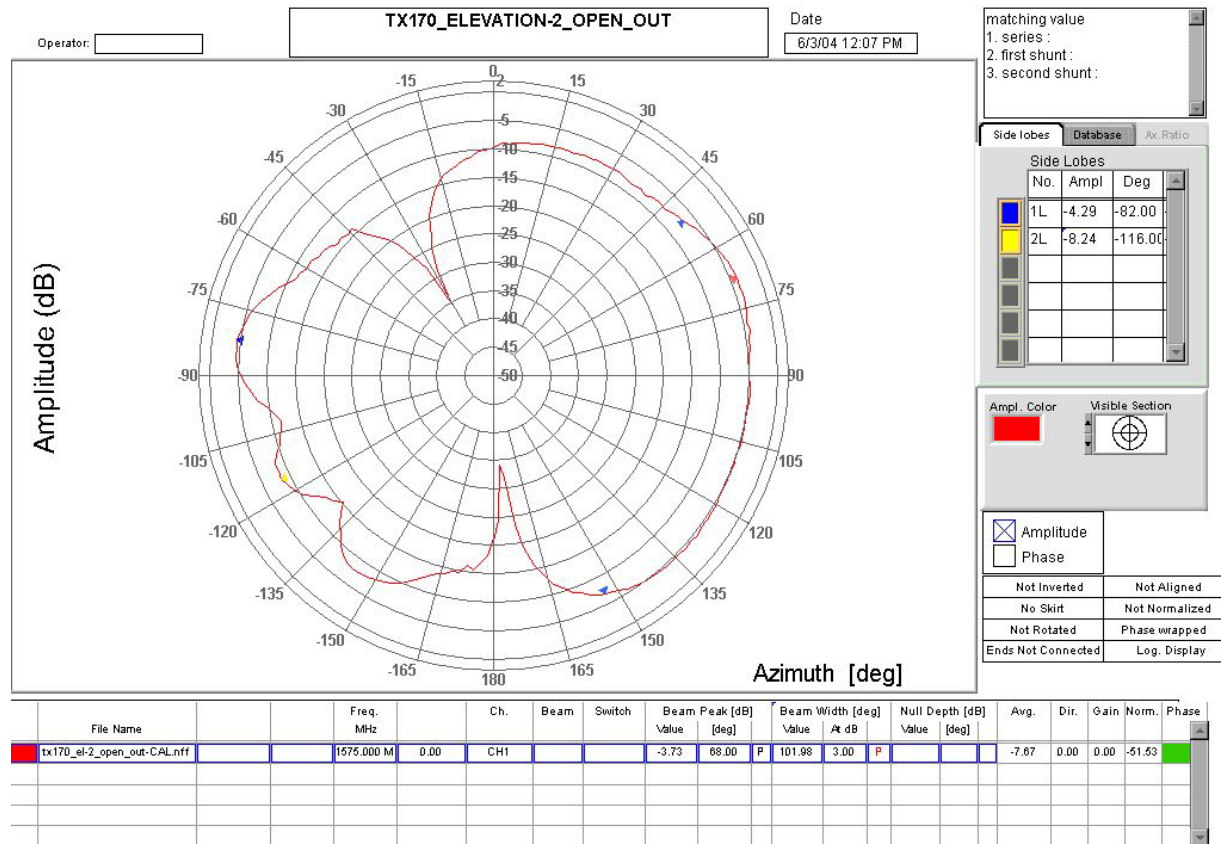




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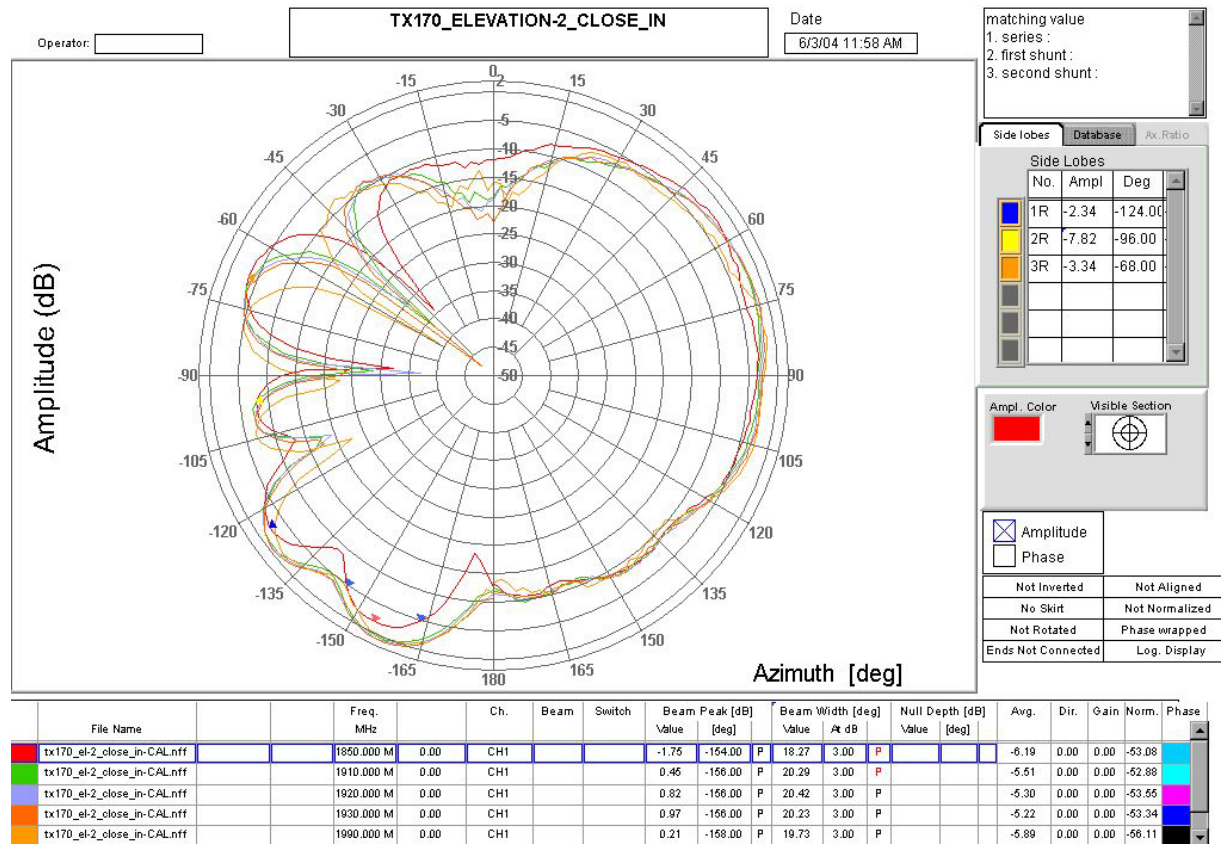
