

Quartz Controlled Pulse Generator

Description

The monolithic integrated bipolar circuit, U2391B, is designed as a quartz controlled pulse generator. The tristate input enables the selection of different pulse period durations. The internal switch-on monitoring

achieves the start up of the IC when the power-on occurs. The output pulse can supply a drive signal upto 150 mA, which is short circuit protected.

Features

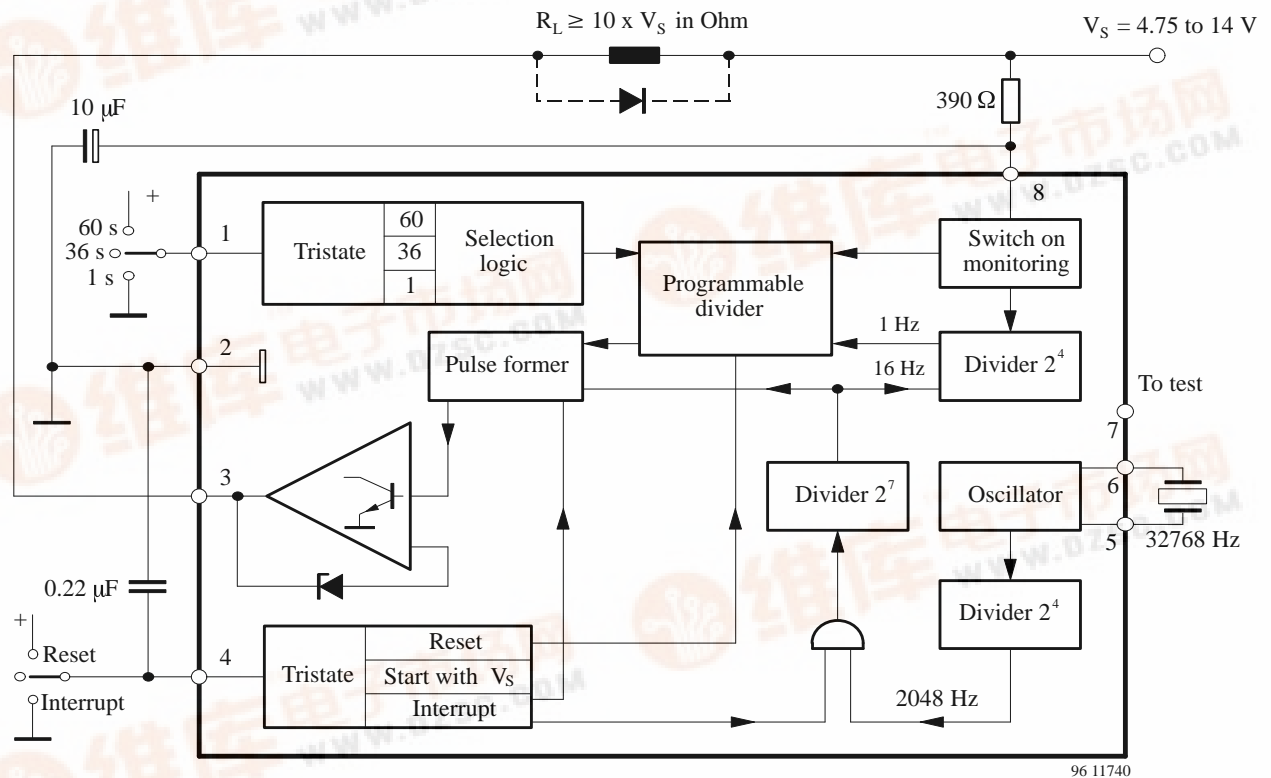
- Standard quartz $f_{osc} = 32.768 \text{ kHz}$
- Minimum operating voltage 4.5 V/1.5 mA
- Pulse width, $t_p = 31.25 \text{ ms}$
- Power stage with current limitation: typical 150 mA
- Tristate period selection: 1/36/60 s
- Reset and disable possibility
- Operation with $C \geq 33 \text{ pF}$, as operational time counter possible
- Minimum dimensions due to SO-case

Application

Operational time counter

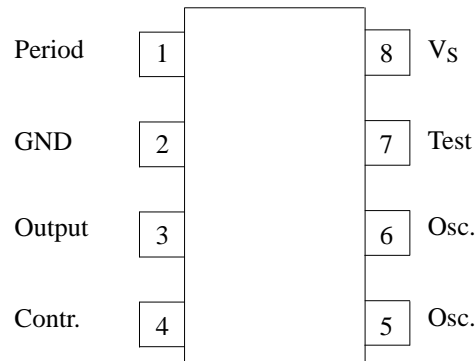
Case: SO8

Block Diagram



Pin Description

Pin	Symbol	Function
1	Period	Period selection input
2	GND	Ground
3	Output	Output control pulse
4	Contr.	Control input
5, 6	Osc.	Quartz-oscillator input
7	Test	Test logic input/output
8	V _S	Supply voltage



