

### ● General Description

The AGM60P12D 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

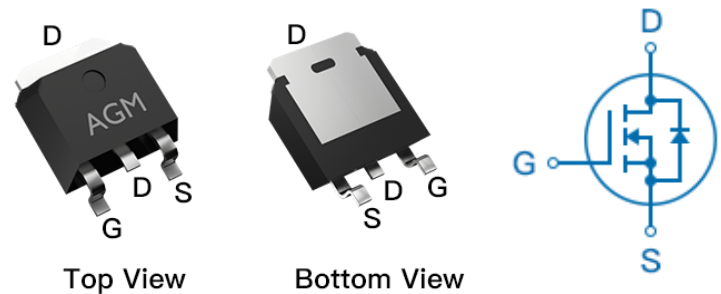
### ● Application

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

### Product Summary

BVDSS	RDS(ON)	ID
-60V	11mΩ	-70A

### TO-252 Pin Configuration



### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM60P12D	AGM60P12D	TO-252	330mm	16mm	2500

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

Symbol	Parameter	Value	Unit
VDS	Drain-Source Voltage (VGS=0V)	-60	V
VGS	Gate-Source Voltage (VDS=0V)	±20	V
ID	Drain Current-Continuous(Tc=25°C) <b>(Note 1)</b>	-70	A
	Drain Current-Continuous(Tc=100°C)	-47	A
IDM (pluse)	Drain Current-Pulsed <b>(Note 2)</b>	-280	A
PD	Maximum Power Dissipation(Tc=25°C)	100	w
	Maximum Power Dissipation(Tc=100°C)	40	w
EAS	Avalanche energy <b>(Note 3)</b>	337	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>	---	1.25	°C/W

