Specification No.	---

Messrs.

Confidential

(first / ~~revised~~)

Delivery Specification

Product Number : Quartz Crystal Unit VT-200-F

Product spec. & Item code :

Product spec.	Item code	
32.768kHz ± 10ppm / 12.5 pF	Q-VT20N0327610C50B	

The number of copies : 1 copy

Date of Registration : 6-Sep-2021 (v1)

Receipt	Remark
REFERENCE ONLY	

〈NOTICE〉

1. Advance agreement will be needed before changing any contents of the specification herein.

2. Provided that the information herein is subject to change, only revised pages shall be reissued.

3. When the product described herein includes Regulated Products subject The Wassenaar Arrangement etc., they may not be exported without authorization from the appropriate governmental authorities.

4. The contents of this specification including all figures and illustrations are proprietary information (copyright or know-how) of Seiko Instruments Inc. It is strictly prohibited to copy all or part of these specifications to third parties without permission.

5. In the case that the products described herein are used as part of any devices or equipment which might influence any one of the human body, human life and property, such as physical exercise equipment, medical equipment or vehicles, please let us know that.

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Approved by QA

Specifications

1. Scope

These specifications apply to QUARTZ CRYSTAL RESONATORS (hereinafter referred to as RESONATORS) to be manufactured by Seiko Instruments Inc. (hereinafter referred to as SII) to customer.

2. Designation

RESONATORS are designated "VT-200-F" (32.768 kHz).

3. Shape and dimensions

As per the VT-200-F drawing shown on page 5.

4. Electrical characteristics

Specified on page 2 through 3.

5. Shipment and packing

5.1 10,000 pcs are the standard lot size to which the lot number shall be allotted.
5.2 The packing shall conform to the resonator packing standards.

6. Outgoing inspection

6.1 When mutually agreed, the outgoing inspection shall be conducted as per the standard on page 4.
6.2 The outgoing inspection slip is not basically affixed to each packing.

7. Warranty

In the event that any defective RESONATORS or defective lot is found at incoming inspection at customer and that any defect resulting from failure in process-control at SII after incoming inspection is found, good RESONATORS shall be supplied to customer free of charge as the replacement.
In the event that any trouble or problems rising directly from RESONATORS occurs, it will be amicably settled between both parties.
However, the scope of warranty shall be the replacement of good RESONATORS.

8. Revision or abolition of the specifications

Revision or abolition of the specifications shall be made upon mutual consent between customer and SII. If any problem arises, it shall be amicably settled between both parties.

9. Effectiveness of the specifications

These specifications are effective after receipt of returned copies with your approved sign.

10. Controls on substances of environmental concern

Pb-free
Complete Halogen-free
Complies with EU RoHS directive

[1] The maximum rating

	Item	Symbol	Rating	Remark
1	Storage temperature range	T_stg	-40 ～ +85℃	
2	Maximum drive level	DL max.	1.0 μW max.	

[2] Recommended Operating Condition

	Item	Symbol	Rating	Remark
1	Operating temperature range	T_use	-40 ～ +85℃	
2	Drive level	DL	0.1 μW typ.	

[3] Electrical -Characteristics

Measurement temperature：25±2℃

	Item	Symbol	Specifications	Conditions
1	Nominal frequency	f_nom	32.768 kHz	
2	Frequency tolerance	f_tol	± 10 × 10^{-6}	
3	Load capacitance *CL spec depend on product spec.	C_L	12.5 pF	
4	Motional resistance	R_1	50 kΩ max.	Measured with KEYSIGHT TECHNOLOGIES Impedance analyzer. OSC LEVEL = 0.1V
5	Q-value	Q	40 × 10^3 min.	calculated with the following equation：$Q=(2\pi \cdot Fr \cdot L_1)/R_1$
6	Motional capacitance	C_1	2.0 fF typ.	
7	Shunt capacitance	C_0	0.9 pF typ.	Measured with KEYSIGHT TECHNOLOGIES Impedance analyzer. OSC LEVEL = 0.1V
8	Turnover temperature	Ti	25 ± 5℃	Measure this coefficient by the frequency at 5 points of -20℃, 0℃, 25℃,40℃and 60℃
9	Parabolic coefficient	B	(-0.035±10%)×10^{-6}/℃^{2}	
10	Frequency ageing	f_age	± 3 × 10^{-6} / year	25±3℃、 First year
11	Insulation resistance	IR	500 MΩ min.	Measured with KEYSIGHT TECHNOLOGIES 4329A Insulation Resistance Meter in between the electrode, and in between the electrode and case. Apply DC100V.