9611805

Figure 2. Pinning

Description

Pin 1, Period Selection Logic

Period selection at Pin 1 is as follows:

Pin 1 = open, $\tau = 36$ s

Pin 1 = ground $\tau = 1$ s

Pin 1 = V_S (Pin 8), $\tau = 60$ s

Pin 2, Ground

Pin 3, Output Stage

Output stage, being short circuit protected is limited to a current value of typical 150 mA. Apart from it, there is a voltage limitation which controls the power stage at the rate of $V_3 \geq 28.8$ to 32 V and serves as an active Z-diode. Output pulse width is 31.25 ms when quartz frequency is 32.768 kHz. It is independent of the selected period.

Pin 4, Control Logic

- Counting delay is typ 1.5 s (maximum 8 s) when Pin 4 is open and V_S is switched on.
- Programmable residual divider $\tau \geq 1$ s is reseeded if Pin 4 is connected to Pin 8. This results in an absolute tolerance, at the start across "Reset/End" to be ≤ 1 s.
- Clock input to the 2^7 divider is inhibited, if Pin 4 is connected to the ground (Pin 2). Absolute tolerance for every interruption is ≤ 0.488 ms.

- An interruption is ignored (Pin 4 = \perp) during the output pulse time.
- When Pin 4 is switched to V_S during the output pulse time – this output pulse will be reseeded.

Pin 5, 6 Quartz-Oscillator Input

The propagated period time selection is based on circuit with a low cost clock quartz of 32.768 kHz.

Pin 7, Test Logic, Figure 2, 3

To test the circuit in a reasonable time, it is possible to control the divider ($f_o = 16$ Hz) at Pin 7 as well as to feed in a higher frequency to the programmed residual counter ($f_i \leq 2$ kHz).

Pin 8, Supply Voltage

An operating voltage of 4.5 V is necessary for the functioning of the circuit, although an internal switch-on monitoring allows it to operate with a voltage of 3.6 V. This means that there is sufficient reliability for the performance of the circuit.

The circuit is designed for 12 V $\pm 10\%$ with internal supply voltage limitation of typical 15 V. In case of higher voltages there is a need of a series resistance and buffer capacitance as shown in figure 1.

Absolute Maximum Ratings

Reference point Pin 2, unless otherwise specified

Parameters	Symbol	Value	Unit
Supply current $t \leq 10 \mu\text{s}$	Pin 8 I_S i_s	30 150	mA
Supply voltage without series resistance	Pin 8 V_S	13.2	V
Voltages			
Selection logic	Pin 1 V_1	0 to V_S	V
Control logic	Pin 4 V_4	0 to V_S	
Output stage, without protection circuit	Pin 3 V_3	28.8	
Currents			
Test logic	Pin 7 I_7	± 100	μA
Oscillator	Pin 5, 6 I_{osc}	± 100	μA
Output stage $t \leq 1 \text{ ms}$	Pin 3 I_3	300	mA
Power dissipation			
$T_{amb} = 45^\circ\text{C}$ $T_{amb} = 85^\circ\text{C}$	P_{tot}	270 135	mW
Storage temperature range	T_{stg}	-40 to +125	$^\circ\text{C}$
Ambient temperature range	T_{amb}	-20 to +100	$^\circ\text{C}$
Junction temperature	T_j	125	$^\circ\text{C}$

Electrical Characteristics

$V_S = 5 \text{ V}$, $T_{amb} = 25^\circ\text{C}$, figure 1, reference point Pin 2, unless otherwise specified

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
DC supply currents	$V_8 = 5 \text{ V}$ Pin 8 $V_8 = 12 \text{ V}$	I_S		1.2	1.5 2	mA
Minimum supply voltage	Pin 8	V_S	4.5			V
Supply voltage limitation	$I_8 = 3 \text{ mA}$ Pin 8 $I_8 = 30 \text{ mA}$	V_S	13.2	15	16.3 17.2	V
Voltage monitoring Pin 8						
Turn-on threshold		V_{TON}		3.6		V
Turn-off threshold		V_{TOFF}		2.4		V
Temperature coefficient		-TC		0.33		%/K
Selection logic	Pin 1 = \perp (1 s) Pin 1 = + (60 s)	I_1 $-I_1$		6 6		μA
Control logic	Pin 4 = 0 V (Interrupt) Pin 4 = 5 V (Reset) Reset current	I_4 $-I_4$ $-I_4$	65	45 135	1500	μA
Oscillator $f_{osc} = 32768 \text{ Hz}$, $C_{osc} \geq 33 \text{ pF}$						
Operating current	Pin 5, 6	$-I_{osc}$		20		μA
Build-up time		t_{on}		1.5	8	s

