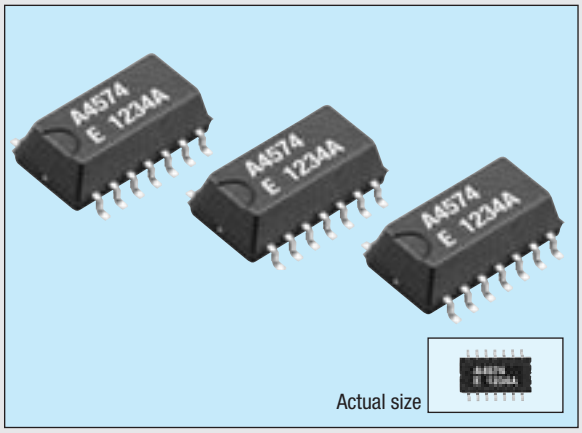
FOR AUTOMOTIVE APPLICATIONS

RA-4574SA

Product number (please refer to page 5)

Q41A4745xxxxx00

- It is suitable for the car accessories.
- Built-in frequency adjusted 32.768kHz crystal oscillator.
- Serial interface which can be controlled by three signal lines.
- Alarm interrupt function for day of week, day, hour, and minute.
- Timer interrupt function which can be set up between 1/4096 second and 255 minutes .
- Dedicated interrupt output of the two systems (alarm and regular cycle) which allows software masking.
- Ability to detect stopping of oscillation and time update.
- Automatic adjustment for leap year.
- Wide range of interface voltage and clock voltage between 1.6 V and 5.5 V.
- Low power consumption at 0.5 µA / 3 V. (Typ.)
- Selectable frequency outputs function.
- Available for lead (Pb) - free soldering.
- Available for lead (Pb) - free terminal.



The details are mentioned in the application manual.

http://www.epsondevice.com

Specifications (characteristics)

Absolute Max. rating

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	V_{DD}	V_{DD} to GND	-0.3	+7.0	V
Input voltage	V_{IN}	Input Pin	GND -0.3	V_{DD} +0.3	
Output voltage	V_{OUT1}	$\overline{TIRQ}$, $\overline{AIRQ}$		+8.0	
	V_{OUT2}	F_{OUT},DATA		V_{DD} +0.3	
Storage temperature	T_{STG}	Stored as bare product after unpacking	-55	+125	°C

Operating range

Item	Symbol	Condition	Min.	Max.	Unit
Power voltage	V_{DD}	–	1.6	5.5	V
Clock voltage	V_{CLK}	–			
Operating temperature	V_{OPR}	No condensation	-40	+85	°C

Frequency characteristics

Item	Symbol	Condition	Range	Unit
Frequency tolerance	Δf/f0	Ta = +25 °C, V_{DD} = 3 V	5 ±23 *1	x 10^{-6}
Oscillation start up time	tSTA	Ta = -40 °C to +85 °C, V_{DD} = 3.0 V *2	3 Max.	s
Frequency temperature characteristics	Top	Ta = -20 °C to +70 °C, V_{DD} = 3.0 V	+10 -120	x 10^{-6}
Frequency voltage characteristics	f/V	Ta = +25 °C, V_{DD} = 1.6 V to 5.5 V	±2	x 10^{-6} / V
Aging	fa	Ta = +25 °C, V_{DD} = 5 V, first year	±5	x 10^{-6} / year

*1 Please ask tighter tolerance.
*2 V_{DD} Power Supply rise up time ≤ 1 ms. (0 % V_{DD} - 90 % V_{DD})

