



ER4612

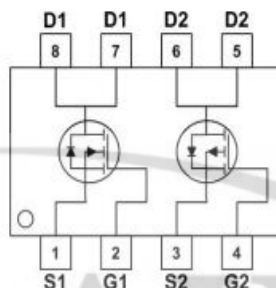
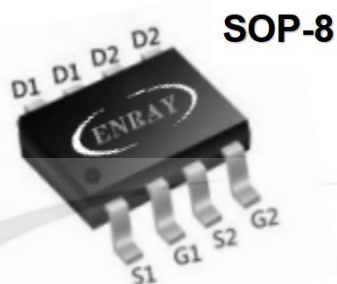
N-Ch and P-Ch Fast Switching MOSFET

Features

The ER4612 is the high performance complementary N-ch and P-ch MOSFETs with high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications. The DS4612 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

Product Summary

BVDSS	RDSON	ID
60V	60mΩ	5A
-60V	100mΩ	-4.0A



Maximum Ratings(Ta=25°C unless otherwise noted)

Parameter	Symbol	Rating		Unit
		N-Ch	P-Ch	
Drain-Source Voltage	VDS	60	-60	V
Gate-Source Voltage	VGS	±20	±20	
Continuous Drain Current	ID@TA=25℃	5.0	-4.0	A
Continuous Drain Current	ID@TA=70℃	3.8	-3	
Pulsed Drain Current ²	IDM	9.6	-7.5	
Single Pulse Avalanche Energy ³	EAS	15.5	20.3	mJ
Avalanche Current	IAS	12.6	-16.6	A
Total Power Dissipation	PD@TC=25℃	1.5	1.5	W
StorageTemperature Range	TSTG	-55 to 150		℃
Operating Junction Temperature	TJ	-55 to 150		

Thermal Data

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance Junction-Ambient ¹	RθJA		39	°C/W
Thermal Resistance Junction-Case	RθJC		9	°C/W

N-Channel Electrical Characteristics(TJ=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters ③						
Drain-Source Breakdown Voltage	BVDSS	VGS = 0V, ID = 250μA	60			V
Zero Gate Voltage Drain Current	IDSS	VDS=48V , VGS=0V			1	μA
Gate-Body leakage Current	IGSS	VGS=±20 V , VDS=0V			±100	nA
Gate Threshold Voltage	VGS(th)	VGS=VDS , ID=250uA	1.2		2.5	V
Static Drain-Source On-Resistance	RDS(on)	VGS=10V , ID=4A		60	75	mΩ
		VGS=4.5V , ID=2A		70	95	mΩ
Dynamic Parameters ④						
Input Capacitance	Ciss	VDS=15V, VGS=0V, f=1.0MHz		695		pF
Output Capacitance	Coss			148		pF
Reverse Transfer Capacitance	Crss			7		pF
Total Gate Charge	Qg	VDS=12V , VGS=10V , ID=4A		5.5		nC
Gate Source Charge	Qgs			1.8		nC
Gate Drain Charge	Qgd			2.4		nC
Switching Parameters ④						
Turn-On DelayTime	td(on)	VDD=12V , VGS=10V , RG=3.3Ω, ID=4A		6		ns
Turn-On Rise Time	tr			10		ns
Turn-Off DelayTime	td(off)			15		ns
Turn-Off Fall Time	tf			7		ns
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Drain to Source Diode Forward Current		IS			5	A
Maximum Pulsed Drain to Source Diode Forwa Current		ISM			9.6	A
Drain to Source Diode Forward Voltage ²	VSD	VGS=0V , IS=1A , TJ=25℃			1.2	V

Note :

