

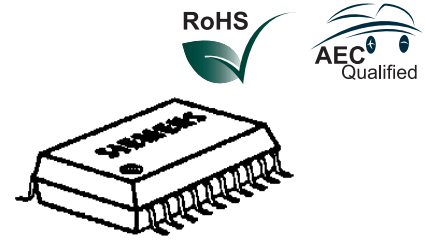


# THE DATASHEET OF BTS730



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 <sup>1)</sup>
- Timing frequency adjustable
- Controlled switching rise and fall times
- Maximum current internally limited
- Protection against loss of GND <sup>2)</sup>
- Electrostatic discharge (ESD) protection
- Package: P-DSO-20-6 (SMD)



PG-DSO20

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

- RoHS compliant (green product)
- AEC qualified

**Maximum Ratings**

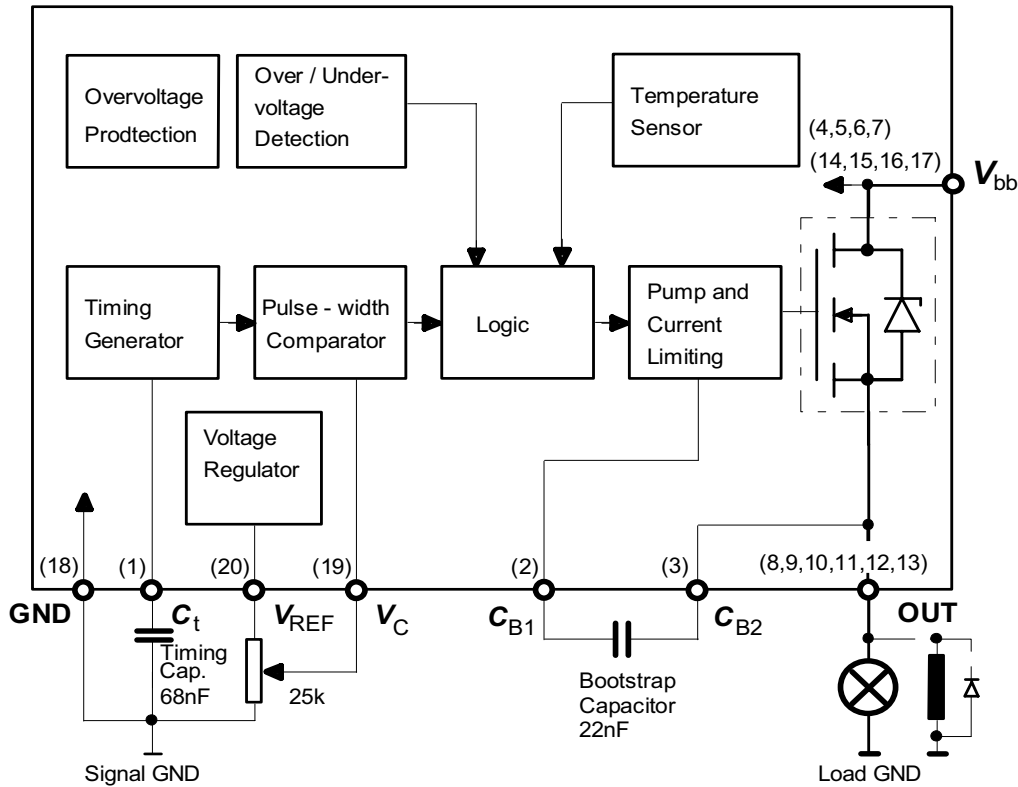
Parameter	Symbol	Values	Unit
Active overvoltage protection	$V_{bb(AZ)}$	>40	V
Short circuit current	$I_{SC}$	self-limited	-
Input current (DC)	$I_{Ct}$	2	mA
Pin1 ( $C_t$ ) and pin19 ( $V_C$ )	$I_{VC}$	2	mA
Operating temperature range	$T_j$	-40...+150	°C
Storage temperature range	$T_{stg}$	-50...+150	
Power dissipation <sup>3)</sup>	$T_a=25^\circ\text{C}$	3	W
	$T_a=85^\circ\text{C}$	2	W
Thermal resistance chip-case <sup>3)</sup>	$R_{th JC}$	≤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

