



YEA SHIN TECHNOLOGY CO., LTD

YS4911S

# P-Channel Enhancement MOSFET



VDS= -40V, ID= -2.9A

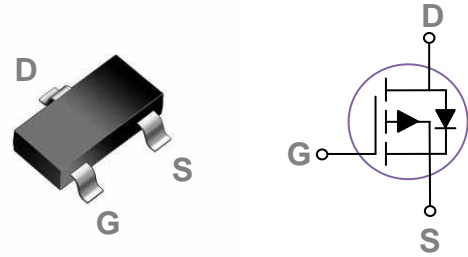
## Features

- -40V,-2.9A,  $R_{DS(ON)} = 68m\Omega @ V_{GS} = -10V$
- Fast switching
- Green Device Available
- Suit for -4.5V Gate Drive Applications

## Applications

- POL Applications
- Load Switch
- LED Application

## SOT-23 Pin Configuration



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

| Symbol           | Parameter                                        | Rating     | Units |
|------------------|--------------------------------------------------|------------|-------|
| V <sub>DS</sub>  | Drain-Source Voltage                             | -40        | V     |
| V <sub>GS</sub>  | Gate-Source Voltage                              | ±20        | V     |
| I <sub>D</sub>   | Drain Current – Continuous ( $T_c=25^\circ C$ )  | -2.9       | A     |
|                  | Drain Current – Continuous ( $T_c=100^\circ C$ ) | -2.32      | A     |
| I <sub>DM</sub>  | Drain Current – Pulsed <sup>1</sup>              | -11.6      | A     |
| P <sub>D</sub>   | Power Dissipation ( $T_c=25^\circ C$ )           | 1          | W     |
|                  | Power Dissipation – Derate above 25°C            | 0.008      | W/°C  |
| T <sub>STG</sub> | Storage Temperature Range                        | -55 to 150 | °C    |
| T <sub>J</sub>   | Operating Junction Temperature Range             | -55 to 150 | °C    |

### Thermal Characteristics

| Symbol           | Parameter                              | Typ. | Max. | Unit |
|------------------|----------------------------------------|------|------|------|
| R <sub>θJA</sub> | Thermal Resistance Junction to ambient | ---  | 125  | °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 | $V_{GS}=0V, I_D=-250\mu A$                | -40  | ---  | ---       | V       |
| $I_{DSS}$  | Drain-Source Leakage Current   | $V_{DS}=-40V, V_{GS}=0V, T_J=25^\circ C$  | ---  | ---  | -1        | $\mu A$ |
|            |                                | $V_{DS}=-32V, V_{GS}=0V, T_J=125^\circ C$ | ---  | ---  | -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 | $V_{GS}=-10V, I_D=-2A$         | ---  | 55    | 68   | $m\Omega$ |
|              |                                   | $V_{GS}=-4.5V, I_D=-1A$        | ---  | 75    | 100  | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -1.0 | -1.65 | -2.5 | V         |
| $g_{fs}$     | Forward Transconductance          | $V_{DS}=-10V, I_D=-1A$         | ---  | 3     | ---  | S         |

### Dynamic and Switching Characteristics

|              |                                    |                                                  |     |     |      |    |
|--------------|------------------------------------|--------------------------------------------------|-----|-----|------|----|
| $Q_g$        | Total Gate Charge <sup>2,3</sup>   | $V_{DS}=-32V, V_{GS}=-10V, I_D=-2A$              | --- | 6.4 | 13   | nC |
| $Q_{gs}$     | Gate-Source Charge <sup>2,3</sup>  |                                                  | --- | 0.5 | 2    |    |
| $Q_{gd}$     | Gate-Drain Charge <sup>2,3</sup>   |                                                  | --- | 2.7 | 6    |    |
| $T_{d(on)}$  | Turn-On Delay Time <sup>2,3</sup>  | $V_{DD}=-20V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A$ | --- | 12  | 24   | ns |
| $T_r$        | Rise Time <sup>2,3</sup>           |                                                  | --- | 9   | 20   |    |
| $T_{d(off)}$ | Turn-Off Delay Time <sup>2,3</sup> |                                                  | --- | 45  | 90   |    |
| $T_f$        | Fall Time <sup>2,3</sup>           |                                                  | --- | 5   | 10   |    |
| $C_{iss}$    | Input Capacitance                  | $V_{DS}=-25V, V_{GS}=0V, f=1MHz$                 | --- | 600 | 1200 | pF |
| $C_{oss}$    | Output Capacitance                 |                                                  | --- | 60  | 120  |    |
| $C_{rss}$    | Reverse Transfer Capacitance       |                                                  | --- | 43  | 80   |    |