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Output stage						
Pin 3						
Saturation voltages	$-I_O = 100 \text{ mA}, V_S = 12 \text{ V}$ $-I_O = 75 \text{ mA}, V_S = 12 \text{ V}$	V_O			0.5 0.5	V
Current limitation	$V_3 = 2 \text{ V}$	$-I_O$	100		220	mA
Output pulse width	$f_{osc} = 32768 \text{ Hz}$	t_p		31.25		ms
Voltage limitation	$-I_O = 1 \text{ mA}$	V_{limit}	28.8		33	V
Reserve current	$V_3 = 12 \text{ V}$	$I_{O(R)}$			10	μA
Drive current (ΔI_8 during t_p)	$V_8 = 5 \text{ V}$ Pin 8 $V_8 = 12 \text{ V}$	ΔI_8		4 10		mA

Test Circuit

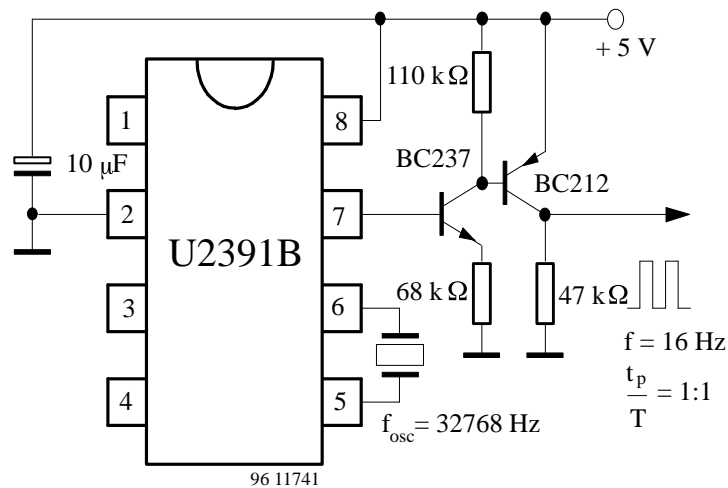


Figure 3. 16 Hz Test

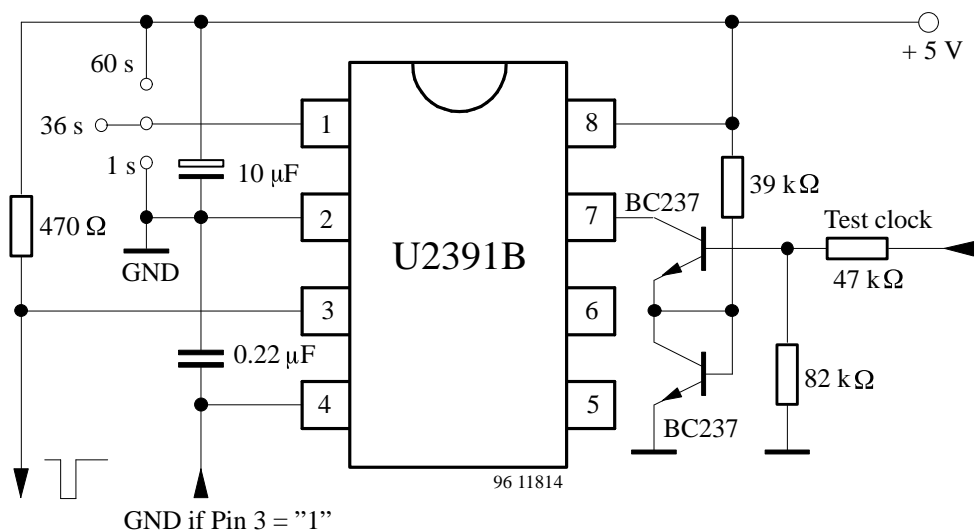


Figure 4. Programmed residual counter $f_i = 2 \text{ kHz}$ (Test clock)

