



YEA SHIN TECHNOLOGY CO., LTD

YS2612AK

## N-Channel Enhancement MOSFET

VDS= 20V, ID= 6.5A



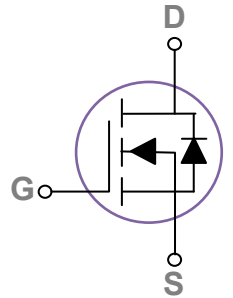
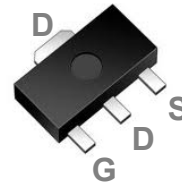
### Features

- 20V, 6.5A,  $R_{DS(ON)} = 22m\Omega @ V_{GS} = 4.5V$
- Improved  $dv/dt$  capability
- Fast switching
- Green Device Available

### Applications

- MB / VGA / Vcore
- POL Applications
- SMPS 2<sup>nd</sup> SR

### SOT-89 Pin Configuration



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

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	20	V
V <sub>GS</sub>	Gate-Source Voltage	±16	V
I <sub>D</sub>	Drain Current – Continuous ( $T_c=25^\circ\text{C}$ )	6.5	A
	Drain Current – Continuous ( $T_c=70^\circ\text{C}$ )	5.2	A
I <sub>DM</sub>	Drain Current – Pulsed <sup>1</sup>	26	A
P <sub>D</sub>	Power Dissipation ( $T_c=25^\circ\text{C}$ )	1.47	W
	Power Dissipation – Derate above $25^\circ\text{C}$	0.01	W/ $^\circ\text{C}$
T <sub>STG</sub>	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 175	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction to ambient	---	85	$^\circ\text{C}/\text{W}$

# DEVICE CHARACTERISTICS

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Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise)

### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA	---	0.015	---	V/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =16V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V	---	---	±100	nA

### On Characteristics

R <sub>DS(ON)</sub>	Static Drain-source On-Resistance <sup>2</sup>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A	---	17.5	22	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =2A	---	22	28	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	0.5	0.8	1.2	V
$\Delta V_{GS(th)}$	V <sub>GS(th)</sub> Temperature Coefficient		---	-2.76	---	mV/°C
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =2A	---	14	---	S

### Dynamic and Switching Characteristics

Q <sub>g</sub>	Total Gate Charge <sup>2,3</sup>	V <sub>DS</sub> =10V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =3A	---	5.9	12	nC
Q <sub>gs</sub>	Gate-Source Charge <sup>2,3</sup>		---	0.7	2	
Q <sub>gd</sub>	Gate-Drain Charge <sup>2,3</sup>		---	1.8	4	
T <sub>d(on)</sub>	Turn-On Delay Time <sup>2,3</sup>	V <sub>DD</sub> =10V, V <sub>GS</sub> =4.5V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =1A	---	4.8	10	ns
T <sub>r</sub>	Rise Time <sup>2,3</sup>		---	7.5	15	
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>2,3</sup>		---	16.5	32	
T <sub>f</sub>	Fall Time <sup>2,3</sup>		---	4.8	10	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHz	---	775	1440	pF
C <sub>oss</sub>	Output Capacitance		---	95	190	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	58	120	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	2.2	---	Ω

### Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	6.5	A
I <sub>SM</sub>	Pulsed Source Current <sup>2</sup>		---	---	13	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1	V

Note :

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

# DEVICE CHARACTERISTICS

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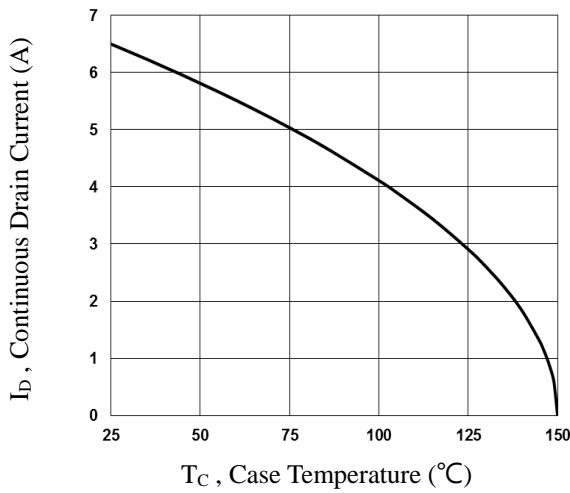


