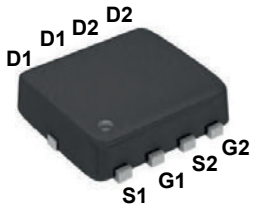
GOOD-ARK SEMICONDUCTOR

# GSFN2812

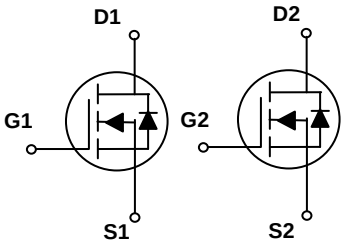
**20V Dual N-Channel MOSFET**

## Main Product Characteristics

| | |
|---|---|
| $V_{(BR)DSS}$ | 20V |
| $R_{DS(ON)}$ | 18mΩ (Max.) |
| $I_D$ | 10A |




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 GSFN2812 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 | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-to-Source Voltage | $V_{GS}$ | ±12 | V |
| Continuous Drain Current, @ Steady-State ($T_A$=25°C)[1] | $I_D$ | 10 | A |
| Continuous Drain Current, @ Steady-State ($T_A$=70°C) | | 8.0 | A |
| Pulsed Drain Current[2] | $I_{DM}$ | 40 | A |
| Power Dissipation ($T_C$=25°C) | $P_D$ | 23 | W |
| Linear Derating Factor | | 0.18 | W/°C |
| Single Pulse Avalanche Energy[3] | $E_{AS}$ | 14 | mJ |
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 5.43 | °C/W |
| Thermal Resistance, 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 +150 | °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 | 20 | - | - | V |
| Drain-to-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=20V, $V_{GS}$=0V | - | - | 1 | μA |
| | | $T_J$=125°C | - | - | 50 | |
| Gate-to-Source Forward Leakage | $I_{GSS}$ | $V_{GS}$=10V | - | - | 100 | nA |
| | | $V_{GS}$=-10V | - | - | -100 | |
| Static Drain-to-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=6.8A | - | 13 | 18 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$=3A | - | 18 | 22 | |
| | | $V_{GS}$=1.8V, $I_D$=2.5A | - | 22 | 26 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250μA | 0.40 | 0.65 | 1.0 | V |
| Forward Transconductance | gfs | $V_{DS}$=10V, $I_D$=4A | - | 6 | - | S |
| **Dynamic and Switching Characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{GS}$=0V, $V_{DS}$=10V, $f$=1MHz | - | 890 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 134 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 118 | - | |
| Total Gate Charge | $Q_g$ | $I_D$=6.8A, $V_{DS}$=10V, $V_{GS}$=4.5V | - | 12 | - | nC |
| Gate-to-Source Charge | $Q_{gs}$ | | - | 1.8 | - | |
| Gate-to-Drain ("Miller") Charge | $Q_{gd}$ | | - | 3.2 | - | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{GS}$=4.5V, $V_{DS}$=10V, $I_D$=6.8A, $R_{GEN}$=3Ω | - | 7.0 | - | nS |
| Rise Time | $t_r$ | | - | 46 | - | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 31 | - | |
| Fall Time | $t_f$ | | - | 50 | - | |
| Gate Resistance | $R_g$ | $f$=1MHz | - | 1.7 | - | Ω |
| **Drain-Source Ratings and Characteristics** | | | | | | |
| Continuous Source Current (Body Diode) | $I_S$ | MOSFET symbol showing the integral reverse p-n junction diode. | - | - | 10 | A |
| Pulsed Source Current (Body Diode) | $I_{SM}$ | | - | - | 40 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=2A, $V_{GS}$=0V | - | 1 | 1.2 | V |
| Reverse Recovery Time | $t_{rr}$ | $T_J$=25°C, $I_F$=6.8A, di/dt=100A/μs | - | 16 | - | nS |
| Reverse Recovery Charge | $Q_{rr}$ | | - | 2.06 | - | nC |

Note:
1. Pulse test: Pulse width ≤300us, duty cycle ≤2%.
2. Repetitive rating; pulse width limited by max. junction temperature.
3. L=0.1mH, $R_g$=25Ω, $V_{DD}$=25V, $T_J$=25°C.
4. Device mounted on FR-4 PCB, 1 inch × 0.85 inch x 0.062 inch.

