

UMTS Base Station Timing with OCXOs

Introduction

Universal Mobile Telecommunications System (UMTS) is a third-generation (3G) wireless communications standard that is capable of delivering voice and high-speed data using Wideband CDMA (WCDMA) radio access technology.

UMTS Reference Challenges

UMTS Base Stations must hold minimum carrier frequency accuracies as per Table 1 below, taken from 3GPP TS 25.104 V7.4.0 (2006-06).

Base station class	Accuracy (life)
Wide Area (macrocell)	±50 ppb
Medium Range	±100 ppb
Local Area (picocell)	±100 ppb

Table 1.

To meet these challenging requirements, CTS has developed extensive UMTS OCXO product platforms for the infrastructure industry. The compelling attributes of CTS' UMTS OCXOs include:

- Superior aging characteristics
- Performance versus cost
- No factory calibration required
- Excellent reliability

UMTS Reference OCXOs

CTS' UMTS OCXOs are designed to be placed in base stations ("Node B") and to be used as stand-alone clocks, although external disciplining, either analog or digital, is an option (e.g., GPS, E1/T1, etc.).

Brief descriptions of the UMTS OCXO platforms are listed below:

- Model 125 – High performance reference
- Model 127 – High performance reference, 36 mm x 27 mm size
- Model 196 – Low phase noise base station reference (UMTS picocell)

The Model 125 and 127 platforms offer performance comparable to traditional double-oven OCXOs at 40% less cost. This tradeoff allows infrastructure equipment manufacturers the ability to meet the stringent UMTS requirements while remaining sensitive to budgetary needs.

Table 2 shows CTS' UMTS OCXO platforms and their corresponding specifications:

Platform	Frequencies (MHz)	Temperature stability	Temperature range	Aging	Package size
Model 125	5.0, 10.0, 15.0	0.8 ppb, p-p (standard) 0.4 ppb, p-p (precision)	-10°C to 75°C (standard) -10°C to 70°C (precision)	Less than 0.1 ppb/day at time of ship, decaying to less than 0.05 ppb/day within the first year (5 MHz crystal)	51 x 51 x 25 mm 51 x 51 x 15.5 mm (> 7MHz resonator)
Model 127	5.0, 10.0, 15.0	1.0 ppb p-p (standard) 0.5 ppb p-p (precision)	-10°C to 75°C (standard) -10°C to 70°C (precision)	Less than 0.1 ppb/day at time of ship, decaying to less than 0.05 ppb/day within the first year (5 MHz crystal)	36 x 27 x 20 mm standard 36 x 27 x 18 mm available (>9MHz resonator)
Model 196	10.0, 10.24, 12.8, 13.0, 15.0, 16.384, 20.0, 26.0, 32.768	± 10 ppb (standard) ± 5 ppb (precision)	-20°C to 70°C	Less than 0.05 ppb/day at time of ship (10 MHz crystal)	36 x 27 x 13.5 mm

Table 2.

A photo of a typical Model 125 UMTS OCXO is shown in Figure 1.



Figure 1.

All of CTS' UMTS OCXOs use SC-cut crystals. SC-cut crystals are doubly-rotated quartz crystals that produce excellent aging and temperature characteristics. Furthermore, CTS subjects the crystals to a rigorous pre-conditioning process. This combination of superior crystal and pre-conditioning process eliminates the need for any additional aging compensation. Moreover, these factors allow CTS to provide 100% characterized (predicted) aging rates for the crystal.

For more information on CTS' UMTS OCXO platforms, please visit <http://www.ctscorp.com/> or call one of the contacts below.

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