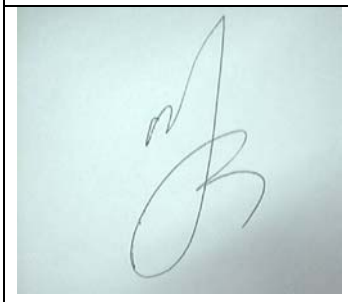
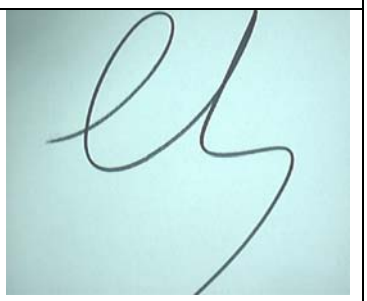
ANTENNA SPECIFICATION

- □ **Description: Cellular & GPS & US-PCS Triple-Band Retractable Antenna**
- □ **MODEL NO: TX-215A (MST-06400)**
- □ **APPROVAL NO:**
- □ **APPROVED DATE:**
- □ **TERM OF VALIDITY:**

	PREPARED	CHECKED	APPROVED
CUSTOMER			
SUPPLIER	PREPARED Advanced young woo _shin	CHECKED Senior engineer jin_kim	APPROVED Director chang hoon_paik





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- □ **PRESIDENT: M.J.Woo**
- □ CUSTOMER: Pantech & Curitel

RETRACTABLE ANTENNA SPECIFICATION

(MRT-06400)

TX-215A

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1. Specification

1.1 Electrical Specification

Frequency Range	CELLULAR 824Mhz – 894 MHz US-PCS 1850MHz – 1990MHz	
V.S.W.R	CELLULAR CLOSE IN	< 2.8 : 1
	CELLULAR CLOSE OUT	< 1.8 : 1
	CELLULAR OPEN IN	< 2.5 : 1
	CELLULAR OPEN OUT	< 2.3 : 1
	US-PCS CLOSE IN	< 2.3 : 1
	US-PCS CLOSE OUT	< 3.7 : 1
	US-PCS OPEN IN	< 3.5 : 1
	US-PCS OPEN OUT	< 2.7 : 1
Impedance	50Ω	
Radiation Pattern	Omni-directional	
Polarization	Vertical	
Max power	2W	

CELLULAR GAIN (PEAK)	TX	849Mhz	1.62Bi	AZIMUTH	CLOSE OUT
	RX	894Mhz	2.30dBi	AZIMUTH	CLOSE OUT
US - PCS GAIN (PEAK)	TX	1850Mhz	1.14dBi	AZIMUTH	OPEN OUT
	RX	1930Mhz	1.10dBi	AZIMUTH	OPEN OUT

1.2 Mechanical Specification

Length	See the drawing
Temperature	−40 °C − +70 °C
Connector type	Screw

1.3 Packing

Description	Q'ty	Material	Remark
Tray	150EA	P.P	
Air Vinyl	−	Polyester	
Inner Box	1,500EA	SW 1 (A)	17.4Kgf/50mm min.
Master Carton Box	7,500EA	DW 1(A)	25.4Kgf/50mm min.

2. Test Equipment

Description	Purpose
Network Analyzer	V.S.W.R, Impedance
Standard Horn	Gain, Impedance
Digital Calipers	Dimension
Torque Driver	Torque Test
Push Pull Gauge	Force Test
Temp. Chamber	Temperature Test
Thermal Shock Chamber	Thermal Shock
Vibration Shaker	Vibration
Dummy Set	Drop Test

3. Electrical Specification

3.1 V.S.W.R

The performance of this antenna shall be in accordance with the best V.S.W.R requirements as followings over the entire band.

V.S.W.R	CELLULAR CLOSE IN	< 2.8 : 1
	CELLULAR CLOSE OUT	< 1.8 : 1
	CELLULAR OPEN IN	< 2.5 : 1
	CELLULAR OPEN OUT	< 2.3 : 1
	US-PCS CLOSE IN	< 2.3 : 1
	US-PCS CLOSE OUT	< 3.7 : 1
	US-PCS OPEN IN	< 3.5 : 1
	US-PCS OPEN OUT	< 2.7 : 1