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

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

<sup>3)</sup> Device on 50mm×50mm×1.5mm epoxy PCB FR4 with 6 cm<sup>2</sup> (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	$V_{bb}$	Supply voltage (Leadframe connected)
14,15,16,17		
8,9,10	OUT	Output
11,12,13		
18		
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**

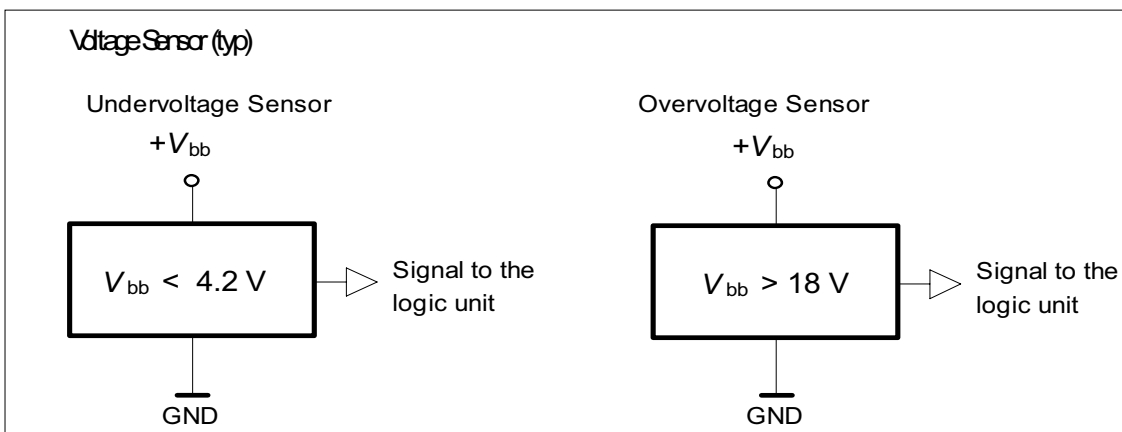
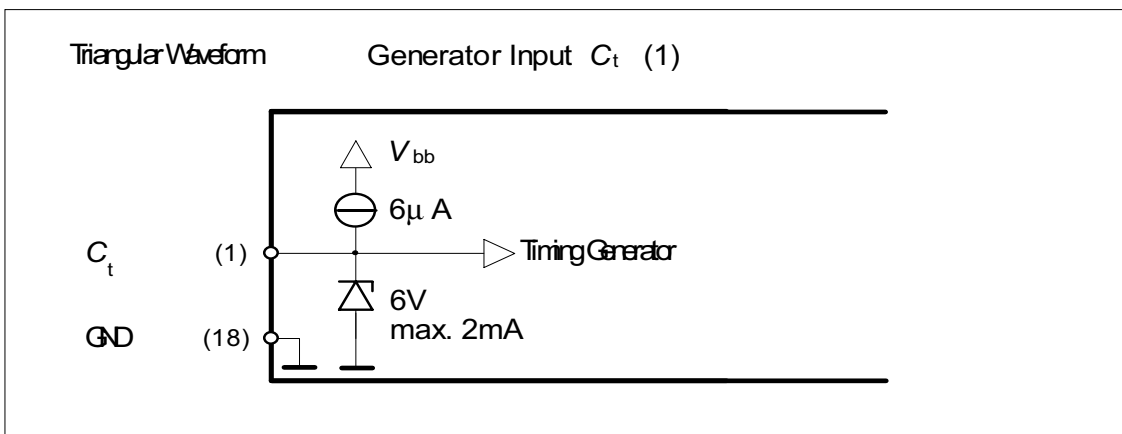
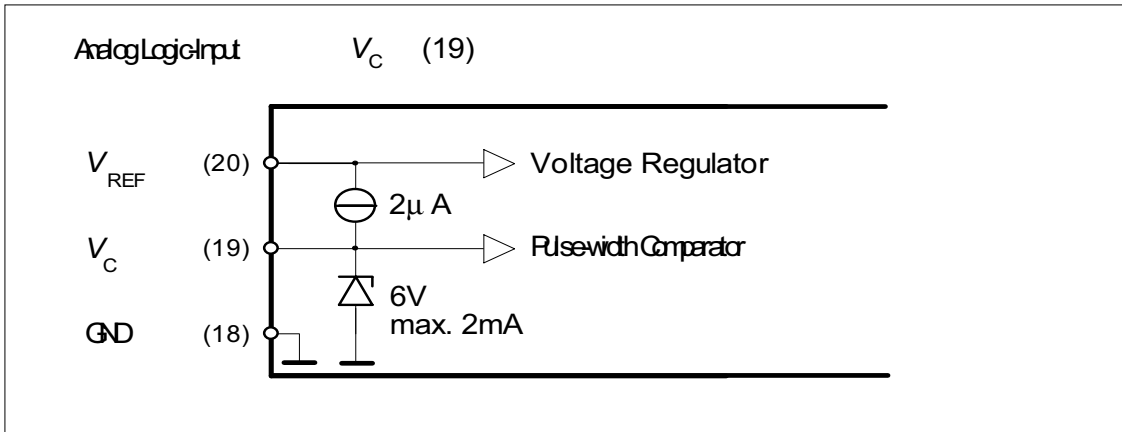
 at  $T_C = 25\text{ °C}$ ,  $V_{bb} = 12\text{ V}$ , unless otherwise specified.  $C_{\text{Bootstrap}} = 22\text{ nF}$ 

