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

Application

Operational time counter

Case: SO8

Block Diagram

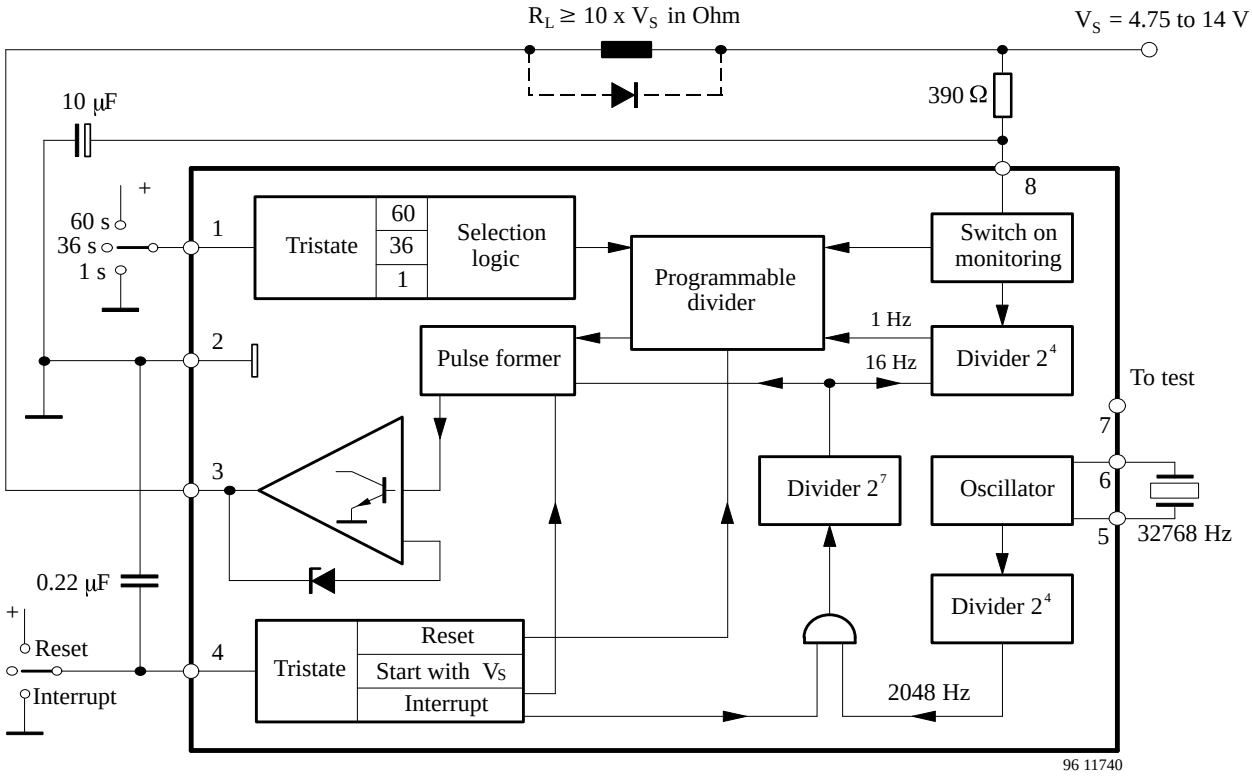


Figure 1. Block diagram with external circuit

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

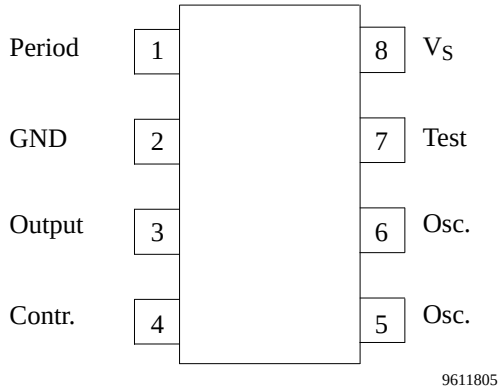


Figure 2. Pinning

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 $\tau \geqq 1$ s is reseated 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 reseated.

