INFORMATION

PRODUCT No. : **Q33615012075800**

MODEL : **SG-615P**

INFO. No. : **A14-281-1A**

DATE : **Jun. 6. 2014**

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INTRODUCTION

1. The contents is subject to change without notice.
   Please exchange the specification sheets regarding
   the product's warranty.

2. This sheet is not intended to guarantee or provide
   an approval of implementation of industrial patents.

3. We have prepared this sheet as carefully as possible.
   If you find it incomplete or unsatisfactory in any
   respect, We would welcome your comments.

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This product listed here is designed as components or parts for electronics equipment in general consumer use. We do not expect that any of these products would be incorporated or otherwise used as a component or part for the equipment, which requires an extra high reliability, such as satellite, rocket and other space systems, and medical equipment, the functional purpose of which is to keep life.

Product No. / Model

The product No. of this crystal oscillator unit is Q33615012075800
The model is SG-615P.

Contents

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[1] Absolute maximum ratings

Parameter	Symbol	Value	Unit	Note
Supply voltage	V_{DD}-GND	-0.3 to +7.0	V	
Storage temperature *	T_{STG}	-55 to +125	°C	Stored as bare product after unpacking.
Output current	I_{OUT}	30 or under	mA	
Input voltage	V_{IN}	-0.5 to V_{DD}+0.5	V	

* Concerning the frequency change, please refer page 6 [7] Environmental and mechanical characteristics.

[2] Operating range

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Supply voltage		V_{DD}	4.5	5.0	5.5	V	
Supply voltage		GND	0.0		0.0	V	
Operating temperature		T_{OPR}	-20		+70	°C	
Input voltage		V_{IN}	GND		V_{DD}	V	
Output load	TTL load	N			10	TTL	
	C-MOS load	CL			50	pF	CL≤ 15 pF

[3] Frequency characteristics

Output frequency ..... 16 MHz

(V_{DD}=5.0 V±0.5 V,GND=0.0 V,Load 10 TTL or CL≤50 pF)

Parameter	Symbol	Value[1×10^{-6}]	Note
Frequency stability *	Δ f/fo	C : ± 100	Ta=-20 °C to +70 °C
Aging	fa	± 5 (Typ.-3)	Ta=+25 °C, V_{DD}=5.0 V First year

* This includes initial frequency tolerance, temperature characteristics, input voltage characteristics, and load characteristics, but excludes aging.

[4] Electrical characteristics

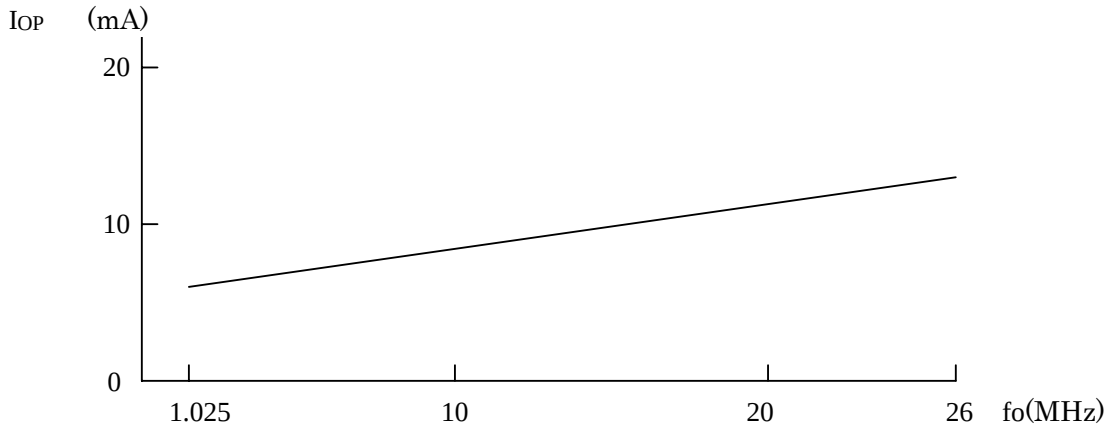
(Please see page 2 [2] Operating range V_{DD}=5.0 V±0.5 V,GND=0.0 V)

Parameter	Symbol	Value		Unit	Note
		Min.	Max.		
Start up time	t_{OSC}		4.0	ms	Time point of V_{DD} 4.5 V is consider as t=0
Current consumption	I_{OP}		23	mA	No load (fo=26 MHz)
Disable current	I_{OE}		12	mA	OE=GND(fo=26 MHz)
Output rise time *	t_{TLH}		8.0	ns	C-MOS load :20 %V_{DD}→80 %V_{DD} Level TTL load:0.4 V→2.4 V Level
Output fall time *	t_{THL}		8.0	ns	C-MOS load :80 %V_{DD}→20 %V_{DD} Level TTL load:2.4 V→0.4 V Level
Output duty *	tw/t	40	60	%	C-MOS load:1/2 V_{DD} Level TTL load:1.4V Level
High level output voltage	V_{OH}	V_{DD}-0.4		V	I_{OH} = -400 μA
Low level output voltage	V_{OL}		0.4	V	I_{OL} = 16 mA
High level input voltage	V_{IH}	2.0	V_{DD}	V	OE terminal
Low level input voltage	V_{IL}	GND	0.8	V	OE terminal
Input current	I_{IH}		1.0	μA	OE = V_{DD}
	I_{IL}	-100	-15	μA	OE = GND
Output disable time *	t_{PXZ}		100	ns	OE terminal High → Low
Output enable time *	t_{PZX}		100	ns	OE terminal Low → High

[5] Test circuit

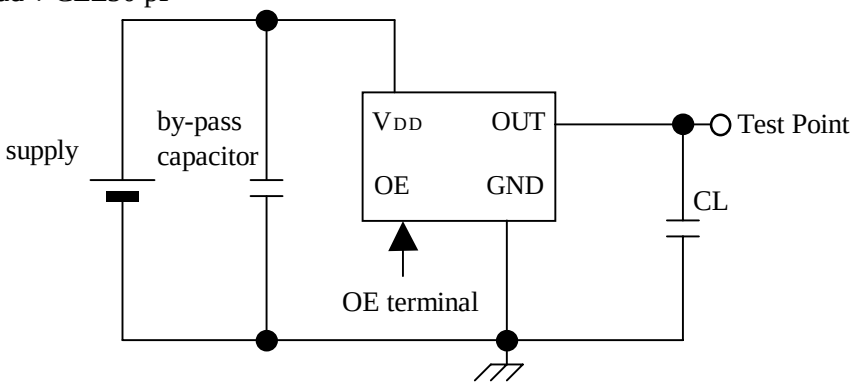
* [6] Timing chart

◆Reference : Current consumption Typ. value (V_{DD} = 5.0 V, Ta = +25 °C, No load)