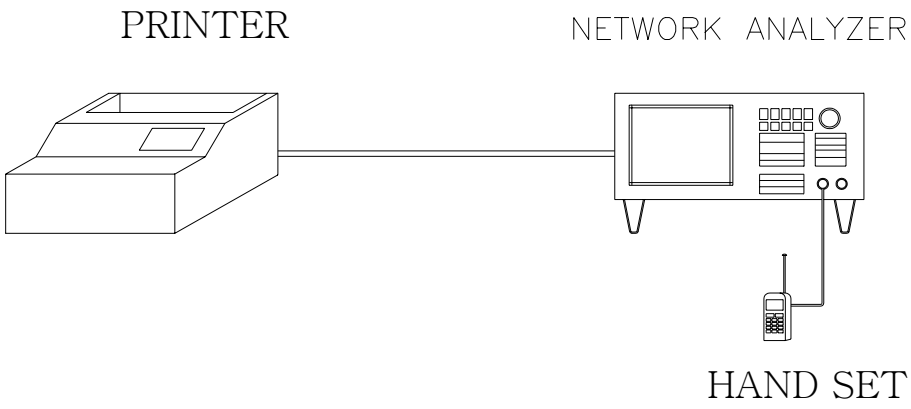
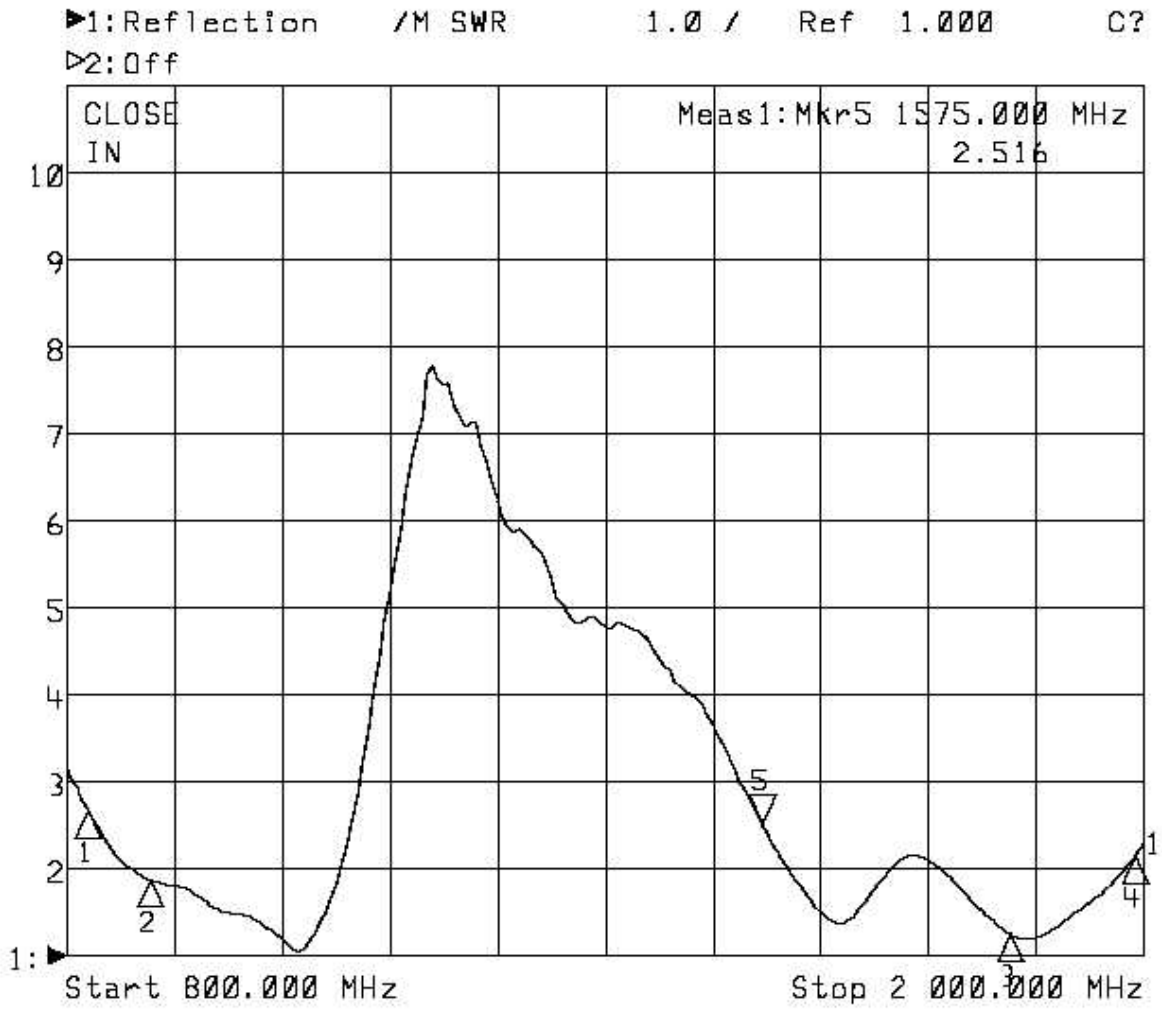


