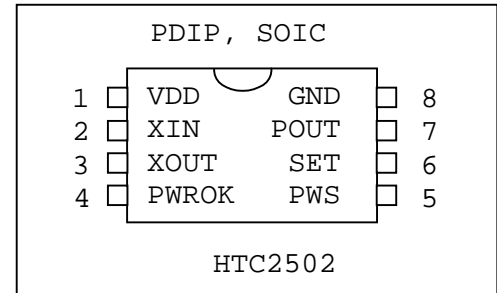## General Description

HTC2502 is analog clock controller IC. It is designed to replace clock driver chips in wall mount clocks. It's versatile design allows it to be used in range of clock application ranging from simple wall clocks to centralized clock controllers for distributed clock systems. HTC2502 generates single pulse every minute for driving unidirectional step motor. This stepping motor is connected to minute hand of the clock. Hour hand is mechanically coupled with minute hand. HTC2502 will generate output pulse only if main power is operational. In case of main power failure it will accumulate pulses using backup power to keep time. In this mode HTC2502 is consuming least amount of power. Once Main power is restored HTC2502 will perform calculations on necessary adjustment value and deliver pulse train to stepping motor to adjust the time. Rate of pulses varies as per PWS pin setting. If PWS pin is connected to VDD then pulse train, while adjusting time, will force minute hand move once per second. Each pulse will have 500ms width. This setting is useful for driving solenoid type systems with big mechanical delays (tower clocks for example). In the clocks that have small mechanical movement mechanisms like wall mount clocks we might use PWS pin connected to GND. In this mode we have 50mS output pulse width at POUT pin and during time adjustment we will deliver four pulses driving solenoid. We utilize our micro RTOS in this design.

```
       PDIP, SOIC
  1 ┌ VDD      GND ┐ 8
  2 ┌ XIN     POUT ┐ 7
  3 ┌ XOUT     SET ┐ 6
  4 ┌ PWROK    PWS ┐ 5
        HTC2502
```

Features:
- Operation from widely available and low power precision 32768Hz crystal.
- Supports backup power supply in case of main power failure.
- Simple intuitive interface for adjusting clock.
- Minimum external components.

Pin out description.

Abbreviations used: O - output, I - input, P – power

Pin number	Name	I / O	Description	Notes
1	VDD	P	Power input.	+2.5 to +6V.
2	XIN	I	Crystal input.	Crystal oscillator input.
3	XOUT	O	Crystal input.	Crystal oscillator output.
4	PWROK	I	Power ok input.	Connected to main power via resistor.
5	PWS	I	Pulse Width Selector	Output pulse period selection is done by tying this pin to GND (50mS) or VDD (500mS).
6	SET	I	Switch input	De-bounced switch input for time adjustment.

| 7 | POUT | O | Pulse output | Can deliver up to 25mA to load. Use external driver if more current needed. |
| 8 | GND | P | Ground | Connects to power ground. |