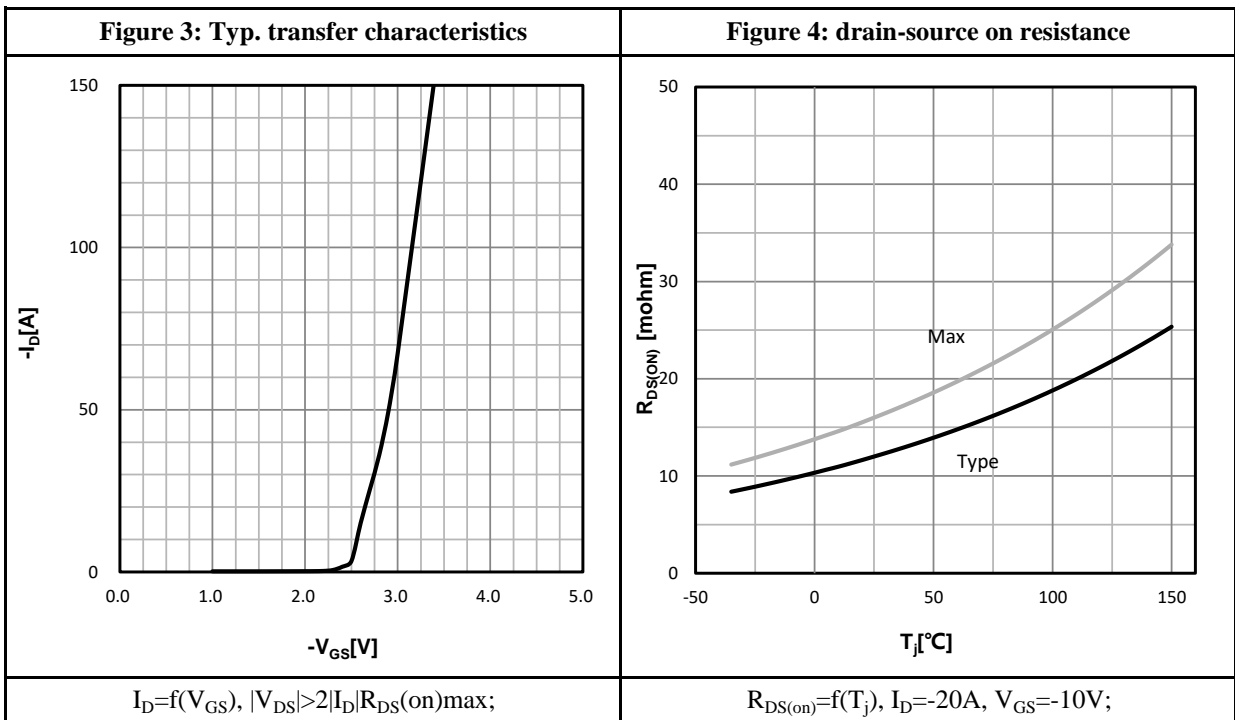
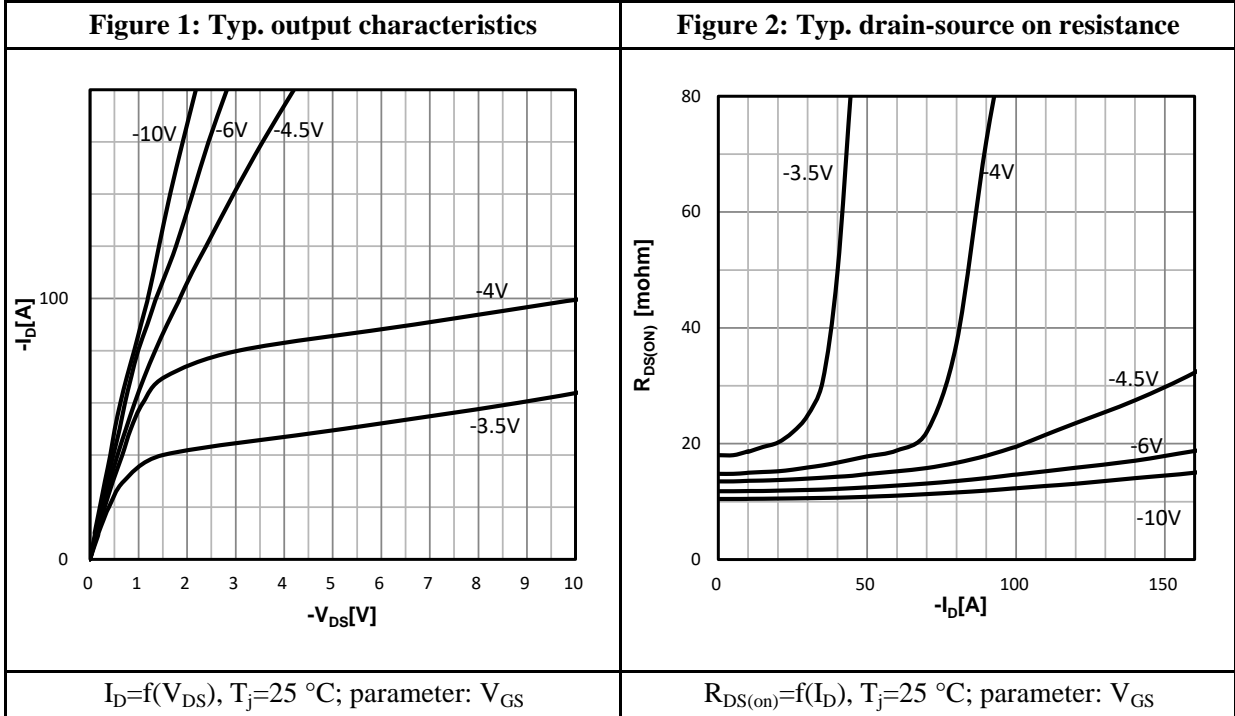
**Table 3. Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)**

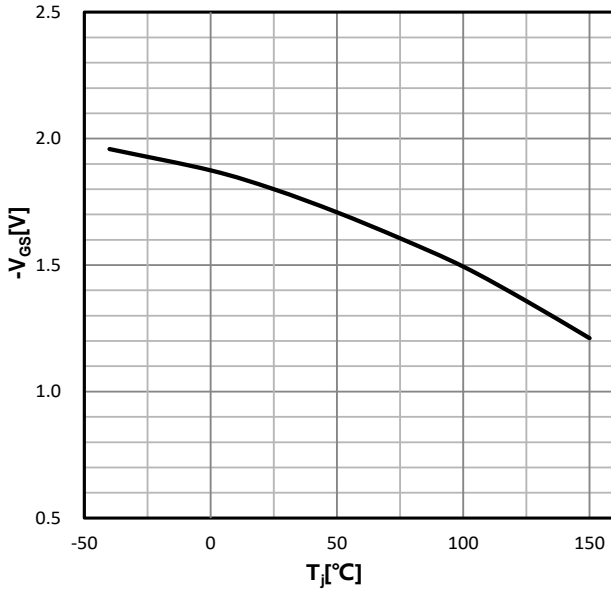
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BVDSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V I <sub>D</sub> =-250μA	-60	--	--	V
IDSS	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V	--	--	-1	μA
IGSS	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.2	-1.8	-2.2	V
gFS	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =-10A	--	5	--	S
RDS(on)	Drain-Source On-State Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	--	11	16	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A	--	16	20	mΩ
<b>Dynamic Characteristics</b>						
Ciss	Input Capacitance	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, F=1MHZ	--	2360	--	pF
Coss	Output Capacitance		--	484	--	pF
Crss	Reverse Transfer Capacitance		--	9.4	--	pF
Rg	Gate resistance	f=1.0MHz	--	12.5	--	Ω
<b>Switching Times</b>						
td(on)	Turn-on Delay Time	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, I <sub>D</sub> =-10A, RGEN=3Ω	--	20	--	nS
tr	Turn-on Rise Time		--	25	--	nS
td(off)	Turn-Off Delay Time		--	60	--	nS
tf	Turn-Off Fall Time		--	30	--	nS
Qg	Total Gate Charge	V <sub>GS</sub> =-10V, V <sub>DS</sub> =-30V, I <sub>D</sub> =-10A	--	39	--	nC
Qgs	Gate-Source Charge		--	2.7	--	nC
Qgd	Gate-Drain Charge		--	1.9	--	nC
<b>Source-Drain Diode Characteristics</b>						
ISD	Source-Drain Current(Body Diode)		--	--	-70	A
VSD	Forward on Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-20A	--	--	-1.2	V
trr	Reverse Recovery Time	I <sub>S</sub> =-20A , VDD=30V dI/dt=100A/μs	--	50	--	ns
Qrr	Reverse Recovery Charge		--	80	--	nc