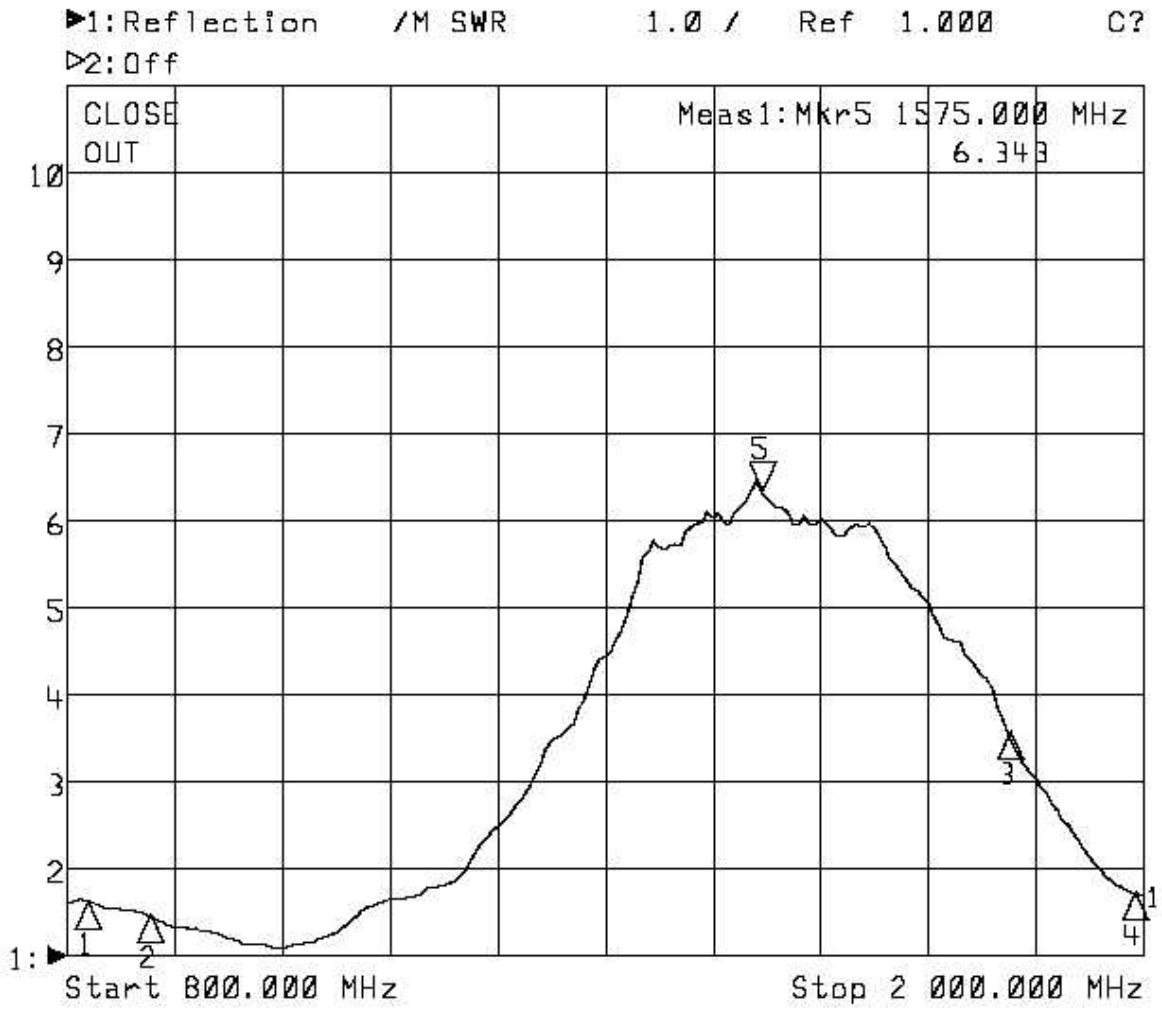
Figure 1 V.S.W.R Measurement System

CLOSE IN



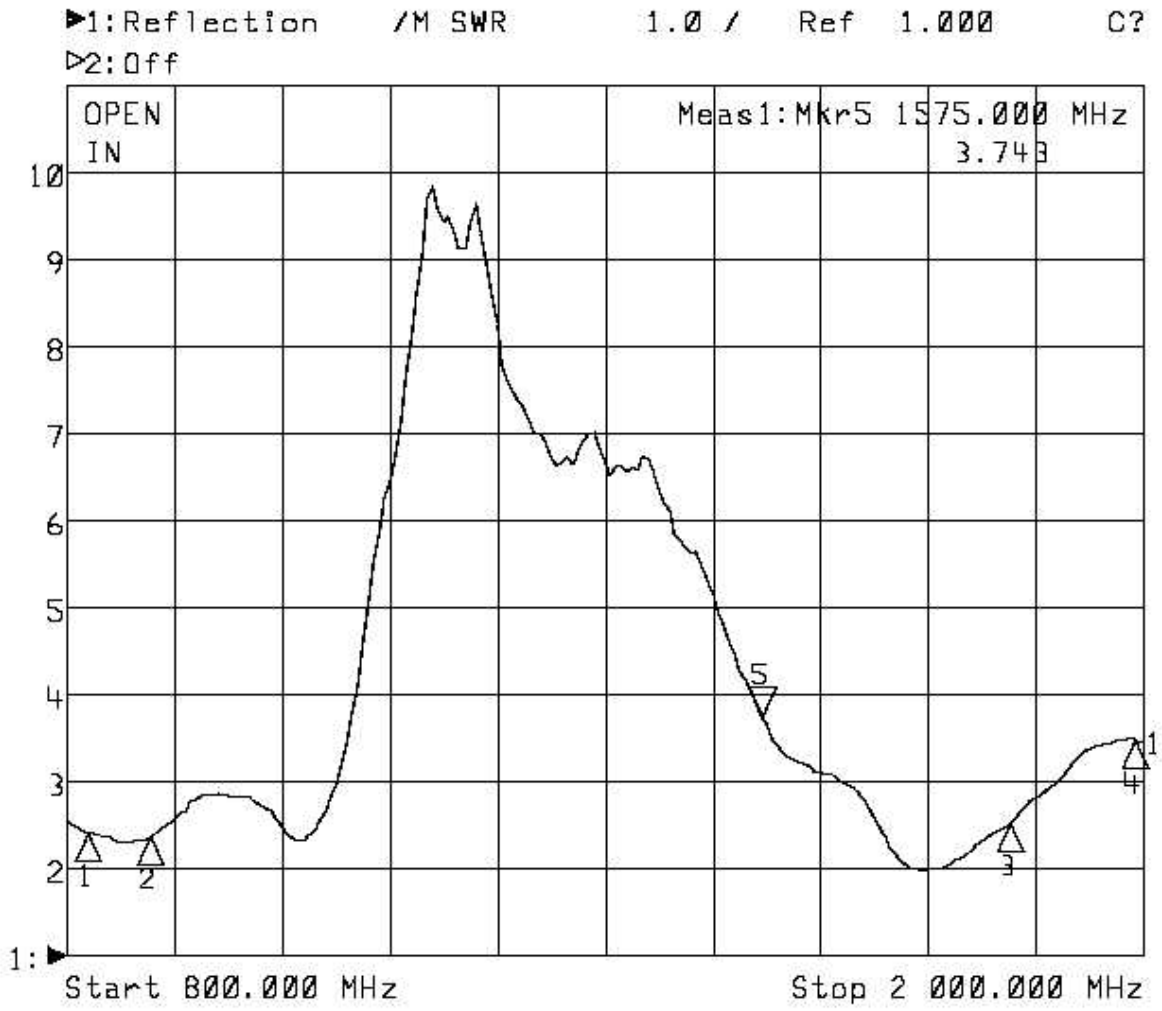
1:Mkr (MHz)		2:Mkr (MHz)
1:	824.0000 2.680	
2:	894.0000 1.871	
3:	1850.0000 1.251	
4:	1990.0000 2.146	
5>	1575.0000 2.516	

