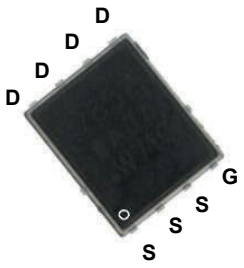
GOOD-ARK SEMICONDUCTOR

# GSGP4R608

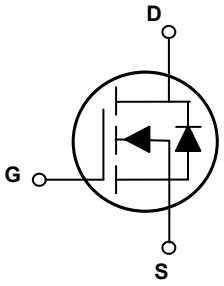
**80V N-Channel MOSFET**

## Main Product Characteristics

| | |
|---|---|
| $V_{(BR)DSS}$ | 80V |
| $R_{DS(ON)}$ | 4.6mΩ (Max.) |
| $I_D$ | 110A |




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 GSGP4R608 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 supplies and a wide variety of other applications.

## Absolute Maximum Ratings ($T_A$=25°C unless otherwise specified)

| Parameter | Symbol | Max. | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 80 | V |
| Gate-to-Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current, @ Steady-State ($T_C$=25°C)[1] | $I_D$ | 110 | A |
| Continuous Drain Current, @ Steady-State ($T_C$=100°C) | | 80 | A |
| Pulsed Drain Current[2] | $I_{DM}$ | 440 | A |
| Power Dissipation ($T_C$=25°C) | $P_D$ | 140 | W |
| Linear Derating Factor ($T_C$=25°C) | | 1.12 | W/°C |
| Single Pulse Avalanche Energy[3] | $E_{AS}$ | 400 | mJ |
| Junction-to-Case | $R_{\theta JC}$ | 0.89 | °C/W |
| Junction-to-Ambient (PCB Mounted, Steady-State)[4] | $R_{\theta JA}$ | 62.5 | °C/W |
| Operating Junction and Storage Temperature Range | $T_J/T_{STG}$ | -55 to +175 | °C |

## Electrical Characteristics ($T_A$=25°C unless otherwise specified)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **On / Off Characteristics** | | | | | | |
| Drain-to-Source Breakdown Voltage | $V_{(BR)DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 80 | - | - | V |
| Drain-to-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=80V, $V_{GS}$=0V | - | - | 1 | μA |
| | | $T_J$=125°C | - | - | 50 | |
| Gate-to-Source Forward Leakage | $I_{GSS}$ | $V_{GS}$=20V | - | - | 100 | nA |
| | | $V_{GS}$=-20V | - | - | -100 | |
| Static Drain-to-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$=30A | - | 3.9 | 4.6 | mΩ |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 2.1 | 3.1 | 3.9 | V |
| **Dynamic and Switching Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=40V, $f$=1MHz | - | 4286 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 669 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 19 | - | |
| Total Gate Charge | $Q_g$ | $I_D$=30A, $V_{DS}$=40V, $V_{GS}$=10V | - | 69 | - | nC |
| Gate-to-Source Charge | $Q_{gs}$ | | - | 30 | - | |
| Gate-to-Drain ("Miller") Charge | $Q_{gd}$ | | - | 16 | - | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{GS}$=10V, $V_{DS}$=40V, $R_g$=24Ω, $I_D$=13.2A | - | 59 | - | nS |
| Rise Time | $t_r$ | | - | 82 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 126 | - | |
| Fall Time | $t_f$ | | - | 72 | - | |
| Gate Resistance | $R_g$ | $f$=1MHz | - | 1.7 | - | Ω |
| **Source-Drain Ratings and Characteristics** | | | | | | |
| Continuous Source Current (Body Diode) | $I_S$ | MOSFET symbol showing the integral reverse p-n junction diode. | - | - | 110 | A |
| Pulsed Source Current (Body Diode) | $I_{SM}$ | | - | - | 440 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=30A, $V_{GS}$=0V | - | 1 | 1.2 | V |
| Reverse Recovery Time | $T_{rr}$ | $T_J$=25°C, $I_F$=20A, di/dt=100A/μs | - | 53 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 0.31 | - | uc |

Note:

1. Pulse test: Pulse width ≤ 300us, duty cycle ≤ 2%.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. L=0.5mH, $I_{AS}$=40A, $V_{DD}$=72V, $T_J$=25°C.
4. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch.