## GPS ELEVATION-2 OPEN OUT





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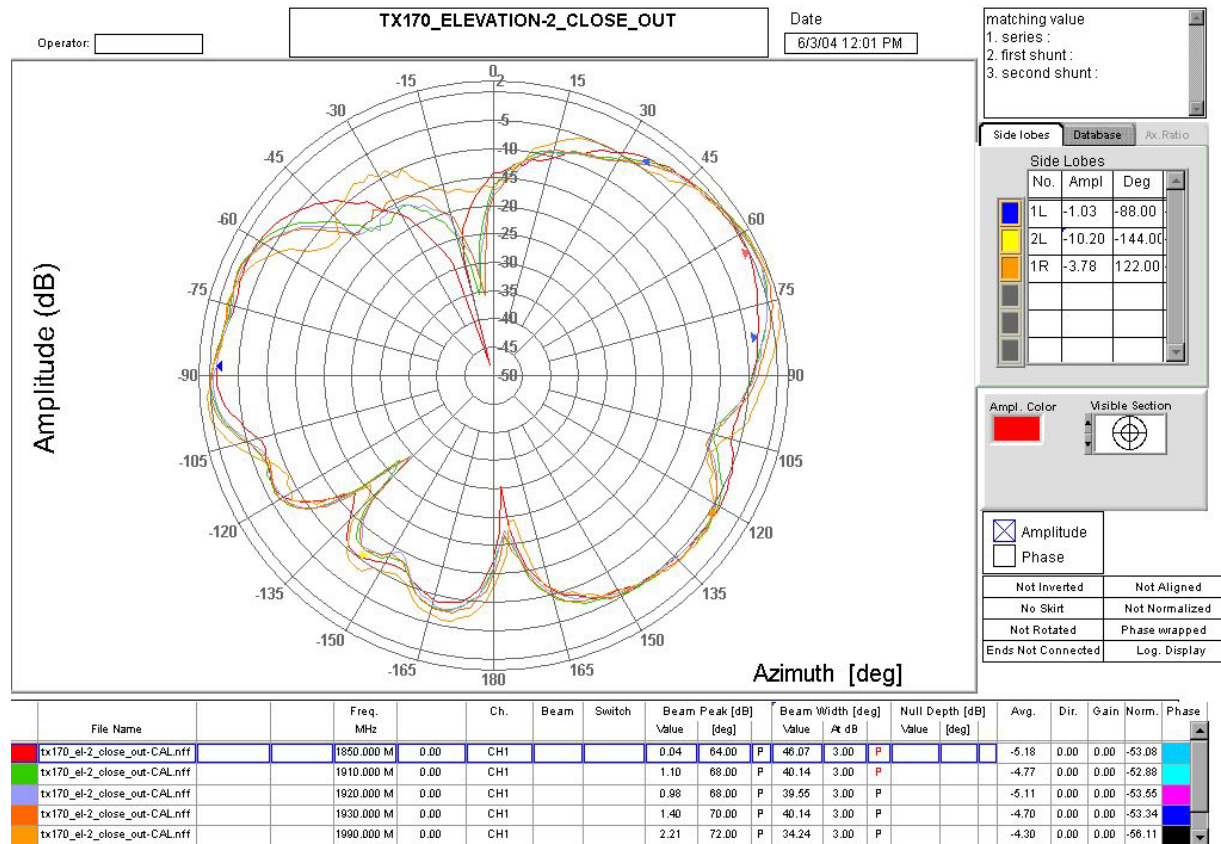
## US-PCS ELEVATION-2 CLOSE IN





