Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

Antenna Specifications

(UM100C)

		Checked By R&D RF	Checked By R&D Mech.	Checked By	Reviewed By	Approved By
UTStarcom	**Name**					
	Signature					

		Checked By R&D RF	Checked By R&D Mech	Approved By
Laird Technologies Korea	**Name**	Dae-hyun.Jung	Wan-chul. Park	Tommy Goh
	Signature			

Supplier: Laird Technologies Korea
Address: 4th Floor, Woorim Lions Vally A, 371-28, Gasan-dong, Geumcheon-gu, Seoul, Korea (Zip Code : 153-786)
Telephone: +82 2 830 2095

Specification No.	Description		
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Customer	**Date**	**Rev**	**Reference**
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Product Family : Internal Antenna		
Model Name : UM100C		
Maker Part No. : 712195.0001	**Revision:**	**1.0**
Customer : UT Starcom		
Customer Part No. : 7083012306	**Revision:**	

Purpose

The product specification is a complete description of the product only together with the specification drawing.

Approval History

REV	DATA	Previous	After	Reason
1.0	January 17, 2008.			Approval

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
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1 GENERAL

1.1 PRODUCT DESCRIPTION

Internal monopole-Style Antenna Consisting of a Stamped Metal Radiator Heat-Staked to a Plastic Carrier.

1.2 PART NO.

Laird Technologies Part No. 712195.0001
UT Starcom Part No.

1.3 PRINT ACCEPTANCE

Samples and a Page one drawing was sent to customer. When they are approved, the approval form should be completed, signed, and sent back to Laird Technologies before further mass production batches can be delivered.

1.4 UNITS, DEFINITIONS, AND ABBREVIATIONS

Unless otherwise stated, SI units are used.

Tx	Transmit Band
Rx	Receive Band
PCB	Printed Circuit Board
VSWR	Voltage Standing Wave Ratio
dBi	Antenna gain in dB (Isotropic)
CW	Continuous Wave
g	Acceleration of gravity (approx. 9.8 m/s^2)
RH	Relative Humidity

1.4.1 "Without mechanical damage"

Implies full mechanical functionality according to specification and compliance with visual requirements according to specification drawing.

1.4.2 "Without permanent mechanical damage"

As above but allows reversible misalignment or deformation and minor visual damage (no through-cuts or holes).

1.4.3 "Unimpaired functionality"

Implies full mechanical functionality according to specification but allows visual damage (no through-cuts or holes).

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1.5 INTERFACE

All properties are guaranteed under the condition that antenna/handset interface is designed in accordance with instructions provided by Laird Technologies. The whole interface should be included in the specification. Functionality with other equipment (such as couplers etc.) is not guaranteed unless this has been agreed upon separately.

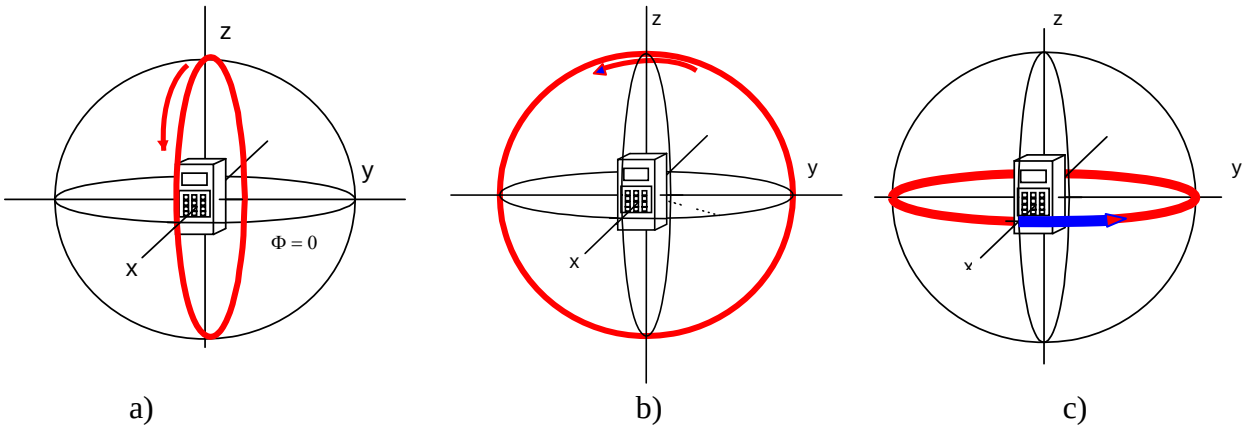
1.6 CONDITIONS

Unless otherwise stated all temperature tolerances are ±3℃ and all RH tolerances are ±5 % units.
Unless otherwise stated all values are valid at +20℃ and 50% RH.
Unless otherwise stated all values are valid for the radio defined in 2.4

1.7 COORDINATE SYSTEM

The coordinate system for the phone is defined as follows:

- Origin is in center of gravity.
- Positive X axis is perpendicular to, and directed from, front plane.
- Positive Y axis is perpendicular to, and directed from, right side plane (as seen from front).
- Positive Z axis is perpendicular to, and directed from, top plane.



a) b) c)

Figure 1-1: a) E_2-plane b) E_1-plane c) H-plane

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2 ELECTRICAL PROPERTIES

2.1 SAMPLES SIZE

All the tests will be conducted as below:

- The VSWR will be measured for 30 samples and a Cpk analysis will be conducted,
- The radiation patterns will be measured on one sample,.

2.2 FREQUENCY BANDS

CDMA	PCS & AWS
824 ~ 894 MHz	1710 ~ 2155 MHz

2.3 IMPEDANCE

2.3.1 Nominal Value:

50 Ohms

2.3.2 Method

Laird Technologies will supply engineering assistance to ensure that the impedance over the frequency bands is as close to 50 ohms as possible after matching.

2.4 THE RADIO

2.4.1 Radio Revision

Customer chassis I.D. : UM100C

2.4.2 Matching circuit

The customer provided the matching circuit used. Customer is responsible for verifying operation and performance of matching circuit.
Matching network:

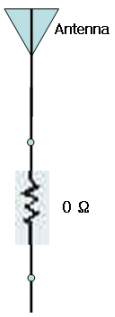

Figure 2-1 Matching Circuit

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2.5 VSWR

2.5.1 Method of Measurement

A 50 ohms coaxial cable is connected (soldered) to the 50 ohms feeding point on the PCB. The connection of the coaxial cable is done so as to introduce a minimum of mismatch. In the other end, the coaxial cable is connected to a network analyzer. The analyzer is calibrated so that the reference plane is at the 50 ohms feeding point. The radio, including the PCB must not in any significant way differ from the mass produced radio, e.g. the antenna feeding parts have to be equivalent to the parts in mass production. Free space means that the radio is attached to a nonconductive surface.

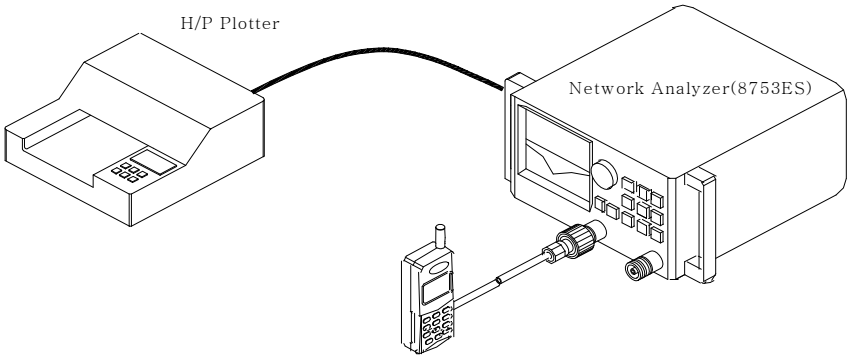

Figure 2-2 VSWR Measurement System

2.5.2 Electrical Performance Assurance

In order to guarantee the specified electrical performance in mass production the following procedure is used (example given for a single band antenna). During the development phase, two antennas are selected; one defining the lowest allowable resonance frequency (when measured on the handset), marked "low freq.", and one defining the highest allowable resonance frequency, marked "high freq.", see Figure 2-3. These antennas are reference antennas. These antennas are then measured on a ground plane used in mass production and define the highest and lowest allowable resonance frequencies on this ground plane and each produced antenna is automatically tested on this ground plane.

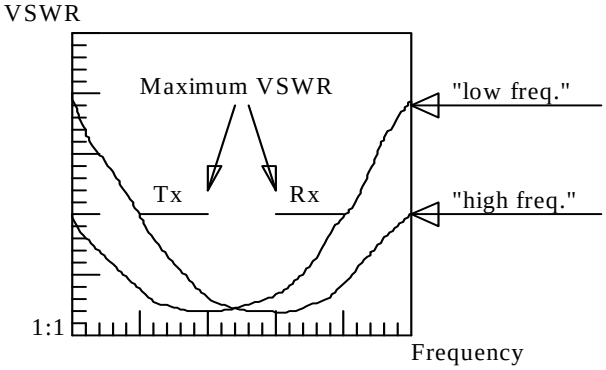

Figure 2-3 Reference antennas defining the lowest and highest

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2007-B4-PS002	UM100C Antenna Product Specification		
Customer **UT Starcom**	Date January 17, 2008	Rev 1.0	Reference

2.6 GAIN (PEAK AND AVERAGE)

Below typical antenna gain values are based on the horn antenna measurement.

