PRODUCT SPECIFICATION SHEET



Customer	HP		
Customer P/N	-		
Product Type	Temperature Compensated Crystal Oscillator		
Part Number	9T320T5003	**Version**	S0
Part Description	SMD TCXO 2.0 x 1.6		
Nominal Frequency	32.000000MHz		

Prepared	Li Xiang
Reviewed	Kuro Peng
Approved	Xing Yue
Date	2022-12-7

Customer's Approval & Date：

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RoHS&HF COMPLIANT

Pb Lead-Free

Moisture Sensitivity Level 1

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1. History of Specification Revision

Ver.	Contents	Date	Reviser	Remark
S0	Initial released	2022-12-7	Li Xiang	

2. Electrical Specifications

2.1 Operation conditions

#	Parameters	Min.	Typ.	Max.	Unit	Remark
1	Nominal frequency		32.000000		MHz	-
2	Supply voltage (V_{DD})	1.71	1.80	3.63	V	-
3	Current consumption	-	-	1.8	mA	-
4	Operating temperature range	-40	-	+85	°C	-
5	Storage temperature range	-40	-	+90	°C	-

2.2 Output characteristics

#	Parameters	Min.	Typ.	Max.	Unit	Remark
1	Output type		Clipped sine wave		-	Decoupling capacitor is required in external circuit
2	Standard output Load		10 KΩ//10 pF		-	-
3	Output level	0.8	-	-	V_{pp}	-
4	Duty cycle	40	50	60	%	-
5	Harmonics			-5	dB	-
6	Start-up time vs. frequency	-	-	2.0	ms	Within ±0.5 ppm
7	Start-up time vs. output level	-	-	2.0	ms	≥90% of Vpp

2.3 Frequency stability characteristics

#	Parameters	Min.	Typ.	Max.	Unit	Remark
1	Nominal frequency		32.000000		MHz	-
2	Frequency tolerance after reflow	-2.0	-	+2.0	ppm	At 25±2°C after 2 times reflow, refer to nominal frequency.
3	Frequency stability vs. temperature 1	-0.5	-	+0.5	ppm	Within -30 to +85°C, refer to frequency at 25 °C
4	Frequency stability vs. temperature 2	-2.0	-	+2.0	ppm	Within -40 to +85°C, refer to frequency at 25 °C
5	Frequency slope vs. temperature 1	-0.1	-	+0.1	ppm/°C	Within -30 to +85°C
6	Frequency slope vs. temperature 2	-0.3	-	+0.3	ppm/°C	Within -40 to -30°C
7	Frequency stability vs. supply voltage	-0.1	-	+0.1	ppm	±5% VDD variation
8	Frequency slope vs. load	-0.2	-	+0.2	ppm	±10% load variation
9	Aging over 1st year	-1.0	-	+1.0	ppm	-
7	ESD		HBM＞2000V		-	JESD22-A114-B
8	MSL		Level 1		-	IPC/JEDEC J-STD-033C

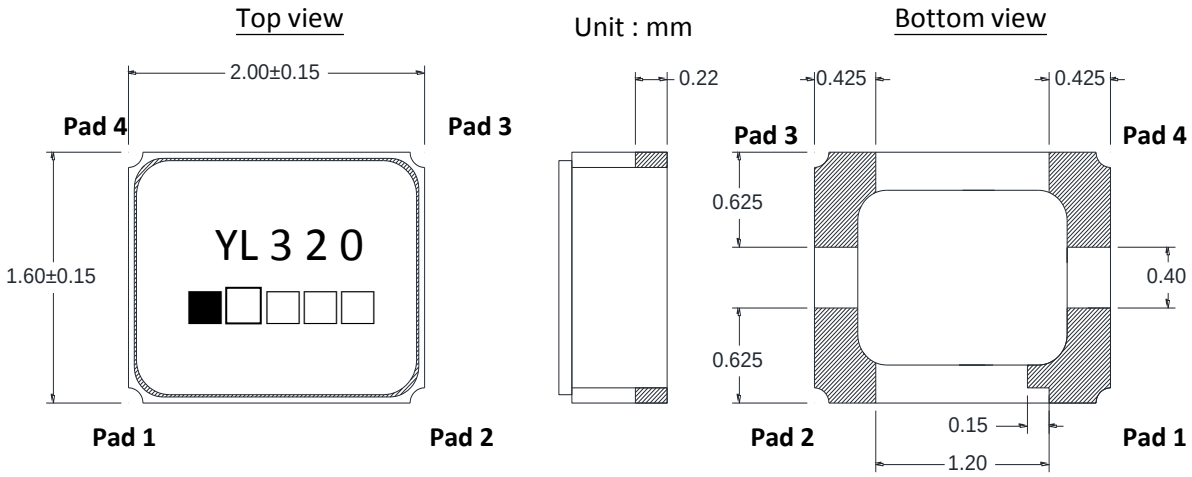
2. Electrical Specifications (Cont.)

