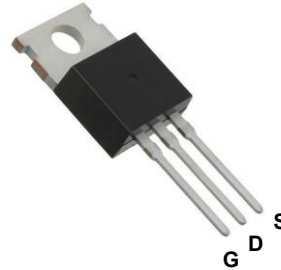
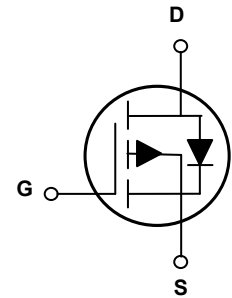


Main Product Characteristics

| | |
|--------------|--------------|
| V_{DS} | -60V |
| $R_{DS(ON)}$ | 23m Ω |
| I_D | -40A |



TO-220



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 GSFH0641 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°C unless otherwise specified)

| Parameter | Symbol | Max. | Unit |
|---|-----------------|-------------|------|
| Drain-Source Voltage | V_{DS} | -60 | V |
| Gate-Source Voltage | V_{GS} | ±20 | V |
| Drain Current-Continuous | I_D | -40 | A |
| Drain Current-Continuous (T _C =100°C) | | -28.3 | A |
| Pulsed Drain Current | I_{DM} | -160 | A |
| Maximum Power Dissipation | P_D | 100 | W |
| Derating Factor | | 0.67 | W/°C |
| Single Pulse Avalanche Energy ⁵ | E_{AS} | 420 | mJ |
| Thermal Resistance, Junction-to-Case ² | $R_{\theta JC}$ | 1.5 | °C/W |
| Operating Junction Temperature Range | T_J | -55 To +175 | °C |
| Storage Temperature Range | T_{STG} | -55 To +175 | °C |

Electrical Characteristics ($T_C=25^\circ\text{C}$ 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 |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-60V, V_{GS}=0V$ | - | - | -1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 20V, V_{DS}=0V$ | - | - | ± 100 | nA |
| On Characteristics³ | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -2 | -2.6 | -4 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}=-10V, I_D=-20A$ | - | 19 | 23 | m Ω |
| Forward Transconductance | g_{FS} | $V_{DS}=-5V, I_D=-20A$ | - | 20 | - | S |
| Dynamic Characteristics⁴ | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=-30V, V_{GS}=0V, F=1.0MHz$ | - | 5410 | - | PF |
| Output Capacitance | C_{oss} | | - | 450 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 234 | - | PF |
| Switching Characteristics⁴ | | | | | | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD}=-30V, I_D=-20A, V_{GS}=-10V, R_{GEN}=3\Omega$ | - | 16 | - | nS |
| Turn-On Rise Time | t_r | | - | 18 | - | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 65 | - | nS |
| Turn-Off Fall Time | t_f | | - | 22 | - | nS |
| Total Gate Charge | Q_g | $V_{DS}=-30V, I_D=-20A, V_{GS}=-10V$ | - | 89.5 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 19 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 22 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage ³ | V_{SD} | $V_{GS}=0V, I_S=-12A$ | - | - | -1.2 | V |
| Diode Forward Current ² | I_S | | - | - | -40 | A |
| Reverse Recovery Time | t_{rr} | $T_J=25^\circ\text{C}, I_F=-20A, d_i/d_t=-100A/\mu s^3$ | - | - | 71 | nS |
| Reverse Recovery Charge | Q_{rr} | | - | - | 170 | nC |

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: $T_J=25^\circ\text{C}, V_{DD}=-30V, V_G=-10V, L=1mH, R_g=25\Omega$

