



## CRYSTAL

### SMD49S-12M2020F

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## ■ ELECTRICAL SPECIFICATIONS

### Standard atmospheric conditions

Unless otherwise specified. The standard range of atmospheric conditions for making measurement and tests are as follow:

Ambient temperature :  $25 \pm 5$

Relative humidity: 40%~70%

If there is no doubt the results, measurement shall be made within the following limits:

Ambient temperature :  $25 \pm 1$

Relative humidity: 40%~70%

### Measure equipment

Electrical characteristics measured by S&A 250B or equivalent.

### Crystal cutting type

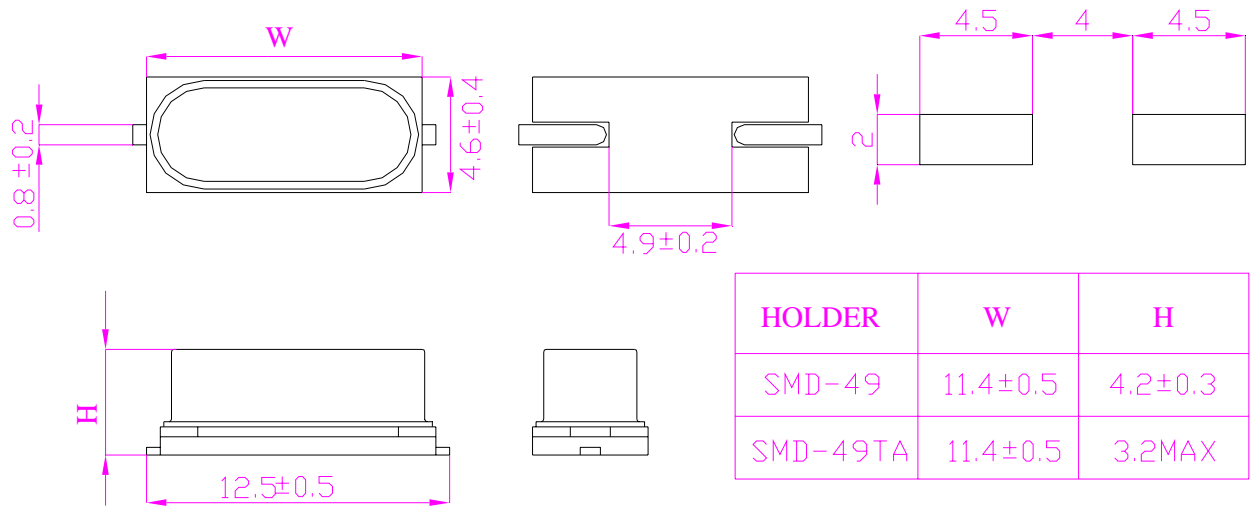
The crystal is using AT CUT (thickness shear mode)

	Parameters	SYM	Electrical spec.	UNITS	Notes
1	Nominal Frequency	FL	12.000	MHz	-
2	Oscillation Mode	-	Fund	-	-
3	Load Capacitance	CL	20	pF	-
4	Frequency Tolerance	-	$\pm 20$	ppm	at 25 $\pm 3$
5	Frequency Tolerance	-	$\pm 50$	ppm	Over Operating Temp. Range (Reference 25 )
6	Operating Temperature	-	-10~+60		-
7	Aging	-	$\pm 5$	ppm	1st Year
8	Drive Level	DL	100	$\mu$ W	-
9	Effective Resistance Rr	Rr	50 max		-
10	Shunt Capacitance C0	C0	7max	pF	-
11	Motional Capacitance C1	C1	-	fF	-
12	Spurious Response	SPDB	-.	dB	
13	Insulation Resistance	-	500	M	at DC 100V
14	Storage Temperature Range	-	-55~+125		-
15	Others				



■ **DIMENSION**

1. Crystal enclosure seal : resistance weld
2. Crystal enclosure medium : Nitrogen



■ **MARKING**

M12.000E8D

■ **SHELF LIFE & STORAGE CONDITIONS**

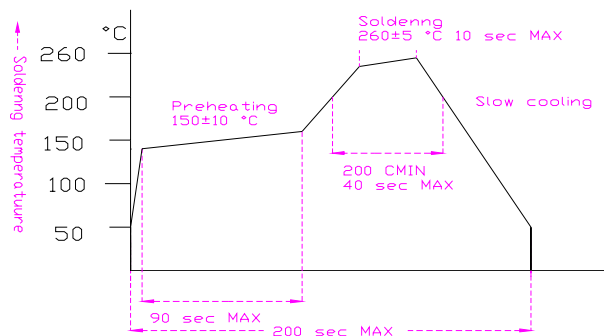
No shipment is allowed by manufactured over 1 year .