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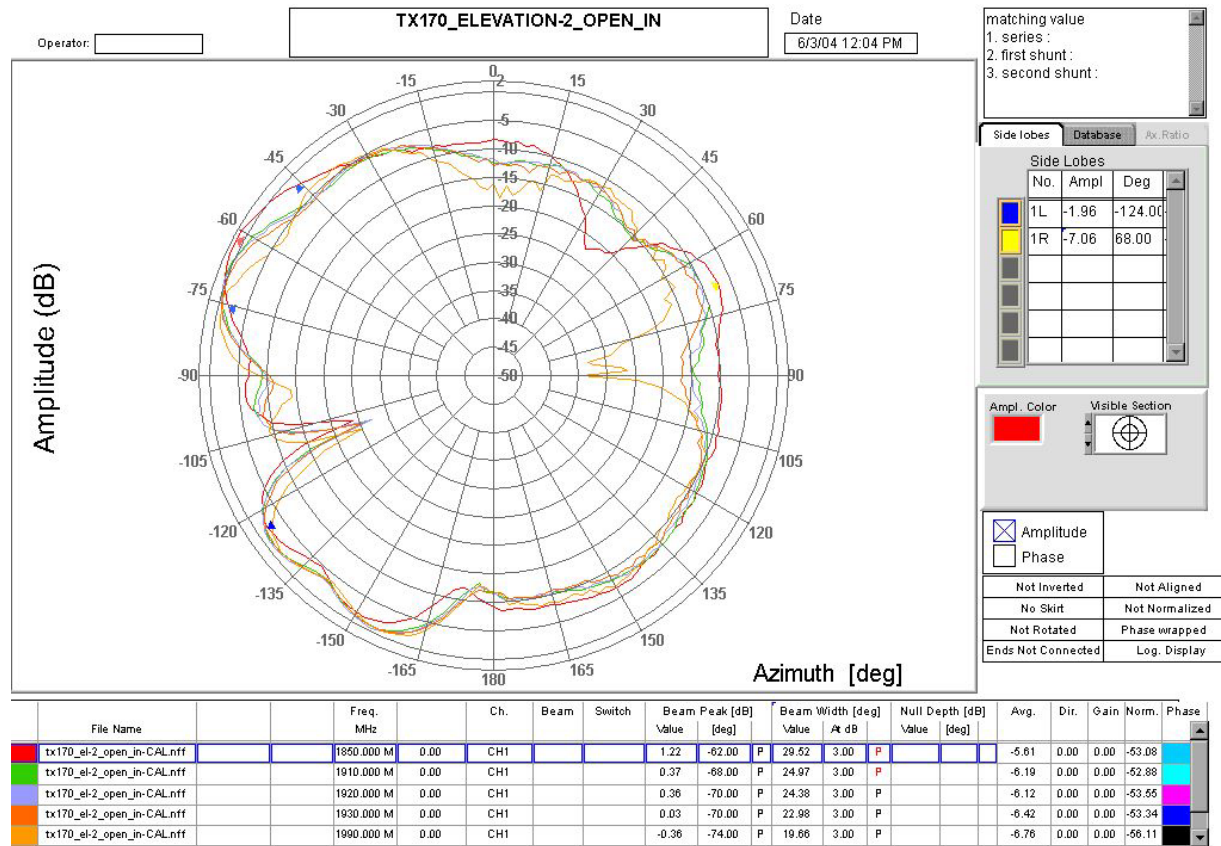
## US-PCS ELEVATION-2 CLOSE OUT





