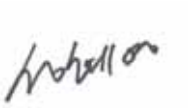
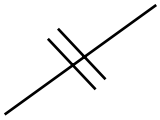
ANTENNA SPECIFICATIONS

CUSTOMER	:	Pantech & Curitel
ITEM	:	L1-C
MODEL NAME	:	DANT-T4-PC04
CUSTOMER P/NO	:	
DATE	:	2007-07-03

		DRAFTING	CHECK	CHECK	APPROVAL
DYKTX	RF Engineer				
		7/4	7/4	7/4	
	Design Engineer				
		7/4		7/4	7/5

#680-9, JAKJEUN-DONG, KYEYANG-GU, INCHON, KOREA

TEL : 82-32-676-9224 FAX : 82-32-546-4797

KTX DAEYOUNG KTX

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1, Document Change Record

Rev. No	Rev. Date	Page	History	Drafter
1	-		-	-
2	-		-	-

2. List of Material

	Raw Material	Material Supplier	Tooling & Injection	Finishing & Spec.	Remark
Carrier	PC HF-1023IM	Cheil Industies	Mpla	-	-
Radiator	STS 304 (t=0.15)	Pung-San Metal	Deayoung KTX	-	-
Assembly	Tolerance of heat staking height should not bk over 0.6mm the surface of pattern				

3. Electrical & Mechanical Specifications

3.1. Electrical Specifications

Frequency Range	CDMA (824 ~ 894MHz)	GPS (1575.42MHz)	PCS (1850 ~ 1990MHz)
Peak gain (H Plane)	-3.5dBi over	-3.5dBi over	-6.0dBi over
VSWR	5.0:1 below	3.5:1 below	5.0:1 below
Impedance	50Ω		
Polarization	Linear		
Radiation pattern	Omni-directional		
Power Handling	2 Watt		

- SET Condition : folder close

3.2. Mechanical Specifications

Connector	Contact Type
Dimension	35.0(W) x 10.0(H) x 7.0(D)
Operating Temperature	-30℃ ~ +80℃
Weight	2.0g

3.3. Package

Name	Quantity	Material	Remark
Tray	50EA	P.S(0.5t)	N/A
Carton BOX	1,000EA	DW 2 Branches(AB)	N/A

4. Electrical properties

4.1. Test equipment

The equipment for the antenna measurement we used is as follows.

4.1.1. Agilent 8720 Series Network Analyzer to measure the V.S.W.R and input impedance.

4.1.2. Three-dimensional anechoic chamber to measure the gain

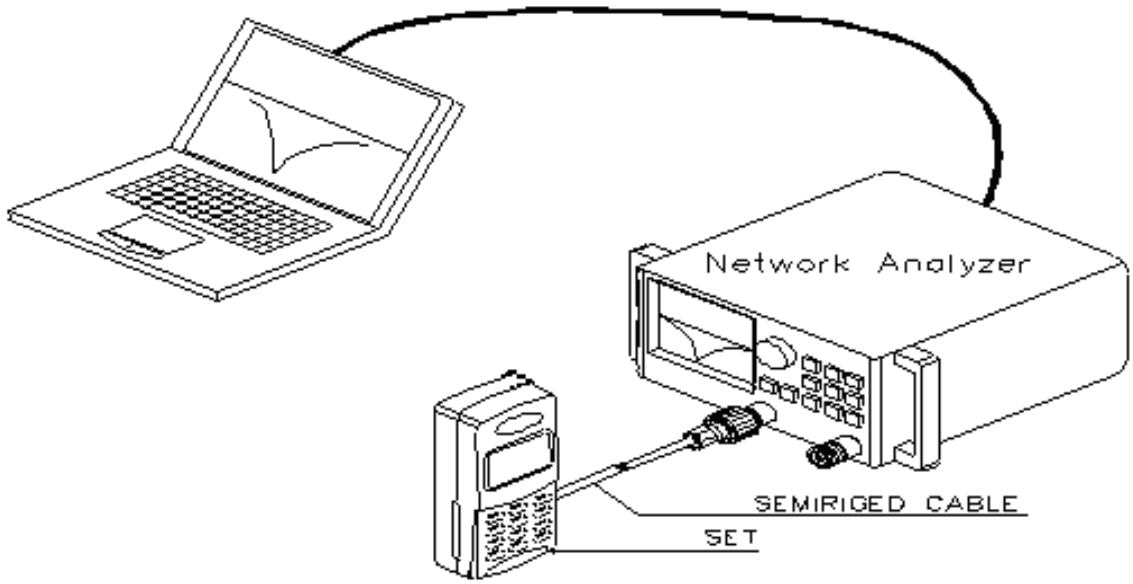
(Standard dipole and horn were used to calibrate the chamber)

4.1.3. Digital caliper to measure the dimensions.

4.1.4. Climatic chamber for mechanical tests.

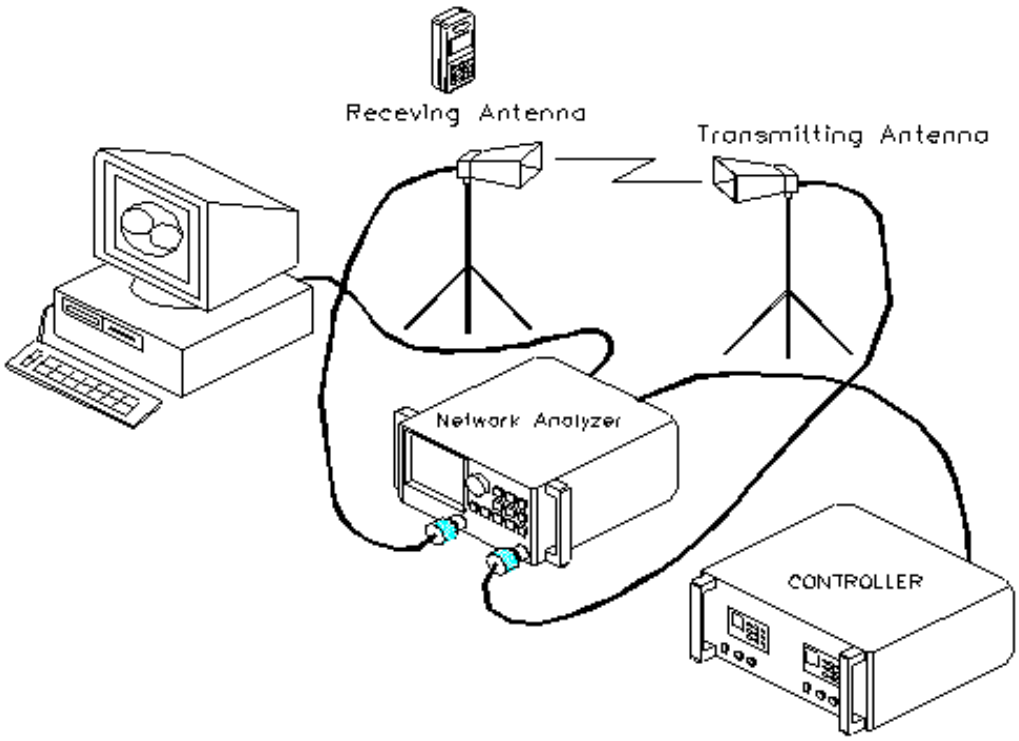
4.2. V.S.W.R

The VSWR characteristics must satisfy the electrical demands. The VSWR is measured with Agilent 8720 Series network analyzer. All the measurements are performed with the customer provided fixture.



4.3. Radiation pattern and gain

Radiation pattern of this antenna has Omni-directional specification in H-Plane. Antenna gain is satisfied with customer demand based on folder-open as dBi after calibration with standard horn antenna.



5. Reliability Test

5.1. Test items

Reliability Test Result

☐ES ☐DS ☐PP ■MP

Approval	Design	Check	Approval

1. Test Substance

Report No.	-	Test Period	2007.7.02. ~ 7.04.	Date	2007-07-04
Test Object	Approval Sheet data			Intance	R&D
Model Name	Intenna	Part Name	L1-C	Sample size	35 EA
Material	Radiator (STS304 0.15t) / Carrier (PC 301EP-30)			Customer	Pantech&curitel
Standard		Inspector	Choi geun young	Result	Acceptable

2. Test Condition/Criterion

Test Item	Condition	Criterion
External	Confirm whether the exterior and internal structure of the product are good or not.	No Weld Line, Burr, shrink, W/peril, s/c, dent and heat unite un excellent with Pattern open, Rib uniformity to Carrier.
Size	Fall in with a drawing.	Coincidence with the figure on drawing.
High Humidity	60℃/90% 48H 2Hr leave.	No faults on external and satisfaction of VSWR.
Low Temperature	- 40℃/0% 48H 2Hr leave.	No faults on external and satisfaction of VSWR.
Heat Stress	-40℃/ 85℃ / 1Hr/ 27 Cycle /40.5Hr/ 2Hr leave.	No faults on external and satisfaction of VSWR.
Brine Atomizing	35℃±2℃ /5%(Brine)/48Hr spray.	No faults on external and satisfaction of VSWR.
Drop	Normal state components 150cm(H),24atime free_drop.	No faults on external and satisfaction of VSWR.
Terminal Stability	maintain range of movement (50gf ~300gf) 500 time execution.	- No destroy of terminal. - Terminal Stability 80% over.
Tension Force	Use push/Pull gage Contact pin measurement.	- Spec 200gf±150gf. - After terminal stability 200gf±150gf.

