



## 1. ELECTRICAL CHARACTERISTICS

(This test shall be performed under the conditions of temp. at +25±3°C, Relative Humidity 60% max.)

(1) NOMINAL FREQUENCY	16.384 MHz		
(2) OVERTONE ORDER	Fundamental		
(3) LOAD CAPACITANCE(CL)	12.5 pF		
(4) FREQUENCY TOLERANCE	±20 ppm (at +25 ± 3 °C)		
(5) DRIVE LEVEL	10 ± 2 μW		( 200 μW max. )
(6) SERIES RESISTANCE	80 Ω max. (at Series)		
(7) OPERATING TEMPERATURE RANGE	-40 ~ +85 °C		
(8) FREQUENCY CHARACTERISTICS OVER TEMPERATURE	±50 ppm /	-40 ~ +85 °C	(ref. to +25°C)
(9) SHUNT CAPACITANCE	2.0 pF max.		
(10) INSULATION RESISTANCE	500 MΩ min. / DC 100 ± 15V		
(11) STORAGE TEMPERATURE RANGE	-40 ~ +85 °C		

## 2. CONSTRUCTION

(1) DIMENSIONS AND MARKING	Refer to 4.
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## 3. OTHER SPECIFICATIONS

(1) EMBOSS CARRIER TAPE AND REEL	Refer to 5.
(2) PACKING	Refer to 6.
(3) REFLOW CONDITIONS (REFERENCE)	Refer to 7.
(4) LAND PATTERN (REFERENCE)	Refer to 8.
(5) RELIABILITY SPECIFICATION	Refer to 9.~11.
(6) OTHER HANDLING INSTRUCTIONS	Refer to 12.

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4. DIMENSIONS AND MARKING

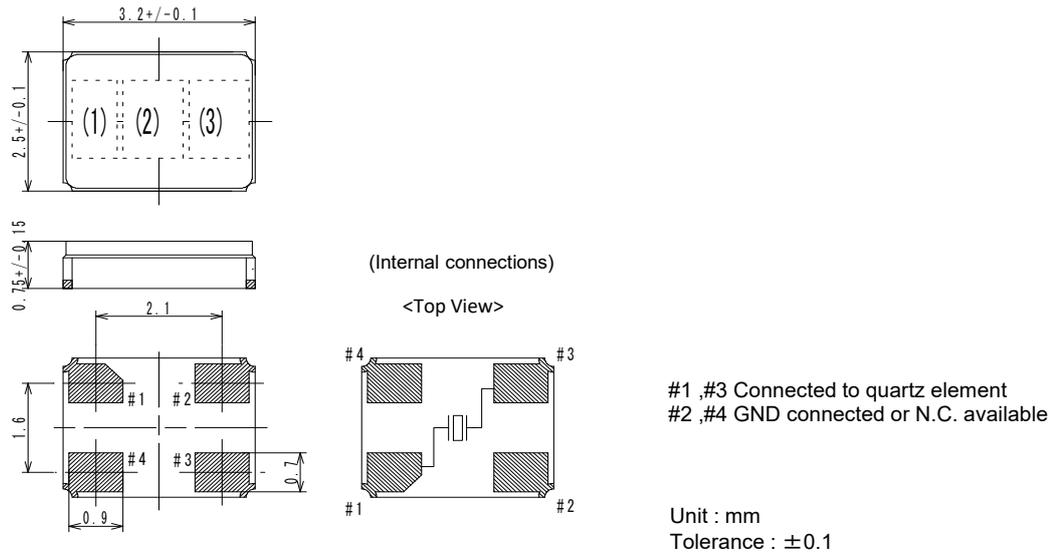


Figure-1

Logo(1) and Nominal Frequency (2) should be printed as follows by producing district

Made in CHINA --> Logo : D , Frequency: 16 : Top Bar with 16

Nominal Frequency ( 2 ) = Mark two digits from upper decimal point  
(ex. 16.384 MHz ----> 16 )

Manufacturing lot No.( 3 )

Year : The last digit of the year

week : We gave the sequence of week numbers 01(first week) for production date.

there are starting from 1st of Jan. However, add '0' figure to the first week during the nine weeks.

The week means are from Sunday to Saturday.

(ex. 2022/3/11 ----> 211 )

Plating material of a terminal. : Ni Plating + Au Plating.

A clearance between the soldering terminal portion and a print circuit board side should be less than 0.1mm.

