



YEA SHIN TECHNOLOGY CO., LTD

YS6912S

N-Channel Enhancement MOSFET



VDS= 60V, ID= 3.2A

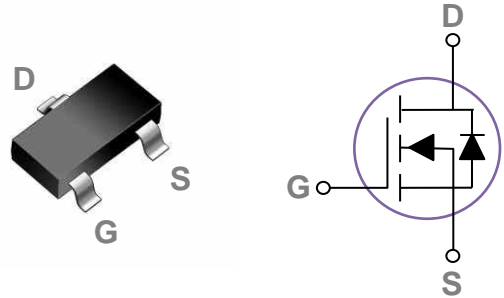
Features

- 60V, 3.2A, $R_{DS(ON)} = 75m\Omega @ V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

Applications

- Motor Drive
- Power Tools
- LED Lighting

SOT-23 Pin Configuration



Absolute Maximum Rating $T_c=25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current – Continuous ($T_c=25^\circ C$)	3.2	A
	Drain Current – Continuous ($T_c=100^\circ C$)	2	A
I_{DM}	Drain Current – Pulsed ¹	12.8	A
P_D	Power Dissipation ($T_c=25^\circ C$)	1.56	W
	Power Dissipation – Derate above $25^\circ C$	0.012	W/ $^\circ C$
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	80	$^\circ C/W$

DEVICE CHARACTERISTICS

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Electrical Characteristics ($T_J=25\text{ }^\circ\text{C}$, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=1\text{mA}$	---	0.05	---	$V/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=60V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=48V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA

On Characteristics

$R_{DS(ON)}$	Static Drain-source On-Resistance	$V_{GS}=10V, I_D=6A$	---	60	75	$m\Omega$
		$V_{GS}=4.5V, I_D=3A$	---	70	90	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.8	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5	---	$mV/^\circ\text{C}$
g_{fs}	Forward Transconductance	$V_{DS}=10V, I_D=3A$	---	7	---	S

Dynamic and Switching Characteristics

Q_g	Total Gate Charge ^{2,3}	$V_{DS}=48V, V_{GS}=10V, I_D=6A$	---	9.3	14	nC
Q_{gs}	Gate-Source Charge ^{2,3}		---	2.1	4	
Q_{gd}	Gate-Drain Charge ^{2,3}		---	1.8	4	
$T_{d(on)}$	Turn-On Delay Time ^{2,3}	$V_{DD}=30V, V_{GS}=10V, R_G=3.3\Omega, I_D=1A$	---	2.9	6	ns
T_r	Rise Time ^{2,3}		---	9.5	18	
$T_{d(off)}$	Turn-Off Delay Time ^{2,3}		---	18.4	35	
T_f	Fall Time ^{2,3}		---	5.3	10	
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	---	500	725	pF
C_{oss}	Output Capacitance		---	45	65	
C_{rss}	Reverse Transfer Capacitance		---	16	30	
R_g	Gate resistance	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	---	2	4	Ω

Drain-Source Diode Characteristics and Maximum Ratings

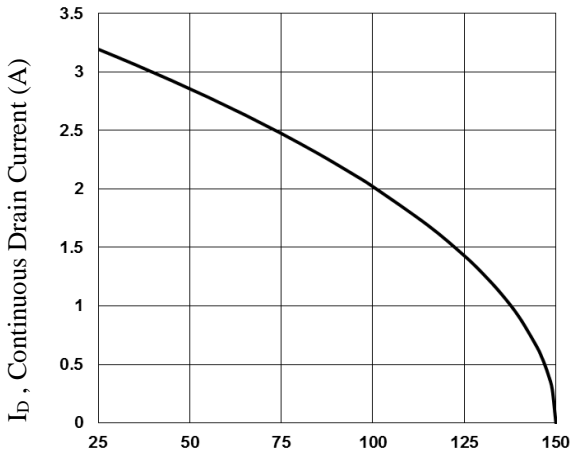
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	3.2	A
I_{SM}	Pulsed Source Current		---	---	6.4	A
V_{SD}	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	1	V
t_{rr}	Reverse Recovery Time ²	$V_{GS}=30V, I_S=1A, di/dt=100A/\mu s$	---	23.2	---	ns
Q_{rr}	Reverse Recovery Charge ²	$T_J=25^\circ\text{C}$	---	14.3	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature.