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5.2. Test result

3. Test Result

3.1 External/Size

Section	Test Standard	#1	#2	#3	#4	#5	Result
External	No Weld Line, Burr, shrink, W/peril, s/c, dent and heat unite un excellent with Pattern open, Rib uniformity to Carrier.	OK	OK	OK	OK	OK	Acc
Size	Agreement to drawing.	OK	OK	OK	OK	OK	Acc

3.2 Environment test

Test Item	Enternal	VSWR	Result
High Humidity	OK	Eppendix Data	Acc
High Temperature	OK	Eppendix Data	Acc
Low Temperature	OK	Eppendix Data	Acc
Heat Stress	OK	Eppendix Data	Acc
Brine Atomizing	OK	Eppendix Data	Acc

3.3 Drop Test

Test Standard	#1	#2	#3	#4	#5	Result
Don'T transformation to ejaculate	OK	OK	OK	OK	OK	Acc
Don'T transformation short loan eparation	OK	OK	OK	OK	OK	Acc
Don'T peel off to austerityPart	OK	OK	OK	OK	OK	Acc

3.4 Contact Terminal Stsbility Cycle Test (unit:mm)

Sample	#1	#2	#3	#4	#5	Result
Before Test (Pitch of terminal)	0.82	0.82	0.75	0.8	0.84	-
After Test (Pitch of terminal)	0.78	0.75	0.74	0.73	0.75	-
Stability (%)	95.12	91.46	98.67	91.25	89.29	Acc

3.5 Contact Terminal Tension Test (unit:gf)

Sample	#1	#2	#3	#4	#5	Result
Before Test	120	100	80	90	110	Acc
After Test	100	90	70	80	90	Acc
Fluctuately(%)	83.33	90.0	87.50	88.9	81.82	Acc

4. Conclusion

The results of the all test items are satisfied in respect of specifications.

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5.3. Test data

Test Data

No	Section		Before(VSWR)_Folder close					After(VSWR)_Folder close					Remark
			824MHz	894MHz	1575.42MHz	1850MHz	1990MHz	824MHz	894MHz	1575.42MHz	1850MHz	1990MHz	
			2.9	3.4	2.2	3.6	4.0	2.9	3.4	2.2	3.6	4.0	
1	High Humidity	X1	2.3	2.8	1.8	2.7	3.2	2.5	2.9	1.8	2.9	3.4	
		X2	2.3	2.6	1.7	2.9	3.7	2.5	3.0	1.8	2.9	3.4	
		X3	2.1	2.7	1.8	3.3	3.4	2.6	2.9	1.7	3.0	3.5	
		X4	2.3	2.9	1.8	2.7	3.5	2.5	2.8	1.9	3.0	3.5	
		X5	2.4	2.6	1.8	2.8	3.5	2.2	3.2	1.8	3.1	3.6	
2	High Temperature	X1	2.4	2.9	1.7	3.4	3.4	2.4	2.7	1.7	3.4	3.7	
		X2	2.2	2.8	1.8	3.0	3.4	2.1	2.8	1.7	3.2	3.7	
		X3	2.2	3.0	1.8	3.2	3.5	2.3	2.5	1.7	3.2	3.7	
		X4	2.4	2.8	1.7	2.5	3.5	2.3	2.7	1.8	2.8	3.3	
		X5	2.1	2.8	1.9	3.2	3.6	2.1	2.8	1.7	2.9	3.4	
3	Low Temperature	X1	2.3	2.9	1.8	2.9	3.7	2.4	2.9	1.7	2.7	3.6	
		X2	2.3	3.0	1.8	2.9	3.7	2.3	2.8	1.8	2.8	3.4	
		X3	2.1	2.9	1.7	3.0	3.7	2.4	3.0	1.6	3.4	3.5	
		X4	2.5	2.8	1.9	3.0	3.3	2.2	2.8	1.8	3.0	3.5	
		X5	2.5	3.2	1.8	3.1	3.4	2.2	2.8	1.8	3.2	3.4	
4	Heat Stress	X1	2.5	2.7	1.8	3.4	3.6	2.3	2.9	1.8	3.2	3.0	
		X2	2.3	2.8	1.8	3.2	3.4	2.3	3.0	1.7	3.0	3.5	
		X3	2.3	2.5	1.7	3.2	3.5	2.1	2.9	1.7	3.1	3.2	
		X4	2.2	2.7	1.9	2.8	3.5	2.3	2.8	1.8	3.1	3.7	
		X5	2.5	2.8	1.8	2.9	3.4	2.4	3.2	1.7	3.0	3.4	
5	Brine Atomizing	X1	2.4	2.8	1.7	2.7	3.0	2.4	2.8	1.8	3.2	3.6	
		X2	2.3	2.6	1.7	2.8	3.5	2.2	3.2	1.7	2.8	3.4	
		X3	2.4	2.7	1.7	3.4	3.2	2.2	2.7	1.8	3.4	3.5	
		X4	2.2	2.9	1.8	3.0	3.7	2.4	2.8	1.8	3.0	3.5	
		X5	2.2	2.6	1.7	3.2	3.4	2.1	2.5	1.8	3.0	3.4	
6	Drop	X1	2.4	2.9	1.7	3.2	3.5	2.3	2.7	1.7	2.9	3.0	
		X2	2.1	2.8	1.8	3.0	3.5	2.3	2.8	1.8	2.9	3.5	
		X3	2.3	3.0	1.6	3.1	3.6	2.1	2.8	1.8	3.0	3.2	
		X4	2.3	2.8	1.8	3.1	3.7	2.5	2.6	1.7	3.0	3.7	
		X5	2.1	2.8	1.8	3.0	3.7	2.5	2.7	1.9	3.1	3.4	
7	Contact terminal Stability	X1	2.5	2.9	1.8	3.2	3.5	2.5	2.9	1.8	3.4	3.5	
		X2	2.5	3.0	1.7	2.8	3.4	2.3	2.8	1.8	3.2	3.5	
		X3	2.6	2.9	1.7	3.4	3.2	2.3	2.8	1.7	3.2	3.6	
		X4	2.5	2.8	1.8	3.0	3.3	2.2	2.9	1.9	2.8	3.7	
		X5	2.2	3.2	1.7	3.0	3.2	2.5	3.0	1.8	2.9	3.7	
USL			2.9	3.4	2.2	3.6	4.0	2.9	3.4	2.2	3.6	4.0	
LSL													
$\bar{x}$			2.32	2.82	1.76	3.03	3.46	2.32	2.83	1.76	3.04	3.47	
Max			2.60	3.16	1.88	3.43	3.70	2.60	3.16	1.88	3.43	3.70	
Min			2.09	2.48	1.62	2.51	3.00	2.09	2.48	1.62	2.69	3.00	
R			0.52	0.68	0.26	0.92	0.70	0.52	0.68	0.26	0.74	0.70	
StDev			0.134	0.151	0.060	0.223	0.172	0.134	0.158	0.059	0.184	0.179	
Cp			3.60	3.76	6.07	2.70	3.88	3.60	3.58	6.20	3.26	3.73	
Cpk			3.60	3.76	6.07	2.70	3.88	3.60	3.58	6.20	3.26	3.73	

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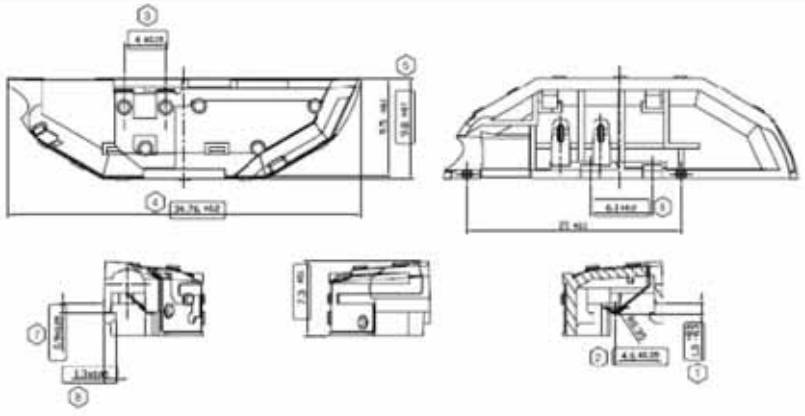
5.4. Inspection data