Typical Electrical and Thermal Characteristic Curves

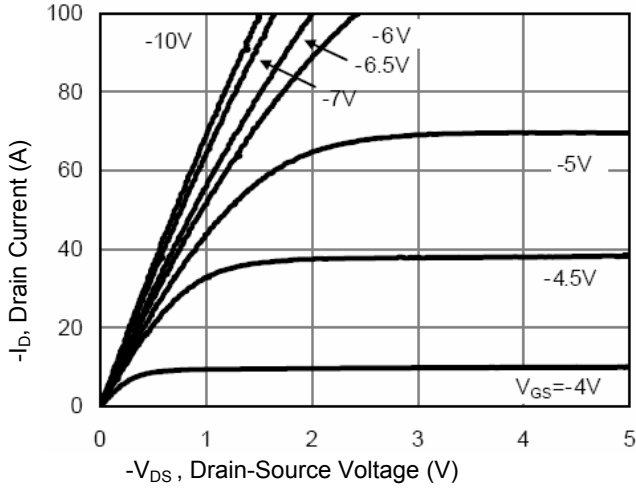


Figure 1. Output Characteristics

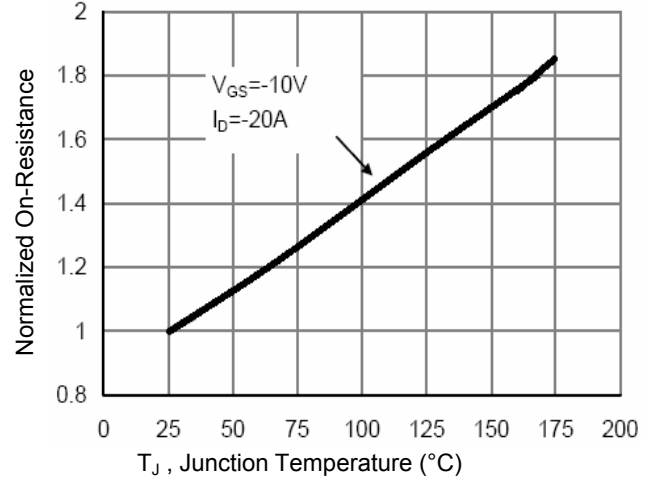


Figure 2. $R_{DS(ON)}$ -Junction Temperature

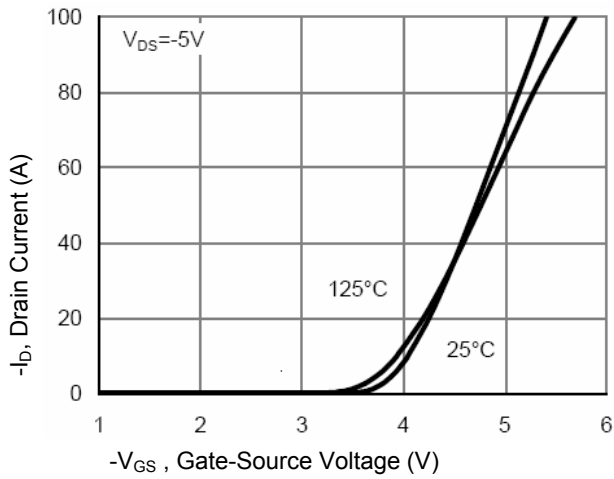


Figure 3. Transfer Characteristics

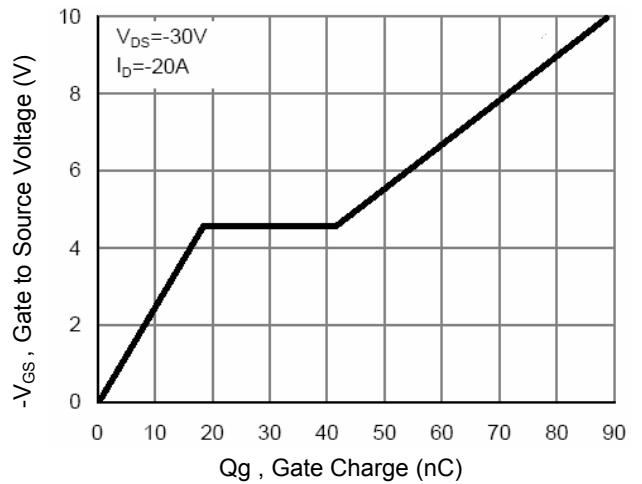


Figure 4. Gate Charge

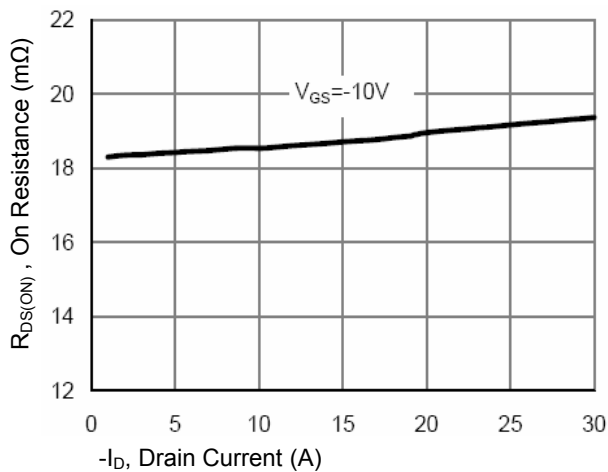


Figure 6. $R_{DS(ON)}$ -Drain Current

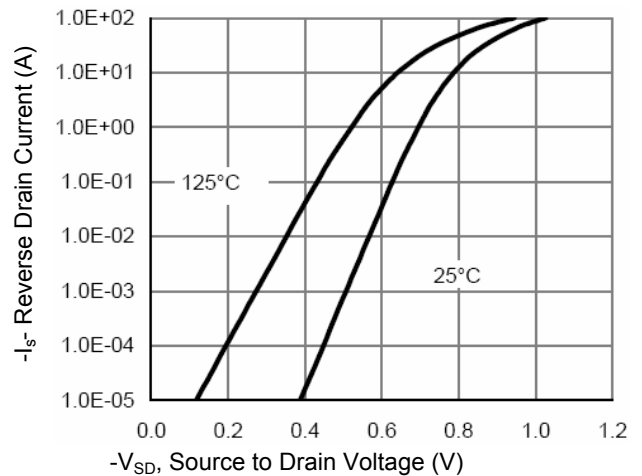


Figure 5. Source-Drain Diode Forward

