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HP E6500A VXI Tuner

Product Overview



HP E6500A Tuner Configurations (left to right: E6500A tuner with Options 003 (20 MHz to 3 GHz) and 006 (6 slot HP E1421B VXI mainframe; E6500A (20 MHz to 1 GHz) two-module set; E6500A Option 003 (20 MHz to 3 GHz) three-module set; and E6500A with Options 003 and 013 (13 slot HP E1401B VXI mainframe).

HP E6500A Description

The HP E6500A VXI tuner system brings high dynamic range, fast tuning, and the flexibility of a modular architecture to receiver system applications in the VHF/UHF frequency ranges. The E6500A tuner system provides frequency coverage from 20 to 1000 MHz using two C-size VXI modules — the E6401A 20 to 1000 MHz downconverter and the E6402A Local Oscillator (LO). Extending coverage to 3 GHz is as simple as adding the E6403A block downconverter VXI module to the E6500A (Option 003). The E6500A tuner system downconverts VHF/UHF signals to an IF of 21.4 MHz or to a baseband output of 2.5 to 9.5 MHz using Option 001. The high dynamic range and fast tuning make this VXI tuner an ideal companion to high performance VXI digitizers, such as those found in the HP E3238S signals development system.

20 to 1000 MHz
(3000 MHz, Optional)

HP E6500A Features

- 20 MHz to 1000 MHz tuning range
- 20 MHz to 3000 MHz (Option 003)
- Excellent dynamic range
  TOI: +15 dBm, typical
  NF: 10 dB, typical (1 GHz)
- Fast LO tuning
- Synthesized 10 Hz tuning steps
- Low phase noise
- RF preselection
- 21.4 MHz IF output BW: 16 MHz
- Baseband output: 2.5 to 9.5 MHz
- Multichannel flexibility
- VXI register-based
- Compatible with HP E3238S signals development system

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Specifications

Specifications describe warranted performance over the temperature range of 0 to 55 °C and include a 30-minute warmup from ambient conditions. Supplemental information identified as "typical" or "characteristic" provide useful information by giving non-warranted performance parameters. **Specifications apply only to the HP E6500A *system*- level configuration. The minimum system consists of the two module set: the HP E6401A downconverter and HP E6402A LO. Specifications are not available at the individual HP E6400 series VXI *module* level (i.e., HP E6401A, HP E6402A, and HP E6403A). Specifications assume that the HP E6500A is used in Hewlett-Packard VXI mainframes (HP E1421B and HP E1401B recommended).**

Typical refers to test data at the fiftieth percentile, averaged over the frequency range, and 25 °C (room temperature).

Characteristic information describes product performance for parameters that are either not subject to variation, non-measurable, verifiable through functional pass-fail tests, or as a matter of routine not measured.

Specifications, typicals, and characteristics refer to the HP E6500A 1 GHz tuner, HP E6500A Option 001 (baseband output), and HP E6500A Option 003 (3 GHz extension) unless otherwise noted.

Frequency-related

Frequency Range	20 MHz to 1000 MHz (HP E6500A) 20 MHz to 3000 MHz (HP E6500A Option 003)
Tuning Resolution	10 Hz
Synthesizer Tuning Speed	1 ms (10 kHz settling), characteristic 2 ms (1 kHz settling), characteristic 4 ms (100 Hz settling), characteristic [data derived from register-based programming]
Tuning Accuracy:	(center frequency x reference accuracy)
Internal OCXO Reference Accuracy	1×10^{-6}/yr [1]
External Reference Input	Requires 10 MHz reference signal with level 0 dBm ± 3 dB

Amplitude-related

Input Parameters

RF Input Impedance	50 ohms, characteristic
RF Input Connector	SMA
Input VSWR	2:1, typical
Maximum Input Without Damage	
Average Continuous RF Power	+ 20 dBm, characteristic
DC Voltage	20 volts, characteristic
RF Input Attenuation	0 - 30 dB in 10 dB steps, characteristic

[1] Procedure for timebase adjustment is given in the user manual.

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Specifications

RF Preselection	Preselector Band	Band Switching Frequencies, characteristic
	1	10 to 40 MHz
	2	40 to 60 MHz
	3	60 to 84 MHz
	4	84 to 118 MHz
	5	118 to 170 MHz
	6	170 to 230 MHz
	7	230 to 350 MHz
	8	350 to 450 MHz
	9	450 to 750 MHz
	10	750 to 1000 MHz
	11	1000 to 1250 MHz
	12	1250 to 1800 MHz
	13	1800 to 2400 MHz
	14	2400 to 3000 MHz

Dynamic Range Parameters

Noise Figure	10 dB, typical (20 to 1000 MHz)[1] 14 dB, typical (1000 to 3000 MHz)[1]
Intermodulation: Second Order	
SOI	+ 40 dBm
Intermodulation: Third Order	
TOI	+15 dBm, typical (20 MHz spacing)
Narrowband intermodulation for 2 signals at -20 dBm and 125 kHz spacing	-64 dBc, typical
Image Rejection	95 dB
IF Rejection	90 dB
Phase Noise @ 20 kHz offset	-100 dBc/Hz, characteristic
Internally Generated Spurious	- 100 dBm, equivalent input
LO Emissions	- 110 dBm (HP E6500A) - 100 dBm (HP E6500A Option 003)

IF Output Parameters

21.4 MHz IF Output	
Bandwidth (3 dB)	16 MHz, characteristic (BW will be reduced at preselector band switching points)
RF-to-IF Gain	5 dB, typical[2]
(Spectral information is inverted for signals in all bands except 11 and 12.) (See "RF Preselection" table above.)	
Baseband Output (HP E6500A Option 001)	
Bandwidth (3 dB)	2.5 to 9.5 MHz, characteristic
RF-to-IF Gain	15 dB, typical[2]
(Spectral information is inverted only for signals in bands 11 and 12. HP E6500A Option 001 does *not* include a 21.4 MHz output.)	

[1] HP E6500A Option 001 noise figure is also 10 dB and 14 dB, but is considered a characteristic.
[2] When amplitude correction table is applied.

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Specifications

Front-panel Connectors

HP E6401A VXI module (20 to 1000 MHz downconverter)	20 to 1000 MHz Input, SMA Block Downconverter Input, SMA 1st LO Input, SMC 2nd LO Input, SMC 21.4 MHz IF Output, SMB

(The HP E6401A Option 001 configuration replaces the "21.4 MHz IF Output" SMB connector with the "IF Output" SMB connector. "IF Output" refers to the 2.5 to 9.5 MHz baseband output. Option 001 also adds another SMB connector, labeled "3rd LO Input".)

HP E6402A VXI module (Local Oscillator)	1st LO Output, SMC 2nd LO Output, SMC Block Downconverter LO Output, SMC 3rd LO Output, SMB Ref Out, SMB Ext Ref In, SMB Ref TTL Out, SMB

(The HP E6402A Option 002 configuration adds a second set of the following outputs: 1st LO Output, 2nd LO Output, and Block Downconverter LO Output.)

HP E6403A VXI module (1000 - 3000 MHz block downconverter)	20 to 3000 MHz Input, SMA 20 to 1000 MHz Output, SMA Block Downconverter Output, SMA Block Downconverter LO Input, SMC

VXI-related Information

VXI Control	Register-based commands (Windows NT driver examples also provided. VXI plug-and-play drivers not available.)
Module Size	VXI C-Size
Slots Used	2 slots (HP E6500A 1 GHz tuner) 3 slots (HP E6500A Option 003 3 GHz tuner)
VXI Interface	Requires slot zero controller such as command module or MXI module (Not included)

Power Requirements

HP E6500A (20 - 1000 MHz)	36 watts, characteristic
HP E6500A Option 003 (20 - 3000 MHz)	50 watts, characteristic

(HP E6500A Option 001 power consumption of 1.5 watts is included in these numbers.)

