BATTERY CHARGER FOR NiCd BATTERIES

Technology: Bipolar

Features:

- Charging time selection via simple oscillator circuit
- Timer reset and interrupt
- Operating voltage range: 4.5...13 V
- Internal operating voltage limitation ≧13.2 mA
- Supply current ≦1.5 mA

Case: DIP 8, SO 8

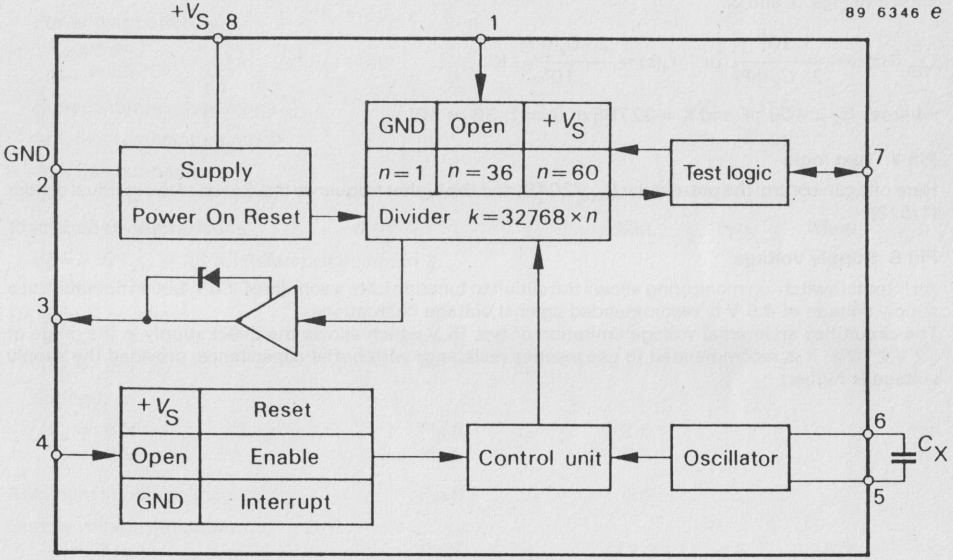


Fig. 1 Block diagram

General Description: Pin 2 – Ground

Pin 1 Divider programming

Pin 1 = GND (Pin 2)	n = 1
Pin 1 = open	n = 36
Pin 1 = +V_S (Pin 8)	n = 60

T1.2/2047.0491

Pin 3 Output stage

The circuit, being short circuit protected, is limited to a current of typ. 150 mA with Z-diode. The output is controlled with voltage of $V_3 \geqq 28.8$ V. Output pulse width, t_p, is 1024 times period duration, T, of the oscillator frequency.

Pin 4 Control input

Pin 4 = open – Enable

Pin 4 = $+V_S$ Reset = Timer is resetted and breaks the creating output pulse.

Timer start after reset (Pin 4 = + V_S), the max. time deviation is 1024 x pulse duration of the oscillator frequency.

Pin 4 = GND interrupt is ignored during t_p time. Max. time deviation after "interrupt" is 16 x T of the oscillator frequency (Fig. 2).

Pin 5, 6 Oscillator

Time delay, t_d, and period duration, T, are determined by oscillator circuit C_X as shown in Fig. 1. Curves are shown in Figs. 2 and 3.

$$f_{osc}\,(\text{Hz}) \approx \frac{10^4}{2 \cdot C_X\,(\text{nF})} \quad \text{or} \quad t_d(\text{s}) \approx \frac{2 \cdot C_X\,(\text{nF})}{10^4}\,\text{K}$$

whereas $C_X \geqq 100$ pF and K = 32768xn (n = 1, 36 or 60).

Pin 7 Test logic

Here one can control the pre-divider ($f_{osc}/2048$) and the higher frequency ($f_i \leqq 2$ kHz) of the residual divider (1/512).

Pin 8 Supply voltage

An internal switch-on monitoring allows the circuit to function upto a voltage of 3.6 V, but an operation at a supply voltage of 4.5 V is recommended against voltage fluctuations.
The circuit has an internal voltage limitation of typ. 15 V which allows the direct supply in the range of 12 V ± 10%. It is recommended to use a series resistance with buffer capacitance, provided the supply voltage is higher.

