

# Crystal Clock Oscillator

## ■ NZ1612SH Data Sheet Standard Type

### Application

- For Smartphone, Wireless LAN, WiMAX, Bluetooth
- For Wearable device



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

Pb free

AEC-Q200

### Features

- Ultra compact and light. Dimensions : 1.6 x 1.2 x 0.6 mm, weight : 0.01 g.
- Supports low frequencies starting from 2 MHz.
- Supports a wide temperature range from -40 to +125 °C.
- Low phase jitter (Typ. 100fs (Frequency Offset : 12 kHz to 20 MHz)@80 MHz, 3.3 V)
- Taped units enable automatic mounting IR Reflow (lead free) is possible.
- Lead-free.
- Conforms to AEC-Q200.

1. Item : Crystal Clock Oscillator
2. Type : NZ1612SH
3. Nominal Frequency : 2 to 80 MHz
4. NDK Spec. No. : See Table1

## 5. Maximum Ratings

	Item	Ratings			Notes
		min	max	Units	
1	Supply Voltage	-0.3	+4.0	V	
2	Input Voltage	-0.3	$V_{CC} + 0.3$	V	
3	Output Current	-20	+20	mA	
4	Storage Temperature Range	-55	+125	°C	

## 6. Electrical Specifications

	Parameters	SYM	Electrical Spec.				Notes
			min	typ	max	Units	
1	Nominal Frequency	$f_{nom}$	2		80	MHz	
2	Supply Voltage	$V_{CC}$	+1.8 to +3.3			V	
3	Current Consumption (Operating)	$I_{CC}$	See Table.2			mA	at 25 °C
4	Current Consumption (Stand-by)	$I_{ST}$			20	μA	at 25 °C
5	Output Level	-	CMOS				
6	Load Capacitance	$C_L$			15	pF	
7	Operating Temperature Range	$T_{opr}$	[-20 to +70] to [-40 to +125]			°C	Table.1
8	Overall Frequency Tolerance	$\Delta f/f_{nom}$	$\pm 25$ to $\pm 100$			ppm	Table.1 *1
9	Output Voltage	$V_{OL}$			$0.1 V_{CC}$	V	
		$V_{OH}$	$0.9 V_{CC}$			V	
10	Rise Time( $t_r$ ), Fall Time( $t_f$ )	$t_r/t_f$			6	ns	$0.1 V_{CC}$ to $0.9 V_{CC}$
11	Symmetry	SYM	45		55	%	at $1/2 V_{CC}$
12	Start-up Time	$t_{su}$			4	ms	
13	Output Wave Form	-	Square wave				
14	Stand-by Function	#1 PAD input				# 3 PAD output	
		H level ( $0.7 V_{CC}$ to $V_{CC}$ ) or open				Operating	
		L level ( $0.3 V_{CC}$ max)				High impedance	

\*1 Inclusive of Freq. tolerance (at 25 °C), frequency/temperature characteristics, frequency/voltage coefficient.

Table.1 NDK Spec. No. List

Overall Frequency Tolerance	Operating Temperature Range (°C)	Supply Voltage (V)			
		+1.8±0.18	+2.5±0.25	+3.0±0.3	+3.3±0.33
$\pm 100 \times 10^{-6}$	-40 ~ +125	NSC5152A	NSC5152B	NSC5152C	NSC5152D
$\pm 50 \times 10^{-6}$	-40 ~ +105	NSC5103A	NSC5103B	NSC5103C	NSC5103D
$\pm 50 \times 10^{-6}$	-40 ~ +85	NSC5101A	NSC5101B	NSC5101C	NSC5101D
$\pm 25 \times 10^{-6}$	-20 ~ +70	NSC5100A	NSC5100B	NSC5100C	NSC5100D

Table.2 Current Consumption (Operating)

