YEA SHIN TECHNOLOGY CO., LTD

N-Channel Enhancement MOSFET

VDS= 60V, ID= 33A

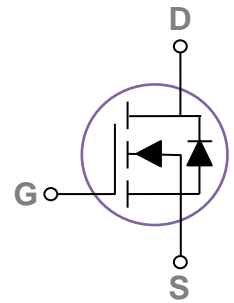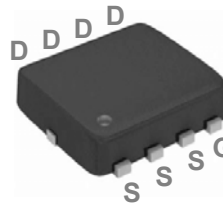# YS6906ZBB

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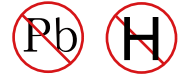
Features

- *60V,33A, RDS(ON) =21mΩ @VGS = 10V*
- *Improved dv/dt capability*
- *Fast switching*
- *100% EAS Guaranteed*
- *Green Device Available*

Applications

- *Motor Drive*
- *Power Tools*
- *LED Lighting*

PPAK3x3 Pin Configuration

Absolute Maximum Rating Tc=25℃ 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 (Tc=25℃)	33	A
	Drain Current – Continuous (Tc=100℃)	20	A
I_{DM}	Drain Current – Pulsed[1]	132	A
EAS	Single Pulse Avalanche Energy[2]	42	mJ
IAS	Single Pulse Avalanche Current[2]	29	A
P_D	Power Dissipation (Tc=25℃)	44.6	W
	Power Dissipation – Derate above 25℃	0.36	W/℃
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	2.8	℃/W

DEVICE CHARACTERISTICS

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Electrical Characteristics **(T$_J$=25 ℃, unless otherwise noted)**

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V, I$_D$=250uA	60	---	---	V
△BV$_{DSS}$/△T$_J$	BV$_{DSS}$ Temperature Coefficient	Reference to 25℃, I$_D$=1mA	---	0.07	---	V/℃
I$_{DSS}$	Drain-Source Leakage Current	V$_{DS}$=60V, V$_{GS}$=0V, T$_J$=25℃	---	---	1	uA
		V$_{DS}$=48V, V$_{GS}$=0V, T$_J$=125℃	---	---	10	uA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V, V$_{DS}$=0V	---	---	±100	nA

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R$_{DS(ON)}$	Static Drain-source On-Resistance[3]	V$_{GS}$=10V, I$_D$=15A	---	17	21	mΩ
		V$_{GS}$=4.5V, I$_D$=8A	---	20	24	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$=250uA	1.2	1.8	2.2	V
△V$_{GS(th)}$	V$_{GS(th)}$ Temperature Coefficient		---	-5	---	mV/℃
gfs	Forward Transconductance	V$_{DS}$=10V, I$_D$=10A	---	9	---	S

Dynamic and Switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q$_g$	Total Gate Charge[3,4]	V$_{DS}$=30V, V$_{GS}$=10V, I$_D$=15A	---	28	42	nC
Q$_{gs}$	Gate-Source Charge[3,4]		---	3.5	7	
Q$_{gd}$	Gate-Drain Charge[3,4]		---	6.5	10	
T$_{d(on)}$	Turn-On Delay Time[3,4]	V$_{DD}$=30V, V$_{GS}$=10V, R$_G$=6Ω, I$_D$=1A	---	7.2	14	ns
T$_r$	Rise Time[3,4]		---	38	72	
T$_{d(off)}$	Turn-On Delay Time[3,4]		---	34	65	
T$_f$	Fall Time[3,4]		---	8.2	16	
C$_{iss}$	Input Capacitance	V$_{DS}$=20V, V$_{GS}$=0V, f=1MHz	---	1110	1665	pF
C$_{oss}$	Output Capacitance		---	110	165	
C$_{rss}$	Reverse Transfer Capacitance		---	60	90	
R$_g$	Gate Resistance	V$_{GS}$=0V, V$_{DS}$=0V, f=1MHz	---	2.2	4.4	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	---	---	33	A
I$_{SM}$	Pulsed Source Current[3]		---	---	66	A
V$_{SD}$	Diode Forward Voltage[3]	V$_{GS}$=0V, I$_S$=1A, T$_J$=25℃	---	---	1	V
t$_{rr}$	Reverse Recovery Time	V$_{GS}$=0V,I$_S$=-1A, di/dt=100A/μs	---	19.6	---	ns
Q$_{rr}$	Reverse Recovery Charge	T$_J$=25℃	---	14.2	---	nC

Note :
1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V$_{DD}$=25V,V$_{GS}$=10V,L=0.1mH,I$_{AS}$=29A.,R$_G$=25Ω,Starting T$_J$=25℃.
3. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
4. Essentially independent of operating temperature.

