

H.ELE.

Specifications for Approval



CUSTOMER

PRODUCT TYPE

Crystal Oscillator HSO211S

NOMINAL FREQUENCY

4.000000MHz

H.ELE. SAMPLE O/N

EOS-Q20150-1

H.ELE. P/N

S1H004000EECHB-T

RELEASE DATE

2026/02/26

VERSION

00

MSL

Level 1

PRODUCT STD.

 Pb free RoHS 2.0 Compliant HF-Halogen free REACH Compliant AEC-Q100 AEC-Q200(Grade 0 1 2 34)

CUSTOMER P/N

APPLICATION & MODEL

APPROVED BY CUSTOMER

(DATE)

Harmony Electronics Corp.		
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1. CRYSTAL OSCILLATOR SPECIFICATION

■ Electrical Specifications

Items	Symbol	Electrical Spec.			Unit	Condition
		Min	Typ	Max		
Output Frequency	(FL)	4.000000			MHz	
Mode of Oscillation		Fundamental				
Frequency Stability	$\Delta f/F$	-25	-	+25	ppm	@1.8±0.09V/-40~85°C
Operating temp. range	Topr	-40	25	+85	°C	
Supply voltage	Vdd	1.71	1.8	1.89	V	
Pin #1 options		YES				
Output load		C-MOS CL =15pF				
Current consumption 1 (#1 pin: open or "H")	Idd1	-	-	5	mA	@1.8V/ 25±3°C
Current consumption 2 (#1 pin: "L" level)	Idd2	-	-	0.01	mA	
Low level output voltage	Vol	-	-	0.1xVdd	V	
High level output voltage	Voh	0.9xVdd	-	-	V	
Symmetry	Duty	40	50	60	%	
Rise & Fall time	Tr & Tf	-	-	10	ns	
Low level input current	Iil	-	-	10	uA	
High Level input current	Iih	-	-	10	uA	
Low level input voltage	Vil	-	-	Vddx0.3	V	
High level input voltage	Vih	Vddx0.7	-	-	V	
Output disable time	Tplz	-	-	150	nsec	
Output enable time	Tpzi	-	-	10	msec	
Aging	-	-3	-	+3	ppm/Year	
Start-up time		-	-	3	ms	
Jitter, Phase	RMS(1-σ)	-	-	1	ps	

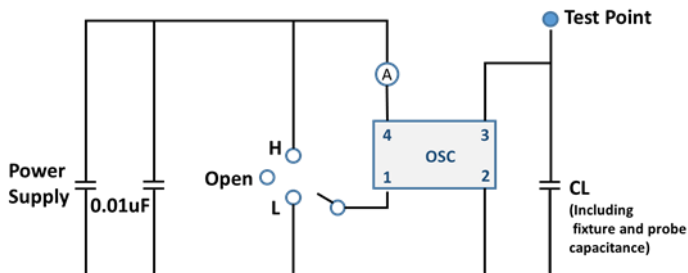
Note: Storage Temperature is only for the product itself.

■ Absolute Maximum Ratings

Item	Symbol	Value	Unit
Vdd terminal voltage	Vdd	-0.5 ~ 4.0	V
Input terminal voltage	Vcont	-0.5 ~ Vdd+0.5	V
Output terminal voltage	Vout	-0.5 ~ Vdd+0.5	V
Output terminal current	Iout	15	mA
Storage temp. range	Tstr	-55 ~ 125	deg.C



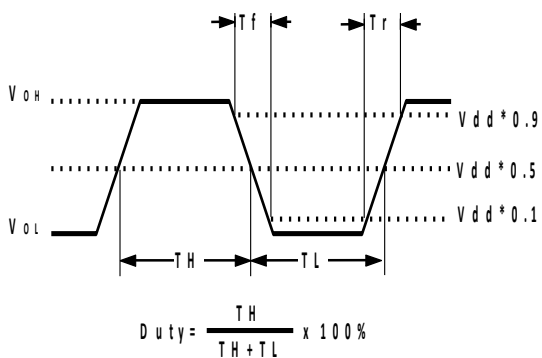
■ TEST Circuit



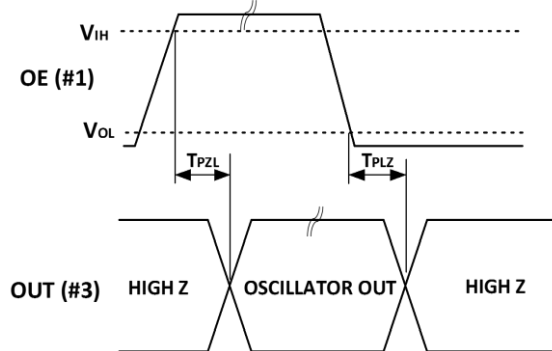
CL = Include jig & probe capacitance
(Refer to 4)