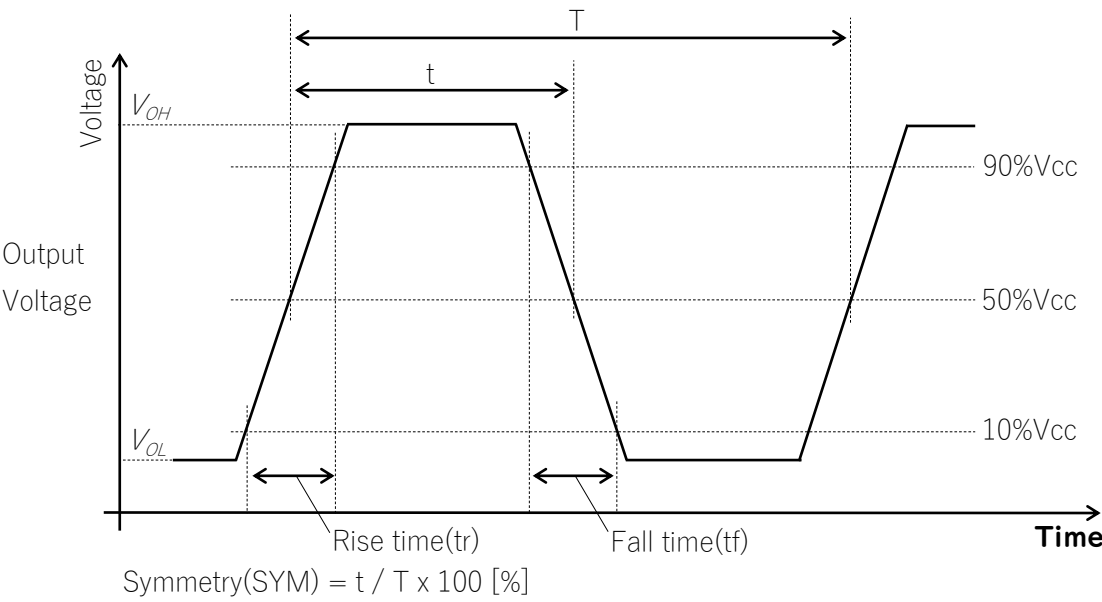
Nominal Frequency [MHz]	Current Consumption (mA)							
	2<F<10	10≤F<20	20≤F<30	30≤F<40	40≤F<50	50≤F<60	60≤F<70	70≤F≤80
1.8 V	2.5 MAX	3.5 MAX	4.0 MAX	4.5 MAX	5.0 MAX	5.5 MAX	6.0 MAX	6.5 MAX
2.5 V	3.0 MAX	4.0 MAX	4.5 MAX	5.0 MAX	5.5 MAX	6.0 MAX	6.5 MAX	7.5 MAX
3.0 V	3.5 MAX	4.5 MAX	5.0 MAX	5.5 MAX	6.0 MAX	6.5 MAX	7.5 MAX	8.5 MAX
3.3 V	3.5 MAX	4.5 MAX	5.0 MAX	5.5 MAX	6.0 MAX	7.0 MAX	8.0 MAX	9.0 MAX

Table.3 Supported Frequency List

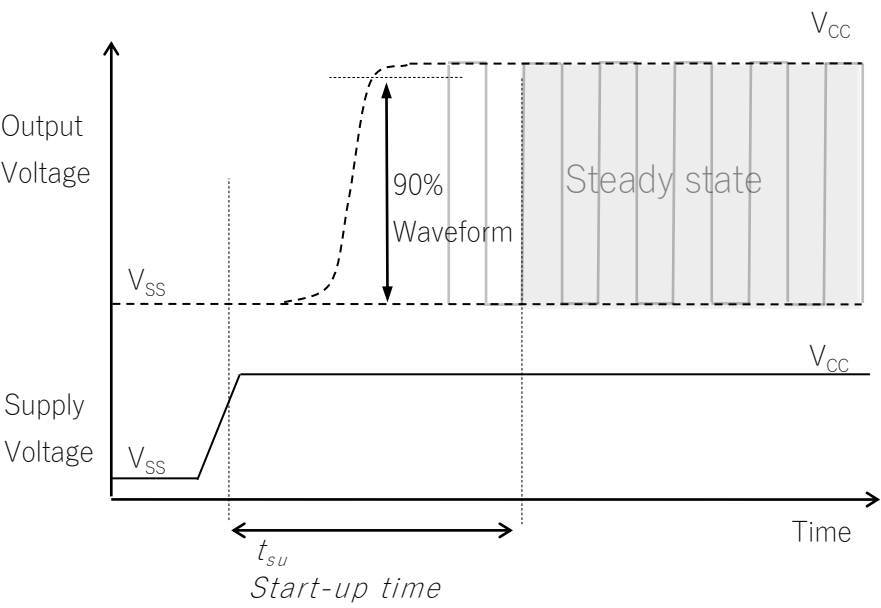
Nominal Frequency [MHz]						
12 MHz	40 MHz					
12.288 MHz	48 MHz					
13 MHz	50 MHz					
16 MHz	52 MHz					
19.2 MHz	80 MHz					
20 MHz						
24 MHz						
25 MHz						
26 MHz						