Physical Parameters

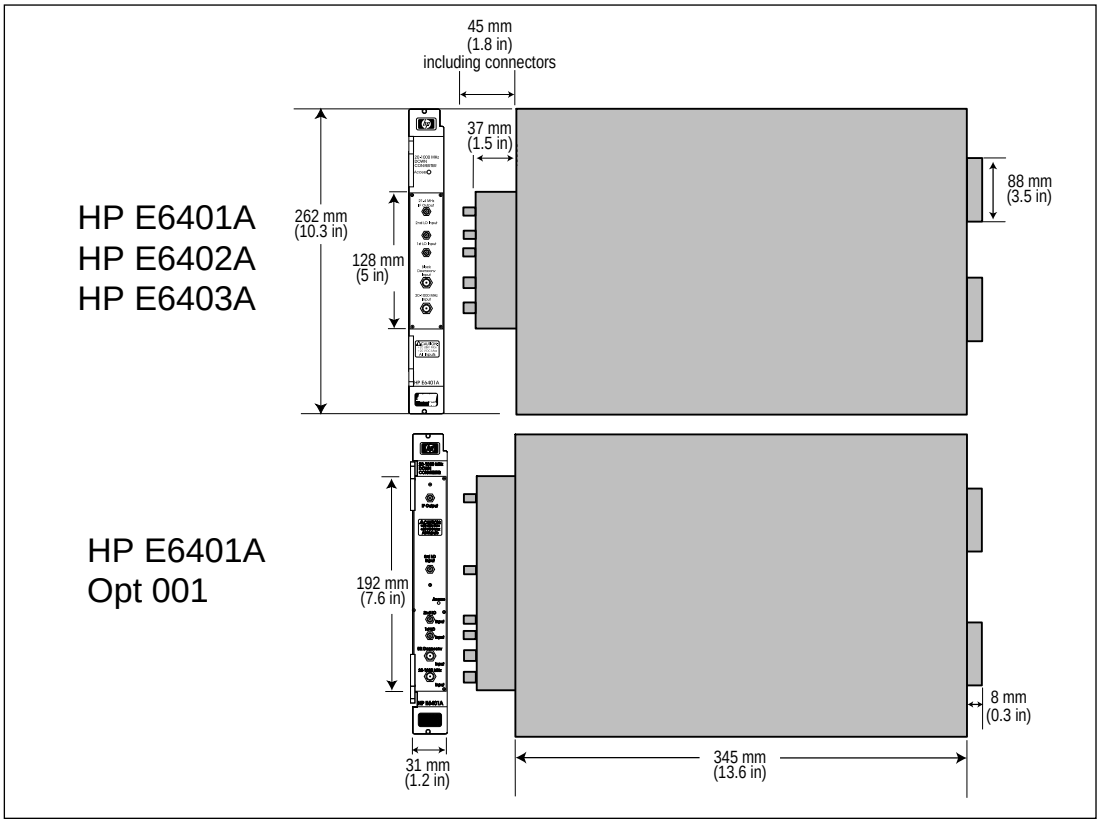
Weight (characteristics)

HP E6500A (20 - 1000 MHz) system	12 lb 10 oz (5.8 kg)
HP E6500A Option 003 (20 - 3000 MHz) system	18 lb 8 oz (8.5 kg)
HP E6401A module (20 - 1000 MHz downconverter)	5 lb 14 oz (2.7 kg)
HP E6401A Option 001 module (baseband output)	6 lb 7 oz (2.9 kg)
HP E6402A module (local oscillator)	6 lb 12 oz (3.1 kg)
HP E6403A module (1000 - 3000 MHz block downconverter)	5 lb 14 oz (2.7 kg)

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Specifications

Dimensions (characteristics)



Dimensions of VXI modules comprising the HP E6500A tuner. Each module occupies a single C-size slot.

