



Serial No. : 2016-0440

DATE : 2016/05/17

ITEM :

CRYSTAL OSCILLATOR

TYPE : DSO221SHF

NOMINAL FREQUENCY : 24.000MHz

SPEC No. : 1XSF024000EHC

Please acknowledge receipt of this specification by signing and returning a copy to us.

RECEIPT	
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General Manufacturer of Quartz Devices

**DAISHINKU CORP.**

1389 Shinzaike, Hiraoka-cho, Kakogawa, Hyogo  
675-0194 Japan  
Phone (81)79-425-3141 Fax (81)79-425-1134  
[http://www.kds.info/index\\_en.htm](http://www.kds.info/index_en.htm)

C.ENG. *S. Shigematsu*

ENG. *E. Kamada*

1. **Device Name** SPXO (Output Load Condition C-MOS)
2. **Type Name** DSO221SHF
3. **Nominal Frequency** 24.000MHz

#### 4. Absolute Maximum Ratings

Item	Symbol	Value	Unit
Vcc terminal voltage	V <sub>CC</sub>	-0.6~+6.0	V
Input terminal voltage	V <sub>IN</sub>	-0.6~ V <sub>CC</sub> +0.6	V
Output terminal voltage	V <sub>OUT</sub>	-0.6~ V <sub>CC</sub> +0.6	V
Output terminal current	I <sub>OUT</sub>	10	mA
Storage temp. range	T <sub>stg</sub>	-40~+85	°C

#### 5. Electric Specifications

Item	Symbol	Value			Unit	Condition	
		min.	typ.	max.		V <sub>CC</sub>	Temp.
Total Frequency tolerance	f <sub>tol</sub>	-50	-	+50	ppm	+1.8±0.2V	-10~+70°C
Operating temp. range	T <sub>use</sub>	-10	+25	+70	°C		-
Supply voltage	V <sub>CC</sub>	+1.6	+1.8	+2.0	V	-	-10~+70°C
Current consumption(No Load) (#1 Pin:Open or "H")	I <sub>CC</sub>	-	-	2.8	mA	+1.8V	+25±3°C
Standby Current (#1 Pin : "L")	I <sub>std</sub>	-	-	0.01	mA		
Symmetry (Duty Cycle)	SYM	45	50	55	%		
Low level output voltage	V <sub>OL</sub>	-	-	V <sub>CC</sub> ×0.1	V		
High level output voltage	V <sub>OH</sub>	V <sub>CC</sub> ×0.9	-	-	V		
Rise & Fall time	t <sub>r</sub> / t <sub>f</sub>	-	-	6	ns		
Output Load	L <sub>CMOS</sub>	-	-	15	pF		
Low level input current	I <sub>IL</sub>	-	-	-0.01	mA		
High level input current	I <sub>IH</sub>	-	-	0.01	mA		
Low level input voltage	V <sub>IL</sub>	-	-	V <sub>CC</sub> ×0.2	V		
High level input voltage	V <sub>IH</sub>	V <sub>CC</sub> ×0.8	-	-	V		
Output disable time	t <sub>PLZ</sub>	-	-	150	ns		
Output enable time	t <sub>PZL</sub>	-	-	1	ms		

Measurement circuit and output wave form is refer to Fig.1. and Fig.2.

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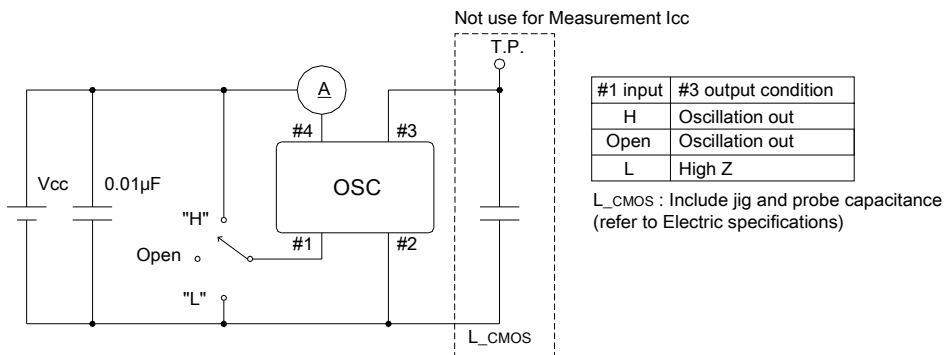


