

深圳市炬烜科技有限公司
CHIP SUN TECHNOLOGY CO., LTD

**APPROVAL
SHEET**



CUSTOMER: _____
DESCRIPTION: SMD2016 TCXO 48.000MHz
MANUFACTURER PART NO.: FTO48.000M1.8SM2A-2.0/2.0CEW
CUSTOMER PART NO.: _____
USED IN MODEL: _____

APPROVAL		
TECHNOLOGY DEPT.	QUALITY DEPT.	PURCHASING DEPT.

Date: March 24, 2023



深圳市炬烜科技有限公司

CHIP SUN TECHNOLOGY CO., LTD

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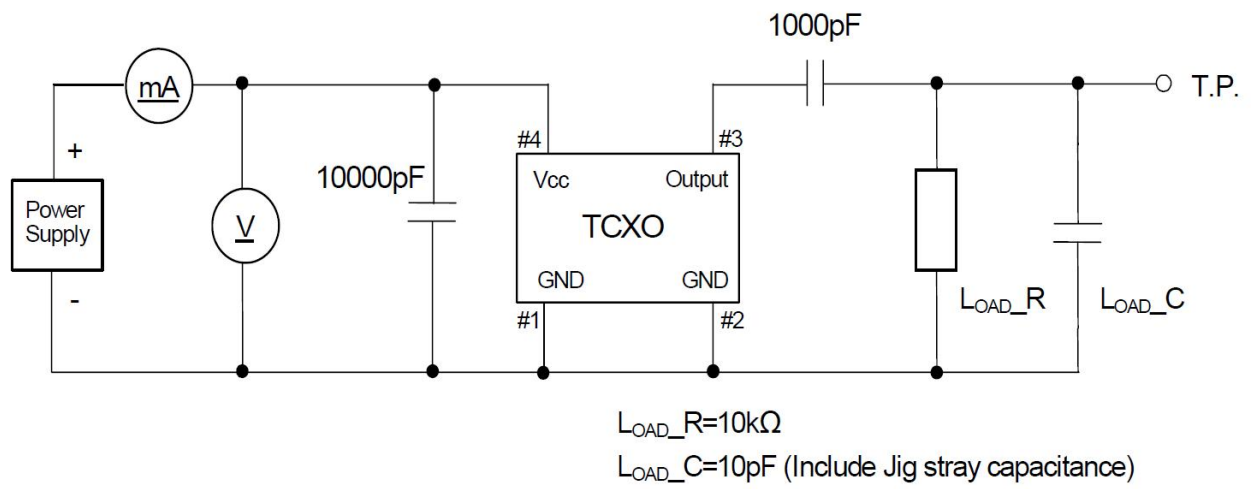
1. TEMPERATURE COMPENSATED CRYSTAL OSCILLATOR SPECIFICATION

Parameter	Value	Condition
1.1 Frequency:	48.000MHz	
1.2 Holder type:	FTO211S	
1.3 Supply voltage:	1.8V _{DC} ±5%	
1.4 Current:	1.5mA max	10KΩ//10pF
1.5 Output Level:	0.8 Vp-p Min (Clipped Sine Wave DC-coupled 10KΩ//10pF)	
1.6 Output Load:	10KΩ//10pF	
1.7 Operable temperature range:	-40°C To +85°C	
1.8 Storage temperature range:	-40°C To +85°C	
1.9 Frequency tolerance:	±2.0ppm max	After 2 times reflow Ref. to nominal frequency
1.10 Frequency Stability:		
vs. Temperature:	±2.0ppm max	T _A =-40°C To +85°C Ref. to nominal frequency
vs. Supply voltage:	±0.2ppm max	V _{CC} =1.8V±5%
vs. Load Coefficient:	±0.2ppm max	10KΩ//10pF ±10%
vs. Aging:	±1.0ppm max	1 st Year (25±2°C)
1.11 Start Up Time	2.0 ms max	More than 90% of final amplitude
1.12 Harmonics	-5 dBc max	
1.13 Duty Cycle	40~60% / 60~40%	
1.14 SSB Phase Noise:	-134 dBc/Hz max	Relative to f ₀ level offset 1kHz
	-144 dBc/Hz max	Relative to f ₀ level offset 10kHz
	-152 dBc/Hz max	Relative to f ₀ level offset 100kHz
1.15 Test circuit	Refer to fig.2	
1.16 Dimensions and marking	Refer to page.3	
1.17 Emboss carrier tape & reel	Refer to page.5 and page.6	

