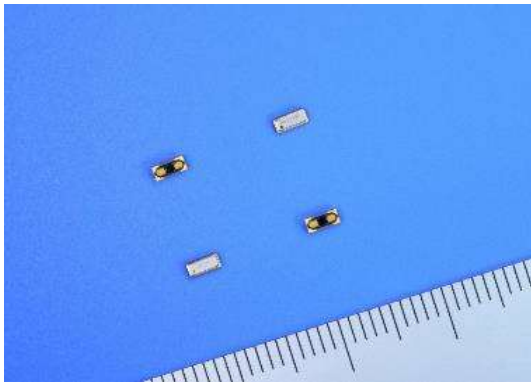


High accuracy Crystal Oscillator 32.768kHz SH-32R



Features

- Excellent frequency accuracy and Temperature characteristics
- Low current consumption
- Complete Pb-free
- Incorporated highly reliable photolithographic crystal resonator

Applications

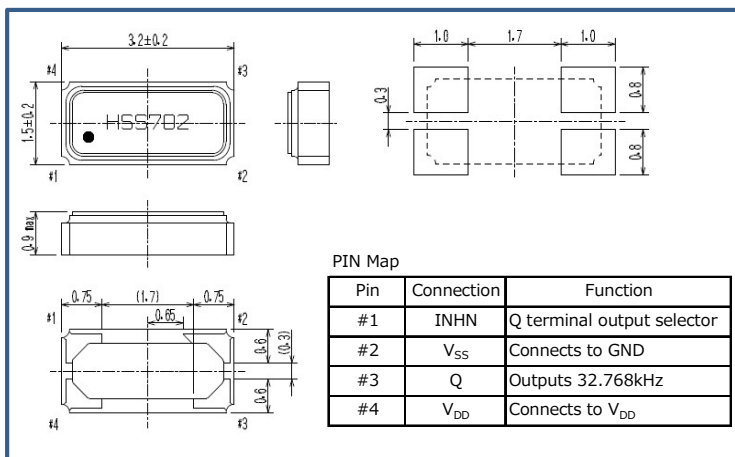
Smart Meter, IoT, Wearable device, Industry device, High precision timing device, Event data recorder

Specifications

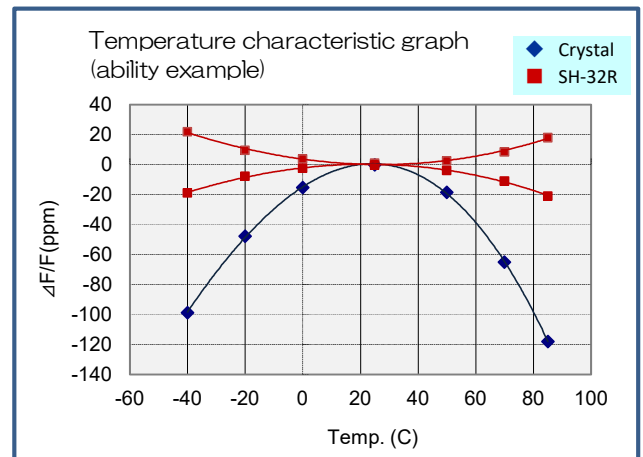
Item	Symbol	Specifications	Unit	Conditions Note
Nominal Frequency	f_nom	32.768	kHz	
Frequency tolerance	f_tol	±3	×10 ⁻⁶	
Frequency temperature coefficient	f0-Tc	±50	×10 ⁻⁶	-40 to +85°C(+25°C is reference)
Frequency / voltage coefficient	f0_V _{DD}	±1	×10 ⁻⁶ /V	V _{DD} 1.5V to 3.63V
Supply Voltage	V _{DD}	1.5~3.63	V	
Storage temperature	T_stg	-55~+125	°C	
Operating temperature	T_use	-40~+85	°C	
Current consumption	I _{DD}	1.3 typ.	µA	No load condition
		2.5 max.	µA	
Symmetry	SYM	40/60	%	Load: 30pF
Rise time	t _r	40 max.	ns	Load: 30pF output level 0.1V _{DD} →0.9V _{DD}
Fall time	t _f	40 max.	ns	Load: 30pF output level 0.9V _{DD} →0.1V _{DD}
Input voltage	V _{IL}	0.2V _{DD} max.	V	INH terminal
	V _{IH}	0.8V _{DD} min.	V	INH terminal
Output voltage	V _{OL}	0.1V _{DD} max.	V	Q terminal
	V _{OH}	0.9V _{DD} min.	V	Q terminal
Output load condition (CMOS)	C _{LOUT}	30 max.	pF	CMOS Loading
Start-up time	t _{str}	0.5 max.	sec	
Frequency aging	f_aging	±3	×10 ⁻⁶	First year

Unless otherwise stated, characteristics (specifications) shown in the above table are based on the Ta=+25°C, V_{DD}=3.3V condition.

