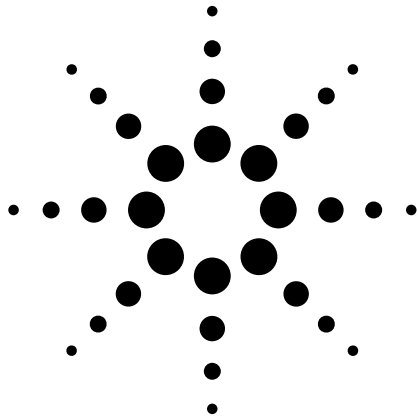




Advanced Test Equipment Corp.

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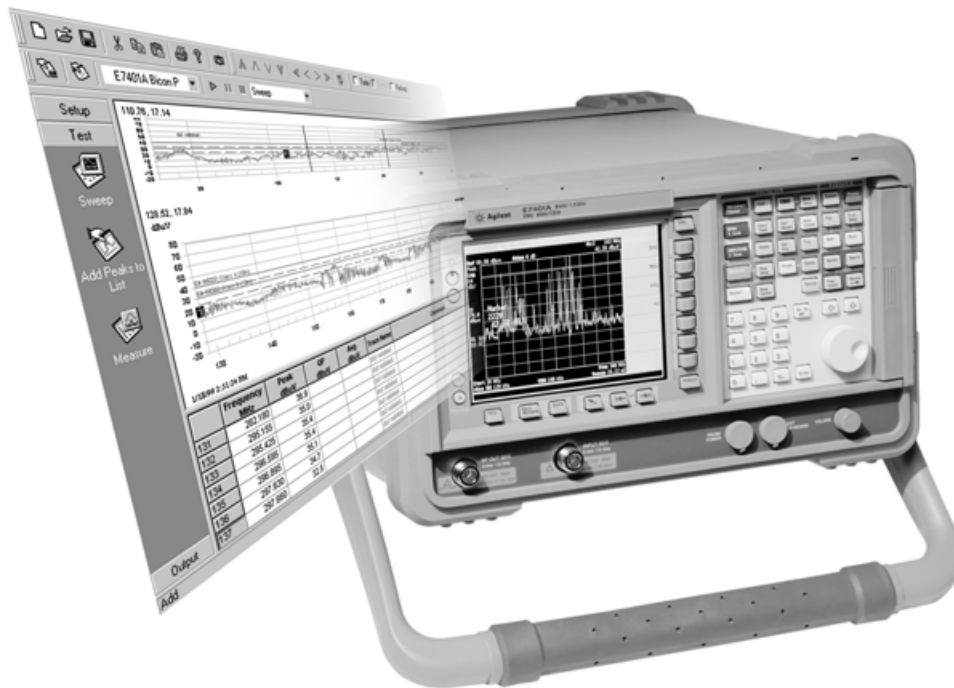
## EMC Precompliance Systems and Accessories Catalog

Agilent 84115EM  
EMC precompliance systems

Agilent E7402A and E7405A  
EMC precompliance analyzers

Agilent E7415A EMC  
measurement 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.

## Table of contents

Listed by Agilent Technologies model number

Page	Model number	Description
12	8120-1840	122 centimeter coaxial cable
12	8449B	Microwave preamplifier
4	85115EM	Preproduction evaluation systems
12	11500A	Six foot RG-214U cable with type-N connector
12	11500F	150 cm cable (APC 3.5 male connectors)
8	84115EM-11909A	Preamplifier
12	11940A	Close field probe 30 MHz to 1 GHz
12	11941A	Close field probe 9 KHz to 30 MHz
11	84115EM-11945A	Close field probe set
9	84115EM-11947A	Transient limiter
4	84115EM-11955A	Biconical antenna
4	84115EM-11956A	Log periodic antenna
7	84115EM-11966E	Double-ridged waveguide horn antenna 1 GHz to 18 GHz
7	84115EM-11966J	Horn antenna 18 GHz to 40 GHz
9	84115EM-11966L	Coaxial cable 10 meter type-N
7	84115EM-11966P	Broadband antenna
10	84115EM-11967D	10A line impedance stabilization network
8	84115EM-11968C	Antenna tripod
5	E7415A	EMI measurement software

# EMC Precompliance Test System

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

## 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.

E7402A, 30 Hz to 3.0 GHz (default selection)

E7405A, 30 Hz to 26.5 GHz

Select the EMC accessories of your choice.

