

M O D E L  
6 5 0 7



**Model 6502**  
10 kHz – 30 MHz

**Model 6507**  
1 kHz – 30 MHz

**Model 6509**  
1 kHz – 30 MHz

**Model 6511**  
20 Hz – 5 MHz

**Model 6512**  
10 kHz – 30 MHz

**Model 7603**  
20 Hz – >50 kHz

**Model 7604**  
20 Hz – 500 kHz

**Model 7605**  
30 Hz – >50 MHz

**Model 7606**  
30 Hz – >50 MHz

- Saturation Indicator
- Remote Monitor Option
- Quality Construction



## Loop & Magnetic Field Coil

EMCO'S LOOP ANTENNAS AND MAGNETIC FIELD COILS provide for a wide range of magnetic field testing from 20 Hz to 30 MHz. Some models include active electronics for impedance matching, consistent linear antenna factors, and signal attenuation. Most include a balanced Faraday shield to reduce response to E-Fields for pure magnetic field measurements. Options like our remote status indicators add convenience. Whether used individually or as a set, our loop antennas provide an efficient and economical solution to magnetic field measurement.

EMCO offers five models of loop antennas. Every loop antenna is individually calibrated in accordance with IEEE-291 Section 2.3.1 methods, using NIST traceable equipment. By knowing the actual antenna factors and performance characteristics of an antenna instead of typical data, you can more accurately calculate field strength in your tests. The performance of the 7600 Series is calculated from theory. Because of precise antenna dimensions and low frequency range, the calculated performance of these models is much more accurate than could be measured.

### EMCO Loop and Coil Features

#### Saturation Indicator

EMCO's loop antenna Models 6502 and 6507 have saturation indicators. If this indicator is lit, the input signal is exceeding the saturation level of the internal preamplifier. During all EMC tests, measurements taken with a signal level that exceeds the limits of the antenna could result in erroneous data. To prevent this, the saturation indicator lights, alerting you to lower the incoming signal. Model 6502 can receive signals up to 5 volts per meter before this indicator is activated, and Model

6507 can receive signals up to 10 volts per meter before the saturation indicator is activated.

#### Remote Monitor Option

An optional remote monitor is available that allows you to view the power and saturation indicators from up to 10 m (32.8 ft) away. See "Options" for additional information.

#### Quality Construction

All loop antennas and coil bases are constructed of lightweight aluminum, except Models 7603 and 7605 which are constructed of linen phenolic. This construction provides durability and reliability for years of trouble-free indoor and outdoor service. The base of the loop antennas, excluding Models 7603 and 7605, accept standard 1/4 in x 20 threads from an EMCO or other tripod.

### Choosing Your Model: Nine Models with Frequency Ranges of 20 Hz to 30 MHz

Active Loop Antennas 1 kHz to 30 MHz, 10 kHz to 30 MHz

**Models 6502 and 6507** are active receiving loop antennas. These antennas are specifically designed to measure shielding effectiveness in accordance with MIL-STD-285 and NSA-65-6. The Model 6502 has a frequency range of 10 kHz to 30 MHz, and the Model 6507 has a frequency range of 1 kHz to 30 MHz. A preamplifier is built into the base of these loop antennas and provides a 50-ohm output, which is used by a receiver. The preamplifier helps these loop antennas produce good sensitivity and almost constant antenna factors. Power for the preamplifier is supplied by rechargeable sealed batteries. Front panel controls and indicators for the preamplifier include a power switch, power-on indicator, and a receptacle for a battery

charger. A battery charger which is switch selectable for 115 VAC / 230 VAC operation is included. The charger operates at 50 Hz / 60 Hz.

**Passive Loop Antennas**

20 Hz to 5 MHz, 1 kHz to 30 MHz, 10 kHz to 30 MHz

EMCO offers three models of passive loop antennas; the **Model 6509, 6511 and 6512**. Model 6509 is designed for shielding effectiveness and immunity, while Models 6511 and 6512 are designed for emissions and immunity tests. Model 6509 has a frequency range of 1 kHz to 30 MHz, Model 6511 has a frequency range of 20 Hz to 5 MHz, and Model 6512 has a frequency range of 10 kHz to 30 MHz. The base of the Model 6509 loop antenna contains a Type N female connector and a manually switchable four-band transformer. The transformer gives the antenna greater efficiency resulting in a better conversion of power to field strength. Models 6511 and 6512 both use BNC connectors.