Storage Conditions:

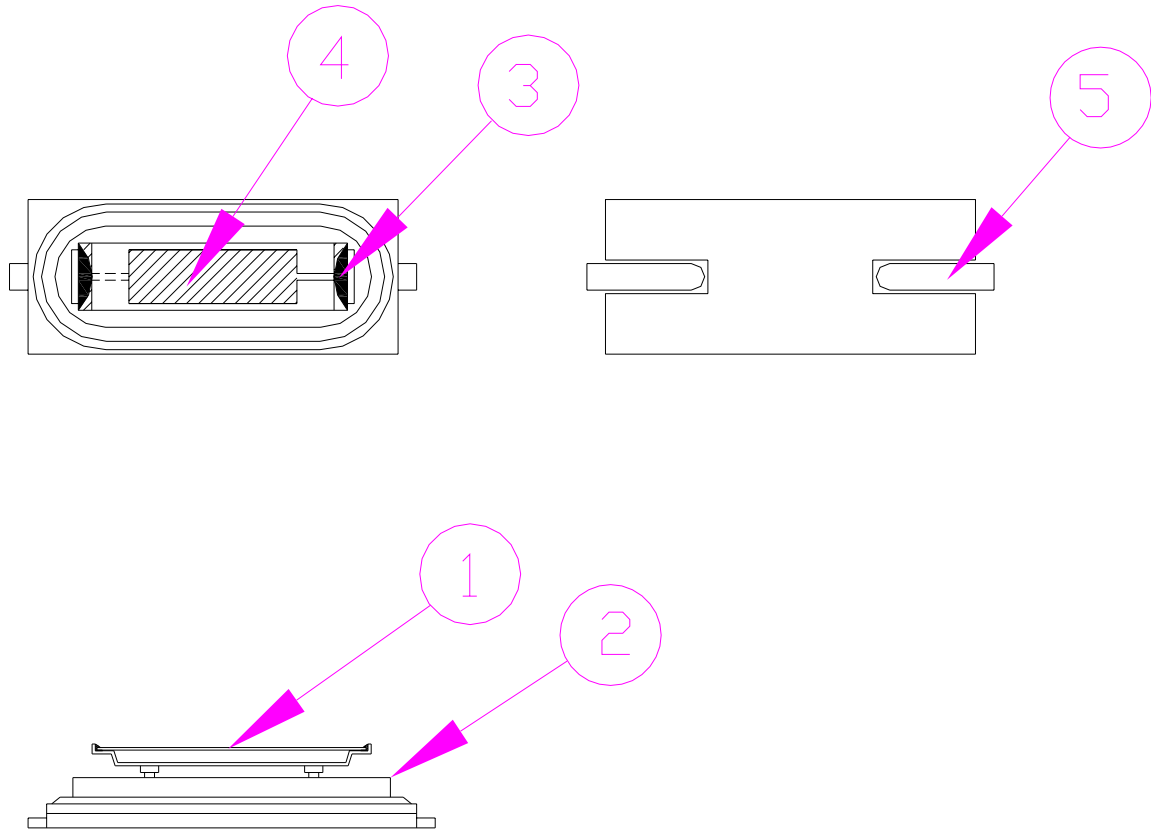
Temp.	Humidity
25 ± 3	40~60%

■ **SUGGESTED REFLOW PROFILE**

Total time : 200sec.Max.