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5. EMOSS CARRIER TAPE AND REEL

(1) DIMENSIONS OF EMOSS CARRIER TAPE

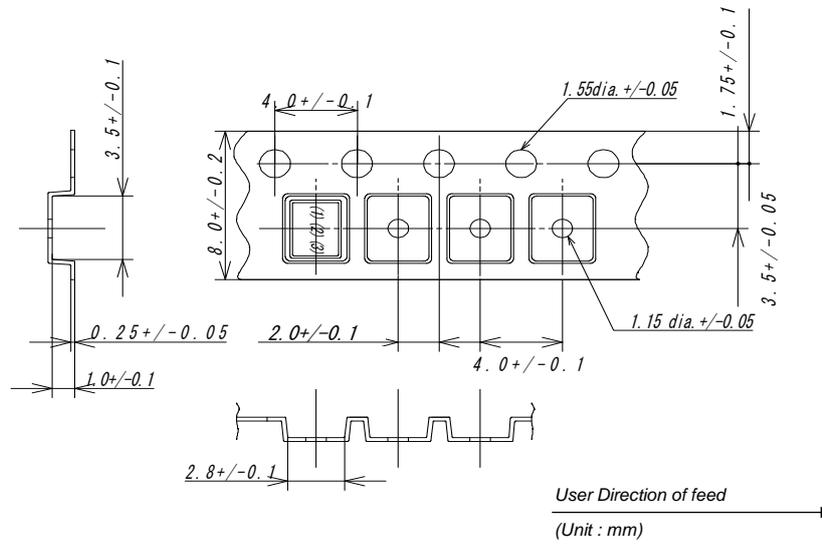


Figure-2

(2) DIMENSIONS OF TAPE REEL

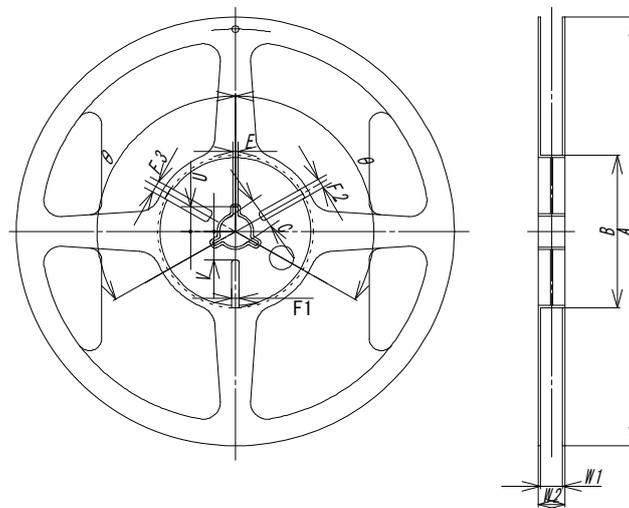


Figure-3

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(Unit:mm)

Item		Mark	Dimensions	Angle	
Flange	Diameter	A	$\Phi 180 +0.0 / -3.0$		
	Inside of Flange	W1	$9.0 \pm 0.3$		
	Outside of Flange	W2	$11.4 \pm 1.0$		
	Inside Diameter	B	$\Phi 60 +1.0 / -0.0$		
Center Core	Center Core Slit	Width	F1	$3.0 \pm 0.2$	
			F2	$4.0 \pm 0.2$	
			F3	$5.0 \pm 0.2$	
	Center Core Slit	Length	V	$11.9 +0.5 / -0.0$	
		Angle	$\theta$	$120^\circ$	
	Spindle Diameter		C	$\Phi 13 \pm 0.2$	
	Key Seats	Width	E	$2.0 \pm 0.5$	
		Length	U	$10.5 \pm 0.4$	
		Angle	$\theta$	$120^\circ$	

## (3) MATERIAL OF THE REEL

Reel	Polystyrene+Carbon (Black)
	Polystyrene(White)

## (4) STORAGE CONDITION

Temperature : +40°C max.

Relative Humidity : 80% max.

(It is a guaranteed term because it obtains an excellent soldering: 6months)

## (5) STANDARD PACKING QUANTITY

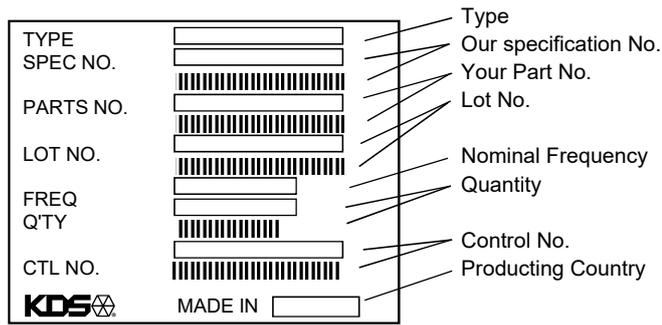
3,000pcs/reel

## (6) MATERIAL OF THE TAPE

Tape	Material
Carrier tape	Polystyrene+Carbon
Cover tape	Polyester

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(7) LABEL CONTENTS



Stick a label on the each reel.