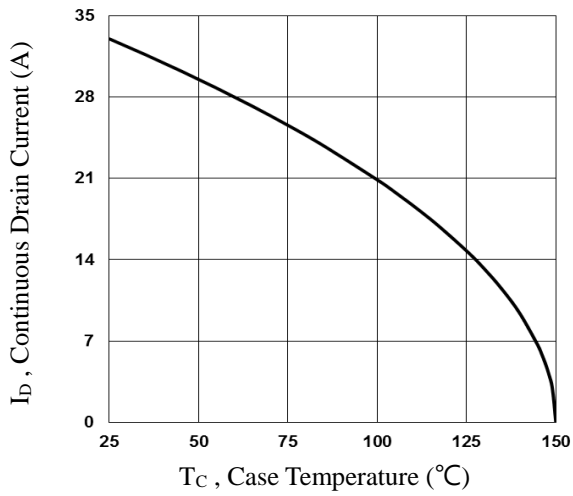# DEVICE CHARACTERISTICS
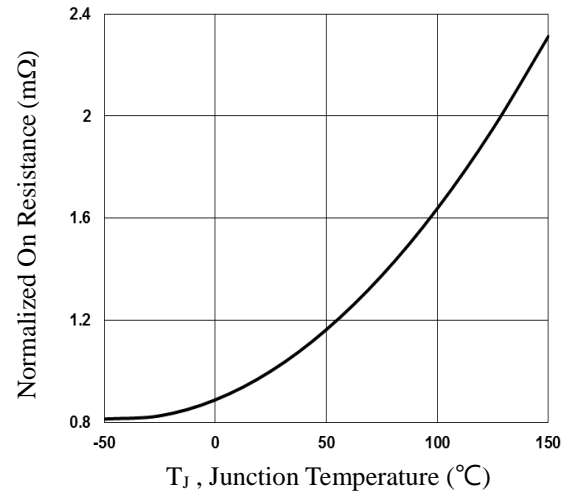
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Fig.1   Continuous Drain Current vs. T_C
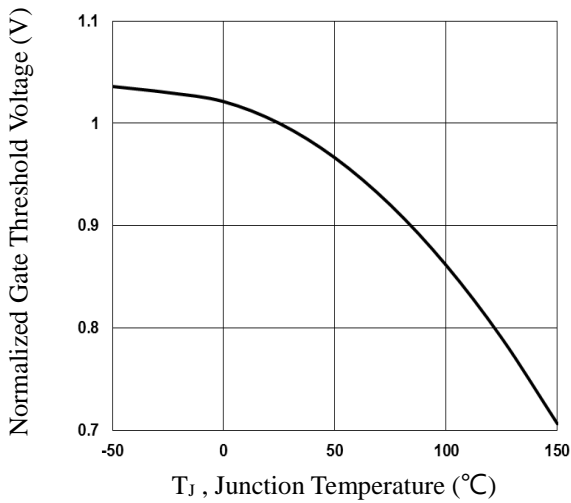

Fig.2   Normalized RDSON vs. T_J
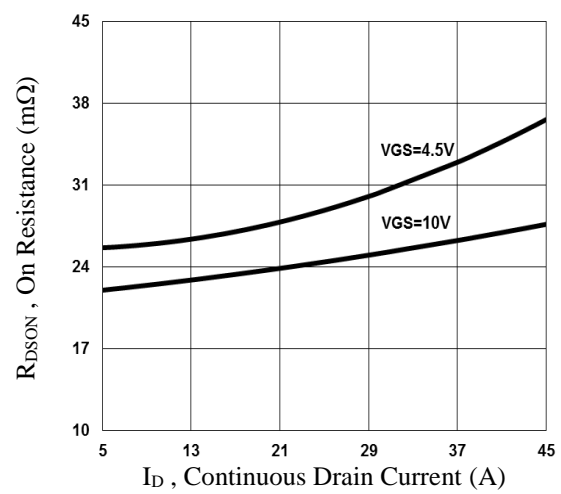

Fig.3   Normalized V_{th} vs. T_J

Fig.4   RDSON vs. Continuous Drain Current
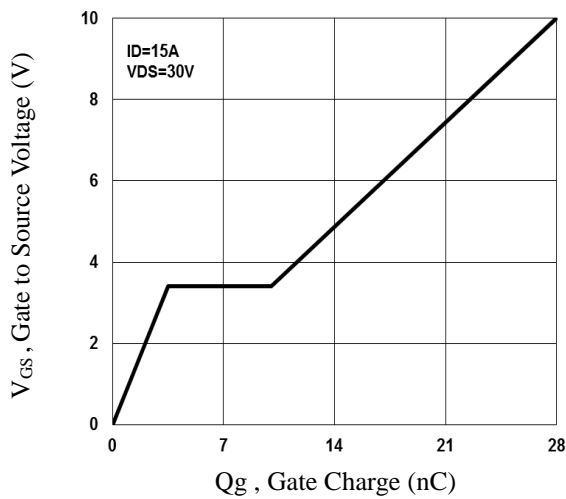

