

AVANTEGO

PRODUCT SPECIFICATION & PERFORMANCE TEST

2003-1-0000

RETRACTABLE SNAP-IN ANTENNA

This AVANTEGO retractable snap-in antenna is developed to be used as a mobile phone antenna. The performance is optimised for the NEXCOM NCP-2000, CDMA handset.

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ELECTRICAL SPECIFICATION

1:1 FREQUENCY RANGE

Frequency range:
824-894 MHz

1:2 HANDSET

Handset number:
AVANTEGO No: NX102
Received at AVANTEGO: 5th February 2000

Note: This specification is only valid with the handset above..

1:3 MATCHING CIRCUIT

The matching provided in the chassis provided by Nexcom is used.
(We believe it is 8.2 or 10 nH in series.)

Note: This specification is only valid with matching circuit above .

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1:4 VSWR

Maximum values in free space for retracted antenna:

824-894 MHz VSWR < 2.5:1

Typical values in talk position for retracted antenna:

824-894 MHz VSWR < 2.5:1

Maximum values in free space for extended antenna:

824-894 MHz VSWR < 2.5:1

Typical values in talk position for extended antenna:

824-894 MHz VSWR < 2.5:1

1:5 GAIN

Typical values in maximum direction for retracted antenna:

824-894 MHz -3.0 dB

Typical values in maximum direction for extended antenna:

824-894 MHz -1.5 dB

1:6 POWER RATING

Maximum input power:

824-894 MHz 2W

Demands:

No visual deformation is allowed, and the antenna must meet the electrical specification after the test.

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MECHANICAL SPECIFICATION

2:1 APPEARANCE

Demands

The appearance shall be according to the product specification drawing 2003-1-0001 issue 7 on page 14.

2:2 HELICAL DEFORMATION

Demands

Angle (α): 30°
Bending Force (F) 30N

The antenna must meet the electrical specification and remain mechanically bounded after the test.
Only minor non reversible deformations is allowed.

2:3 TORQUE

Typical value

T=10 Ncm

The antenna must meet the electrical specification and remain mechanically bounded after the test. Only minor non reversible deformations is allowed.

2:4 Force on Contact Spring

Demands

F=5 N

The antenna must meet the electrical specification and remain mechanically bounded after the test.

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2:5 DROP

Demands

Drop Height	150cm
Handset weight	100g
Angle	45°

The antenna must meet the electrical specification and remain mechanically bounded after the test.
Only minor non reversible deformations is allowed.

2:6 TENSION LOAD

Demands

Between cover and frame	50N
Between whip and helix	50N

The antenna must meet the electrical specification and remain mechanically bounded after the test.
Only minor non reversible deformations is allowed.

2:7 EXTENSION AND RETRACTION FORCES

Demands

Extension from retracted position	0,5-5,0N
Retraction from extended position	0,5-5,0N

The demands is valid up to 10 000 cycles.

2:8 OPERATING TEMPERATURE

Demands

-20°C to 70°C

No visual deformation is allowed, and the antenna must operate properly during the test.

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2:9 TEMPERATURE CYCLING

Demands

Low cycling temperature -40°C

High cycling temperature 70°C

No visual deformation is allowed, and the antenna must meet the specification after the test.

2:10 HUMIDITY

Demands

Relative humidity 95%

Temperature 55°C

No visual deformation is allowed, and the antenna must satisfy the electrical specification after the test.