2.4 Phase noise and jitter characteristics

#	Parameters	Min.	Typ.	Max.	Unit	Remark
1	Phase noise at 10Hz offset	-	-88	-	dBc/Hz	At 25±2°C.
2	Phase noise at 10Hz offset	-	-112	-	dBc/Hz	At 25±2°C.
3	Phase noise at 1KHz offset	-	-133	-	dBc/Hz	At 25±2°C.
4	Phase noise at 10KHz offset	-	-147	-	dBc/Hz	At 25±2°C.
5	Phase noise at 100KHz offset	-	-152	-	dBc/Hz	At 25±2°C.

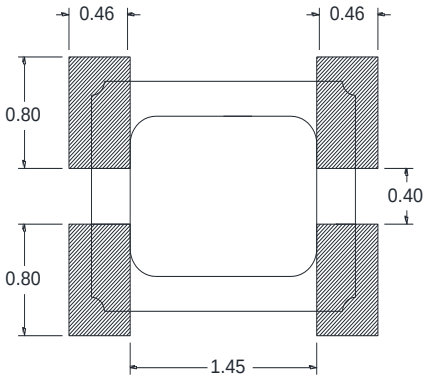
3. Product Design

3.1 Package dimensions and pad functions



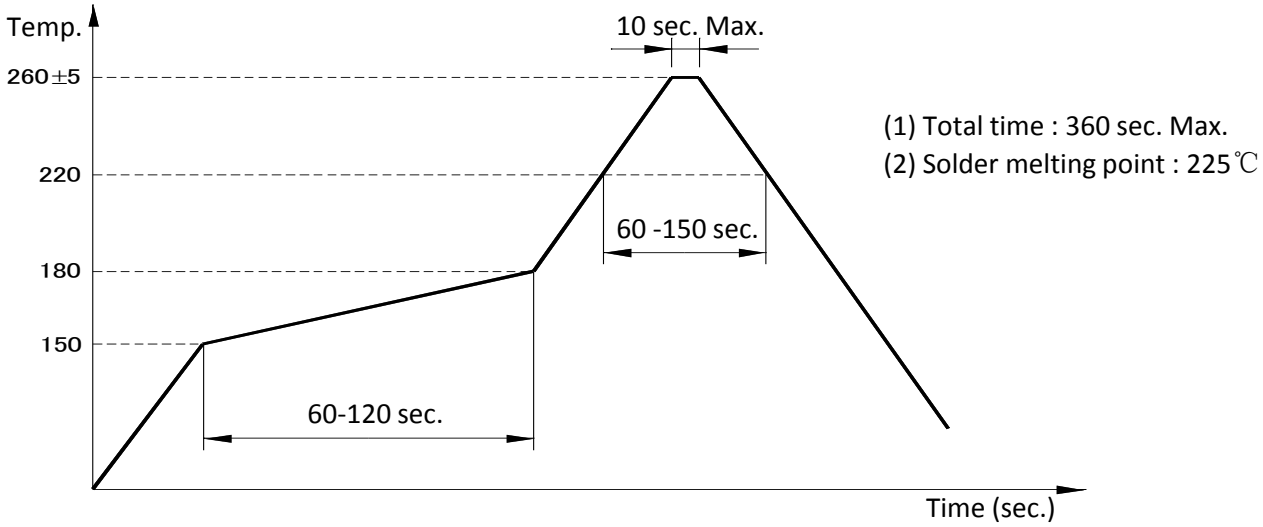
Pad	Function	Symbol
1	NC or GND (Ground recommanded)	NC
2	Ground	GND
3	Output	OUT
4	Supply voltage	V_{DD}

