Temperature Compensated Crystal Oscillator (VC-TCXO)



Preliminary Specifications

MODEL : TG5032SGN 40.000000MHz

SPEC. No. : ISD-16-0150 Rev.02

DATE : Dec. 19, 2016

SEIKO EPSON CORPORATION

Pb free	Pb free.
RoHS Compliant	Complies with EU RoHS directive. *About the products without the Pb-free mark. Contains Pb in products exempted by EU RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.)

INTRODUCTION

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2. This sheet is not intended to guarantee or provide an approval of implementation of industrial patents.

Preliminary Specifications

[1] Characteristics

· Package size (5.0 mm×3.2 mm×1.45 mm)
· Ultra high stability VC-TCXO
· Output waveform : Clipped sine wave

[2] Absolute maximum ratings

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Supply voltage	Vcc-GND	-0.5	-	+4.0	V	
Frequency control voltage	Vc-GND	-0.5	-	Vcc+0.5	V	Vc Terminal
Storage temperature range	T_stg	-40	-	+90	℃	Storage as single product

[3] Recommended operating conditions

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Supply voltage	Vcc	3.135	3.3	3.465	V	Vcc=3.3V +/-5%
Supply voltage	GND	0	-	0	V	
Frequency control voltage	Vc	0.5	1.5	2.5	V	Vc=1.5 +/-1.0V
Operating temperature range	T_use	-40	+25	+85	℃	
Output load	Load_R	9	10	11	kΩ	
Output load	Load_C	9	10	11	pF	
Output load	Cc	0.01	-	-	μF	DC-cut capacitor *

* DC-cut capacitor is not included in this TCXO. Please attach an external DC-cut capacitor to the out pin.

[4] Frequency characteristics

(1) Frequency characteristics

(Vcc=3.3 V, GND=0.0 V, Vc=1.5 V, Load=10 kΩ // 10 pF, T_use=+25℃)

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Output Frequency	fo	-	40	-	MHz	
Frequency tolerance *1	f_tol	-1.0	-	+1.0	$x10^{-6}$	T_use=+25℃+/-2℃ After 2 reflows *2
Frequency / temperature characteristics	fo-Tc	-0.1	-	0.1	$x10^{-6}$	T_use=-40℃ to +85℃ [Reference to (fmax+fmin)/2]
Frequency / load coefficient	fo-Load	-0.1	-	+0.1	$x10^{-6}$	Load +/-10%
Frequency / voltage coefficient	fo-Vcc	-0.1	-	+0.1	$x10^{-6}$	Vcc +/-5%
Frequency aging	f_age	-0.5	-	+0.5	$x10^{-6}$	T_use=+25 ℃, 1year
Frequency aging	f_age	-3.0	-	+3.0	$x10^{-6}$	T_use=+25 ℃, 20years
Holdover stability, constant temperature	-	-10	-	+10	$x10^{-9}$	T_use=+25 ℃, 24 hours (after 10 days of continuous operation)
Holdover stability, constant temperature	-	-40	-	+40	$x10^{-9}$	T_use=+25 ℃, 24 hours (after 48 hours of continuous operation)
Holdover stability (Free-run accuracy) *3	-	-4.6	-	+4.6	$x10^{-6}$	

*1 Include initial frequency tolerance and frequency deviation after reflow cycles.

*2 Measured in the elapse of 24 hours after reflow soldering.

*3 This includes initial frequency tolerance, frequency / temperature characteristics, frequency / load coefficient, frequency/voltage coefficient and frequency aging (+25℃, 20 years) .

(2) Frequency control characteristics (Vcc=3.3 V, GND=0.0 V, Vc=1.5 V, Load=10 kΩ // 10 pF, T_use=+25℃)

Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Frequency control range	f_cont	-10	-	-5	$x10^{-6}$	Vc= 0.5 V
Frequency control range	f_cont	+5	-	+10	$x10^{-6}$	Vc= 2.5 V
Input impedance	Zin	100	-	-	kΩ	Vc-GND(DC), Vc=1.5V
Frequency change polarity	-	Positive polarity			-	

[5] Electrical characteristics (Vcc=3.3 V, GND=0.0 V, Vc=1.5 V, Load=10 kΩ // 10 pF, T_use=+25℃)

