

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:	24.000000 MHz
明德亨料号 MDH P/N:	2.D.1.240001218
客户料号 Customer P/N:	

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

Date: 2024年10月9日

批准 Accepted	审核 Checked	拟制 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

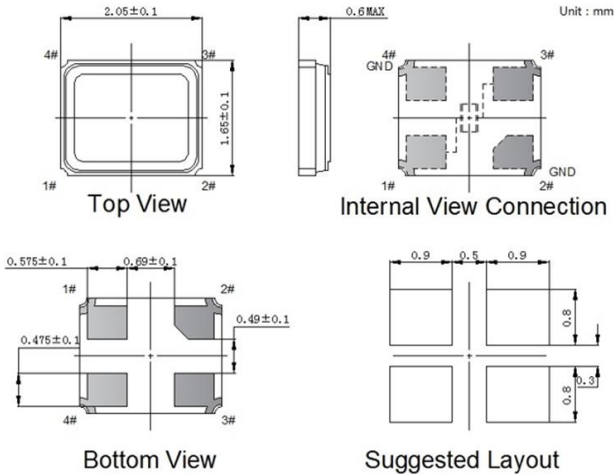
1.1 一般特性 / General characteristics

Items	Electrical spec.			Unit	Notes
	Min.	Typ.	Max.		
1.Frequency(FL)	24.000000			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)	12			pF	-
6.Equivalent resistance(RR)	-	-	40	Ω	Series(ESR)
7.Drive Level (DL)	0.01	10	100	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

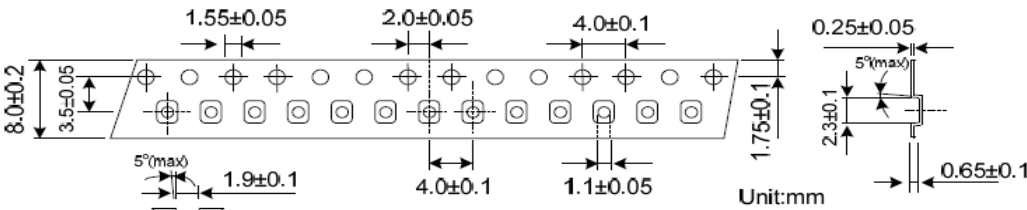
2.0 外形尺寸、外观 / Outline dimensions、Appearances

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

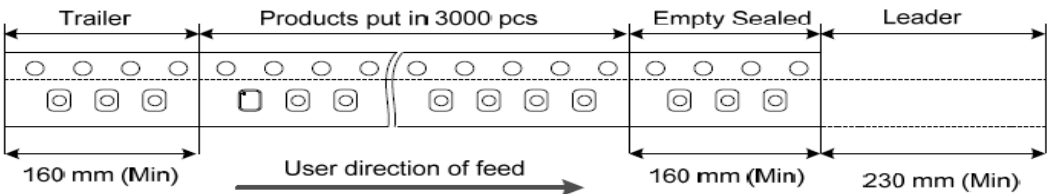
Unit:mm



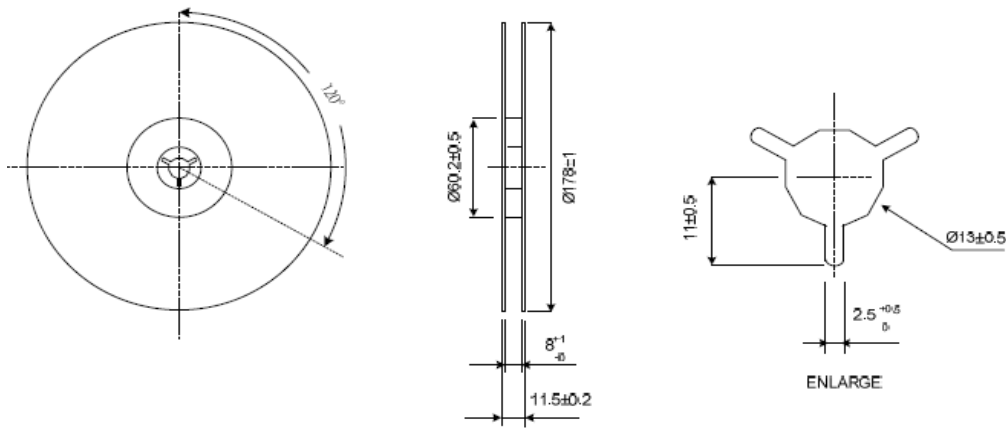
2.2 载带外形尺寸图(mm)/Carrier Dimensional Drawing (mm)



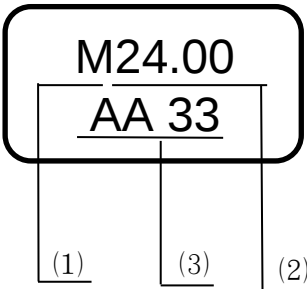
REMARK :