Frequencies not listed in the list are also available, so please contact us if you have any request.

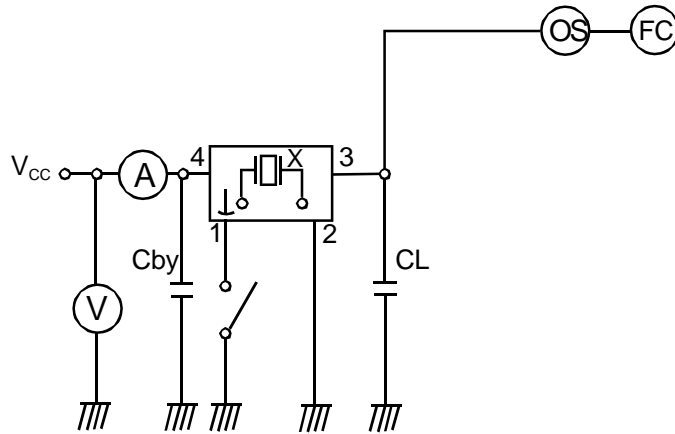
Output Voltage



Start-up Time



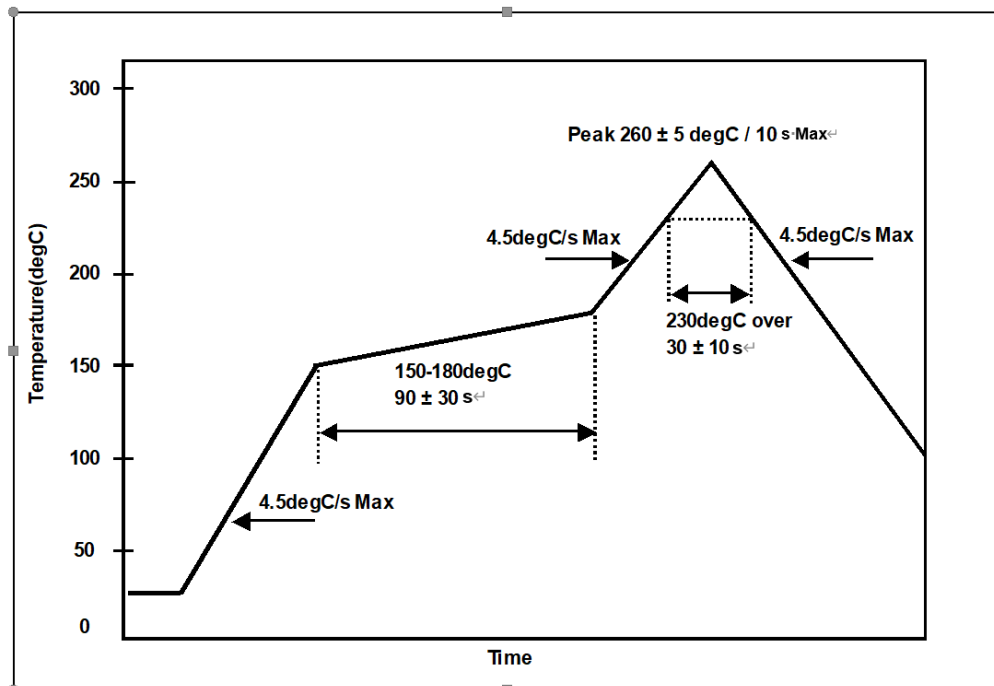
## Measuring circuits



CL ; 15pF MAX including input capacity of oscilloscope  
 Cby ; Bypass capacitor (0.01uF)

