

RST2520A

1.0 Specification References

Parameter	Description
a. Rakon part number	T6524
b. Description	38.4 MHz RST2520A VCTCXO
c. Package	L x W x H: 2.5 x 2.0 x 0.8 mm



2.0 Absolute Maximum Rating ¹

Parameter	Min.	Max.	Unit
a. Power supply	-0.6	+4.6	V
b. Storage temperature	-40	85	°C

3.0 Frequency Characteristics

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Nominal frequency		38.4		MHz	
b. Frequency calibration			±1	ppm	Offset from nominal frequency measured at 25°C ±2°C.
c. Reflow shift			±1	ppm	Two consecutive reflows as per attached profile after 2 hours relaxation at 25°C.
d. Temperature range	-40		85	°C	The operating temperature range over which the frequency stability is measured
e. Frequency stability over temperature			±0.5	ppm	Referenced to the midpoint between minimum and maximum frequency value over the specified temperature range ² Control voltage set to midpoint of control voltage
f. Frequency slope			0.1	ppm/°C	Minimum of one frequency reading every 2°C over the operating temperature range ²
g. Static temperature hysteresis			0.6	ppm	Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C
h. Sensitivity to supply voltage variations			±0.1	ppm	Supply voltage varied ±5% at 25°C
i. Sensitivity to load variations			±0.2	ppm	±10% load change at 25°C ³
j. Long term stability			±1 ±3	ppm	Frequency drift over the first year at 25°C Frequency drift over 3 years at 25°C
k. Acceleration sensitivity			2	ppb/g	Gamma vector all three axes, from 30 to 1500Hz.

4.0 Power Supply

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Supply voltage (V _{DD})		3.0		V	With a tolerance of ±5%
b. Supply current			2.0	mA	At maximum V _{DD} ³

¹ Operating beyond this limit may result in change or permanent damage to the device.

² Parts should be shielded from drafts causing unexpected thermal gradients. Temperature changes due to ambient air currents on the oscillator can lead to short term frequency drift.

³ Specified for load stated in oscillator output section at 25°C.

5.0 Control Voltage (VCO)

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Control voltage range	0.4	1.4	2.4	V	The nominal VCO value is midway between the minimum and maximum. Voltage control should not exceed the supply voltage -0.1V or GND.
b. Frequency tuning	12			ppm	Frequency shift from minimum to maximum VCO ⁴
c. Control voltage input resistance		500		kΩ	Measured between VCO and GND pin
d. Linearity			10	%	Deviation from straight line fit

6.0 Oscillator Output

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Output waveform					DC coupled clipped sine-wave ⁵
b. Output voltage level	0.8			V _{pk-pk}	At minimum supply voltage ³
c. Output load					10kΩ // 10pF ±10%
d. Start up time (amplitude)			0.5	ms	Within 90% of the minimum specified output level
e. Start up time (frequency)			2	ms	Within ±0.5ppm of steady state frequency

7.0 SSB Phase Noise (38.4 MHz, at 25°C)

Parameter	Typ.	Max.	Unit.	Test Condition / Description
a. 1Hz offset	-57		dBc/Hz	
b. 10Hz offset	-86		dBc/Hz	
c. 100Hz offset	-112		dBc/Hz	
d. 1kHz offset	-134		dBc/Hz	
e. 10kHz offset	-152		dBc/Hz	
f. 100kHz offset	-155		dBc/Hz	
g. 1MHz offset	-155		dBc/Hz	