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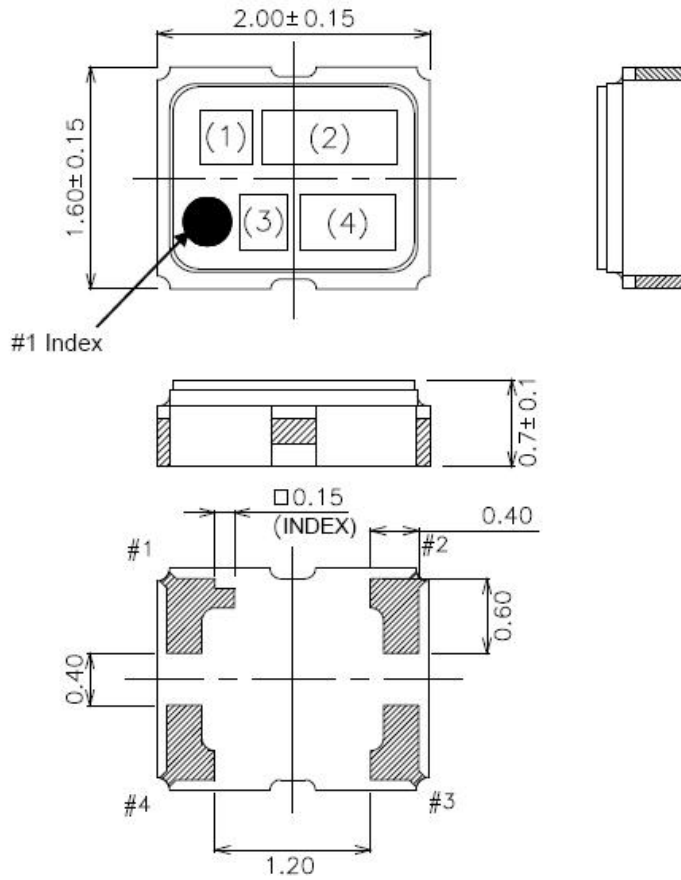
2. Measurement circuit



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3. FTO221S MARKING & DIMENSIONS



Pin Connections

Pin No.	Connection
#1	GND
#2	GND
#3	Output
#4	V_{CC}

Marking

(1) Model code	BN
(2) Frequency	26.0 (MHz, 3digits)
(3) Logo	D
(4) Date code	Year (1digit) +Week (2digits) e.g.2014/1/1 → 401

unit: mm

Dimensional Tolerance: ± 0.1

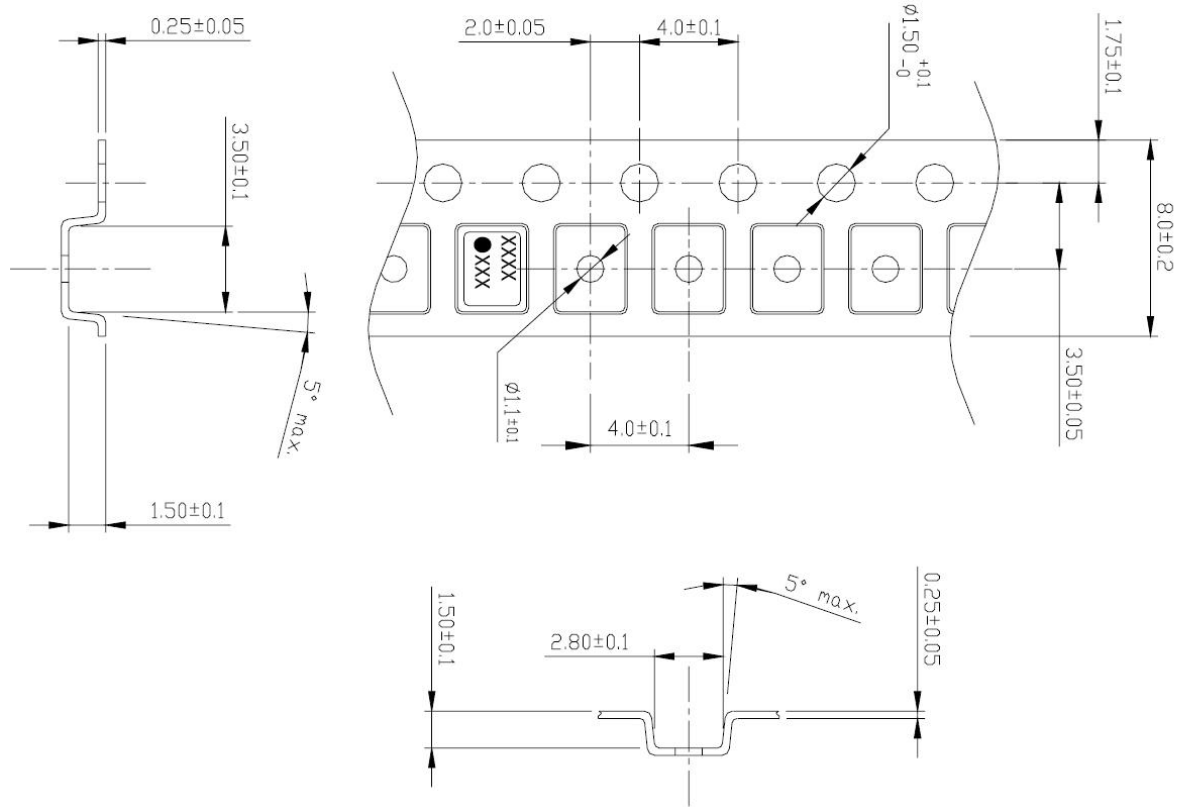
(Unless otherwise noted)