1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t < 5 sec.
3. Pulse Test : Pulse Width≤300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters ③						
Drain-Source Breakdown Voltage	BVDSS	VGS = 0V, ID = -250μA	-60			V
Zero Gate Voltage Drain Current	IDSS	VDS=-48V , VGS=0V			-1	μA
Gate-Body leakage Current	IGSS	VGS=±20 V , VDS=0V			±100	nA
Gate Threshold Voltage	VGS(th)	VDS=VGS, ID= -250μA	-1.2		-2.5	V
Static Drain-Source On-Resistance	RDS(on)	VGS=10V , ID=-3A		100	115	mΩ
		VGS=4.5V , ID=-2A		115	130	mΩ
Dynamic Parameters ④						
Input Capacitance	Ciss	VDS= -12V, VGS=0V, f=1.0MHz		715		pF
Output Capacitance	Coss			51		pF
Reverse Transfer Capacitance	Crss			34		pF
Total Gate Charge	Qg	VDS=-20V , VGS=-4.5V , ID=-3A		5.9		nC
Gate Source Charge	Qgs			2.9		nC
Gate Drain Charge	Qgd			1.8		nC
Switching Parameters ④						
Turn-On DelayTime	td(on)	VDD=-12V , VGS=-10V , RG=3.3Ω, ID=-3A		10		ns
Turn-On Rise Time	tr			17		ns
Turn-Off DelayTime	td(off)			22		ns
Turn-Off Fall Time	tf			21		ns
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Drain to Source Diode Forward Current		IS			-4	A
Maximum Pulsed Drain to Source Diode Forwa Current		ISM			-7.5	A
Drain to Source Diode Forward Voltage ²	VSD	VGS=0V , IS=-1A , TJ=25℃			-1.2	V

Note :

1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t < 5 sec.
3. Pulse Test : Pulse Width≤300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

