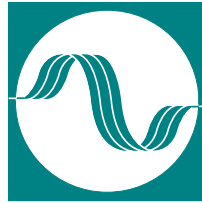


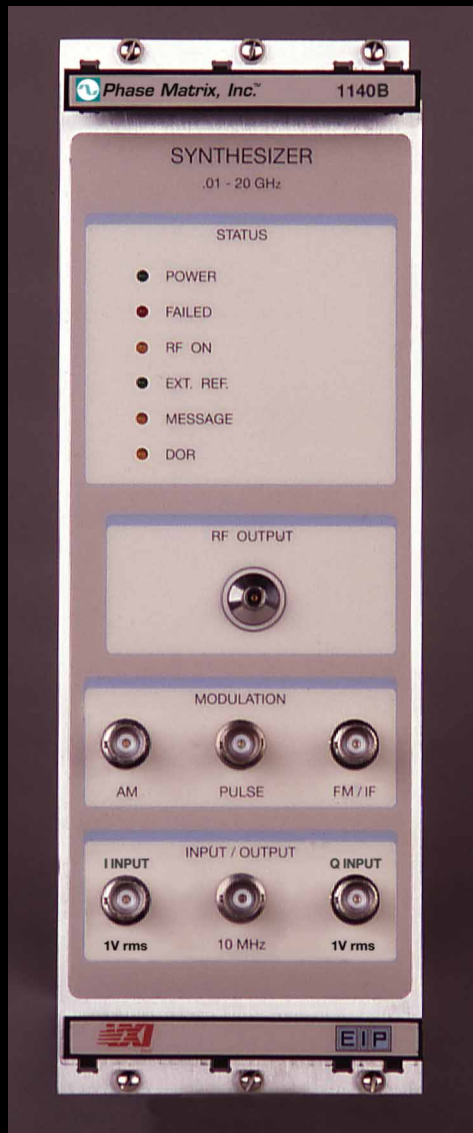
**1140B
1141B**



Phase Matrix, Inc.TM
Instruments You Can Count On

VXIbus Synthesized Signal Generators

High-Performance Microwave Signal Generation for VXIbus Systems



- 0.001 to 20 GHz Frequency Range
- +16 to -90 dBm Leveled Output Power
- Excellent Spectral Purity
- 1 Hz Frequency Resolution
- AM, FM, Pulse and I/Q Modulation
- Complex IF Up-Conversion

Phase Matrix / EIP VXIbus Synthesized Signal Generators

High-Performance Microwave Signal Generation for VXIbus Systems

Model 1140B Specification Summary

- 0.001 to 20 GHz Frequency Range
- 1 Hz Frequency Resolution
- <-60 dBc Spurious
- <-85 dBc/Hz SSB Phase Noise (10 kHz offset from 10 GHz)
- +16 to -90 dBm Leveled Output Power
- 0.1 dB Power Resolution
- Pulse Modulation
- dc to 10 MHz PRF
- 50 ns Minimum Pulse Width
- >80 dB On/Off Ratio
- <10 ns Rise/Fall Time
- Amplitude Modulation
- DC to 100 kHz Rates
- 0% to 90% Depth
- Frequency Modulation
- 5 kHz to 10 MHz Rates
- 25 MHz peak Deviation
- I/Q Modulation
- DC to > 40 MHz
- External IF Input for Complex Modulation
- 40 MHz Instantaneous Bandwidth
- VXIbus Revision 1.3/1.4
- C-Size, 3 Slots Wide

