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VXIbus Rubidium Frequency Standard — Model bc824/827VXI



Features

Rubidium Oscillator modes:

- Free Running
- 10 MHz Synchronization
- 1 PPS Synchronization
- Time Code Synchronization

Outputs Generated by Low Phase Noise Crystal Oscillator
100 Nanosecond Resolution Internal Clock
Register/Message Based Device
Two-Slot Wide, C-Size VXIbus Module
External Event Time Capture (10 nanosecond resolution)
Programmable Periodics and Strobe (signal and interrupts)
Time Code Output (IRIG B)

Optional Features

Global Positioning Satellite Synchronization (bc827VXI)

Overview

Datum Inc has provided GPS-disciplined precision timing systems since 1984 and telecommunications products for more than 25 years. The VXIbus Rubidium Frequency Standard plug-in card is an ultra stable miniature atomic oscillator supported by a C-size mainframe and resource manager configured in accordance with the VXIbus specification. The timing card will provide an ultra stable 10 MHz sine wave or TTL outputs with minimal noise. The standard product employs both a rubidium oscillator and a low phase noise ovenized crystal oscillator (OCXO). The rubidium oscillator provides exceptional long term stability if the synchronizing input is lost. The OCXO phase locks to the rubidium oscillator, removing rubidium frequency spurs and providing an excellent noise floor.

The VXIbus Rubidium Frequency Standard Plug-in card is a register based device as well as a message based device. The message based interface capability will provide minimal access latency to the card via the system bus. The capability of interrupt generation will allow interrupt driven algorithms to interface to the card.

The bc824VXI will synchronize to an external 1 PPS, 10 MHz reference or IRIG time code. The bc827VXI adds the capability of synchronizing to the GPS satellite constellation. If the input source is lost, then time will be maintained in a flywheel state based on the on-board rubidium standard.

Applications



Radar/EW Systems



Satellite Ground Stations



RF Telecom Systems

datum

Specifications

Electrical

Phase Noise	-75 dBc/Hz @ 1 Hz -110 dBc/Hz @ 10 Hz -140 dBc/Hz @ 100 Hz -150 dBc/Hz @ 1 kHz -150 dBc/Hz @ 10 kHz
Spurious	-80dBc Overall
Harmonics	<-50 dBc
Channel-to-Channel Isolation	<-80dBc

Disciplined Oscillator

Frequency		10 MHz
Outputs		10 MHz
Rate Accuracy:		
Stability	1 sec	$1X10^{-10}$ Allen Variance
	10 sec	$3X10^{-11}$ Allen Variance
	100 sec	$1X10^{-11}$ Allen Variance
Aging	Monthly	$<5X10^{-11}$
	Yearly	$<5X10^{-10}$
Temperature Coefficient		$2.5X10^{-10}$
One-day Stability		$1X10^{-10}$ @ 25 C ±3 C
(includes aging, frequency offset over temperature range, setting accuracy and 10% input voltage change)		
Accuracy at Shipment		$5X10^{-11}$ @ 25 C
Frequency Retrace		$5X10^{-11}$ (after 1 hour power on and less than 25 hours power off)

Sync Sources

bc824VXI	Time Code, 1 PPS, 10 MHz
bc827VXI	GPS, Time Code, 1 PPS, 10 MHz

Real Time Clock

Bus Request Resolution	100 nanoseconds
Bus Request Latency	Zero
Major Time Format	Binary or BCD
Minor Time Format	Binary

Time Code Translator

Time Code Formats	IRIG A or B, modulated or DCLS (IEEE-1344 compliant)
Modulation Ratio	2:1 to 6:1
Input Amplitude	500 mV to 5 V P-P
Input Impedance	>10KΩ (AC coupled)
Signal to Noise Ratio	20 dB minimum

Time Code Generator

Time Code Format	IRIG B
Modulation Ratio	3:1
Output Amplitude	4 V P-P (fixed)
DC Level Shift	TTL/CMOS

Timing Functions

Heartbeat (TTL, 50Ω)	Programmable periodic 250 kHz to less than 1 Hz
Event Capture (TTL, 50Ω)	100 ns resolution, zero latency
Enhanced Event (TTL, 50Ω)	10 ns resolution, 50µs latency
Event Compare (TTL)	Programmable, 1ms - hours
1 PPS Pulse Rate (TTL, 50Ω)	Positive edge on-time

GPS Subsystem (bc827VXI only)

Time Accuracy	<200 nanoseconds
Position Accuracy	100 meters SEP (SA on)
Maximum Velocity	300 meters/sec (1,080 KPH)
Number of Channels	6
Receiver Frequency	1.575 GHz (L1, C/A code)
Time to First Fix	Brief power off: 1.5 minutes (1, 3 and 4 satellites) Worst case: 5 to 15 minutes
Solution Modes	1, 3 and 4 satellites

Environment

	Module	Antenna
Temperature:		
Operating	0C to 50C	-40C to 70C
Storage	-50C to 50C	-55C to 85C
Humidity:		
Operating	10% to 80%*	100%
Storage	5% to 95%	100%

*non-condensing

VXI Bus

Address Space	A16 only		
Data Transfer	Byte, Half-Word, Word		
Power	V	Warmup	Operating
	+5VDC	0.75A	0.75A
	+12	1.0A	0.5A
	+24	2.0A @ 0C	0.8A
	-24	0.4A	0.4A
Input Voltage Sensitivity	$<5X10^{-11}$ (Δ = ±10% VDC)		
Warm-up Time	Time to Lock ≤4 min (25C) 6 minutes/$1X10^{-9}$		

Physical

Size	Double Wide C-Size (9.2 in X 13.5 in)
Weight	4.25 lbs
Connector Types	8 front panel BNC outputs SMA for optional GPS antenna 15-pin 'D' connector P1 & P2 per VXIbus specification
GPS Cable Length	50 feet

Option

LabVIEW Driver

Datum - San Jose
6781 Via Del Oro
San Jose CA 95119-1360
Toll Free (800) 348-0648
Telephone (408) 578-4161
Fax (408) 574-4950
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