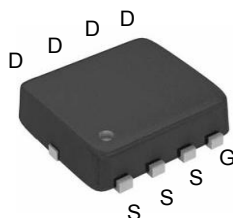
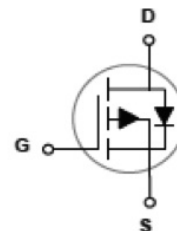


### Main Product Characteristics

|               |      |
|---------------|------|
| $V_{(BR)DSS}$ | -20V |
| $R_{DS(ON)}$  | 8mΩ  |
| $I_D$         | -60A |



PPAK3x3



Schematic Diagram

### Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery



### Description

The SSFN2603 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supply and a wide variety of other applications.

### Absolute Maximum Ratings ( $T_C=25^{\circ}C$ unless otherwise specified)

| Parameter   | Symbol    | Rating      | Unit |
|---|-----------|-------------|------|
| Drain-Source Voltage                              | $V_{DS}$  | -20         | V    |
| Gate-Source Voltage                               | $V_{GS}$  | ±12         | V    |
| Drain Current – Continuous ( $T_C=25^{\circ}C$ )  | $I_D$     | -60         | A    |
| Drain Current – Continuous ( $T_C=100^{\circ}C$ ) |           | -38         | A    |
| Drain Current – Pulsed <sup>1</sup>               | $I_{DM}$  | -240        | A    |
| Power Dissipation ( $T_C=25^{\circ}C$ )           | $P_D$     | 62.5        | W    |
| Power Dissipation – Derate above 25°C             |           | 0.5         | W/°C |
| Storage Temperature Range                         | $T_{STG}$ | -55 to +150 | °C   |
| Operating Junction Temperature Range              | $T_J$     | -55 to +150 | °C   |

### Thermal Characteristics

| Parameter                              | Symbol          | Typ. | Max. | Unit |
|--|-----------------|------|------|------|
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | ---  | 62   | °C/W |
| Thermal Resistance Junction to Case    | $R_{\theta JC}$ | ---  | 2    | °C/W |

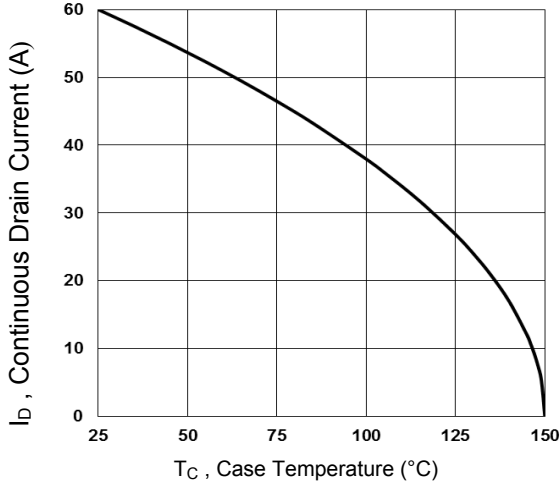
**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