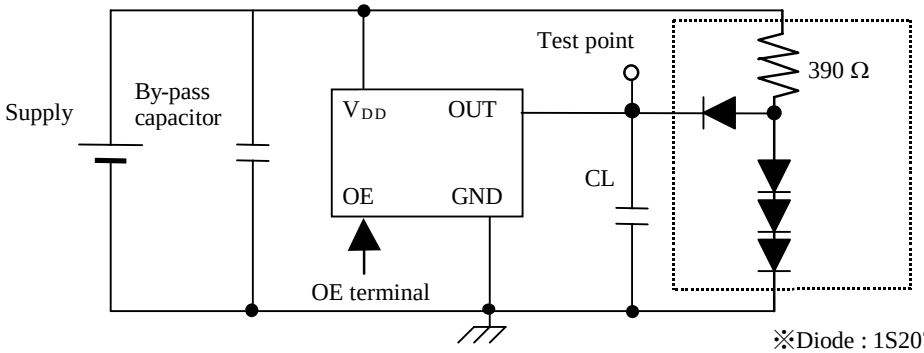


[5] Test circuit

1) C-MOS load：CL≤50 pF

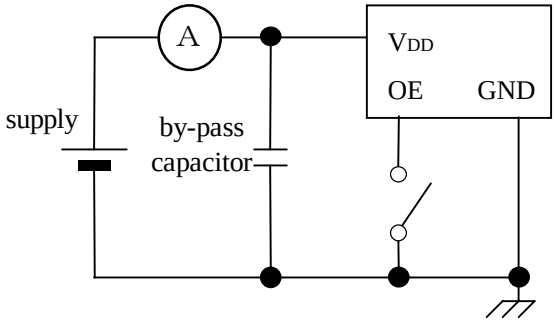


2)TTL load：10 TTL



※Diode : 1S2076A
※CL≤15 pF

3) Current consumption



*Current consumption under the disable function should be OE = GND.

4) Condition

(1) Oscilloscope

- Band width should be minimum 5 times higher (wider) than measurement frequency.
- Probe earth should be placed closely from test point and lead length should be as short as possible.

* Recommendable to use miniature socket. (Don't use earth lead.)

(2) 'CL' includes probe capacitance.

(3) By-pass capacitor (0.01 μF to 0.1 μF) is placed closely between V_{DD} and GND.

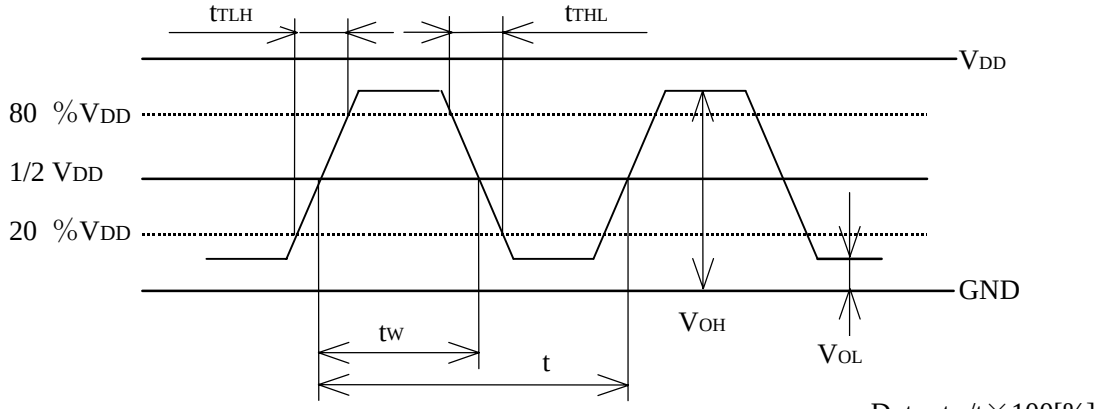
(4) Use the current meter whose internal impedance value is small.

(5) Power supply

- Start up time (0 %V_{DD} → 90 %V_{DD}) of power source should be more than 150 μs.
- Impedance of power supply should be as lowest as possible.

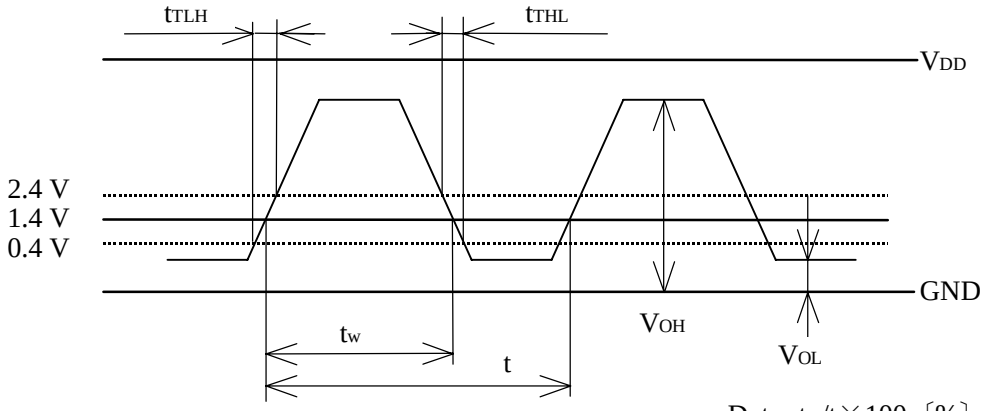
[6] Timing chart

1) C-MOS load (C-MOS Level)



Duty=tw/t×100[%]

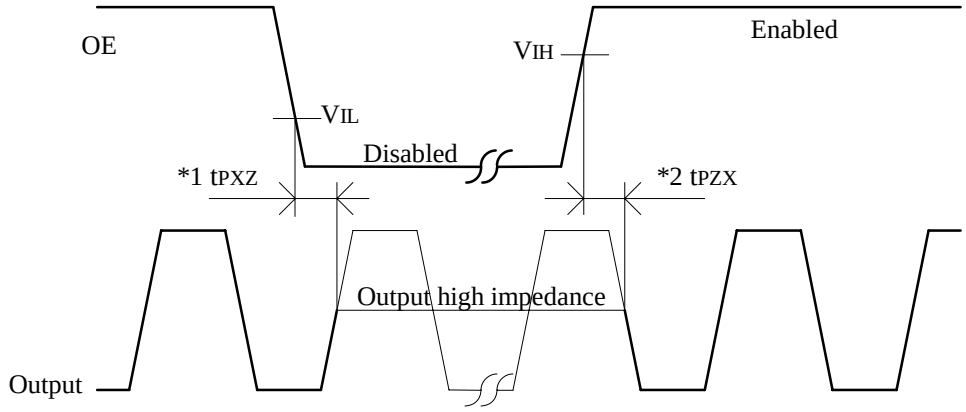
2) TTL load(10 TTL)



Duty=$t_w/t\times100$〔%〕

3) OE function and timing

OE function	Osc. circuit	Output status
High or Open	Oscillation	Specified frequency is output : Enable
Low	Oscillation	Output becomes high impedance : Disable



*1 The time taken from OE=VIL to output = Disable (high impedance)

*2 The time taken from OE=VIH to output = Enable

[7] Environmental and mechanical characteristics

(The company evaluation condition We evaluate it by the following examination item and examination condition.)

