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Technical Specification for Hickory 2.4 GHz Non-Articulating Dipole Antenna

Headline

This document outlines the technical requirements for a 2.4 GHz dipole antenna to be used with Cisco Aironet access points. This dipole antenna is built directly on an RP-TNC connector without an articulating feature to be as short as possible in support of the Hickory Access Point where the antennas are connected through the top of the AP housing.

Approvals

Name / Title	Signature	Date
Fred Anderson Manager, RF Engineering		
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Revision History

Rev	Date	Author	Comment
1.0	3/13/2006	Steve Saliga	Initial Release
2.0	3/27/2006	Steve Saliga	Fixed “cut-and-paste” error in Temperature Shock test so that reference to testing with “hinge flexed” has been removed.

1. Introduction

This document describes the complete set of required specifications for a dipole antenna for use with Cisco access points. In general, this antenna is a standard dipole, about 4.4 inches long, built directly on a reverse polarity-TNC connector. In a break from tradition, this dipole has NO articulating feature. It is designed to be as short as possible. The antenna will operate in the 2.4 GHz band and should be built to operate in an indoor environment.

2. Antenna Electrical Specifications

The electrical specifications for this antenna are summarized in Table 1 below. All the manufacturer's specifications should be reported in data sheet format.

Electrical Specifications					
	Parameter	Design Goal	Minimum Acceptable	Maximum Acceptable	Notes
1	Antenna Type	Dipole			
2	Operating Frequency Range	2402 - 2485 MHz			
3	Nominal Input Impedance	50 Ω			
4	2:1 VSWR Bandwidth	2385 - 2515 MHz			
5	Peak Gain	1.8 dBi	1.5 dBi	2.2 dBi	Over entire operating frequency range
6	H-Plane Ripple	< 0.7 dB			
7	Polarization	Linear, Vertical			
8	E-Plane 3 dB Beamwidth	70 Degrees	65 Degrees	75 degrees	
9	H-Plane 3-dB Beamwidth	Omnidirectional			

Table 1
Summary of Antenna Electrical Specifications

3. Mechanical and Environmental Specifications

The mechanical specifications will cover the physical appearance of the antenna as well as all mounting, cable and connectors. The mechanical and environmental specs are summarized in Table 2. A mechanical drawing of the desired product is shown in Figure 1. Note that there is NO articulating feature. Also, in a departure from previous antennas of this type, this antenna is "Cisco Medium Gray" (GY5A333). See Cisco document 95-5818-01 for color details. **Note there is a known typo in 95-5818-01. The correct GE color number is GY5A333.**

