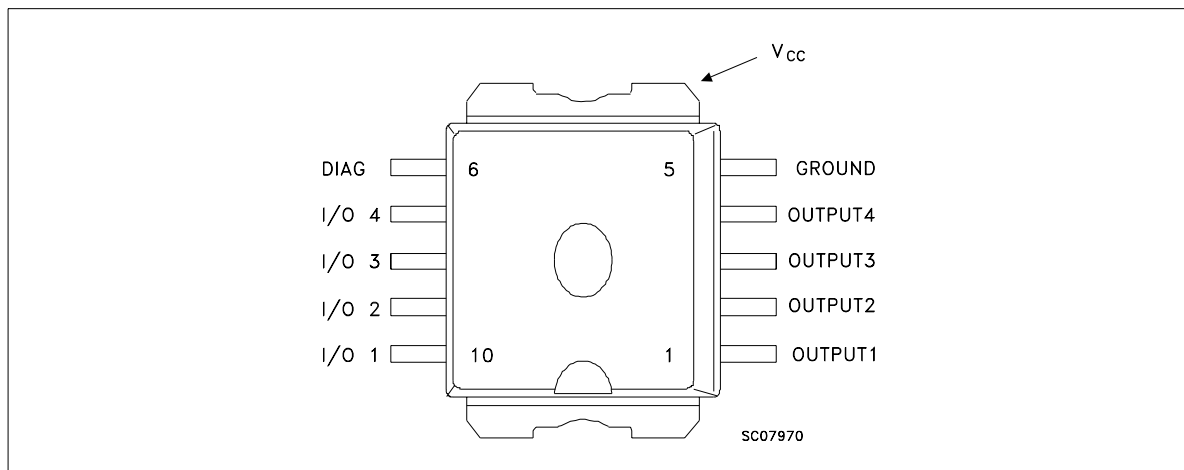


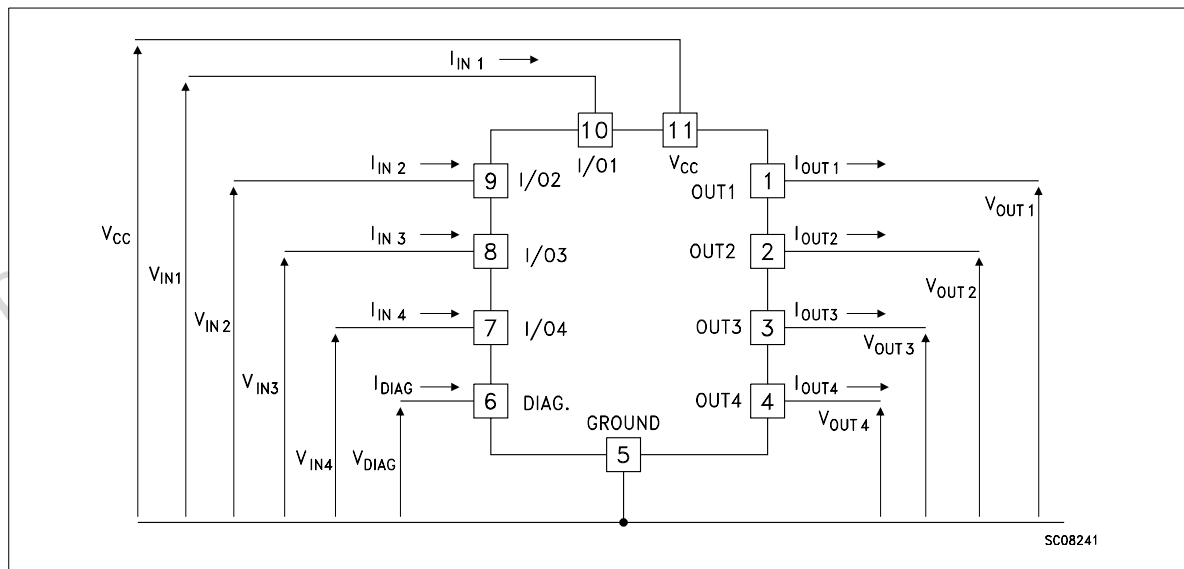
## ABSOLUTE MAXIMUM RATING

| Symbol     | Parameter                                                                   | Value              | Unit       |
|------------|-----------------------------------------------------------------------------|--------------------|------------|
| $V_{CC}$   | Power supply voltage                                                        | 45                 | V          |
| $-V_{CC}$  | Reverse supply voltage                                                      | -4                 | V          |
| $I_{OUT}$  | Output current (continuous)                                                 | Internally limited | A          |
| $I_R$      | Reverse output current (per channel)                                        | -6                 | A          |
| $I_{IN}$   | Input current (per channel)                                                 | $\pm 10$           | mA         |
| $I_{DIAG}$ | Diag pin current                                                            | $\pm 10$           | mA         |
| $V_{ESD}$  | Electrostatic discharge ( $R=1.5K\Omega$ ; $C=100pF$ )                      | 2000               | V          |
| $E_{AS}$   | Single pulse avalanche energy per channel not simultaneously (see figure 1) | 400                | mJ         |
| $P_{tot}$  | Power dissipation at $T_c=25^\circ C$                                       | Internally limited | W          |
| $T_j$      | Junction operating temperature                                              | Internally limited | $^\circ C$ |
| $T_{stg}$  | Storage temperature                                                         | -55 to 150         | $^\circ C$ |

## CONNECTION DIAGRAM TOP VIEW



## CURRENT AND VOLTAGE CONVENTIONS



## THERMAL DATA

| Symbol         | Parameter                                      | Value | Unit |
|----------------|------------------------------------------------|-------|------|
| $R_{thj-case}$ | Thermal resistance junction-case (1) (MAX)     | 3     | °C/W |
| $R_{thj-amb}$  | Thermal resistance junction-ambient (\$) (MAX) | 50    | °C/W |