No.	Item	Value *1		Test Conditions
		Δ f / f *2 [1×10^{-6}]	Electrical characteristics	
1	High temperature storage	*3 ± 50	Satisfy Item [4] after test.	+125 °C × 1 000 h
2	Low temperature storage	*3 ± 10		-55 °C × 1 000 h
3	High temperature bias	*3 ± 20		+70 °C × 5.5 V × 1 000 h
4	Low temperature bias	*3 ± 10		-20 °C × 5.5 V × 1 000 h
5	Temperature humidity bias	*3 ± 20		+85 °C × 85 %RH × 5.5 V × 1 000 h
6	Temperature cycle	*3 ± 20		-55 °C ↔ +125 °C 30 min. at each temperature 100 cycles
7	Resistance to soldering heat for termination	± 10		a) Infrared – reflow or convection reflow soldering furnace (2 time) b) Dip termination into solder bath at +260 °C ± 5 °C for 10 s , 2 times
8	Drop	± 20		Free drop from 750 mm height on a hard wooden board for 3 times (Board thickness is more than 30 mm)
9	Vibration	± 10		10 Hz to 55 Hz amplitude 0.75 mm 55 Hz to 500 Hz acceleration 98 m/s^2 10 Hz → 500 Hz → 10 Hz 15 min./cycle 6 h (2 hours , 3 directions)
10	Pull - off	No peeling-off at a solder part		10 N press for 10 s ± 1 s Ref. EIAJ ED-4702
11	Solderability	Termination must be 95 % covered with fresh solder		Dip termination into solder bath at +235 °C ± 5 °C for 5 s. (Using Rosin Flux)
12	Solvent resistance	The marking shall be legible		Ref. JIS C 0052 or IEC 60068-2-45

< Notes >

*1 Each test done independently.

*2 Measuring 2 h to 24 h later leaving in room temperature after each test.

*3 Pre conditionings.

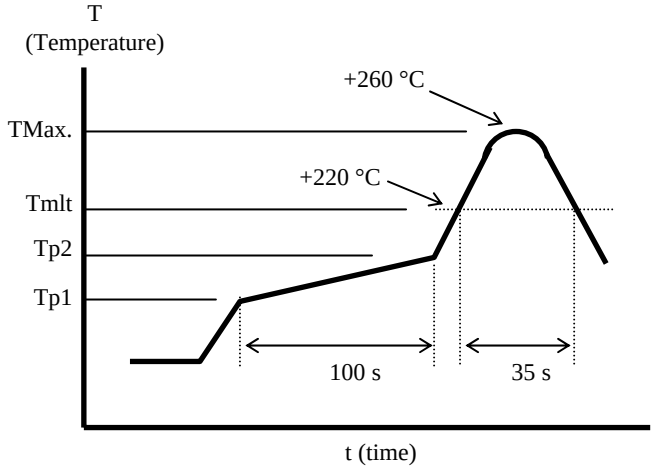
1.+125 °C × 24 h to +85 °C × 85 % × 48 h → reflow 2times.

2. Initial value shall be after 24 h at room temperature.

Infrared-reflow soldering furnace

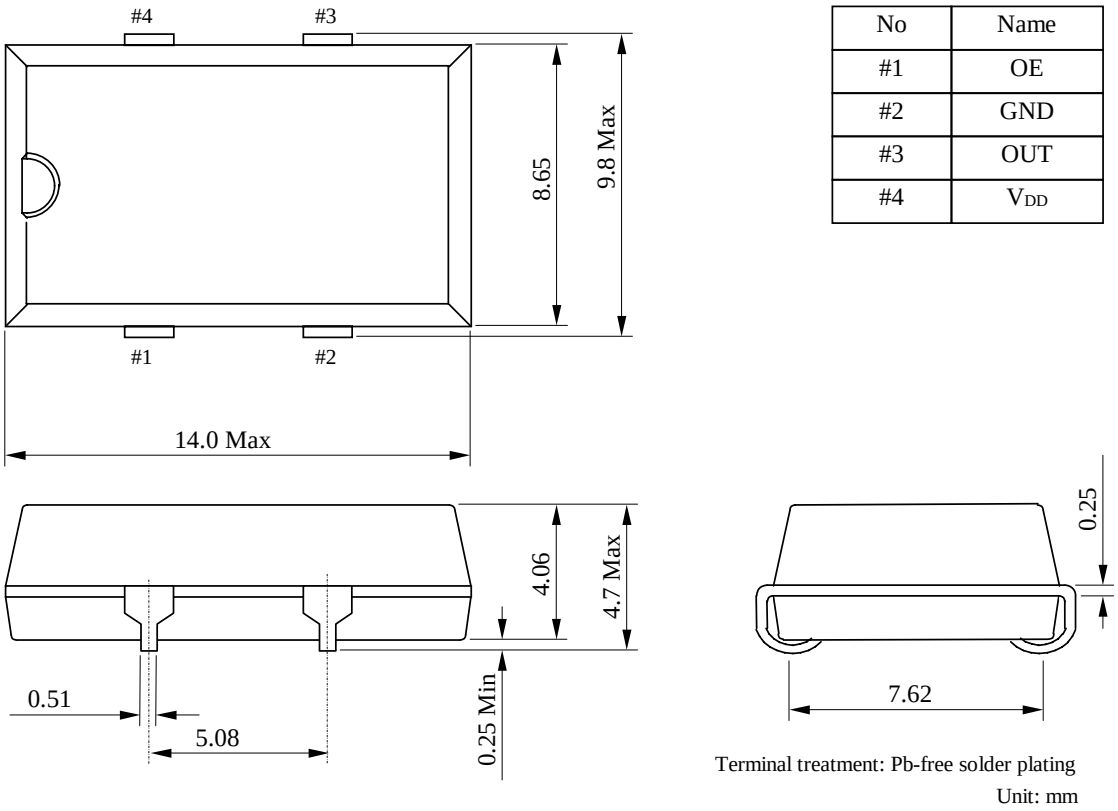
1.Pre heating temperature : Tp1 ~ Tp2 = +170 °C

2.Peak temperature must not exceed +260 °C and the duration of over +220 °C should be 35 s.



