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ANTENNA SPECIFICATION

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

C U S T O M E R	PREPARED	CHECKED	APPROVED
S U P P L I E R	PREPARED Advanced young woo _shin	CHECKED Senior engineer jin_kim	APPROVED Director chang hoon_paik
			

- ☐ **SUPPLIER: MRW Communications ,Ltd**
- ☐ **ADDRESS: 137-5, Okum-ri, Tanhyon-myon, Paju-shi,Kyunggi-do,Korea**
- ☐ **TEL: 031-940-9001 / FAX: 031-940-9090**
- ☐ **PRESIDENT: M.J.Woo**
- ☐ **CUSTOMER: Pantech & Curitel**



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RETRACTABLE ANTENNA SPECIFICATION

(MRT-06400)

TX-215



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1. Specification

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1.1 Electrical Specification

Frequency Range	CELLULAR 824Mhz – 894 MHz GPS 1575 MHz US-PCS 1850MHz – 1990MHz	
V.S.W.R	CELLULAR CLOSE IN	< 3.2 : 1
	CELLULAR CLOSE OUT	< 1.7 : 1
	CELLULAR OPEN IN	< 2.0 : 1
	CELLULAR OPEN OUT	< 1.8 : 1
	GPS CLOSE IN	< 2.1 : 1
	GPS CLOSE OUT	< 3.25 : 1
	GPS OPEN IN	< 1.8 : 1
	GPS OPEN OUT	< 3.93 : 1
	US-PCS CLOSE IN	< 2.8 : 1
	US-PCS CLOSE OUT	< 3.41 : 1
	US-PCS OPEN IN	< 2.3 : 1
	US-PCS OPEN OUT	< 3.8 : 1
Impedance	50Ω	
Radiation Pattern	Omni-directional	
Polarization	Vertical	
Max power	2W	

CELLULAR GAIN (PEAK)	TX	849Mhz	1.83dBi	AZIMUTH	CLOSE OUT
	RX	894Mhz	2.54dBi	ELEVATION-2	CLOSE OUT
US - PCS GAIN (PEAK)	TX	1850Mhz	2.02dBi	ELEVATION-1	OPEN OUT
	RX	1930Mhz	0.70dBi	AZIMUTH	CLOSE IN
GPS GAIN (PEAK)	1575Mhz		1.78dBi	AZMUTH	OPEN IN



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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	50EA	P.P	
Air Vinyl	—	Polyester	
Inner Box	20EA	SW 1 (A)	17.4Kgf/50mm min.
Master Carton Box	1,000EA	DW 1(A)	25.4Kgf/50mm min.



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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

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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.

