DESCRIPTION

The AM4559 is available in SOP8 package.

BVDSS	RDSON	ID
60V	30mΩ	6.0A
-60V	70mΩ	-5.0A

APPLICATIONS

- DC/DC converter
- Power management
- LCD backlight inverter

ORDERING INFORMATION

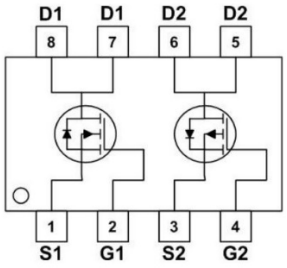
Package Type	Part Number	
SOP8 SPQ: 3,000pcs/Reel	M8	AM4559M8R
		AM4559M8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

FEATURES

- N-Channel
  $R_{DS(ON),typ.}$= 30mΩ@V_{GS}=10V
  $R_{DS(ON),typ.}$= 36mΩ@V_{GS}=4.5V
- P-Channel
  $R_{DS(ON),typ.}$=70 mΩ@V_{GS}=-10V
  $R_{DS(ON),typ.}$=100 mΩ@V_{GS}=-4.5V
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

TYPICAL APPLICATION

N−Channel / P−Channel



Pin#	Symbol	Function
1	S1	Source
2	G1	Gate
3	S2	Source
4	G2	Gate
5	D2	Drain
6	D2	Drain
7	D1	Drain
8	D1	Drain

ABSOLUTE MAXIMUM RATINGS

T_A = 25°C, unless otherwise noted

Parameter		Symbol	N-Channel	P-Channel	Units
Drain-Source Voltage		V_{DS}	60	-60	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current, V_{GS} @ 10V (1)	T_A=25℃	I_D	6.0	-5.0	A
	T_A=70℃		4.0	-3.5	A
Pulsed Drain Current (2)		I_{DM}	11	-8.5	A
Single Pulse Avalanche Energy (3)		EAS	22.5	35.5	mJ
Avalanche Current		I_{AS}	22.6	-26.6	A
Total Power Dissipation (4)	T_A=25℃	P_D	2.5	2.5	W
Storage Temperature Range		T_{STG}	-55 to 150	-55 to 150	℃
Operating Junction Temperature Range		T_J	-55 to 150	-55 to 150	℃

Stress beyond above listed “Absolute Maximum Ratings” may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

THERMAL RESISTANCE

Parameter	Symbol	Max	Units
Thermal Resistance Junction-Ambient (1)	$R_{\theta JA}$	85	°C/W
Thermal Resistance Junction-Case (1)	$R_{\theta JC}$	62.5	

(1) Calculated continuous current based on maximum allowable junction temperature.
(2) Pulse Width Limited by Maximum Junction Temperature.
(3) T_A=25℃,V_{DD}=30V,V_G=10V,L=0.5mH,Rg=25Ω,I_{AS}=8.7A
(4) The power dissipation is limited by 150℃ junction temperature

ELECTRICAL CHARACTERISTICS

N-Channel

T_A = 25°C, unless otherwise noted

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Off Characteristic						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS} = 0V,	-	-	1.0	μA
Gate to Body Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS\ (th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0	1.6	2.5	V
Static Drain-Source on-Resistance (1)	$R_{DS\ (on)}$	V_{GS}=10V, I_D=5A	-	30	40	mΩ
		V_{GS}=4.5V, I_D=3A	-	36	50	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1.0MHz	-	1148	-	pF
Output Capacitance	C_{oss}		-	58.5	-	pF
Reverse Transfer Capacitance	C_{rss}		-	49.4	-	pF
Total Gate Charge	Q_g	V_{DS}=30V, I_D=2.5A, V_{GS}=10V	-	20.3	-	nC
Gate-Source Charge	Q_{gs}		-	3.7	-	nC
Gate-Drain(“Miller”) Charge	Q_{gd}		-	5.3	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Drain to Source Diode Forward Current	I_S	-	-	-	6	A
Maximum Pulsed Drain to Source Diode Forward Current	I_{SM}	-	-	-	20	A
Drain to Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=5A	-	-	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F=5A, dI/dt=100A/μs	-	29	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	43	-	nC

