



# Microwave Signal Source Replaces and Upgrades QuickSyn

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In the relentless pursuit of compact, high performance signal sources and frequency synthesizers, AnaPico has raised the bar once again with the launch of the APMQS20, a microwave signal source delivered in the form of a flange-mount module. This module is intentionally designed to seamlessly replace the QuickSyn FSW-0020 frequency synthesizer, which was phased out by NI a few years ago. AnaPico's APMQS20 serves as a drop-in replacement, providing an uncomplicated transition for QuickSyn users and ensuring uninterrupted performance.

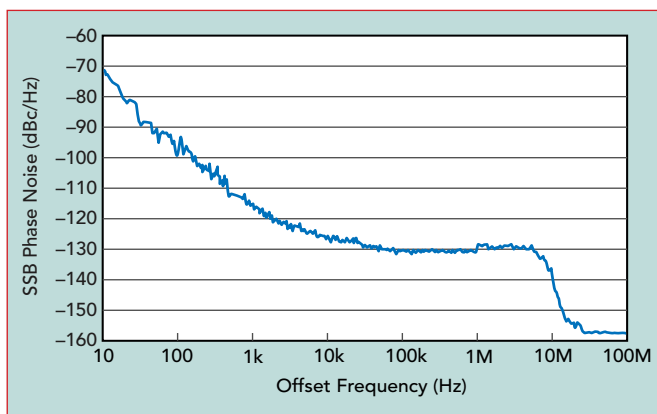
## ELEVATED PERFORMANCE

The APMQS20 preserves the best attributes of the FSW-0020 while implementing a host of enhanced capabilities. The APMQS20 is an instrument-grade signal

source that achieves performance that is on par with or surpasses the performance of the FSW-0020. The heart of the APMQS20's exceptional performance lies in the integration of a high-quality oven-controlled crystal oscillator (OCXO) as an internal reference. The OCXO delivers low close-to-carrier phase noise, establishing excellent long-term frequency stability. Capitalizing on AnaPico's proprietary signal synthesis techniques, the APMQS20 integrates a low noise VCO with phase detectors, frequency dividers and multipliers. This architecture results in a signal source with what we believe is the lowest phase noise among all compact frequency synthesizers currently available. The measured single sideband (SSB) phase noise of the APMQS20 signal source at 10 GHz is shown in **Figure 1**.

To minimize non-harmonic signal components, AnaPico has implemented a two-stage frequency synthesis scheme. In the initial stage, a finely tuned reference frequency is generated that deliberately avoids an integer multiple of the OCXO. The second stage employs this reference frequency for octave frequency range synthesis, bolstered by level conditioning and filtering. This architecture results in a -70 dBc level of non-harmonic frequency components across the spectrum from 0.1 to 20 GHz. This is complemented by direct digital synthesis technology, offering frequency resolution down to 1 mHz.

The APMQS20 contains a whole host of other features that improve performance and



▲ Fig. 1 SSB phase noise of APMQS20 at 10 GHz.

<b>TABLE 1</b>		
<b>TECHNICAL COMPARISON OF NI FSW-0020 AND ANAPICO APMQS20/BNC MODEL 805-M</b>		
<b>Parameter</b>	<b>NI FSW-0020</b>	<b>AnaPico APMQS20 BNC Model 805-M</b>
Frequency Range	0.2 to 20 GHz	8 kHz to 20 GHz
Switching Speed	100 $\mu$ s (list sweep) 200 $\mu$ s (over SPI)	20 $\mu$ s (list sweep) 200 $\mu$ s (over SPI)
Power Range	-10 to +13 dBm at > 0.5 GHz	-25 to +16 dBm at > 1 GHz
Level Accuracy	$\pm$ 2.0 dB	$\pm$ 0.3 dB
Phase Noise at 100 Hz / 10 kHz / 1 MHz from 10 GHz	-83 / -122 / -126 dBc/Hz	-95 / -126 / -130 dBc/Hz
Harmonics / Non-harmonics	-35 / -70 dBc at > 0.5 GHz	-50 / -70 dBc at > 0.1 GHz
Modulations	Pulse, AM/FM	Pulse, AM/FM
Reference In/Out	10 MHz	10 MHz, 100 MHz, 1 GHz
Communication Ports	SPI, USB	SPI, USB, Ethernet
Power Supply and Consumption	12 VDC / 20 W	12 to 30 VDC / 24 W

user experience. It has an automatic level control mechanism that delivers power level setting accuracy of  $\pm$  0.3 dB, surpassing the QuickSyn capabilities. The APMQS20 harnesses multiple switched VCOs within the base frequency octave to provide a fast frequency switching capability, with switching typically occurring within 20  $\mu$ s. This approach significantly improves frequency tuning times, ensuring responsiveness that matches the demands of multiple applications. The APMQS20 also boasts the ability to support analog modulations, further enhancing its versatility in a diverse set of applications.

AnaPico maintains a commitment to a holistic user experience. The module's energy-efficient design enables passive cooling when correctly mounted on heat-dissipating surfaces. The device is provisioned with comprehensive GUI control software, facilitating seamless control. Communication capabilities are enriched through USB, LAN and SPI ports, catering to diverse user preferences.

### **BENCHMARKING EXCELLENCE: A COMPARATIVE OVERVIEW**

A concise comparison between the APMQS20, the co-branded 805-M model from Berkeley Nucleonics Corporation and NI's FSW-0020 is presented in **Table 1**. This table succinctly highlights the APMQS20's performance enhancements and reinforces its position as an innovative replacement for the FSW-0020.

### **UNLEASHING POSSIBILITIES**

The APMQS20's versatility extends to a wide spectrum of applications. It serves as a precision system clock, a high purity local oscillator for analog mixers and digital modulators and a reliable microwave source for spectroscopic systems. Its fast switching prowess makes it a solution that is well-suited for fast frequency hopping, radar signal generation and mission-critical electronic warfare applications. Notably, former NI QuickSyn frequency synthesizer users now have an exceptional replacement that ensures product availability and continuity without the burden of costly redesigns.

The APMQS20 is positioned as a top choice for RF and microwave engineers and scientists. It encapsulates the trifecta of high signal purity, precise setting capabilities and fast switching capabilities. As the industry continues its quest for excellence, the APMQS20 stands at the forefront, ushering in a new era of microwave signal sources that empower innovation.



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