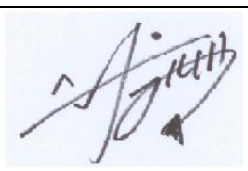
RoHS

Antenna Specifications

GTX75

		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**	Martin Jung	Steve Kim	Danny Jung
	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		
2008-B4-015	Antenna Product Specification		
Customer **UTStarcom**	Date July. 22. 2008	Rev 1.0	Reference

Product Family: Internal Antenna	
Model Name : GTX75	
Maker Part No.: 712297.0001	**Revision: 1.0**
Customer : UTStarcom	
Customer Part No. : 7083013106	**Revision: 1.0**

Purpose

This document is issued by **Laird Technologies Korea** in confidence, and is not to be reproduced in whole or in part without the prior written permission of **Laird Technologies Korea.**
The information contained herein is the property of **Laird Technologies Korea**, and is intended solely for contractual use between **Laird Technologies Korea** and **UTStarcom.**

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

Approval History

REV	DATE	Previous	After	Reason
1.0	July. 22. 2008			Initial release

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

Table of Contents

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

1 GENERAL

1.1 PRODUCT DESCRIPTION

Internal PIFA-style antenna consisting of a stamped metal radiator heat-staked to a plastic carrier.

1.2 PART NO.

Laird Technologies Part No.	712297.0001
UTStarcom Part No.	7083013106

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).

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

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.

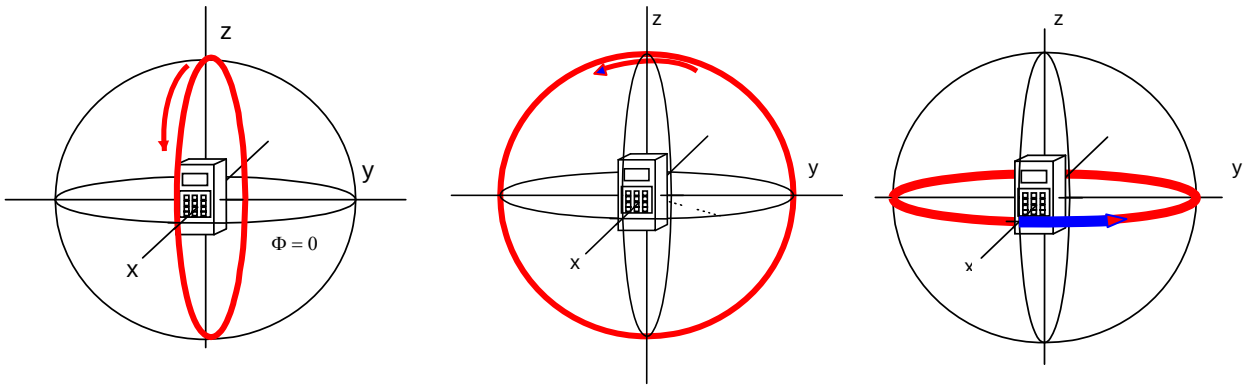
1.6 CONDITIONS

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

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer **UTStarcom**	Date July. 22. 2008	Rev 1.0	Reference

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

	GSM850	PCS1900
TX	824 – 849 MHz	1850 – 1910 MHz
RX	869 – 894 MHz	1930 – 1990 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 (PHONE / HANDSET)

2.4.1 Radio Revision

Customer chassis I.D. : GTX75

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:

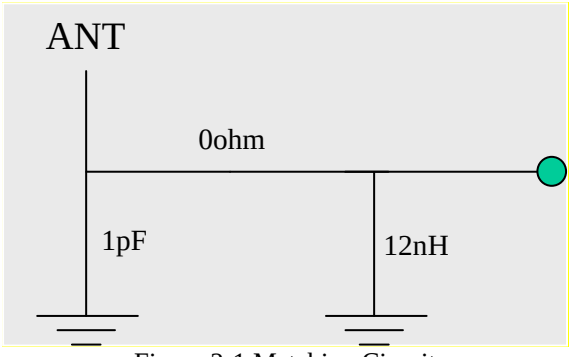


Figure 2-1 Matching Circuit

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.

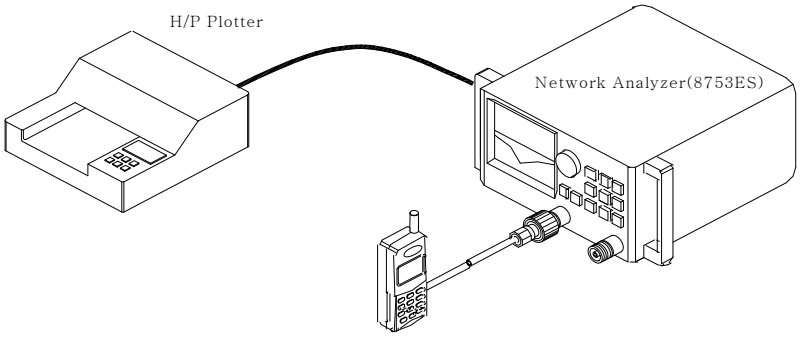


Figure 2-2 VSWR Measurement System

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.

