



## EMC Precompliance Systems and Accessories Catalog

Agilent 84105EM and 84115EM  
EMC precompliance systems

Agilent E7401A, E7402A, E7403A,  
E7404A, and E7405A EMC  
precompliance analyzers

Agilent E7415A EMC  
precompliance software

Agilent EMC precompliance  
Antennas, probes, preamplifiers,  
and other accessories



Agilent Technologies

# EMC Precompliance systems and test accessories

## General description

Early evaluation of your design's EMI performance is essential for a successful product. Whether your industry is information technology, communications, automotive, medical, or industrial equipment, your product must comply with EMC requirements before it can be introduced to the marketplace.

With Agilent Technologies' EMC precompliance solutions, you get all the features that make in-house EMC precompliance testing a simple reality:

- Preprogrammed, automated measurements that require no special knowledge or training, so you can begin making EMC measurements as soon as your EMC precompliance analyzer arrives.
- Interactive software that allows you to perform test from your PC, or capture measurements made directly from the front panel.
- Automatic remeasure functions for consistent repeatable results.
- A variety of measurement tools and accessories available with our packaged precompliance systems.

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# EMC Precompliance test systems

The 84105EM and 84115EM makes ordering your EMC precompliance system easy. The 84115EM provides the tools accessories you need to perform radiated and conducted emissions measurements to test your product to the major commercial regulatory agency requirements. The 84105EM provides the troubleshooting tools you need to locate emission hotspots.

## Agilent 84105EM design development system

### Includes:

**E7400A** Series EMC analyzer

**11945A** Close field probe set

### Options

Select and configure the E7400A series EMC analyzer of your choice.

E7401A, 9 kHz to 1.5 GHz (default)

E7402A, 9 kHz to 3.0 GHz

E7403A, 9 kHz to 6.7 GHz

E7404A, 9 kHz to 13.2 GHz

E7405A, 9 kHz to 26.5 GHz



## EMC Precompliance test systems *continued*

### Agilent 84115EM preproduction evaluation systems

#### Includes:

**E7400A** Series EMC analyzer

At least three of the following options:

11945A, 11955A, 11956A, 11966P, 11966E, 11966J,  
E7415A, 11967D

#### Options

Select and configure the E7400A series EMC analyzer of your choice.

E7401A, 9 kHz to 1.5 GHz (default)

E7402A, 9 kHz to 3.0 GHz

E7403A, 9 kHz to 6.7 GHz

E7404A, 9 kHz to 13.2 GHz

E7405A, 9 kHz to 26.5 GHz

Select the EMC accessories of your choice.

11945A Close field probe set (default)

11955A Biconical antenna, 30 MHz to  
300 MHz (default)

11956A Log periodic antenna, 200 MHz to  
1 GHz (default)

11966P BiConiLog broadband antenna,  
26 MHz to 2 GHz

11966E Double ridged waveguide horn  
antenna, 1 GHz to 18 GHz

11966J Horn antenna, 18 GHz to 40 GHz

11968C Antenna tripod (default)

11966L 10 m type N cable (default)

E7415A EMI measurement software  
(default)

84115EM-488 National Instruments AT  
GPIB/TNT card

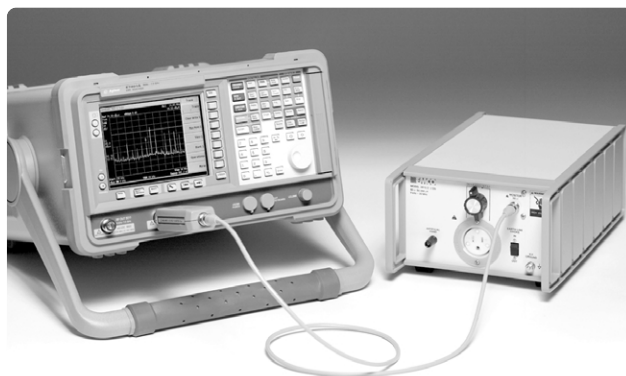
11909A Amplifier, 9 kHz to 1 GHz

11947A Transient limiter with high-pass  
filter (default)

11967D Line Impedance Stabilization  
Network (LISN), NEMA (default)