114XB - Ideal Synthesizer for ATE Applications

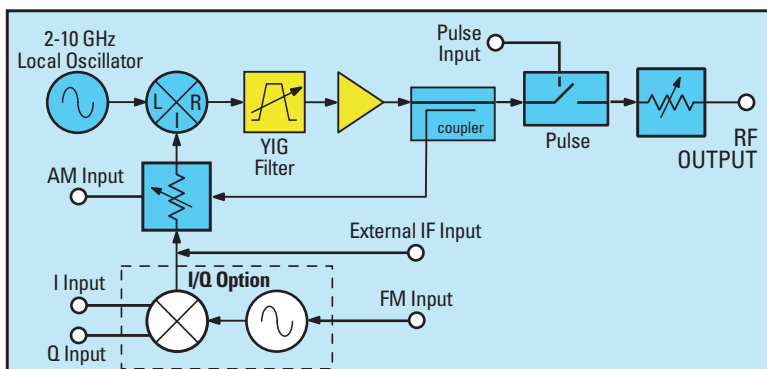
Phase Matrix/EIP VXIbus synthesized signal generators are designed to be ideal for ATE applications. The 114XB family synthesizers occupy only three VXI slots, yet cover the entire 0.001 to 20 GHz or, depending on the model chosen, a more limited 2.0 to 20 GHz frequency spectrum with 1 Hz resolution. All models feature unique complex modulation capability and outstanding spectral purity. And all are fully compliant with Revision 1.3/1.4 of the VXIbus Specification for message based instruments and with Standard Commands for Programmable Instruments (SCPI) Version 1993.

Superb Spectral Purity

The 114XB family of synthesizers is designed to function in the VXIbus environment with no compromise in microwave performance. Despite the small size, full modular shielding and post regulation with double filtering are utilized to ensure outstanding performance even when sharing a system with digital instruments. With spurious signals below -60dBc, the 114XB is an excellent choice as a local oscillator in radar/EW testing, narrow band device characterization and general communications system testing.

Unmatched Complex Modulation Performance

An IF Modulation input is standard on the 114XB and provides the means to up-convert complex digital signals or sophisticated jamming scenarios to microwave frequencies. The 40 MHz instantaneous bandwidth of the IF input supports wideband frequency, phase and amplitude modulation as well as noise injection in any combination. Hence, the complex signals needed to test digital receivers may be easily produced, co-channel and adjacent channel interference simulated and sub-microsecond frequency hopping up to a 40 MHz instantaneous bandwidth (fast enough to simulate many spread-spectrum sources) generated.



Simplified Block diagram of the 114XB.

High Performance Amplitude, Frequency, Pulse and I/Q Modulation

The 114XB family offers three independent modulation channels which may be used separately or simultaneously. Amplitude modulation (AM) at up to 90% modulation at modulating frequencies from DC to 100 kHz make the 114XB ideal for antenna scan pattern or satellite beacon simulation or other power control applications as well as for conventional AM. The extremely fast pulse modulation (PM) characteristics of the 114XB synthesizers allow for pulse widths of as little as 50 ns and pulse repetition frequencies as high as 10 MHz, enabling them to simulate virtually any radar or to serve as a highly versatile source for pulsed device characterization. Option 02

substitutes internal frequency modulation (FM) for the IF modulation channel. Modulation rates of up to 10 MHz and deviations of up to 25 MHz peak facilitate the testing of FM video and telemetry receivers as well as satellite communications systems. Option 05 overlays an I/Q modulator onto the FM channel, giving the 114XB the capability of generating complex (quadrature) modulation consisting of any combination of amplitude and phase modulation at modulating frequencies ranging from DC to in excess of 40 MHz across the complete synthesized frequency output range.

Simultaneous use of the 114XB AM, FM, Pulse and I/Q modulators in conjunction with a multi-channel Arbitrary Waveform Generator allows the creation or replication of virtually any form of modulated signal. The principal limitation on the application of the 114XB family is the imagination of the user.

Plenty of Power

The Phase Matrix/EIP 114XB with Option 06 provides +16 dBm of leveled output power across the entire band. This extra power coupled with the 114XB's Custom Calibration feature, enables you to provide leveled power at any point in your system. This powerful feature plus the 114XB's excellent close-in phase noise make it the premier choice to serve as a local oscillator in a VXIbus test system.

Flexible Programming

Full compliance with VXIbus Specification Revision 1.3/1.4 and Standard Commands for Programmable Instruments (SCPI) Version 1993.0 ensures ease of programming. And to further ease system integration and reduce programming time, Phase Matrix supports the 114XB with software drivers for most popular development environments. The 114XB synthesizers provide synchronization and trigger capability that can be as simple or as complex as your system requires. The unique Triggered List Function, for example, allows you to step through more than 200 ordinary instrument functions triggered from a single trigger input. The flexibility of the 114XB software ensures easy integration into any system, regardless of its complexity.