Fig.1 Continuous Drain Current vs.  $T_C$

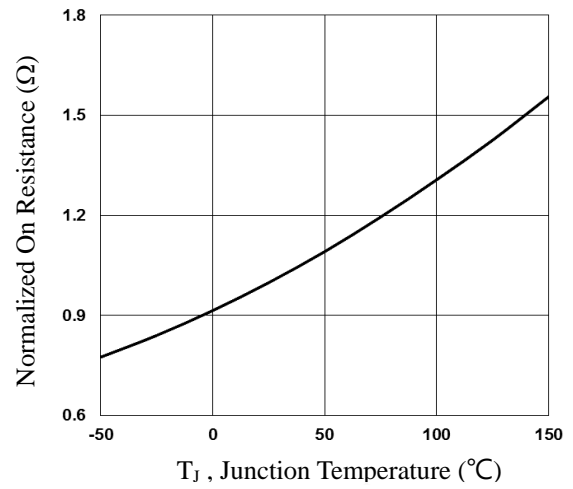


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_J$

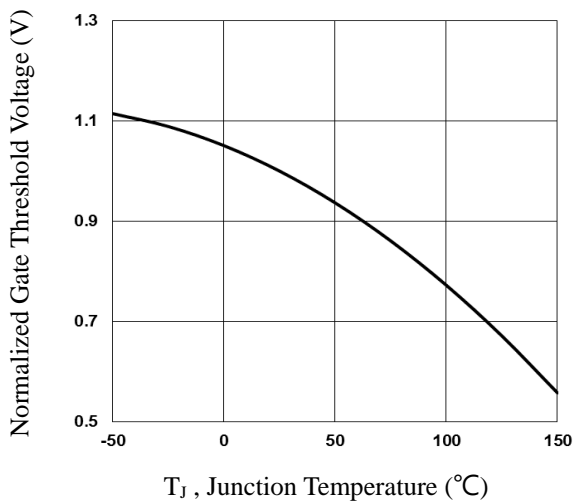


Fig.3 Normalized  $V_{th}$  vs.  $T_J$

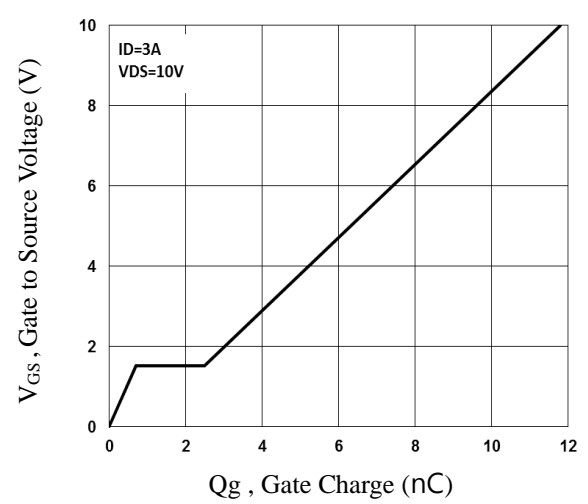


Fig.4 Gate Charge Waveform

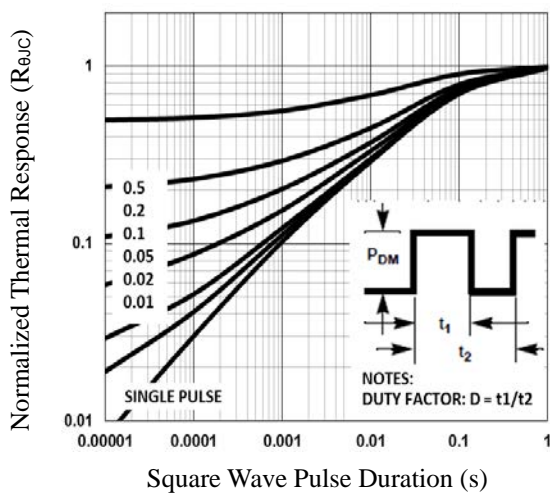


Fig.5 Normalized Transient Impedance

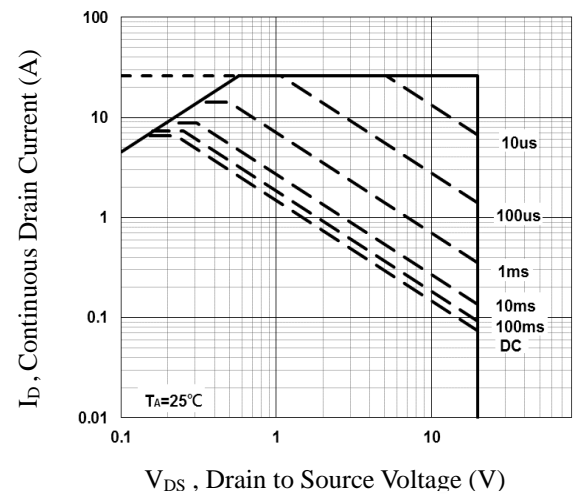


Fig.6 Maximum Safe Operation Area

# DEVICE CHARACTERISTICS

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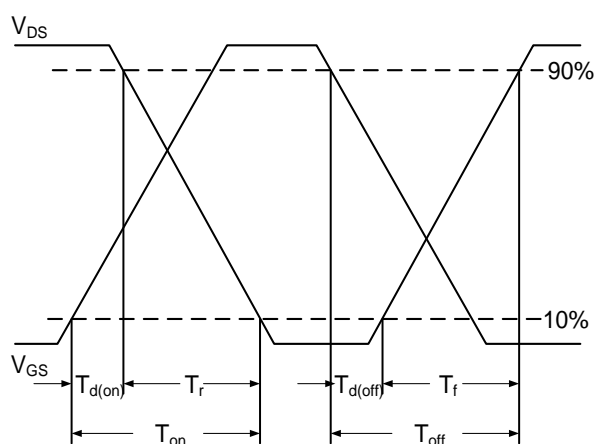


