



STS11NF30L

N-CHANNEL 30V - 0.009 Ω - 11A SO-8 LOW GATE CHARGE STripFET™ POWER MOSFET

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|------------|------------------|---------------------|----------------|
| STS11NF30L | 30 V | <0.012 Ω | 11 A |

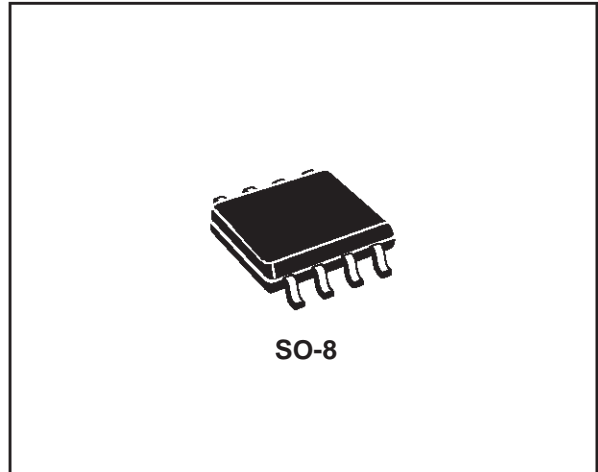
- TYPICAL R_{DS(on)} = 0.009Ω @ 10 V
- TYPICAL Q_g = 19nC @ 4.5 V
- OPTIMAL R_{DS(on)} x Q_g TRADE-OFF
- CONDUCTION LOSSES REDUCED

DESCRIPTION

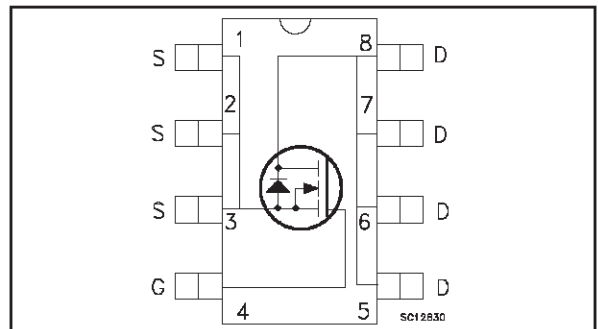
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- SPECIFICALLY DESIGNED AND OPTIMISED FOR HIGH EFFICIENCY CPU CORE DC/DC CONVERTERS
- AUTOMOTIVE



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---------------------|--|------------|------|
| V _{DS} | Drain-source Voltage (V _{GS} = 0) | 30 | V |
| V _{DGR} | Drain-gate Voltage (R _{GS} = 20 kΩ) | 30 | V |
| V _{GS} | Gate- source Voltage | ± 18 | V |
| I _{D(●)} | Drain Current (continuous) at T _C = 25°C | 11 | A |
| I _D | Drain Current (continuous) at T _C = 100°C | 7 | A |
| I _{DM(●●)} | Drain Current (pulsed) | 44 | A |
| P _{tot} | Total Dissipation at T _C = 25°C | 2.5 | W |
| | Derating Factor | 0.02 | W/°C |
| dV/dt (1) | Peak Diode Recovery voltage slope | 4 | V/ns |
| T _{stg} | Storage Temperature | -55 to 150 | °C |
| T _j | Max. Operating Junction Temperature | 150 | °C |

(●●) Pulse width limited by safe operating area.
 (●) Current limited by the package

(1) I_{SD} ≤ 11A, di/dt ≤ 290A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}

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THERMAL DATA

| | | | | |
|-------------------|---|------------|-----------|------------|
| Rthj-amb T_J | Thermal Resistance Junction-ambient Maximum Lead Temperature For Soldering Purpose | Max Typ | 50 150 | °C/W °C |
|-------------------|---|------------|-----------|------------|

ELECTRICAL CHARACTERISTICS ($T_{case} = 25\text{ °C}$ unless otherwise specified)

OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|--|---|------|------|-----------|--------------------------------|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D = 250\ \mu\text{A}$, $V_{GS} = 0$ | 30 | | | V |
| I_{DSS} | Zero Gate Voltage Drain Current ($V_{GS} = 0$) | $V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$ $T_C = 125\text{°C}$ | | | 1 10 | μA μA |
| I_{GSS} | Gate-body Leakage Current ($V_{DS} = 0$) | $V_{GS} = \pm 18\text{ V}$ | | | ± 100 | nA |