Inspection Data

No	External	Demension(Unit : mm)										Remark
		1	2	3	4	5	6	7	8			
		1+0.5(-0.3)	4.6±0.35	4±0.15	34.76±0.2	9.8±0.1	6.1±0.2	0.9±0.05	1.3±0.05			
X1	OK	0.98	4.56	3.98	34.73	9.78	6.14	0.92	1.28			
X2	OK	0.97	4.69	4.06	34.71	9.76	6.18	0.91	1.30			
X3	OK	0.98	4.58	3.99	34.79	9.79	6.10	0.90	1.31			
X4	OK	1.00	4.53	4.00	34.76	9.82	6.12	0.92	1.32			
X5	OK	0.98	4.62	4.01	34.76	9.80	6.09	0.87	1.30			
X6	OK	0.98	4.67	3.97	34.79	9.85	6.13	0.89	1.29			
X7	OK	0.99	4.60	3.99	34.72	9.76	6.11	0.90	1.31			
X8	OK	0.97	4.52	4.06	34.75	9.80	6.17	0.92	1.30			
X9	OK	0.98	4.48	4.07	34.71	9.76	6.08	0.88	1.29			
X10	OK	0.98	4.71	4.01	34.76	9.80	6.10	0.92	1.31			
X11	OK	0.98	4.63	4.00	34.77	9.79	6.12	0.93	1.31			
X12	OK	0.99	4.62	4.03	34.73	9.78	6.17	0.92	1.30			
X13	OK	0.98	4.58	3.98	34.74	9.82	6.14	0.91	1.30			
X14	OK	0.98	4.56	3.97	34.72	9.83	6.09	0.92	1.30			
X15	OK	0.99	4.51	4.02	34.71	9.78	6.11	0.91	1.28			
X16	OK	1.00	4.67	4.06	34.75	9.81	6.09	0.92	1.30			
X17	OK	1.00	4.69	4.07	34.76	9.84	6.12	0.88	1.29			
X18	OK	0.99	4.63	3.96	34.70	9.83	6.14	0.91	1.30			
X19	OK	1.00	4.56	3.99	34.78	9.85	6.12	0.92	1.29			
X20	OK	0.97	4.62	4.02	34.72	9.81	6.13	0.90	1.31			
USL	-	1.50	4.95	4.15	34.96	9.90	6.30	0.95	1.35			
LSL	-	0.70	4.25	3.85	34.56	9.70	5.90	0.85	1.25			
$\bar{X}$	-	0.985	4.602	4.012	34.743	9.803	6.123	0.908	1.300			
Max	-	1.00	4.71	4.07	34.79	9.85	6.18	0.93	1.32			
Min	-	0.97	4.48	3.96	34.70	9.76	6.08	0.87	1.28			
R	-	0.03	0.23	0.11	0.09	0.09	0.10	0.06	0.04			
StDev	-	0.010	0.065	0.036	0.028	0.028	0.028	0.017	0.011			
Cp	-	13.35	1.79	1.40	2.39	1.17	2.36	1.01	1.59			
Cpk	-	13.35	1.79	1.40	2.39	1.17	2.36	1.01	1.59			
Comment												
Drawing												

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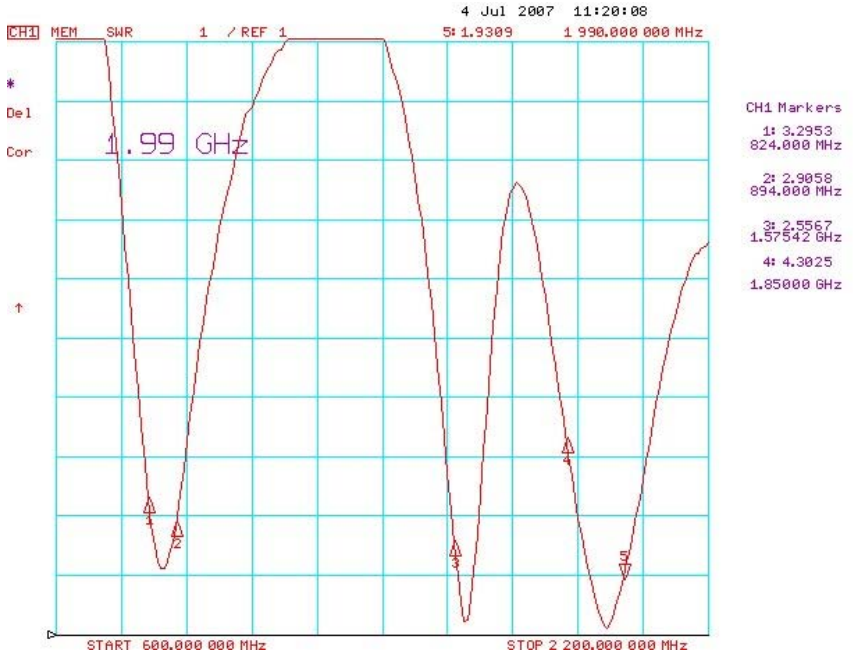
6. Measurement Data

6.1. V.S.W.R

Folder Close



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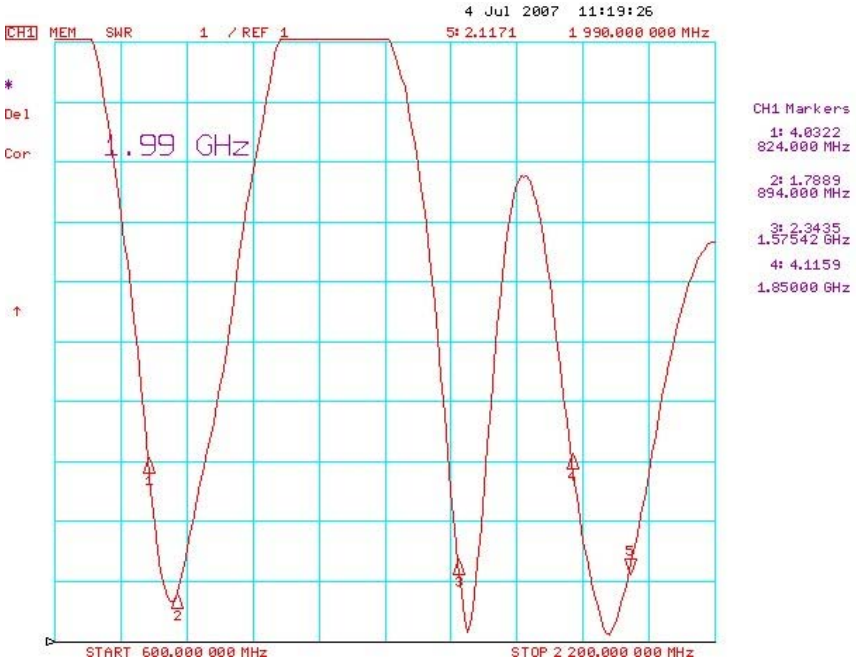
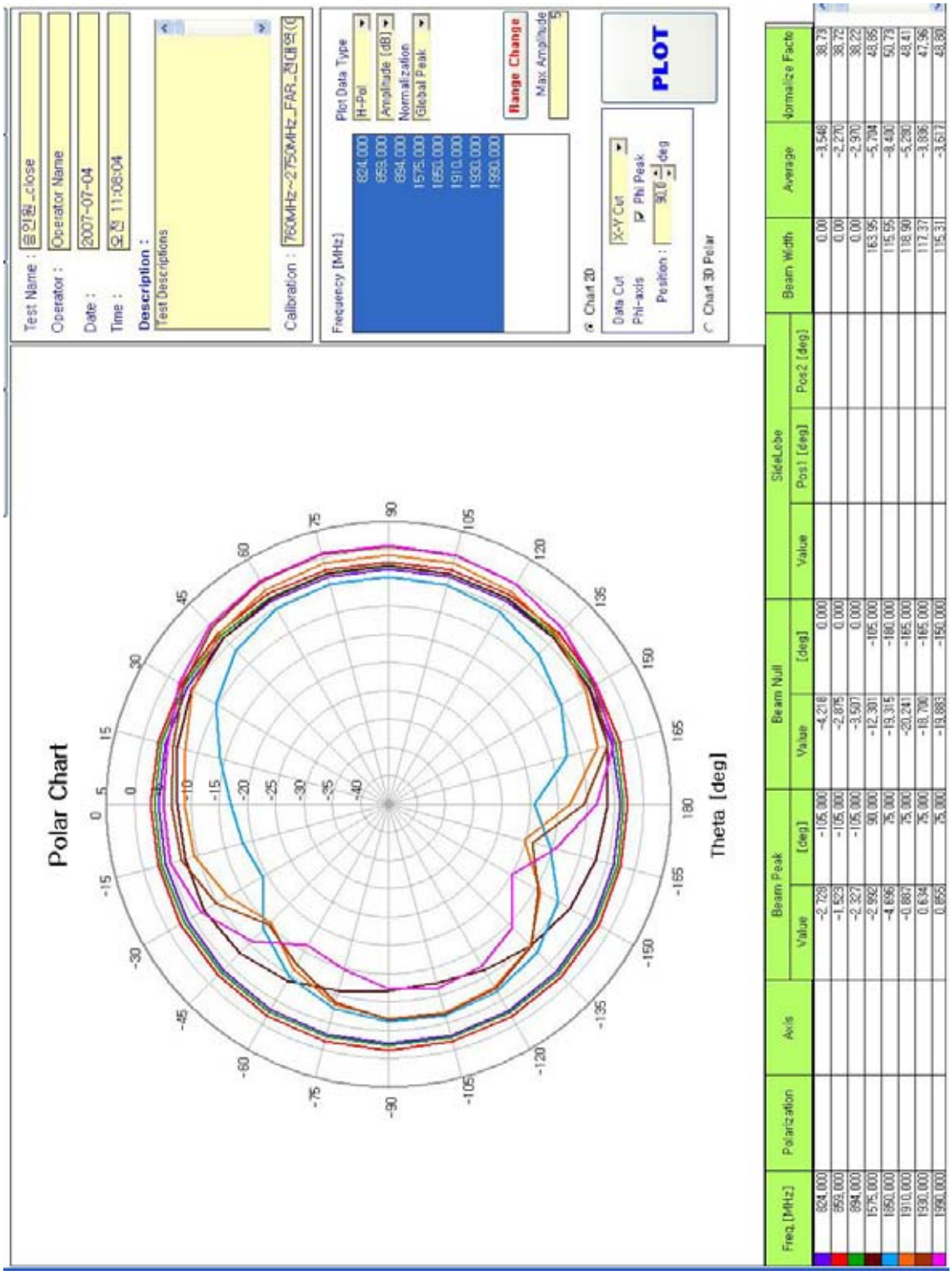
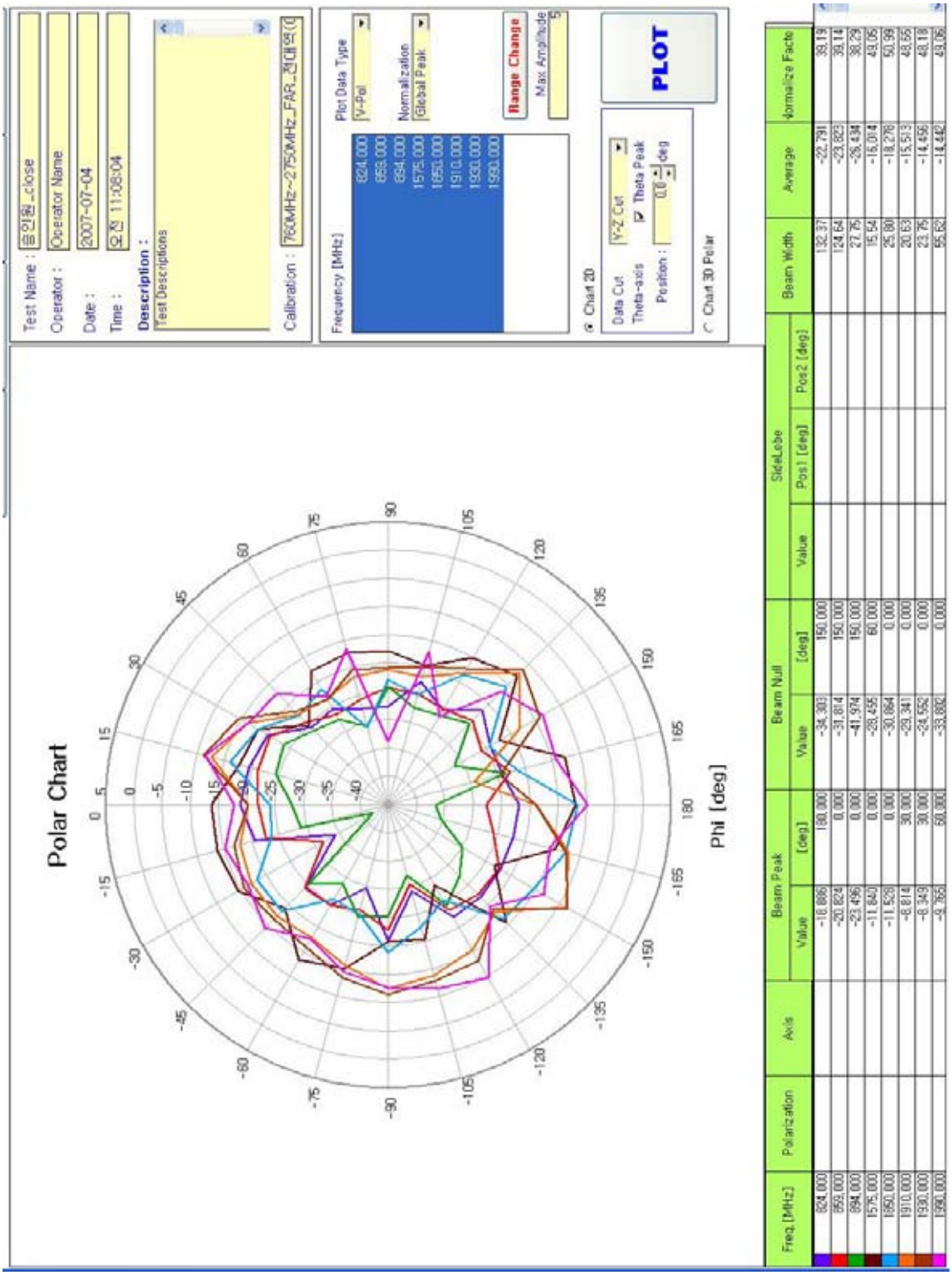


