Crystal Unit

■NX2012SE Data Sheet
(for Mobile Communications and OA / AV)

Application
Communications equipment
Consumer equipment

Features
Tuning fork crystal unit with low ESR
(Equivalent Series Resistance)

- Applicable for Microcontroller requiring low ESR
- Excellent electric characteristics optimum for mobile communications, OA (office automation) and AV (audiovisual) applications
- Surface-mount tuning fork crystal unit
(Available for reflow soldering)
- Reflow temperature profile
(Available for lead free soldering)

RoHS Compliant
Directive 2011/65/EU
Directive (EU) 2015/863

Pb free

1. Item : Crystal Unit
2. Type : NX2012SE
3. Nominal Frequency : 32.768 kHz
4. NDK Spec. No. : EXS00A-MU01260
5. NDK parts number : MU01260-32.768K
6. Electrical Specifications

	Parameters	SYM.	Electrical Spec.				Notes
			min	typ	max	Units	
1	Nominal frequency	f_{nom}		32.768		kHz	---
2	Overtone order	-		Fundamental		-	---
3	Load Capacitance	C_L	-	6.0	-	pF	Network analyzer
4	Frequency tolerance	-	-20	-	+20	$\times 10^{-6}$	@ +25°C (Not include aging)
5	Turnover temperature	-	+20	-	+30	°C	---
6	Parabolic coefficient	-	-	-	-0.04	ppm/ °C^2	---
7	Operating temp. range	T_{opr}	-40	-	+125	°C	---
8	Storage temp. range	T_{str}	-40	-	+125	°C	---
9	Aging	-	-3	-	+3	$\times 10^{-6}$	1st year (at +25°C)
			-8	-	+8	$\times 10^{-6}$	5 years (at +25°C)
			-10	-	+10	$\times 10^{-6}$	10 years (at +25°C)
			-20	-	+20	$\times 10^{-6}$	20 years (at +25°C)
10	Level of drive	-	-	0.1	0.5	μW	---
11	Equivalent resistance	R_r	-	35	-	kΩ	at +25°C, Network analyzer / Series
			-	-	50	kΩ	-40 to +85°C, Network analyzer / Series
			-	-	60	kΩ	+85 to +125°C, Network analyzer / Series
12	Insulation resistance	-	500	-	-	MΩ	When terminal to terminal were applied at DC100V ±15V.
13	Shunt Capacitance	C_0	1.4	1.7	2.0	pF	Network analyzer / Series
14	Motional Capacitance	C_1	5.0	6.0	7.0	fF	Network analyzer / Series
15	Motional Inductance	L_1	3000	3900	5000	H	Network analyzer / Series
16	Pulling Sensitivity	PS	-63.9	-50.6	-39.1	ppm/pF	This value is calculated by following formula. $\text{Pulling sensitivity (PS)}\,[\text{ppm/pF}] = \frac{-(C_1 \times 1000)}{2(C_0 + C_L)^2}$ Unit C_0:pF C_1:fF, CL:pF

Specifications shown are NDK standard spec. Other specifications than above are also available, so please contact us if you have any request.

Mounted conditions

Be sure to use the product under the following conditions. Otherwise, the characteristics deterioration or destruction of the product may result.