(8) TAPING DIMENSION

Leader	Cover-tape	The length of cover-tape in the leader is more than 400mm including empty embossed area.
	Carrier-tape	After all products were packaged, must remain more than twenty pieces or 400mm empty area, which should be sealed by cover-tape.
Terminal	Cover-tape	The tip of cover-tape shall be fixed temporary by paper tape and roll around the core of reel one round.
	Carrier-tape	The empty embossed area which are sealed by cover-tape must remain more than 40mm.

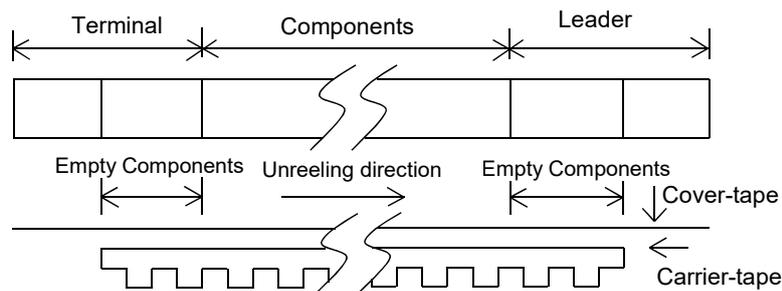


Figure-4

(9) JOINT OF TAPE

The carrier-tape and cover-tape should not be jointed.

(10) RELEASE STRENGTH OF COVER TAPE

It has to between 0.1~0.7N under following condition.

- Pulling direction 165~180°
- Speed 300mm/min
- Otherwise unless specified.

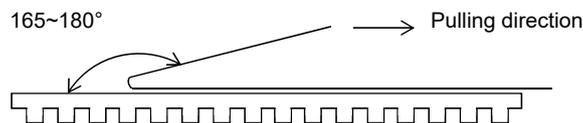


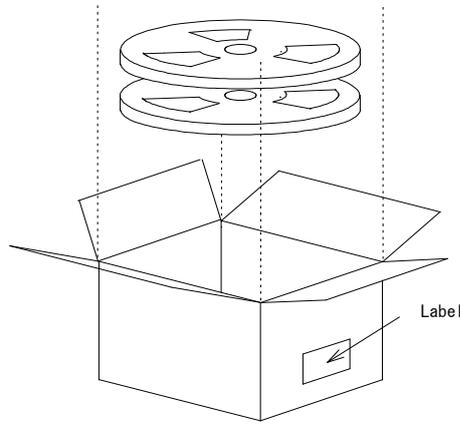
Figure-5

Other standards shall be based on JIS C 0806 -1990-

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6. PACKING

(1) STORAGE METHOD



Label contents

TYPE  
 SPEC NO.  
 LOT NO.  
 FREQ.  
 Q'TY  
 CTL NO.

Figure-6

(2) BOX SIZE

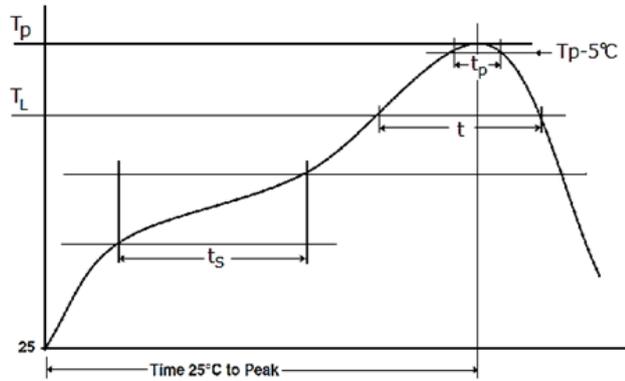
From lot size packingsize shall be changed.

In the upper and lower part and the opening in box it shall be protected products using aircushion sheets.

