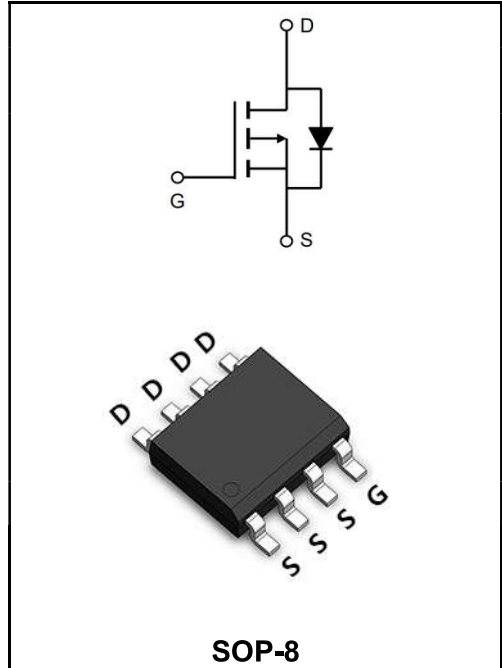


**-40V P-CHANNEL ENHANCEMENT MODE MOSFET**

**MAIN CHARACTERISTICS**

|   |                             |
|---|-----------------------------|
| <b>I<sub>D</sub></b>                                | -12A                        |
| <b>V<sub>DSS</sub></b>                              | -40V                        |
| <b>R<sub>DS(on)-typ(@V<sub>GS</sub>=-10V)</sub></b> | < 18mΩ( <b>Type:14 mΩ</b> ) |



**Application**

- ◆ Battery protection
- ◆ Load switch
- ◆ Uninterruptible power supply

**Product Specification Classification**

| Part Number | Package | Marking          | Pack         |
|-------------|---------|------------------|--------------|
| YFW12P04S   | SOP-8   | YFW 12P04S XXXXX | 3000PCS/Tape |

**Maximum Ratings at T<sub>c</sub>=25°C unless otherwise specified**

| Characteristics   | Symbols                | Value       | Units       |
|---|------------------------|-------------|-------------|
| Drain-Source Voltage  | <b>V<sub>DS</sub></b>  | -40         | <b>V</b>    |
| Gate - Source Voltage   | <b>V<sub>GS</sub></b>  | ±20         | <b>V</b>    |
| Continuous Drain Current, V <sub>GS</sub> @ -10V <sup>1</sup> @T <sub>c</sub> =25°C | <b>I<sub>D</sub></b>   | -12         | <b>A</b>    |
| Continuous Drain Current, V <sub>GS</sub> @ -10V <sup>1</sup> @T <sub>c</sub> =75°C | <b>I<sub>D</sub></b>   | -8.9        | <b>A</b>    |
| Pulsed Drain Current <sup>2</sup>   | <b>I<sub>DM</sub></b>  | -36         | <b>A</b>    |
| Single Pulse Avalanche Energy <sup>3</sup>  | <b>E<sub>AS</sub></b>  | 125         | <b>mJ</b>   |
| Total Power Dissipation <sup>4</sup> @T <sub>c</sub> =25°C                          | <b>P<sub>D</sub></b>   | 3.5         | <b>W</b>    |
| Total Power Dissipation <sup>4</sup> @T <sub>A</sub> =25°C                          | <b>P<sub>D</sub></b>   | 1.9         | <b>W</b>    |
| Storage Temperature Range   | <b>T<sub>STG</sub></b> | -55 to +150 | <b>°C</b>   |
| Operating Junction Temperature Range  | <b>T<sub>J</sub></b>   | -55 to +150 | <b>°C</b>   |
| Thermal Resistance Junction-Ambient <sup>1</sup>                                    | <b>R<sub>θJA</sub></b> | 85          | <b>°C/W</b> |
| Thermal Resistance Junction to Case <sup>1</sup>                                    | <b>R<sub>θJC</sub></b> | 5           | <b>°C/W</b> |