Switch	Out term.
H	Oscillation out
Open	Oscillation out
L	High Z

■ Output Wave Form

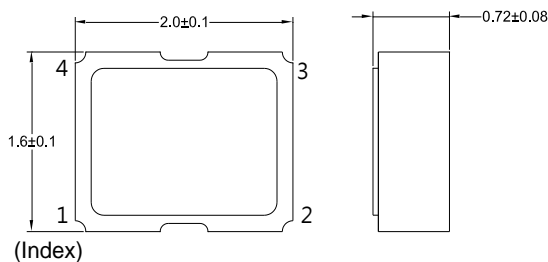


■ Input and Output Condition

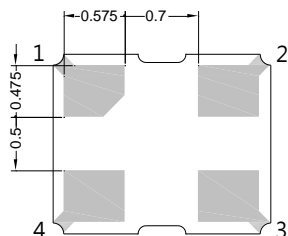


2. DIMENSION

TOP VIEW

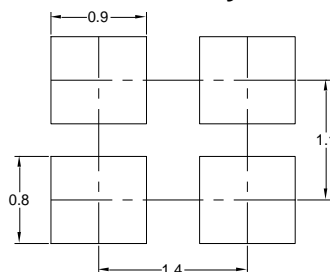


BOTTOM VIEW



Tolerance: ±0.1
Unit: mm

TOP VIEW Land Pattern Layout

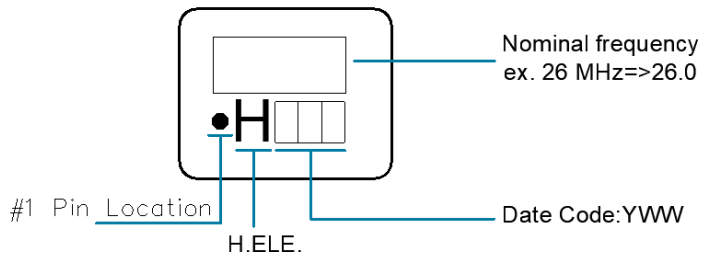


Pin Connections	
1	OE(Output Enable)
2	GND
3	Output
4	Vdd

* Note: The Index mark was defined by the BASE suppliers.



3. MARKING



Note:

1. Laser marking.
2. Date Code:

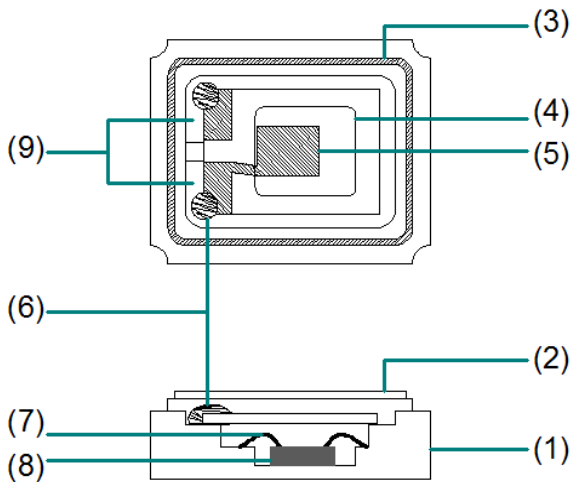
Y= Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Code	0	1	2	3	4	5	6	7	8	9

*Y= (1) last digit of the calendar year, repeat every 10 years.

WW=Week	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	...	W52
Code	01	02	03	04	05	06	07	08	09	10	...	52

* WW=2 digit week. There are 52 weeks in one year, the 1st week of January (W1) should be marked as "01".

4. INSIDE STRUCTURE



Reference drawing

No.	Component	Material	Note
1	Base-Ceramic	Ceramic	Al ₂ O ₃
2	Lid	Metal	Fe- Ni -Co
3	Kovar	Metal	Fe-Ni-Co
4	Crystal Blank	Quartz	SiO ₂ Rectangular At-Cut
5	Electrode	Metal	-
6	Connective Adhesive	Silver Powder	Ag
7	Bonding Wire	Metal	Au
8	IC	Silicon	Si, Al
9	Pad	Metal	W Ni-Plating Au-Plating

※The use prohibition chemistry substance of Table 1 of DHE-0204-1 (QA-QM-22) is not included in this item.