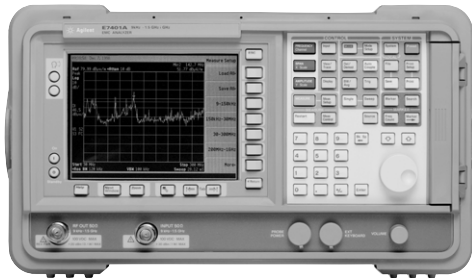
11967D-001 Line Impedance Stabilization  
Network (LISN), SCHUKO

11967D-002 Line Impedance Stabilization  
Network (LISN), British



# EMI Precompliance analyzer and test software

## Agilent EMC analyzers



The heart of the EMI precompliance measurement system is the Agilent E7400 A series portable EMC analyzer. This analyzer has all the capabilities needed to perform EMI measurements including quasi peak detectors, average detectors, and EMI bandwidths. The E7400 A series is offered in 5 different models to better meet your needed frequency range.

### Models:

- E7401A** 9 kHz to 1.5 GHz
- E7402A** 9 kHz to 3.0 GHz
- E7403A** 9 kHz to 6.7 GHz
- E7404A** 9 kHz to 13.2 GHz
- E7405A** 9 kHz to 26.5 GHz

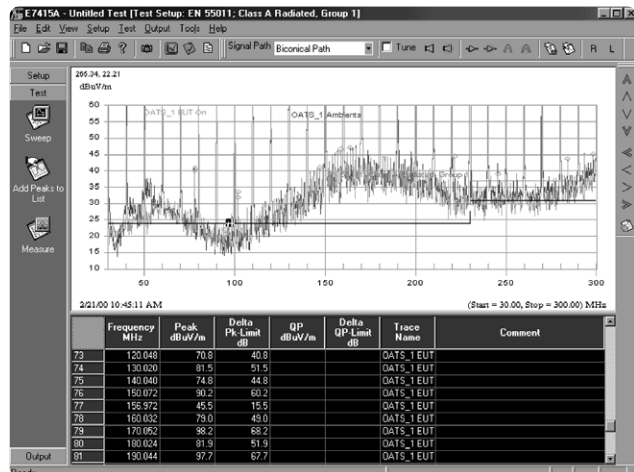
### Includes:

- E740xA-AYQ** EMI detectors/FM demod
- E740xA-1DS** RF preamplifier (20 dB gain, 1 MHz to 3.0 GHz<sup>1</sup>)
- E740xA-1DR** Narrow resolution bandwidths to 10 Hz
- E740xA-A4H** GPIB/parallel port
- E740xA-B72** Memory extension to 10 MB
- E740xA-060** Low emissions shielding
- E740xA-XXX** IntuiLink connecting software

### Options:

- E740xA-1AX** Replaces GPIB with RS-232<sup>5</sup>
- E740xA-1CP** Rackmount and handle kit
- E740xA-UKB** Low frequency extension (30 Hz)<sup>4</sup>
- E740xA-1D5** Adds high stability time base (includes 1 and 3 Hz RBW)
- E740xA-1D6** Time gated sweep
- E740xA-1DN** Adds tracking generator
- E740xA-A4J** Adds IF and sweep ports
- E740xA-A5D** Adds 12 Vdc power cable
- E740xA-AXT** Adds transit case
- E740xA-AYT** Adds grey soft carrying case
- E740xA-AYU** Adds yellow soft carrying case
- E740xA-AYX** Adds fast time domain sweep
- E740xA-BAB** Replaces type “N” connector with APC 3.5 connector<sup>2</sup>
- E740xA-UK6** Commercial calibration certificate
- E740xA-UK9** Front panel cover

## Agilent E7415A EMI measurement software



The E7415A EMI software simplifies your test setup. The software allows you to maintain repeatable customized test setups, capture and save data on your PC, and generate test reports. Supports Windows® 95, 95 and NT® 4.0.

