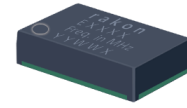


## SMD Low Acceleration Sensitivity TCXO / TCVCXO.

A series of surface mountable Temperature Compensated Voltage Controlled Crystal Oscillators (TCVCXOs) for applications where phase noise performance under vibration is critical.



### Product description

The RFPT700 TCVCXO uses Rakon's proprietary ASIC 'Pluto™', a single chip oscillator with analogue compensation circuit, and a patented crystal resonator design, resulting in high stability over a wide temperature range paired with typically 0.2ppb/g acceleration sensitivity.

### Applications

- Communications
- Avionics
- Guidance
- Military

### Features

### Specifications

#### 1.0 SPECIFICATION REFERENCES

Line	Parameter	Description
1.1	Description	RFPT700
1.2	Rakon part number	
1.3	RoHS compliant	Yes (non-RoHS version available upon request)
1.4	Package size	14.7 x 9.2 x 4.35 mm (max)

#### 2.0 FREQUENCY CHARACTERISTICS

Line	Parameter	Test Condition	Value	Unit
2.1	Frequency range		10 to 30	MHz
2.2	Frequency calibration	At 25°C±2°C, at time of shipment, reference to nominal frequency	±1 max	ppm
2.3	Reflow shift	After 1 hour recovery at 25°C	±1 max	ppm
2.4	Frequency stability over temperature	Reference to (Fmax + Fmin)/2 (note 1)	±0.2 to 5	ppm
2.5	Temperature range	Operating temperature range over which temperature stability is measured (note 2)	-55 to 105	°C
2.6	Slope	Temperature ramp 1°C/minute	20 to 200	ppb/°C
2.7	Supply voltage stability, HCMOS output	±5% variation, reference to frequency at nominal supply voltage, typically less than...	±0.2	ppm
2.8	Supply voltage stability, clipped sinewave output	±5% variation, reference to frequency at nominal supply voltage, typical less than...	±0.1	ppm
2.9	Load sensitivity, HCMOS output	±5pF variation, reference to frequency at 15pF load, typically less than...	±0.2	ppm
2.10	Load sensitivity, Clipped Sinewave Output	±10% variation, reference to frequency at 10k//10pF, typically less than...	±0.1	ppm
2.11	Long term stability	first year, ≤ 26MHz	±1 max	ppm
2.12	Long term stability	first year, > 26MHz	±2 max	ppm
2.13	Long term stability	10 years, ≤ 26MHz	±3 max	ppm
2.14	Long term stability	10 years, > 26MHz	±5 max	ppm
2.15	Acceleration sensitivity	Gamma Vector over operating temperature range (typically 0.2ppb/g)	0.5 max	ppb/g

### 3.0 POWER SUPPLY

Line	Parameter	Test Condition	Value	Unit
3.1	Supply voltage	Standard supply voltages: 3.3 and 5.0V ( $\pm 5\%$ ), other values available upon request.	2.5 to 5.7	V
3.2	Current HCMOS	typically: $1 + \text{frequency(MHz)} * \text{supply(V)} * \{\text{load(pF)} + 15\} * 10^{-3} \text{mA}$ e.g 20MHz, 5V, 15pF = 4mA		mA
3.3	Current Clipped Sinewave	typically: $1 + \text{frequency(MHz)} * 1.2 * \{\text{load(pF)} + 30\} * 10^{-3} \text{mA}$		mA

### 4.0 OSCILLATOR OUTPUT HCMOS (optional) - note 3

Line	Parameter	Test Condition	Value	Unit
4.1	Output waveform	HCMOS		
4.2	Output voltage level low		0.1 max	Vs
4.3	Output voltage level high		0.9 min	Vs
4.4	Rise and fall times	Measured with Vcc = 3.3V	8 max	ns
4.5	Rise and fall times	Measured with Vcc = 5.0V	7 max	ns
4.6	Duty cycle	Measured at 50% level	45 to 55	%
4.7	Load		15	pF

