

SECTION 1 GENERAL INFORMATION

DESCRIPTION

The EIP Models 1140A, 1141A, and 1142A VXIbus Synthesized Microwave Frequency Generators are message-based VXI modules capable of generating microwave signals. The 1140A has a frequency range of 0.01 to 20 GHz with a dynamic range of +10 to -90 dBm. The 1141A has a frequency range of 2 GHz to 20 GHz with a dynamic range of +10 to -90 dBm. The 1142A has a frequency range of 4 GHz to 12.4 GHz with a dynamic range of +10 to -100 dBm. Other than interface address switches, the instruments have no manual controls. The instruments are normally controlled via a computer using SCPI type commands. The instruments also provide, as standard, a variety of external modulation inputs including: AM, FM, Pulse, and complex modulation. The 1140A, 1141A, and 1142A are VXIbus "C" size, 3-wide plug-in modules that require a VXIbus mainframe for operation.

OPERATING CONDITIONS

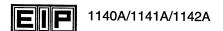
The EIP 1140A, 1141A, and 1142A synthesizers are designed to operate at temperatures from 0 to 50 °C at a relative humidity not to exceed 95% (75% over 25 °C; 45% over 40 °C). The synthesizers will perform to specifications at altitudes not exceeding 10,000 ft (3050 m). They are fungus resistant. The module housings are not designed to provide protection from severe mechanical shock or liquids and are intended for normal VXIbus use in an environmentally clean area.

The 1140A, 1141A, and 1142A synthesizers meet the requirements of MIL-T-28800D, Type III, Class 7, Style G, Color R with the following modifications and exceptions:

- 1. The non-operating temperature requirement is limited to the range of -40 to +70 °C.
- 2. The operating and non-operating altitude requirements are not invoked.
- 3. The EMI requirement is modified as follows:
 - a. For frequencies ≥1 GHz, RE02 of MIL-STD-461C applies.
 - b. For frequencies <1 GHz, VXIbus System Specifications Revision 1.3/1.4 applies.
- 4. The warm up time is 15 minutes at 25 °C ambient temperature.

STORAGE

To prevent possible damage to the synthesizers, they must be stored in an antistatic bag or enclosure and in an environment that is protected from moisture, dust, and other contaminants. Do not expose the instruments to temperatures below -40 °C or above 70 °C, altitudes above 40,000 ft (12,000 m), nor vibration exceeding 2 g.



1142A SPECIFICATIONS

GENERAL					
Operating Temperature Range	0 to 50 °C				
Non-operating Temperature Range	-40 to 70 °C				
Relative Humidity	0 to 95%, non-condensing				
EMI Below 1 GHz Above 1 GHz	Complies with VXIbus Revision 1.3/1.4 specifications Complies with RE02 of MIL-STD-461C				
Warm-up Time	15 minutes at 25 °C ambient temperature				
Weight	<18 lbs				
	VXIbus				
Compatibility	Full compliance with VXIbus Revision 1.3/1.4 specifications for message-based instruments				
Module Size	C-size, 3 slots wide				
Device Type	Message-based instrument				
Protocol	Word Serial				
Address/Data Modes Supported	A16/D16				
Local Bus	Not used				
ECLTRG Utilization	Available for triggerable functions				
TTLTRG Utilization	Available for triggerable functions				
CLK10 Utilization	Not used				
Cooling	0.1 mm H_2O @ 5 liters/sec for <15 °C internal temperature rise				
Power Dissipation	<126 watts				
Current Requirements	Voltage (VDC) +5 +12 +24 -2 -5.2 -12 -24				
	IPEAK (Amperes) 2.0 2.2 1.7 0.2 0.2 0.8 1.6				

FREQUENCY

Range 4 to 12.4 GHz

Resolution 1 Hz

Accuracy Same as timebase

Internal Timebase

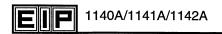
Frequency

10 MHz <1 x 10^{-9} /day at 25 °C after 72 hours warm-up <1 x 10^{-7} change over 0 to 50 °C Aging Rate

Temperature Stability

Switching Time <40 ms to within 500 Hz

(Triggered List Mode, 4 to 12.4 GHz step)



1142A SPECIFICATIONS (Continued)

PROGRAMMING

Compatibility Conforms to SCPI Version 1993.0

Sweep Mode Triggered List/Sweep

SPECTRAL PURITY (at +10 dBm CW output level, Complex Modulation OFF)

