

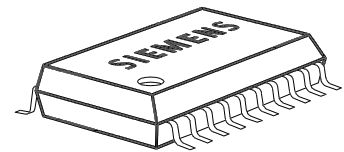
## Smart Two Channel Highside Power Switch

### Features

- Overload protection
- Current limitation
- Short-circuit protection
- Thermal shutdown
- Overvoltage protection (including load dump)
- Fast demagnetization of inductive loads
- Reverse battery protection<sup>1)</sup>
- Undervoltage and overvoltage shutdown with auto-restart and hysteresis
- Open drain diagnostic output
- Open load detection in ON-state
- CMOS compatible input
- Loss of ground and loss of  $V_{bb}$  protection
- Electrostatic discharge (ESD) protection

### Product Summary

|                        |              |            |              |
|------------------------|--------------|------------|--------------|
| Overvoltage Protection | $V_{bb(AZ)}$ | 43         | V            |
| Operating voltage      | $V_{bb(on)}$ | 5.0 ... 34 | V            |
| active channels:       |              | one        | two parallel |
| On-state resistance    | $R_{ON}$     | 40         | 20           |
| Nominal load current   | $I_{L(NOM)}$ | 4.8        | 7.3          |
| Current limitation     | $I_{L(SCr)}$ | 19         | 19           |



### Application

- $\mu$ C compatible power switch with diagnostic feedback for 12 V and 24 V DC grounded loads
- All types of resistive, inductive and capacitive loads
- Replaces electromechanical relays, fuses and discrete circuits

### General Description

N channel vertical power FET with charge pump, ground referenced CMOS compatible input and diagnostic feedback, monolithically integrated in Smart SIPMOS® technology. Fully protected by embedded protection functions.

#### Pin Definitions and Functions

| Pin                       | Symbol   | Function   |
|---------------------------|----------|--|
| 1,10, 11,12, 15,16, 19,20 | $V_{bb}$ | <b>Positive power supply voltage.</b> Design the wiring for the simultaneous max. short circuit currents from channel 1 to 2 and also for low thermal resistance |
| 3                         | IN1      | <b>Input 1,2</b> , activates channel 1,2 in case of logic high signal  |
| 7                         | IN2      |  |
| 17,18                     | OUT1     | <b>Output 1,2</b> , protected high-side power output of channel 1,2. Design the wiring for the max. short circuit current  |
| 13,14                     | OUT2     |  |
| 4                         | ST1      | <b>Diagnostic feedback 1,2</b> of channel 1,2, open drain, low on failure  |
| 8                         | ST2      |  |
| 2                         | GND1     | <b>Ground 1</b> of chip 1 (channel 1)  |
| 6                         | GND2     | <b>Ground 2</b> of chip 2 (channel 2)  |
| 5,9                       | N.C.     | <b>Not Connected</b>   |

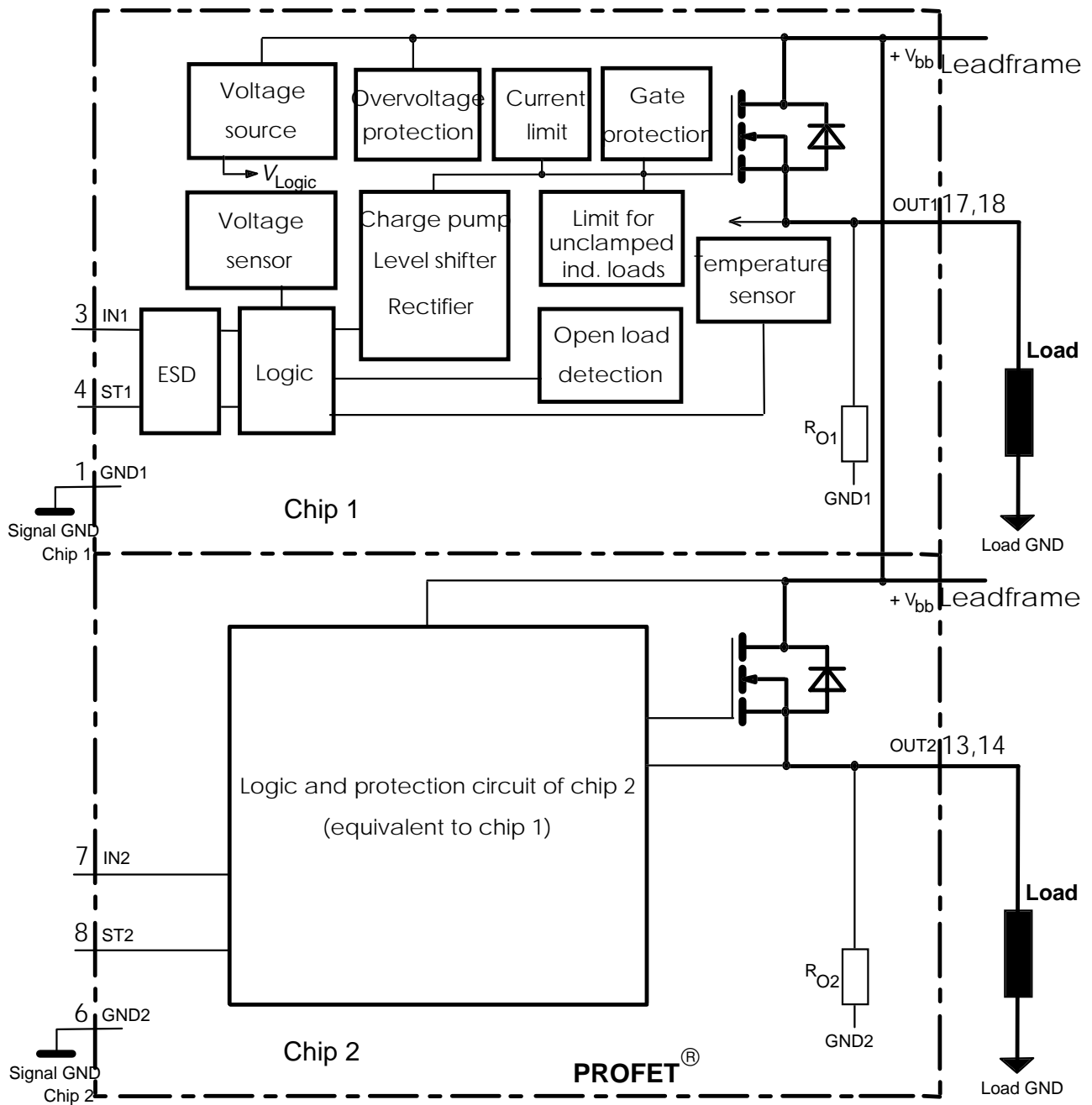
#### Pin configuration (top view)

|          |    |    |          |
|----------|----|----|----------|
| $V_{bb}$ | 1  | 20 | $V_{bb}$ |
| GND1     | 2  | 19 | $V_{bb}$ |
| IN1      | 3  | 18 | OUT1     |
| ST1      | 4  | 17 | OUT1     |
| N.C.     | 5  | 16 | $V_{bb}$ |
| GND2     | 6  | 15 | $V_{bb}$ |
| IN2      | 7  | 14 | OUT2     |
| ST2      | 8  | 13 | OUT2     |
| N.C.     | 9  | 12 | $V_{bb}$ |
| $V_{bb}$ | 10 | 11 | $V_{bb}$ |

<sup>1)</sup> With external current limit (e.g. resistor  $R_{GND}=150 \Omega$ ) in GND connection, resistor in series with ST connection, reverse load current limited by connected load.