2.0 Typical connection diagram.
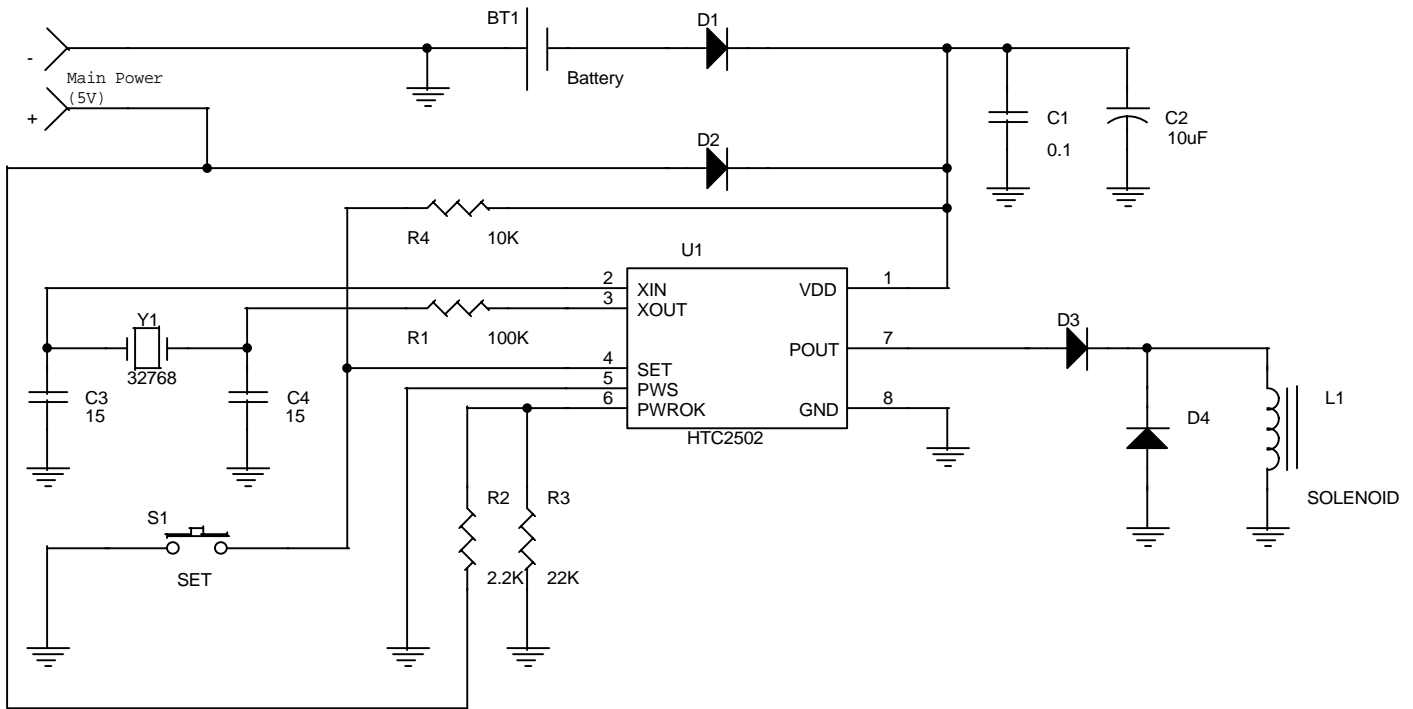
Functional Description

HTC2502 will generate 50mS pulse (or 500mS if PWS pin is tied to VDD) every minute if main power is operational. In case of main power failure HTC2502 starts accumulating pulses while operating from backup power supply. Power consumption in this mode is minimal. As soon as main power is restored HTC2502 will send train of pulses to POUT pin at rate of one pulse per second if PWS pin is attached to VDD pin. Pulse width at this mode is 500mS. HTC2502 will output four pulses per second at PWS output if PWS is connected to GND. In this case output pulse width is 50mS. Please note that before generating each pulse main power is checked. This is achieved by checking PWOK input. These insures reliable and worry free operation. Please note that PWOK is digital input and has protection diodes internally. Current into this pin is limited by R2 resistor and R3 brings input level down during main power failure. Set key input is provided to setup time while main power is operational. Set key input is ignored if main power is down or during clock adjustment after main power is restored. Clock adjusted during key up event or in other words when set key is released.
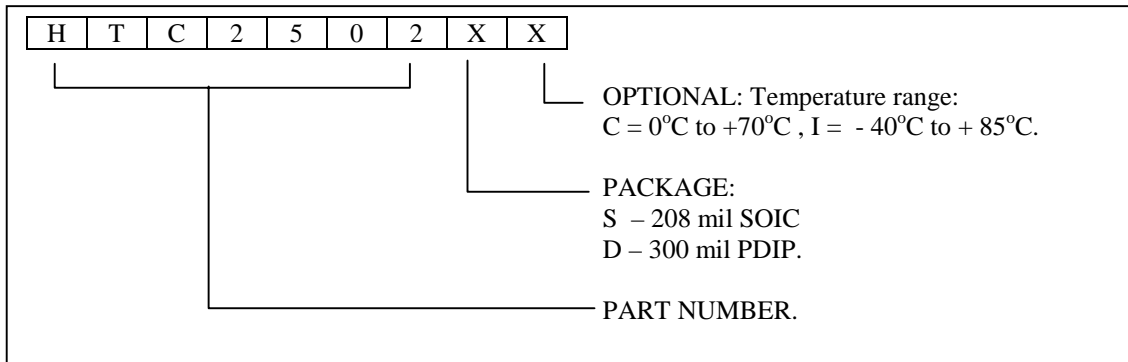
Electrical Characteristics