## 7. Prohibited items

Example For Soldering Conditions (The below graph corresponds to Pb free solder)



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 temperature: 265 °C, 10 s

Heating: 230 °C or higher, 40 s

Preheating: 150 °C to 180 °C, 120 s

Reflow passage times: 3 times

(2) Manual soldering heat resistance

Pressing a soldering iron of 350 °C on the terminal electrode for 3 s.

## 8. Electrostatic Discharge

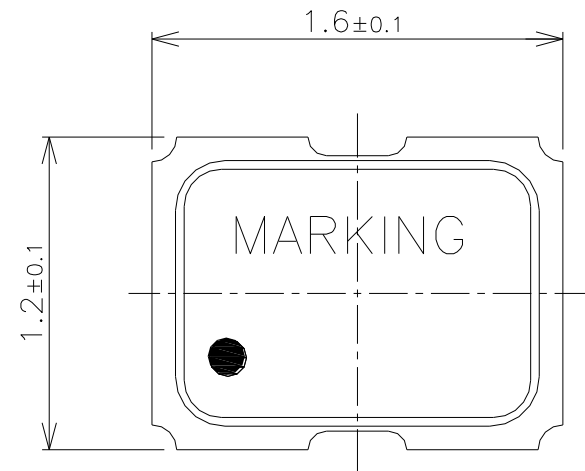
MM: 200 V

HBM: 2000 V

CDM: 500 V

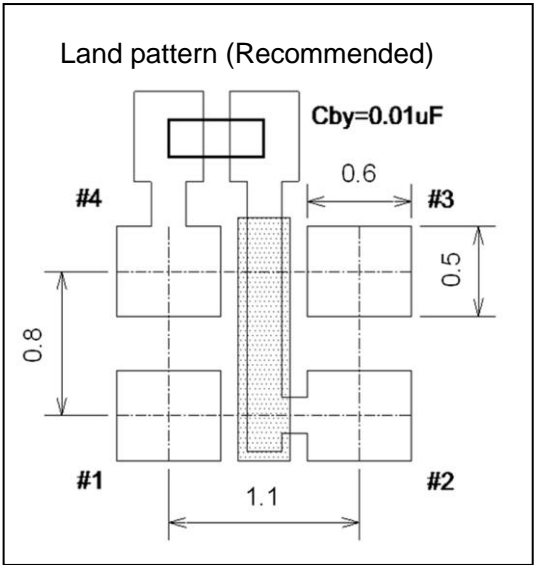
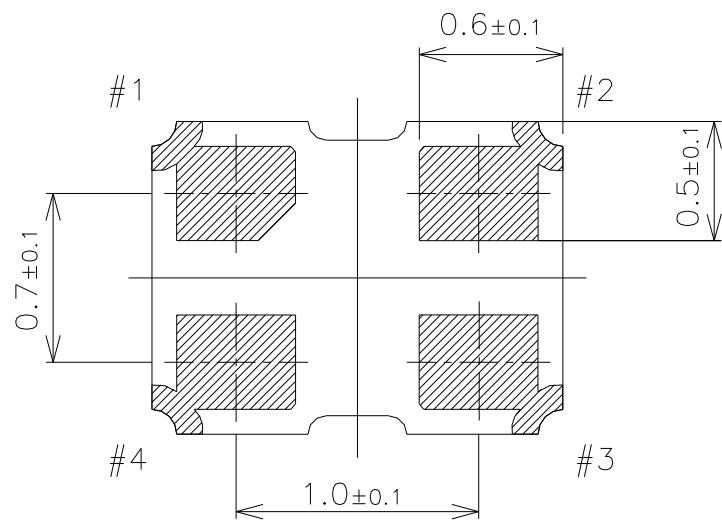
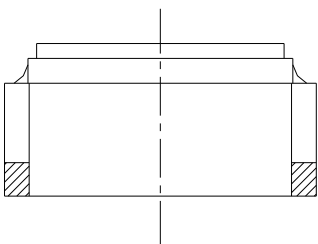
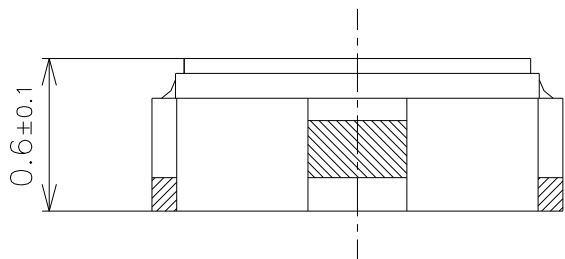
Dimension of External