84115EM-11945A Close field probe set (default)

84115EM-11955A Biconical antenna  
30 MHz to 300 MHz (default)

84115EM-11956A Log periodic antenna  
200 MHz to 1 GHz (default)

84115EM-11966P BiConiLog broadband antenna  
26 MHz to 2 GHz

84115EM-11966E Double ridged waveguide horn  
antenna, 1 GHz to 18 GHz

84115EM-11966J Horn antenna, 18 GHz to 40 GHz

84115EM-11968C Antenna tripod (default)

84115EM-11966L 10 m type N cable (default)

E7415A EMI measurement software (default)

84115EM-11909A Amplifier, 9 kHz to 1 GHz

84115EM-11947A Transient limiter with high-pass  
filter (default)

84115EM-11967D Line Impedance Stabilization  
Network (LISN), NEMA (default)

84115EM-11967D-001 Line Impedance Stabilization  
Network (LISN), SCHUKO

84115EM-11967D-002 Line Impedance Stabilization  
Network (LISN), British

### Recommended GPIB interface

82350B PCI GPIB card

82357A USB/GPIB adapter



Use the EMC analyzer with the 84115EM-11967D LISN device to test for conducted emissions.



A number of antennas are available with the 84115EM system to test for RF emissions. The E7400 EMC analyzer will also work with other third party antennas.



The 11945A probe set included with the 84115EM system provides a troubleshooting tool to locate emission hot spots.

# 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 two different models to better meet your needed frequency range.

### Models:

**E7402A** 30 Hz to 3.0 GHz

**E7405A** 30 Hz to 26.5 GHz

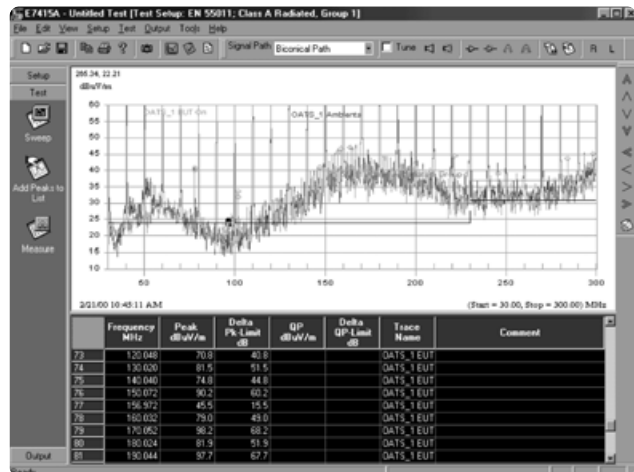
### Includes:

- E740xA-AYQ** EMI detectors/FM demod
- E740xA-AYX** Adds fast time domain sweep
- E740xA-1D5** High stability time base (includes 1 and 3 Hz RBW)
- E740xA-1DS** RF preamplifier (20 dB gain 1 MHz to 3.0 GHz)
- 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-UKB** Low frequency extension (30 Hz<sup>3</sup>)
- E740xA-XXX** IntuiLink connecting software

### Options:

- E740xA-1AX** Replaces GPIB with RS-232<sup>1</sup>
- E740xA-1CP** Rack mount and handle kit
- E740xA-1D6** Time gated sweep
- E740xA-1DN** Adds tracking generator
- E740xA-A5D** Adds 12 Vdc power cable
- E740xA-AXT** Adds transit case
- E740xA-AYT** Adds grey soft carrying case
- 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, 98 and NT® 4.0, XP and 2000.

### 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>2</sup>

1. Not compatible with E7415A
2. Option E7415A-001 includes only the post processing report generation to be run on a separate P.C. Excludes data acquisition capability.
3. 30 Hz nominal; 100 Hz specified

# 84115EM EMC Precompliance Test System Components

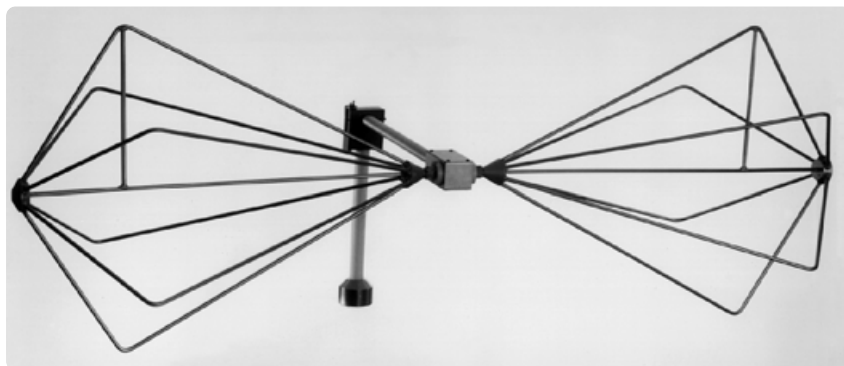
## Antennas

### Agilent 84115EM-11955A biconical antenna

This economical antenna has typical antenna factors.