Notes 1.The maximum current rating is package limited.

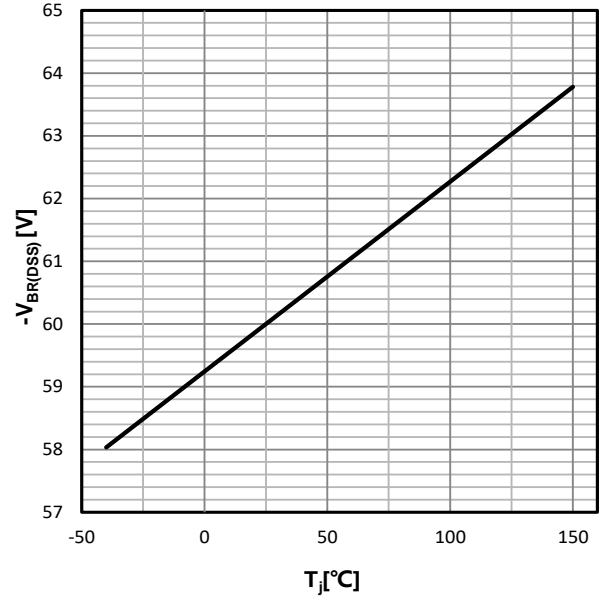
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T<sub>J</sub>=25°C

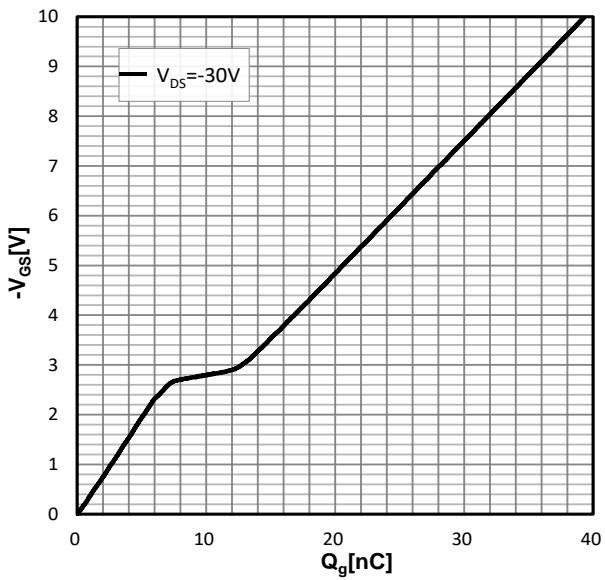
**Characteristics Curve:**


**Figure 5: Typ. gate threshold voltage**


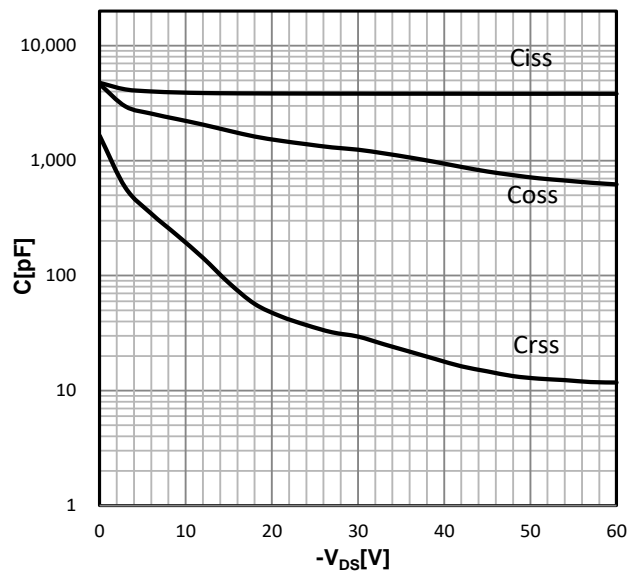
$$V_{GS}=f(T_j), I_{V_{GS}}=V_{DS}, I_D=-250\mu A;$$

