rakon

Timing Solutions for Financial Networks

In today's financial networks, one critical challenge is the need for time synchronisation accuracy for all connected elements. IT organisations in financial institutions are becoming mandated to keep accurate records of all transitions such as when a transaction is initiated and completed along with the real-time date and time stamps for each transaction. Packet based timing and synchronisation techniques are used to achieve accurate time at each connected key part of financial networks.

Rakon offers a unique range of OCXOs ideal for time synchronisation in financial networks.

Precision Time Protocol (PTP) for Synchronisation

The price and trade related data for a reported financial instrument is exceeding many million per second on global stock exchanges. Therefore, the precision required to correctly identify the messages is in the order of 100s of nano seconds. The order of processing of the incoming records is maintained and trading decisions are taken based on time stamps. The multi-cast market data messages are time stamped when leaving the exchanges to make sure every one gets the same time stamp.

Packet based timing technologies are becoming popular in financial networks for accurate time stamping. Traditionally GPS with IRIG-B solutions which provided high accuracy solutions required expensive and dedicated hardware. First generation packet based synchronisation solutions such as Network Time Protocol (NTP) offered lower precision.

Precision Time Protocol (PTP) is fast being adapted for time synchronisation in financial networks because of its ease of deployment and management over existing infrastructure. For time synchronisation in financial networks, Rakon offers OCXOs to support the frequency control and time synchronisation networks at the core, edge and metro level.

Oscillators for PTP Solutions in Financial Networks

PTP Grand Master solutions translate clocks traceable to primary references to timing packets. These systems use stable reference clock sources to protect themselves from network synchronisation failures using holdover mechanisms.

Boundary Clocks and Slave Clocks recover frequency and time on packet base networks. The packet based implementations introduce varying loop bandwidths depending on the network scenario and short and medium term stability of the oscillator at each such loop bandwidth becomes important.

Rakon OCXO Key Specifications

	Oscillators	Frequency	Stability (FvsT)	Temperature	Ageing	Holdover
ASIC OCXO 9 x 7 mm	**RFPO45** **RFPO55**	10 to 26 MHz	10 ppb pk-pk	-40 to 85°C (20°C window)	< ±0.5 ppb/day	1.5 µs /30 min
14 x 9 mm	**ROM1490E**	10 to 40 MHz	10 ppb pk-pk	-40 to 85°C	< ±0.5 ppb/day	1.5 µs /1 hour
Discrete OCXO	**ROX2522S4**	10 to 50 MHz	±5 ppb	-40 to 85°C	< ±0.5 ppb/day	1.5 µs /2 hours
25 x 22 mm	**ROX2522S3**	10 to 50 MHz	2 ppb pk-pk	-40 to 85°C	< ±0.3 ppb/day	8 µs /12 hours
38 x 27 mm	**ROX3827T2** **ROX5242T2**	10 to 20 MHz	0.5 ppb pk-pk	-40 to 85°C	≤ ±0.2 ppb/day	≤ 8 µs/day
	ROX5252T1	10 to 20 MHz	0.05 ppb pk-pk	-40 to 85°C	≤ ±0.1 ppb/day	< 8 µs/1~3 day
52 x 42 mm	**ROD5242T1***	10 to 20 MHz	0.05 ppb pk-pk	-40 to 85°C	≤ ±0.01 ppb/day after compensation	< 1.5 µs/24 hours with ±10°C variation (10°C/hour)

* Note: Ageing compensated SMART GPSDO (GPS Displined Oscillator).

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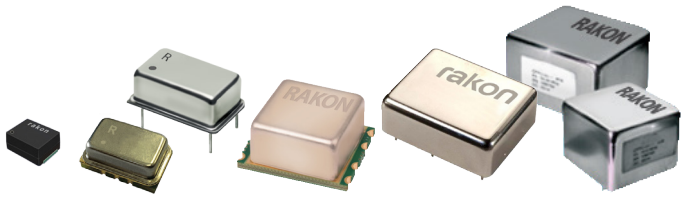
Issue: V6, 02 Nov 2020