5. HANDLING SUGGESTION

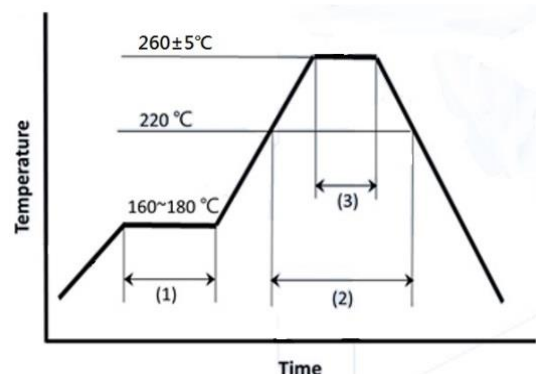
■ Reflow Condition

Please stay with our proposed reflow condition and do soldering within 2 times.

(1)	Preheat	160~180deg.C	120 sec.
(2)	Primary heat	>=220 deg.C	100±20 sec.
(3)	Peak	260±5 deg.C	10 sec. Max.

■ Manual Solder iron (Example)

Bit temp.: 350°C max., Time: 3sec max. ,
Each terminal only should be soldered once.





■ Mounting Conditions

Our products are suitable for most automated SMT processes. However, we strongly advise all our customers to conduct SMT sampling prior to mass production in order to make sure production processes will not affect the properties and specifications of our product. Seal welding and mounting procedures involving the use of ultra-sonic processes are not recommended and will affect and/or damage the internal properties of our product. Excessive shock during the mounting process will also affect the product and we strongly recommend setting SMT conditions to minimize such conditions.

If a possibility of the PCB being warped exists we strongly advise to ensure the degree of warping will not affect the product.

Please also ensure the operating characteristics and or soldering conditions are all within the specifications of use for our product.

Ultimately the worst case scenario of all the above will lead to cases of non-oscillation but other negative effects are also likely should our products be used in an inappropriate way. Please note such cases of misuse and its related quality issues are not included in our product warranty.

■ Cleansing Conditions

General cleaning solutions may be used to clean our products but we always recommend testing to be performed prior to mass production processes. Ultrasonic cleaning procedures are not recommended and we strongly advise other forms of cleansing to be evaluated first. Unsuitable cleansing may lead to a number of negative effects such as damage to the product surface, discoloration of the product, corrosion of the package, package contamination, illegible marking, etc. Please note cases of unadvised treatment and its related quality issues are not included in our product warranty.

■ Storage Conditions

Our Packaged product's storage conditions should at least meet the following condition:

Environmental Temperature: +15~+35 degrees Celsius

Relative Humidity: 80%RH Maximum

Please ensure our products are preserved appropriately in their original packaging.

Do not store with, close to, or within the vicinity of any corrosive chemicals.

Environmental moisture will affect the quality of our products, including and not limited to frequency instability, solderability, etc. Please make sure you store our products in a clean and cool environment away from direct sunlight.

Excessive heat will damage the packaging reel or cause it to deform. Please make sure to keep packaging reels in environments less than 40 degrees Celsius with relative humidity at 80% maximum.

Please do not place any other products directly on top of the reels or their cartons as this may damage the product inside.

Our products are miniature in size and are at high risk of structural fractures or other forms of damage. Precautions must be taken to avoid any excessive vibration of the product in or out of its packaging. We advise to avoid storing on high shelves where the products in or out of its packaging may fall. We do not recommend using the products if they have falling from high places.