## Block diagram

Two Channels; Open Load detection in on state;



Leadframe connected to pin 1, 10, 11, 12, 15, 16, 19, 20

**Maximum Ratings** at  $T_j = 25^\circ\text{C}$  unless otherwise specified

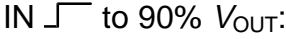
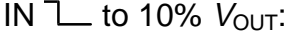
| Parameter  | Symbol   | Values | Unit |
|--|----------|--------|------|
| Supply voltage (overvoltage protection see page 4)   | $V_{bb}$ | 43     | V    |
| Supply voltage for full short circuit protection<br>$T_{j,start} = -40 \dots +150^\circ\text{C}$ | $V_{bb}$ | 34     | V    |



## Electrical Characteristics

| Parameter and Conditions, each of the two channels<br>at $T_j = 25^\circ\text{C}$ , $V_{bb} = 12\text{ V}$ unless otherwise specified | Symbol | Values |     |     | Unit |
|---|--------|--------|-----|-----|------|
|   |        | min    | typ | max |      |

## Load Switching Capabilities and Characteristics

|   |                  |            |                |                |                        |
|---|------------------|------------|----------------|----------------|------------------------|
| On-state resistance ( $V_{bb}$ to OUT)<br>$I_L = 2\text{ A}$ each channel, $T_j = 25^\circ\text{C}$ :<br>$T_j = 150^\circ\text{C}$ :<br>two parallel channels, $T_j = 25^\circ\text{C}$ : | $R_{ON}$         | --         | 36<br>67<br>18 | 40<br>75<br>20 | $\text{m}\Omega$       |
| Nominal load current one channel active:<br>two parallel channels active:<br>Device on PCB <sup>5)</sup> , $T_a = 85^\circ\text{C}$ , $T_j \leq 150^\circ\text{C}$                        | $I_{L(NOM)}$     | 4.4<br>6.7 | 4.8<br>7.3     | --             | A                      |
| Output current while GND disconnected or pulled up; $V_{bb} = 30\text{ V}$ , $V_{IN} = 0$ , see diagram page 9  | $I_{L(GNDhigh)}$ | --         | --             | 10             | mA                     |
| Turn-on time <sup>7)</sup> IN  to 90% $V_{OUT}$ :  | $t_{on}$         | 80         | 180            | 350            | $\mu\text{s}$          |
| Turn-off time IN  to 10% $V_{OUT}$ :<br>$R_L = 12\ \Omega$ , $T_j = -40\dots+150^\circ\text{C}$          | $t_{off}$        | 80         | 250            | 450            | $\mu\text{s}$          |
| Slew rate on <sup>7)</sup><br>10 to 30% $V_{OUT}$ , $R_L = 12\ \Omega$ , $T_j = -40\dots+150^\circ\text{C}$ :   | $dV/dt_{on}$     | 0.1        | --             | 1              | $\text{V}/\mu\text{s}$ |
| Slew rate off <sup>7)</sup><br>70 to 40% $V_{OUT}$ , $R_L = 12\ \Omega$ , $T_j = -40\dots+150^\circ\text{C}$ :  | $-dV/dt_{off}$   | 0.1        | --             | 1              | $\text{V}/\mu\text{s}$ |

## Operating Parameters

|  |                        |     |          |            |               |
|--|------------------------|-----|----------|------------|---------------|
| Operating voltage <sup>8)</sup> $T_j = -40\dots+150^\circ\text{C}$ :                                     | $V_{bb(on)}$           | 5.0 | --       | 34         | V             |
| Undervoltage shutdown $T_j = -40\dots+150^\circ\text{C}$ :   | $V_{bb(under)}$        | 3.5 | --       | 5.0        | V             |
| Undervoltage restart $T_j = -40\dots+25^\circ\text{C}$ :<br>$T_j = +150^\circ\text{C}$ :                 | $V_{bb(u\ rst)}$       | --  | --       | 5.0<br>7.0 | V             |
| Undervoltage restart of charge pump<br>see diagram page 14 $T_j = -40\dots+150^\circ\text{C}$ :          | $V_{bb(ucp)}$          | --  | 5.6      | 7.0        | V             |
| Undervoltage hysteresis<br>$\Delta V_{bb(under)} = V_{bb(u\ rst)} - V_{bb(under)}$                       | $\Delta V_{bb(under)}$ | --  | 0.2      | --         | V             |
| Overvoltage shutdown $T_j = -40\dots+150^\circ\text{C}$ :  | $V_{bb(over)}$         | 34  | --       | 43         | V             |
| Overvoltage restart $T_j = -40\dots+150^\circ\text{C}$ :   | $V_{bb(o\ rst)}$       | 33  | --       | --         | V             |
| Overvoltage hysteresis $T_j = -40\dots+150^\circ\text{C}$ :  | $\Delta V_{bb(over)}$  | --  | 0.5      | --         | V             |
| Overvoltage protection <sup>9)</sup> $T_j = -40\dots+150^\circ\text{C}$ :<br>$I_{bb} = 40\text{ mA}$     | $V_{bb(AZ)}$           | 42  | 47       | --         | V             |
| Standby current, all channels off $T_j = 25^\circ\text{C}$ :<br>$V_{IN} = 0$ $T_j = 150^\circ\text{C}$ : | $I_{bb(off)}$          | --  | 16<br>24 | 40<br>50   | $\mu\text{A}$ |

7) See timing diagram on page 12.

8) At supply voltage increase up to  $V_{bb} = 5.6\text{ V}$  typ without charge pump,  $V_{OUT} \approx V_{bb} - 2\text{ V}$

9) see also  $V_{ON(CL)}$  in circuit diagram on page 8.

| Parameter and Conditions, each of the two channels<br>at $T_j = 25^\circ\text{C}$ , $V_{bb} = 12\text{ V}$ unless otherwise specified                                    | Symbol              | Values   |            |        | Unit          |
|--|---------------------|----------|------------|--------|---------------|
|  |                     | min      | typ        | max    |               |
| Leakage output current (included in $I_{bb(\text{off})}$ )<br>$V_{IN} = 0$   | $I_{L(\text{off})}$ | --       | --         | 20     | $\mu\text{A}$ |
| Operating current <sup>10)</sup> , $V_{IN} = 5\text{V}$ , $T_j = -40\dots+150^\circ\text{C}$<br>$I_{GND} = I_{GND1} + I_{GND2}$ ,<br>one channel on:<br>two channels on: | $I_{GND}$           | --<br>-- | 1.8<br>3.6 | 4<br>8 | mA            |

### Protection Functions

|  |                             |                                  |                |                |                  |
|--|-----------------------------|----------------------------------|----------------|----------------|------------------|
| Initial peak short circuit current limit, (see timing diagrams, page 13)<br><br>each channel, $T_j = -40^\circ\text{C}$ :<br>$T_j = 25^\circ\text{C}$ :<br>$T_j = +150^\circ\text{C}$ :<br>two parallel channels | $I_{L(\text{SCP})}$         | 47<br>35<br>21                   | 55<br>44<br>26 | 66<br>54<br>34 | A                |
|  |                             | twice the current of one channel |                |                |                  |
| Repetitive short circuit current limit,<br>$T_j = T_{jt}$<br>each channel<br>two parallel channels<br><br>(see timing diagrams, page 13)   | $I_{L(\text{SCR})}$         | --<br>--                         | 19<br>19       | --<br>--       | A                |
| Initial short circuit shutdown time<br>$T_{j,\text{start}} = -40^\circ\text{C}$ :<br>$T_{j,\text{start}} = 25^\circ\text{C}$ :<br><br>(see page 11 and timing diagrams on page 13)                               | $t_{\text{off}(\text{SC})}$ | --<br>--                         | 3<br>2.5       | --<br>--       | ms               |
| Output clamp (inductive load switch off) <sup>11)</sup><br>at $V_{\text{ON}(\text{CL})} = V_{bb} - V_{\text{OUT}}$   | $V_{\text{ON}(\text{CL})}$  | 41                               | 47             | --             | V                |
| Thermal overload trip temperature  | $T_{jt}$                    | 150                              | --             | --             | $^\circ\text{C}$ |
| Thermal hysteresis   | $\Delta T_{jt}$             | --                               | 10             | --             | K                |

### Reverse Battery

|  |                  |    |     |    |    |
|--|------------------|----|-----|----|----|
| Reverse battery voltage <sup>12)</sup>   | $-V_{bb}$        | -- | --  | 32 | V  |
| Drain-source diode voltage ( $V_{\text{out}} > V_{bb}$ )<br>$I_L = -4.8\text{ A}$ , $T_j = +150^\circ\text{C}$ | $-V_{\text{ON}}$ | -- | 600 | -- | mV |