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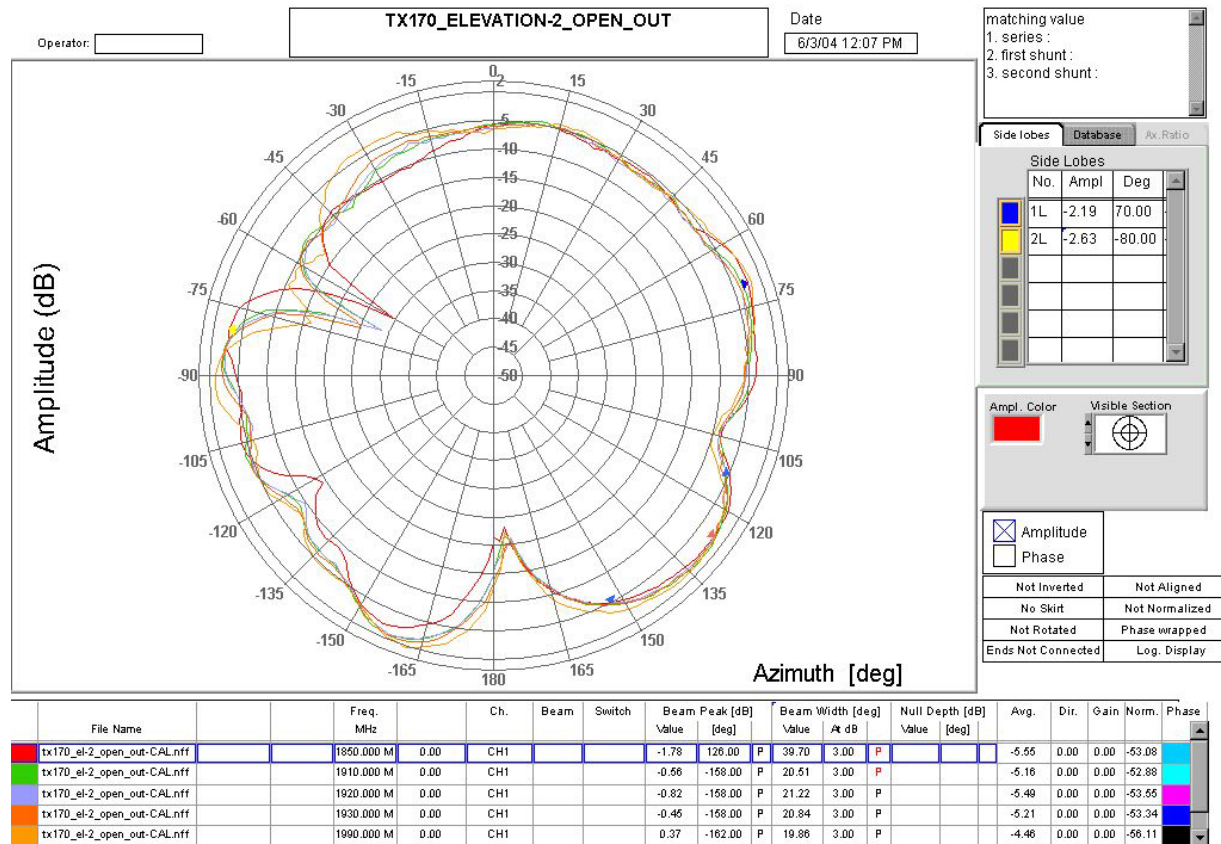
US-PCS ELEVATION-2 OPEN IN





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## US-PCS ELEVATION-2 OPEN OUT



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### 3.3 Antenna Gain

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

The peak gain of the antenna as follows.

GAIN(Peak)	CELLULAR CLOSE IN	> 0 dBi
	CELLULAR CLOSE OUT	> 1 dBi
	CELLULAR OPEN IN	> -1 dBi
	CELLULAR OPEN OUT	> 1 dBi
	GPS CLOSE IN	> -2 dBi
	GPS CLOSE OUT	> -2 dBi
	GPS OPEN IN	> -2 dBi
	GPS OPEN OUT	> -3 dBi
	US-PCS CLOSE IN	> 0 dBi
	US-PCS CLOSE OUT	> 0 dBi
	US-PCS OPEN IN	> 0 dBi
	US-PCS OPEN OUT	> 0 dBi

