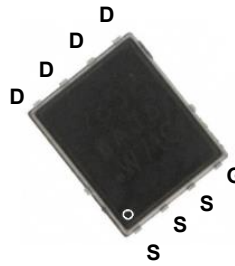
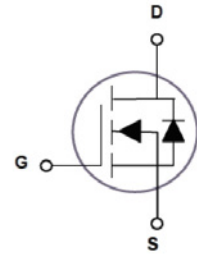


Main Product Characteristics

| | |
|---------------|--------------|
| $V_{(BR)DSS}$ | 60V |
| $R_{DS(ON)}$ | 12m Ω |
| I_D | 50A |



PPAK5x6



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 SSFP6904 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 ($T_C=25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Rating | Unit |
|--|-----------|-------------|---------------------|
| Drain-Source Voltage | V_{DS} | 60 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current – Continuous ($T_C=25^\circ\text{C}$) | I_D | 50 | A |
| Drain Current – Continuous ($T_C=100^\circ\text{C}$) | | 31 | A |
| Drain Current – Pulsed ¹ | I_{DM} | 200 | A |
| Single Pulse Avalanche Energy ² | E_{AS} | 61 | mJ |
| Single Pulse Avalanche Current ² | I_{AS} | 35 | A |
| Power Dissipation ($T_C=25^\circ\text{C}$) | P_D | 96 | W |
| Power Dissipation – Derate above 25°C | | 0.77 | W/ $^\circ\text{C}$ |
| Storage Temperature Range | T_{STG} | -55 to +150 | $^\circ\text{C}$ |
| Operating Junction Temperature Range | T_J | -55 to +150 | $^\circ\text{C}$ |

Thermal Characteristics

| Parameter | Symbol | Typ. | Max. | Unit |
|--|-----------------|------|------|---------------------------|
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | --- | 62 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | --- | 1.3 | $^\circ\text{C}/\text{W}$ |

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

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|------------------------------|---|------|------|-----------|------------------------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=250\mu A$ | 60 | --- | --- | V |
| BV_{DSS} Temperature Coefficient | $\Delta BV_{DSS}/\Delta T_J$ | Reference to $25^{\circ}\text{C}, I_D=1\text{mA}$ | --- | 0.03 | --- | $V/^{\circ}\text{C}$ |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}=60V, V_{GS}=0V, T_J=25^{\circ}\text{C}$ | --- | --- | 1 | μA |
| | | $V_{DS}=48V, V_{GS}=0V, T_J=125^{\circ}\text{C}$ | --- | --- | 10 | μA |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | --- | --- | ± 100 | nA |
| On Characteristics | | | | | | |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}=10V, I_D=10A$ | --- | 10 | 12 | m Ω |
| | | $V_{GS}=4.5V, I_D=8A$ | --- | 12 | 15 | m Ω |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}=V_{DS}, I_D=250\mu A$ | 1.2 | 1.6 | 2.5 | V |
| $V_{GS(th)}$ Temperature Coefficient | $\Delta V_{GS(th)}$ | | --- | -4 | --- | $\text{mV}/^{\circ}\text{C}$ |
| Forward Transconductance | g_{fs} | $V_{DS}=10V, I_D=6A$ | --- | 11.7 | --- | S |
| Dynamic and Switching Characteristics | | | | | | |
| Total Gate Charge ^{3,4} | Q_g | $V_{DS}=30V, V_{GS}=10V, I_D=10A$ | --- | 39.2 | 59 | nC |
| Gate-Source Charge ^{3,4} | Q_{gs} | | --- | 5.9 | 9 | |
| Gate-Drain Charge ^{3,4} | Q_{gd} | | --- | 8.8 | 14 | |
| Turn-On Delay Time ^{3,4} | $T_{d(on)}$ | $V_{DD}=15V, V_{GS}=10V, R_G=6\Omega, I_D=1A$ | --- | 9.6 | 18 | nS |
| Rise Time ^{3,4} | T_r | | --- | 28.2 | 54 | |
| Turn-Off Delay Time ^{3,4} | $T_{d(off)}$ | | --- | 45.3 | 86 | |
| Fall Time ^{3,4} | T_f | | --- | 10.9 | 21 | |
| Input Capacitance | C_{iss} | $V_{DS}=25V, V_{GS}=0V, F=1\text{MHz}$ | --- | 2100 | 3050 | pF |
| Output Capacitance | C_{oss} | | --- | 165 | 240 | |
| Reverse Transfer Capacitance | C_{rss} | | --- | 80 | 120 | |
| Gate Resistance | R_g | $V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$ | --- | 1.6 | 3.2 | Ω |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
| Continuous Source Current | I_S | $V_G=V_D=0V, \text{Force Current}$ | --- | --- | 55 | A |
| Pulsed Source Current | I_{SM} | | --- | --- | 200 | 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. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=35A, R_G=25\Omega, \text{Starting } T_J=25^{\circ}\text{C}.$
3. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
4. Essentially independent of operating temperature.

Typical Electrical and Thermal Characteristic Curves

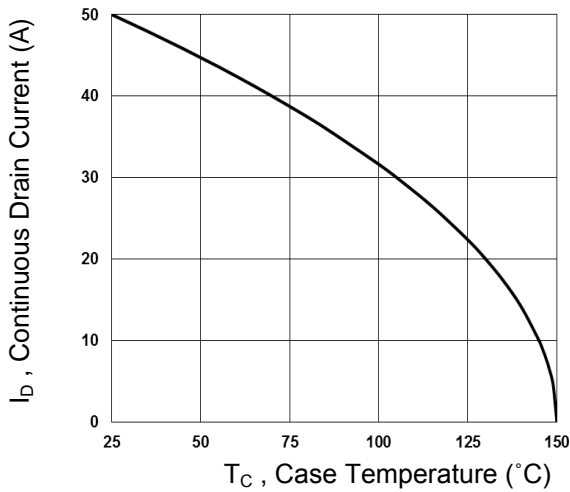


Fig.1 Continuous Drain Current vs. T_C

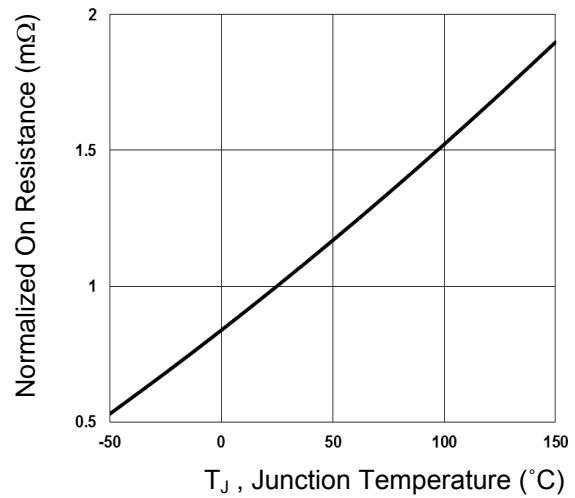


Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

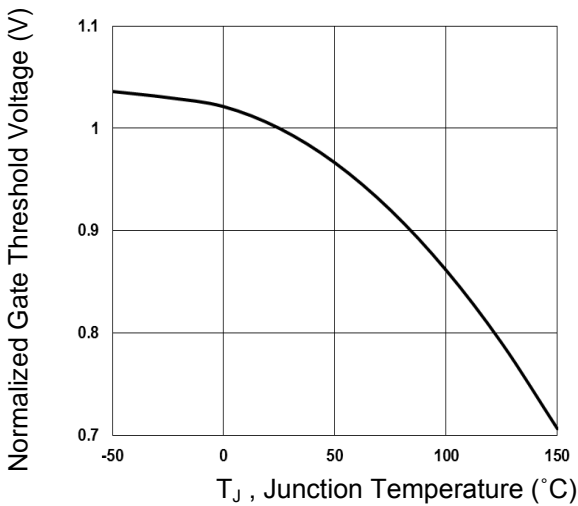


Fig.3 Normalized V_{th} vs. T_J

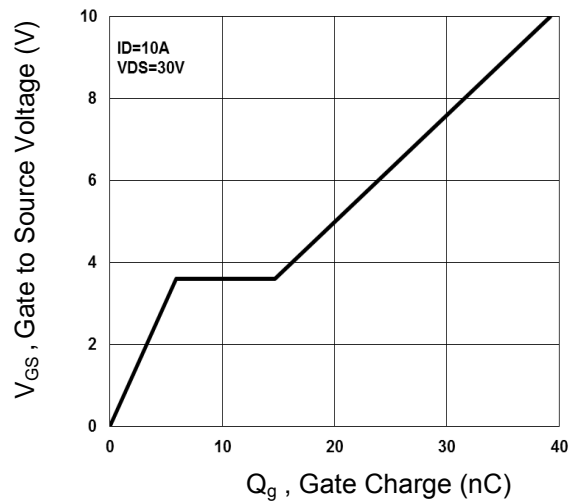


Fig.4 Gate Charge Waveform

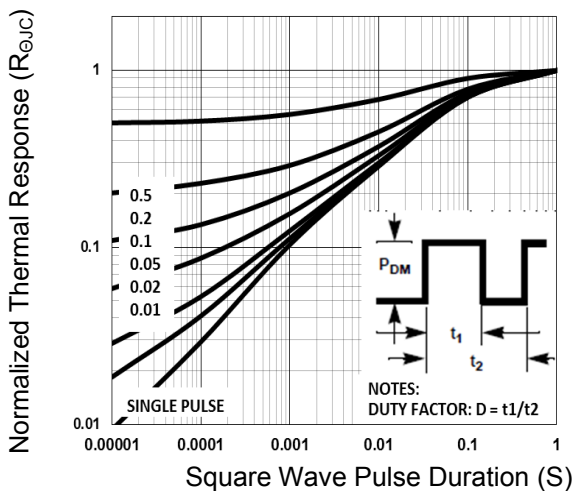


Fig.5 Normalized Transient Impedance

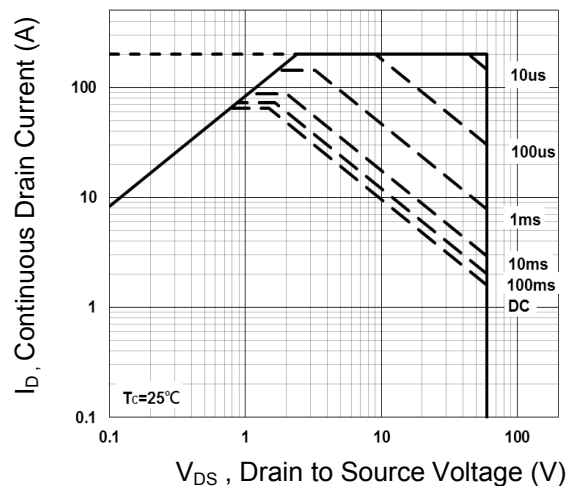


Fig.6 Maximum Safe Operation Area

Typical Electrical and Thermal Characteristic Curves

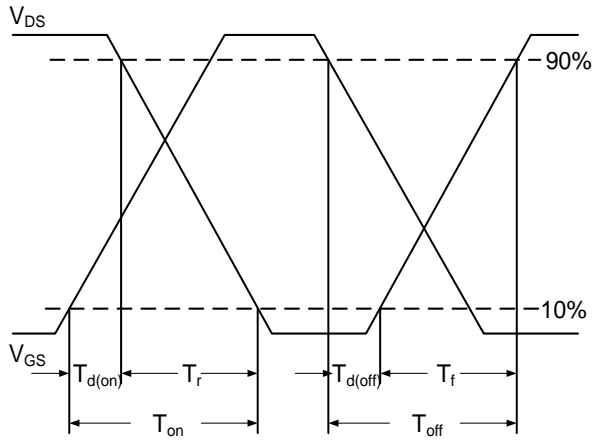


Fig.7 Switching Time Waveform

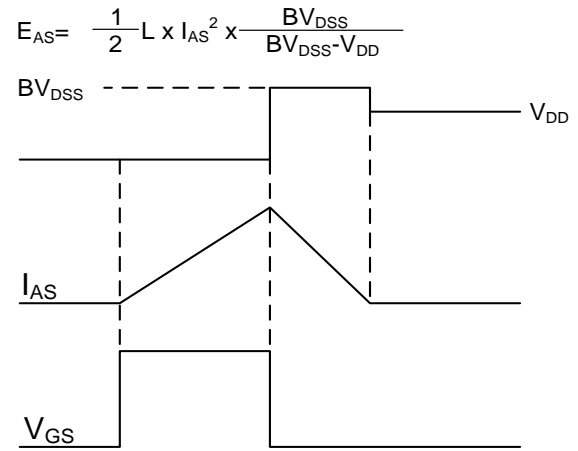
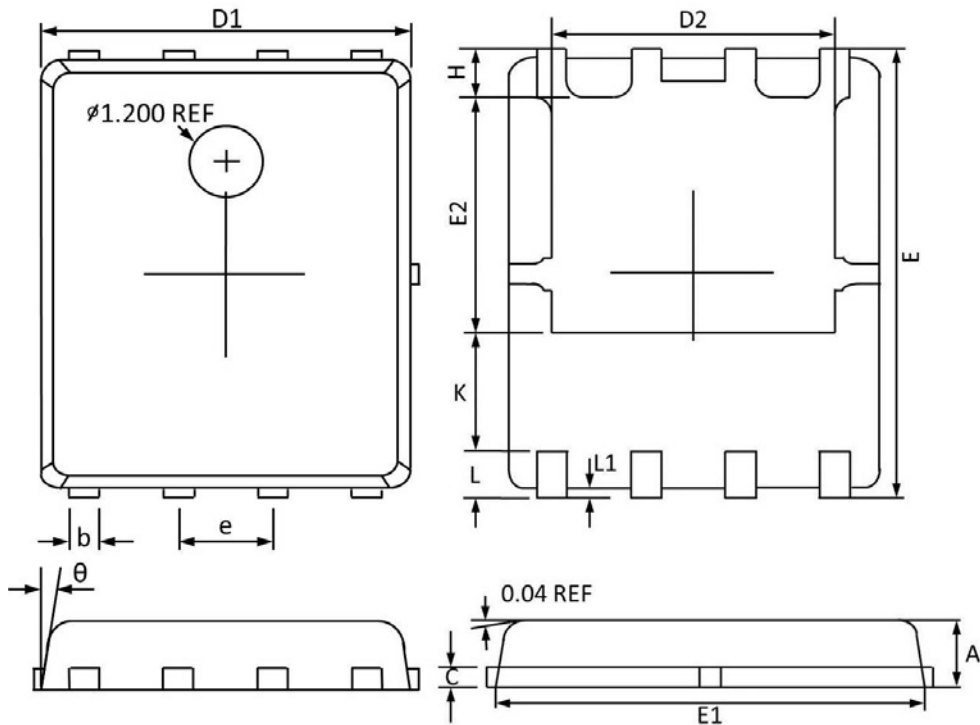


Fig. 8 E_{AS} Waveform

Package Outline Dimensions

PPAK5x6



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|----------|---------------------------|-------|----------------------|-------|
| | MAX | MIN | MAX | MIN |
| A | 1.100 | 0.800 | 0.043 | 0.031 |
| b | 0.510 | 0.330 | 0.020 | 0.013 |
| C | 0.300 | 0.200 | 0.012 | 0.008 |
| D1 | 5.100 | 4.800 | 0.201 | 0.189 |
| D2 | 4.100 | 3.610 | 0.161 | 0.142 |
| E | 6.200 | 5.900 | 0.244 | 0.232 |
| E1 | 5.900 | 5.700 | 0.232 | 0.224 |
| E2 | 3.780 | 3.350 | 0.149 | 0.132 |
| e | 1.27BSC | | 0.05BSC | |
| H | 0.700 | 0.410 | 0.028 | 0.016 |
| K | 1.500 | 1.100 | 0.059 | 0.043 |
| L | 0.710 | 0.510 | 0.028 | 0.020 |
| L1 | 0.200 | 0.060 | 0.008 | 0.002 |
| θ | 12° | 0° | 12° | 0° |