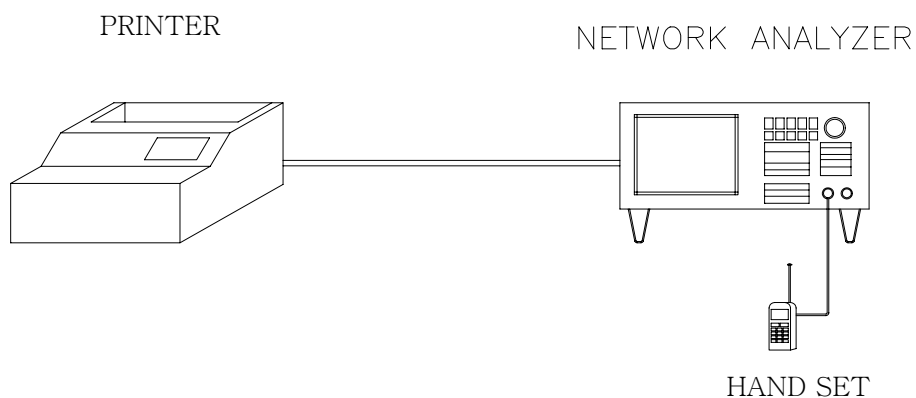


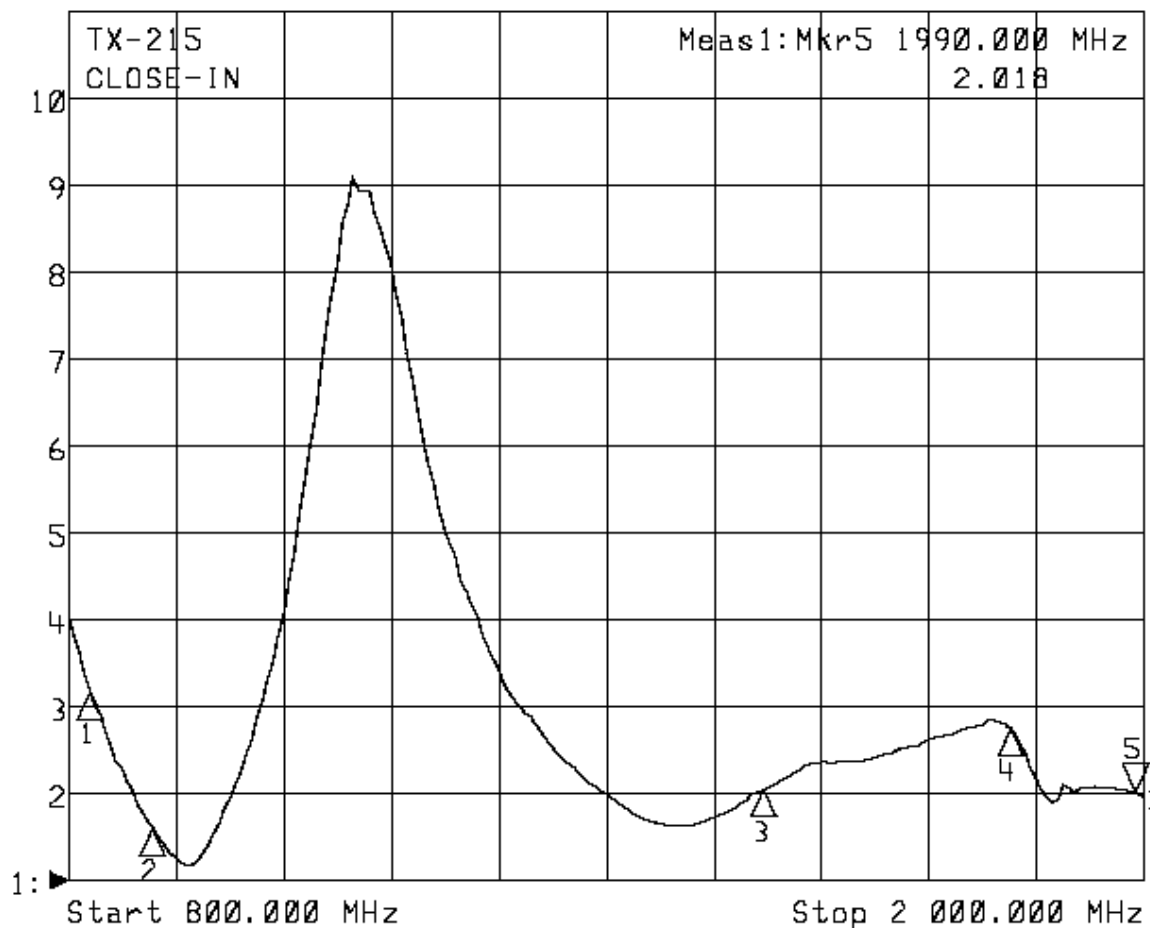
Figure 1 V.S.W.R Measurement System



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CLOSE IN

►1: Reflection SWR 1.0 / Ref 1.000 C?
►2: Off



1: Mkr (MHz)	2: Mkr (MHz)	Ohm	Ohm
1: 824.0000	3.174		
2: 894.0000	1.611		
3: 1575.0000	2.042		
4: 1850.0000	2.752		
5> 1990.0000	2.018		

