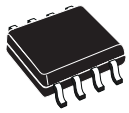
# STS1HNK60

## N-CHANNEL 600V - 8Ω - 0.3A SO-8
## SuperMESH™Power MOSFET

| TYPE | $V_{DSS}$ | $R_{DS(on)}$ | $I_D$ | Pw |
|---|---|---|---|---|
| STS1HNK60 | 600 V | < 8.5 Ω | 0.3 A | 2 W |

- TYPICAL $R_{DS}(on)$ = 8 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- GATE CHARGE MINIMIZED
- NEW HIGH VOLTAGE BENCHMARK

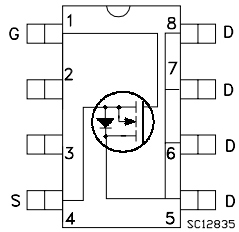


**SO-8**

### DESCRIPTION

The SuperMESH™ series is obtained through an extreme optimization of ST's well established strip-based PowerMESH™ layout. In addition to pushing on-resistance significantly down, special care is taken to ensure a very good dv/dt capability for the most demanding applications. Such series complements ST full range of high voltage MOSFETs including revolutionary MDmesh™ products.

**INTERNAL SCHEMATIC DIAGRAM**




### APPLICATIONS

- SWITCH MODE LOW POWER SUPPLIES (SMPS)
- LOW POWER, LOW COST CFL (COMPACT FLUORESCENT LAMPS)
- LOW POWER BATTERY CHARGERS

### ORDERING INFORMATION

| SALES TYPE | MARKING | PACKAGE | PACKAGING |
|---|---|---|---|
| STS1HNK60 | S1HNK60 | SO-8 | TAPE & REEL |

## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source Voltage ($V_{GS}$ = 0) | 600 | V |
| $V_{DGR}$ | Drain-gate Voltage ($R_{GS}$ = 20 kΩ) | 600 | V |
| $V_{GS}$ | Gate- source Voltage | ± 30 | V |
| $I_D$ | Drain Current (continuous) at $T_C$ = 25°C | 0.3 | A |
| $I_D$ | Drain Current (continuous) at $T_C$ = 100°C | 0.19 | A |
| $I_{DM}$ (•) | Drain Current (pulsed) | 1.2 | A |
| $P_{TOT}$ | Total Dissipation at $T_C$ = 25°C | 2 | W |
| | Derating Factor | 0.016 | W/°C |
| dv/dt (1) | Peak Diode Recovery voltage slope | 3 | V/ns |
| $T_j$<br>$T_{stg}$ | Operating Junction Temperature<br>Storage Temperature | -65 to 150 | °C |

(•) Pulse width limited by safe operating area
(1) $I_{SD}$ ≤0.3A, di/dt ≤100A/µs, $V_{DD}$ ≤ $V_{(BR)DSS}$, $T_j$ ≤ $T_{JMAX}$.

## THERMAL DATA

| | | | |
|---|---|---|---|
| Rthj-amb | Thermal Resistance Junction-ambient Max | 62.5 | °C/W |

## ELECTRICAL CHARACTERISTICS ($T_{CASE}$ =25°C UNLESS OTHERWISE SPECIFIED)

ON/OFF

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D$ = 1 mA, $V_{GS}$ = 0 | 600 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{GS}$ = 0) | $V_{DS}$ = Max Rating<br>$V_{DS}$ = Max Rating, $T_C$ = 125 °C | | | 1<br>50 | µA<br>µA |
| $I_{GSS}$ | Gate-body Leakage Current ($V_{DS}$ = 0) | $V_{GS}$ = ± 30 V | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 2.25 | 3 | 3.7 | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS}$ = 10 V, $I_D$ = 0.5 A | | 8 | 8.5 | Ω |

**ELECTRICAL CHARACTERISTICS** (CONTINUED)

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $g_{fs}$ (1) | Forward Transconductance | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$, $I_D = 0.5$ A | | 1 | | S |
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$ | Input Capacitance<br>Output Capacitance<br>Reverse Transfer Capacitance | $V_{DS} = 25V$, f = 1 MHz, $V_{GS} = 0$ | | 156<br>23.5<br>3.8 | | pF<br>pF<br>pF |