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

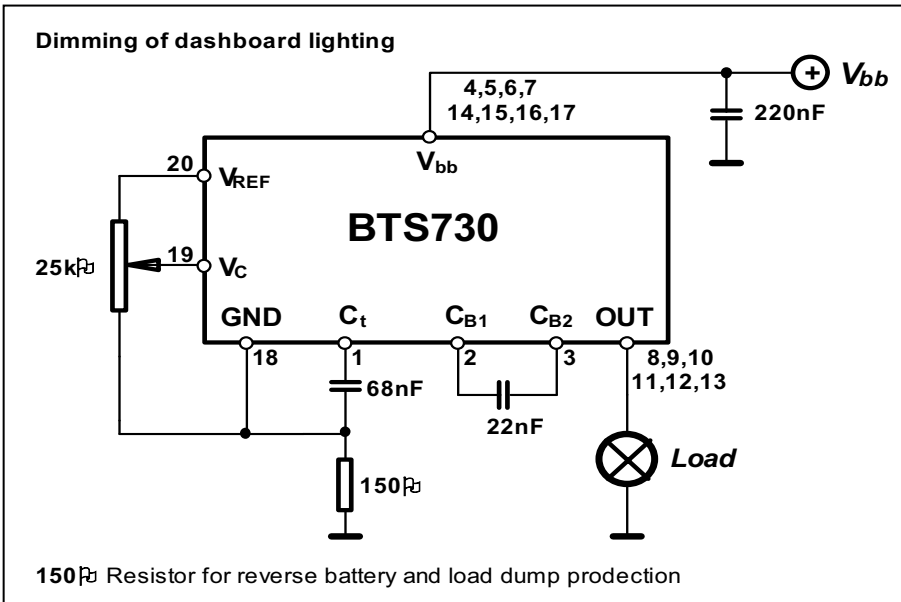
<sup>1)</sup> **Note:** undervoltage shutdown