| Parameter   | Symbol                       | Conditions  | Min. | Typ.  | Max.      | Unit                 |
|---|------------------------------|---|------|-------|-----------|----------------------|
| <b>Off Characteristics</b>                                    |                              |   |      |       |           |                      |
| Drain-Source Breakdown Voltage                                | $BV_{DSS}$                   | $V_{GS}=0V, I_D=-250\mu A$                            | -20  | ---   | ---       | V                    |
| $BV_{DSS}$ Temperature Coefficient                            | $\Delta BV_{DSS}/\Delta T_J$ | Reference to $25^{\circ}\text{C}$ , $I_D=-1\text{mA}$ | ---  | -0.01 | ---       | $V/^{\circ}\text{C}$ |
| Drain-Source Leakage Current                                  | $I_{DSS}$                    | $V_{DS}=-20V, V_{GS}=0V, T_J=25^{\circ}\text{C}$      | ---  | ---   | -1        | $\mu A$              |
|   |                              | $V_{DS}=-16V, V_{GS}=0V, T_J=125^{\circ}\text{C}$     | ---  | ---   | -10       | $\mu A$              |
| Gate-Source Leakage Current                                   | $I_{GSS}$                    | $V_{GS}=\pm 12V, V_{DS}=0V$                           | ---  | ---   | $\pm 100$ | nA                   |
| <b>On Characteristics</b>                                     |                              |   |      |       |           |                      |
| Static Drain-Source On-Resistance                             | $R_{DS(ON)}$                 | $V_{GS}=-4.5V, I_D=-8A$                               | ---  | 6     | 8         | $m\Omega$            |
|   |                              | $V_{GS}=-2.5V, I_D=-5A$                               | ---  | 8     | 11        | $m\Omega$            |
|   |                              | $V_{GS}=-1.8V, I_D=-3A$                               | ---  | 11    | 16        | $m\Omega$            |
| Gate Threshold Voltage  | $V_{GS(th)}$                 | $V_{GS}=V_{DS}, I_D=-250\mu A$                        | -0.3 | -0.6  | -1.0      | V                    |
| Forward Transconductance                                      | $g_{fs}$                     | $V_{DS}=-10V, I_D=-5A$                                | ---  | 20    | ---       | S                    |
| <b>Dynamic and Switching Characteristics</b>                  |                              |   |      |       |           |                      |
| Total Gate Charge <sup>2,3</sup>                              | $Q_g$                        | $V_{DS}=-10V, V_{GS}=-4.5V, I_D=-5A$                  | ---  | 44.4  | 80        | nC                   |
| Gate-Source Charge <sup>2,3</sup>                             | $Q_{gs}$                     |   | ---  | 7.2   | 14        |                      |
| Gate-Drain Charge <sup>2,3</sup>                              | $Q_{gd}$                     |   | ---  | 10.2  | 20        |                      |
| Turn-On Delay Time <sup>2,3</sup>                             | $T_{d(on)}$                  | $V_{DD}=-10V, V_{GS}=-4.5V, R_G=25\Omega, I_D=-1A$    | ---  | 13.2  | 26        | nS                   |
| Rise Time <sup>2,3</sup>                                      | $T_r$                        |   | ---  | 68    | 120       |                      |
| Turn-Off Delay Time <sup>2,3</sup>                            | $T_{d(off)}$                 |   | ---  | 160   | 320       |                      |
| Fall Time <sup>2,3</sup>                                      | $T_f$                        |   | ---  | 154   | 300       |                      |
| Input Capacitance   | $C_{iss}$                    | $V_{DS}=-15V, V_{GS}=0V, F=1\text{MHz}$               | ---  | 4060  | 8000      | pF                   |
| Output Capacitance  | $C_{oss}$                    |   | ---  | 520   | 1000      |                      |
| Reverse Transfer Capacitance                                  | $C_{rss}$                    |   | ---  | 400   | 800       |                      |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |                              |   |      |       |           |                      |
| Parameter   | Symbol                       | Conditions  | Min. | Typ.  | Max.      | Unit                 |
| Continuous Source Current                                     | $I_S$                        | $V_G=V_D=0V, \text{Force Current}$                    | ---  | ---   | -60       | A                    |
| Pulsed Source Current   | $I_{SM}$                     |   | ---  | ---   | -120      | A                    |
| Diode Forward Voltage   | $V_{SD}$                     | $V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$          | ---  | ---   | -1        | V                    |

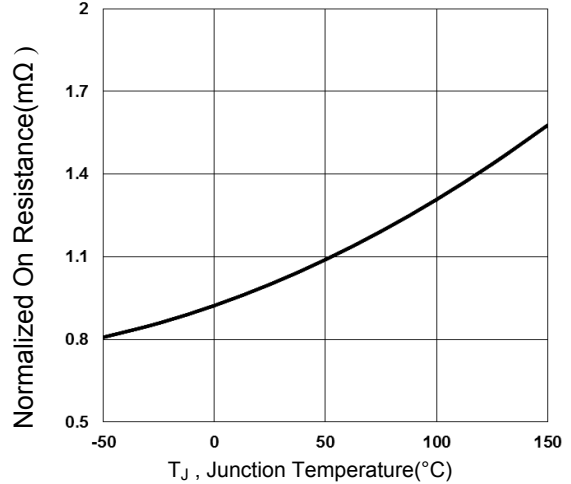
Note:

1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
3. Essentially independent of operating temperature.

