

30V, 7A N-Channel Power MOSFET

GENERAL DESCRIPTION

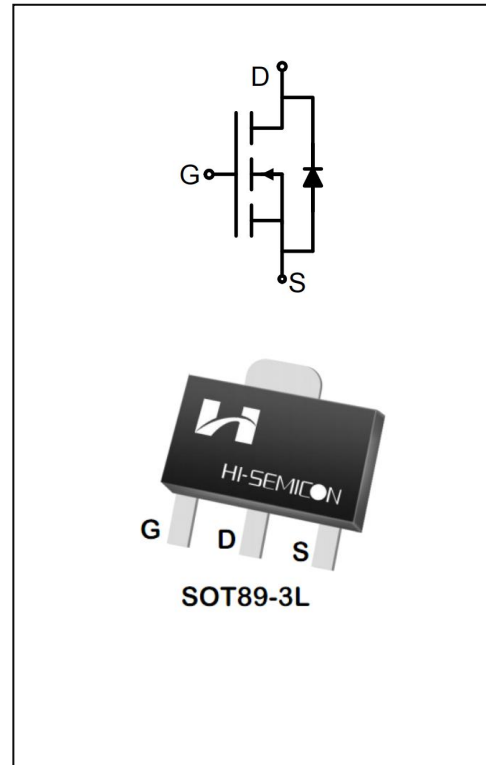
The SFE3007T uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a Battery protection or in other Switching application.

Features

- ◆ $V_{DS}=30V, I_D=7A$
- ◆ $R_{DS(ON)}$
 - TYP:20.5mΩ@ $V_{GS}= 10V$
 - TYP:24.0mΩ@ $V_{GS}= 4.5V$
 - TYP:35.0mΩ@ $V_{GS}= 2.5V$

Applications

- ◆ Power faction correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



ORDERING INFORMATION

| Part No. | Package | Marking | Material | Packing |
|----------|----------|----------|----------|---------|
| SFE3007T | SOT89-3L | SFE3007T | Pb Free | Reel |

ABSOLUTE MAXIMUM RATINGS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

| Characteristics | | Symbol | Ratings | Unit |
|---|----------------------------|-----------|---------------|--------------------|
| Drain-Source Voltage | | V_{DS} | 30 | V |
| Gate-Source Voltage | | V_{GS} | ± 12 | V |
| Drain Current | $T_C = 25^{\circ}\text{C}$ | I_D | 7 | A |
| | $T_C = 75^{\circ}\text{C}$ | | 5.1 | |
| Drain Current Pulsed(Note 1) | | I_{DM} | 28 | A |
| Power Dissipation($T_C=25^{\circ}\text{C}$) -Derate above 25°C | | P_D | 1.8 | W |
| Operation Junction Temperature Range | | T_J | $-55\sim+150$ | $^{\circ}\text{C}$ |
| Storage Temperature Range | | T_{stg} | $-55\sim+150$ | $^{\circ}\text{C}$ |
| Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | | TL | 300 | $^{\circ}\text{C}$ |