Dimensions



Temperature characteristic



Seiko Instruments Inc.

Quartz Crystal Sales Department
 1-8, Nakase, Mihamaku, Chiba-shi, Chiba 261-8507, Japan
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High accuracy Crystal Oscillator 32.768kHz SH-32R

Maximum Rating

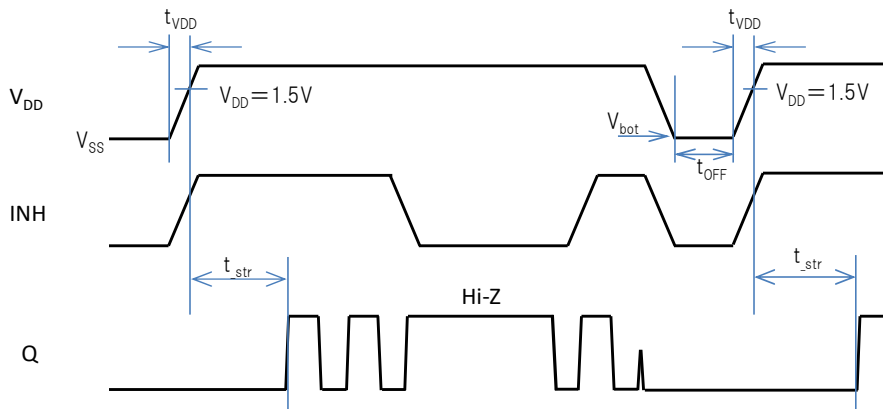
Item	Symbol	Conditions	Rated value	Unit
Supply voltage range	V_{DD}	$V_{DD}-V_{SS}$	-0.3~+4.5	V
Input voltage range	V_{in}	input terminal (INH/N)	-0.3~ $V_{DD}+0.3$	V
Output voltage range	V_{out}	Output terminal (Q)	-0.3~ $V_{DD}+0.3$	V
output current	I_{out}	Output terminal (Q)	± 10	mA

*It is a value that should not be exceeded even for a moment.

Operating Condition

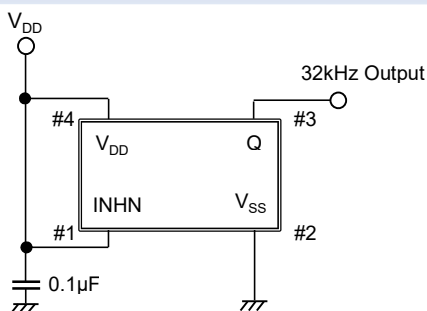
Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage	V_{DD}		1.5	1.8	3.63	V
Input voltage	V_{IN}	Terminal INHN	V_{SS}	-	V_{DD}	V
Oscillation start	t_{VDD}		-	-	10	ms/V
	t_{OFF}		0.5	-	-	msec
	V_{bot}		-	-	0	V

Timing chart for applying power supply voltage



- ◆ A power-on-clear circuit is built in to prevent unstable operation at power-on.
To ensure power-on-clear operation, V_{DD} must be held at 0V for 0.5msec or more and then started at less than 10ms/V.
- ◆ In order to shorten the oscillation start-up time (t_{str}), a boot circuit is built in to increase the drive capability.
The boot circuit operates for 500msec after oscillation starts.
The oscillation frequency during boot circuit operation does not become 32.768kHz \pm 3ppm.
- ◆ If use it outside the operating condition range, it may affect the operation and reliability, so please use it within this range.

Circuit connection with MCU



Input Low/High to the INHN pin to turn ON/OFF the 32kHz output.
Connect a bypass capacitor (0.01 μ F to 0.1 μ F) between the power supply pins ($V_{DD}-V_{SS}$).

Q terminal output setting

Terminal Q	Terminal INHN	remarks
32kHzOutput	High	$0.8V_{DD}\sim V_{DD}+0.3$
Hi-Z	Low	$-0.3V\sim 0.2V_{DD}$
—	OPEN	—
		Do not use