[8] Dimensions and marking layout

1) Dimensions

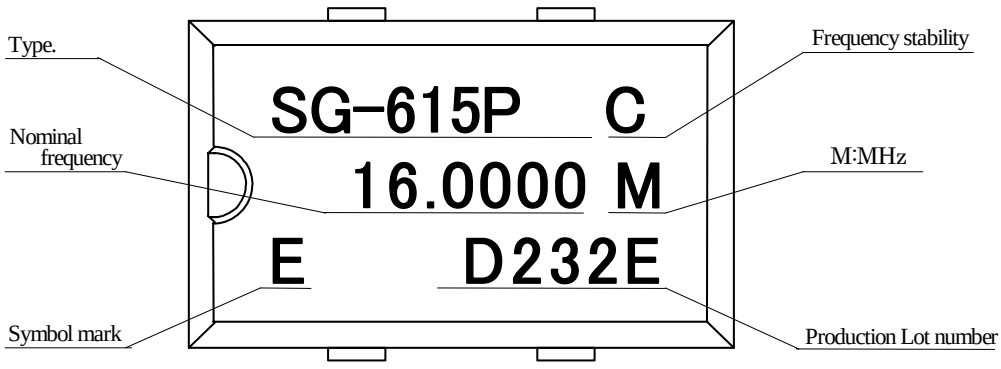


No	Name
#1	OE
#2	GND
#3	OUT
#4	V_{DD}

Terminal treatment: Pb-free solder plating

Unit: mm

2) Marking layout



- ♦ Nominal frequency shows as example.
- ♦ Output frequency shall indicate by 4 digits for below decimal point, if the value of frequency over 4 digits, the least significant digits will be omitted.
- ♦ The above marking layout shows only marking contents and their approximate position and it is not for font, size and exact position.

[9] Notes

1) This device is made with C-MOS IC.
   Please take precautions to prevent damage due to electrical static discharge.

2) We recommend placing a 0.01 μF to 0.1 μF capacitor closely between V_{DD} and GND to obtain stable operation and protest against power line ripple.

3) V_{DD} and GND pattern shall be as big as possible so that high frequency impedance shall be small.

4) We can not recommend to put filtering element into power line so as to reduce noise. Oscillator might be unstable oscillation because high frequency impedance of power line become higher. When use filtering element, please verify electrical construction and or element's spec.

5) Not recommend to power on from intermediate electric potential and/or extreme fast power on.
   Those powering on conditions may cause no oscillation and/or malfunction.

6) Power ripple : 200 mV P-P max.

7) As a long output line may cause irregular output, please take care to design output line is as short as possible, and also keeps high level signal source away from this device.

8) Another high level signal line may cause the operation error, so please do not place high level signal line close to this device.

9) This device contains a crystal resonator, so please don’t expose not give too much shock or vibration.
   We recommend to storage device under normal temperature and humidity to keep the specification.

10) An automatic insertion is available, however, the internal crystal resonator might be damaged in case that too much shock or vibration is applied by machine condition.
    Be sure to check your machine condition in advance.

11) Ultrasonic cleaning can be applicable on the SG-615P, however, since the oscillator might be damaged under some conditions, please exercise in advance.

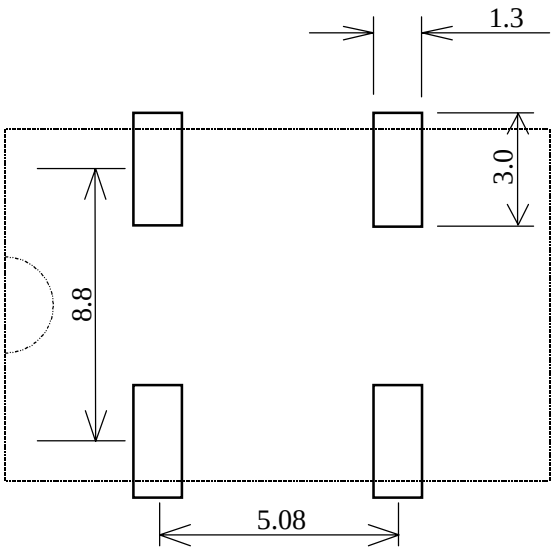
12) We recommend to use and store under room temperature and normal humidity to secure frequency accuracy and prevent moisture.

13) When don’t intend to use OE pin, please connect the pin to V_{DD}.
    We recommend to install a resistor in between to mitigate effect by surge etc.

[10] Recommendable patterning and glue position

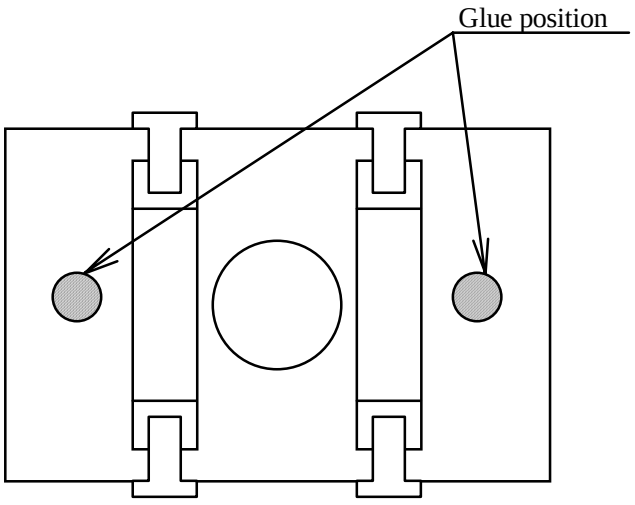
The soldering pad sample indicated as like following:

1) Soldering position (Unit : mm)



2) Glue position

Adhesive is recommended to be put on below position to avoid ejector pin dent.



TAPING SPECIFICATION

Ⅰ. Application

This standard will apply to SOJ 4 pin package.

Spec：JA package

Ⅱ. Contents

Item No.	Item	Page
〔1〕	Taping specification	1 to 2
〔2〕	Inner carton	3
〔3〕	Shipping carton	
〔4〕	Marking	4
〔5〕	Quantity	
〔6〕	Storage environment	
〔7〕	Handling	