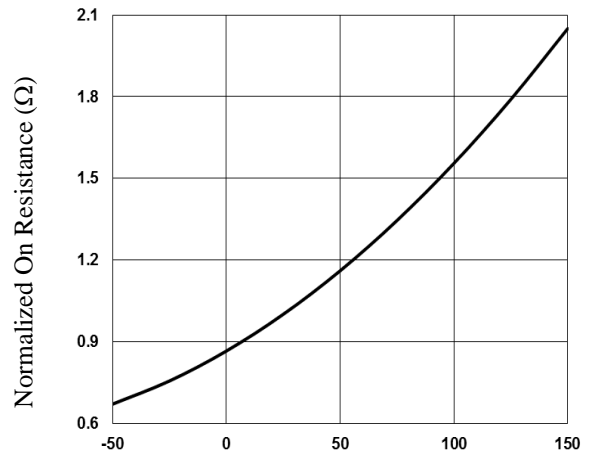
DEVICE CHARACTERISTICS

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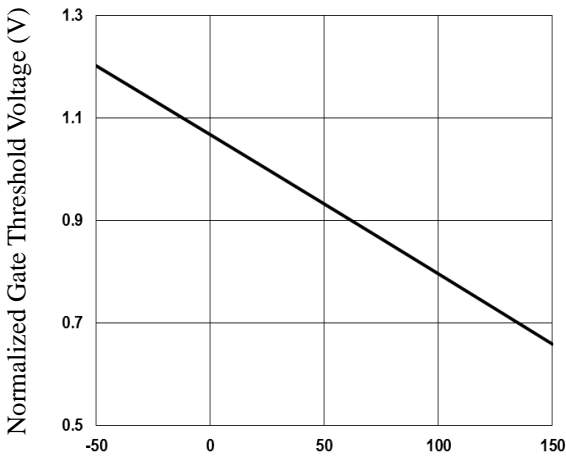
T_C , Case Temperature ($^{\circ}C$)

Fig.1 Continuous Drain Current vs. T_C



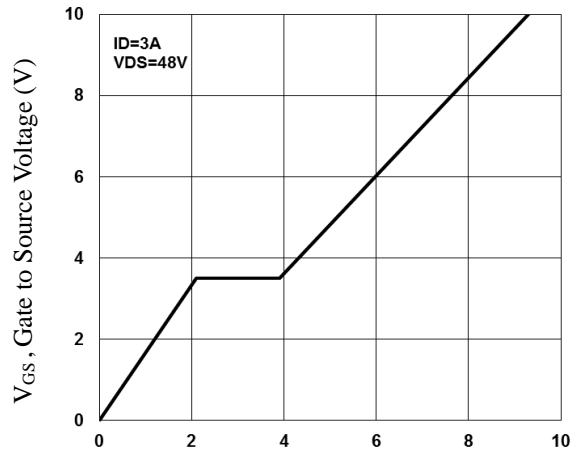
T_J , Junction Temperature ($^{\circ}C$)

Fig.2 Normalized $R_{DS(ON)}$ vs. T_J



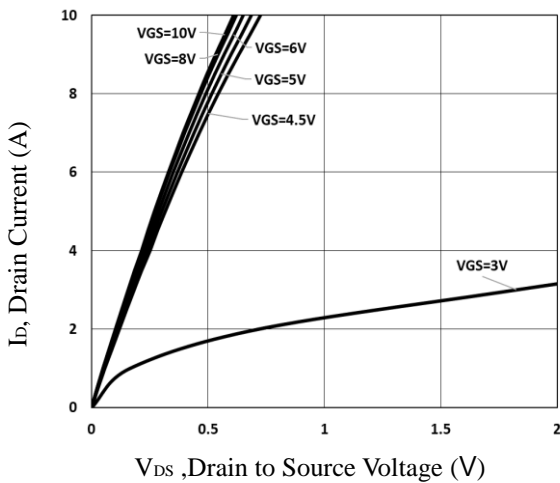
T_J , Junction Temperature ($^{\circ}C$)