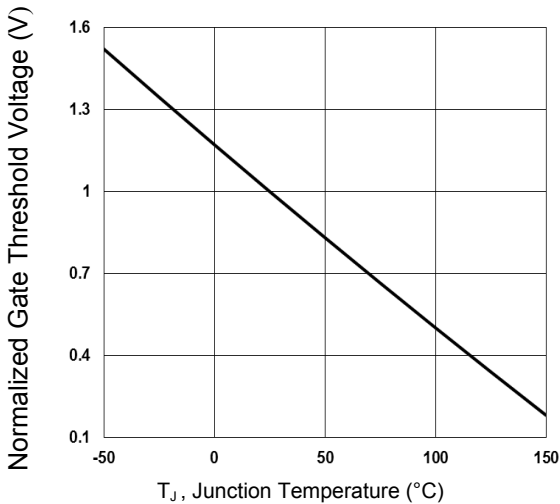
**Typical Electrical and Thermal Characteristic Curves**



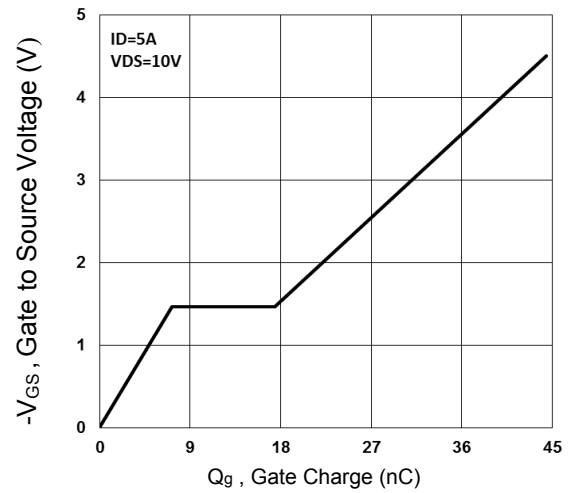
**Fig.1 Continuous Drain Current vs.  $T_c$**



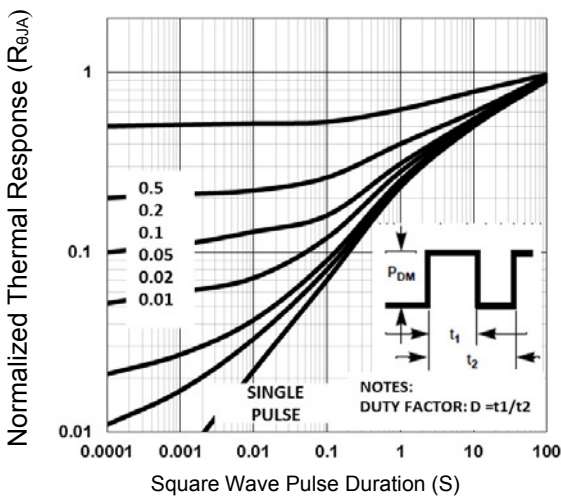
**Fig.2 Normalized  $R_{DS(ON)}$  vs.  $T_j$**



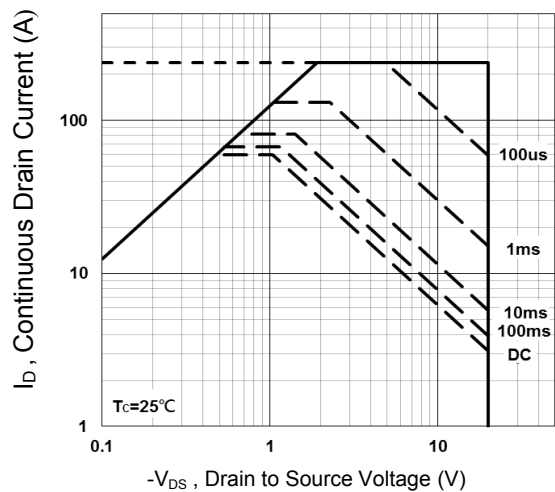
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.4 Gate Charge Waveform**