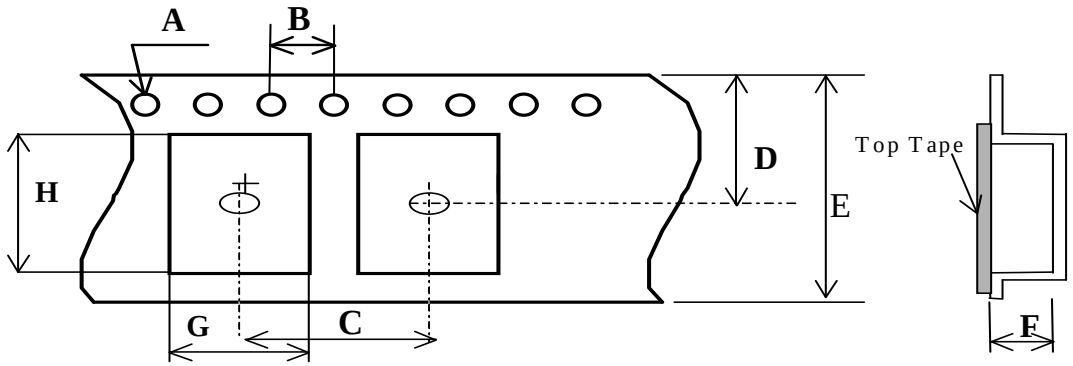
〔1〕 Taping specification

Subject to「EIA-481」and「IEC-60286」

(1) Tape dimensions TE-2412L

Material of the carrier tape : ＰＳ

Material of the top tape : PET

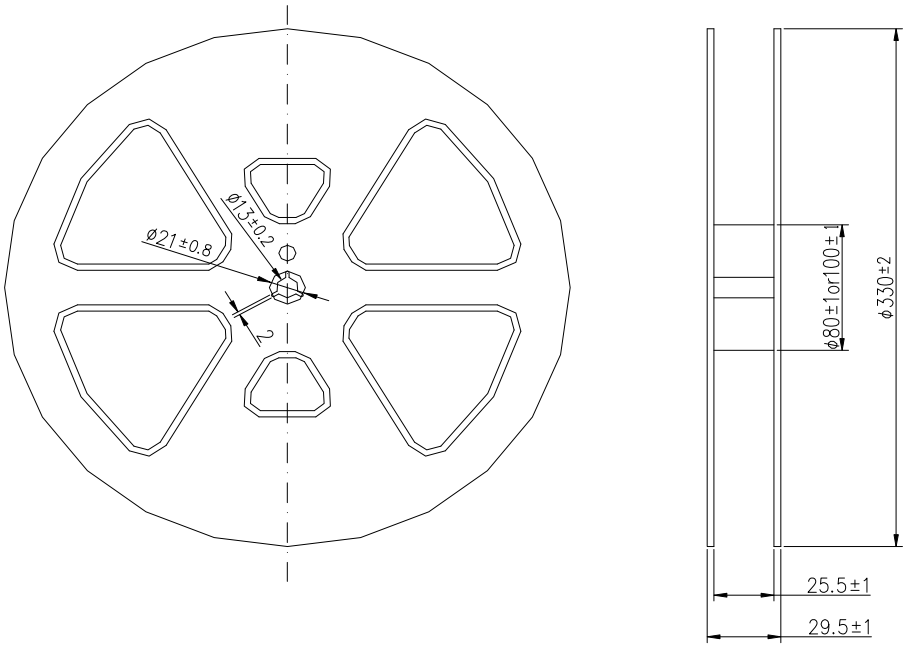


Symbol	A	B	C	D	E	F	G	H
Value	ϕ 1.55 +1.0/-0	4.0 ±0.1	12.0 ±0.1	13.25 ±0.2	24.0 ±0.3	4.5 ±0.3	10.0 ±0.1	14.4 ±0.1

Unit : mm

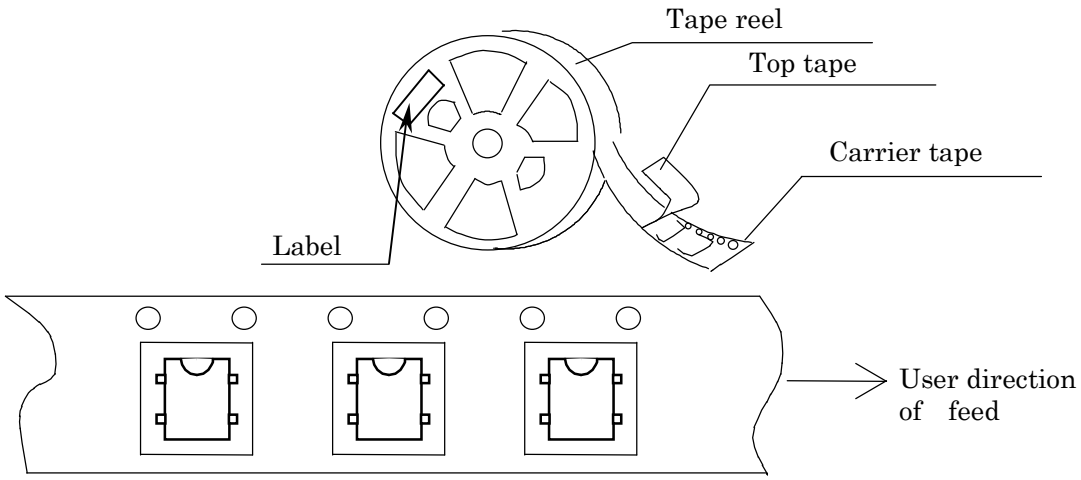
(2) Reel dimensions

Material of the reel : Conductive polystyrene

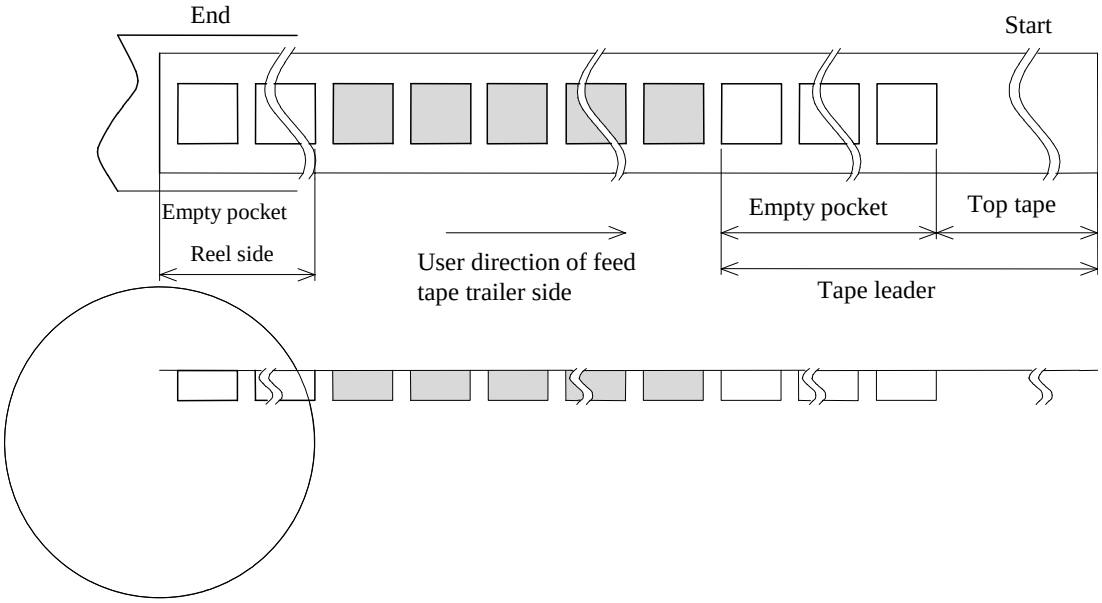


(3) Packing

①Tape & reel



②Start & end point



Item		Empty space
Tape leader	Top tape	Min. 1 000 mm
	Carrier tape	Min. 120 mm
Tape trailer	Top tape	Min. 0 mm
	Carrier tape	Min. 120 mm