(1) Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

P-Channel

T_A = 25°C, unless otherwise noted

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250uA	-60	-	-	V
Static Drain-Source On-Resistance (2)	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-3.5A	-	70	100	mΩ
		V_{GS}=-4.5V, I_D=-3.1A	-	100	115	
Gate Threshold Voltage	$V_{GS\ th)}$	V_{GS}=V_{DS}, I_D =-250uA	-1.0	-	-2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-48V, V_{GS}=0V , T_A =25℃	-	-	1	uA
		V_{DS}=-48V, V_{GS}=0V , T_J=55℃	-	-	5	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
Forward Transconductance	g_{fs}	V_{DS}=-5V, I_D=-3A	-	8.5	-	S
Total Gate Charge (-4.5V)	Q_g	V_{DS}=-48V, V_{GS}=4.5V, I_D=-3A	-	12.1	-	nC
Gate-Source Charge	Q_{gs}		-	2.2	-	
Gate-Drain Charge	Q_{gd}		-	6.3	-	
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=-15V, V_{GS}=-10V, R_G=3.3Ω, I_D=-1A	-	9.2	-	ns
Rise Time	T_r		-	20.1	-	
Turn-Off Delay Time	$T_{d(off)}$		-	46.7	-	
Fall Time	T_f		-	9.4	-	
Input Capacitance	C_{iss}	V_{DS}=-15V, V_{GS}=0V, f=1MHz	-	1137	-	pF
Output Capacitance	C_{oss}		-	76	-	
Reverse Transfer Capacitance	C_{rss}		-	50	-	
Diode Characteristics						
Continuous Source Current (1)(3)	I_S	V_G=V_D=0V, Force Current	-	-	-6.0	A
Diode Forward Voltage (2)	V_{SD}	V_{GS}=0V, I_S=-1A, T_A =25℃	-	-	-1.2	V