SWITCHING ON

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$<br>$t_r$ | Turn-on Delay Time<br>Rise Time | $V_{DD} = 300$ V, $I_D = 0.5$ A<br>$R_G = 4.7\Omega$ $V_{GS} = 10$ V<br>(Resistive Load see, Figure 3) | | 6.5<br>5 | | ns<br>ns |
| $Q_g$<br>$Q_{gs}$<br>$Q_{gd}$ | Total Gate Charge<br>Gate-Source Charge<br>Gate-Drain Charge | $V_{DD} = 480$ V, $I_D = 1$ A,<br>$V_{GS} = 10V$, $R_G = 4.7\Omega$ | | 7<br>1.1<br>3.4 | 10 | nC<br>nC<br>nC |

SWITCHING OFF

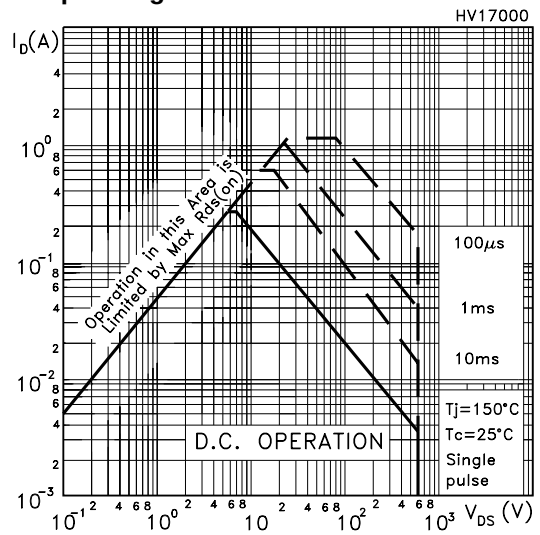
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(off)}$<br>$t_f$ | Turn-off Delay Time<br>Fall Time | $V_{DD} = 300$ V, $I_D = 0.5$ A<br>$R_G = 4.7\Omega$ $V_{GS} = 10$ V<br>(Resistive Load see, Figure 3) | | 19<br>25 | | ns<br>ns |
| $t_{r(Voff)}$<br>$t_f$<br>$t_c$ | Off-voltage Rise Time<br>Fall Time<br>Cross-over Time | $V_{DD} = 480V$, $I_D = 1.0$ A,<br>$R_G = 4.7\Omega$, $V_{GS} = 10V$<br>(Inductive Load see, Figure 5) | | 24<br>25<br>44 | | ns<br>ns<br>ns |

SOURCE DRAIN DIODE

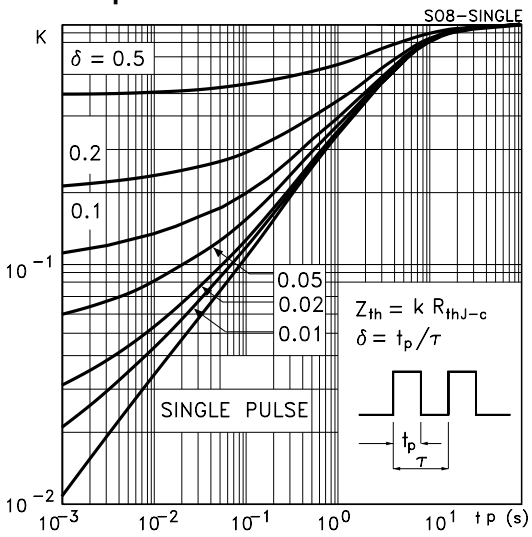
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{SD}$<br>$I_{SDM}$ (2) | Source-drain Current<br>Source-drain Current (pulsed) | | | | 0.3<br>1.2 | A<br>A |
| $V_{SD}$ (1) | Forward On Voltage | $I_{SD} = 0.3$ A, $V_{GS} = 0$ | | | 1.6 | V |
| $t_{rr}$<br>$Q_{rr}$<br>$I_{RRM}$ | Reverse Recovery Time<br>Reverse Recovery Charge<br>Reverse Recovery Current | $I_{SD} = 0.3$ A, di/dt = 100 A/µs<br>$V_{DD} = 25$ V, $T_j = 150°C$<br>(see test circuit, Figure 5) | | 229<br>377<br>3.3 | | ns<br>µC<br>A |

Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
2. Pulse width limited by safe operating area.