### 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         | ---  | ---  | -2.9 | A    |
| $I_{SM}$ | Pulsed Source Current     |                                      | ---  | ---  | -5.8 | A    |
| $V_{SD}$ | Diode Forward Voltage     | $V_{GS}=0V, I_S=-1A, T_J=25^\circ C$ | ---  | ---  | -1   | V    |

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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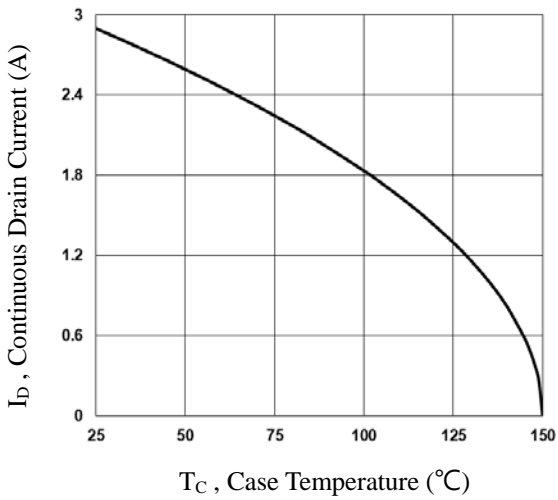


Fig.1 Continuous Drain Current vs.  $T_c$