(1) The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

(2) The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

(3) The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

TYPICAL ELECTRICAL CHARACTERISTICS

N-Channel

Fig.1 Output Characteristics

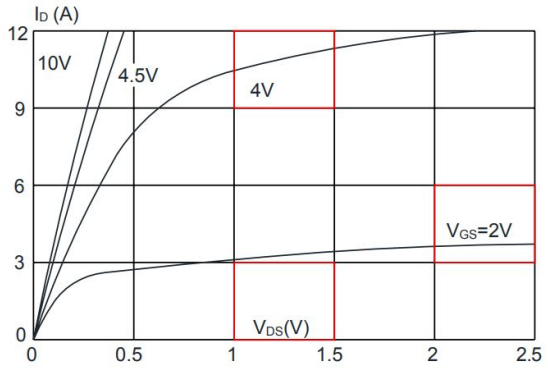


Fig.2 Typical Transfer Characteristics

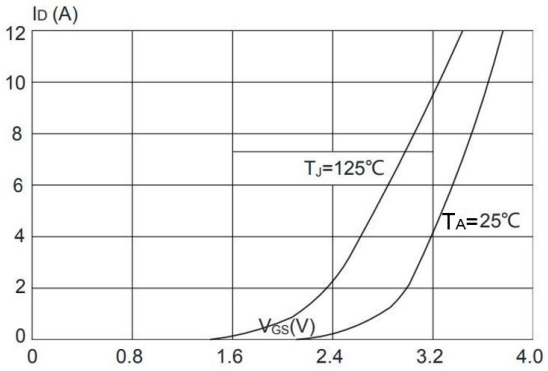


Fig.3 On-resistance vs. Drain Current

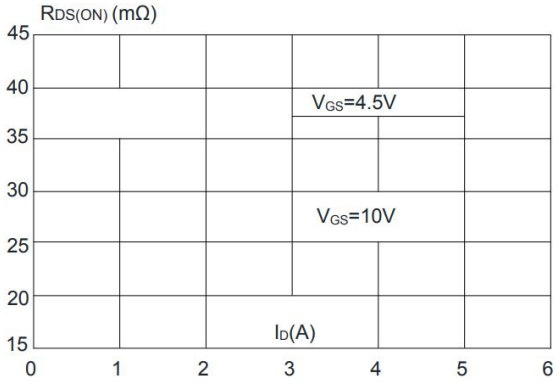


Fig.4 Body Diode Characteristics

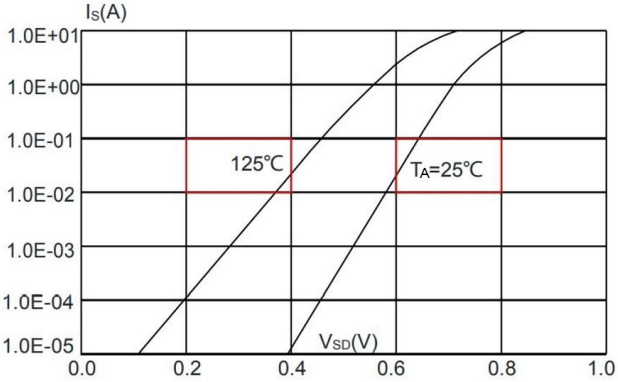


Fig.5 Gate Charge Characteristics

