

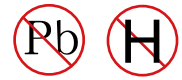


YEA SHIN TECHNOLOGY CO., LTD

YS6909L

## P-Channel Enhancement MOSFET

VDS= -60V, ID= -3.2A



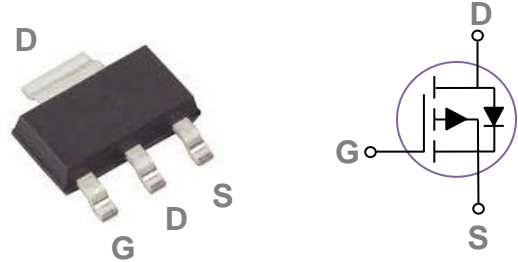
### Features

- -60V, -3.2A,  $R_{DS(ON)} = 105m\Omega @ V_{GS} = -10V$
- Improved  $dv/dt$  capability
- Fast switching
- 100% EAS Guaranteed
- Green Device Available

### Applications

- Motor Drive
- Power Tools
- LED Lighting

### STO-223 Pin Configuration



Absolute Maximum Ratings  $T_c=25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-60	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub>	Drain Current – Continuous ( $T_A=25^\circ\text{C}$ )	-3.2	A
	Drain Current – Continuous ( $T_A=70^\circ\text{C}$ )	-2.56	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	-12.8	A
EAS	Single Pulse Avalanche Energy <sup>2</sup>	25	mJ
IAS	Single Pulse Avalanche Current <sup>2</sup>	-18	A
P <sub>D</sub>	Power Dissipation ( $T_A=25^\circ\text{C}$ )	2.02	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.02	W/ $^\circ\text{C}$
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	62	$^\circ\text{C}/\text{W}$
R <sub>θJC</sub>	Thermal Resistance Junction to Case	---	23	$^\circ\text{C}/\text{W}$

# DEVICE CHARACTERISTICS

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Electrical Characteristics ( $T_J=25^\circ\text{C}$ , 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 $25^\circ\text{C}$ , $I_D=-1mA$	---	-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	$\mu A$
		$V_{DS}=-48V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA

### On Characteristics

$R_{DS(ON)}$	Static Drain-source On-Resistance <sup>3</sup>	$V_{GS}=-10V, I_D=-3A$	---	87	105	$m\Omega$
		$V_{GS}=-4.5V, I_D=-2A$	---	120	145	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.6	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	3	---	$mV/^\circ\text{C}$
$g_{fs}$	Forward Transconductance	$V_{DS}=-10V, I_D=-3A$	---	5.5	---	S

### Dynamic and Switching Characteristics

$Q_g$	Total Gate Charge <sup>3,4</sup>	$V_{DS}=-30V, V_{GS}=-10V, I_D=-2A$	---	10	15	nC
$Q_{gs}$	Gate-Source Charge <sup>3,4</sup>		---	1.6	3.2	
$Q_{gd}$	Gate-Drain Charge <sup>3,4</sup>		---	3	6	
$T_{d(on)}$	Turn-On Delay Time <sup>3,4</sup>	$V_{DD}=-30V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A$	---	8	16	ns
$T_r$	Rise Time <sup>3,4</sup>		---	15.4	30	
$T_{d(off)}$	Turn-Off Delay Time <sup>3,4</sup>		---	42.8	80	
$T_f$	Fall Time <sup>3,4</sup>		---	8.4	16	
$C_{iss}$	Input Capacitance	$V_{DS}=-30V, V_{GS}=0V, f=1MHz$	---	785	1300	pF
$C_{oss}$	Output Capacitance		---	175	300	
$C_{rss}$	Reverse Transfer Capacitance		---	8.4	16	
$R_g$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	---	36	---	$\Omega$