[4] Reliability

No	Item	Specification	Conditions	
1	High temperature storage	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	Measured at room temperature after storage at 85℃ for 500 hrs.	*1
2	Low temperature storage	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	Measured at room temperature after storage at -40℃ for 500 hrs.	*1
3	High temperature and high humidity storage	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	Measured at room temperature after storage at 60±2℃ under 90 to 95% RH for 500 hrs.	*1
4	Thermal shock resistance	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	Measured at room temperature after 20 cycles. -25℃⇔+80℃ for 0.5 hr.	*1
5	Mechanical shock resistance	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	3 times of free drop onto a concrete from height of 75cm. Measure after 2 hours left at room temperature	*2
6	Vibration resistance	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	Amplitude 1.5mm and 10-60Hz with cycle time 2-3 minutes in 3 direction (X,Y,and Z axis)each for 2 hrs.	*2
7	Resistance to soldering heat	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	Measured at room temperature after immersing the lead wire in a soldering bath of 300℃±10℃ for 5±1 seconds up to a position where it is 2mm away from the root of the plug.	*1
8	Tensile strength of lead wire	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	Apply a load of 500g for 30 seconds in the lead wire's axial direction.	*2
9	Bending strength of lead wire	$\triangle f/f_0 = \pm 5 \times 10^{-6}$	Bending cycle : 0˚→ 90˚→ 0˚→ 90˚→ 0˚	*2
10	Solderability of lead wire	A minimum 95% of the area to be coated with solder	Apply resin-flux contained-solder to a soldering iron of 280℃±5℃ for 5 seconds.	—

Note:
1. The above tests no. 1 to 9 must be conducted independently (not series tests)
2. *1: Measure after 24 hours left at room temperature .
3. *2: Measure after 2 hours left at room temperature .
4. R1 is 60kΩ max. after the each above tests.

[5]Precautions

5-1. Temperature for soldering the lead wire shall not exceed 300℃ and the soldering time shall be within 5 seconds.
This product can not be used for the reflow soldering or flow soldering.

5-2. Position to be soldered : Solder only the position where the lead wire is 1.0mm away from the glass seal.
Do not solder the case.

5-3. Cutting, bending and correction of lead wire : The glass seal shall be free of any crack or other damage which may deteriorate the characteristics of RESONATORS.

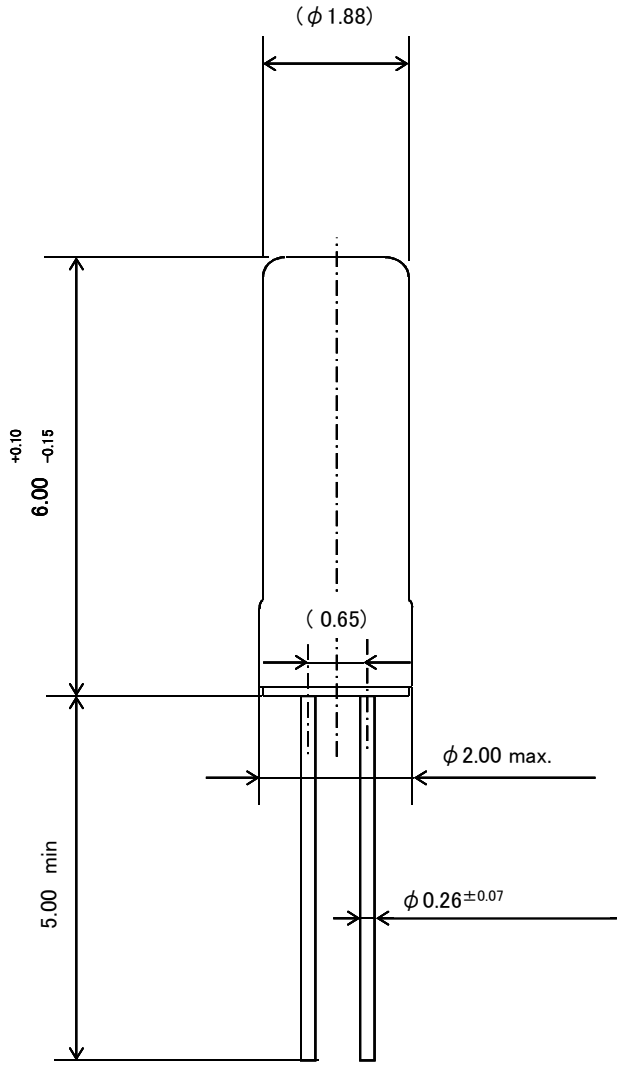
[6] Outgoing inspection standard

・The outgoing inspection shall be conducted as per the following standard .