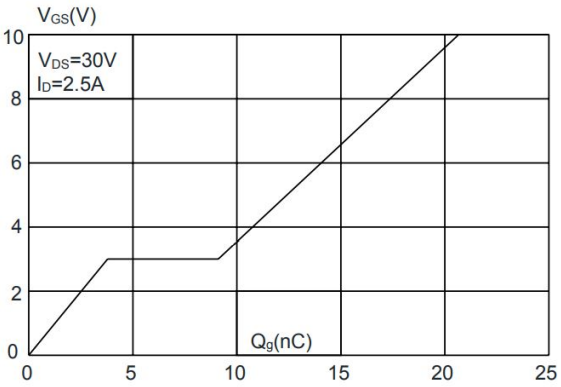


Fig.6 Capacitance Characteristics

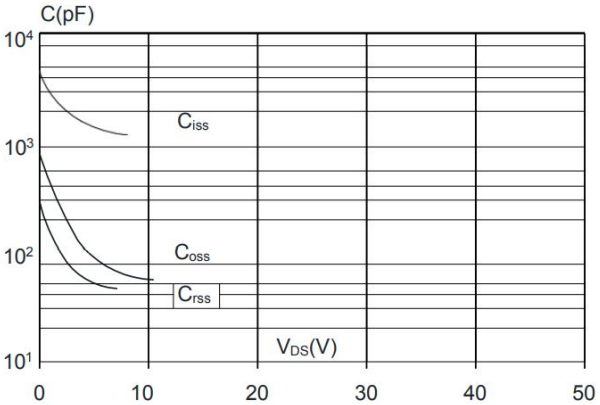


Fig.7 Normalized Breakdown Voltage vs. Junction Temperature

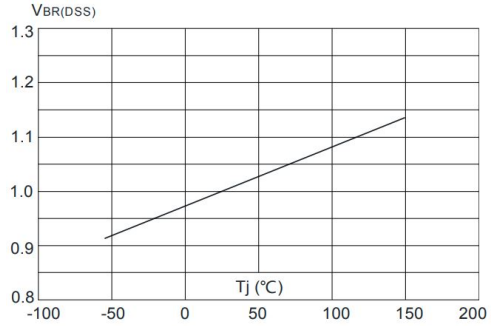


Fig.8 Normalized on Resistance vs. Junction Temperature

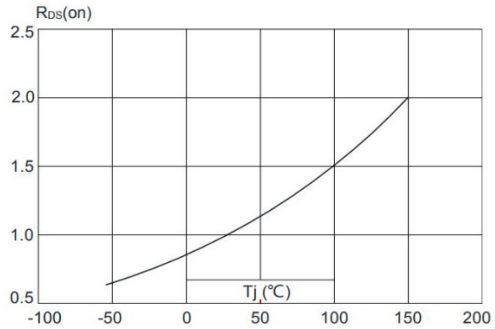


Fig.9 Maximum Safe Operating Area

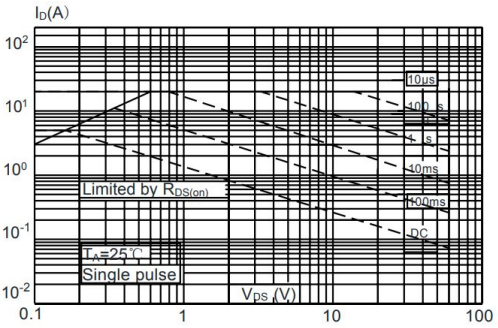


Fig.10 Maximum Continuous Drain Current vs. Ambient Temperature

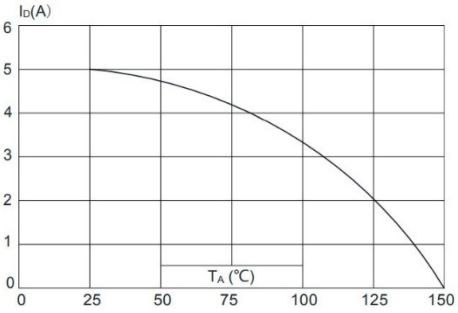
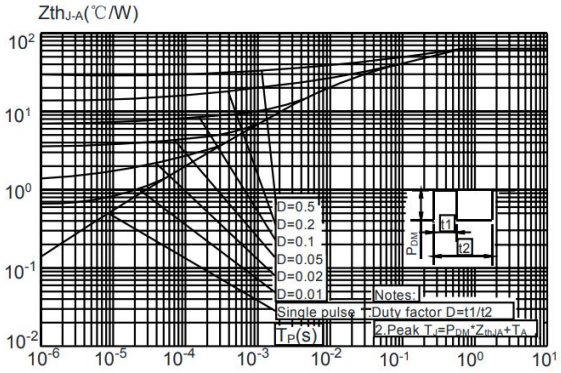