**Maximum Ratings at Tc=25°C unless otherwise specified**

| Characteristics                                | Test Condition  | Symbols                      | Min  | Typ    | Max  | Units |
|--|---|------------------------------|------|--------|------|-------|
| Drain-Source Breakdown Voltage                 | $V_{GS}=0V, I_D=-250\mu A$  | $BV_{DSS}$                   | -40  | -44    | -    | V     |
| BVDSS Temperature Coefficient                  | Reference to 25°C, $I_D=-1mA$   | $\Delta BV_{DSS}/\Delta T_J$ | -    | -0.023 | -    | V/°C  |
| Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=-10V, I_D=-30A$   | $R_{DS(ON)}$                 | -    | 14     | 18   | mΩ    |
|  | $V_{GS}=-4.5V, I_D=-20A$  |                              | -    | 18     | 25   |       |
| Gate -Threshold Voltage                        | $V_{DS}=V_{GS}, I_D=-250\mu A$  | $V_{GS(th)}$                 | -1.0 | -1.6   | -2.5 | V     |
| $V_{GS(th)}$ Temperature Coefficient           |   | $\Delta V_{GS(th)}$          | -    | 4.74   | -    | mV/°C |
| Drain-Source Leakage Current                   | $V_{DS}=-40V, V_{GS}=0V, T_J=25^\circ C$  | $I_{DSS}$                    | -    | -      | 1    | μA    |
|  | $V_{DS}=-40V, V_{GS}=0V, T_J=55^\circ C$  |                              | -    | -      | 5    |       |
| Gate -Source Leakage Current                   | $V_{GS}=\pm 20V, V_{DS}=0V$   | $I_{GSS}$                    | -    | -      | ±100 | nA    |
| Total Gate Charge(-4.5V)                       | $V_{DS}=-20V$<br>$V_{GS}=-4.5V$<br>$I_D=-12A$                                   | $Q_g$                        | -    | 25     | -    | nC    |
| Gate-Source Charge                             |   | $Q_{GS}$                     | -    | 11     | -    |       |
| Gate-Drain Charge                              |   | $Q_{gd}$                     | -    | 9.5    | -    |       |
| Turn-on delay time                             | $V_{DD}=-15V$<br>$R_L=15\Omega$<br>$I_D=-1A$<br>$V_{GEN}=-10V$<br>$R_G=6\Omega$ | $t_{d(on)}$                  | -    | 48     | -    | ns    |
| Rise Time                                      |   | $T_r$                        | -    | 24     | -    |       |
| Turn-Off Delay Time                            |   | $t_{d(OFF)}$                 | -    | 88     | -    |       |
| Fall Time                                      |   | $t_f$                        | -    | 9.6    | -    |       |
| Input Capacitance                              | $V_{DS}=-20V$<br>$V_{GS}=0V$<br>$f=1MHz$  | $C_{iss}$                    | -    | 2760   | -    | pF    |
| Output Capacitance                             |   | $C_{oss}$                    | -    | 260    | -    |       |
| Reverse Transfer Capacitance                   |   | $C_{rss}$                    | -    | 85     | -    |       |
| Continuous Source Current <sup>1,5</sup>       | $V_G=V_D=0V, \text{Force Current}$  | $I_S$                        | -    | -      | -40  | A     |
| Pulsed Source Current <sup>2,5</sup>           |   | $I_{SM}$                     | -    | -      | -90  | A     |
| Diode Forward Voltage <sup>2</sup>             | $V_{GS}=0V, I_S=-1A, T_J=25^\circ C$  | $V_{SD}$                     | -    | -      | -1.3 | V     |

Note :

- 1、The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width  $\cong 300\mu s$  , duty cycle  $\cong 2\%$
- 3、The power dissipation is limited by 150°C junction temperature
- 4、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Ratings and Characteristic Curves