DC characteristics

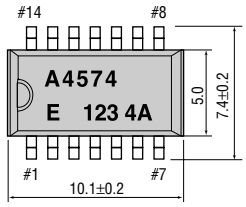
(GND = 0 V, V_{DD} = 1.6 V to 5.5 V, Ta = -40 °C to +85 °C)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit
Standby current 1	I_{DD1}	V_{DD} = 5 V	CE0,CE1 = GND DATA, AIRQ, TIRQ = V_{DD}	–	1.0	2.0	µA
Standby current 2	I_{DD2}	V_{DD} = 3 V			0.5	1.0	
Input voltage	V_{IH}	CE0,CE1,CLK, DATA,FCON pins		0.8 V_{DD}	–	V_{DD} +0.3	V
	V_{IL}			GND -0.3		0.2 V_{DD}	
Input leakage current	I_{LK}	V_{IN} = GND or V_{DD} CE1, CLK FCON pins CE0		-0.5		0.5	µA
Pulldown R1	R_{DWN1}	V_{DD} = 5 V	CE0 pins V_{IN} = V_{DD}	75	150	300	kΩ
Pulldown R2	R_{DWN2}	V_{DD} = 3 V		150	300	600	
Output voltage 1	V_{OH1}	V_{DD} = 5 V	I_{OH} = -1 mA DATA,FOUT pins	4.5	–	5.0	V
	V_{OH2}	V_{DD} = 3 V		2.0		3.0	
	V_{OH3}		I_{OH} = -100 µA DATA,FOUT pins	2.9			
Output voltage 2	V_{OL1}	V_{DD} = 5 V	I_{OL} = 1 mA DATA,FOUT pins	GND		GND +0.5	
	V_{OL2}	V_{DD} = 3 V				GND +0.8	
	V_{OL3}		I_{OL} = 100 µA DATA,FOUT pins			GND +0.1	
	V_{OL4}	V_{DD} = 5 V	I_{OL} = 1 mA AIRQ, TIRQ pins			GND +0.25	
	V_{OL5}	V_{DD} = 3 V				GND +0.4	
Output leakage current	I_{OZ}	V_{OUT} = GND or V_{DD}, DATA , AIRQ, TIRQ pins		-0.5		0.5	µA

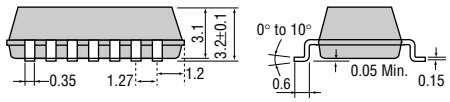
External dimensions / Terminal connection

(Unit: mm)

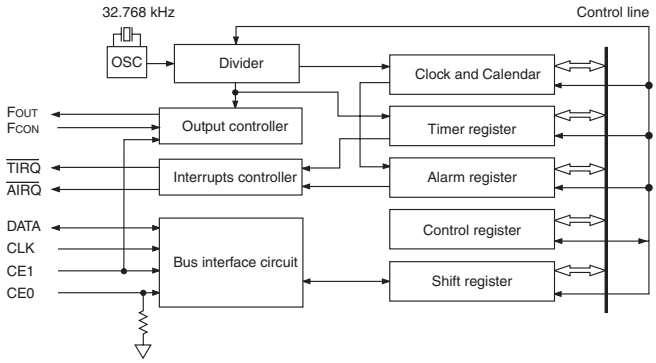
● **RA-4574SA** (SOP 14-pin)



No.	Pin terminal	No.	Pin terminal
1	GND	14	FCON
2	FOUT	13	CE1
3	N.C	12	DATA
4	N.C	11	CLK
5	N.C	10	$\overline{TIRQ}$
6	N.C	9	$\overline{AIRQ}$
7	VDD	8	CE0



Block diagram



AC characteristics

(GND = 0 V, Ta = -40 °C to +85 °C)

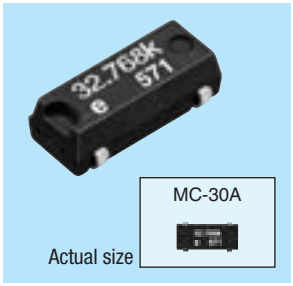
Item	Symbol	Control	V_{DD} = 3 V ±10%		V_{DD} = 5 V ±10%		Unit
			Min.	Max.	Min.	Max.	
CLK clock cycle	tCLK	–	800	–	350	–	ns
CLK H pluse width	tWH		400		175		
CLK L pulse width	tWL						
CE setup time	tCS						
CE hold time	tCH						
CE recovery time	tCR		600		300		
Write data setup time	tDS		100		50		
Write data hold time	tDH		80				
Write data disable delay time	tWZ		0		0		
Read data delay time	tRD	CL = 50 pF	–	300	–	120	
Output disable time	tRZ	CL = 50 pF RL = 10 kΩ		200		100	
Rise and fall time	tRF	–		100		50	
FOUT duty ratio (32.768 kHz output)	Duty		35	65	40	60	%

QUARTZ DEVICE FOR AUTOMOTIVE

■ Low-medium frequency crystal unit — MC-30A

● **Target application**

ECU sub clock (Power window / seat, Key-less entry, Imobilizer etc.)
Clock
Instrument panel display
Bluetooth sub clock
ITS (Telematics, VICS, ETC), Clock / sub clock

