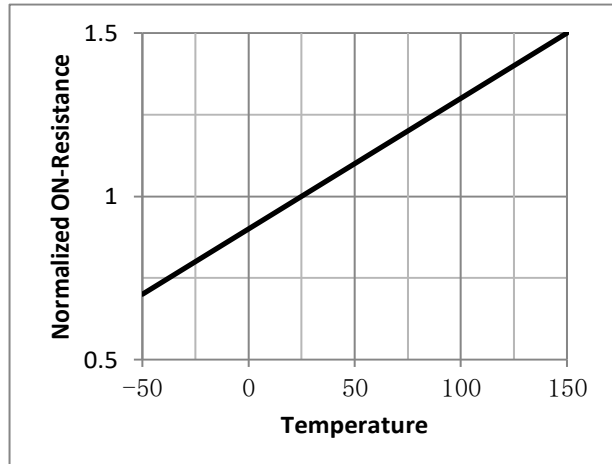Fig.5 On-Resistance VS Gate Source Voltage

Fig.6 On-Resistance V.S Junction Temperature

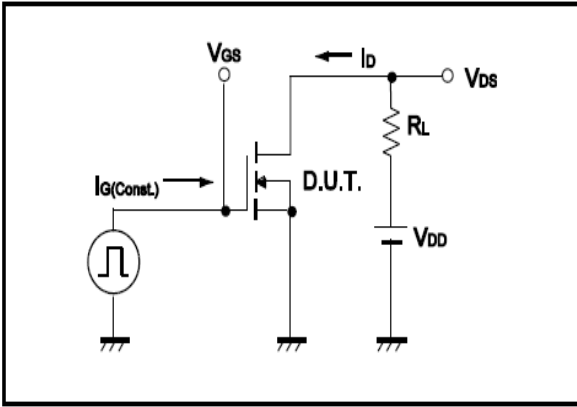●**Test Circuit**

Fig.1 Switching Time Measurement Circuit
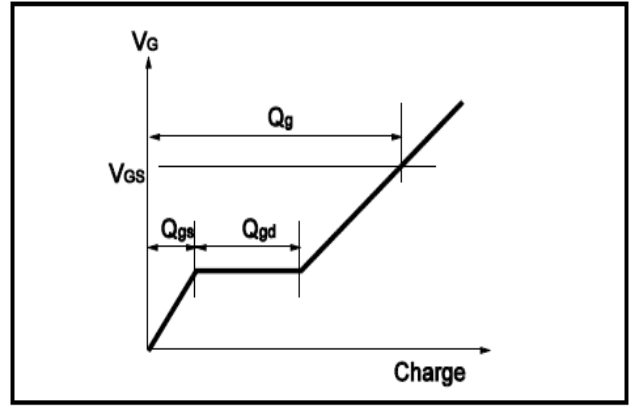
Fig.2 Gate Charge Waveform
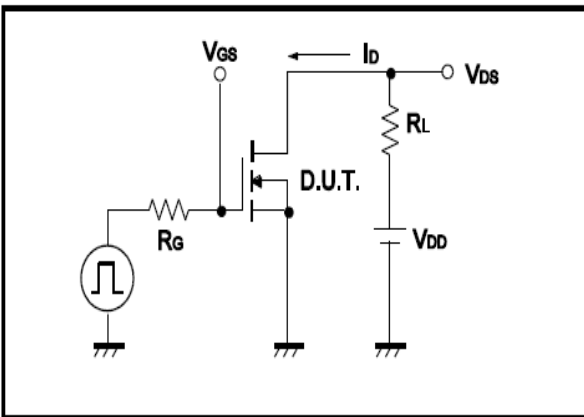
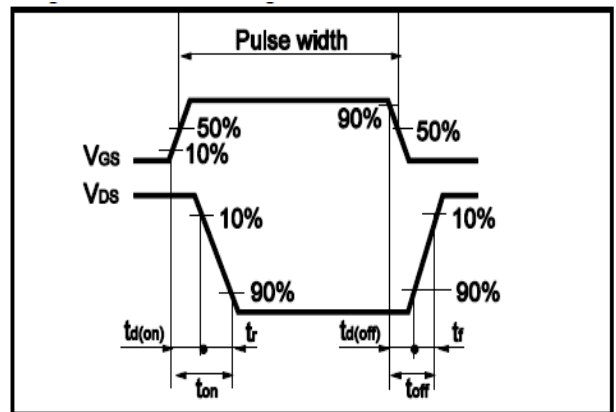Fig.3 Switching Time Measurement Circuit