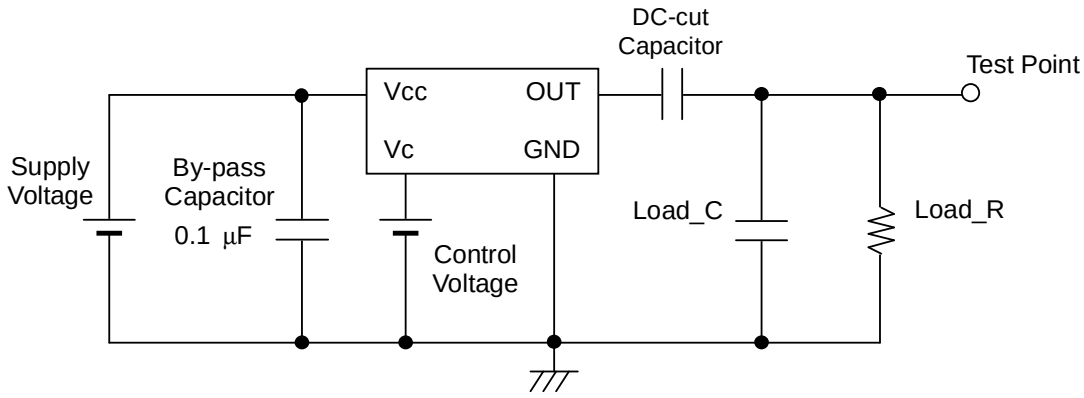
Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Current consumption	Icc	-	-	5.0	mA	
Output level	Vp-p	0.8	-	-	V	Peak to peak voltage
Phase jitter	PJ	-	430	-	fs	12kHz to 20MHz
Phase noise	L(f)	-	-85	-	dBc/Hz	10Hz offset
Phase noise	L(f)	-	-110	-	dBc/Hz	100Hz offset
Phase noise	L(f)	-	-132	-	dBc/Hz	1kHz offset
Phase noise	L(f)	-	-149	-	dBc/Hz	10kHz offset
Phase noise	L(f)	-	-151	-	dBc/Hz	100kHz offset
Phase noise	L(f)	-	-154	-	dBc/Hz	1MHz offset
Phase noise	L(f)	-	-155	-	dBc/Hz	10MHz offset

[6] Enable/disable function

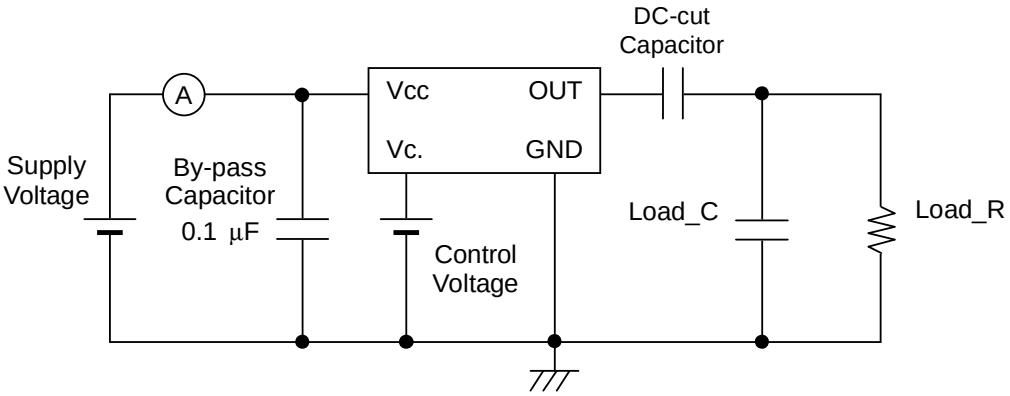
Parameter	Symbol	Specifications			Unit	Conditions
		Min.	Typ.	Max.		
Enable voltage	V_{IH}	70% Vcc	-	Vcc	V	OE terminal (Enable voltage)
Disable voltage	V_{IL}	0	-	30% Vcc	V	OE terminal (Disable voltage)
Input impedance	-	50	-	-	kΩ	
Output resistance of disable	-	High impedance			-	

