

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.

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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

The system includes an analyzer and a selection of accessories from the list below. At a minimum the system must include the analyzer and at least three of the following options:

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

Ordering:

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

E7402A, 30 Hz to 3.0 GHz

E7405A, 30 Hz to 26.5 GHz

Select the EMC accessories of your choice.

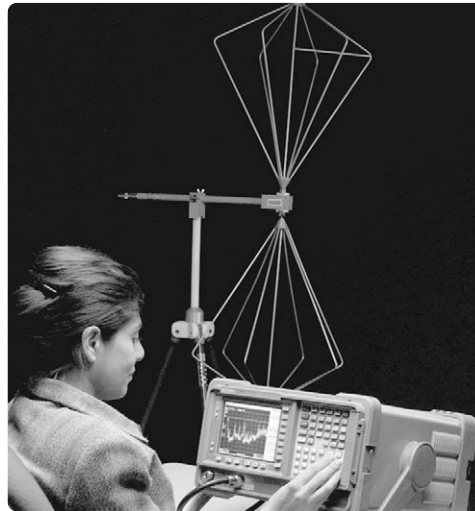
84115EM-11945A	Close field probe set (default) ¹
84115EM-11955A	Biconical antenna 30 MHz to 300 MHz (default) ¹
84115EM-11956A	Log periodic antenna 200 MHz to 1 GHz (default) ¹
84115EM-11966P	BiConiLog broadband antenna 26 MHz to 2 GHz
84115EM-11966E	Double ridged waveguide horn antenna, 1 GHz to 18 GHz
84115EM-11966J	Horn antenna, 18 GHz to 40 GHz
84115EM-11968C	Antenna tripod (default) ¹
84115EM-11966L	10 m type N cable (default) ¹
E7415A	EMI measurement software (default) ¹
84115EM-11909A	Amplifier, 9 kHz to 1 GHz
84115EM-11947A	Transient limiter with high-pass filter (default) ¹
84115EM-11967D	Line Impedance Stabilization Network (LISN), NEMA (default) ¹
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.

1. The recommended system includes the items identified as default. These items should be deselected if they are not wanted.

EMI Precompliance Analyzer and Test Software

Agilent EMC analyzers



The heart of the EMI precompliance measurement system is the Agilent E7400A 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 E7400A 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

Standard capabilities⁴:

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 Hz³)

E740xA-XXX IntuiLink connecting software

Available options:

E740xA-1AX Replaces GPIB with RS-232¹

E740xA-1CP Rack mount and handle kit

E740xA-1D6 Time gated sweep

E740xA-STG Adds tracking generator

E740xA-A5D Adds 12 Vdc power cable

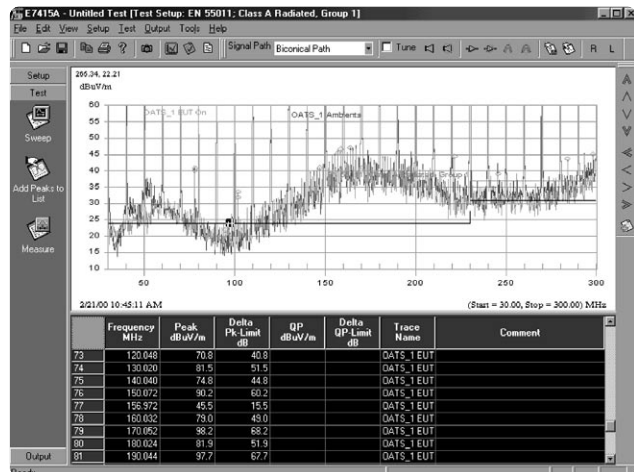
E740xA-AXT Adds transit case

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 only²

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.
4. Options are automatically included with all new EMC analyzers.

84115EM EMC Precompliance Test System Components

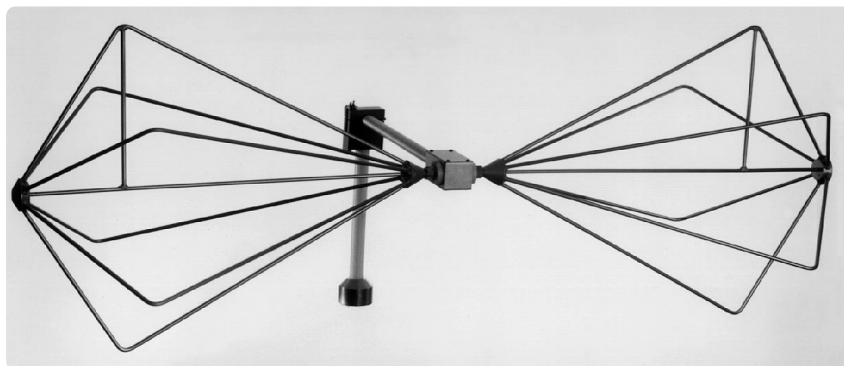
Antennas

Agilent 84115EM-11955A biconical antenna

This economical antenna has typical antenna factors.

