

## E7380LF



### 1.0 Specification References

Parameter	Description
a. Rakon part number	E7380LF
b. Description	20.46MHz RPT7050A TCVCXO
c. Version	A (2016-11-14) - PROVISIONAL
d. Package	L x W: 7.0 x 5.0 mm nom, H: 2.0mm max (6 pad)

### 2.0 Absolute Maximum Ratings <sup>1</sup>

Parameter	Min.	Max.	Unit.
a. Junction temperature		150	°C
b. Supply voltage (Vcc)	-0.5	7	V
c. All other inputs	-0.5	Vcc + 0.5	V
d. Power dissipation		100	mW

### 3.0 Frequency Characteristics

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Nominal frequency (Fn)		20.46		MHz	
b. Frequency calibration			±1.0	ppm	Frequency at 25°C ±2°C, Vc=1.5V, reference to Fn
c. Reflow shift			±1.0	ppm	Pre to post reflow ΔF (measured ≥ 60 minutes after reflow)
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	Reference to (F <sub>MAX</sub> +F <sub>MIN</sub> )/2
f. Frequency slope			±0.1	ppm/°C	Minimum of 1 frequency reading every 2°C
g. Supply voltage stability		±0.025		ppm	±5% variation, reference to frequency at nominal supply voltage
h. Load sensitivity		±0.050		ppm	±10% variation, reference to frequency at nominal load
i. Long term stability			±1	ppm	Frequency drift over 1 year at 25°C
j. Acceleration sensitivity		< 2		ppb/g	Gamma vector, 3-axes, 30-1500Hz
k. Start-up time			15	ms	90% amplitude

### 4.0 Power Supply

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Supply voltage (Vcc)		3.0		V	±5%
b. Supply current		2.8	3.5	mA	

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

## 5.0 Control Voltage (Vc)

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Control voltage range	0.5		2.5	V	
b. Frequency tuning	±5		±10	ppm	Reference to frequency at Vc=1.5V
c. Frequency tuning linearity			1	%	Deviation from straight line curve fit
d. Port input impedance	100			kΩ	
e. Modulation bandwidth	1			Hz	

## 6.0 Oscillator Output

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Output waveform					DC coupled clipped sinewave
b. Output voltage level	0.8	1.1		Vpp	
c. Output load resistance		10		kΩ	
d. Output load capacitance		10		pF	

## 7.0 Tri-State Control <sup>2</sup>

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Tri-state mode					The device features a tri-state mode which allows the output to be disabled and brought into a high impedance state
b. Tri-state control (pin 6), input level low (V <sub>IL</sub> )			20%Vcc	V	Device disabled (output in high impedance state)
c. Tri-state control (pin 6), input level high (V <sub>IH</sub> )	60%Vcc			V	Device enabled (operating)
d. Current when in tri-state mode		2		mA	
e. Output enable time			100	μs	

## 8.0 Pin Connections

Parameter	Connection
a. Pin 1	Control Voltage (Vc)
b. Pin 2	GND
c. Pin 3	Do not connect
d. Pin 4	RF Output (if an AC coupled output is required a 10nF capacitor should be placed in series with the output)
e. Pin 5	Supply Voltage (Vcc)
f. Pin 6	Tri-state Control (Enable) <sup>2</sup>

<sup>2</sup> The tri-state control (enable) input pin has an internal 100kΩ pull up resistor which allows it to be left unconnected if not used. When in tri-state mode, the output stage is disabled, but the oscillator and compensation circuit are still active.

## 9.0 SSB Phase Noise (at 25°C)

Parameter	Typ.	Unit.	Test Condition / Description
a. 1Hz offset	-70	dBc/Hz	
b. 10Hz offset	-100	dBc/Hz	
c. 100Hz offset	-125	dBc/Hz	
d. 1kHz offset	-145	dBc/Hz	
e. 10kHz offset	-153	dBc/Hz	
f. 100kHz offset	-155	dBc/Hz	
g. 1MHz offset	-158	dBc/Hz	

## 10.0 Marking

Parameter	Description
a. Type	Laser marked
b. Line 1	[ R # YW ] R = Rakon, # YW = manufacturing identifier
c. Line 2*	[ E7380 YW ] E7380 = abbreviated part number, YW = device date code
d. Note	* Rotated by 180°

## 11.0 Manufacturing Information

Parameter	Description
a. Reflow soldering	See reflow profile diagram
b. Packaging description	Tape and reel (see drawing)