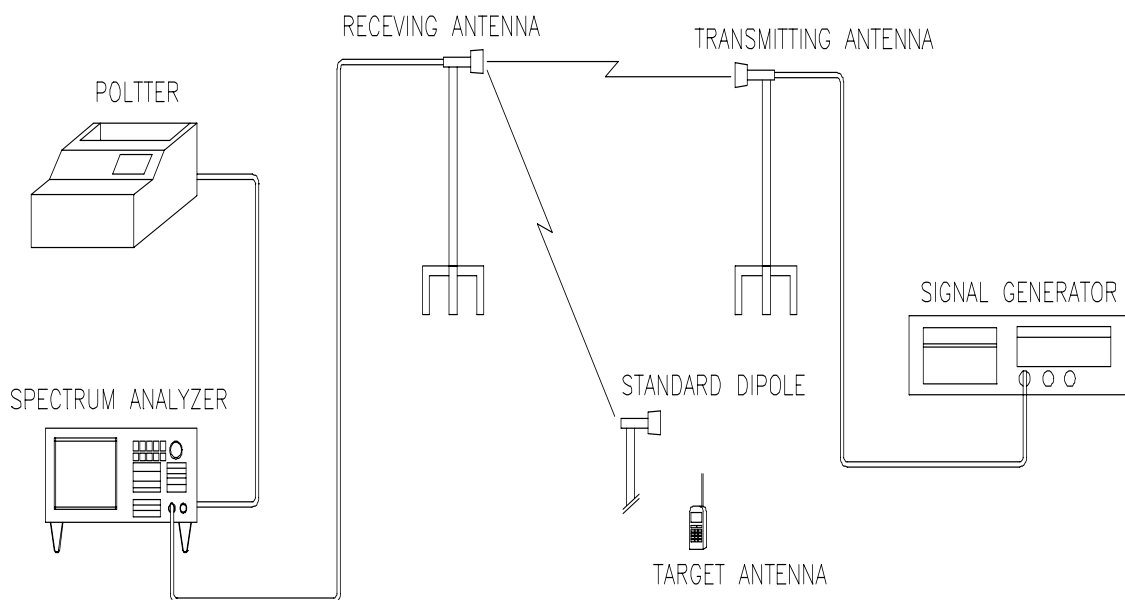
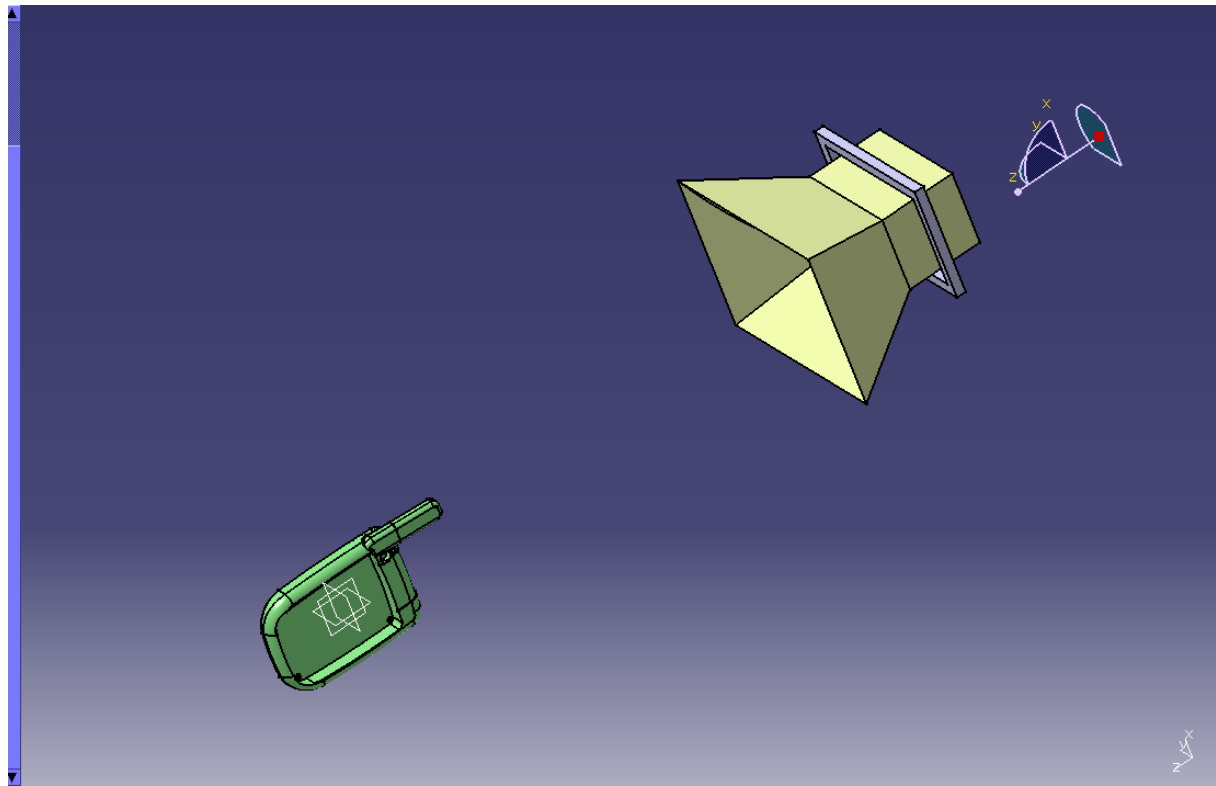