## Typical Electrical and Thermal Characteristic Curves

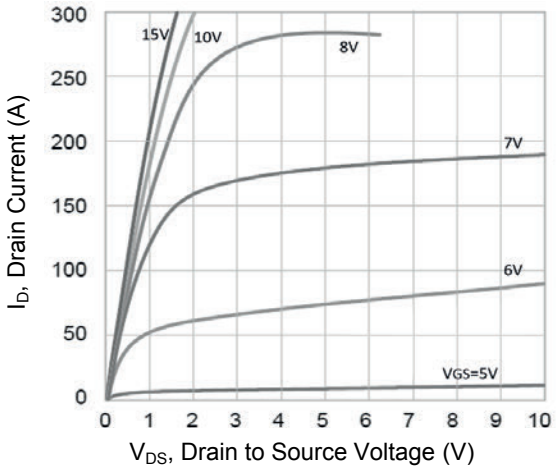



**Figure 1. Typical Output Characteristics**

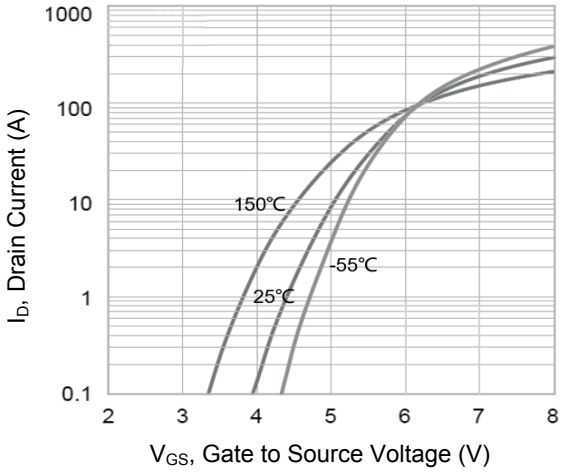



**Figure 2. Transfer Characteristics**

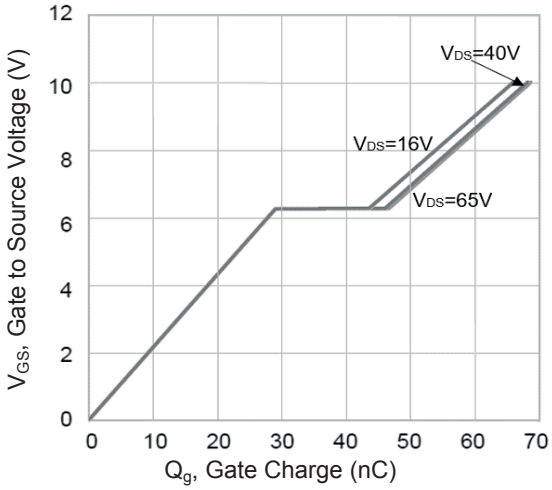



**Figure 3. Gate Charge**

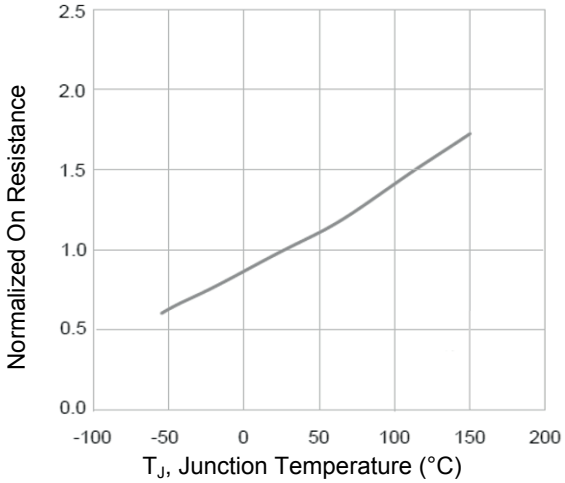



**Figure 4. Normalized $R_{DS(ON)}$ vs. $T_J$**

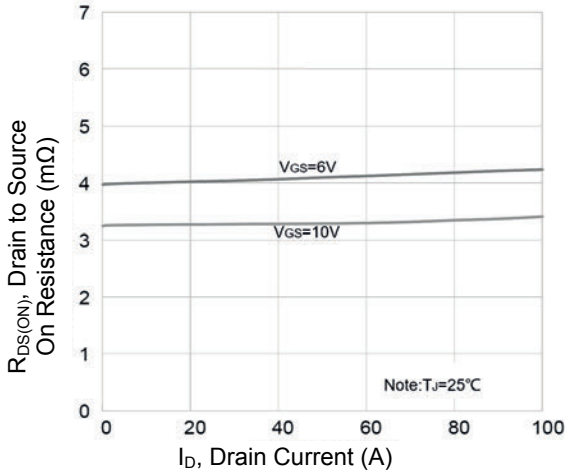



**Figure 5. $R_{DS(ON)}$ vs. Drain Current**

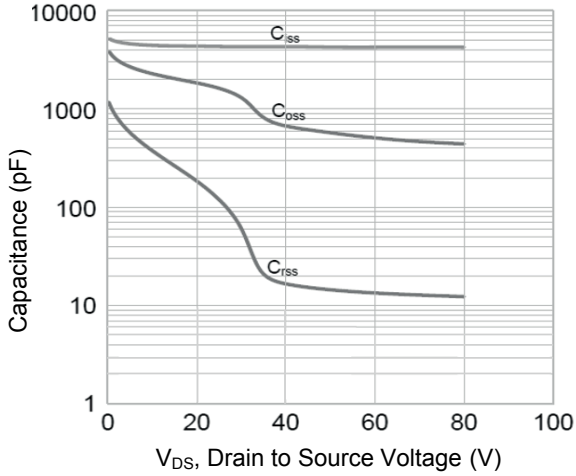



**Figure 6. Capacitance Characteristics**

## Typical Electrical and Thermal Characteristic Curves

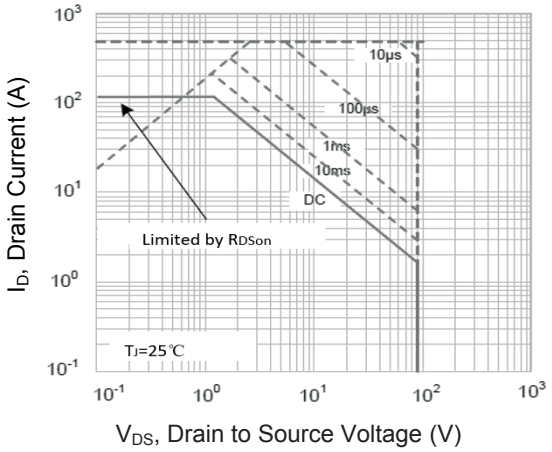



**Figure 7. Safe Operation Area**

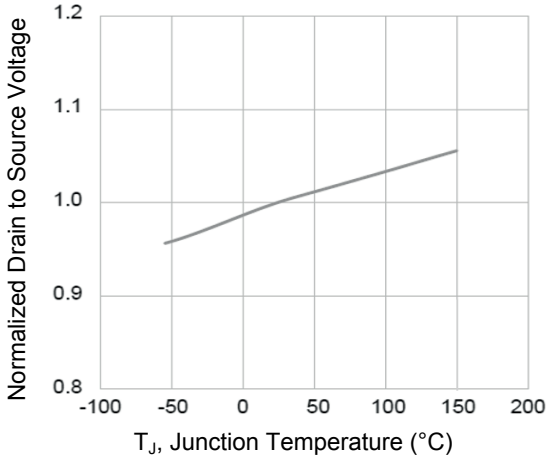
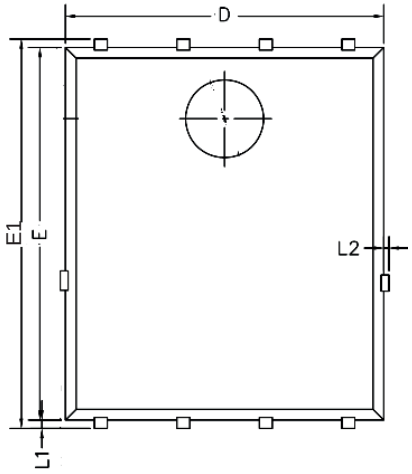
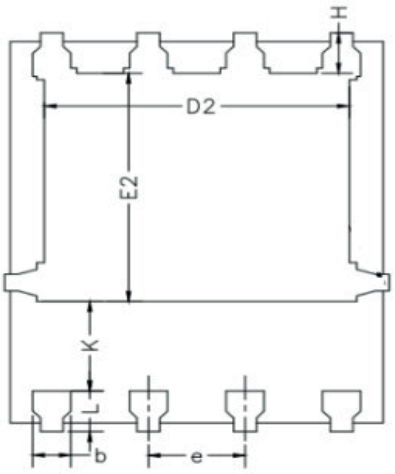