Fig.11 Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



P-Channel

Fig.1 Typical Output Characteristics

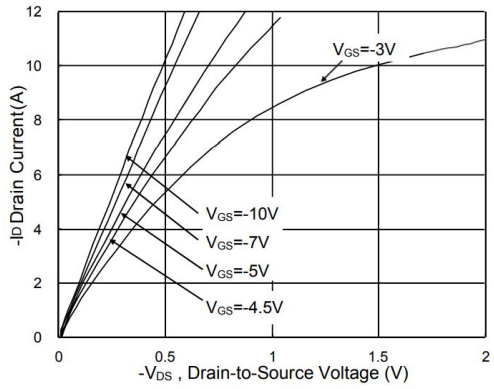


Fig.2 On-Resistance vs. G-S Voltage

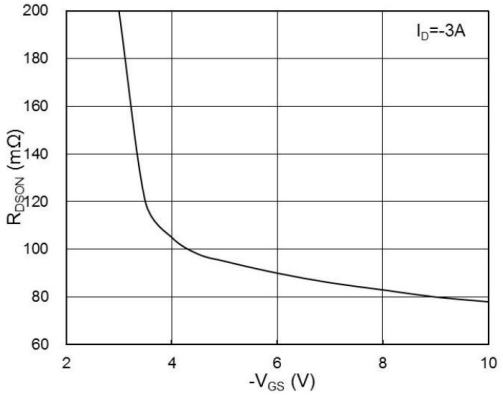


Fig.3 Source Drain Forward Characteristics

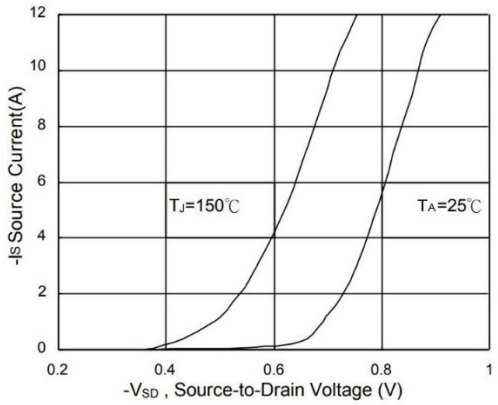


Fig.4 Gate-Charge Characteristics

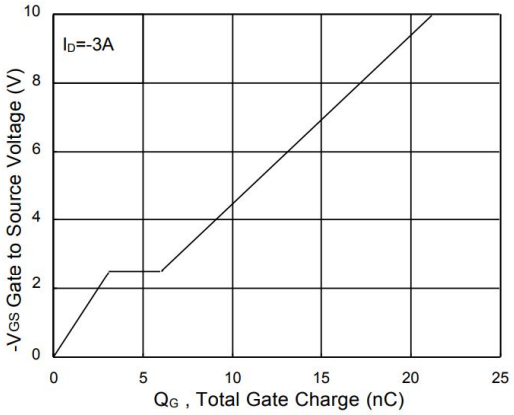


Fig.5 Normalized $V_{GS\,(th)}$ vs. T_J

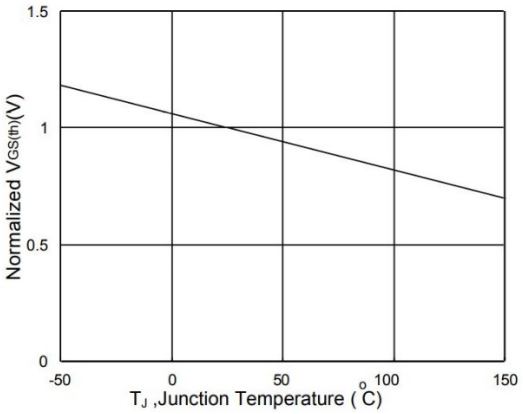


Fig.6 Normalized R_{DSON} vs. T_J

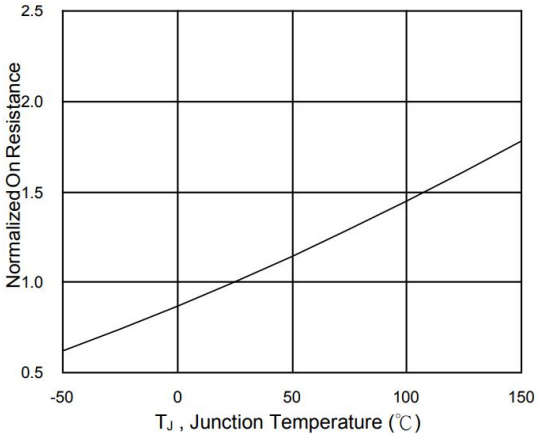


Fig.7 Capacitance

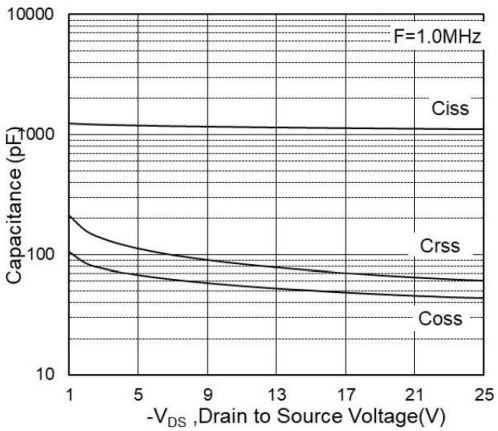


