M41TC8025

Highly accurate, temperature-compensated serial real-time clock (RTC) with embedded crystal

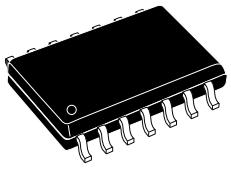
Data brief

Features

- Embedded high-stability 32 KHz DTCXO
- Temperature-compensated serial real-time clock
  - ±5.0 ppm max from -40 to 85 °C
  - ±3.8 ppm max from 0 to 50 °C
- Supply voltage
  - Clock operating & timekeeping: 1.6 to 5.5 V
  - I^2C interface operating: 1.8 to 5.5 V
  - Temperature compensation: 2.2 to 5.5 V
- 0.8 µA typical current at 3.0 V supply voltage
- 400 kHz I^2C interface
- Time-of-day alarm (with interrupt)
- Fixed-cycle timer interrupt function
- Time update interrupt function
- Programmable frequency output
  - FOUT = 1 Hz, 1 KHz and 32 KHz
- Registers for seconds, minutes, hours, day-of-week, date (day of month), month and year with automatic leap year compensation
- Programmable temperature compensation intervals (0.5 s, 2 s default, 10 s, 30 s)

Applications

- Power meters
- Industrial applications



SO14
14-pin SOIC

Description

The M41TC8025 is a serial I^2C real-time clock (RTC) incorporating temperature compensation to maintain accurate timekeeping over the industrial temperature range of -40 to +85 °C. In addition to providing date and time (seconds, minutes, hours, day-of-week, date (day of month), month and year), the device also provides an alarm function, fixed-cycle timer, time update interrupt and programmable frequency outputs (1 Hz, 1 KHz and 32 KHz).

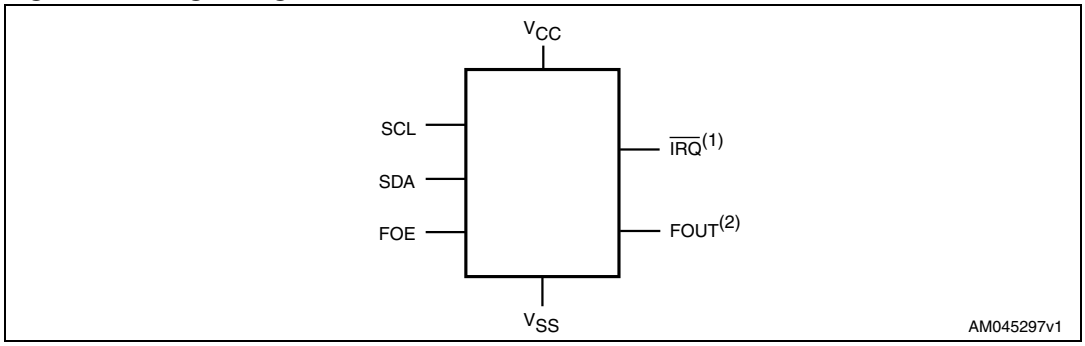
The M41TC8025 is provided in a 200 mil, 14-pin SOIC package.

Table 1. Device summary

Order code	Accuracy	Package
M41TC8025AMC6F	±5.0 ppm (-40 to 85 °C) ±3.8 ppm (0 to 50 °C)	SO14