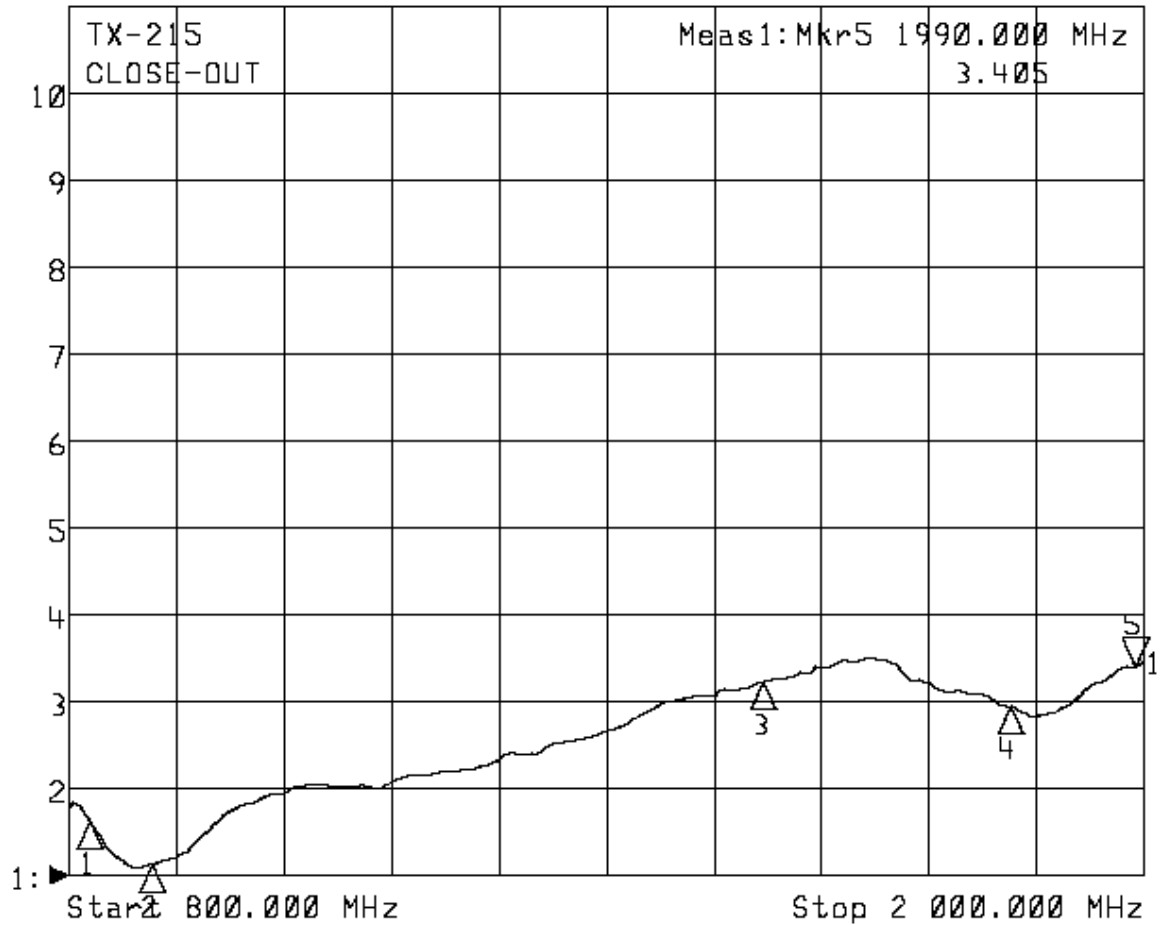


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CLOSE OUT

►1: Reflection SWR 1.0 / Ref 1.000 C?