6.2. Radiation pattern

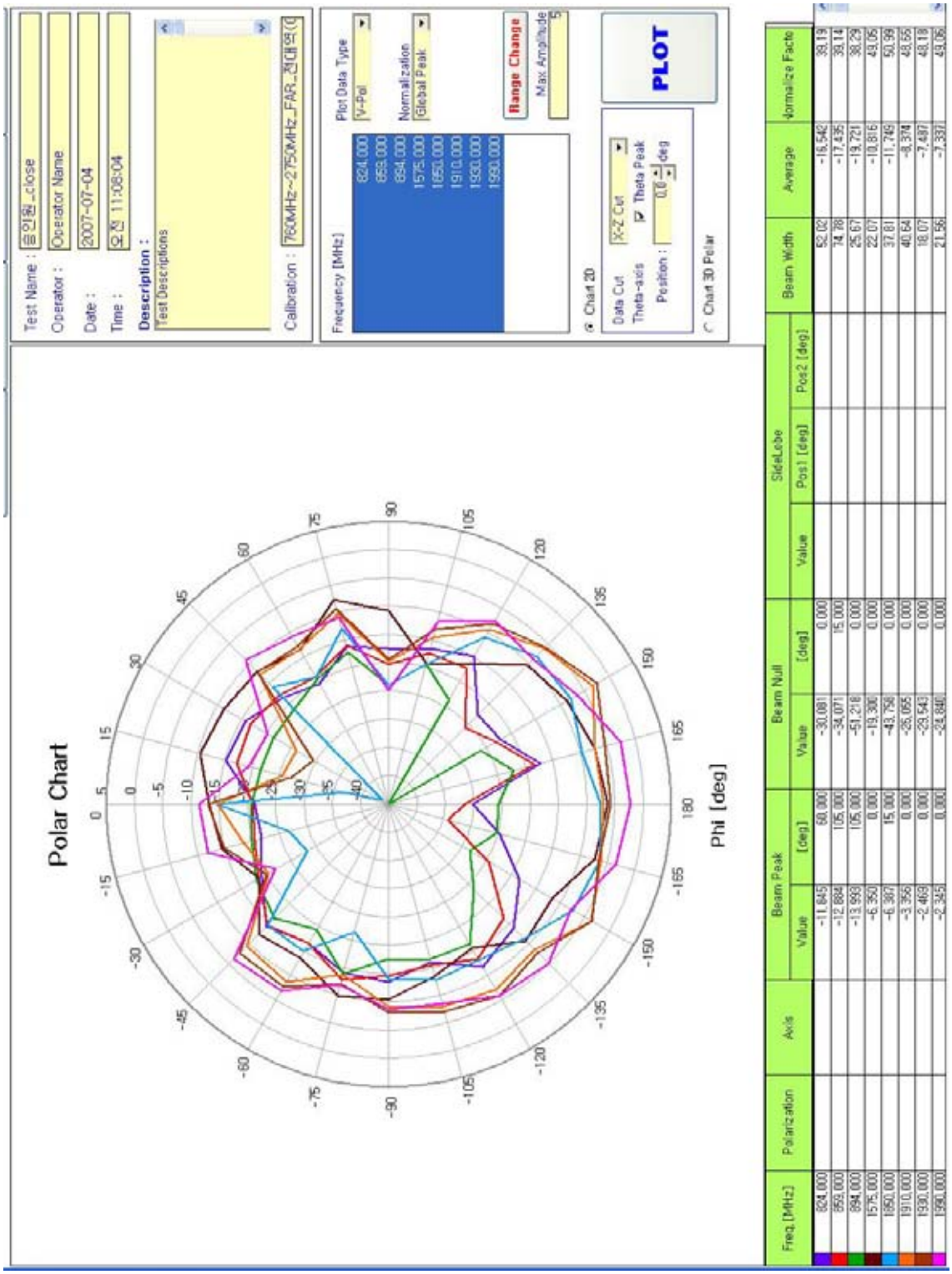
Folder close azimuth pattern theta=90



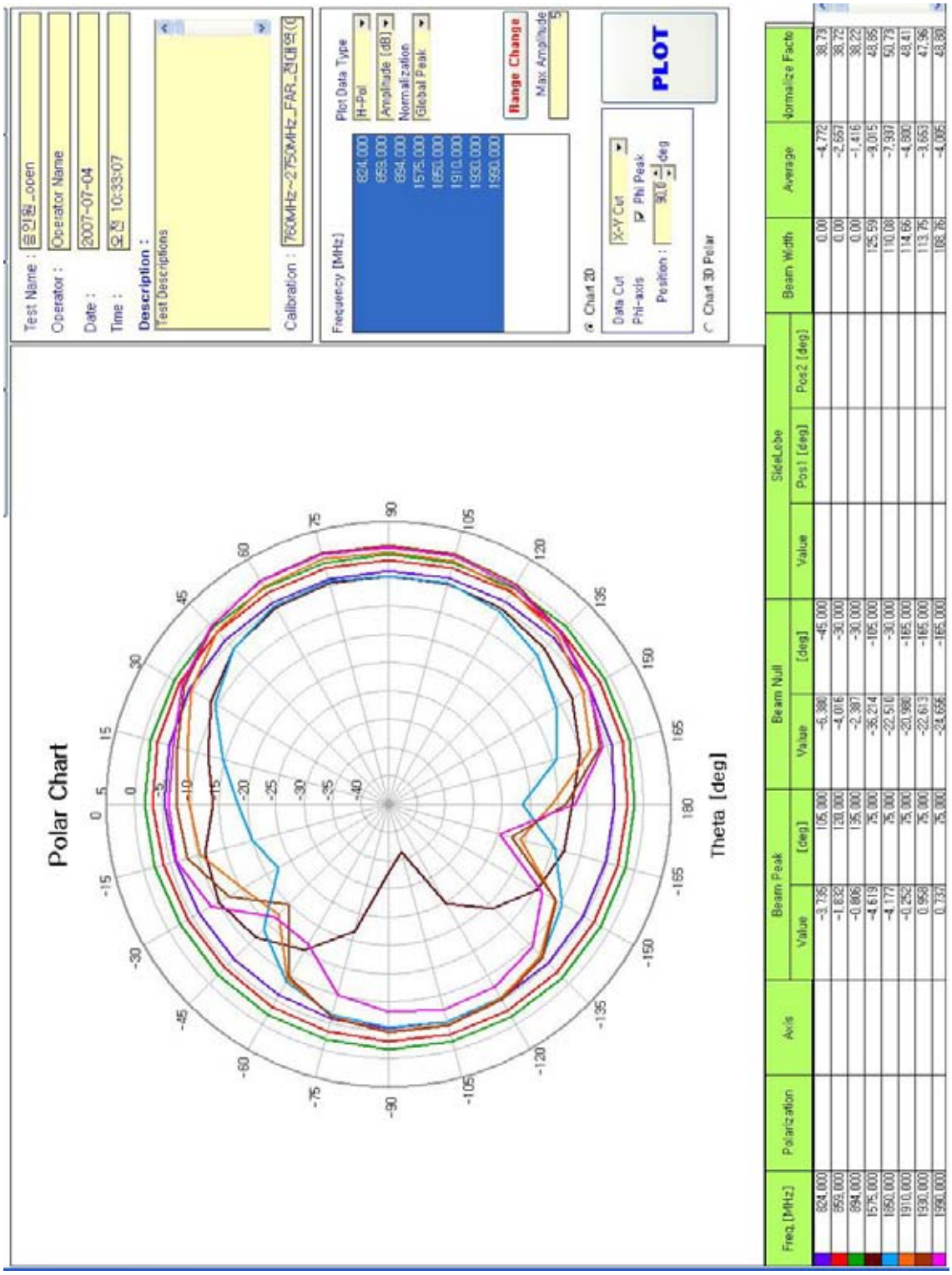
Folder close elevation pattern phi=0



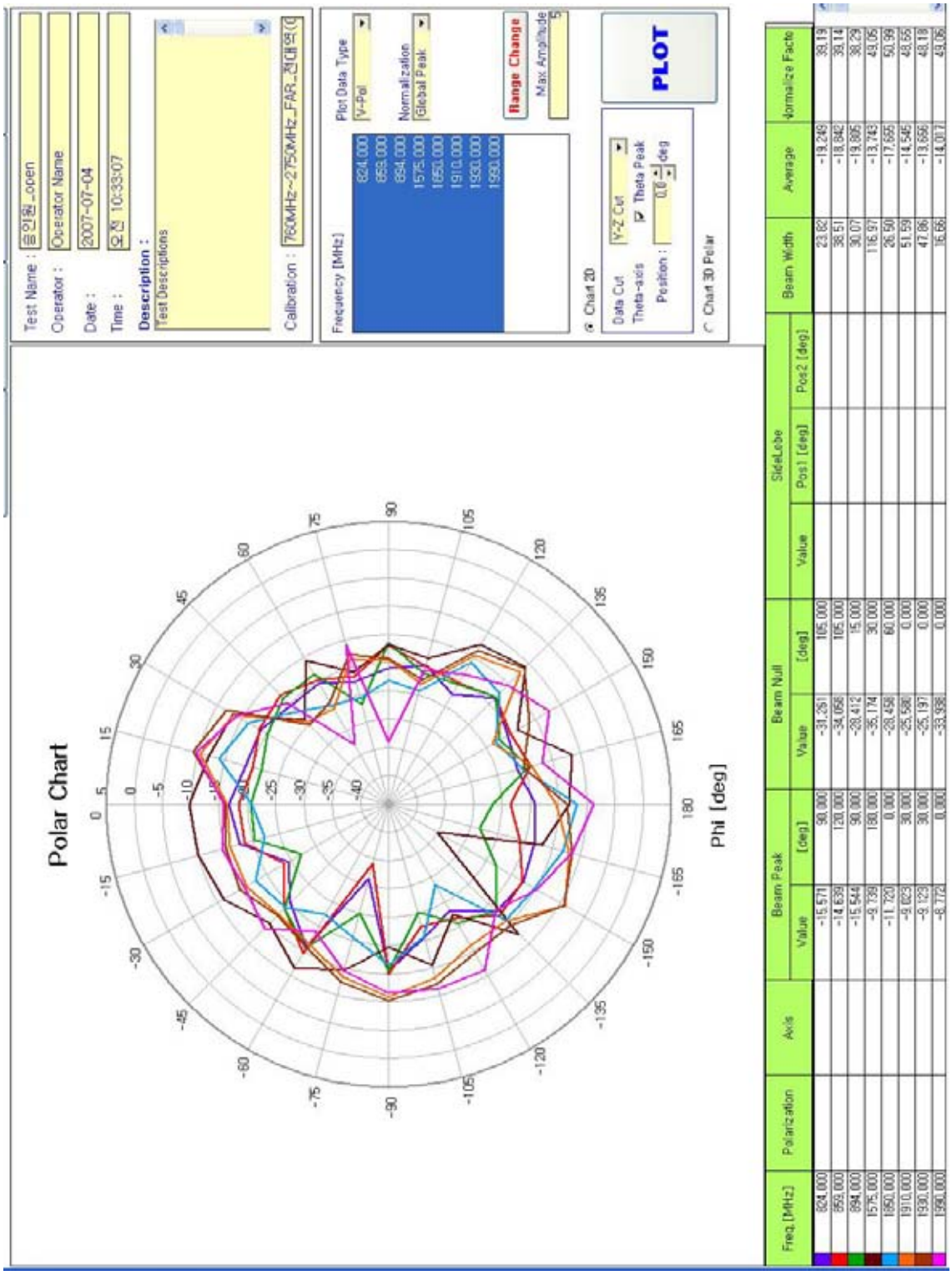
Folder close elevation pattern phi=90



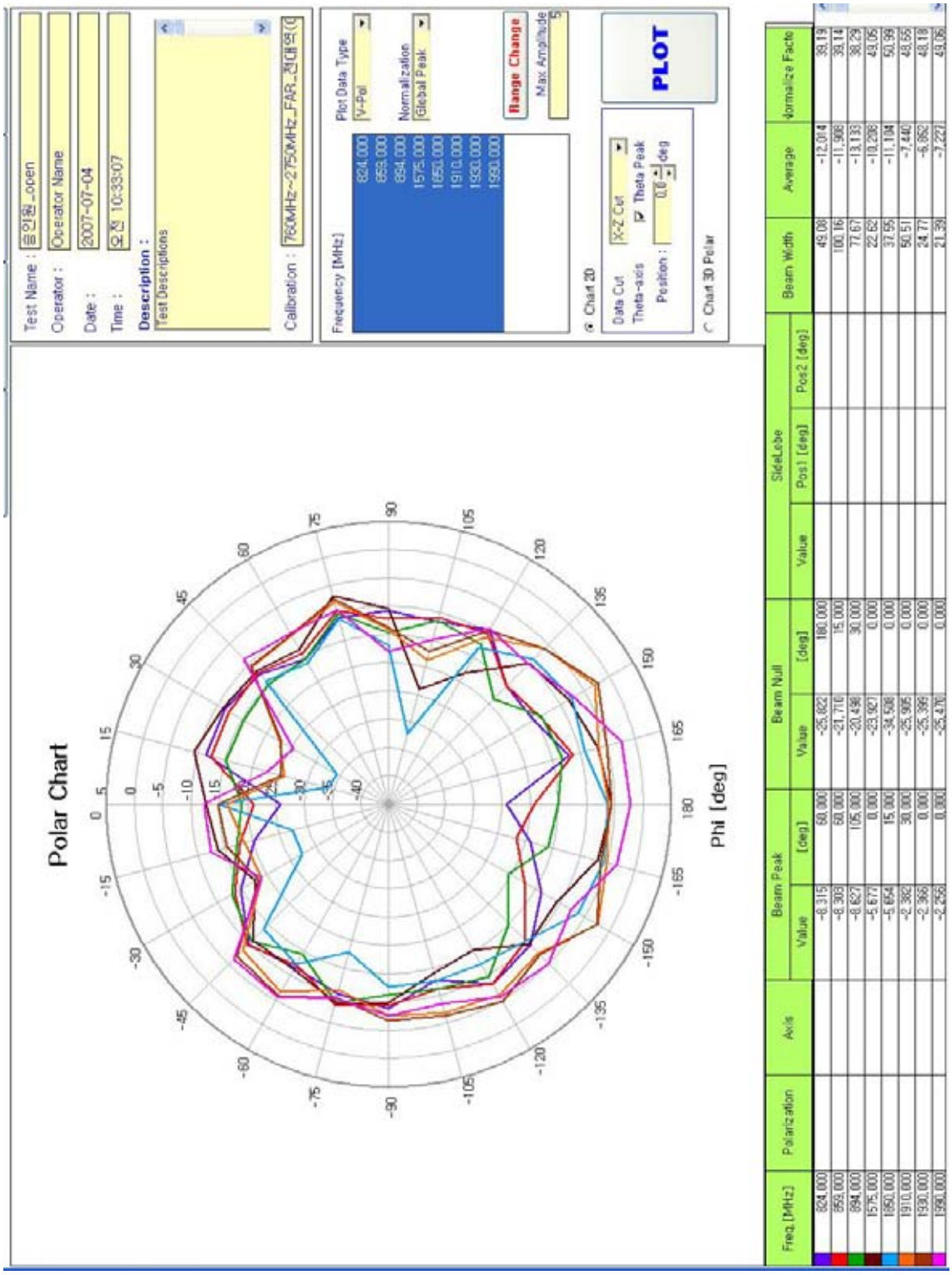
Folder open azimuth pattern theta=90



Folder open elevation pattern phi=0

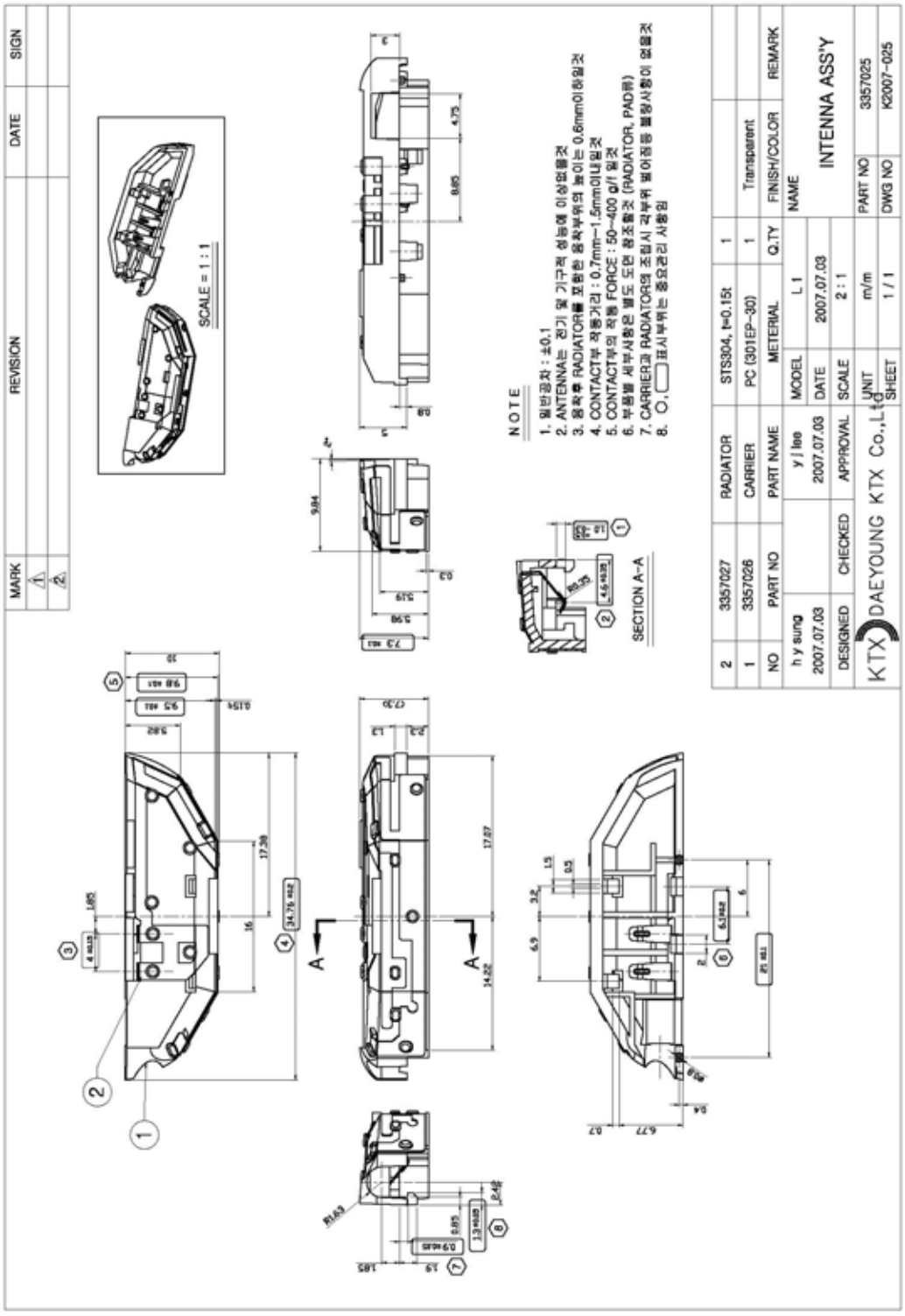


Folder open elevation pattern phi=90

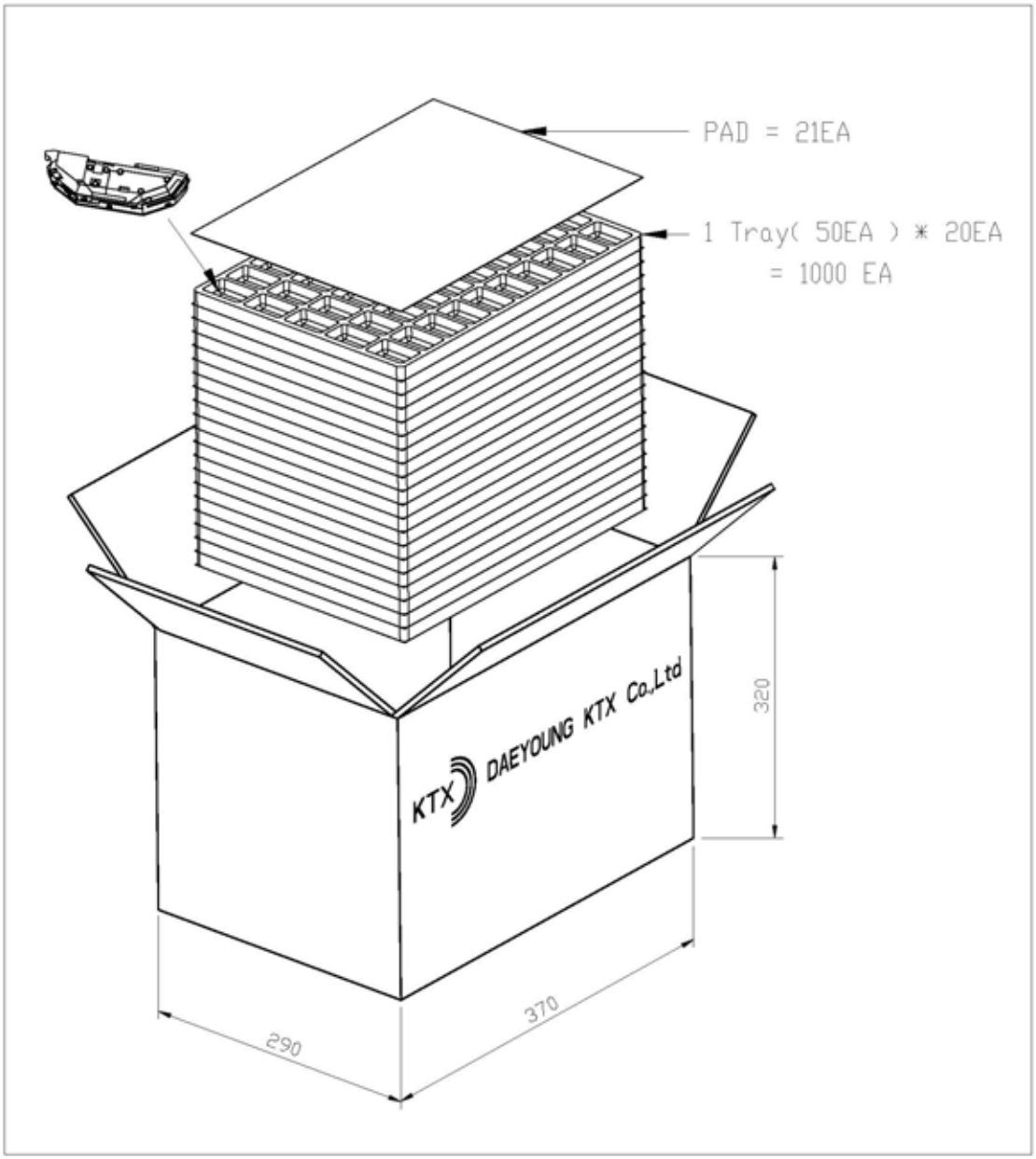


7. Mechanical Drawing

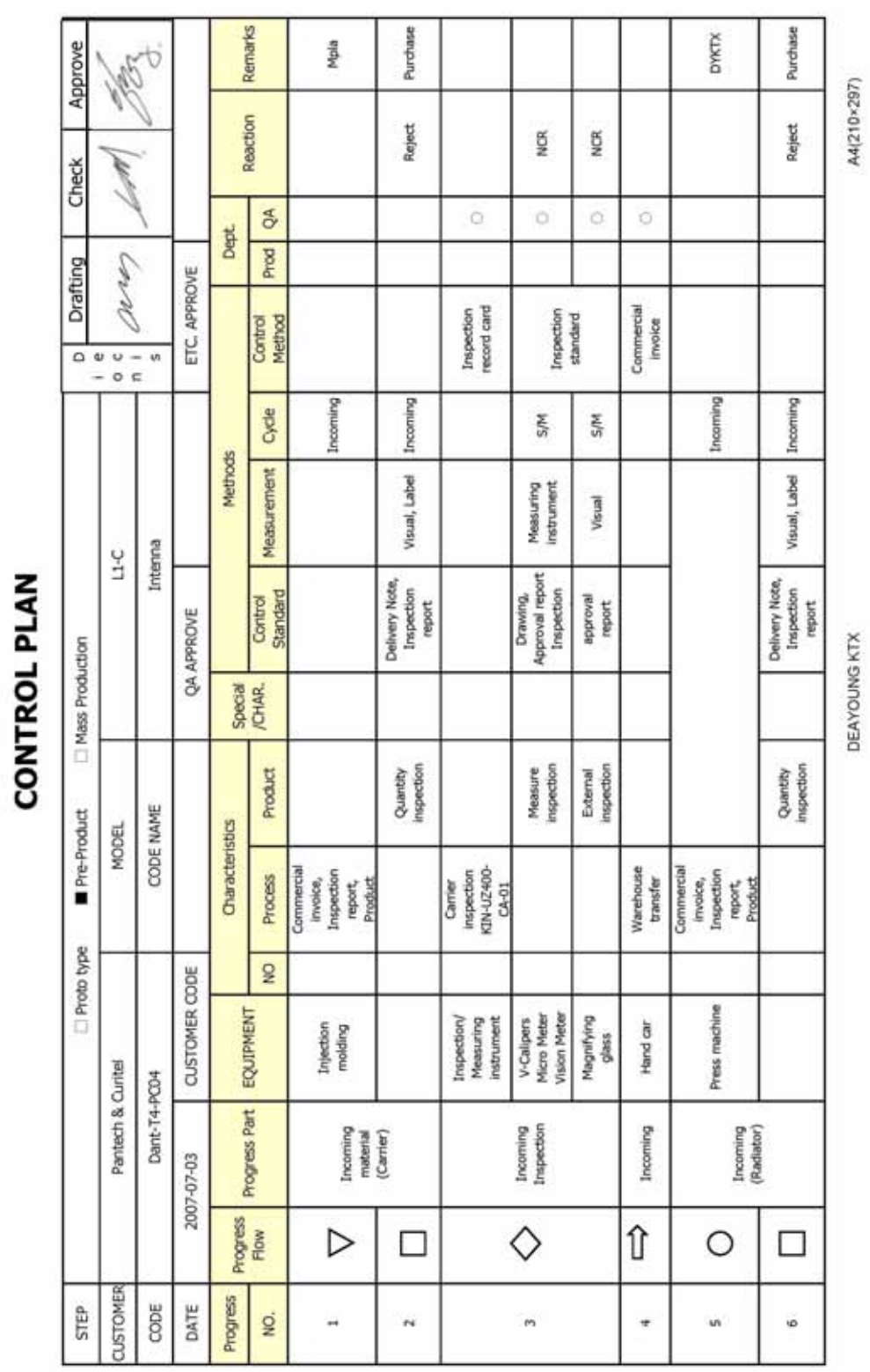
7.1. Assembly



7.2. Package


PAD = 21EA
1 Tray(50EA) * 20EA
= 1000 EA
KTX DAEYOUNG KTX Co.Ltd
320
290
370

8. Control Plan



Progress NO.	Progress Flow	Progress Part	EQUIPMENT	Characteristics NO	Characteristics Process	Characteristics Product	Special /CHAR.	Methods Control Standard	Methods Measurement	Methods Cycle	Methods Control Method	Dept. Prod	Dept. QA	Reaction	Remarks
7	◇	Incoming Inspection	Inspection/ Measuring instrument		Radiator inspection KIN-UZ400-SM-02						Inspection record card		○		
			V-Calipers Micro Meter Vision Meter			Measure inspection		Drawing, Approval report Inspection report	Measuring instrument	S/M	Inspection standard		○	NCR	
			Magnifying glass			External inspection		Approval report	Visual	S/M			○	NCR	
8	⇧	Incoming	Hand car		Warehouse transfer						Commercial invoice		○		
9	⇧	Material in-out	Hand car			FIFO		Lot control	Label		Invoice	○			
10	⇧	Kitting	Loading									○			
11	○	Ass'y	Hand made		Carrier + Radiator Ass'y						Work standard	○			
						Carrier		External inspection	Visual	All		○		Inspection/ call Supervisor	
						Radiator		External inspection	Visual	All		○		Inspection/ call Supervisor	