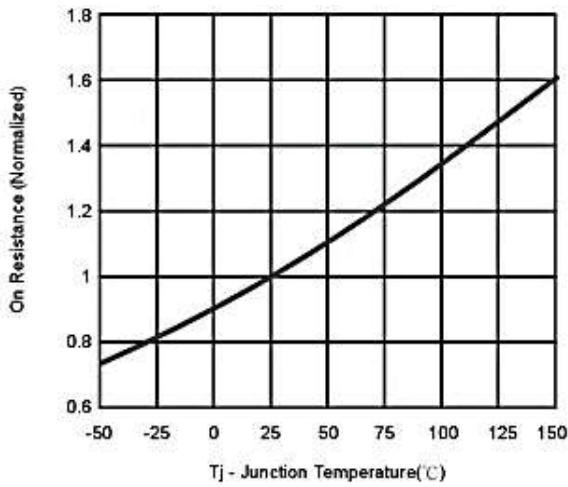


Fig.1 On Resistance Vs Junction Temperature

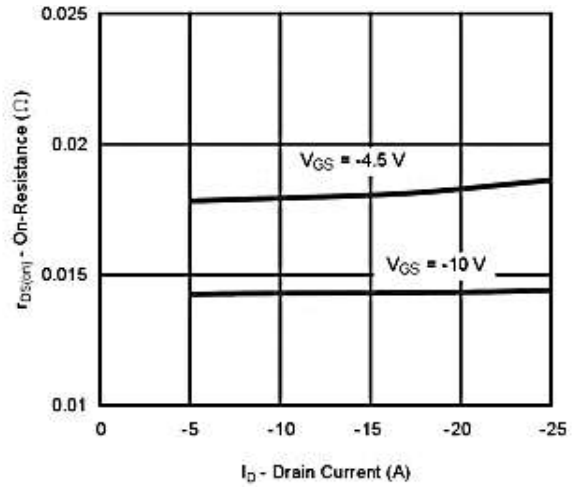


Fig.2 On-Resistance Vs. Drain Current

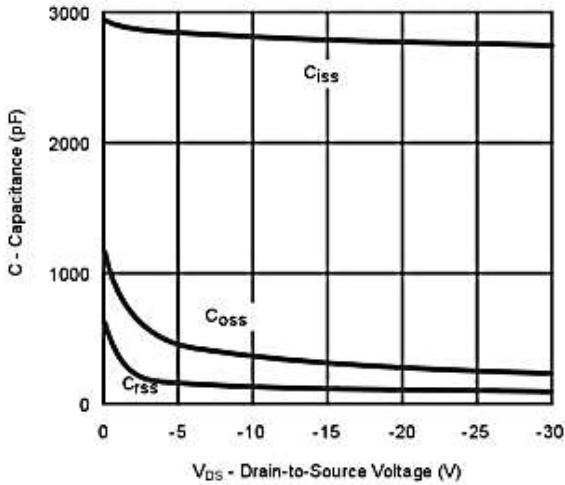


Fig.3 Capacitance

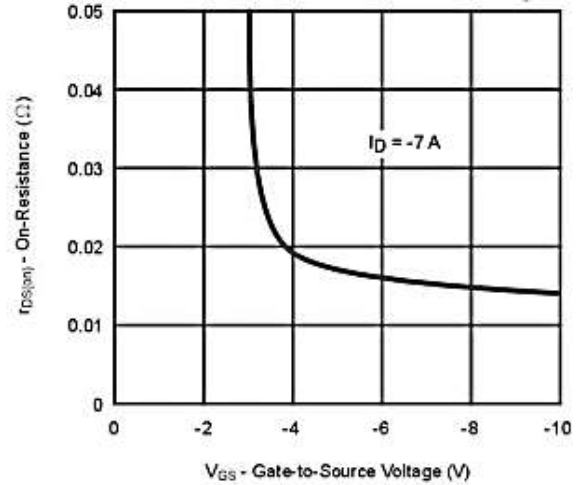


Fig.4 On-Resistance Vs. Gate-to-Source Voltage

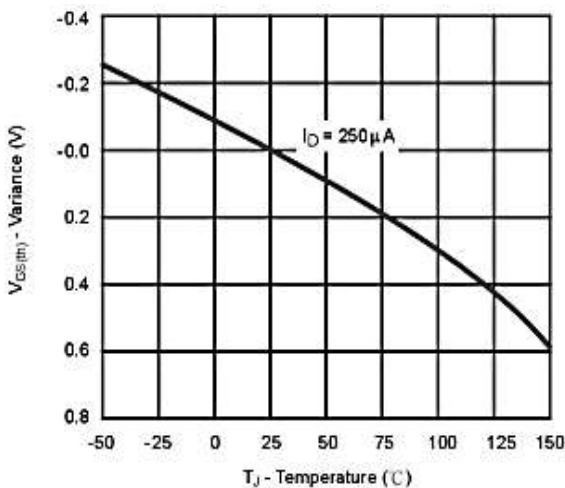


Fig.5 Threshold Voltage

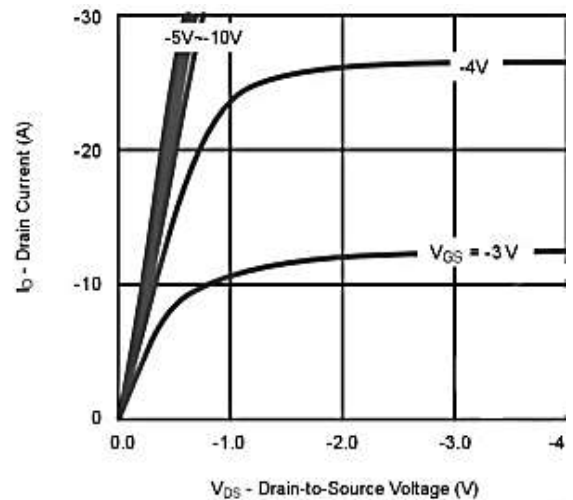


Fig.6 On-Region Characteristics

