# Agilent E2747A/48A Vector Waveform Generator dc to 6 MHz

**Technical Specifications** 



The Agilent E2747A and E2748A Vector Waveform Generators use a flexible digital transmitter architecture to provide easy development of vector signals for improved time-to-market of new and unique vector modulation formats.

#### Applications

- Transmitter simulation
- Receiver testing
- Spectral environment simulation
- Realistic production testing
- Flexible arbitrary waveform generation with variable sample rate



Agilent Technologies

### **Specifications**

Hardware form factor	
E2747A	PC-format instrument. Preconfigured hardware, and pre-loaded with the application software.
E2748A	Module assembly to be used in separate DSP carrier for system builder applications
	Supported DSP carriers include:
	VXI: SCMVX008 with Options -001 Front panel SMB connectors and -082 4MB DRAM for VXI development environments.
	PCI: Dakar C44-Based PCI Processor Board fron Spectrum Signal Processing for PC-based development environments.

(the following apply to both the E2747A and the E2748A)

Carrier frequency	dc to 6 MHz
Signal bandwidth	Actual bandwidth limit depends on the filter and coding parameters selected by the user.
	2 MHz, typical, for real time signal computation 6 MHz, in play back mode.
Output resistance	50 $\Omega$ nominal
Level accuracy	±0.5 dB at 10 kHz
Flatness (relative to 10 KHz)	±0.75 dB
Full scale output	±2 V
dc Offset	±50 mV
Harmonic distortion	-55 dB below full scale
Spurious distortion	-70 dB with full scale
DAC resolution	14-bits
DAC clock	

Frequency accuracy (15 MHz, 0–40°C)

Clock phase noise density (single sideband power density of 5 MHz signal, <0.05 G vibration) ±30 ppm w/o phase lock Lockable to external 10 MHz reference to remove absolute frequency error

 $\Delta f{=}50$  Hz: -80 dBc/Hz  $\Delta f{=}10$  kHz: -130 dBc/Hz

Power Requiremen	its		
E2747A			
Auto-ranging, world	dwide power supply	100-240 VAC over 47-63 Hz	
E2748A			
VXI-power and coo (Add for each E274 installed in a SCMV	ling. 8A (X008)		
Power supply	I <sub>PM</sub> (A)	I <sub>DM</sub> (A)	
+5.0 V	1.0	0.01	
+12 V	0.150	0.005	
-12 V	0.100	0.005	
+24 V	0	0	
-5.2 V	0	0	
-2.0 V	0	0	
Cooling/Slot			
Watts/slot		8 W	
Air flow		0.67 liters/second	
∆PmmH <sub>2</sub> 0		0.093 mmH <sub>2</sub> 0	
Note: The above sp to be added to the p specifications of th See its technical sp applicable data.	ecifications need power and cooling e SCMVX008. ecifications for		

Environmental & Regulatory	
E2747A	
Temperature	Operating: 5–40° C
	Non-operating: -40–70° C
Humidity	Operating: 15–80% RH at 40° C
	Non-operating: 90% RH for 24 hours
Maximum altitude	Operating: 4600 m (15,000 ft). Above 2300 m (7500 ft.) derate operating temperature by -3.6° C per 1000 m (-1.1° C per 1000 ft).
	Non-operating: 4600 m (15,000 ft.).
Safety	EN61010/IEC 1010 Laser Class I
Harmonics	IEC 555-2
Flicker	IEC 1000-3-3
Rad/Cond emissions	EN50011/CISPR 11, Group 1, Class A
Immunity	EN55082-1 IEC 801-2, ESD, 4kV CD, 8kV AD IEC 801-3 Rad. 3V/m IEC 801-4, Fast Transients, 0.5 kV I/0, 1 kV pwr.line
E2748A	
Temperature	Operating: 0–55° C,
	Non-operating: -40–70° C
Humidity	Operating: 15–95% RH max at 40°C,
	Non-operating: 90% RH for 24 hours
Maximum altitude	Operating: 4600 m (15,000 ft). Above 2300 m (7500 ft.) derate operating temperature by -3.6° C per 1000 m (-1.1° C per 1000 ft).
	Non-operating: 4600 m (15,000 ft.).
Safety	EN61010/IEC 1010
Rad/Cond emissions	EN50011/CISPR 11, Group 1, Class A
Immunity	EN55082-1 IEC 801-2, ESD, 4kV CD, 8kV AD IEC 801-3 Rad. 3V/m IEC 801-4, Fast Transients, 0.5 kV I/O, 1 kV pwr.line

### Warranty

E2748A

During the warranty period, the unit will either be replaced or repaired, at Agilent's option, and returned to the customer without charge E2747A