12	○	Fusion splice	Heat fusion splice machine		Heat fusion splice			Fusion splice condition (pressure :7kgf/㎠, temperature :170 ℃, Time:2sec)	Visual	Before work	Work standard	○		Manual mode /call Supervisor	
						Carrier + Radiator		External inspection (Fusion splice)	Visual	All		○		Inspection/ call Supervisor	

DEAYOUNG KTX

A4(210*297)

Progress NO.	Progress Flow	Progress Part	EQUIPMENT	Characteristics NO	Characteristics Process	Characteristics Product	Special /CHAR.	Methods Control Standard	Methods Measurement	Methods Cycle	Methods Control Method	Dept. Prod	Dept. QA	Reaction	Remarks
13	▷	Measurement inspection	Network Analyzer (Ag 8753ES)		V.S.W.R			V.S.W.R inspection	Set ass'y	Often	Work standard	○		call Supervisor	
14	⊠	Packing			Tray insert			Tray KSB-TR-910 -01	50 cavity/ 20tray/ /1000EA		Work standard	○		call Supervisor	
					Box packing			Box KSB-TR-911 -01	380×270 ×280	Daily		○		call Supervisor	
15	⇧	Inspection request	Hand car		Waiting for a inspection						Inspection request report	○			
16	◇	Outgoing inspection	Magnifying glass		External/ass'y inspection			External Ass'y inspection	Visual	S/M	Inspection standard		○	NCR	
			Network Analyzer (Ag 8753ES)		V.S.W.R			V.S.W.R inspection	Set ass'y	S/M			○	NCR	
			V-Calipers Micro Meter Vision Meter		Inspection			Drawing, Approval report	Measuring instrument	S/M			○	NCR	
17	⇧	Product transfer	Hand car		Acceptable product carrying						Inspection request report		○		
			Hand car		warehouse transfer			Acceptable product	Accept stamp	Inspection completed		○	○		
18	▽	Product shipping	Hand car		Product extraction			Model, Quantity check	Label check	Outgoing	Invoice report	○	○	NCR	

DEAYOUNG KTX

A4(210*297)

9. RoHS