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4. FT0221S EMBOSS CARRIER TAPE & REEL

a.) Dimensions of Carrier Tape



1. Clearance of an embossing tape, and a product unit: mm

Direction	Pocket size	TCXO size	Clearance
L	2.35 ± 0.10	2.0 ± 0.15	0.35 ± 0.25
W	1.95 ± 0.10	1.6 ± 0.15	0.35 ± 0.25
H	0.85 ± 0.05	0.7 ± 0.10	0.15 ± 0.15

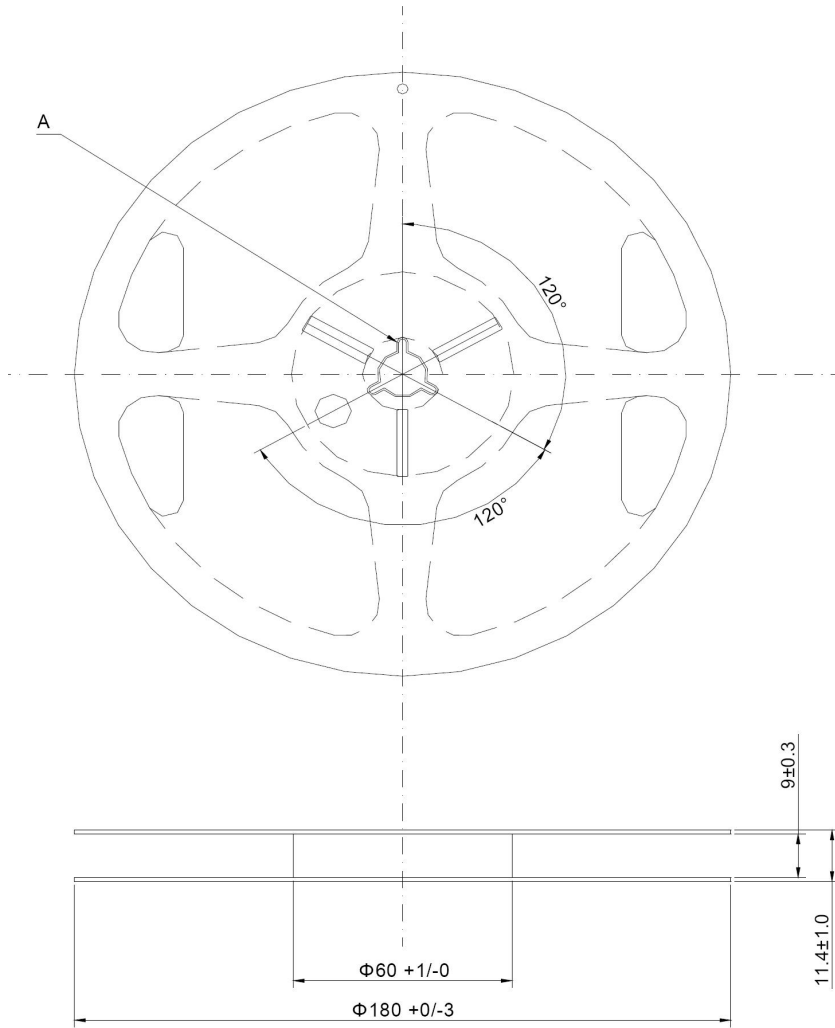
2. Quality : Polystyrene (Conductivity)