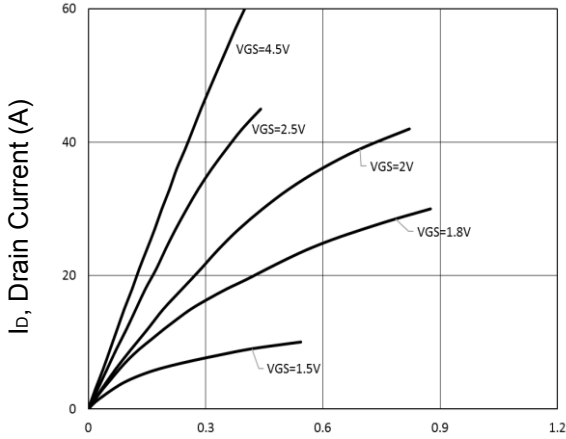


**Fig.5 Normalized Transient Impedance**

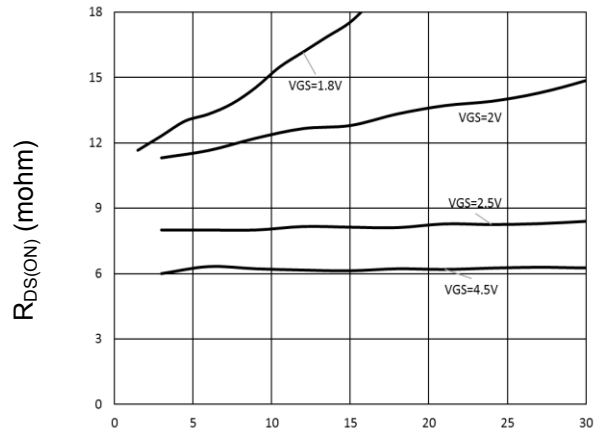


**Fig.6 Maximum Safe Operation Area**

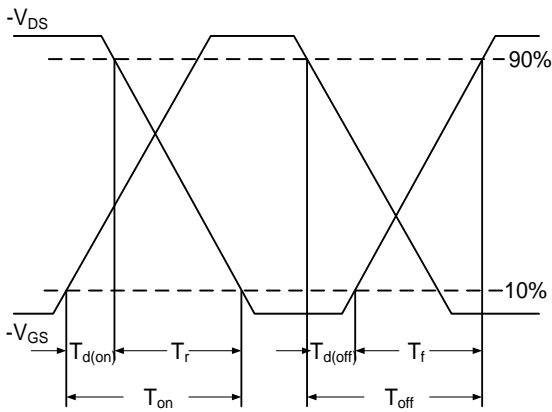
**Typical Electrical and Thermal Characteristic Curves**



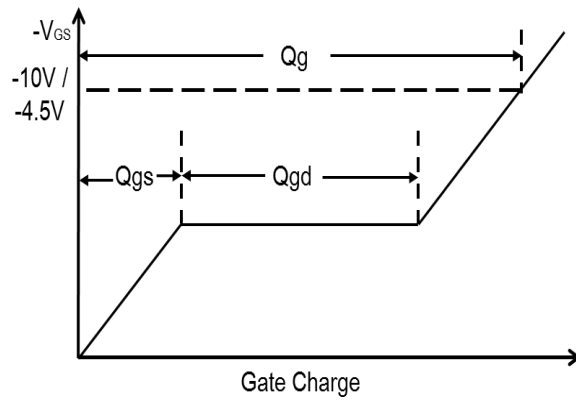
$V_{DS}$ , Drain to Source Voltage  
**Fig.7 Typical Output Characteristics**