►2: Off



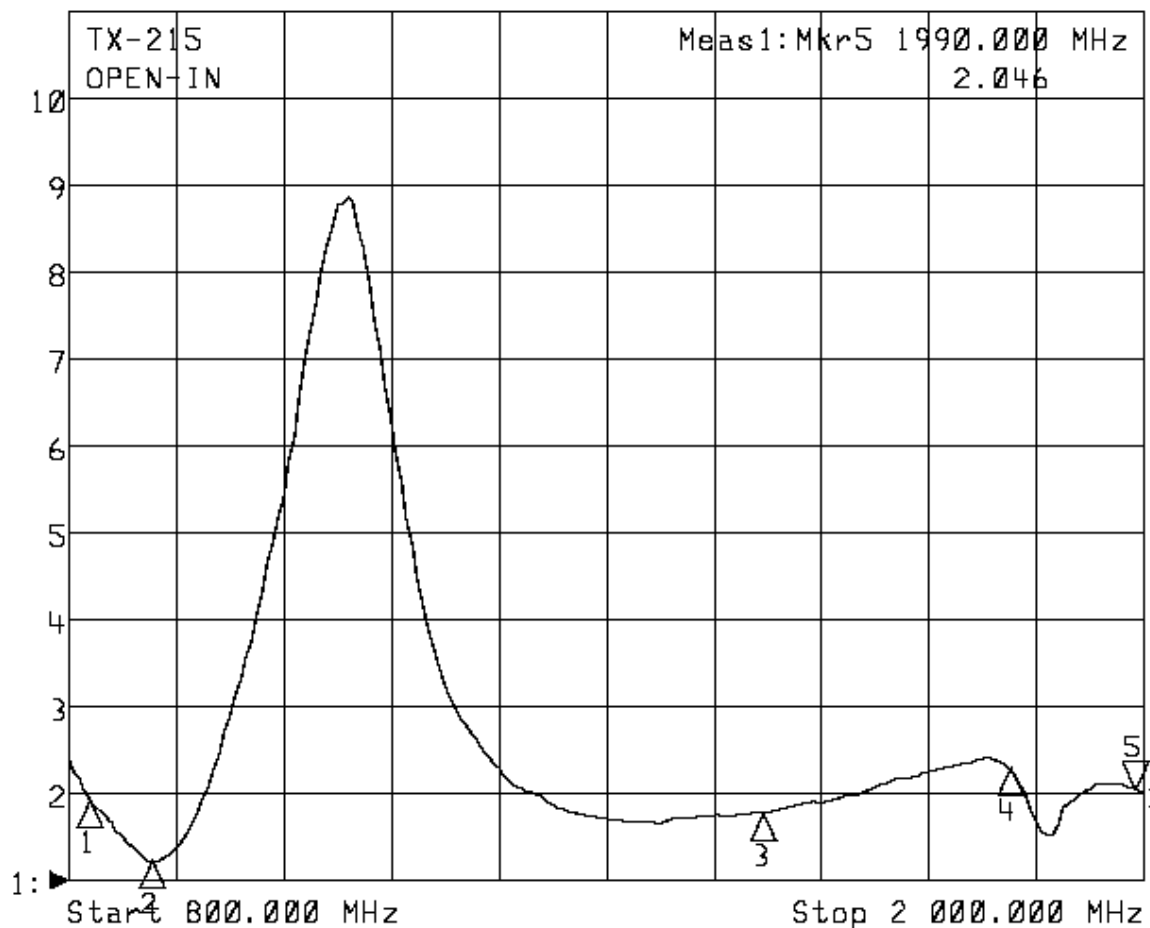
1: Mkr (MHz)	2: Mkr (MHz)	Ohm	Ohm
1: 824.0000	1.626		
2: 894.0000	1.124		
3: 1575.0000	3.218		
4: 1850.0000	2.940		
5> 1990.0000	3.405		



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OPEN IN

►1: Reflection SWR 1.0 / Ref 1.000 C?
►2: Off



1: Mkr (MHz)	2: Mkr (MHz)	Ohm	Ohm
1: 824.0000	1.926		
2: 894.0000	1.216		
3: 1575.0000	1.777		
4: 1850.0000	2.291		
5: 1990.0000	2.046		