Unit : mm



Terminal land connections

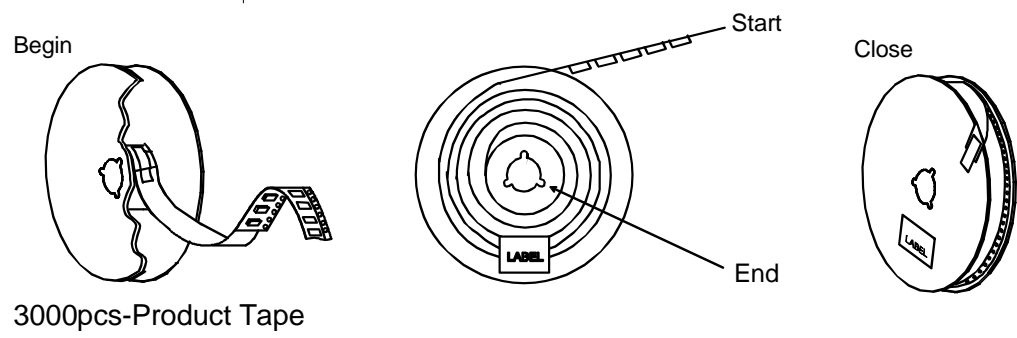
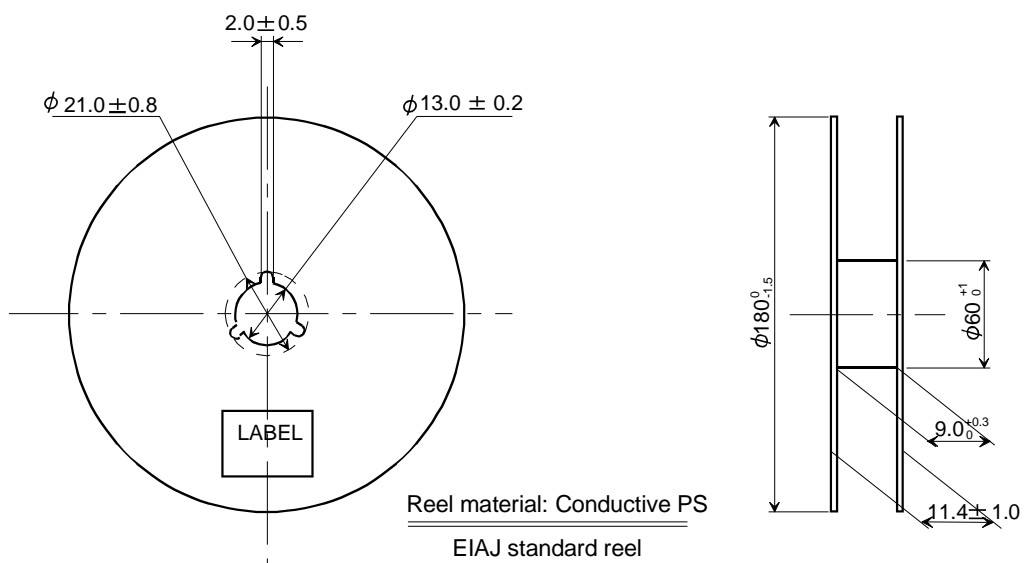
