

Часы и таймеры M4T, M48T, M41ST, M41T, TS Технические характеристики

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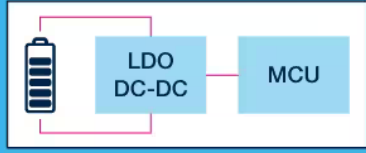
Clocks and Timers

Overview

ST offers a wide portfolio of clocks and timers, including legacy timers as well as parallel- and serial-interface real-time clock (RTC) ICs. These devices provide best-in-class performance for **accuracy and ultra-low power consumption** to address communication, networking, industrial and battery-powered applications.

Why use a standalone RTC?

A standalone real-time clock (RTC) offers significantly higher performance than an embedded RTC in the standard MCU. With a standalone RTC, an application consumes roughly 3 times less, compared to a standard MCU used to retain time. This is important in **systems powered by coin cells or disposable batteries**.
In a **system powered by disposable batteries**, a standalone RTC can keep the time using a small capacitor, when the battery is being replaced. An RTC can also be connected directly to the battery and provide all the functionalities using limited space on the PCB also improving the system security and safety.

	Standalone RTC	Embedded RTC
Long battery life	Ultra low current consumption (~365 nA)	Roughly three times current consumption compared to standalone RTC
Space and cost	Can be connected directly to a rechargeable lithium battery (4.4 V max) 	Additional LDO or DC-DC is required to connect to a Li-Ion battery 
	High accuracy thanks to embedded crystal and factory calibration	Need on board calibration if accuracy is required

Product types:

Real-time clock (RTC) ICs

Real-time clock (RTC) ICs
An extended range of products are available, including ultra-low power devices, standard package with embedded crystal, and ST's SNAPHAT with lithium battery and crystal integrated. RTC functions **include alarm management, battery switchover, reset**, and special features such as **time stamp, antitamper for secure applications**.

Timers

Timers
ST offers low-power timers, in single and dual versions. These are highly stable monolithic circuits, generating accurate time delays or oscillations designed in CMOS technology.

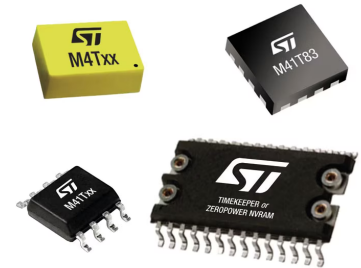
The industry-standard frequency generators are circuits designed in bipolar technology, low frequency and with high power consumption, while **ST low power products are designed in CMOS technology, low power and low consumption** and they can reach high frequency operation up to 2.7 MHz.

Real-Time Clock (RTC) ICs

Overview

ST offers a wide portfolio of real-time clock (RTC) ICs with parallel or serial interface, including ultra-low-power devices packaged in standard SMD SOX18 and SOX28 with embedded $\pm 5\text{ppm}$ 32kHz factory-calibrated Crystal.

Our devices offer many value-added features such as supervisory functions that include alarm, battery switchover, and reset as well as special features with time stamp and anti-tamper for secure applications.



Applications

Real-time clock (RTC) ICs can be used on a broad range of applications.



Home and Professional Appliances

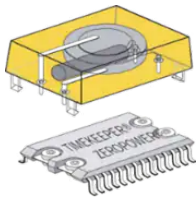


GNSS/GPS



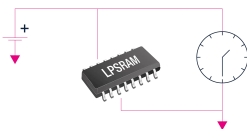
Bridge and Gateway

Product types



Battery and Crystal

These devices are detachable lithium power sources with embedded 32-kHz crystal housed in a special top called SNAPHAT®. They are compatible with ST's Serial RTC and nonvolatile TIMEKEEPER® surface-mount in SOIC (MH) package.



RTC - Parallel Interface (Timekeepers)

ST's parallel real-time clock ICs, also called Timekeepers, combine a SRAM with up to 256 Kbytes of memory and a byte-wide interface along with a quartz-based very-low-power oscillator with a clock/calendar circuit to provide real-time data.

Advanced RTC ICs include additional features such as programmable alarms, watchdog timers, system reset outputs and battery-low warning flags.



RTC - Serial Interface

ST's serial real-time clocks range from ultra-low power devices for portable applications to high-accuracy parts with analog calibration up to factory-calibrated RTC modules with an embedded crystal.

Benefits

Along with ST's serial and parallel RTC portfolio, ST's unique SNAPHAT® devices have a special removable/replaceable top that contains a lithium coin-cell battery and a 32-kHz crystal designed to be "snapped on" after the surface mount process. It solves the reflow compatibility of the lithium batteries and provides a solution compatible with all ST's real-time clocks in surface-mount SOH-28 and SOH-44 packages.