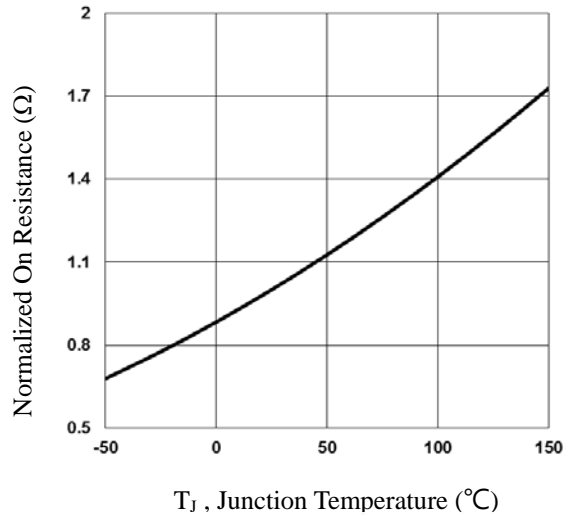


Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$

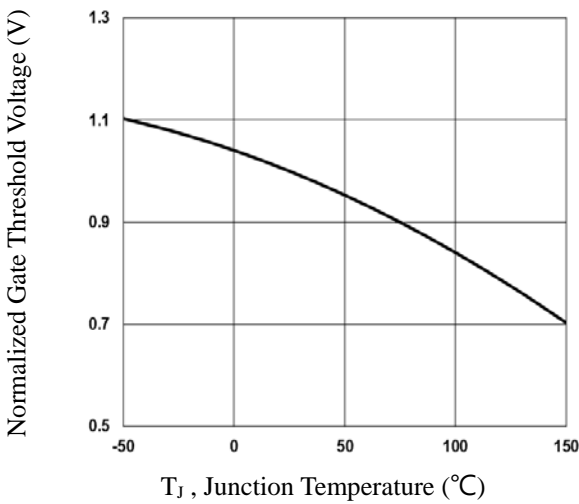


Fig.3 Normalized  $V_{th}$  vs.  $T_j$

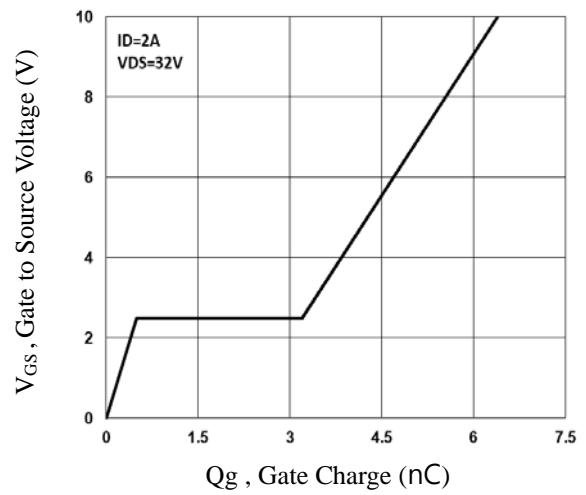


Fig.4 Gate Charge Waveform

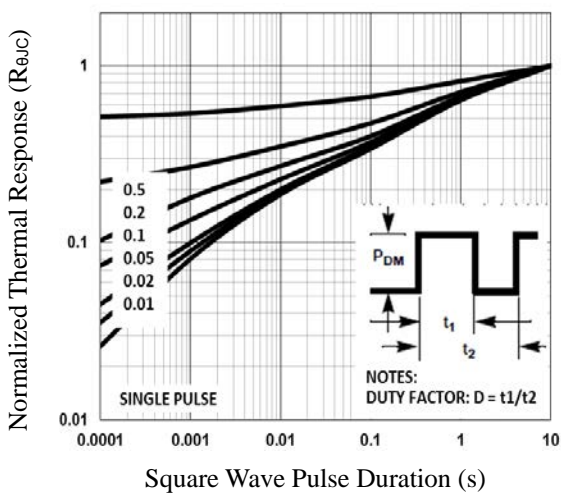


Fig.5 Normalized Transient Impedance

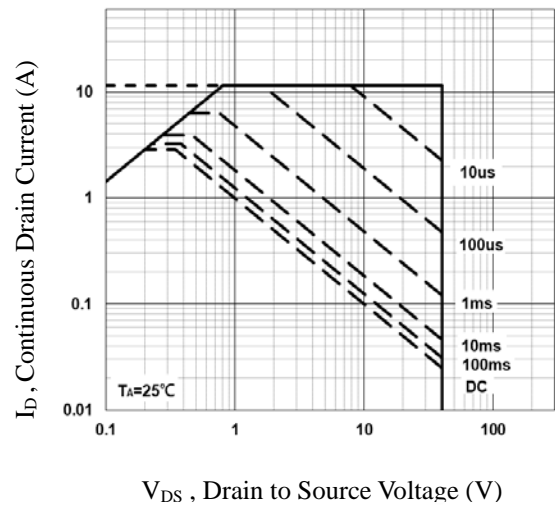


Fig.6 Maximum Safe Operation Area

# DEVICE CHARACTERISTICS

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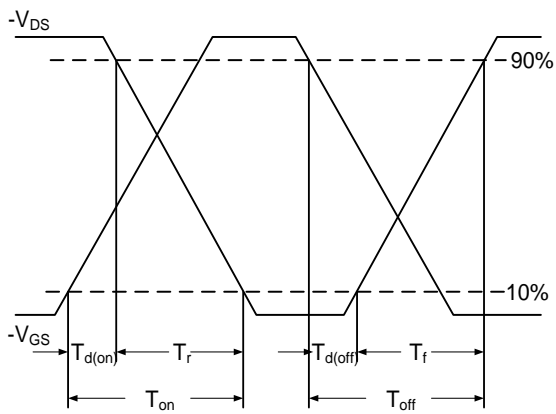