1 Device overview

Figure 1. Logic diagram



1. $\overline{IRQ}$ is an open-drain output
2. FOUT is a CMOS output

Figure 2. Pinout

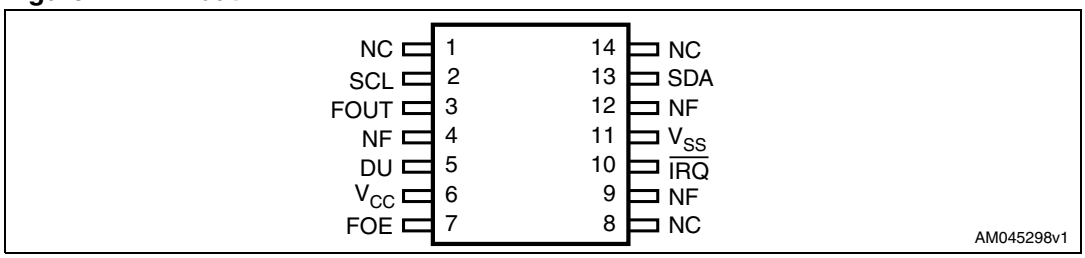


Table 2. Pin description

Pin	Name	Description
1	NC	No connect. The NC pin can be connected to V_{CC}, GND or left floating.
2	SCL	Serial clock input
3	FOUT	Programmable frequency output (CMOS). The FOUT pin is Hi-Z if FOE is low.
4	NF	No function. The NF pin can be connected to V_{CC}, GND or left floating.
5	DU	Do not use externally. The DU pin must be left floating.
6	V_{CC}	Power supply
7	FOE	Frequency output enable, controls the frequency output on FOUT pin