**Passive Coils** 20 Hz to 50 kHz, 20 Hz to 500 kHz

Both **Models 7603 and 7604** are built from the specifications in the original MIL-STD-461E document. The Model 7603 is a magnetic field generating coil 12.0 cm (4.75 in) diameter, made of delrin and wound with 10 turns of AWG-16 wire. Model 7604 is a magnetic field pick-up coil 13.3 cm (5.25 in) diameter, and has a loop that is constructed of aluminum. The loop has 36 turns of 7 x 41 Litz wire for lower inductance. Both models operate within the specified limits of MIL-STD-461E; Model 7604 operates from 20 Hz to over 500 kHz, and Model 7603 operates from 20 kHz to over 50 kHz. Female BNC connectors are used on Model 7604, and female banana jacks are used on Model 7603.

**Radiating Loop Antenna and Sensor** 30 Hz to 50 kHz

EMCO's **Model 7605 and 7606** Loops are precision built to the exact specifications as described in MIL-STD 461E for Method RS101. The Model 7605, a radiating loop, and the Model 7606, a sensing loop, are used as part of a system to verify the ability of an EUT to withstand radiated magnetic fields. The Model 7605 is a 20-turn coil of AWG-12 enamel-insulated copper wire and features a 5 cm spacing from the face of the loop to the center-point of the coils as per MIL-STD-461E. The Model 7606 sensing loop is a 4 cm diameter, electrostatically-shielded loop antenna which has 51 turns of 7-strand AWG-41 Litz wire.

**Standard Configuration**

- ▶ Antenna/coil assembly
- ▶ Mounting bracket drilled to accept an EMCO or other tripod mount with standard 1/4 in x 20 threads (except Models 7603, 7605, and 7606)
- ▶ Individually calibrated per IEEE STD 291. Actual individual calibration factors and signed Certificate of Calibration Conformance included in Manual (except 7600 Series Models)
- ▶ Battery charger (Model 6502, 6507 only)

**Options**

**Custom Cases**

Custom cases are available on request.

**Remote Monitor Option**

10 meter (32.8 ft) fiber optic Remote Monitor Option for remote display of power-on and saturation indicators (Models 6502, 6507 only).

(Part#'s 6502: 6502-RM; 6507: 6507-RM)

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Loop antennas have been used to measure field strength contours around radio broadcast stations since the advent of the vacuum tube. Today, EMC engineers find loop antennas useful to measure magnetic field emissions for a variety of test standards.

EMCO loop antennas are calibrated to the requirements of IEEE STD 291.



Remote Monitor Option

## Applications

MODEL	VDE	FCC-18	IEC/CISPR/EN	SAE J1113	SAE J551	SAE J1816	MIL-STD-461E	MIL-STD-1541	MIL-STD-285	NSA 65-6	IEEE STD 299	NACSIM
6502	RE	RE	RE	RE	RE	RE		RE				RE
6507		RE	RE	RE	RE	RE		RE	RX	RX	RX	RE
6509			RI	RI	RI			RI	TX	TX	TX	
6511	RE		RE, RI					RE, RI				RE
6512			RE, RI		RE	RE						RE
7603							RI					
7604							RE					
7605							RI					
7606							RI					

RE = Radiated Emissions    RI = Radiated Immunity (Susceptibility)    TX = Transmit    RX = Receive