Fig.3 Normalized V_{th} vs. T_J



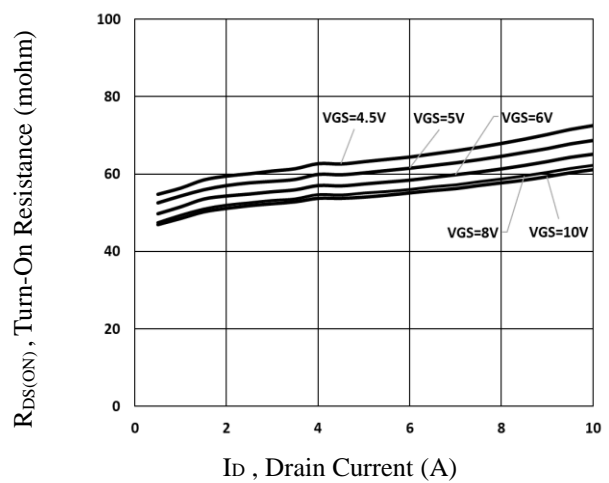
Q_g , Gate Charge (nC)

Fig.4 Gate Charge Waveform



V_{DS} , Drain to Source Voltage (V)

Fig.5 Typical Output Characteristics



I_D , Drain Current (A)

Fig.6 Turn-On Resistance vs. I_D

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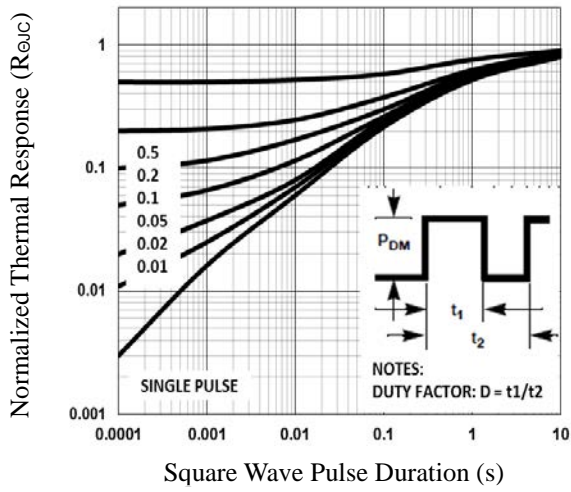