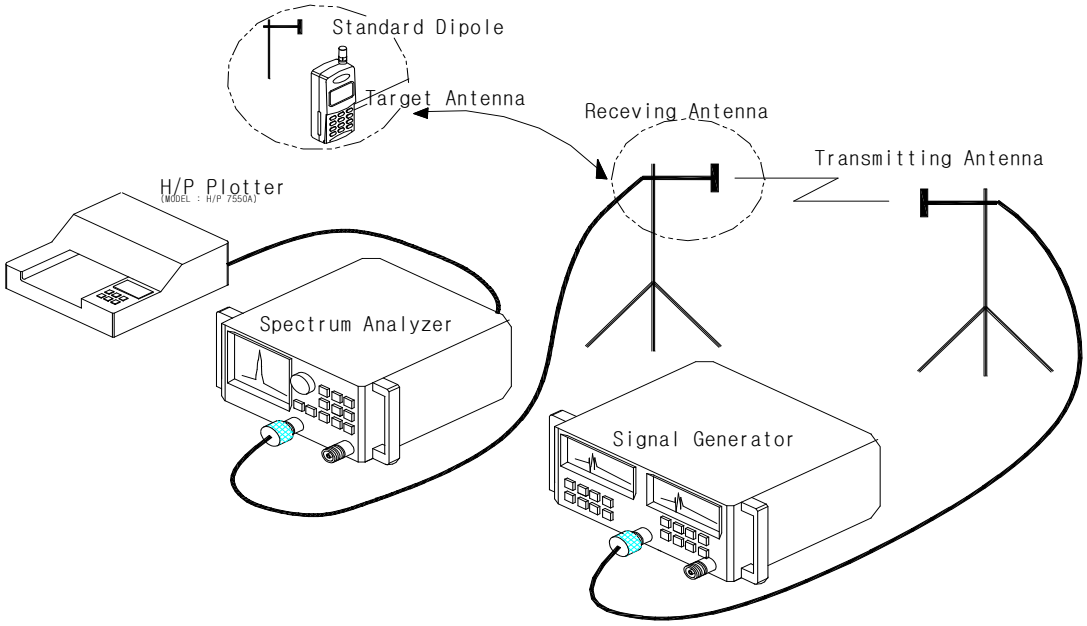

Figure 2-4 Gain Measurement System

2.7 POWER RATING

2.7.1 Maximum Value

P=2W (CW)

2.7.2 Method of Measurement

The connection is done according to 2.5.1. The specified power, P, is applied for 10 minutes at the middle frequency of each Tx band defined in 2.2. Immediately after the test the VSWR is measured.

2.7.3 Post Test Requirements

Neither mechanical damage nor electrical performance reduction should be observed after the test.

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2.8 ELECTRICAL SPECIFICATION & TEST DATA

Electrical Spec.		CDMA		PCS & AWS	
		824 MHz (Tx)	894 MHz (Rx)	1710 MHz (AWS Rx)	2155 MHz (AWS Tx)
VSWR	set	Less than 6.0 : 1	Less than 10.5 : 1	Less than 4.0 : 1	Less than 6.0 : 1
	notebook	Less than 4.5 : 1	Less than 9.0 : 1	Less than 4.5 : 1	Less than 6.0 : 1

			CDMA		PCS		AWS	
			824~849 (Tx)	869~894 (Rx)	1850~1910 (Tx)	1930~1990 (Rx)	1710~1755 (Rx)	2110~2155 (Tx)
Avg. gain (min)	set	H	-9.0 dBi	-12.0 dBi	-5.0 dBi	-5.0 dBi	-8.0 dBi	-6.0 dBi
		E1	-12.5 dBi	-16.0 dBi	-7.0 dBi	-7.0 dBi	-9.5 dBi	-8.0 dBi
		E2	-12.0 dBi	-15.0 dBi	-7.0 dBi	-7.0 dBi	-10.0 dBi	-8.0 dBi
	Note book	H	-16.0 dBi	-18.5 dBi	-5.5 dBi	-7.0 dBi	-5.0 dBi	-8.0 dBi
		E1	-12.0 dBi	-17.0 dBi	-6.0 dBi	-7.0 dBi	-6.0 dBi	-9.0 dBi
		E2	-13.5 dBi	-18.0 dBi	-8.0 dBi	-8.5 dBi	-7.5 dBi	-10.0 dBi

(Value : More than XX dBi)

Test Data		CDMA		PCS & AWS	
		824 MHz (Tx)	894 MHz (Rx)	1710 MHz (AWS Rx)	2155 MHz (AWS Tx)
VSWR	set	Less than 5.1 : 1	Less than 9.1 : 1	Less than 3.0 : 1	Less than 4.6 : 1
	notebook	Less than 3.6 : 1	Less than 8.0 : 1	Less than 3.3 : 1	Less than 4.6 : 1

			CDMA		PCS		AWS	
			824~849 (Tx)	869~894 (Rx)	1850~1910 (Tx)	1930~1990 (Rx)	1710~1755 (Rx)	2110~2155 (Tx)
Avg. gain (min)	set	H	-8.1 dBi	-11.3 dBi	-3.8 dBi	-3.9 dBi	-6.8 dBi	-5.2 dBi
		E1	-11.5 dBi	-15.0 dBi	-5.9 dBi	-6.1 dBi	-8.4 dBi	-7.3 dBi
		E2	-10.9 dBi	-13.9 dBi	-6.3 dBi	-6.3 dBi	-8.9 dBi	-7.1 dBi
	Note book	H	-15.3 dBi	-17.6 dBi	-4.7 dBi	-5.9 dBi	-4.3 dBi	-6.9 dBi
		E1	-11.0 dBi	-15.8 dBi	-5.2 dBi	-6.2 dBi	-4.9 dBi	-8.3 dBi
		E2	-12.4 dBi	-17.2 dBi	-6.9 dBi	-7.7 dBi	-6.7 dBi	-8.8 dBi

(Value : More than XX dBi)

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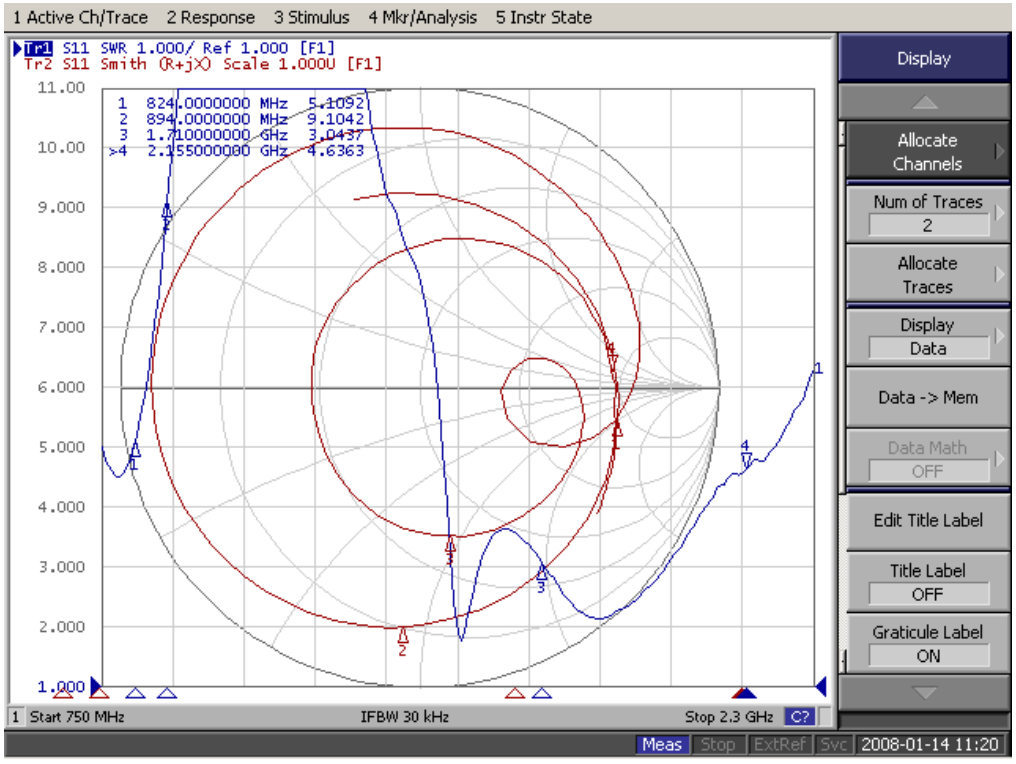
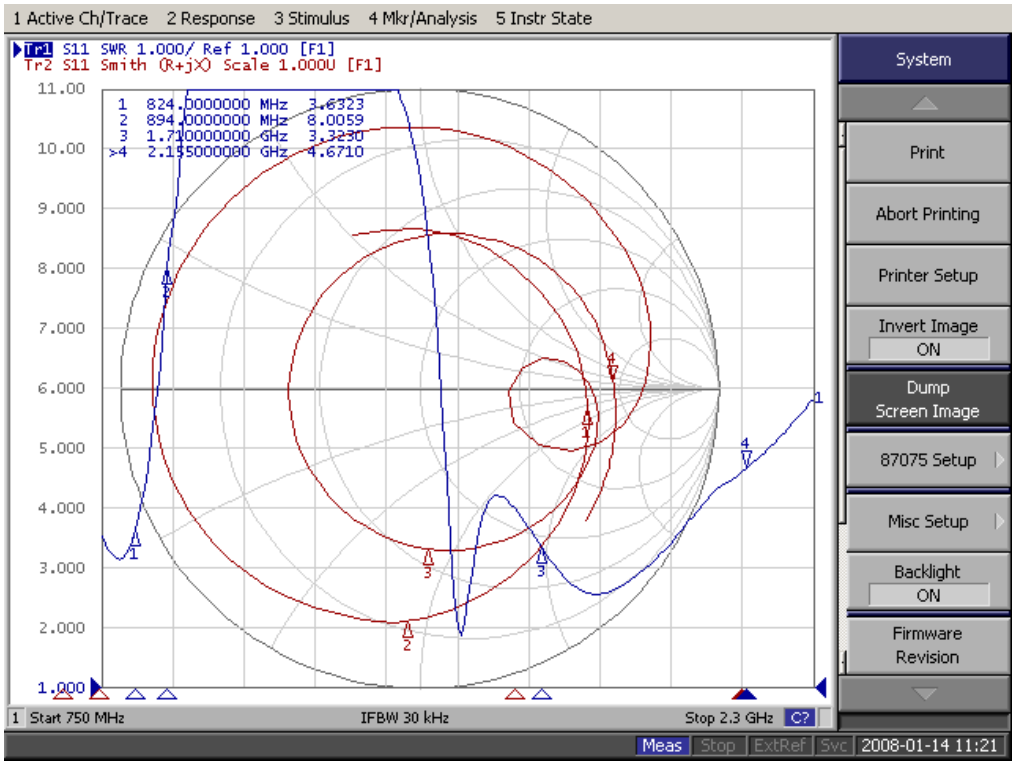
- VSWR & SMITH CHART