Applications

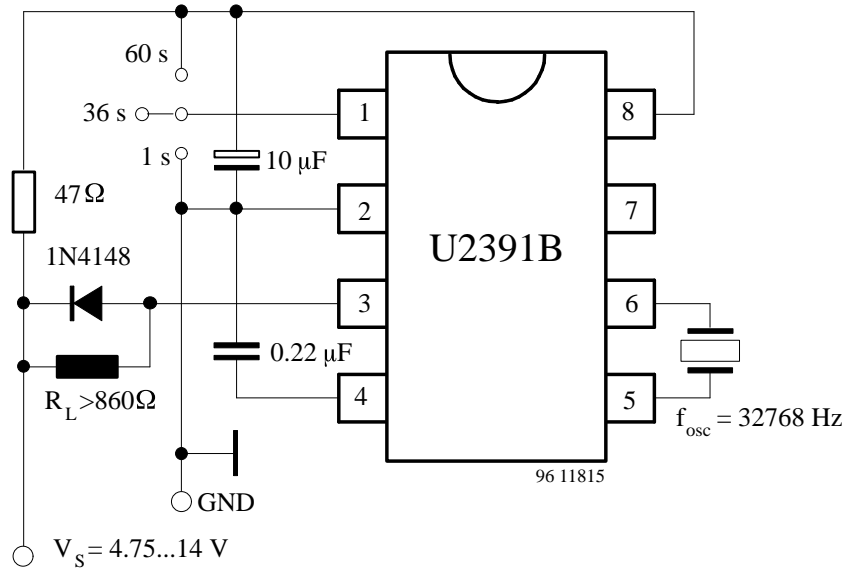


Figure 5. Standard circuit for $V_S = 4.75$ to 14 V, without reset and interruption
Cycle duration selected by Pin 1

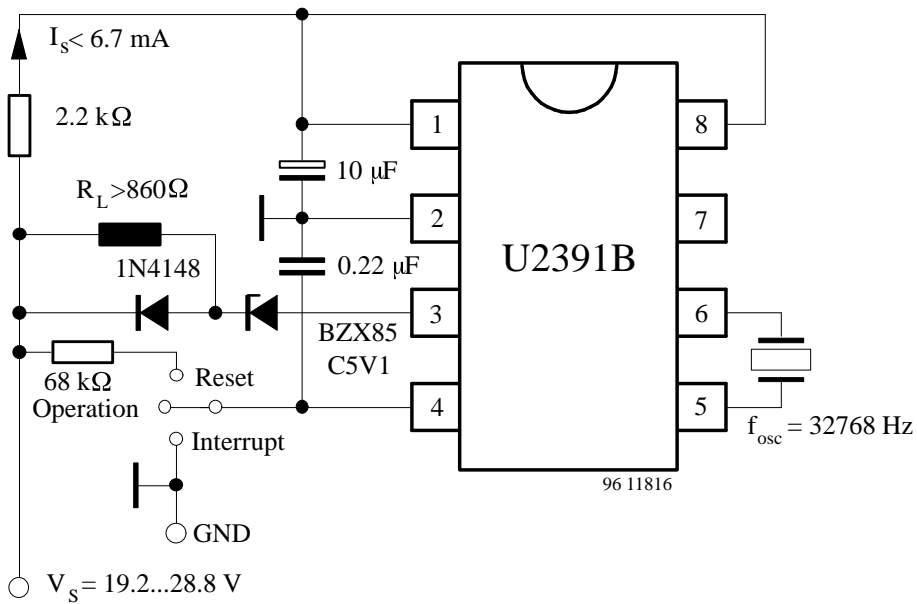
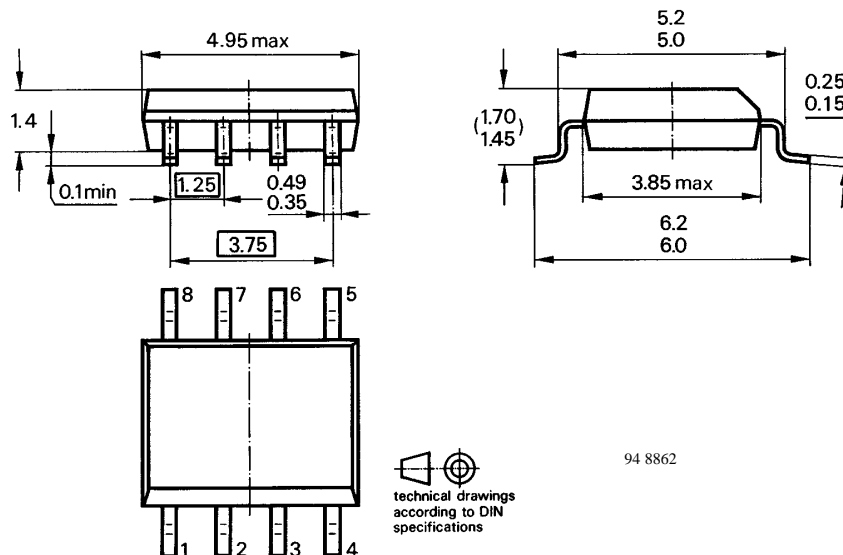


Figure 6. $V_S = 24$ V \pm 20% with reset and interrupt switch,
Cycle time $\tau = 60$ sec.

U2391B

Dimensions in mm

Package: SO8



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2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

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1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

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