**Figure 6: Drain-source breakdown voltage**


$$V_{BR(DSS)}=f(T_j); I_D=-250\mu A;$$

**Figure 7: Typ. gate charge**


$$V_{GS}=f(Q_g), I_D=-10A, T_j=25\text{ }^\circ\text{C}; \text{parameter: } V_{DS}$$

**Figure 8: Typ. Capacitances**


$$C=f(V_{DS}); V_{GS}=0V; f=1.0\text{ MHz};$$

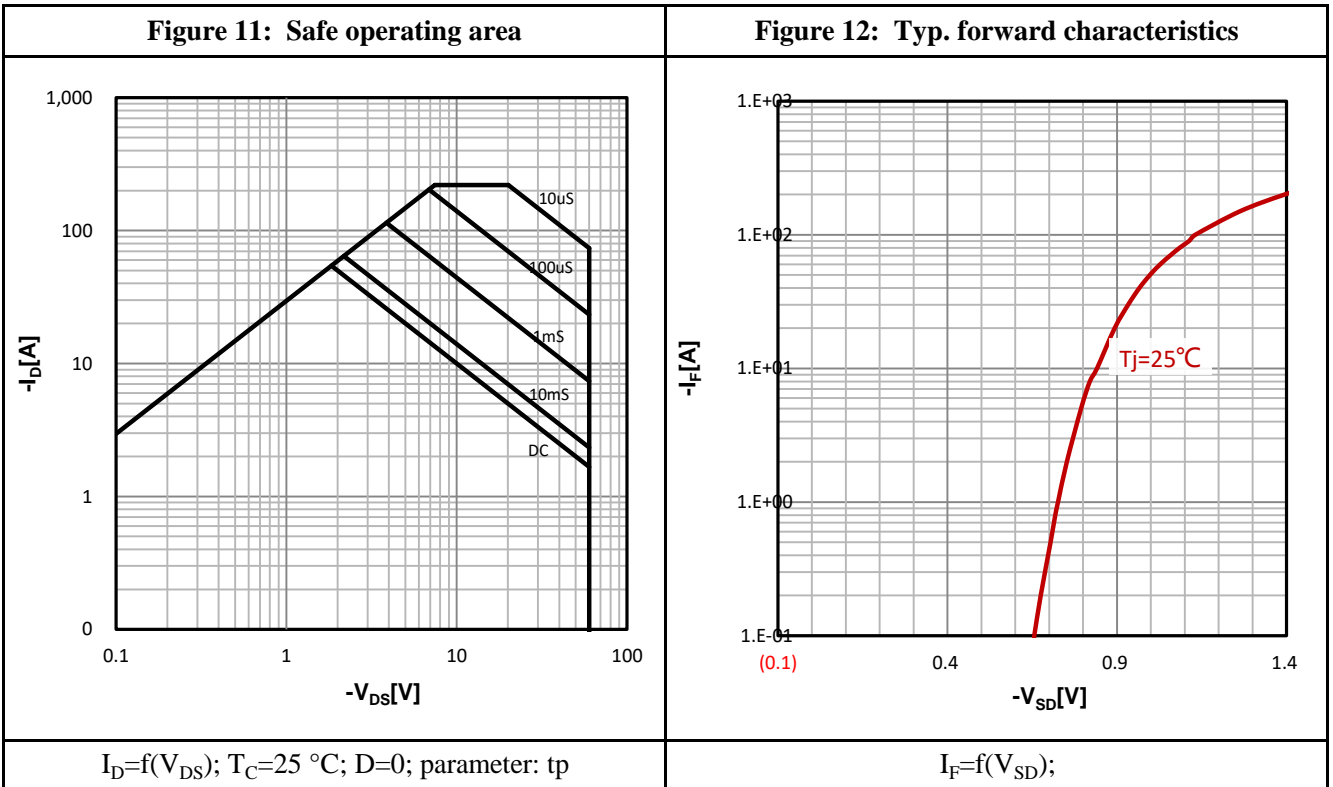
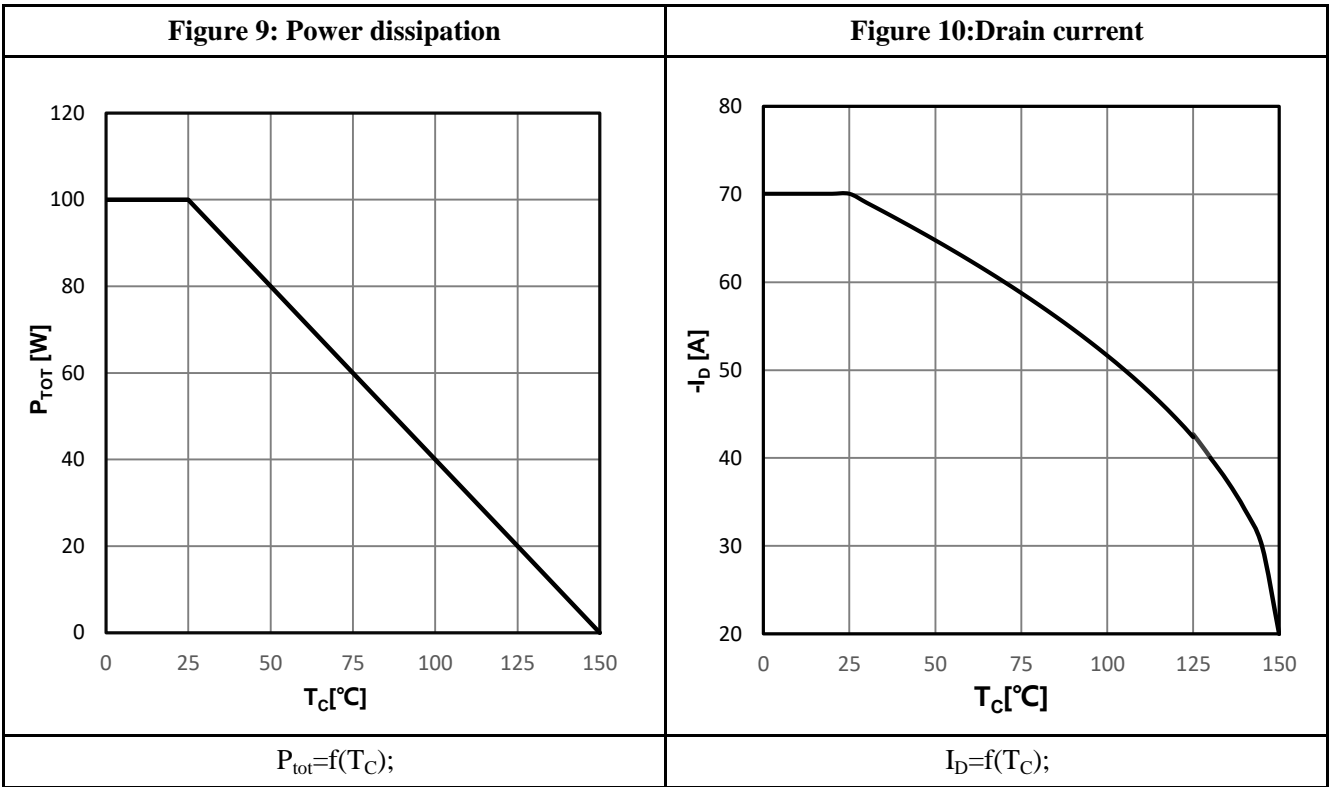
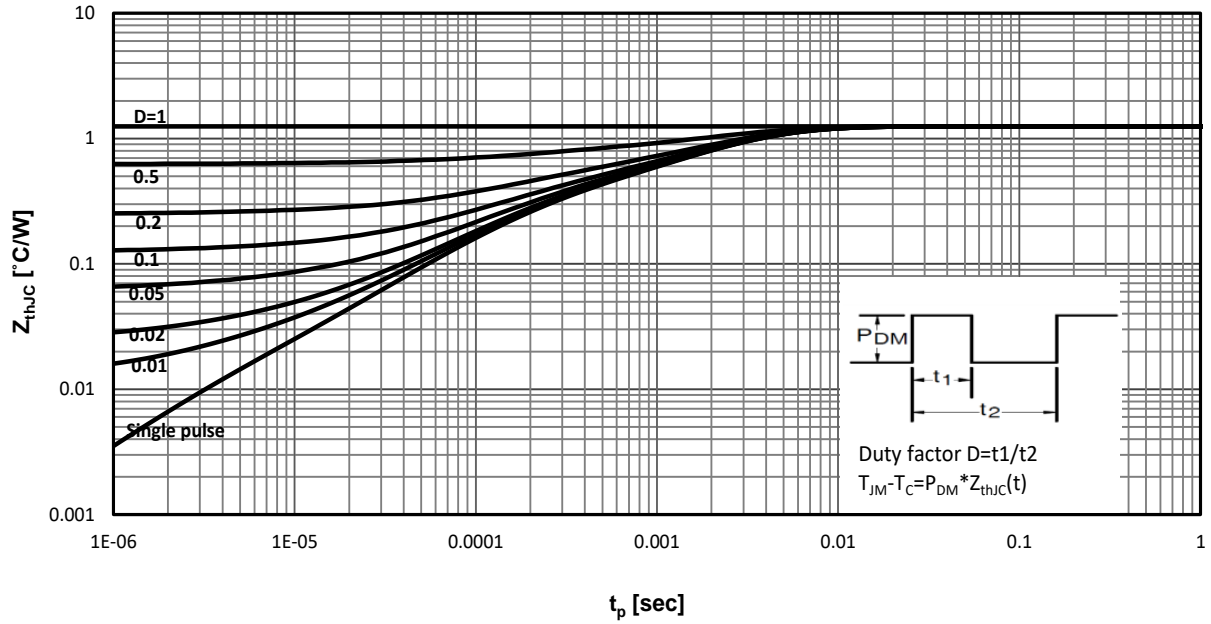
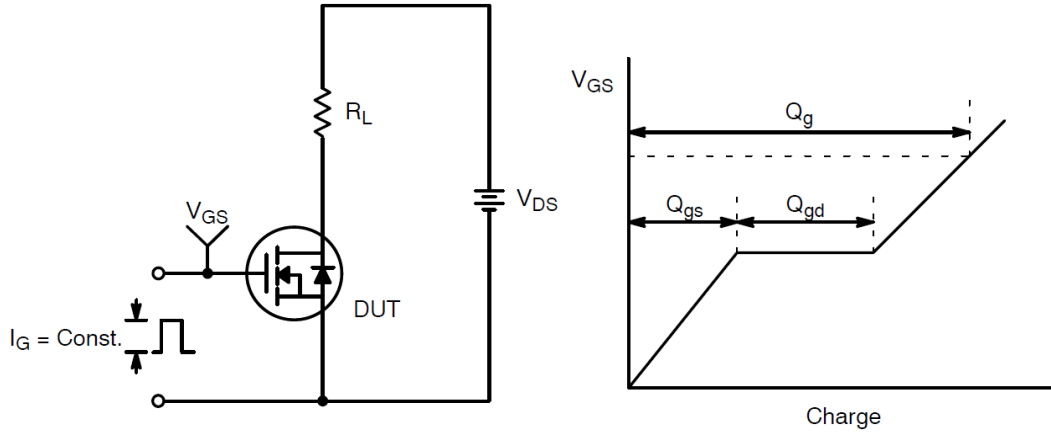


