

General Description

The AGM628MD-M1 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

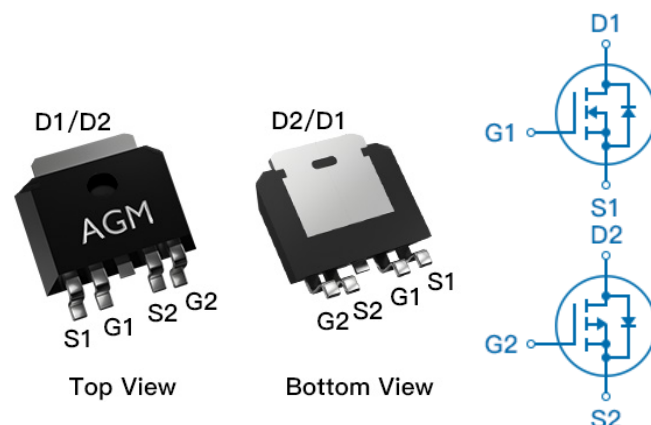
Application

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

Product Summary

BVDSS	RDSON	ID
60V	36mΩ	20A
-60V	60mΩ	-19A

TO-252-4L Pin Configuration



Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM628MD	AGM628MD-M1	TO-252-4L	330mm	16mm	2500

Table 1. Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$)

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	60	-60	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	± 20	V
I_D	Drain Current-Continuous($T_c=25^{\circ}\text{C}$) (Note 1)	20	-19	A
	Drain Current-Continuous($T_c=100^{\circ}\text{C}$)	14	-13	A
IDM (pluse)	Drain Current-Pulsed (Note 2)	80	-76	A
P_D	Total Power Dissipation($T_c=25^{\circ}\text{C}$)	34	40	W
	Total Power Dissipation($T_c=100^{\circ}\text{C}$)	13.5	16	W
EAS	Avalanche energy (Note 3)	14.5	33.8	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	$^{\circ}\text{C}$

Table 2. Thermal Characteristic

Symbol	Parameter	N-Max	P-Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) ¹	50	50	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	3.7	3.1	$^{\circ}\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	60	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=60V,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	2.2	V
gFS	Forward Transconductance	VDS=5V,ID=10A	--	12	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=15A	--	36	40	mΩ
		VGS=4.5V, ID=10A	--	37	43	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=30V,VGS=0V, F=1MHZ	--	705	--	pF
Coss	Output Capacitance		--	45	--	pF
Crss	Reverse Transfer Capacitance		--	36	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	2.2	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=10V,VDS=30V, ID=2A,RGEN=2.5Ω	--	6.1	--	nS
tr	Turn-on Rise Time		--	2.5	--	nS
td(off)	Turn-Off Delay Time		--	15	--	nS
tf	Turn-Off Fall Time		--	2.3	--	nS
Qg	Total Gate Charge	VGS=10V, VDS=30V, ID=5A	--	24	--	nC
Qgs	Gate-Source Charge		--	3.5	--	nC
Qgd	Gate-Drain Charge		--	5.1	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	20	A
VSD	Forward on Voltage	VGS=0V,IS=15A	--	--	1.2	V
trr	Reverse Recovery Time	IF=15A , dI/dt=100A/μs , TJ=25℃	--	36	--	ns
Qrr	Reverse Recovery Charge		--	53	--	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℃,VDD=30V,Vgs=10V,ID=17A,L=0.1mH,RG=25ohm

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=-250μA	-60	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=-60V,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	-1.7	-2.2	V
gFS	Forward Transconductance	VDS=-5V,ID=-10A	--	12	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=-10V, ID=-15A	--	60	75	mΩ
		VGS=-4.5V, ID=-10A	--	74	88	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=-30V,VGS=0V, F=1MHZ	--	525	--	pF
Coss	Output Capacitance		--	92	--	pF
Crss	Reverse Transfer Capacitance		--	4.5	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	3.5	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=-10V,VDS=-30V, ID=3.5A,RGEN=3Ω	--	10	--	nS
tr	Turn-on Rise Time		--	6.0	--	nS
td(off)	Turn-Off Delay Time		--	40	--	nS
tf	Turn-Off Fall Time		--	13	--	nS
Qg	Total Gate Charge	VGS=-10V, VDS=-30V, ID=-3.5A	--	10.5	--	nC
Qgs	Gate-Source Charge		--	2.8	--	nC
Qgd	Gate-Drain Charge		--	1.5	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	-19	A
VSD	Forward on Voltage	VGS=0V,IS=-15A	--	-0.8	-1.2	V
trr	Reverse Recovery Time	IF=-15A , dI/dt=100A/μs , TJ=25°C	--	50	--	ns
Qrr	Reverse Recovery Charge		--	105	--	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°C, VDD=-30V, Vgs=-10V, ID=-26A, L=0.1mH, RG=25ohm

N-Channel Typical electrical and thermal characteristics:

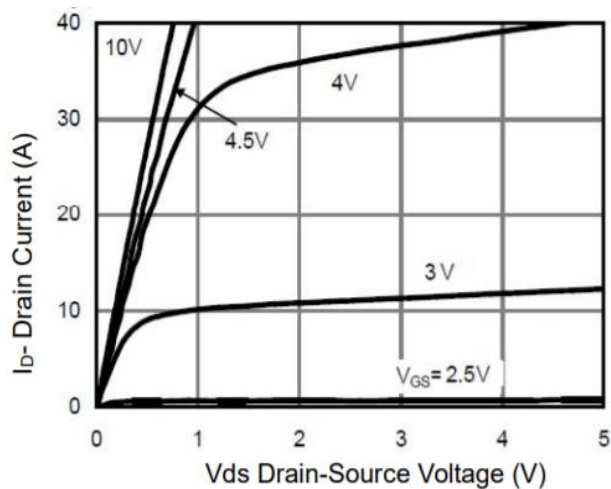


Figure 1: Typical Output Characteristics

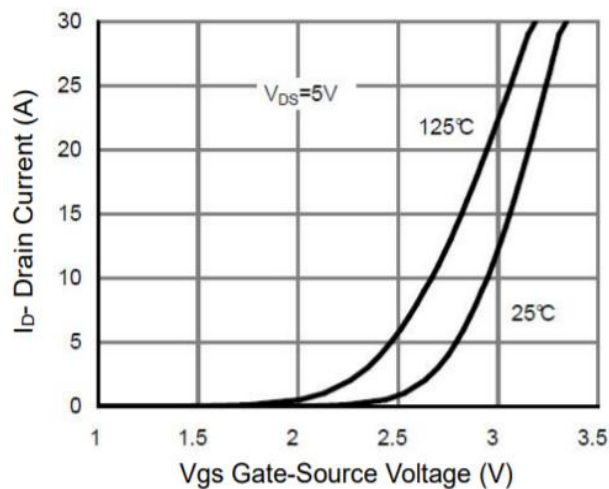


Figure 2: Typical Transfer Characteristics

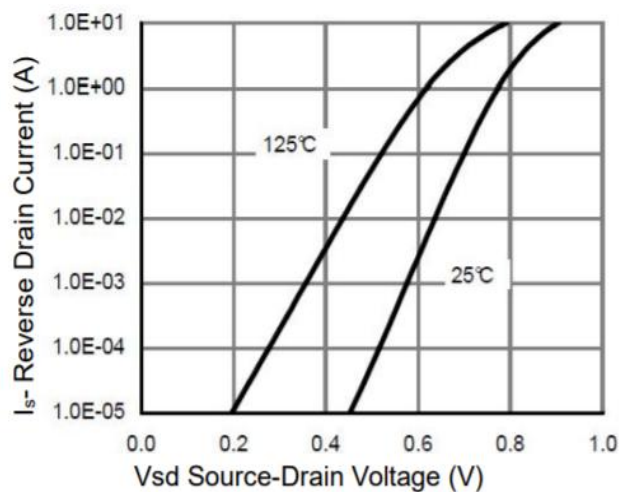


Figure 3: Body-Diode Characteristics

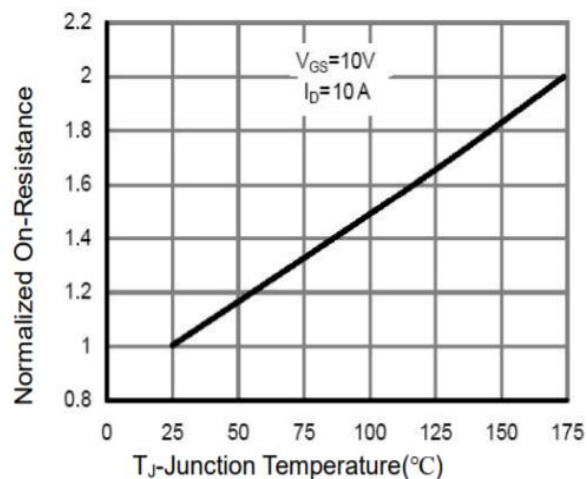


Figure 4: On-Resistance vs. Junction Temperature

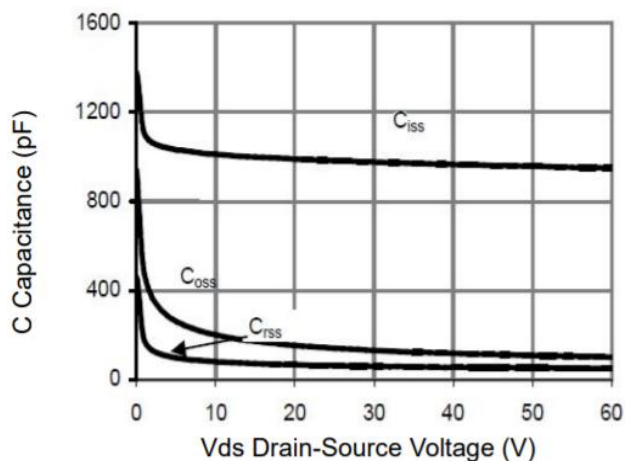


Figure 5: Capacitance Characteristics

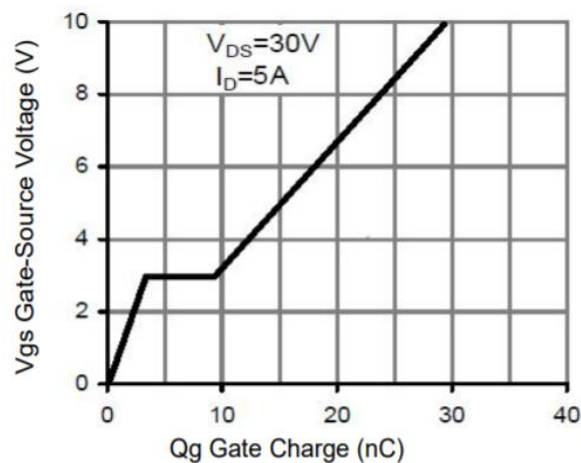


Figure 6: Gate-Charge Characteristics

Typical electrical and thermal characteristics:

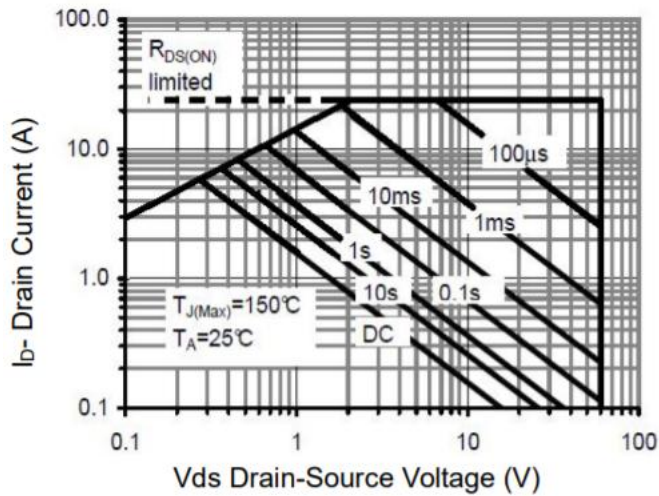


Figure 7: Maximum Forward Biased Safe Operating Area

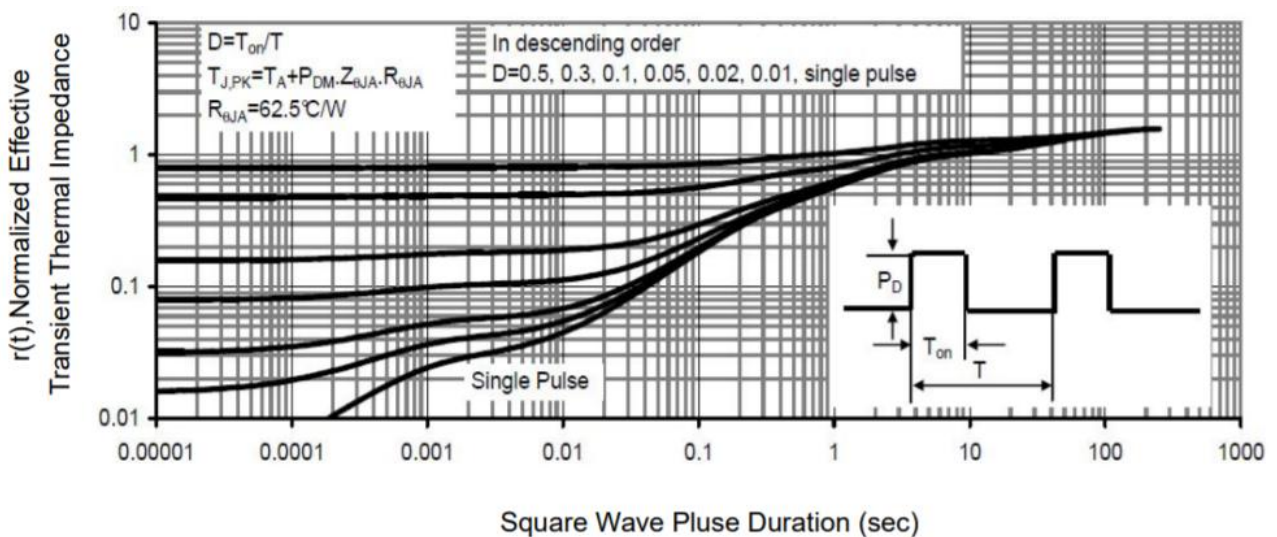
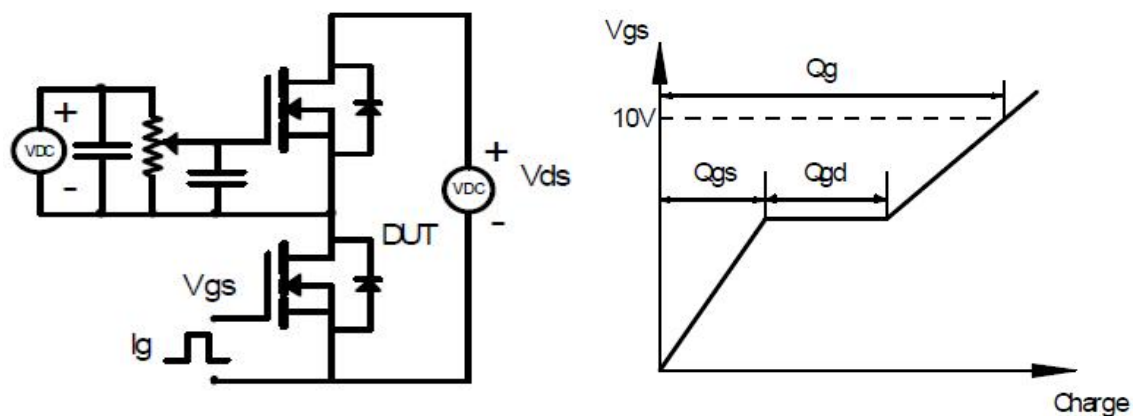


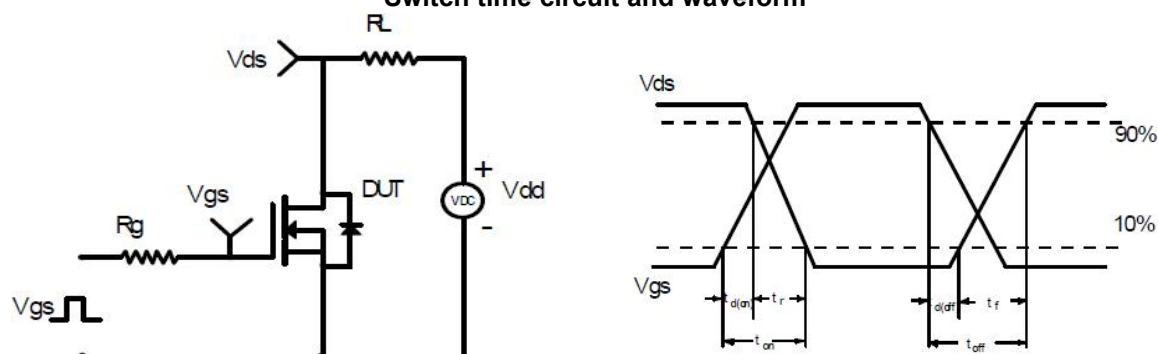
Figure 8: Normalized Maximum Transient Thermal Impedance