Small Size and Light Weight

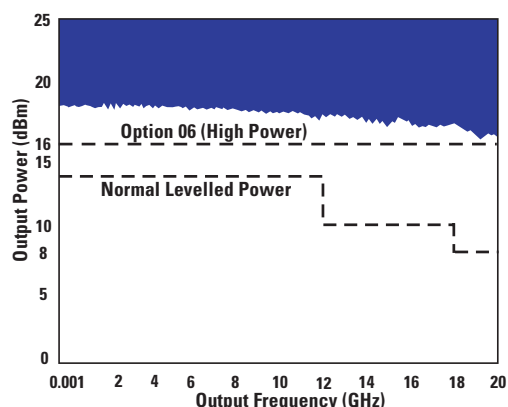
No other products combine small size and light weight with uncompromised high performance as effectively as the Phase Matrix/EIP 114XB family. Less than one-fourth the size of comparable "rack and stack" microwave synthesizers, the 114XB family is the perfect solution in portable and flight-line VXIbus automatic test systems or in any other application where small size, light weight and high performance are important.

Accessory Modules Enhance the 114XB's Capability

A host of accessory modules, including pulse generators, down converters, power amplifiers, etc. are readily available to complement the 114XB synthesizers. Phase Matrix, in partnership with other proven manufacturers of high quality, industry standard VXIbus equipment, can supply all of your automated microwave testing needs.



The microwave synthesizer is a key component in complete VXIbus RF/microwave stimulus/response test suites.



Phase Matrix / EIP 114XB typical maximum available output power. High output level compensates for ATE system cable losses and provides adequate LO drive signal.



The 114XB series of synthesized signal generators are ideal for mobile or portable test suites and flight line systems.

1140B/1141B SPECIFICATIONS

	1141B	1140B
Frequency Range	2 to 20 GHz	0.001 to 20 GHz
Power Range (levelled)		
10 MHz to 2 GHz	-----	+13 to -80 dBm
2 to 12 GHz	+13 to -90 dBm	+13 to -90 dBm (+16 dBm Option 06)
12 to 18 GHz	+10 to -90 dBm	+10 to -90 dBm (+16 dBm Option 06)
18 to 20 GHz	+10 to -90 dBm	+8 to -90 dBm (+16 dBm Option 06)
Source Impedance	50 ohms	50 ohms
Output Connector Type	APC 3.5mm Female	APC 3.5mm Female
VSWR (typical)	2:1	2:1
Reverse Power Tolerance	1 watt	1 watt

	Frequency	Power
Resolution	1 Hz	0.1 dB
Accuracy	Same as time base	>-50 dBm: 1 dB ² -50 dBm to -80 dBm: 1 dB ² <-80 dBm: 2 dB typ.
Switching Time ³	<50 ms	Without Atten Change <50 ms
Switching Time (IF Input) ⁴	<100 ns	With Atten Change <150 ms

Spectral Purity (Specifications apply at +10 dBm CW output level, Complex Modulation off)

Spurious

	1141B/1140B			
	0.001 to 2 GHz	2 to 4.84 GHz	4.84 to 10 GHz	10 to 20 GHz
Harmonic	<-40 dBc	<-40 dBc typical	<-40 dBc typical	<-40 dBc typical
Power Line Related	<-45 dBc	<-51 dBc	<-45 dBc	<-45 dBc

Non-Harmonically Related Spurious

	1141B/1140B			
	0.001 to 2 GHz	2 to 4.84 GHz	4.84 to 10 GHz	10 to 20 GHz
Offset Frequency				
<100 kHz	<-60 dBc	<-60 dBc	<-60 dBc	<-60 dBc
100 kHz to 1 MHz	<-60 dBc	<-60 dBc	<-60 dBc	<-60 dBc
1 MHz to 100 MHz	<-60 dBc	<-60 dBc	<-60 dBc	<-60 dBc
>100 MHz	<-60 dBc	<-70 dBc	<-70 dBc	<-60 dBc