(1) Per channel

(\$) When mounted using minimum recommended pad size on FR-4 board

ELECTRICAL CHARACTERISTICS (10V <  $V_{CC}$  < 36V; -25°C <  $T_J$  < 85°C; unless otherwise specified)

## POWER

| Symbol      | Parameter                  | Test Conditions                                                                                                  | Min         | Typ         | Max                | Unit                             |
|-------------|----------------------------|------------------------------------------------------------------------------------------------------------------|-------------|-------------|--------------------|----------------------------------|
| $V_{CC}$    | Supply voltage             |                                                                                                                  | 10          |             | 36                 | V                                |
| $R_{ON}$    | On state resistance        | $I_{OUT}=0.5A$ ; $T_J=25^\circ C$<br>$I_{OUT}=0.5A$ ; -25°C < $T_J$ < 85°C<br>$I_{OUT}=0.5A$ ; $T_J=125^\circ C$ |             |             | 0.2<br>0.32<br>0.4 | $\Omega$<br>$\Omega$<br>$\Omega$ |
| $I_S$       | Supply current             | All channels off<br>On state; $V_{IN}=30V$ ; $I_{OUTn}=0V$<br>( $T_J=125^\circ C$ )                              |             |             | 1<br>6             | mA<br>mA                         |
| $V_{OL}$    | Low state output voltage   | $V_{IN}=V_{IL}$ ; $R_{LOAD} \geq 10M\Omega$                                                                      |             |             | 1.5                | V                                |
| $V_{demag}$ | Output voltage at turn-off | $I_{OUT}=0.5A$ ; $L_{LOAD}=1mH$                                                                                  | $V_{CC}-65$ | $V_{CC}-55$ | $V_{CC}-45$        | V                                |
| $I_{LGND}$  | Output current at turn-off | $V_{CC}=V_{INn}=V_{GND}=V_{STAT}=18$ to 30V<br>$T_{amb}=-25^\circ C$ to 85°C (*)                                 |             |             | 2                  | mA                               |