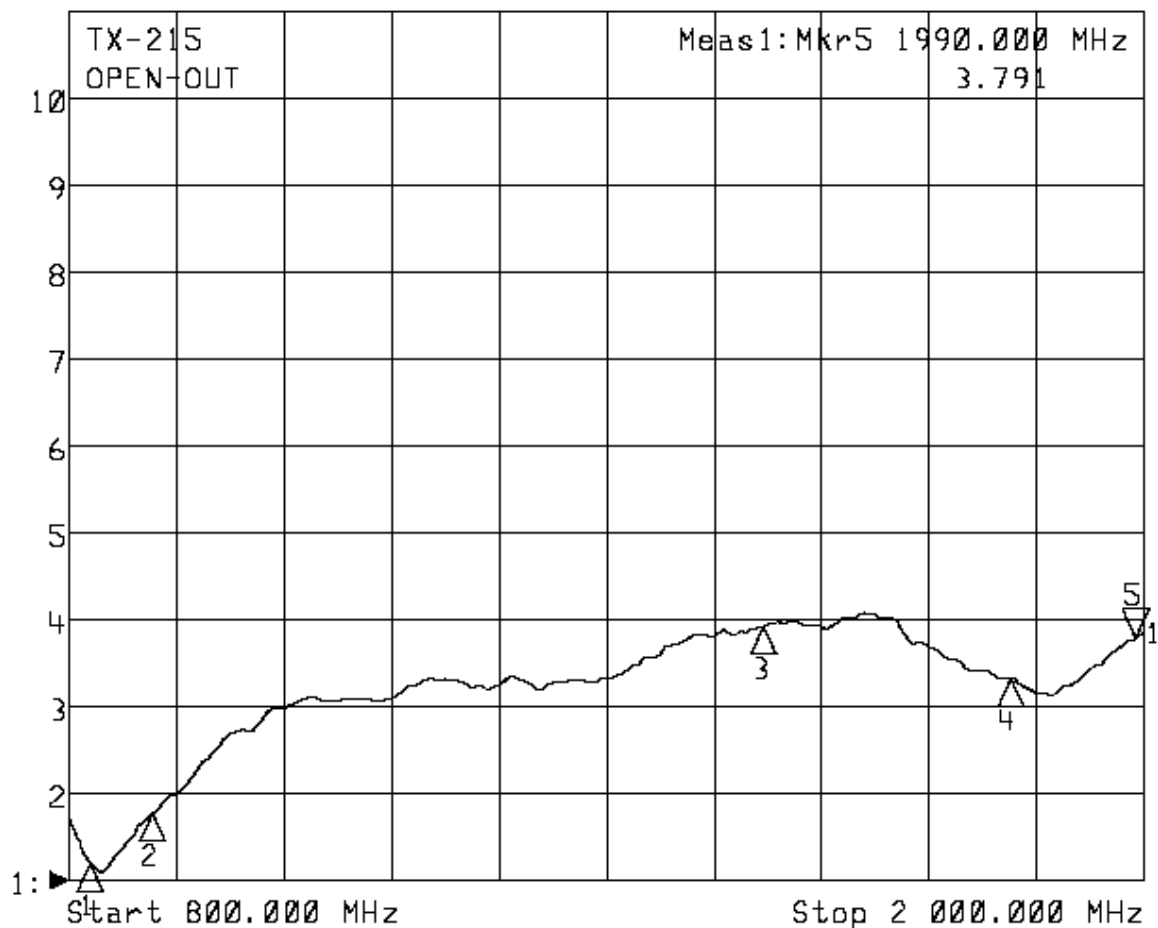


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OPEN OUT

►1:Reflection SWR 1.0 / Ref 1.000 C?

►2:Off



1: Mkr (MHz)	2: Mkr (MHz)	Ohm	Ohm
1: 824.0000	1.202		
2: 894.0000	1.768		
3: 1575.0000	3.924		
4: 1850.0000	3.320		
5> 1990.0000	3.791		

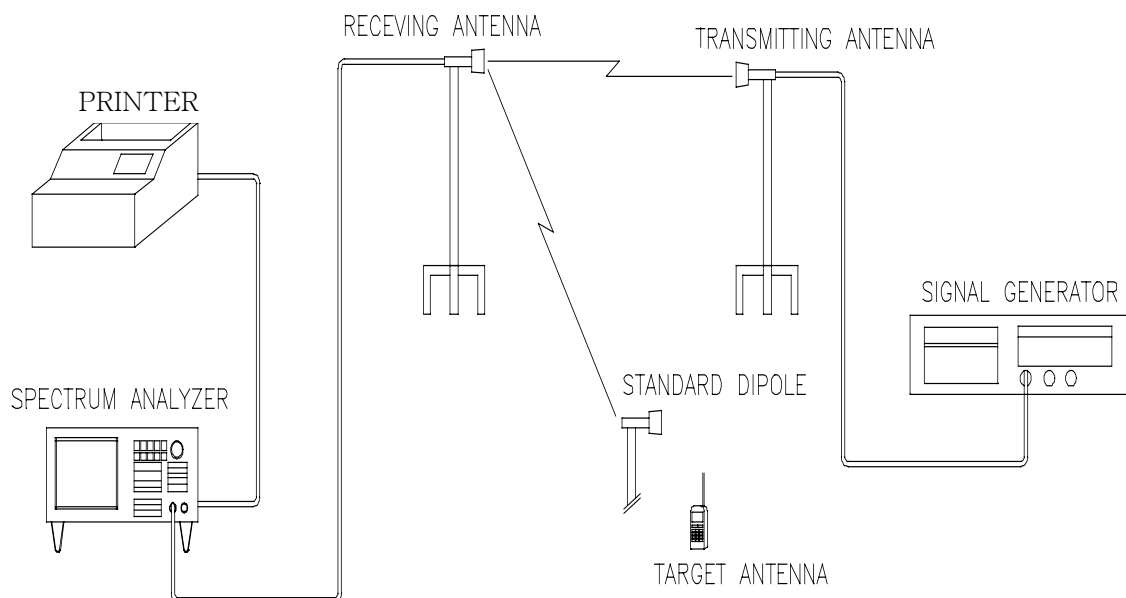
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3.2 Antenna Gain

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

The peak gain of the antenna as follows.