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

Electrical Characteristics

V_S = 5 V, Tamb = 25°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 V Pin 8 V_8 = 12 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 mA Pin 8 I_8 = 30 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 = ⊥ (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 Hz, $C_{osc} \geq 33$ pF					
Operating current	Pin 5, 6	–Iosc		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 mA, V_S = 12 V $-I_O$ = 75 mA, V_S = 12 V	V_O			0.5 0.5	V
Current limitation	V_3 = 2 V	$-I_O$	100		220	mA
Output pulse width	f_{osc} = 32768 Hz	t_p		31.25		ms
Voltage limitation	$-I_O$ = 1 mA	V_{limit}	28.8		33	V
Reserve current	V_3 = 12 V	$I_{O(R)}$			10	µA
Drive current (ΔI_8 during t_p)	V_8 = 5 V Pin 8 V_8 = 12 V	ΔI_8		4 10		mA

Test Circuit

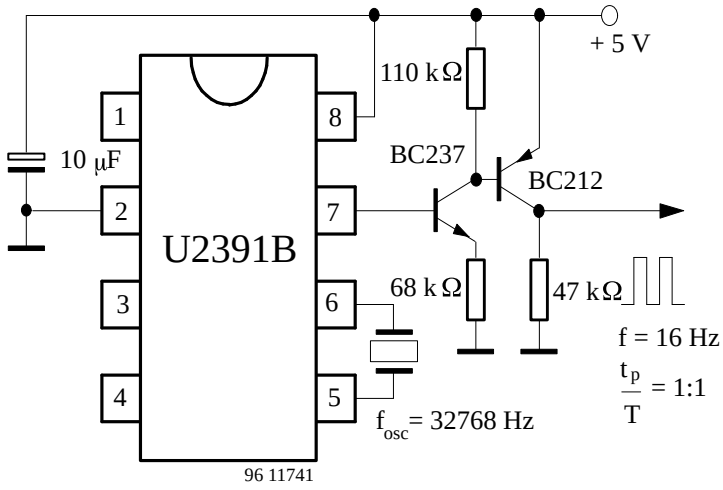


Figure 3. 16 Hz Test

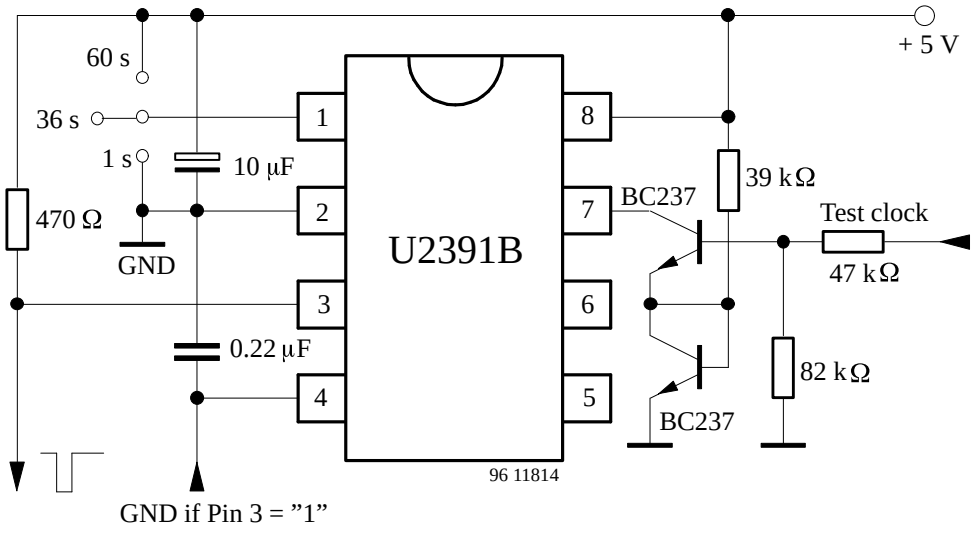


Figure 4. Programmed residual counter f_i= 2 kHz (Test clock)