<sup>10)</sup> Add  $I_{ST}$ , if  $I_{ST} > 0$

<sup>11)</sup> If channels are connected in parallel, output clamp is usually accomplished by the channel with the lowest  $V_{\text{ON}(\text{CL})}$



<sup>12)</sup> Requires a  $150\ \Omega$  resistor in GND connection. The reverse load current through the intrinsic drain-source diode has to be limited by the connected load. Power dissipation is higher compared to normal operating conditions due to the voltage drop across the drain-source diode. The temperature protection is not active during reverse current operation! Input and Status currents have to be limited (see max. ratings page 3 and circuit page 8).

| Parameter and Conditions, each of the two channels<br>at $T_j = 25^\circ\text{C}$ , $V_{bb} = 12\text{ V}$ unless otherwise specified | Symbol | Values |     |     | Unit |
|---|--------|--------|-----|-----|------|
|   |        | min    | typ | max |      |

### Diagnostic Characteristics

|  |               |                                  |                |                    |            |
|--|---------------|----------------------------------|----------------|--------------------|------------|
| Open load detection current, (on-condition)<br>each channel, $T_j = -40^\circ\text{C}$ :<br>$T_j = 25^\circ\text{C}$ :<br>$T_j = 150^\circ\text{C}$ :<br>two parallel channels | $I_{L(OL)}$   | 20<br>20<br>20                   | --<br>--<br>-- | 1050<br>800<br>800 | mA         |
|  |               | twice the current of one channel |                |                    |            |
| Open load detection voltage <sup>13)</sup> $T_j = -40..+150^\circ\text{C}$ :   | $V_{OUT(OL)}$ | 2                                | 3              | 4                  | V          |
| Internal output pull down<br>(OUT to GND), $V_{OUT} = 5\text{ V}$ $T_j = -40..+150^\circ\text{C}$ :  | $R_O$         | 4                                | 10             | 30                 | k $\Omega$ |

### Input and Status Feedback<sup>14)</sup>

|  |                                 |                 |                 |                  |               |
|--|---------------------------------|-----------------|-----------------|------------------|---------------|
| Input resistance<br>(see circuit page 8)   | $R_I$                           | 2.5             | 3.5             | 6                | k $\Omega$    |
| Input turn-on threshold voltage<br><br>$T_j = -40..+150^\circ\text{C}$ :  | $V_{IN(T+)}$                    | 1.7             | --              | 3.3              | V             |
| Input turn-off threshold voltage<br><br>$T_j = -40..+150^\circ\text{C}$ :   | $V_{IN(T-)}$                    | 1.5             | --              | --               | V             |
| Input threshold hysteresis   | $\Delta V_{IN(T)}$              | --              | 0.5             | --               | V             |
| Off state input current<br>$V_{IN} = 0.4\text{ V}$ :<br>$T_j = -40..+150^\circ\text{C}$ :  | $I_{IN(off)}$                   | 1               | --              | 50               | $\mu\text{A}$ |
| On state input current<br>$V_{IN} = 5\text{ V}$ :<br>$T_j = -40..+150^\circ\text{C}$ :   | $I_{IN(on)}$                    | 20              | 50              | 90               | $\mu\text{A}$ |
| Delay time for status with open load after switch<br>off<br>(see timing diagrams, page 13), $T_j = -40..+150^\circ\text{C}$ :  | $t_{d(ST\ OL4)}$                | 100             | 520             | 1000             | $\mu\text{s}$ |
| Status invalid after positive input slope<br>(open load) $T_j = -40..+150^\circ\text{C}$ :   | $t_{d(ST)}$                     | --              | 250             | 600              | $\mu\text{s}$ |
| Status output (open drain)<br>Zener limit voltage $T_j = -40..+150^\circ\text{C}$ , $I_{ST} = +1.6\text{ mA}$ :<br>ST low voltage $T_j = -40..+25^\circ\text{C}$ , $I_{ST} = +1.6\text{ mA}$ :<br>$T_j = +150^\circ\text{C}$ , $I_{ST} = +1.6\text{ mA}$ : | $V_{ST(high)}$<br>$V_{ST(low)}$ | 5.4<br>--<br>-- | 6.1<br>--<br>-- | --<br>0.4<br>0.6 | V             |

<sup>13)</sup> External pull up resistor required for open load detection in off state.

<sup>14)</sup> If ground resistors  $R_{GND}$  are used, add the voltage drop across these resistors.

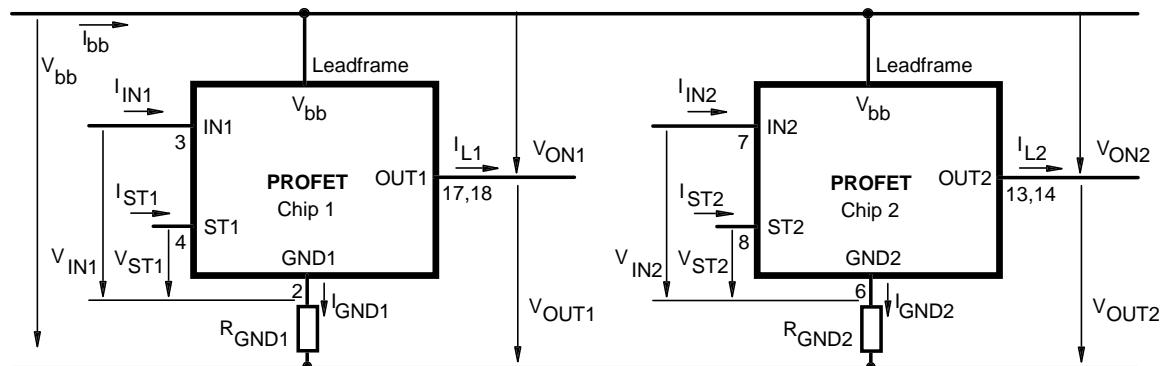
## Truth Table

| Channel 1                        | Input 1 | Output 1 | Status 1             |
|----------------------------------|---------|----------|----------------------|
| Channel 2                        | Input 2 | Output 2 | Status 2             |
|                                  | level   | level    | BTS 734L1            |
| Normal operation                 | L       | L        | H                    |
|                                  | H       | H        | H                    |
| Open load                        | L       | Z        | H (L <sup>15</sup> ) |
|                                  | H       | H        | L                    |
| Short circuit to V <sub>bb</sub> | L       | H        | L <sup>16</sup>      |
|                                  | H       | H        | H (L <sup>17</sup> ) |
| Overtemperature                  | L       | L        | H                    |
|                                  | H       | L        | L                    |
| Undervoltage                     | L       | L        | H                    |
|                                  | H       | L        | H                    |
| Overvoltage                      | L       | L        | H                    |
|                                  | H       | L        | H                    |

L = "Low" Level      X = don't care      Z = high impedance, potential depends on external circuit  
H = "High" Level      Status signal valid after the time delay shown in the timing diagrams

Parallel switching of channel 1 and 2 is easily possible by connecting the inputs and outputs in parallel. The status outputs ST1 and ST2 have to be configured as a 'Wired OR' function with a single pull-up resistor.

## Terms

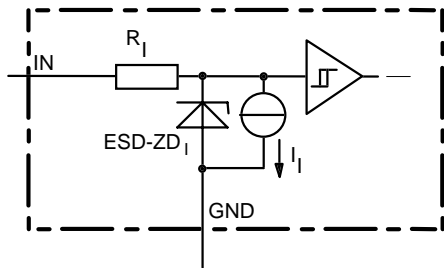


Leadframe ( $V_{bb}$ ) is connected to pin 1,10,11,12,15,16,19,20

External  $R_{GND}$  optional; two resistors  $R_{GND1}$ ,  $R_{GND2} = 150 \Omega$  or a single resistor  $R_{GND} = 75 \Omega$  for reverse battery protection up to the max. operating voltage.