Test circuits and Waveforms:

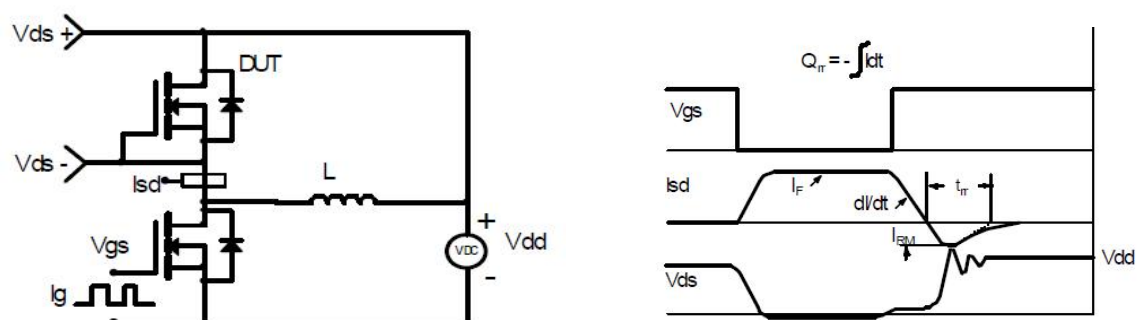
Gate charge circuit and waveform



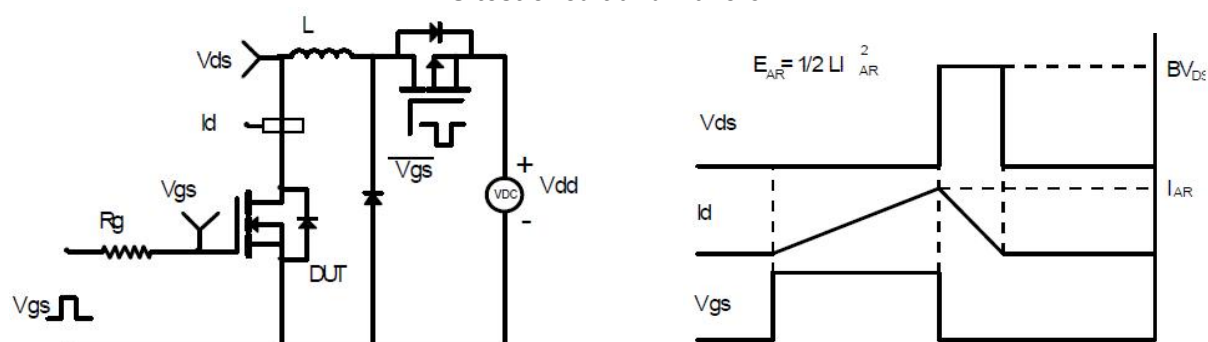
Switch time circuit and waveform



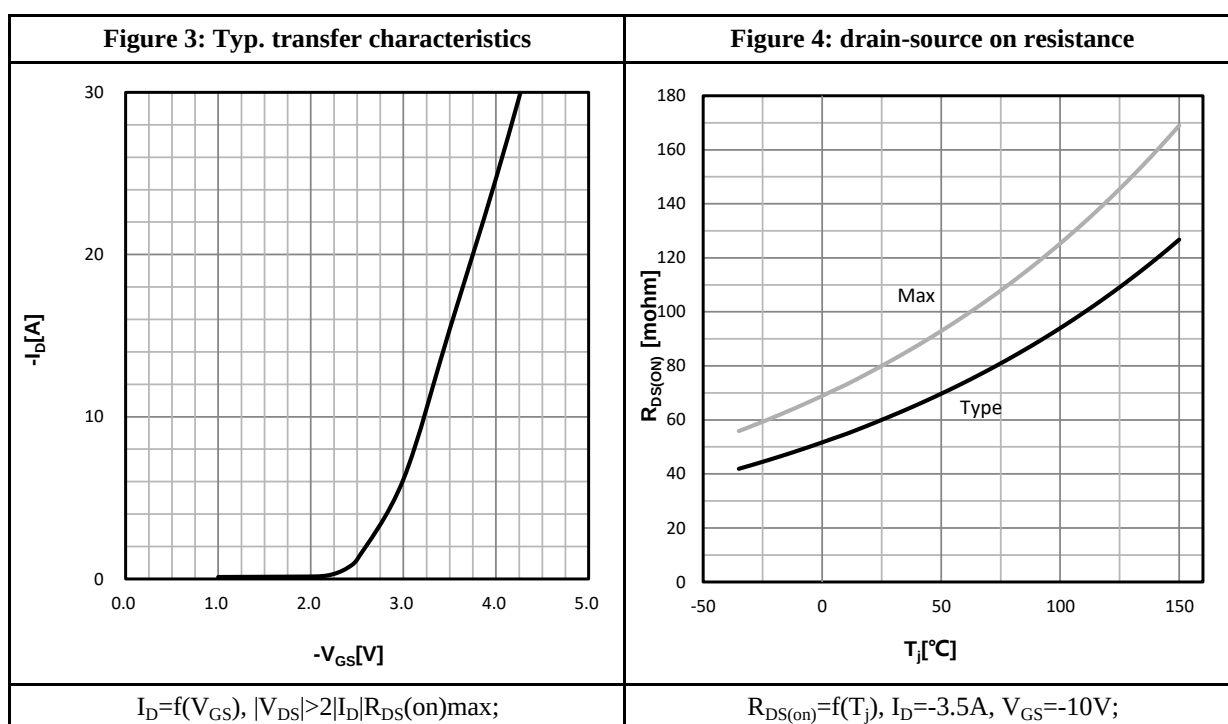
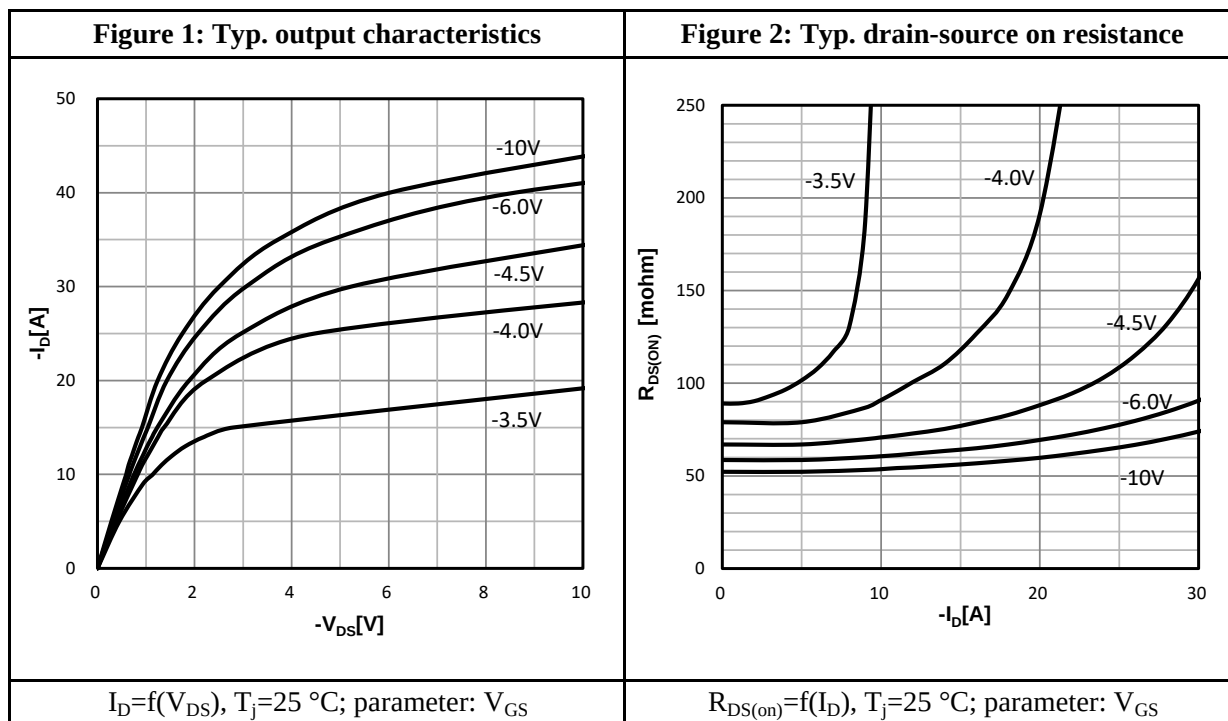
Reverse recovery test circuit and waveform