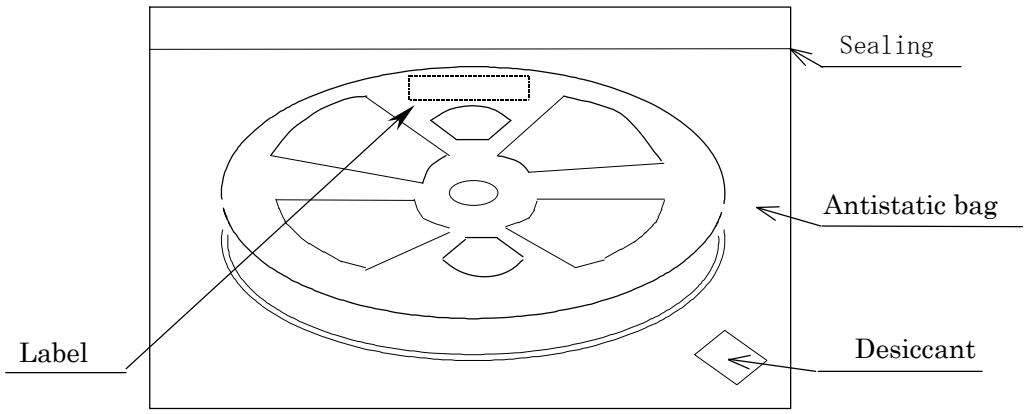
(4) Peel force of the cover tape

① angle : cover tape during peel off and the direction of unreeling shall be 165° to 180°.

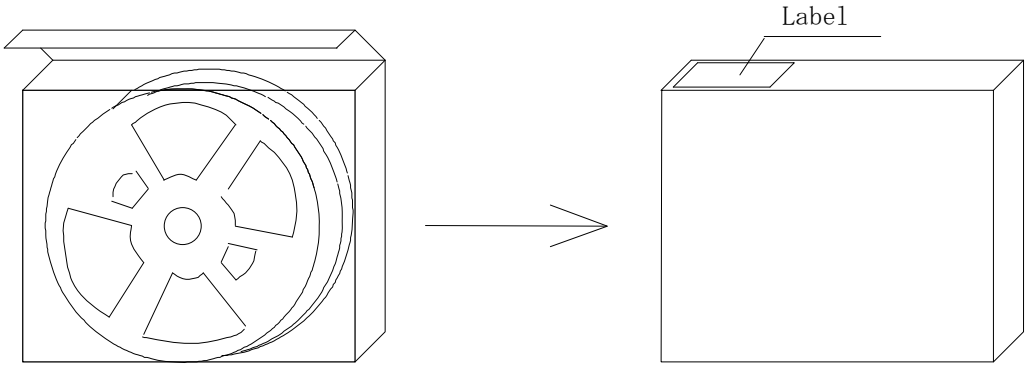
② peel speed : 300 mm / min.

〔2〕 Inner carton

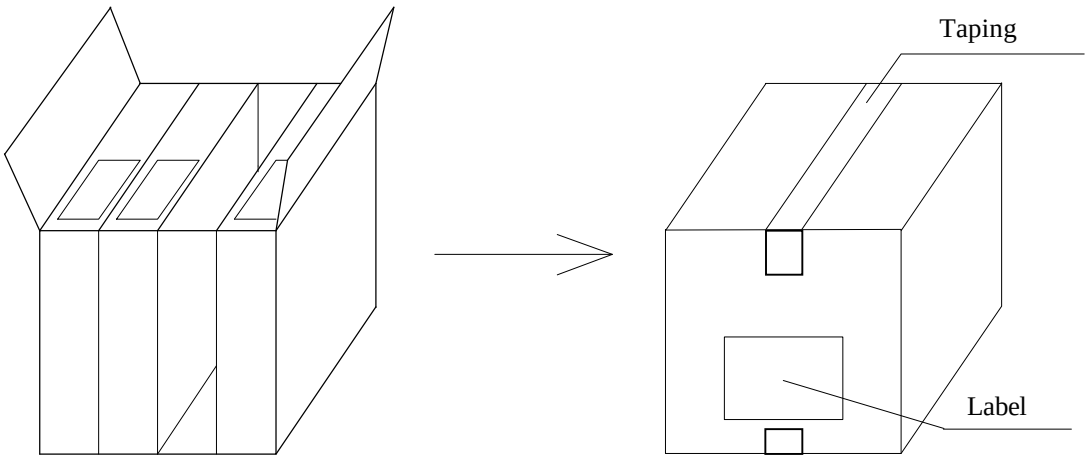
a) Packing to antistatic bag



b) Packing to inner carton



〔3〕 Shipping carton



〔4〕 Marking

(1) Reel marking

・Reel marking shall consist of :

1) Parts name
2) Quantity
3) Manufacturing date or symbol
4) Manufacturer's date or symbol
5) Others (if necessary)

(2) Inner carton marking

・Same as reel marking.

(3) Shipping carton marking

・Shipping carton marking shall consist of :

1) Parts name
2) Quantity

〔5〕 Quantity

・1 000 pcs./reel

〔6〕 Storage environment

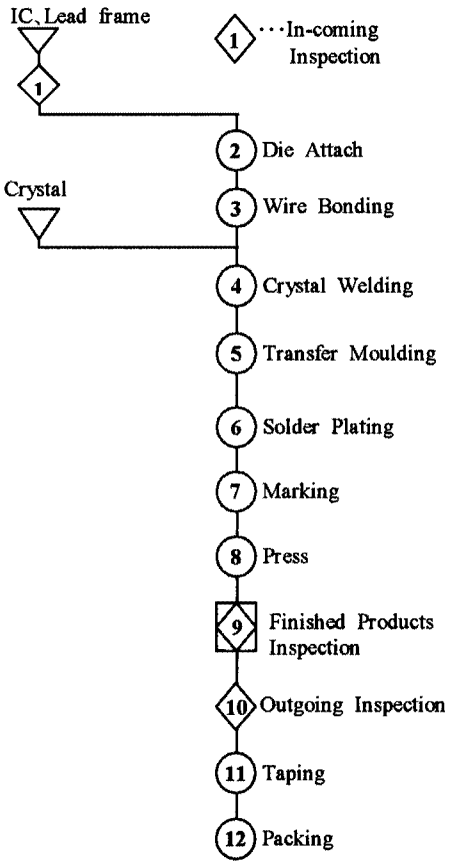
(1) To storage the reel at 15 °C to 35 °C, 25 %RH to 85 %RH of humidity.
(2) To open the packing just before using.
(3) Not to expose the sun.
(4) Not to storage with some erosive chemicals.
(5) Nothing is allowed to put on the reel or carton to prevent mechanical damage.