SET



NOTEBOOK

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
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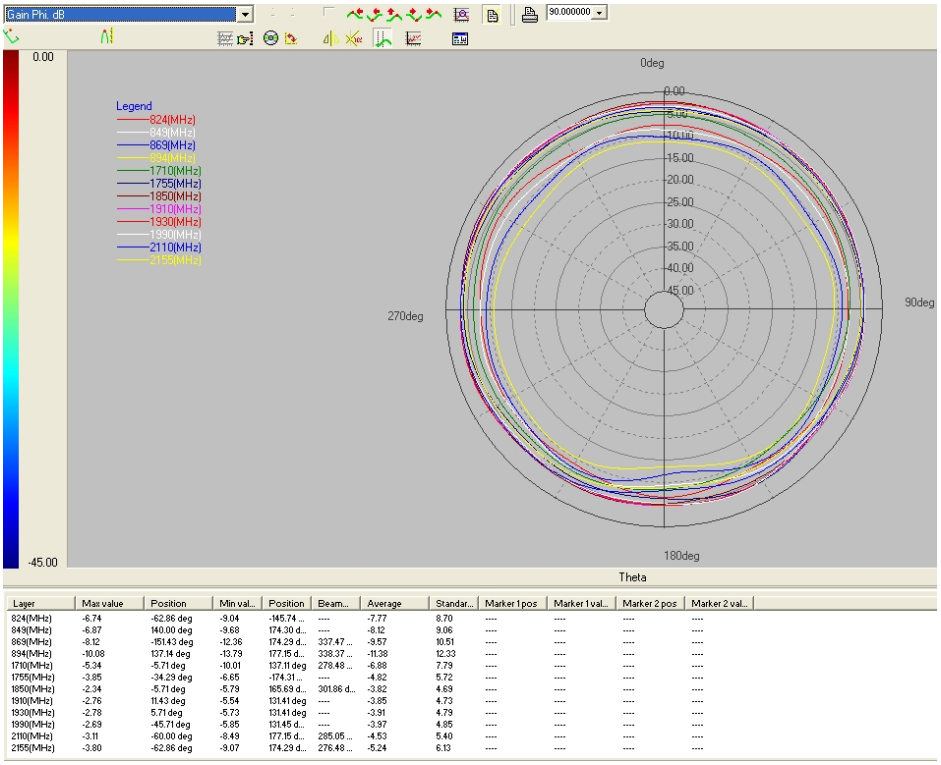
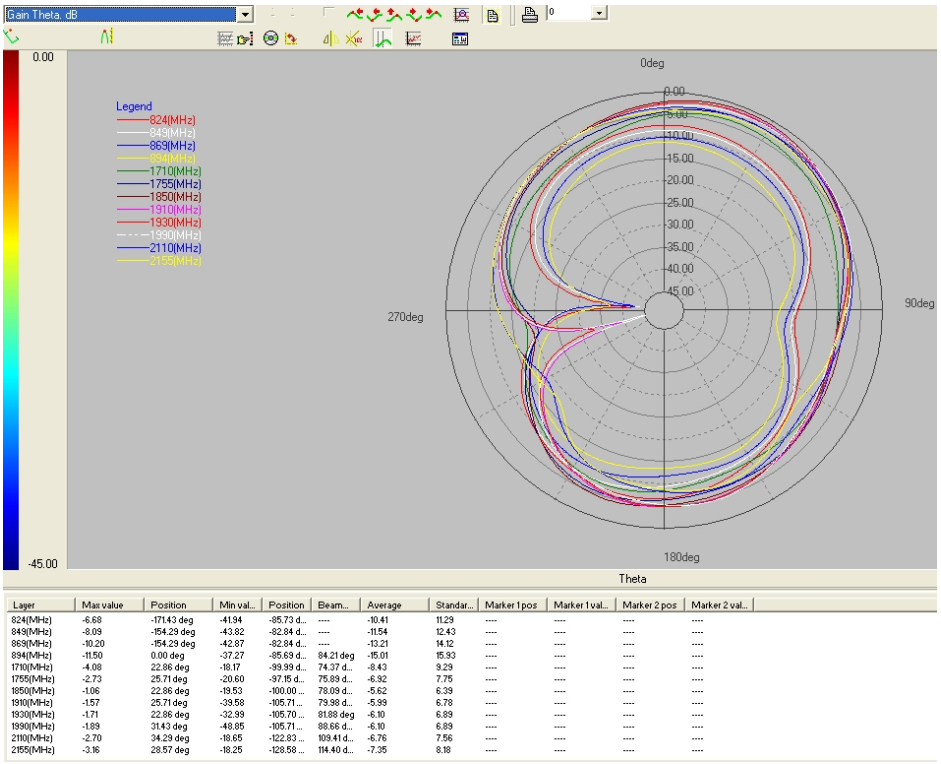
-Radiation Pattern (-SET)



Lager	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-6.74	-62.86 deg	-9.04	-145.74 ...	----	-7.77	8.70	----	----	----	----
849(MHz)	-6.87	140.00 deg	-9.68	174.30 d...	----	-8.12	9.06	----	----	----	----
869(MHz)	-8.12	-151.43 deg	-12.36	174.29 d...	337.47 ...	-9.57	10.51	----	----	----	----
894(MHz)	-10.08	137.14 deg	-13.79	177.15 d...	338.37 ...	-11.38	12.33	----	----	----	----
1710(MHz)	-5.34	-5.71 deg	-10.01	137.11 deg	278.48 ...	-6.88	7.79	----	----	----	----
1755(MHz)	-3.85	-34.29 deg	-6.65	-174.31 ...	----	-4.82	5.72	----	----	----	----
1850(MHz)	-2.34	-5.71 deg	-5.79	165.69 d...	301.86 d...	-3.82	4.69	----	----	----	----
1910(MHz)	-2.76	11.43 deg	-5.54	131.41 deg	----	-3.85	4.73	----	----	----	----
1930(MHz)	-2.78	5.71 deg	-5.73	131.41 deg	----	-3.91	4.79	----	----	----	----
1990(MHz)	-2.69	-45.71 deg	-5.85	131.45 d...	----	-3.97	4.85	----	----	----	----
2110(MHz)	-3.11	-60.00 deg	-8.49	177.15 d...	285.05 ...	-4.53	5.40	----	----	----	----
2155(MHz)	-3.80	-62.86 deg	-9.07	174.29 d...	276.48 ...	-5.24	6.13	----	----	----	----

H-plane



Lager	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-6.68	-171.43 deg	-41.94	-85.73 d...	----	-10.41	11.29	----	----	----	----
849(MHz)	-8.09	-154.29 deg	-43.82	-82.84 d...	----	-11.54	12.43	----	----	----	----
869(MHz)	-10.20	-154.29 deg	-42.87	-82.84 d...	----	-13.21	14.12	----	----	----	----
894(MHz)	-11.50	0.00 deg	-37.27	-85.69 d...	84.21 deg	-15.01	15.93	----	----	----	----
1710(MHz)	-4.08	22.86 deg	-18.17	-99.99 d...	74.37 d...	-8.43	9.29	----	----	----	----
1755(MHz)	-2.73	25.71 deg	-20.60	-97.15 d...	75.89 d...	-6.92	7.75	----	----	----	----
1850(MHz)	-1.06	22.86 deg	-19.53	-100.00 ...	78.09 d...	-5.62	6.39	----	----	----	----
1910(MHz)	-1.57	25.71 deg	-39.58	-105.71 ...	79.98 d...	-5.99	6.78	----	----	----	----
1930(MHz)	-1.71	22.86 deg	-32.99	-105.70 ...	81.88 deg	-6.10	6.89	----	----	----	----
1990(MHz)	-1.89	31.43 deg	-49.85	-105.71 ...	86.66 d...	-6.10	6.89	----	----	----	----
2110(MHz)	-2.70	34.29 deg	-18.65	-122.83 ...	109.41 d...	-6.76	7.56	----	----	----	----
2155(MHz)	-3.16	28.57 deg	-18.25	-128.58 ...	114.40 d...	-7.35	8.18	----	----	----	----