CLOSE OUT



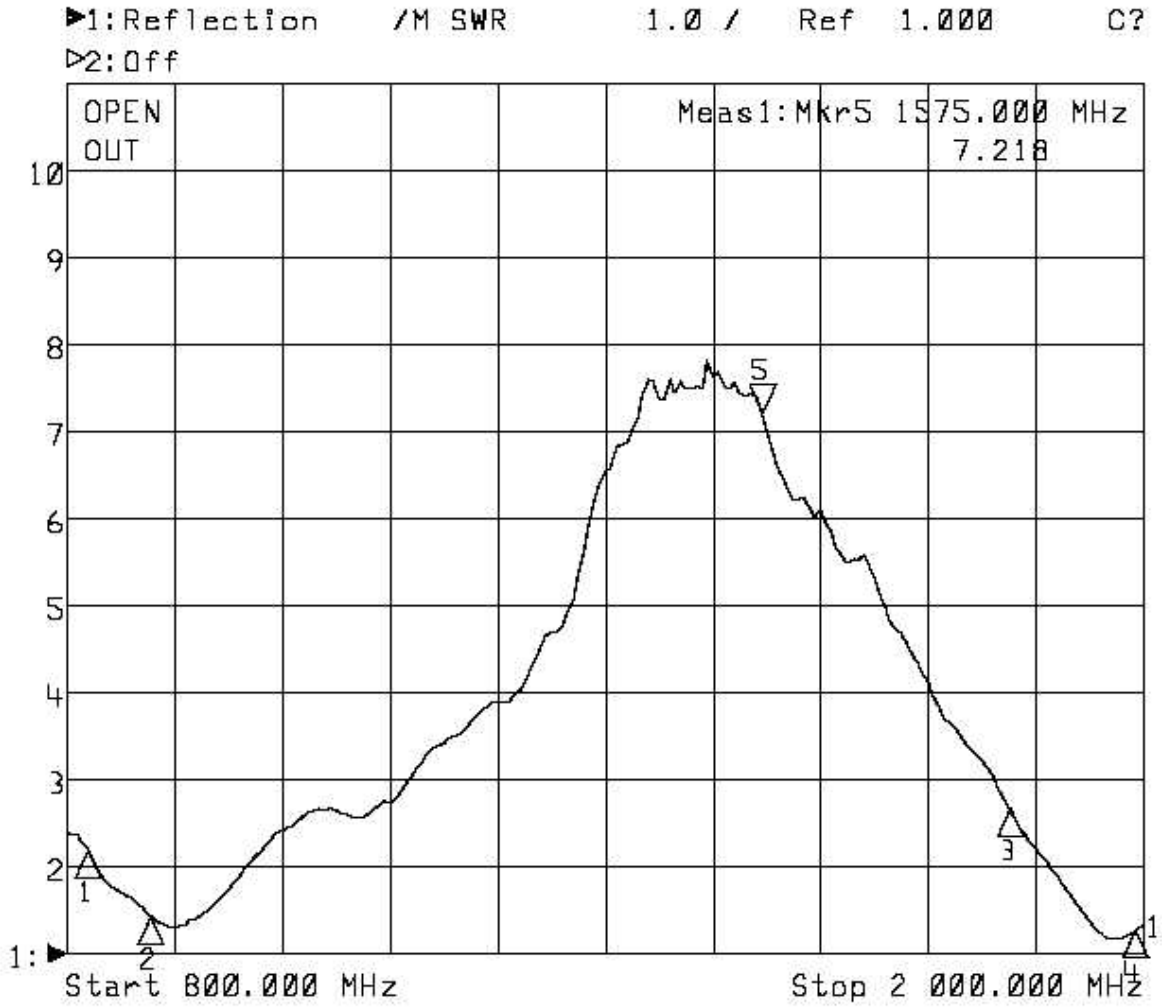
1:Mkr (MHz)		2:Mkr (MHz)
1:	824.0000 1.633	
2:	894.0000 1.475	
3:	1850.0000 3.581	
4:	1990.0000 1.728	
5>	1575.0000 6.343	

OPEN IN



1:Mkr (MHz)		2:Mkr (MHz)
1:	824.0000 2.403	
2:	894.0000 2.367	
3:	1850.0000 2.516	
4:	1990.0000 3.480	
5>	1575.0000 3.743	