3. Tensile strength of an embossing tape : more than 14N

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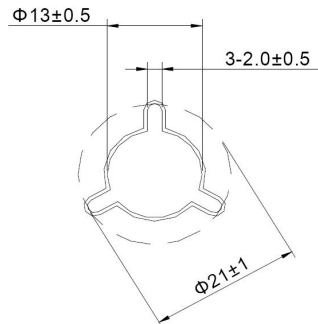
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b.) Dimensions of Reel



Material: Polystyrene (Conductivity)
unit:mm

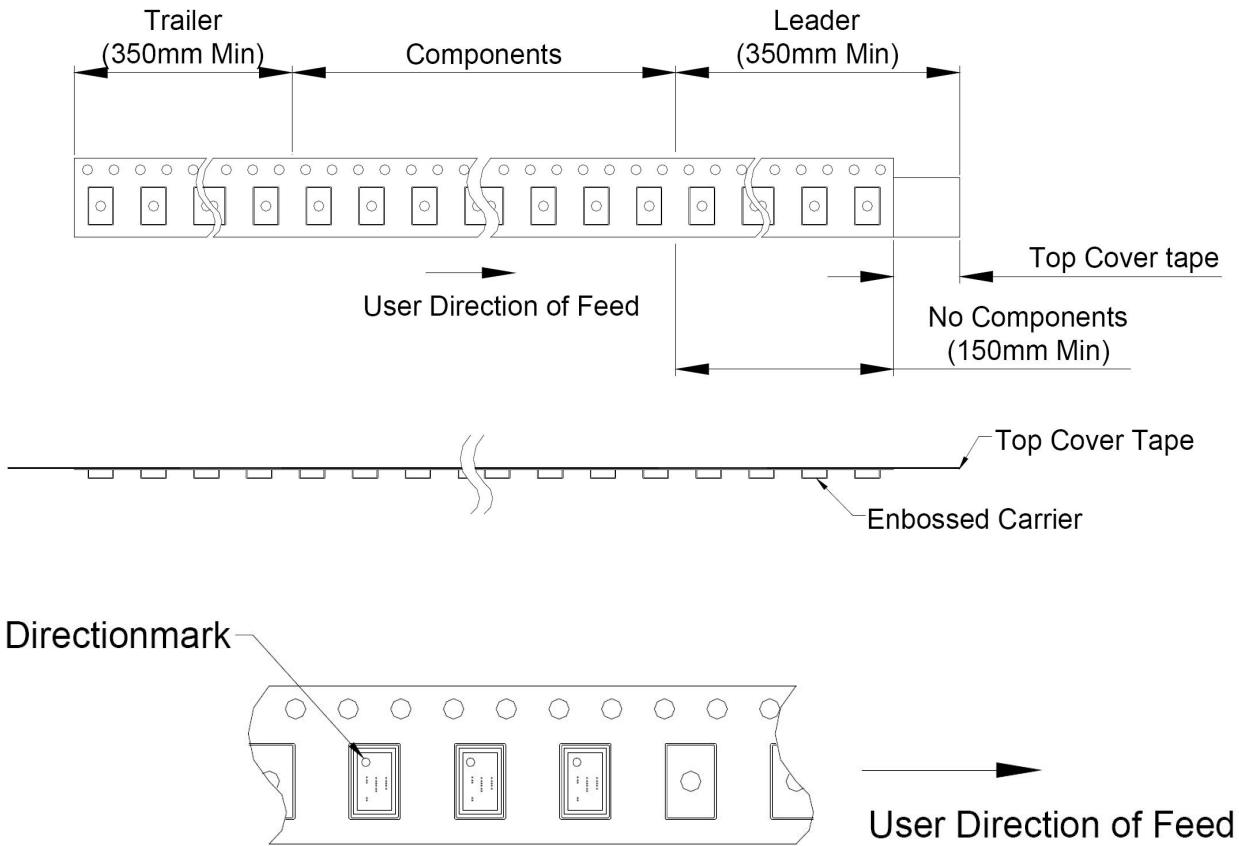
Section A



