

### DESCRIPTION

The SSF4606 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. This complementary MOSFET may be used in power inverters and other applications.

### GENERAL FEATURES

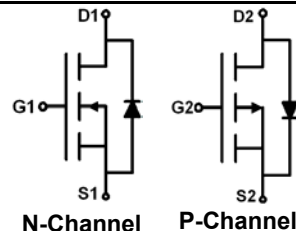
#### ● N-Channel

$V_{DS} = 30V, I_D = 6.9A$   
 $R_{DS(ON)} < 42m\Omega @ V_{GS}=4.5V$   
 $R_{DS(ON)} < 28m\Omega @ V_{GS}=10V$

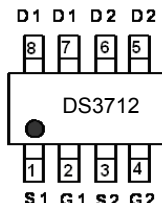
#### ● P-Channel

$V_{DS} = -30V, I_D = -6A$   
 $R_{DS(ON)} < 58m\Omega @ V_{GS}=-4.5V$   
 $R_{DS(ON)} < 35m\Omega @ V_{GS}=-10V$

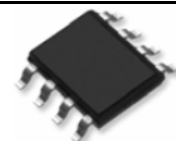
- High Power and Current Handling Capability
- Lead Free
- Surface Mount Package



Schematic Diagram



Marking and Pin Assignment



SOP-8 Top View

### PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device  | Device Package | Reel Size | Tape Width | Quantity   |
|----------------|---------|----------------|-----------|------------|------------|
| DS3712         | SSF4606 | SOP-8          | Ø330mm    | 12mm       | 2500 units |

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ C$ unless otherwise noted)

| Parameter                                        |                  | Symbol         | N-Channel  | P-Channel  | Unit       |
|--------------------------------------------------|------------------|----------------|------------|------------|------------|
| Drain-Source Voltage                             |                  | $V_{DS}$       | 30         | -30        | V          |
| Gate-Source Voltage                              |                  | $V_{GS}$       | $\pm 20$   | $\pm 20$   | V          |
| Continuous Drain Current                         | $T_A=25^\circ C$ | $I_D$          | 6.9        | -6         | A          |
|                                                  | $T_A=70^\circ C$ |                | 6.0        | -5.0       |            |
| Pulsed Drain Current (Note 1)                    |                  | $I_{DM}$       | 30         | -30        | A          |
| Maximum Power Dissipation                        | $T_A=25^\circ C$ | $P_D$          | 2.0        | 2.0        | W          |
|                                                  | $T_A=70^\circ C$ |                | 1.44       | 1.44       |            |
| Operating Junction and Storage Temperature Range |                  | $T_J, T_{STG}$ | -55 To 150 | -55 To 150 | $^\circ C$ |

### THERMAL CHARACTERISTICS

|                                                 |                 |      |      |              |
|-------------------------------------------------|-----------------|------|------|--------------|
| Thermal Resistance, Junction-to-Ambient (Note2) | $R_{\theta JA}$ | N-Ch | 62.5 | $^\circ C/W$ |
|                                                 |                 | P-Ch | 62.5 |              |

### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ C$ unless otherwise noted)

| Parameter           | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------|--------|-----------|-----|-----|-----|------|
| OFF CHARACTERISTICS |        |           |     |     |     |      |