## Electrical Specifications

MODEL	FREQUENCY RANGE	DYNAMIC RANGE	SENSITIVITY (TYPICAL)	1 DB COMPRESSION POINT	POWER REQUIRED	MAXIMUM INPUT POWER	IMPEDANCE (NOMINAL)	CONNECTOR
6502	10 kHz – 30 MHz	85 dB @10 kHz 125 dB @ 1 MHz	-1 dB(μA/m) @ 10 kHz -42 dB(μA/m) @ 1 MHz	5 V/m	13.8 VDC	NA	50 Ω	BNC female
6507	1 kHz – 30 MHz	76 dB @10 kHz 116 dB @ 1 MHz	11 dB(μA/m) @ 10 kHz -29 dB(μA/m) @ 1 MHz	10 V/m	13.8 VDC	NA	50 Ω	BNC female
6509	1 kHz – 30 MHz Band1 1 kHz – 60 kHz Band2 60 kHz – 400 kHz Band3 400 kHz – 1 MHz Band4 1 MHz – 30 MHz	NA	NA	NA	NA	1kW	varies w/freq <sup>2</sup>	Type N fem
6511	20 Hz – 5 MHz <sup>1</sup>	NA	NA	NA	NA	20 W	varies w/freq <sup>2</sup>	BNC female
6512	10 kHz – 30 MHz	NA	NA	NA	NA	20 W	varies w/freq <sup>2</sup>	BNC female
7603	20 Hz – >50 kHz	NA	NA	NA	NA	5 A	50 Ω <sup>3</sup>	Banana Jack-2
7604	20 Hz – 500 kHz	NA	NA	NA	NA	NA	50 Ω <sup>3</sup>	BNC female
7605	30 Hz – >50 kHz	NA	NA	NA	NA	NA	50 Ω <sup>3</sup>	Banana Jack-2
7606	30 Hz – >50 kHz	NA	NA	NA	NA	NA	50 Ω <sup>3</sup>	BNC female

<sup>1</sup> Calibrated from 1 kHz - 5 MHz. Values from 20 Hz - 1 kHz are theoretical.

<sup>2</sup> Calibrated in 50 Ω system.

<sup>3</sup> Typical response provided for 50 Ω systems to 500 kHz and for high impedance to 50 kHz.



Model 7605 Radiating Loop

Model 7606 Sensing Loop



Model 7603 Magnetic Field Generating Coil

## Physical Specifications

MODEL	BASE WIDTH	BASE DEPTH	HEIGHT	LOOP DIAMETER	WEIGHT
<b>6502</b>	19.0 cm 7.5 in	12.0 cm 4.7 in	67.3 cm 26.5 in	60.0 cm 23.6 in	2.0 kg 4.5 lb
<b>6507</b>	19.0 cm 7.5 in	12.0 cm 4.7 in	37.8 cm 14.9 in	30.4 cm 12.0 in	1.8 kg 4.0 lb
<b>6509</b>	8.0 cm 3.1 in	7.6 cm 3.0 in	47.8 cm 18.7 in	30.4 cm 12.0 in	1.3 kg 2.9 lb
<b>6511</b>	12.7 cm 5.0 in	3.8 cm 1.5 in	59.8 cm 23.5 in	56.0 cm 22.0 in	1.6 kg 3.5 lb
<b>6512</b>	12.7 cm 5.0 in	3.8 cm 1.5 in	59.8 cm 23.5 in	56.0 cm 22.0 in	1.6 kg 3.5 lb
<b>7603</b>	NA	NA	8.0 cm 3.1 in	12.0 cm 4.7 in	0.5 kg 1.0 lb
<b>7604</b>	6.3 cm 2.5 in	2.8 cm 1.1 in	17.8 cm 7.0 in	13.3 cm 5.2 in	0.9 kg 2.0 lb
<b>7605</b>	NA	NA	5.9 cm 2.3 in	13.2 cm 5.2 in	0.2 kg 0.3 lb
<b>7606</b>	5.1 cm 2.0 in	1.9 cm 0.7 in	13.5 cm 5.3 in	4.7 cm 1.8 in	0.4 kg 0.7 lb