GAIN(Peak)	CELLULAR CLOSE IN	> 2.29 dBi
	CELLULAR CLOSE OUT	> 2.54 dBi
	CELLULAR OPEN IN	> 2.51 dBi
	CELLULAR OPEN OUT	> 2.52 dBi
	GPS CLOSE IN	> 1.66 dBi
	GPS CLOSE OUT	> -0.03 dBi
	GPS OPEN IN	> 1.78 dBi
	GPS OPEN OUT	> -0.66 dBi
	US-PCS CLOSE IN	> 1.63 dBi
	US-PCS CLOSE OUT	> 1.40 dBi
	US-PCS OPEN IN	> 1.39 dBi
	US-PCS OPEN OUT	> 2.02dBi

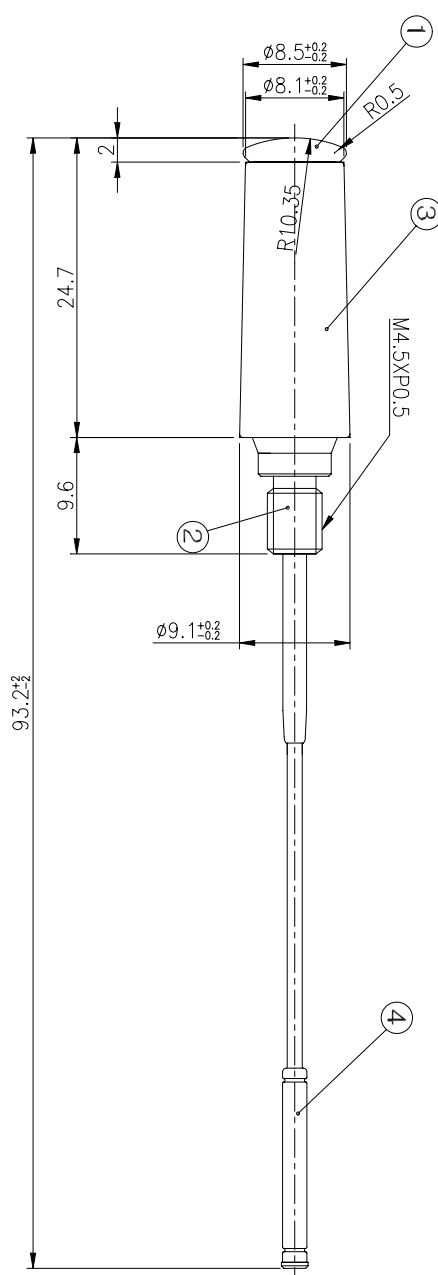


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4. Mechanical Specification

4.1 Dimension (Refer to the drawing)

GENERAL TOLERANCE			MARK	REVISION	DATE	SIGN
DIM.	GRADE					
	A	B	C			
~10	±0.05	±0.	±0.2			
11~20	±0.07	±0.15	±0.25			
21~30	±0.10	±0.20	±0.30			
31~50	±0.15	±0.25	±0.40			
51~150	±0.20	±0.35	±0.60			
151~	±0.30	±1.50	±2.00			



MODEL	TX-215		DESIGNED	CHECKED	APPROVAL							
PART NAME	ANT ASM		J KIM		백창훈	4	2단 PIPE	-	SUS	1	MBN3	-
PART NO	-	2005.04.21				2005.04.21	3	COVER	-	TPU(168D)	1	지정 색
	SCALE	2/1				2	METAL	-	BSBM 2중	1	MBN3	-
	UNIT	mm				1	WHIP ASM	-	Ny66	1	지정 색	-
												
Communications												
		MATERIAL										
		Q'TY FINISH/COLOR REMARKS										

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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.