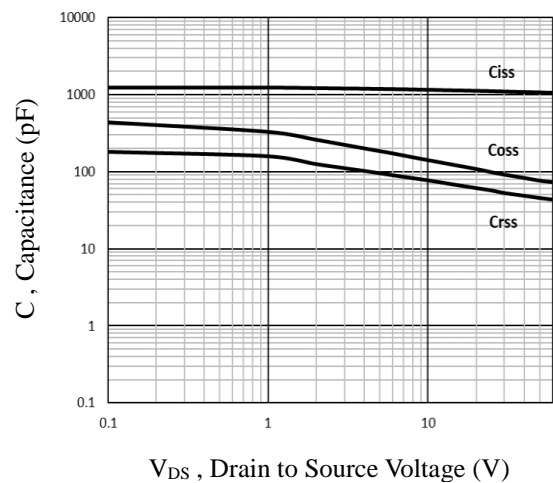Fig.5   Gate Charge Waveform

Fig.6   Capacitance Characteristics

DEVICE CHARACTERISTICS

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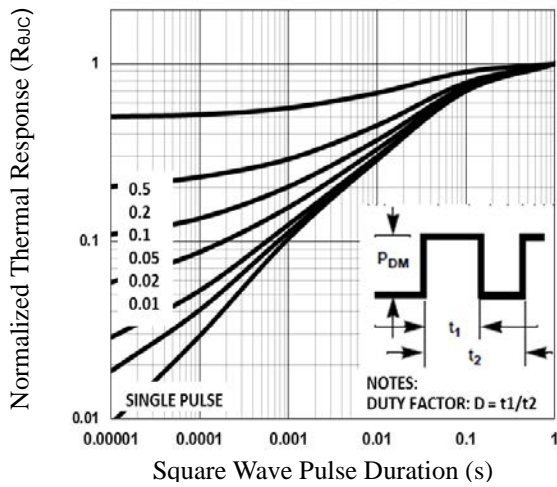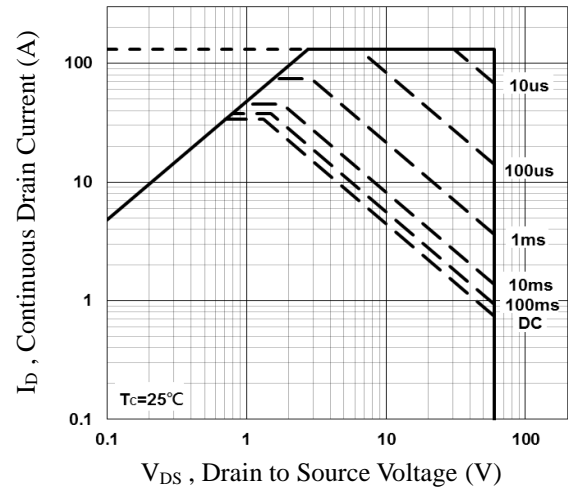