Synchronisation for Financial Networks

Rakon's OCXO Performance

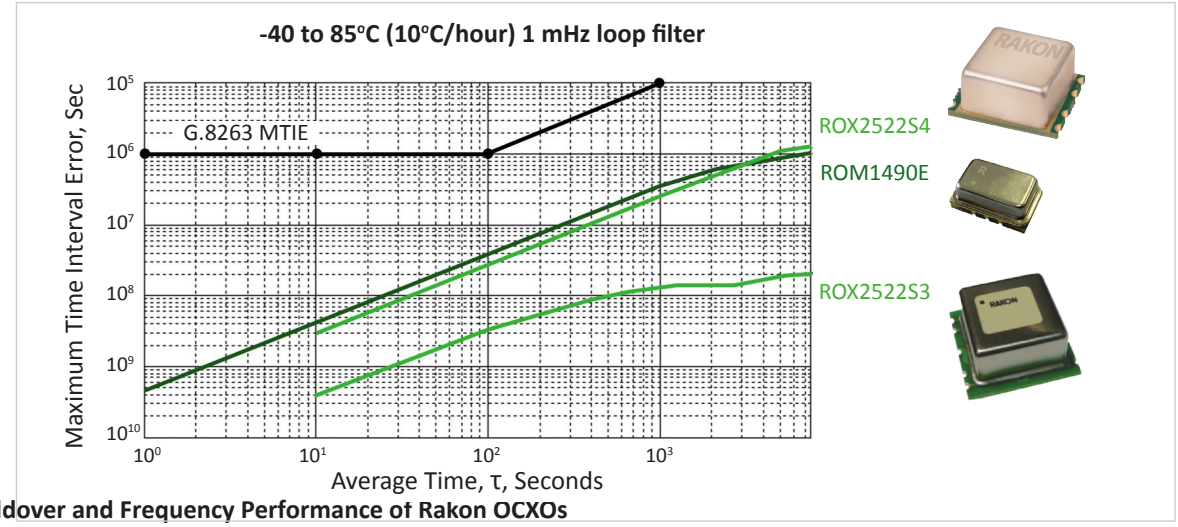
Rakon has characterised various types of oscillators under changing environmental conditions for the loop time periods relevant to Packet Networks MTIE and TDEV performance at various loop bandwidths.



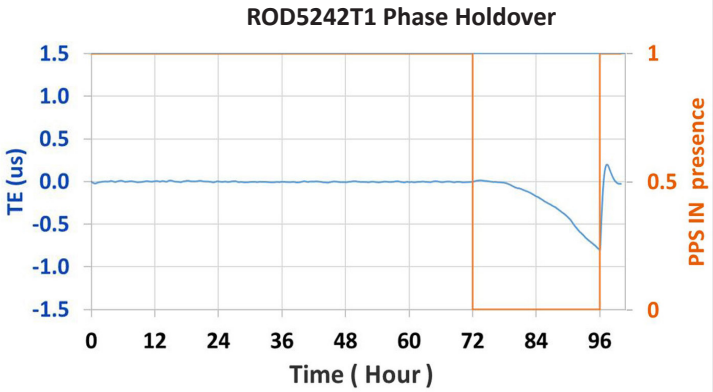
Rakon performs extended tests on the holdover phase movement performance of its OCXOs and offers devices that have holdover performance of a few µs across the temperature range over 24 hours. Rakon has a wide range of OCXOs that economically fit holdover requirements of 1 to 10 µs across 8 to 24 hours.

The graphs below show examples of OCXO MTIE and holdover performances.

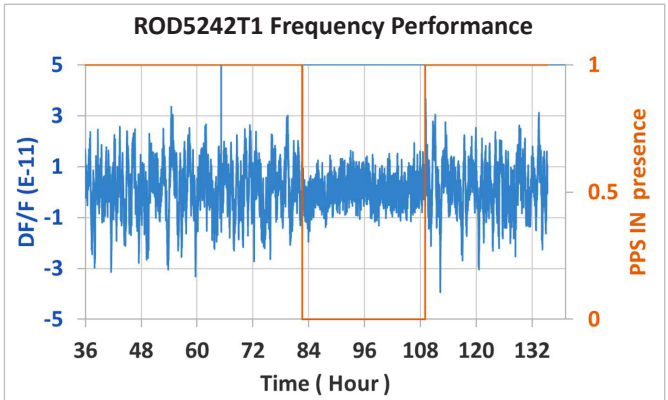
MTIE Performance of Rakon OCXOs:



Phase Holdover and Frequency Performance of Rakon OCXOs



Time Error (TE) during the holdover performance validation for a thermal variation worst case (10°C/H between 25°C to 45°C on 24H without PPS IN and 48H of learning period.



Holdover performance validation during a thermal cycling between 20°C to 60°C on 24H without PPS IN and 48H of learning period.

About Rakon

Rakon is a global high technology company that designs and manufactures world leading frequency control and timing solutions.

Today we live in a connected society of wired, wireless and optical networks. Data is being transferred everywhere, at any time and at high speeds. Our products are found at the forefront of communications where speed and reliability are paramount.

synchronising connectivity everywhere

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