〔7〕 Handling

・To handle with care to prevent the damage of tape, reel and products.

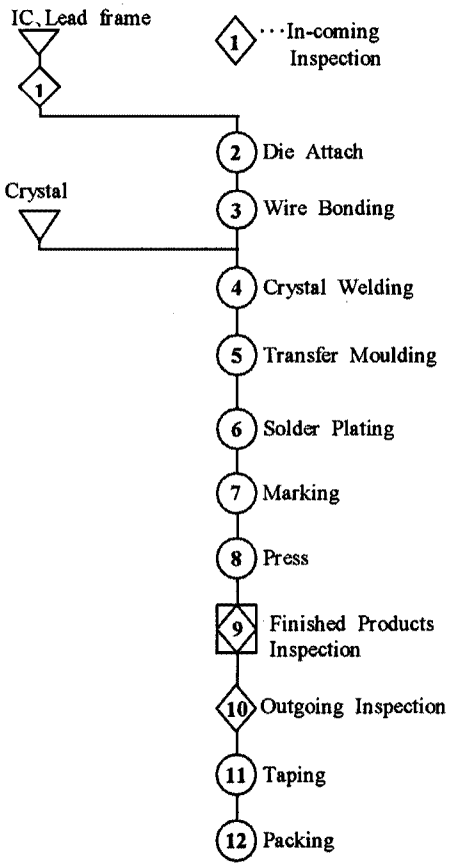
- PROCESS QUALITY CONTROL -

No. 615 – 00 – AME – 1 CRYSTAL OSCILATOR SG-615 Series '05.10.13

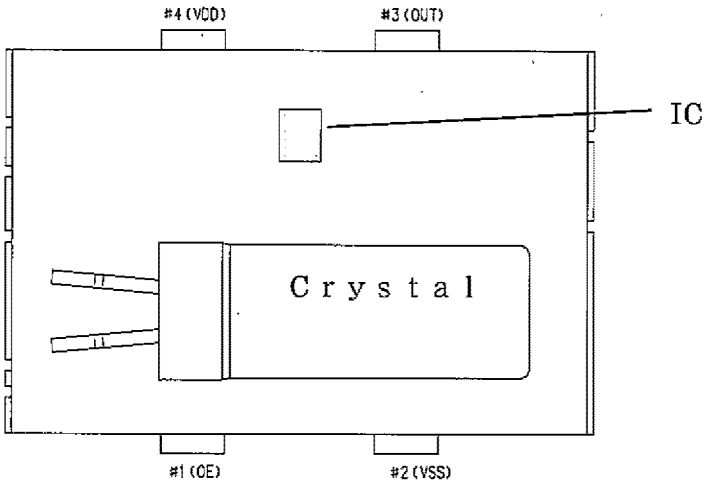
Manufacturing process chart	No.	Section in charge	Standards & specifications	Inspection & Control item	Inspection Instruments	Inspection methods	Record
	1	Inspection Section	Purchasing specification Incoming inspection standard	Appearance Dimension	Microscope	Sampling	Date sheet
	2	Production Section	Manufacturing inspection sheet	Appearance	Microscope	Sampling	Date sheet
	3	Production Section	Manufacturing inspection sheet	Bonding strength Appearance	Gauge Microscope	Sampling	Date sheet
	4	Production Section	Manufacturing inspection sheet	Appearance	Microscope	Sampling	Date sheet
	5	Production Section	Manufacturing inspection sheet	Shape of bonded wire	X-ray radio graphic equipment	Sampling	Date sheet
	6	Subcontractor company	Solder plating specification	Plating thickness	Fluorescent X-ray	Sampling	Date sheet
	7	Production Section	Manufacturing inspection sheet	Appearance	Visual inspection	Sampling	Date sheet
	8	Production Section	Manufacturing inspection sheet	Appearance	Microscope	Sampling	Date sheet
	9	Production Section	Manufacturing inspection sheet Finished products inspection standard	Electrical characteristics Appearance Master check	Measuring equipment Visual inspection	100% inspection Sampling One/Day	Date sheet
	10	Production Section	Delivery specification Outgoing inspection standard	Electrical characteristics Appearance Master check	Measuring equipment Visual inspection	Sampling	Date sheet
	11	Production Section	Manufacturing inspection sheet	Tape peeling force Frequency check function	Peeling force test machine	Sampling One/Day	Date sheet
	12	Production Section	Manufacturing inspection sheet Daily shipping list	Customers Type Quantity	—	—	Delivery slip

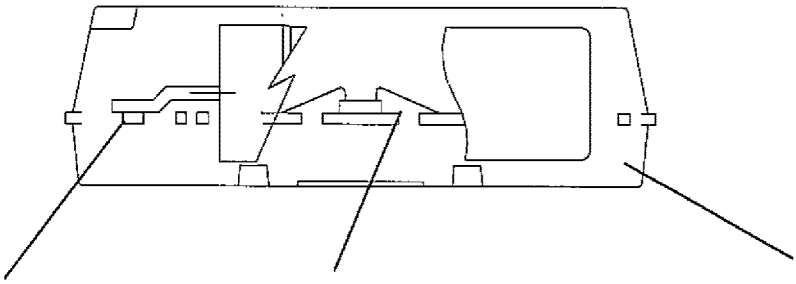
- PROCESS QUALITY CONTROL -

No. 615 – 00 – AEE – 1 CRYSTAL OSCILATOR SG-615 Series '05.10.13

Manufacturing process chart	No.	Section in charge	Standards & specifications	Inspection & Control item	Inspection Instruments	Inspection methods	Record
	1	Inspection Section	Purchasing specification Incoming inspection standard	Appearance Dimension	Microscope	Sampling	Date sheet
	2	Malaysia Plant	Manufacturing inspection sheet	Appearance	Microscope	Sampling	Date sheet
	3	Malaysia Plant	Manufacturing inspection sheet	Bonding strength Appearance	Gauge Microscope	Sampling	Date sheet
	4	Malaysia Plant	Manufacturing inspection sheet	Appearance	Microscope	Sampling	Date sheet
	5	Malaysia Plant	Manufacturing inspection sheet	Shape of bonded wire	X-ray radio graphic equipment	Sampling	Date sheet
	6	Subcontractor company	Solder plating specification	Plating thickness	Fluorescent X-ray	Sampling	Date sheet
	7	Malaysia Plant	Manufacturing inspection sheet	Appearance	Visual inspection	Sampling	Date sheet
	8	Malaysia Plant	Manufacturing inspection sheet	Appearance	Microscope	Sampling	Date sheet
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	11	Malaysia Plant	Manufacturing inspection sheet	Tape peeling force Frequency check function	Peeling force test machine	Sampling One/Day	Date sheet
	12	Malaysia Plant	Manufacturing inspection sheet Daily shipping list	Customers Type Quantity	—	—	Delivery slip

