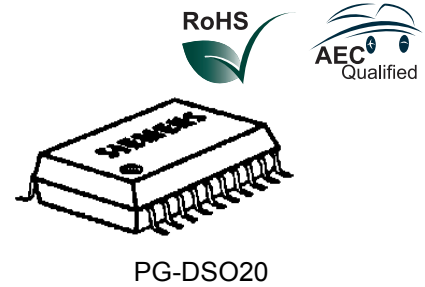


The device allows continuous power control for lamps, LEDs or inductive loads.

- Highside switch (Bootstrap)
- 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: P-DSO-20-6 (SMD)



Note: Switching frequency is programmed with an external capacitor

- RoHS compliant (green product)
- AEC qualified

Maximum Ratings

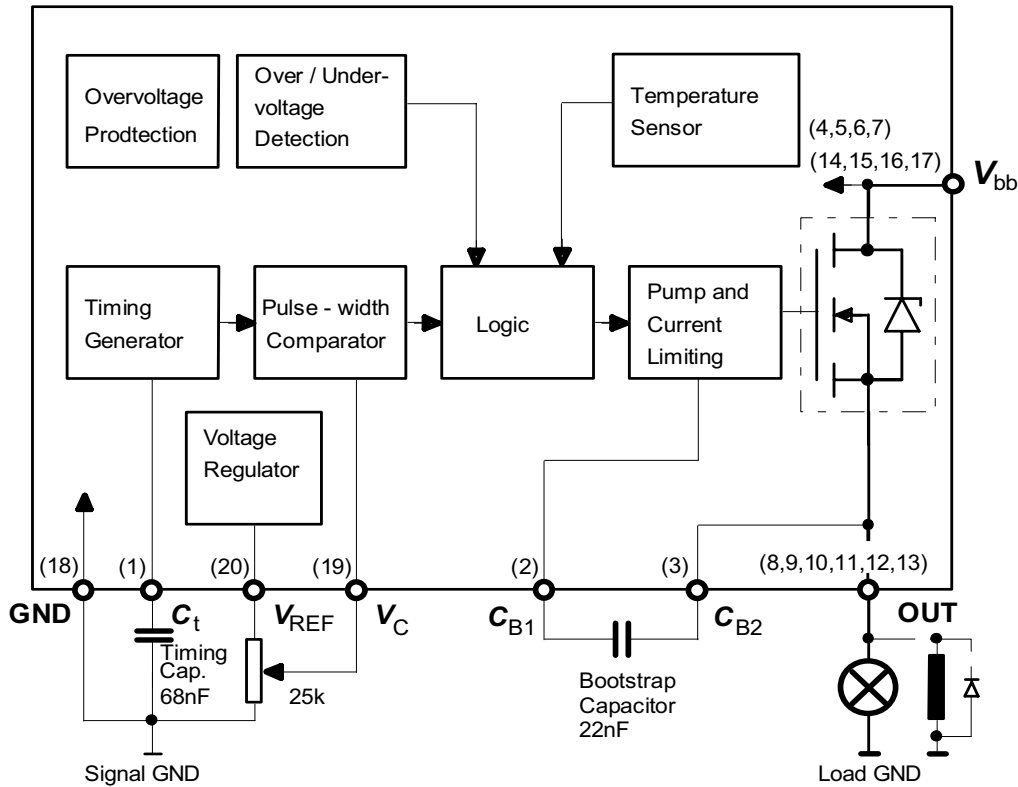
| Parameter | Symbol | Values | Unit |
|---|------------------------|--------------|------|
| Active overvoltage protection | $V_{bb(AZ)}$ | >40 | V |
| Short circuit current | I_{SC} | self-limited | - |
| Input current (DC) | I_{Ct} | 2 | mA |
| Pin1 (C_t) and pin19 (V_C) | I_{VC} | 2 | mA |
| Operating temperature range | T_j | -40...+150 | °C |
| Storage temperature range | T_{stg} | -50...+150 | |
| Power dissipation ³⁾ | $T_a=25^\circ\text{C}$ | 3 | W |
| | $T_a=85^\circ\text{C}$ | 2 | W |
| Thermal resistance chip-case ³⁾ | $R_{th JC}$ | ≤35 | K/W |
| | chip-ambient | $R_{th JA}$ | ≤75 |
| Electrostatic discharge capability (ESD) (Human Body Model) acc. MIL-STD883D, method 3015.7 and ESD assn. std. S5.1-1993; R=1.5KΩ; C=100pF | V_{ESD} | ≤ 1 | kV |

¹⁾ With 150Ω resistor in signal GND connection.