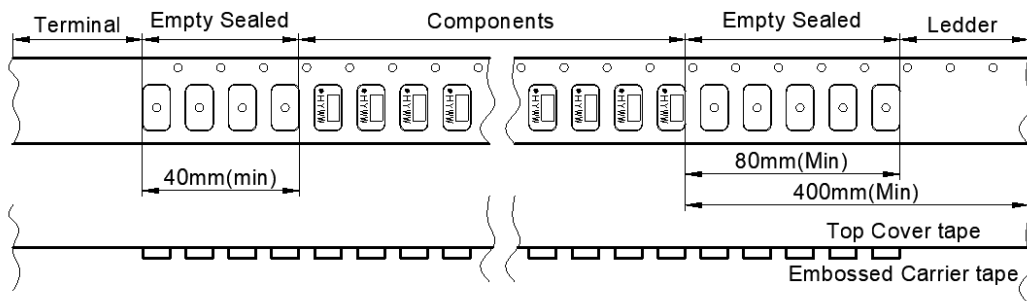
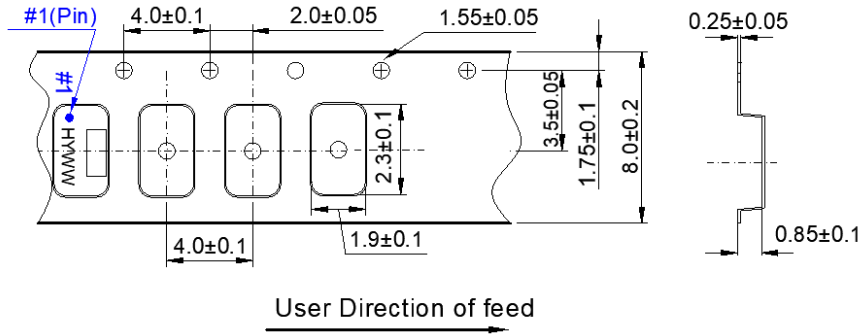
Please note storage instances which do not conform to our guidelines and the related quality issues produced as an outcome are not included in our product warranty.

HARMONY ELECTRONICS CORPORATION

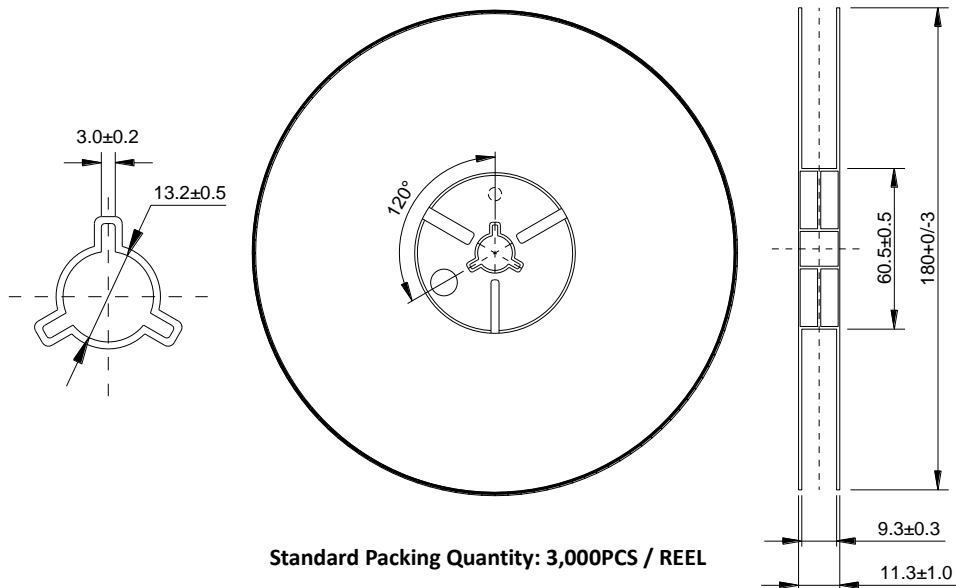


6. EMBOSS CARRIER TAPE AND REEL

Carrier Tape (unit:mm)



Reel (unit:mm)



Material of The Tape

Tape	Material
Carrier tape	PS Conductive
Top tape	Polyester

Joint of tape

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



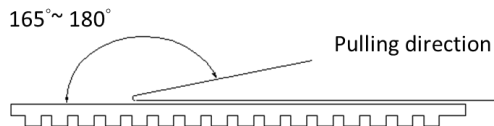
■ **Release strength of cover tape**

The force should be controlled between 0.1N to 0.7N under following condition.

Pulling direction: 165° to 180°

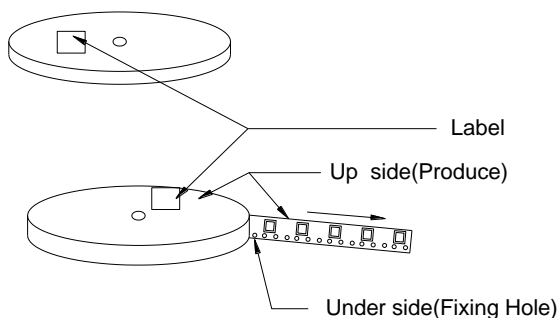
Speed: 300mm/min.

Otherwise unless specified.



