GOOD-ARK SEMICONDUCTOR

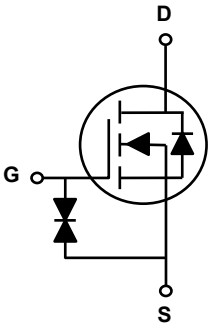
# GSFC3416

**20V N-Channel MOSFET**

## Main Product Characteristics

| | |
|---|---|
| $V_{(BR)DSS}$ | 20V |
| $R_{DS(ON)}$ | 20mΩ (Max.) |
| $I_D$ | 7.2A |


SOT-23




Schematic Diagram

## Features and Benefits

- Advanced MOSFET process technology
- Low on-resistance and low gate charge.
- Featuring low switching and drive losses.
- Fast switching and reverse body recovery.
- High ruggedness and robustness.

## Description

The GSFC3416 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 ($T_C$=25°C unless otherwise specified)

| Parameter | Symbol | Max. | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 20 | V |
| Gate-to-Source Voltage | $V_{GS}$ | ±10 | V |
| Drain Current-Continuous ($T_A$=25°C) | $I_D$ | 7.2 | A |
| Drain Current-Continuous ($T_A$=100°C) | | 4.6 | A |
| Drain Current-Pulsed[1] | $I_{DM}$ | 28.8 | A |
| Power Dissipation ($T_A$=25°C) | $P_D$ | 1.5 | W |
| Power Dissipation-Derate above 25°C | | 0.012 | W/°C |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 90 | °C/W |
| Operating Junction and Storage Temperature Range | $T_J$ /$T_{STG}$ | -55 to +150 | °C |

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

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **On / Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250μA | 20 | - | - | V |
| $BV_{DSS}$ Temperature Coefficient | $\triangle BV_{DSS}/\triangle T_J$ | Reference to 25°C, $I_D$=1mA | - | 0.02 | - | V/°C |
| Drain-Source Leakage Current | $I_{DSS}$ | $V_{DS}$=20V, $V_{GS}$=0V, $T_J$=25°C | - | - | 1 | μA |
| | | $V_{DS}$=16V, $V_{GS}$=0V, $T_J$=125°C | - | - | 10 | μA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±10V, $V_{DS}$=0V | - | - | ±10 | μA |
| Static Drain-Source On-Resistance | $R_{DS(ON)}$ | $V_{GS}$=4.5V, $I_D$=5A | - | 14 | 20 | mΩ |
| | | $V_{GS}$=2.5V, $I_D$=4A | - | 18 | 28 | |
| | | $V_{GS}$=1.8V, $I_D$=4A | - | 26 | 38 | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 0.5 | 0.7 | 1.0 | V |
| $V_{GS(th)}$ Temperature Coefficient | $\triangle V_{GS(th)}$ | | - | -2 | - | mV/°C |
| Forward Transconductance | gfs | $V_{DS}$=5V, $I_S$=5A | - | 14 | - | S |
| **Dynamic and Switching Characteristics** | | | | | | |
| Total Gate Charge[2,3] | $Q_g$ | $V_{DS}$=10V, $I_D$=5A, $V_{GS}$=4.5V | - | 9.2 | - | nC |
| Gate-Source Charge[2,3] | $Q_{gs}$ | | - | 1.6 | - | |
| Gate-Drain Charge[2,3] | $Q_{gd}$ | | - | 2.1 | - | |
| Turn-On Delay Time[2,3] | $t_{d(on)}$ | $V_{DD}$=10V, $R_G$=3Ω, $V_{GS}$=4.5V, $I_D$=5A | - | 11 | - | nS |
| Rise Time[2,3] | $t_r$ | | - | 34 | - | |
| Turn-Off Delay Time[2,3] | $t_{d(off)}$ | | - | 54 | - | |
| Fall Time[2,3] | $t_f$ | | - | 52 | - | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$=10V, $V_{GS}$=0V, F=1MHz | - | 670 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 150 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 90 | - | |
| **Source-Drain Ratings and Characteristics** | | | | | | |
| Continuous Source Current | $I_S$ | $V_G$=$V_D$=0V, Force Current | - | - | 7.2 | A |
| Pulsed Source Current | $I_{SM}$ | | - | - | 28.8 | A |
| Diode Forward Voltage | $V_{SD}$ | $V_{GS}$=0V, $I_S$=3A, $T_J$=25°C | - | - | 1.2 | V |

Notes:

1. Repetitive rating; pulse width limited by max. junction temperature.
2. Pulse test: Pulse width ≤ 300us, duty cycle ≤ 2%.
3. Essentially independent of operation temperature.