E1-plane

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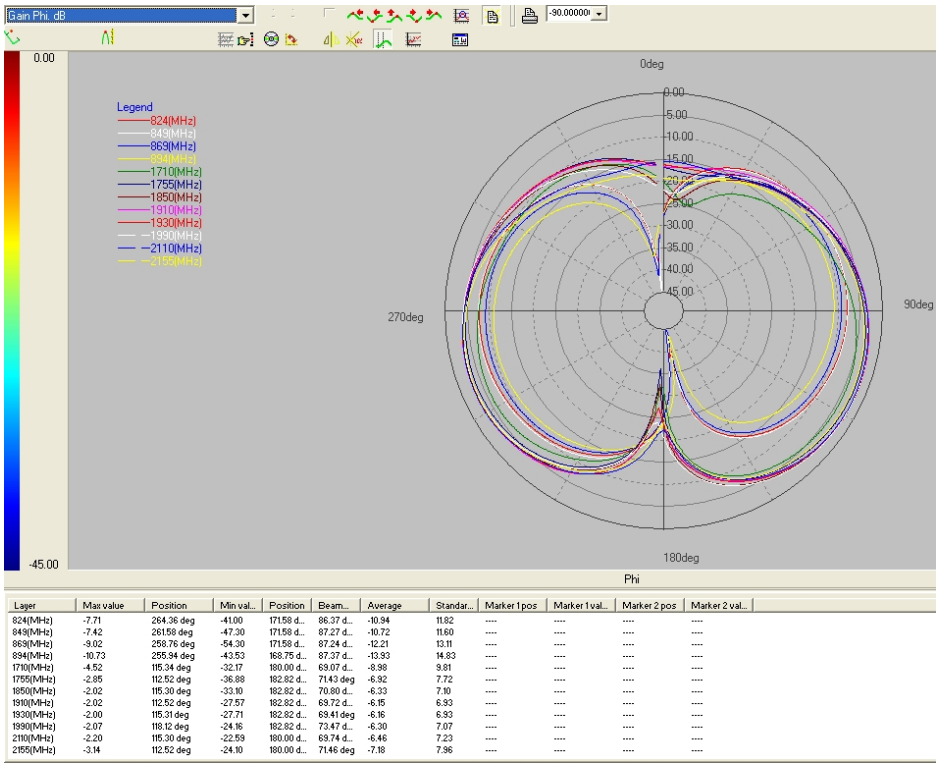
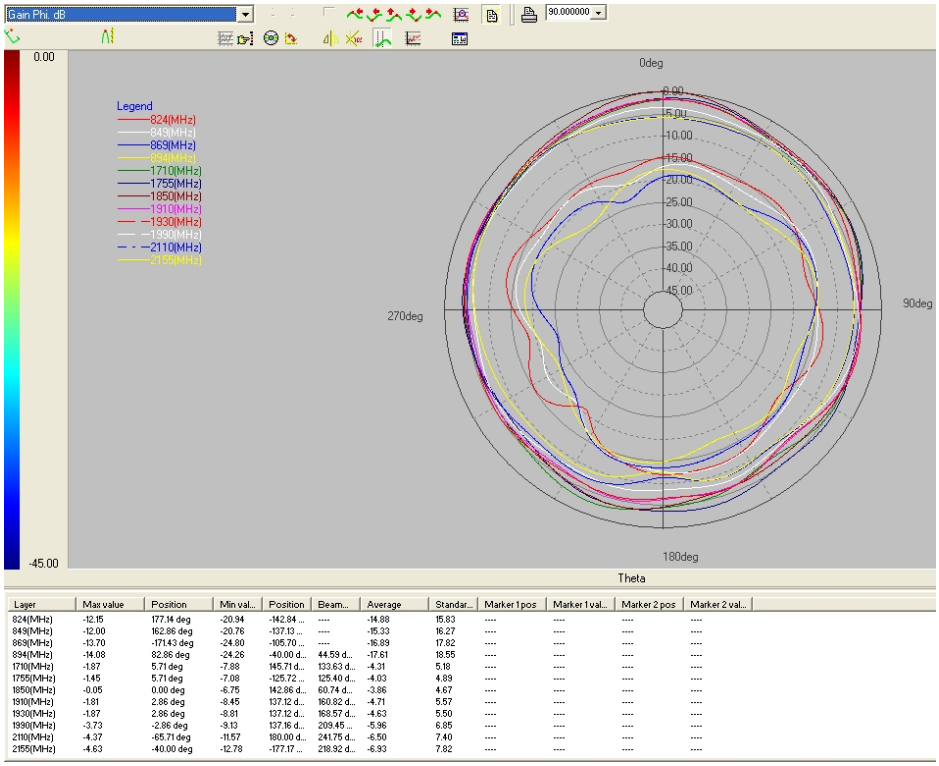


Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-7.71	264.36 deg	-41.00	171.58 d...	86.37 d...	-10.94	11.82	----	----	----	----
849(MHz)	-7.42	261.58 deg	-47.30	171.58 d...	87.27 d...	-10.72	11.60	----	----	----	----
869(MHz)	-9.02	259.76 deg	-54.30	171.58 d...	87.24 d...	-12.21	13.11	----	----	----	----
894(MHz)	-10.73	255.94 deg	-43.53	168.75 d...	87.37 d...	-13.93	14.83	----	----	----	----
1710(MHz)	-4.52	115.34 deg	-32.17	180.00 d...	69.07 d...	-8.98	9.81	----	----	----	----
1755(MHz)	-2.85	112.52 deg	-36.88	182.82 d...	71.43 deg	-6.92	7.72	----	----	----	----
1850(MHz)	-2.02	115.30 deg	-33.10	182.82 d...	70.80 d...	-6.33	7.10	----	----	----	----
1910(MHz)	-2.02	112.52 deg	-27.57	182.82 d...	69.72 d...	-6.15	6.93	----	----	----	----
1930(MHz)	-2.00	115.31 deg	-27.71	182.82 d...	69.41 deg	-6.16	6.93	----	----	----	----
1990(MHz)	-2.07	118.12 deg	-24.16	182.82 d...	73.47 d...	-6.30	7.07	----	----	----	----
2110(MHz)	-2.20	115.30 deg	-22.59	180.00 d...	69.74 d...	-6.46	7.23	----	----	----	----
2155(MHz)	-3.14	112.52 deg	-24.10	180.00 d...	71.46 deg	-7.18	7.96	----	----	----	----

E2−plane

-Radiation Pattern (-NOTEBOOK)



Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-12.15	177.14 deg	-20.94	-142.84 ...	----	-14.88	15.83	----	----	----	----
849(MHz)	-12.00	162.86 deg	-20.76	-137.13 ...	----	-15.33	16.27	----	----	----	----
869(MHz)	-13.70	-171.43 deg	-24.80	-105.70 ...	----	-16.89	17.82	----	----	----	----
894(MHz)	-14.08	82.86 deg	-24.26	-40.00 d...	44.59 d...	-17.61	18.55	----	----	----	----
1710(MHz)	-1.87	5.71 deg	-7.88	145.71 d...	133.63 d...	-4.31	5.18	----	----	----	----
1755(MHz)	-1.45	5.71 deg	-7.08	-125.72 ...	125.40 d...	-4.03	4.89	----	----	----	----
1850(MHz)	-0.05	0.00 deg	-6.75	142.86 d...	60.74 d...	-3.86	4.67	----	----	----	----
1910(MHz)	-1.81	2.86 deg	-8.45	137.12 d...	160.82 d...	-4.71	5.57	----	----	----	----
1930(MHz)	-1.87	2.86 deg	-8.81	137.12 d...	168.57 d...	-4.63	5.50	----	----	----	----
1990(MHz)	-3.73	-2.86 deg	-9.13	137.16 d...	209.45 ...	-5.96	6.85	----	----	----	----
2110(MHz)	-4.37	-65.71 deg	-11.57	180.00 d...	241.75 d...	-6.50	7.40	----	----	----	----
2155(MHz)	-4.63	-40.00 deg	-12.78	-177.17 ...	218.92 d...	-6.93	7.82	----	----	----	----

H−plane

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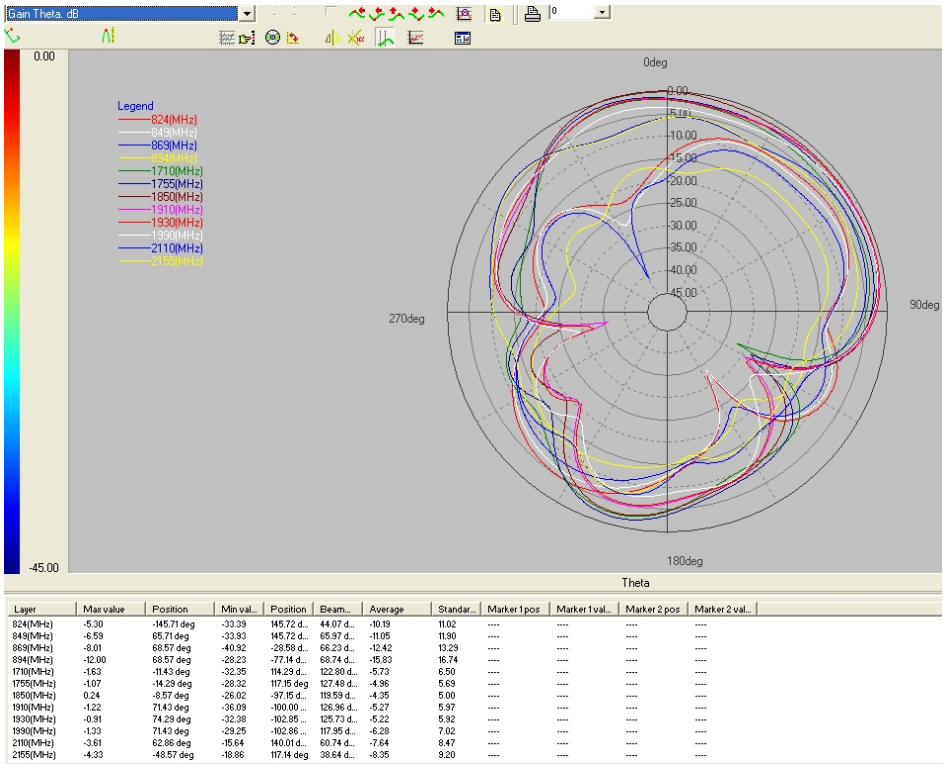
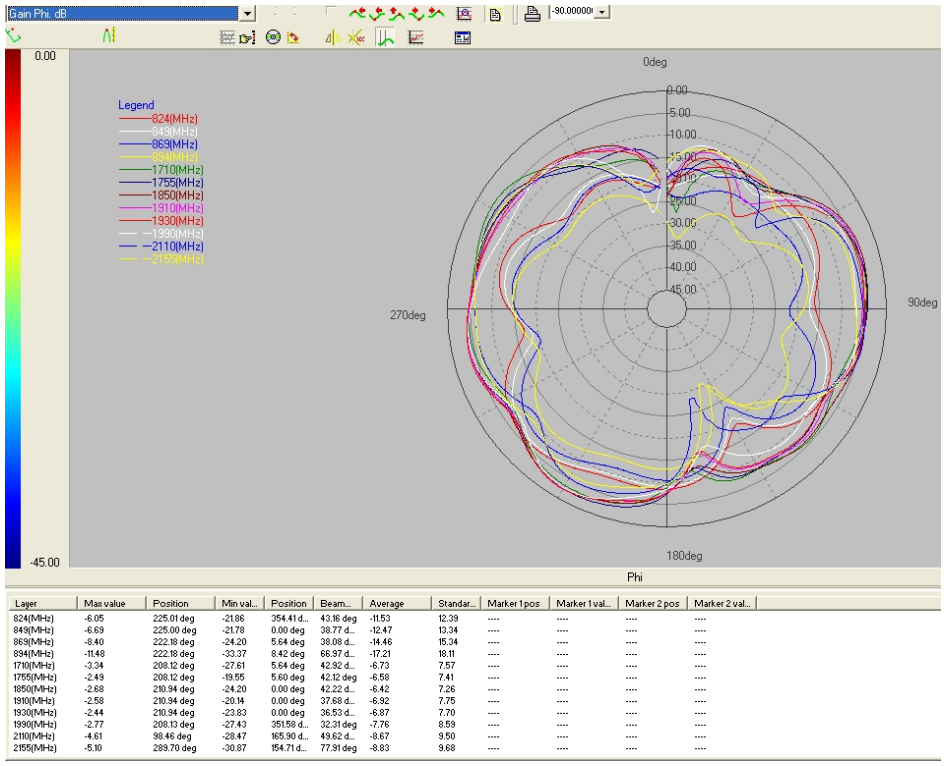


Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-5.30	-145.71 deg	-33.39	145.72 d...	44.07 d...	-10.19	11.02	----	----	----	----
849(MHz)	-6.59	65.71 deg	-33.93	145.72 d...	65.97 d...	-11.05	11.90	----	----	----	----
869(MHz)	-8.01	68.57 deg	-40.92	-28.58 d...	66.23 d...	-12.42	13.29	----	----	----	----
894(MHz)	-12.00	68.57 deg	-28.23	-77.14 d...	68.74 d...	-15.83	16.74	----	----	----	----
1710(MHz)	-1.63	-11.43 deg	-32.25	114.29 d...	122.80 d...	-5.73	6.50	----	----	----	----
1755(MHz)	-1.07	-14.29 deg	-28.32	117.15 deg	127.48 d...	-4.96	5.69	----	----	----	----
1850(MHz)	0.24	-8.57 deg	-26.02	-97.15 d...	119.59 d...	-4.35	5.00	----	----	----	----
1910(MHz)	-1.22	71.43 deg	-36.09	-100.00 ...	126.96 d...	-5.27	5.97	----	----	----	----
1930(MHz)	-0.91	74.29 deg	-32.38	-102.85 ...	125.73 d...	-5.22	5.92	----	----	----	----
1990(MHz)	-1.33	71.43 deg	-29.25	-102.86 ...	117.95 d...	-6.28	7.02	----	----	----	----
2110(MHz)	-3.61	62.86 deg	-15.64	140.01 d...	60.74 d...	-7.64	8.47	----	----	----	----
2155(MHz)	-4.33	-48.57 deg	-18.86	117.14 deg	38.64 d...	-8.35	9.20	----	----	----	----

E1-plane



Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-6.05	225.01 deg	-21.86	354.41 d...	43.16 deg	-11.53	12.39	----	----	----	----
849(MHz)	-6.69	225.00 deg	-21.78	0.00 deg	38.77 d...	-12.47	13.34	----	----	----	----
869(MHz)	-8.40	222.18 deg	-24.20	5.64 deg	38.08 d...	-14.46	15.34	----	----	----	----
894(MHz)	-11.48	222.18 deg	-33.57	8.42 deg	66.97 d...	-17.21	18.11	----	----	----	----
1710(MHz)	-3.34	208.12 deg	-27.61	5.64 deg	42.92 d...	-6.73	7.57	----	----	----	----
1755(MHz)	-2.49	208.12 deg	-19.55	5.60 deg	42.12 deg	-6.58	7.41	----	----	----	----
1850(MHz)	-2.68	210.94 deg	-24.20	0.00 deg	42.22 d...	-6.42	7.26	----	----	----	----
1910(MHz)	-2.58	210.94 deg	-20.14	0.00 deg	37.68 d...	-6.92	7.75	----	----	----	----
1930(MHz)	-2.44	210.94 deg	-23.83	0.00 deg	36.53 d...	-6.87	7.70	----	----	----	----
1990(MHz)	-2.77	208.13 deg	-27.43	351.59 d...	32.31 deg	-7.76	8.59	----	----	----	----
2110(MHz)	-4.61	98.46 deg	-28.47	165.90 d...	49.62 d...	-8.67	9.50	----	----	----	----
2155(MHz)	-5.10	289.70 deg	-30.87	154.71 d...	77.91 deg	-8.83	9.68	----	----	----	----

E2-plane

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer **UT Starcom**	Date January 17, 2008	Rev 1.0	Reference

3 MECHANICAL PROPERTIES

3.1 SAMPLES SIZE

All the tests will be conducted on 5 samples.

3.2 APPEARANCE

The appearance shall be according to specification drawing (see 6).

3.3 DROP TEST

3.3.1 Post Test Requirements

The antenna satisfies the electrical data.

3.3.2 Procedure

The antenna is assembled to mobile phone provided by UTStarcom, Should with standard 3drop per every each 6side from 1.5m heights on to a steel plate.

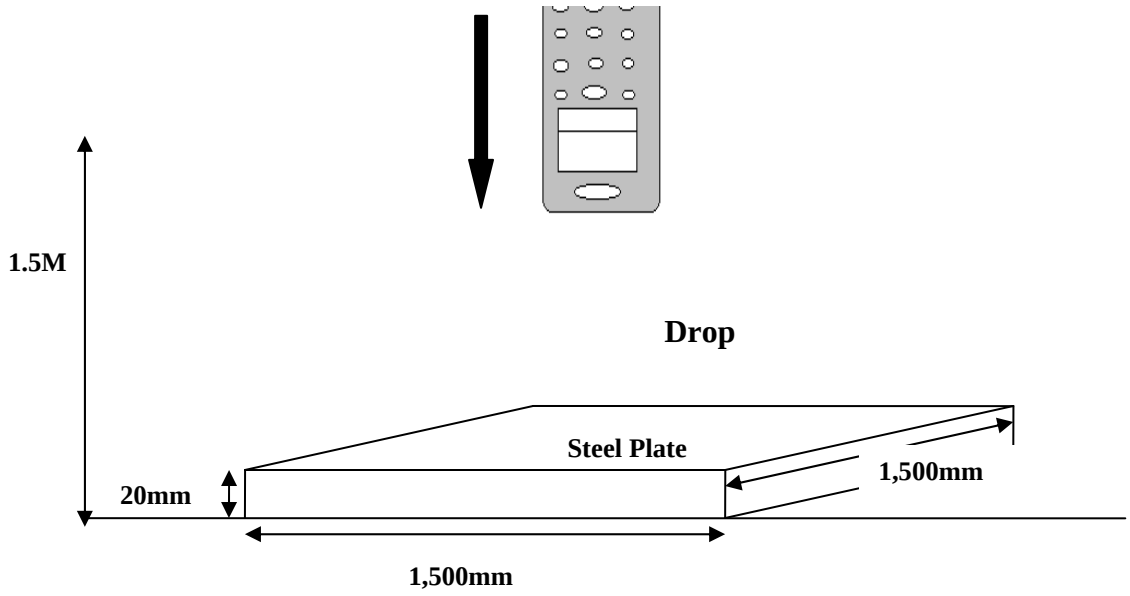


Figure 3-1: Drop

3.4 CONTACT FORCE TEST

3.4.1 Post Test Requirements

The antenna satisfies the electrical and mechanical data.

3.4.2 Procedure

Measure reaction force of the antenna spring contacts with 250±150gf .

Place the antenna on the contact force measuring device, fix the antenna, and press on the top contact point to the height of pcb contact area. The force shall be 250±150gf.

Figure 3-2: Contact Force

3.5 CONTACT RESTITUTION TEST

3.5.1 Post Test Requirements

The antenna satisfies the electrical and mechanical data.

3.5.2 Procedure

Measure reaction force of the antenna spring contacts with overlap by 500 times. And than deformation is not more than 20%.

4 ENVIRONMENTAL RESISTANCE PROPERTIES

4.1 SAMPLES SIZE

All the tests will be conducted on 5 samples.

4.2 HIGH TEMPERATURE TEST

Temperature	+70℃
Time	48 hours

4.2.1 Post Test Requirements

No visual, fitting or mold changes have been observed after the test. The antenna satisfied the electrical data.

4.2.2 Procedure

Set temperature to +70℃. Keep the temperature for 48 hours. and then return to normal temperature & humidity for 2hours.

4.3 LOW TEMPERATURE

Temperature	-40℃
Time	48 hours

4.3.1 Post Test Requirements

No visual, fitting or mold changes have been observed after the test. The antenna satisfied the electrical data.

4.3.2 Procedure

Set temperature to -40℃. Keep the temperature for 48 hours. and then return to normal temperature & humidity for 2hours.

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

4.4 HUMIDITY

4.4.1 Condition: +70℃ / 93% RH / 48HOURS

4.4.2 Post Test Requirements

No visual, fitting or mold changes have been observed after the test. The antenna satisfied the electrical data.

4.4.3 Procedure

Set temperature & humidity to +70℃/93%. Keep the temperature & humidity for 48 hours. and then return to normal temperature & humidity for 2hours.

4.5 SALT SPRAY

4.5.1 Post Test Requirements

No visual, fitting or mold changes have been observed after the test. The antenna satisfied the electrical data.