ON (1)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|-----------------------------------|---|------|----------------|-----------------|----------------------|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS} = V_{GS}$ $I_D = 250\ \mu\text{A}$ | 1 | | | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS} = 10\text{ V}$ $I_D = 5.5\text{ A}$ $V_{GS} = 5\text{ V}$ $I_D = 5.5\text{ A}$ | | 0.009 0.014 | 0.012 0.0185 | Ω Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|---|---|------|--------------------|------|----------------|
| $g_{fs} (^{\circ})$ | Forward Transconductance | $V_{DS}=25\text{V}$ $I_D = 5.5\text{ A}$ | | 10 | | S |
| C_{iss} C_{oss} C_{rss} | Input Capacitance Output Capacitance Reverse Transfer Capacitance | $V_{DS} = 25\text{V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$ | | 1470 490 110 | | pF pF pF |

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|--|---|------|---------------|------|----------------|
| $t_{d(on)}$ t_r | Turn-on Delay Time Rise Time | $V_{DD} = 15\text{ V}$ $I_D = 35\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3) | | 20 65 | | ns ns |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD} = 24\text{ V}$ $I_D = 11\text{ A}$ $V_{GS} = 4.5\text{ V}$ | | 19 5 10 | 25 | nC nC nC |

SWITCHING OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|----------------------------------|--|------|----------|------|----------|
| $t_{d(off)}$ t_f | Turn-off Delay Time Fall Time | $V_{DD} = 15\text{ V}$ $I_D = 5.5\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3) | | 35 24 | | ns ns |

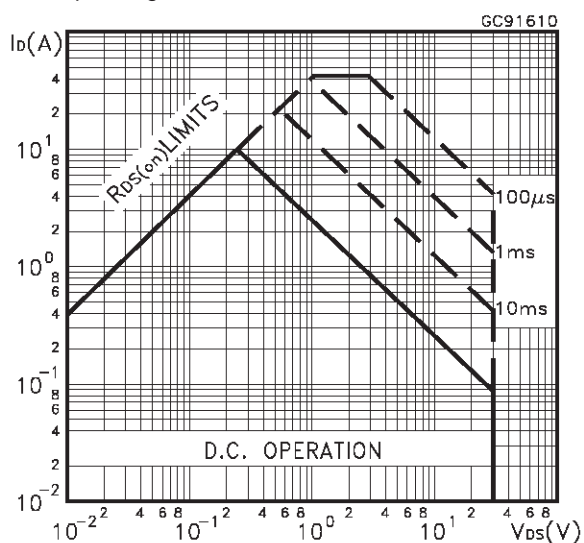
SOURCE DRAIN DIODE

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|---|------|------------------|----------|---------------|
| I_{SD} $I_{SDM} (\bullet)$ | Source-drain Current Source-drain Current (pulsed) | | | | 11 44 | A A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 11\text{ A}$ $V_{GS} = 0$ | | | 1.2 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 11\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 20\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5) | | 75 110 2.9 | | ns nC A |

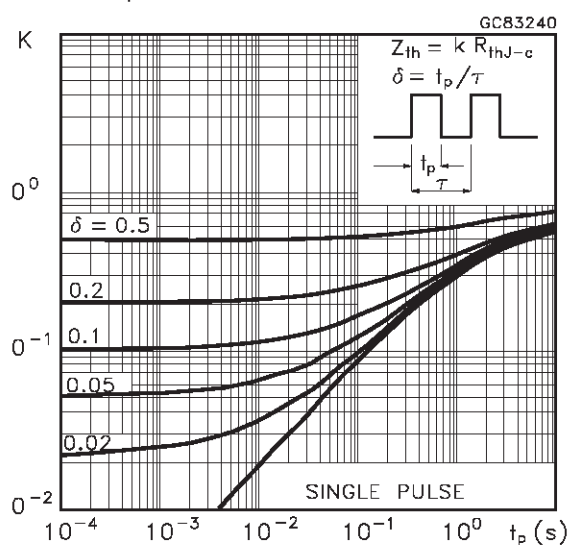
(*)Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

(\bullet)Pulse width limited by safe operating area.