Fig.8 Safe Operating Area

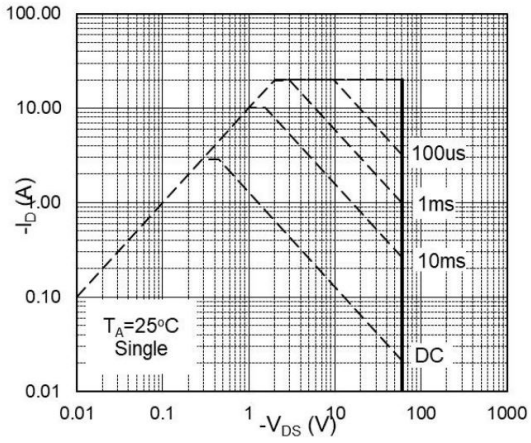


Fig.9 Normalized Maximum Transient Thermal Impedance

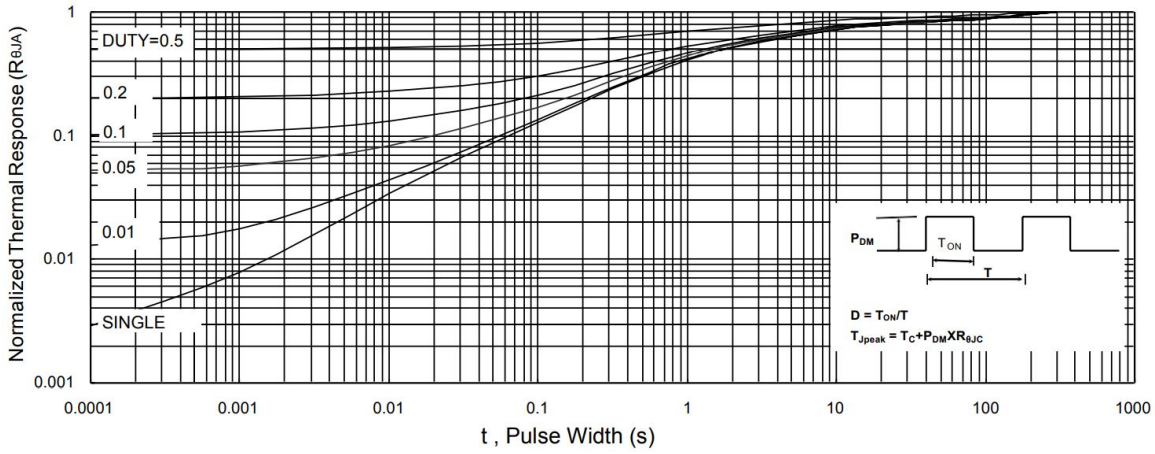


Fig.10 Switching Time Waveform

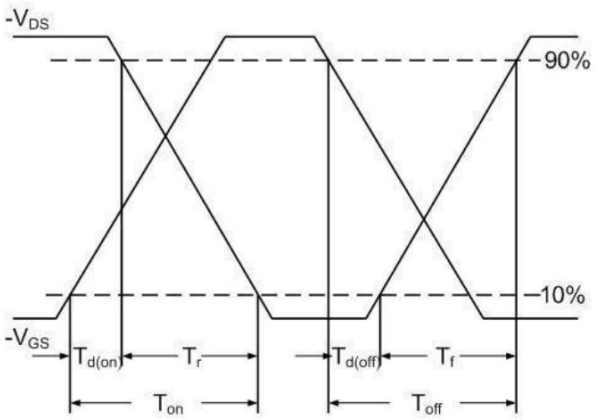
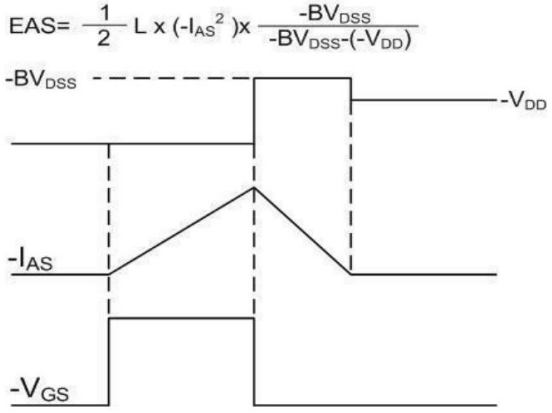
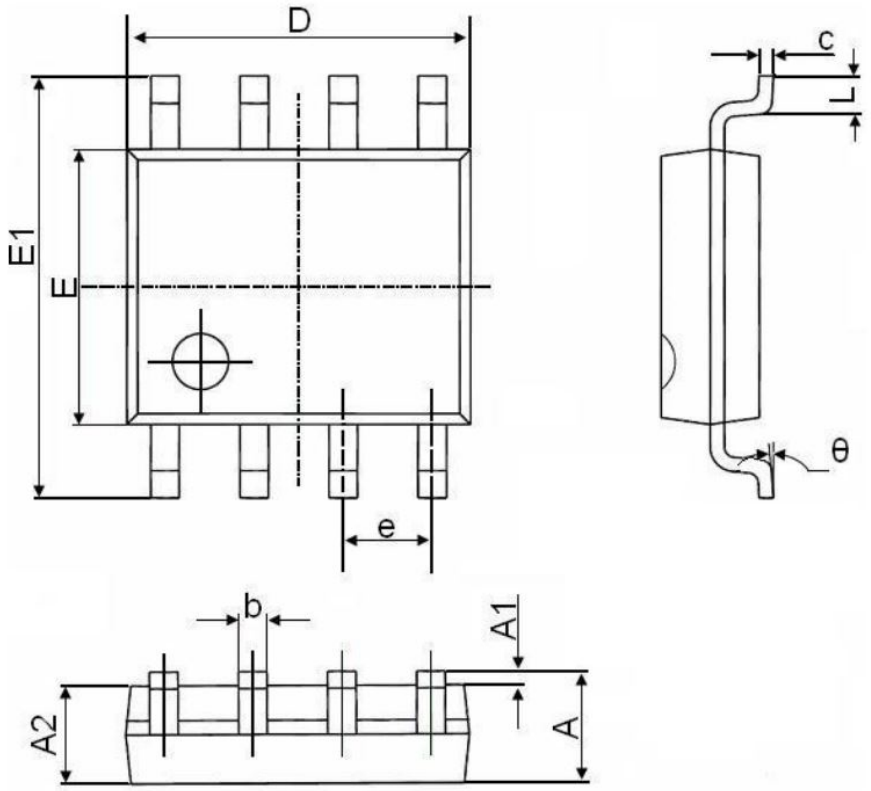


Fig.11 Unclamped Inductive Waveform



PACKAGE INFORMATION

Dimension in SOP8 Package (Unit: mm)



Symbol	Min.	Max.
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
e	1.270(BSC)	
L	0.400	1.270
θ	0°	8°

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