### 5.0 OSCILLATOR OUTPUT CLIPPED SINEWAVE (optional) - note 3

Line	Parameter	Test Condition	Value	Unit
5.1	Output waveform	Clipped sinewave, DC-coupled		
5.2	Output voltage level	Peak to peak voltage	0.8 min	V
5.3	Output load resistance		10	k $\Omega$
5.4	Output load capacitance		10	pF

### 6.0 FREQUENCY ADJUSTMENT (optional)

Line	Parameter	Test Condition	Value	Unit
6.1	Control Voltage Range	Vc	0.5 to 2.5	V
6.2	Frequency Adjustment Range	frequency $\leq$ 26MHz	$\pm 5$ min	ppm
6.3	Frequency Adjustment Range	frequency $>$ 26MHz	$\pm 7$ min	ppm

## 7.0 PHASE NOISE

Line	Parameter	Test Condition	Value	Unit
7.1	SSB phase noise power density at 1Hz offset	Typical value for a 20MHz Clipped sine wave oscillator at 25°C	-63	dBc/Hz
7.2	SSB phase noise power density at 10Hz offset	Typical value for a 20MHz Clipped sine wave oscillator at 25°C	-93	dBc/Hz
7.3	SSB phase noise power density at 100Hz offset	Typical value for a 20MHz Clipped sine wave oscillator at 25°C	-104	dBc/Hz
7.4	SSB phase noise power density at 1kHz offset	Typical value for a 20MHz Clipped sine wave oscillator at 25°C	-128	dBc/Hz
7.5	SSB phase noise power density at 10kHz offset	Typical value for a 20MHz Clipped sine wave oscillator at 25°C	-136	dBc/Hz
7.6	SSB phase noise power density at 100kHz offset	Typical value for a 20MHz Clipped sine wave oscillator at 25°C	-140	dBc/Hz
7.7	SSB phase noise power density at 1MHz offset	Typical value for a 20MHz Clipped sine wave oscillator at 25°C	-143	dBc/Hz
7.8	Note	Low phase noise option available with HCMOS output - consult sales office		

## 8.0 ENVIRONMENTAL INFORMATION

Line	Parameter	Description
8.1	Storage temperature	-55°C to 125°C
8.2	Acceleration Steady State	IEC 60068-2-7 test Ga, 5000g, 10s (at peak acceleration), Y-axis only
8.3	Vibration	IEC 60068-2-6, test Fc: 10-60Hz 0.75mm displacement, 60-500Hz 200m/s <sup>2</sup> (20gn) acceleration, 1.5 hours in each of three mutually perpendicular axes at 1 octave per minute.
8.4	Mechanical Shock	IEC 60068-2-27, test Ea; 1000 m/s <sup>2</sup> (100gn) acceleration for 6ms, half sine pulse, 3 shocks in each direction along three mutually perpendicular axes (18 shocks total)
8.5	RoHS	Parts are fully compliant with the European Union directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Note parts are suitable for assembly using both Lead-free solders and Tin/Lead solders. Non-RoHS version available on request.
8.6	Marking	Laser Marked

## 9.0 MANUFACTURING INFORMATION

Line	Parameter	Description
9.1	Reflow Soldering	See reflow profile diagram. Solderability: MIL-STD-202, method 208, category 3
9.2	Packaging description	Quantities ≥ 100 pieces will be supplied on tape & reel

## 10.0 SPECIFICATION NOTES

Line	Parameter	Description
10.1	Note 1	Availability of stability depends on temperature range - not all combinations may be possible - please check with our sales office.
10.2	Note 2	Availability of temperature range -55 to 105°C depends on nominal frequency - please check with our sales office.
10.3	Note 3	ACMOS / pure sine wave output available upon request

## 11.0 PIN CONNECTIONS

Line	Parameter	Description
11.1	Pin 1	Control Voltage (Vc) OR Do not connect (depending on option selected)
11.2	Pin 2	Not connected
11.3	Pin 3	GND
11.4	Pin 4	Output
11.5	Pin 5	Not connected
11.6	Pin 6	Supply Voltage (Vs)