8	NC	No connect. The NC pin can be connected to V_{CC}, GND or left floating.
9	NF	No function. The NF pin can be connected to V_{CC}, GND or left floating.
10	$\overline{IRQ}$	Interrupt output (open drain)
11	V_{SS}	Ground supply
12	NF	No function. The NF pin can be connected to V_{CC}, GND or left floating.
13	SDA	Serial data input/output
14	NC	No connect. The NC pin can be connected to V_{CC}, GND or left floating.

Note: Be sure to connect a 0.1 µF to 1 µF bypass capacitor between V_{CC} and V_{SS}.

Figure 3. Block diagram

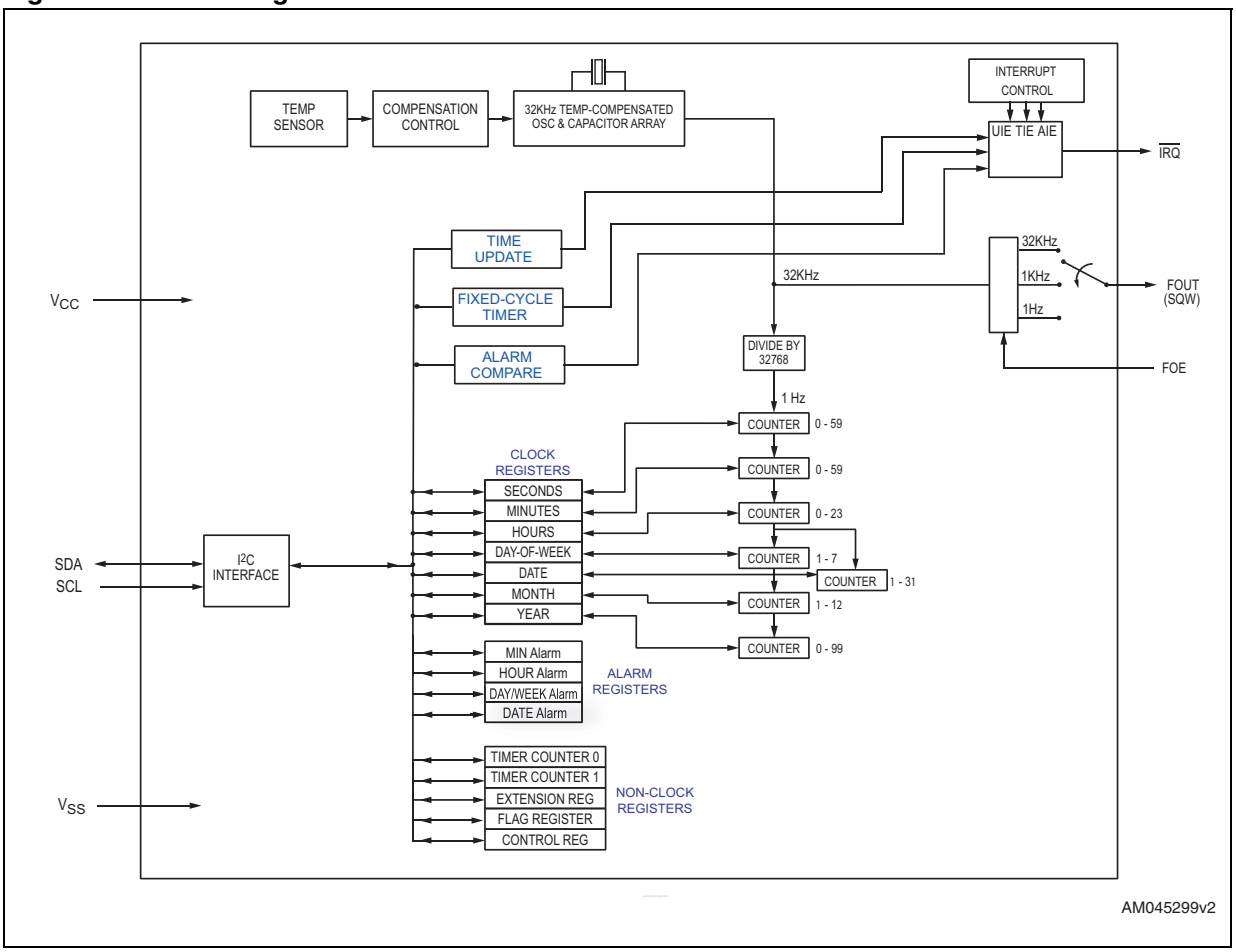
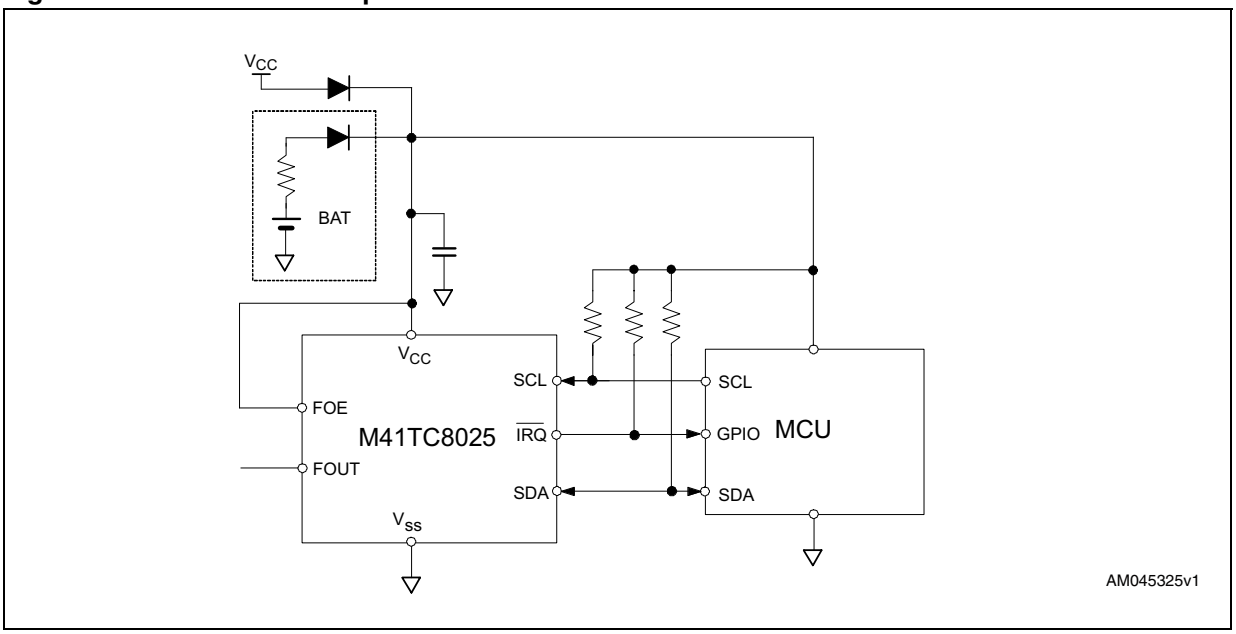