## 12.0 Environmental Specification

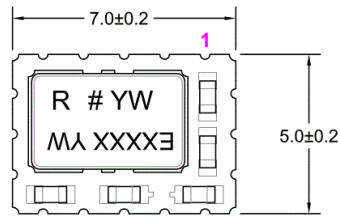
Parameter	Description
a. RoHS	Parts are fully compliant with the European Union directives 2002/95/EC and 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Note the RoHS compliant parts are suitable for assembly using both Lead-free solders and Tin / Lead solders.
b. Solderability	JESD22-B102, M1, condition E (IPC/EIA J-STD-002A), 245°C for 5s, precondition for 16 hours at +150°C
c. High Temperature Operating Life (HTOL)	JESD22-A108, 1008 hours at +125°C
d. Temperature cycle	JESD22-A104, 500 cycles, -55°C to +125°C
e. Low temperature storage	IEC 60068-2-1 test Ab, 1000 hours at -55°C
f. High temperature storage	IEC 60068-2-2 test Bb, 1000 hours at +150°C
g. Moisture resistance	JESD22-A113, MSL = 1
h. Temperature / Humidity bias	JESD22-A101, 1008 hours at +85°C / 85% R.H., precondition: 3 Reflow cycles (peak temperature 260°C)
i. Mechanical vibration	JESD22-B103, 20g, 60-2000Hz, 4 hours in each of three axes (12 hours total)
j. Mechanical shock	JESD22-B104, 1500g <sub>n</sub> , 0.5ms, 5 pulses in each of 6 directions
k. Aging	MIL-PRF-55310, 1008 hours at +85°C, precondition: 3 Reflow cycles (peak temperature 260°C)
l. Resistance to soldering heat	IPC/JEDEC J-STD-020, 3 reflow cycles (peak temperature 260°C)

### 13.0 Disclaimer

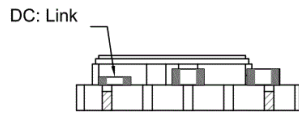
Parameter	Description
a. Disclaimer	"Samples supplied according to this specification are supplied from our development or pre-production programme and as such are not qualification approved products. No condition, warranty or representation regarding quality, suitability, performance, life or continuation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

14.0 Model Outline:

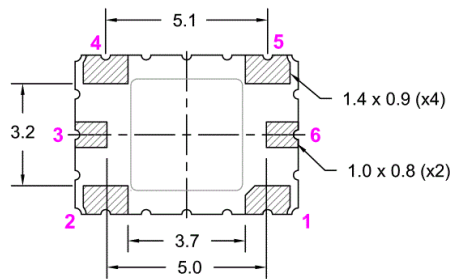
MODEL DRAWING



TOP VIEW



FRONT VIEW (DC)



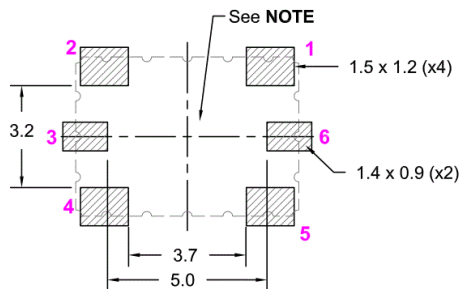
BOTTOM VIEW

PIN CONNECTIONS	
1 *	Do Not Connect / Vc
2	GND
3 *	Do Not Connect / Vref / Vtemp
4	RF Output
5	Vcc
6	Enable
* Depending on specification	