Typical Electrical and Thermal Characteristic Curves

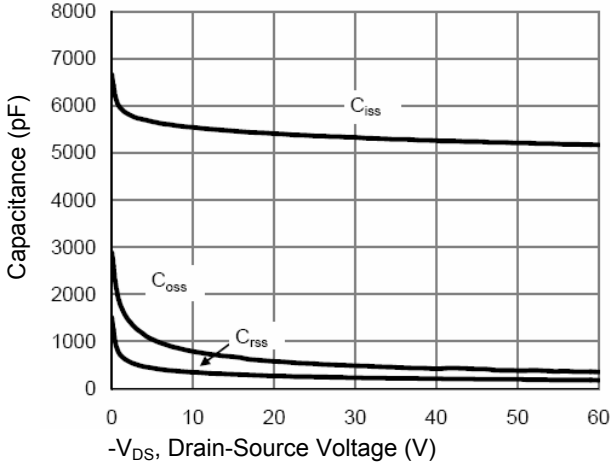


Figure 7. Capacitance vs. V_{DS}

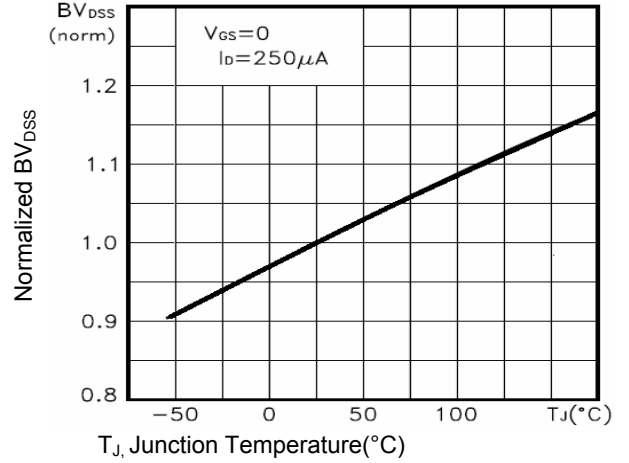


Figure 8. BV_{DSS} vs Junction Temperature

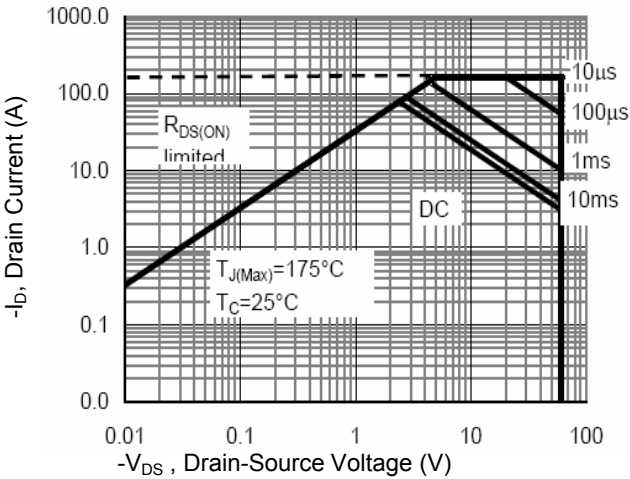


Figure 9. Safe Operation Area

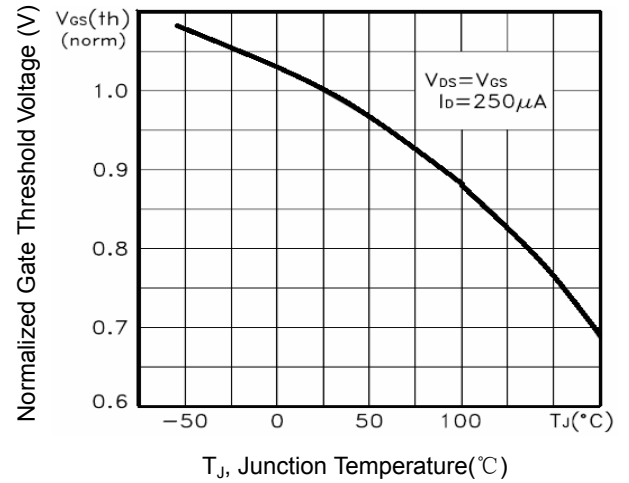


Figure 10 $V_{GS(th)}$ vs Junction Temperature

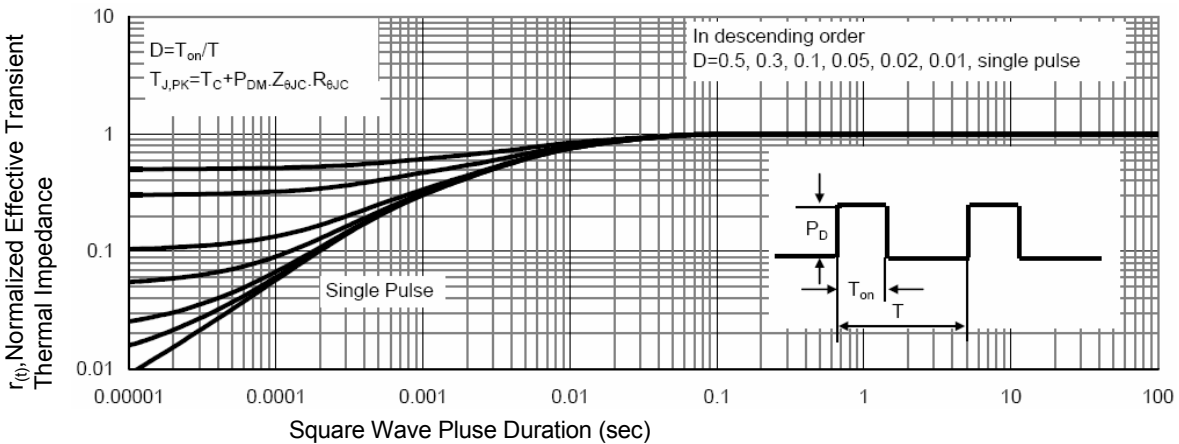


Figure 11. Normalized Maximum Transient Thermal Impedance

Typical Electrical and Thermal Characteristic Curves

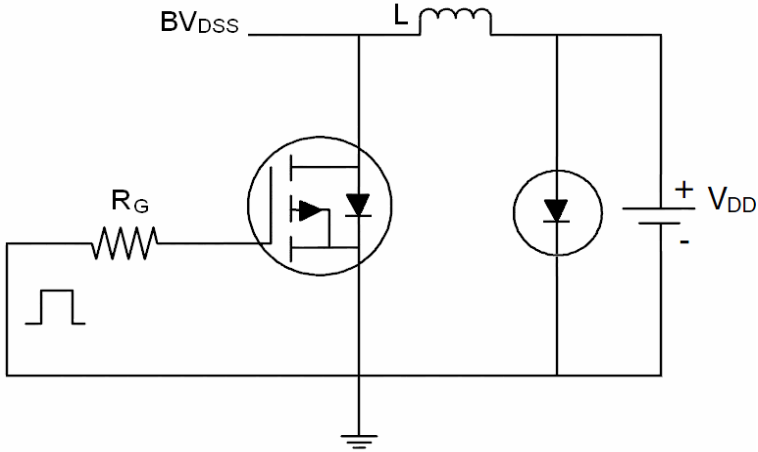