(\*) see test configuration and application description

SWITCHING ( $V_{CC}=24V$ )

| Symbol       | Parameter                             | Test Conditions                                                                     | Min | Typ | Max | Unit    |
|--------------|---------------------------------------|-------------------------------------------------------------------------------------|-----|-----|-----|---------|
| $t_{d(on)}$  | Turn-on delay time of Output current  | $I_{OUT}=0.5A$ , Resistive Load<br>Input rise time < 0.1 $\mu s$ , $T_J=25^\circ C$ |     | 52  | 100 | $\mu s$ |
| $t_r$        | Rise time of Output current           | $I_{OUT}=0.5A$ , Resistive Load<br>Input rise time < 0.1 $\mu s$ , $T_J=25^\circ C$ |     | 94  | 250 | $\mu s$ |
| $t_{d(off)}$ | Turn-off delay time of Output current | $I_{OUT}=0.5A$ , Resistive Load<br>Input rise time < 0.1 $\mu s$ , $T_J=25^\circ C$ |     | 34  | 50  | $\mu s$ |
| $t_f$        | Fall time of Output current           | $I_{OUT}=0.5A$ , Resistive Load<br>Input rise time < 0.1 $\mu s$ , $T_J=25^\circ C$ |     | 8   | 20  | $\mu s$ |

**ELECTRICAL CHARACTERISTICS** (continued)**LOGIC INPUT** (Per each channel)

| Symbol        | Parameter                                    | Test Conditions               | Min | Typ        | Max | Unit    |
|---------------|----------------------------------------------|-------------------------------|-----|------------|-----|---------|
| $V_{IL}$      | I/O Input low level voltage                  |                               |     |            | 2   | V       |
| $V_{IH}$      | I/O Input high level voltage<br>(see note 1) |                               | 3.5 |            |     | V       |
| $V_{I(HYST)}$ | I/O Input hysteresis voltage                 |                               |     | 0.5        |     | V       |
| $I_{IN}$      | I/O Input current                            | $V_{IN}=30V$                  |     |            | 25  | $\mu A$ |
| $V_{ICL}$     | I/O Input clamp voltage<br>(see note 1)      | $I_{IN}=1mA$<br>$I_{IN}=-1mA$ | 32  | 36<br>-0.7 |     | V<br>V  |

Note 1 : The input voltage is internally clamped at 32V minimum , it is possible to connect the input pins to an higher voltage via an external resistor calculate to not exceed 10mA.