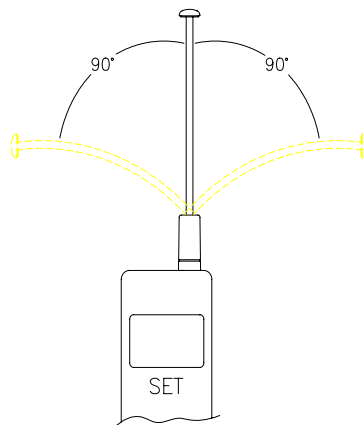


Figure. 3 Bending Test

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.

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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.

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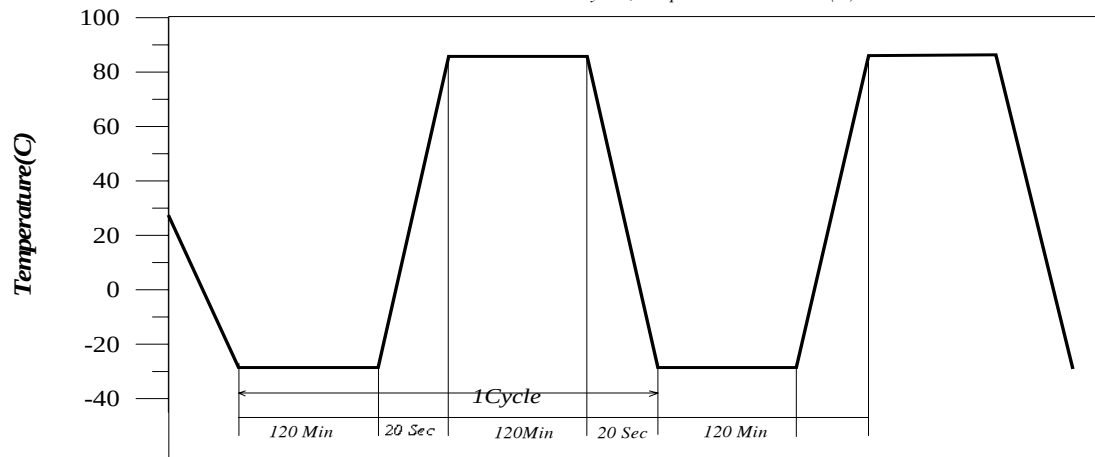
5. Environmental Specification

5.1 Thermal Shock

The antenna shall withstand 10 repeated cycles of 120 minutes at -25°C and 120 minutes at $+85^{\circ}\text{C}$ 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.

Temperature Shock Test

Test Duration : 10 Cycles, Temperature : $+85 - -25(^{\circ}\text{C})$



5.2 Temperature Cycling

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

After that, the antenna is again placed in the temperature chamber with $+70^{\circ}\text{C}$ for 3 hours and measured after taking out of chamber.

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

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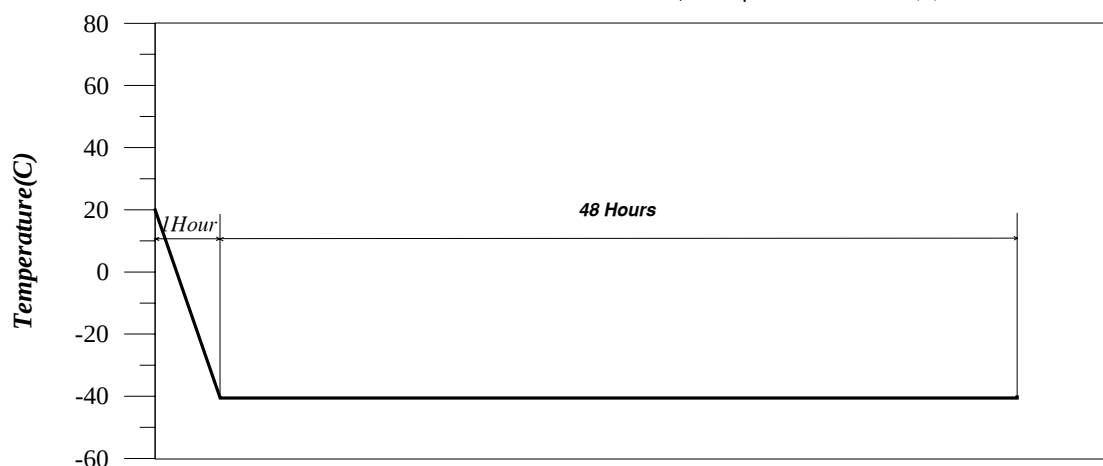
5.3 Low Temperature Test

