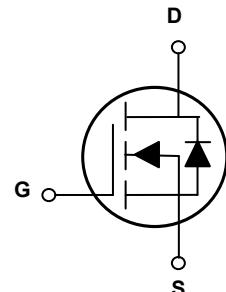
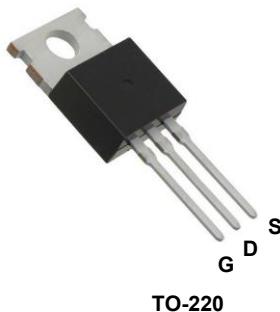


Main Product Characteristics

| | |
|--------------|-------|
| V_{DSS} | 30V |
| $R_{DS(on)}$ | 3.0mΩ |
| I_D | 150A |



Schematic Diagram

Features and Benefits

- High avalanche capabilities
- High ESD capabilities
- Ultra low Rdson
- Excellent heat dissipation



Description

The GSFH03150 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 | Value | Unit |
|---|--------------------------|------------|------|
| Drain-Source Voltage | V_{DS} | 30 | V |
| Gate-Source Voltage | V_{GS} | ± 20 | V |
| Drain Current-Continuous | I_D | 150 | A |
| Drain Current-Continuous($T_C=100^\circ\text{C}$) | $I_D(100^\circ\text{C})$ | 105 | A |
| Pulsed Drain Current ¹ | I_{DM} | 600 | A |
| Maximum Power Dissipation | P_D | 130 | W |
| Derating Factor | | 0.87 | W/°C |
| Single pulse avalanche energy ⁵ | E_{AS} | 1700 | mJ |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 175 | °C |
| Thermal Resistance, Junction-to-Case ² | $R_{\theta JC}$ | 1.15 | °C/W |

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

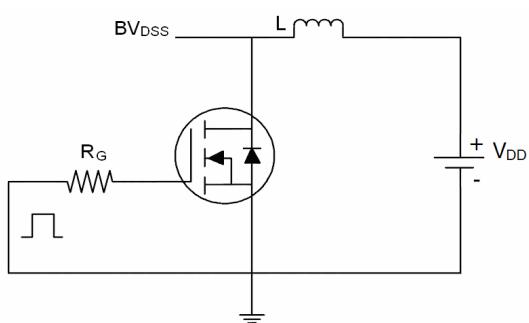
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|----------------------------|---|-----|------|-----------|------------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{\text{GS}}=0\text{V}, I_{\text{D}}=250\mu\text{A}$ | 30 | 35 | - | V |
| Zero Gate Voltage Drain Current | I_{bss} | $V_{\text{DS}}=30\text{V}, V_{\text{GS}}=0\text{V}$ | - | - | 1 | μA |
| Gate-Body Leakage Current | I_{GSS} | $V_{\text{GS}}=\pm 20\text{V}, V_{\text{DS}}=0\text{V}$ | - | - | ± 100 | nA |
| On Characteristics ³ | | | | | | |
| Gate Threshold Voltage | $V_{\text{GS}(\text{th})}$ | $V_{\text{DS}}=V_{\text{GS}}, I_{\text{D}}=250\mu\text{A}$ | 1.2 | 1.7 | 2.5 | V |
| Drain-Source On-State Resistance | $R_{\text{DS}(\text{ON})}$ | $V_{\text{GS}}=10\text{V}, I_{\text{D}}=20\text{A}$ | - | 2.3 | 3.0 | $\text{m}\Omega$ |
| | | $V_{\text{GS}}=4.5\text{V}, I_{\text{D}}=10\text{A}$ | | 3.2 | 4.0 | |
| Forward Transconductance | g_{FS} | $V_{\text{DS}}=10\text{V}, I_{\text{D}}=20\text{A}$ | 32 | - | - | S |
| Dynamic Characteristics ⁴ | | | | | | |
| Input Capacitance | C_{iss} | $V_{\text{DS}}=15\text{V}, V_{\text{GS}}=0\text{V}, F=1.0\text{MHz}$ | - | 5000 | - | PF |
| Output Capacitance | C_{oss} | | - | 1135 | - | PF |
| Reverse Transfer Capacitance | C_{rss} | | - | 563 | - | PF |
| Switching Characteristics ⁴ | | | | | | |
| Turn-on Delay Time | $t_{\text{d}(\text{on})}$ | $V_{\text{DD}}=15\text{V}, I_{\text{D}}=2\text{A}, R_{\text{L}}=15\Omega$ $V_{\text{GS}}=10\text{V}, R_{\text{G}}=2.5\Omega$ | - | 26 | - | nS |
| Turn-on Rise Time | t_{r} | | - | 24 | - | nS |
| Turn-Off Delay Time | $t_{\text{d}(\text{off})}$ | | - | 91 | - | nS |
| Turn-Off Fall Time | t_{f} | | - | 39 | - | nS |
| Total Gate Charge | Q_{g} | $V_{\text{DS}}=15\text{V}, I_{\text{D}}=30\text{A}, V_{\text{GS}}=10\text{V}$ | - | 38 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 9 | - | nC |
| Gate-Drain Charge | Q_{gd} | | - | 13 | - | nC |
| Drain-Source Diode Characteristics | | | | | | |
| Diode Forward Voltage ³ | V_{SD} | $V_{\text{GS}}=0\text{V}, I_{\text{s}}=150\text{A}$ | - | | 1.2 | V |
| Diode Forward Current ² | I_{s} | | - | - | 150 | A |
| Reverse Recovery Time | t_{rr} | $T_{\text{J}} = 25^\circ\text{C}, I_{\text{F}} = 20\text{A}$ $dI/dt = 100\text{A}/\mu\text{s}$ ³ | - | 42 | - | nS |
| Reverse Recovery Charge | Q_{rr} | | - | 39 | - | nC |
| Forward Turn-On Time | t_{on} | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

Notes:

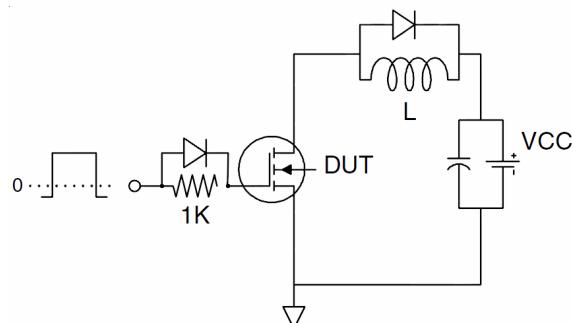
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
4. Guaranteed only by design
5. E_{AS} condition : $T_j=25^\circ\text{C}, V_{\text{DD}}=20\text{V}, V_{\text{G}}=10\text{V}, L=1\text{mH}, R_{\text{g}}=25\Omega, I_{\text{AS}}=58.5\text{A}$

Test Circuits and Waveforms

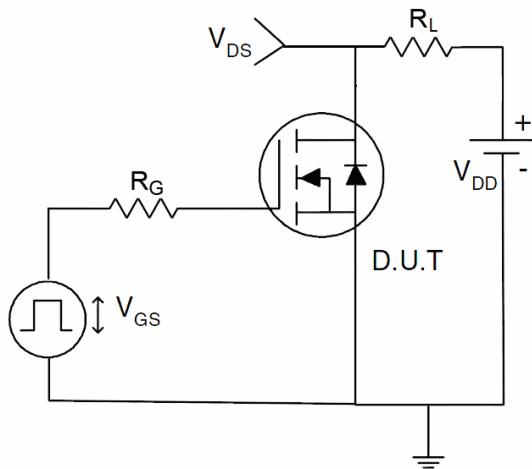
EAS Test Circuit:



Gate charge test circuit:



Switching Time Test Circuit:



Typical Electrical and Thermal Characteristic Curves

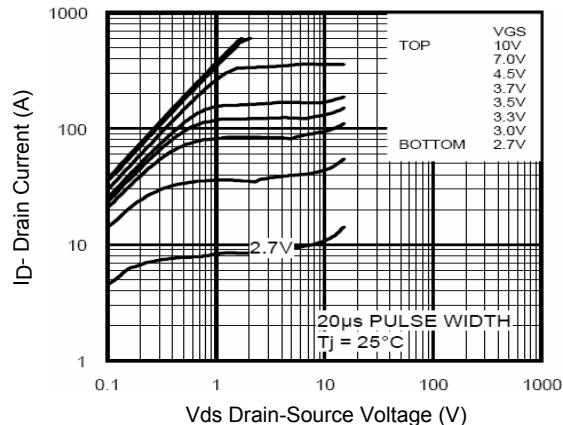


Figure 1. Output Characteristics

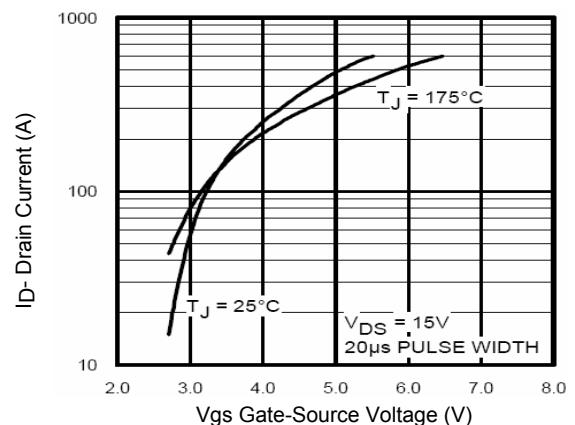


Figure 2. Transfer Characteristics

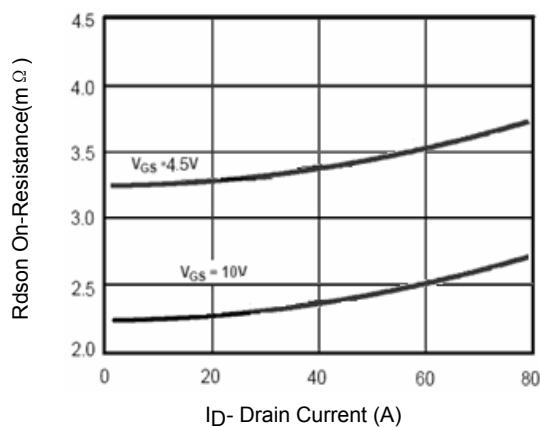


Figure 3. R_{DSON} - Drain Current

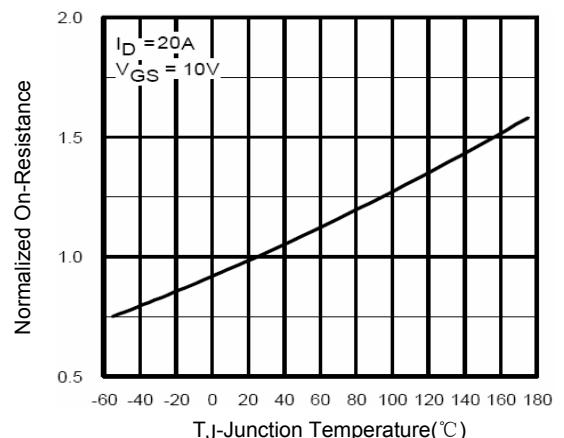


Figure 4. R_{DSON} -JunctionTemperature

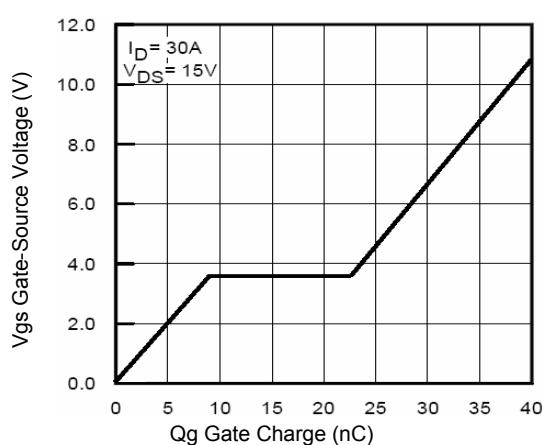


Figure 5. Gate Charge

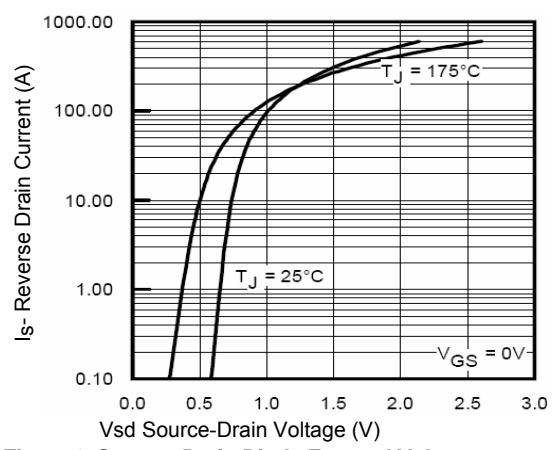


Figure 6. Source- Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristic Curves

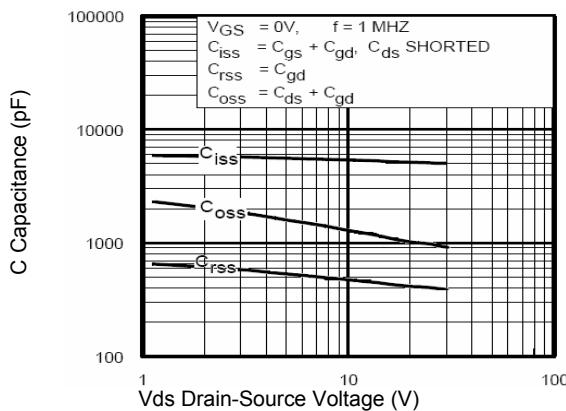


Figure 7. Capacitance vs Vds

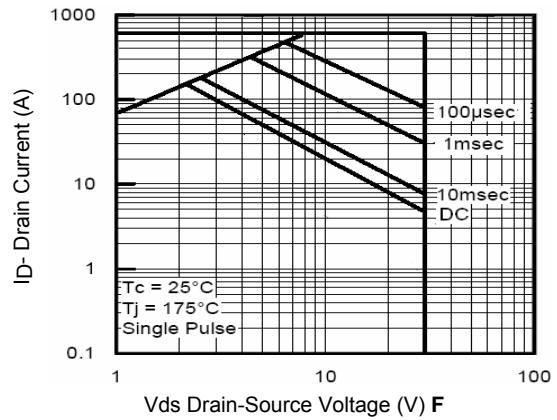


Figure 8. Safe Operation Area

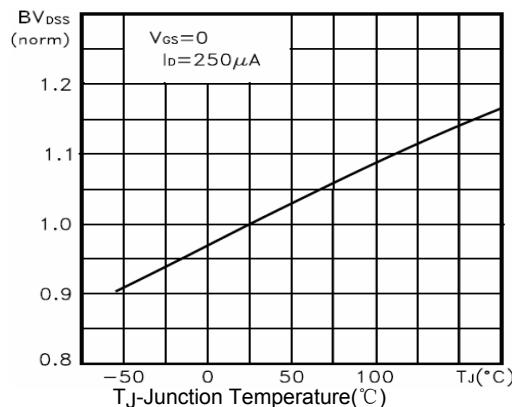


Figure 9. BV_{DSS} vs Junction Temperature

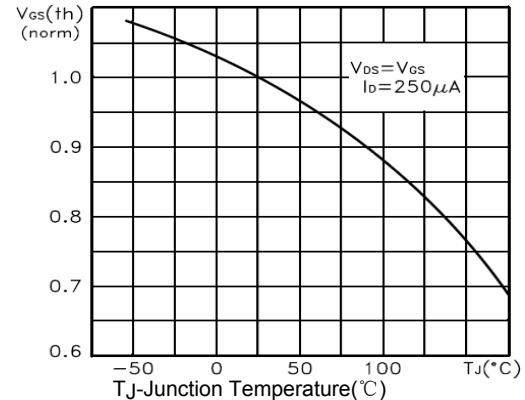


Figure 10. $V_{GS(th)}$ vs Junction Temperature

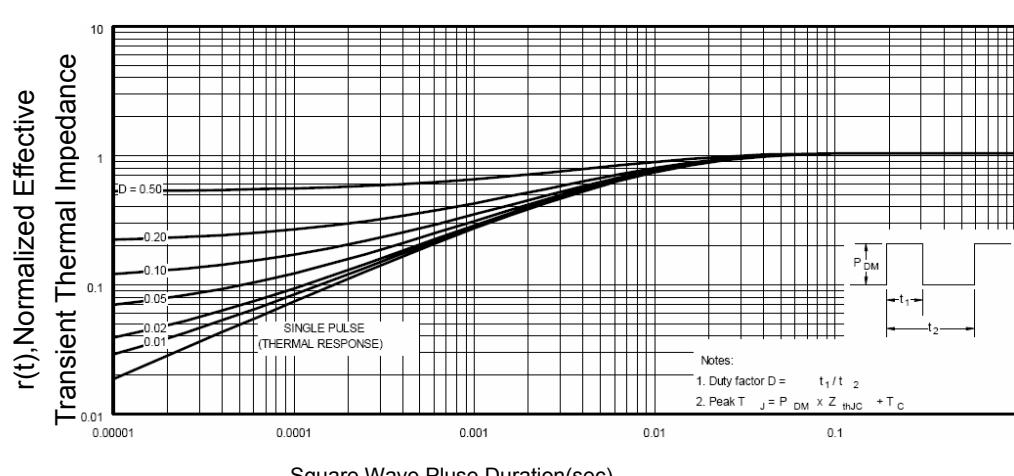
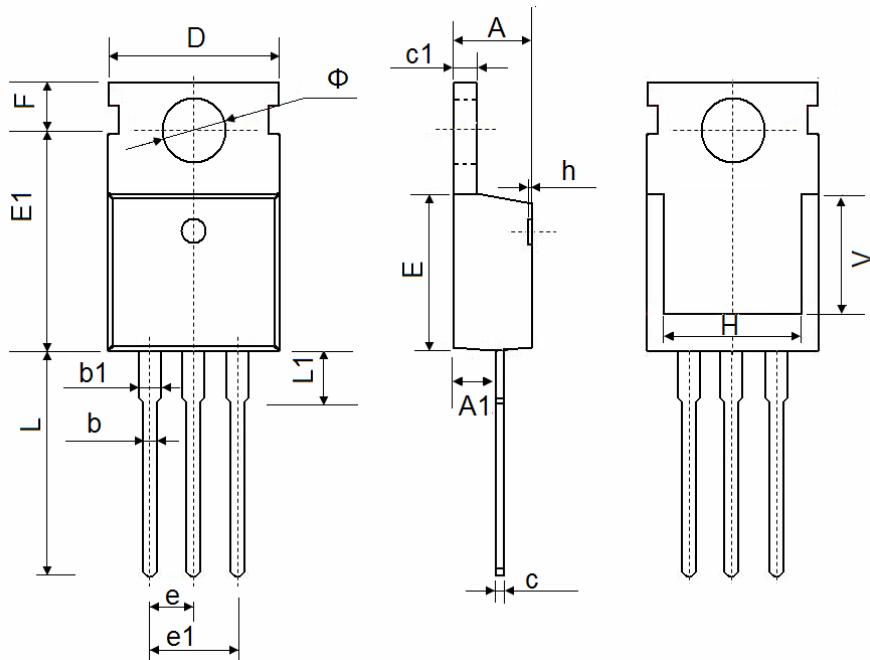


Figure 11. Normalized Maximum Transient Thermal Impedance

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 |