Standard component of the 84115EM EMC precompliance test system.

Antennas are supplied to Agilent by ETS-Lindgren. To purchase separately, see: [www.ets-lindgren.com/vip](http://www.ets-lindgren.com/vip)



<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 84115EM-11956A log periodic antenna

This economical antenna has typical antenna factors.

Standard component of the 84115EM EMC precompliance test system.

Antennas are supplied to Agilent by ETS-Lindgren. To purchase separately, see: [www.ets-lindgren.com/vip](http://www.ets-lindgren.com/vip)



<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

# 84115EM EMC Precompliance Test System Components

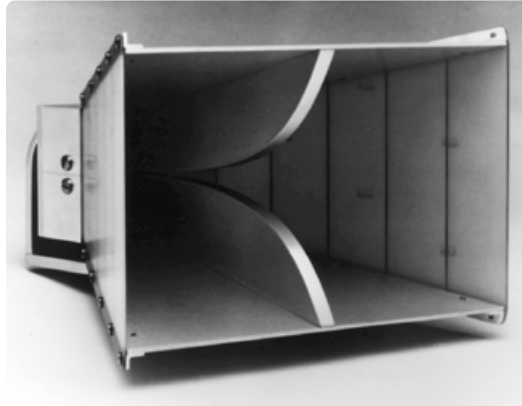
## Antennas

### Agilent 84115EM-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 an option in the 84115EM EMC precompliance test system.

Antennas are supplied to Agilent by ETS-Lindgren. To purchase separately, see: [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 84115EM-11966J horn antenna

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

Available as an option in the 84115EM EMC precompliance test system.

Antennas are supplied to Agilent by ETS-Lindgren. To purchase separately, see: [www.ets-lindgren.com/vip](http://www.ets-lindgren.com/vip)

<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 84115EM-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 an option in the 84115EM EMC precompliance test system.

Antennas are supplied to Agilent by ETS-Lindgren. To purchase separately, see: [www.ets-lindgren.com/vip](http://www.ets-lindgren.com/vip)



<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

# 84115EM EMC Precompliance Test System Components

## Antenna tripod

### Agilent 84115EM-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 component of the 84115EM EMC precompliance test system.

Tripods are supplied to Agilent by ETS-Lindgren. To purchase separately, see: [www.ets-lindgren.com/vip](http://www.ets-lindgren.com/vip)

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



## Preamplifier

### Agilent 84115EM-11909A amplifier (sold separately as 11909A)

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 84115EM EMC systems.



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



# 84115EM EMC Precompliance Test System Components

## Cables

### Agilent 84115EM-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 component of the 84115EM EMC precompliance test system.

Cables are supplied to Agilent by ETS-Lindgren. To purchase separately, see: [www.ets-lindgren.com/vip](http://www.ets-lindgren.com/vip)

## Limiters

### Agilent 84115EM-11947A transient limiter (sold separately as 11974A)

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 component of the 84115EM EMC precompliance test system.



<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

# 84115EM EMC Precompliance Test System Components

## Conducted EMI accessories

### Agilent 84115EM-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 the product.

Standard option in the 84115EM EMC precompliance test system.

LISN can be purchased separately at: [www.ets-lindgren.com/vip](http://www.ets-lindgren.com/vip)



<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

# 84115EM EMC Precompliance Test System Components

## Magnetic field probes

### **Agilent 84115EM-11945A close field probe set (sold separately as 11945A)**

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.