### Includes:

- Supports the E7400 Series, 8590EM Series and the 8546A/42E Series of EMC analyzers
- Report generation capability

### Options

- E7415A-001** Post processing reporting only<sup>3</sup>

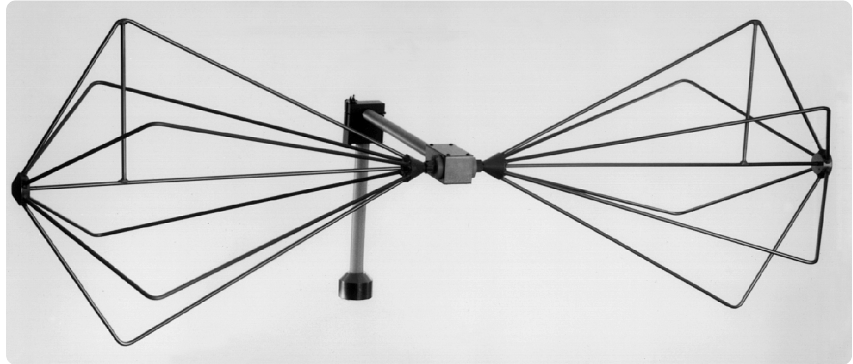
1. Option E7401A-1DS 100 kHz to 1.5 GHz
2. E7405A only
3. Option E7415A-001 includes only the post processing report generation to be run on a separate P.C. Excludes data acquisition capability.
4. All models except E7401A
5. Not compatible with E7415A

# Antennas

## Agilent 11955A biconical antenna

This economical antenna has typical antenna factors.

Standard option in the 84115EM EMC precompliance test system. Antenna can be purchased separately from ETS test systems. ([www.ets-lindgren.com](http://www.ets-lindgren.com))

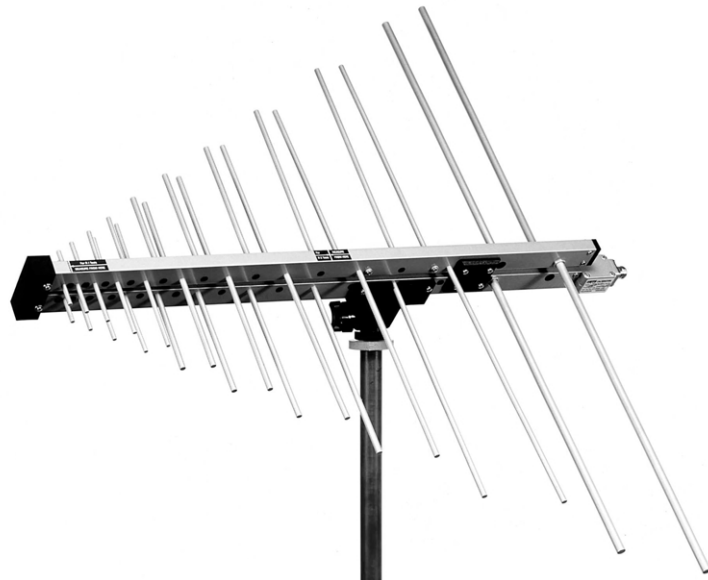


<b>Frequency range</b>	30 MHz to 300 MHz
<b>Maximum continuous power</b>	250 mW
<b>VSWR (average)</b>	2.0 : 1
<b>Impedance</b>	50 $\Omega$
<b>Connector type</b>	N female
<b>Mounting base</b>	1/4 inch x 20 female thread

## Agilent 11956A log periodic antenna

This economical antenna has typical antenna factors.

Standard option in the 84115EM EMC precompliance test system. Antenna can be purchased separately from ETS test systems. ([www.ets-lindgren.com](http://www.ets-lindgren.com))



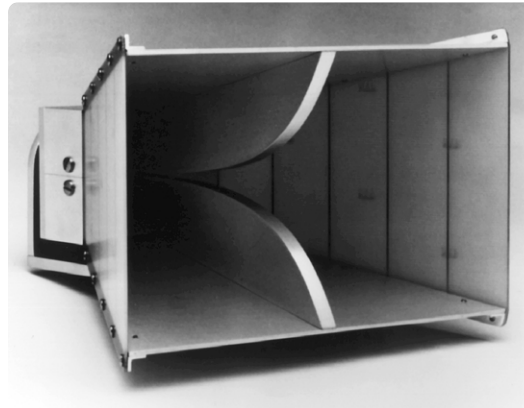
<b>Frequency range</b>	200 MHz to 2 GHz
<b>Maximum continuous power</b>	1 kW
<b>VSWR (average)</b>	1.2 : 1
<b>Impedance</b>	50 $\Omega$
<b>Connector type</b>	Type-N
<b>Mounting base</b>	1/4 inch x 20 female thread

# Antennas

## Agilent 11966E double ridged waveguide horn antenna

This antenna covers a very broad frequency range and provides excellent gain and VSWR characteristics. It is suitable for receiving and transmitting signals and can handle up to 300 watts of power.