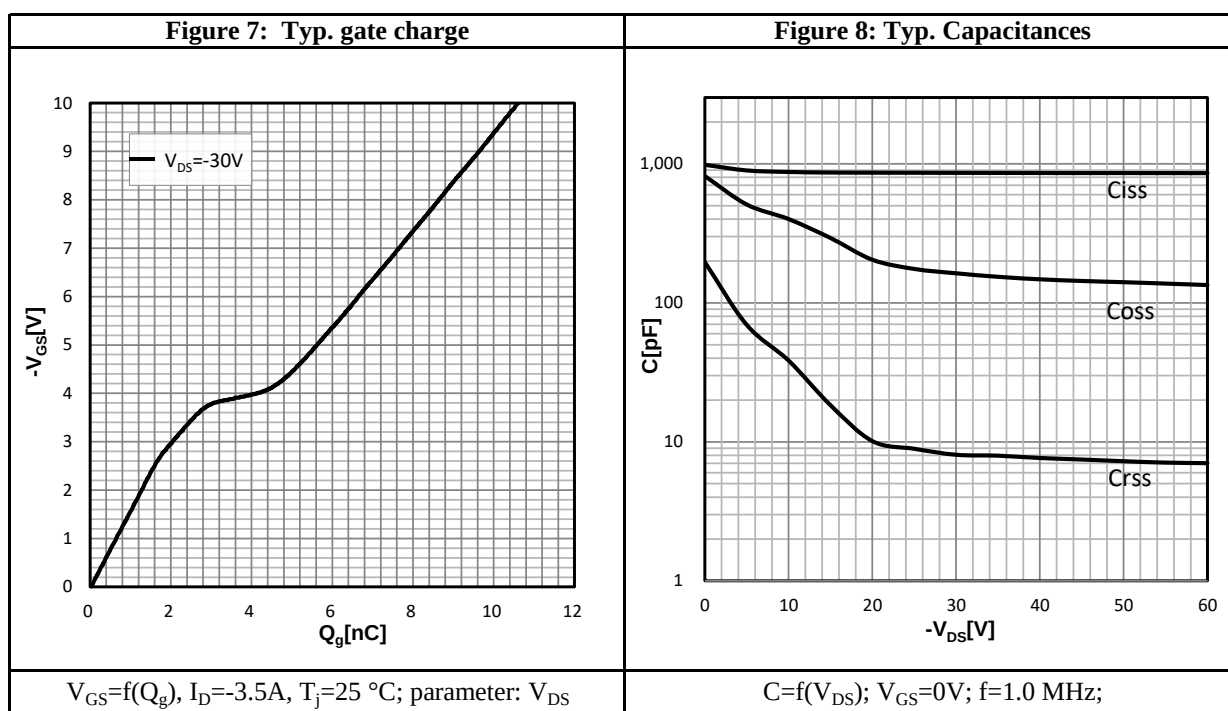
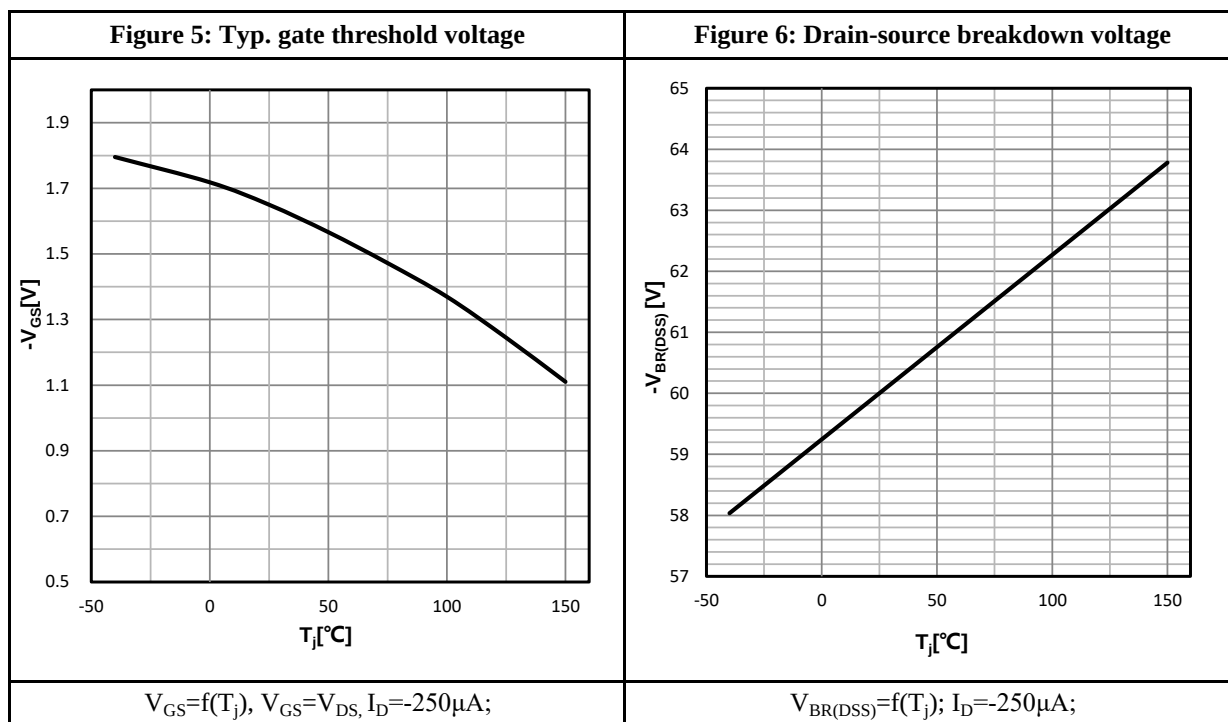