8.0 Marking

Parameter	Test Condition / Description																																																																																								
a. Type	Engraved																																																																																								
b. Line 1	[R ##M# YM] R = Rakon, ##M# = Frequency (M=MHz, e.g. 19M2=19.2MHz) ⁶ , YM = Date code*																																																																																								
c. Line 2	[• _____] • = Pin 1, Internal Code																																																																																								
d. Date code*	Y - Year Code <table><tr><th>Code</th><th>Year</th><th>Code</th><th>Year</th><th>Code</th><th>Year</th></tr><tr><td>A</td><td>2010</td><td>J</td><td>2019</td><td>S</td><td>2028</td></tr><tr><td>B</td><td>2011</td><td>K</td><td>2020</td><td>T</td><td>2029</td></tr><tr><td>C</td><td>2012</td><td>L</td><td>2021</td><td>U</td><td>2030</td></tr><tr><td>D</td><td>2013</td><td>M</td><td>2022</td><td>V</td><td>2031</td></tr><tr><td>E</td><td>2014</td><td>N</td><td>2023</td><td>W</td><td>2032</td></tr><tr><td>F</td><td>2015</td><td>O</td><td>2024</td><td>X</td><td>2033</td></tr><tr><td>G</td><td>2016</td><td>P</td><td>2025</td><td>Y</td><td>2034</td></tr><tr><td>H</td><td>2017</td><td>Q</td><td>2026</td><td>Z</td><td>2035</td></tr><tr><td>I</td><td>2018</td><td>R</td><td>2027</td><td></td><td></td></tr></table> M - Month Code <table><tr><th>Code</th><th>Month</th><th>Code</th><th>Month</th></tr><tr><td>1</td><td>Jan</td><td>7</td><td>Jul</td></tr><tr><td>2</td><td>Feb</td><td>8</td><td>Aug</td></tr><tr><td>3</td><td>Mar</td><td>9</td><td>Sep</td></tr><tr><td>4</td><td>Apr</td><td>A</td><td>Oct</td></tr><tr><td>5</td><td>May</td><td>B</td><td>Nov</td></tr><tr><td>6</td><td>Jun</td><td>C</td><td>Dec</td></tr></table>	Code	Year	Code	Year	Code	Year	A	2010	J	2019	S	2028	B	2011	K	2020	T	2029	C	2012	L	2021	U	2030	D	2013	M	2022	V	2031	E	2014	N	2023	W	2032	F	2015	O	2024	X	2033	G	2016	P	2025	Y	2034	H	2017	Q	2026	Z	2035	I	2018	R	2027			Code	Month	Code	Month	1	Jan	7	Jul	2	Feb	8	Aug	3	Mar	9	Sep	4	Apr	A	Oct	5	May	B	Nov	6	Jun	C	Dec
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⁴ The maximum frequency tuning range depends on the design frequency and the trimming sensitivity of the crystal. Linearity performance degrades if maximum frequency tuning setting is selected.

⁵ External AC-Coupling capacitor required. 1nF or greater recommended.

⁶ Frequency marking is only represented by the first three significant digits. For example, on an RST2016F TCXO at 16.368MHz, its frequency code marking will be 16M3.

9.0 Manufacturing Information

Parameter	Test Condition / Description
a. Reflow	Solder reflow processes as per profile attached
b. Packaging description	Tape and reel. Standard packing quantity is 3000 units per reel