Available as option in the 84115EM EMC precompliance test system. Antenna can be purchased separately from ETS test systems. ([www.ets-lindgren.com/vip](http://www.ets-lindgren.com/vip))



<b>Frequency range</b>	1 GHz to 18 GHz
<b>Maximum continuous power</b>	300 W
<b>VSWR (average)</b>	< 1.5 : 1
<b>Impedance</b>	50 $\Omega$
<b>Connector type</b>	N female
<b>Mounting base</b>	1/4 inch x 20 female thread

## Agilent 11966J horn antenna

The double-ridged design of this horn enables it to cover two waveguide bands with a single antenna.

Available as option in the 84115EM EMC precompliance test system. Antenna can be purchased separately from ETS test systems. ([www.ets-lindgren.com](http://www.ets-lindgren.com))

<b>Frequency range</b>	18 GHz to 40 GHz
<b>Maximum continuous power</b>	50 W
<b>VSWR (average)</b>	< 1.6 : 1
<b>Impedance</b>	50 $\Omega$
<b>Connector type</b>	K female
<b>Mounting base</b>	1/4 inch x 20 female thread

## Agilent 11966P broadband antenna

The 11966P broadband antenna covers 30 MHz to 2 GHz. This broadband antenna removes the need to change antennas above 200 MHz when making radiated EMI measurements. The antenna's high power handling capability makes it ideal for immunity testing generating fields of up to 10 volts/meter.

Available as option in the 84115EM EMC precompliance test system. Antenna can be purchased separately from ETS test systems. ([www.ets-lindgren.com](http://www.ets-lindgren.com))



<b>Frequency range</b>	30 MHz to 2 GHz
<b>Maximum continuous power</b>	1 kW (300 W below 60 MHz)
<b>VSWR (average)</b>	2 : 1
<b>Impedance (nominal)</b>	50 $\Omega$
<b>Connector type</b>	N (female)

Note: Tripod not included

# Antenna tripod

## Agilent 11968C antenna tripod

The 11968C is a non-metallic tripod made of linen phenolic and delrin to minimize unwanted reflections in the test environment.

Standard option in the 84115EM EMC precompliance test system. Tripod can be purchased separately from ETS test systems. ([www.ets-lindgren.com](http://www.ets-lindgren.com))

<b>Height</b>	94 cm to 2.0 m
<b>Maximum load</b>	11.8 kg
<b>Thread</b>	1/4 inch x 20 female thread





# Cables

## Agilent 11966L

This 10 meter (32.8 ft) antenna cable is constructed of RG-214/U coaxial cable with type-N male connectors at both ends.

Standard option in the 84115EM EMC precompliance test system. Cable can be purchased separately from ETS test systems. (www.ets-lindgren.com)

## Agilent 11500A cable

Six foot long RG-214/U cable with type-N connectors.

## Agilent 11500F cable

150 centimeter cable with APC 3.5 male connector.

## 8120-1840

122 centimeter (48 inches) coaxial cable with type-BNC male connectors at both ends.

# Limiters

## Agilent 11947A transient limiter

In precompliance applications where a spectrum analyzer is used for measurements instead of an EMI receiver, it is always a good idea to use a transient limiter. Transient limiters protect the spectrum analyzer input from damage caused by high-level transients from line impedance stabilization networks (LISNs) during EMI testing for conducted emissions.

Standard option in the 84115EM EMC precompliance test system. Also sold separately.



<b>Frequency range</b>	9 kHz to 200 MHz
<b>Insertion loss</b>	10 dB
<b>Maximum input level</b>	Continuous: 2.5 W (+34 dBm) Pulse: 10 kW for 10 $\mu$ sec DC: $\pm$ 12 V

# Conducted EMI accessories

## Agilent 11967D 10 Amp line impedance stabilization network

This V-network, two line, single phase line impedance stabilization network (LISN) meets the requirements of the FCC, VDE, and the European Norms (ENs) for commercial conducted emissions testing. NEMA power outlet comes standard with product.

