# E7157LF

## 1.0 Specification References

| Parameter | Description |
|---|---|
| a. Rakon part number | E7157LF |
| b. Description | 100.0MHz RHT1490A TCVCXO |
| c. Version | D (2016-12-12) – PROVISIONAL |
| d. Package | 14.4 x 9.2 x 4.7 mm max. |


## 2.0 Absolute Maximum Ratings [1]

| Parameter | Min. | Max. | Unit. |
|---|---|---|---|
| a. Storage temperature | -40 | 85 | °C |
| b. Supply voltage ($V_{DD}$) | -0.6 | 4.6 | V |

## 3.0 Frequency Characteristics

| Parameter | Min. | Typ. | Max. | Unit | Test Condition / Description |
|---|---|---|---|---|---|
| a. Nominal frequency (Fn) | | 100.0 | | MHz | |
| b. Frequency calibration | | | ±1 | ppm | At 25°C ± 2°C, Vc=1.65V, at time of shipment, reference to nominal frequency |
| c. Reflow shift | | | ±1 | ppm | Pre to post reflow ΔF (measured ≥ 60 minutes after reflow) |
| d. Operating temperature range | -40 | | 85 | °C | |
| e. Frequency stability over temperature | | | ±1 | ppm | Reference to $(F_{MAX} + F_{MIN})/2$ |
| f. Supply voltage stability | | | ±0.1 | ppm | ±5% variation, reference to frequency at 3.3V |
| g. Load sensitivity | | | ±0.1 | ppm | ±5pF variation, reference to frequency at 5pF |
| h. Long term stability | | | ±1<br>±7 | ppm<br>ppm | 1 year<br>10 years |
| i. Start-up time | | | 1 | ms | 90% amplitude |
| j. Acceleration stability | | 2 | | ppb/*g* | Gamma vector 3-axes, 30 – 1500Hz |

## 4.0 Power Supply

| Parameter | Min. | Typ. | Max. | Unit | Test Condition / Description |
|---|---|---|---|---|---|
| a. Supply voltage ($V_{DD}$) | | 3.3 | | V | ±5% |
| b. Supply current | | | 14 | mA | Load 5pF//1kΩ |

[1] 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 | 0.3 | | 3.0 | V | |
| b. Frequency tuning | ±5 | | ±10 | ppm | Reference to frequency at Vc = 1.65V |
| c. Frequency tuning linearity | | | 5 | % | Deviation from straight line curve fit |
| d. Input impedance | 100 | | | kΩ | |
| e. Slope | | | | | Positive |

## 6.0 Oscillator Output – CMOS

| Parameter | Min. | Typ. | Max. | Unit | Test Condition / Description |
|---|---|---|---|---|---|
| a. Output voltage level low ($V_{OL}$) | | | 20% | VDD | Measured with a capacitive load of 5pF |
| b. Output voltage level high ($V_{OH}$) | 80% | | | VDD | Measured with a capacitive load of 5pF |
| c. Rise time | | 1.2 | 1.5 | ns | Measured 20% to 80% VDD , 5pF load |
| d. Fall time | | 1.2 | 1.5 | ns | Measured 80% to 20% VDD , 5pF load |
| e. Duty cycle | 40 | | 60 | % | Measured at 50% VDD trigger level |
| f. Load | | 5 | 10 | pF | |

## 7.0 SSB Phase Noise and RMS Phase Jitter (100MHz, at 25°C)

| Parameter | Typ. | Unit. | Test Condition / Description |
|---|---|---|---|
| a. 1Hz offset | -51 | dBc/Hz | |
| b. 10Hz offset | -81 | dBc/Hz | |
| c. 100Hz offset | -108 | dBc/Hz | |
| d. 1kHz offset | -132 | dBc/Hz | |
| e. 10kHz offset | -145 | dBc/Hz | |
| f. 100kHz offset | -148 | dBc/Hz | |
| g. 1MHz offset | -149 | dBc/Hz | |
| h. 5MHz offset | -155 | dBc/Hz | |
| i. 20MHz offset | -164 | dBc/Hz | |
| j. RMS Phase Jitter | 168 | fs | 12kHz to 20MHz |