OPEN OUT



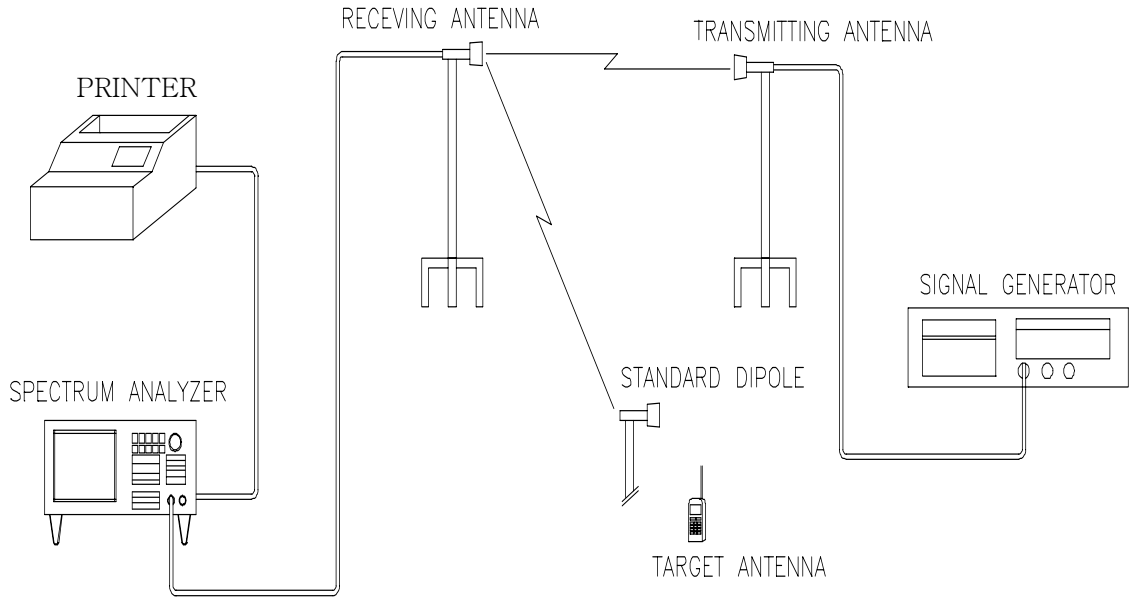
1:Mkr (MHz)		2:Mkr (MHz)
1:	824.0000 2.191	
2:	894.0000 1.432	
3:	1850.0000 2.673	
4:	1990.0000 1.263	
5>	1575.0000 7.218	

3.2 Antenna Gain

Antenna gain shall be measured in decibels relative to a half wavelength horn reference antenna (unit : dBi)

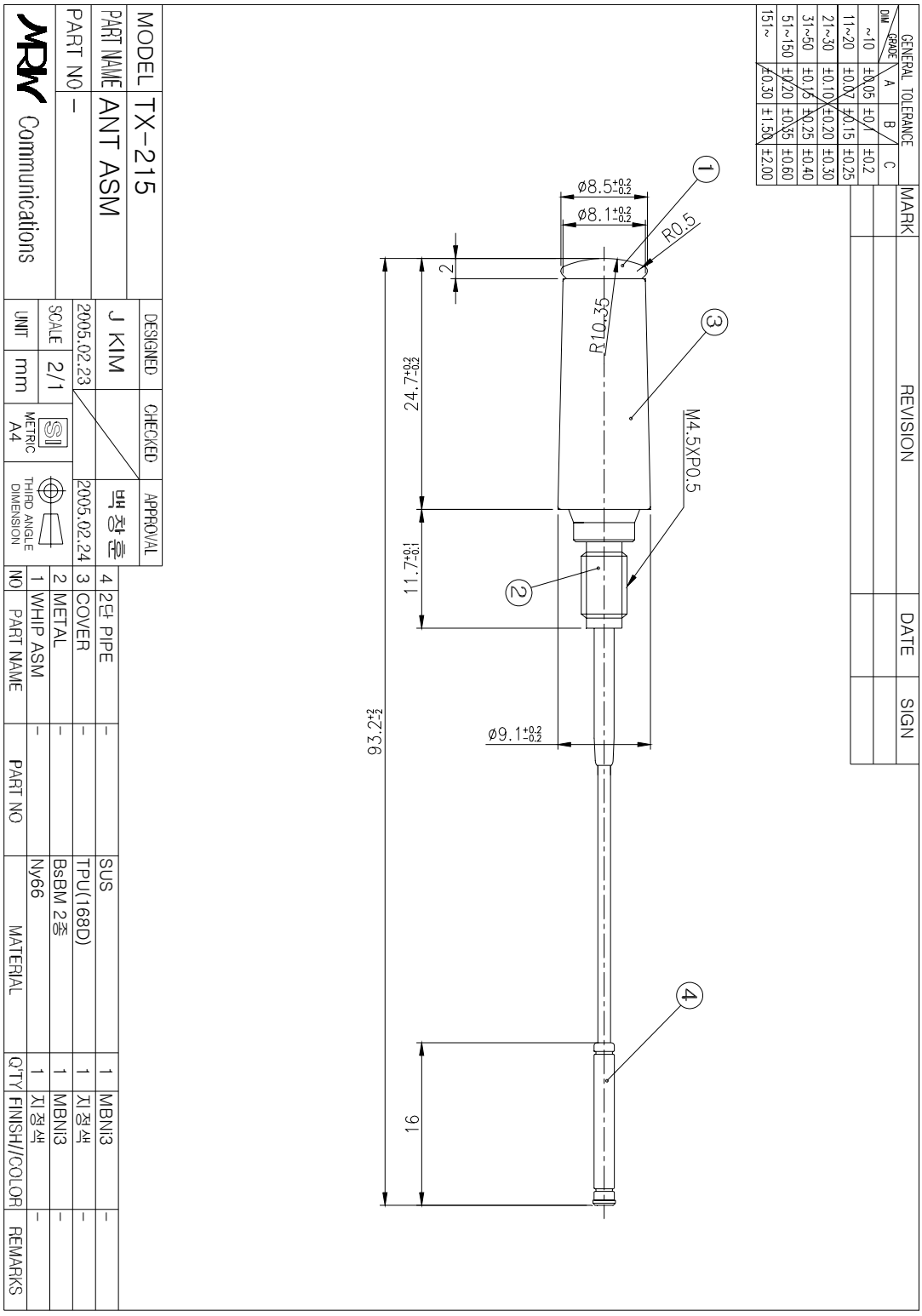
The peak gain of the antenna as follows.