Recommended 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



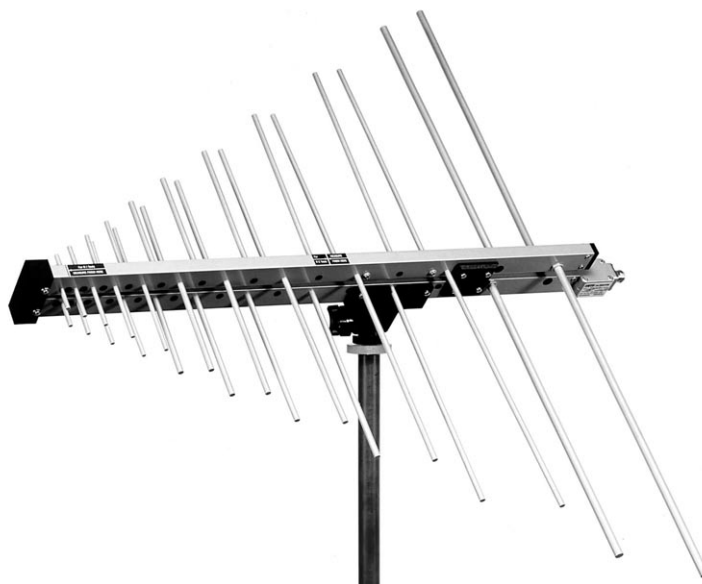
Frequency range	30 MHz to 300 MHz
Maximum continuous power	250 mW
VSWR (average)	2.0 : 1
Impedance	50 Ω
Connector type	N female
Mounting base	1/4 inch x 20 female thread

Agilent 84115EM-11956A log periodic antenna

This economical antenna has typical antenna factors.

Recommended 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



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

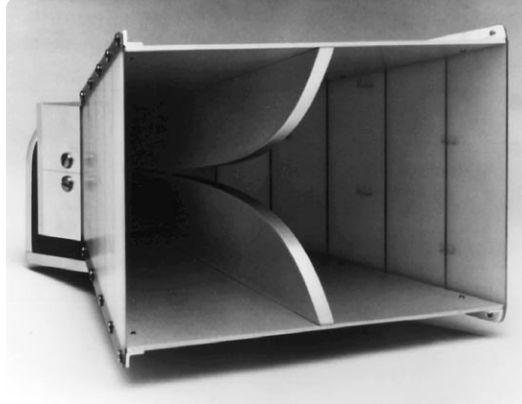
84115EM EMC Precompliance Test System Components

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

Frequency range	1 GHz to 18 GHz
Maximum continuous power	300 W
VSWR (average)	< 1.5 : 1
Impedance	50 Ω
Connector type	N female
Mounting base	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.

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

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

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

Frequency range	30 MHz to 2 GHz
Maximum continuous power	1 kW (300 W below 60 MHz)
VSWR (average)	2 : 1
Impedance (nominal)	50 Ω
Connector type	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.

Recommended 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

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 ± 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.

Recommended 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

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.

Recommended component of the 84115EM EMC precompliance test system.



Frequency range	9 kHz to 200 MHz
Insertion loss	10 dB
Maximum input level	Continuous: 2.5 W (+34 dBm) Pulse: 10 kW for 10 μ 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 and CISPR for commercial conducted emissions testing. NEMA power outlet comes standard with the product.

Recommended component in the 84115EM EMC precompliance test system.

LISN can be purchased separately at: www.ets-lindgren.com/vip



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

Recommended 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.

Frequency range	1 GHz to 26.5 GHz
Noise figure	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
Minimum gain	23.5 dB
Gain flatness	1.0 to 26.5 GHz ± 4.5 dB 2.0 to 22.0 GHz ± 3.5 dB
Connector type	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.