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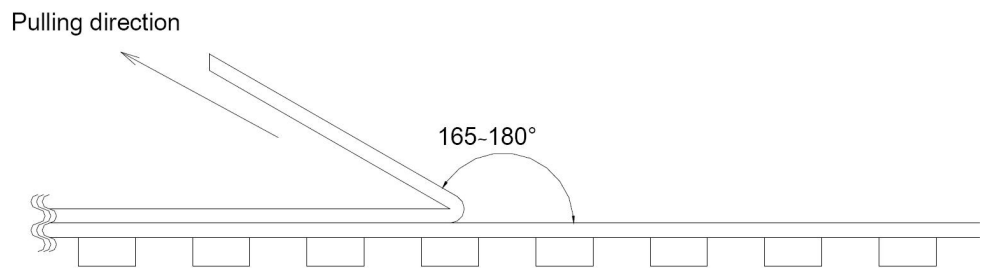
c.) Packing



When a tape end is taken out to the front, sprocket holes becomes right hand side.

Peel strength

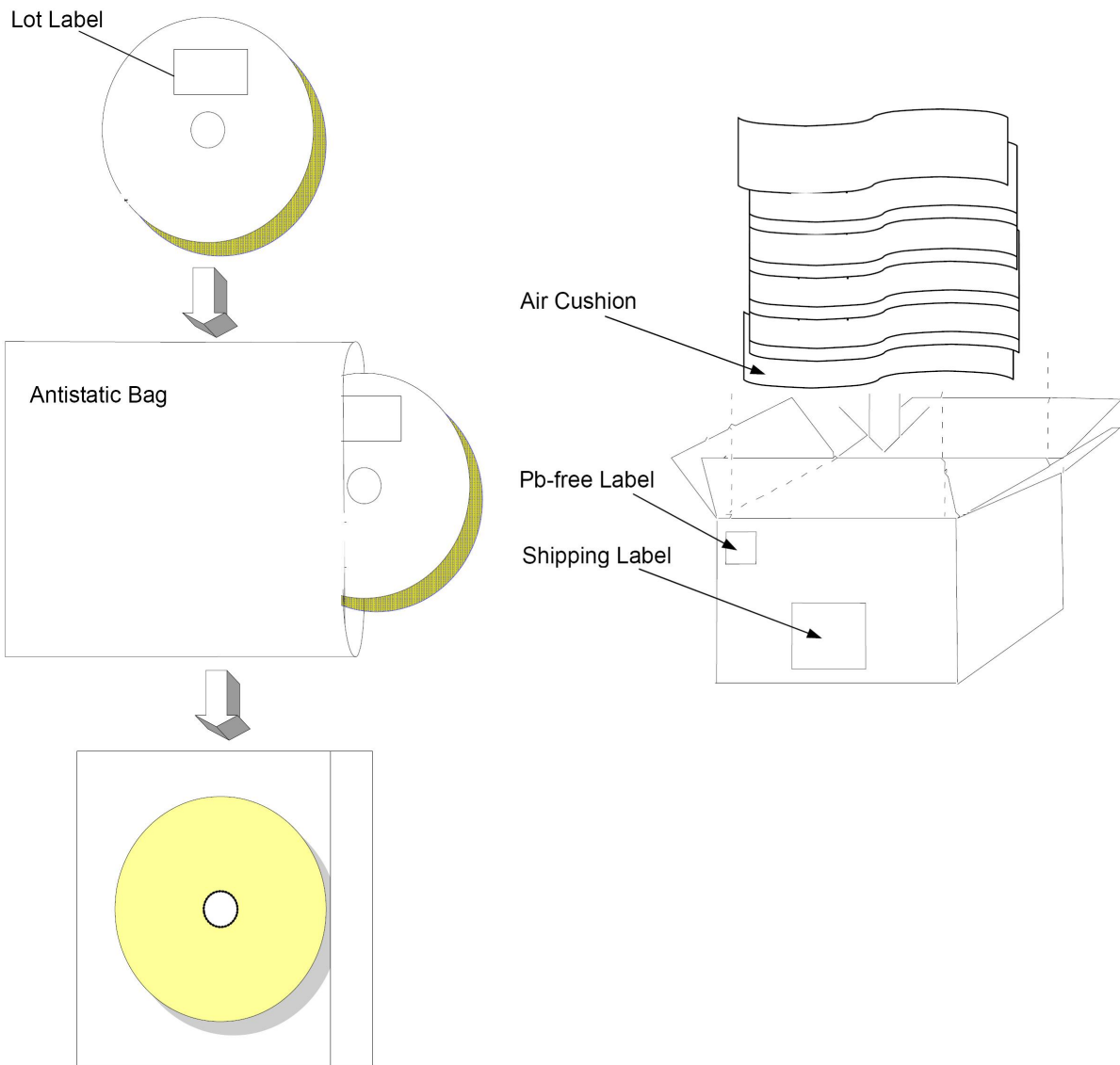
Pulling angle 165~180°, pulling speed at 300mm/min, strength should be 0.2~0.7N.