GAIN(Peak)	
CELLULAR AZMUTH CLOSE IN	> 0.86 dBi
CELLULAR AZMUTH CLOSE OUT	> 2.30 dBi
CELLULAR AZMUTH OPEN IN	> −0.14dBi
CELLULAR AZMUTH OPEN OUT	> 1.38 dBi
US-PCS AZMUTH CLOSE IN	> 0.49 dBi
US-PCS AZMUTH CLOSE OUT	> 0.94 dBi
US-PCS AZMUTH OPEN IN	> 0.26 dBi
US-PCS AZMUTH OPEN OUT	> 1.14 dBi
CELLULAR ELEVATION-1 CLOSE IN	> −0.28 dBi
CELLULAR ELEVATION-1 CLOSE OUT	> 1.33dBi
CELLULAR ELEVATION-1 OPEN IN	> −0.61dBi
CELLULAR ELEVATION-1 OPEN OUT	> 1.43dBi
US-PCS ELEVATION-1 CLOSE IN	> −1.84dBi
US-PCS ELEVATION-1 CLOSE OUT	> 0.92dBi
US-PCS ELEVATION-1 OPEN IN	> −1.98dBi
US-PCS ELEVATION-1 OPEN OUT	> 0.69dBi
CELLULAR ELEVATION-2 CLOSE IN	> 0.39dBi
CELLULAR ELEVATION-2 CLOSE OUT	> 1.98dBi
CELLULAR ELEVATION-2 OPEN IN	> 0.25dBi
CELLULAR ELEVATION-2 OPEN OUT	> 2.05dBi
US-PCS ELEVATION-2 CLOSE IN	> −0.49dBi
US-PCS ELEVATION-2 CLOSE OUT	> −0.47dBi
US-PCS ELEVATION-2 OPEN IN	> 0.08dBi
US-PCS ELEVATION-2 OPEN OUT	> 0.23dBi


RECEVING ANTENNA
TRANSMITTING ANTENNA
PRINTER
SIGNAL GENERATOR
SPECTRUM ANALYZER
STANDARD DIPOLE
TARGET ANTENNA

4.Mechanical Specification

4.1Dimension (Refer to the drawing.)



4.2 Bending Test

There shall not be any visible damage and shall met electrical specification after 1,000 times bending at 90° form side to side.

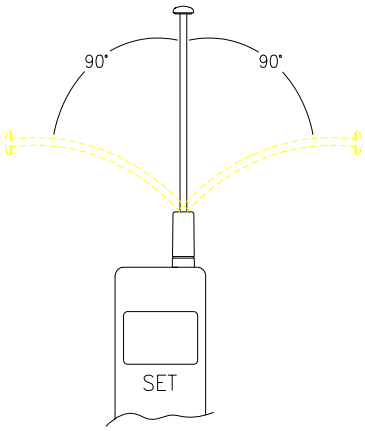


Figure. 3 Bending Test

4.3 Extraction / Retraction Test

When the whip of antenna is pulled up for extraction in retracted position, the force should be 200 ~ 600gf and when the whip of antenna is pushed down for retraction, he release force of stopper shall be 200 ~600gf.

4.4 Drop Test

The handset installed with antenna is dropped from 1.5m onto the concrete bottom for 3 times.

There shall not be any major visible damage and the antenna shall perform normally as defined in this specification after the test.

4.5 Pull Test

The antenna is assembled in the test equipment and pulling force with 7kgf is applied to the antenna for 30 seconds.

No visual deterioration shall occur and the antenna shall satisfy the electrical demands after the test.

4.6 Torque Test

The antenna is assembled to the test equipment. After applying the torque force with 5kgf in clockwise direction between fitting and plastic, no visual deterioration shall occur, the antenna shall satisfy the electrical demands after the test.

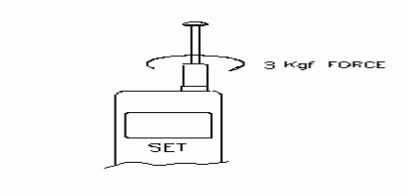


Figure 4. Torque Test

4.7 Cycle Test

The antenna is fully extended / retracted (1 cycle) with 10000 times and the extraction / retraction force is measured every 2000 cycles.