Figure. 2 Antenna Gain Measurement System

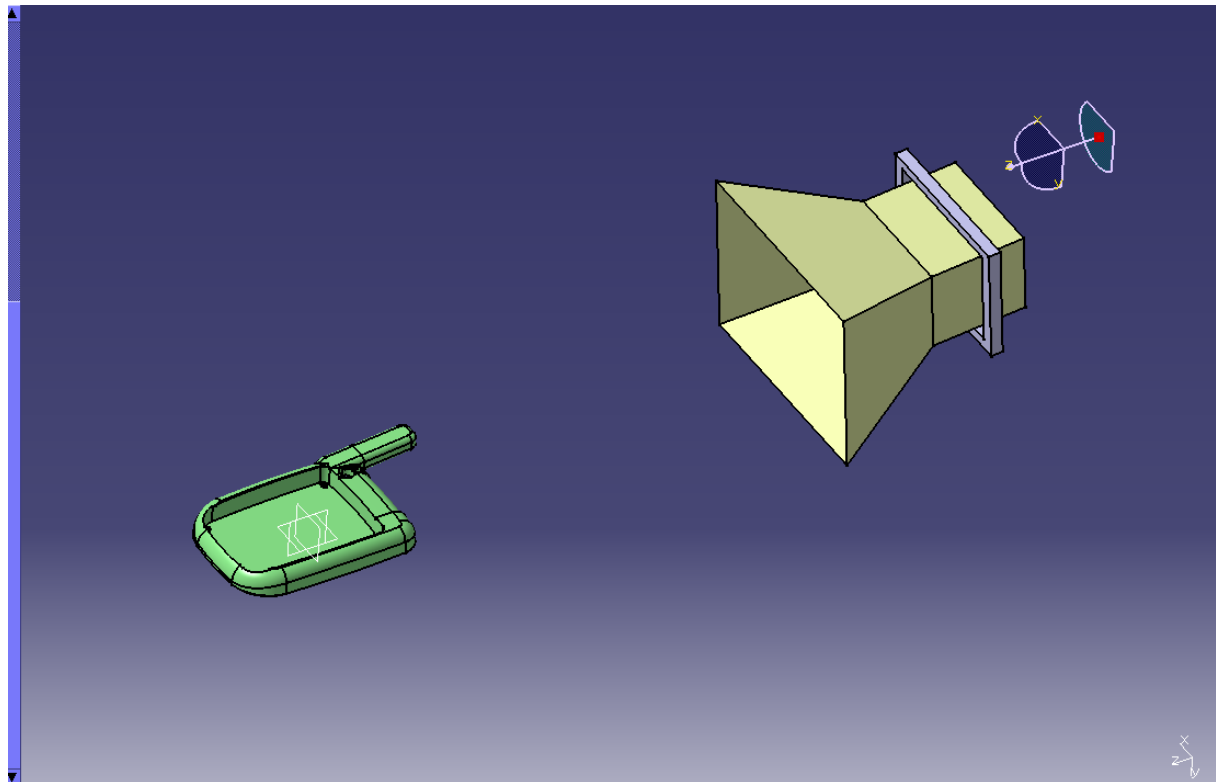


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#### ELEVATION-1 MEASUREMENT

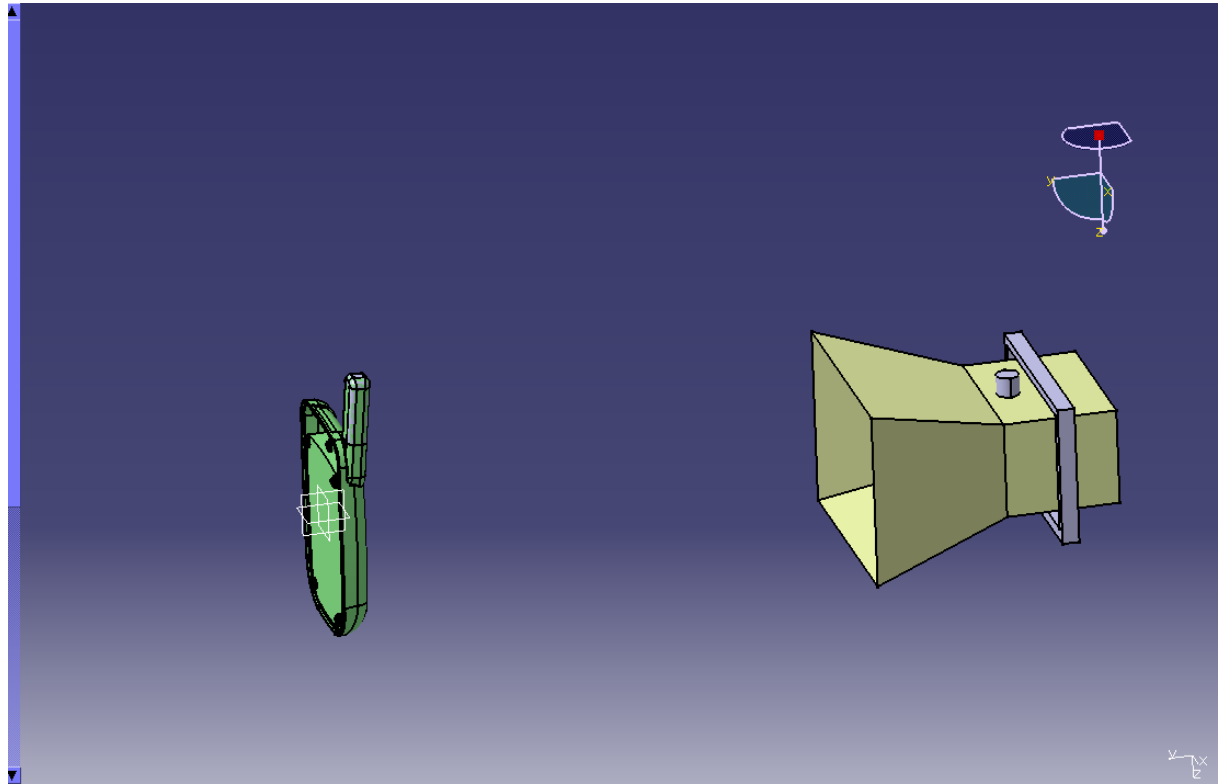


#### ELEVATION-2 MEASUREMENT





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**Retractable Antenna****AZIMUTH MEASUREMENT**





