

*Model 3126 Series*  
**Sleeve Dipole Antennas**  
**User Manual**



Sleeve Dipole Antenna, Model 3126 Series




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B	Addition of new model data	March, 2006

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<b>General Safety Considerations</b>	
	This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.
	<b>Warning:</b> No operator serviceable parts exist inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.
	<b>Warning:</b> This instrument is used in a manner not specified by ETS-Lindgren; the protection provided by the instrument may be impaired.

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## 1. Introduction

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ETS-Lindgren Model 3126 Sleeve Dipoles are designed as precision gain references for antenna range calibration and to meet the Cellular Telecommunication and Internet Association's (CTIA)  $\pm 0.1$  dB symmetry requirement for ripple test measurements. These antennas are truly omni-directional, having an electric dipole pattern approaching that of a half-wave resonant dipole with typical gains between 1.5 and 2.0 dB. The sleeve dipole design allows the antenna to be end-fed to avoid cable and feed-point interactions that interfere with the performance of the antenna. Integral quarter-wave chokes and/or ferrite loading (depending on frequency range) also helps to reduce cable interaction. This design also provides exceptional symmetry (better than  $\pm 0.1$  dB (0.2 dB peak-to-null)) to meet or exceed CTIA criteria for ripple test antennas.

All Model 3126 sleeve dipoles are designed with a VSWR less than 1.2:1 in at least a  $\pm 10$  MHz band around the labeled center frequency. Gain values and  $\pm 0.1$  dB symmetry certification are provided for a 200 MHz – 300 MHz band (depending on model) centered about the labeled frequency. The dipoles have a typical VSWR <3:1 across this entire band, and may be used for precision range calibrations across the entire band provided appropriate padding (recommended 10dB) is used to minimize possible standing wave effects on cables. The dipoles have a nominal 50 W impedance, a maximum continuous transmit power of one watt, and are equipped with a female SMA connector.

The dipoles are calibrated using an A2LA accredited process with a typical measurement uncertainty on the order of  $\pm 0.2$  dB. During the calibration process, the dipoles are also certified to meet the  $\pm 0.1$  dB symmetry required for use in the ripple test specified in the CTIA's Over-The-Air Performance Test Plan. Gain, VSWR, maximum ripple, and measurement uncertainty values are provided with each calibration.

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## **2. Getting Started**

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### **2.1. Unpacking and Acceptance**

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**Step 1.** Upon delivery of your order, inspect the shipping container(s) for evidence of damage. Record any damage on the delivery receipt before signing. In case of concealed damage or loss, retain the packing materials for inspection by the carrier.

**Step 2.** Remove the antenna from its shipping container(s). Save the boxes and any protective packing materials for future use.

**Step 3.** Check all materials against the packing list to verify that the equipment received matches what was ordered. If you find any discrepancies, note them and call ETS-Lindgren Customer Service (+1.512.531.6400) for further instructions.

Ensure that you are satisfied with the contents of your order and the condition of your equipment prior to placing the antenna in service.

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### 3. Specifications

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#### 3.1. Electrical Characteristics

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Model	Center Frequency	Frequency Range	VSWR Ratio (Avg.)
3126-700	700 MHz	600 MHz – 800 MHz	<1.2:1 at the center frequency
3126-836	836 MHz	736 MHz – 936 MHz	<1.2:1 at the center frequency
3126-880	880 MHz	780 MHz – 980 MHz	<1.2:1 at the center frequency
3126-920	920 MHz	820 MHz – 1020 MHz	<1.2:1 at the center frequency
3126-1225	1225 MHz	1075 MHz – 1375 MHz	<1.2:1 at the center frequency
3126-1575	1575 MHz	1425 MHz – 1725 MHz	<1.2:1 at the center frequency
3126-1845	1845 MHz	1695 MHz – 1995 MHz	<1.2:1 at the center frequency
3126-1880	1880 MHz	1730 MHz – 2030 MHz	<1.2:1 at the center frequency
3126-2140	2140 MHz	1990 MHz – 2290 MHz	<1.2:1 at the center frequency
3126-2450	2450 MHz	2300 MHz – 2600 MHz	<1.2:1 at the center frequency