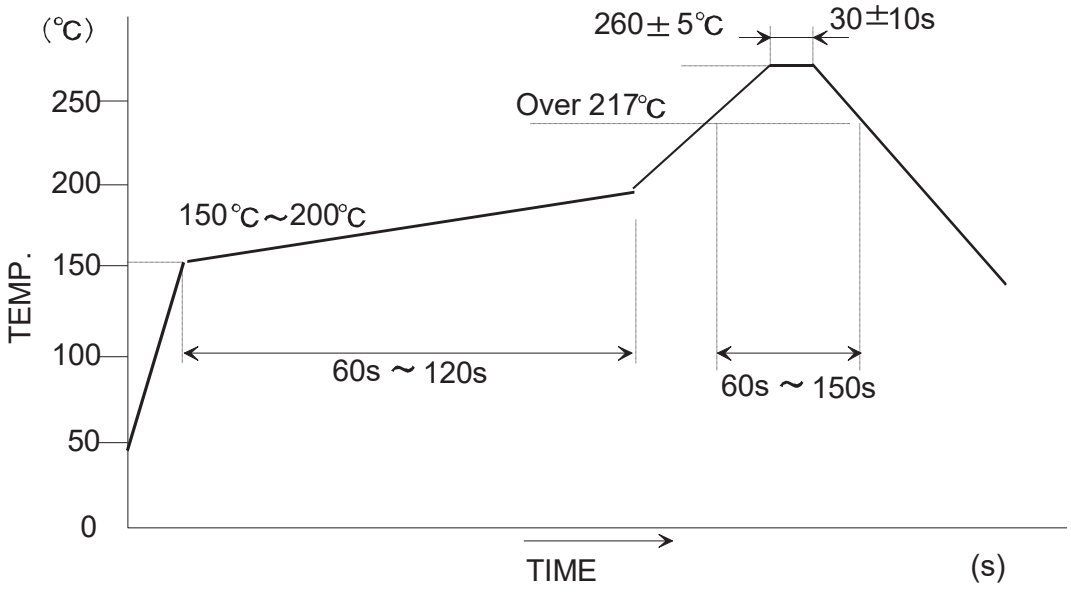
(1) Reflow soldering heat resistance

Peak Temp.	: 260°C, 40 sec.
Heating	: 217°C or higher, 150 sec.
Preheating	: 150~200°C, 120 sec.
Reflow passage times	: twice

(2) Manual soldering heat resistance

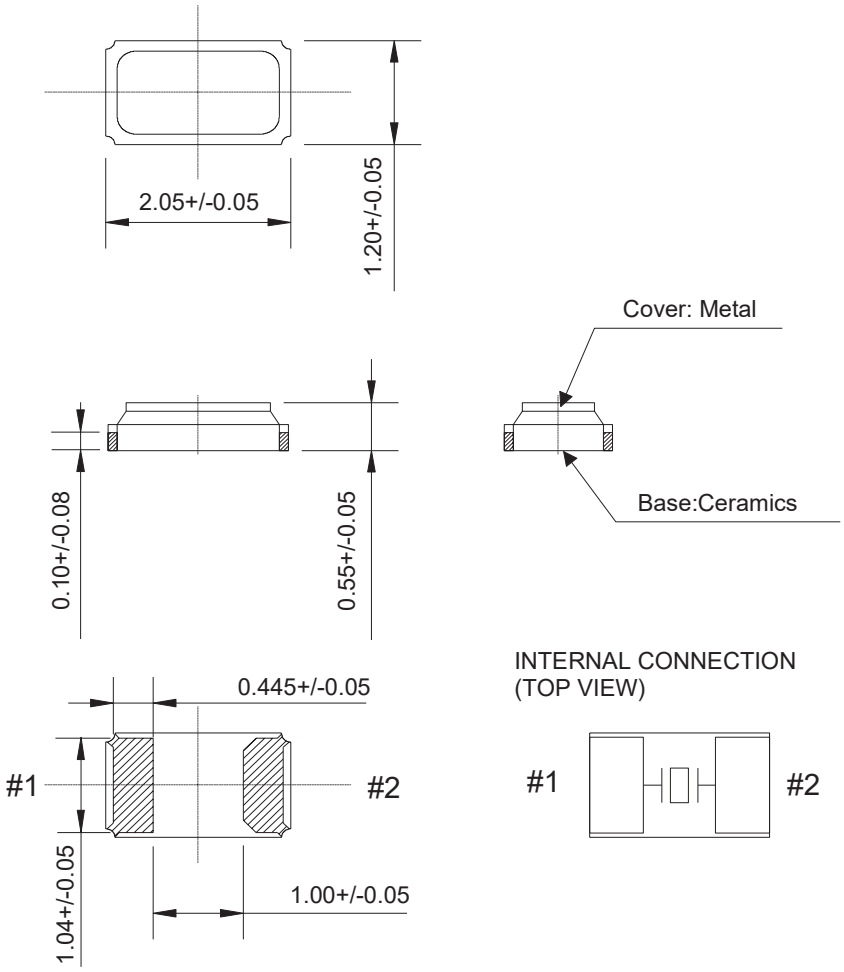
Pressing a soldering iron of 400°C on the terminal electrode for four seconds (twice).