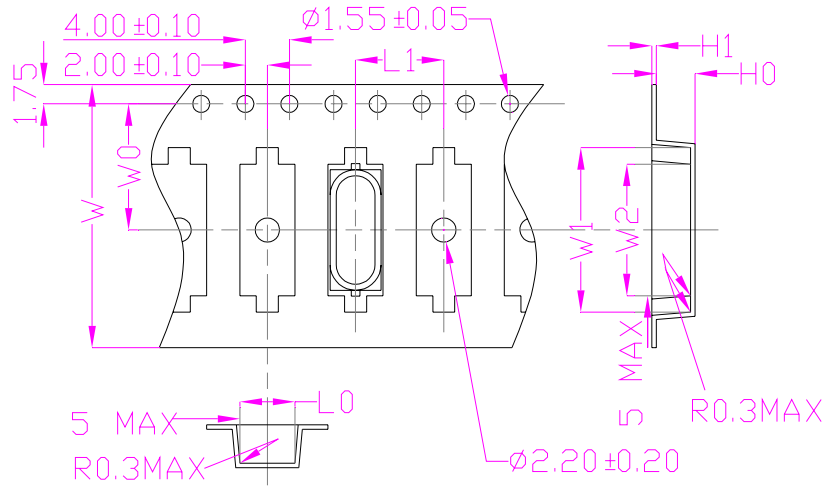
■ STRUCTURE ILLUSTRATION



No	COMPONENTS	MATERIALS	QTY	FINISH/SPECIFCATIONS
1	CRYSTAL BLANK	SiO <sub>2</sub>	1	-
2	BASE	SPCC-SD	1	-
3	CONDUCTIVE ADHESIVE	Ag +Resin	2	-
4	ELECTRODE	Ag	2	-
5	ELECTRODE	Ag + Cr	2	-

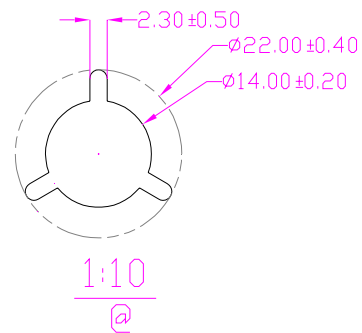
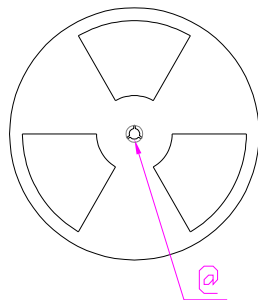
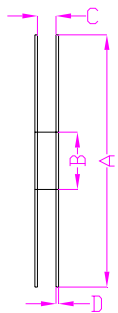
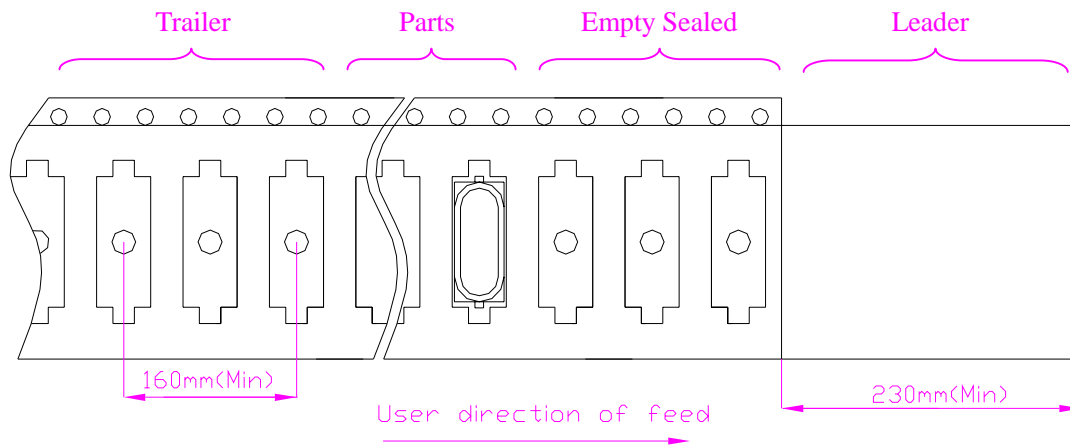


- **PACKING: (EIA-481-2)** — Shear strength between cover and carrier tape should be 30-100g.
- Carrier tape should be folded over three times with no break at all.



Specification	Symbol	Dimension Tolerance (mm)							
	W	W0	W1	W2	L0	L1	H0	H1	
49-SMD		24 ± 0.3	11.5 ± 0.1	15 ± 0.1	12 ± 0.1	5.0 ± 0.1	8.0/12.0 ± 0.1	0.4 ± 0.05	4.25/3.5 ± 0.2

REMARK:



Specification	Symbol	Dimension Tolerance (mm)			
	A	B	C	D	
49-SMD		330 ± 2.0	100 ± 1.0	24.5 ± 1.0	2.4 ± 0.2