Figure 12. EAS Test Circuit

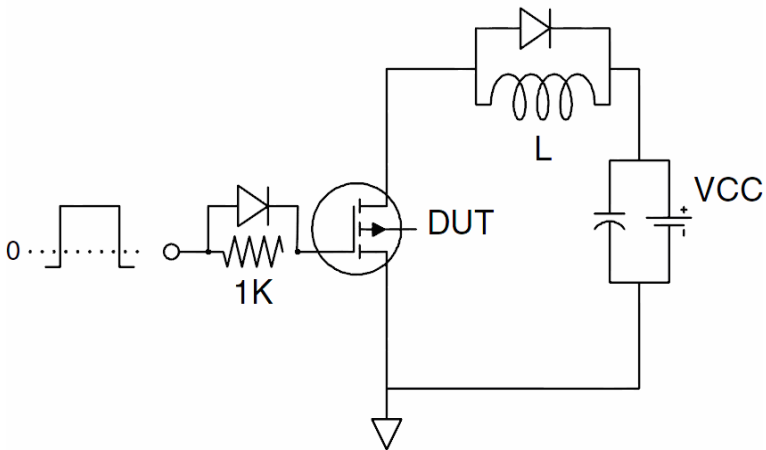


Figure 13. Gate Charge Test Circuit

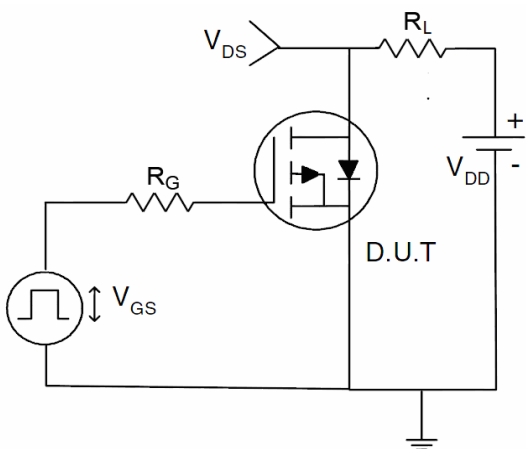
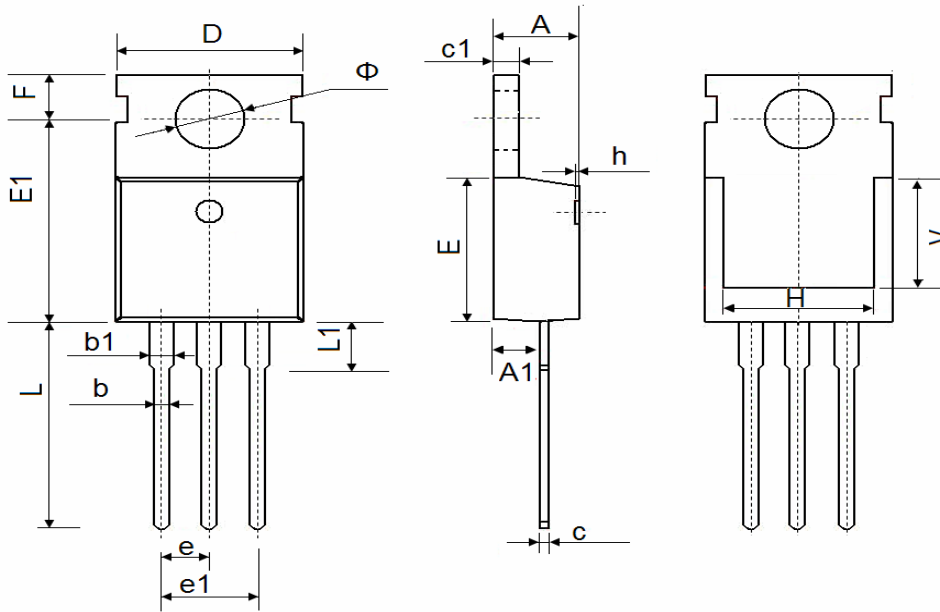


Figure 14. Switch Time Test Circuit

Package Outline Dimensions (TO-220)



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|--------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 4.400 | 4.600 | 0.173 | 0.181 |
| A1 | 2.250 | 2.550 | 0.089 | 0.100 |
| b | 0.710 | 0.910 | 0.028 | 0.036 |
| b1 | 1.170 | 1.370 | 0.046 | 0.054 |
| c | 0.330 | 0.650 | 0.013 | 0.026 |
| c1 | 1.200 | 1.400 | 0.047 | 0.055 |
| D | 9.910 | 10.250 | 0.390 | 0.404 |
| E | 8.9500 | 9.750 | 0.352 | 0.384 |
| E1 | 12.650 | 12.950 | 0.498 | 0.510 |
| e | 2.540 TYP. | | 0.100 TYP. | |
| e1 | 4.980 | 5.180 | 0.196 | 0.204 |
| F | 2.650 | 2.950 | 0.104 | 0.116 |
| H | 7.900 | 8.100 | 0.311 | 0.319 |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| L | 12.900 | 13.400 | 0.508 | 0.528 |
| L1 | 2.850 | 3.250 | 0.112 | 0.128 |
| V | 7.500 REF. | | 0.295 REF. | |
| Φ | 3.400 | 3.800 | 0.134 | 0.150 |