・The sampling shall be performed once according to the ANSI/ASQCZ1.4-1996 .

No	Item	Sampling level	AQL(%)
1	Frequency tolerance	Standard Ⅰ	1.0
2	Equivalent series resistance	Standard Ⅰ	1.0
3	Outer appearance	Standard Ⅰ	1.5
4	Others characteristics	Periodical quality inspection	

[7] Dimensions

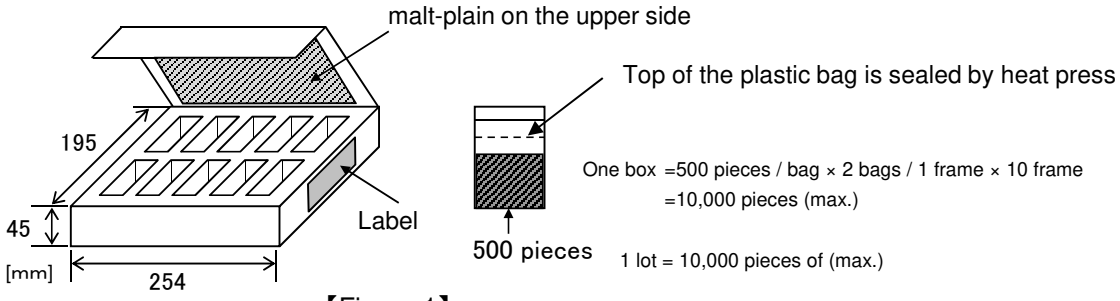


Product No	Materials	Remark
VT-200-F	Case: Nickel silver + Ni plating Lead: Kov + SnCu plating	UNIT:1=1mm

[8] Packing specification

1. Packing specification for the inner case

1) The packing method for white case.



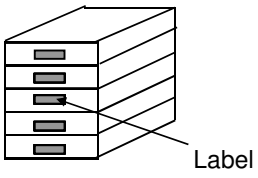
【Figure.1】

2. Packing specification for the outer case (sectional view)【Figure 3】

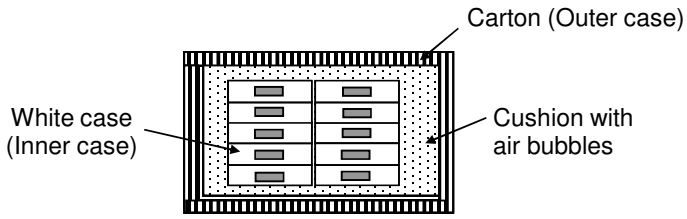
1) Carton size (outer case) and the number of white case(inner case).【Table 1】【Figure 2】

【 Table 1 】

Outer case	B4	VT5	VT10	VT20
Size（mm）	345 x 235 x 141	320 x 245 x 292	455 x 300 x 289	570 x 440 x 290
Number of white case	2boxes	5boxes	10boxes	20boxes

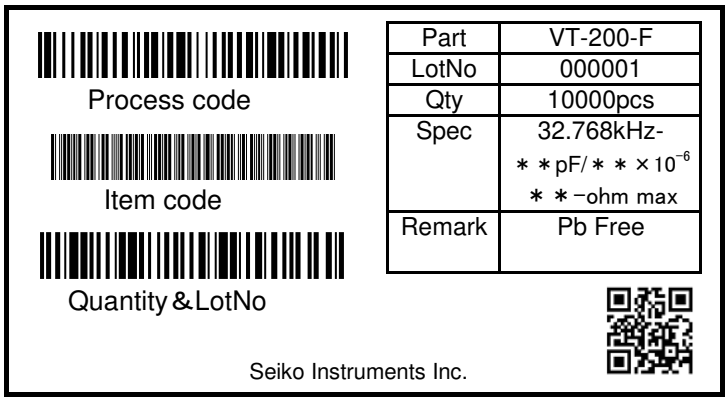


【Figure.2】



【Figure.3】

3. Sample of the label (For the label position, please refer to Figure 1, Figure 2)



Part	VT-200-F
LotNo	000001
Qty	10000pcs
Spec	32.768kHz- ＊＊pF/＊＊×10^{-6} ＊＊−ohm max
Remark	Pb Free

Part : Our company's product name
Lot No : Lot No
Qty : Quantity
Spec : Frequency, CL, F0 deviation, R1value
Remark : Environment adaptability, etc.

2 dimensional barcode:
Shipment inspection date

4. Storage environment

Please keep the products under the following conditions

Avoid the sunlight

Temperature condition : +15 to 35 ℃

Humidity condition : 25 to 85%RH