Recommendation reflow condition

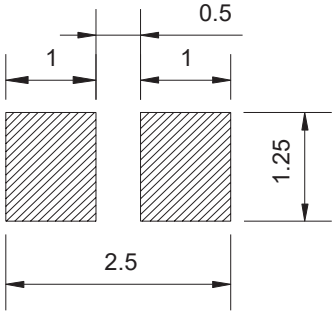


Dimension drawing

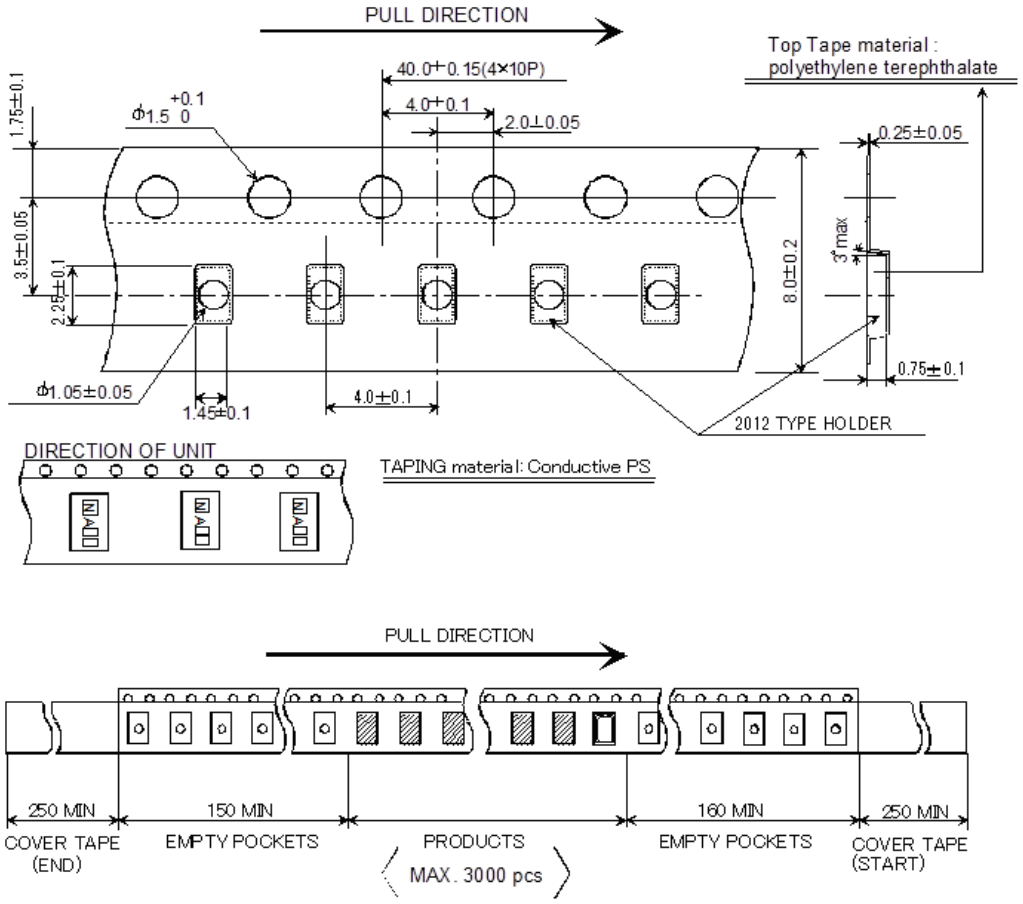
Unit : mm
Tolerance : +/-0.1mm



Recommended soldering pattern



Taping and reel spec.