EAS test circuit and waveform



P-Channel Characteristics Curve:





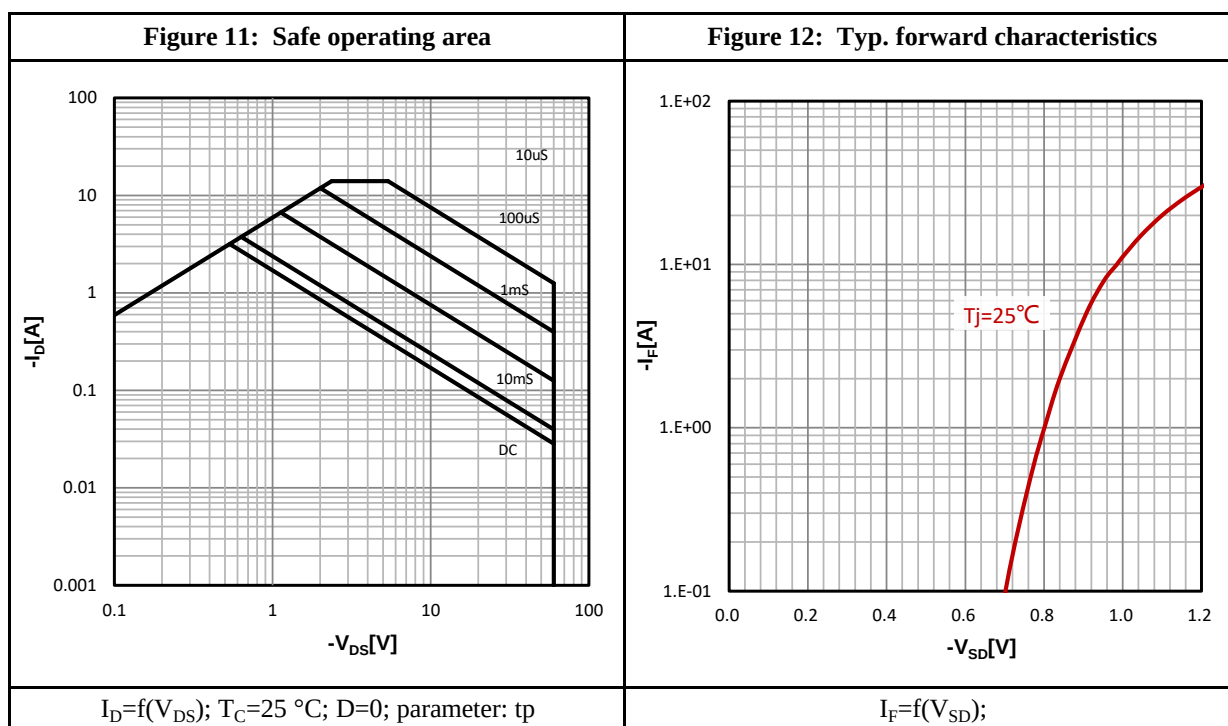
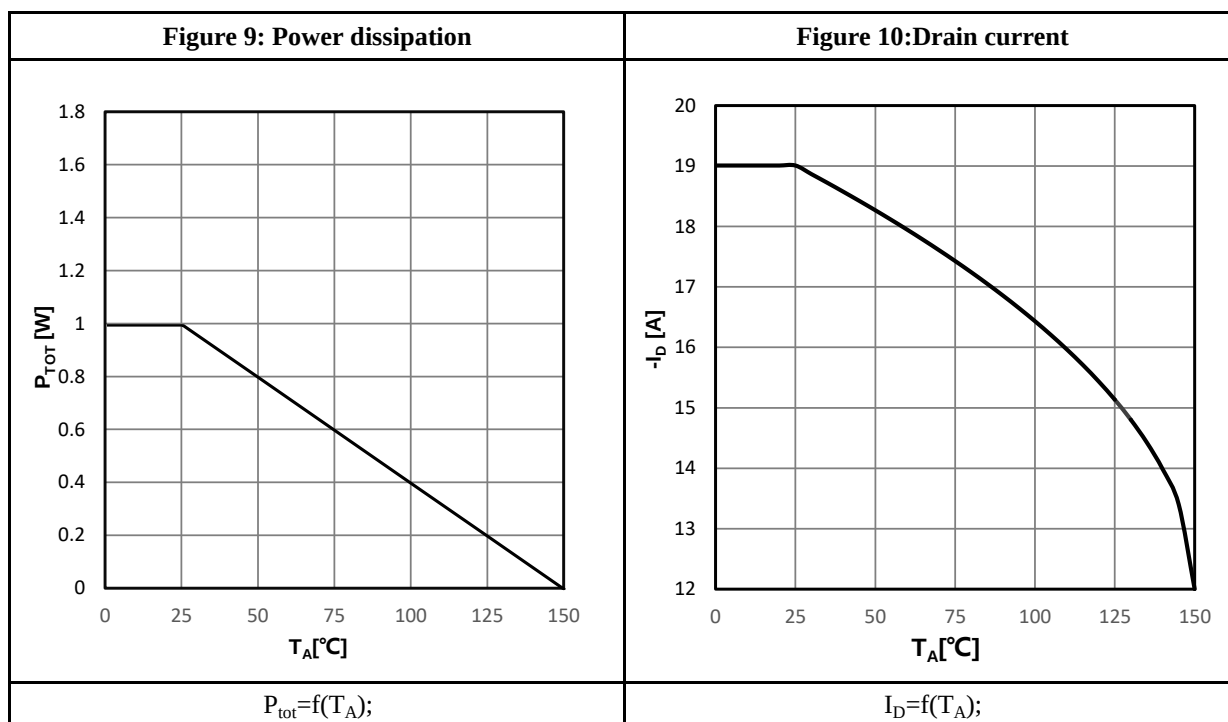
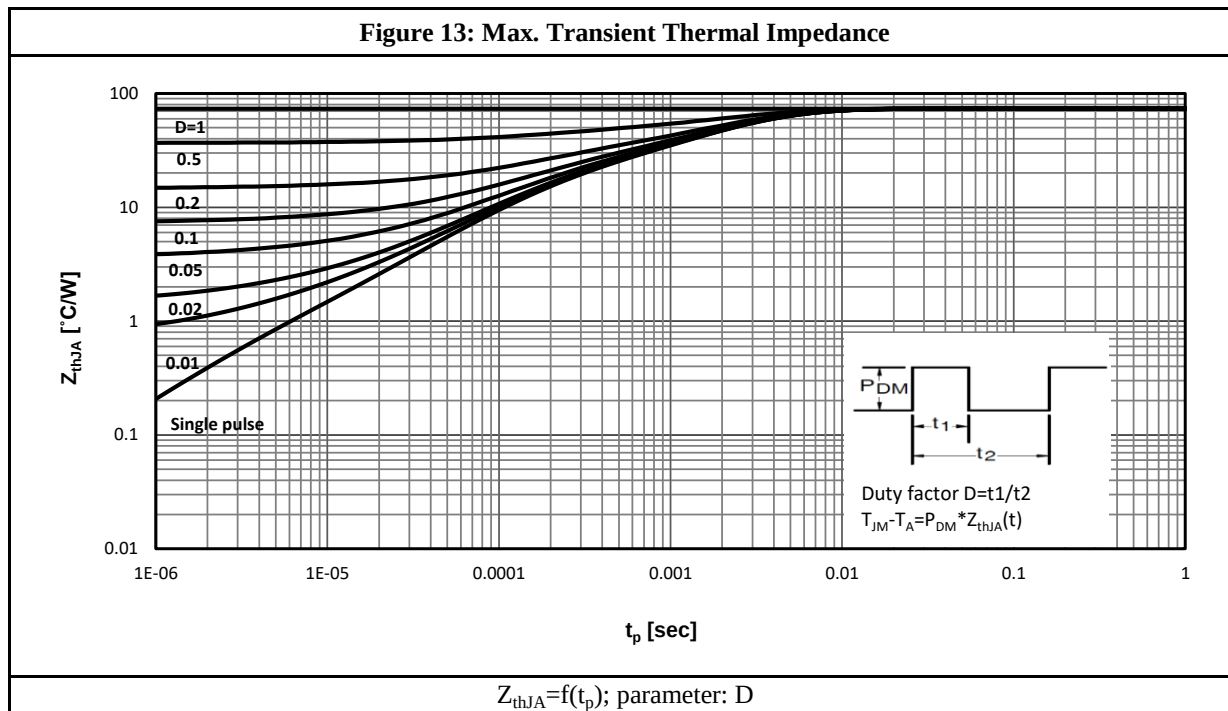