Fig.4 Gate Charge Waveform

Fig.5 Avalanche Measurement Circuit

Fig.6 Avalanche Waveform

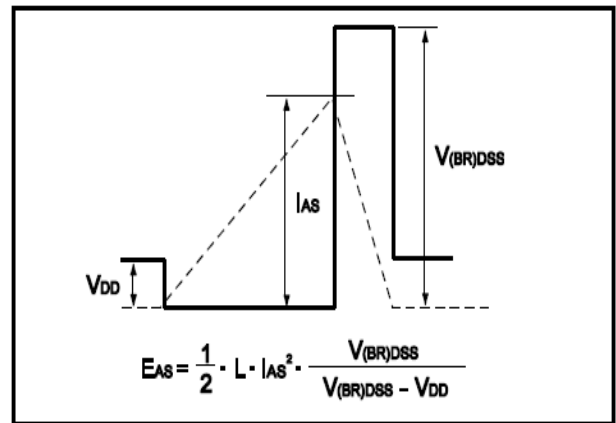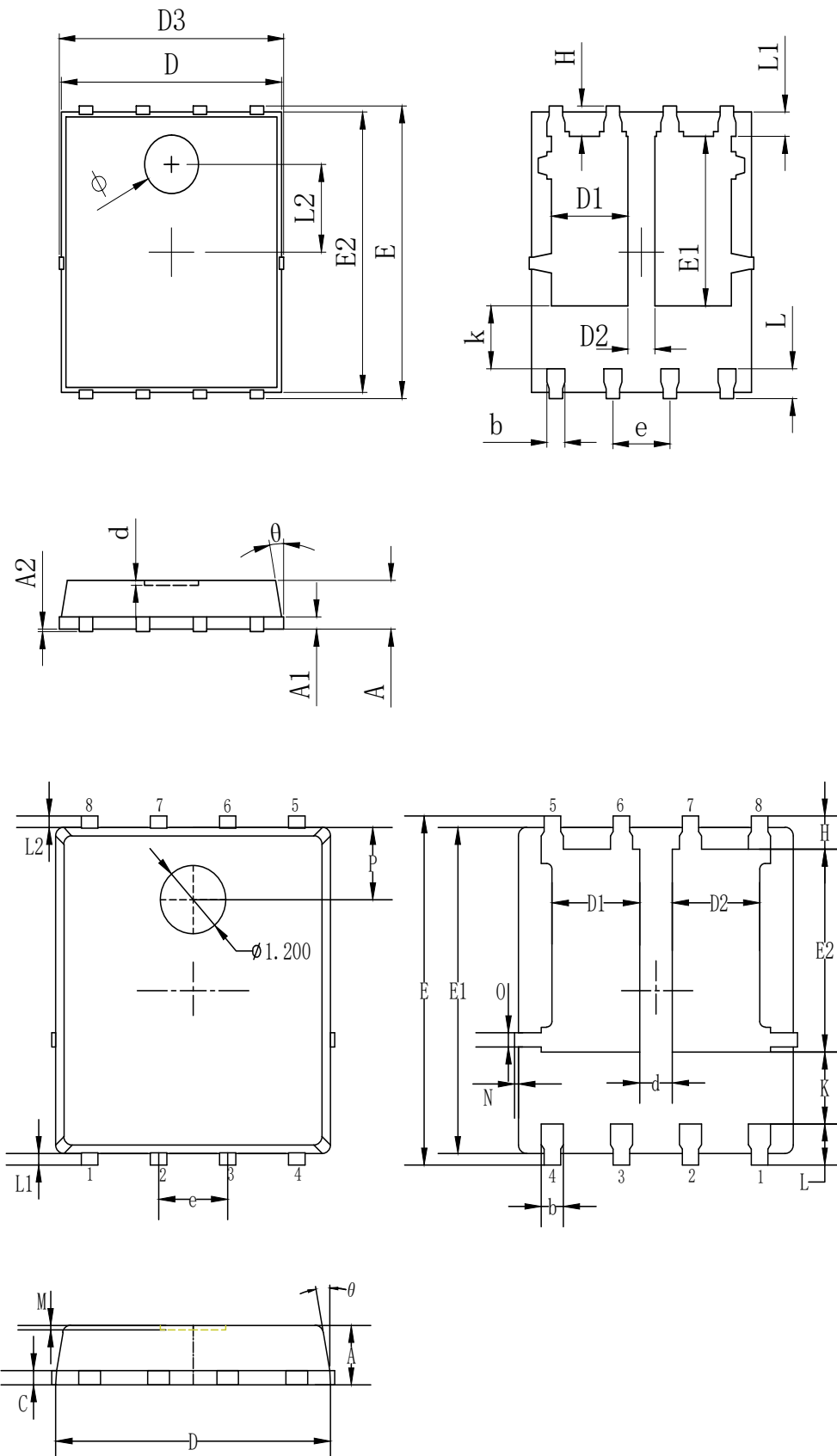$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AS}^2 \cdot \frac{V_{(BR)DSS}}{V_{(BR)DSS} - V_{DD}}$$

●**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

Symbols	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.		

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