

# NAKAGAWA ELECTRONICS LIMITED

## QUARTZ CRYSTAL UNIT SPECIFICATION

NKG PART NUMBER	<b>S6M12.0000F18E22</b>
DESCRIPTION	Quartz Crystal in 6.0x3.5 ceramic seam seal SMD package, 12.0MHz, 18pF, 20/20ppm; -20°C to +70°C

CUSTOMER
CUSTOMER P/N

<p>Please sign and chop for approval of the provided specification sheet and return us this cover page to us, thank you.</p>	<h3>CUSTOMER APPROVAL</h3>
	<p>Signature(s) and stamp here please.</p>

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### REVISION TABLE

REV.	DESCRIPTION	PREPARED	APPROVED	DATE
A	Original release	<i>E. Tse</i>	<i>N. Wong</i>	2010-03-19
B	Change form, add DL TYP, reduce CO, incr. T <sub>ST</sub>	<i>Jiang Y. B.</i>	<i>M. Bruech</i>	2013-01-31
C	Rev form, upd. date code table, add T <sub>OPAB</sub>	<i>KT Yuen</i>	<i>M. Bruech</i>	2022-05-30
D	NO ENTRY			

ADDRESS: Block A, Flat 1-2 7/F., Hoi Luen Ind. Centre, 55 Hoi Yuen Rd., Kwun Tong, Kln., Hong Kong,  
 Tel: (852) 2389 9201, Fax: (852) 2341 0001, E-mail: info@nkg.com.hk, Web: www.nkg.com.hk

**1. ELECTRICAL PARAMETERS AND ENVIRONMENTAL CONDITIONS**

PACKAGE TYPE (SEE NEXT PAGE FOR DETAILS)	CX-6M (6.0x3.5 p4h11)
NOMINAL FREQUENCY (F <sub>N</sub> )	<b>12.000MHz</b>
MODE OF OSCILLATION	FUNDAMENTAL
CRYSTAL CUT	AT-Cut
LOAD CAPACITANCE (C <sub>L</sub> )	18pF
FREQUENCY TOLERANCE (Δf/F <sub>N</sub> at +25°C)	±20ppm
FREQUENCY STABILITY (NOTE 1)	±20ppm
OPERATING TEMPERATURE (T <sub>OP</sub> ) (NOTE 2)	-20°C to +70°C
OPERABLE TEMPERATURE (T <sub>OPAB</sub> ) (NOTE 2)	-40°C to +85°C
AGING FIRST YEAR ( (Δf/F <sub>N</sub> )/y <sub>1</sub> at +25°C)	±3ppm
EQUIVALENT SERIES RESISTANCE (ESR)	50Ω MAX
DRIVE LEVEL (DL)	100μW TYP; 500μW MAX
SHUNT CAPACITANCE (C <sub>0</sub> )	5.0pF MAX
INSULATION RESISTANCE (IR @100V <sub>DC</sub> )	500MΩ MIN
STORAGE TEMPERATURE (T <sub>ST</sub> )	-55°C to +125°C
TEST IMPEDANCE METER (NOTE 3)	IEC-444 COMPLIANT
REFLOW SOLDERING CONDITIONS	10s MAX AT +260°C±5°C

NOTE 1: Frequency stability is the frequency deviation over operating temperature in reference to the frequency reading at +25°C.

NOTE 2: Parameter limits are guaranteed over the operating temperature range. The unit operates correctly over the operable temperature range, but may exceed one or more specified parameter limits.

NOTE 3: Test impedance meter such as S&A 250B, KOLINKER KH series or other IEC-444 compliant equipment.

**2. PRODUCT MARKING**



NKG = NAKAGAWA logo and DATE CODE “Yww”