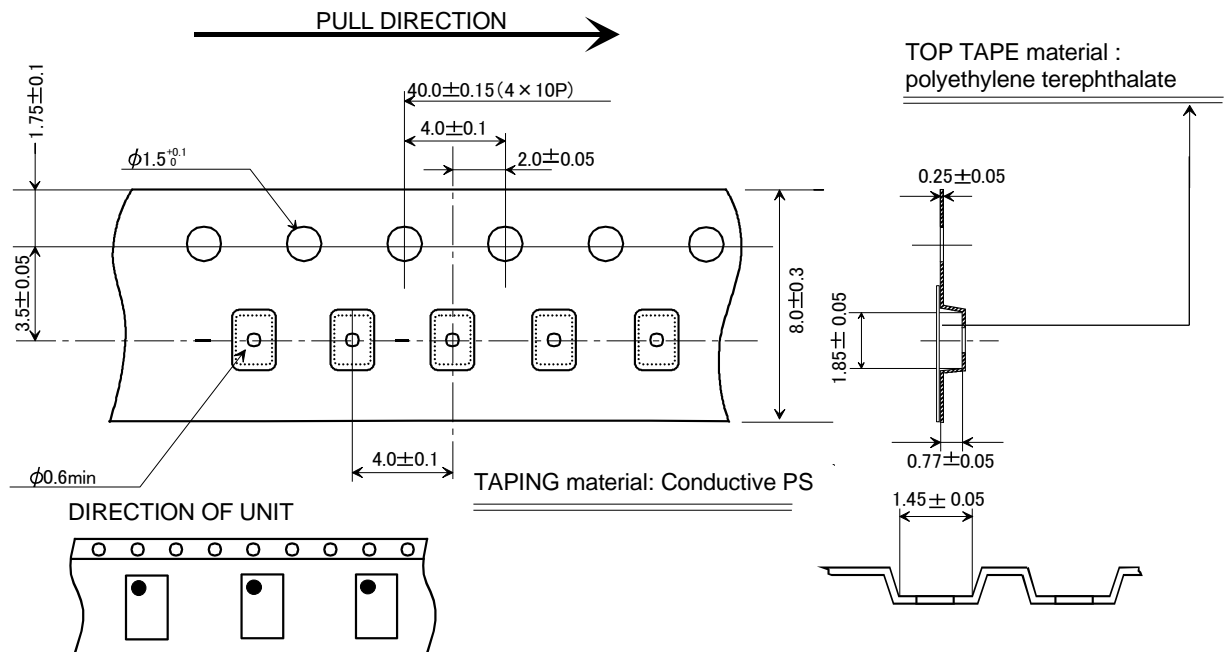
#1	STAND-BY
#2	GND
#3	OUTPUT
#4	V <sub>CC</sub>