Absolute maximum ratings

Reference point Pin 2, unless otherwise specified

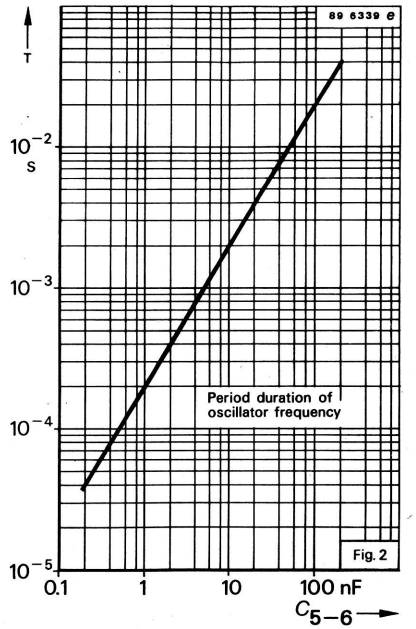
Input current	Pin 8	I_S	30	mA
Peak input current $t \leqq 10$ µs	Pin 8	i_S	150	mA
Supply voltage	Pin 8	V_S	13.2	V
Selection logic	Pin 1	V_I	0 ... V_S	
Control logic	Pin 4	V_I	0 ... V_S	
Test logic	Pin 7	$\pm i_I$	100	µA
Oscillator	Pin 5, 6	$\pm i_I$	100	µA
Output stage	Pin 3	V_O	28.8	V
Overvoltage peak current $t \leqq 1$ ms	Pin 3	i_o	300	mA
Power dissipation				
$T_{amb} = 45$ °C		P_{tot}	270	mW
$T_{amb} = 85$ °C		P_{tot}	135	mW
Storage temperature range		T_{stg}	−40 ... +125	°C
Ambient temperature range		T_{amb}	−20 ... +100	°C
Junction temperature		T_j	125	°C

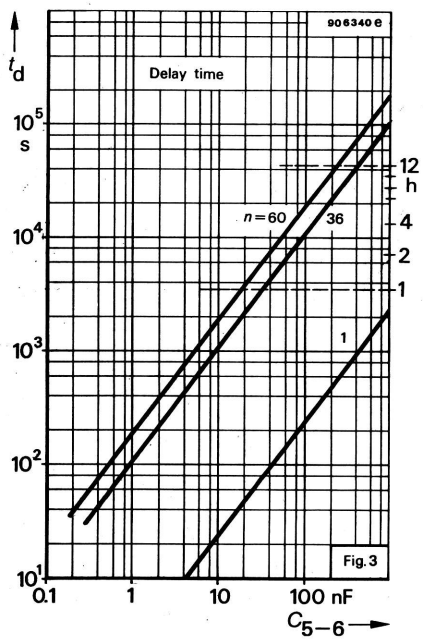
Electrical characteristics

$V_S = 5$ V, $T_{amb} = 25$ °C, Reference point Pin 2, unless otherwise specified

			Min.	Typ.	Max.	
DC supply currents						
$V_8 = 5$ V	Pin 8	I_S		1.2	1.5	mA
$V_8 = 12$ V	Pin 8	I_S			2	mA
during t_p						
$V_8 = 5$ V	Pin 8	i_S	2.6			mA
$V_8 = 12$ V	Pin 8	i_S	7.5			mA
Minimum supply voltage	Pin 8	V_S	4.5			V
Supply voltage limitation						
$I_8 = 3$ mA	Pin 8	V_S	13.2	15	16.3	V
$I_8 = 30$ mA	Pin 8	V_S			17.2	V
Voltage monitoring	Pin 8					
Enable		I_{TON}		3.6		V
Reset		V_{TOFF}		2.4		V
Temperature coefficient		TC		−0.33		%/K

			Min.	Typ.	Max.	
Selection logic						
$V_1 = 0$ V	Pin 1	I_I		6		µA
$V_1 = +V_S$	Pin 1	$-I_I$		6		µA
Control logic Pin 4						
Pin 4 = 0 V (Interrupt)		I_I		45		µA
Pin 4 = 5 V (Reset)		$-I_I$		135		µA
Reset current		$-I_I$	65		1500	µA
Oscillator						
Operating current measured w.r.t. +2 V	Pin 5, 6	$-I_I$		20		µA
Switching output						
Saturation voltage						
$-I_O = 100$ mA, $V_S = 12$ V	Pin 3	V_O			0.5	V
$-I_O = 75$ mA, $V_S = 5$ V	Pin 3	V_O			0.5	V
Current limitation						
$V_3 = 2$ V, $V_S = 12$ V	Pin 3	$-I_O$	100		220	mA
Voltage limitation						
$-I_O = 1$ mA	Pin 3	V_O	28.8		33	V
Reverse current						
$V_3 = 12$ V	Pin 3	I_R			10	µA
Drive current (ΔI_8 during t_p)						
$V_8 = 5$ V	Pin 8	ΔI_I		2.6		mA
$V_8 = 12$ V		ΔI_I		7.5		mA





Applications:

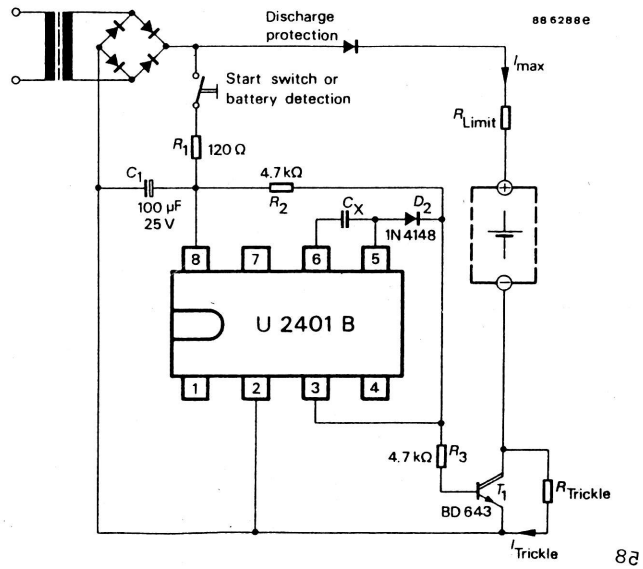


Fig. 4 Battery charger with start button

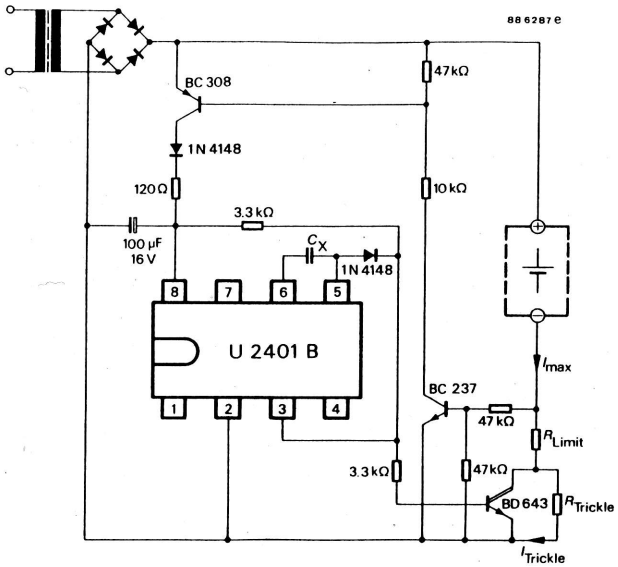


Fig. 5 Battery charge timer with auto-start and battery detection

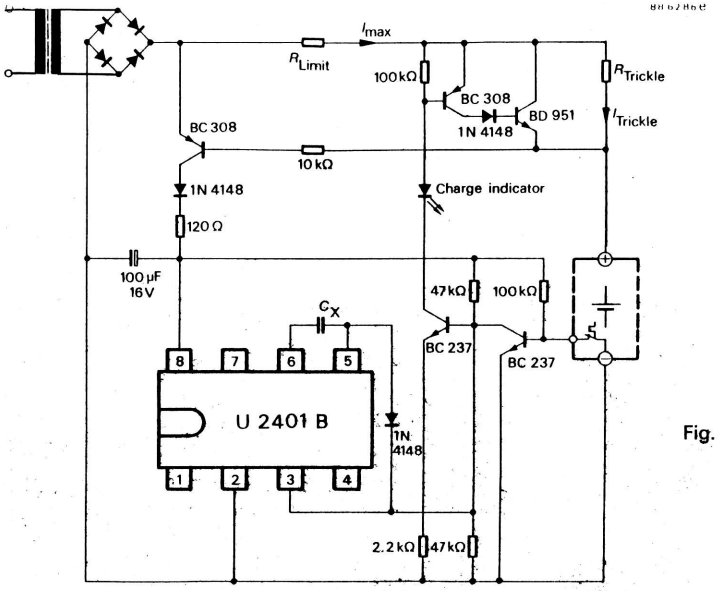


Fig. 6 Battery charge timer with:
- time interrupt by bimetal protected batteries
- auto-start with battery detection

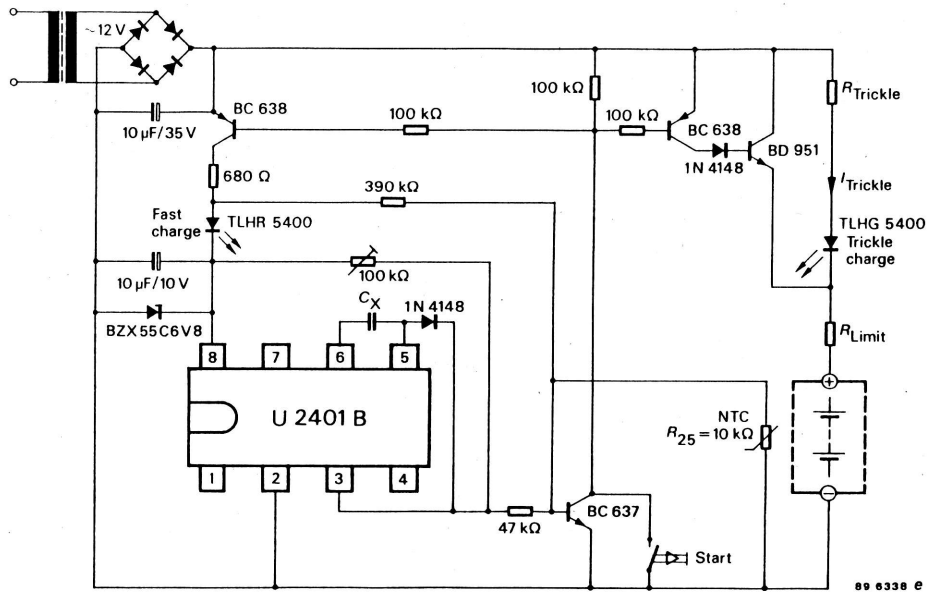


Fig. 7 Battery charge timer with:
- Temperature control with NTC-Sensor
- Start button