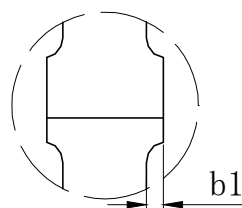
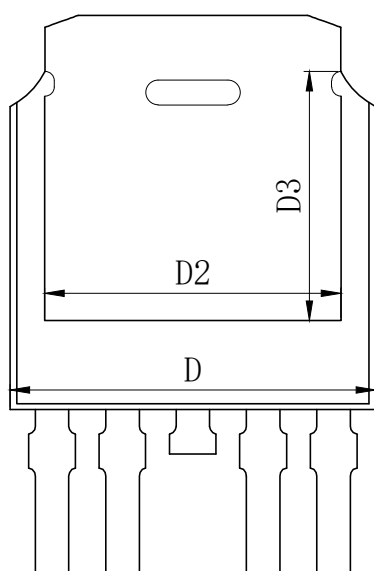
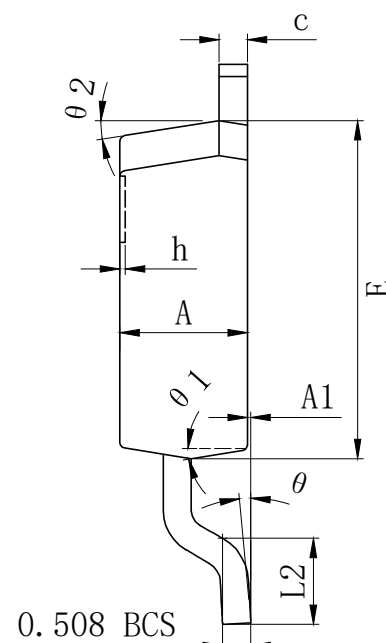
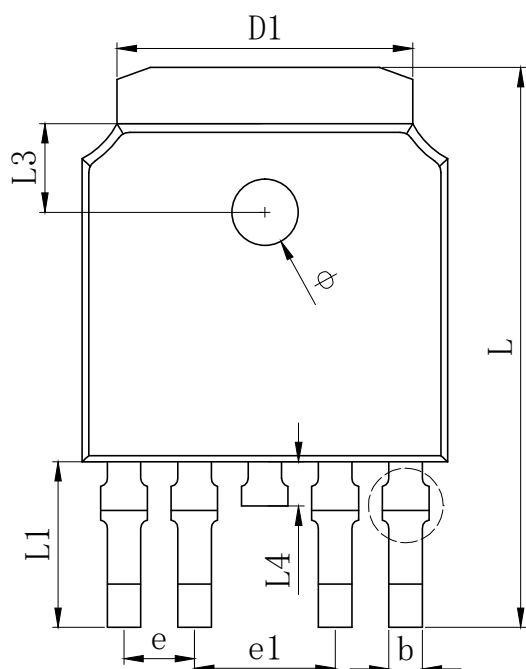


