

RFPT705



SMD Low Acceleration Sensitivity TCXO / TCVCXO.

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



Product description

The RFPT705 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

- Avionics
- Communications
- Guidance
- Military
- Precision GPS

Features

- g-sensitivity down to 0.2ppb/g
- HCMOS or Clipped sinewave frequency output
- Variants tailored to specific customer requirements
- Very wide operating temperature range
- High stability

Specifications

1.0 SPECIFICATION REFERENCES

Line	Parameter	Description
1.1	Description	RFPT705
1.2	Rakon part number	
1.3	RoHS compliant	Yes (non-RoHS version available upon request)
1.4	Package size	7.0 x 5.0 x 1.8 mm

2.0 FREQUENCY CHARACTERISTICS

Line	Parameter	Test Condition	Value	Unit
2.1	Nominal frequency range		16 to 40	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 2	ppm
2.5	Temperature range	Operating temperature range over which temperature stability is measured	-40 to 85	°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 (±5%), other values available upon request.	2.5 to 6	V
3.2	Current HCMOS	typically: 1+frequency(MHz)*supply(V)*{load(pF)+15}*10 ⁻³ mA e.g 20MHz, 5V, 15pF = 4mA		mA
3.3	Current Clipped Sinewave	typically: 1+frequency(MHz)*1.2*{load(pF) +30}*10 ⁻³ mA		mA

4.0 OSCILLATOR OUTPUT HCMOS (optional) - note 2

Line	Parameter	Test Condition	Value	Unit
4.1	Output waveform	HCMOS		
4.2	Output voltage level low (Vol)		0.1 max	Vs
4.3	Output voltage level high (Voh)		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 2

Line	Parameter	Test Condition	Value	Unit
5.1	Output waveform	Clipped sinewave, AC-coupled		
5.2	Output voltage level	Peak to peak voltage	0.8 min	V
5.3	Output load resistance		10	kΩ
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
6.4	Slope	Positive		
6.5	Input Resistance		100 min	k Ω
6.6	Modulation Bandwidth		2 min	kHz

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

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, duration 1 minute, peak acceleration... X1 & X2 axes 10,000g, Y1 & Y2 axes 20,000g, Z1 & Z2 axes 10,000g
8.3	Vibration	IEC 60068-2-6, test Fc: 10-60Hz 0.75mm displacement, 60-500Hz 200m/s ² (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; half sine pulse, duration 1ms, 3 shocks in each direction along three mutually perpendicular axes (18 shocks total), X1 & X2 axes 10,000g, Y1 & Y2 axes 30,000g, Z1 & Z2 axes 5,000g
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 PIN CONNECTIONS

Line	Parameter	Description
9.1	Pin 1	Control Voltage (Vc) or do Not Connect (NC. depending on option selected)
9.2	Pin 2	GND
9.3	Pin 3	Output
9.4	Pin 4	Supply Voltage (Vs). It is recommended to decouple the supply voltage with a 0.1 to 1.0 μ F capacitor close to the oscillator.

10.0 MARKING

Line	Parameter	Description
10.1	Crystal 1 - Line 1	[R X YW] R = Rakon, X YW = Manufacturing Identifier
10.2	Crystal 1 - Line 2	[NNNN Δ] NNNN = abbreviated part number, Δ = static sensitivity identifier, pin 1 indicator
10.3	Crystal 2	Crystal 2 rotated by 180°C
10.4	Crystal 2 - Line 1	[R X YW] R = Rakon, X YW = Manufacturing Identifier
10.5	Crystal 2 - Line 2	[YW] YW = manufacturing date code
10.6		

11.0 MANUFACTURING INFORMATION

Line	Parameter	Description
11.1	Reflow Soldering	See reflow profile diagram. Solderability: MIL-STD-202, method 208, category 3
11.2	Packaging description	Tape and reel. Standard packing quantity is 500 pieces per reel

12.0 SPECIFICATION NOTES

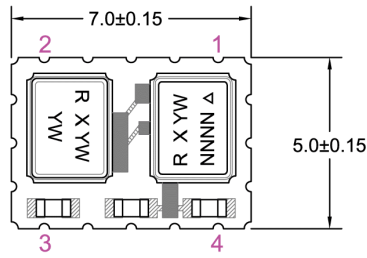
Line	Parameter	Description
12.1	Note 1	Availability of stability depends on temperature range - not all combinations may be possible - please check with our sales office.
12.2	Note 2	ACMOS / pure sine wave output available upon request

13.0 DISCLAIMER

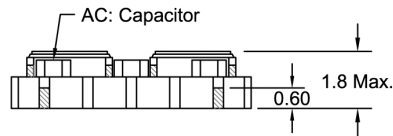
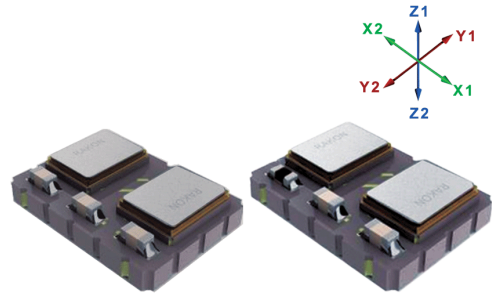
Line	Parameter	Description
13.1	Disclaimer	"Samples supplied according to this specification are supplied from our development or pre-production programme and as such are not qualification approved products. No condition, warranty or representation regarding quality, suitability, performance, life or 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: RFPT705 Model Drawing

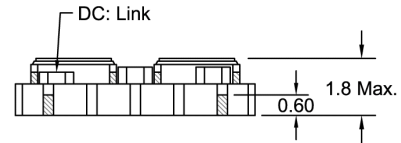
MODEL DRAWING



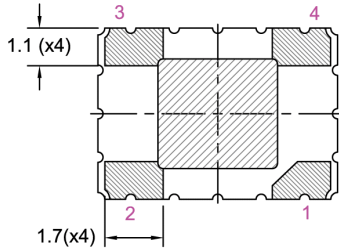
TOP VIEW



FRONT VIEW (AC)



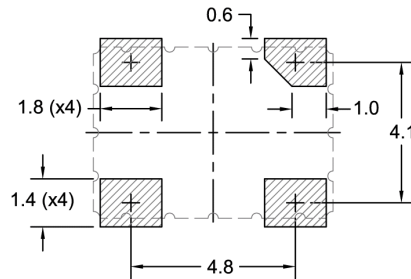
FRONT VIEW (DC)



BOTTOM VIEW

NOTE:
Pin connections are detailed in the specification.

