

U7592LF

1.0 Specification References

Parameter	Description
a. Rakon part number	U7592LF
b. Description	ROM1490E 10.0MHz MERC+ 14x9H HOT RC2.5 3.3V
c. Version	B (2019-01-24) - PRELIMINARY
d. Package	L x W x H: 14.2 x 9.2 x 6.5 mm nom.



2.0 Absolute Maximum Ratings ¹

Parameter	Min.	Max.	Unit.
a. Storage temperature	-55	125	°C
b. Supply voltage (Vcc)	-0.5	6	V
c. Power dissipation		2	W
d. Load		50	pF

3.0 Frequency Characteristics ²

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Nominal frequency (Fn)		10.0		MHz	
b. Frequency calibration			±0.5	ppm	At 25°C ± 2°C, at time of shipment, reference to nominal frequency
c. Reflow shift			±0.5	ppm	After 1 hour recovery at 25°C
d. Operating temperature range	-40		+85	°C	
e. Frequency stability over temperature (in still air)			±5	ppb	Reference to (F _{MAX} + F _{MIN})/2
f. Frequency slope ΔF/ΔT in still air			±0.5	ppb/°C	Temperature ramp ≤ 1°C/minute
g. All causes stability			±4.6	ppm	Including calibration, temperature, supply voltage & load changes and 20 years life, reference to Fn
h. Supply voltage stability		±5		ppb	±2% variation, reference to frequency at 3.3V
i. Load sensitivity		±5		ppb	±10% variation, reference to frequency at 15pF
j. Warm-up time ³		< 3		minutes	
k. Long term stability (aging) ⁴			±1 ±0.3 ±1.5	ppb ppm	Per day First year 10 years
l. Wander generation ⁵	TDEV compliant with GR-1244 fig 5-4 & G.812 types II & III fig 2 MTIE compliant with GR-1244 fig 5-5 & G.812 types II & III fig 1 TDEV & MTIE compliant with G.8262, G.8263, G.8273.2				

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

² The characteristics of the component may be temporarily affected by the processes of assembly and soldering. The frequency specifications apply after 48 hours of continuous operation after assembly. Nominal conditions (T=25°C, Vcc=3.3V, C_{load}=15pF) apply unless otherwise stated.

³ Time needed for frequency to be within ±20 ppb reference to frequency after 1 hour, at 25°C. Parameter is frequency, assembly and operating history dependent.

⁴ After 60 days of continuous operation.

⁵ Oscillator stabilised 24 hours at constant temperature (±1°C, still air). Data subjected to relevant loop filter values (-3dB cut-off, 2nd order high pass).

4.0 Root Allan Variance (at 25°C)

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Root Allan Variance		5×10^{-11} 8×10^{-11} 6×10^{-11} 6×10^{-11} 5×10^{-11}			tau = 0.1s tau = 1.0s tau = 10s tau = 100s tau = 1000s

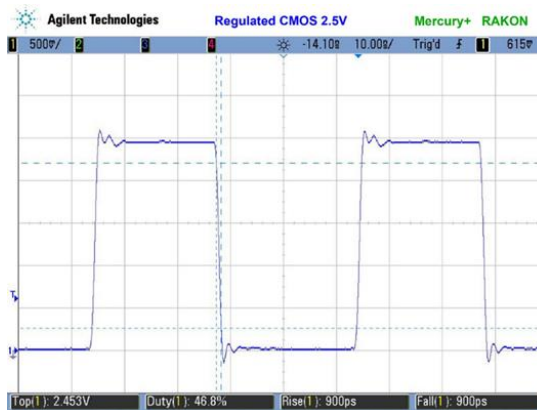
5.0 Power Supply

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Supply voltage (Vcc)		3.3		V	±5%
b. Input power (Warm up)		1200	1500	mW	At Vcc = 3.3V
c. Input power (Steady state in still air at 25°C)		400	440	mW	At Vcc = 3.3V

6.0 Oscillator Output – Regulated CMOS 2.5V

Parameter	Min.	Typ.	Max.	Unit	Test Condition / Description
a. Output voltage level low (V _{OL})	0		0.2	V	
b. Output voltage level high (V _{OH})	2.3		2.7	V	
c. Rise and fall time		1	2	ns	10% to 90% level
d. Duty cycle	45		55	%	At 50% level
e. Load		15		pF	Nominal

f. Waveform screenshot (example at 20MHz)