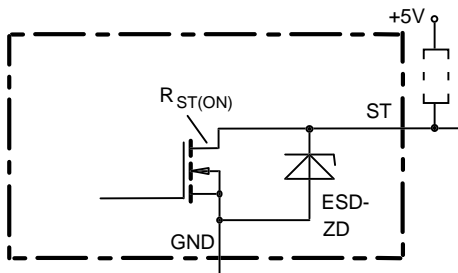
- 15) With external resistor between output and  $V_{bb}$
- 16) An external short of output to  $V_{bb}$  in the off state causes an internal current from output to ground. If  $R_{GND}$  is used, an offset voltage at the GND and ST pins will occur and the  $V_{ST\ low}$  signal may be erroneous.
- 17) Low resistance to  $V_{bb}$  may be detected by no-load-detection

## Input circuit (ESD protection), IN1 or IN2



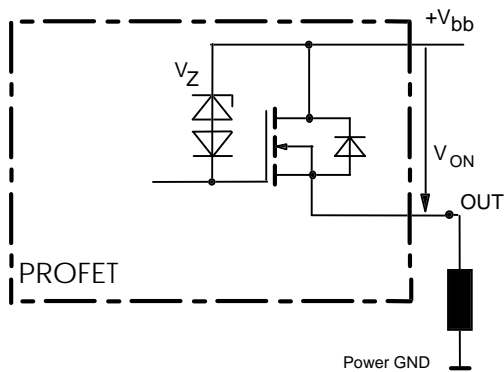
ESD zener diodes are not to be used as voltage clamp at DC conditions. Operation in this mode may result in a drift of the zener voltage (increase of up to 1 V).

## Status output, ST1 or ST2



ESD-Zener diode: 6.1 V typ., max 5.0 mA;  $R_{ST(ON)} < 375 \Omega$  at 1.6 mA, ESD zener diodes are not to be used as voltage clamp at DC conditions. Operation in this mode may result in a drift of the zener voltage (increase of up to 1 V).

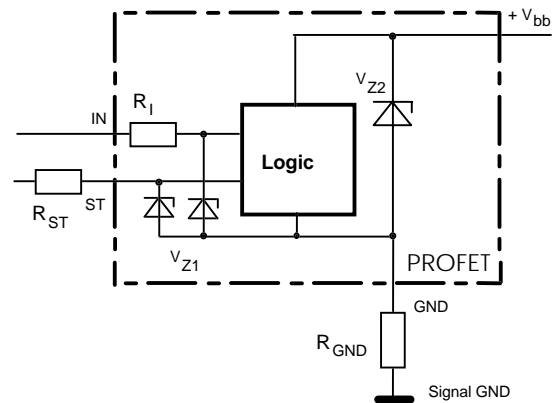
## Inductive and overvoltage output clamp, OUT1 or OUT2



$V_{ON}$  clamped to  $V_{ON(CL)} = 47 \text{ V typ.}$

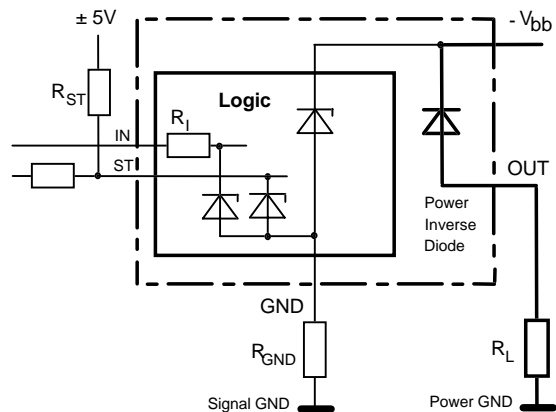
## Overvoltage protection of logic part

GND1 or GND2



$V_{Z1} = 6.1 \text{ V typ.}$ ,  $V_{Z2} = 47 \text{ V typ.}$ ,  $R_I = 3.5 \text{ k}\Omega \text{ typ.}$ ,  $R_{GND} = 150 \Omega$ ,  $R_{ST} = 15 \text{ k}\Omega \text{ nominal.}$

## Reverse battery protection



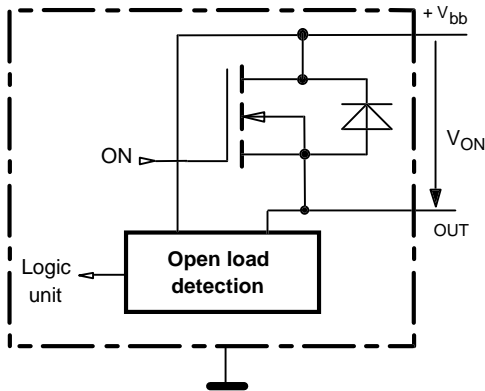
$R_{GND} = 150 \Omega$ ,  $R_I = 3.5 \text{ k}\Omega \text{ typ.}$

Temperature protection is not active during inverse current operation.

## Open-load detection, OUT1 or OUT2

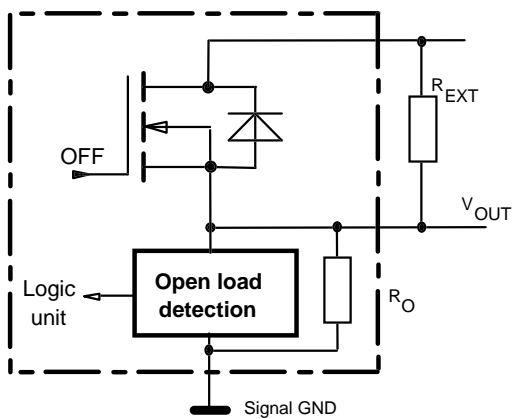
ON-state diagnostic condition:

$$V_{ON} < R_{ON} \cdot I_{L(OL)}; \text{IN high}$$

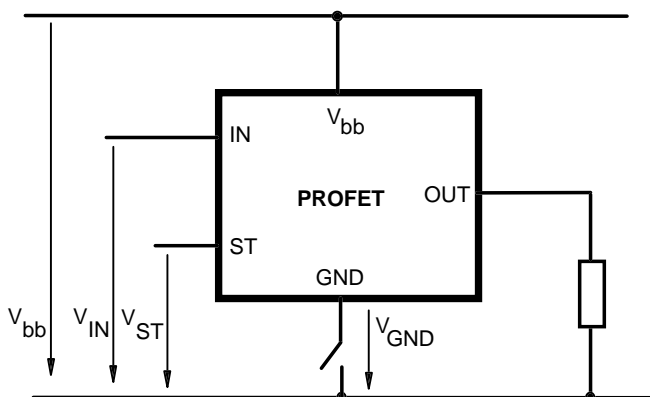


OFF-state diagnostic condition:

$$V_{OUT} > 3 \text{ V typ.}; \text{IN low}$$

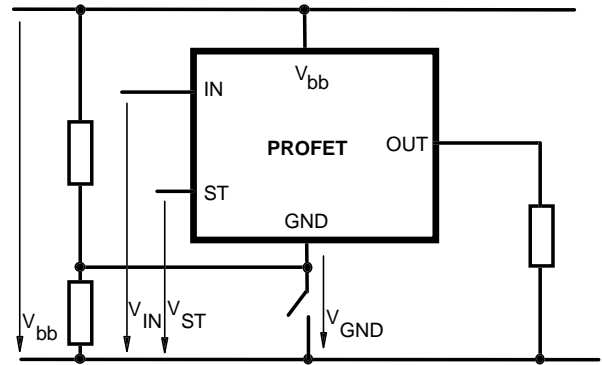


## GND disconnect



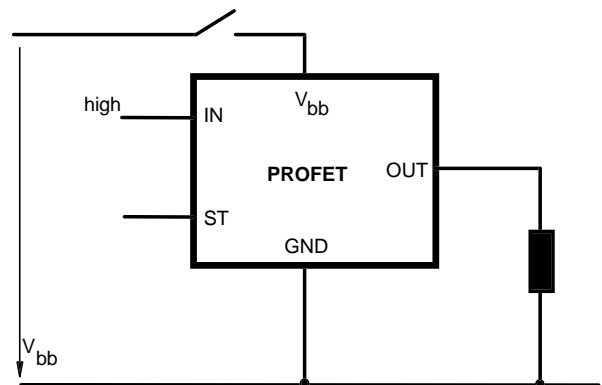
Any kind of load. In case of IN=high is  $V_{OUT} \approx V_{IN} - V_{IN(T+)}$ .  
Due to  $V_{GND} > 0$ , no  $V_{ST} = \text{low}$  signal available.