9.1. Carrier

SGS

Test Report No. F690501/LF-CTSGP06-17371 Date: July 12, 2006 Page 1 of 3

To: LG DOW POLYCARBONATE CO.,LTD.
9F,Hana Security Bldg.#23-3
Yeoyido-dong
Youngdungpo-gu
SEOUL
Korea

The following merchandise was submitted and identified by the client as :

Commodity	: CALIBRE 301 EP
SGS File No.	: GP06-17371
Received Date	: July 05, 2006
Test Performing Date	: July 06, 2006
Test Performed	: SGS Testing Korea tested the sample(s) selected by applicant with following results
Test Results	: For further details, please refer to following page(s)
Buyer(s)	: SAMSUNG

SGS Testing Korea Co. Ltd.

Jade Jang
Monet Jeong
Jully Oh
Jerry Jung
/Testing Person

Jeff Jang / Chemical Lab Mgr

SGS

Test Report No. F690501/LF-CTSGP06-17371 Date: July 12, 2006 Page 2 of 3

Sample No. : GP06-17371.001
Sample Description : CALIBRE 301 EP
Style/Item No. : N/A
Comments : Material is Polycarbonate resins

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium(Cd)	mg/kg	EN 1122(2001), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3050B(1996), US EPA 6010B(1996), ICP	5	N.D.
Mercury (Hg)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	US EPA 3060A(1996), US EPA 7196A(1992), UV	1	N.D.

Flame Retardants-PBBs/PBDEs

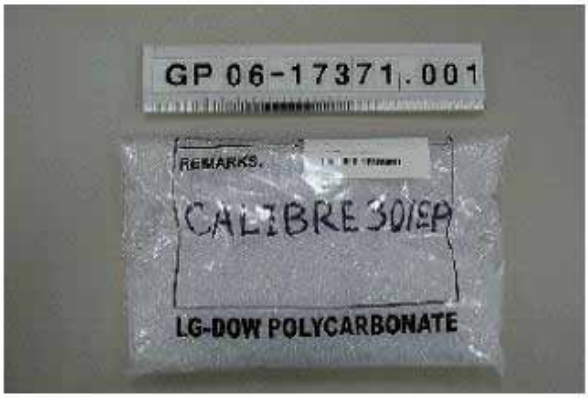
Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromobiphenyl	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Monobromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Dibromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tribromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Tetrabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Pentabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Hexabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Heptabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Octabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Nonabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.