Voltage on VDD pin in respect to GND	+2.5 to +5.5V
Operational current without external load	0.25 mA[1]
Current consumption in Power Saving mode	0.03mA[1]
POUT output low voltage max (5mA load)	0.4V[1]
POUT output high voltage min (5mA source)	VDD-0.7V[1]
POUT maximum sink current	25mA[1]
POUT maximum source current	25mA[1]
PWOK minimum input voltage measured against GND	-0.5V
PWOK maximum input voltage measured against GND	VDD + 0.5V
PWOK nominal input voltage measured against GND	0.85VDD

NOTES:
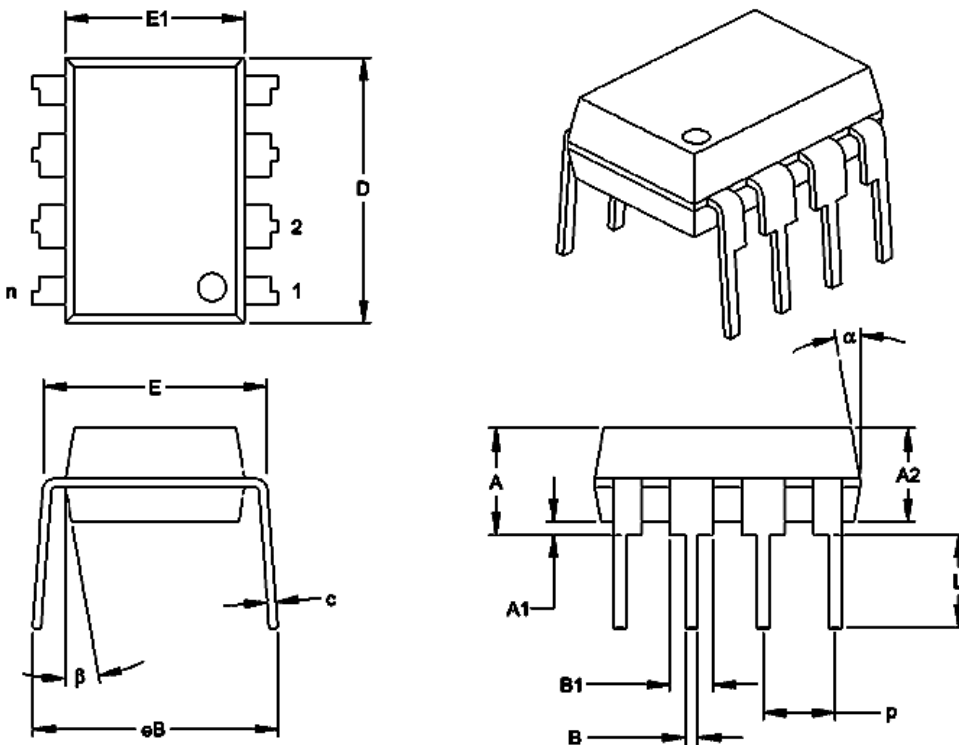1. Those values are characterized but not tested.

Ordering Information

When ordering please use part numbering scheme below.

H	T	C	2	5	0	2	X	X

OPTIONAL: Temperature range:
C = 0°C to +70°C , I = - 40°C to + 85°C.

PACKAGE:
S – 208 mil SOIC
D – 300 mil PDIP.

PART NUMBER.

Mechanical information.

8-Lead Plastic Dual In-line (P) — 300 mil (PDIP)