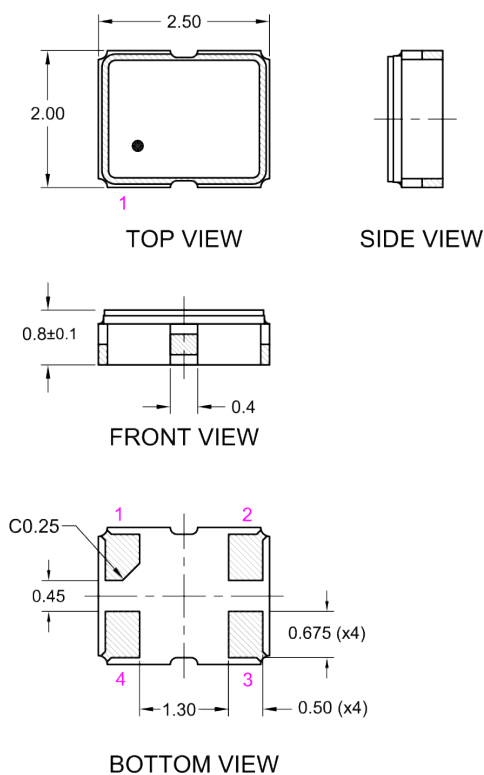
10.0 Environmental Specification

Parameter	Test Condition / Description										
a. RoHS compliant	Yes										
b. Shock	Free dropping from 150 cm height 5 times on a hard wooden board										
c. Moisture resistance	500 ±12 hours at 60°C ±3°C, 85% relative humidity ⁷										
d. Thermal cycling	The unit shall be subjected to 100 successive change of temperature cycles, then 25 ±2°C over 2 hours before testing, each cycle as below: <table> <tr> <td>Temperature</td><td>Duration:</td></tr> <tr> <td>1. -40 +0/-6°C</td><td>30 ±3 minutes</td></tr> <tr> <td>2. 25°C ±2°C</td><td>2 – 3 minutes</td></tr> <tr> <td>3. 85 +4/-0°C</td><td>30 ±3 minutes</td></tr> <tr> <td>4. 25°C ±2°C</td><td>2 – 3 minutes</td></tr> </table>	Temperature	Duration:	1. -40 +0/-6°C	30 ±3 minutes	2. 25°C ±2°C	2 – 3 minutes	3. 85 +4/-0°C	30 ±3 minutes	4. 25°C ±2°C	2 – 3 minutes
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3. 85 +4/-0°C	30 ±3 minutes										
4. 25°C ±2°C	2 – 3 minutes										
e. Vibration	Frequency: 10 – 200 Hz Amplitude (total excursion): 1.5 mm (10 – 36 Hz), 4G (36 – 200 Hz) Sweep time: 1 Min./1oct 3 direction time: 2 hours for each X, Y, Z axis										

⁷ Frequency shift ≤2ppm after environmental conditions.

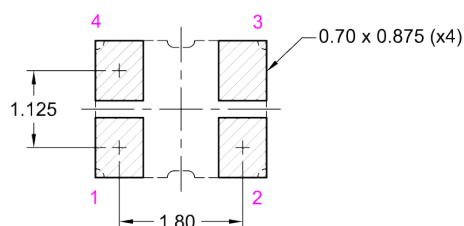
11.0 Model Outline

MODEL OUTLINE



Pin	Connections
1	VCO
2	GND
3	OUTPUT
4	Supply Voltage (VDD)

RECOMMENDED PAD LAYOUT - TOP VIEW



TITLE: RST/RIT 2520 TCXO (All-in-one, Package A)

RELATED DRAWINGS:

FILENAME: CAT1065

REVISION: D

DATE: 25-May-2020

SCALE: 10 : 1

Millimetres

TOLERANCES:

XX =

X.X = ±0.2

X.XX = ±0.15

X.XXX =

X° =

Hole =

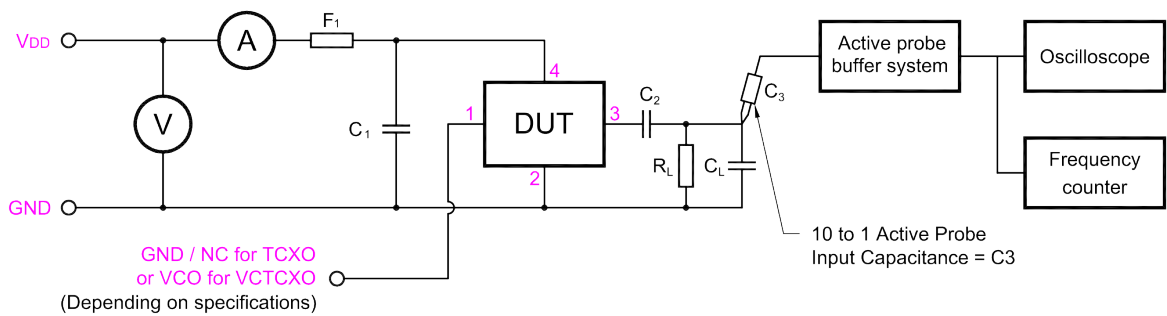


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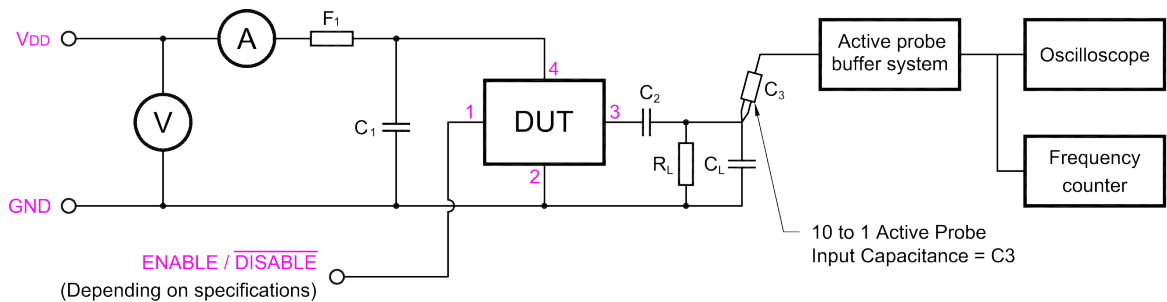
12.0 Test Circuit

CLIPPED SINEWAVE TEST CIRCUIT :

– TCXO / VCTCXO MODE



– POWER DOWN MODE



C ₁ : 100nF	C _T = C _L + C ₃ (C ₃ - Oscilloscope probe capacitance)
C ₂ : ≥1nF	C _T as stated in OSCILLATOR OUTPUT section
R _L : 10K	F ₁ : A ferrite bead or a resistor between 22Ω ~ 47Ω recommended.

