RFPT100

An emergency distress beacon is a small battery-powered device that can be carried onboard ships (called EPIRB = Emergency Position Indicating Radio Beacon), aircraft (called ELT = Emergency Locator Transmitter) and on one’s person (called PLB = Personal Locator Beacon). Once activated it transmits a signal that is detectable by government search and rescue authorities. These beacons are regulated by Cospas-Sarsat, an international organisation for the search and rescue of persons in distress. The Cospas-Sarsat system uses a constellation of satellites orbiting the globe and a network of earth stations to provide distress alert and location information to rescue teams anywhere in the world. Using the signals transmitted by the beacon, the system calculates its position to within a few km. The beacon’s correct operation depends to a great extent on the stability of the reference oscillator that is used to generate the 406 MHz transmitter signal.

Traditionally Oven Controlled Crystal Oscillators (OCXO) have been used for this function. However, an OCXO needs significant power and time to heat the internal oven whereas the Rakon RFPT100 TCXO has a power consumption of only 6mW (typ.) and instantaneously provides a stable output frequency. This results in increased battery life or allows the use of a smaller battery. The smaller battery reduces system cost and allows future beacons to be smaller and lighter.

The RFPT100 TCXO makes use of Rakon’s Pluto™ ASIC which is a fourth-order temperature-compensation chip. The Pluto™ ASIC uses certain patented features, which enables it to achieve critical Medium Term Stability (MTS), previously unattainable with any TCXO. This unique performance for the first time has enabled the use of compact, low-cost TCXOs in emergency beacon applications. The Pluto™ TCXO employs One-Time Programmable (OTP) non-volatile memory which ensures lifetime reliability under adverse conditions.

### Features
- Low power consumption
- COSPAS-SARSAT and Iridium compliant
- MTS: 100% tested
- Test data supplied with each unit
- Clipped sinewave and voltage control options
- Non-volatile memory for lifetime reliability

### Applications
- Emergency beacon (EPIRB, ELT, PLB)
- Argos beacon
- Personal survival radio

### Standard Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal frequency (Fn)</td>
<td>10 – 20</td>
<td>MHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency calibration</td>
<td>±0.5</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reflow shift</td>
<td>±1</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-40 -20</td>
<td>55</td>
<td>55</td>
<td>°C</td>
</tr>
<tr>
<td>Frequency stability over temperature (FvT)</td>
<td>±0.2</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply voltage stability</td>
<td>±0.1</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Load sensitivity</td>
<td>±0.1</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium term stability (MTS)¹</td>
<td>±2.0</td>
<td>ppb/min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long term stability (LTS)</td>
<td>±1</td>
<td>ppm</td>
<td>±3</td>
<td>ppm</td>
</tr>
<tr>
<td>Supply voltage (Vcc)</td>
<td>3.3</td>
<td>V</td>
<td></td>
<td>1 year</td>
</tr>
<tr>
<td>Supply current</td>
<td>2.5</td>
<td>mA</td>
<td></td>
<td>10 years</td>
</tr>
<tr>
<td>Root Allan Variance</td>
<td>1*10⁹</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oscillator output options</td>
<td>Clipped Sinewave: 10kΩ//10pF nominal load. HCMOS: 15pF nominal load.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Medium term stability specified and measured according to Cospas-Sarsat 406MHz distress beacon specifications T.001, issue 3 and T.007, issue 4 (averaged over 18 measurements in 15 minute period and following 15 minute power up period). Test results shipped with each device, identified by date and serial number, retained for 10 years.
Medium Term Stability (MTS)

Medium Term Stability Test Profile

- **Temperature Gradient Test Profile**
  - **Residual Frequency** ≤ 3.0 ppb
  - **Mean Slope** = 0.1 ppb/min (Points A to B: C + Warm up to D, E + Warm up to F)
  - **Slope** = 5°C/min

**Notes:**
- **T_{min} (Class 1)** = -40°C
- **T_{min} (Class 2)** = -20°C
- **T_{min} (Beacon turn-on time)** = after 2 hour cold soak
- **T_{meas} (Start time of frequency stability measurement)**

Model Outline and Recommended Pad Layout

**TOP VIEW**

**SIDE VIEW**

**BOTTOM VIEW**

**RECOMMENDED PAD LAYOUT**

- **TOP VIEW**
  - 1.45 x 0.83 (x4)
  - 0.63 x 1.45 (x5)

- **SIDE VIEW**
  - 0.63 x 1.96
  - 2.54

- **BOTTOM VIEW**
  - 0.63 x 1.96
  - 2.54
  - 4.35

**PIN CONNECTIONS**

1. Do Not Connect
2. NC
3. Do Not Connect
4. GND
5. RF Output
6. RF Output
7. NC
8. Tri-state Control (Enable)
9. Supply Voltage (Vcc)
10. Do Not Connect

**NOTE:** Unit is mm