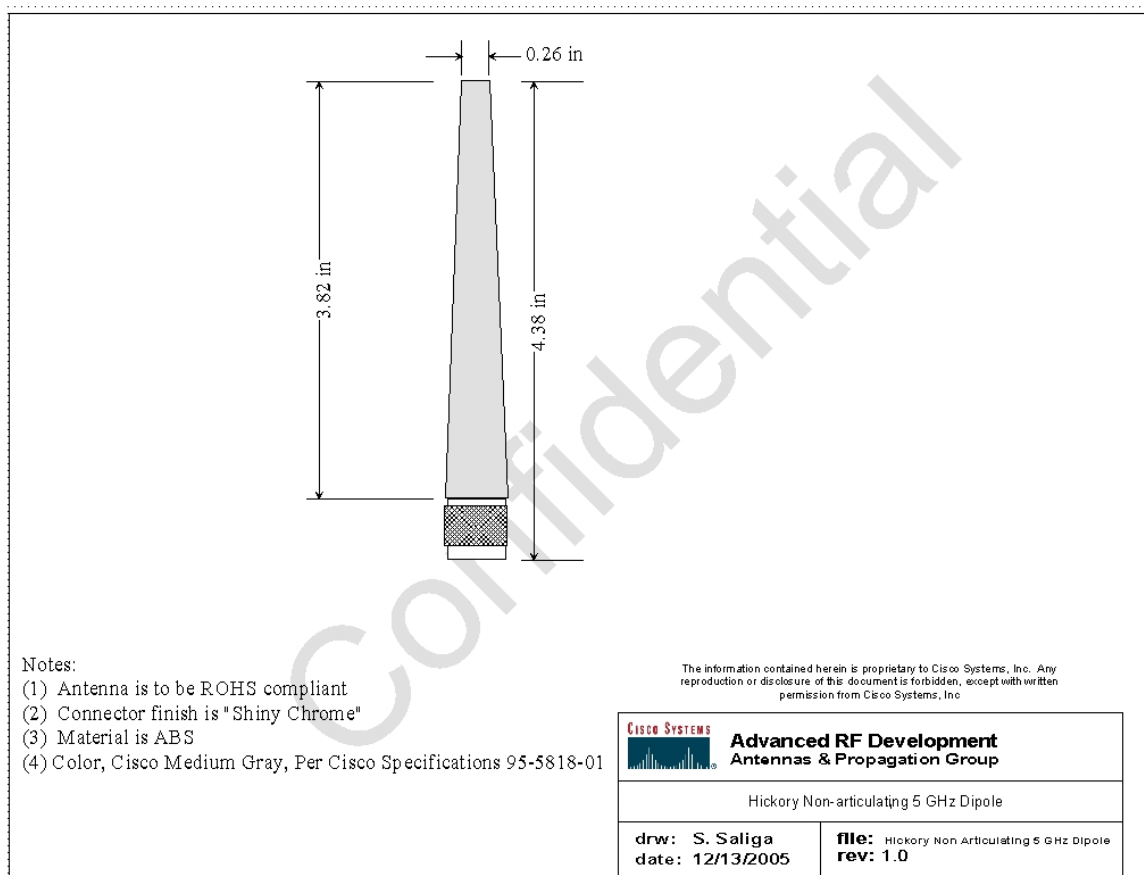


Figure 1
Proposed Dipole Form Factor

	Mechanical /Environmental Specifications				
	Parameter	Design Goal	Minimum Acceptable	Maximum Acceptable	Notes
1	Total Length of Antenna	4.38 in		4.38	Including RP-TNC connector.
2	Length of Antenna Radome	3.82 in			Excluding RP-TNC connector
3	Radome Shape	0.57 in base diameter, 0.26 in tip diameter			See drawing in Figure 1
4	Radome Material	Flexible Thermoplastic Rubber			
5	Radome Color	Cisco Medium Gray			Color is GY5A333. See 95-5818-01
6	Radome Surface Finish	Mold-Tech 11020			Or equivalent with Cisco approval
7	Connector Type	RP-TNC Plug			Threads inspected with standard go/no-go gauge.
8	Connector Finish	Shiny Chrome			
9	Antenna Weight	1 ounce		1.5 ounces	
10	Environment	Indoor			
11	Operating Temperature Range	-20 C to +60 C			Manufacturer to provide product deration/operation details over temp range
12	Storage Temperature Range	-40 to +85 C			
13	45-degree Flex Test	Bend AUT 45-degrees from the tip fifty times in four directions, each about 90-degrees apart. No creasing or noticeable permanent deformation to radome. VSWR still less than 2:1. Manufacturer to provide standard test spec and results.			
14	Pull Test	Straight pull of 25-lb applied to radome tip. No radome separation or deformation. VSWR still less than 2:1. Manufacturer to provide standard test spec and results.			
15	Rotation Test	NA			
16	Drop Test	1-meter random drop, 10 times. No permanent damage or deformation to the radome. VSWR still less than 2:1. Manufacturer to provide standard test spec and results.			