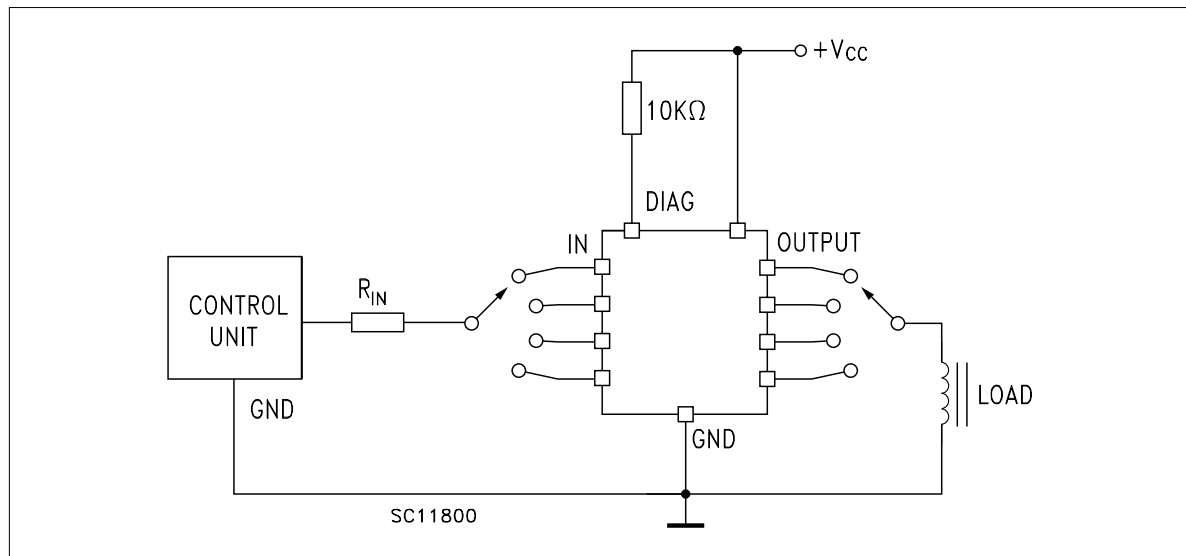
**PROTECTION AND DIAGNOSTICS**

| Symbol         | Parameter                         | Test Conditions                                                      | Min | Typ        | Max | Unit        |
|----------------|-----------------------------------|----------------------------------------------------------------------|-----|------------|-----|-------------|
| $V_{DIAG} (*)$ | Status voltage output low         | $I_{STAT}=5mA$<br>(Fault condition)                                  |     |            | 1   | V           |
| $V_{SCL} (*)$  | Status clamp voltage              | $I_{DIAG}=1mA$<br>$I_{DIAG}=-1mA$                                    | 32  | 36<br>-0.7 |     | V<br>V      |
| $V_{USD}$      | Undervoltage shut down            |                                                                      | 5   |            | 8   | V           |
| $I_{LIM}$      | DC Short circuit current          | $V_{CC}=24V$ ; $R_{LOAD}<10m\Omega$                                  | 0.7 |            | 2   | A           |
| $I_{OVPK}$     | Peak short circuit current        | $V_{CC}=24V$ ; $V_{IN}=30V$ ; $R_{LOAD}<10m\Omega$<br>(see figure 2) |     |            | 4   | A           |
| $I_{DIAGH}$    | Leakage on diag pin in high state | $V_{DIAG}=24V$                                                       |     |            | 25  | $\mu A$     |
| $I_{LOAD}$     | Output leakage current            | $V_{CC}=10$ to $36V$ ; $V_{IN}=V_{IL}$                               |     |            | 50  | $\mu A$     |
| $t_{SC}$       | Delay time of current limiter     |                                                                      |     |            | 100 | $\mu s$     |
| $T_{TSD}$      | Thermal shut down temperature     |                                                                      | 150 | 170        |     | $^{\circ}C$ |
| $T_R$          | Thermal reset temperature         |                                                                      | 135 | 155        |     | $^{\circ}C$ |

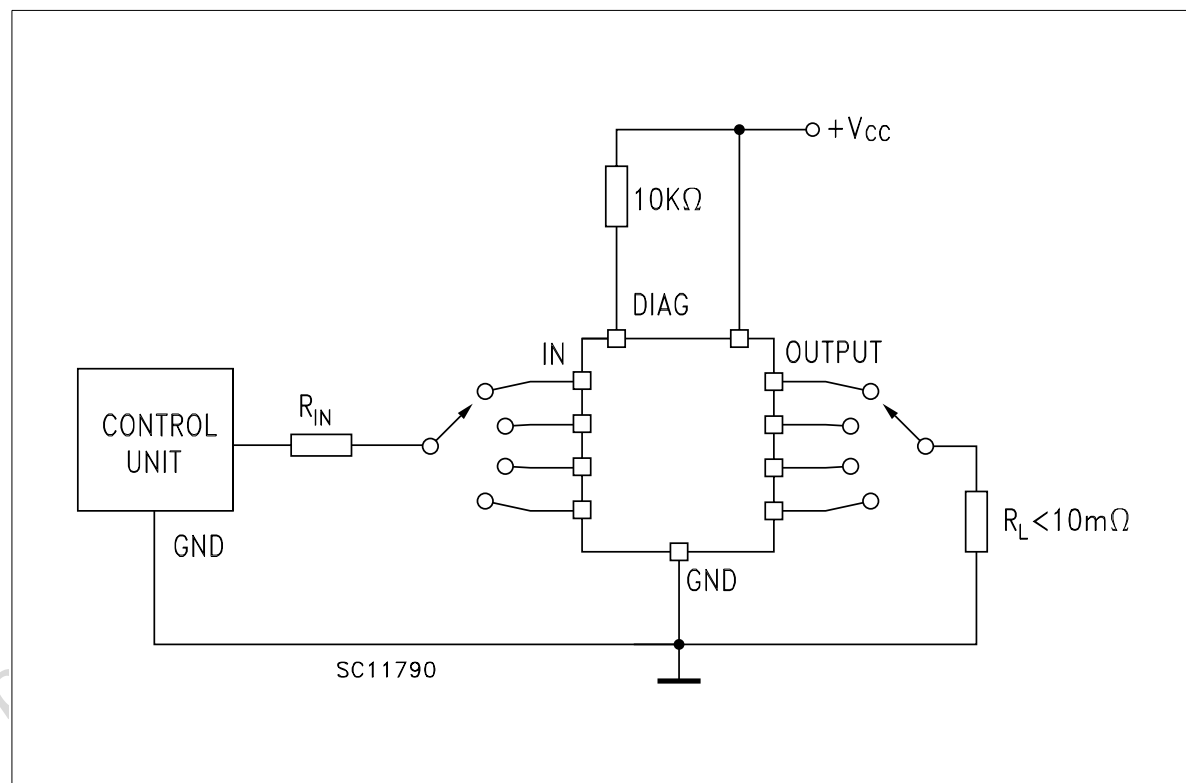
(\*) Status determination > 100 $\mu s$  after the switching edge.