**Figure 8. Normalized $BV_{DSS}$ vs. $T_J$**

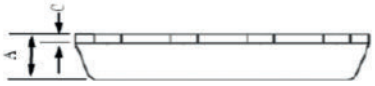
## Package Outline Dimensions (PPAK5x6)




TOP VIEW




BOTTOM VIEW




SIDE VIEW

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.90 | 1.20 | 0.035 | 0.047 |
| b | 0.30 | 0.55 | 0.012 | 0.022 |
| C | 0.15 | 0.35 | 0.006 | 0.014 |
| D | 4.70 | 5.20 | 0.185 | 0.205 |
| D2 | 3.76 | 4.20 | 0.148 | 0.165 |
| E2 | 3.30 | 3.85 | 0.130 | 0.152 |
| E | 5.60 | 5.90 | 0.220 | 0.232 |
| E1 | 5.80 | 6.20 | 0.228 | 0.244 |
| K | 1.10 | - | 0.043 | - |
| H | 0.45 | 0.75 | 0.018 | 0.030 |
| L | 0.45 | 0.75 | 0.018 | 0.030 |
| L1 | 0.25 | 0.45 | 0.010 | 0.018 |
| e | 1.27 BSC | | 0.050 BSC | |

## Order Information

| Device | Package | Marking | Carrier | Quantity |
|---|---|---|---|---|
| GSGP4R608 | PPAK5x6 | P4R608 | Tape & Reel | 5,000 Pcs / Reel |