Fig.1. Measurement circuit

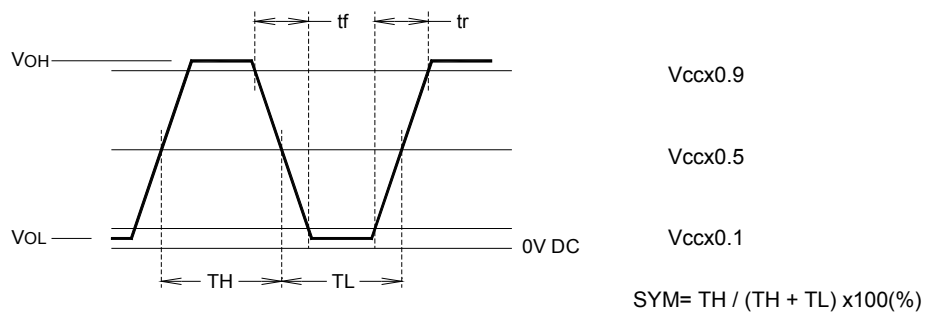


Fig.2. Output wave form

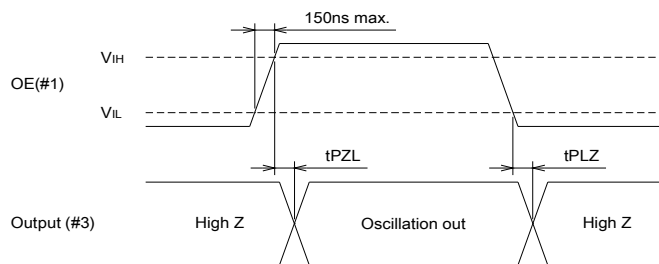


Fig.3. Input output condition

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**7. Mechanical Performance**

- 7.1 Natural Drop  
Drop 3 times from the height of 50cm onto min. 30mm thickness hard wooden board.  
The component shall satisfy requirement of the electrical characteristics.
- 7.2 Resistance impact  
6ms/1000m/s<sup>2</sup> to X,Y and Z axes (6 directions), 3cycles.  
The component shall satisfy requirement of the electrical characteristics. No physical damage.
- 7.3 Vibration  
Frequency 10 ~ 55Hz, Sine Wave full amplitude of 1.5mm to X, Y and Z axis, Duration of 2h to each axis.  
The component shall satisfy requirement of the electrical characteristics. No physical damage.
- 7.4 Sealing Tightness  
Leak Rate  $1.0 \times 10^{-9}$  Pa m<sup>3</sup>/s max. measured by Helium leak detector.  
And no bubble continued (1 time max.) in Fluorinert at +125± 5°C.
- 7.5 Solderability  
After applying ROSIN Flux, dipping in solder bath at +245± 5°C for 5s.  
Over 90% of terminal shall be covered by solder.