Note: Nominal impedance for all models = 50 ohm  
Connector for all models = SMA

### 3.2. Physical Characteristics

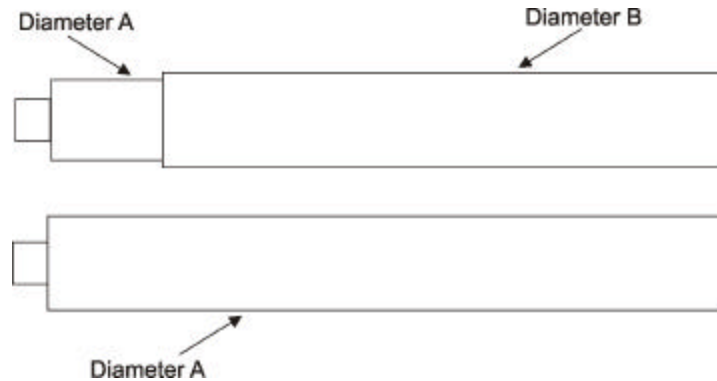


Figure 1: Model 3126 Dimension Reference

Model	Diameter A	Diameter B	Length
3126-700	1.90 cm (0.75 in)	2.69 cm (1.06 in)	24.46 cm (9.63 in)
3126-836	1.90 cm (0.75 in)	2.69 cm (1.06 in)	24.46 cm (9.63 in)
3126-880	1.90 cm (0.75 in)	2.69 cm (1.06 in)	24.46 cm (9.63 in)
3126-920	1.90 cm (0.75 in)	2.69 cm (1.06 in)	24.13 cm (9.50 in.)
3126-1225	1.90 cm (0.75 in)	2.69 cm (1.06 in)	22.86 cm (9.00 in)
3126-1575	1.90 cm (.75 in)	N/A	21.59 cm (8.50 in)
3126-1845	1.90 cm (0.75 in)	N/A	19.51 (7.68 in)
3126-1880	1.90 cm (0.75 in)	N/A	19.30 cm (7.60 in)

Model	Diameter A	Diameter B	Length
3126-2140	1.90 cm (0.75 in)	N/A	19.05 cm (7.50 in)
3126-2450	1.90 cm (0.75 in)	N/A	18.75 cm (7.38 in)

### 3.3. Standard Configuration

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- Sleeve dipole antenna
- Manual
- A2LA Accredited precision calibration and symmetry certification including signed Certificate of Calibration.

### 3.4. Optional Items

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**CTIA Ripple Test Mounting Kit** for ETS-Lindgren MAPS systems: An optional ripple test mounting kit is available to attach the dipole to an ETS-Lindgren multi-axis positioning system (MAPS). This mounting kit provides all adapters necessary to position both dipole and loop antennas at each offset geometry required to perform the ripple test as specified in the CTIA test plan. The center position mount can also be used for performing range calibrations (CTIA Substitution Part) and is the same mount design used for calibrating the antenna, thereby reducing measurement uncertainty.

**Model 3127 Resonant Loop Antennas** are magnetic dipole antennas designed to meet the CTIA  $\pm 0.1$  dB symmetry requirement for ripple test measurements at the labeled center frequency.

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## 4. Operation

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It is recommended that a 10dB pad/attenuator be used at the input end of the antenna to minimize standing waves on the transmit cable. This is especially important for frequencies where the input VSWR is greater than 1.2:1.

The electric field of the antenna is polarized parallel to the antenna axis. The specified antenna gain is realized along the plane perpendicular to the antenna axis and centered at the center of the dipole elements. The center of the dipole elements (bore sight location) is indicated by a line marked on the dipole, approximately 5.9 inches (15 cm) from the base (connector end) of the antenna housing.