Figure 4. Hardware hookup



2 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Figure 5. SO14 - 14-lead small outline (200 mils body width) package mechanical drawing

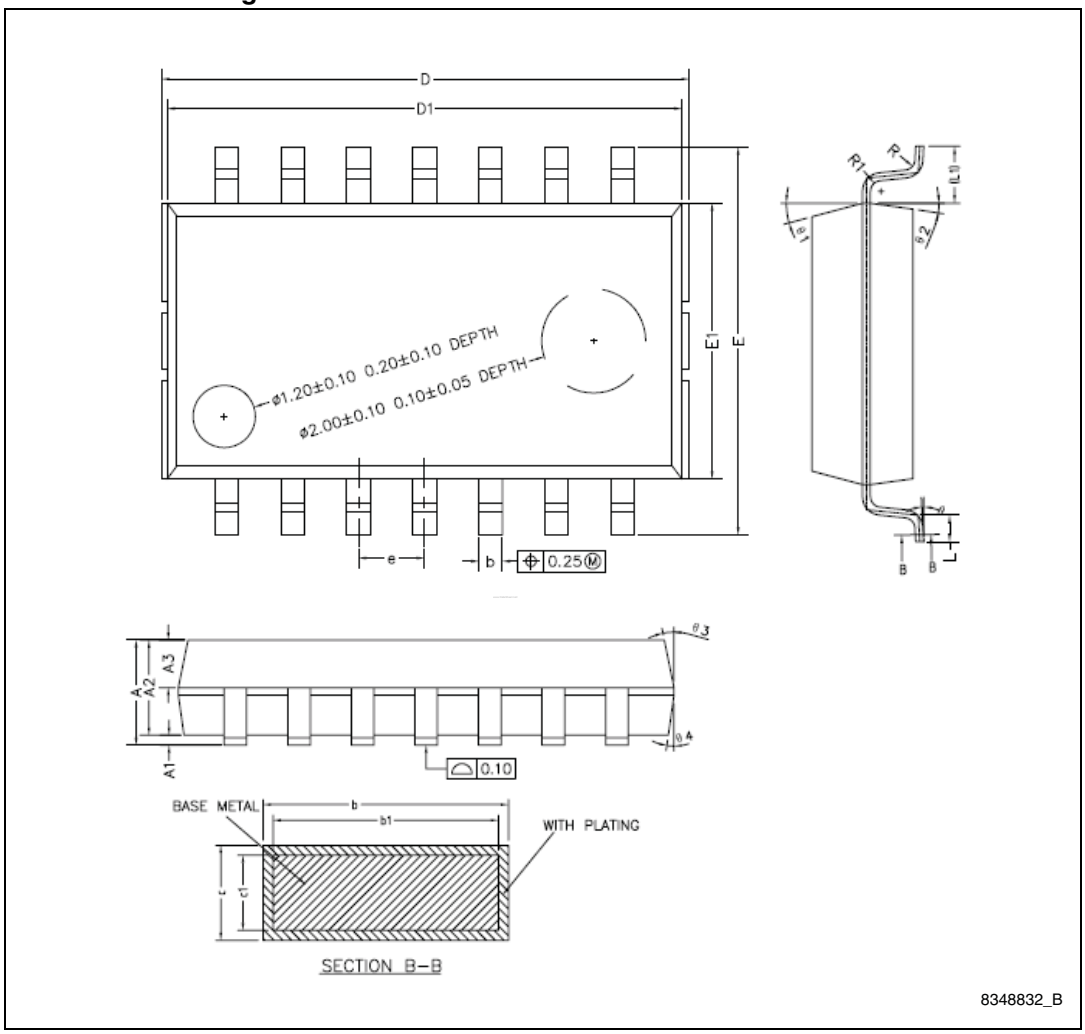


Table 3. SO14 - 14-lead small outline (200 mils body width) package mechanical data

Symbol	mm			in		
	Min	Typ	Max	Min	Typ	Max
A	-	-	2.25	-	-	0.089
A1	0.15	0.20	0.25	0.006	0.008	0.010
A2	1.80	1.90	2.00	0.071	0.075	0.079
A3	0.85	0.95	1.05	0.033	0.037	0.041
b	0.41	-	0.54	0.016	-	0.021
b1	0.40	0.45	0.50	0.016	0.018	0.020
c	0.14	-	0.21	0.006	-	0.008
c1	0.13	0.15	0.17	0.005	0.006	0.007
D1	9.80	9.90	10.00	0.386	0.390	0.394
D(1)	10.05	10.15	10.25	0.396	0.400	0.404
E	7.30	7.45	7.60	0.287	0.293	0.299
E1	5.20	5.30	5.40	0.205	0.209	0.213
e	1.27			0.050		
L	0.30	0.50	0.70	0.012	0.020	0.028
L1	1.07 ref.			0.042 ref.		
R	0.07	-	-	0.003	-	-
R1	0.07	-	-	0.003	-	-
θ1	0°	-	8°	0°	-	8°
θ2	13°	15°	17°	13°	15°	17°
θ3	6°	8°	10°	6°	8°	10°
θ4	9.5°	11.5°	13.5°	9.5°	11.5°	13.5°
θ5	6°	8°	10°	6°	8°	10°

1. Dimension “D” includes mold flash.

3 Part numbering

Table 4. Ordering information scheme

Example: M41TC 8025 A MC 6 F

Device family

M41TC

Device type

8025

Accuracy

A = ±5.0 ppm (-40 to 85 °C)

±3.8 ppm (0 to 50 °C)

Package

MC = SO14

Temperature range

6 = –40 °C to 85 °C

Shipping method

F = ECOPACK® package, tape & reel

For other options, or for more information on any aspect of this device, please contact the ST sales office nearest you.

4 Revision history

Table 5. Document revision history

Date	Revision	Changes
21-Aug-2012	1	Initial release.
21-Sep-2012	2	Modified title of document; updated *Figure 3: Block diagram*.

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