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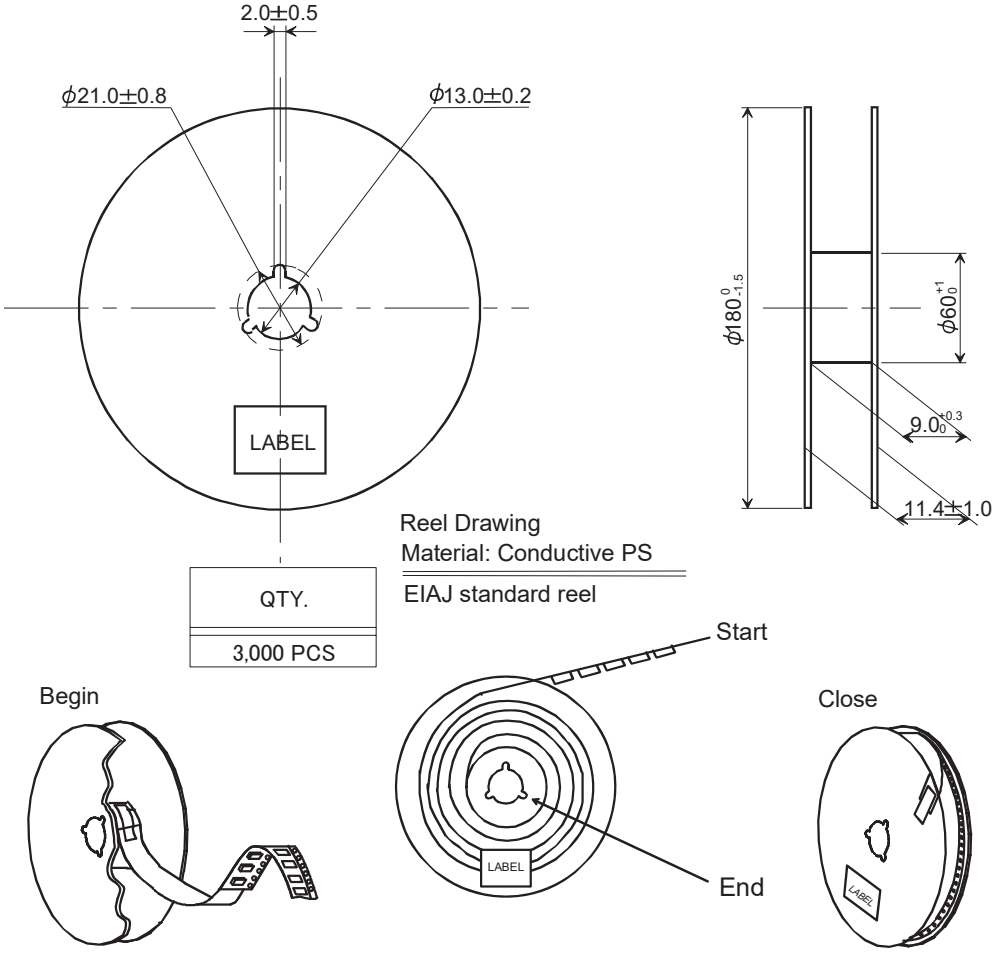
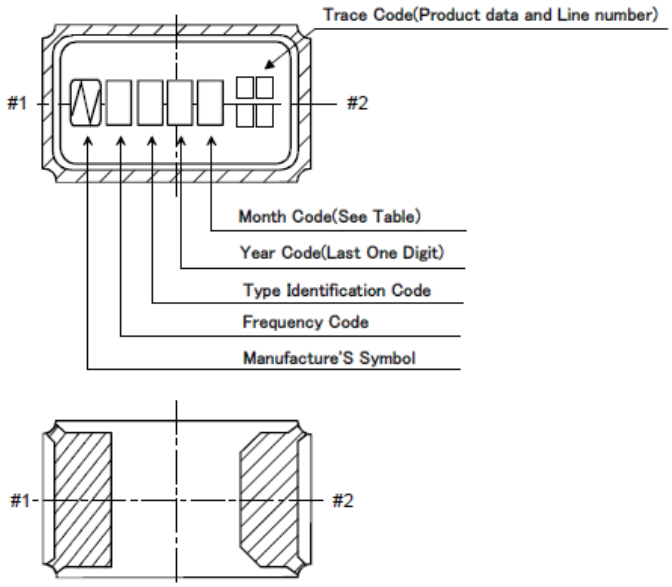


Marking spec.



NOTE

1. Frequency Code

A : 32.768kHz

2.Type Identification Code

E : NX2012SE

3.Month Code

Month	1 Jan.	2 Feb.	3 Mar.	4 Apr.	5 May	6 June	7 July	8 Aug.	9 Sep.	10 Oct.	11 Nov.	12 Dec.
Month Code	1	2	3	4	5	6	7	8	9	X	Y	Z

4.Marking Method

Marking Method is Laser Trimming.

