

8040C

Rubidium Frequency Standard



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Summary

Today's precision test equipment requires a stable reference to make accurate frequency measurements. The equipment used varies depending on stability, accuracy and output signal format. All of these parameters can lead to a multitude of configurations, platforms and products that can be expensive to implement and maintain.

The Microchip 8040C solves this problem by providing a stable and accurate frequency reference with multiple output signal formats in an easy to install 1U rack mountable chassis.

Unlike other units, the 8040C offers configurable RF outputs, external GPS disciplining and a RS-232 interface for command and control.

The 8040C has six outputs, each of which can be user configured to provide a 1 MHz, 5 MHz or 10 MHz sine, square wave, or 1PPS output. The standard configuration of the 8040C has three 10 MHz, one 5 MHz, one 1 MHz and 1PPS output.

A 1PPS input allows the 8040C to be disciplined by an external GPS receiver for improved frequency accuracy and long-term stability. The 8040C auto adaptive algorithm allows plug-and-play connectivity for easy GPS disciplining.

The 8040C is field-configurable, allowing the instrument to support changing functionality in evolving systems.

If more outputs are required, the 8040C can be purchased with an option card that adds six additional outputs, bringing the total output configuration to twelve. The option card, like the standard unit, can be configured for any combination of available frequency or format.

Also available is a low phase noise version that provides a greater than 30 dB improvement in close in-phase noise.

The 8040C is designed around Microchip's SA.55 Miniature Atomic Clock, which is deployed worldwide as the reference oscillator in wireless base stations.

Features

- 6 configurable outputs
- RF and pulse outputs
- AC input
- Remote monitoring and control
- GPS disciplining

Optional Features

- 12 configurable outputs
- Low phase noise
- DC input

Performance Parameters

Accuracy at shipment	$<\pm 5 \times 10^{-11}$
Retrace on-off-on	$<\pm 5 \times 10^{-11}$ 24 hours, 24 hours, 24 hours at 25°C
Control range	$\pm 1 \times 10^{-6}$ with 1×10^{-12} resolution
Aging Monthly,¹ Yearly 1. After 30 days of continuous operation.	$<5 \times 10^{-11}$, $<5 \times 10^{-10}$

Stability

Avg. Time (s)	ADEV Standard	ADEV Low Noise
1	$<3.0 \times 10^{-11}$	$<1.5 \times 10^{-11}$
10	$<1.0 \times 10^{-11}$	$<8 \times 10^{-12}$
100	$<3.0 \times 10^{-12}$	$<2.5 \times 10^{-12}$

SSB Phase Noise

Offset (Hz)	8040C Standard, 10 MHz	8040C Low Noise, 10 MHz
1	-72 dBc	-100 dBc
10	-95 dBc	-130 dBc
100	-130 dBc	-144 dBc
1K	-140 dBc	-150 dBc
10K	-148 dBc	-150 dBc

Specifications

Electrical Specification (standard and low noise)

Frequency Outputs	
Frequency	1 MHz, 5 MHz and 10 MHz
Format	Sinewave
Amplitude	1 Vrms
Harmonic	<-40 dBc
Non-harmonic	<-60 dBc (standard) <-80 dBc (low noise)
Connector	BNC
Load impedance	50Ω
Location	Rear panel
Frequency	1 MHz, 5 MHz and 10 MHz
Format	TTL
Amplitude	>3V peak
Pulse width	50% duty cycle
Connector	BNC
Load impedance	50Ω
Location	Rear panel
Timing Outputs	
Format	1 PPS
Amplitude	>3V
Pulse width	400 ns
Rise time	<20 nS
Jitter	<10 pSD RMS
Connector	BNC
Load impedance	50Ω
Location	Rear panel
Timing Inputs	
Sync input	1 PPS
Amplitude	5V max
Connector	BNC
Load impedance	>100 kΩ
Location	Rear panel

All specifications at 25°C (ambient) unless noted otherwise.

Performance Parameters

Warm-up Time	
Time to lock	<5 minutes
Time to <1E-9	<8 minutes
GPS Disciplining	
Time for valid output	<20 minutes
Frequency accuracy	<1 × 10 ⁻¹²
Remote system interface and control	
Connector	9-Pin female rectangular D-Sub
Location	Rear panel
Protocol	RS-232-C (DTE), 57600 BAUD, 8 Data Bit, 1 Stop Bit

Environmental and Physical Specifications

General Environment (operating)	
Temperature	0°C to 50°C
Temperature coefficient	<3E ⁻¹⁰
Storage temperature	-40°C to 71°C
Humidity	95% 0 to 50°C
Magnetic field	DC (±2 gauss)
Magnetic sensitivity	<4E ⁻¹¹ /gauss
Altitude (operating)	0 to 50,000 feet
AC power requirements	90 to 240 VAC 47 to 63 Hz 25W (operating) 45W (warm-up)
DC power requirements (optional)	18 to 36 VDC (24VDC nominal) 25 W (operating) 45 W (warm-up)
Dimensions/weight	19" W × 1.75" H × 12" D <6 lbs.
MTBF= 232,500 hours IAW Telcordia (Bellcore) SR332, Issue 1	

Compliance

EMI/EMC	FCC Part 15 Subpart B, Class B
	ICES-003 Issue 7
UL Safety	IEC 61010-1:2001 (2nd Edition)

Ordering Information

Part Number	Description
15230-101	6 output standard performance
15230-102	12 output standard performance
15230-104	6 output low phase noise
15230-105	12 output low phase noise

8040C Connections (shown with 12 output option)