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7. REFLOW CONDITIONS (REFERENCE)

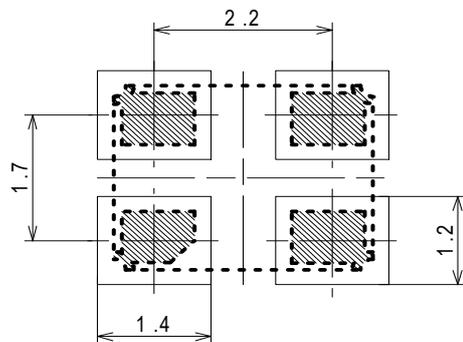
During the solder reflow process, please complete within following temperature, period.  
 Reflow soldering shall be allowed only 3times.



ts	(°C)	150~200
ts time	(s)	60~120
T <sub>L</sub>	(°C)	217
t time	(s)	60~150
T <sub>p</sub>	(°C)	max. 260
tp	(s)	max. 30

Figure-7

8. LAND PATTERN (REFERENCE)



Unit : mm

Figure-8

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9. MECHANICAL ENDURANCE

(1) SHOCK (ACCELERATION)

After the following test, parts shall conform specification 11.C  
 1000m/s<sup>2</sup> by 6ms X,Y,Z each axis (6directions), 10cycles

(2) SHOCK (MOUNTING DROP)

After the following test, parts shall conform specification 11.C  
 10cycles(60times) drop from 150cm heights to concrete.  
 Further,parts shall be solderd on substrate, fixed Aluminum materials(about 100g).  
 Substrate materials : FR-4, t=1.6mm  
 1cycle : each 1times of 6directions

(3) VIBRATION

After the following test, parts shall conform specification 11.C  
 and no abnormal appearance shall be observed.  
 Frequency of Vibration : 10~2000Hz  
 Amplitude(p-p) : Sine waves of 1.5mm (10~55Hz) and 200m/s<sup>2</sup> (55~2000Hz)  
 Cycle : 20min  
 Vibration axis : X,Y,Z  
 Vibration period : 2h for each axis

(4) SEAL

Less than 1.0×10<sup>-9</sup>Pa·m<sup>3</sup>/s by Helium leak detector.

(5) SOLDERABILITY

After the following test, more than 90% of terminal shall be covered by new solder.  
 3±0.5s dip in +245±5°C solder.  
 (Solder composition : Sn-3Ag-0.5Cu) (Use rosin type flux for solder.)

(6) RESISTANCE TO SOLDERING HEAT (REFLOW)

48h past at room temperature from following test, parts shall conform specification 11.D  
 perform the attached Reflow conditions to reference.

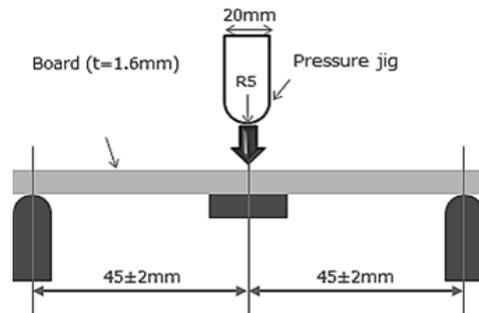
(7) SUBSTRATE BENDING

After the following test, parts shall conform specification 11.C  
 and no abnormality shall be observed in external appearance and sealing  
 tightness and others shall be based on ET-7403 of EIAJ.

Mount the specimen on substrate.

Apply the following pressure

- Direction : see right figure
- Speed : about 1.0mm/s
- Hours : 5±1s
- Amount of substrate : 3mm max.
- Substrate materials : FR-4, t=1.6mm

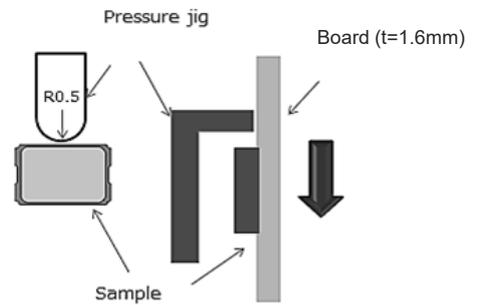


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(8) SHEAR

After the following test, parts shall conform specification 11.C and no abnormality shall be observed in external appearance and sealing tightness and others shall be based on ET-7403 of EIAJ.

