

新品 变更



产品规格书

SPECIFICATION FOR APPROVAL

产品名称 Product Name:	石英晶体谐振器 Quart crystal unit
产品型号 Product Type:	SMD2016
标称频率 Nominal Freq:	48.000000 MHz
明德亨料号 MDH P/N:	2.D.1.48000B115
客户料号 Customer P/N:	

客户承认
Approved By Customer签章
Signature:日期
Date:

Date: 2024年12月24日

批准	审核	拟制
Accepted	Checked	Issued
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RoHS Compliant

Revision Record

[illegible]

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1 石英晶体产品规格及特性 / Product specification and features

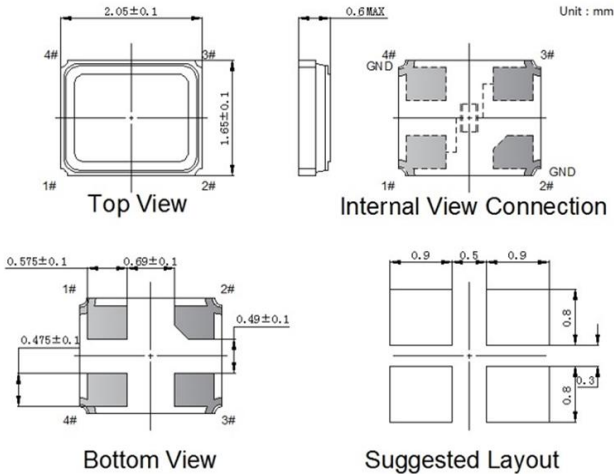
1.1 一般特性 / General characteristics

Items	Electrical spec.			Unit	Notes
	Min.	Typ.	Max.		
1.Frequency(FL)	48.000000			MHz	-
2.Mode of oscillation	Fundamental			-	-
3.Crystal Cutting Type	AT-CUT			-	Thickness shear mode
4.Frequency tolerance	-10	~	10	ppm	At 25℃±3℃
5.Loading capacitance(CL)	11.1			pF	-
6.Equivalent resistance(RR)	-	-	40	Ω	Series(ESR)
7.Drive Level (DL)	-	300	-	uW	-
8.Temperature stability	-20	~	20	ppm	Ref. to 25℃
9.Operating temperature range	-40	~	85	℃	-
10.Storage temperature range	-55	~	125	℃	-
11.Shut Capacitance(C0)	-	-	3	pF	-
12.Motional Capacitance (C1)	-	-	-	fF	-
13.SPDB	-	-	-3	dB	-
14.Aging	-3	-	3	ppm/Year	-
15.Insulation Resistance	500	-	-	MΩ	DC 100±10V

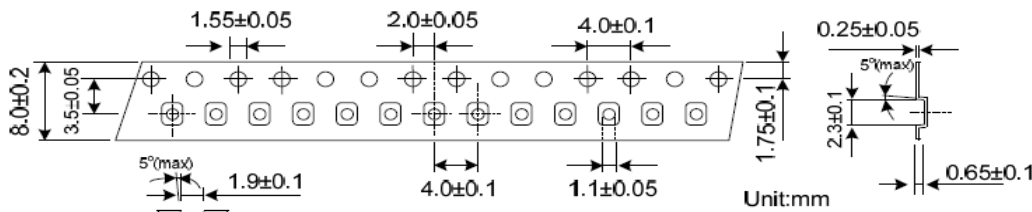
2.0 外形尺寸、外观 / Outline dimensions、Appearances

2.1 产品外形尺寸(mm)/ Product outline dimension(mm)