ELECTRICAL CHARACTERISTICS

| Characteristics | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|--|--------------|---|------|------|------|------------|
| Off Characteristics | | | | | | |
| Drain -Source Breakdown Voltage | B_{VDSS} | $V_{GS}= 0V, I_D= 250\mu A$ | 30 | -- | -- | V |
| Drain-Source Leakage Current | I_{DSS} | $V_{DS}= 30V, V_{GS}= 0V$ | -- | -- | 1 | μA |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}= 12V, V_{DS}= 0V$ | -- | -- | 100 | nA |
| Gate-Source Leakage Current | I_{GSS} | $V_{GS}= -12V, V_{DS}= 0V$ | -- | -- | -100 | |
| On Characteristics | | | | | | |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{GS}= V_{DS}, I_D= 250\mu A$ | 0.7 | 0.9 | 1.4 | V |
| Static Drain- Source On State Resistance | $R_{DS(on)}$ | $V_{GS}= 10V, I_D= 5.0A$ | -- | 20.5 | 27 | m Ω |
| | | $V_{GS}= 4.5V, I_D= 5.0A$ | -- | 24.0 | 30 | |
| | | $V_{GS}= 2.5V, I_D= 4.0A$ | -- | 35.0 | 42 | |
| Dynamic Characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}= 15V$ $V_{GS}= 0V$ $f=1.0\text{MHZ}$ | -- | 816 | -- | pF |
| Output Capacitance | C_{oss} | | -- | 97 | -- | |
| Reverse Transfer Capacitance | C_{rss} | | -- | 78 | -- | |
| Switching Characteristics | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}= 15V, V_{GS}= 10V$ $R_G= 3\Omega, I_D= 3.0A$ (Note 2.3) | -- | 4.5 | -- | nS |
| Turn-on Rise Time | t_r | | -- | 4.0 | -- | |
| Turn-off Delay Time | $t_{d(off)}$ | | -- | 24.5 | -- | |
| Turn-off Fall Time | t_f | | -- | 3.8 | -- | |
| Total Gate Charge | Q_g | $V_{DS}=15V, I_D=5.8A$ $V_{GS}=4.5V$ | -- | 10.5 | -- | nC |
| Gate-Source Charge | Q_{gs} | | -- | 1.5 | -- | |
| Gate-Drain Charge | Q_{gd} | | -- | 3.6 | -- | |

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

| Characteristics | Symbol | Test conditions | Min. | Typ. | Max. | Unit |
|---------------------------|----------|---|------|------|------|------|
| Continuous Source Current | I_S | Integral Reverse P-N Junction Diode in the MOSFET | -- | -- | 7 | A |
| Pulsed Source Current | I_{SM} | | -- | -- | 28 | |
| Diode Forward Voltage | V_{SD} | $I_S = 5A, V_{GS} = 0V$ | -- | 0.8 | 1.2 | V |

NOTE:

- 1.Pulse width limited by maximum junction temperature
- 2.Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
- 3.Essentially independent of operating temperature