²⁾ Potential between signal GND and load GND >0.5V

³⁾ Device on 50mm×50mm×1.5mm epoxy PCB FR4 with 6 cm² (one layer, 70μm thick) copper area for V_{bb} connection, PCB is vertical without air blowing.

Block Diagram



Pin Definitions and Funktionen

| Pin | Symbol | Funktionen |
|------------------------|-----------|--------------------------------------|
| 1 | C_t | Timing capacitor for frequency |
| 2 | C_{B1} | Bootstrap capacitor |
| 3 | C_{B2} | |
| 4,5,6,7 14,15,16,17 | V_{bb} | Supply voltage (Leadframe connected) |
| 8,9,10 11,12,13 | OUT | Output |
| 18 | GND | Ground |
| 19 | V_C | Voltage for PWM-Control |
| 20 | V_{REF} | Reference Voltage |

Pin Configuration (top view)

| | | | |
|----------|----|----|-----------|
| C_t | 1 | 20 | V_{REF} |
| C_{B1} | 2 | 19 | V_C |
| C_{B2} | 3 | 18 | GND |
| V_{bb} | 4 | 17 | V_{bb} |
| V_{bb} | 5 | 16 | V_{bb} |
| V_{bb} | 6 | 15 | V_{bb} |
| V_{bb} | 7 | 14 | V_{bb} |
| OUT | 8 | 13 | OUT |
| OUT | 9 | 12 | OUT |
| OUT | 10 | 11 | OUT |