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d.) Inner& Outer carton



e.) Standard packing quantity

2,000PCS / REEL

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5. STORAGE ENVIRONMENT

- * Storage the reel at normal temperature and humidity
- * Open the packing just before using.
- * Do not expose the sun.
- * Do not storage with some erosive chemicals.
- * Nothing is allowed to put on the reel or carton to prevent mechanical damage.

6. HANDLING

- * Handle with care to prevent the damage of tape, reel and products.

- ELECTROSTATIC DISCHARGES

This device contains a CMOS IC. Please take precautionary measures against ESD damage.

- SHOCK RELIABILITY

This device contains a quartz crystal, so please do not give too much shock or vibration. Surface mounters can be used for assembling, but be sure to check your machine conditions before using them.

- ULTRASONIC CLEANING

Also be sure to check your cleaning condition of ultrasonic cleaning apparatus.

- TEMPERATURE AND HUMIDITY

We recommend to store and use device under normal temperature and humidity for frequency stability. Condensation may cause this device damages.

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7. Mechanical Characteristics:

NO.	ITEM	CONDITIONS	REQUIREMENT
7.1	Drop	Natural drop (On concrete) Mounting on the set or test fixture.(Total weight 100g) Height : 150cm Direction : X,Y,Z, 6directions Test cycle : 3cycles Reference specification : EIAJ-ED-4702A Method5	df/f=<±1.0ppm
7.2	Vibration Test	Sweep range : 10~500Hz Sweep speed : 11min/cycle Amplitude : 1.5mm (10~55Hz) Acceleration : 200m/s ² (55~500Hz) Direction : X,Y,Z, 3directions Test cycle : 10cycles Reference specification : IEC 60068-2-6	df/f=<±0.5ppm
7.3	Shock	Acceleration : 1000m/s ² Direction : X,Y,Z, 6directions Duration : 6ms Test cycle : 3cycles/each directions Reference specification : IEC 60068-2-27	df/f=<±0.5ppm
7.4	PCB bend strength	PWB : t=1.6mm Pressure speed : 1.0mm/s Bend width : 1 2 3mm Duration : 10±1s Reference specification : IEC 60068-2-21 Ue1	df/f=<±0.5ppm No visible damage. No leak damage.
7.5	Adherence nature	PWB : t=1.6mm Direction : X,Y, 2directions Pressure : 10N Duration : 10±1s Reference specification : IEC 60068-2-21 Ue3	df/f=<±0.5ppm No visible damage. No leak damage.
7.6	Package strength	Pressure : 10N Duration : 10±1s Reference specification : IEC 60068-2-77	df/f=<±0.5ppm No mechanical damage. No leak damage.
7.7	Gross leak	It is immersed for 3min into +125±5°C Chlorofluorocarbon (CFCs) liquid. Reference specification : IEC 60068-2-17	No continuous air bubbles.
7.8	Fine leak	It shall be measured by the helium leak detector after pressurization for 60min by the pressure of (3.92±0.49) x10 ⁵ Pa in a helium gas atmosphere. Reference specification : IEC 60068-2-17	Less than 1.0x10 ⁻⁹ Pa m ³ /s.
7.9	Solderability	Solder bath temperature : +245±5°C Duration : 3±0.3s Reference specification : IEC 60068-2-58	A new uniform coating of solder shall cover a minimum of 95% of the surface being immersed.
7.10	Resistance to soldering heat	1) Solder iron method Bit size : B(φ3) Bit temperature : +350±10°C Duration : 3+1/-0s /each terminal It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-20	df/f=<±0.5ppm dV _{OUT} =<±0.2V _{P-P} No visible damage.
		2) Reflow In refer to temperature profile shown in clause13. Test cycle : 3cycles It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-58	df/f=<±1.0ppm dV _{OUT} =<±0.2V _{P-P} No visible damage.