4.5.2 Procedure

The antenna is placed in an atmosphere saturated by 5% (by weight) sodium chloride solution for 48 hours at +35°C.

4.6 THERMAL SHOCK

4.6.1 Post Test Requirements

No visual, fitting or mold changes have been observed after the test. The antenna satisfied the electrical data.

4.6.2 Procedure

The antenna is placed in a climatic chamber.
The temperature is cycled as follows: The temperature is kept constant at -40°C for 1 hour and is kept constant at +85°C for another 1 hour. This procedure is repeated 24 times. and then return to normal temperature & humidity for 2hours.

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

5. PACKAGING

Antenna to be individually placed in compartmentalized plastic tray.
All the sizes and quantities are to be decided.

- 1 Tray = 60 Antennas
- 1 Box = 22 Tray = 1,320 Antennas

-		Quantity	Size	Remark
1	Tray	22/1,320	380 X 280 X 160 (mm)	60EA Antennas Add empty tray above top of product
2	Carton Box	1/1,320	415 X 305 X 255 (mm)	22EA Tray = 1,320EA Antennas
3	Pad	2/1,320	385 X 285 (mm)	-

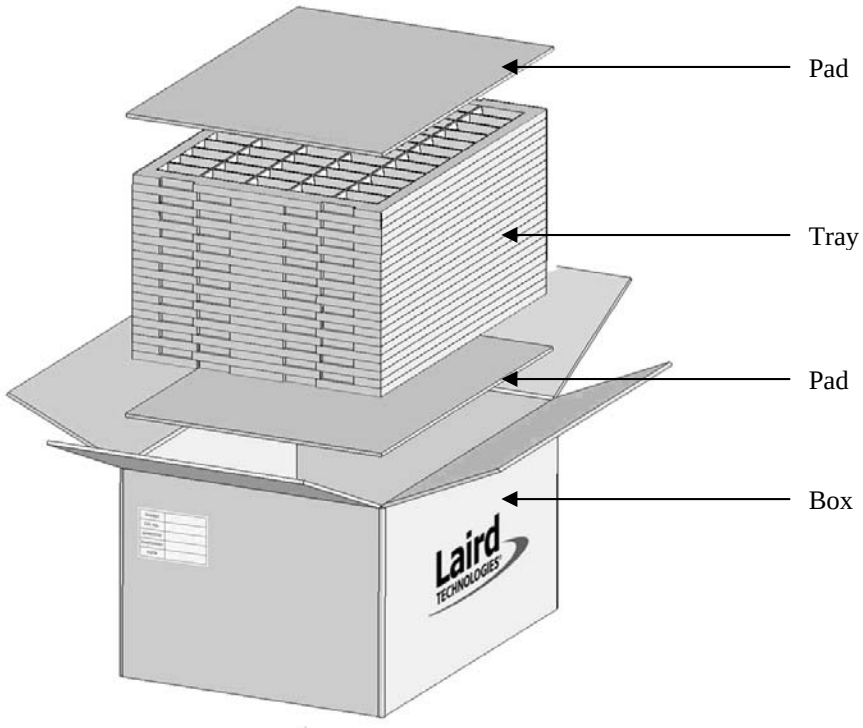


Figure 5-1: Packing

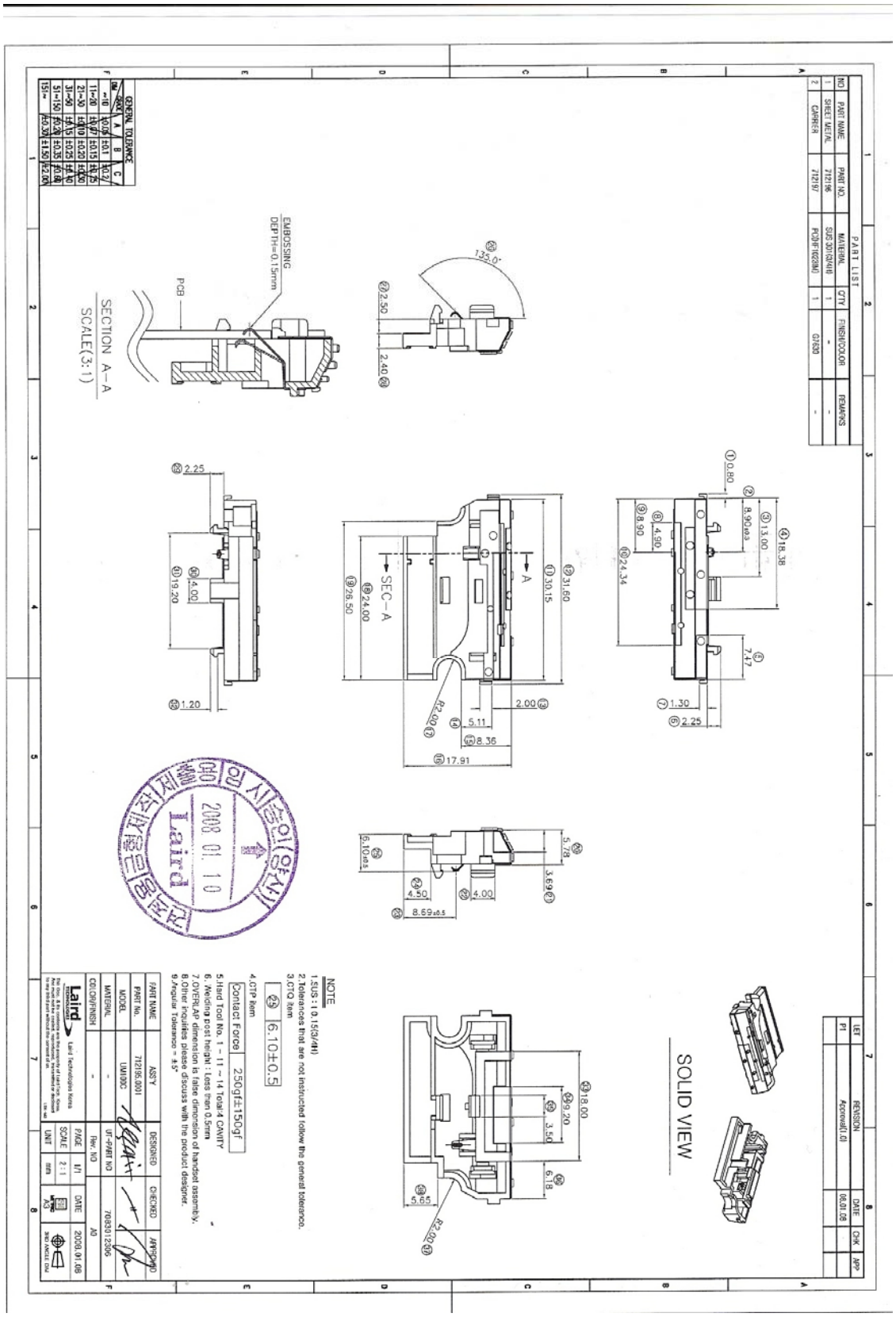
Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

6. SPECIFICATIONS DRAWINGS

No.	PART NAME	Material	Part No.	Quantity
1	Carrier	PC	712197	1
2	Sheet Metal	SUS	712196	1

[Part List]

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	



[Assembly Drawing]

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

7. TEST REPORT

Test Report	Tested By	Approved By
		

1. Test Summary Date **16-Jan-08**

Report No	2008-B4-TR002	**Test Date**	1/11 ~ 1/16	**Tested By**	Kisu Byun
Test Purpose	Qualification for UM100C, Internal Antenna				
Model	UM100C	**Type**	Internal Antenna	**Customer**	UTstarcom
Test Category	■ Electrical	■ Mechanical	■ Environmental	□ Coating Requirements	
Parts Description	1. Carrier : PC HF1023IM (G7630)		2. Sheet Metal : SUS 301		
Test Result	■ ACCEPT		□ REJECT		

2. Test Requirements

No	Test	Test Method & Conditions	Requirements	Result
1	DROP TEST	Antenna Specifications 3.3	– Meet the all test requirements. – There shall be no visual deterioration, and unbroken without any deformation. – No Appreciable Degradation Pre / Post Electrical Performance	OK
2	CONTACT FORCE TEST	Antenna Specifications 3.4		OK
3	CONTACT RESTITUTION TEST	Antenna Specifications 3.5		OK
4	HIGH TEMPERATURE TEST	Antenna Specifications 4.2		OK
5	LOW TEMPERATURE TEST	Antenna Specifications 4.3		OK
6	HUMIDITY TEST	Antenna Specifications 4.4		OK
7	SALT SPRAY TEST	Antenna Specifications 4.5		OK
8	THERMAL SHOCK TEST	Antenna Specifications 4.6		OK

3. Remark

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

TEST RESULT

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1. Drop Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
DROP TEST	● Height : 1.5mm ● Weight : 32.6g ● Cycle : 3Cycle (Total 18 Times)	● Meet the All Test Requirements. ● There shall be no visual deterioration, and unbroken without any deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	Drop Tester	

2) Test Result

- SET

No	Sample	Before (VSWR) Set				After (VSWR) Set				Result	
		824Mhz	894Mhz	1710Mhz	2155Mhz	824Mhz	894Mhz	1710Mhz	2155Mhz	Visual	Electrical
		6.0:1	10.5:1	4.0:1	6.0:1	6.0:1	10.5:1	4.0:1	6.0:1		
1	X1	4.823	8.581	2.290	4.460	4.959	9.082	3.030	4.526	OK	OK
	X2	4.883	8.769	2.820	4.803	5.012	9.062	2.958	4.574	OK	OK
	X3	4.914	9.017	3.011	4.431	4.579	8.925	2.929	4.513	OK	OK
	X4	4.831	9.029	2.681	4.499	4.681	8.967	2.377	4.654	OK	OK
	X5	4.673	8.568	2.816	4.474	4.971	8.674	2.927	4.600	OK	OK
USL		6.0	10.5	4.0	6.0	6.0	10.5	4.0	6.0		
LSL											
$\bar{X}$		4.825	8.793	2.724	4.533	4.840	8.942	2.844	4.573		
Max		4.914	9.029	3.011	4.803	5.012	9.082	3.030	4.654		
Min		4.673	8.568	2.290	4.431	4.579	8.674	2.377	4.513		
R		0.241	0.461	0.721	0.372	0.433	0.408	0.653	0.141		
StDev		0.093	0.225	0.269	0.153	0.196	0.163	0.264	0.057		