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

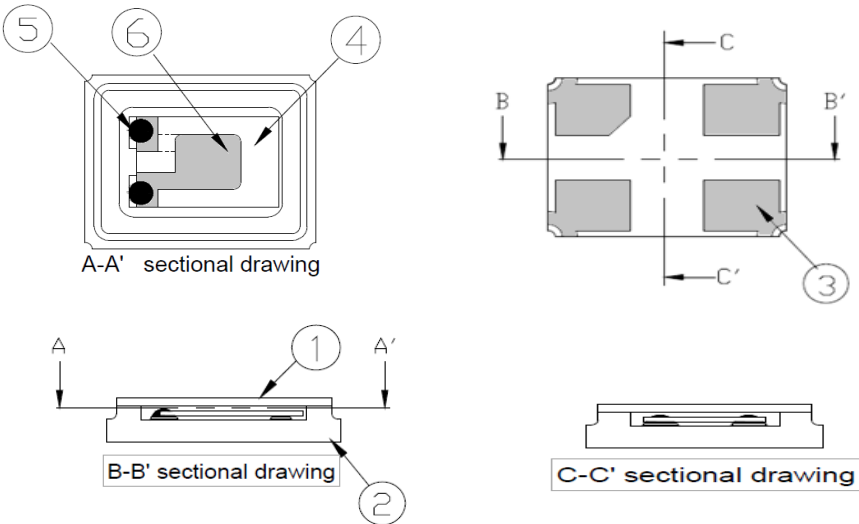


2.4 印字 Marking



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

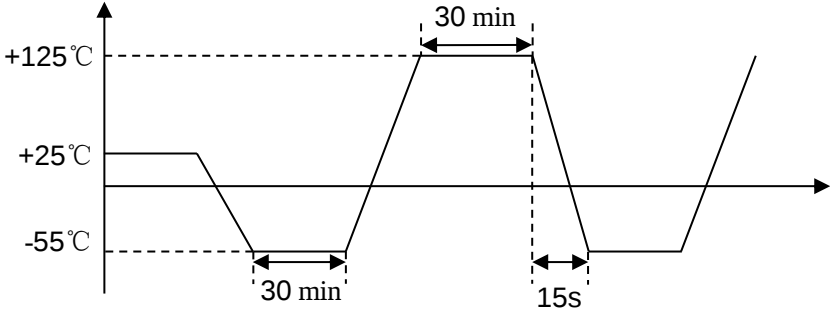
3.0 内部构造图 / Product internal structure



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±2℃ for 500±2 hrs then 25±2℃ 2 hrs before testing	
A.2	耐高温性（耐热性）测试（Heat resistance）	(I)
	Stored at 125±2℃ for 500±2 hrs then 25±2℃ 2 hrs before testing	
A.3	耐湿热性 (Humidity Resistance Result)	(I)
	稳态温度：85±2℃；湿度：85±3%RH；时间：500±2 hrs Steady temperature: 85±2℃;humidity: 85±3%RH; time:500±2 hrs	
A.4	老化测试（Aging）	(I)
	Stored at 85±2℃ for 720±2Hrs then 25±2℃ 2 Hrs before testing	
A.5	气密性 (Leakage)	(IV)
	细漏Fine leak: Put the product in the Helium pressure tank, 4 ~ 5kgf/cm ² , 0.5hrs.	
A.6	冷热冲击实验 温度循环（Temperature Cycle）	(I)
	-55℃ ~ 125℃，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

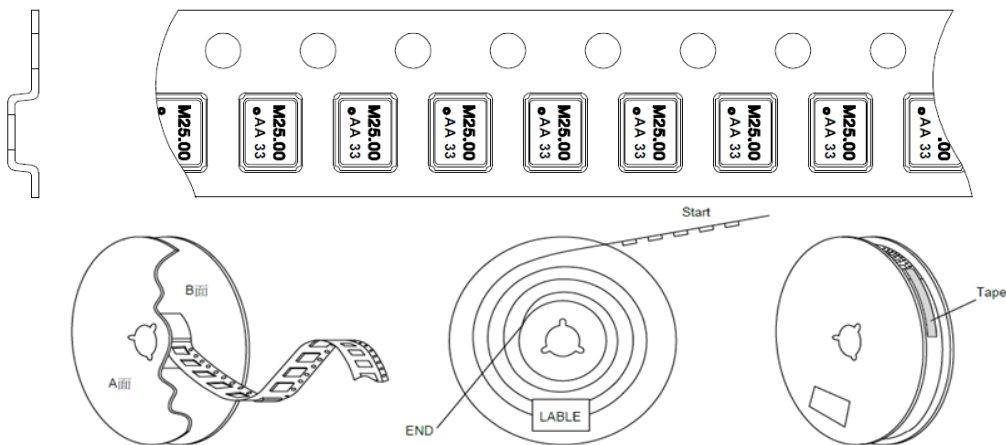
生产商/Manufacturer: 烟台明德亨电子科技有限公司 ☒

YanTai MDH Technology Co.,Ltd

四川明德亨电子科技有限公司

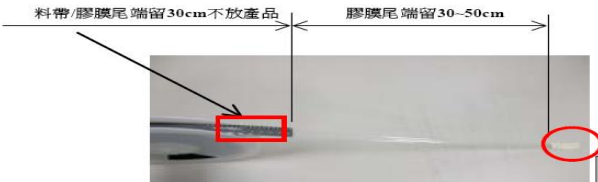
SiChuan MDH Technology Co.,Ltd

5.1 包装规格Package specification

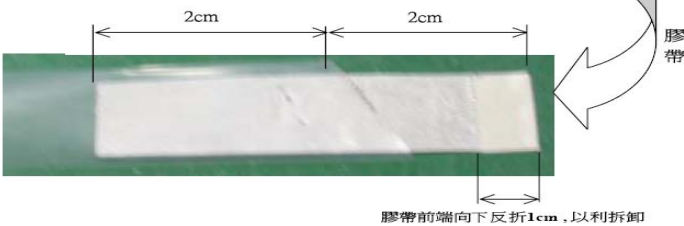


Standard Reel Quantity is 3,000 pcs per reel

(2)



(3)



165°~180°