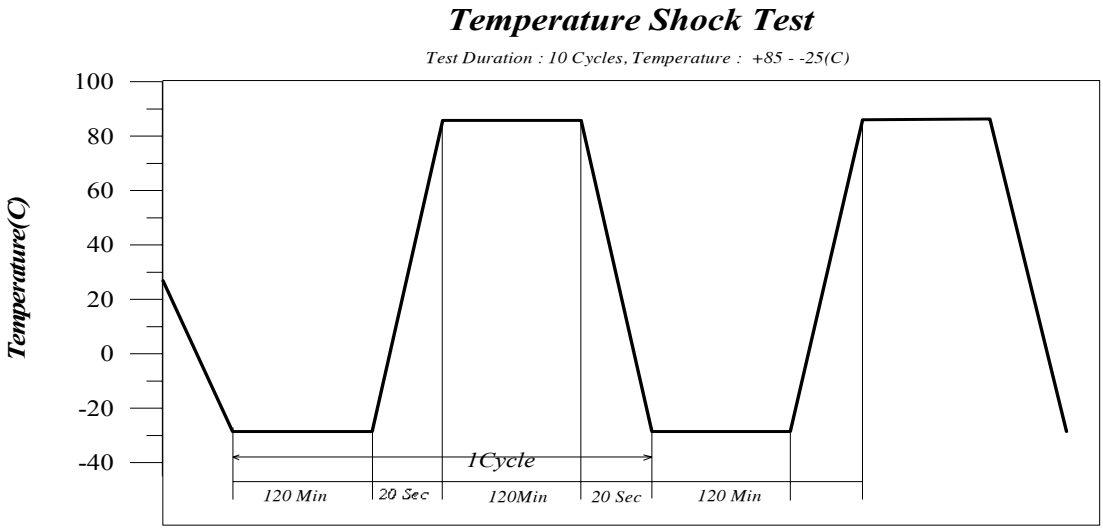
The extraction/retraction force of antenna shall keeps 50 ~ 350gf.

No visual deterioration shall occur and the antenna shall satisfy the electrical demands after the test.

5. Environmental Specification

5.1 Thermal Shock

The antenna shall withstand 10 repeated cycles of 120 minutes at −25ºC and 120 minutes at +85ºC with a maximum transition time between temperature extremes of 20 seconds. The antenna shall satisfy the electrical specification after the test. The antenna shall have no deterioration after the test.



5.2 Temperature Cycling

The antenna is placed in the temperature chamber with −40 for 3 hours and measured after taking out of chamber.

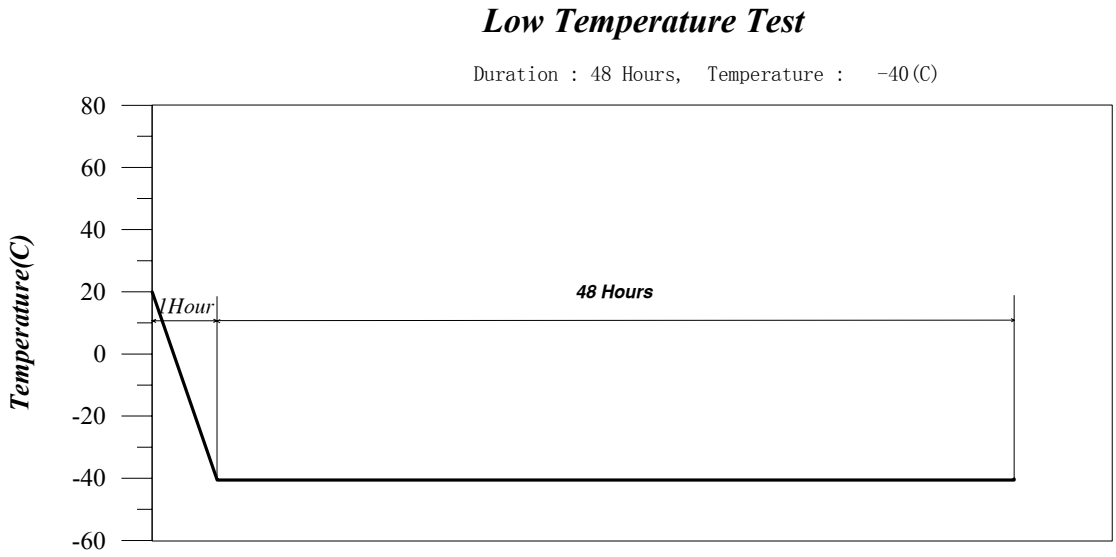
After that, the antenna is again placed in the temperature chamber with +70ºC for 3 hours and measured after taking out of chamber.

The antenna shall not be any visible damage and it shall meet electrical spec.

5.3 Low Temperature Test

The antenna is placed in the temperature chamber with −40℃ for 48 hours and measured after taking out of chamber.