Electrical Characteristics

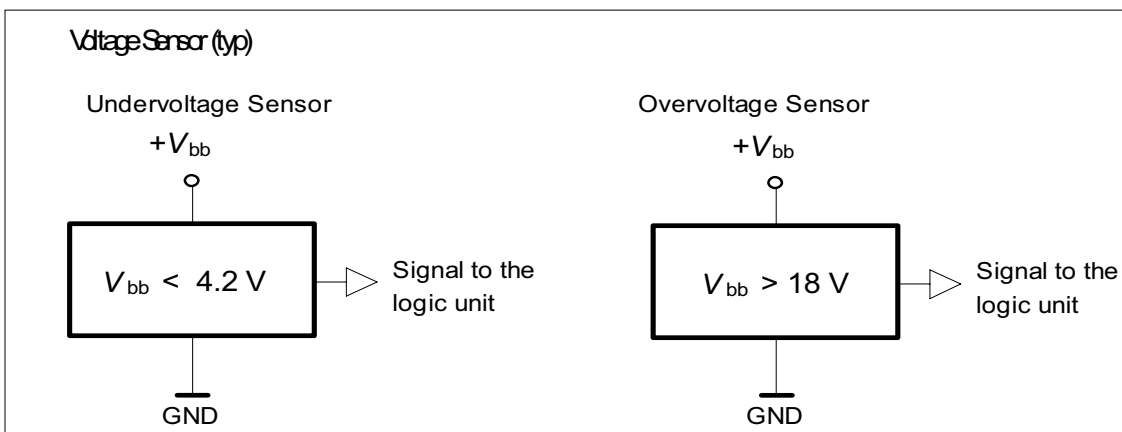
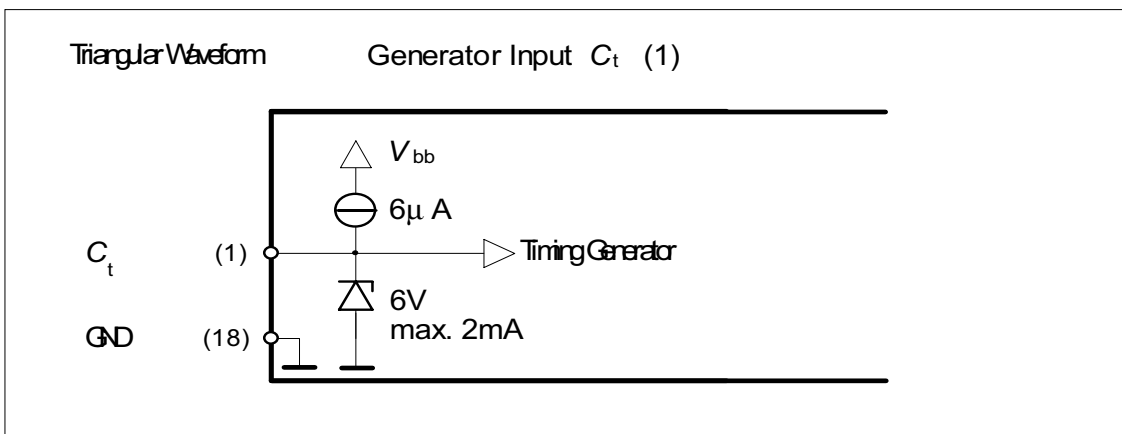
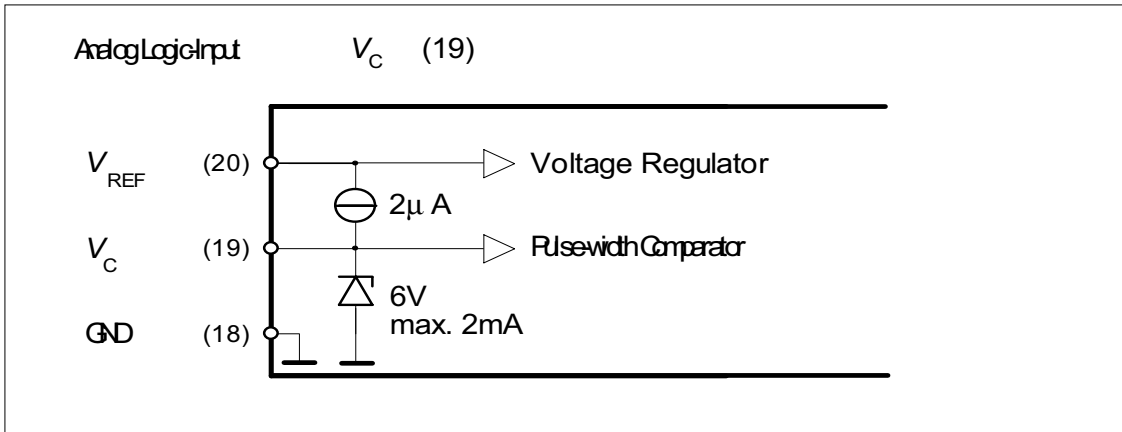
 at $T_C = 25\text{ °C}$, $V_{bb} = 12\text{ V}$, unless otherwise specified. $C_{\text{Bootstrap}} = 22\text{ nF}$