### 4.1. Mounting

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The Model 3126 Sleeve Dipole must be mounted to a support at the connector end of the antenna. An ETS-Lindgren mounting kit is recommended to support the antenna. Under no circumstances should any mounting structure extend inward more than 1.5 inches (38 mm) past the connector end of the antenna. This area approaches the radiating element of the antenna and any material in this region will significantly change the performance of the antenna and affect the accuracy of the measurement. The mounting structure should have a low dielectric and a minimum amount of mass in the region of the antenna.

When mounting to an ETS-Lindgren mounting kit, the antenna mount consists of a Teflon sleeve with small clamp screws to hold the antenna in place. Fixed length spacers are then attached to the mounting sleeve to position it at each test position. For repeatable positioning, the antenna must be inserted into the sleeve until it bottoms out in the socket, then the clamp screws should be tightened symmetrically around the antenna to ensure that the axis of the antenna is along the axis of the mount. Note that an RF cable must be attached to the antenna prior to inserting it into the mounting socket. An optional blind mate socket and adaptor combination is available to allow

attaching the cable to the Teflon socket adapter and sliding the antenna with blind mate connector adaptor into the RF socket.

Ferrite loaded RF cables are recommended for use with the Model 3126 to minimize the interaction with the dipole. ETS-Lindgren offers a line of ferrite loaded cables for this application. Lightweight RF cabling should be used and properly supported to avoid putting unnecessary load on the SMA connector of the antenna. Route cabling away from the antenna along the antenna axis for as far as practical to minimize the interaction of the cable with the antenna and avoid distortion of the antenna pattern.

## **5. Maintenance**

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### **5.1. Cleaning**

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Should the Model 3126 require cleaning, use a clean soft cloth moistened with water. Do not use any harsh or abrasive chemicals to clean the dipole as they may damage the components.

### **5.2. Calibration**

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To ensure reliable and repeatable long-term performance, annual calibration and inspection of the antenna by ETS-Lindgren's experienced technicians is recommended. Our staff can recalibrate almost any type or brand of antenna. Please call to receive a Service Order Number prior to sending an antenna to us for calibration.

For more information about our calibration services or to place an order for antenna calibration visit our calibration website at <http://www.ets-lindgren.com>.

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## 6. Warranty

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### Scope and Duration of Warranties

Seller warrants to Buyer that the Standard EMCO Brand Products Excluding 5211 & 5220 be (1) free from defects in material, manufacturing workmanship, and title, and (2) conform to the Seller's applicable product descriptions and specifications, if any, contained in or attached to Seller's quotation. If no product descriptions or specifications are contained in or attached to the quotation, Seller's applicable product descriptions and specifications in effect on the date of shipment shall apply. The criteria for all testing shall be Seller's applicable product specifications utilizing factory-specified calibration and test procedures and instruments.

All product warranties, except the warranty of title, and all remedies for warranty failures are limited in time as shown in the table below.

Product Warranted	Duration of Warranty Period
Standard EMCO Brand Products Excluding 5211 & 5220	2 Years

Any product or part furnished to Buyer during the warranty period to correct a warranty failure shall be warranted to the extent of the unexpired term of the warranty applicable to the repaired or replaced product.

The warranty period shall commence on the date the product is delivered to Buyer; however, if Seller assembles the product, or provides technical direction of such assembly, the warranty period for such product shall commence on the date the assembly of the product is complete. Notwithstanding the foregoing, in the event that the assembly is delayed for a total of thirty (30) days or more from the date of delivery for any reason or reasons for which Seller is not responsible, the warranty period for such product may, at Seller's options, commence on the thirtieth (30th) day from the date such product is delivered to Buyer. Buyer shall promptly inspect all products upon delivery. No claims for shortages will be allowed unless shortages are reported to Seller in writing within ten (10) days after delivery. No other claims against Seller will be allowed unless asserted in writing within thirty (30) days after delivery (or assembly if the products are to be assembled by Seller) or, in the case of alleged breach of warranty, within the applicable warranty period.