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

TEST RESULT

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2. Contact Force Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
CONTACT FORCE TEST	● Force shall be 250±150gf ● press on the top contact point to the height of PCB contact area.	● Meet the All Test Requirements. ● There shall be no visual deterioration, and unbroken without any deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	Contact Force Tester	

2) Test Result

Inspection		Spec	X1	X2	X3	X4	X5	Remark
Force Data	Contact A	250gf ± 150gf	2.55	2.93	247	214	222	
Visual			OK	OK	OK	OK	OK	
Result			OK	OK	OK	OK	OK	

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

TEST RESULT

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3. Contact Restitution Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
CONTACT RESTITUTION TEST	● Cycle : 500 Times ● Deformation is not more than 20%	● Meet the All Test Requirements. ● There shall be no visual deterioration, and unbroken without any deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	Contact Force Tester	

2) Test Result

Inspection	1		2		3		4		5		Remark
Visual	OK		OK		OK		OK		OK		
Contact Position	Contact A		Contact A		Contact A		Contact A		Contact A		
Before	1.15		1.16		1.08		1.10		1.19		
After (500 Times)	0.98		1.00		0.94		0.93		1.02		
Deformation Ratio	17.0%	0.0%	16.0%	0.0%	14.0%	0.0%	17.0%	0.0%	17.0%	0.0%	
Visual	OK		OK		OK		OK		OK		
Result	OK		OK		OK		OK		OK		

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

TEST RESULT

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4. High Temperature Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
HIGH TEMPERATURE TEST	● Temperature : +70℃ ● Times : 48 hours. ● And then return to normal temperature & humidity for 2hours.	● Meet the All Test Requirements. ● There shall be no visual deterioration, corrosion, oxidation cracking or deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	High Temperature Chamber	

2) Test Result

- SET

No	Sample	Before (VSWR) Set				After (VSWR) Set				Result	
		824Mhz	894Mhz	1710Mhz	2155Mhz	824Mhz	894Mhz	1710Mhz	2155Mhz	Visual	Electrical
		6.0:1	10.5:1	4.0:1	6.0:1	6.0:1	10.5:1	4.0:1	6.0:1		
4	X1	4.688	8.533	2.664	4.391	4.682	8.490	2.655	4.716	OK	OK
	X2	4.918	8.671	2.967	4.845	4.827	8.893	3.049	4.771	OK	OK
	X3	4.939	8.934	2.567	4.761	4.940	8.623	2.559	4.551	OK	OK
	X4	4.981	8.799	3.059	4.758	4.697	8.929	2.525	4.386	OK	OK
	X5	4.577	9.165	2.893	4.642	4.858	8.844	2.481	4.457	OK	OK
USL		6.0	10.5	4.0	6.0	6.0	10.5	4.0	6.0		
LSL											
$\bar{X}$		4.821	8.820	2.830	4.679	4.801	8.756	2.654	4.576		
Max		4.981	9.165	3.059	4.845	4.940	8.929	3.049	4.771		
Min		4.577	8.533	2.567	4.391	4.682	8.490	2.481	4.386		
R		0.404	0.632	0.492	0.454	0.258	0.439	0.568	0.385		
StDev		0.178	0.243	0.207	0.177	0.110	0.190	0.230	0.165		

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

TEST RESULT

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5. Low Temperature Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
LOW TEMPERATURE TEST	● Temperature : -40℃ ● Times : 48 hours. ● And then return to normal temperature & humidity for 2hours.	● Meet the All Test Requirements. ● There shall be no visual deterioration, corrosion, oxidation cracking or deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	Low Temperature Chamber	

2) Test Result

- SET

No	Sample	Before (VSWR) Set				After (VSWR) Set				Result	
		824Mhz	894Mhz	1710Mhz	2155Mhz	824Mhz	894Mhz	1710Mhz	2155Mhz	Visual	Electrical
		6.0:1	10.5:1	4.0:1	6.0:1	6.0:1	10.5:1	4.0:1	6.0:1		
5	X1	4.713	9.116	2.991	4.390	4.661	8.584	2.346	4.400	OK	OK
	X2	4.663	8.705	2.321	4.493	4.973	9.053	2.769	4.779	OK	OK
	X3	4.932	8.815	2.648	4.571	4.696	8.989	2.909	4.708	OK	OK
	X4	4.594	8.681	2.444	4.400	4.553	9.178	2.655	4.388	OK	OK
	X5	4.885	8.776	2.879	4.661	4.716	9.150	2.507	4.397	OK	OK
USL		6.0	10.5	4.0	6.0	6.0	10.5	4.0	6.0		
LSL											
$\bar{X}$		4.757	8.819	2.657	4.503	4.720	8.991	2.637	4.534		
Max		4.932	9.116	2.991	4.661	4.973	9.178	2.909	4.779		
Min		4.594	8.681	2.321	4.390	4.553	8.584	2.346	4.388		
R		0.338	0.435	0.670	0.271	0.420	0.594	0.563	0.391		
StDev		0.145	0.175	0.282	0.115	0.155	0.240	0.220	0.193		

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

TEST RESULT

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6. Humidity Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
HUMIDITY TEST	● Temperature : +70℃ ● Humidity : 93% ● Times : 48 hours. ● And then return to normal temperature & humidity for 2hours.	● Meet the All Test Requirements. ● There shall be no visual deterioration, corrosion, oxidation cracking or deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	Temperature & Humidity Chamber	

2) Test Result

- SET

No	Sample	Before (VSWR) Set				After (VSWR) Set				Result	
		824Mhz	894Mhz	1710Mhz	2155Mhz	824Mhz	894Mhz	1710Mhz	2155Mhz	Visual	Electrical
		6.0:1	10.5:1	4.0:1	6.0:1	6.0:1	10.5:1	4.0:1	6.0:1		
6	X1	5.032	8.909	2.880	4.637	4.783	9.172	2.412	4.787	OK	OK
	X2	4.603	8.791	2.970	4.435	4.737	9.038	2.913	4.676	OK	OK
	X3	4.791	8.930	2.459	4.546	4.764	8.962	2.789	4.763	OK	OK
	X4	4.845	8.978	2.931	4.648	4.667	8.631	2.731	4.842	OK	OK
	X5	4.601	9.150	2.458	4.638	4.637	8.767	2.978	4.872	OK	OK
USL		6.0	10.5	4.0	6.0	6.0	10.5	4.0	6.0		
LSL											
$\bar{X}$		4.774	8.952	2.740	4.581	4.718	8.914	2.765	4.788		
Max		5.032	9.150	2.970	4.648	4.783	9.172	2.978	4.872		
Min		4.601	8.791	2.458	4.435	4.637	8.631	2.412	4.676		
R		0.431	0.359	0.512	0.213	0.146	0.541	0.566	0.196		
StDev		0.181	0.131	0.259	0.091	0.063	0.216	0.220	0.076		

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

TEST RESULT

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7. Salt Spray Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
SALT SPRAY TEST	● Temperature : +35℃ ● Salinity : NaCl solution 5% by weight. ● Times : 48 hours.	● Meet the All Test Requirements. ● There shall be no visual deterioration, corrosion, oxidation cracking or deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	Salt Spray Chamber	

2) Test Result

- SET

No	Sample	Before (VSWR) Set				After (VSWR) Set				Result	
		824Mhz	894Mhz	1710Mhz	2155Mhz	824Mhz	894Mhz	1710Mhz	2155Mhz	Visual	Electrical
		6.0:1	10.5:1	4.0:1	6.0:1	6.0:1	10.5:1	4.0:1	6.0:1		
7	X1	4.868	8.507	3.045	4.605	4.869	8.968	2.351	4.853	OK	OK
	X2	4.850	8.950	2.944	4.636	4.810	8.681	2.581	4.834	OK	OK
	X3	4.740	8.918	2.869	4.728	4.627	8.791	2.924	4.466	OK	OK
	X4	4.795	8.659	3.024	4.806	5.024	8.490	2.515	4.375	OK	OK
	X5	4.799	8.693	2.372	4.786	4.727	8.609	2.672	4.513	OK	OK
USL		6.0	10.5	4.0	6.0	6.0	10.5	4.0	6.0		
LSL											
$\bar{X}$		4.810	8.745	2.851	4.712	4.811	8.708	2.609	4.608		
Max		4.868	8.950	3.045	4.806	5.024	8.968	2.924	4.853		
Min		4.740	8.507	2.372	4.605	4.627	8.490	2.351	4.375		
R		0.128	0.443	0.673	0.201	0.397	0.478	0.573	0.478		
StDev		0.051	0.186	0.277	0.089	0.150	0.182	0.212	0.221		

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

TEST RESULT

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8. Thermal Shock Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
THERMAL SHOCK TEST	● Temperature : -40℃(1hr) / +85℃(1hr) ● Cycle : 24 Cycle ● And then return to normal temperature & humidity for 2hours.	● Meet the All Test Requirements. ● There shall be no visual deterioration, corrosion, oxidation cracking or deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	Thermal Shock Chamber	