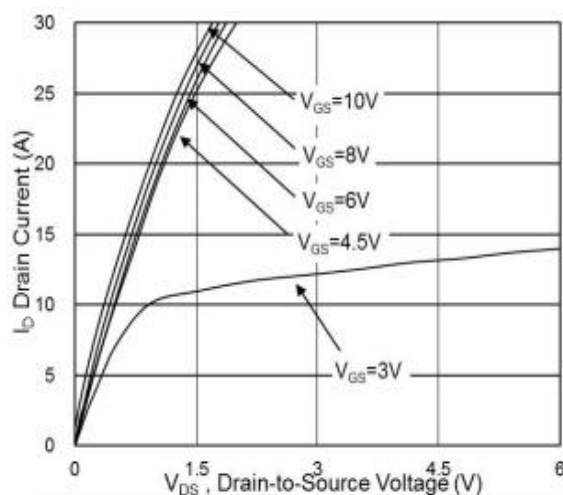


Fig.1 Typical Output Characteristics

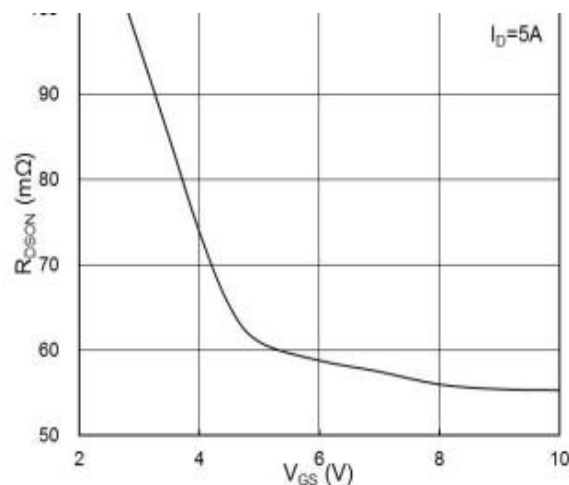


Fig.2 On-Resistance v.s Gate-Source

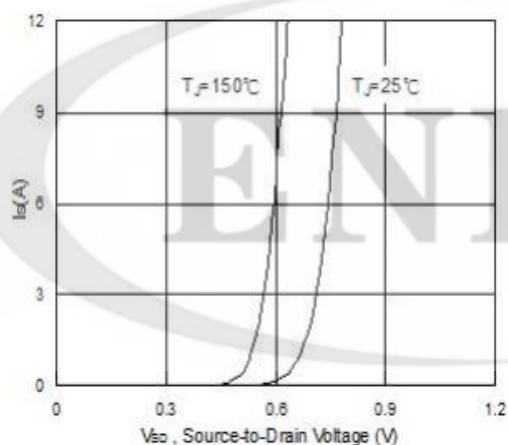


Fig.3 Forward Characteristics of Reverse

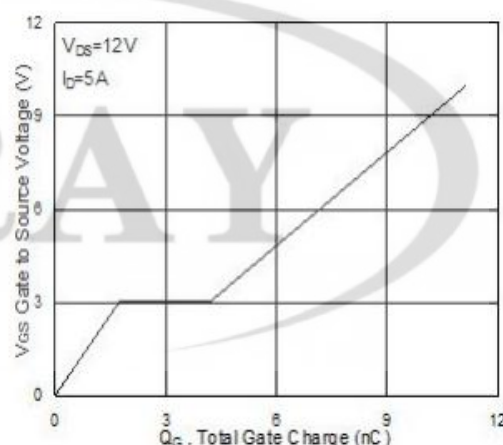


Fig.4 Gate-Charge Characteristics

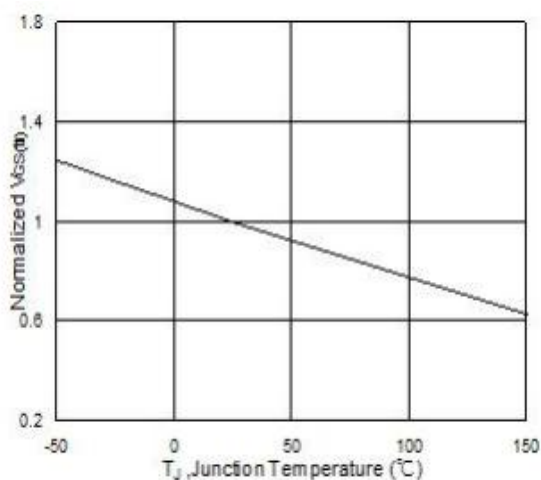