Model 7604 Magnetic Field Pick-Up Coil



Model 6511 and 6512 Passive Loops

### USA:

Tel +1.512.531.6400  
Fax +1.512.531.6500

### FINLAND:

Tel +358.2.838.3300  
Fax +358.2.865.1233

### UK:

Tel +44.(0)1438.730.700  
Fax +44.(0)1438.730.750

### SINGAPORE:

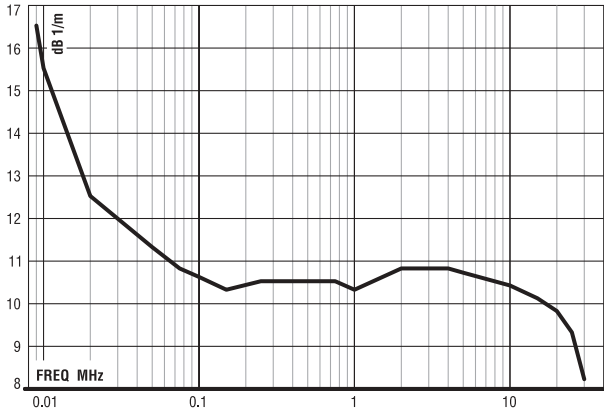
Tel +65.536.7078  
Fax +65.536.7093

### ONLINE:

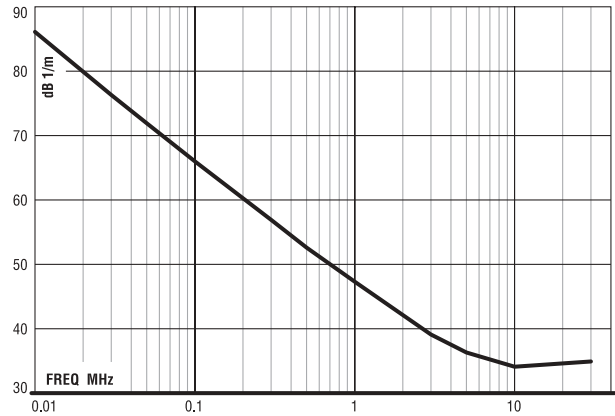
info@ets-lindgren.com  
www.ets-lindgren.com