$I_D$ , Drain Current (A)  
**Fig.8  $R_{DS(ON)}$  vs. Drain Current**



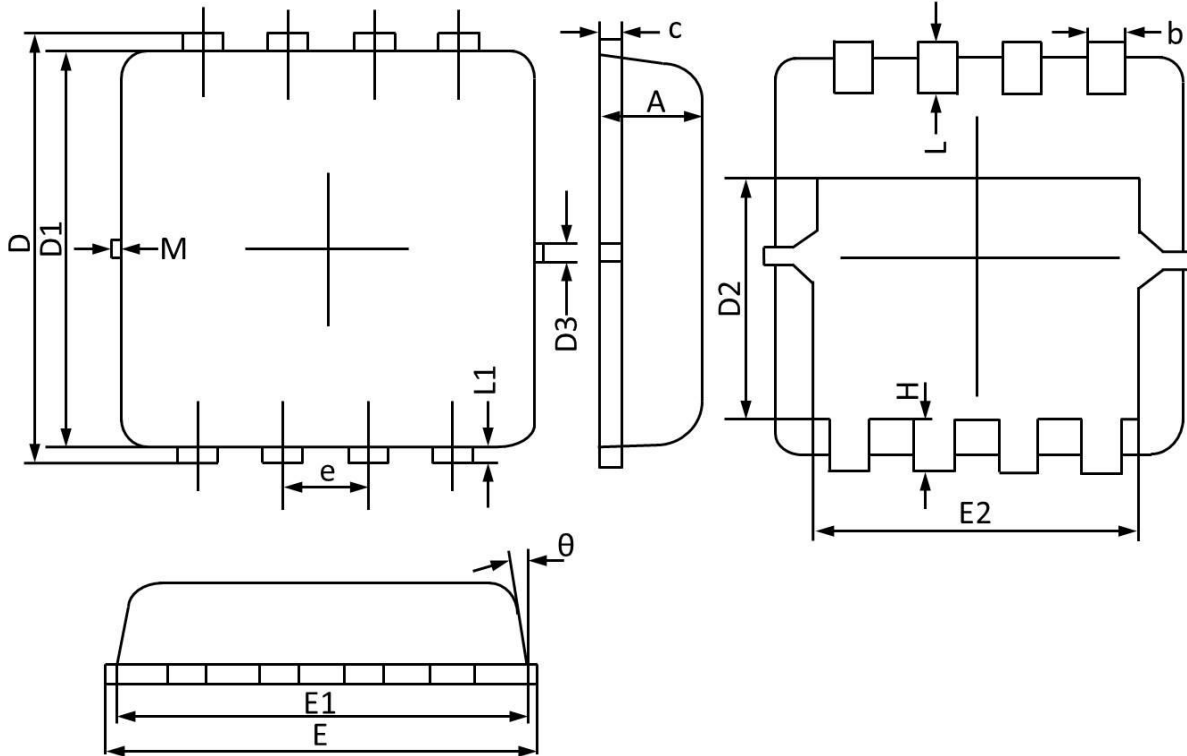
**Fig.9 Switching Time Waveform**



**Fig.10 Gate Charge Waveform**

**Package Outline Dimensions**

**PPAK3x3**



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | MAX                       | MIN   | MAX                  | MIN   |
| A      | 0.900                     | 0.700 | 0.035                | 0.028 |
| b      | 0.350                     | 0.240 | 0.014                | 0.009 |
| c      | 0.250                     | 0.100 | 0.010                | 0.004 |
| D      | 3.450                     | 3.050 | 0.136                | 0.120 |
| D1     | 3.200                     | 2.900 | 0.126                | 0.114 |
| D2     | 1.850                     | 1.350 | 0.073                | 0.053 |
| E      | 3.400                     | 3.000 | 0.134                | 0.118 |
| E1     | 3.250                     | 2.900 | 0.128                | 0.114 |
| E2     | 2.600                     | 2.350 | 0.102                | 0.093 |
| e      | 0.65BSC                   |       | 0.026BSC             |       |
| H      | 0.500                     | 0.300 | 0.020                | 0.012 |
| L      | 0.500                     | 0.300 | 0.020                | 0.012 |
| L1     | 0.200                     | 0.070 | 0.008                | 0.003 |
| theta  | 12°                       | 0°    | 12°                  | 0°    |