Note: If INPUT pin is floating the corresponding channel will automatically switch off. If GND pin is disconnected, the channel will switch off provided  $V_{CC}$  not exceed 36V.

**FIGURE 1:** Avalanche Energy Test Circuit



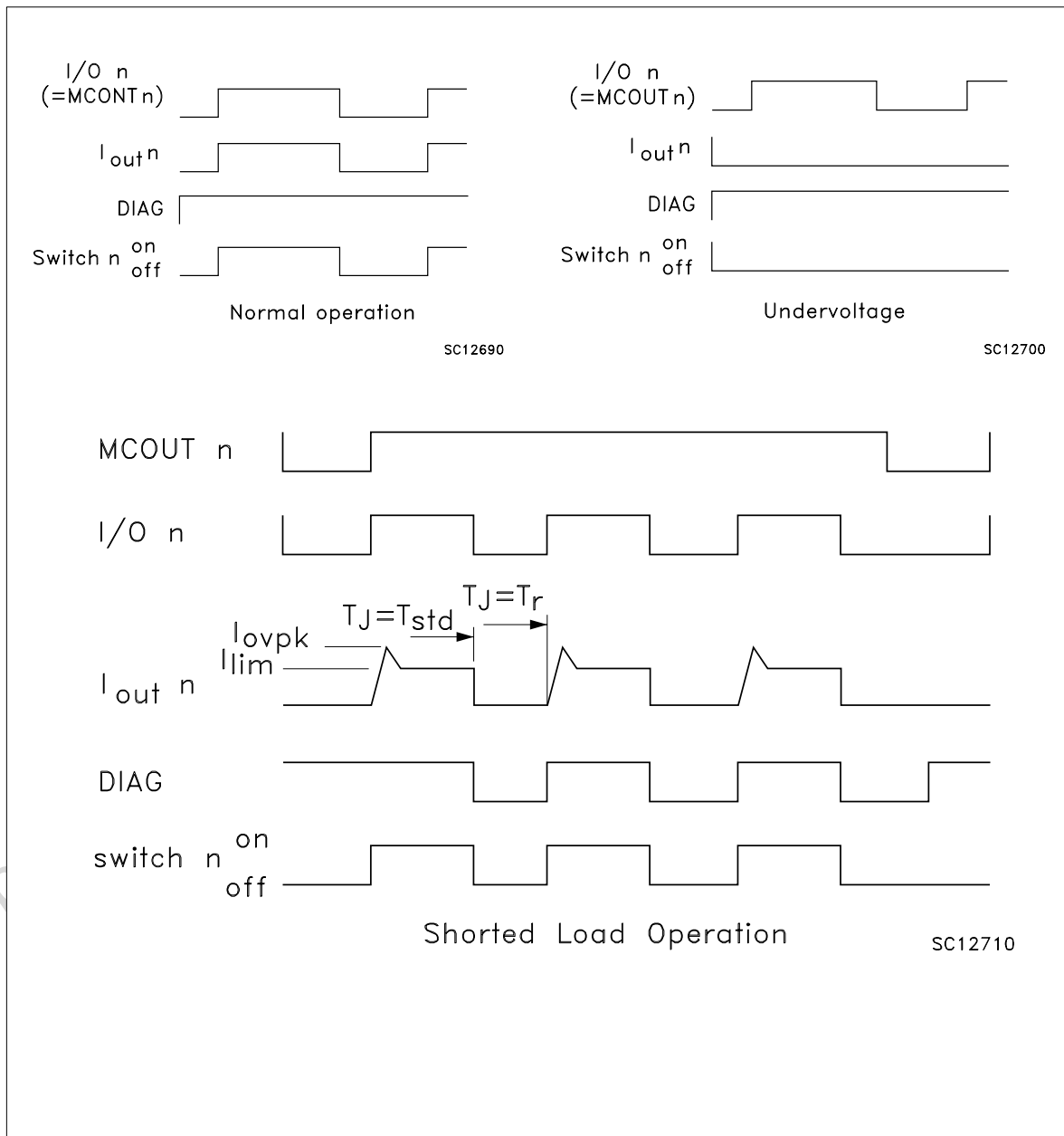
**FIGURE 2:** Peak Short Circuit Current Test Circuit