Figure 13: Max. Transient Thermal Impedance

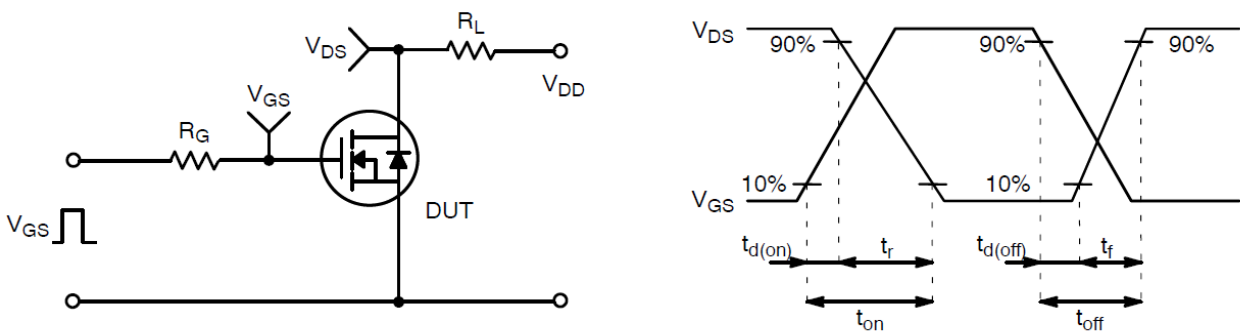


$Z_{thJC} = f(t_p)$ ; parameter: D

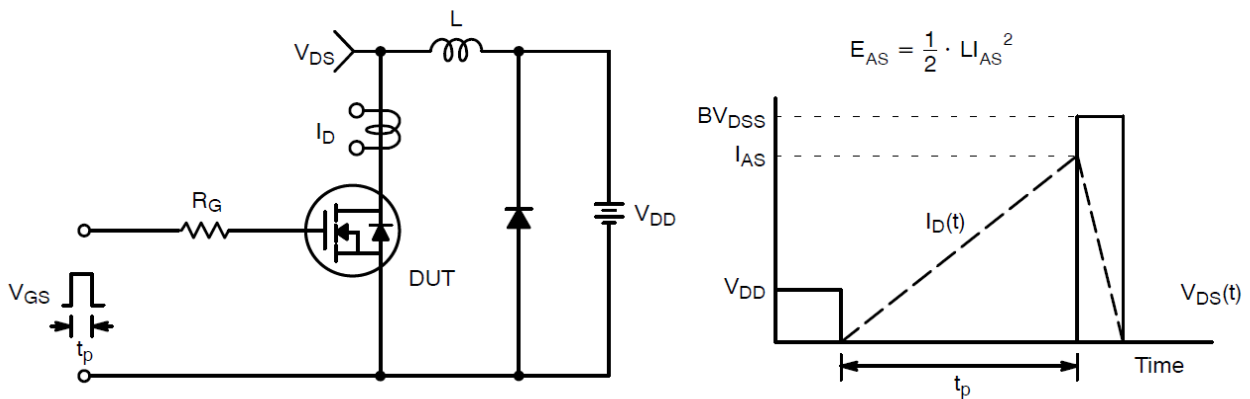
**Test Circuit & Waveform:**



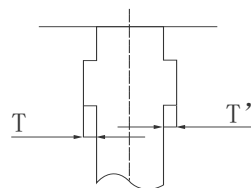
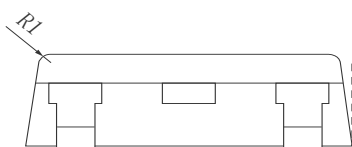
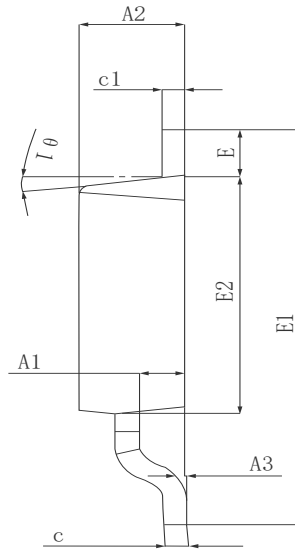
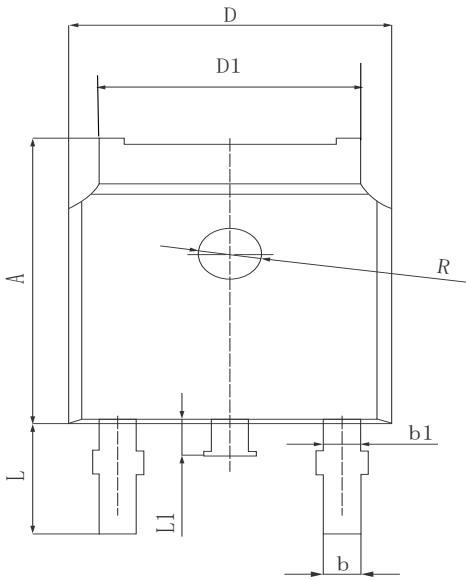
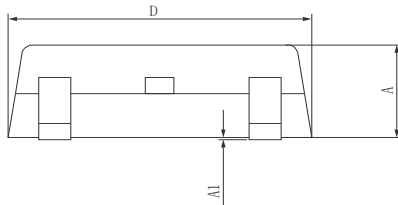
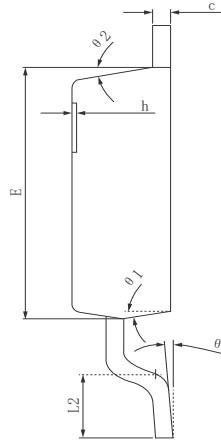
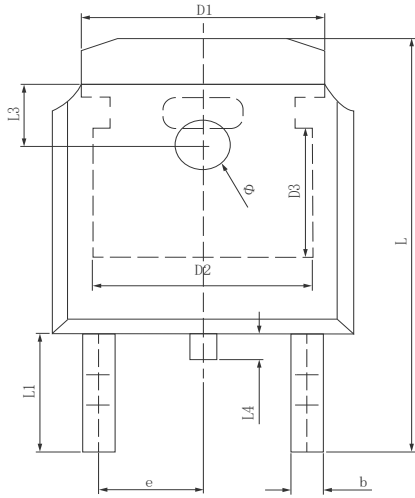
**Figure 14: Gate Charge Test Circuit & Waveform**