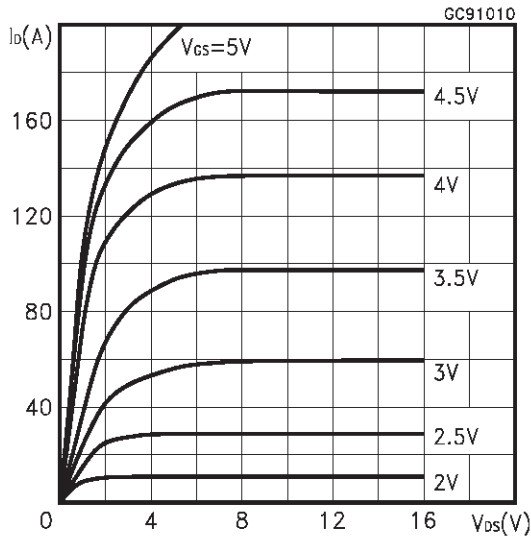
Safe Operating Area



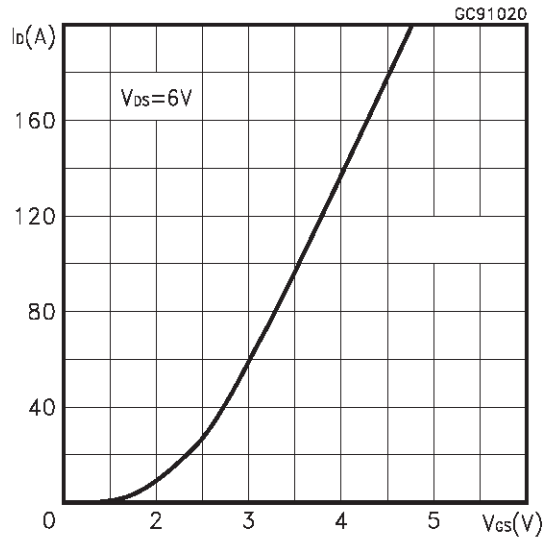
Thermal Impedance



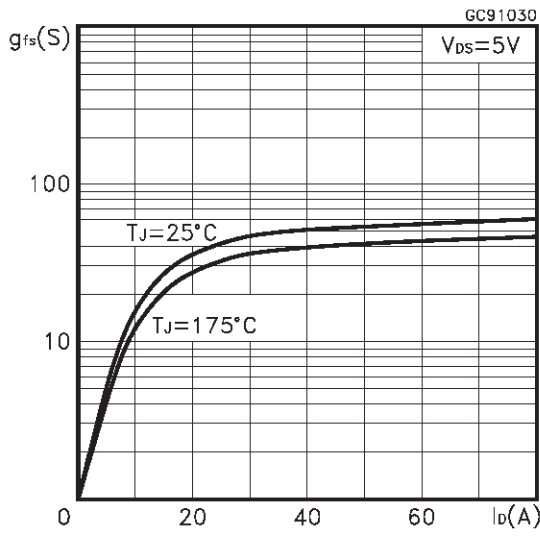
Output Characteristics



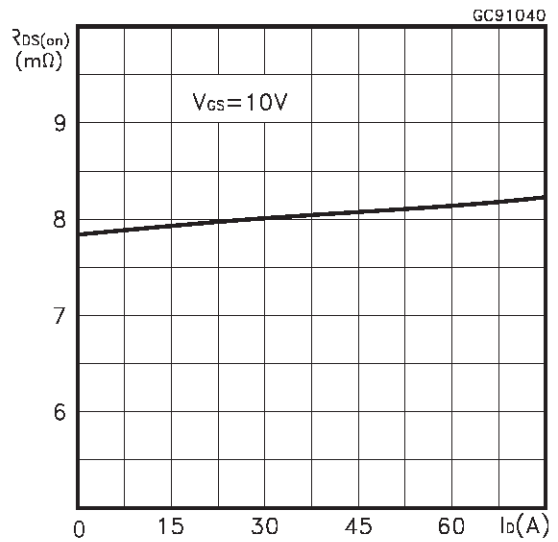
Transfer Characteristics



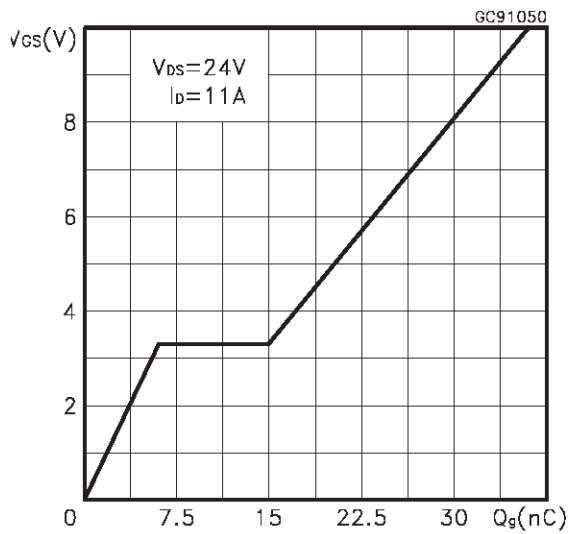