**NOTE:**

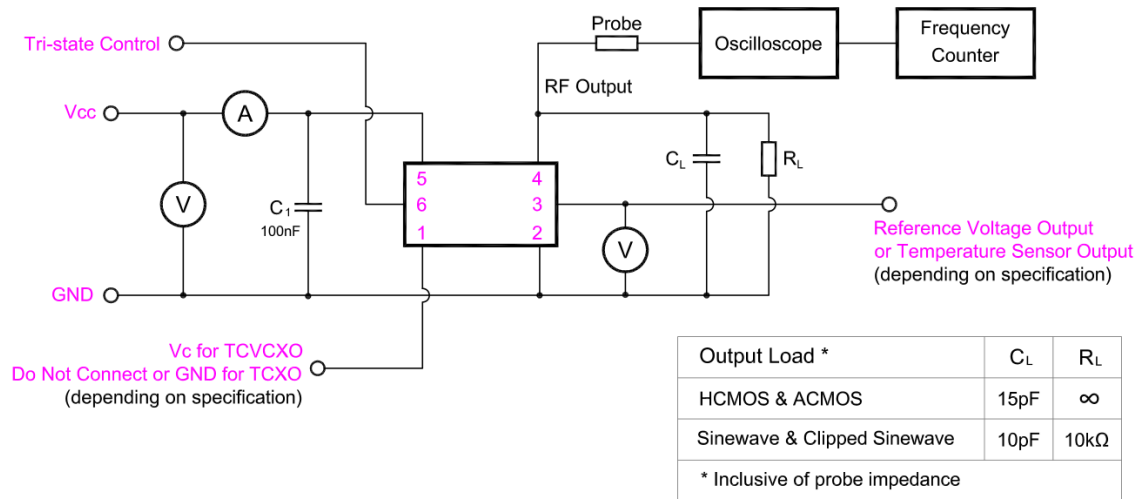
- The area between the pads is a keep-out area, no tracks or ground plane allowed on any layer.

RECOMMENDED PAD LAYOUT - TOP VIEW



**15.0 Test Circuit and Output Waveform:**

6 PIN TEST CIRCUIT:



TITLE: Pluto+ TCXO/TCVCXO TEST CIRCUIT

FILENAME: CAT781

RELATED DRAWINGS:

REVISION: A

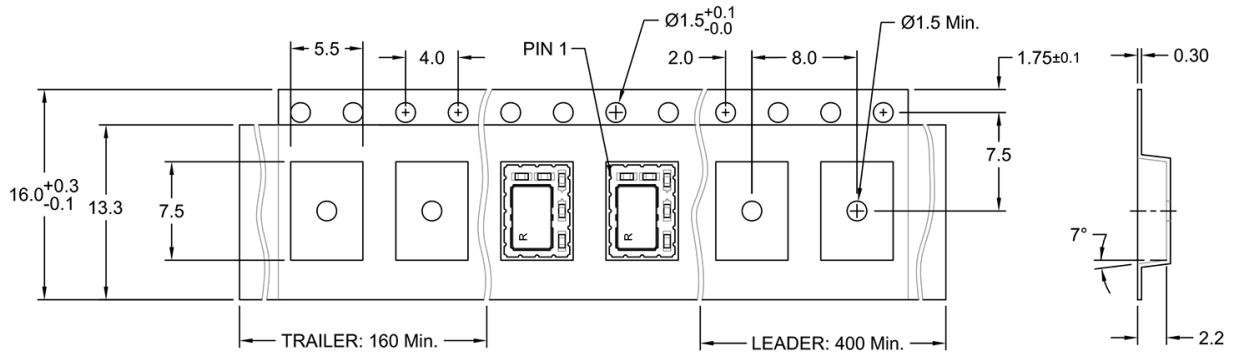
DATE: 20-Mar-13

SCALE: NTS

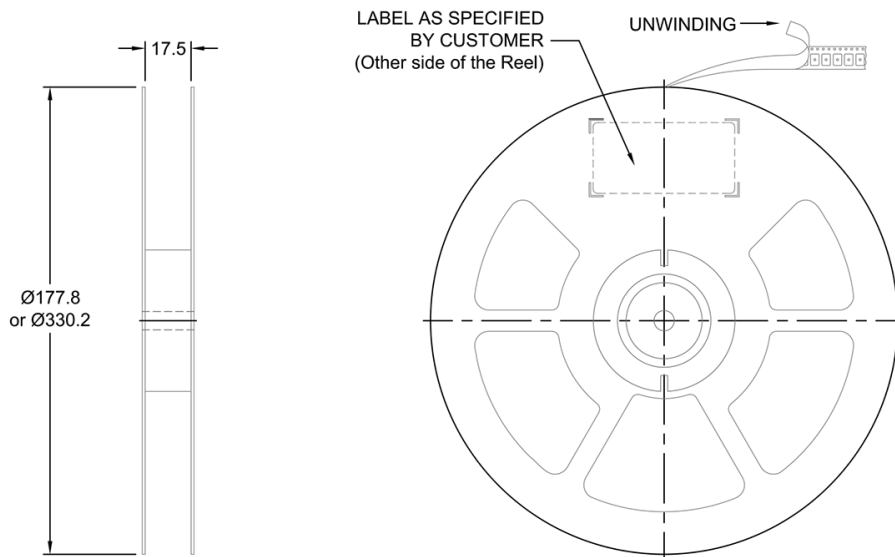
Millimetres

16.0 Tape and Reel ( $\varnothing 178\text{mm}/\varnothing 330\text{mm}$ ):

TAPE DETAILS



REEL DETAILS



TITLE: 7050 SERIES TAPE & REEL

RELATED DRAWINGS:

FILENAME: CAT778

REVISION: A

DATE: 25-Feb-13

SCALE:

Millimetres

TOLERANCES:

XX =

X.X = ±0.2

X.XX = ±0.10

X.XXX =

X° =

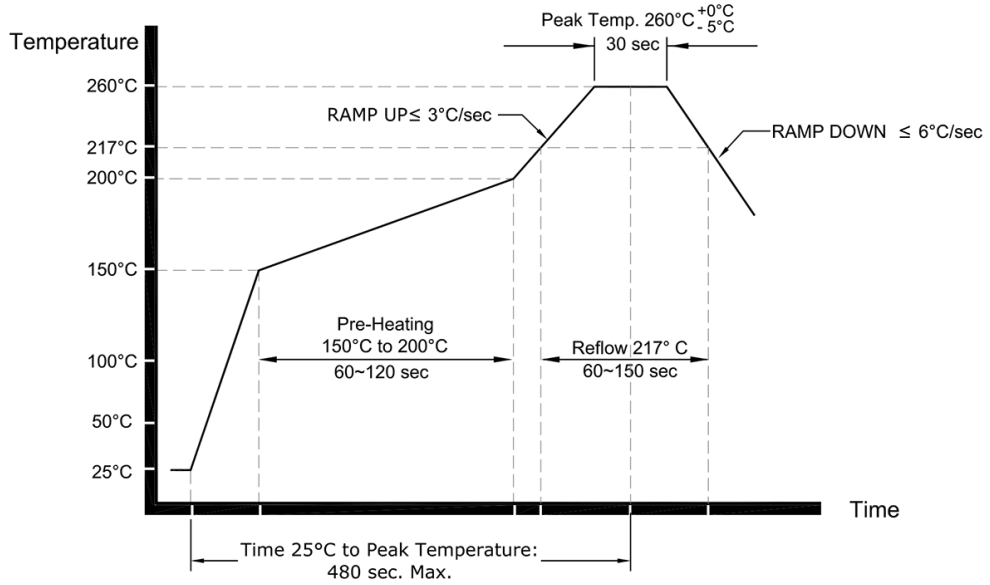
Hole =

**rakon**

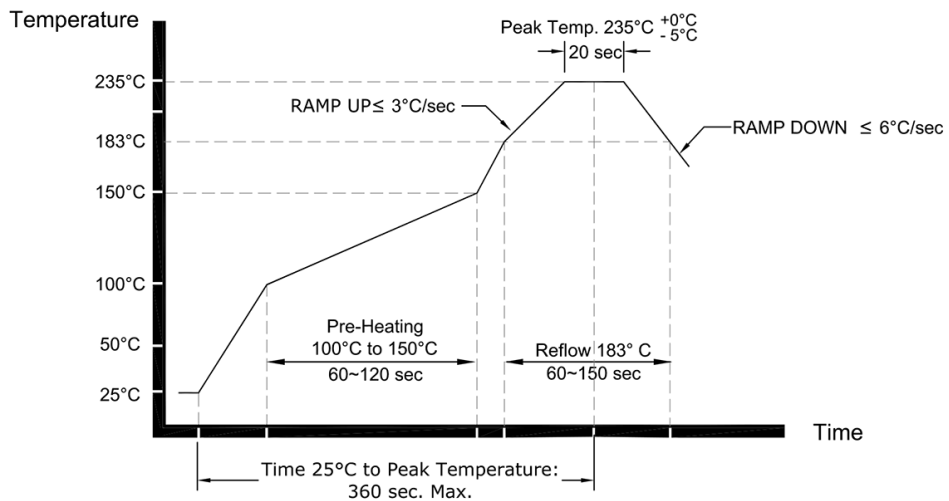
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17.0 Reflow:

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: Pluto 7050 Series TCXO Reflow

FILENAME: CAT711

RELATED DRAWINGS:

REVISION: B  
DATE: 25-Jun-13  
SCALE: NTS  
Millimetres



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### 18.0 Specification History

Version	User	Changes	Approver	Date
A	JO	Initial issue	KW	2016-11-14