### Drain-Source Diode Characteristics and Maximum Ratings

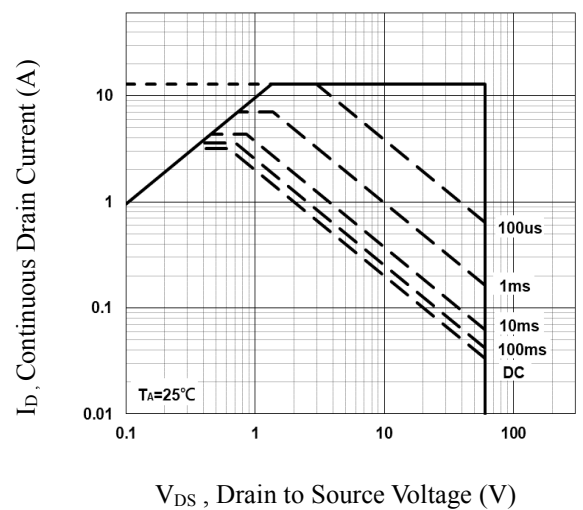
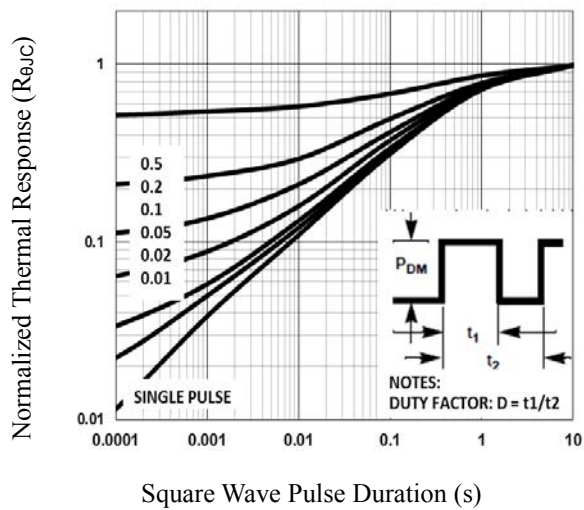
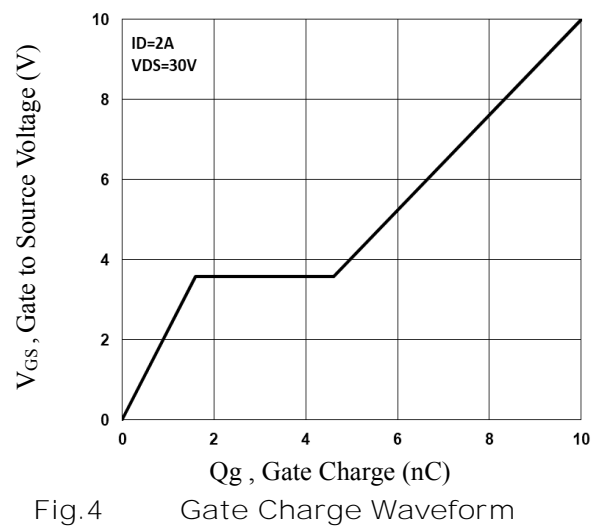
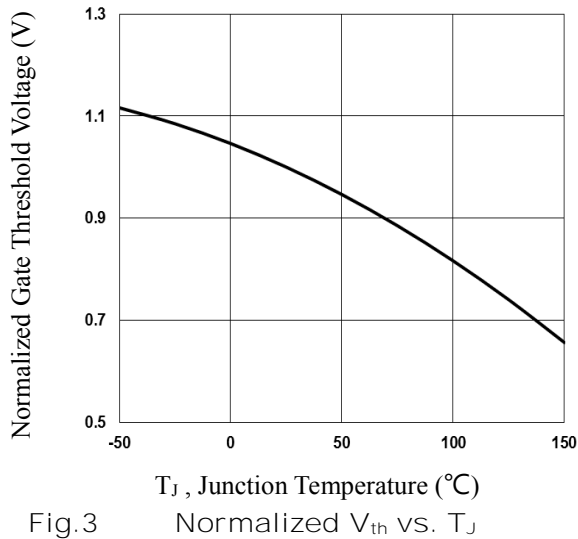
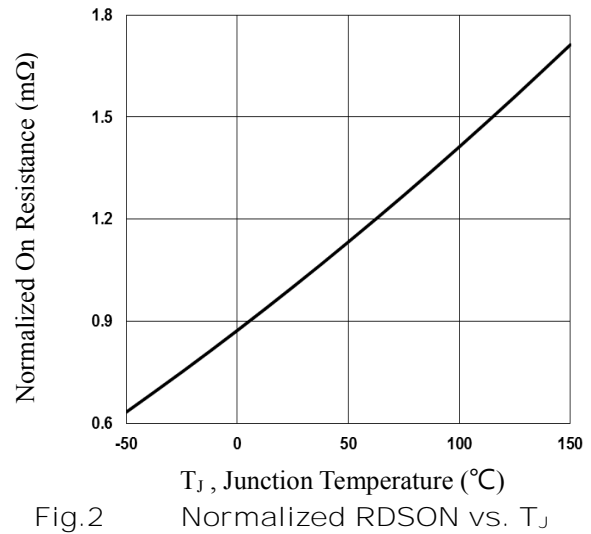
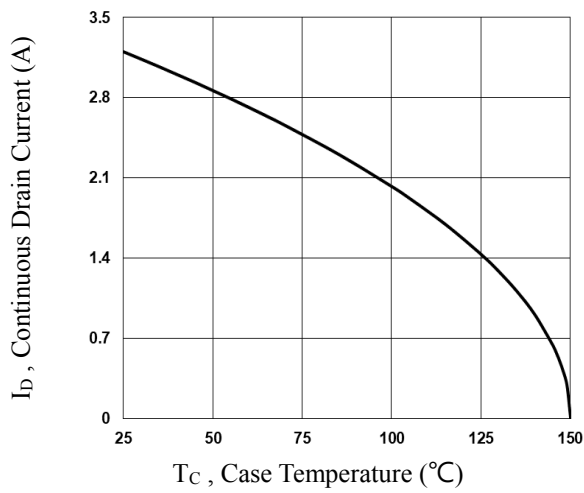
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	-3.2	A
$I_{SM}$	Pulsed Source Current <sup>3</sup>		---	---	-6.4	A
$V_{SD}$	Diode Forward Voltage <sup>3</sup>	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1	V