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PERFORMANCE TEST

3:1 VSWR

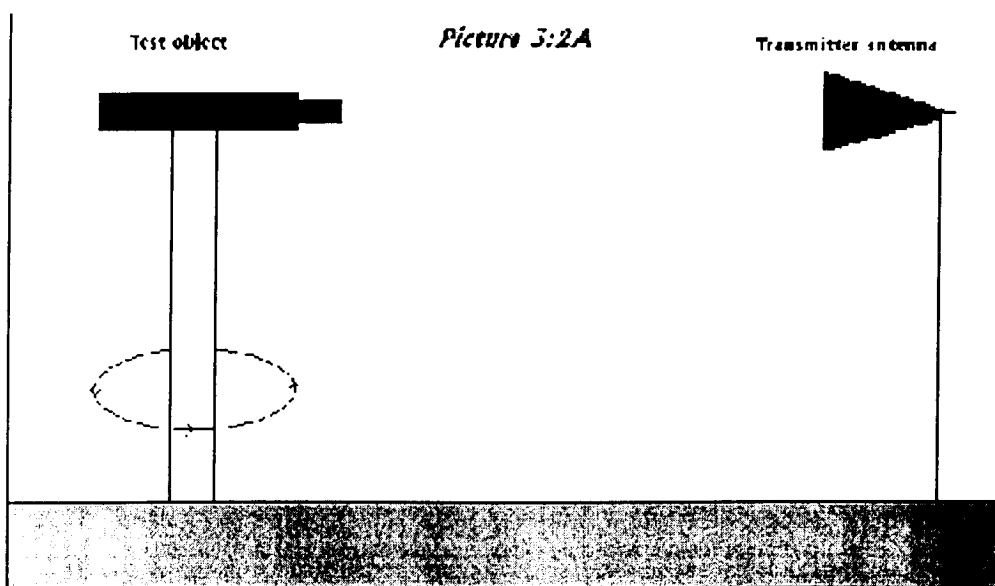
The VSWR is measured with a network analyser or other equipment with same or better accuracy as HP 8753D network analysers.

Free space means that the antenna and mobile phone is placed on a non absorbing non reflecting material in an environment suitable for measurements on antennas. *Talk position* means that the phone is measured in user position. The talk position VSWR measurements is performed when a person is holding the phone in a typical user position.

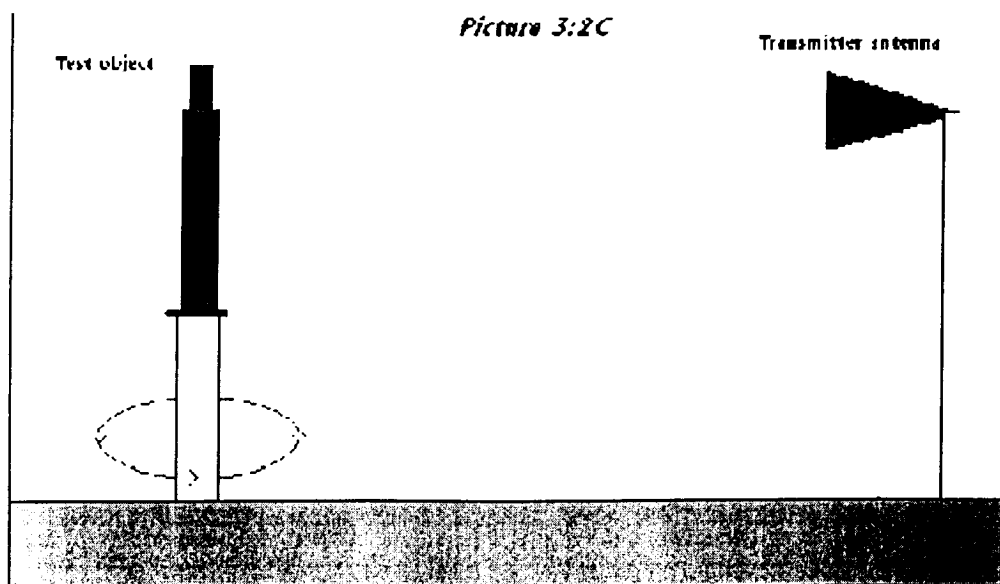
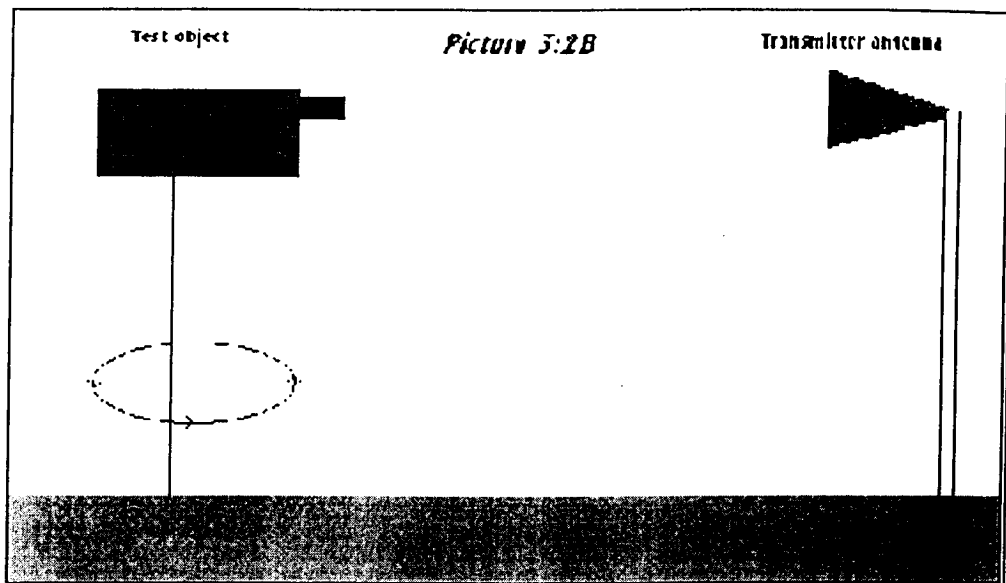
3:2 RADIATION