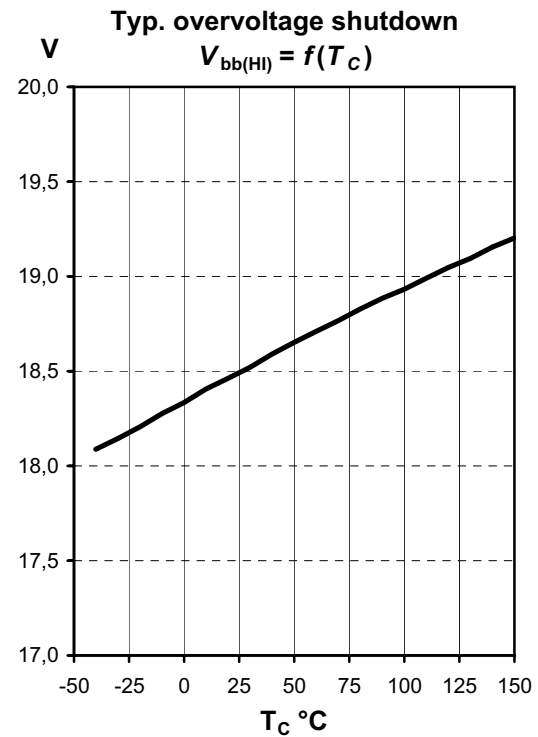
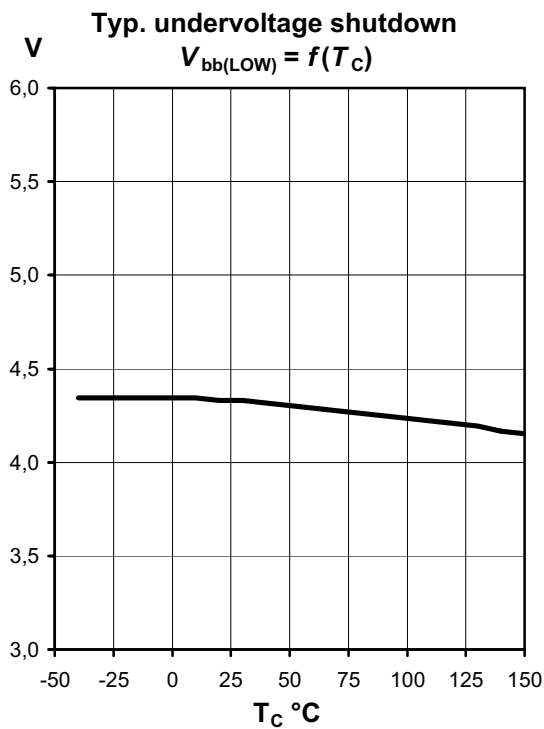
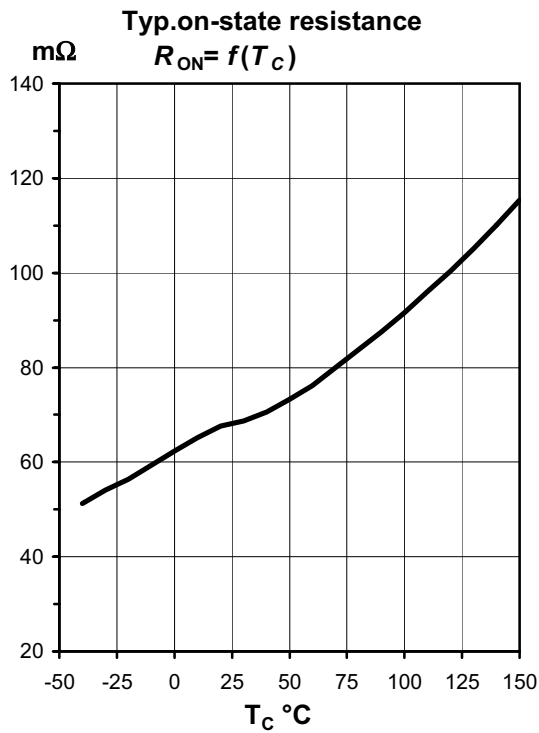
<sup>2)</sup> **Note:** overvoltage shutdown