[7] Test circuit

1) Output Load : Load_R // Load_C = 10 kΩ // 10 pF



2) Current consumption

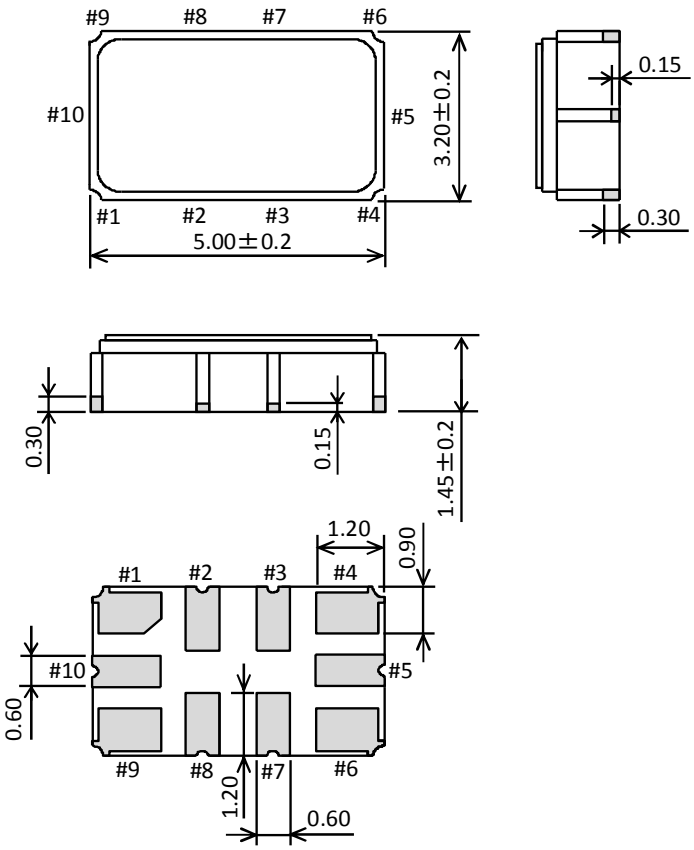


3) Conditions

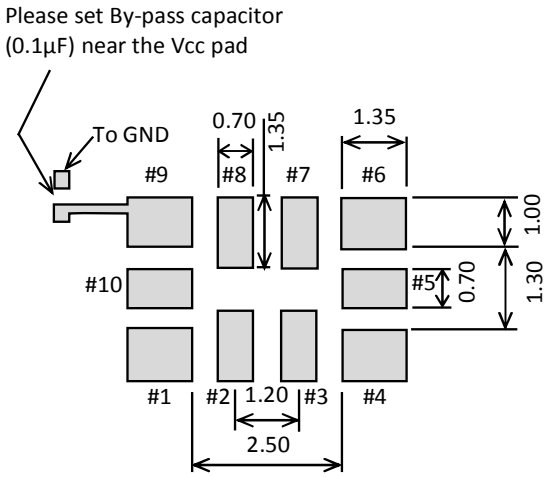
1. Oscilloscope: Impedance Min. 1MΩ
   Input capacitance Max. 10 pF
   Band width Min. 300 MHz
   Impossible to measure both frequency and wave form at the same time.
   (In case of using oscilloscope's amplifier output, possible to measure both at the same time.)
2. Load_C includes probe capacitance.
3. A capacitor (By-pass:0.1 µF) is placed between Vcc and GND,and closely to TCXO.
4. Use the current meter whose internal impedance value is small.
5. Power Supply
   Impedance of power supply should be as low as possible.
6. GND pin should be connected to low impedance GND.

Preliminary Specifications

[8] Outline drawing unit:mm



[9] Recommended foot print unit:mm



Pin #	Connection
1	Vc
2	N.C.
3	OE
4	GND
5	N.C.
6	OUT
7	N.C.
8	N.C.
9	Vcc
10	N.C.

Material
Ceramics(Cavity)
Au plated nickel(Electric terminal)
Fe-Ni-Co(Lid)

Do not connect “N.C.” pin with any other leads (also mutually)

To maintain stable operation, provide a 0.1 µF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc - GND).

If OE Function does not use, We recommended connecting OE(#3pin) to Vcc(#9pin).

[10] Handling precautions

Prior to using this product, please carefully read the section entitled “Precautions” on our Web site (http://www5.epsondevice.com/en/quartz/tech/precaution/) for instructions on how to handle and use the product properly to ensure optimal performance of the product in your equipment.
Before using the product under any conditions other than those specified therein, please consult with us to verify and confirm that the performance of the product will not be negatively affected by use under such conditions.

In addition to the foregoing precautions, in order to avoid the deteriorating performance of the product, we strongly recommend that you DO NOT use the product under ANY of the following conditions:

(1) Mounting the product on a board using water-soluble solder flux and using the product without removing the residue of the flux completely from the board. The residue of such flux that is soluble in water or water-soluble cleaning agent, especially the residues which contains active halogens, will negatively affect the performance and reliability of the product.
(2) Using the product in any manner that will result in any shock or impact to the product.
(3) Using the product in places where the product is exposed to water, chemicals, organic solvent, sunlight, dust, corrosive gasses, or other materials.
(4) Using the product in places where the product is exposed to static electricity or electromagnetic waves.
(5) Applying ultrasonic cleaning without advance verification and confirmation that the product will not be affected by such a cleaning process, because it may damage the crystal, IC and/or metal line of the product.
(6) Touching the IC surface with tweezers or other hard materials directly.
(7) Using the product under any other conditions that may negatively affect the performance and/or reliability of the product.
(8) Power supply with ripple may cause of incorrect operation or degradation of phase noise characteristics, so please evaluate before use.
(9) Frequency aging is from environmental tests results to the expectation of the amount of the frequency variation. This doesn't guarantee the product-life cycle.

Should any customer use the product in any manner contrary to the precautions and/or advice herein, such use shall be done at the customer’s own risk.

[Notice]

This product is compliant with RoHS Directive.

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