TITLE: RIT/RST SERIES TCXO/VCTCXO TEST CIRCUIT (4 Pin, Package A)

FILENAME: CAT1077

RELATED DRAWINGS:

REVISION: C

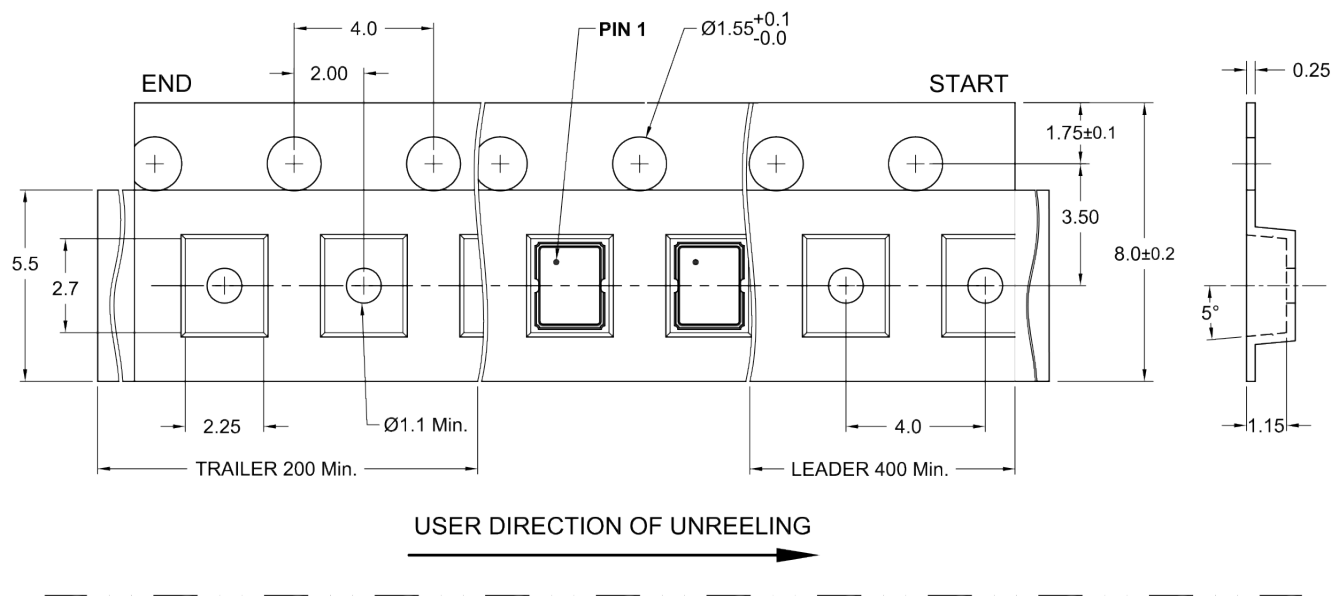
DATE: 12-Sep-2018

SCALE: NTS

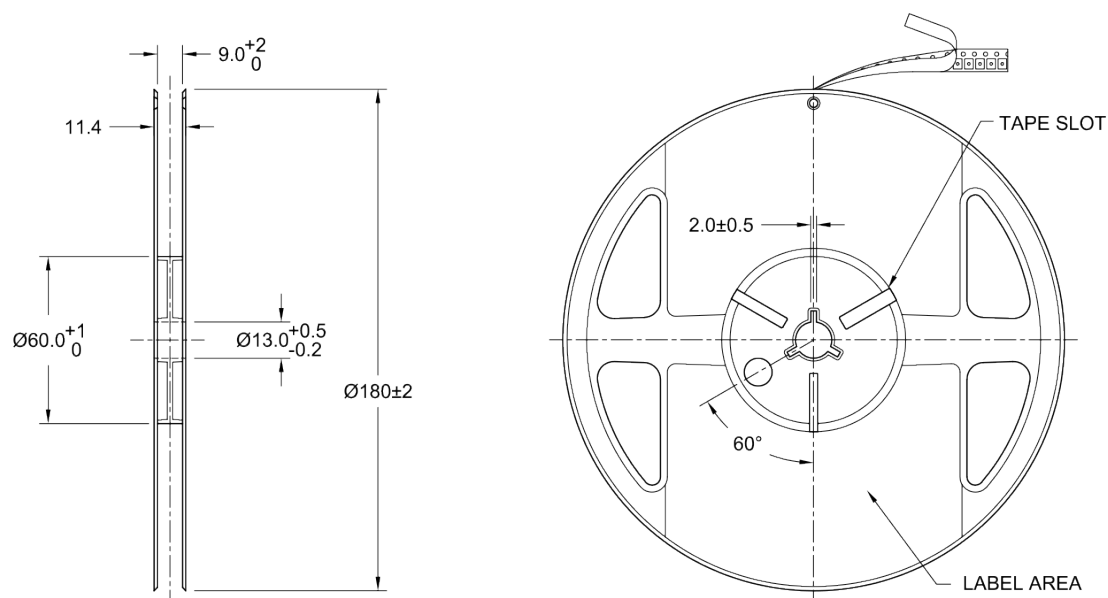
Millimetres

13.0 Tape and Reel

TAPE DETAILS



REEL DETAILS



Note: The tape & reel packaging specifications follow the guidelines of the EIA Standard EIA-481.

TITLE: RST/RIT 2520 TAPE & REEL (Package A)

RELATED DRAWINGS:

FILENAME: CAT1066

REVISION: C

DATE: 04-Jun-2020

SCALE: 5 : 1

Millimetres

TOLERANCES:

XX =

X.X = ±0.2

X.XX = ±0.10

X.XXX =

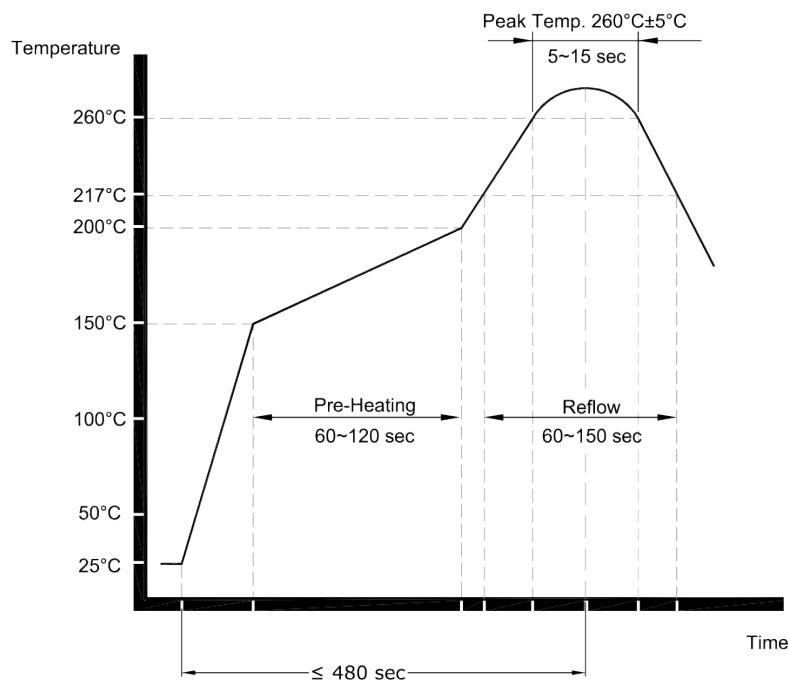
X° =

Hole =



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14.0 Reflow



TITLE: Pb-FREE Reflow (Package A/AG)

RELATED DRAWINGS:

FILENAME: CAT1036

REVISION: B

DATE: 03-Mar-2017

SCALE: NTS

Millimetres

TOLERANCES:

XX =

X.X =

X.XX =

X.XXX =

X° =

Hole =

rakon

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15.0 Specification History

Revision	User	Notes	Approver(s)	Date
A	PK	Specification created to duplicate T6472.	BK/ TL	2021-05-07
B	RS	Updated phase noise to represent test data	BK/ TL	2021-09-21
C	RS	Removed "Preliminary" from the specification	BK/ TL	2022-05-19