All ST RTCs are Underwriters Laboratories® (UL) recognized, see application note AN1011; "Battery technology used in NVRAM and real-time clock (RTC) products".

Home and Professional Appliances:

- Integrated switchover
- Long time retention with capacitor backup
- Embedded crystal

GNSS/GPS:

- Low standby current
- Analog and digital calibration

Bridge and Gateway:

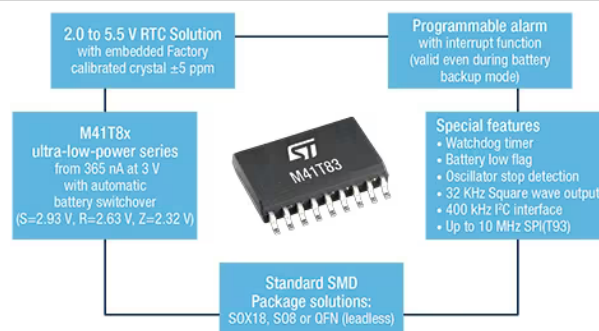
- Analog and digital calibration
- Embedded crystal with factory calibration
- NVRAM for retention of configuration data
- Tamper detection
- Replaceable battery and crystal

Real-time clock (RTC) design support

To make designing with real-time clock ICs even easier, ST offers two simulators:

- Battery life calculator evaluates the battery capacity consumption and lifetime of ST's real-time clock ICs
- Clock calibration calculator demonstrates the digital calibration feature of RTC ICs

See also our summary of development hints in application note AN3060; "Application guide for serial real-time clocks (RTCs)".



Clocks and Timers / Real-Time Clock (RTC) ICs/Battery and Crystal

Part Number	General Description	Package	Battery Type	Crystal frequency (Hz) nom	Operating Temperature (°C) min	Operating Temperature (°C) max
M4T28-BR12SH	SNAPHAT® 48 mAh lithium coin cell battery with crystal	1225 SNAPHAT	Lithium coin cell 48mAh	32768	0	70
M4T32-BR12SH	SNAPHAT® 120 mAh lithium coin cell battery with crystal	1632 SNAPHAT	Lithium coin cell 120mAh	32768	-40,0	70,85

Clocks and Timers / Real-Time Clock (RTC) ICs/RTC - Parallel Interface (Timekeepers)

Part Number	General Description	Package	SRAM Supervisor	Operating Temperature (°C) min	Operating Temperature (°C) max	Memory Organization	Supply Voltage (V) min	Supply Voltage (V) max	Programmable Alarms	Watchdog Timer	Battery Low Detect
M48T02	5.0 V, 16 Kbit (2 Kb x 8) TIMEKEEPER® SRAM	PDIP 24 .7	false	0	70	16Kb (2K x 8)	4.75	5.5	false	false	true
M48T08	5 V, 64 Kbit (8 Kb x 8) TIMEKEEPER® SRAM	PDIP 28 .7	false	0	70	64Kb (8K x 8)	4.75	5.5	false	false	false
M48T08Y	5 V, 64 Kbit (8 Kb x 8) TIMEKEEPER® SRAM	SOH28	false	0	70	64Kb (8K x 8)	4.5	5.5	false	false	false
M48T12	5.0 V, 16 Kbit (2 Kb x 8) TIMEKEEPER® SRAM	PDIP 24 .7	false	0	70	16Kb (2K x 8)	4.5	5.5	false	false	true
M48T18	5 V, 64 Kbit (8 Kb x 8) TIMEKEEPER® SRAM	PDIP 28 .7	false	0	70	64Kb (8K x 8)	4.5	5.5	false	false	false
M48T201V	5.0 or 3.3 V TIMEKEEPER® supervisor	SOH44	true	0	70	external	3	3.6	true	true	true
M48T201Y	5.0 or 3.3 V TIMEKEEPER® supervisor	SOH44	true	0	70	external	4.5	5.5	true	true	true
M48T35	5 V, 256 Kbit (32 Kb x 8) TIMEKEEPER® SRAM	PDIP 28 .7	false	0	70	256Kb (32K x 8)	4.75	5.5	false	false	false
M48T35AV	3.3 V, 256 Kbit (32 Kbit x 8) TIMEKEEPER® SRAM	PDIP 28 .7,SOH28	false	0	70	256Kb (32K x 8)	3	3.6	false	false	true
M48T35Y	5 V, 256 Kbit (32 Kb x 8) TIMEKEEPER® SRAM	PDIP 28 .7,SOH28	false	0	70	256Kb (32K x 8)	4.5	5.5	false	false	false
M48T37V	5.0 or 3.3 V, 256 Kbit (32 Kbit x 8) TIMEKEEPER® SRAM	SOH44	false	0	70	256Kb (32K x 8)	3	3.6	true	true	true
M48T37Y	5.0 or 3.3 V, 256 Kbit (32 Kbit x 8) TIMEKEEPER® SRAM	SOH44	false	0	70	256Kb (32K x 8)	4.5	5.5	true	true	true
M48T58	5.0 V, 64 Kbit (8 Kb x 8) TIMEKEEPER® SRAM	PDIP 28 .7	false	0	70	64Kb (8K x 8)	4.75	5.5	false	false	true
M48T58Y	5.0 V, 64 Kbit (8 Kb x 8) TIMEKEEPER® SRAM	PDIP 28 .7,SOH28	false	0	70	64Kb (8K x 8)	4.5	5.5	false	false	true