Figure 13: Max. Transient Thermal Impedance



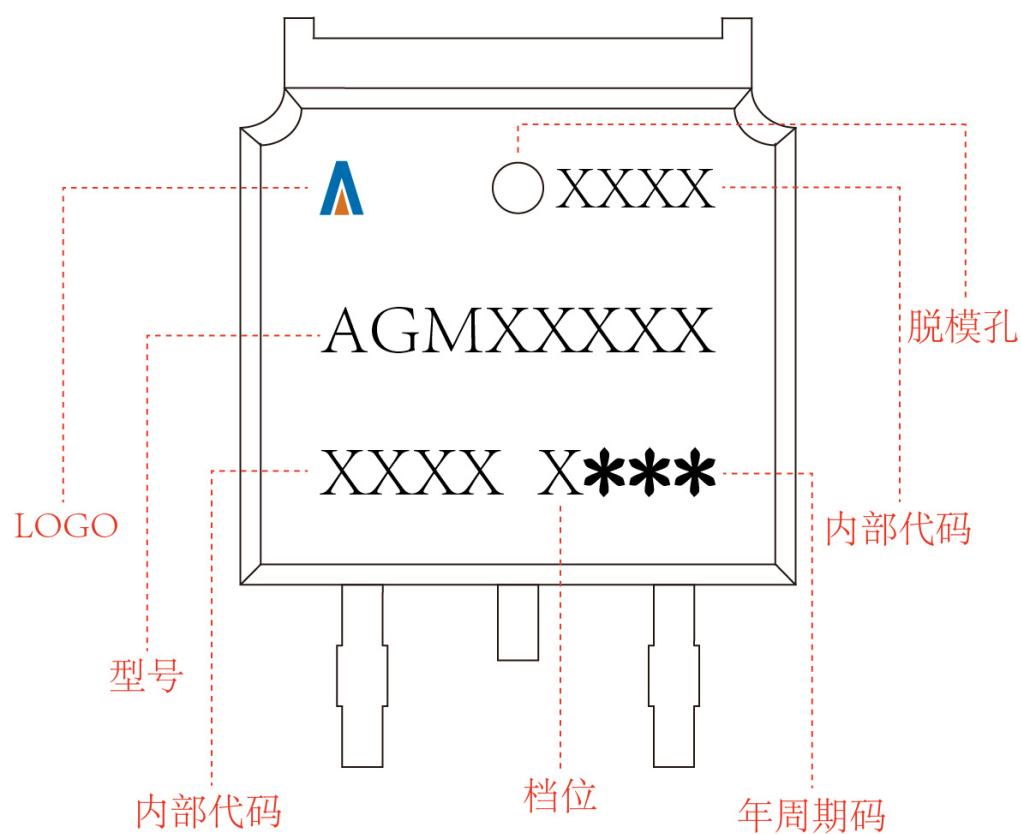
TO-252-4 L Package Outline Data



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.550	0.600	0.650
b1	0.000		0.120
c (电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	5.346 REF		
D3	4.490 REF		
E	6.000	6.100	6.200
e	1.270 TYP		
e1	2.540 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.988 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.700	0.800	0.900
Φ	1.100	1.200	1.300
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		

TO-252-4L

Marking Instructions:



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