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

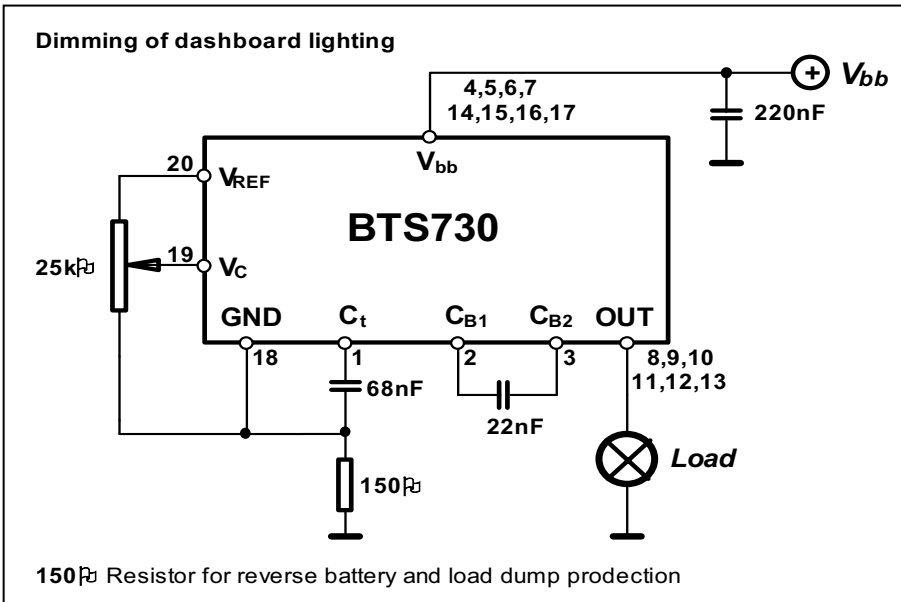
¹⁾ **Note:** undervoltage shutdown

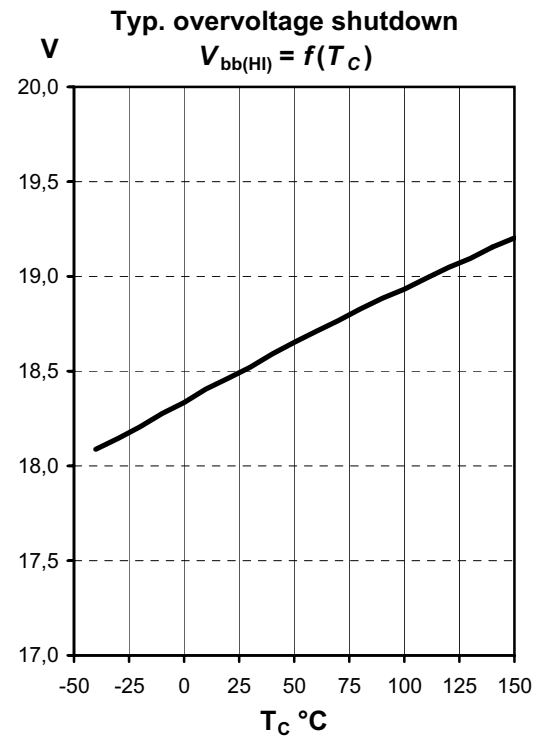