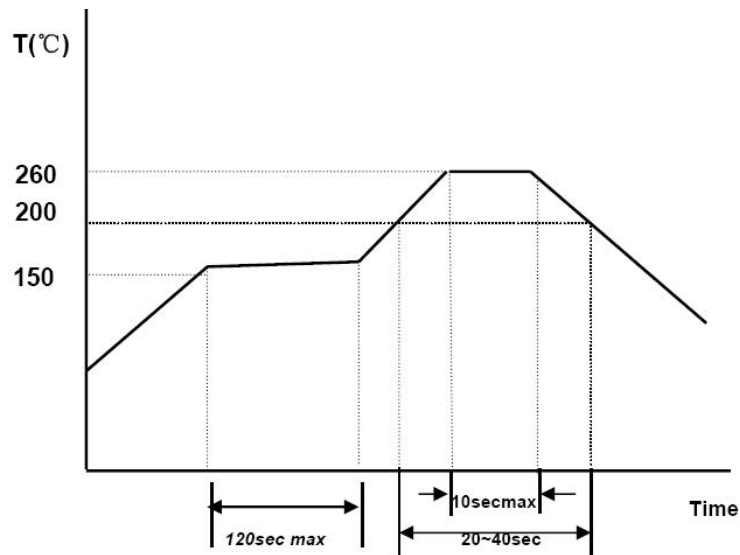
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8. Environmental Characteristics:

NO.	ITEM	CONDITIONS	REQUIREMENT
8.1	Low temperature storage	Temperature : $-40\pm 3^{\circ}\text{C}$ Duration : 1000h It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-1 Ab	$df/f \leq \pm 1.0\text{ppm}$ $dV_{\text{OUT}} \leq \pm 0.2\text{VP-P}$ The electrical characteristics are satisfied.
8.2	High temperature storage	Temperature : $+85\pm 2^{\circ}\text{C}$ Duration : 1000h It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-2 Bb	$df/f \leq \pm 1.0\text{ppm}$ $dV_{\text{OUT}} \leq \pm 0.2\text{VP-P}$ The electrical characteristics are satisfied.
8.3	Humidity	Temperature : $+85\pm 2^{\circ}\text{C}$ R.H. $85\pm 5\%$ Duration : 1000h It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-3	$df/f \leq \pm 1.0\text{ppm}$ $dV_{\text{OUT}} \leq \pm 0.2\text{VP-P}$ The electrical characteristics are satisfied.
8.4	HTB	Temperature : $+85\pm 2^{\circ}\text{C}$ Duration : 1000h BIAS : Max value of supply voltage It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-2 Bb	$df/f \leq \pm 1.0\text{ppm}$ $dV_{\text{OUT}} \leq \pm 0.2\text{VP-P}$ The electrical characteristics are satisfied.
8.5	THB	Temperature : $+40\pm 2^{\circ}\text{C}$ R.H. $90\sim 95\%$ Duration : 1000h BIAS : Max value of supply voltage It shall be measured after 2h at room temperature, humidity. Reference specification : IEC 60068-2-3	$df/f \leq \pm 1.0\text{ppm}$ $dV_{\text{OUT}} \leq \pm 0.2\text{VP-P}$ The electrical characteristics are satisfied.
8.6	Thermal shock	Thermal shock : $-40\pm 3^{\circ}\text{C} : 0.5\text{h} \leftrightarrow +85\pm 2^{\circ}\text{C} : 0.5\text{h}$ Test cycle : 200cycles Shift time : 2~3min It shall be measured after 2h at room temperature, humidity. Reference specification : IEC pub.68-2-14. Na	$df/f \leq \pm 1.0\text{ppm}$ $dV_{\text{OUT}} \leq \pm 0.2\text{VP-P}$ The electrical characteristics are satisfied.

INFRARED REFLOW TEMP. PROFILE:



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