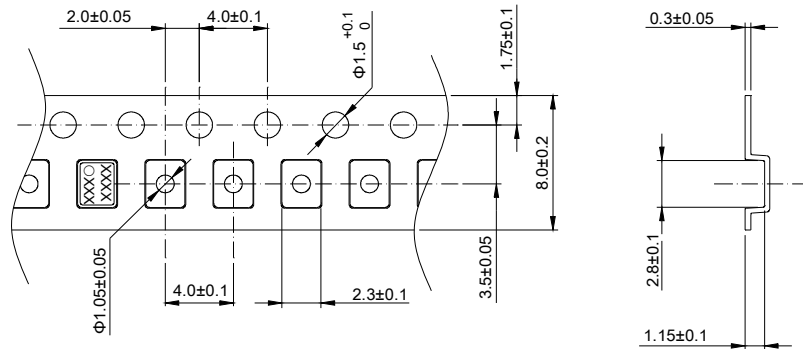
**8. Environment Performance**

- 8.1 Humidity  
Temperature +60± 2°C RH 90 ~ 95 %, Duration of 240h.  
Back to the room temperature first, then in 24h, the component shall be checked.  
The component shall satisfy requirement of the electrical characteristics. No physical damage.
- 8.2 Storage in Low Temperature  
Lower Operating temperature ± 3°C Duration of 240h.  
Back to the room temperature first, then in 24h, the component shall be checked.  
The component shall satisfy requirement of the electrical characteristics. No physical damage.
- 8.3 Storage in High Temperature  
Upper Operating temperature ± 2°C Duration of 240h.  
Back to the room temperature first, then in 24h, the component shall be checked.  
The component shall satisfy requirement of the electrical characteristics. No physical damage.
- 8.4 Temperature cycles  
Lower Operating temperature ± 3°C (30 min) <-> Upper Operating temperature ± 2°C (30 min)  
20 cycles. Back to the room temperature first, then in 24h, the component shall be checked.  
The component shall satisfy requirement of the electrical characteristics. No physical damage.
- 8.5 High Temperature Operation  
Upper Operating temperature ± 2°C maximum V<sub>CC</sub> Duration of 240h.  
Back to the room temperature first, then in 24h, the component shall be checked.  
The component shall satisfy requirement of the electrical characteristics. No physical damage.
- (\*) Upper Operating temperature: Case of +85°C max. -> +85°C  
(\*) Lower Operating temperature: Case of -30°C max. -> -30°C
- 8.6 Static Electricity  
Antistatic electrical intensity level  
Test Conditions Breakdown Voltage  
(MM) C=200pF, R=0Ω ±200 V  
(HBM) C=100pF, R=1.5kΩ ±2000 V  
Number of times : 3times max.  
The component shall satisfy requirement of the electrical characteristics. No physical damage.

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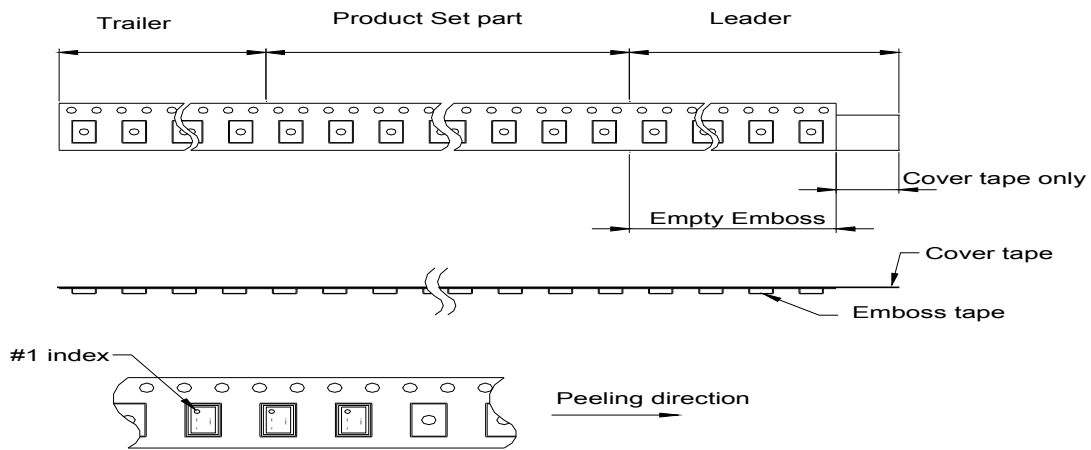
9. Taping and Packing

9.1 Emboss Tape specifications



Material:PS(Conductivity)  
unit:mm

9.2 Joint of Tape  
Emboss Tape and cover tape should not be jointed.



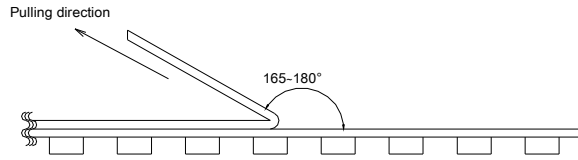
9.3 Taping Dimension

Leader	Cover tape	The length of cover tape in the leader is more than 400mm including empty emboss area.
	Emboss tape	After all products were packaged, must remain more than twenty pieces or 400mm empty area, which should be sealed by cover tape.
Trailer	Cover tape	The trailer area which are sealed by cover tape must remain more than 350mm.
	Emboss tape	