Notes on use

1. Even if the appearance color etc. of the product differs by purchasing the component parts by more than two companies, there is no influence on the characteristics and reliability.
2. Since the crystal unit is a passive component, it is important to have appropriate circuit conditions. Please be sure to check the circuit conditions before using the crystal units, and ensure the necessary circuit margin, and confirm that the desired frequency is output. Moreover, please check the circuit conditions when using an existing crystal unit for another model or board. If the circuit conditions are not appropriate, there is a risk of oscillation stop or frequency deviation.
3. IN THE CASE OF THE FOLLOWING ITEMS, WE ARE NOT RESPONSIBLE FOR WARRANTY / COMPENSATION.
   (1) WHEN PRODUCTS OF THIS SPECIFICATION ARE USED FOR EQUIPMENT RELATED TO HUMAN LIFE OR PROPERTY, IT IS THE RESPONSIBILITY OF THE CUSTOMER TO CONFIRM THE INFLUENCE ON THIS PRODUCT AND EQUIPMENT TO BE USED BEFOREHAND, CONDUCT NECESSARY SAFETY DESIGN (INCLUDING REDUNDANT DESIGN, MALFUNCTION PREVENTION DESIGN, etc.), AND PLEASE USE IT AFTER SECURING SUFFICIENT SAFETY OF EQUIPMENT.
      1. SAFETY-RELATED EQUIPMENT SUCH AS AUTOMOBILES, TRAINS, SHIPS, etc., OR EQUIPMENT DIRECTLY INVOLVED IN OPERATION
      2. AIRCRAFT EQUIPMENT
      3. SPACE EQUIPMENT
      4. MEDICAL EQUIPMENT
      5. MILITARY EQUIPMENT
      6. DISASTER PREVENTION / CRIME PREVENTION EQUIPMENT
      7. TRAFFIC LIGHT
      8. OTHER EQUIPMENT REQUIRING THE SAME PERFORMANCE AS THE ABOVE-MENTIONED EQUIPMENT

   (2) IN CASES WHERE IT IS NOT INDICATED IN THE REQUESTED STANDARD AND IS USED UNDER CONDITIONS OF USE (INCLUDING CIRCUIT MARGIN etc.) THAT CAN NOT BE PREDICTED AT THE PRODUCTION STAGE.

   (3) WHEN USING ULTRASONIC WELDING MACHINE. (THERE IS A POSSIBILITY THAT THE CHARACTERISTIC DEGRADATION IS CAUSED BY THE RESONANCE PHENOMENON OF THE PIEZOELECTORIC MATERIAL.(EXAMPLE; CRYSTAL PIECE))
   WE WILL NOT TAKE ANY RESPONSIBILITY FOR THE INFLUENCE OF THE CUSTOMERS' PROCESS.SO, PLEASE SUFFICIENTLY EVALUATE AT A SAMPLE STEP WHEN YOU USE ULTRASONIC WELDING MACHINE.

   (4) USING RESIN MOLD MAY AFFECT THE PRODUCT CHARACTERISTIC.
   PLEASE MAKE SURE TO TELL OUR SALES CONTACT WHEN YOU USE RESIN MOLD. WE WILL PERFORM INDIVIDUAL CORRESPONDENCE ABOUT A DELIVERY SPECIFICATION AND AN EVALUATION METHOD. IN ADDITION, IF YOU USE RESIN MOLD WITHOUT CONTACTING US, AND CAUSES DAMAGES AGAINST A CUSTOMER OR A THIRD PARTY, WE WILL NOT BE LIABLE FOR THE DAMAGES AND OTHER RESPONSIBILITIES BECAUSE WE CONSIDER IT IS UNDER SELF-RESPONSIBILITY USING RESIN MOLD. WE WILL NOT TAKE ANY RESPONSIBILITY FOR THE INFLUENCE OF THE CUSTOMERS' PROCESS. PLEASE SUFFICIENTLY EVALUATE AT A SAMPLE STEP WHEN YOU USE RESIN MOLD.

   (5) WHEN PERFORMING IMPROPER HANDLING THAT EXCEEDS THE GUARANTEED RANGE.

4. This product cannot be used for equipment related to the safety of automobiles or equipment directly involved in operation.(example: air bag, TPMS, engine control, steering control, brake control etc.)

Notes on storage

1. When storing the product in high temperature and high humidity condition for a long time, product characteristics (solderability etc.) and packaging condition may be deteriorated. Please store product at temperature + 5°C ~ + 35°C, humidity 85% RH or less. The product is an electronic component, so please do not storage and use, under a dewing state.
2. The product storage deadline is 12 months after delivery in unopened state. Please use within storage deadline. If you exceed storage deadline, please check the product characteristics etc, please use.

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