Clocks and Timers / Real-Time Clock (RTC) ICs/RTC - Serial Interface

Part Number	General Description	Package	SRAM Supervisor	Battery Supply Current (nA) typ	NVRAM size (B)	Data bus type	Supply Voltage (V) min	Supply Voltage (V) max	Supply Voltage (V) (For Timekeeping) min	Programmable Alarms	Square Wave Output	Oscillator fail detect	Output Frequency (kHz) typ	Battery Switchover	Watchdog Timer	Battery Low Detect	Power Fail Comparator	Power on reset/Low voltage detector output	Reset inputs	Operating Temperature (°C) min	Operating Temperature (°C) max
M41ST85W	3.0/3.3 V I ² C combination real-time clock, NVRAM supervisor and microprocessor supervisor	SO28 WITH EMBEDDED CRYSTAL,SOH28	true	400	44	I2C	2.7	3.6	-	true	true	-	-	true	true	true	true	true	true	-40	85
M41ST87W	5.0 V, 3.3/3.0 V secure real-time clock , NVRAM supervisor with tamper detection and 128 bytes of clearable NVRAM	SO28 WITH EMBEDDED CRYSTAL,SSOP 20 7.2x5.3	true	500	128	I2C	2.7	3.6	-	true	true	true	32	true	true	true	true	true	true	-40	85
M41T0	Serial real-time clock (RTC)	SO-8	-	900	-	I2C	2	5.5	2	-	-	true	-	-	-	-	-	-	-	-40	85
M41T00	Serial real-time clock (RTC)	SO-8	-	800	-	I2C	2	5.5	2	-	-	-	-	true	-	-	-	-	-	-40	85
M41T00AUD	Serial real-time clock (RTC) with audio	QFN-16L P 0.5 mm	-	600	-	I2C	3	3.6	1.7	-	-	true	32	true	-	-	-	-	-	0	70
M41T00S	Serial real-time clock (RTC)	SO-8	-	600	-	I2C	2.7	5.5	2	-	-	true	-	true	-	-	-	-	-	-40	85
M41T01	Serial real-time clock (RTC) with built-in battery switchover circuit	SO-8	-	800	-	I2C	2	5.5	2	-	-	-	-	true	-	-	-	-	-	-40	85
M41T11	Serial real-time clock (RTC) with 56 bytes of NVRAM	SO-8,SOH28	-	800	56	I2C	2	5.5	2	-	-	-	-	true	-	-	-	-	-	-40	85
M41T56	Serial real-time clock (RTC) with 56 bytes NVRAM	SO-8	-	450	56	I2C	4.5	5.5	2.5	-	-	-	-	true	-	-	-	-	-	-40	85
M41T80	Serial real-time clock (RTC) with alarm	SO-8	-	1500	-	I2C	2	5.5	2	true	true	-	-	-	-	-	-	-	-	-40	85
M41T81	Serial real-time clock (RTC) with alarm	SO-8	-	600	-	I2C	2	5.5	2	true	true	-	-	true	true	true	-	-	-	-40	85
M41T81S	Serial real-time clock (RTC) with alarm	SO-8,SO18 with embedded crystal	-	600	-	I2C	2.7	5.5	2	true	true	true	-	true	true	true	-	-	-	-40	85
M41T82	Serial I ² C bus real-time clock (RTC) with battery switchover	SO-8	-	365	7	I2C	2.38	5.5	1.8	-	-	true	-	true	-	true	-	true	-	-40	85
M41T83	Serial I ² C bus real-time clock (RTC) with battery switchover	SO18 with embedded crystal,VFQFPN 16 4x4x1.0	-	365	7	I2C	2.38	5.5	1.8	true	true	true	32	true	true	true	-	true	-	-40	85
M41T93	Serial SPI bus real-time clock (RTC) with battery switchover	SO18 with embedded crystal,VFQFPN 16 4x4x1.0	-	365	7	SPI	2.38	5.5	1.8	true	true	true	32	true	true	true	-	true	-	-40	85
M41T94	Serial real-time clock (RTC) with 44 bytes NVRAM and reset	SO-16,SOH28	-	400	44	SPI	2.7	5.5	-	true	true	-	-	true	true	true	-	true	true	-40	85