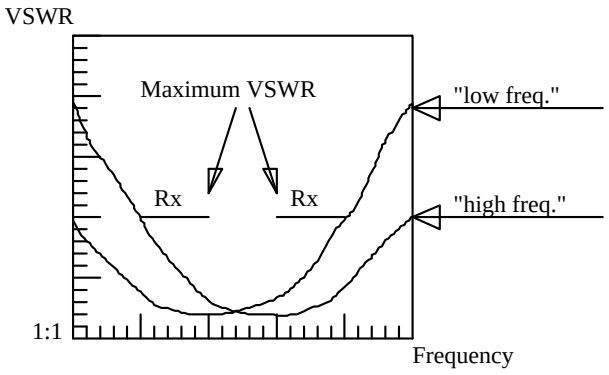


Figure 2-3 Reference antennas defining the lowest and highest

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

2.6 GAIN (PEAK AND AVERAGE)

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

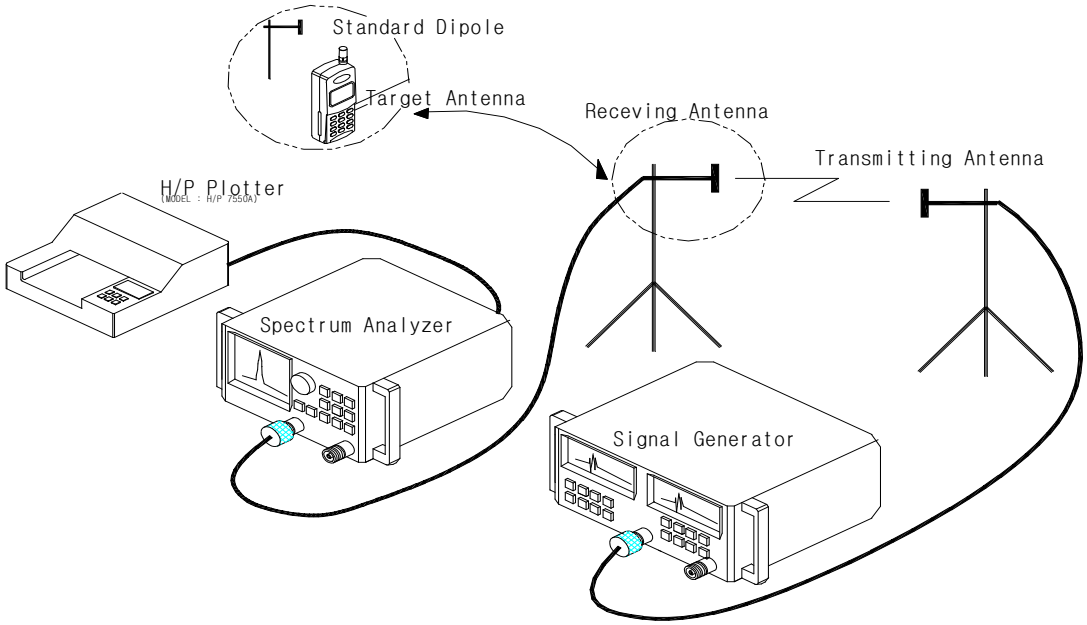


Figure 2-4 Gain Measurement System

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.

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

2.8 ELECTRICAL SPECIFICATION & TEST DATA – UP

Electrical Spec.	GSM850		PCS1900	
	824 MHz (Tx)	894MHz (Rx)	1850 MHz (Tx)	1990 MHz (Rx)
VSWR	Less than 5.8 : 1	Less than 4.8 : 1	Less than 3.1 : 1	Less than 3.6 : 1

Electrical Spec.		GSM850		PCS1900	
		824~849 (Tx)	869~894 (Tx)	1850~1910 (Tx)	1930~1990 (Rx)
Avg. gain (min)	H	-7.0 dBi	-6.5 dBi	-5.5 dBi	-5.0 dBi
	E1	-10.5 dBi	-10.0 dBi	-8.5 dBi	-7.5 dBi
	E2	-10.0 dBi	-9.0 dBi	-8.0 dBi	-7.5 dBi

(Value : More than XX dBi)

Test Data	GSM850		PCS1900	
	824 MHz (Tx)	894MHz (Rx)	1850 MHz (Tx)	1990 MHz (Rx)
VSWR	3.4 : 1	3.8 : 1	1.7 : 1	2.2 : 1