2) Test Result

- SET

No	Sample	Before (VSWR) Set				After (VSWR) Set				Result	
		824Mhz	894Mhz	1710Mhz	2155Mhz	824Mhz	894Mhz	1710Mhz	2155Mhz	Visual	Electrical
		6.0:1	10.5:1	4.0:1	6.0:1	6.0:1	10.5:1	4.0:1	6.0:1		
8	X1	4.752	8.813	2.833	4.473	4.798	8.537	2.778	4.507	OK	OK
	X2	4.761	8.960	2.729	4.640	4.924	8.734	2.478	4.381	OK	OK
	X3	4.920	9.169	2.494	4.578	4.642	9.137	3.045	4.646	OK	OK
	X4	4.822	9.193	2.782	4.813	4.896	9.147	2.297	4.597	OK	OK
	X5	4.727	8.750	2.681	4.617	4.557	8.968	2.305	4.420	OK	OK
USL		6.0	10.5	4.0	6.0	6.0	10.5	4.0	6.0		
LSL											
$\bar{X}$		4.796	8.977	2.704	4.624	4.763	8.905	2.581	4.510		
Max		4.920	9.193	2.833	4.813	4.924	9.147	3.045	4.646		
Min		4.727	8.750	2.494	4.473	4.557	8.537	2.297	4.381		
R		0.193	0.443	0.339	0.340	0.367	0.610	0.748	0.265		
StDev		0.077	0.201	0.130	0.123	0.160	0.265	0.325	0.113		

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

8. DIMENSION MEASUERMENT DATA

UM100C _ Dimension Measurment Data

Dimension												Visual	Result
No.	-	-	-	-	-	-	**CTQ**	-	-	-	-		
	2	6	12	16	18	23	25	29	30	31	32		
Spec.	8.90	2.25	31.60	17.90	24.00	8.69	6.10	2.25	4.00	19.20	1.20		
Print tol(+)	0.3	0.1	0.25	0.15	0.2	0.5	0.5	0.1	0.1	0.15	0.1		
Print tol(-)	0.3	0.1	0.25	0.15	0.2	0.5	0.5	0.1	0.1	0.15	0.1		
Instrument	V/M	V/C	V/C	V/M	V/C	V/M	V/M	V/C	V/C	V/C	V/C		
1	8.92	2.24	31.55	17.98	24.04	8.87	5.97	2.24	3.97	19.20	1.20	OK	OK
2	8.87	2.22	31.57	18.02	24.03	8.91	6.03	2.23	3.98	19.20	1.20	OK	OK
3	8.87	2.24	31.58	17.98	24.05	8.87	5.94	2.23	3.97	19.21	1.21	OK	OK
4	8.84	2.23	31.56	17.99	24.03	8.84	5.94	2.23	3.97	19.23	1.20	OK	OK
5	8.83	2.22	31.57	17.97	24.03	8.86	6.03	2.23	3.99	19.22	1.20	OK	OK
6	8.85	2.24	31.56	17.98	24.03	8.90	6.04	2.22	3.99	19.21	1.21	OK	OK
7	8.82	2.23	31.55	18.00	24.04	8.94	5.99	2.22	3.99	19.19	1.19	OK	OK
8	8.84	2.24	31.57	18.03	24.02	8.69	5.91	2.23	3.98	19.20	1.20	OK	OK
9	8.88	2.23	31.57	18.00	24.02	8.87	6.07	2.23	3.98	19.22	1.21	OK	OK
10	8.85	2.24	31.57	18.01	24.04	8.93	6.02	2.23	3.97	19.22	1.20	OK	OK
11	8.89	2.24	31.57	18.02	24.03	8.94	6.07	2.24	3.99	19.20	1.22	OK	OK
12	8.81	2.24	31.55	17.99	24.03	8.83	5.98	2.22	3.99	19.23	1.21	OK	OK
13	8.83	2.24	31.55	17.98	24.03	8.86	6.02	2.23	3.97	19.20	1.21	OK	OK
14	8.87	2.23	31.58	17.97	24.05	8.85	6.01	2.22	3.98	19.23	1.20	OK	OK
15	8.87	2.23	31.57	18.01	24.02	8.93	6.09	2.23	3.97	19.22	1.20	OK	OK
16	8.86	2.24	31.54	18.00	24.04	8.89	5.99	2.24	3.98	19.23	1.19	OK	OK
17	8.87	2.23	31.54	17.99	24.02	8.77	5.95	2.23	3.98	19.19	1.20	OK	OK
18	8.87	2.24	31.54	18.00	24.03	8.78	5.95	2.23	3.98	19.19	1.21	OK	OK
19	8.95	2.23	31.56	18.02	24.04	8.78	6.07	2.23	3.99	19.21	1.20	OK	OK
20	8.82	2.22	31.58	18.00	24.02	8.75	5.96	2.24	3.97	19.23	1.20	OK	OK
USL	9.20	2.35	31.85	18.05	24.20	9.19	6.60	2.35	4.10	19.35	1.30		
LSL	8.60	2.15	31.35	17.75	23.80	8.19	5.60	2.15	3.90	19.05	1.10		
Xbar	8.861	2.235	31.562	17.997	24.032	8.869	6.030	2.232	3.980	19.212	1.203		
Max	8.95	2.24	31.58	18.03	24.05	8.94	6.09	2.24	3.99	19.23	1.22		
Min	8.81	2.22	31.54	17.97	24.02	8.69	5.91	2.22	3.97	19.19	1.19		
R	0.14	0.02	0.04	0.06	0.03	0.25	0.18	0.02	0.02	0.04	0.03		
StDev	0.034	0.007	0.013	0.018	0.010	0.069	0.052	0.006	0.008	0.015	0.007		
Cpk	2.55	3.74	5.23	1.01	5.89	1.63	2.60	4.11	3.21	3.16	4.41		

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

9. RECORDS ISSUED BY CERTIFIED TEST INSTITUES

9.1 Carrier(1/3)

SGS

Test Report No. F690501/LF-CTSAYA07-28055R1 Issued Date: December 17, 2007 Page 1 of 3

To: DAE SANG
783 Wonsi-dong
Danwon-gu
Ansan-city
GYEONGGI-DO 429-110
Korea

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

Product Name	: HF1023IM(G7630)
SGS File No.	: AYA07-28055R1
Received Date	: December 11, 2007
Test Performing Date	: December 12, 2007
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, LG
Comments	: This Report cancels and supersedes the Report No. F690501/LF-CTSAYA07-28055 dated December 17, 2007 issued by SGS Testing Korea Co., Ltd. The sample description (or commodity) had changed from PC to HF1023IM-G7630by client's request.

SGS Testing Korea Co. Ltd.

Pluto Kim
Monet Jeong
Billy Oh / Testing Person

Jeff Jang / Chemical Lab Mgr

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

9.1 Carrier(2/3)

SGS

Test Report No. F690501/LF-CTSAYA07-28055R1 Issued Date: December 17, 2007 Page 2 of 3

Sample No. : AYA07-28055R1.001
Sample Description : HF1023IM(G7630)
Item No./Part No. : HF1023IM(G7630)

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3052(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) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable

F052 Version2

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

9.1 Carrier(3/3)

SGS

Test Report No. F690501/LF-CTSAYA07-28055R1 Issued Date: December 17, 2007 Page 3 of 3

Picture of Sample as Received:

Sample Color : Gray

*** End ***

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

F052 Version2

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

9.2 Sheet Metal(1/4)

SGS

Test Report No. F690501/LF-CTSAYA07-25043 Issued Date: November 14, 2007 Page 1 of 4

To: TAIHAN STAINLESS STEEL CO., LTD
603 Seonggok-dong
Danwon-gu
Ansan-city
GYEONGGI-DO
Korea

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

Product Name	: STS301
SGS File No.	: AYA07-25043
Received Date	: November 08, 2007
Test Performing Date	: November 09, 2007
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)	: LG,SAMSUNG

SGS Testing Korea Co. Ltd.

Pluto Kim
Monet Jeong
Billy Oh / Testing Person

Jeff Jang / Chemical Lab Mgr

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

9.2 Sheet Metal(2/4)

SGS

Test Report No. F690501/LF-CTSAYA07-25043 Issued Date: November 14, 2007 Page 2 of 4

Sample No. : AYA07-25043.001
Sample Description : STS301
Style/Item No. : N/A
Comments : Material is stainless steel.

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Cadmium (Cd)	mg/kg	US EPA 3052(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Lead (Pb)	mg/kg	US EPA 3052(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) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable

F052 Version2

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

9.2 Sheet Metal(3/4)

SGS

Test Report No. F690501/LF-CTSAYA07-25043 Issued Date: November 14, 2007 Page 3 of 4

Picture of Sample as Received:

Sample Color : Silver

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

Specification No.	Description		
2007-B4-PS002	UM100C Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UT Starcom	January 17, 2008	1.0	

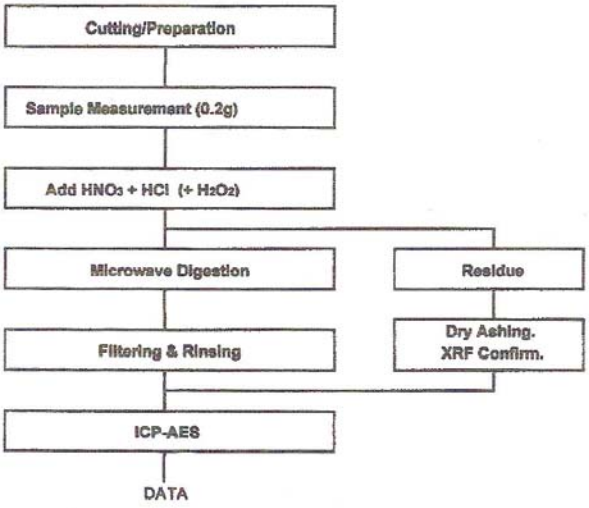
9.2 Sheet Metal(4/4)

SGS

Test Report No. F690501/LF-CTSAYA07-25043 Issued Date: November 14, 2007 Page 4 of 4

Flow Chart of Digestion

(EPA 3052 for Cd, Pb)



The samples were dissolved totally by pre-conditioning method according to above flow chart.

Operator Dami Yeom

Section Chief Jeff Jang

*** End ***

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

F052 Version2