|                                    |                     |                                                                                                   |                                                                                                     |      |      |      |    |    |
|------------------------------------|---------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------|------|------|----|----|
| Drain-Source Breakdown Voltage     | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V I <sub>D</sub> =250μA                                                         | N-Ch                                                                                                | 30   |      |      | V  |    |
|                                    |                     | V <sub>GS</sub> =0V I <sub>D</sub> =-250μA                                                        | P-Ch                                                                                                | -30  |      |      |    |    |
| Zero Gate Voltage Drain Current    | I <sub>DSS</sub>    | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V                                                         | N-Ch                                                                                                |      |      | 1    | μA |    |
|                                    |                     | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V                                                        | P-Ch                                                                                                |      |      | -1   |    |    |
| Gate-Body Leakage Current          | I <sub>GSS</sub>    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                        | N-Ch                                                                                                |      |      | ±100 | nA |    |
|                                    |                     |                                                                                                   | P-Ch                                                                                                |      |      | ±100 |    |    |
| ON CHARACTERISTICS (Note 3)        |                     |                                                                                                   |                                                                                                     |      |      |      |    |    |
| Gate Threshold Voltage             | V <sub>GS(th)</sub> | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                          | N-Ch                                                                                                | 1    | 1.9  | 3    | V  |    |
|                                    |                     | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                         | P-Ch                                                                                                | -1.2 | -2   | -2.4 |    |    |
| Drain-Source On-State Resistance   | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =6.9A                                                        | N-Ch                                                                                                |      | 22.5 | 28   | mΩ |    |
|                                    |                     | V <sub>GS</sub> =-10V, I <sub>D</sub> =-6.0A                                                      | P-Ch                                                                                                |      | 28   | 35   |    |    |
|                                    |                     | V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A                                                         | N-Ch                                                                                                |      | 34.5 | 42   |    |    |
|                                    |                     | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A                                                       | P-Ch                                                                                                |      | 44   | 58   |    |    |
|                                    |                     |                                                                                                   |                                                                                                     |      |      |      |    |    |
| Forward Transconductance           | g <sub>FS</sub>     | V <sub>DS</sub> =5V, I <sub>D</sub> =6.9A                                                         | N-Ch                                                                                                | 10   | 15.4 |      | S  |    |
|                                    |                     | V <sub>DS</sub> =-5V, I <sub>D</sub> =-6A                                                         | P-Ch                                                                                                |      | 13   |      |    |    |
| DYNAMIC PARAMETERS                 |                     |                                                                                                   |                                                                                                     |      |      |      |    |    |
| Input Capacitance                  | C <sub>iss</sub>    | N-Ch<br>V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz                                         | N-Ch                                                                                                |      | 680  |      | pF |    |
|                                    |                     |                                                                                                   | P-Ch                                                                                                |      | 900  |      |    |    |
| Output Capacitance                 | C <sub>oss</sub>    | P-Ch<br>V <sub>GS</sub> =0V, V <sub>DS</sub> =-15V, f=1MHz                                        | N-Ch                                                                                                |      | 100  |      |    |    |
|                                    |                     |                                                                                                   | P-Ch                                                                                                |      | 200  |      |    |    |
| Reverse Transfer Capacitance       | C <sub>rss</sub>    |                                                                                                   | N-Ch                                                                                                |      | 77   |      |    |    |
|                                    |                     |                                                                                                   | P-Ch                                                                                                |      | 120  |      |    |    |
| SWITCHING CHARACTERISTICS (Note 4) |                     |                                                                                                   |                                                                                                     |      |      |      |    |    |
| Turn-on Delay Time                 | t <sub>d(on)</sub>  | N-Ch<br>V <sub>DD</sub> =15V, R <sub>L</sub> =2.2Ω<br>V <sub>GEN</sub> =10V, R <sub>GEN</sub> =3Ω | N-Ch                                                                                                |      | 4.6  |      | nS |    |
|                                    |                     |                                                                                                   | P-Ch                                                                                                |      | 7.7  |      |    |    |
| Turn-on Rise Time                  | t <sub>r</sub>      |                                                                                                   | P-Ch<br>V <sub>DD</sub> =-15V, R <sub>L</sub> =2.7Ω<br>V <sub>GEN</sub> =-10V, R <sub>GEN</sub> =3Ω | N-Ch |      | 4.1  |    | nS |
|                                    |                     |                                                                                                   |                                                                                                     | P-Ch |      | 5.7  |    |    |
| Turn-Off Delay Time                | t <sub>d(off)</sub> | N-Ch                                                                                              |                                                                                                     |      | 20.6 |      | nS |    |
|                                    |                     | P-Ch                                                                                              |                                                                                                     |      | 20   |      |    |    |
| Turn-Off Fall Time                 | t <sub>f</sub>      | N-Ch                                                                                              |                                                                                                     |      | 5.2  |      | nS |    |
|                                    |                     | P-Ch                                                                                              |                                                                                                     |      | 9.5  |      |    |    |
| Total Gate Charge                  | Q <sub>g</sub>      | N-Ch<br>V <sub>DS</sub> =15V, I <sub>D</sub> =6.9A,<br>V <sub>GS</sub> =4.5V                      | N-Ch                                                                                                |      | 7    |      | nC |    |
|                                    |                     |                                                                                                   | P-Ch                                                                                                |      | 9.6  |      |    |    |
| Gate-Source Charge                 | Q <sub>gs</sub>     |                                                                                                   | P-Ch<br>V <sub>DS</sub> =-15V, I <sub>D</sub> =-6A,<br>V <sub>GS</sub> =-4.5V                       | N-Ch |      | 1.8  |    | nC |
|                                    |                     |                                                                                                   |                                                                                                     | P-Ch |      | 2.5  |    |    |
| Gate-Drain Charge                  | Q <sub>gd</sub>     |                                                                                                   | N-Ch                                                                                                |      | 3.2  |      | nC |    |
|                                    |                     |                                                                                                   | P-Ch                                                                                                |      | 4.5  |      |    |    |

### DRAIN-SOURCE DIODE CHARACTERISTICS

|                                |          |                      |      |  |       |    |   |
|--------------------------------|----------|----------------------|------|--|-------|----|---|
| Diode Forward Voltage (Note 3) | $V_{SD}$ | $V_{GS}=0V, I_S=1A$  | N-Ch |  | 0.76  | 1  | V |
|                                |          | $V_{GS}=0V, I_S=-1A$ | P-Ch |  | -0.77 | -1 | V |

### NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production testing.

### N-Channel THERMAL CHARACTERISTICS

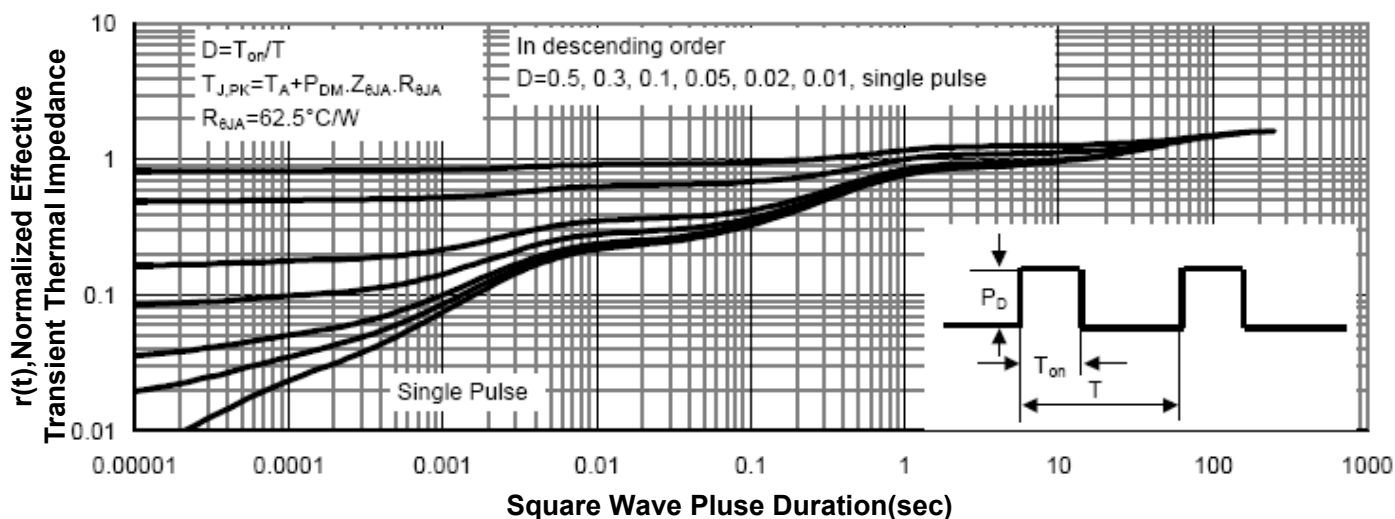


Figure 1. Normalized Maximum Transient Thermal Impedance

### P-Channel THERMAL CHARACTERISTICS

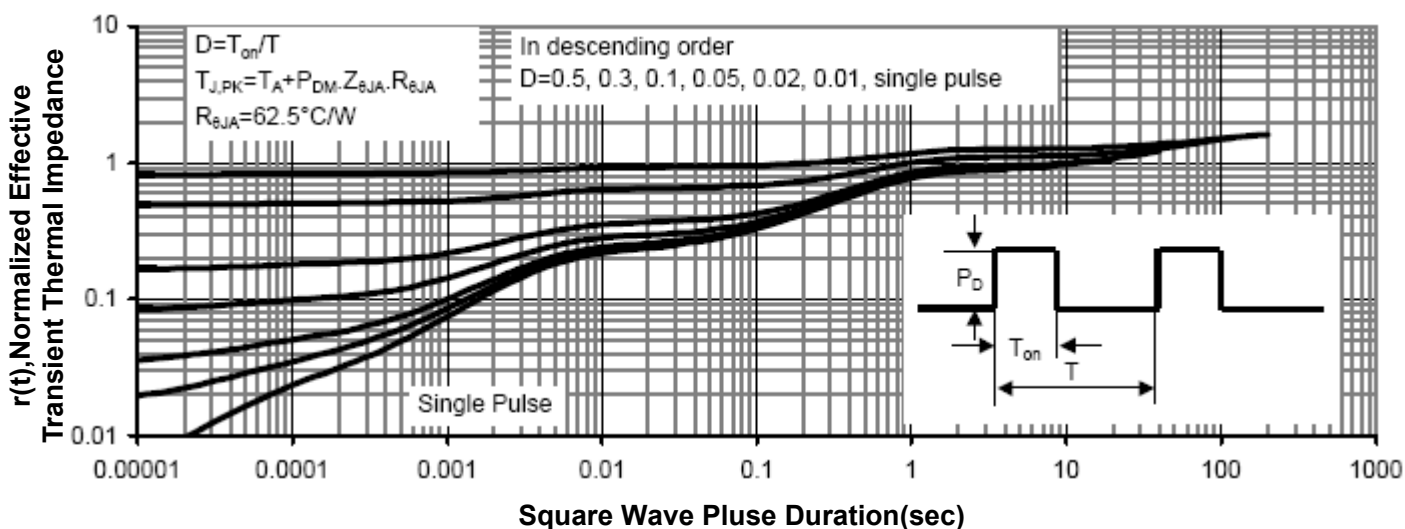
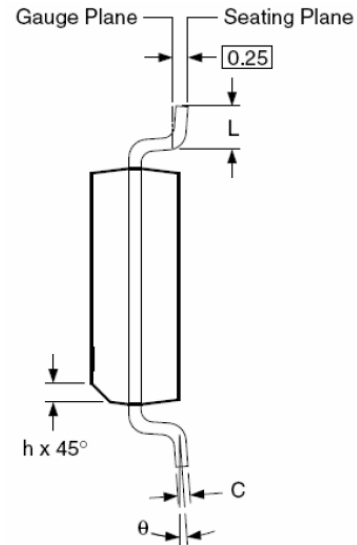
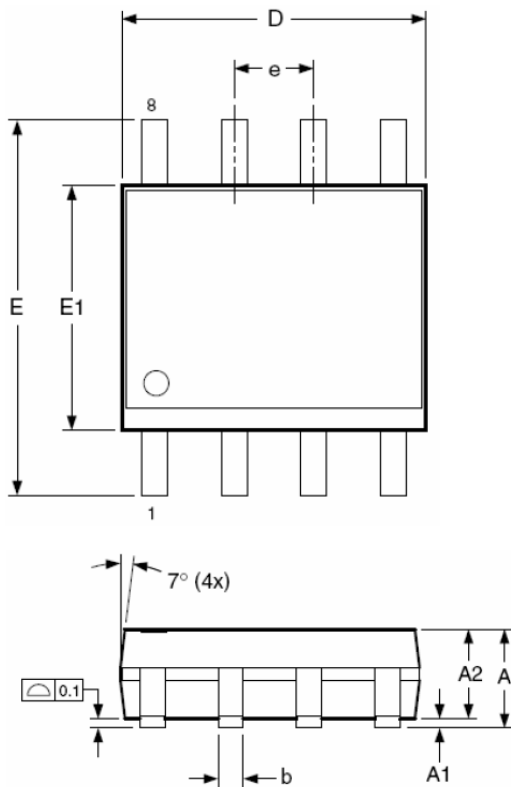
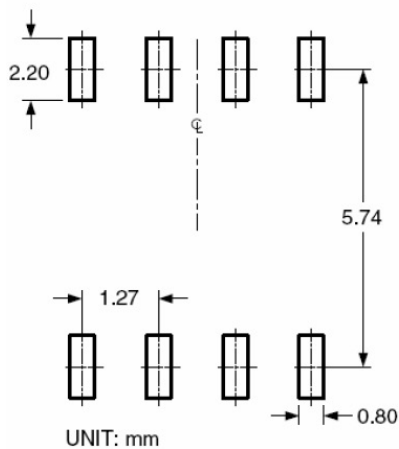


Figure 2. Normalized Maximum Transient Thermal Impedance

### SOP-8 PACKAGE INFORMATION



### RECOMMENDED LAND PATTERN



#### Dimensions in millimeters

| Symbols | Min.     | Nom. | Max. |
|---------|----------|------|------|
| A       | 1.35     | 1.65 | 1.75 |
| A1      | 0.10     | —    | 0.25 |
| A2      | 1.25     | 1.50 | 1.65 |
| b       | 0.31     | —    | 0.51 |
| c       | 0.17     | —    | 0.25 |
| D       | 4.80     | 4.90 | 5.00 |
| E1      | 3.80     | 3.90 | 4.00 |
| e       | 1.27 BSC |      |      |
| E       | 5.80     | 6.00 | 6.20 |
| h       | 0.25     | —    | 0.50 |
| L       | 0.40     | —    | 1.27 |
| θ       | 0°       | —    | 8°   |

#### Dimensions in inches

| Symbols | Min.      | Nom.  | Max.  |
|---------|-----------|-------|-------|
| A       | 0.053     | 0.065 | 0.069 |
| A1      | 0.004     | —     | 0.010 |
| A2      | 0.049     | 0.059 | 0.065 |
| b       | 0.012     | —     | 0.020 |
| c       | 0.007     | —     | 0.010 |
| D       | 0.189     | 0.193 | 0.197 |
| E1      | 0.150     | 0.154 | 0.157 |
| e       | 0.050 BSC |       |       |
| E       | 0.228     | 0.236 | 0.244 |
| h       | 0.010     | —     | 0.020 |
| L       | 0.016     | —     | 0.050 |
| θ       | 0°        | —     | 8°    |

### NOTES:

1. All dimensions are in millimeters.
2. Dimensions are inclusive of plating.
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 6 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.