Typical Performance Characteristics

Figure 1. Output Characteristics

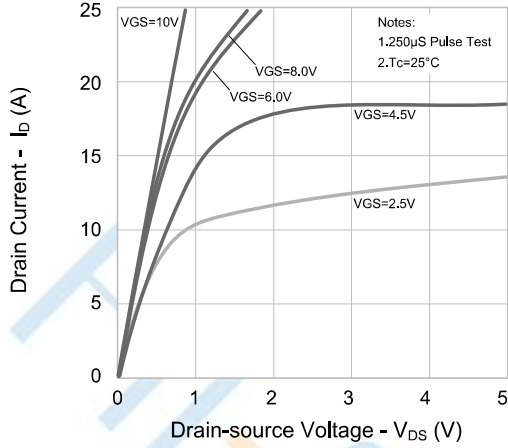


Figure 2. Transfer Characteristics

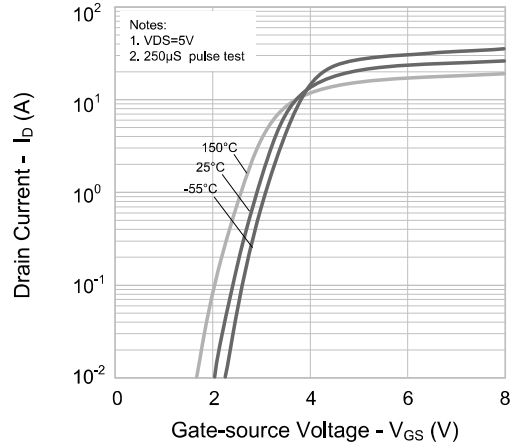


Figure 3. On-resistance vs. Drain Current

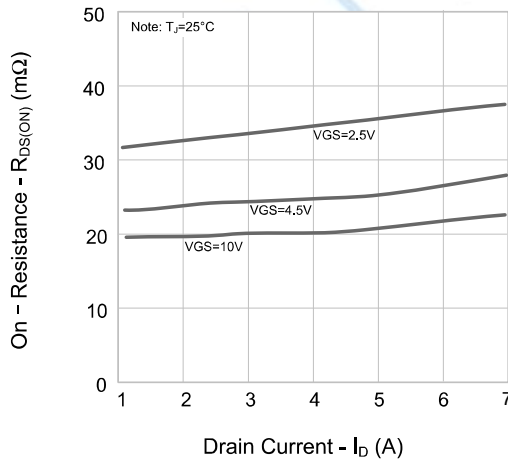


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