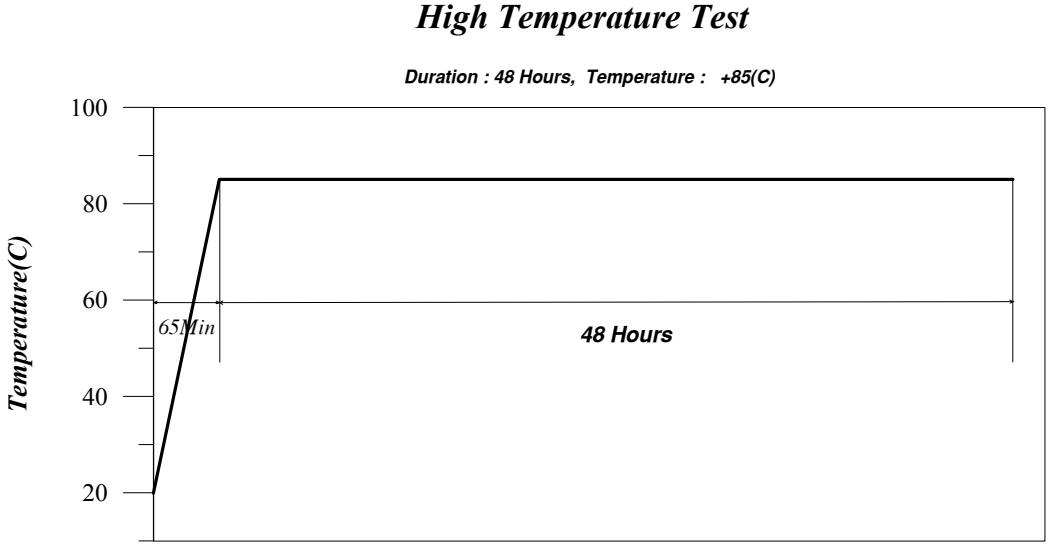
The antenna shall not be any visible damage and it shall meet electrical spec.



5.4 High Temperature Test

The antenna is placed in the temperature chamber and test it under below condition and measured it after taking out of chamber.

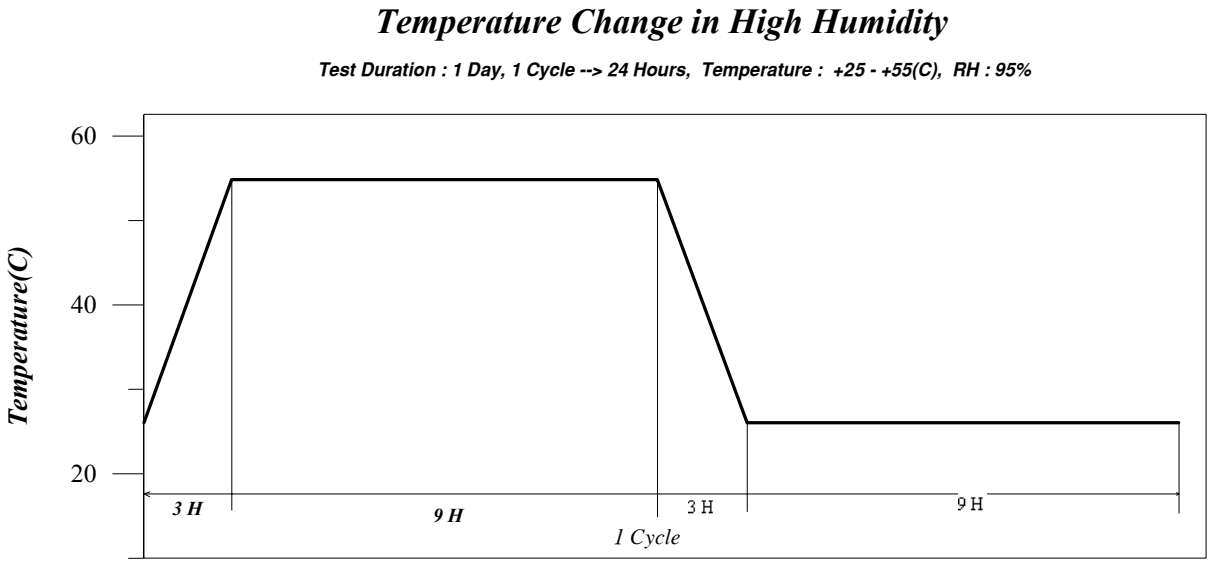
The antenna shall not be any visible damage and it shall meet electrical spec.



5.5 Humidity Test

The antenna is placed in the temperature chamber and test it under below condition and measured it after taking out of chamber.

The antenna shall not be any visible damage and it shall meet electrical spec.



5.6 Vibration Test

The antenna shall withstand 2G's RMS(10Hz – 150Hz – 10Hz / 1cycle) with 0.5 octave/min, 12cycles in X,Y,Z direction.

No appearance or function changes shall be found after the test.

5.7 Salt Spray Test

The antenna shall be exposed for 48 hours at +35℃ to a 5% Sodium Chloride fog and have no appearance or function changes after the test.

Appendix A. Reference of TestMethods

		Test Items	Reference
Mechanical	MRWS-Ma	Drop Test	IEC 68-2-31
	MRWS-Mb	Insertion/Extraction Test	-
	MRWS-Mc	Pulling Test	-
	MRWS-Md	Bending Test	-
	MRWS-Me	Torsion Test	-
	MRWS-Mf	Helix Breaking Test	-
	MRWS-Mg	Endurance Test	-
Enviromental	MRWES-Na	Temperature Shock Test	IEC 68-2-14
	MRWES-Nb	Temperature Cyclng Test	IEC 68-2-14
	MRWES-Ab	Low Temperature Test	IEC 68-2-1
	MRWES-Bb	Hot Temperature Test	IEC 68-2-2
	MRWES-D	Humidity Test	IEC 68-2-30
	MRWES-Fc	Sinusoidal Vibration Test	IEC 68-2-6

. MRWS-M : MRW Mechanical Standard

. MRWES- : MRW Environmental Standard