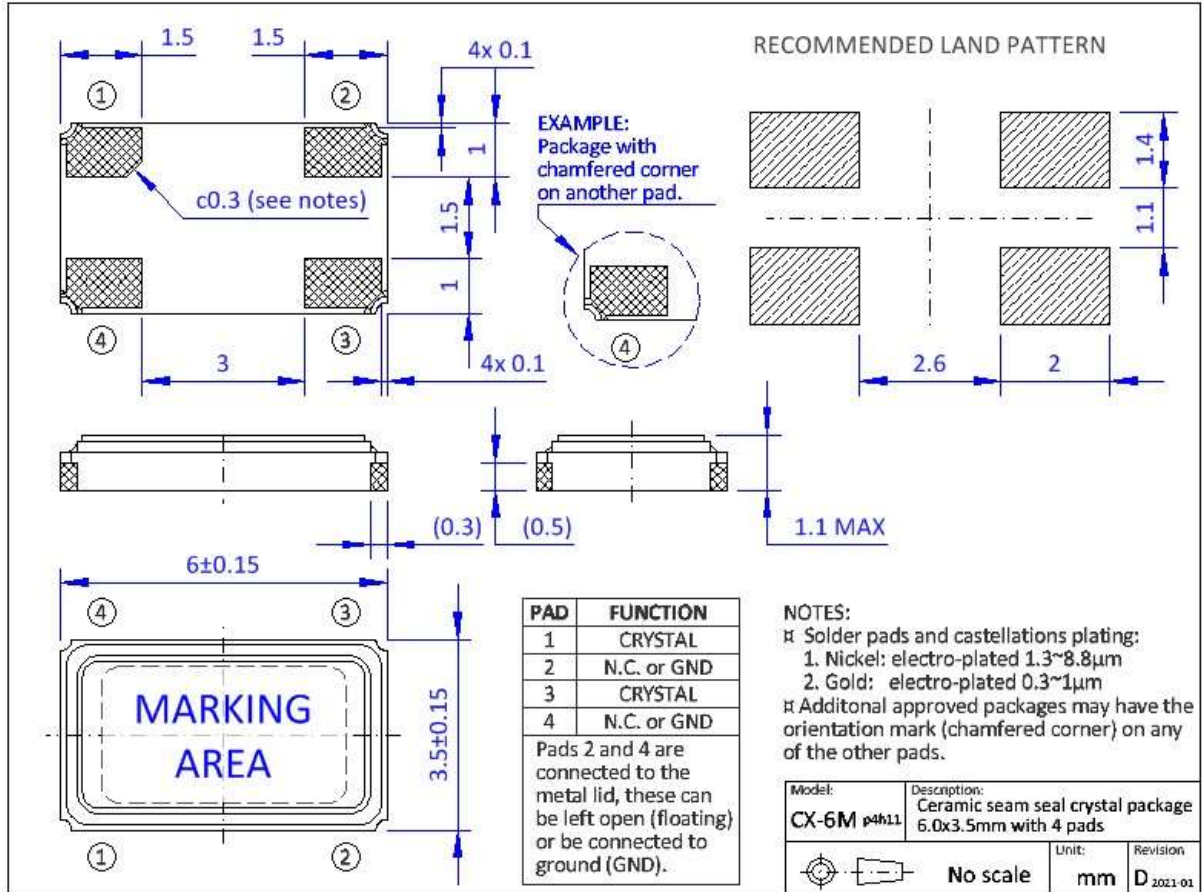
[Y] = alpha YEAR CODE per table below

[ww] = WEEK number of manufacturing

FREQUENCY in MHz (2+3 digits or 3+2 for OT mode units)

YEAR	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
CODE	W	X	Y	Z	A	B	C	D	E	F	G

**3. PACKAGE DIMENSIONS**

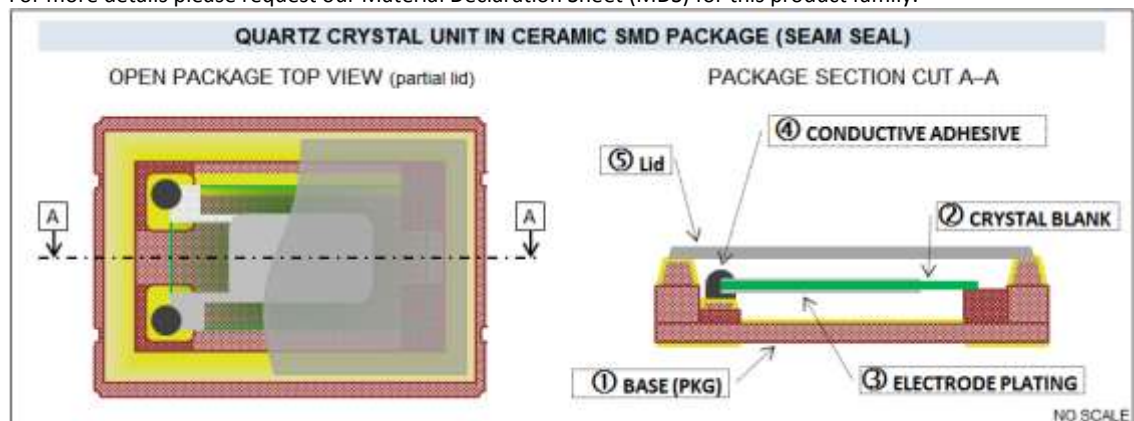


**4. ENVIRONMENTAL COMPLIANCE INFORMATION**

The product consists of the following parts and materials:

NO.	PART	MATERIAL(S)	REMARKS
1	BASE (PACKAGE)	Ceramic (Al <sub>2</sub> O <sub>3</sub> )	Terminals gold plated
2	CRYSTAL BLANK	Quartz (SiO <sub>2</sub> )	Synthetic material, pure
3	ELECTRODE PLATING	Silver (Ag)	High purity metal
4	CONDUCTIVE ADHESIVE	Silver filled epoxy type	Conductive cement
5	LID (COVER)	Metal alloy (Kovar)	Surface Nickel coated

For more details please request our Material Declaration Sheet (MDS) for this product family.



- **RoHS COMPLIANCE**

We can certify herewith that the product is fully RoHS complaint according the “DIRECTIVE 2011/65/EU OF THE EURPPEAN COUNCIL and DIRECTIVE 2015/863 (RoHS 2/3 or also called RoHS 10) for electrical and electronic equipment and its amendments.

No exemptions are applicable for this product.

This product is considered LEAD-FREE, Lead (Pb) contamination guaranteed to be below 500ppm.

In regards of RoHS CE marking directive for finished products, we can provide RoHS test reports and MDS to show compliance, but since our product is not a final application we cannot provide a CE mark.

- **HALOGEN FREE**

We can certify that this product is Halogen-Free per IEC 61249-2-21:2003 meeting the threshold limits given by the standard.

- **REACH (SVHC) COMPLIANCE**

We have verified and continue monitoring the usage of substances (SVHC) listed by REACH, Registration, Evaluation, Authorization and Restriction of Chemicals, a European Community Regulation on chemicals and their safe use (Regulation (EC) No 1907/2006) entered into force on June 1st 2007. We keep continuously monitoring the ongoing updates made by REACH and verify that the products stay compliant; please feel free to request our CoC for compliance confirmation.

The product does comply as well with the substance prohibitions and restrictions defined in Annex XVII of Regulation 1907/2006 (REACH), none of the listed substances being contained. (As of today, the release date of this document.)

- **PFOS / PFOA FREE**

We can certify that the product as specified is being FREE of any PFOS and PFOA.

- **ELECTROSTATIC DISCHARGE (ESD) SENSITIVITY**

This product is NOT sensitive to ELECTROSTATIC DISCHARGE (ESD), no specific precautions for handling and storage are required.

- **MOISTURE SENSITIVITY (MSL) CLASSIFICATION [ J-STD-020C ]**

This product in a hermetically sealed package, does NOT fall under the classification of moisture sensitivity per above stated standard (standard is for non-hermetically sealed components).

If customer’s system requires an entry in this regard we suggest using LEVEL 1.