Timers

Overview

ST offers pin-to-pin fully **standard-compatible low-power timers, in single and dual independent channel versions.**

These devices are highly stable monolithic circuits, generating accurate time delays (monostable mode) or programmable oscillations (stable mode) with accurate frequency and duty-cycle.

The industry-standard frequency generators are circuits designed in bipolar technology, low frequency and with high power consumption. ST low-power products are designed in CMOS technology, low power and low consumption and can reach high frequency operation up to 2.7 MHz.



TS555: single CMOS timer with very low power consumption

Applications:



Home, Building and
City Automation



Home and Professional
Appliances



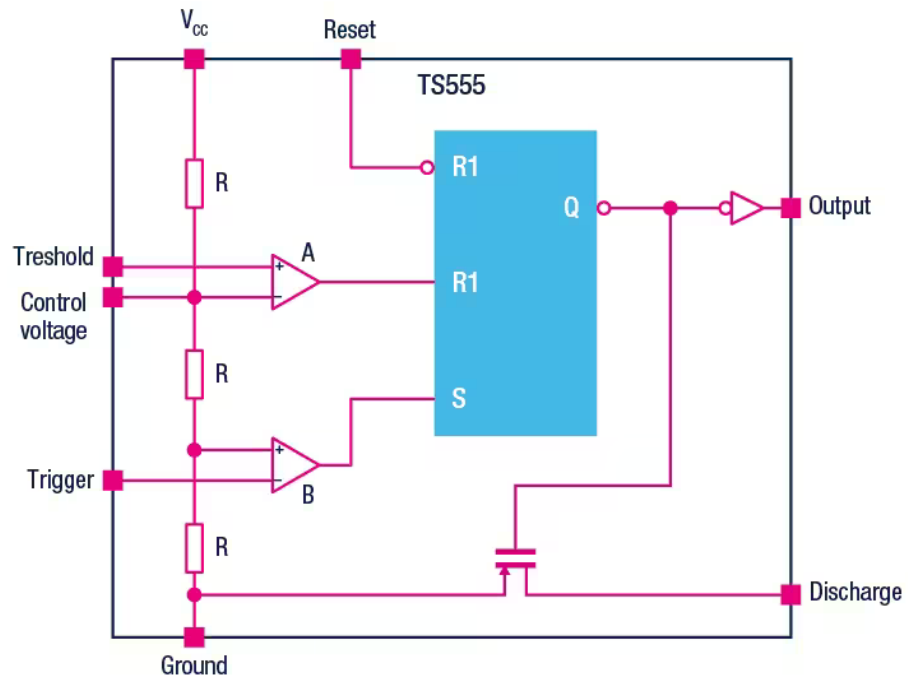
Factory Automation



IoT for Smart Home
and City

Product types:

TS555 and TS556 devices require a voltage supply range within +2V to +16V allowing to work with multiple different voltage rails (3.3V, 5.0V, 12V, etc.). The excellent temperature stability (75ppm/°C) allows small timing shift with ambient temperature variation up to 125°C. ST CMOS low power timers are available in standard plastic SMD packages SO8 and SO14 for single and dual channels, respectively.



Simplified single channel timer block diagram

Benefits

- High frequency operation up to 2.7 MHz
- Reduced power consumption
- Reduced supply current spikes during output transitions
- Flexible application design from 2V up to 16V power supply
- Extended temperature range up to 125°C for extreme ambient conditions

Clocks and Timers/Timers

Part Number	General Description	Package	Operating Temperature (°C) min	Operating Temperature (°C) max	Number of Output nom	Supply Voltage (V) min	Supply Voltage (V) max
TS555	Low power single CMOS timer	SO-8	-40	125	1	2	16
TS556	Low power dual CMOS timer	SO-14	-40	125	2	2	16

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