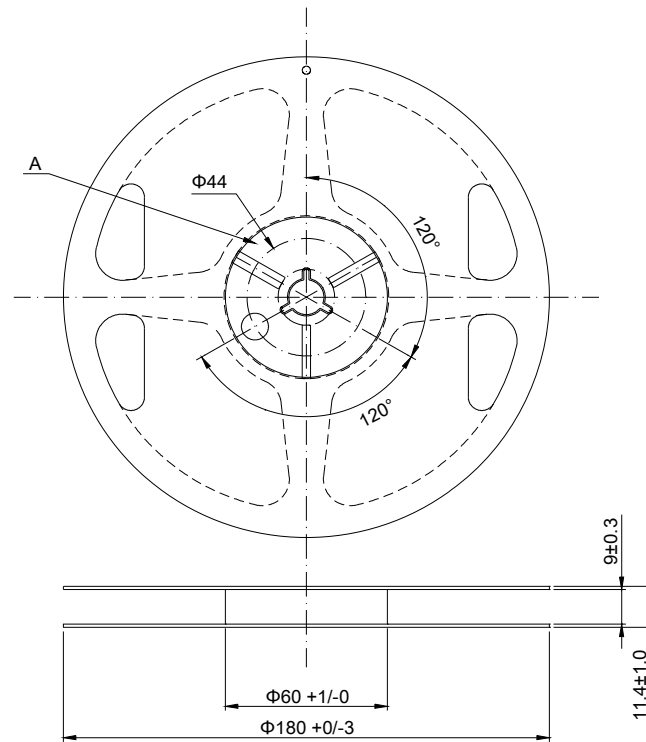
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9.4 Peeling Strength of Cover tape

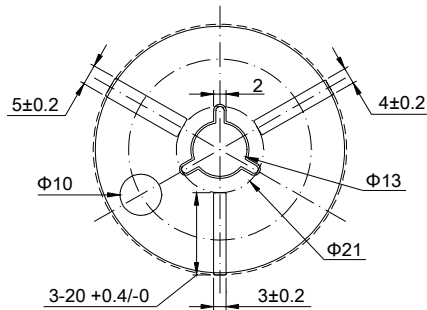
The peeling strength of cover tape pulls and keep to angle 165~180° and make limit 0.1~ 0.7N without prescription, when it pulled it with the speed of 300mm/min. (Others conform to JIS C 0806\_1990)



9.5 Reel specifications



A Part




Material:PS(Conductivity)  
unit: mm

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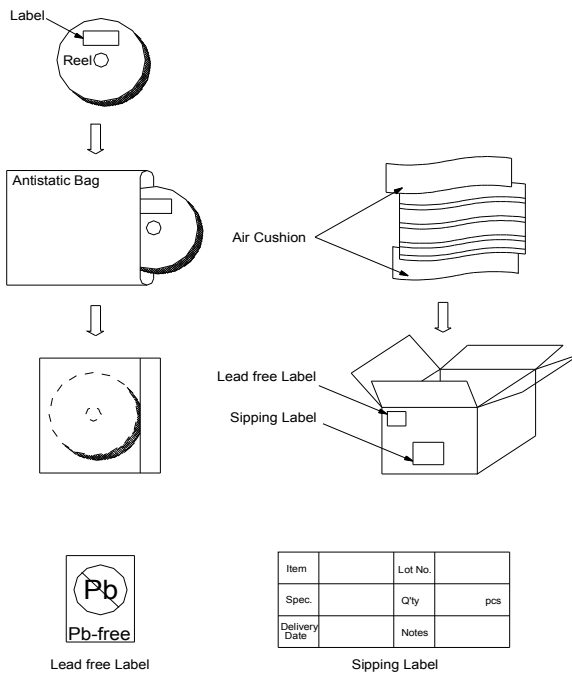
9.6 Storage  
Temperature+40°C max. Humidity80% max.

9.7 Quantity on reel  
2000pcs. / reel

9.8 Label  
Label is following information. Printing Label at each reel.

TYPE	*****	The type of product
SPEC	*****	Our specification No.
No.		
PARTS	*****	Your Part No.
No.		Lot No.
LOT	***** **	
No.		
FREQ.	***** **	Nominal Frequency
Q'TY	****	Quantity
		Producing country name
MADE IN JAPAN		

9.9 Shipping carton  
Packed in a carton box. The following label on the side of carton box.



(\*) The product is packed up with the method which does not break in the handling by a shipping agent.