Fig.7 Normalized Transient Response

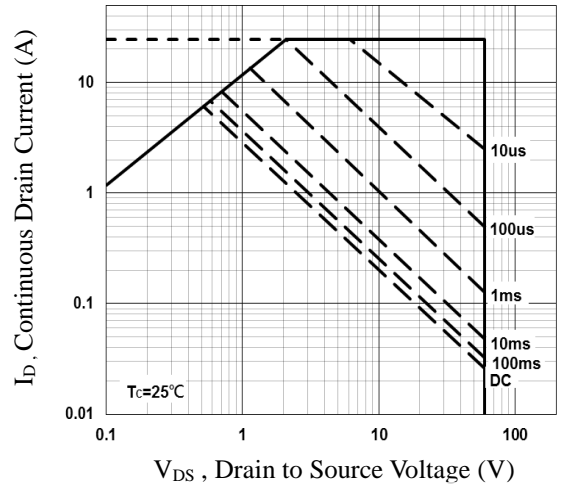


Fig.8 Maximum Safe Operation Area

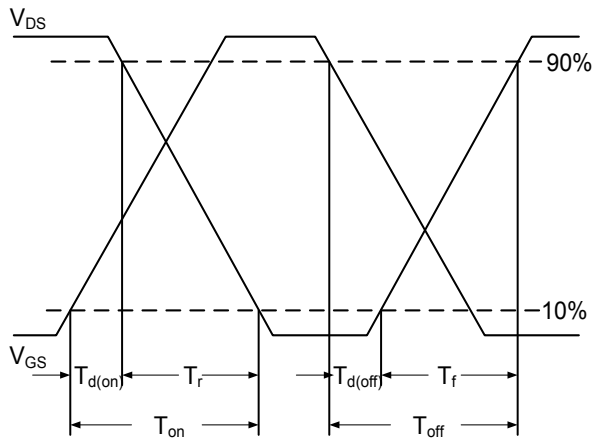


Fig.9 Switching Time Waveform

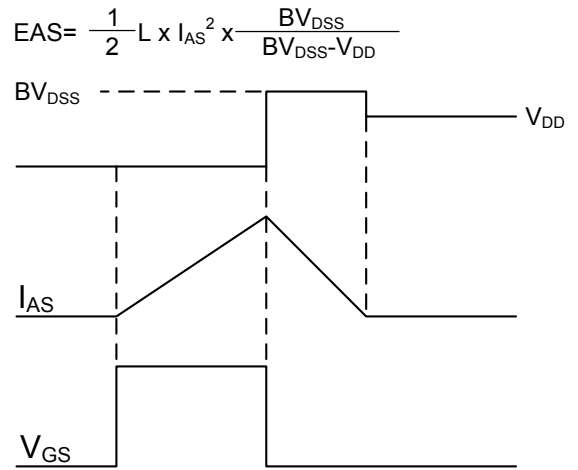
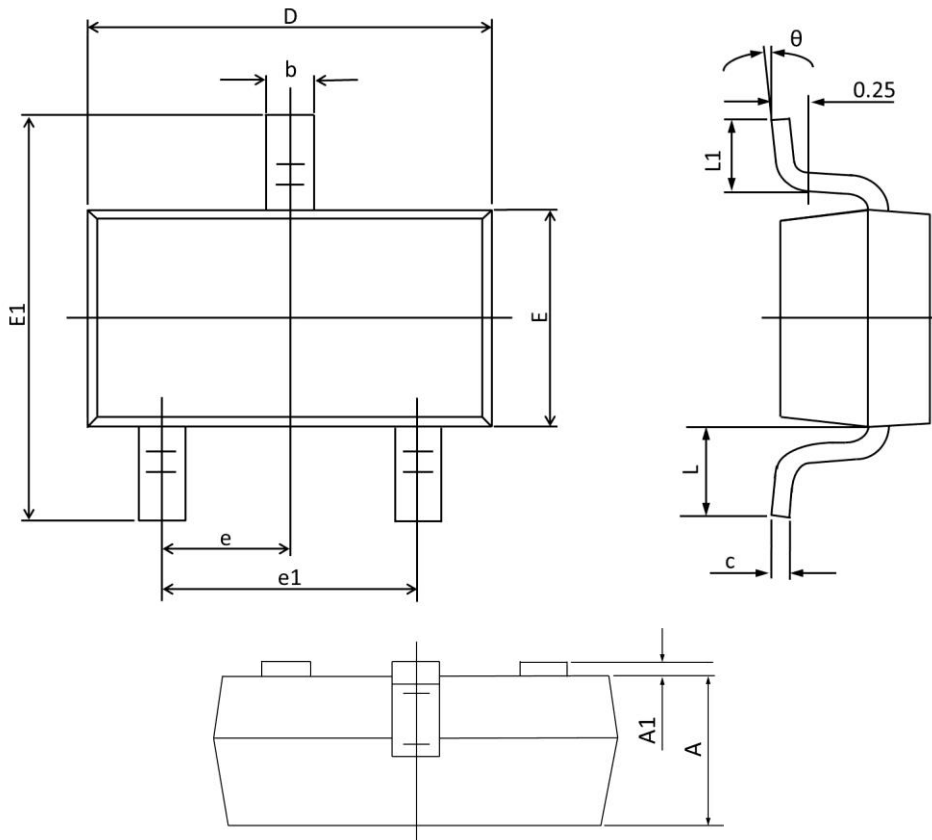


Fig.10 EAS Waveform

PACKAGE OUTLINE & DIMENSIONS

YS6912S



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.000	0.035	0.039
A1	0.000	0.100	0.000	0.004
b	0.300	0.500	0.012	0.020
c	0.090	0.110	0.003	0.004
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	1°	7°	1°	7°