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

7. PACKAGE



One reel quantity: [1000pcs]&[3000pcs]

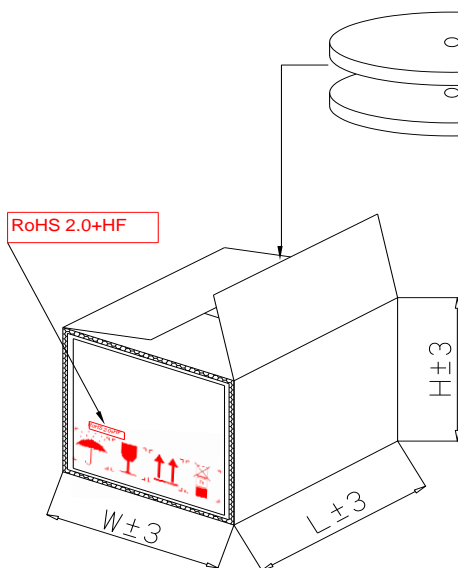
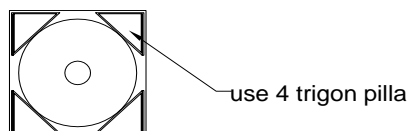
- ① Top and bottom with 2.3cm thickness foam-rubber cushion for protection.
- ② Carton's Q'TY: 1~15 pcs.
- ③ Carton Type=A,B,C use 4 trigon pilla

Label Contents

TYPE:
SPEC. No.:
Parts No.:
Lot No.:

FREQ.: MHz
Q'TY: PCS RoHS 2.0+HF
HARMONY ELECTRONICS CORP. MSL: 1

The label will be stickled on all reels.



Carton Type	A	B	C	D
Produce Type	840/751	630/531/ 421	321/221 211/111	OTHER
Reel	15	15	15	1~7
L±3	200	200	200	195
W±3	200	200	200	195
H±3	230/260	230	230	150



8. MECHANICAL PERFORMANCE

Item		Test Methods	Specifications Code
1	Drop	Dropping from 100 cm height 3 times on 30 mm Concrete floor. Refer to: JIS C 60068-2-32	FREQ. DRIFT: ±5 ppm Max.
2	Vibration	Supplying following vibration: Vibration Frequency:10 to 55 Hz, 0.8 mm, full wave Cycle : 1~2 min Direction : X. Y. Z. Time : 120min. to each direction Refer : MIL-HDBK-781A 6.5.2/ JIS C 60068-2-6	FREQ. DRIFT: ±5 ppm Max.
3	Leakage Test	Leak Rate 1.0×10^{-9} Pa·m ³ /sec. Max. Measured by Helium leak detector.	---
4	Solder ability	245+/-5°C, 3+/-0.5 sec Refer to: J-STD-002	Solder shall be cover 95% min.
5	Resistance of Soldering Heat	IR Reflow: 260+/-5°C (component temp), 10 sec, 1times. Test before and after at room temperature. Refer to: JIS C 60068-2-58	FREQ. DRIFT: ±5 ppm Max.

9. ENVIRONMENT PERFORMANCE

Item		Test Methods	Specifications Code
1	Temperature-Humidity	Temperature 60°C+/-2°C, RH 95%, for 240,500 hrs. Measurement at 24 hrs after test conclusion. Refer to: JIS C 60068-2-3	FREQ. DRIFT: ±5 ppm Max.
2	Low Temperature Storage	-40°C +/-2°C, for 240,500 hrs. Measurement at 24 hrs after test conclusion. Refer to: JIS C 60068-2-1	FREQ. DRIFT: ±5 ppm Max.
3	High Temperature Storage	+125 °C +/-2°C, for 240,500 hrs. Measurement at 24 hrs after test conclusion. Refer to: JIS C 60068-2-2	FREQ. DRIFT: ±5 ppm Max.
4	Thermal shock	-55 °C to 125°C, for 200 cycles Temp. Increasing or reducing time <3min 20min dwell time at each temperature extreme. Measurement at 24 hrs after test conclusion. Refer : JIS C 0025	FREQ. DRIFT: ±5 ppm Max.

FACTORY LOCATION

HEAD OFFICE/TAIWAN FACTORY

NO.39, HUADONG RD., DALIAO DIST., DAFA INDUSTRIAL PARK, KAOHSIUNG CITY 831.

CHINA FACTORY

DONGGUAN

BUILDING A1, HUAZHI INDUSTRIAL PARK, NO.38, JINGFU EAST ROAD, DALANG TOWN, DONGGUAN CITY.

THAILAND FACTORY

66MOO 5, KAONGU-BEOKPRAI RD., T.BEOKPRAI, A. BANPONG, RATCHABURI PROVINCE 70110.

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