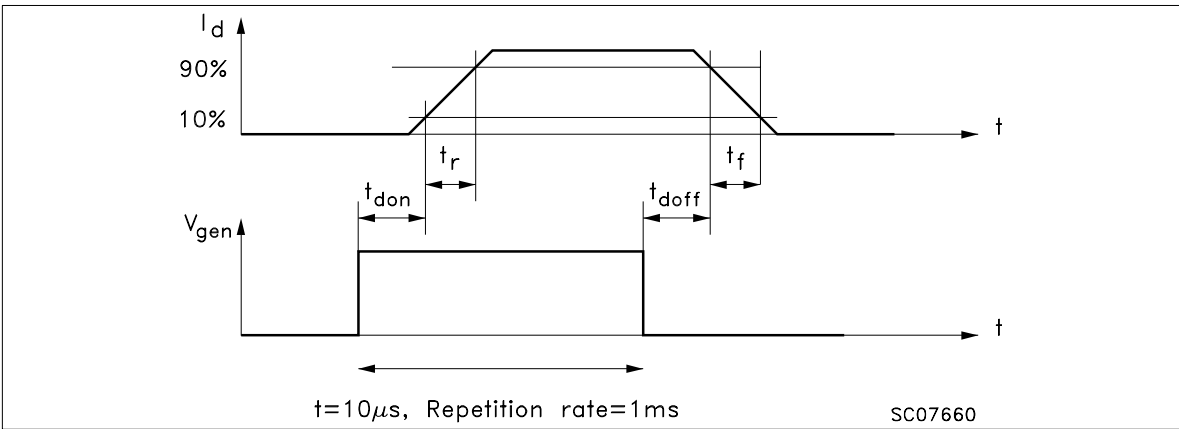
## THRUTH TABLE

|                                      | MCOUTn | I/On   | OUTPUTn | DIAGNOSTIC |
|--------------------------------------|--------|--------|---------|------------|
| Normal operation                     | L<br>H | L<br>H | L<br>H  | H<br>H     |
| Overtemperature                      | L<br>H | L<br>L | L<br>L  | H<br>L     |
| Undervoltage                         | L<br>H | L<br>H | L<br>L  | H<br>H     |
| Shorted load<br>(Current limitation) | L<br>H | L<br>H | L<br>H  | H<br>H     |