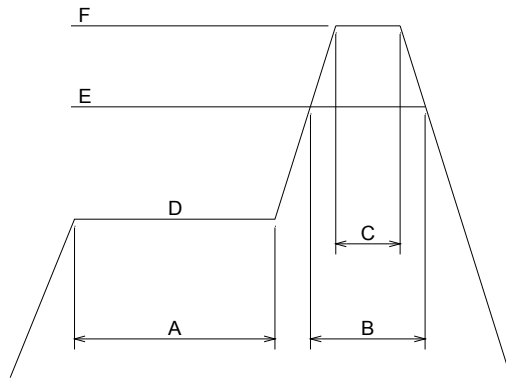
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**10. Supplement**

**10.1 Reflow Soldering (Example)**

Please stay with our proposed reflow condition and do then soldering 2 times max.

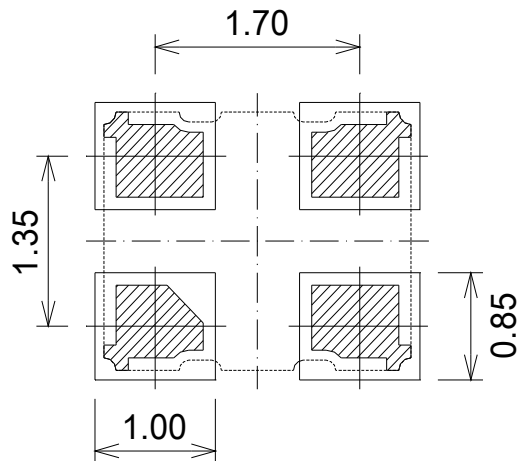


A:Pre Heat	120 s
B:Heat	60 s
C:Peak	10 s max.
D:Pre Heat temp.	+160 ~ +180 °C
E:Heat temp.	+220 °C
F:Peak temp.	+260 °C

**10.2 Solder iron(Example)**

Bit temp.: +350°C max., Time:5s max., Each terminal solder a 1 time max.

**10.3 Land pattern layout (Example)**



unit:mm

**10.4 Mounting**

This component is designed for automatic insertion.

However you are requested to do the trial with your insertion machine in order to be sure of proper operation and no damage of component.

Please pay attention to board warp which may damage the component and cause soldering process.

Please mount so that the metalize side and other electrical conductivity structures (a main part lid is included ) of the base side do not contact electrically.

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- 10.5 Cleaning  
Cleaning liquid which corrodes Nickel shall not be used. It may cause the problem on the surface color marking etc. Ultrasonic cleaning is possible however you are requested to check on your board. Because we only checked as single unit.
- 10.6 Handling  
This product is designed to withstand Drop and Vibration, however, the crystal blank might be broken. So if excess force is given, please check the characteristics before use. This product has C-MOS circuit inside. Please pay attention to latch-up, static-electricity as same handling as other C-MOS devices.
- 10.7 By-pass Capacitor  
It has no by-pass capacitor integrated. we recommend you to use capacitor ( like ceramic chip capacitor ) 0.01 $\mu$ F in-between Vcc and GND.
- 10.8 Storage  
Please keep away from high temperature and high humidity, which may cause put solderbility. No direct Sunlight. No dew as well.
- 10.9 Thrust an ultrasonic cleaning  
Because It use a small, thin crystal piece depending on a condition, the inside does resonance, and there is fear to cause the non-oscillation. When it's the worst, it may be destroyed. About the ultrasonic cleaning, it is use in the implementation of your company is in a state and confirming a thing without the influence in the appearance and a characteristic beforehand.
- 10.10 Point out supersonic wave welding  
It can't recommend implementation by the supersonic wave welding and the processing so that the vibration excessive inside of the crystal oscillator propagates, and there is a threat that It cause characteristic deterioration and the non-oscillation.
- 10.11 RoHS Compliance  
These Products do not contain the six substances restricted and prohibited on the restriction of the use of certain hazardous substances in electrical and electronic equipment.(DIRECTIVE 2011/65/EU OF THE EUROPIAN PARLIAMENT AND OF THE COUNCIL)

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