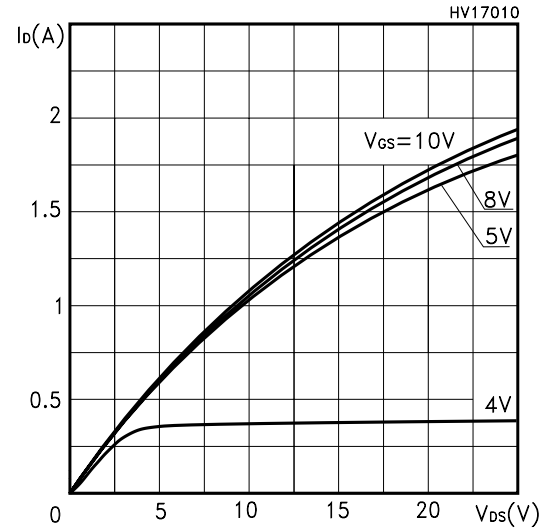
### Safe Operating Area



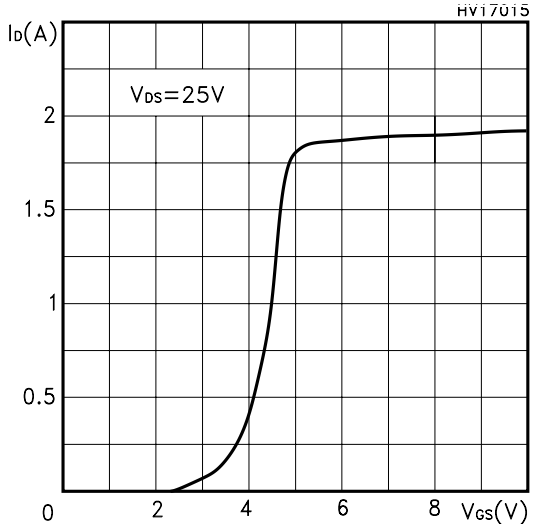

### Thermal Impedance



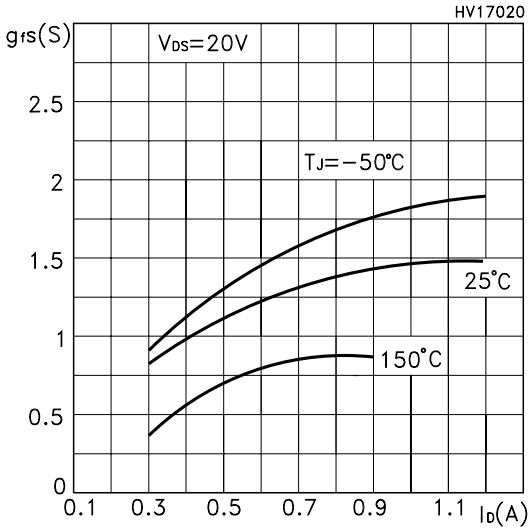

### Output Characteristics



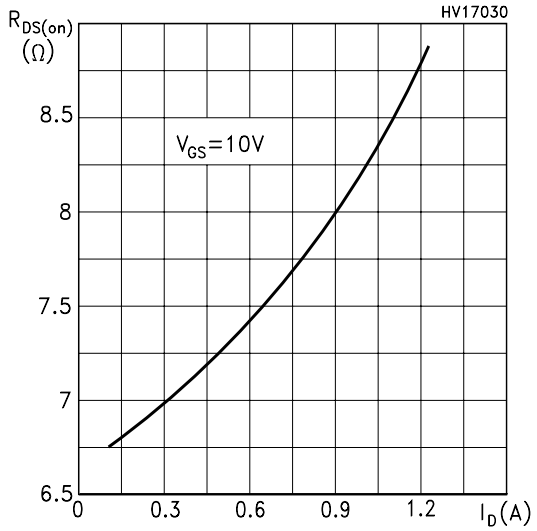

### Transfer Characteristics



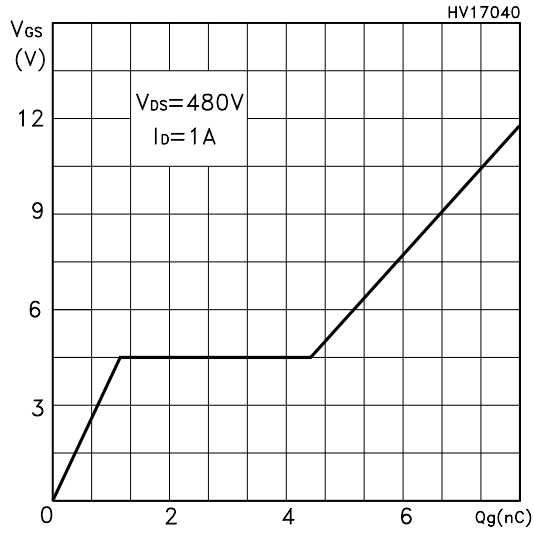

### Transconductance



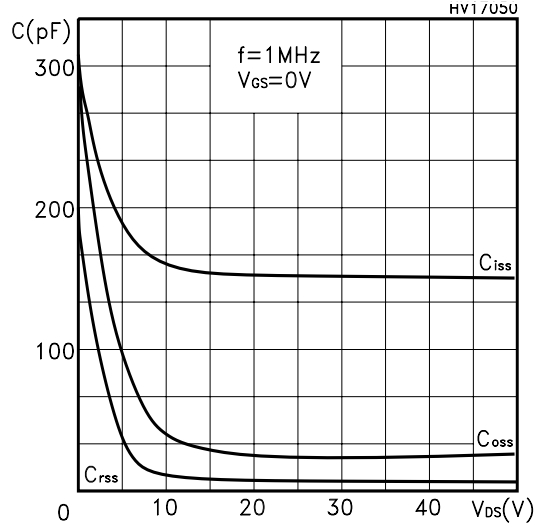