Decabromodiphenyl ether	mg/kg	US EPA 3540C, GC/MS	5	N.D.

NOTE: (1) N.D. = Not detected.(<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable

SGS

Test Report No. F690501/LF-CTSGP06-17371 Date: July 12, 2006 Page 3 of 3

Picture of Sample as Received:



*** End ***

NOTE: (1) N.D. = Not detected.(<MDL)
(2) ppm = mg/kg
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable

MATERIAL SAFETY DATA SHEET

July 1, 2001
CALIBRE 301 TINTED POLYCARBONATE

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

LG DOW POLYCARBONATE LTD.

762-1, Jungheung-Dong,
Yeosu, Chunnam
Republic of Korea

Tel: 82 61 680 6602
Fax: 82 61 680 6604

Product Name: **CALIBRE* 301 TINTED POLYCARBONATE**

LV70: 14654 Issue Date: Sept. 93 Ref: 0320A

2. COMPOSITION/INFORMATION ON INGREDIENTS

Polycarbonate copolymer (CAS# 103598-77-2)

3. HAZARDS IDENTIFICATION

This product is not hazardous according to EC criteria.

4. FIRST-AID MEASURES

Never give fluids or induce vomiting if patient is unconscious or is having convulsions.

Inhalation
No adverse effects anticipated by this route of exposure incidental to proper industrial handling.

Skin Contact
Wash off in flowing water or shower.

Eye Contact
Irrigate immediately with water for at least 5 minutes.
Mechanical irritation only.

Ingestion
No adverse effects anticipated by this route of exposure incidental to proper industrial handling.

5. FIRE-FIGHTING MEASURES

Extinguishing Media
Water. Carbon dioxide. Dry chemical. Synthetic foams.