# Additional EMC Accessories

## 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 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>	$\pm 1$ 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 $\pm 2$ dB in a 377 $\Omega$ field impedance

### Agilent 11500A cable

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

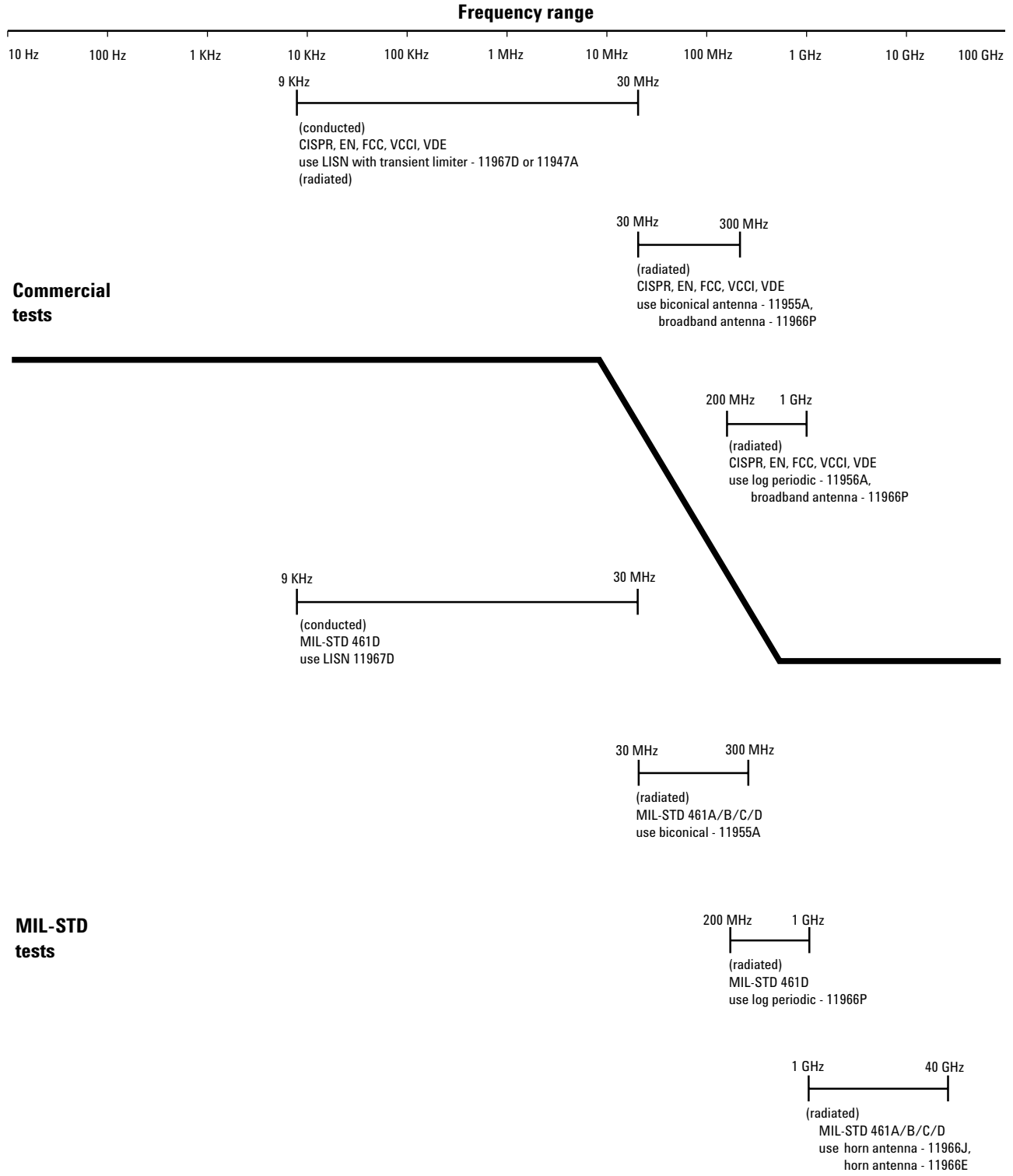
### Agilent 11500F cable

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.

# 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  30 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.



## Agilent Email Updates

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#### Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

#### Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

#### Agilent T&M Software and Connectivity

Agilent's Test and Measurement software and connectivity products, solutions and developer network allows you to take time out of connecting your instruments to your computer with tools based on PC standards, so you can focus on your tasks, not on your connections. Visit [www.agilent.com/find/connectivity](http://www.agilent.com/find/connectivity) for more information.

**By internet, phone, or fax, get assistance with all your test & measurement needs**

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[www.agilent.com/find/assist](http://www.agilent.com/find/assist)

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