7.0 SSB Phase Noise (at 25°C)

Parameter	Typ.	Unit.	Test Condition / Description
a. 1Hz offset	-82	dBc/Hz	
b. 10Hz offset	-113	dBc/Hz	
c. 100Hz offset	-141	dBc/Hz	
d. 1kHz offset	-157	dBc/Hz	
e. 10kHz offset	-159	dBc/Hz	
f. 100kHz offset	-159	dBc/Hz	
g. 1MHz offset	-159	dBc/Hz	

8.0 Marking

Parameter	Description
a. Type	Laser marked
b. Line 1	[R FFFF YM] Rakon identifier R, Frequency FFFF (M=MHz, e.g. 10M0=10.0MHz), Year Y (A=2010, B=2011, ...), Month M (1=Jan, 2=Feb, ..., A=Oct, B=Nov, C=Dec)
c. Line 2	[• LLL] Pin 1 •, Lot code LLL

9.0 Manufacturing Information

Parameter	Description
a. Reflow soldering	IPJ/JEDEC J-STD-020, see Pb-free solder reflow profile attached
b. Packaging description	Tape & Reel (see drawing attached)
c. Application Note	For optimum performance follow the instructions in Guidelines for use of Mercury™ /Mercury+™ IC-OCXO

10.0 Environmental Specification ⁶

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 these RoHS compliant parts are suitable for assembly using both Lead-free solders and Tin / Lead solders
b. Solderability	IPC/ECA J-STD-002, method 2, precondition 150°C, 16 hours
c. Latch Up	EIA/JESD78, tested at room temperature and maximum ambient operating temperature
d. Electrostatic Discharge (ESD)	Human Body Model (HBM), JEDEC JS-001-2012, ≥ 2000V Charged Device Model (CDM), JESD22-C101, ≥ 1000V Machine Model (MM), JESD22-A115, ≥ 200V
e. Low Temperature Storage	JESD22-A119, 1000 hours at -55°C, unbiased
f. Thermal Shock	JESD22-A104 / MIL-STD-883, method 1010, 15 cycles from -55°C to 125°C
g. Temperature Cycling	JESD22-A104 / MIL-STD-883, method 1010, 1000 cycles, -55°C to +125°C, non-operating, 15 minute soak
h. High Temperature Operating Life	JESD22-A108, ≥ 2000 hours at 125°C & max. Vcc
i. Cold Power Cycling	Rakon standard, -40°C, 12 minutes OFF, 4 minutes ON, 1000 cycles
j. Frequency Aging	MIL-PRF-55310, 1008 hours
k. Mechanical Shock	MIL-STD-202 (method 213), 1500g, 0.5ms duration, 18 shocks total
l. Vibration	JESD22-B103 (section 4.2.2), test Fc: 20g, 20 to 2000Hz, 4 minute sweep, 4 sweeps x 3 axes