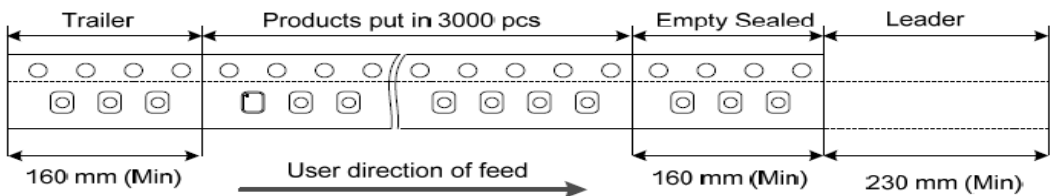
Unit:mm



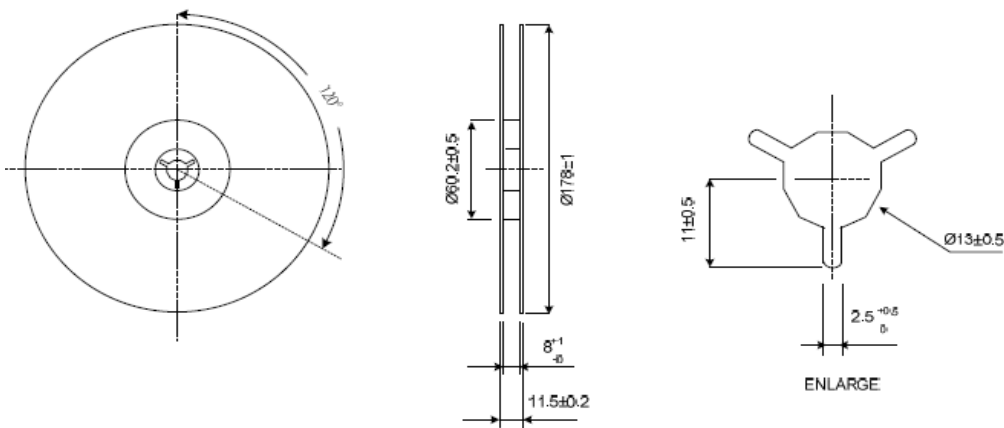
2.2 载带外形尺寸图(mm)/Carrier Dimensional Drawing (mm)



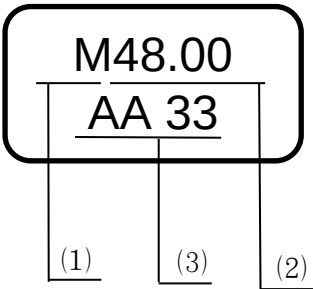
REMARK :



2.3 编带盘外形尺寸图(mm) /Reel Dimensional Drawing (mm)

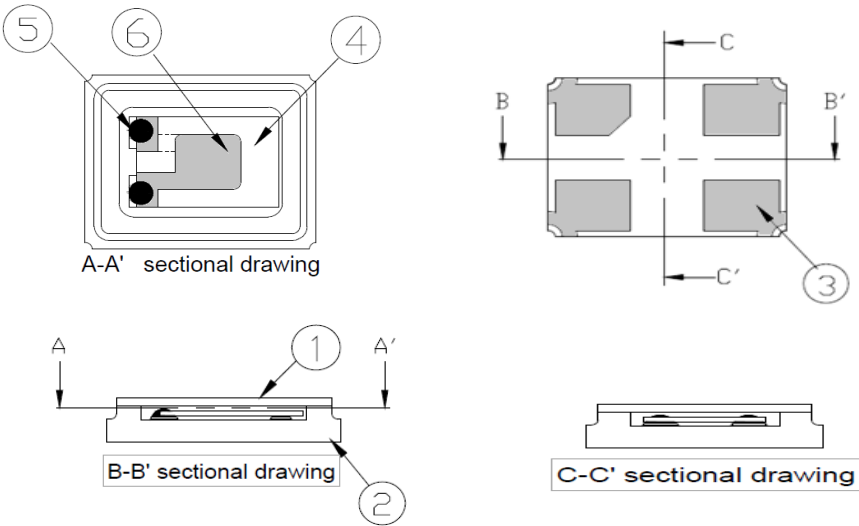


2.4 印字 Marking



- (1) 代表公司Logo
- (2) 代表标称频率
- (3) 代表批次号

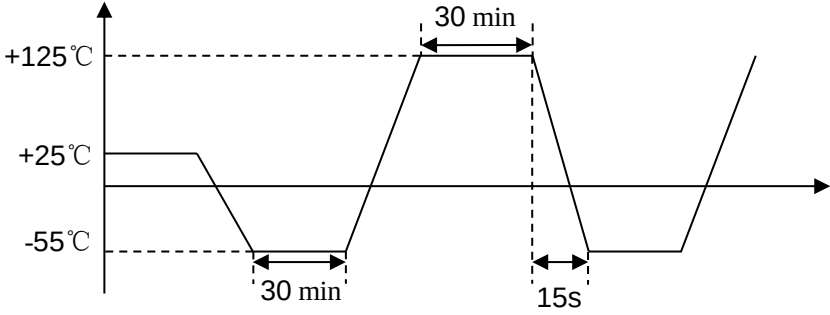
3.0 内部构造图 / Product internal structure



质量（参考值）：0.005±0.002 g/pcs			
NO.	COMPONENETS	MATERIALS	SPECIFICATIONS
1	LID	Kovar (Fe/Co/Ni)	-
2	Package	Ceramic (Al ₂ O ₃) + Kovar (Fe/Co/Ni)+ Au/Ni	Color Blank
3	Pad	Au	Tungsten metalize+ Ni plating+ Au plating
4	Crystal blank	SiO ₂	-
5	Conductive adhesive	Resin+Ag	Silicon resin
6	Electrode	Noble Metal	-

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4.0 石英晶体之可靠性 / Product reliability

