



## REFERENCE SPECIFICATION

Customer: Richwell \_\_\_\_\_

Item:	CRYSTAL OSCILLATOR
Type:	NT2520SF
Nominal frequency:	16.368 MHz
Customer's Spec. No.:	----
NDK Spec. No.:	ENE5147A

Receipt

Revision Record						
Rev.	Date	Items	Contents	Approved	Checked	Drawn
----	Jun. 14. 2017	Issue	---	K.Moriya	S.Kawahara	H.Kawabata

1. Type NT2520SF

## 2. Maximum Rating

	Item	Rating	unit
1	Storage temp. range	-40 to +85	°C

## 3. Electrical specification

	Parameters	Electrical Spec.				Notes
		Min.	Typ.	Max.	Units	
1	Nominal frequency		16.368		MHz	
2	Supply voltage (Vcc)	+1.71	+2.8	+3.3	V	(-Earth)
3	Current consumption			1.5	mA	
4	Output voltage	0.8			Vp-p	Clipped sine wave (DC-Coupling)
5	Operating temp. range	-40		+85	°C	
6	Load impedance (resistance part)	9	10	11	kΩ	
7	Load impedance (parallel capacitance)	9	10	11	pF	
8	DC-cut capacitor					DC-cut capacitor of output is not put in TCXO. Please add DC-cut capacitor (1000 pF) in output line.
9	Frequency stability					
	1. Frequency /Temperature characteristics	-0.5		+0.5	ppm	-30 to +85 °C
		-3.0		+3.0	ppm	-40 to -30 °C
	Based on frequency at +25+/-2 °C					
	2. Frequency temperature slope	-0.05		+0.05	ppm/°C	-20 to +65 °C
		-0.1		+0.1	ppm/°C	-30 to +85 °C
		-0.35		+0.35	ppm/°C	-40 to -30 °C
	(Minimum of one measurement every 2 °C)					
	3. Temperature hysteresis	-0.6		+0.6	ppm	Frequency change after reciprocal temperature ramped over the Operating range. Frequency measured before and after at +25 °C
	4. Frequency/Voltage coefficient	-0.1		+0.1	ppm	+1.71 to +3.3 V (at +25 °C)
	5. Frequency/Load coefficient	-0.1		+0.1	ppm	(10 kΩ//10 pF) +/-5 %
	6. Frequency tolerance	-2.0		+2.0	ppm	+25+/-2 °C after 2 times reflow soldering, based on nominal frequency
	7. Long-term frequency stability	-1.0		+1.0	ppm	year
		-1.5		+1.5	ppm	2 years
-2.5			+2.5	ppm	5 years	
-5.0			+5.0	ppm	10 years	
at +25+/-2 °C						

	Parameters	Electrical Spec.				Notes
		Min.	Typ.	Max.	Units	
10	Start-up time			2.0	ms	More than 90 % of final output voltage
11	Stabilization time			2.0	ms	Less than +/-0.5 ppm of steady state frequency
12	Harmonic distortion			-8.0	dBc	
13	Phase noise(at +25 °C)			-50	dBc/Hz	@1 Hz offset
				-80	dBc/Hz	@10 Hz offset
				-105	dBc/Hz	@100 Hz offset
				-130	dBc/Hz	@1 kHz offset
				-145	dBc/Hz	@10 kHz offset
				-150	dBc/Hz	@100 kHz offset

## 4. Reflow soldering

Conditions of temperature profile (Refer to Fig.1)  
Soldering peak temp. +260 °C

## 5. Marking

- (1) Manufacture Name(NDK symbol mark)
- (2) Trace code
- (3) Nominal frequency (MHz)
- (4) Lot No.

## 6. Inspection parameters

Para 3.1, 3.3, 3.4, 3.9.1, 5, 10.2 are inspected.

The other parameters are guaranteed to be within specified characteristics by NDK design.

Inspection data is not submitted for mass production lot. But only if requested, a copy of first lot production data will be submitted.

## 7. Precaution in the storage

Please keep the oscillator in the ordinary temperature and humidity that are suggested as below table.

	Before taking out of dry bag	After taking out of dry bag
Temperature	+5 °C to +45 °C	+30 °C max.
Humidity	10 % to 75 % RH	70 % max.
Period	6 months	168 hours *

(table)

\*It is desirable for the oscillator to be used within 168 hours after taking out of dry bag.

Please pack the oscillator into used dry bag with a desiccant and seal it up by heat sealer etc.

In case the heat sealer is not available, sealing up with cellophane tape or a vinyl tape will do.

8. Frequency establishment condition

When output frequency is set, we suppose to have the ground pattern under the oscillator.

9. Washing

Not available for washing.