Transconductance



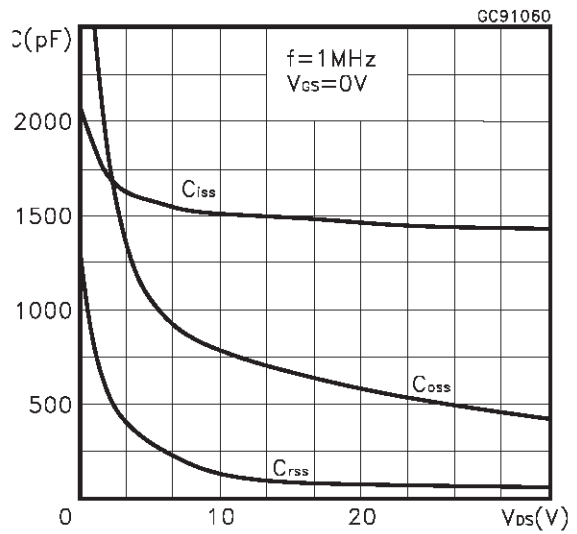
Static Drain-source On Resistance



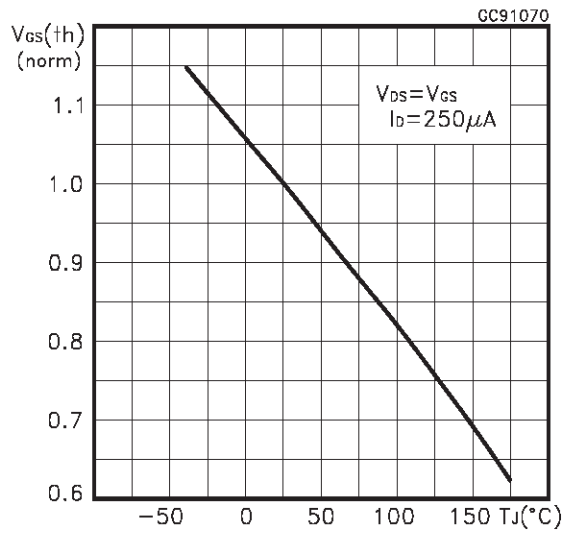
Gate Charge vs Gate-source Voltage



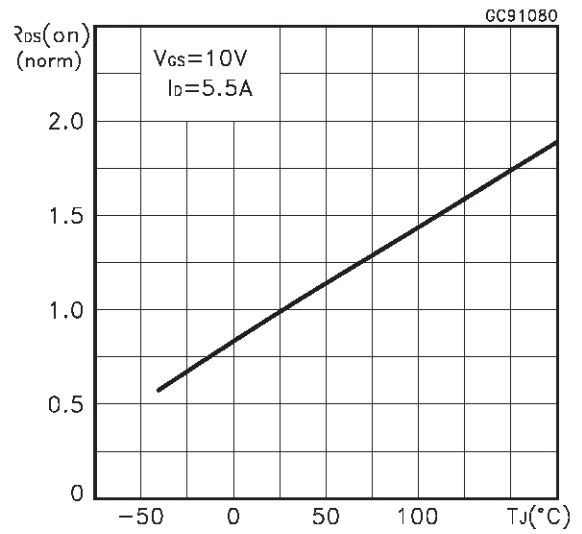
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics

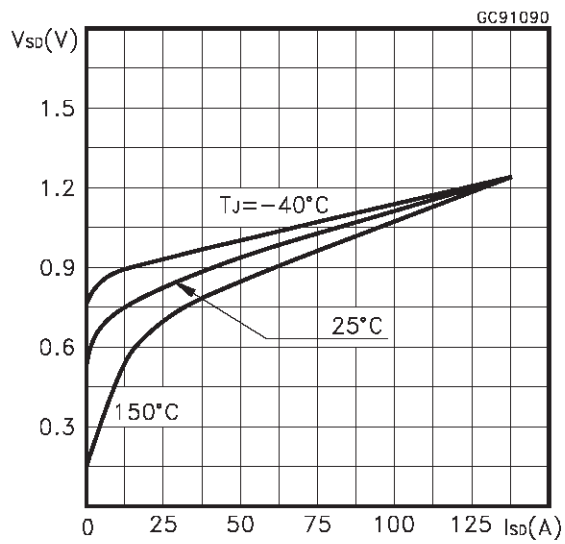


Fig. 1: Unclamped Inductive Load Test Circuit



Fig. 2: Unclamped Inductive Waveform

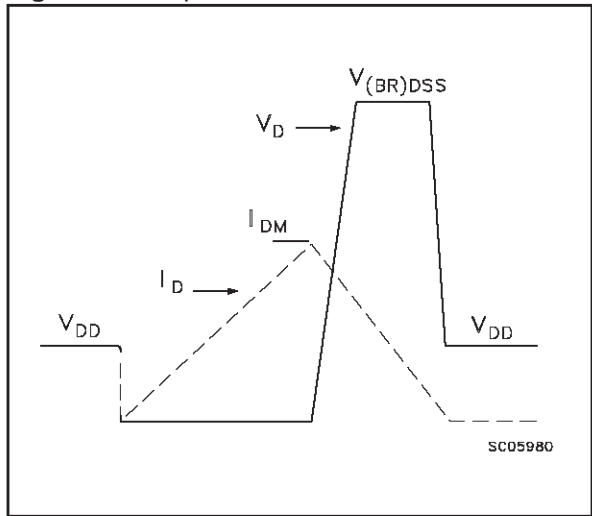


Fig. 3: Switching Times Test Circuits For Resistive Load

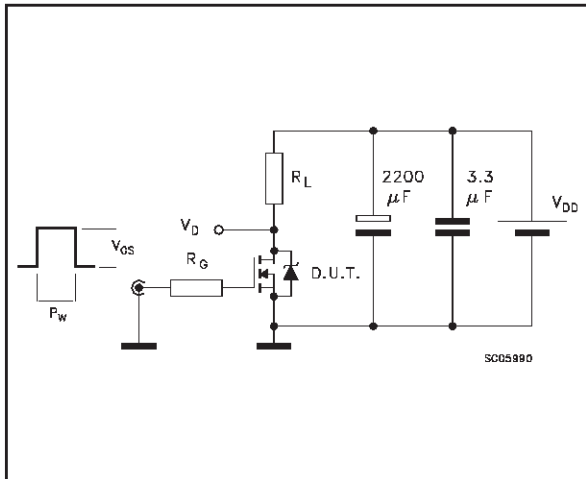


Fig. 4: Gate Charge test Circuit

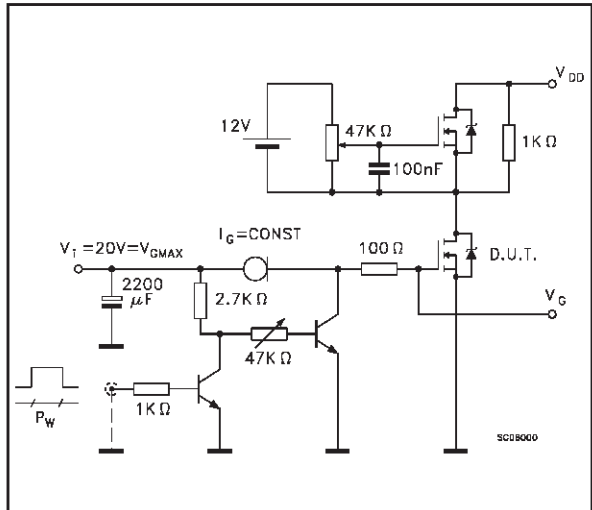
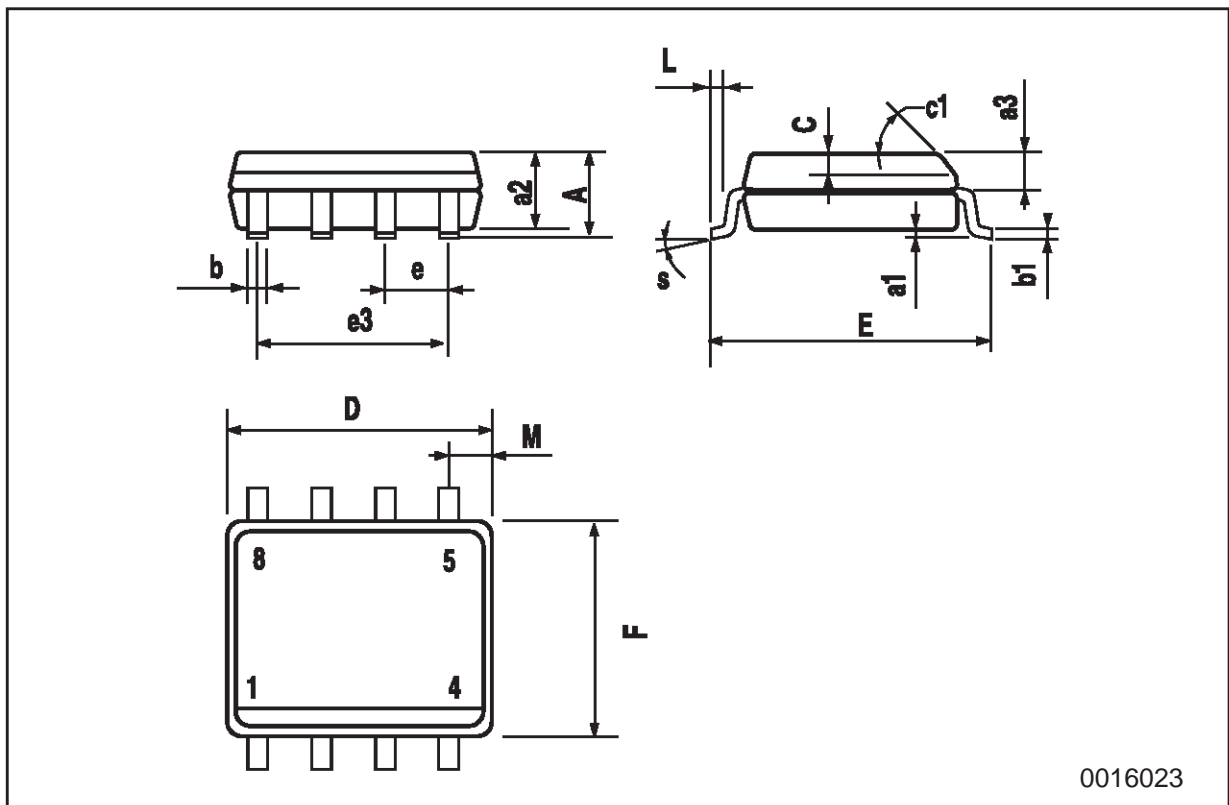


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



SO-8 MECHANICAL DATA

| DIM. | mm | | | inch | | |
|------|-----------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 1.75 | | | 0.068 |
| a1 | 0.1 | | 0.25 | 0.003 | | 0.009 |
| a2 | | | 1.65 | | | 0.064 |
| a3 | 0.65 | | 0.85 | 0.025 | | 0.033 |
| b | 0.35 | | 0.48 | 0.013 | | 0.018 |
| b1 | 0.19 | | 0.25 | 0.007 | | 0.010 |
| C | 0.25 | | 0.5 | 0.010 | | 0.019 |
| c1 | 45 (typ.) | | | | | |
| D | 4.8 | | 5.0 | 0.188 | | 0.196 |
| E | 5.8 | | 6.2 | 0.228 | | 0.244 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 3.81 | | | 0.150 | |
| F | 3.8 | | 4.0 | 0.14 | | 0.157 |
| L | 0.4 | | 1.27 | 0.015 | | 0.050 |
| M | | | 0.6 | | | 0.023 |
| S | 8 (max.) | | | | | |



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