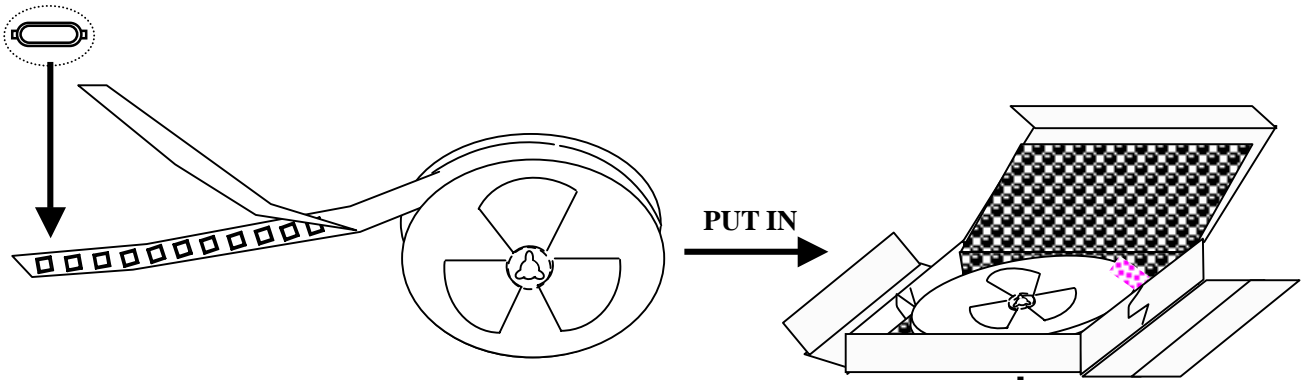
Unit : mm

Standard Reel Quantity is 1,000 pcs per reel.



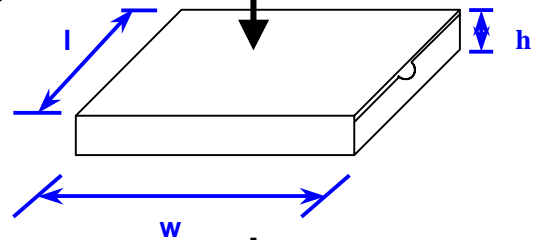
■ PACKING FOR PB FREE PARTS:

1 . INNER BOX :( Unit : mm )

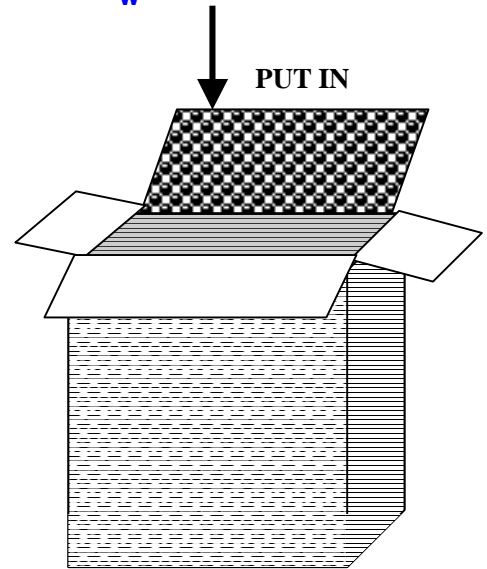


2 . LOGO STICKER ( CARTON and INNER BOX ) :( Unit : mm )

Dimensions(+/-10)				
No	w	l	h	Q'ty
1.	335	335	35	1K

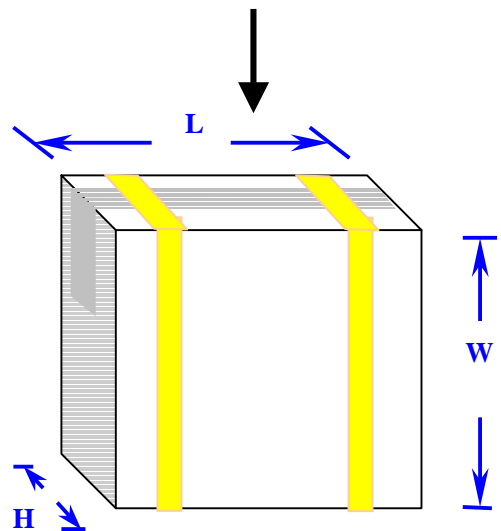


Put in stuff between space,  
1000pcs/box\*5box=5000pcs/carton



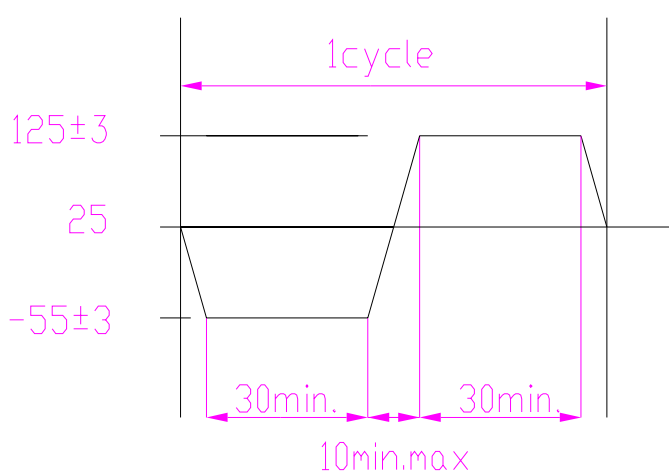
Dimensions(+/-10)				
No	W	L	H	Q'ty
1.	390	340	29	5K

Tie up the carton with 2 packthreads.