Structure diagram SG-615P/615PH





Lead Frame　　Bonding Wire　　Mould Package

LIST	
Name of part	Material
Lead Frame	42 Alloy
Transfer Moulding Compound	Epoxy Compound (Halide free)
Lead Frame Suface Treatment (Outer Lead)	Solder plating (Pb-free)
IC	C-MOS
IC Conductive Adhesive	Ag Paste
Bonding Wire	Au
Crystal Mount	Welding

RELIABILITY TEST DATA

Product Name : SG-615 Seris (P / PH / PTJ / PCN)

The Company evaluation condition

We evaluate environmental and mechanical characteristics by the following test condition . **No. OUT7-34-0507E**

No.	ITEM	TEST CONDITIONS	VALUE *1		TEST Qty [n]	FAIL Qty [n]
			Δ f / f *2 [1 × 10^{-6}]	Electrical characteristics		
1	High temperature storage	+125 ℃ × 1 000 h	*3 ± 50	Satisfy specification after test	22	0
2	Low temperature storage	-55 ℃ × 1 000 h	*3 ± 10		22	0
3	High temperature bias	+70 ℃ × 5.5V × 1 000 h	*3 ± 20		22	0
4	Low temperature bias	-20 ℃ × 5.5V × 1 000 h	*3 ± 10		22	0
5	Temperature humidity bias	+85 ℃ × 85 %RH × 5.5V × 1 000 h	*3 ± 20		22	0
6	Temperature cycle	-55 ℃ ⇔ +125 ℃ 30 min at each temp. 100 cycles	*3 ± 20		22	0
7	Resistance to soldering heat (Reflow characteristics)	Reflow furnace with the condition 2 times	± 10		11	0
8	Drop	Free drop from 750 mm height on a hard wooden board for 3 times (Board is thickness more than 30 mm)	± 20		11	0
9	Vibration	10 Hz to 55 Hz amplitude 0.75 mm 55 Hz to 500 Hz acceleration 98 m/s^2 10 Hz → 500 Hz → 10 Hz 15 min / cycle 6 h (2 × 3 directions)	± 10		11	0
10	Pull - off	10 N press for 10 s ± 1 s Ref. EIAJ ED-4702	No peeling - off at a solder part		11	0
11	Solderability	Dip termination into solder bath at +235 °C ± 5 °C for 5 s (Using Rosin Flux)	Termination must be 95 % covered with fresh solder		11	0
12	Solvent resistance	Ref. JIS C 0052 or IEC 60068-2-45	The marking shall be legible		11	0

Notes

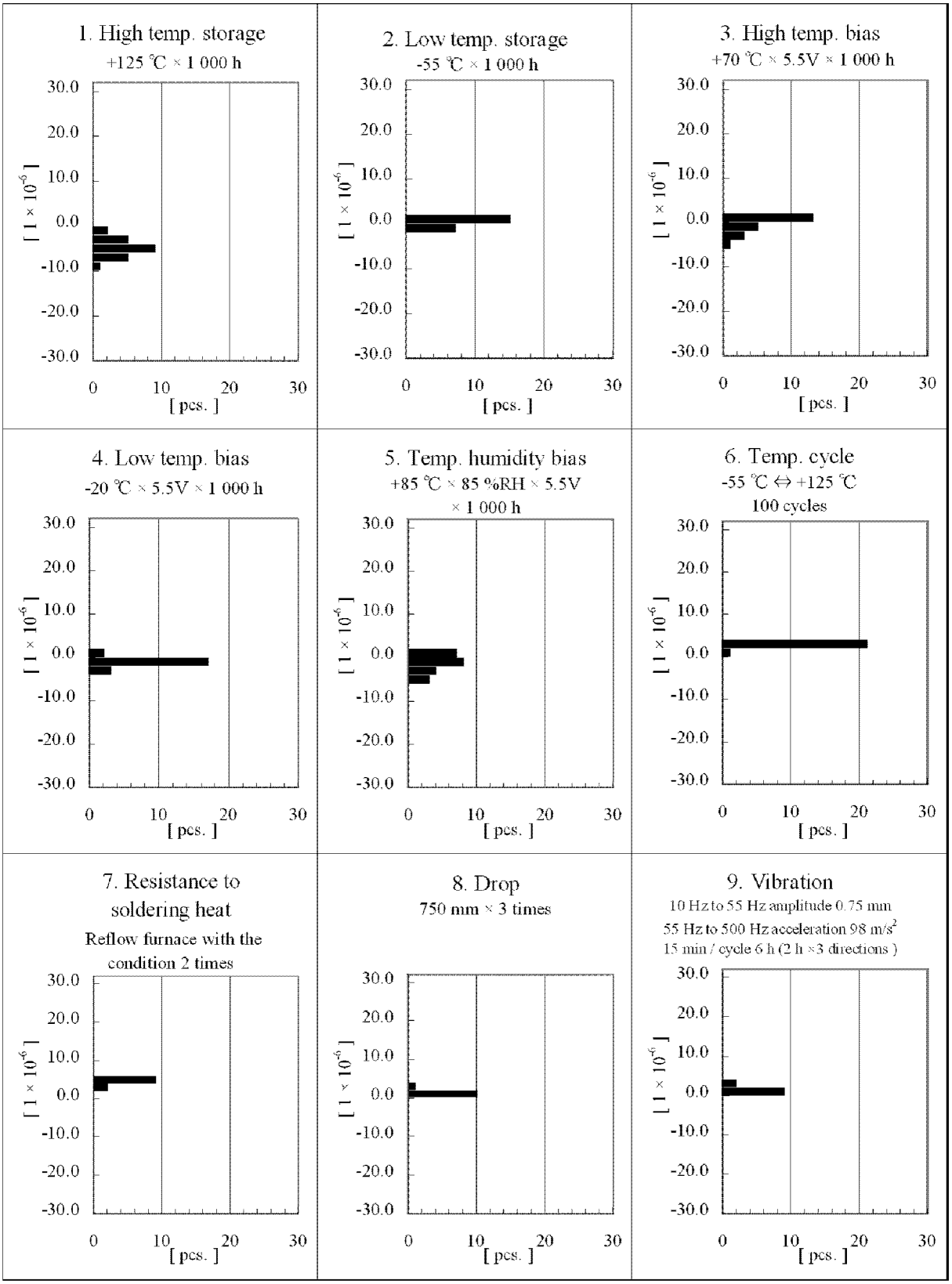
1. *1 Each test done independently.
2. *2 Measuring 2 h to 24 h later leaving in room temperature after each test.
3. *3 Pre conditionings
   1. +125 ℃ × 24 h to +85 ℃ × 85 % × 48 h → reflow 2 times
   2. Initial value shall be after 24 h at room temperature.

Qualification Data

Product Name : SG-615 Seris (P / PH / PTJ / PCN)

Δ f / f

No. OUT7-34-0507E



Qualification Data