

# 1750A

10 MHz to power-of-2 reference frequency translator

# apparateq

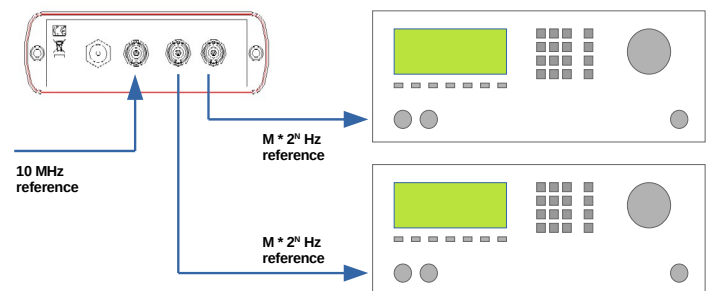
Electronics for Research and Science

## PRELIMINARY INFORMATION



- Provides a  $M * 2^N$  Hz reference from a 10 MHz reference
- Allows accurate frequencies with no phase wander from your DDS design
- Supports some legacy DDS-generators
- Version A:  $1 \text{ MHz} * 2^{33}$
- Version B:  $0.1 \text{ MHz} * 2^{38}$
- Custom versions available
- Dual outputs
- Wide input level range
- Low jitter
- Low spurious

The 1750A provides the exact reference frequency required for either your own DDS design or selected legacy DDS-generators that have an input reference frequency of the form  $M * 2^N$  Hz. This allows the generators to output any frequency you have entered without phase wander.



The 1750A is easily located between your 10 MHz laboratory frequency reference and the reference input of the DDS generator. The reference outputs may each be daisy chained, or connected to a single input.

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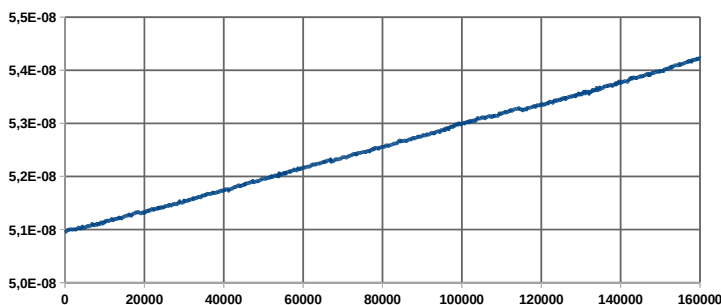
### Specifications and characteristics

<b>Frequency input</b>	10 MHz $\pm$ 25 ppm, 20 mV to 5 V RMS BNC, AC-coupled
<b>Frequency output</b>	Of the form $M * 2^N$ Hz, with the following as standard versions: 0.001 Hz * $2^{33}$ ( 8.589934592 MHz), allowing frequency synthesis with accurate 1 mHz steps 0.0001 Hz * $2^{38}$ ( 27.4877906944 MHz), allowing frequency synthesis with accurate 0.1 mHz steps 2 x BNC, TTL level, 50 $\Omega$ source impedance
<b>Indicators</b>	Power, and synthesizer locked
<b>Supply</b>	9 – 30 V DC, $\leq$ 5 W, typically 1.5 W *), reverse voltage protected.
<b>Measures</b>	109 mm (W) x 129 mm (D) x 35 mm (H)

\*) Preliminary information; The parameters are yet to be fully characterized

The 1750A provides a clock for DDS generators that should output an accurate output frequency, controlled by your 10 MHz laboratory reference, without phase wander. You may also use the 1750A to put some legacy DDS generators into valuable use as accurate frequency sources.

Then, why not just use any DDS-generator with a 10 MHz reference input? It is true that many DDS generators have a high frequency resolution, but the convenient 10 MHz reference comes at a cost: The phase accumulator word is truncated to get as close as possible to the chosen frequency. The result is a systematic frequency error, or phase wander, depending on the actual generator and setting, which may be unacceptable.



Above: An example of a DDS-generator with systematic phase wander: The delay between its 10 MHz reference input and its output set to 10 MHz increases with time.

In contrast, DDS generators that use a reference frequency of the form  $M * 2^N$  Hz do not need to truncate the phase word. However, such generators can not be connected directly to a 10 MHz laboratory reference. This is what the 1750A addresses: It gives you the accuracy you need from a DDS generator, and properly locked to your 10 MHz reference.

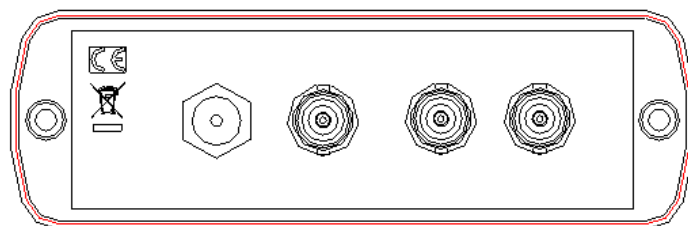
*Do you need other frequencies to be synthesized from a laboratory reference? The 1750A can be customized according to your specifications. Call us and find out more*

*Apparateq provides solutions to measurement challenges within science, research and metrology. Check out our web pages, or call us, to learn how we may help you.*

The 1750A is essentially a single-frequency PLL-generator with a crystal oscillator running at the desired reference frequency, and with a DDS in the divider branch. As a result, the reference output has the exact frequency required with a high suppression of unwanted signal components.

The 1750A is available in two versions, one (suffix -01) for generators that operate with a 8.589934592 MHz clock, and another (suffix -02) for generators that operate with a 27.4877906944 MHz clock. When ordering your 1750A make sure to state the correct version.

The 1750A finds use in setups where you need to generate signals with no systematic drift compared to a laboratory frequency reference. Typical examples are found in time and frequency metrology, such as spectroscopy for stabilized lasers, or monitoring of time dissemination transmitter services. Importantly, the clock frequency provided by the 1750A allows you to design a generator without truncation of the phase accumulator.



To ease integration into existing setups the 10 MHz reference input accepts signals over a wide range of levels, and has a high input impedance. A 50  $\Omega$  shunt load is added in case the 10 MHz line should be terminated.

The TTL level of the synthesized outputs ensures that the 1750A can drive logic and the reference input of legacy DDS generators.