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-25A, R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .
3. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

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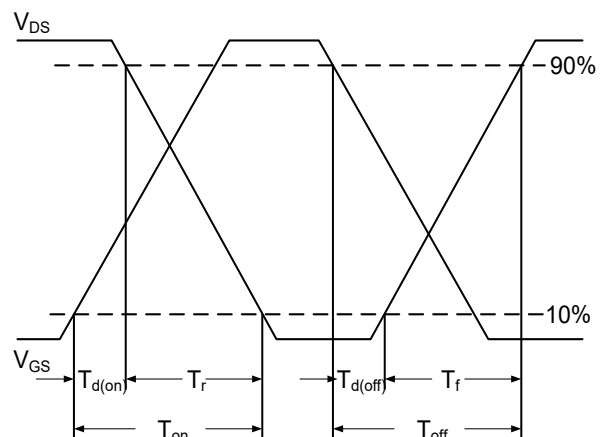


Fig.7 Switching Time Waveform

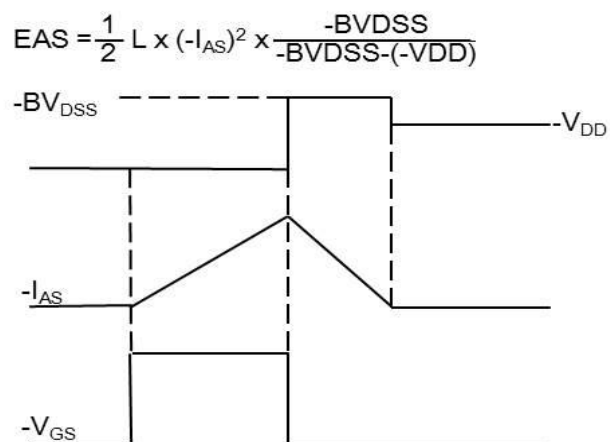
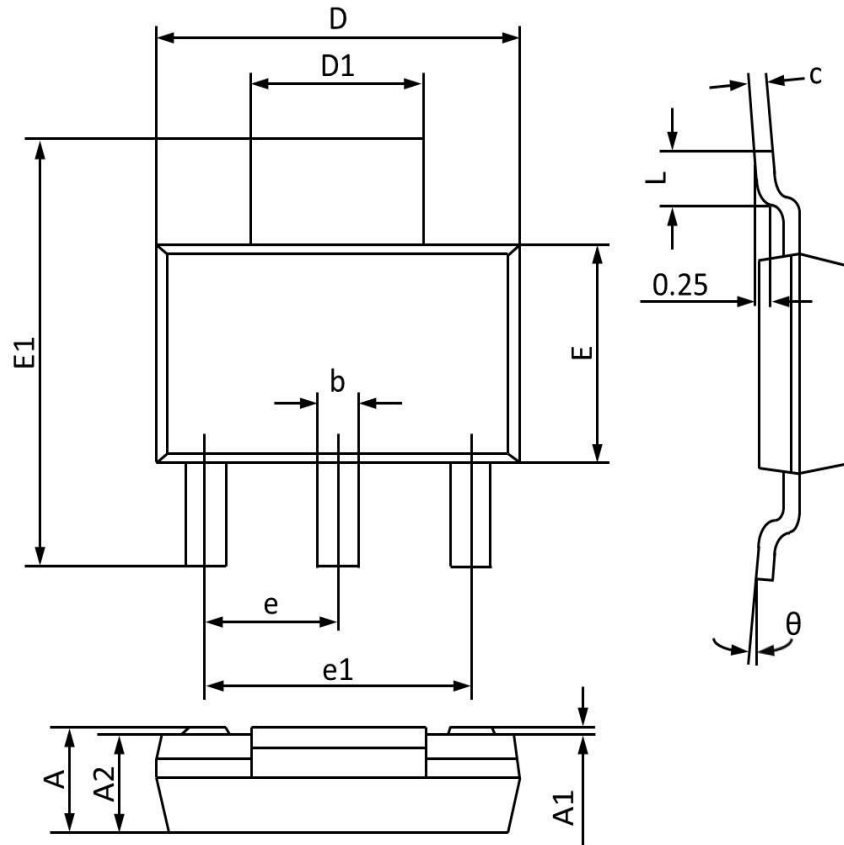


Fig.8 EAS Waveform

# PACKAGE OUTLINE & DIMENSIONS

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## TO-223 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	1.800	1.520	0.071	0.060
A1	0.100	0.000	0.004	0.000
A2	1.700	1.500	0.067	0.059
b	0.820	0.660	0.032	0.026
c	0.350	0.250	0.014	0.010
D	6.400	6.200	0.252	0.244
D1	3.100	2.900	0.122	0.114
E	3.700	3.300	0.146	0.130
E1	7.070	6.830	0.278	0.269
e	2.30(BSC)		0.091(BSC)	
e1	4.700	4.500	0.185	0.177
L	1.150	0.900	0.045	0.035
θ	10°	0°	10°	0°