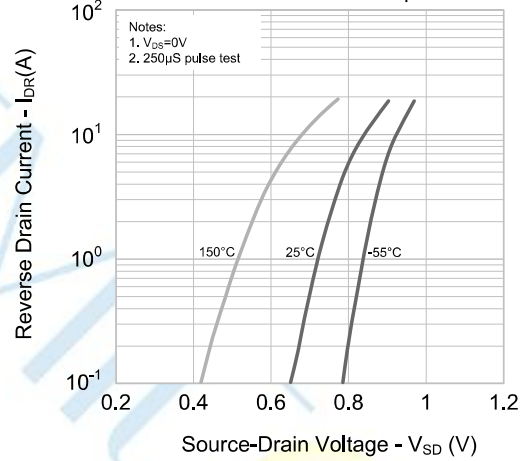


Figure 5. Capacitance Characteristics

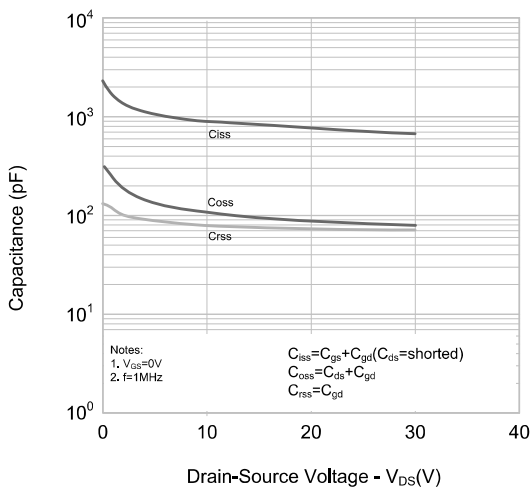
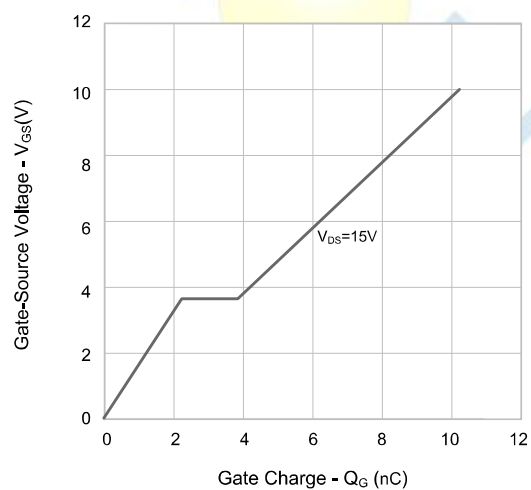
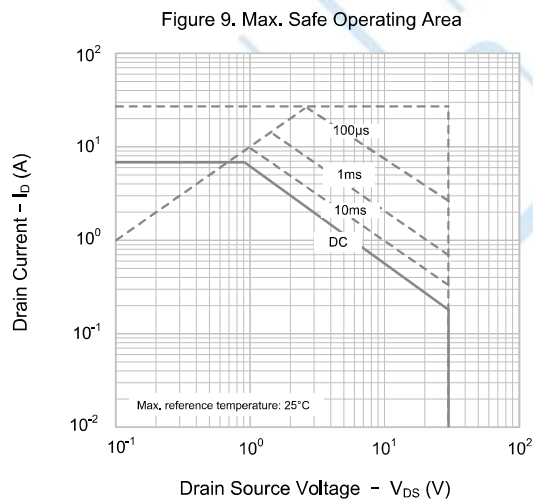
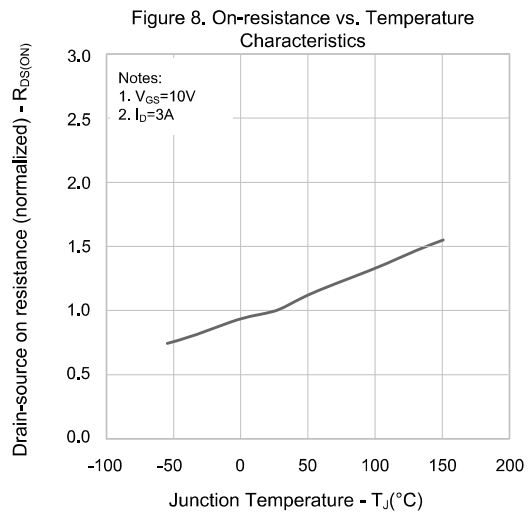
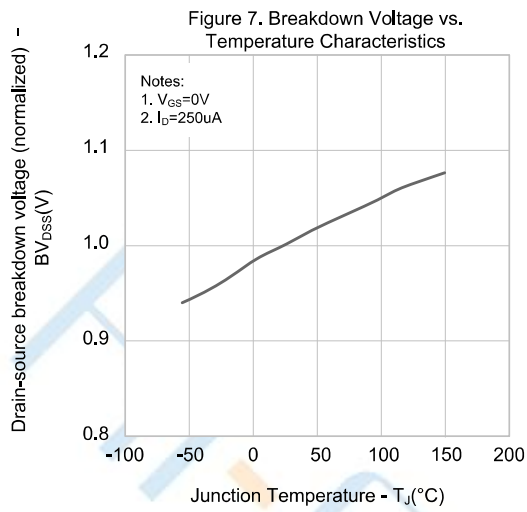