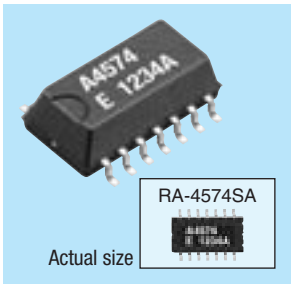


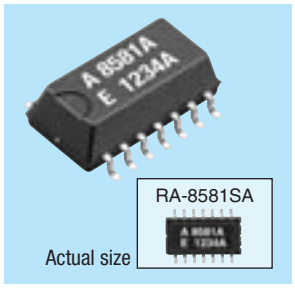
■ Real time clock module — Serial Interface

- 3-Wire — RA-4574SA
- I²C bus — RA-8581SA

● **Target application**

ITS (Telematics, VICS, ETC), Clock / sub clock / Timing control





■ Saw device

Saw resonator — FS-585

● **Target application**

TPMS transmitter

Saw resonator — FS-335 / 555, NS-32R

● **Target application**

Key-less entry transmitter
Smart key transmitter

Saw filter — FF-585

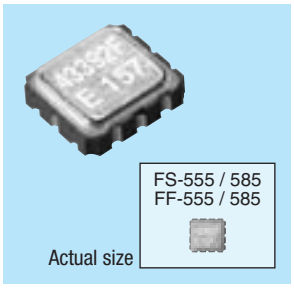
● **Target application**

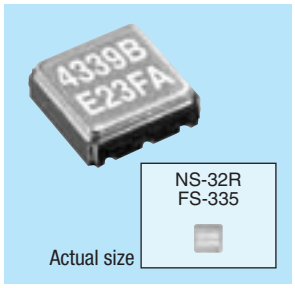
TPMS receiver

Saw filter — FF-555

● **Target application**

Key-less entry receiver
Smart key receiver





THE CRYSTALMASTER

ENERGY SAVING EPSON

EPSON offers effective savings to its customers through a wide range of electronic devices, such as semiconductors, liquid crystal display (LCD) modules, and crystal devices. These savings are achieved through a sophisticated melding of three different efficiency technologies.

Power saving technology provides low power consumption at low voltages.

Space saving technology provides further reductions in product size and weight through super-precise processing and high-density assembly technology.

Time saving technology shortens the time required for design and development on the customer side and shortens delivery times.

Our concept of Energy Saving technology conserves resources by blending the essence of these three efficiency technologies. The essence of these technologies is represented in each of the products that we provide to our customers.

In the industrial sector, leading priorities include measures to counter the greenhouse effect by reducing CO2, measures to preserve the global environment, and the development of energy-efficient products. Environmental problems are of global concern, and although the contribution of energy-saving technology developed by EPSON may appear insignificant, we seek to contribute to the development of energy-saving products by our customers through the utilization of our electronic devices. EPSON is committed to the conservation of energy, both for the sake of people and of the planet on which we live.

WORKING WITH ENVIRONMENTAL ISSUES

In 1988, Seiko Epson led in working to abolish CFCs, and perfect abolition of those ozone layer-destroying substances was achieved in 1992. In 1998, the 10th year of start of the CFC-free activity, Seiko Epson set this year as the "Second Environmental Benchmark Year" and established a new corporate General Environmental Policy. Seiko Epson is tackling with environmental issues comprehensively.

At the end of Fiscal 1988, Seiko Epson succeeded in abolishing chloric solvents doubted to be harmful to human body. In fiscal 1999, Seiko Epson started the activity with a goal of abolishing lead solder pointed out possibility of enironmental pollutant.

Promotion of Environment Management System conforming to International Standard

To strengthen management for environmental activities, Seiko Epson Group aims at acquisition of the ISO14001 certification for Japanese and abroad main business bases (including affiliates) for manufacturing, sales, software development and others.

As of May 25 , 2001, planned 68 bases of all manufacturing bases and some non-manufacturing bases have acquired the certification.

Co-existence Mark

The environmental mark symbolizing Epson's basic stance of "Co-existence with Nature".
The design incorporates a fish, flower, and water, representing mutually supportive co-existence.

ISO14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

WORKING FOR HIGH QUALITY

Seiko-Epson quickly began working to acquire company-wide ISO9000 series certification, and has acquired ISO9001 or ISO9002 certification with all targeted products manufactured in Japanese and overseas plants.

The Quartz Device Operations Division (Ina Japan, EPM and SZE) have acquired QS-9000 certification, which are of higher level.

QS-9000:
This is an enhanced standard for quality assurance systems formulated by leading U.S. automobile manufacturers based on the international ISO 9000 series.