**Warranty Exclusions**

Except as set forth in any applicable patent indemnity, the foregoing warranties are exclusive and in lieu of all other warranties, whether written, oral, express, implied, or statutory. EXCEPT AS EXPRESSLY STATED ABOVE, SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, BY STATUTE OR OTHERWISE, WHETHER OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE OR OTHERWISE ON THE PRODUCTS, OR ON ANY PARTS OR LABOR FURNISHED DURING THE SALE, DELIVERY OR SERVICING OF THE PRODUCTS. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.

Warranty coverage does not include any defect or performance deficiency (including failure to conform to product descriptions or specifications) which results, in whole or in part, from (1) negligent storage or handling of the product by Buyer, its employees, agents, or contractors, (2) failure of Buyer to prepare the site or provide an operating environmental condition in compliance with any applicable instructions or recommendations of Seller, (3) absence of any product, component, or accessory recommended by Seller but omitted at Buyer's direction, (4) any design, specification, or instruction furnished by Buyer, its employees, agents or contractors, (5) any alteration of the product by persons other than Seller, (6) combining Seller's product with any product furnished by others, (7) combining incompatible products of Seller, (8) interference with the radio frequency fields due to conditions or causes outside the product as furnished by Seller, (9) improper or extraordinary use of the product, or failure to comply with any applicable instructions or recommendations of Seller, or (10) acts of God, acts of civil or military authority, fires, floods, strikes or other labor disturbances, war, riot, or any other causes beyond the reasonable control of Seller. This warranty does not cover (1) contact fingers or replacements unless loss is caused by a defect in material or manufacturing workmanship within the scope of this warranty (2) items designed to be consumable and (3) removal and reconstruction of walls, partitions, ceilings and other facility costs arising from repair or replacement of the product or parts thereof by Seller under the warranty. Seller does not warranty products of others which are not included in Seller's published price lists for shielding products and systems supplies and accessories.

**Buyer's Remedies**

If Seller determines that any product fails to meet any warranty during the applicable warranty period, Seller shall correct any such failure by either, at its option, repairing, adjusting, or replacing without charge to Buyer any defective or nonconforming product, or part or parts of the product. Seller shall have the option to furnish either new or exchange replacement parts or assemblies.

Warranty service during the applicable warranty period will be performed without charge to Buyer within the contiguous 48 United States during Seller's normal business hours. After the warranty period, service will be performed at Seller's prevailing service rates. Subject to the availability of personnel, after-hours service is available upon request at an additional charge. For service outside the contiguous 48 United States, travel and per diem expenses, when required, shall be the responsibility of the Buyer, or End User, whichever is applicable.

The remedies set forth herein are conditioned upon Buyer promptly notifying Seller within the applicable warranty period of any defect or nonconformance and making the product available for correction.

The preceding paragraphs set forth Buyer's exclusive remedies and Seller's sole liability for claims based on failure of the products to meet any warranty, whether the claim is in contract, warranty, tort (including negligence and strict liability) or otherwise, and however instituted, and, upon the expiration of the applicable warranty period, all such liability shall terminate. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND ARISING OUT OF, OR AS A RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, ASSEMBLING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT DESPITE ANY NEGLIGENCE ON BEHALF OF THE SELLER. IN NO EVENT SHALL SELLER'S LIABILITIES UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCT IN RESPECT OF WHICH DAMAGES ARE CLAIMED. This agreement shall be construed in accordance with laws of the State of Illinois. In the event that any provision hereof shall violate any applicable statute, ordinance, or rule of law, such provision shall be ineffective to the extent of such violation without invalidating any other provision hereof.

Any controversy or claim arising out of or relating to the sale, delivery, non-delivery, servicing, assembling, use or loss of use of the products or any part thereof or for any charges or expenses in connection therewith shall be settled in Austin, Texas by arbitration in accordance with the Rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator may be entered in either the Federal District Court for the Western District of Texas or the State District Court in Austin, Texas, all of the parties hereto consenting to personal jurisdiction of the venue of such court and hereby waive the right to demand a jury trial under any of these actions.