项 目 (Item)	条 件 (Condition)	结 果 (Result)
A.1	耐低温性（耐寒性）测试（Cold resistance）	(I)
	Stored at $-40\pm 2^{\circ}\text{C}$ for 500 ± 2 hrs then $25\pm 2^{\circ}\text{C}$ 2 hrs before testing	
A.2	耐高温性（耐热性）测试（Heat resistance）	(I)
	Stored at $125\pm 2^{\circ}\text{C}$ for 500 ± 2 hrs then $25\pm 2^{\circ}\text{C}$ 2 hrs before testing	
A.3	耐湿热性 (Humidity Resistance Result)	(I)
	稳态温度: $85\pm 2^{\circ}\text{C}$; 湿度: $85\pm 3\%\text{RH}$; 时间: 500 ± 2 hrs Steady temperature: $85\pm 2^{\circ}\text{C}$; humidity: $85\pm 3\%\text{RH}$; time: 500 ± 2 hrs	
A.4	老化测试（Aging）	(I)
	Stored at $85\pm 2^{\circ}\text{C}$ for 720 ± 2 Hrs then $25\pm 2^{\circ}\text{C}$ 2 Hrs before testing	
A.5	气密性 (Leakage)	(IV)
	细漏Fine leak: Put the product in the Helium pressure tank, $4 \sim 5\text{kgf/cm}^2$, 0.5hrs.	
A.6	冷热冲击实验 温度循环（Temperature Cycle）	(I)
	$-55^{\circ}\text{C} \sim 125^{\circ}\text{C}$, Retain 30Min, 100 cycles  温度循环（Temperature Cycle）	

4.1机械性能 / Mechanism characteristics

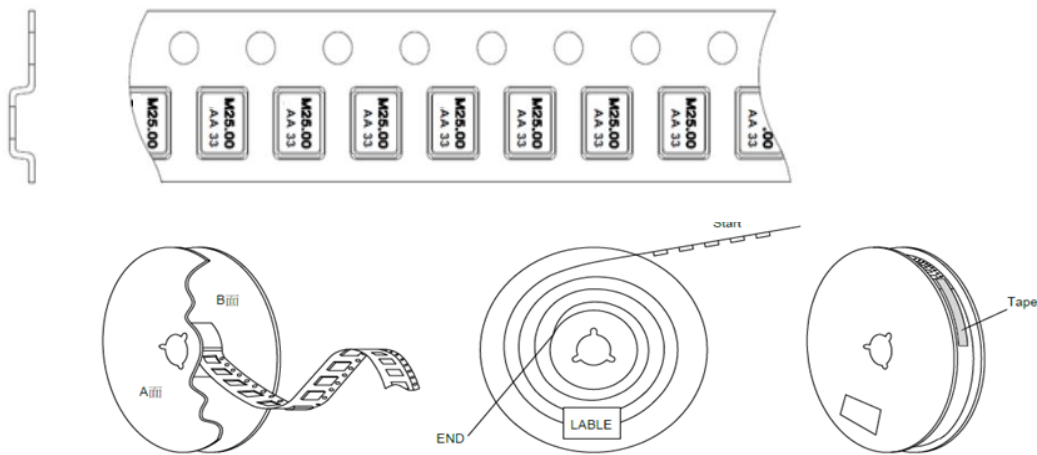
B.1	跌落测试（Drop Test）	（I）
	Device are dropped from a height of 150 cm onto 20mm thickness stainless plate executing 3 times of random drops.	
B.2	耐振性（Resistance of Vibration）	（I）
	Frequency: 10~55Hz, amplitude(total excursion): 1.5mm±15%,3 direction (X,Y,Z) each 2 hrs then 25±2℃ 2 hrs before testing	
B.3	可焊性试验（Solderability）	（III）
	245±5℃，5±1s	
B.4	耐焊接热（Reflow）Resistance to soldering heat（Reflow）	（I）
	参考曲线图（Reference Curve）：	

项目 Item	结果编号Result NO.	规格要求 Specification Requirements
1	(I)	频率变化<±10ppm；电阻变化<±5Ω或规格电阻的±15%，取大者 Frequency variation <±10ppm； Resistance variation < ±5Ω or ±15% of RR spec., select the bigger value.
2	(II)	频率变化<±10ppm；电阻变化<±10Ω或规格电阻的±20%，取大者 Frequency variation <±10ppm； Resistance variation < ±10Ω or ±20% of RR spec., select the bigger value.
3	(III)	上锡覆盖率高于95% The covering rate of Tin-plating is more than 95%.
4	(IV)	<1*10 ⁻⁹ Pa.m³/s Max

5.0 生产商及产地说明 / Manufacturer and origin

生产商/Manufacturer: 烟台明德亨电子科技有限公司 ☒
YanTai MDH Technology Co.,Ltd
四川明德亨电子科技有限公司
SiChuan MDH Technology Co.,Ltd

5.1 包装规格 Package specification



Standard Reel Quantity is 3,000 pcs per reel