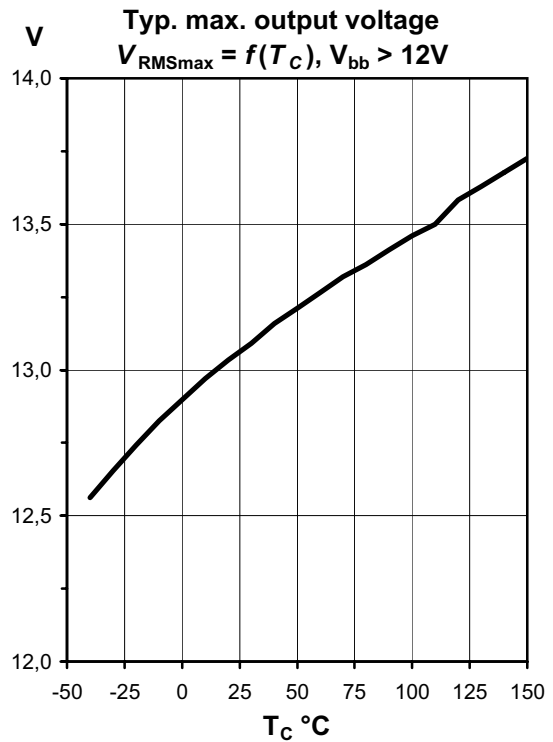
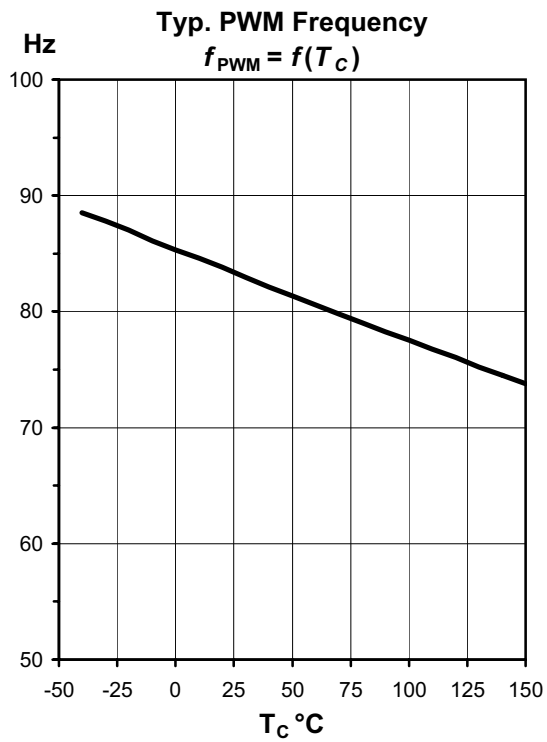
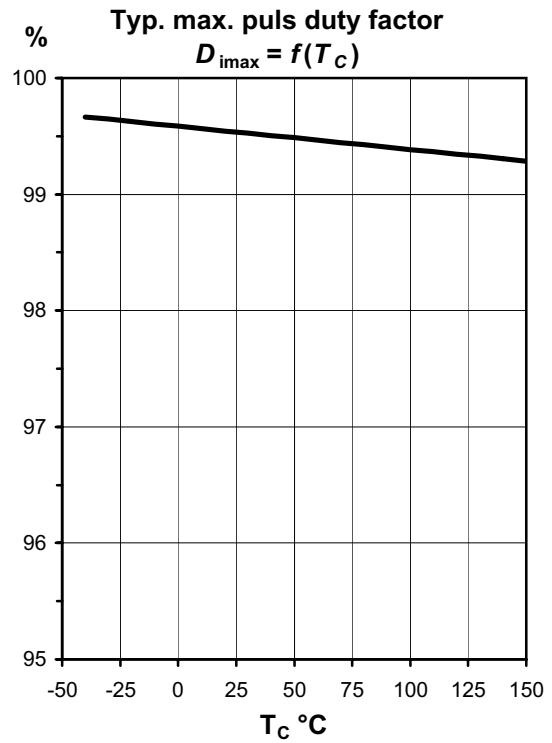
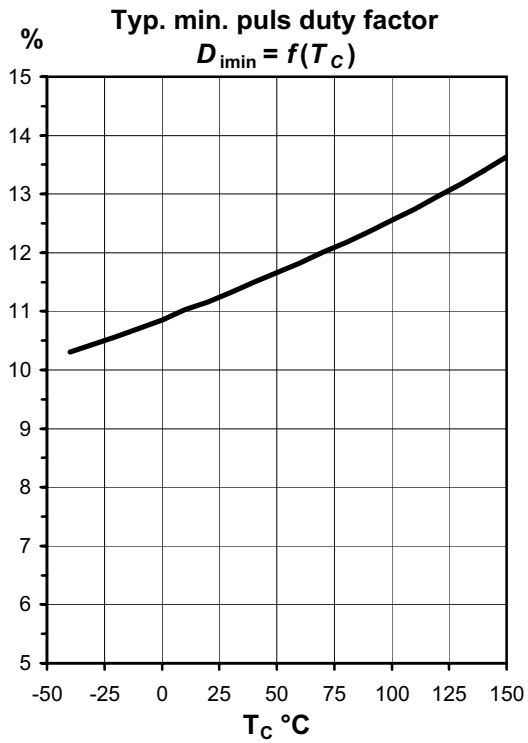
Circuits