Figure 3: Switching Waveforms



SWITCHING PARAMETERS TEST CONDITIONS



DRIVING CIRCUIT

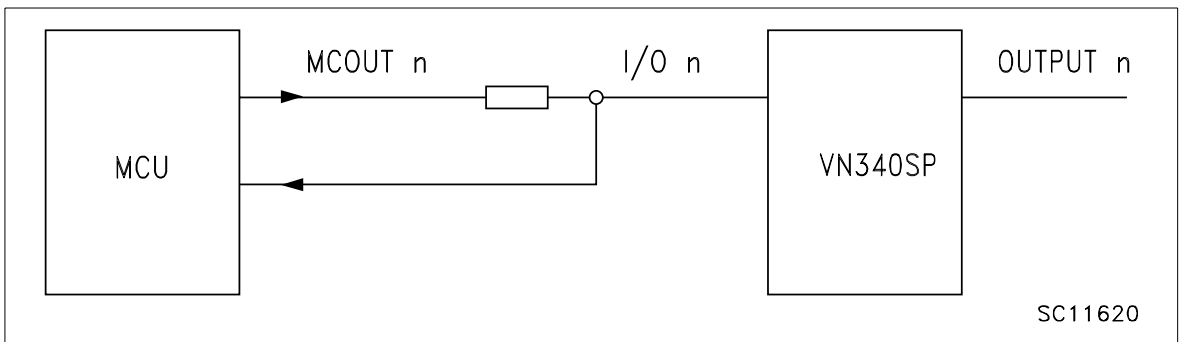
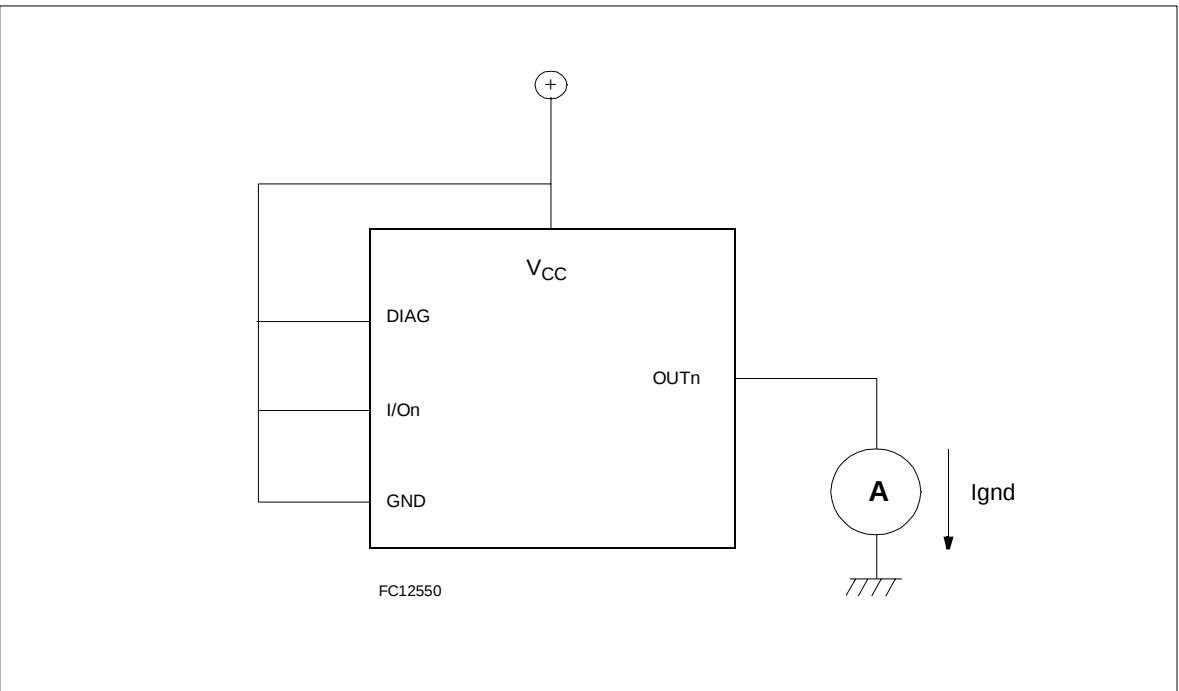