Fig.7   Normalized Transient Impedance

Fig.8   Maximum Safe Operation Area
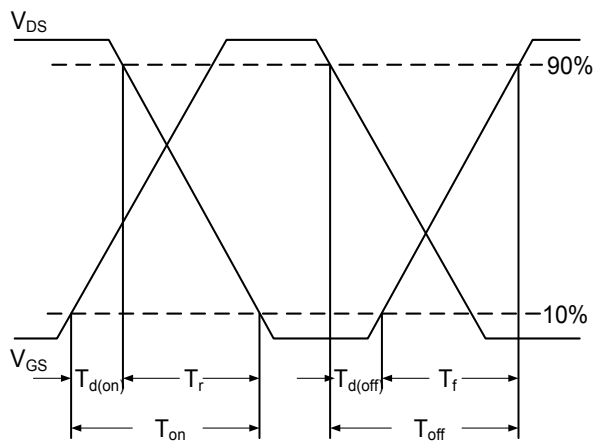

Fig.9   Switching Time Waveform
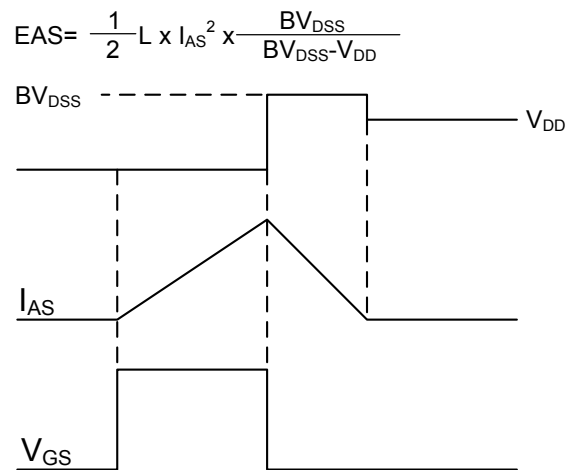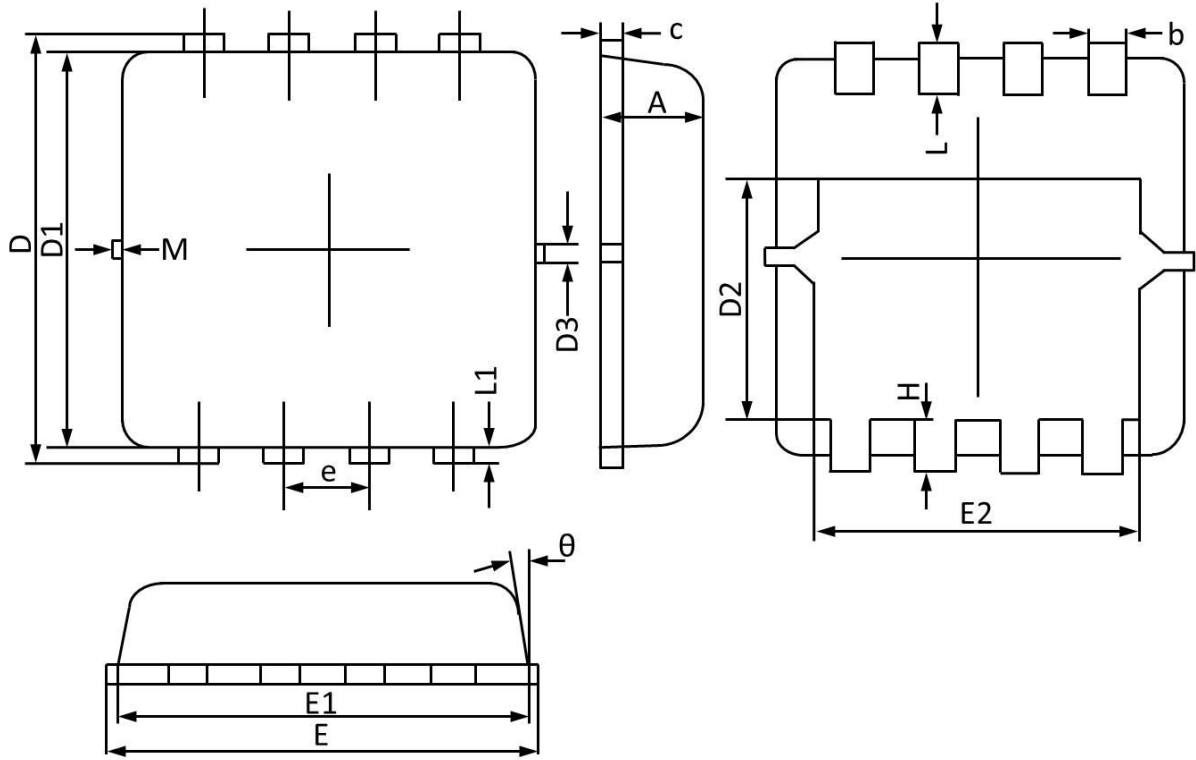
$$EAS= \frac{1}{2}L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

Fig.10   EAS Waveform

PACKAGE OUTLINE & DIMENSIONS

YS6906ZBB

PPAK3x3 PACKAGE INFORMATION

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	**Max**	**Min**	**Max**
A	0.700	0.800	0.028	0.031
b	0.250	0.350	0.010	0.013
c	0.100	0.250	0.004	0.009
D	3.250	3.450	0.128	0.135
D1	3.000	3.200	0.119	0.125
D2	1.780	1.980	0.070	0.077
D3	0.130 REF		0.005 REF	
E	3.200	3.400	0.126	0.133
E1	3.000	3.200	0.119	0.125
E2	2.390	2.590	0.094	0.102
e	0.650 BSC		0.026 BSC	
H	0.300	0.500	0.011	0.019
L	0.300	0.500	0.011	0.019
L1	0.130 REF		0.005 REF	
θ	0°	12°	0°	12°
M	0.150 REF		0.006 REF	