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

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

Low Temperature Test

Duration : 48 Hurs, Temperature : -40°C



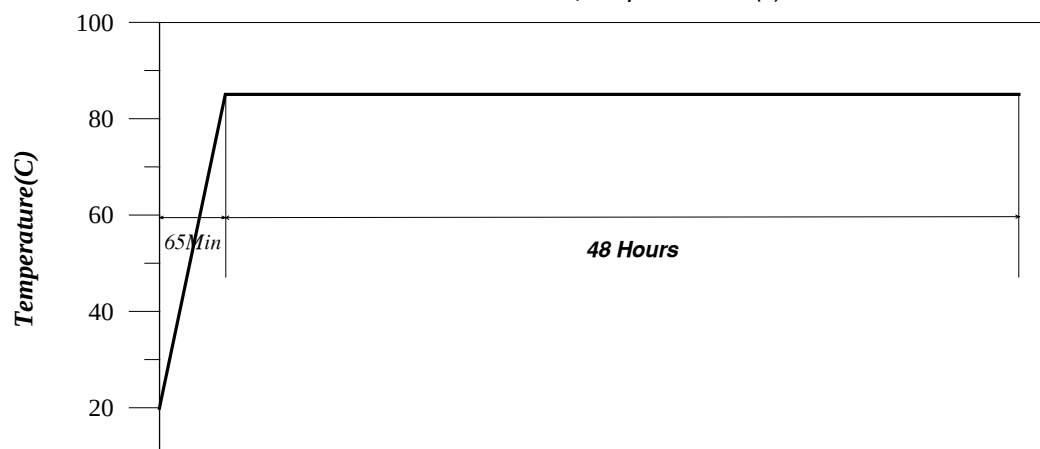
5.4 High Temperature Test

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.

High Temperature Test

Duration : 48 Hours, Temperature : $+85^{\circ}\text{C}$





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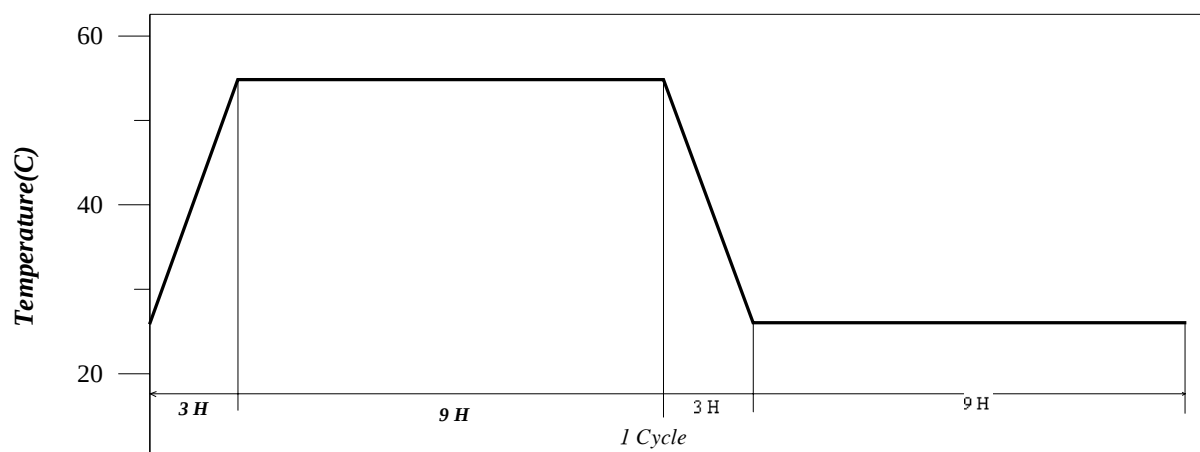
5.5 Humidity Test

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.

Temperature Change in High Humidity

Test Duration : 1 Day, 1 Cycle --> 24 Hours, Temperature : +25 - +55(C), RH : 95%



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°C to a 5% Sodium Chloride fog and have no appearance or function changes after the test.



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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 Cycling 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