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#### 4. Mechanical Specification

##### 4.1 Dimension (Refer to the drawing.)

GENERAL TOLERANCE				MARK	REVISION	DATE	SIGN
GRADE	A	B	C				
11~20	±0.05	±0.1	±0.2				
21~30	±0.07	±0.15	±0.25				
31~50	±0.10	±0.20	±0.30				
51~150	±0.15	±0.25	±0.40				
151~	±0.20	±0.35	±0.60				
	±0.30	±1.50	±2.00				

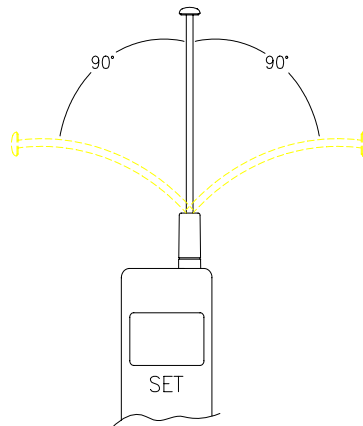
MODEL	TX-170S/TX-170SA	DESIGNED	J.KIM	CHECKED		APPROVAL	K.H.LEE
PART NAME	ANTENNA ASS'Y						
PART NO	MRT-05300	SCALE	2/1	UNIT	mm	METRIC	A4
						THIRD ANGLE	
						DIMENSION	
MRW Communications							

NO	PART NAME	PART NO	MATERIAL	Q'TY	FINISH/COLOR	REMARKS
1	METAL	-	-	1	MBN3	-
2	BODY PLASTIC	-	-	1	MBN3	-
3	WHIP TUBE	-	-	1	Light Gray	-
4	WHIP PLASTIC	-	-	1	Light Gray	-
5	WHIP CAP	-	-	1	Light Gray	-
6	2E STOPPER	-	-	1	MBN3	-
7	GUIDE TUBE	-	-	1	-	-

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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 100 ~ 350gf and when the whip of antenna is pushed down for retraction, he release force of stopper shall be 100 ~ 350gf.

#### 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

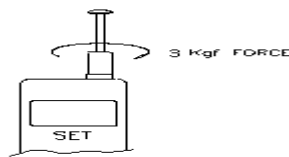
The antenna is assembled in the test equipment and pulling force with 7kgf is applied to the antenna for 10 seconds.

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 3kgf 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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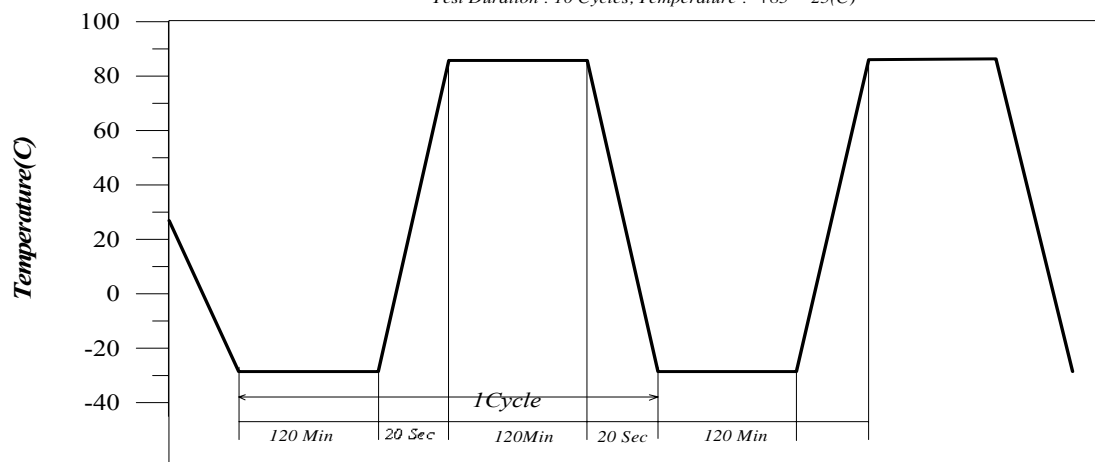
## 5. Environmental Specification