## Typical Electrical and Thermal Characteristic Curves

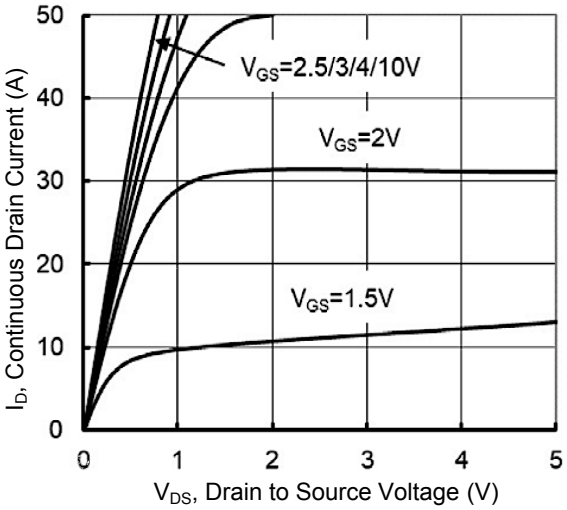



**Figure 1. Typical Output Characteristics**

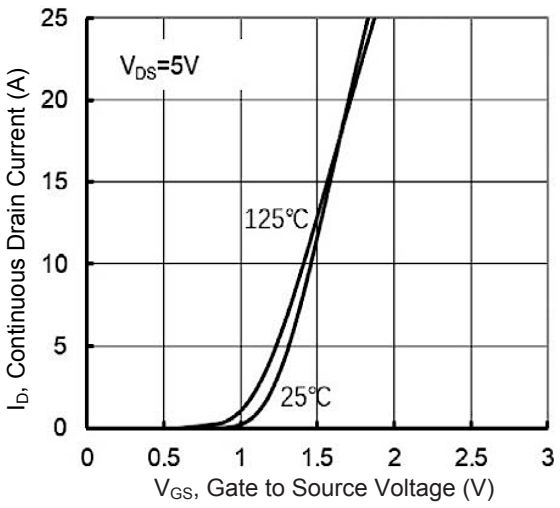



**Figure 2. Typical Transfer Characteristics**

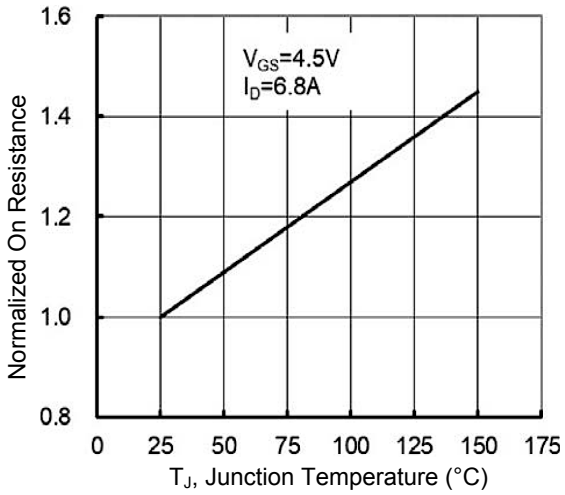



**Figure 3. Normalized $R_{DS(ON)}$ vs. $T_J$**

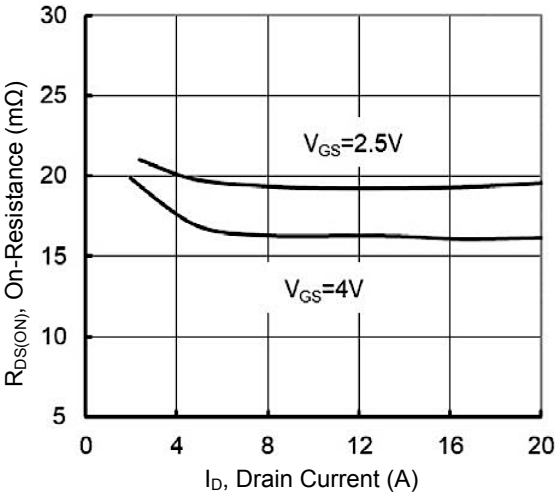



**Figure 4. $R_{DS(ON)}$ vs. $I_D$**

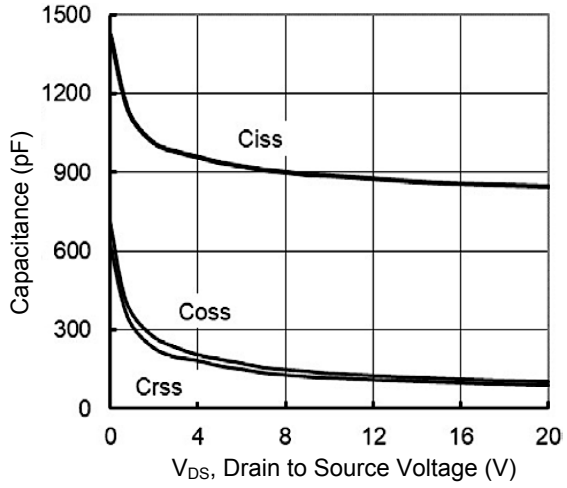



**Figure 5. Capacitance Characteristics**

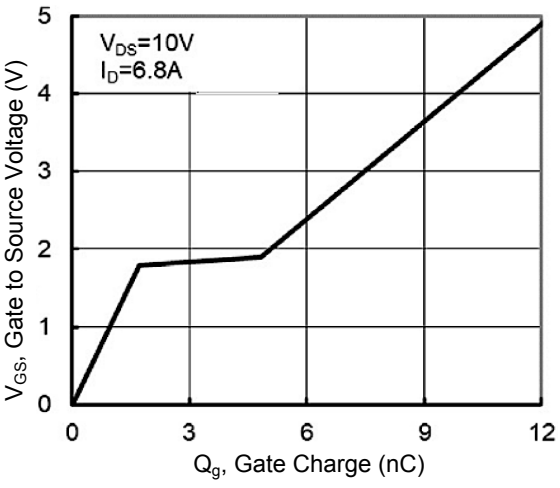
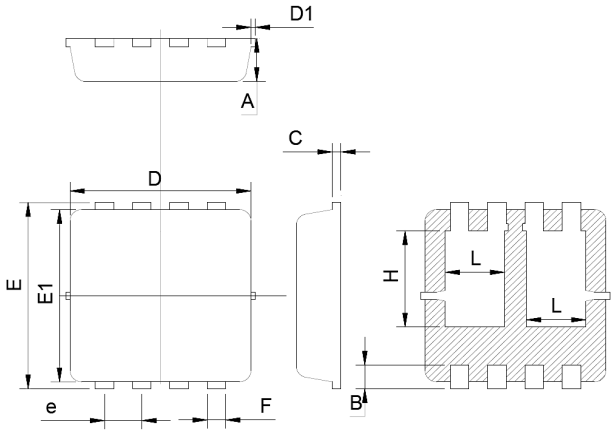


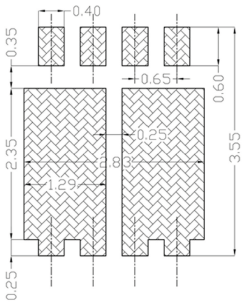

**Figure 6. Gate Charge Characteristics**

## Package Outline Dimensions (PPAK3x3)




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.725 | 0.825 | 0.029 | 0.032 |
| B | 0.280 | 0.480 | 0.011 | 0.019 |
| C | 0.130 | 0.200 | 0.005 | 0.008 |
| D | 3.050 | 3.250 | 0.120 | 0.128 |
| D1 | - | 0.100 | - | 0.004 |
| E | 3.250 | 3.450 | 0.128 | 0.136 |
| E1 | 3.000 | 3.200 | 0.118 | 0.126 |
| e | 0.600 | 0.700 | 0.024 | 0.028 |
| F | 0.250 | 0.350 | 0.010 | 0.014 |
| H | 1.630 | 1.830 | 0.064 | 0.072 |
| L | 0.930 | 1.130 | 0.037 | 0.044 |

## Recommended Pad Layout




unit : mm

## Order Information

| Device | Package | Marking | Packaging | SPQ |
|---|---|---|---|---|
| GSFN2812 | PPAK3x3 | N2812 | Tape & Reel | 5,000 Pcs / Reel |