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

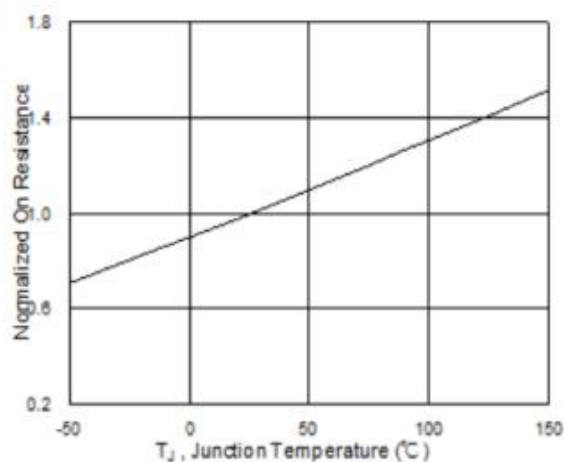


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

N-Channel Typical Characteristics

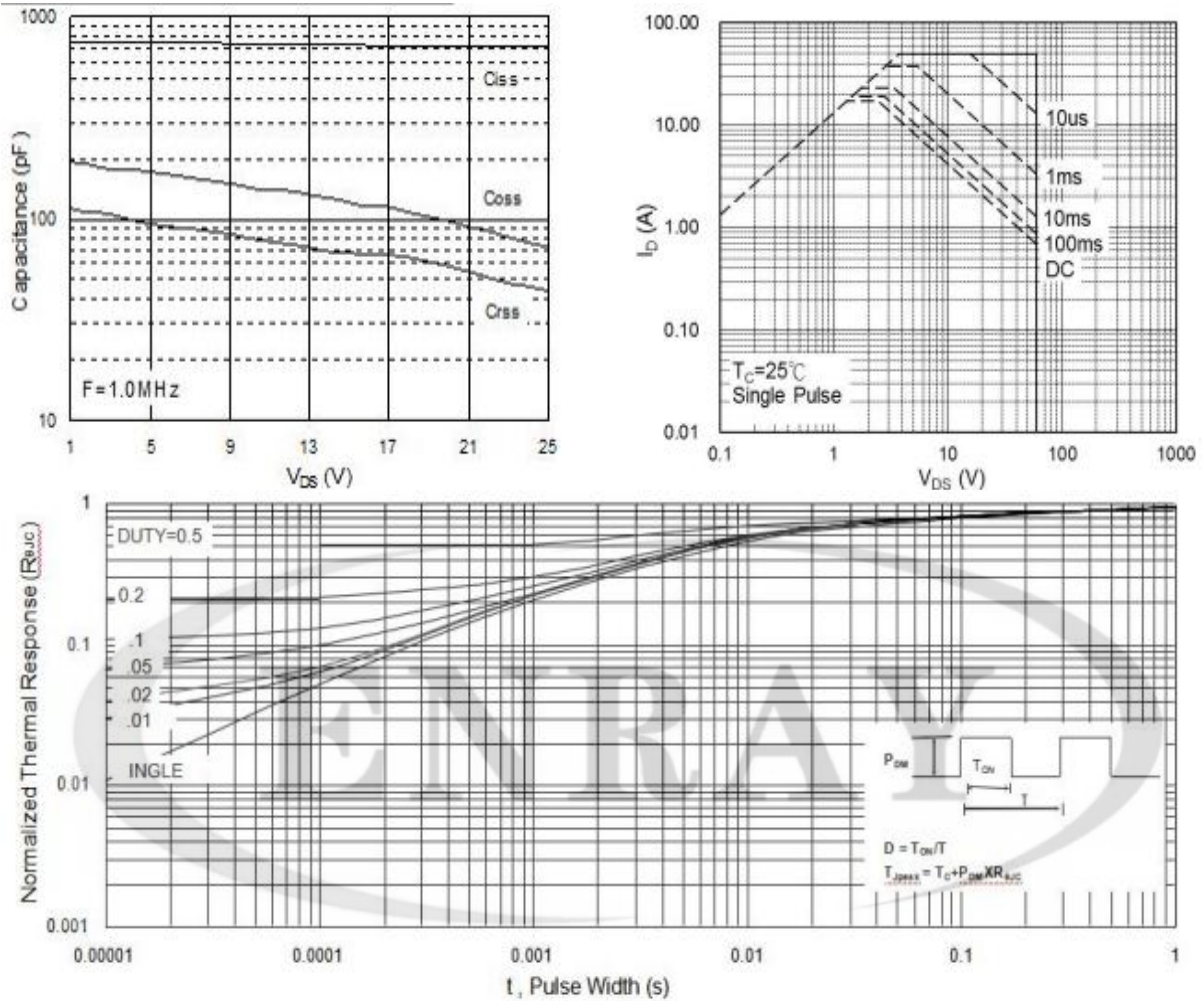


Fig.9 Normalized Maximum Transient Thermal Impedance

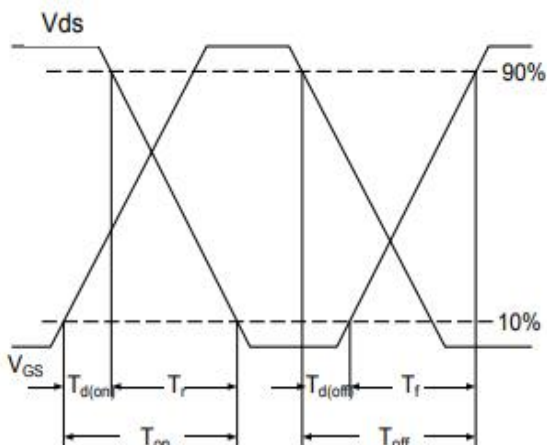


Fig.10 Switching Time Waveform

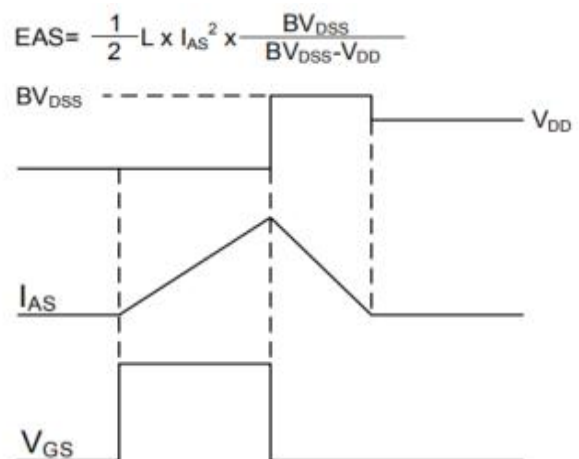


Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

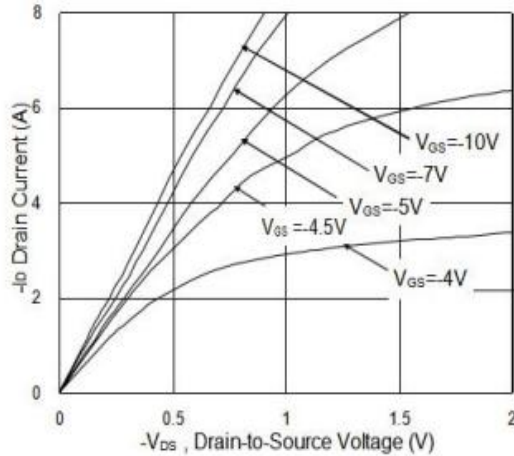


Fig.1 Typical Output Characteristics

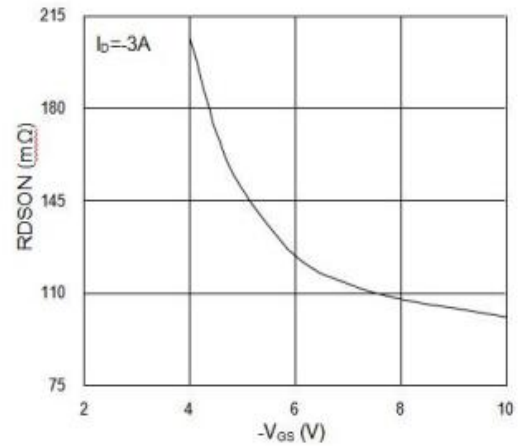


Fig.2 On-Resistance v.s Gate-Source

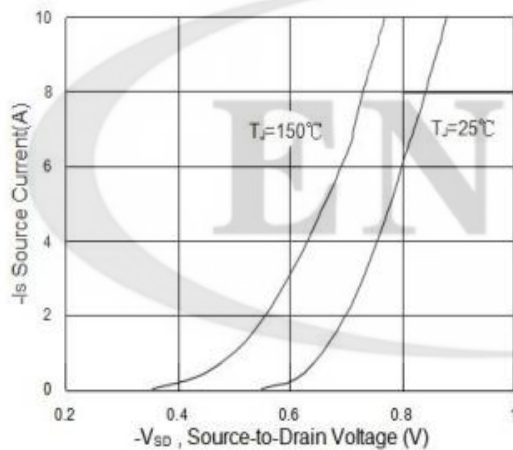


Fig.3 Forward Characteristics of Reverse

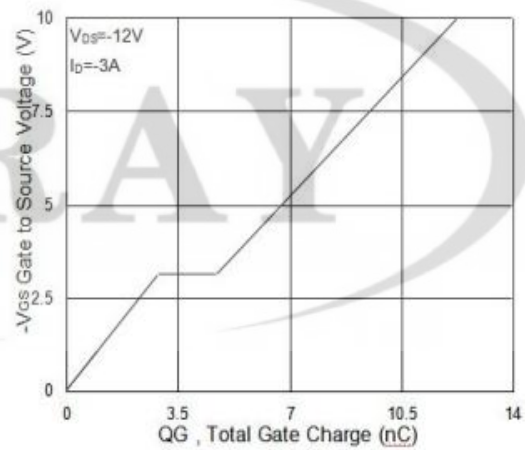


Fig.4 Gate-Charge Characteristics

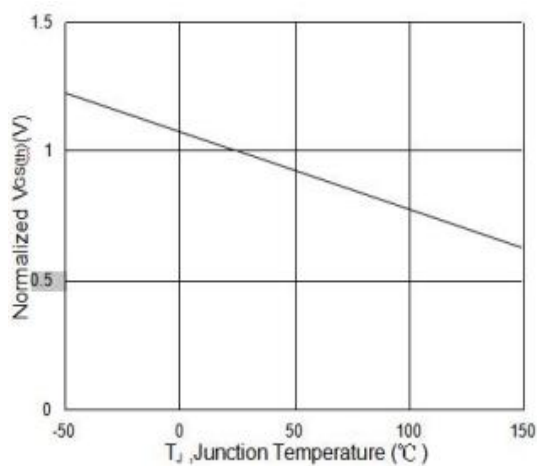