Subharmonic Spurious None

Harmonic Spurious <-40 dBc
Power Line Related Spurious <-45 dBc

Non-Harmonically Related Spurious

Offset Frequency	Level	Typical
<100 kHz	<-40 dBc	<-50 dBc
100 kHz to <1 MHz	<-50 dBc	<-60 dBc
1 to 100 MHz	<-60 dBc	<-70 dBc
>100 MHz	<-70 dBc	<-75 dBc

Residual Modulation (50 Hz to 15 kHz bandwidth)

Single-sideband Phase Noise (dbc/Hz)*

FM: <150 Hz rms, AM: <0.1% peak

Frequency	Offset from Carrier				
GHz	30 Hz	100 Hz	1 kHz	10 kHz	100 kHz
4.0	-83	-87	-89	-86	-87
5.0	-83	-86	-89	-85	-87
6.0	-81	-85	-88 -	-85	-87
7.0	-78	-83	-87	-84	-86
8.0	-78	-82	-86	-83	-84
9.0	-77	-79	-84	-82	-84
10.0	-77	-79	-84	-80	-80
11.0	-76	-79	-81	-78	-79
12.4	-75	-78	-81	-78	-79

^{*} Typical performance is >7 dB lower than specified.

RF OUTPUT

Range (Leveled) +10 to -100 dBm

Resolution 0.1 dB

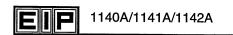
Power Accuracy \pm 1.0 dB, >-50 dBm (In CW mode with attenuator and \pm 2.0 dB, -50 to -80 dBm ALC coupled) \pm 2.0 dB typical, <-80 dBm

Output Level Switching Time With attenuator change: <100 ms, typical (Triggered List mode) Without attenuator change: <5 ms/dB, typical

Source Impedance 50 Ω nominal

VSWR <2.0:1 (0 dB attenuation) typical

Connector Type N female
Reverse Power Tolerance 1 watt continuous



1142A SPECIFICATIONS (Continued)

10 MHz INPUT/OUTPUT

Frequency 10 MHz

Level 0 dBm \pm 3 dB (0.7 V p-p \pm 0.2 V p-p)

Impedance 50Ω nominal Connector BNC female

PULSE MODULATION (external) (at +10 dBm output power)

Pulse Repetition Frequency DC to 10 MHz

Minimum Pulse Width <50 ns
On/Off Ratio >80 dB

Rise/Fall Time <15 ns, 10% to 90%

Pulse Overshoot, Ringing <10% for PRF's <1 MHz

Pulse Width Compression <10 ns at 50% points (<5 ns typical)
Video Feedthrough <20 mV p-p (<10 mV p-p 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 ≤Vin ≤ +7.0 Vdc continuous

Polarity RF output is ON with a TTL logic "1" input

Connector BNC female

AMPLITUDE MODULATION (external)

Rate DC to 100 kHz (3 dB bandwidth, typical)

Depth 0% to 90% minimum

Distortion <5% (50% depth, 1 kHz rate)

Sensitivity Programmable from 0% to 100%. 2.0 V p-p input gives

full-scale modulation.

Modulation Index Accuracy ± 10% (50% depth, 1 kHz rate, 2.0 V p-p modulating

input)

Modulation Overdrive Threshold $\pm 2 \text{ Vdc} \pm 10\%$

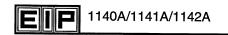
Average Power Output $-20 \log \left(1 + \frac{\text{Modulation Index}}{100}\right) \pm 2 \text{ dB relative to set}$

CW level with AM OFF

Input Impedance $10 \text{ k}\Omega \pm 10\%$

Input Level Tolerance ± 20 Vdc continuous

Connector BNC female



1142A SPECIFICATIONS (Continued)

IF INPUT (Complex Modulation)

Input Frequency 300 MHz to 1 GHz, programmable, in the 4 to 12 GHz

range

Input Level -6 dBm nominal

Instantaneous 3 dB Bandwidth >50 MHz typical (ALC OFF)

Spurious Output (+10 dBm output level, ALC ON, -6 dBm input level), typical

IF Input	Level		
300 to <700 MHz	<-30 dBc		
700 MHz to 1 GHz	<-60 dBc		

 $\begin{array}{lll} \mbox{Input Impedance} & 50 \ \Omega \ \ \mbox{nominal} \\ \mbox{Input VSWR} & <2.0:1 \ \mbox{typical} \\ \mbox{Connector} & \mbox{BNC female} \end{array}$

Note: Specifications subject to change without notice.