## 8.0 Marking

| Parameter | Description |
|---|---|
| a. Line 1 | rakon |
| b. Line 2 | [R FFFF YM ]<br>Rakon identifier R, Frequency FFFF (M=MHz, e.g. 100M=100MHz),<br>Year Y (A=2010, B=2011, …), Month M (1=Jan, 2=Feb, …, A=Oct, B=Nov, C=Dec) |
| c. Line 3 | [ ● LLL ]<br>Pin1 ● and 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 and reel. 24 mm wide tape and Ø330 mm (Ø 13') reel |

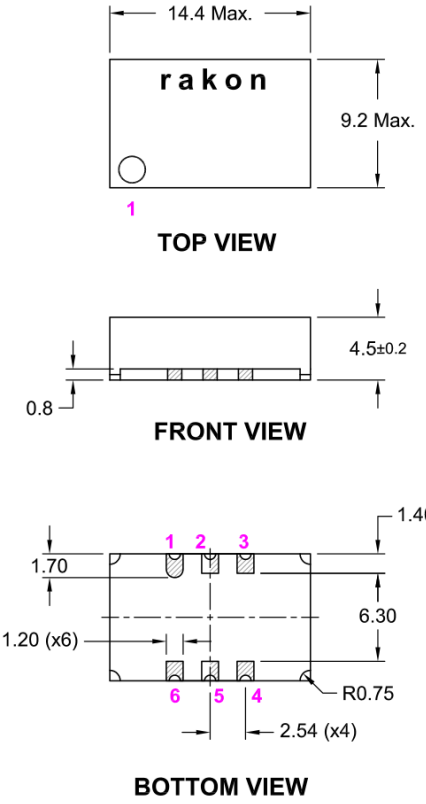
## 10.0 Environmental Specification

| 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 |
| b. Vibration | IEC 60068-2-6 Test Fc, 10-60Hz, 1.5mm displacement, 60 –2000Hz at 98.1m/s$^2$, 30 minutes in each of three mutually perpendicular axes at 1 octave per minute |
| c. Mechanical Shock | IEC 60068-2-27 Test Ea, 980m/s$^2$ acceleration for 6ms duration, 3 shocks in each direction along three mutually perpendicular axes |
| d. Solderabilty | MIL-STD-202, Method 208, Category 3 |

## 11.0 Disclaimer

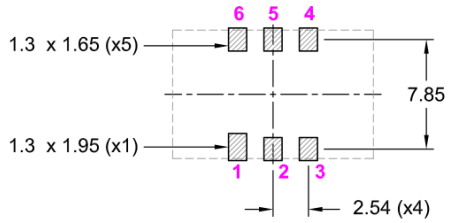
| Parameter | Description |
|---|---|
| a. Disclaimer | "Samples supplied according to this specification are supplied from our development or pre-production programme and as such are not qualification approved products. No condition, warranty or representation regarding quality, suitability, performance,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

## 12.0 Model Outline: RHT1490A




| Pin | Connections |
|---|---|
| 1 | Control Voltage (Vc) |
| 2 | Do not connect |
| 3 | GND |
| 4 | Output |
| 5 | Do not connect |
| 6 | Supply Voltage ($V_{DD}$) |