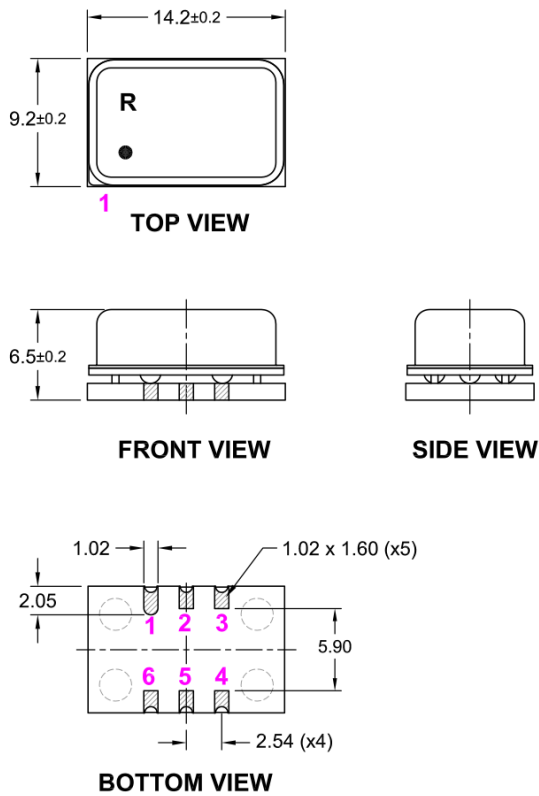
11.0 Disclaimer

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

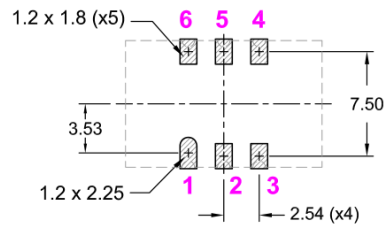
⁶ For all relevant tests the units are pre-conditioned as per JESD22-A113 (5 temperature cycles -40°C to +60°C + bake for 24 hours at T = +125°C + moisture soak for 168 hours at +85°C / 85% RH + 3x reflow at T_{MAX} = +260°C).

12.0 Model Outline:

MODEL OUTLINE



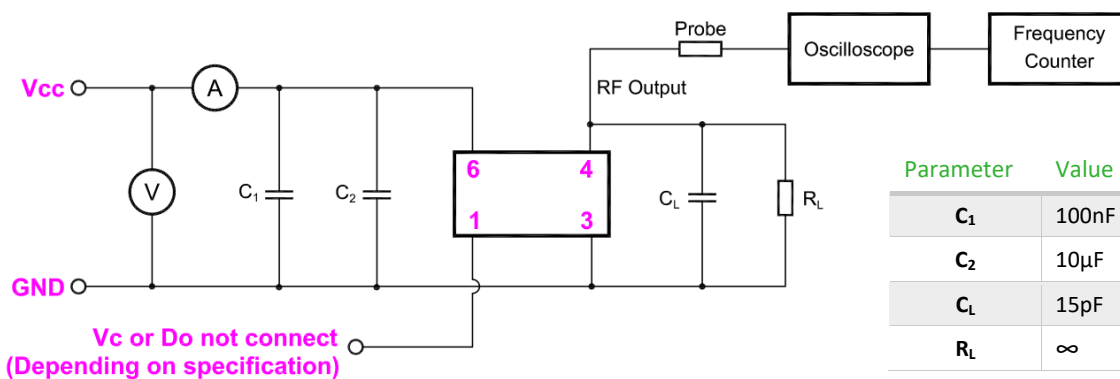
RECOMMENDED PAD LAYOUT (TOP VIEW)



Pin Connections

Pin	Connections
1	Do not connect (GND optional)
2	Do not connect (GND optional)
3	GND
4	Output
5	NC
6	Supply Voltage (Vcc), for correct operation decouple the supply voltage with a 10µF capacitor close to the oscillator

TEST CIRCUIT



Parameter	Value
C ₁	100nF
C ₂	10µF
C _L	15pF
R _L	∞

TITLE: ROM1490 Mercury+™ IC OCXO (Hermetic, H = 6.5mm)

FILENAME: CAT1105

TOLERANCES:

RELATED DRAWINGS:

REVISION: A

XX =

X.X = ±0.2

X.XX = ±0.10

X.XXX = ±0.05

X° =

Hole =

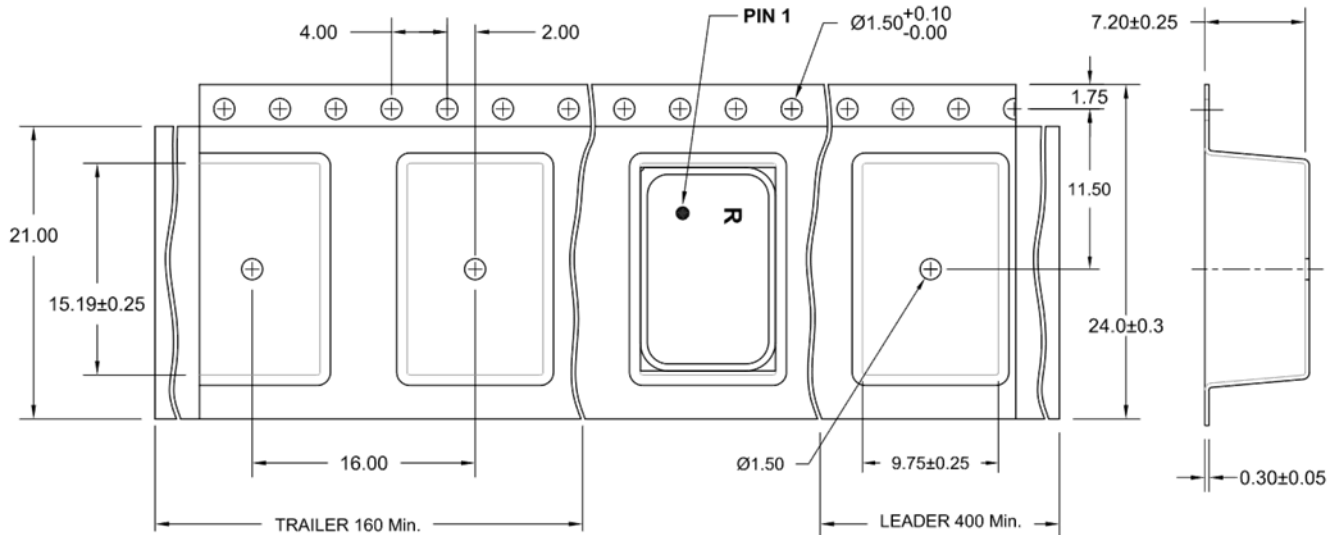
DATE: 26-Sep-2017

SCALE: 2 : 1

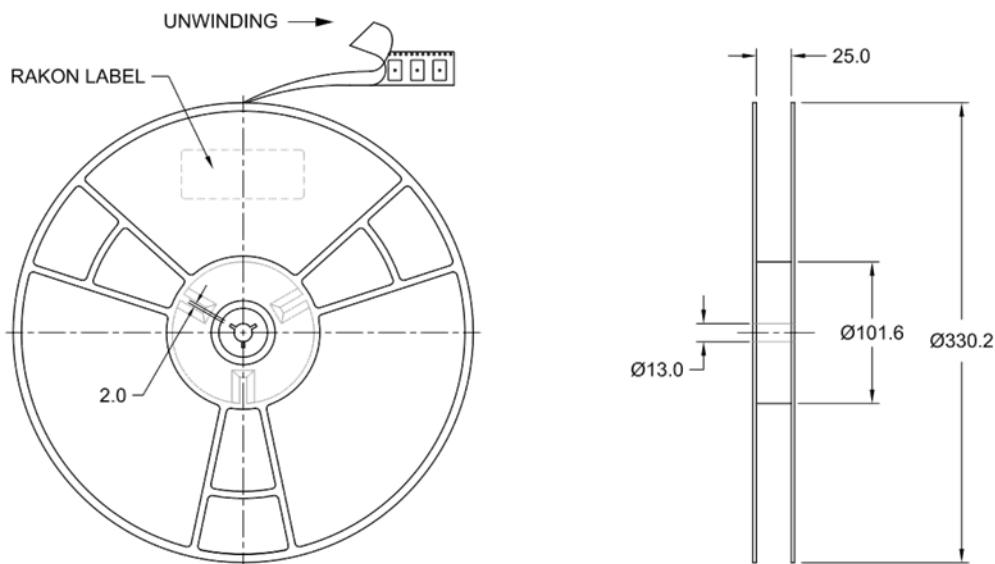
Millimetres

13.0 Tape and Reel:

TAPE DETAIL (SCALE 2 : 1)



REEL DETAIL (SCALE 1 : 5)



TITLE: 1490 Series Tape & Reel (H:7.20 mm)

RELATED DRAWINGS:

FILENAME: CAT976

REVISION: B

DATE: 07-Dec-2015

SCALE:

Millimetres

TOLERANCES:

XX =

X.X = ±0.2

X.XX = ±0.10

X.XXX = ±0.05

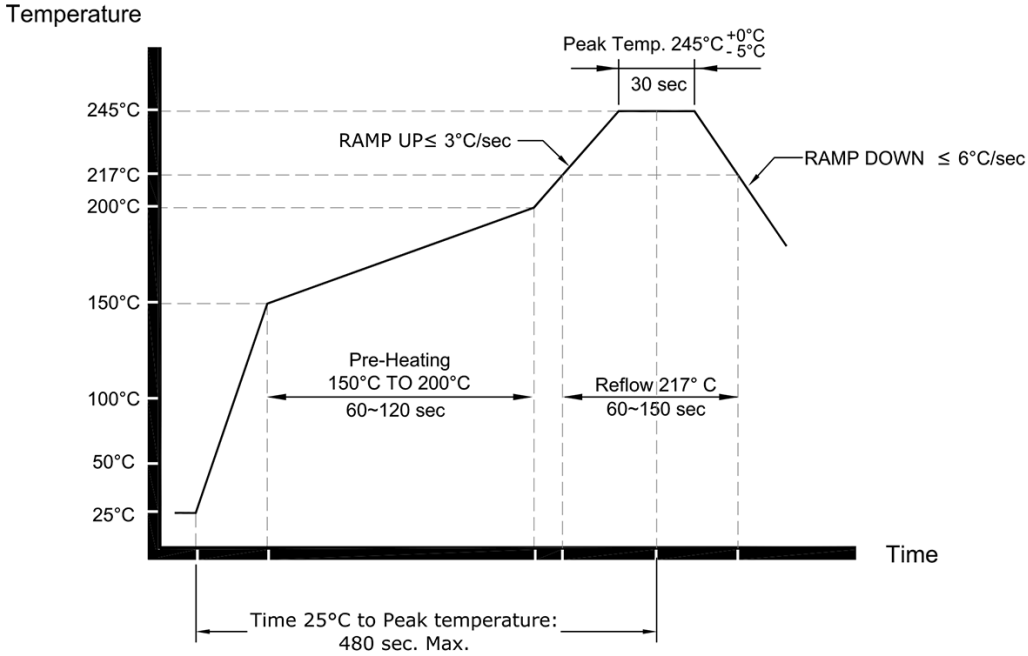
X° =

Hole = ±0.10

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14.0 Reflow:



NOTE:

This profile was used during the qualification testing of the product and therefore represents worst case conditions. It is not recommended for use by the customer in the actual assembly of these parts.

TITLE: Mercury 1490 Series OXCO Reflow

FILENAME: CAT647

RELATED DRAWINGS:

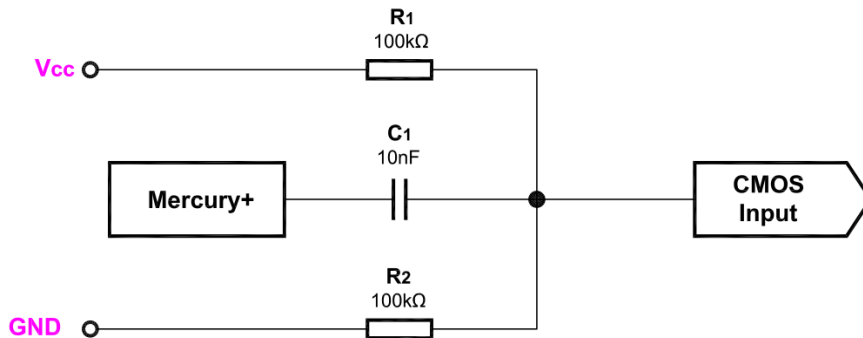
REVISION: B
 DATE: 27-Jun-13
 SCALE: NTS
 Millimetres



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15.0 Optional Bias Network to convert Mercury+ Output to Standard CMOS

Parameter	Vcc = 3.135V		Vcc = 3.3V		Vcc = 3.465V	
	Without	With	Without	With	Without	With
VOH	≥ 2.3V	≥ 2.76V	≥ 2.3V	≥ 2.85V	≥ 2.3V	≥ 2.93V
VOH [%Vcc]	≥ 73%	≥ 88%	≥ 70%	≥ 86%	≥ 66%	≥ 73%
VOL	≤ 0.2V	≤ 0.36V	≤ 0.2V	≤ 0.45V	≤ 0.2V	≤ 0.53V
VOL [%Vcc]	≤ 6.4%	≤ 12%	≤ 6.1%	≤ 14%	≤ 5.8%	≤ 15%



TITLE: Mercury+™ IC OCXO Optional Bias Network Output to Standard

FILENAME: CAT977

RELATED DRAWINGS:

REVISION: A

DATE: 07-Apr-2015

SCALE: NTS

Millimetres

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16.0 Specification History

Version	User	Changes	Approver	Date
A	JO	Initial issue	BR	2017-09-11
B	JO	Updated outline drawing, environmental section, marking, pin 2 label, phase noise, various typographical and style changes as per latest product model template	LX	2019-01-24