Ratings and Characteristic Curves

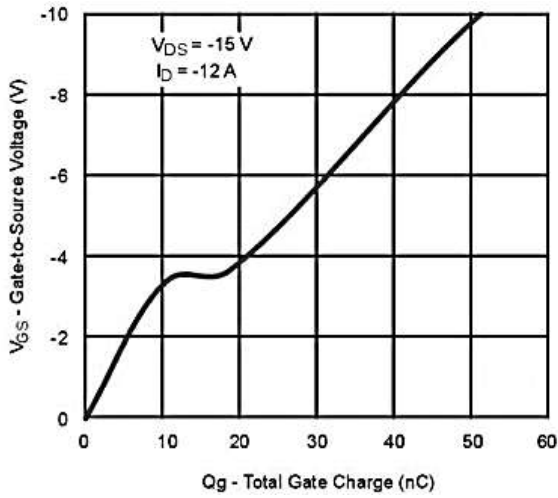


Fig.7 Gate Charge

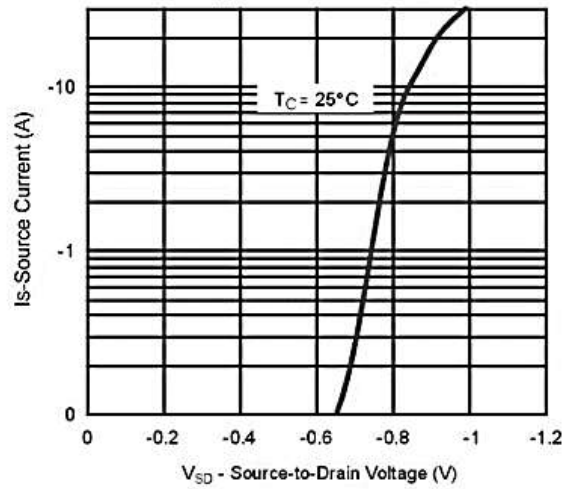


Fig.8 Body-diode Characteristic

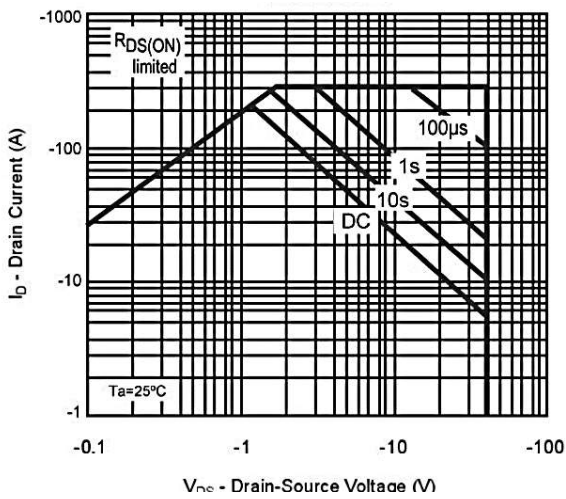


Fig.9 Safe Operating Area

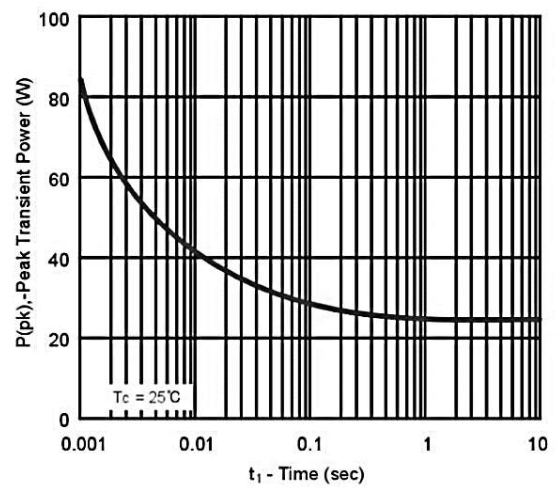


Fig.10 Single Pulse Maximum Power Dissipation

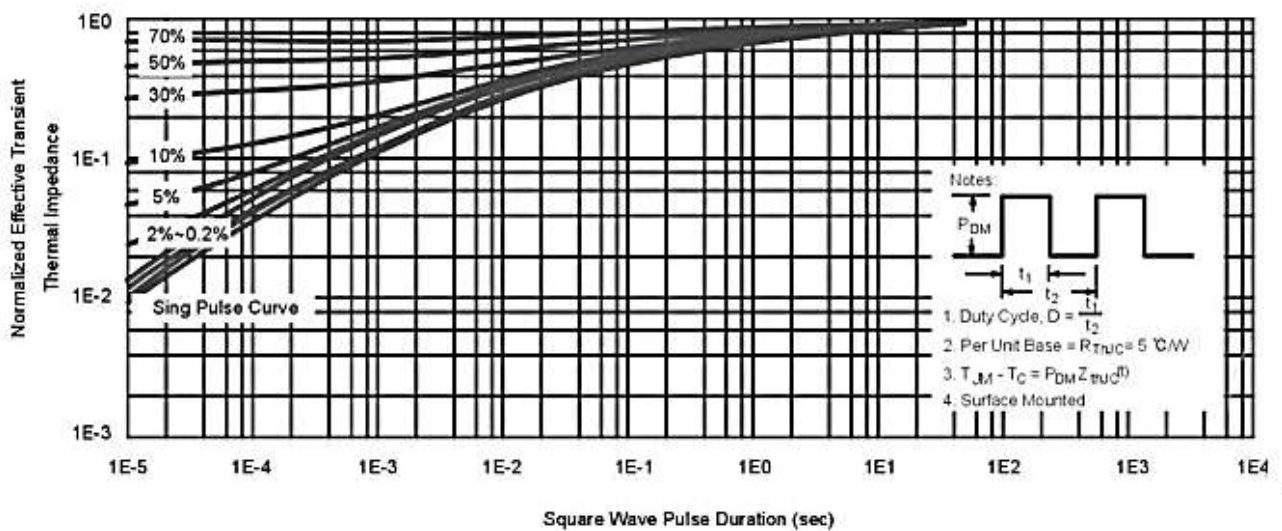
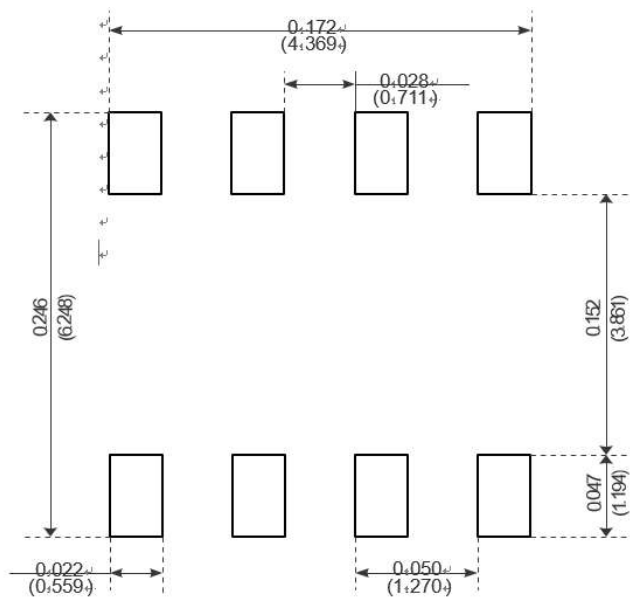
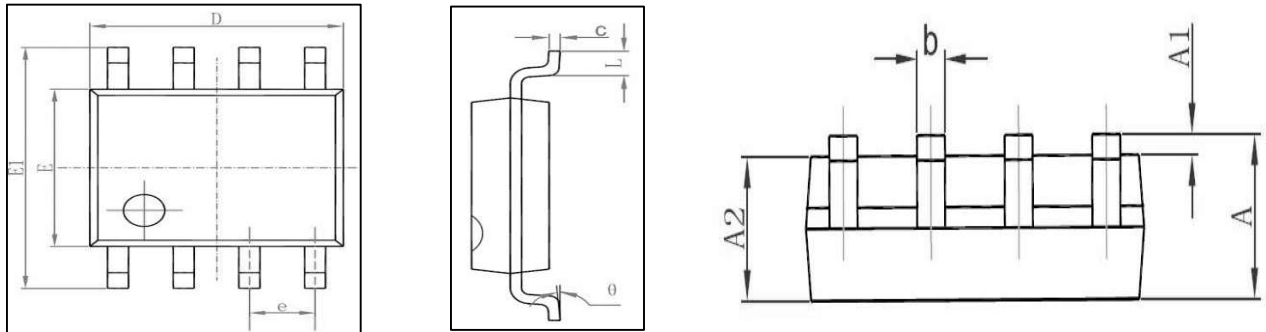


Fig.11 Normalized Maximum Transient Thermal Impedance

SOP-8



Recommended Minimum Pads

| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.006                | 0.010 |
| D      | 4.700                     | 5.100 | 0.185                | 0.200 |
| E      | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200 | 0.228                | 0.244 |
| e      | 1.270 (BSC)               |       | 0.050 (BSC)          |       |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |