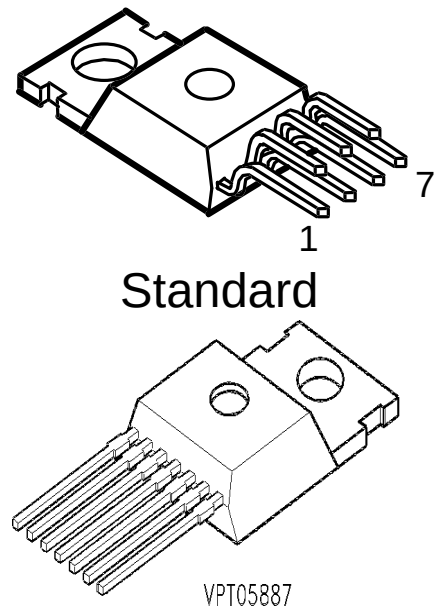


## PWM Power Unit

The device allows continuous power control for lamps, LEDs or inductive loads.

- Highside switch
- Overtemperature protection
- Short circuit / overload protection through pulse width reduction and overload shutdown
- Load dump protection
- Undervoltage and overvoltage shutdown with auto-restart and hysteresis
- Reverse battery protection 1)
- Timing frequency adjustable
- Controlled switching rise and fall times
- Maximum current internally limited
- Protection against loss of GND 2)
- Electrostatic discharge (ESD) protection
- Package: TO220/7 and TO220/7 E3128 (SMD), Pin 4 is shorted to the mounting flange



**Note:** Switching frequency is programmed with an external capacitor.

| Type              | Ordering Code   | Marking | Package        |
|-------------------|-----------------|---------|----------------|
| BTS630 (Standard) | Q67060-S6305-A2 | -       | TO220/7        |
| BTS630            | Q67060-S6305-A3 | -       | TO220/7, E3230 |

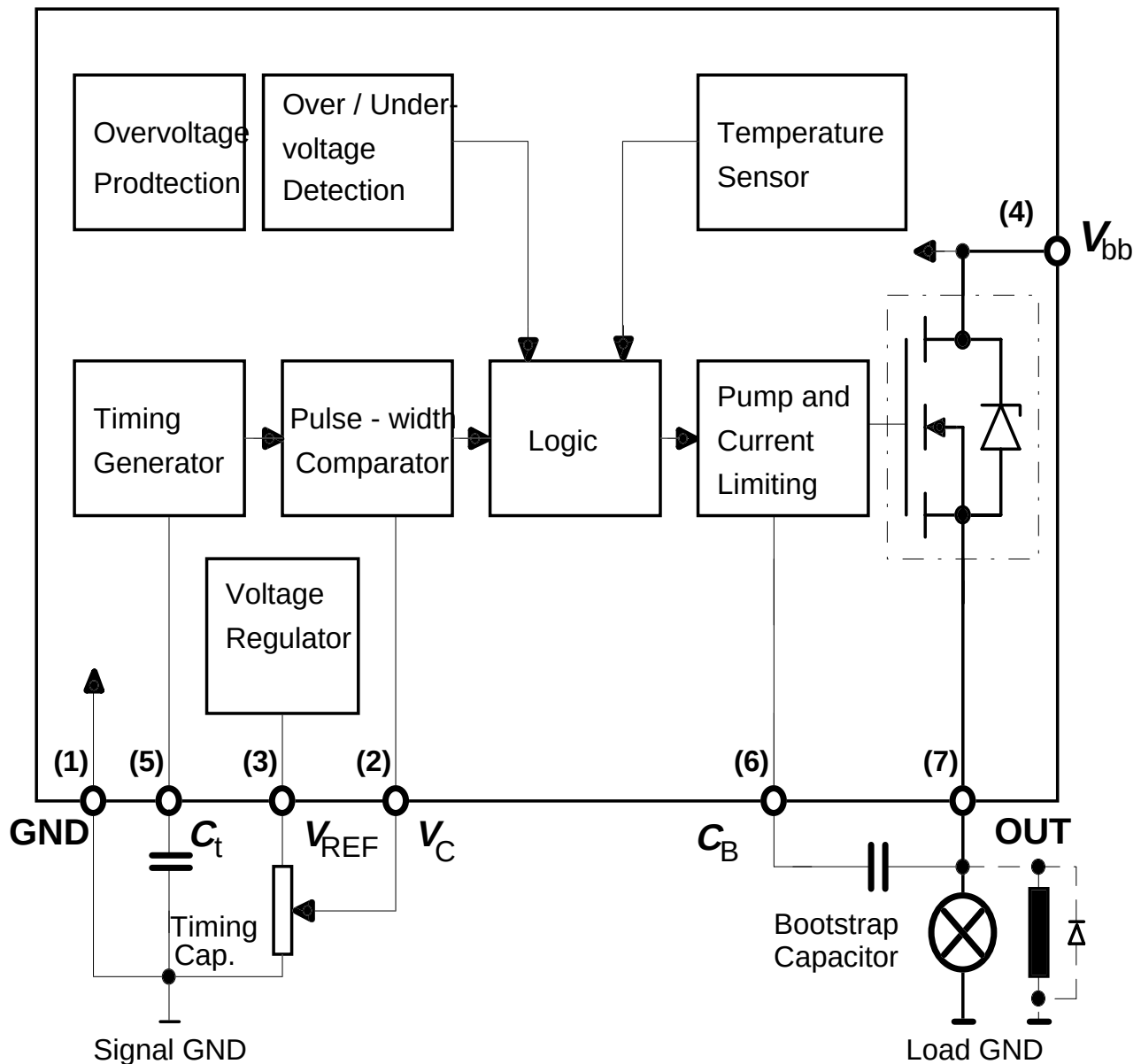
### Maximum Ratings

| Parameter                                  | Symbol       | Values       | Unit |
|--------------------------------------------|--------------|--------------|------|
| Active overvoltage protection              | $V_{bb(AZ)}$ | >40          | V    |
| Short circuit current                      | $I_{SC}$     | self-limited | -    |
| Input current (DC)                         | $I_{Ct}$     | 2            | mA   |
| Pin1 ( $C_t$ ) and pin19 ( $V_C$ )         | $I_{VC}$     | 2            | mA   |
| Operating temperature range                | $T_j$        | -40...+150   | °C   |
| Storage temperature range                  | $T_{stg}$    | -50...+150   |      |
| Power dissipation $T_a=25^{\circ}\text{C}$ | $P_{tot}$    | 75           | W    |
| Thermal resistance chip-case               | $R_{th JC}$  | $\leq 1.67$  | K/W  |
| chip-ambient                               | $R_{th JA}$  | $\leq 75$    |      |

<sup>1)</sup> With 150Ω resistor in signal GND connection.

<sup>2)</sup> Potential between signal GND and load GND >0.5V

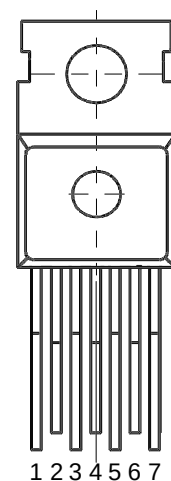
## Block Diagram



## Pin Definitions and Funktionen

| Pin | Symbol    | Funktionen                     |
|-----|-----------|--------------------------------|
| 1   | GND       | Ground                         |
| 2   | $V_C$     | Voltage for PWM-Control        |
| 3   | $V_{REF}$ | Reference Voltage              |
| 4   | $V_{bb}$  | Supply voltage                 |
| 5   | $C_t$     | Timing capacitor for frequency |
| 6   | $C_B$     | Bootstrap capacitor            |
| 7   | OUT       | Output                         |

## Pin Configuration (top view)



## Electrical Characteristics

at  $T_j = 25\text{ °C}$ , unless otherwise specified.  $C_{\text{Bootstrap}} = 22\text{ nF}$

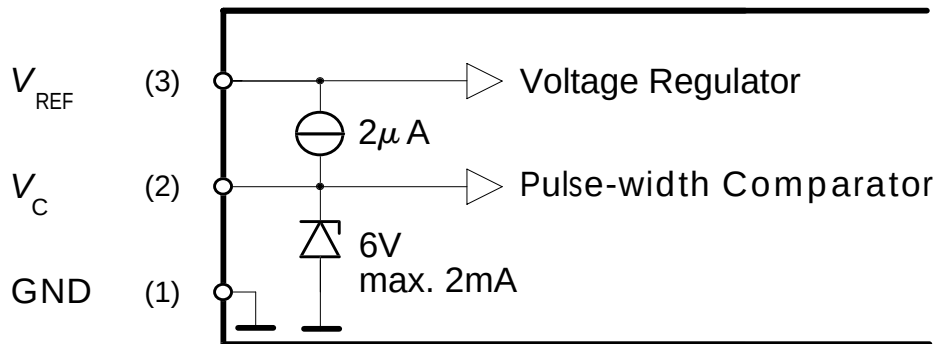
| Parameter                                                                                                             | Symbol                 | Values            |      |                    | Unit                    |
|-----------------------------------------------------------------------------------------------------------------------|------------------------|-------------------|------|--------------------|-------------------------|
|                                                                                                                       |                        | min.              | typ. | max.               |                         |
| On-state resistance<br>$I_L = 3\text{ A}$ , $V_{bb} = 12\text{ V}$                                                    | $R_{\text{ON}}$        | -                 | -    | 70                 | $\text{m}\Omega$        |
| Operating voltage<br>$T_j = -40 \dots +150\text{ °C}$                                                                 | $V_{bb}$               | 5.9 <sup>1)</sup> |      | 16.9 <sup>2)</sup> | V                       |
| Nominal current, calculated value<br>ISO-standard: $V_{bb} - V_{\text{OUT}} \leq 0.5\text{ V}$ , $T_c = 85\text{ °C}$ | $I_L\text{-ISO}$       | 5.8               | -    | -                  | A                       |
| Load current limit<br>$V_{bb} - V_{\text{OUT}} > 1\text{ V}$                                                          | $I_{\text{LLim}}$      | -                 | 20   | -                  | A                       |
| Undervoltage shutdown<br>$I_L = 3\text{ A}$                                                                           | $V_{bb(\text{LOW})}$   | 3                 | 4.2  | 5.4                | V                       |
| Overvoltage shutdown<br>$I_L = 3\text{ A}$                                                                            | $V_{bb(\text{HI})}$    | 17                | 18   | 19                 | V                       |
| Max. output voltage (RMS)<br>$I_L = 3\text{ A}$ , $V_{bb} > 12\text{ V}$                                              | $V_{\text{RMSmax}}$    | 12                | -    | 14                 | V                       |
| Reference voltage<br>$I_{\text{REF}} = 10\text{ mA}$                                                                  | $V_{\text{REF}}$       | 2                 |      | 3                  | V                       |
| Reference current<br>pin 18 (GND) to pin 20 ( $V_{\text{REF}}$ ) short                                                | $I_{\text{REF}}$       | -                 | 150  | -                  | mA                      |
| Internal current consumption during operation, measured in PWM gap                                                    | $I_R$                  | -                 |      | 5                  | mA                      |
| Bootstrap voltage, pin 2 ( $C_{B1}$ ) to pin 3 ( $C_{B2}$ )<br>$V_{bb} = 12\text{ V}$ ,                               | $V_B$                  | -                 | 10   | -                  | V                       |
| PWM frequency<br>$T_c = -40 \dots +150\text{ °C}$ , $C_t = 68\text{ nF}$                                              | $f_{\text{PWM}}$       | 50                | -    | 100                | Hz                      |
| Max. pulse duty factor<br>$I_L = 3\text{ A}$ , $V_C = 0\text{ V}$ , (50% $V_{\text{OUT}}$ )                           | $D_{\text{imax}}$      | 95                | 98   | -                  | %                       |
| Min. pulse duty factor<br>$I_L = 3\text{ A}$ , $V_C = 0\text{ V}$ , (50% $V_{\text{OUT}}$ )                           | $D_{\text{imin}}$      | -                 | 8    | 14                 | %                       |
| Slew rate "on"<br>10 ... 90% $I_{\text{OUT}}$                                                                         | $du/dt_{(\text{on})}$  | 20                | -    | 120                | $\text{mV}/\mu\text{s}$ |
| Slew rate "off"<br>90 ... 10% $I_{\text{OUT}}$                                                                        | $du/dt_{(\text{off})}$ | 20                | -    | 120                | $\text{mV}/\mu\text{s}$ |
| Thermal overload trip temperature                                                                                     | $T_j$                  | 150               | -    | -                  | $\text{°C}$             |

1) **Note:** undervoltage shutdown

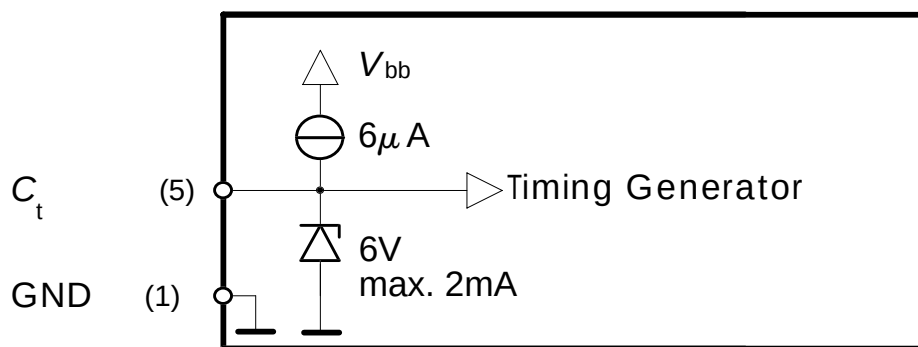
2) **Note:** overvoltage shutdown

## Circuits

### Analog Logic-Input $V_C$ (2)

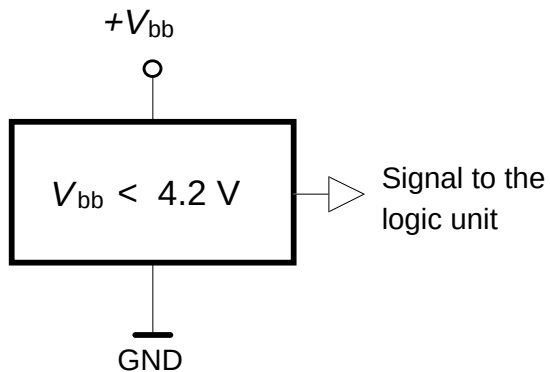


### Triangular Waveform Generator Input $C_t$ (5)

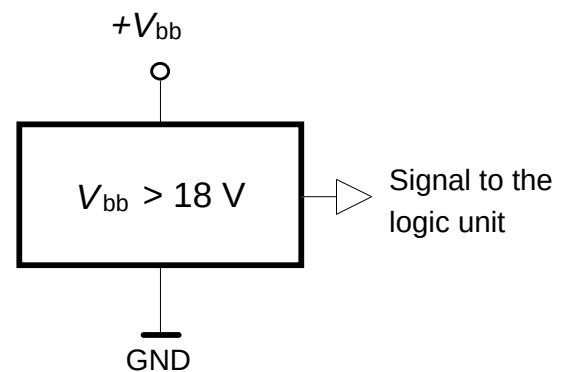


### Voltage Sensor (typ)

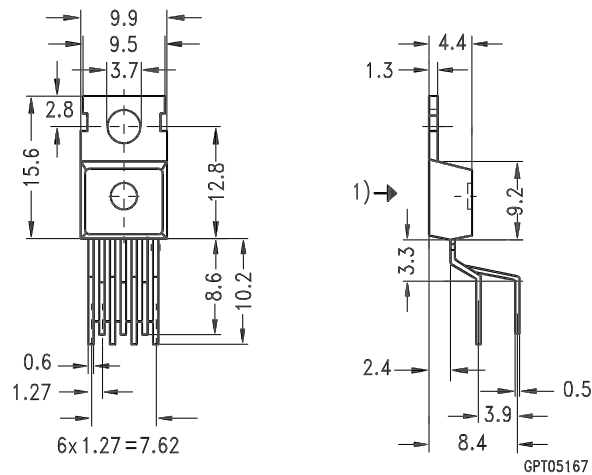
#### Undervoltage Sensor



#### Overvoltage Sensor



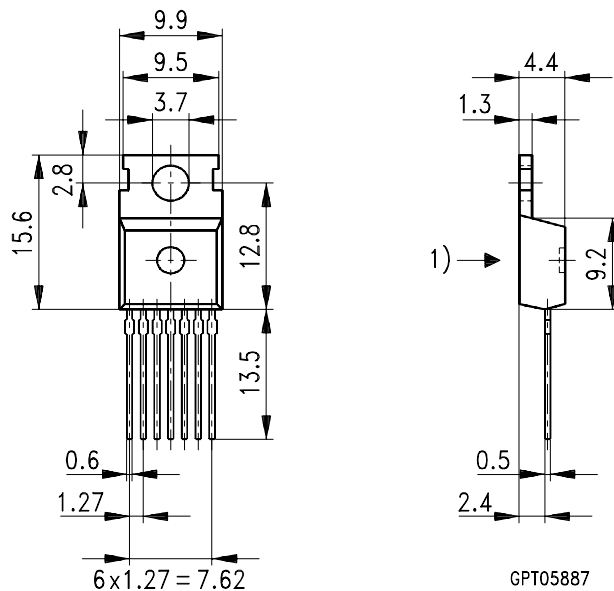
Package Outline      **TO220/7**



1) shear and punch direction no burrs this surface

Dimensions in mm

Package Outline      **TO220/7**      **E3230**



1) Shear and punch direction no burrs this surface

Dimensions in mm

## Application Note