### 1 year return to Agilent 3 year return to Agilent

Software	
Operating system	
E2747A	Windows $NT^{\textcircled{R}}$ 4.0 or better (included)
E2748A	Compatible with Windows NT 4.0, Windows 95, or better (not provided)
User interface	Parameters set by
Soft front panel	Graphical "fill-in-the-blanks" template
Calls to function library	Supported development environment (not provided, both E2747A and E2748A): Microsoft <sup>®</sup> Visual BASIC; Microsoft Visual C++
Save/Recall/Print capability	Channel modulation parameters
	Multi-channel workspace settings
	Filter parameters
	RAM data arrays
	Code tables
Instrument control modes	Run/pause
	Select a channel
	Apply the configuration to the designated channel
	Manual trigger
	Reset pseudo-random noise to beginning of sequence
	Reset data source to start-up field
	Status update
Data source block	Data for each message field may be read from any of the following sources
RAM	128k words maximum Data word size: up to 16 bits User viewable and editable
File	Real-time data flow from program file via serial COM port. Data read in byte mode, and packed or unpacked data mode
Noise	Pseudo-random noise; Repetition rate: >140 trillion input data words
Register	User loadable data register; 16 bits fixed
Program	Only available when using Function Library control
	Allows real-time serial data flow from buffer maintained by external program

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Message Fields	
Number of fields per message	1–16
Field length	1–2,097,151; infinity
For each field	Assign data source (see Data Source types).
	Extend field with additional samples: yes/no; number of samples for extension.
	JUMP to field 0 on completion.
	Select bypass coder.
	Reset the next state in the code table register.
	Restart at the beginning of the RAM data sequence.
Coder	
Maximum code table size	2 <sup>17</sup> codes
Modes	Coder disabled
	One symbol per data word
	Multiple symbols per data word
Filter, mapping and resample block	
Filter modes	Real
	I & Q
	Complex
	FM
Filter response shape	Gaussian (±0.15 F <sub>s</sub> )
	Gaussian (±0.075 F <sub>s</sub> )
	Flat (±0.25 F <sub>s</sub> )
	Custom
<b>Custom filter</b> (wizard to synthesize custom filter allows you to cascade any of the following)	Standard filter types: Gaussian, raised cosine, root raised cosine with adjustable bandwidth and alpha (Gaussian, bandwidth only)
	Filter time domain impulse response: real or complex; symmetric or asymmetric
	Filter frequency domain response: real or complex; symmetric or asymmetric
Mapping	Number of symbol bits (maximum 10 for custom filter, else 16)
	Edit symbol code map
	Q channel delay (relative to I); number of filter samples
	Add symbol rotation: 0, $\pi/4$ , $\pi/2$ , $\pi$ , $-\pi/4$ , $-\pi/2$
Resampling	Sample frequency
	Number of filter samples per symbol period

Modulator	
Built-in modulation A library of preprogrammed signal	
setups is provided. Included are:	NADC
	IS-95 (CDMA) Base station, pilot channel;
	Base station, sync channel; Mobile station
	GSM
	Multi-level FSK
	QAM
	Offset QPSK
	Iridium downlink traffic channel
	Common analog modulation types such as: triangle, sine, square, pulse, FM
	More as available. See Agilent web site for latest listing.
Modulation mode	All modulation files can be created by using a form of one of these modulation types
1/0	Set I attenuation; Q attenuation: 0–84 dB in -6 dB steps and infinity
FM	Set full scale FM deviation range: 229 Hz to 7.5 MHz, in octave steps
Settable carrier frequency	dc to 6 MHz
Trigger	
Mode	Manual
	Auto (on transition from pause to run)
Actions on trigger	Center frequency change
	Symbol rate change
	Reset internal noise source
	Reset message to designated start-up field

### Memory Allocation

Assign 0, 1/4, 1/2, or Full memory among Filter, Code Table, RAM data

#### **Related Agilent Literature**

Agilent E2747A/48A Vector Waveform Generator dc to 6 MHz Product Overview literature number 5966-4764E

Agilent E2747A/48A Vector Waveform Generator dc to 6 MHz Configuration Guide literature number 5967-5509E

Agilent SCMVX008 TI-Based DSP Module Technical Specifications literature number 5966-3437E

Agilent ESG Series RF Digital and Analog Signal Generators literature number 5965-9088E

Agilent Test System and VXI Products Catalog literature number 5965-2815EN

Agilent Test System and VXI Products Data Book literature number 5965-5497E

#### **Specification Note**

Specifications describe warranted performance over the specified temperature range, after a 15-minute warm-up from ambient conditions. Supplemental characteristics identified as "typical", provide useful information by giving nonwarranted performance parameters. Typical performance is applicable from 20–30° C.

#### Agilent Technologies' Test and Measurement Support, Services, and Assistance

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