### Static Drain-source On Resistance



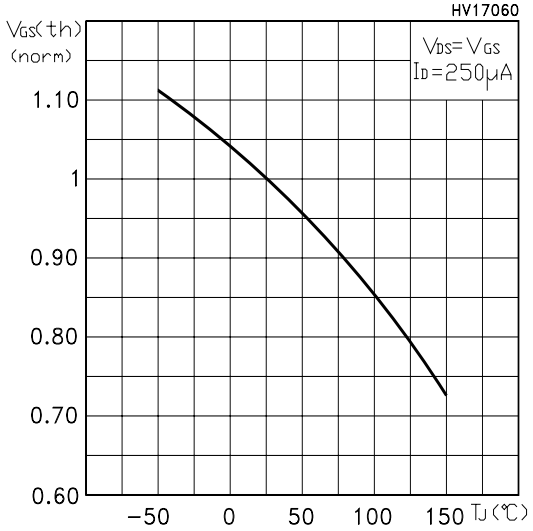
### Gate Charge vs Gate-source Voltage



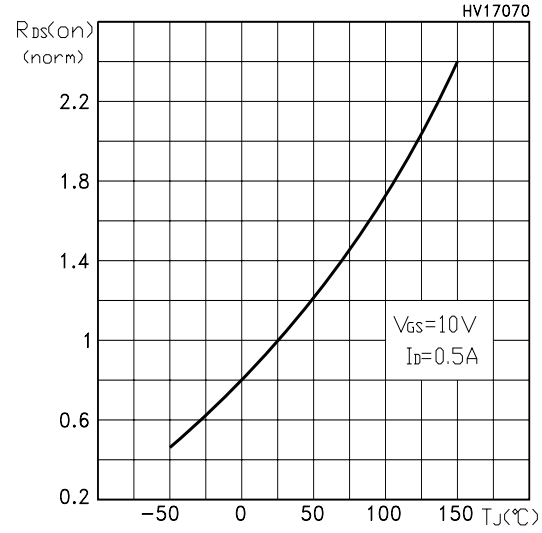

### Capacitance Variations



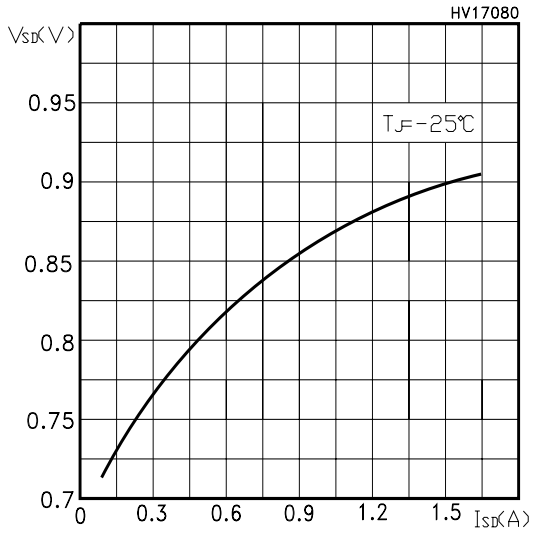

### Normalized Gate Threshold Voltage vs Temp.




### Normalized On Resistance vs Temperature




### Source-drain Diode