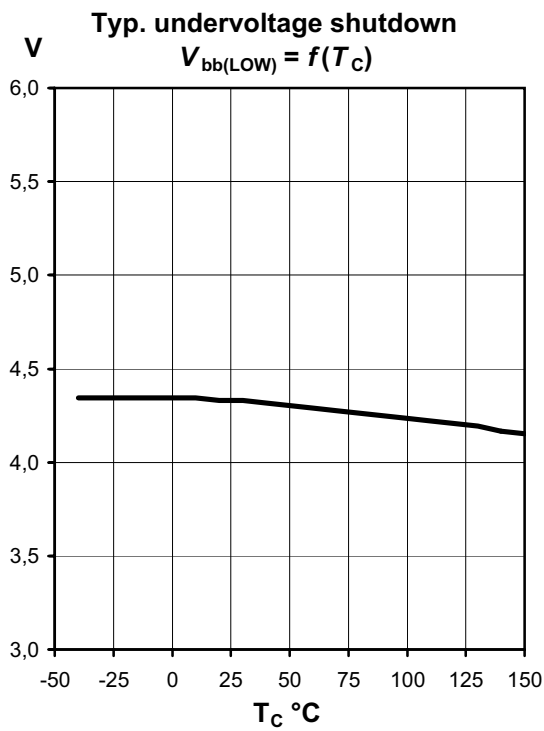
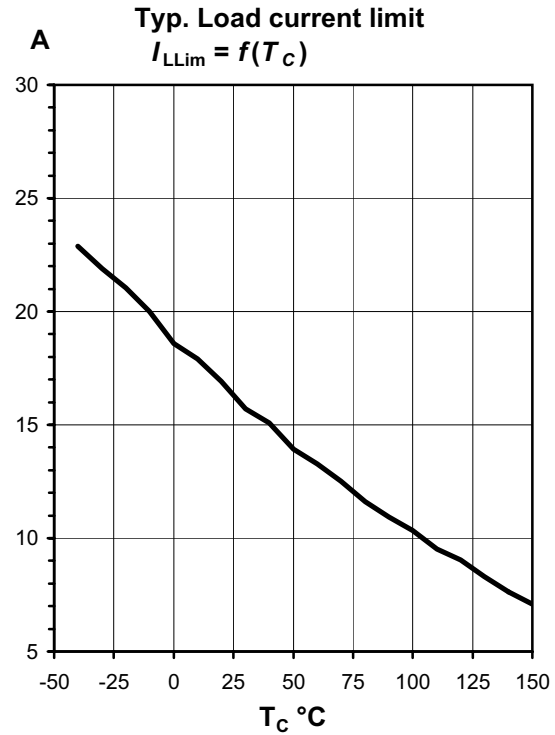
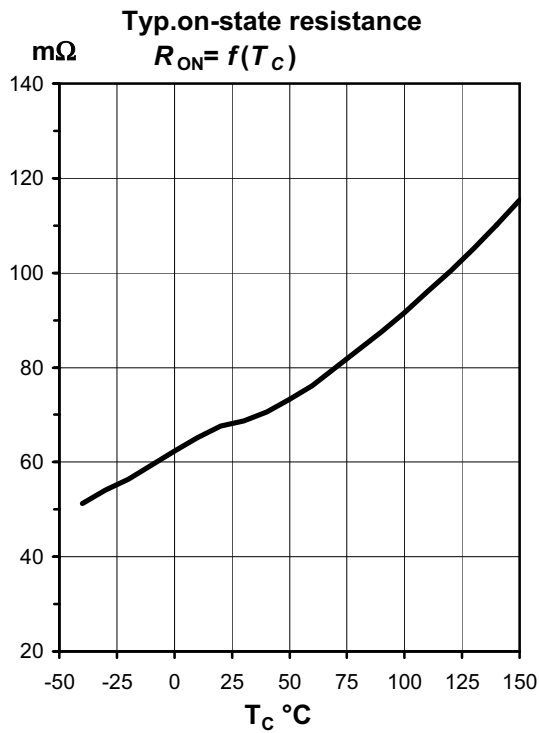
²⁾ **Note:** overvoltage shutdown