Models 6502, 6507, 6509, 6511, 6512 Technical Data

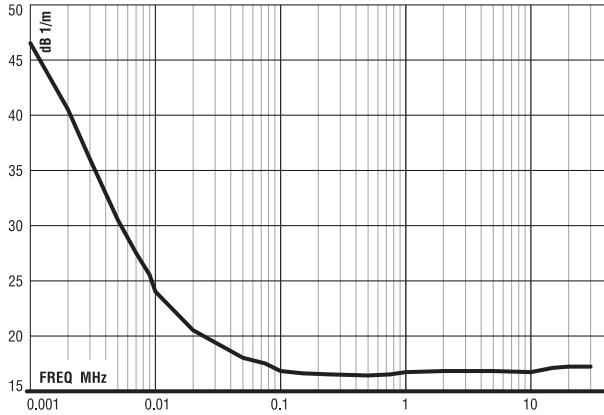
Model 6502 Electric Antenna Factor



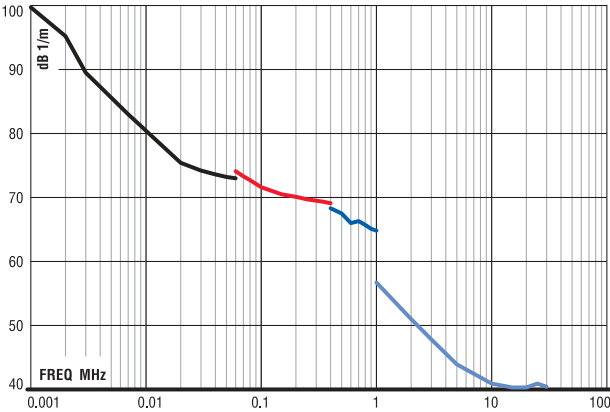
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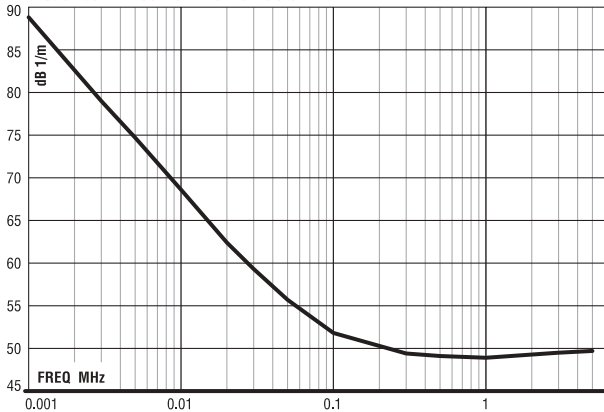
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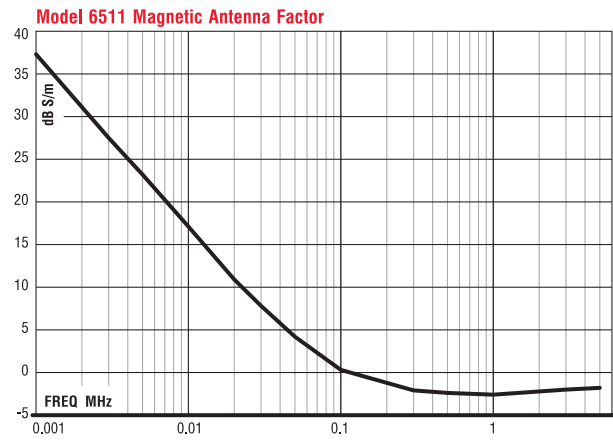
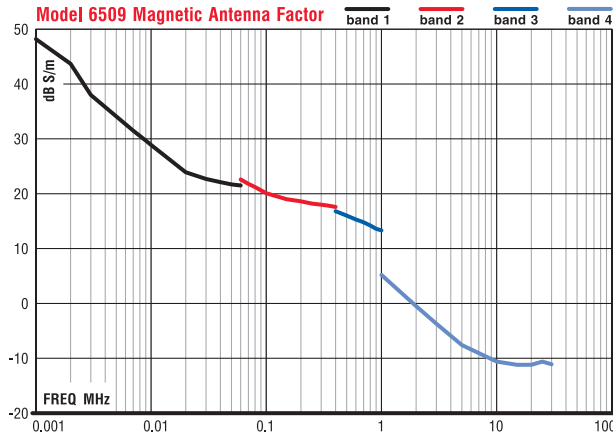
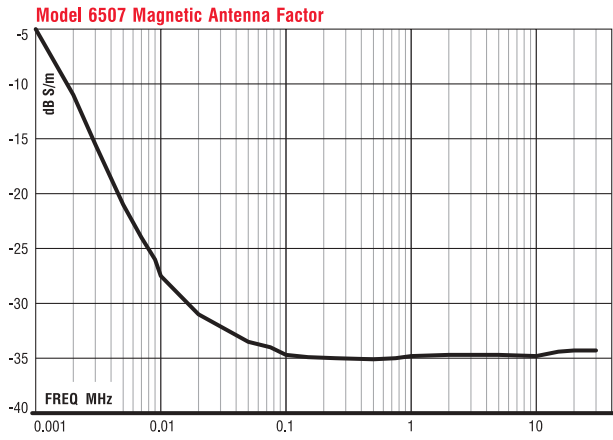
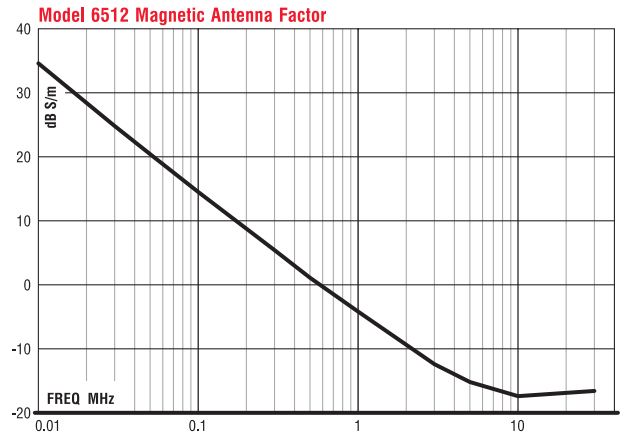
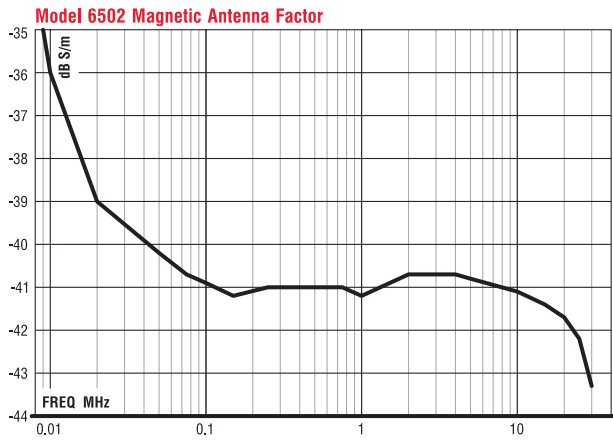
Model 6509 Electric Antenna Factor



Model 6511 Electric Antenna Factor



Model 6509 Passive Loop



Model 6502 Active Loop