Residual Modulation (50 Hz to 15 kHz bandwidth)

	1141B/1140B			
	0.001 to 2 GHz	2 to 4.84 GHz	4.84 to 10 GHz	10 to 20 GHz
FM	<150 Hz rms	<75 Hz rms	<150 Hz rms	<300 Hz rms
AM	<0.1% peak	<0.1% peak	<0.1% peak	<0.1% peak

Single Side Band Noise (dBc/Hz)

Offset From Carrier	Frequency (GHz)									
	≤2	4	6	8	10	12	14	16	18	20
30 Hz	-78	-83	-82	-78	-77	-75	-72	-71	-70	-68
100 Hz	-81	-85	-84	-81	-80	-78	-78	-77	-77	-75
1 kHz	-82	-90	-88	-87	-85	-83	-82	-80	-80	-80
10 kHz	-80	-90	-88	-88	-85	-82	-82	-80	-80	-80
100kHz	-88	-97	-92	-88	-88	-88	-84	-82	-80	-80

1140B/1141B SPECIFICATIONS

Internal Time Base

Frequency	10 MHz
Aging Rate	$<1 \times 10^{-9}$ /day at 25°C after 72 hour warm-up
Temperature Stability	$<1 \times 10^{-7}$ /change over 0°C to 50°C

Pulse Modulation (external)

Pulse Repetition Frequency	DC to 10 MHz
Minimum Pulse Width	50 ns
On/Off Ratio	>80 dB
Rise/Fall Time	<10 ns, 10% to 90%
Pulse Overshoot, Ringing	<10% for PRF's <1 MHz Typical
Pulse Width Compression	<10 ns at 50% points (<5 ns typical)
Video Feedthrough	<20 mV peak to peak (<10 mV peak to peak typical)
Delay Time	<55 ns, 50% TTL to 50% RF (<30 ns typical)
Peak-to-CW Level Accuracy	<0.5 dB change (>50 ns pulse widths excluding leading edge overshoot/ringing)
Input Level	TTL compatible
Input Level Tolerance	$-0.5 \leq V_{in} \leq +7$ VDC Continuous
Polarity	RF output is ON with TTL logical "1" input
Connector	BNC Female

Amplitude Modulation (external)

Rate	DC to 100 kHz (3 dB bandwidth)
Depth	0 to 90% minimum
Distortion	<5% (50% depth, 1 kHz rate)
Sensitivity	Programmable from 0 to 100%. 2.0V peak-to-peak input gives full scale modulation
Modulation Index Accuracy	$\pm 10\%$ (50% depth, 1 kHz rate 2.0V peak-to-peak modulating input)
Modulation Overdrive Threshold	± 2 VDC $\pm 10\%$
Average Power Output	$-20 \log[1 + (\text{Modulation Index})/100] \pm 2$ dB relative to set CW level with AM OFF
Input Impedance	10 kohm $\pm 10\%$
Input Level Tolerance	± 20 VDC continuous
Connector	BNC female

IF (Complex Modulation) Input⁽¹⁾

Input Frequency	300 MHz to 1 GHz, programmable		Input Impedance	50 ohms nominal						
Input Level	-6 dBm nominal		Input VSWR	<2.0:1 typical						
Instantaneous 3 dB Bandwidth	>40 MHz typical (ALC OFF)		Connector	BNC female						
Spurious Output (+10 dBm output level, ALC On, -6dBm input level)	<table><tr><th>IF Input</th><th>Level</th></tr><tr><td>300 to <750 MHz</td><td><-30 dBc</td></tr><tr><td>750 MHz to 1 GHz</td><td><-60 dBc</td></tr></table>		IF Input	Level	300 to <750 MHz	<-30 dBc	750 MHz to 1 GHz	<-60 dBc		
IF Input	Level									
300 to <750 MHz	<-30 dBc									
750 MHz to 1 GHz	<-60 dBc									

Frequency Modulation (external) Option 02⁽¹⁾

Rate	5 kHz to 10 MHz (3 dB bandwidth)	Input Impedance	600 Ohms nominal (AC Coupled)
Deviation	25 MHz p-p, f_o 0.05 - 20 GHz	Input VSWR	<2.0:1 typical
	10 MHz p-p f_o 10 - 50 MHz	Connector	BNC female
Distortion	<5% typical		
Sensitivity	5 MHz p-p per volt fixed		