**MEC**

■ RELIABILITY SPECIFICATIONS

NO	Test Item	Test Methods	Ref.Doc
1	Drop test	50 cm height, fall freely onto stainless plate 3times.	-
2	Mechanical Shock	Device are shocked to half sine wave (1000G) three mutually pendicular axes each 3 times.0.5sec.duration time.	-
3	Vibration	Frequency range 10~2000Hz Amplitude 1.52mm Sweep time 20 minute Pendicular axes each test time 4 hours (Total test time 12 hours)	-
4	Solderability	Temperature 255 ± 5 Immersing depth 0.5mm minimum Immersion time 10 ± 0.5seconds Flux Rosin resin methyl alcohol Solvent (1:4)	-
5	Resistance To Soldering Heat	Pre-heat temperature 125 Pre-heat time 60~120sec. Test temperature 260 ± 5 Test time 5 ± 1sec.	-
6	High Temp. Storage	+125 ± 2 for 1000 ± 12hours	-
7	Low temp. Storage	-40 ± 2 for 1000 ± 12hours	
8	Thermal Cycles	Total 100 cycles of the following temperature cycle  	-



# 环境管理物质使用规范

## Specification of the environment-related substances

范围 Range	产品 Products	包材 Packing Material	Test Method
禁限物质 Banned Substances	最高含量 Maximum concentration ppm(mg/kg)	最高含量 Maximum concentration ppm(mg/kg)	
1. 镉及镉化合物 Cadmium and cadmium compounds	5	5	ICP-AES as per EN1122, method B2001 or other acid digestion.
2. 铅及铅化合物 Lead and lead compounds	40	100	ICP-AES after as per EPA 3050B or other acid digestion.
3. 汞及汞化合物 Mercury and mercury compounds	5	5	ICP-AES after as per EPA 3052 or other acid digestion.
4. 六价铬化合物 Hexavalent-Chromium VI (Cr <sup>+6</sup> )	10	10	As per US EPA 7196A and US EPA 3060A.
5. 聚溴联苯 PBB Polybrominated biphenyls	5	5	With reference to USEPA 3540 or USEPA3550. Analysis was performed by LPLC/DAD, LC/MS or GC/MS. (prohibited by 2002/95/EC (RoHS),83/261/EEC, and76/769/EEC)
6. 聚溴二苯醚 PBDE Polybrominated diphenyl ethers	5	5	With reference to USEPA3540or USEPA3550. Analysis was performed by HPLC/DAD LC/MS or GC/MS.(prohibited by 2002/95/EC(RoHS), 83/264/EEC, and 76/769/EEC)
7. 多氯联苯 (PCB) Polychlorinated biphenyl	5	5	
8. 多氯化萘 (PCN) Polychlorinated naphthalene	5	5	
9. 氯代烷烃 (CP) Chlorinated paraffin	5	5	
10. 其他有机氯化物 Other chlorinated organic compounds	5	5	
11. 其他有机溴化合物 Other brominated organic compounds	5	5	
12. 有机锡化合物 (三丁基锡化合物, 三苯基锡化合物) Organic tin compounds (Tributyl tin category & Triphenyl tin category )	5	5	
13. 石棉 Asbestos	5	5	
14. 偶氮化合物 Azo compounds	5	5	
15. 甲醛 Formaldehyde	5	5	
16. 聚氯乙烯(PVC)以及聚氯乙烯混合物 Polyvinyl chloride (PVC) and PVC blends	No detect	No detect	
17. 包装材料中重金属(汞、镉、六价铬、铅、PBB、PBDE)之总量 Heavy metals (mercury, cadmium, lead, Cr <sup>+6</sup> ,PBB and PBDE) in packing materials	N/A	<100	

Lead Free Products are "Directive 2002/95/EC of The European Parliament of 27 January 2003 on the restriction of certain hazardous substances (RoHS) in electrical and electronic equipment" and Sony SS-00259 Compliant.