Fig.7 Switching Time Waveform

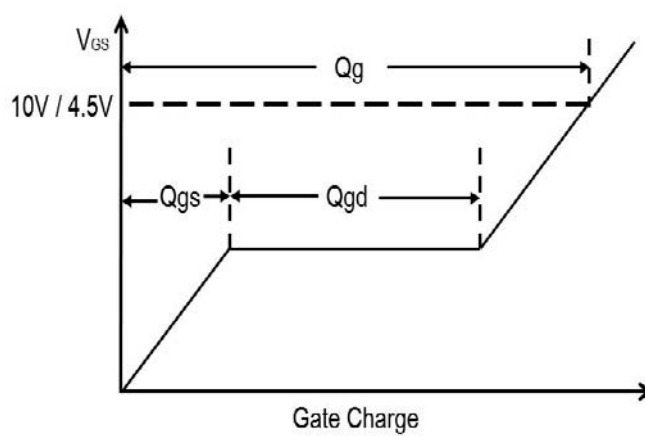
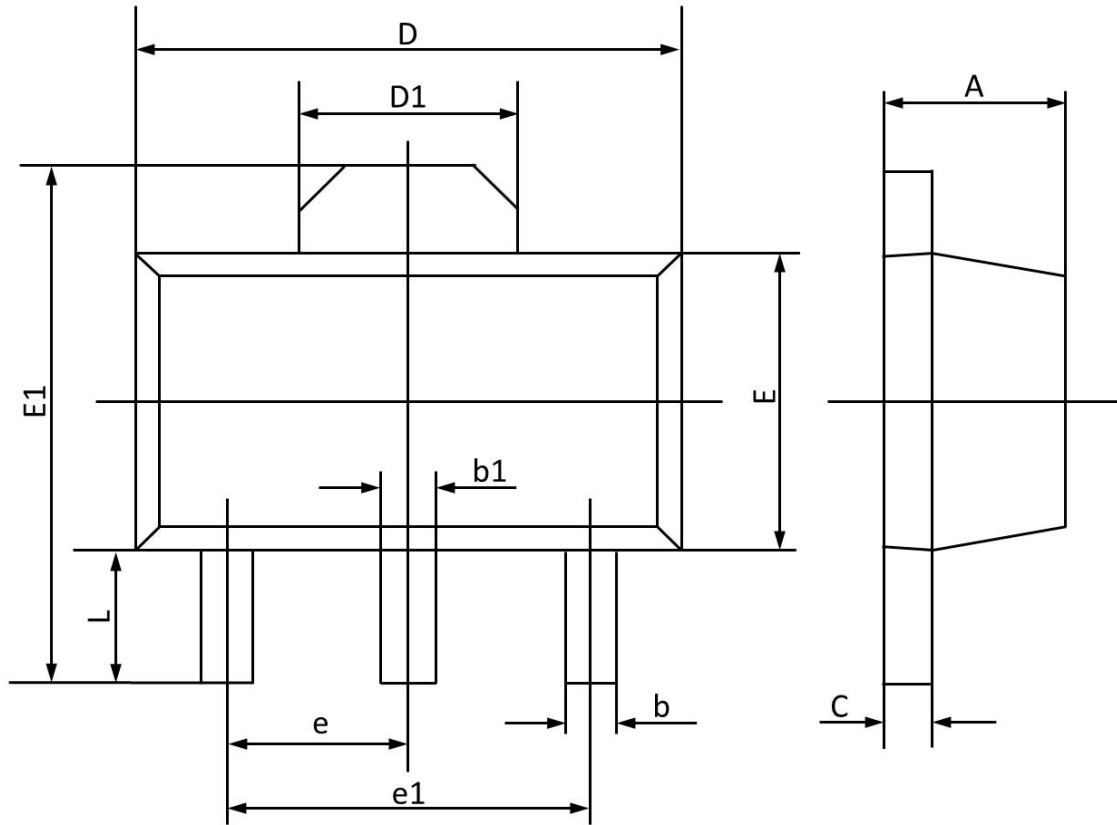


Fig.8 Gate Charge Waveform

# PACKAGE OUTLINE & DIMENSIONS

YS2612AK

## SOT-89 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP		0.118 TYP	
L	0.900	1.200	0.035	0.047