The radiation measurements are performed in an anechoic chamber.

Three different planes are measured. E1-plane (*picture 3:2A*), E2-plane (*picture 3:2B*) and H-plane (*picture 3:2C*).



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3:3 POWER RATING

A 2W cw signal from a signal generator/amplifier is connected, through a power meter to the antenna for 10 minutes at room temperature.

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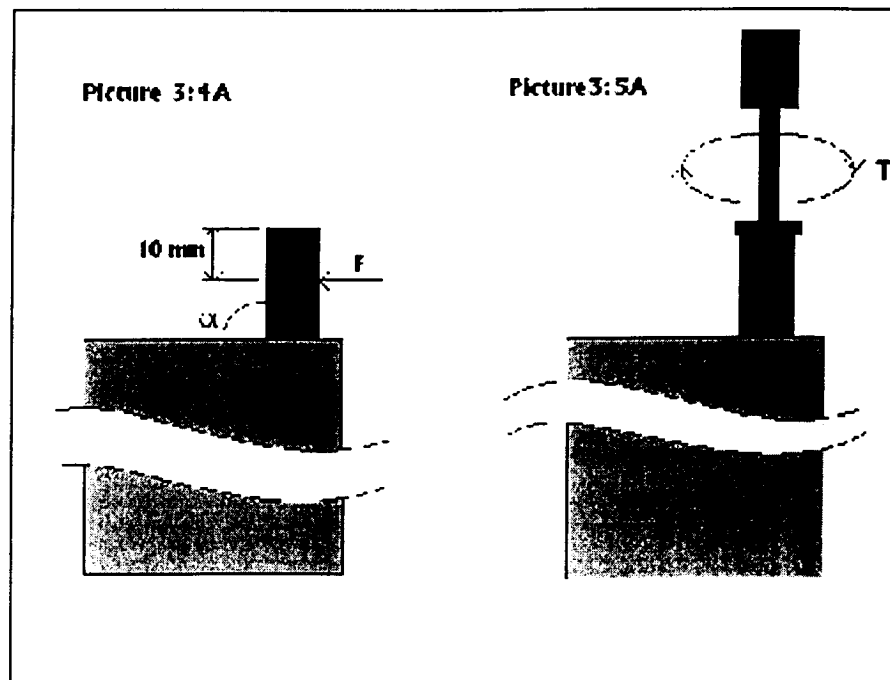
3:4 HELIX DEFORMATION

The test object is placed in a test jig.