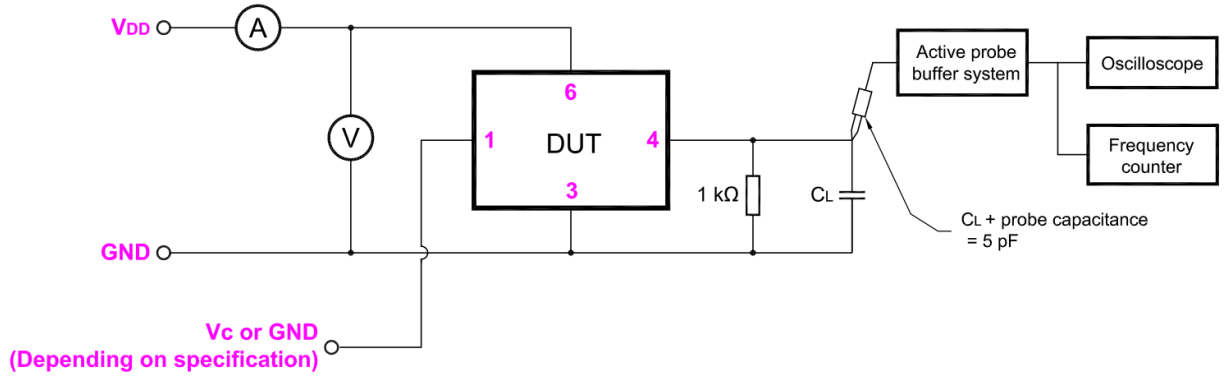
**RECOMMENDED PAD LAYOUT (TOP VIEW)**




| | | | |
|---|---|---|---|
| TITLE: RHT1490 Series Model | FILENAME: CAT995 | TOLERANCES: | |
| RELATED DRAWINGS: | REVISION: C | XX = | |
| | DATE: 04-Oct-16 | X.X = ±0.2 | |
| | SCALE: 2 : 1 | X.XX = ±0.10 | |
| | Millimetres | X.XXX = ±0.05 | |
| | | X° = | |
| | | Hole = | |

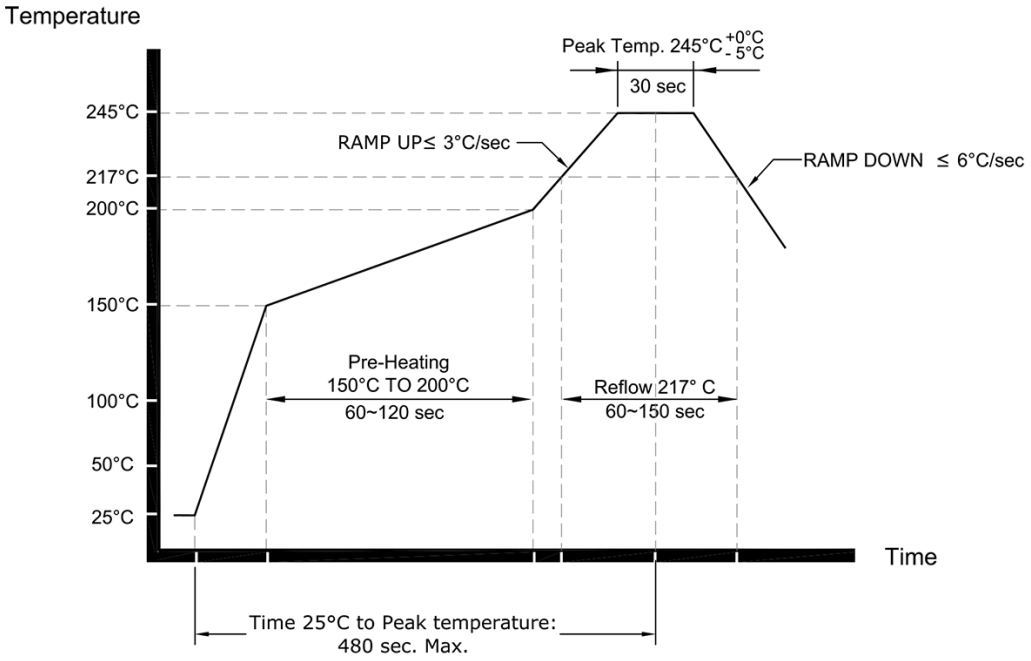


## 13.0 Test Circuit: RHT1490A (CMOS Output)




| | | |
|---|---|---|
| TITLE: RHT1490 Series Test Circuit - CMOS Output | FILENAME: CAT1039 | |
| RELATED DRAWINGS: | REVISION: B | |
| | DATE: 07-Dec-2016 | |
| | SCALE: NTS | |
| | Millimetres | |

## 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.

## 15.0 Specification History

| Version | User | Changes | Approver | Date |
|---|---|---|---|---|
| A. | JO | Initial issue | DS/NJ | 2016-03-18 |
| B. | JS | Marking corrected | JO/TB | 2016-08-22 |
| C. | JO | Changed marking as per RSP072D, used updated model image and outline drawing as per latest WCS template | DS/TB | 2016-11-21 |
| D. | JO | Pin 1 label changed to GND | DS/TB | 2016-12-12 |