Fig.7 Switching Time Waveform

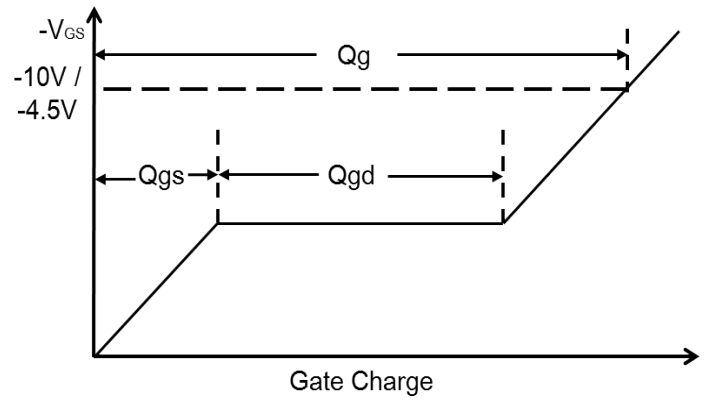
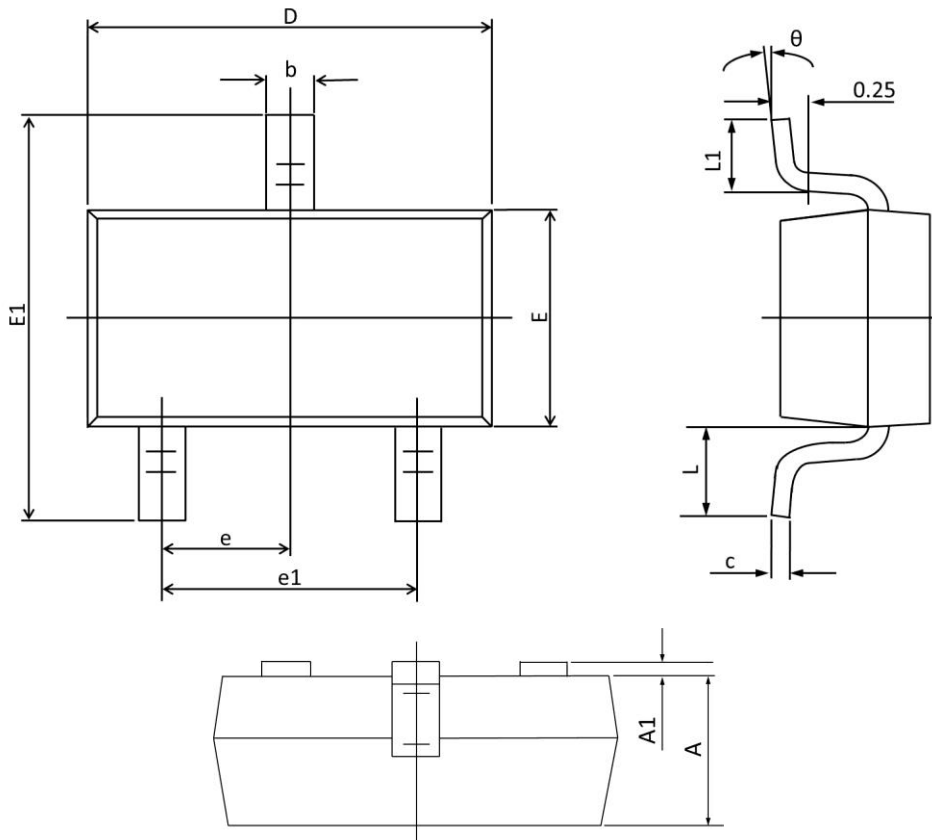


Fig.8 Gate Charge Waveform

# PACKAGE OUTLINE & DIMENSIONS

## YS4911S



| 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 |
| $\theta$ | 1°                        | 7°    | 1°                   | 7°    |