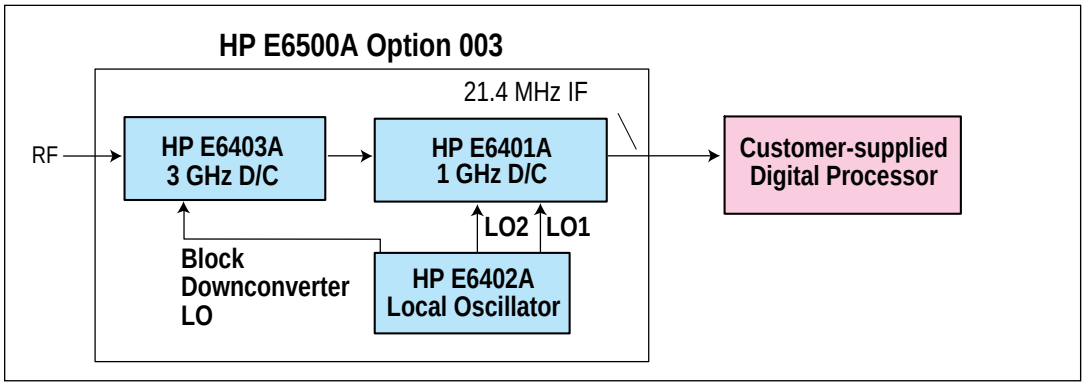
Environmental

Operating temperature	0 to +55 °C
Calibration interval	2 years

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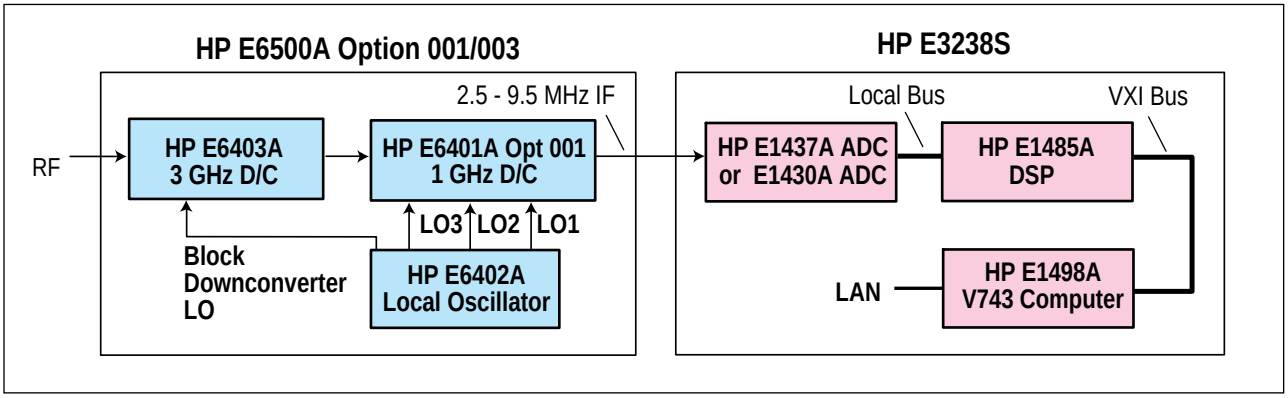
Configurations

The standard HP E6500A configuration consists of the HP E6401A 20 to 1000 MHz downconverter (D/C) module and the E6402A local oscillator (LO) VXI modules. Option 003 extends frequency coverage to 3 GHz using the E6403A 1000 to 3000 MHz block downconverter VXI module. The system block diagram is shown here.



HP E6500A Option 003 tuner configuration provides high dynamic range tunable downconversion to customer-supplied digital processors.

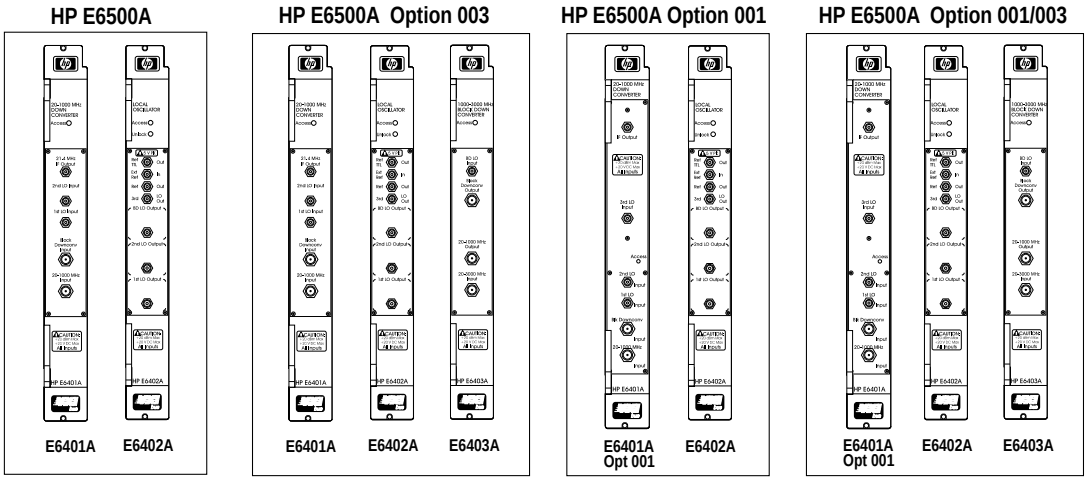
When used as a high dynamic range tuner for the HP E3238S signals development system, the E6500A tuner requires the use of the Option 001 baseband (IF to IF converter) configuration.



HP E6500A with Options 001 and 003 provides high dynamic range downconversion for the HP E3238S signals development system. The HP E6500A tuner allows the system to be completely VXI, thus saving rack space and offering additional flexibility.

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Ordering Information



The following configurations are available for the HP E6500A VXI tuner. Each E6500A system is comprised of two or three E6400 series VXI modules.

"Systems"

HP E6500A: 20 MHz to 1000 MHz VXI tuner
Option 001: Baseband output
Option 003: Increases frequency range to 3000 MHz
Option 006: Add HP E1421B 6-slot VXI mainframe
Option 013: Add HP E1401B 13-slot VXI mainframe

(Note: As with any VXI instrument, a slot zero control module must be ordered separately for computer-controlled operation.)

VXI modules

HP E6401A: 20 MHz to 1000 MHz downconverter VXI module
Option 001: Baseband output
HP E6402A: Local Oscillator VXI module
Option 002: Dual LO output
HP E6403A: 1000 to 3000 MHz block downconverter VXI module

(Note: HP E6400 series VXI modules are not specified when used standalone. Specifications only apply when the modules are used in an E6500A "system" configuration. Modules are meant to be ordered for system upgrading or VXI module replacement purposes.)

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