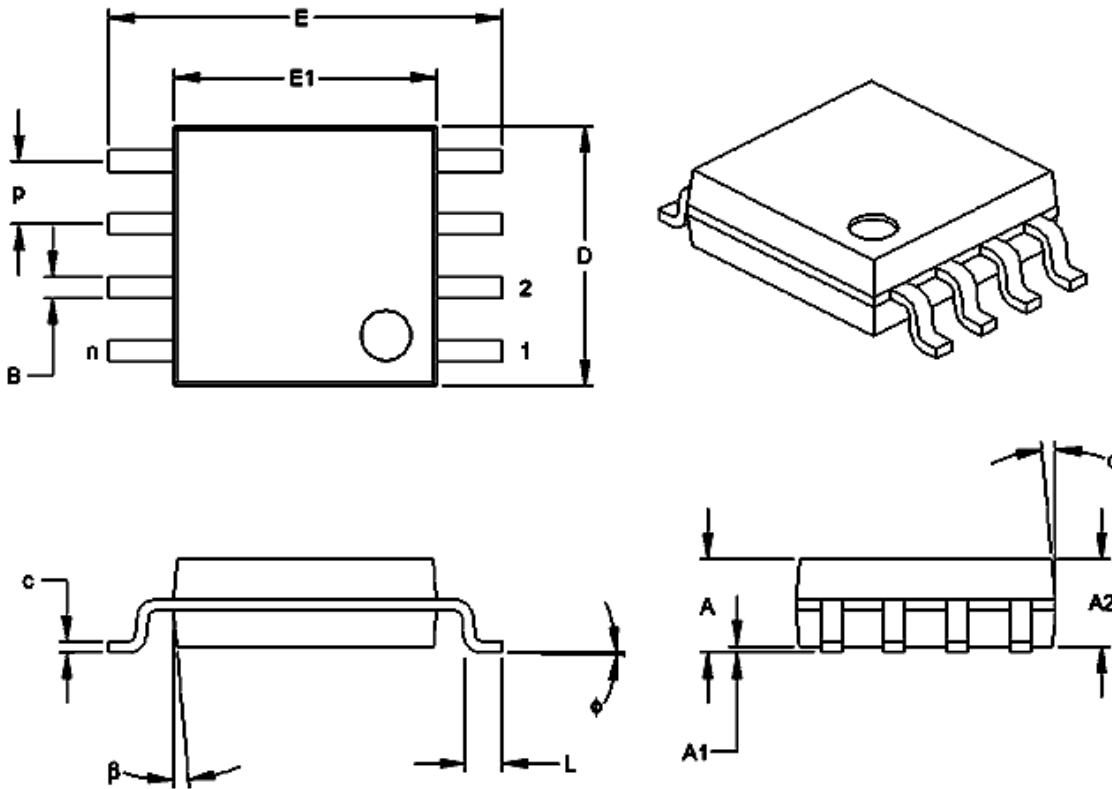| Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		8			8	
Pitch	p		.100			2.54	
Top to Seating Plane	A	.140	.155	.170	3.56	3.94	4.32
Molded Package Thickness	A2	.115	.130	.145	2.92	3.30	3.68
Base to Seating Plane	A1	.015			0.38		
Shoulder to Shoulder Width	E	.300	.313	.325	7.62	7.94	8.26
Molded Package Width	E1	.240	.250	.260	6.10	6.35	6.60
Overall Length	D	.360	.373	.385	9.14	9.46	9.78
Tip to Seating Plane	L	.125	.130	.135	3.18	3.30	3.43
Lead Thickness	c	.008	.012	.015	0.20	0.29	0.38
Upper Lead Width	B1	.045	.058	.070	1.14	1.46	1.78
Lower Lead Width	B	.014	.018	.022	0.36	0.46	0.56
Overall Row Spacing	eB	.310	.370	.430	7.87	9.40	10.92
Mold Draft Angle Top	α	5	10	15	5	10	15
Mold Draft Angle Bottom	β	5	10	15	5	10	15

*Controlling Parameter
Notes:

Dimensions D and E1 do not include mold flash protrusions. Mold flash or protrusions shell not exceed .010″ (0.254mm)per side.

JEDEC Equivalent: MS-001

8-Lead Plastic Small Outline (SM) – Medium, 208 mil (SOIC)

Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		8			8	
Pitch	P		.050			1.27	
Overall Height	A	.070	.075	.080	1.78	1.97	2.03
Molded Package Thickness	A2	.069	.074	.078	1.75	1.88	1.98
Standoff	A1	.002	.005	.010	0.05	0.13	0.25
Overall Width	E	.300	.313	.325	7.62	7.95	8.26
Molded Package Width	E1	.201	.208	.212	5.11	5.28	5.38
Overall Length	D	.202	.205	.210	5.13	5.21	5.33
Foot Length	L	.020	.025	.030	0.51	0.64	0.76
Foot Angle	φ	0	4	8	0	4	8
Lead Thickness	c	.008	.009	.010	0.20	0.23	0.25
Lead Width	B	.014	.017	.020	0.36	0.43	0.51
Mold Draft Angle Top	α	0	12	15	0	12	15
Mold Draft Angle Bottom	β	0	12	15	0	12	15

*Controlling Parameter

Notes:

Dimensions D and E1 do not include mold flash protrusions. Mold flash or protrusions shell not exceed .010″ (0.254mm)per side.

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