Protection of Firefighters

* Trademark of The Dow Chemical Company.

MATERIAL SAFETY DATA SHEET

July 1, 2001
CALIBRE 301 TINTED POLYCARBONATE

Wear positive-pressure self-contained breathing apparatus and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots and gloves).

Hazardous Combustion Products
Dense smoke is emitted when burned without sufficient oxygen.
The smoke may contain combustion products of varying composition in addition to carbon dioxide and carbon monoxide.

Specific Methods of Firefighting
Soak thoroughly with water to cool and prevent re-ignition.

6. ACCIDENTAL RELEASE MEASURES

Sweep up, recover if possible, or dispose of according to applicable regulations.

7. HANDLING AND STORAGE

Handling
Avoid breathing dust.
Good general ventilation should be sufficient for most conditions.

Storage
Store in a cool, dry place away from direct sunlight.
Storage silos must be grounded to prevent static charge.
Proper ventilation is recommended to control dust formation.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls
Good general ventilation should be sufficient for most processing operations. Local exhaust ventilation may be necessary for some operations.

Personal Protective Equipment
- Respiratory Protection
In dusty atmospheres, use an approved dust respirator. For most conditions, no respiratory protection should be needed; however, if handling at elevated temperatures without sufficient ventilation, use an approved air-purifying respirator.

- Skin Protection
No precautions other than clean body-covering clothing should be needed.

- Eye/Face Protection
Use safety glasses.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: granules
Color: transparent
Odor: none

Melting point/range: 150-200 deg.C
Decomposition temp.: >400 deg.C

MATERIAL SAFETY DATA SHEET

Water solubility: insoluble
Vapor pressure: not applicable
Specific gravity: 1.19-1.23
Flash point: >450 deg.C
Auto-ignition temp. : >450 deg.C
Flammability-LFL: not applicable
Flammability-UFL: not applicable

10. STABILITY AND REACTIVITY

Chemical Stability
Stable under normal handling and storage conditions, see Section 7, Handling and Storage.

Conditions to Avoid
Excessive heat. See decomposition temperature, Section 9.
Processed at high temperatures, the material may generate vapor levels sufficient to cause eye and respiratory irritation.

Hazardous Decomposition Products
Fumes released during processing may include traces of:
Hydrocarbons. Phenol. Carbon monoxide.

11. TOXICOLOGICAL INFORMATION

Ingestion
Single dose oral toxicity is believed to be very low.
Considered to be physiologically inert.
May cause choking if swallowed.

Eye Contact
Solid or dust may cause irritation or corneal injury due to mechanical action.

Skin Contact
Essentially non-irritating to skin.
Mechanical injury only.
Skin absorption is unlikely due to physical properties.

Inhalation
At room temperature, exposure to vapors is unlikely due to physical properties; higher temperatures may generate vapor levels sufficient to cause irritation and other effects.
Dust may cause irritation to upper respiratory tract (nose and throat).

Other Information
Pigments and dyes and/or flame retardant are encapsulated in the resin and are not expected to cause any hazardous condition when processed according to good manufacturing procedures.

12. ECOLOGICAL INFORMATION

In the aquatic environment, this product should not present problems because of extremely low solubility.
In the soil compartment, material is inherently very difficult to degrade.

MATERIAL SAFETY DATA SHEET

July 1, 2001
CALIBRE 301 TINTED POLYCARBONATE

13. DISPOSAL CONSIDERATIONS

Conversion or process waste can be recycled (see Section 16, Other Information). Clean uncontaminated product may be disposed of by sale to reprocessors. Scrap materials may be disposed of at approved landfills or preferably by incineration under approved conditions.

14. TRANSPORT INFORMATION

Product is not classified for any mode of transportation.

15. REGULATORY INFORMATION

EC Classification and User Label Information
This product does not require classification according to the criteria of the Commission of the European Communities.

EINECS Status
The constituent monomers, initiators and additives of this product are listed on EINECS.

16. OTHER INFORMATION

Refer to Dow's information brochure, 'Guidelines for determining dust hazard potential'. For reprocessing these materials the guidelines of this MSDS should be followed.

9.2. Radiator

KOREA TESTING & RESEARCH INSTITUTE

KTR www.ktr.or.kr

TEST REPORT (Registered Copy)

Report No : TAK-015284
Client : Chang Eun Choi
#48-179, Sanmjong-Dong, Ojeong-gu, Pucheon-City, Kyunggi-Do, Korea.
SONG EUN METAL CO., LTD.

Receipt Date : Sep.15.2006
Test Date : Sep.22.2006

Sample : Matal specimen(STS304)

TEST RESULTS

TEST ITEM	UNIT	SAMPLE	RESULT	TEST METHOD
Pb	㎎/㎏		Not Detected	ASTM E 350 : 1995
Cd	㎎/㎏		Not Detected	ASTM E 350 : 1995 (Apply Correspondingly)
Hg	㎎/㎏		Not Detected	JIS H 1066 : 1993 (Apply Correspondingly)
Cr(VI)	㎍/㎠		Not Detected	ISO 3613 : 2000(E) (Distilled Water*Boiling*1hrs)

* Limit of detection : Pb(10㎎/㎏), Cd(1㎎/㎏), Hg(1㎎/㎏), Cr(VI)(0.2㎍/㎠)

USAGE : QUALITY CONTROL

NOTE : 1. The test result of this test report only limited in the sample and sample name presented by the client and do not guarantee the all products of the client.
2. This test report shall be used only within the purpose of its defined usage and also shall not be used for public relation, advertisement and suit without the KTR's written approval.

Hyun-Sik Kim
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Mu-Sang Lyu
Reviewed by Mu-Sang Lyu
Technical Manager
E-mail: ymsang@ktr.or.kr

Registered copy date: Sep.25.2006

Sep.22.2006

Korea Testing & Research Institute

President Bowon Lee

1 of Tots 1 Panels

M S D S

1. Product and Company Identification

1) Product Identification : STAINLESS STEEL COIL & SHEET

2) Company Information

- Company Name : TAIHAN ELECTRIC WIRE Co., Ltd. Ansan Plant
- Company Address (Head Office)
  : #194-15, 1Ka, Hoehyun-Dong, Chung-Gu, Seoul, Korea.
- Company Address (Ansan Plant)
  : #603, Seonggok-Dong, Danwon-Gu, Ansan-Si, Gyunggi-Do, Korea

3) Date of MSDS : 01/20/2006, Technical Review Date : 04/30/2003

2. Composition/Information on Ingredients STAINLESS STEEL

Ingredient	Synonym	Ingredient CAS Number	Content (%)
Iron	Fe	7439-89-6	55~87
Carbon	C	7440-44-0	0.01~0.32
Silicon	Si	7440-21-3	0.30~3.70
Manganese	Mn	7439-96-5	0.6~1.8
Phosphorus	P	7723-14-0	~0.035
Sulfur	S	7704-34-9	~0.020
Aluminum	Al	7429-90-5	~0.15
Nitrogen	N	10102-44-0	0.010~0.18
Chromium	Cr	7440-47-3	12.0~26.6
Copper	Cu	7440-50-8	~3.5
Nickel	Ni	7440-02-0	~19.8
Titanium	Ti	13463-67-7	~0.7

3. Hazards Identification

1) Eye Contact : May cause irritation

2) Skin Contact : May cause irritation

3) Inhalation : May cause metal fume fever of the upper respiration

4) Ingestion : stomachache

5) Chronic Sign & Syndrome : Not Known about serious side-effect

4. First Aid Measures

1) Eye : Flush with running water

2) Skin : Wash with soap and water

3) Inhalation : Move to fresh air. Artificial respiration, if necessary.

4) Ingestion : Obtain medical attention

5. Explosion & Fire Fighting Measures
   1) Ignition Point : No data.
   2) Spontaneous Combustion Point : No data.
   3) Explosion(Combustion) Upper & Lower Limit Point : No data.
   4) Burning Noxiousness : No data.

6. Accidental Release Measures
   1) Necessary Measurements for Protection of Human Body : No data.
   2) Necessary Measurements for Protection of Environment : No data.
   3) Purgation or Remove Method : Remove remaining things using High-effective Vacuum Cleaner

7. Handling and Storage
   1) Safety Handling : Storage & Handling by Current Law & Regulation
   2) Storage : Separate from Mixed-Prohibited Material

8. Exposure Controls & Personal Protection
   1) Technical Control Method : Install a Part Exhauster
   2) Protection of Respiratory Organ : Wear a Breathing Apparatus When Severe Exposure
   3) Protection of Eye : Wear Goggle Which can be Protected by Scatter
   4) Protection of Hand : Wear Impervious Glove
   5) Protection of Body : Wear Impervious Clothes
   6) Hygiene Note : Nothing Special.

9. Physical & Chemical Properties
   1) Appearance : White or Gray Color Solid Material
   2) Smell : Not
   3) pH : Not Related.
   4) Solubility : Insolubility
   5) Boiling Point / Range of Boiling Point : 2,750℃
   6) Melting Point / Range of Melting Point : 1,535℃
   7) Explosion : Not Related.
   8) Decomposition : No data.
   9) Vapor Pressure : Not Related.
   10) Specific Gravity : Depends on Alloy (e.g. Type 304 : 7.93)

10. Stability & Reactivity Data
   1) Chemical Stability : Stable in Normal Temperature & Pressure
   2) Noxiousness Produced When Resolution : Iron Oxide

11. Toxicological Information

No data

12. Ecological Information

No data.

13. Disposal Considerations

Observe Related Law & Regulation

14. MSDS Transport Information

No data

15. Regulatory Information

No data