## GND disconnect with GND pull up



Any kind of load. If  $V_{GND} > V_{IN} - V_{IN(T+)}$  device stays off  
Due to  $V_{GND} > 0$ , no  $V_{ST} = \text{low}$  signal available.

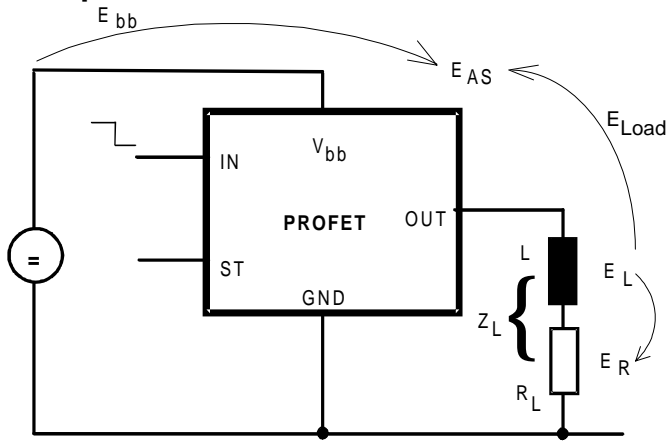
## V<sub>bb</sub> disconnect with energized inductive load



For inductive load currents up to the limits defined by  $E_{AS}$  (max. ratings and diagram on page 10) each switch is protected against loss of  $V_{bb}$ .

Consider at your PCB layout that in the case of  $V_{bb}$  disconnection with energized inductive load all the load current flows through the GND connection.

## Inductive load switch-off energy dissipation



Energy stored in load inductance:

$$E_L = \frac{1}{2} \cdot L \cdot I_L^2$$

While demagnetizing load inductance, the energy dissipated in PROFET is

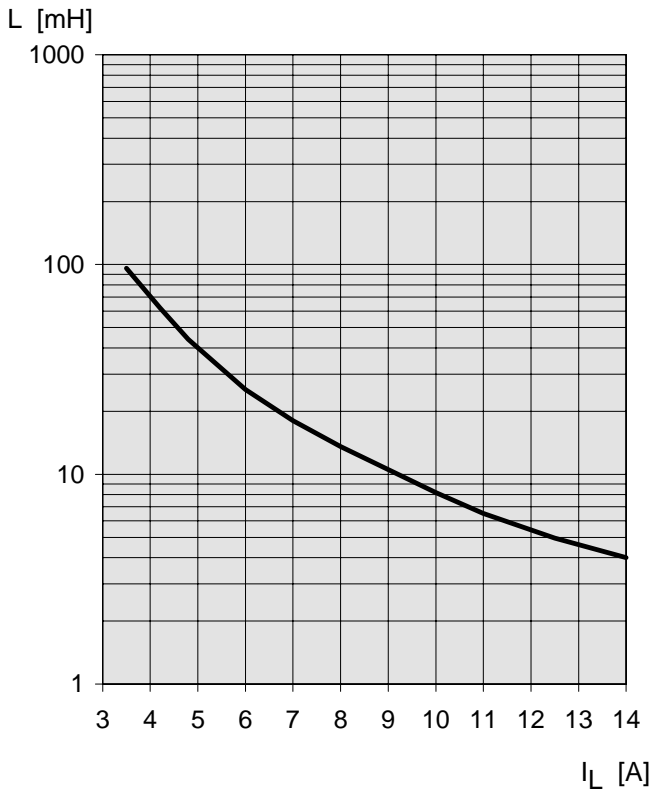
$$E_{AS} = E_{bb} + E_L - E_R = \int V_{ON(CL)} \cdot i_L(t) dt,$$

with an approximate solution for  $R_L > 0 \Omega$ :

$$E_{AS} = \frac{I_L \cdot L}{2 \cdot R_L} (V_{bb} + |V_{OUT(CL)}|) \ln \left( 1 + \frac{I_L \cdot R_L}{|V_{OUT(CL)}|} \right)$$

## Maximum allowable load inductance for a single switch off (one channel)<sup>5)</sup>

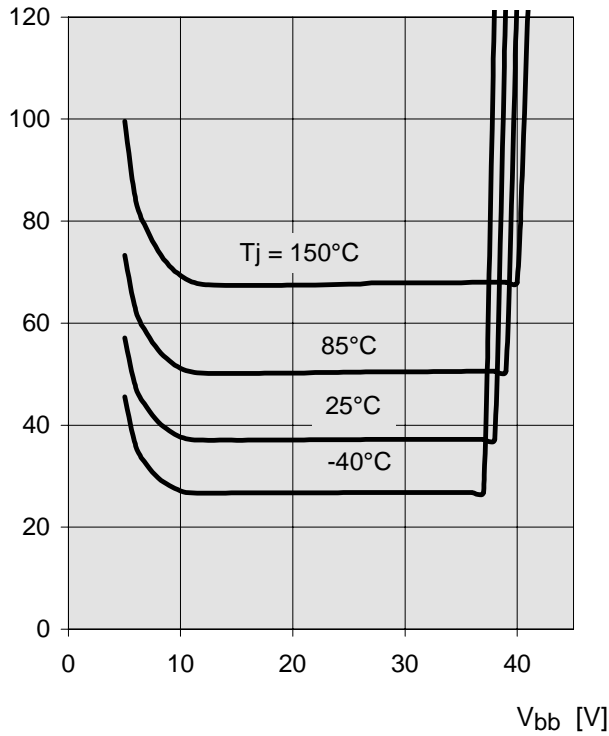
$L = f(I_L)$ ;  $T_{j,start} = 150^\circ\text{C}$ ,  $V_{bb} = 12\text{V}$ ,  $R_L = 0 \Omega$



### Typ. on-state resistance

$$R_{ON} = f(V_{bb}, T_j); I_L = 2 \text{ A}, I_N = \text{high}$$

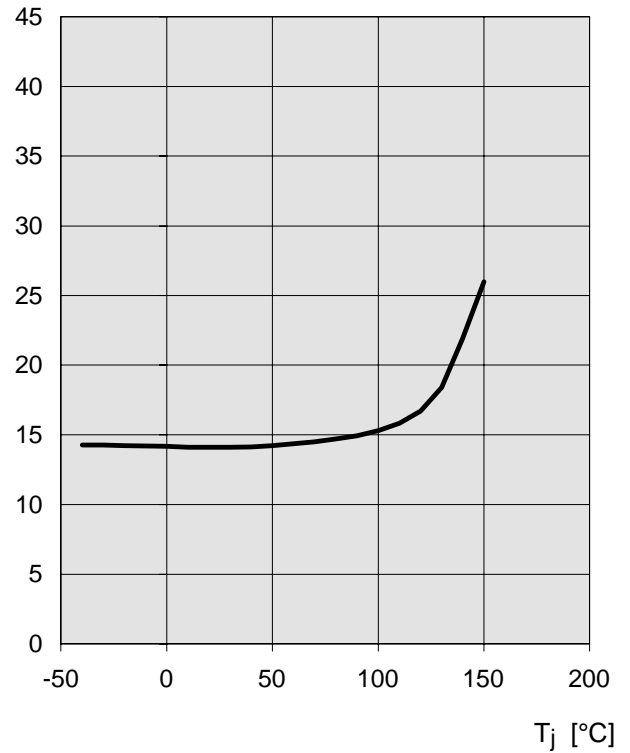
$R_{ON}$  [mOhm]