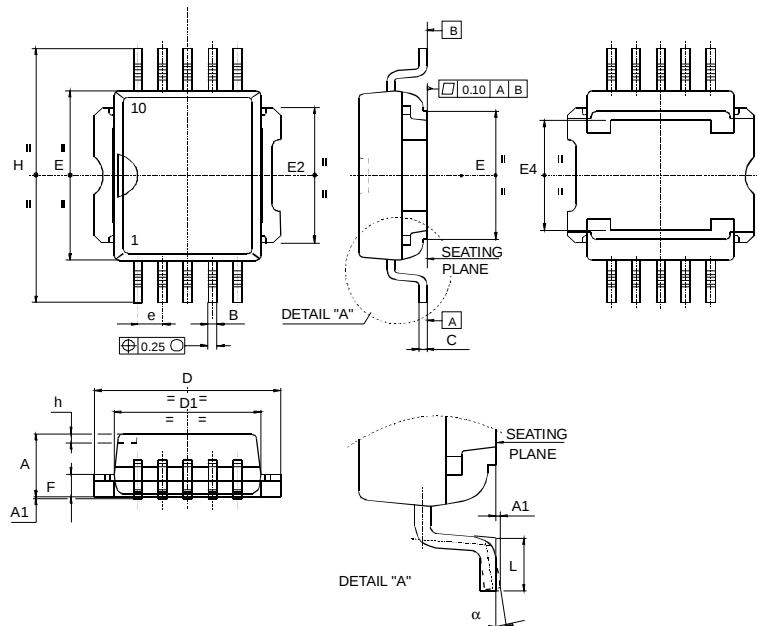
Fig. 4:  $I_{LGND}$  Test Configuration



## PowerSO-10™ MECHANICAL DATA

| DIM.         | mm.   |      |       | inch  |       |        |
|--------------|-------|------|-------|-------|-------|--------|
|              | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.   |
| A            | 3.35  |      | 3.65  | 0.132 |       | 0.144  |
| A (*)        | 3.4   |      | 3.6   | 0.134 |       | 0.142  |
| A1           | 0.00  |      | 0.10  | 0.000 |       | 0.004  |
| B            | 0.40  |      | 0.60  | 0.016 |       | 0.024  |
| B (*)        | 0.37  |      | 0.53  | 0.014 |       | 0.021  |
| C            | 0.35  |      | 0.55  | 0.013 |       | 0.022  |
| C (*)        | 0.23  |      | 0.32  | 0.009 |       | 0.0126 |
| D            | 9.40  |      | 9.60  | 0.370 |       | 0.378  |
| D1           | 7.40  |      | 7.60  | 0.291 |       | 0.300  |
| E            | 9.30  |      | 9.50  | 0.366 |       | 0.374  |
| E2           | 7.20  |      | 7.60  | 0.283 |       | 300    |
| E2 (*)       | 7.30  |      | 7.50  | 0.287 |       | 0.295  |
| E4           | 5.90  |      | 6.10  | 0.232 |       | 0.240  |
| E4 (*)       | 5.90  |      | 6.30  | 0.232 |       | 0.248  |
| e            |       | 1.27 |       |       | 0.050 |        |
| F            | 1.25  |      | 1.35  | 0.049 |       | 0.053  |
| F (*)        | 1.20  |      | 1.40  | 0.047 |       | 0.055  |
| H            | 13.80 |      | 14.40 | 0.543 |       | 0.567  |
| H (*)        | 13.85 |      | 14.35 | 0.545 |       | 0.565  |
| h            |       | 0.50 |       |       | 0.002 |        |
| L            | 1.20  |      | 1.80  | 0.047 |       | 0.070  |
| L (*)        | 0.80  |      | 1.10  | 0.031 |       | 0.043  |
| $\alpha$     | 0°    |      | 8°    | 0°    |       | 8°     |
| $\alpha$ (*) | 2°    |      | 8°    | 2°    |       | 8°     |

(\*) Muar only POA P013P



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