Test Data		GSM850		PCS1900	
		824~849 (Tx)	869~894 (Tx)	1850~1910 (Tx)	1930~1990 (Rx)
Avg. gain (min)	H	-5.6 dBi	-5.2 dBi	-4.0 dBi	-3.8 dBi
	E1	-9.0 dBi	-8.8 dBi	-7.0 dBi	-6.3 dBi
	E2	-8.6 dBi	-7.8 dBi	-6.7 dBi	-6.0 dBi

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer **UTStarcom**	Date July. 22. 2008	Rev 1.0	Reference

ELECTRICAL SPECIFICATION & TEST DATA – DOWN

Electrical Spec.	GSM850		PCS1900	
	824 MHz (Tx)	894MHz (Rx)	1850 MHz (Tx)	1990 MHz (Rx)
VSWR	Less than 5.0 : 1	Less than 5.0 : 1	Less than 2.5 : 1	Less than 4.5 : 1

Electrical Spec.		GSM850		PCS1900	
		824 MHz (Tx)	894MHz (Rx)	1850 MHz (Tx)	1990 MHz (Rx)
Avg. gain (min)	H	-6.0 dBi	-6.5 dBi	-6.5 dBi	-7.5 dBi
	E1	-9.5 dBi	-10.0 dBi	-8.5 dBi	-8.5 dBi
	E2	-10.0 dBi	-10.0 dBi	-6.5 dBi	-6.5 dBi

(Value : More than XX dBi)

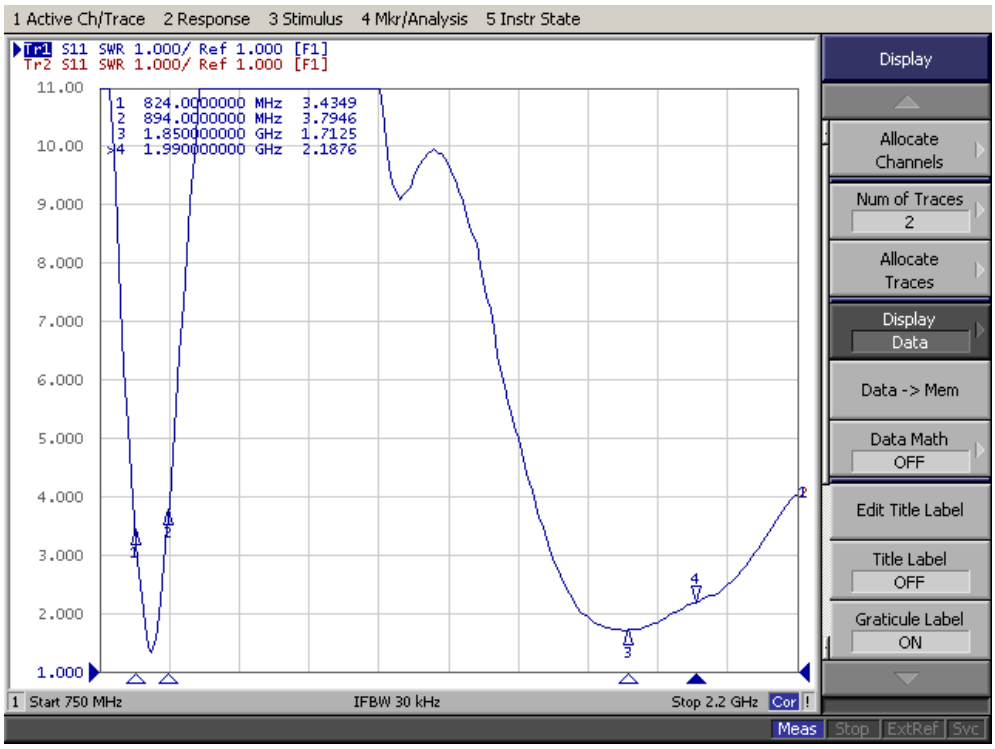
Test Data	GSM850		PCS1900	
	824 MHz (Tx)	894MHz (Rx)	1850 MHz (Tx)	1990 MHz (Rx)
VSWR	2.9 : 1	4.1 : 1	1.2 : 1	2.9 : 1

Test Data		GSM850		PCS1900	
		824 MHz (Tx)	894MHz (Rx)	1850 MHz (Tx)	1990 MHz (Rx)
Avg. gain	H	-4.8 dBi	-4.9 dBi	-5.0 dBi	-6.4 dBi
	E1	-8.3 dBi	-8.8 dBi	-6.8 dBi	-6.7 dBi
	E2	-8.4 dBi	-8.2 dBi	-4.9 dBi	-5.2 dBi