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

Agilent 11500A cable

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

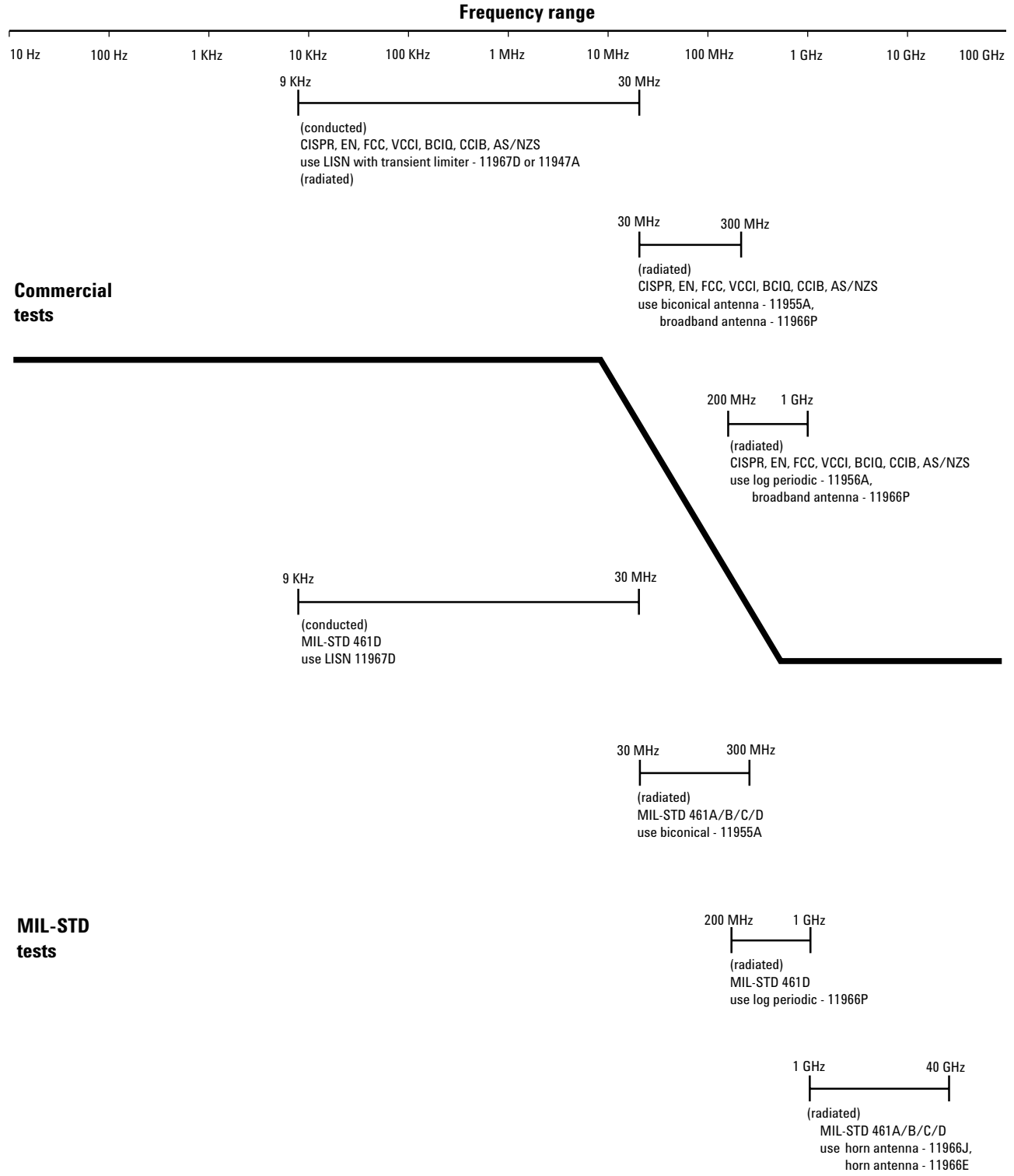
Agilent 11500F cable

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	11955A biconical antenna 11956A log periodic antenna or 11966P broadband antenna 11966E waveguide antenna 11966J horn antenna
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 CISPR AS/NZR	EN 55014 CISPR14 1004		
	conducted	150 kHz to 30 MHz	11967D LISN
	radiated	30 MHz to 300 MHz	11955A biconical antenna
CENELEC CISPR AS/NZR CCIB	EN 55022 CISPR22 3548 GB9254		
	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 CISPR AS/NZR	EN 55011 CISPR11 2064		
	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 ¹
	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
for additional literature information.

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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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 receive your new Agilent equipment, we can help verify that it works properly and help with initial product operation.

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.

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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 for more information.

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