10. Application drawing

10.1 Reliability assurance item

ETS30B-00399

10.2 Dimension of External

ETD14B-01865

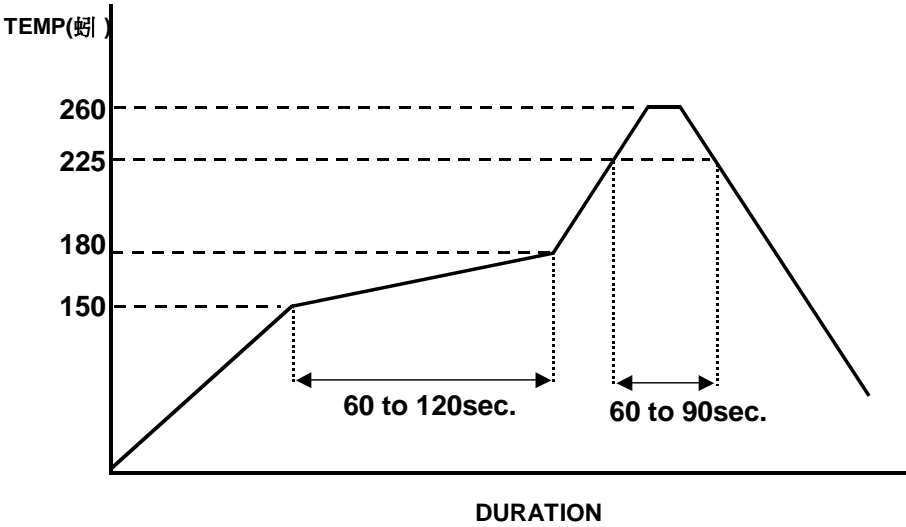
10.3 Land pattern

ETD15B-00022A

11. Notice

11.1 Order items are manufactured according to specification. As to conditions, which are not indicated in this specification and unpredictable such as applied condition and oscillation margin, please check them beforehand.

11.2 If you use resin for fixing components during manufacturing, please keep resin from adhering to the oscillator.



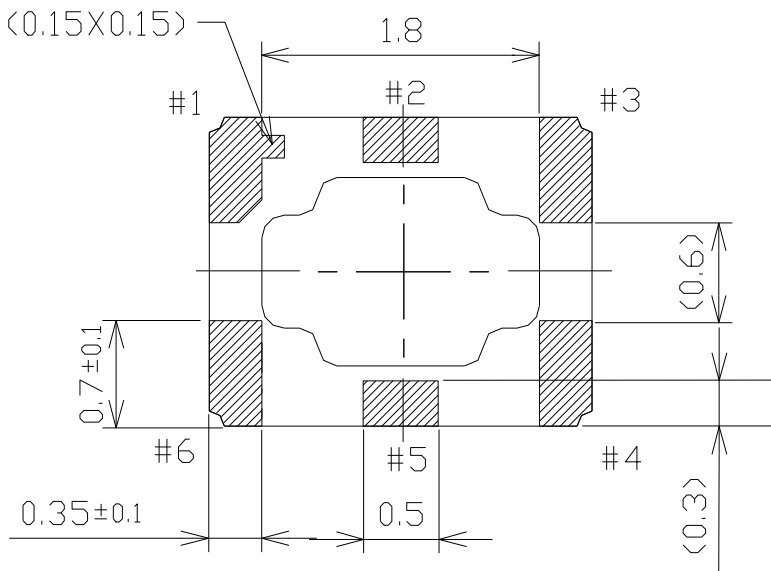
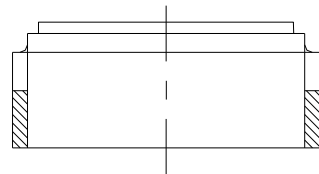
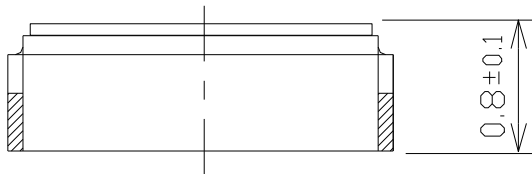
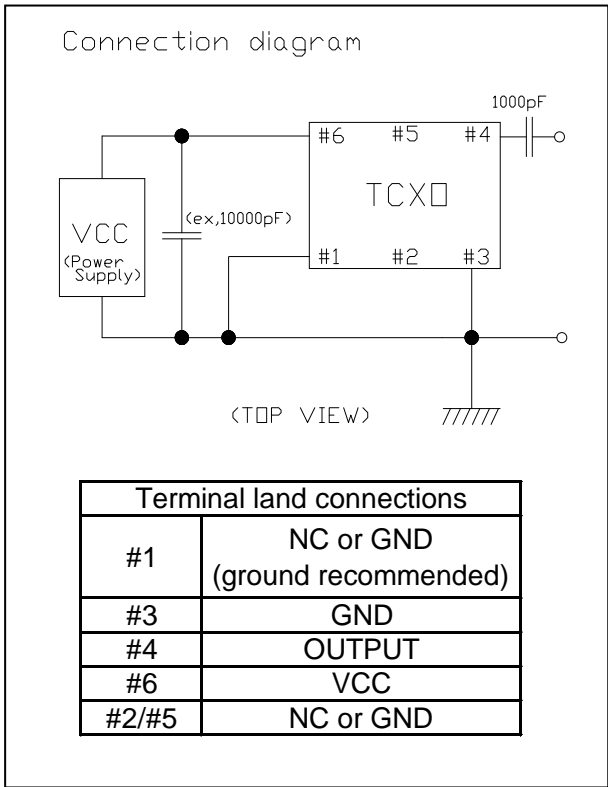
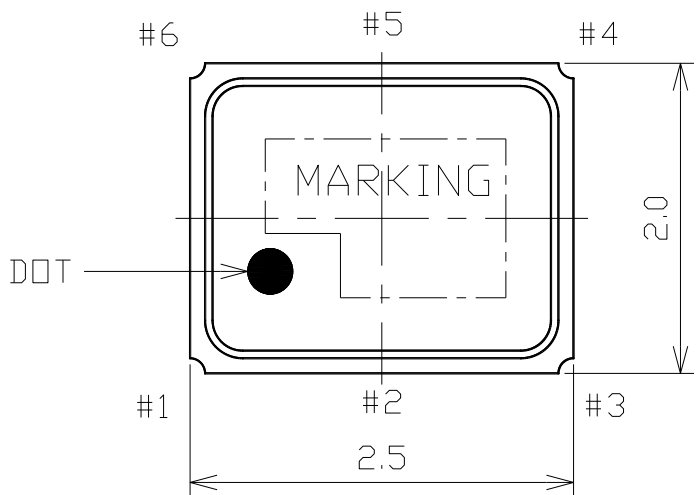
(Fig.1)