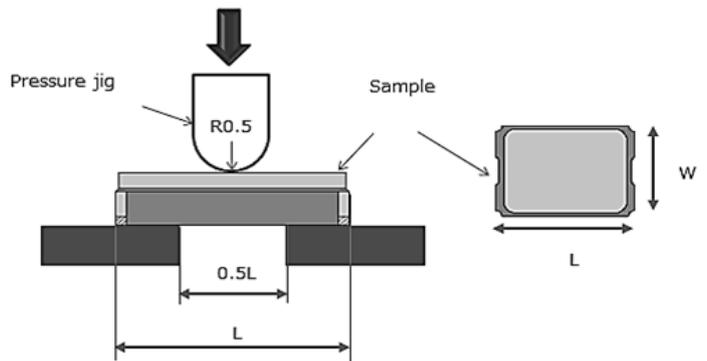
Mount the specimen on substrate.  
 Apply the following pressure  
 Weight : 10N  
 Hours : 10±1s  
 Direction : see right figure



(9) BODY STRENGTH

After the following test, parts shall conform specification 11.C and no abnormality shall be observed in external appearance and sealing tightness and others shall be based on ET-7403 of EIAJ.

Mount the specimen on substrate.  
 Apply the following pressure  
 Pressure jig : R0.5  
 Weight : 10N  
 Hours : 10±1s  
 Direction : see right figure



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10. ENVIRONMENTAL ENDURANCE

(1) LOW TEMPERATURE

2h past at room temperature after following test, parts shall conform specification 11.C  
240h, -40±2°C.

(2) HUMIDITY

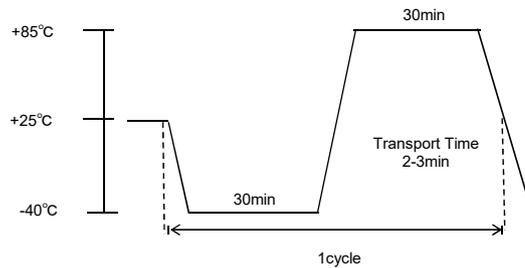
2h past at room temperature after following test, parts shall conform specification 11.C  
240h, +85±2°C, relative humidity 85±5%.

(3) HIGH TEMPERATURE

2h past at room temperature after following test, parts shall conform specification 11.C  
240h, +85±2°C.

(4) TEMPERATURE CYCLE

2h past at room temperature after 200cycles of following test, parts shall conform specification 11.C



11. SPECIFICATION

Frequency Variation and Equivalent Resistance shall be within Table below after the reliability test.

Spec.	Frequency Variation	Equivalent Resistance
A	±2ppm	±15% or ±2.0Ω (Use larger specification)
B	±5ppm	±15% or ±2.0Ω (Use larger specification)
C	±5ppm	±20% or ±3.0Ω (Use larger specification)
D	±10ppm	±20% or ±3.0Ω (Use larger specification)

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## 12. DSX321G TYPE QUARTZ CRYSTAL HANDLING INSTRUCTIONS

## (1) SOLDERING

Please perform the attached Reflow conditions to reference within 3times.

## (2) MOUNT

Crystal products are designed to be compatible with automatic mounting.

Be sure to have a mounting test in advance by using the actual mounting machine and check that the characteristics of the products are not damaged by the automatic mounting.

In the process where the board is warped, such as board separation process, be careful that the warping does not influence the characteristics and soldering of crystal products.

Since mounting by Ultrasonic welding and processing have a possibility of an excessive vibration spreading inside a crystal resonator and becoming the cause of characteristic deterioration and not oscillating, it does not recommend.

Underfilling Material for DSX321G Types, KDS considers underfilling material such as heat-cured resin would not affect the characteristics of the DSX321G crystal mounted, however, we recommend the crystal be tested and checked in such a case prior to use so that there are the possibility that the crystal may have a lid off or a crack in the ceramic base.

## (3) WASHING

About use of the washing liquid of a basin system, an alcoholic system, and a chlorofluorocarbon-replacing material system, it is checking that it is satisfactory.

However please consult in advance about other washing liquid.

Although the check about ultrasonic washing is performed, since it is an examination with a crystal resonator simple substance, the check by the use state is recommended again.

## (4) THE CAUTIONS ON USE

The piece of crystal it is processed very smaller than the conventional thing inside DSX321G series crystal unit may be damaged, if excessive excitation electric power is applied.

Please use it below with the value specified on a catalog and specifications.

Please refrain from forming patterns between crystal land pattern's since there is a possibility to cause crack in base.

If the temperature is higher than +280°C, there is a possibility for the sealing glass to remelt.

Avoid using the product at temperature higher than specified.

## (5) HANDLING OF A PRODUCT

DSX321G series has sufficient intensity to fall and vibration.

However when too much shock is added according to a certain cause, the use after a characteristic check is recommended.

## (6) STORAGE

Since the soldering nature of a terminal may be degraded, please avoid storage in high temperature and a humid place.

Please keep it in the place which direct rays do not hit and dew condensation does not generate.

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