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

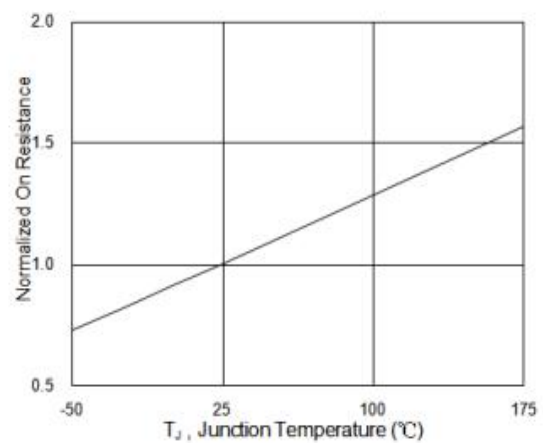


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

P-Channel Typical Characteristics

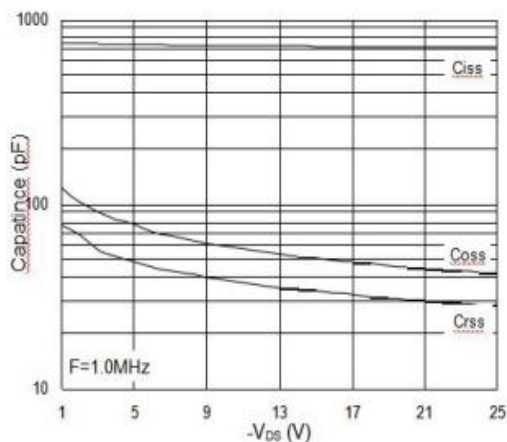


Fig.7 Capacitance

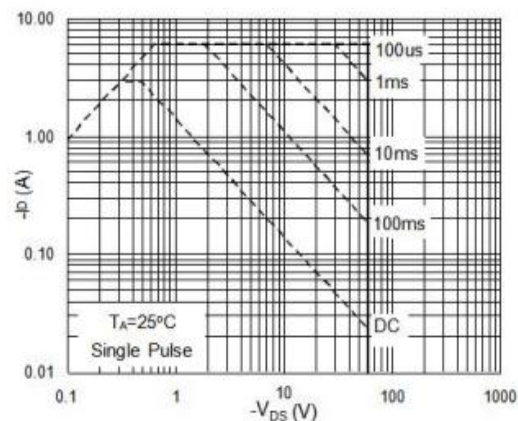


Fig.8 Safe Operating Area

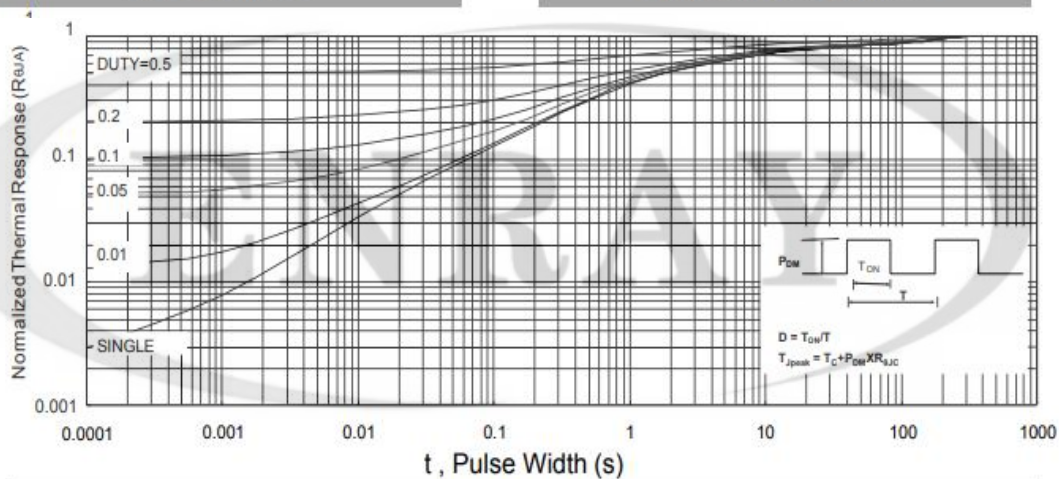