### Typ. standby current

$$I_{bb(off)} = f(T_j); V_{bb} = 9 \dots 34 \text{ V}, I_{N1,2} = \text{low}$$

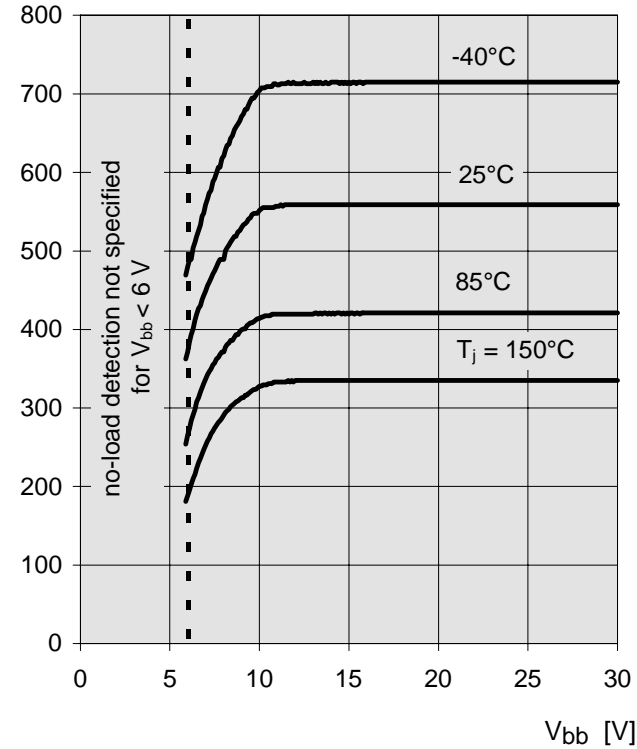
$I_{bb(off)}$  [ $\mu\text{A}$ ]



### Typ. open load detection current

$$I_{L(OL)} = f(V_{bb}, T_j); I_N = \text{high}$$

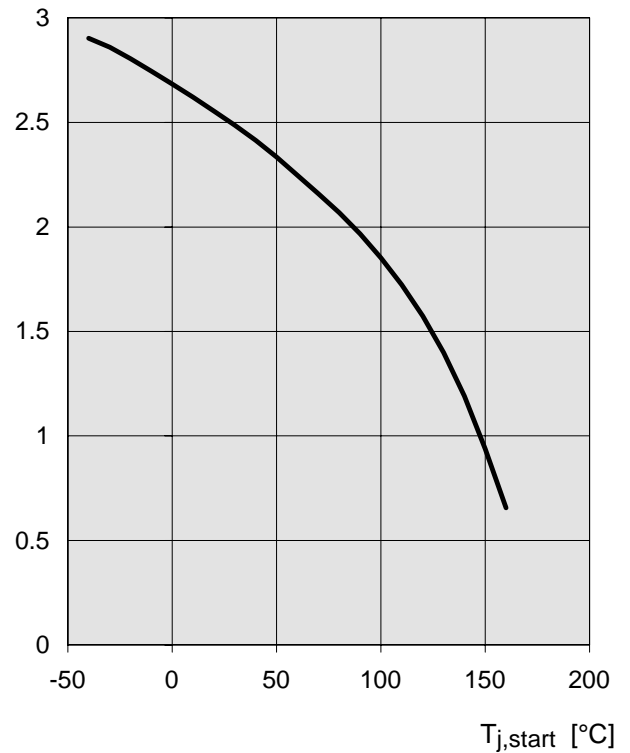
$I_{L(OL)}$  [mA]



### Typ. initial short circuit shutdown time

$$t_{off(SC)} = f(T_{j,start}); V_{bb} = 12 \text{ V}$$

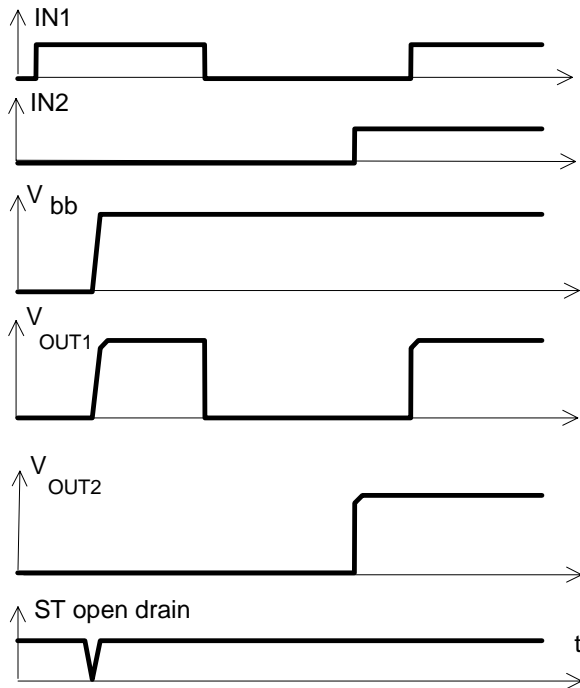
$t_{off(SC)}$  [msec]



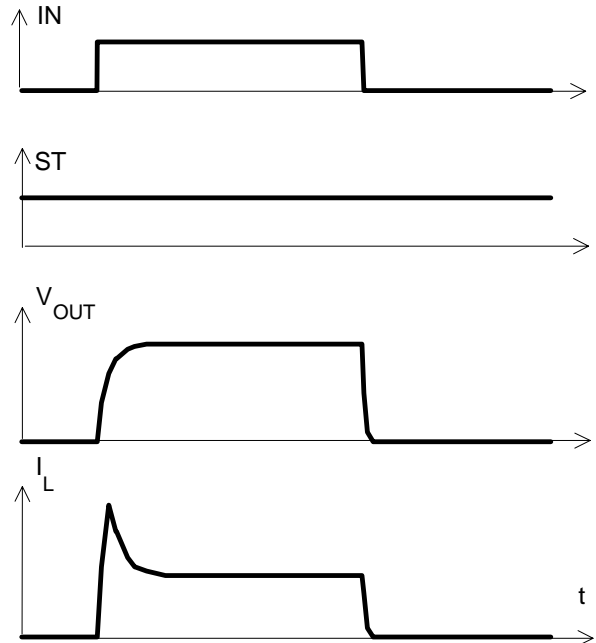
## Timing diagrams

Both channels are symmetric and consequently the diagrams are valid for channel 1 and channel 2

**Figure 1a:**  $V_{bb}$  turn on:

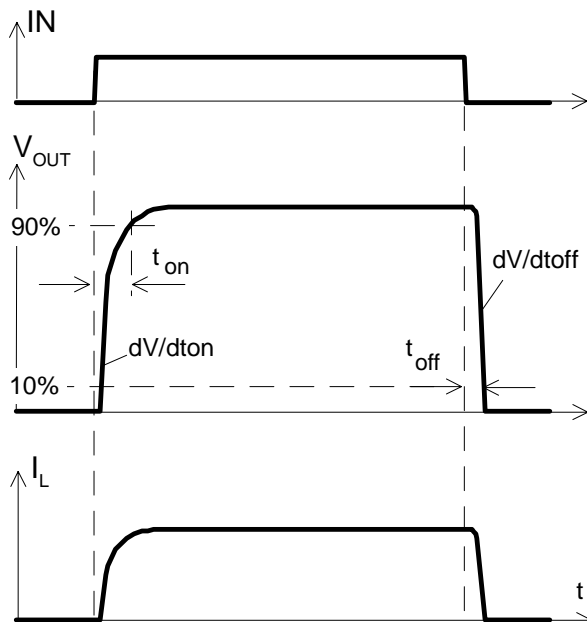


**Figure 2b:** Switching a lamp:

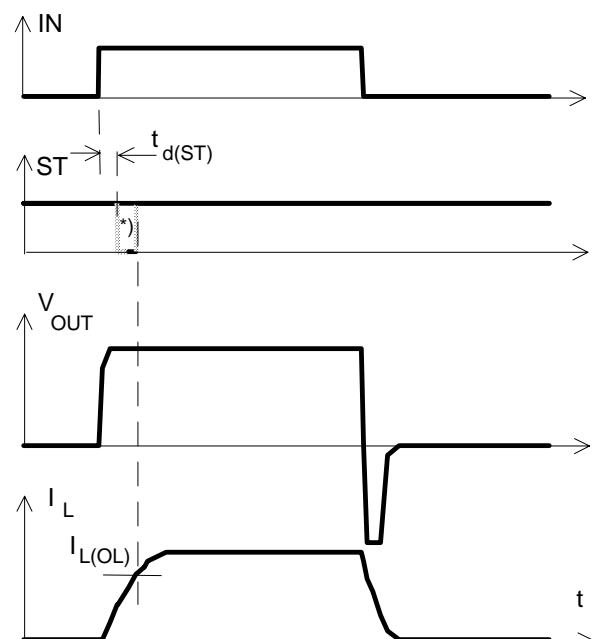


The initial peak current should be limited by the lamp and not by the initial short circuit current  $I_{L(SCP)} = 44 \text{ A}$  typ. of the device.