RECOMMENDED PAD LAYOUT - TOP VIEW



TITLE: RFPT705 Model

RELATED DRAWINGS:

FILENAME: CAT754

REVISION: B

DATE: 15-Jan-13

SCALE: 5 : 1

Millimetres

TOLERANCES:

XX = ±0.5

X.X = ±0.2

X.XX = ±0.10

X.XXX = ±0.05

X° = ±1.0°

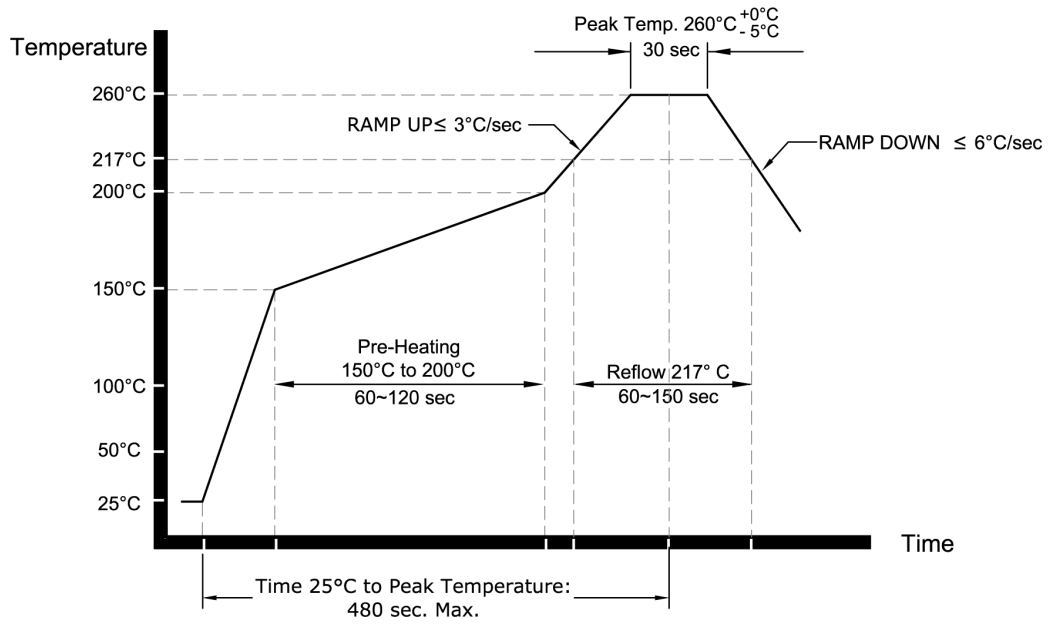
Hole = ±0.10

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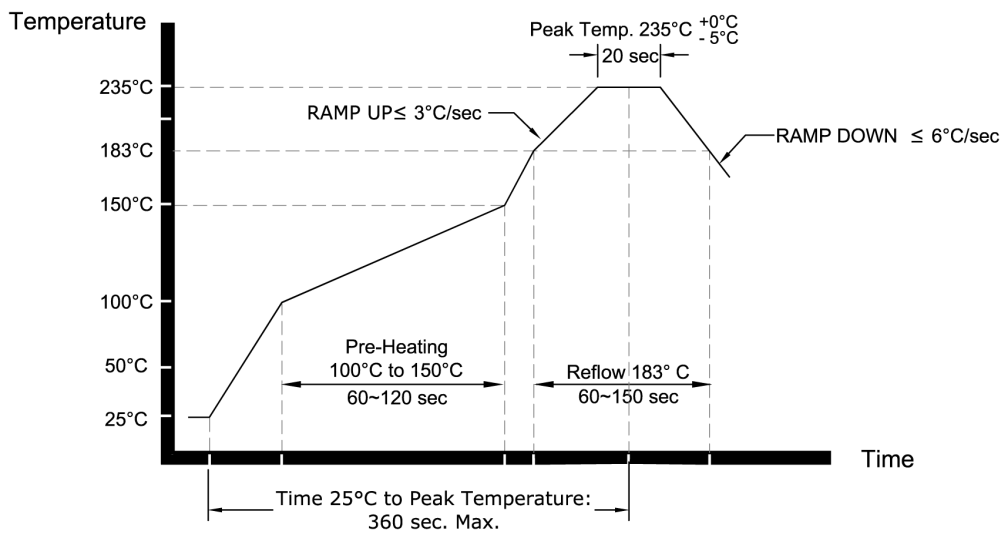
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Drawing Name: RFPT705 Series Reflow

Pb-Free Reflow Soldering Profile *



Sn-Pb Eutectic Reflow Soldering Profile *



*** NOTE:**

These profile were used during the qualification testing of the product and therefore represents worst case conditions. They are not recommended for use by the customer in the actual assembly of these parts.

TITLE: FFPT705 SERIES REFLOW

FILENAME: CAT755

RELATED DRAWINGS:

REVISION: A

DATE: 28-Nov-12

SCALE: NTS

Millimetres

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