3.2 Recommended land pattern



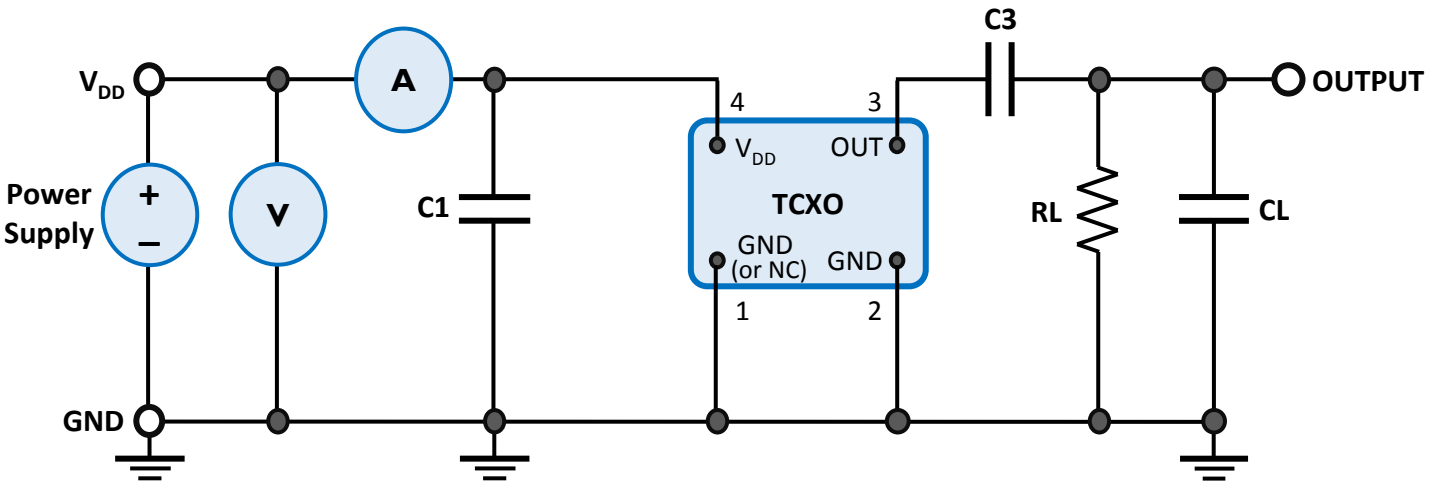
Unit : mm

3.3 Recommended reflow profile



(1) Total time : 360 sec. Max.
(2) Solder melting point : 225℃

4. Testing Circuit



External Components:

Parts	Function	Recommended
C1	AC noise bypass for V_{DD}	10nF
C3	DC block for output	10nF
RL	Load resistance	10KΩ
CL	Load capacitance	10pF

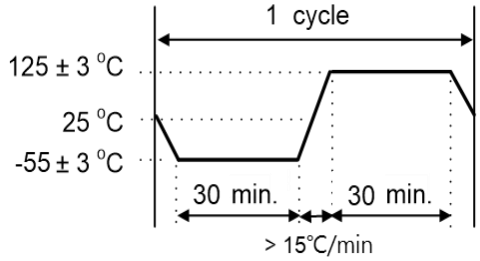
5. Reliability

5.1 Mechanical endurance

#	Item	Test Condition	Reference
1	Drop test	Height : 150 cm height Direction : X, Y, Z, 6 directions Test cycles : 3 cycles Concrete floor Mounting on test fixture (total weight=150 g)	IEC-68-02-27
2	Mechanical shock	Acceleration : 100 g Duration : 6.0 ms half sine shock pulse Test cycles : 3 times for all 3 directions	JESD47F_JEDECB
3	Vibration	Acceleration : 20 g Duration : 4 hours/each direction Frequency range : 10 ~ 55 Hz and 55 ~ 2,000 Hz Amplitude : 0.75 mm (for 10 ~ 55 Hz) Direction : X, Y, Z, 3 directions	JESD47F_JEDECB
4	Gross leak	Standard Sample For Automatic Gross Leak Detector. Test Pressure: 2kg /cm^2	MIL-STD-883E
5	Fine leak	Helium bombing 4.5 kgf / cm^2 for 2 hours	MIL-STD-883E

5. Reliability (Cont.)

5.2 Environmental endurance

#	Item	Test Condition	Reference
1	High temperature storage	Temperature : +125°C ± 3°C Duration : 1,000 hours	JESD47F_JEDECB
2	Low temperature storage	Temperature : -40°C ± 3°C Duration : 1,000 hours	JESD47F_JEDECB
3	High temperature & humidity	Temperature : 85°C ± 3°C Humidity : RH 85% Duration : 1,000 hours	JESD47F_JEDECB
4	Thermal shock (air to air)	Total 500 cycles of the following temperature cycle 	JESD47F_JEDECB
5	Highly accelerated stress test (un-bias)	Temperature : 130°C ± 3°C Humidity : RH 85% Pressure : 2 atms Duration : 96 hours	JESD47F_JEDECB
6	Aging	Temperature : 105°C ± 3°C Duration : 1,000 hours Voltage input by specification	JESD47F_JEDECB