**Figure 2a:** Switching a resistive load, turn-on/off time and slew rate definition:

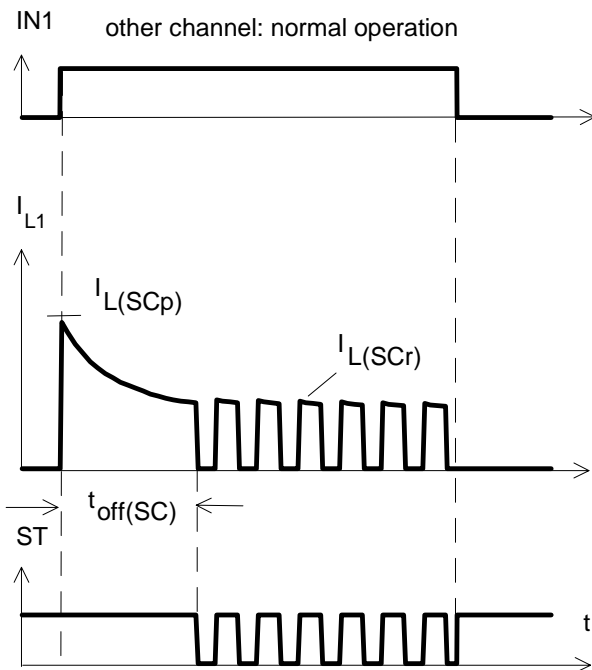


**Figure 2c:** Switching an inductive load



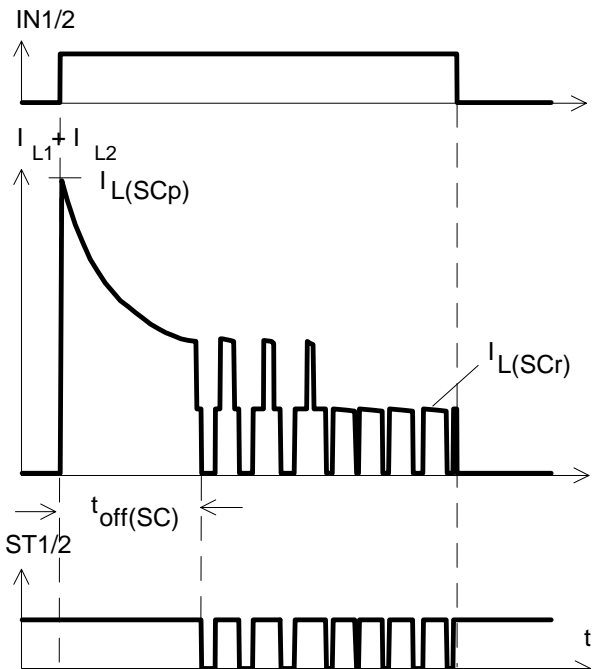
\*) if the time constant of load is too large, open-load-status may occur

**Figure 3a:** Turn on into short circuit:  
shut down by overtemperature, restart by cooling



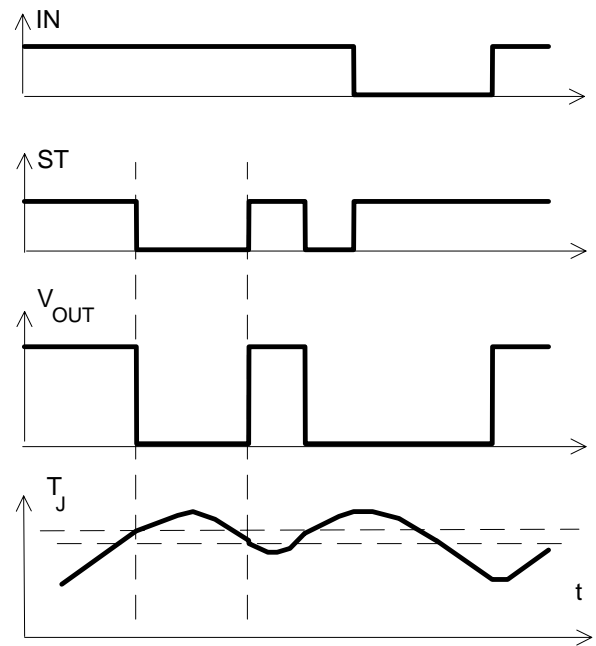
Heating up of the chip may require several milliseconds, depending on external conditions ( $t_{off(SC)}$  vs.  $T_{j,start}$  see page 11)

**Figure 3b:** Turn on into short circuit:  
shut down by overtemperature, restart by cooling  
(two parallel switched channels 1 and 2)

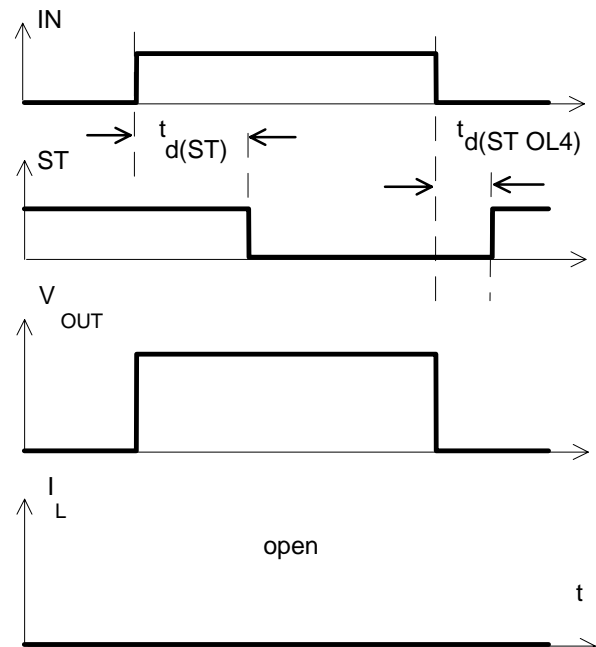


$ST1$  and  $ST2$  have to be configured as a 'Wired OR' function  $ST1/2$  with a single pull-up resistor.