## Typical Electrical and Thermal Characteristic Curves

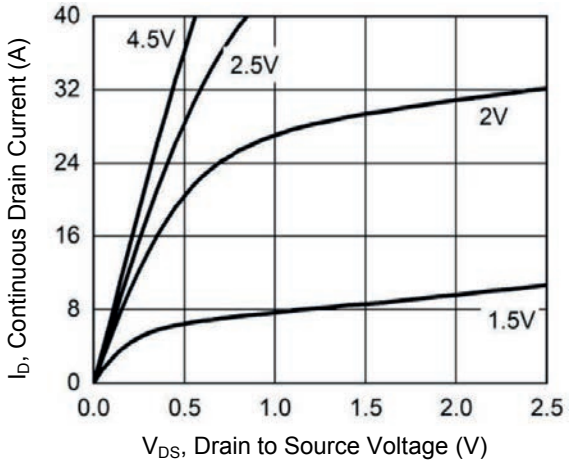



**Figure 1. Output Characteristics**

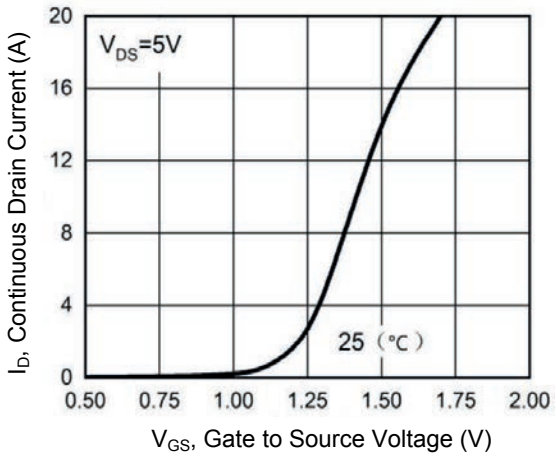



**Figure 2. Transfer Characteristics**

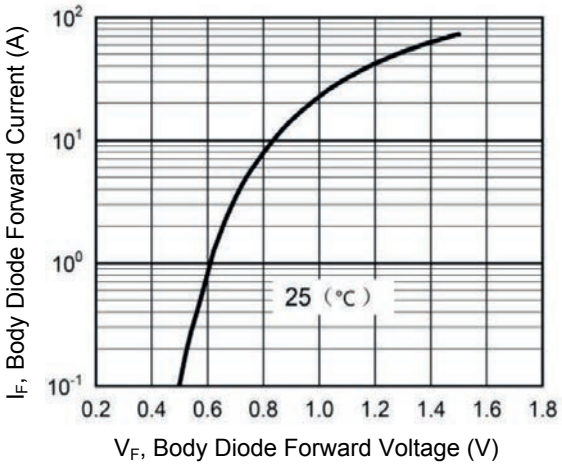



**Figure 3. Body Diode Characteristics**

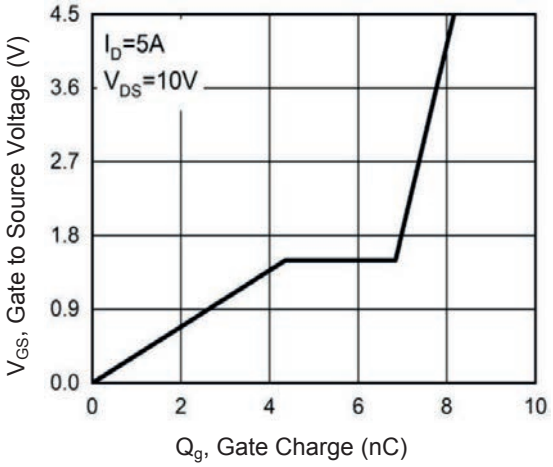



**Figure 4. Gate Charge Waveform**

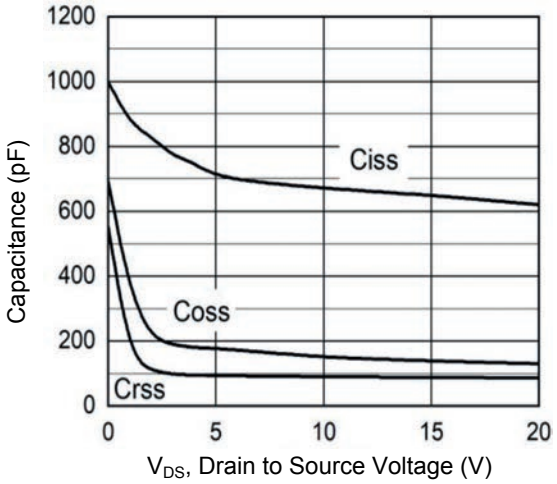



**Figure 5. Capacitance Characteristics**

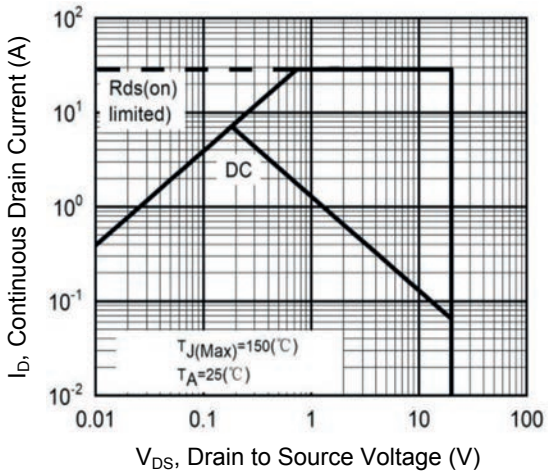
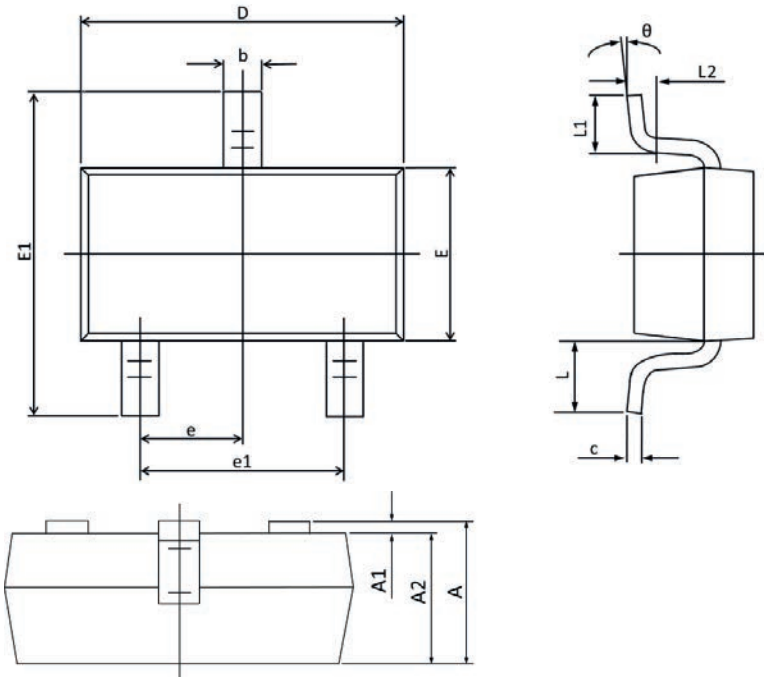



**Figure 6. Maximum Safe Operation Area**

## Package Outline Dimensions (SOT-23)




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 1.200 | 1.400 | 0.047 | 0.055 |
| E1 | 2.250 | 2.550 | 0.089 | 0.100 |
| e | 0.95 TYP. | | 0.037 TYP. | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.55 REF. | | 0.022 REF. | |
| L1 | 0.300 | 0.500 | 0.012 | 0.020 |
| L2 | 0.25 TYP. | | 0.01 TYP. | |
| θ | 0° | 8° | 0° | 8° |

## Order Information

| Device | Package | Marking | Carrier | Quantity |
|---|---|---|---|---|
| GSFC3416 | SOT-23 | 3416 | Tape & Reel | 3,000 pcs / Reel |