*Storage conditions： 18 months

*Constant humidity： 40~70%

6. Marking and Packing

6.1 Marking definition

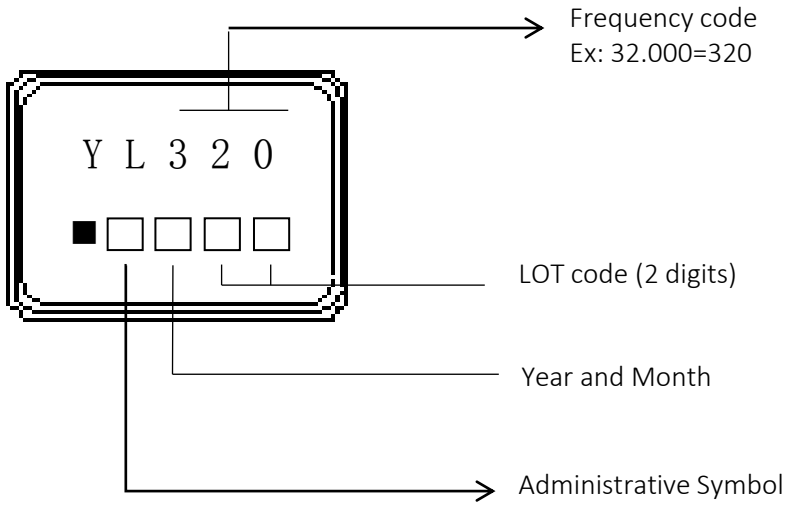
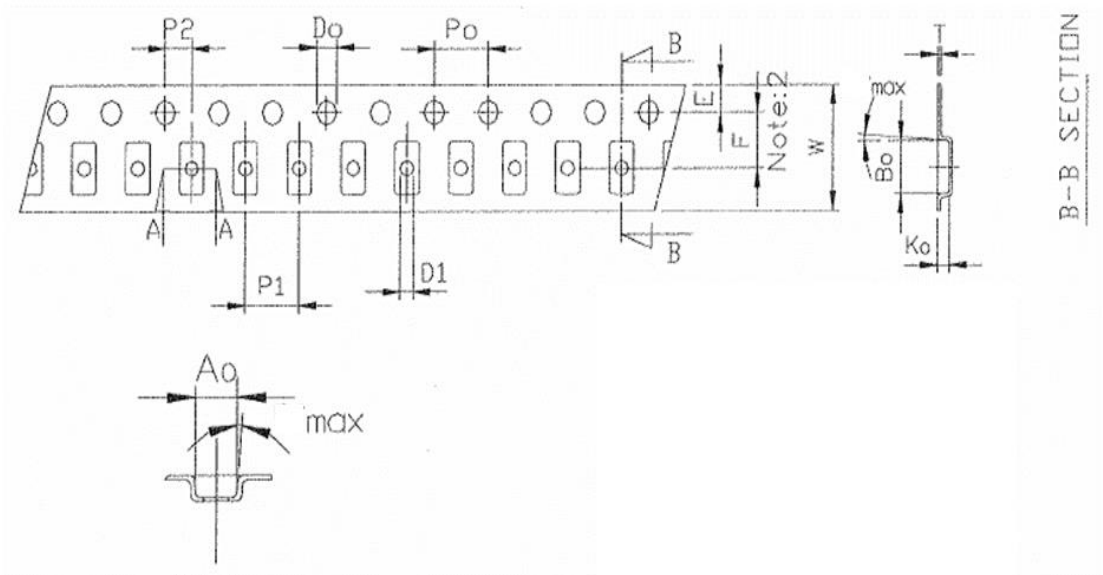


Table of Year and Month code

Year \ Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2021	2025	A	B	C	D	E	F	G	H	J	K	L	M
2022	2026	N	P	Q	R	S	T	U	V	W	X	Y	Z
2023	2027	a	b	c	d	e	f	g	h	j	k	l	m
2024	2028	n	p	q	r	s	t	u	v	w	x	y	z

6.2 Packing (EIA-481-2)



PKG Type	Dimension (Unit : mm)						
2016 (8mm)	A_0	B_0	K_0	T	W	E	F
	1.90±0.1	2.30±0.1	1.25±0.1	0.25±0.05	8.00±0.3	1.75±0.2	3.50±0.1
	P1	P2	D1	D_0	P_0		
	4.00±0.1	2.00±0.1	1.00±0.1	1.55±0.05	4.00±0.1		

Standard Reel Quantity is 3000 pcs per reel.

6. Marking and Packing (Cont.)

6.2 Packing (EIA-481-2) (Cont.)

The inspection standard of tape tension

Item		Defect	Method
Appearance	All	1. The tape is not coincidence 2. The bubble	Visual inspection
Tape tension	8045, 7050 6035-12mm 5032-12mm 3225-12mm	Overstep 61±5g (55 to 67g)	Pull test
	3225-8mm	Overstep 40±5g (35 to 45g)	
	2520-8mm	Overstep 55±6g (49 to 61g)	
	2016-8mm	Overstep 34±6g (28 to 40g)	
	1612-8mm	Overstep 34±6g (28 to 40g)	
	6035-16mm 5032-16mm	Overstep 60±6g (54 to 66g)	