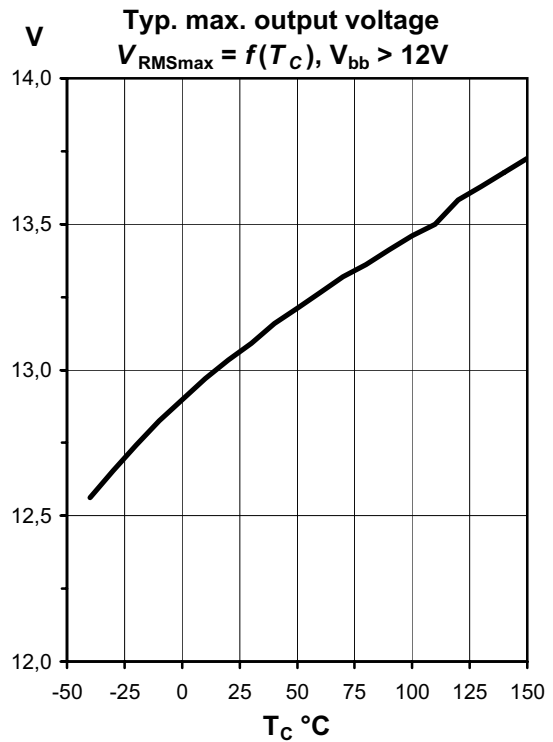
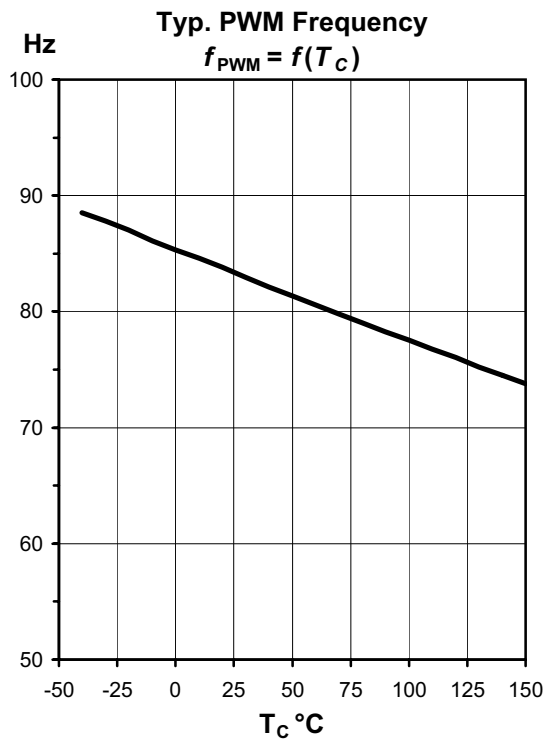
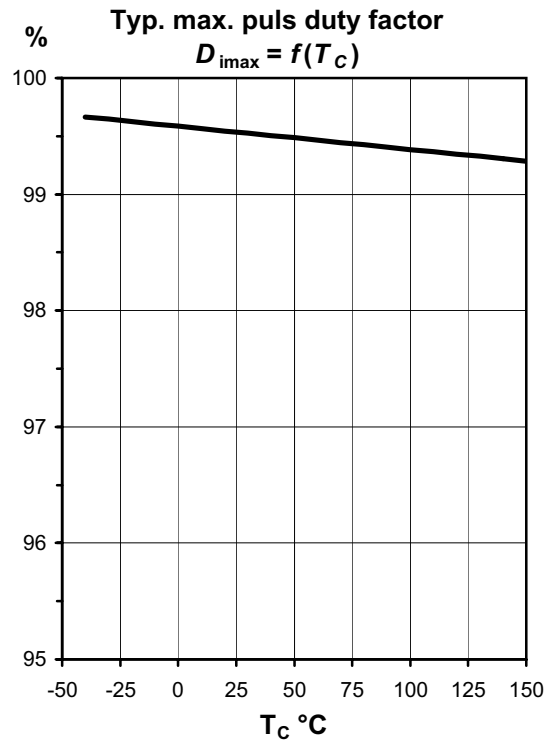
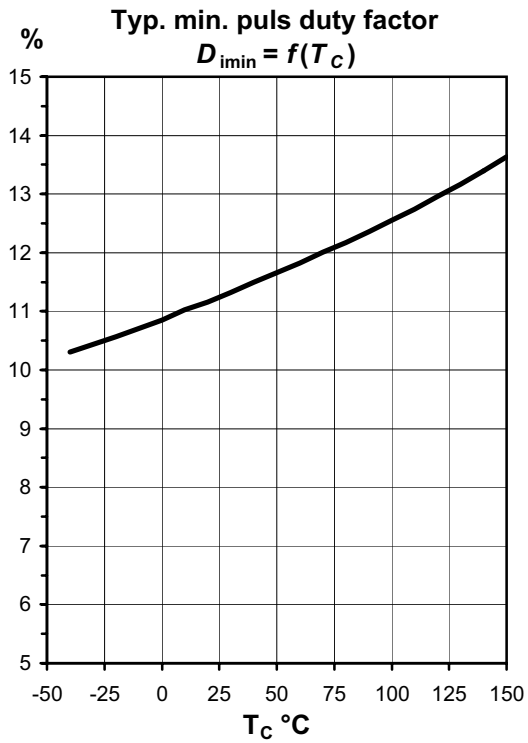
Circuits