Applications

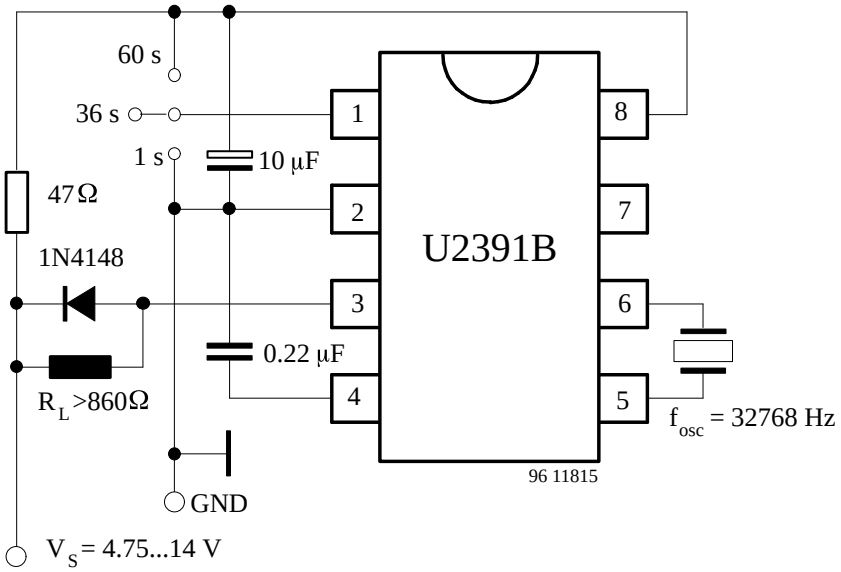


Figure 5. Standard circuit for V_S = 4.75 to 14 V, without reset and interruption
Cycle duration selected by Pin 1

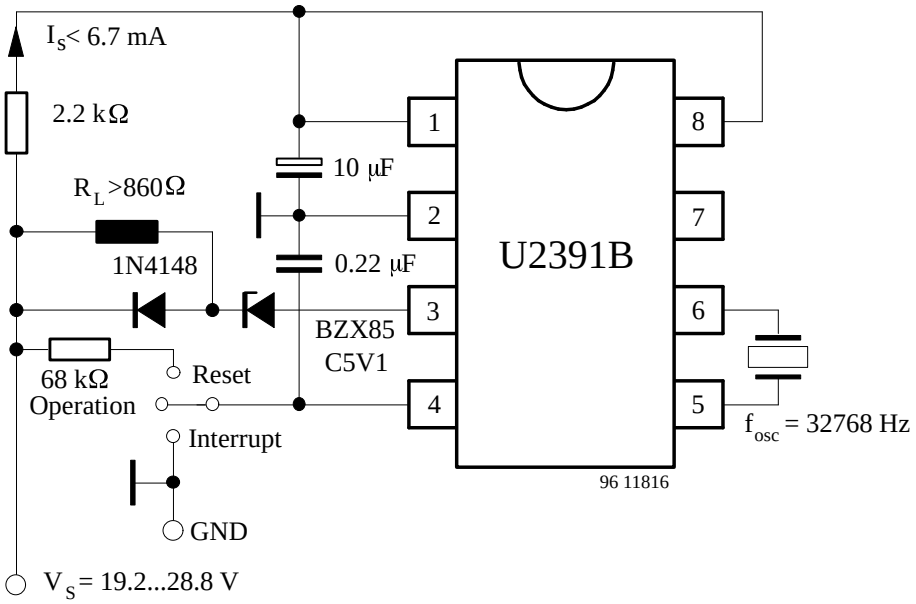
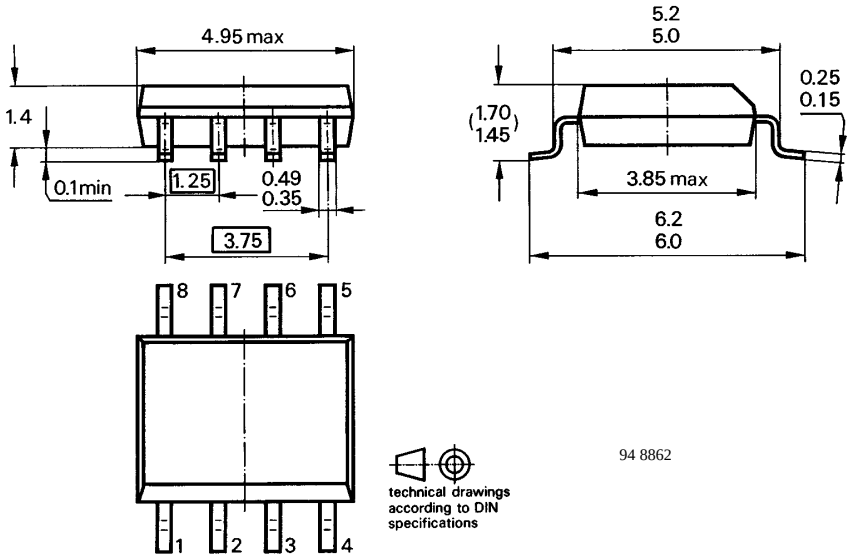


Figure 6. V_S = 24 V ± 20% with reset and interrupt switch,
Cycle time τ = 60 sec.

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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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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