Standard option in the 84115EM EMC precompliance test system. LISN can be purchased separately from ETS test systems. ([www.ets-lindgren.com](http://www.ets-lindgren.com))



<b>Frequency range</b>	9 kHz to 30 MHz
<b>Power source frequency</b>	60 Hz, or 50 Hz with Option 11967D-001 or 11967D-002
<b>Maximum current</b>	10 A
<b>Maximum voltage</b>	125 VAC line-to-ground 250 VAC line-to-ground (Option 11967D-001 or 11967D-002)
<b>Network inductance</b>	50 μH to 250 μH
<b>Network impedance</b>	50 Ω
<b>Connector type</b>	BNC female
<b>Standard</b>	NEMA outlet
<b>Option 11967D-001</b>	SCHUKO outlet
<b>Option 11967D-002</b>	British outlet

# Magnetic field probes

## Agilent 11940A and 11941A close field probes

These hand-held probes are specially designed to measure magnetic field radiation from surface currents, slots, cables, and ICs for EMC diagnostic and troubleshooting measurements. Their unique design results in a high level of electric field rejection. This significantly reduces errors allowing calibrated and repeatable measurements. Each probe is calibrated and comes with a two-meter, RG-223 coaxial cable, an SMA(f) to type-N(m) adapter, and an SMA(f) to BNC(m) adapter.

Option 1194xA-001 adds an SMA rotary joint connector. Probes are included in the 11945A close field probe set.

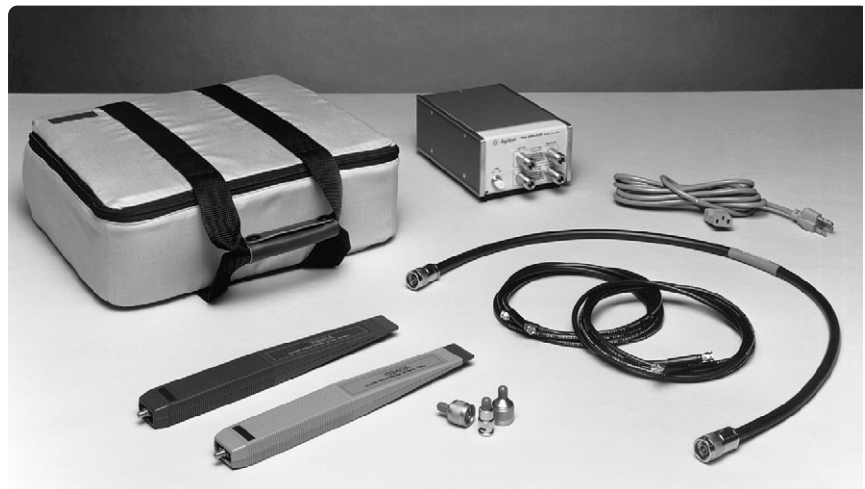


<b>Frequency range</b>	11940A: 30 MHz to 1 GHz 11941A: 9 kHz to 30 MHz
<b>Maximum input power</b>	0.5 W
<b>Temperature range</b>	Variation over 0°C to + 40°C
<b>Dielectric breakdown</b>	± 1 kV, typical
<b>Connector</b>	SMA, replaceable barrel
<b>VSWR</b>	< 3 : 1, typical for 11940A only
<b>Antenna factor accuracy</b>	Individually calibrated to within ± 2 dB in a 377 Ω field impedance

## Agilent 11945A close field probe set

The 11945A close field probe set includes both the 11940A and 11941A probes to provide full coverage from 9 kHz to 1 GHz. This set provides a powerful measurement tool for electrical and mechanical designers who want to search for and eliminate sources of interference from their products early in the design process. Option 11945A-E51 adds 11909A preamplifier, a 36 inch (914 mm) Type-N cable and a carrying bag to store and protect the entire set of probes, preamplifier, and cables.

Included in the 84105EM standard option in the 84115EM EMC systems. Also available for purchase separately.



# Preamplifiers

## Agilent 8449B microwave preamplifier

A high-gain, low-noise preamplifier to provide additional sensitivity for MIL-STD radiated measurements.