Forward Characteristics




### Normalized BVDSS vs Temperature

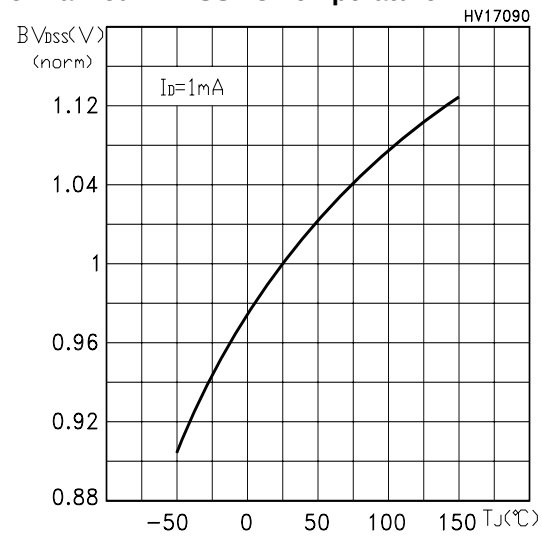


**Fig. 1:** Unclamped Inductive Load Test Circuit

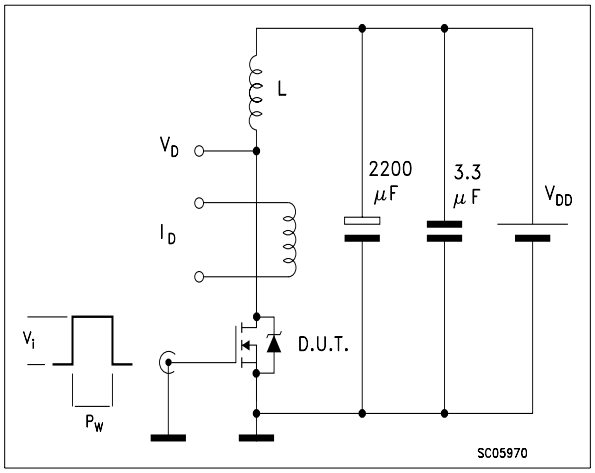



**Fig. 2:** Unclamped Inductive Waveform

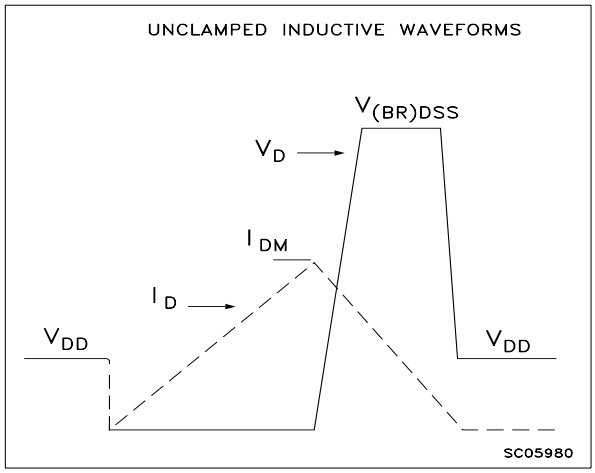



**Fig. 3:** Switching Times Test Circuit For Resistive Load

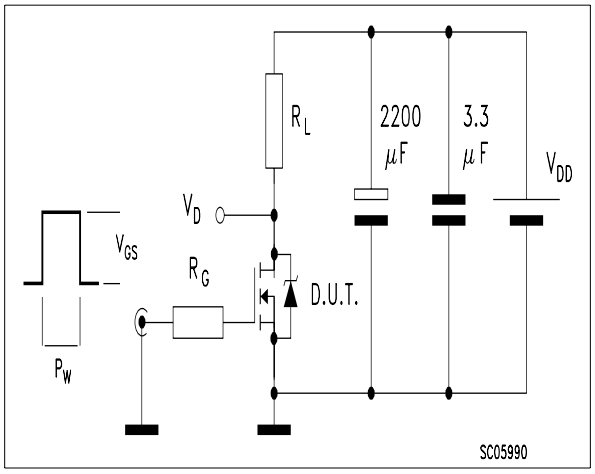