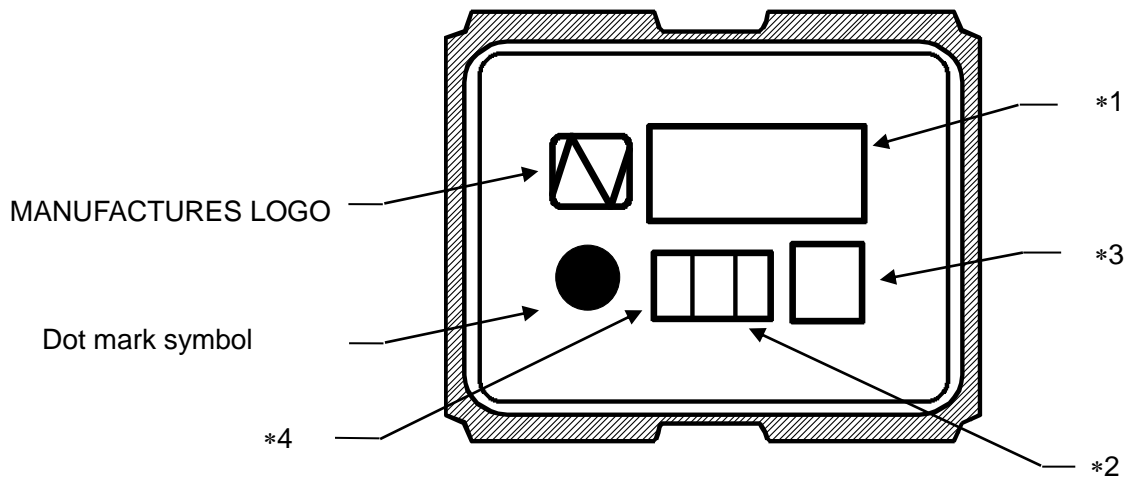


■Taping and Reel Spec.

Unit : mm



## ■ Marking



\*1 [FREQUENCY]

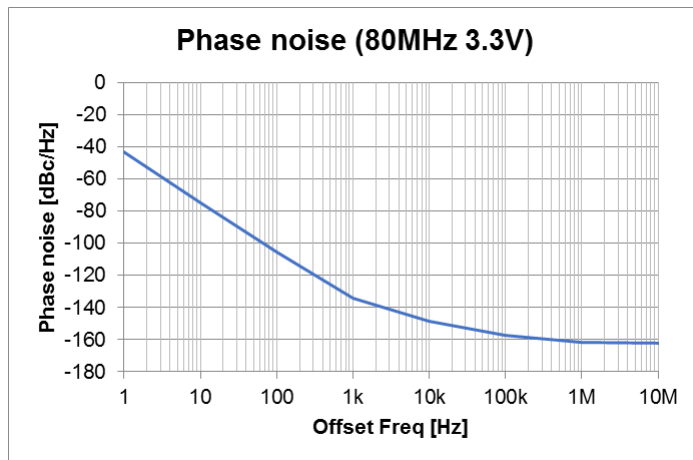
\*2[Lot Code(Digits are Two)]

\*3 [Trace code]

\*4 [Model Symbol]  
NZ1612SH → H

## ■ Data

## • Phase jitter



- Phase jitter : Typ. 100 fs (Frequency Offset: 12 kHz to 20 MHz) @80 MHz, 3.3 V

## Instruction Notice

### 1 Noise

When using this product, please insert a bypass capacitor between the power supply and GND.

(Closer to the product terminal is desirable.)

The bypass capacitor values shown in our specifications and drawings are for reference only.

(They are not guaranteed values.)

In actual use, please select the appropriate bypass capacitor value for your circuit.

NDK shall not be liable for any and all events resulting from or in connection with the use of this product in a manner that does not comply with the above instruction.

### 2 Resistance to dropping

The NZ1612S series is designed to be impactproof so that no damage occurs when dropped a height (75 cm) three times. However, if dropped from a desk etc., it is advisable to check their performance or contact us to check it.

### 3 Electrostatic protection

The NZ1612S series employ C-MOS ICs for the active element. Please use them in static-free environments.

### 4 Cleaning

Basically, the NZ1612S series are applicable for ultrasonic wave cleaning. However, in some case, during ultrasonic wave cleanings, internal design may get damage. Please check condition carefully beforehand.

### 5 Other

The NZ1612S series are C-MOS applied products. And careful handling (same as with C-MOS IC) are needed to avoid electrostatic problems.

Incorrect PAD connection is cause of trouble. Please make sure to connect correctly as below.

#2 terminal → GND

#4 terminal → V<sub>CC</sub>

## 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 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.), 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 PIEZOELECTRIC 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 A 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 EFFICIENTLY EVALUATE AT A SAMPLE STEP WHEN YOU USE RESIN MOLD.
- (5) WHEN PERFORMING IMPROPER HANDLING THAT EXCEEDS THE GUARANTEED RANGE.
- 3 This product can not 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 to + 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.

## Handling of this document and other requests

Please refer to the " Site Guidance" on our website for the handling of information contained in this document. (<https://www.ndk.com/en/terms/>)