Fig.9 Normalized Maximum Transient Thermal Impedance

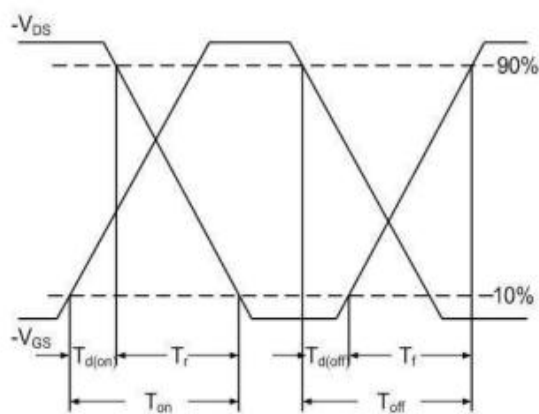


Fig.10 Switching Time Waveform

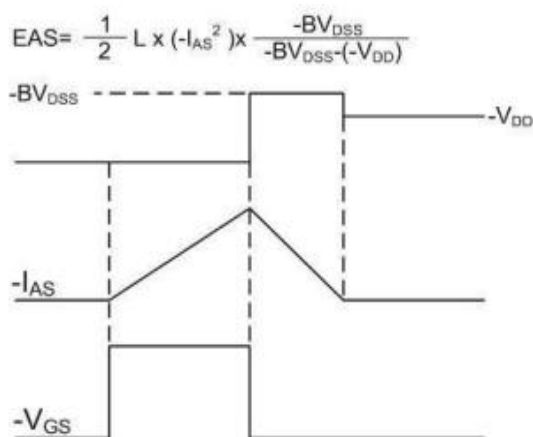
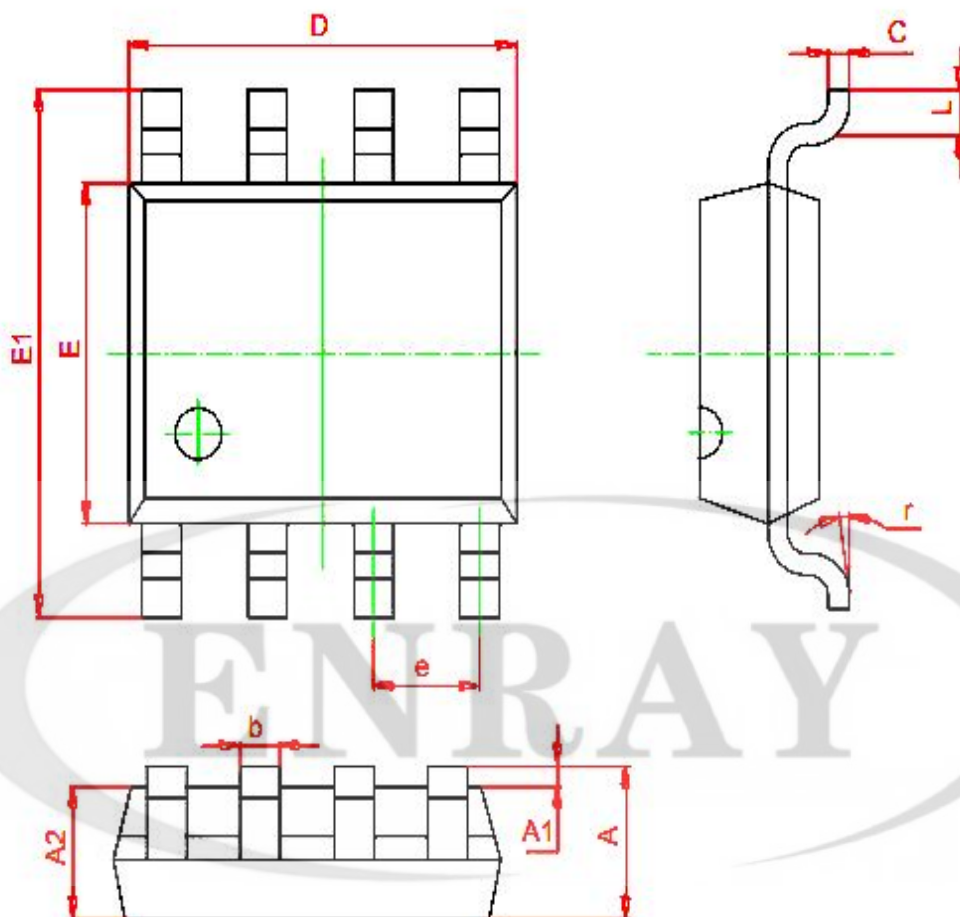


Fig.11 Unclamped Inductive Waveform

SOP-8 Package Outline Dimesions



DIMENSIONS(unit:mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
C	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°