**5. RELIABILITY TEST INFORMATION**

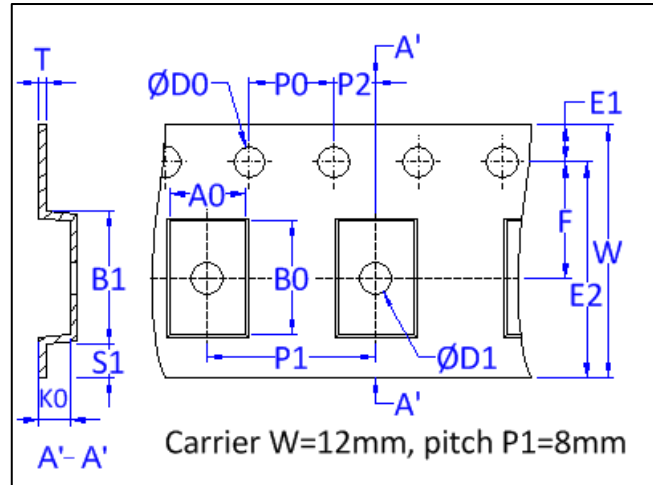
NO.	TEST ITEM	TEST CONDITIONS	CRITERIA
1	High Temperature Storage MIL-STD-202 Method 108	1,000 hours ±12 hours; @85°C ±2°C 24±2 hours rest before electrical test	ΔFr=±10ppm ΔRs=±5ohm
2	Biased Humidity MIL-STD-202 Method 103	1,000 hours ±12 hours; @85°C ±2°C and RH=85% 24±2 hours rest before electrical test	ΔFr=±10ppm ΔRs=±5ohm
3	Low Temperature Storage IEC-60068-2-1	1,000 hours ±12 hours @-40°C ±2°C 24±2 hours rest before electrical test	ΔFr=±10ppm ΔRs=±5ohm
4	Temperature Cycling JESD22 Method JA-104	@-55°C and +125°C; 1000 cycles Transfer time 5min, dwell time 30min 24±2 hours rest before electrical test	ΔFr=±10ppm ΔRs=±5ohm
5	Shock Test (Drop Test) IEC-60068-2-32	3 times drop from 100cm height onto 3cm thick hard wood plate	ΔFr=±5ppm ΔRs=±2ohm
6	Shock Test (Mechanical) MIL-STD-202 Method 213	Devices are shocked with 100G, half since wave in three perpendicular axis for three times each direction	ΔFr=±5ppm ΔRs=±2ohm
7	Vibration MIL-STD-202 Method 204	Frequency range 10~2,000Hz Amplitude 5g Sweep time 20 min 12 cycles of each direction (3 axis)	ΔFr=±5ppm ΔRs=±2ohm
8	Resistance to Soldering Heat J-STD-020C	Pre-heat temp. +150~200°C Pre-heat time 60~180s Test temperature +260°C ±5°C Test time 20~40s, 2 times	ΔFr=±5ppm ΔRs=±2ohm Visually good, no rusting
9	Solderability J-STD-002	Pre-conditioned @+155°C, 4 hours dry heat, subject to soldering by applying SMD method B: 260°C±5°C	≥95% solder coverage
10	Terminal Strength (SMD) JISC60068-2-21	1.8kg tangential thrust (60 seconds) and 1.8kg of vertical tension (60 seconds)	No rupture of solder pads

For more details you may request our Reliability Test procedure or the bi-annual test reports.

**6. PACKAGING INFORMATION**

ALL NON-SPECIFIED DIMENSIONS AND T&R PARAMETERS ARE IN COMPLIANCE TO EIA-481.

▪ **CARRIER TAPE**

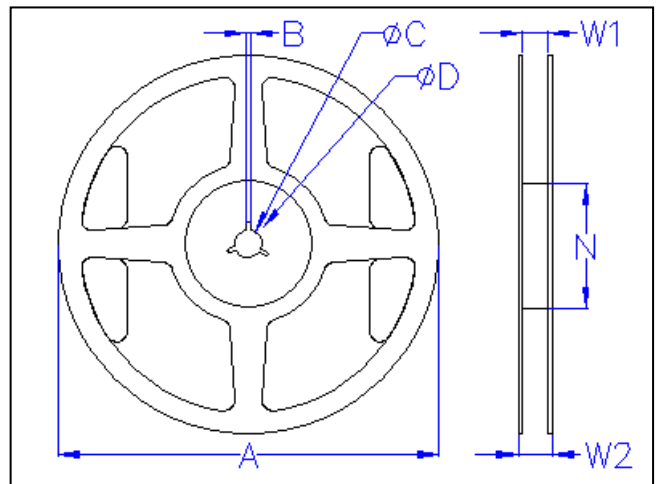


Symbol	A0	B0	B1	D0	D1	E1	F	K0	P0	P1	P2	T	W
Dim.	4.0	6.4	8.0	1.5	1.5	1.75	5.5	1.4	4.0	8.0	2.0	0.3	12.0±0.2

ALL DIMENSIONS [mm]; ALL TOLERANCES ±0.1 IF NOT STATED OTHERWISE.

▪ **REEL**

QTY per reel: 1,000pcs



Symbol	A	B	∅C	∅D	N	W1	W2
Dim.	∅178±1.0 (altern. 180mm)	2.5+0.5	∅13.0±0.5	22.2±1.0	∅60	12.5+0.5	16.0+0.5

ALL DIMENSIONS [mm]

▪ **UNREELING AND PRODUCT ORIENTATION**

Quartz crystal units are non-polarized components; there is no pin identification or specific orientation in the carrier tape required. Products may insert in the carrier tape with their marking all in same direction for cosmetic reasons only.

▪ **PACKAGING BOX (Pizza box)**

Box size: 185x185x25 MAX

QTY per box: 1 Reel

**END OF DOCUMENT**