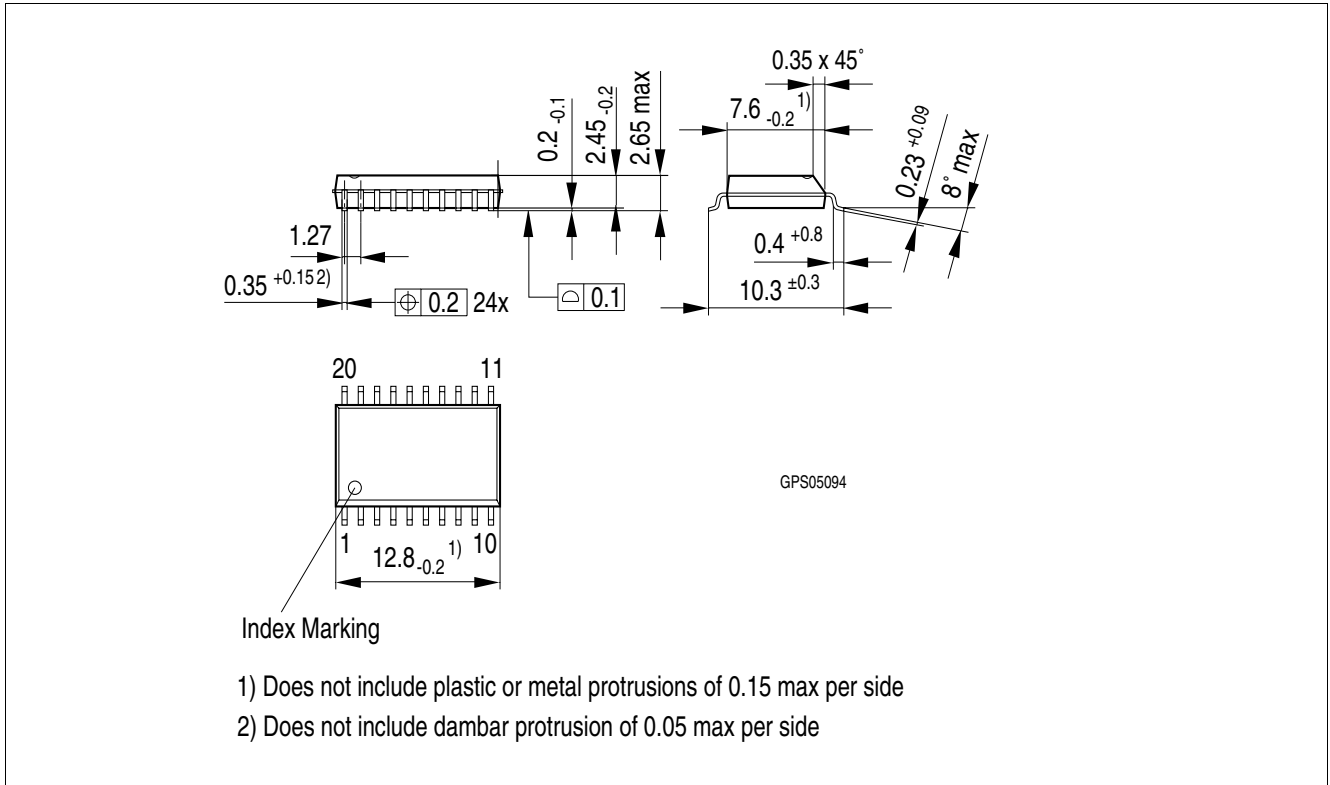
Application Note







## 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.

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