**Figure 4a:** Overtemperature:  
Reset if  $T_j < T_{jt}$

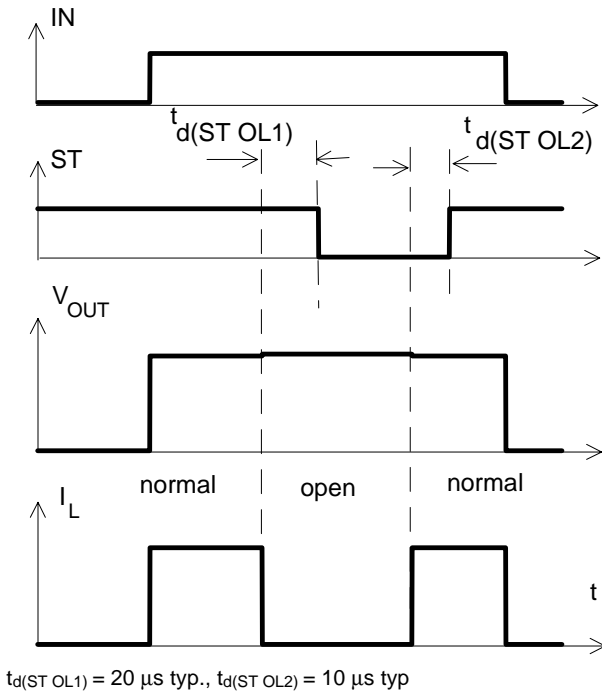


**Figure 5a:** Open load: detection in ON-state, turn on/off to open load

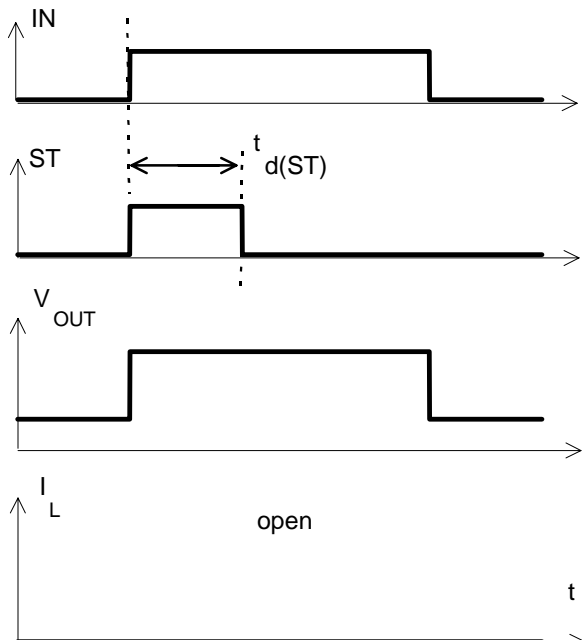


The status delay  $t_{d(ST OL4)}$  is for differentiation between the failure modes "open load in ON-state" and "overtemperature";  $t_{d(ST OL4)}$  only appears after turn off to open load.

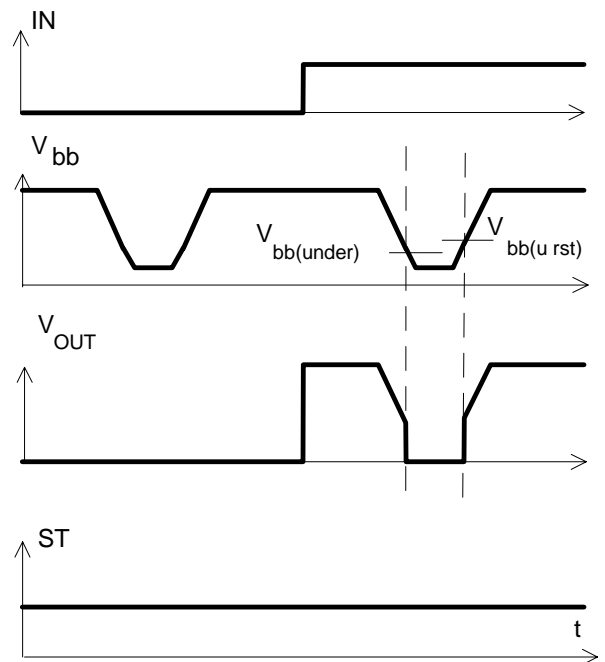
**Figure 5b:** Open load: detection in ON-state, open load occurs in on-state



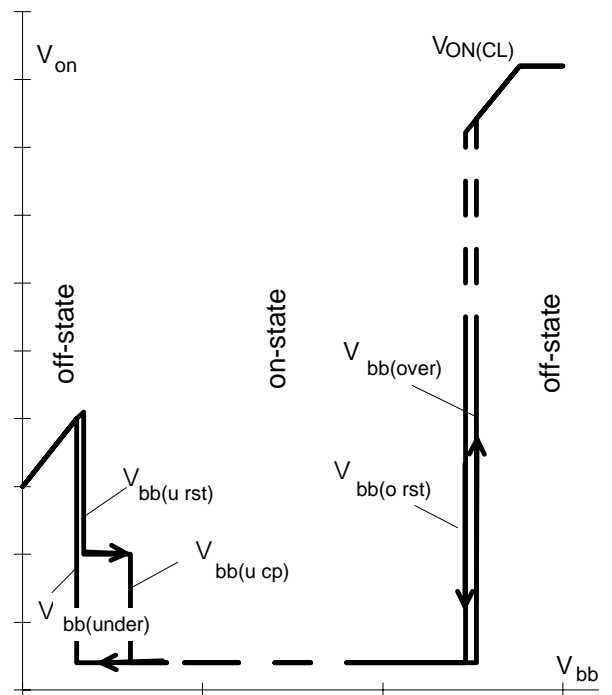
**Figure 5c:** Open load: detection in ON- and OFF-state (with  $R_{EXT}$ ), turn on/off to open load



**Figure 6a:** Undervoltage:

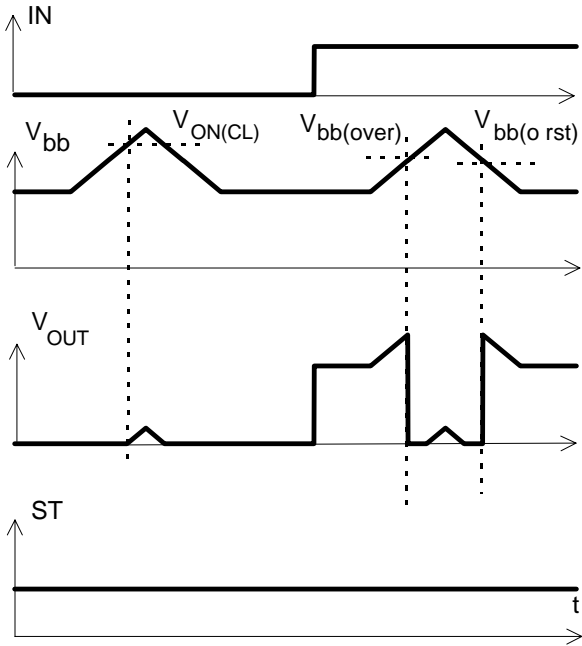


**Figure 6b:** Undervoltage restart of charge pump



IN = high, normal load conditions.  
Charge pump starts at  $V_{bb(ucp)} = 5.6 V$  typ.

Figure 7a: Overvoltage:

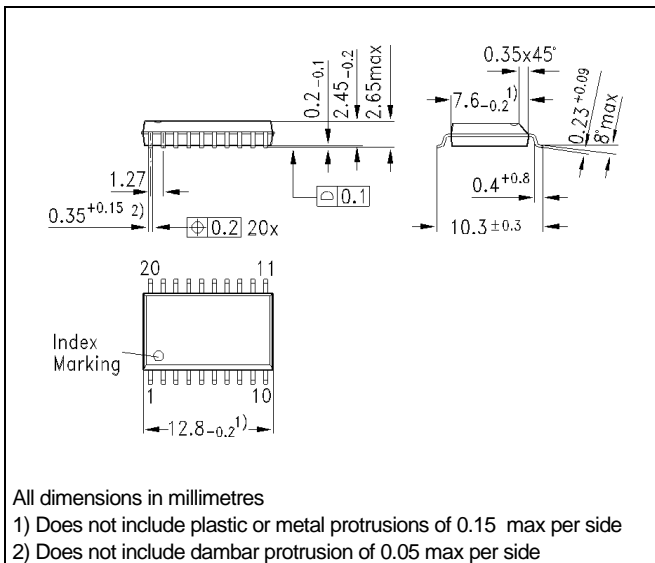


## Package and Ordering Code

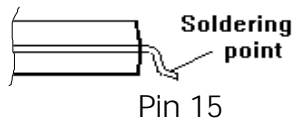
Standard P-DSO-20-9

Ordering Code

|          |                 |
|----------|-----------------|
| BTS734L1 | Q67060-S7009-A2 |
|----------|-----------------|



Definition of soldering point with temperature  $T_s$ :  
 upper side of solder edge of device pin 15.



Printed circuit board (FR4, 1.5mm thick, one layer 70 $\mu$ m, 6cm<sup>2</sup> active heatsink area) as a reference for max. power dissipation  $P_{tot}$ , nominal load current  $I_{L(NOM)}$  and thermal resistance  $R_{thja}$