**Reliability assurance item**

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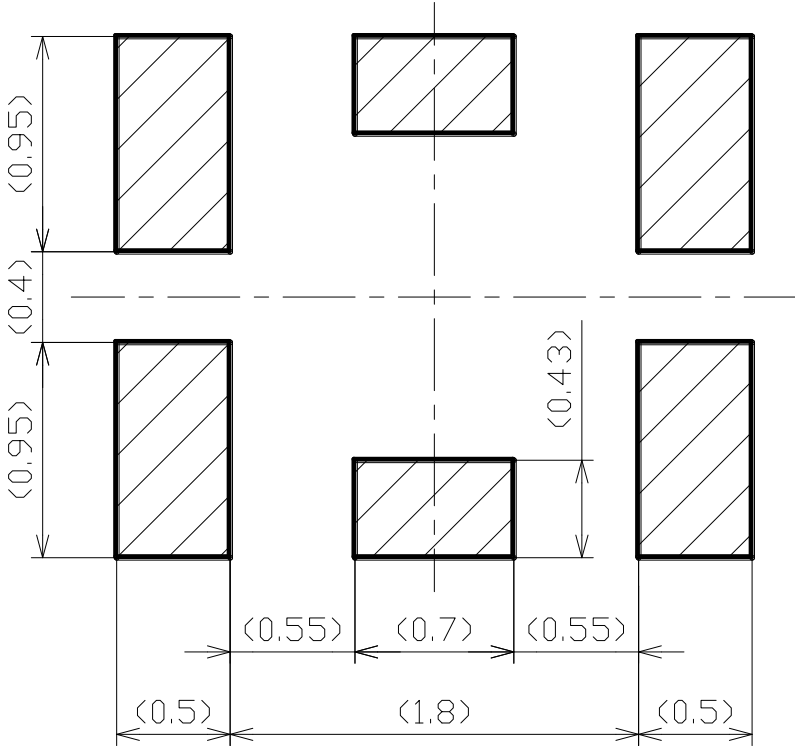
No.	Test Item	Test Methods	Specification Code
1	Vibration	5 to 26Hz: 1.52mm (total amplitude) 26 to 500Hz: 19.6m/s <sup>2</sup> 20 minutes per 1 cycle. 2 hours for each 3 planes.	A
2	Shock	Half sine wave 6ms, 980 m/s <sup>2</sup> . 3 times for each 3 planes.	A
3	Drop Test	Drop freely on the concrete from the height of 150cm With jig(150g). 3time for each 6 planes.	A
4	Humidity	+60°C, 95% RH for 48H. And normal temperature, with normal humidity for 24H.	A

Specification code	Specification
A	After the test, shall meet electrical specification.



Date of Revise	Charge	Approved	Reason		
-					
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	29.Jun.2015	M.Fukunaga	Dimension:mm	+/- 0.2	20/1
Designed	29.Jun.2015	M.Fukunaga	Title	Drawing No.	Rev.
Checked	29.Jun.2015	K.Koyama			
Approved	29.Jun.2015	K.Moriya			
Dimension of External			ETD14B-01865		-

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Note) Please reserve a large ground pattern on the PCB where the oscillator is installed.

	Date of Revise	Charge	Approved	Reason	
A	17. Nov. 2011	A.Fujii	K.Moriya	Note change	
	Date	Name	Third Angle Projection	Tolerance	Scale
Drawn	18.Apr.2007	H.Harima	Dimension:mm	-----	30 / 1
Designed	18.Apr.2007	H.Harima	Title	Drawing No.	Rev.
Checked	18.Apr.2007	K.Moriya			
Approved	18.Apr.2007	H.Mizumura			
			<b>Land pattern</b>	<b>ETD15B-00022</b>	<b>A</b>

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