**Fig. 4:** Gate Charge test Circuit

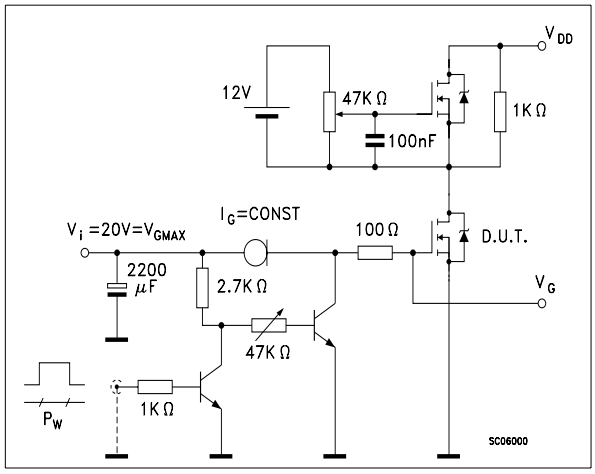
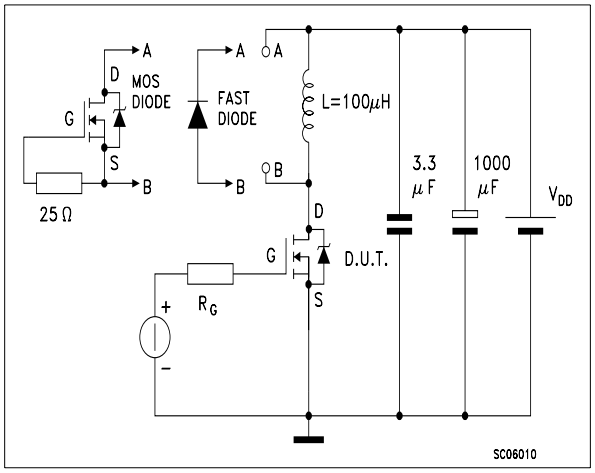
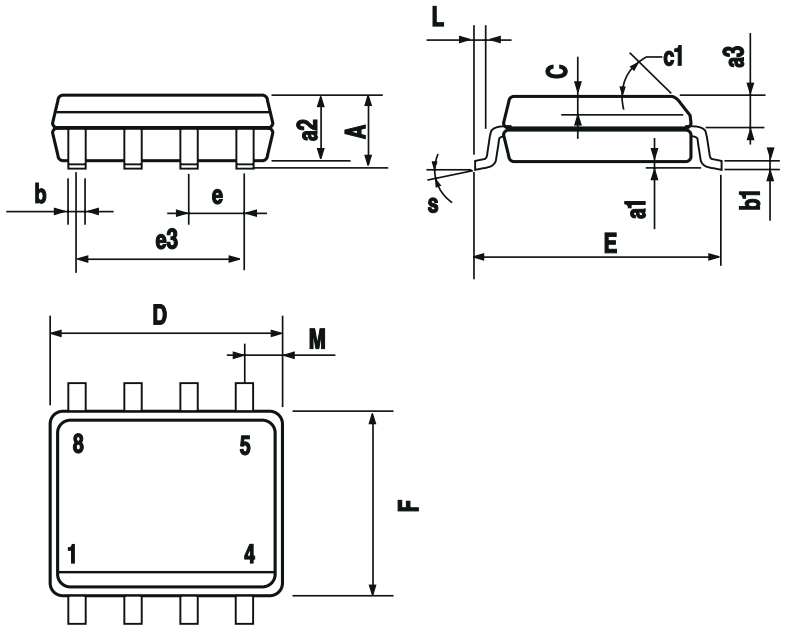



**Fig. 5:** Test Circuit For Inductive Load Switching And Diode Recovery Times



## 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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