## 12.0 MARKING

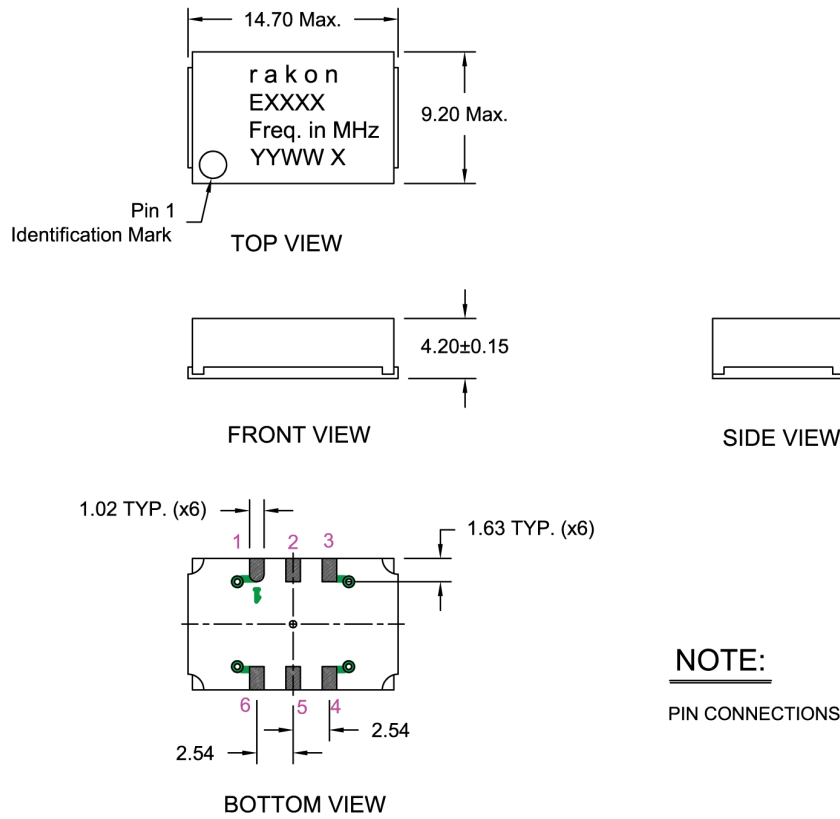
Line	Parameter	Description
12.1	Marking	includes
12.2		rakon
12.3		Part Number (Exxxx)
12.4		Frequency (MHz)
12.5		Pad 1 identifier (indent)
12.6		Device date / location code

## 13.0 DISCLAIMER

Line	Parameter	Description
13.1	Disclaimer	"Samples supplied according to this specification are supplied from our development or pre-production programme and as such are not qualification approved products. No condition, warranty or representation regarding quality, suitability, performance, life or continuation of supply is given or implied and Guarantee in clause 6.1 of our standard Conditions of Sale is not applicable. The right is reserved to change the design or specification or cease supply without notice." RAKON UK Limited

# Drawing Name: RFPT700 Model Drawing

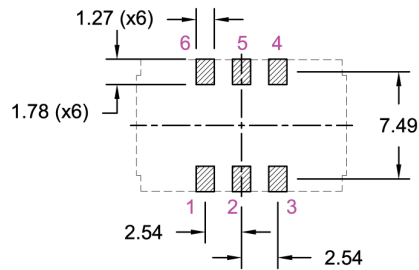
## MODEL OUTLINE



### NOTE:

PIN CONNECTIONS ARE DETAILED IN THE SPECIFICATION

## RECOMMENDED PAD LAYOUT (Top View)



TITLE: RFPT700 MODEL

RELATED DRAWINGS:

FILENAME: CAT637

REVISION: B

DATE: 14-Mar-12

SCALE: 2 : 1

Millimetres

TOLERANCES:

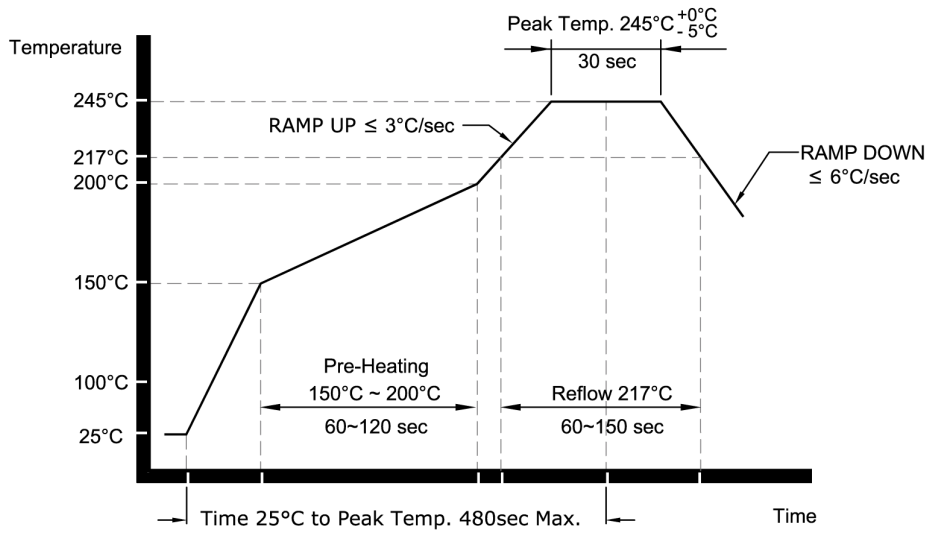
XX =  
 X.X = ±0.2  
 X.XX = ±0.10  
 X.XXX =  
 X° =  
 Hole =

**rakon**

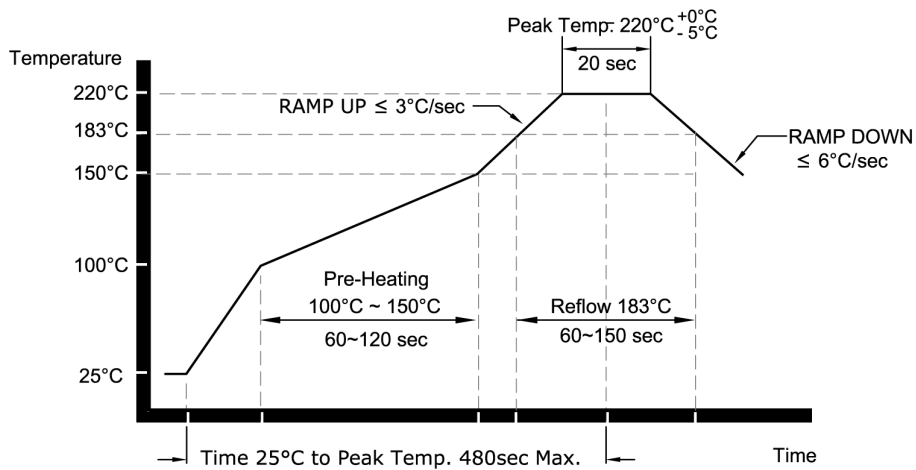
© 2009 Rakon Limited

**Drawing Name: Pluto USTCXO Reflow**

**Pb-FREE REFLOW SOLDERING PROFILE\***



**Sn-Pb EUTECTIC REFLOW SOLDERING PROFILE\***



**NOTE:**

THE PROFILES WERE USED DURING THE QULIFICATION TESTING OF THE PRODUCT AND THEREFORE REPRESENT WORST CASE CONDITIONS. THEY ARE NOT RECOMMENDED FOR USE BY THE CUSTOMER IN THE ACTUAL ASSEMBLY OF THESE PARTS.

TITLE: PLUTO USTCXO REFLOW

FILENAME: CAT640

RELATED DRAWINGS:

REVISION: A

DATE: 03-Oct-11

SCALE: NTS

Millimetres

**rakon**

© 2009 Rakon Limited