I/Q Modulation (external) Option 05⁽¹⁾⁽⁵⁾

I/Q Bandwidth	DC to > 40 MHz	Max. Input Level	1 V rms
I/Q Sensitivity	0.5 Vp for 100% Modulation Drive Level	Connector	BNC female
I/Q Input Impedance	600 Ohms nominal (DC Coupled)		

10 MHz Input/Output

Frequency	10 MHz	Input Impedance	50 ohms nominal
Level	0 dBm ± 3 dB	Connector	BNC female

Programming

Conforms to SCPI Version 1993.0	List Mode	201 points, separate control of Frequency, Power, AM depth, CM State, Pulse Mod State
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General (Tested to MIL-PRF 28800F, Class III)

Temperature Range	
Operating	0° to 50° C
Non-operating	-40° to 70° C
Relative Humidity	0 to 95 % non-condensing
EMI	
Below 1 GHz	Complies with VXIbus Revision 1.3/1.4 specification
Above 1 GHz	Complies with RE02 of MIL-STD-461C
Certifications	CE Certified for EMC to EN50011 and EN50082-1, CE Certified for Safety to IEC1010-1 (1990)
Warm-up Time	<15 minute at 25°C ambient temperature
Weight	<18 lbs

1140B/1141B SPECIFICATIONS

VXIbus Specification

Module Size	Complies fully with Revision 1.3/1.4 of VXIbus Specification for message-based instruments
Device Type	C-size, 3 slots wide
Protocol	Message-based instrument
Address/ Data Mode Supported	Word Serial
Local Bus	A16/D16
ECLTRG Utilization	Not Used
TTLTRG Utilization	Available for triggered functions
CLK10 Utilization	Available for triggered functions
Cooling	Not Used
1141B/1140B	1.2mm H ₂ O @ 9 liters/sec for <25°C internal temperature rise

Power Requirements

	Power	I _{peak} (Amperes)						
		+5V	+12V	+24V	-2V	-5.2V	-12V	-24V
1141B	<155 Watts	2.0	2.8	2.5	0.2	0.2	0.8	1.7
1140B	<160 Watts	2.0	2.8	2.9	0.2	0.2	0.8	2.0

¹ Adding Option 02 and/or Option 05 removes IF Input

² Model 1140B accuracy is degraded by 1 dB from 0.01 to 2 GHz

³ Switching time is to within 500 Hz, triggered list mode

⁴ IF input less than 40 MHz deviation

⁵ Option 05 (I/Q Modulation) includes Option 02 (FM Modulation)

*Typical, means approximately 2/3 of all units will meet these characteristics.

ORDERING INFORMATION

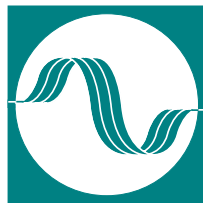
MODEL 1140B	0.001 - 20 GHz VXIbus Synthesized Signal Generator
MODEL 1141B	2 - 20 GHz VXIbus Synthesized Signal Generator

Option 02⁽¹⁾	FM Modulation (external)
Option 03	APC 3.5mm Male Connector (replaces standard female type)
Option 05	I/Q and FM Modulation (external) ⁽¹⁾
Option 06	High Power Output (+16 dBm min.)

Accessories	Model 1313B	1 to 26.5 GHz VXIbus Microwave Downconverter
	Model 1911A	4 Channel VXIbus Pulse Generator
	Model 1355A	1 to 20 GHz VXIbus Microwave Power Amplifier

Warranty	Phase Matrix, Inc. has a proven commitment to quality and reliability in instrumentation. This commitment is demonstrated in the 114XA family of synthesizers with a full 1 year standard warranty. Part, Labor, even shipping are all included at no cost to you.
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**1140B
1141B**



Phase Matrix, Inc.™
Instruments You Can Count On



VXIbus Synthesized Signal Generators

**High-Performance Microwave Signal
Generation for VXIbus Systems**

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