A force (F) is applied perpendicular to the antenna, 10mm from the top until the specified force (F) or angle (α) is reached. (picture 3:4A)

3:5 TORQUE

The test object is placed in a test jig. A torque measurement instrument is attached to the test object. The test object is exposed to the specified torque. (picture 3:5A)



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3:6 FORCE ON CONTACT SPRING

The test object is placed in a test jig.

A force (F) is applied on the contact spring in axial direction. The force (F) is increased until the contact spring releases from the antenna.

3:7 DROP

The retracted antenna is attached to a test fixture with a specified weight, and is after that dropped from a specified height and with specified angle. This is repeated with the same antenna in extended position.

3:8 TENSION LOAD

The antenna is placed in a test jig. A force measurement instrument is attached to the cover. The cover is exposed to the specified force. Then the whip is exposed to the specified force.

3:9 EXTENSION AND RETRACTION FORCES

The antenna is placed in a test jig. A force measurement instrument is attached to the whip. The antenna is extended from retracted position.

The whip is locked in extended position. The antenna is pushed down from extended position using a force measurement instrument.

3:10 OPERATING TEMPERATURE

The test is performed in a climatic chamber.

VSWR is measured at lowest and highest specified temperature

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3:11 TEMPERATURE CYCLING

The test is performed in a climatic chamber.

The temperature is cycled between “Low cycling temperature” and “High cycling temperature” 10 times. Between every cycling the temperature is kept constantly at “Low cycling temperature” and “High cycling temperature” for one hour. Start and end temperature is room temperature (approximately 20°C)

Room temperature $\Rightarrow$ 10 times (Low cycling temperature for one hour $\Rightarrow$ High cycling temperature for one hour) $\Rightarrow$ Room temperature

3:12 HUMIDITY

The test object is placed in a climatic chamber with specified humidity for 24 hours. After that it's kept in room temperature for 24 hours.

The antenna must satisfy the electrical demands after the test.

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4 LOG OF CHANGES

Issue	Item	From	To
2	1:2	TBD	Specified Handset
2	1:3	TBD	Specified Matching
2	1:4	TBD	Specified VSWR
2	1:4	TBD	Specified Gain
3	1:2	Handset NX101	Handset NX102
3	1:3	8,2 nH in series	Matching provided by Nexcom in the chassis NX102.
3	1:5	-1,0dB	-1,5dB
3	5	Max 90	92,4±1

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 Nexcom NCP-2000
 Product drawing
 Project 2003-1
 Issue 7
 Retractable helical antenna.
 09 February 2000
 Scale 2:1

Dimensions:
 Top view: 3.4 ± 0.10, 1.6 ± 0.10, 0.3 ± 0.15 (2x), 2.4 ± 0.15, 3.5 ± 0.15
 Side view: 10.9 ± 0.30, 6.4 ± 0.25, 0.9 ± 0.15, 7.5 ± 0.15, 6.4 ± 0.10, 5.1 ± 0.20, 6.05 ± 0.10, 1 ± 0.20, R3.9
 Cross-section A (5:1): 96.6 ± 1, 0.4 ± 0.15, 0.7 ± 0.15 (2x), 4.6, 12 ± 0.30, 14.39 ± 0.50, R0.6 ± 0.15 (2x), R2.5 ± 0.30, +0.45, 5.6 -0.3
 Cross-section B (5:1): 18 ± 0.30, 92.4 ± 1, 8.6 ± 0.3, 6.6 ± 0.20, 7.8 ± 0.20, 2.2 ± 0.20, 1.6 ± 0.20, R10 ± 2, R0.5
 Cross-section C (5:1): 6.6 ± 0.20, 7.8 ± 0.20, 2.2 ± 0.20, 1.6 ± 0.20, R10 ± 2, R0.5

Item	Material	Note
5	PVC	Colour Black
4	Stainless steel	Gold plated
3	Zytel	Surface acc. to Charnilles VDI 3400 No. 30. Colour Black
2	Delrin	Surface acc. to Charnilles VDI 3400 No. 30. Colour Black
1	Santoprene 103-40	Surface acc. to Charnilles VDI 3400 No. 33. Colour acc. to NCS 8500

Scale 1:1