### 5.1 Thermal Shock

The antenna shall withstand 10 repeated cycles of 120 minutes at  $-25^{\circ}\text{C}$  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  $-40^{\circ}\text{C}$  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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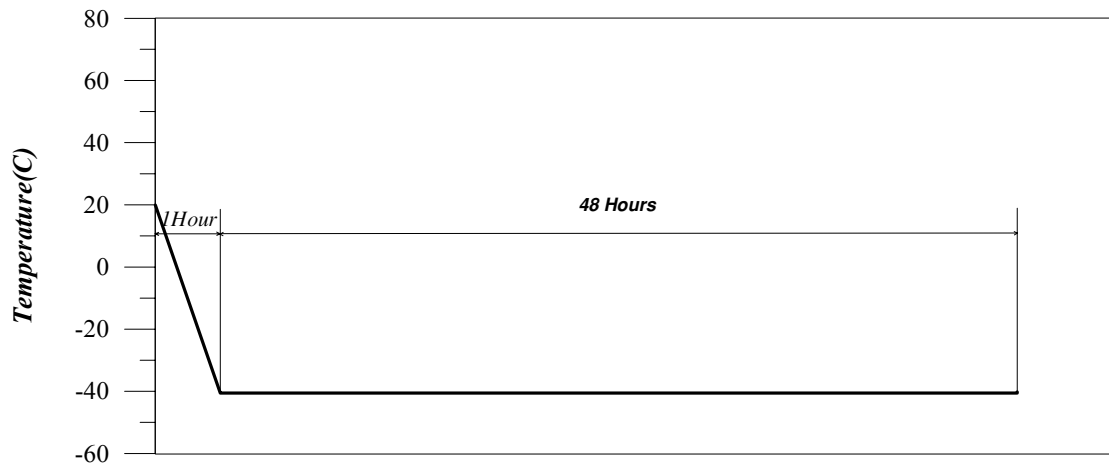
**Retractable Antenna****5.3 Low Temperature Test**

The antenna is placed in the temperature chamber with  $-40^{\circ}\text{C}$  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 Hours, Temperature :  $-40^{\circ}\text{C}$

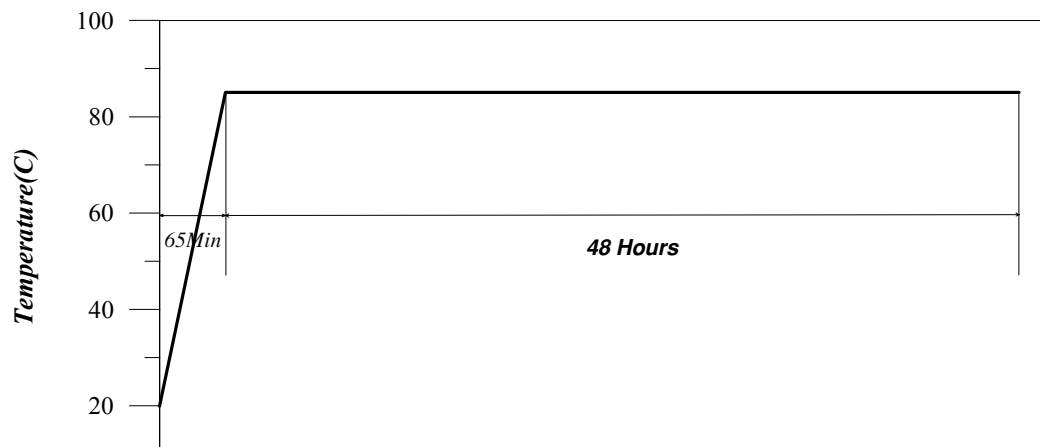
**5.4 High Temperature Test**

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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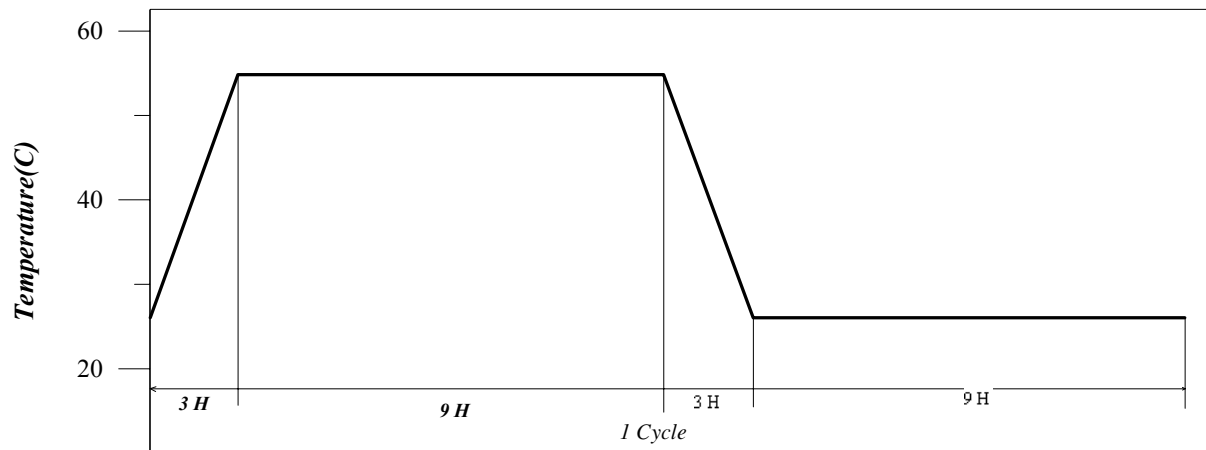
### 5.5 Humidity Test

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
<b>Mechanical</b>	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	–
<b>Enviromental</b>	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