<b>Frequency range</b>	1 GHz to 26.5 GHz
<b>Noise figure</b>	1.0 to 12.5 GHz 8.5 dB 12.5 to 22.0 GHz 12.5 dB 22.0 to 26.5 GHz 14.5 dB
<b>Minimum gain</b>	23.5 dB
<b>Gain flatness</b>	1.0 to 26.5 GHz $\pm 4.5$ dB 2.0 to 22.0 GHz $\pm 3.5$ dB
<b>Connector type</b>	APC-3.5 female



## Agilent 11909A amplifier

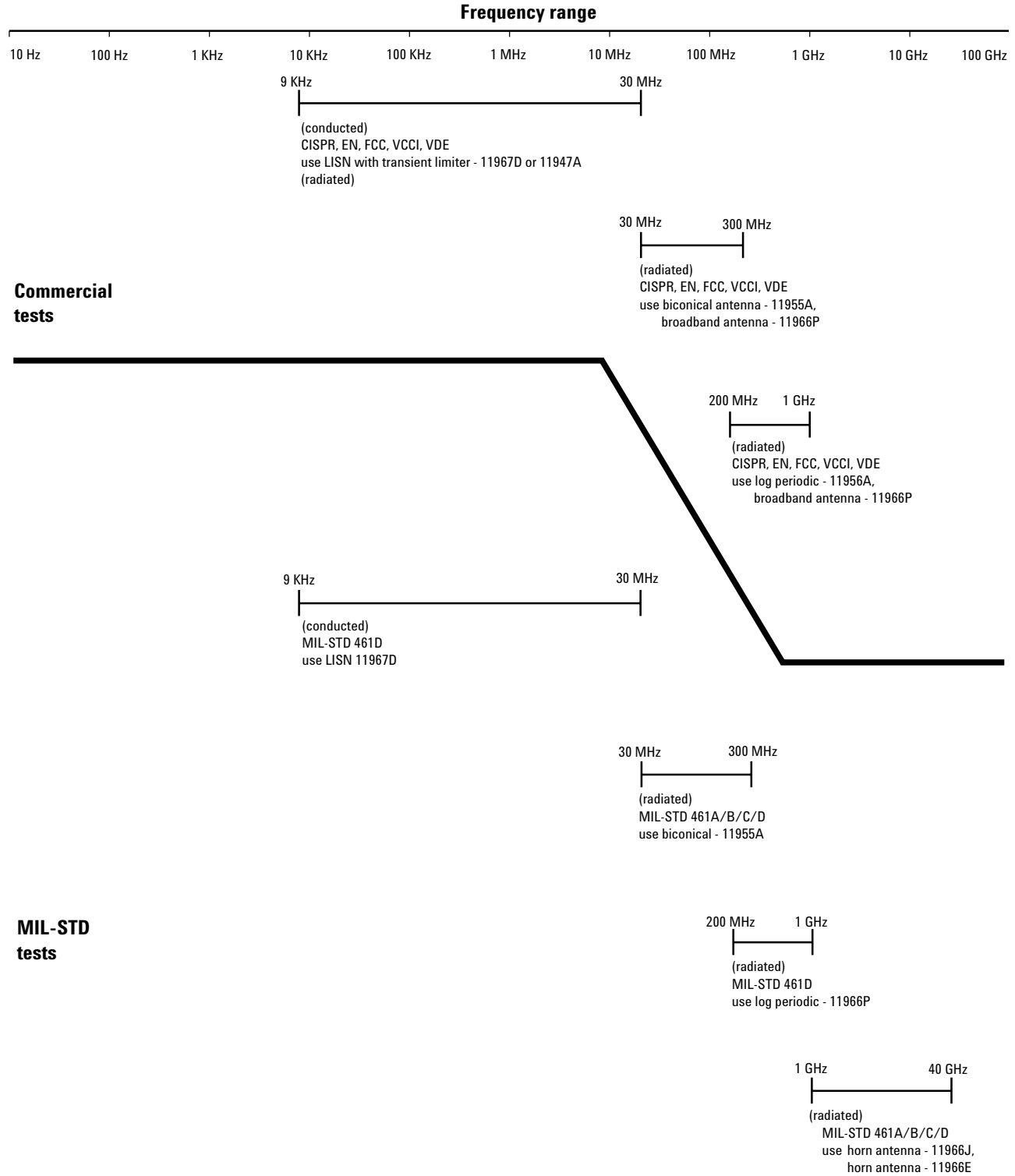
The amplifier improves receiver and spectrum analyzer sensitivity. It is ideally suited for use with the Agilent 11940A and Agilent 11941A close-field probes to detect low-level emissions from a device under test. Radiated emissions from measurements using a spectrum analyzer and antenna are improved by the increased sensitivity that this unit offers.