Application Note







Package Outlines

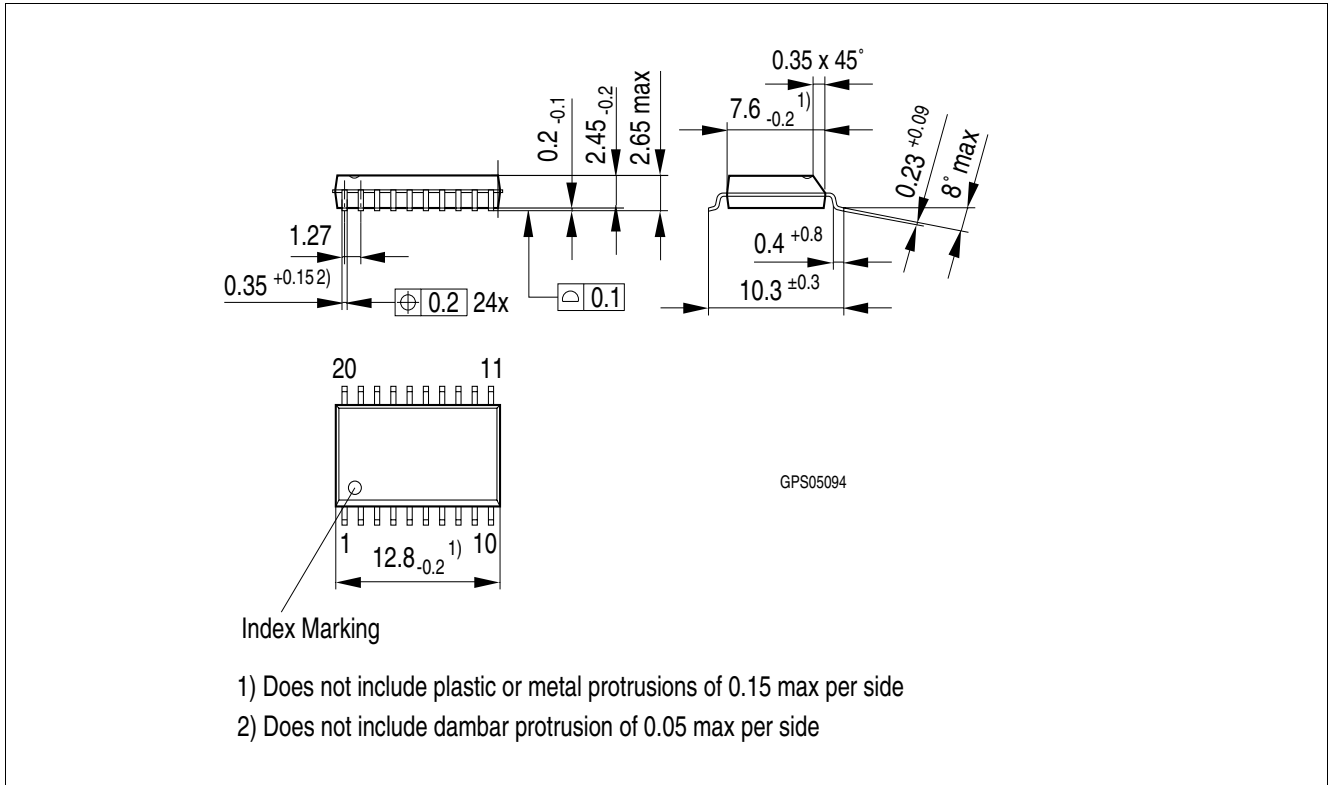


Figure 1 PG-DSO-20 (Plastic Dual Small Outline Package) (RoHS-compliant)

To meet the world-wide customer requirements for environmentally friendly products and to be compliant with government regulations the device is available as a green product. Green products are RoHS-Compliant (i.e Pb-free finish on leads and suitable for Pb-free soldering according to IPC/JEDEC J-STD-020).

Please specify the package needed (e.g. green package) when placing an order

Revision History

| Version | Date | Changes |
|---------|------------|--|
| V1.0 | 2007-12-17 | Creation of the green datasheet. First page : Adding the green logo and the AEC qualified Adding the bullet AEC qualified and the RoHS compliant features Package page Modification of the package to be green. |

Edition 2007-12-17

**Published by
Infineon Technologies AG
81726 Munich, Germany**

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