**Figure 15: Resistive Switching Test Circuit & Waveforms**



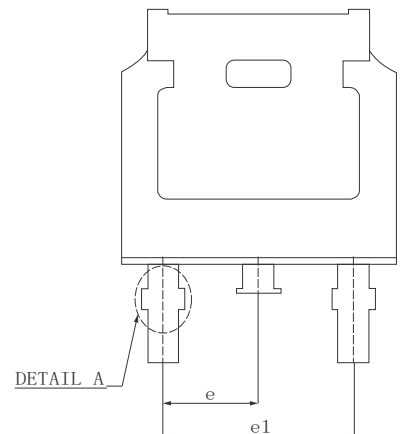
**Figure 16: Unclamped Inductive Switching Test Circuit & Waveforms**

**●Dimensions (TO-252)**


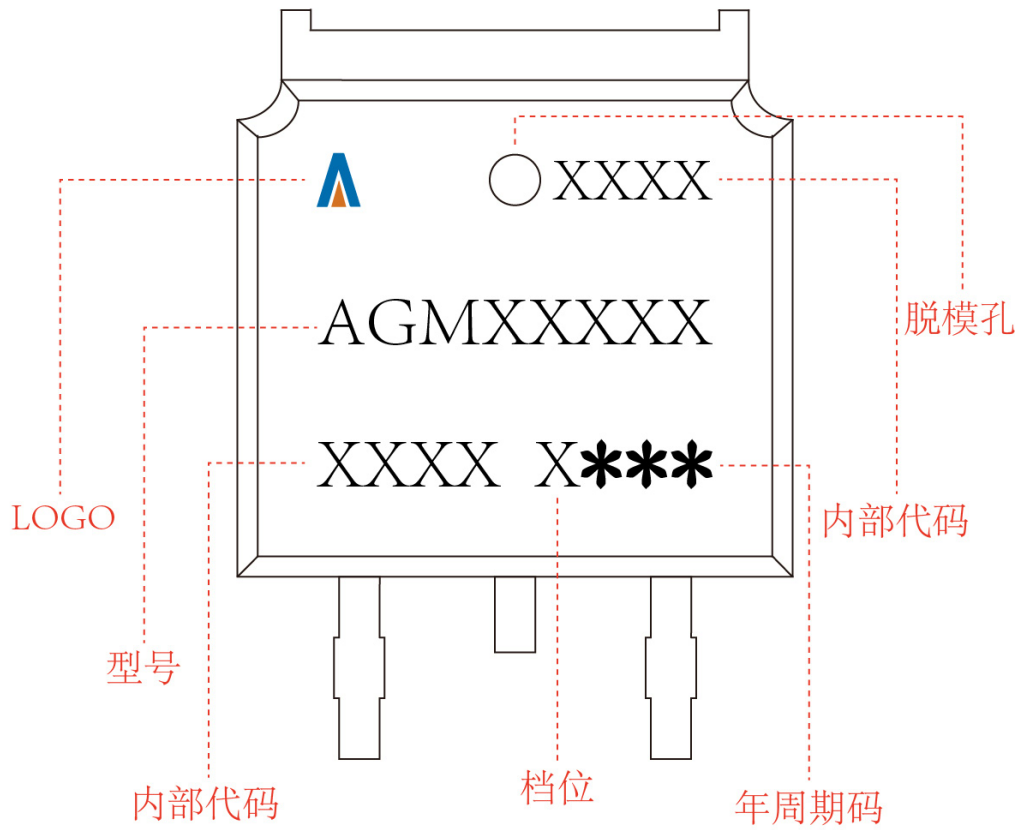
$0 \leq T, T' \leq 0.12$   
**DETAIL A**

SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.640	0.690	0.740
c (电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	4.826 REF		
D3	3.166 REF		
E	6.000	6.100	6.200
e	2.286 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.888 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.600	0.800	1.000
Φ	1.100	1.200	1.300
θ	0°		8°
θ 1	9° TYP		
θ 2	9° TYP		

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	7.050	7.100	7.150
A1	0.960	1.010	1.060
A2	2.250	2.300	2.350
A3	0.000	0.050	0.100
b	0.760REF.		
b1	1.000REF.		
c	0.508REF.		
c1	0.508REF.		
D	6.550	6.600	6.650
D1	5.220	5.320	5.420
E	0.950	1.000	1.050
E1	9.700	9.900	10.100
E2	6.050	6.100	6.150
e	2.286BSC		
e1	4.572REF.		
L	2.650	2.800	2.950
L1	0.700	0.800	0.900
θ 1	7° REF.		
R	1.300REF.		
R1	0.250REF.		



TO-252  
Marking Instructions:




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