Available as an option in the 84105EM and 84115EM EMC systems. Also available for purchase separately.



<b>Frequency range</b>	9kHz to 1 GHz
<b>Gain</b>	32.5 +/- 1.5 dB at 100 MHz
<b>Gain flatness</b>	25 kHz to 800 MHz $\pm 0.5$ dB
<b>Noise figure</b>	5 MHz to 500 MHz 1.8 dB typical 500 MHz to 1 GHz 2.5 dB typical
<b>Connector type</b>	Type N
<b>Power requirements</b>	100, 120, 220, or 240V AC, $\pm 10\%$ 50 Hz to 60 Hz, 10VA

# Recommended transducers for commercial and MIL-STD EMI testing



# EMC accessory application guide

## Commercial measurements

Agency	Test	Frequency range	Recommended accessories
FCC	Part 15		
	conducted	450 kHz to 30 MHz	11967D LISN
	radiated	30 MHz to 300 MHz 200 MHz to 1 GHz	11955A biconical antenna 11956A log periodic antenna or 11966P broadband antenna
VDE	0871, 0875		
	conducted	10 kHz to 30 MHz	11967D LISN
	radiated	30 MHz to 300 MHz 200 MHz to 1 GHz	11955A biconical antenna 11956A log periodic antenna
CISPR	22		
	conducted	150 kHz to 30 MHz	11967D LISN
VCCI			
	conducted	150 kHz to 30 MHz	11967D LISN
	radiated	30 MHz to 300 MHz 200 MHz to 1 GHz	11955A biconical antenna 11956A log periodic antenna
CENELEC	EN 55014		
	conducted	150 kHz to 30 MHz	11967D LISN
	radiated	30 MHz to 300 MHz	11955A biconical antenna
	EN 55022		
	conducted	150 kHz to 30 MHz	11967D LISN
	radiated	30 MHz to 300 MHz 200 MHz to 1 GHz	11955A biconical antenna 11956A log periodic antenna
	EN 55011		
	conducted	150 kHz to 30 MHz	11967D LISN
	radiated	30 MHz to 300 MHz 200 MHz to 1 GHz	11955A biconical antenna 11956A log periodic antenna

# Military measurements

Agency	Test	Frequency range	Recommended accessories
MIL-STD	461/462		
	RE-02	30 MHz to 300 MHz 200 MHz to 1 GHz 1 GHz to 18 GHz	11955A biconical antenna 11956A log periodic antenna 11966E waveguide horn antenna
	RE-03	30 MHz to 300 MHz 200 MHz to 2 GHz 1 GHz to 18 GHz 1 GHz to 26.5 GHz	11955A biconical antenna 11956A log periodic antenna 11966E waveguide horn antenna 8449B preamplifier <sup>1</sup>
	CE-102	10 kHz to 10 MHz	11967D or E LISN
	RE-102	30 MHz to 300 MHz 200 MHz to 2 GHz 1 GHz to 18 GHz	11955A biconical antenna 11956A log periodic antenna 11966E double-ridged horn antenna

1. MIL-STD radiated emission 02 tests can be performed with either linearly polarized antennas, such as the log periodic, or circularly polarized antennas, such as the conical spiral. Linear antennas offer slightly better gain and antenna factor, but they require separate scans over the full frequency range once in horizontal polarization and again in vertical polarization. While circularly polarized antennas typically are slightly less sensitive, they allow the measurement to be made in a single scan because they can receive signals that have either horizontal or vertical polarization.

# For more information

## Online

[www.agilent.com/find/emc](http://www.agilent.com/find/emc)  
for additional literature information.

[www.agilent.com/find/notifyme](http://www.agilent.com/find/notifyme)  
subscribe online to receive test and measurement updates.

## Literature

*ESA/EMC, Configuration Guide,*  
Literature number 5968-3412E.

*EMC Precompliance Analyzers and EMI Measurement Software,*  
Literature number 5968-2516E.

*EMC Analyzers, Data Sheet*  
Literature number 5968-3662E.

*Cookbook for EMC Precompliance Measurements,*  
Literature number 5968-3661E.



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