17	Temperature Shock	Non-operational Temperature Shock, See ENG-3396. Humidity not controlled. Increase temp to +70 C @ 5 C/minute minimum. Dwell for 1 hr. Decrease temp to -25 C @ 5 C/minute minimum. Dwell for 1 hr. Increase temp to +70 C @ 5 C/minute minimum. Dwell for 1 hr. Decrease temp to -25 C @ 5 C/minute minimum. Dwell for 1 hr. Increase temp to +70 C @ 5 C/minute minimum. Dwell for 1 hr. Decrease temp to -25 C @ 5 C/minute minimum. Dwell for 1 hr.												
18	Humidity	Design Limit: All Product Categories: 95% RH Test Method: The product shall be subjected to the temperature and humidity profile detailed in the Aggravated Humidity test in MIL-STD-810 Method 507.3, Procedure III for five 24 hour cycles. The product shall be non-operational during this entire period. VSWR still less than 2:1 Manufacturer to provide standard test spec and results.												
19	Vibration	Cisco Vibration Test Test Method: This test shall be run at standard room conditions. The product shall be affixed to the vibration table in each of its three mutually perpendicular axes and subjected to a random vibration input of 30 minutes in each axis. The random vibration spectrum to be used covers the frequency band of 3-500 Hz at an input level of 1.12 G-rms as described below in the table titled, "Non-Operational Random Vibration Profile". MIL-STD-810, Method 514.4 should be used as a guideline. Non-Operational Random Vibration Profile <table> <tr> <th>Frequency</th><th>Spectral Break Point</th><th>Slope</th></tr> <tr> <td>3-10Hz</td><td></td><td>5 db/octave</td></tr> <tr> <td>10-100Hz</td><td>.0065 G2/Hz</td><td></td></tr> <tr> <td>100-500Hz</td><td></td><td>-5 db/octave</td></tr> </table> VSWR still as specified and no deformation or exterior damage such that the product is considered "un-sellable".	Frequency	Spectral Break Point	Slope	3-10Hz		5 db/octave	10-100Hz	.0065 G2/Hz		100-500Hz		-5 db/octave
Frequency	Spectral Break Point	Slope												
3-10Hz		5 db/octave												
10-100Hz	.0065 G2/Hz													
100-500Hz		-5 db/octave												

20	Mechanical Shock (non-operational)	Cisco Non-Operational Shock Test Conditions: Temperature = 21 C, +/- 5 C, Humidity = 30-60% RH. Product shall be subjected to one Trapezoidal Shock impact for each direction (positive and negative) in each of 3 axes at a level not to exceed the maximum peak acceleration values listed. <table><tr><td>Weight</td><td>MINIMUM Peak Acceleration</td><td>MAXIMUM Peak Acceleration</td><td>Min. Velocity Change</td></tr><tr><td>< 4.5 Kg</td><td>65 G</td><td>80 G</td><td>4.78 m/s</td></tr></table> Trapezoidal Shock pulse generation is referred to ASTM D 3332. Record VSWR at Minimum Peak Acceleration level and again at Maximum Peak Acceleration level. Pass Criteria: VSWR still as specified and no deformation or exterior damage (at minimum acceleration) levels such that the product is considered "un-sellable".	Weight	MINIMUM Peak Acceleration	MAXIMUM Peak Acceleration	Min. Velocity Change	< 4.5 Kg	65 G	80 G	4.78 m/s
Weight	MINIMUM Peak Acceleration	MAXIMUM Peak Acceleration	Min. Velocity Change							
< 4.5 Kg	65 G	80 G	4.78 m/s							

Table 2
Summary of Antenna Mechanical and Environmental Specifications

4. General Requirements

Antenna markings, documentation and sample requirements as outlined in Table 3.

General Requirements		
1	Electrical Documentation	- Vendor to provide VSWR characterization over the range 2400-2500 MHz. Data must be provided, in plot form and in a text file with frequency and VSWR on ten (10) antenna samples. - Vendor to provide both horizontal (H-Plane) and vertical (E-Plane) patterns average and peak gains in both planes. Raw data must also be provided as a text file with angle and gain (dBi). Patterns will be generated at three frequencies, 2400 MHz, 2450 MHz, and 2500 MHz on at least two (2) antenna samples.
2	Mechanical/ Environmental Documentation	- Vendor to provide a full set of mechanical drawings. - Vendor to perform all mechanical and environmental test results as outlined on at least thirty (30) samples. - Vendor to provide all mechanical/environmental test data covering at least thirty (30) samples.
3	Samples	- Vendor to provide ten (10) prototypes and/or twenty (20) production intent samples to Cisco Engineering. - Vendor to provide complete documentation (outlined above) with the samples.

Table 3
General Requirements