Figure 6. Gate Charge

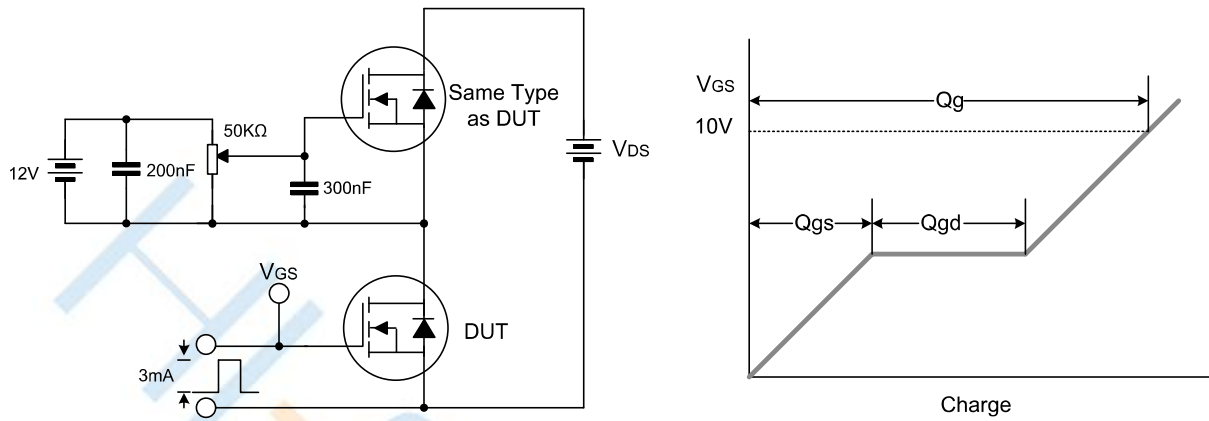


Typical Performance Characteristics

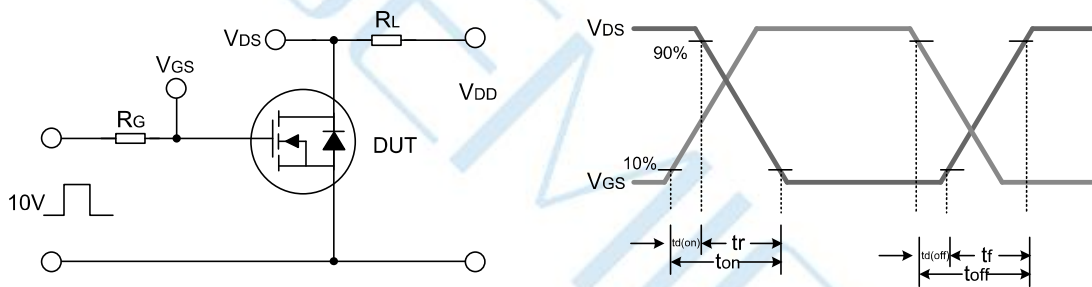


Test Circuit

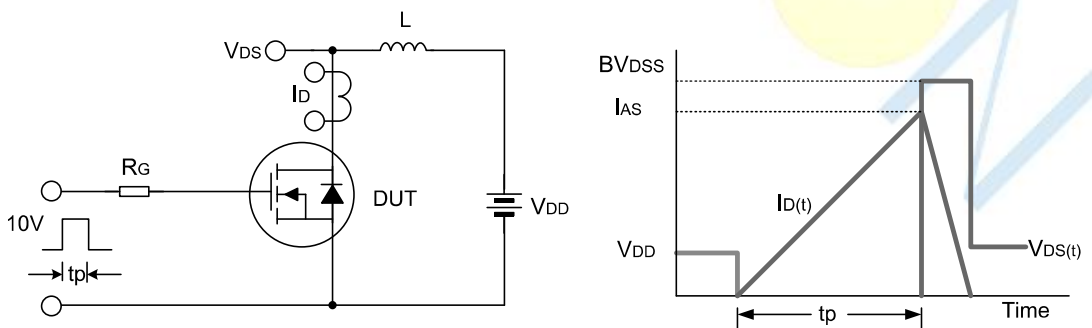
Gate Charge Test Circuit & Waveform



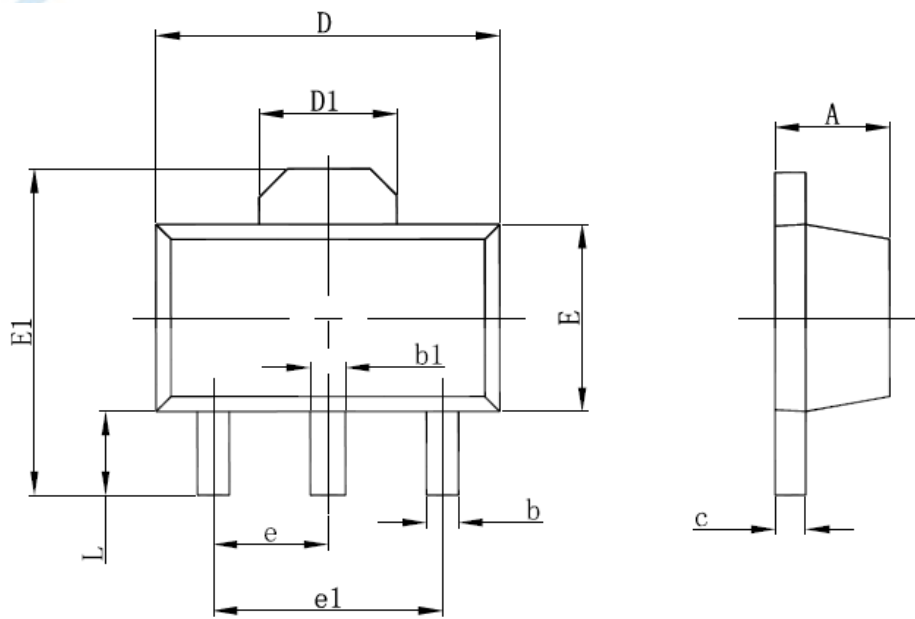
Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Package Dimensions of SOT89-3L



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.400 | 1.600 | 0.055 | 0.063 |
| b | 0.320 | 0.520 | 0.013 | 0.020 |
| b1 | 0.400 | 0.580 | 0.016 | 0.023 |
| c | 0.350 | 0.440 | 0.014 | 0.017 |
| D | 4.400 | 4.600 | 0.173 | 0.181 |
| D1 | 1.550 REF. | | 0.061 REF. | |
| E | 2.300 | 2.600 | 0.091 | 0.102 |
| E1 | 3.940 | 4.250 | 0.155 | 0.167 |
| e | 1.500 TYP. | | 0.060 TYP. | |
| e1 | 3.000 TYP. | | 0.118 TYP. | |
| L | 0.900 | 1.200 | 0.035 | 0.047 |

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