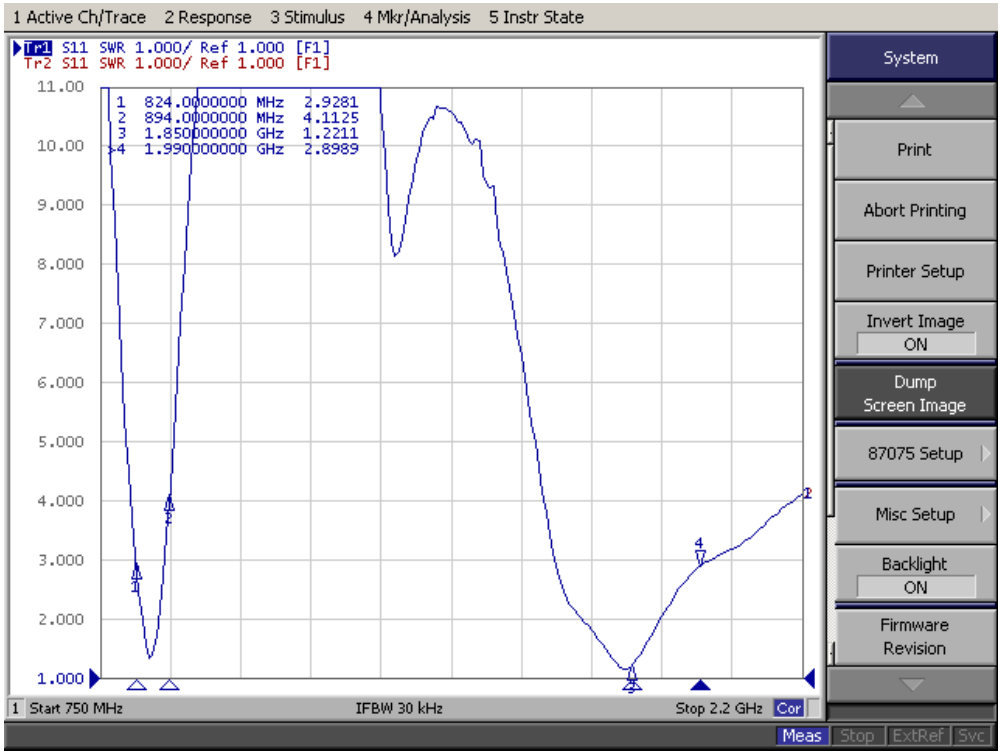
Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

-VSWR Chart

UP



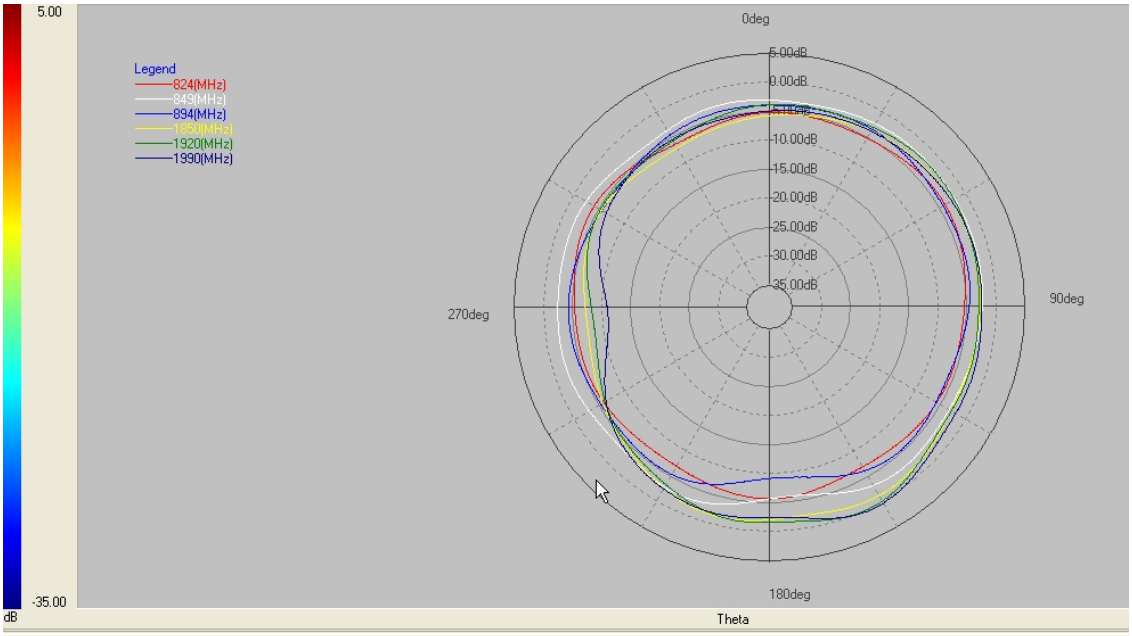
DOWN



Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

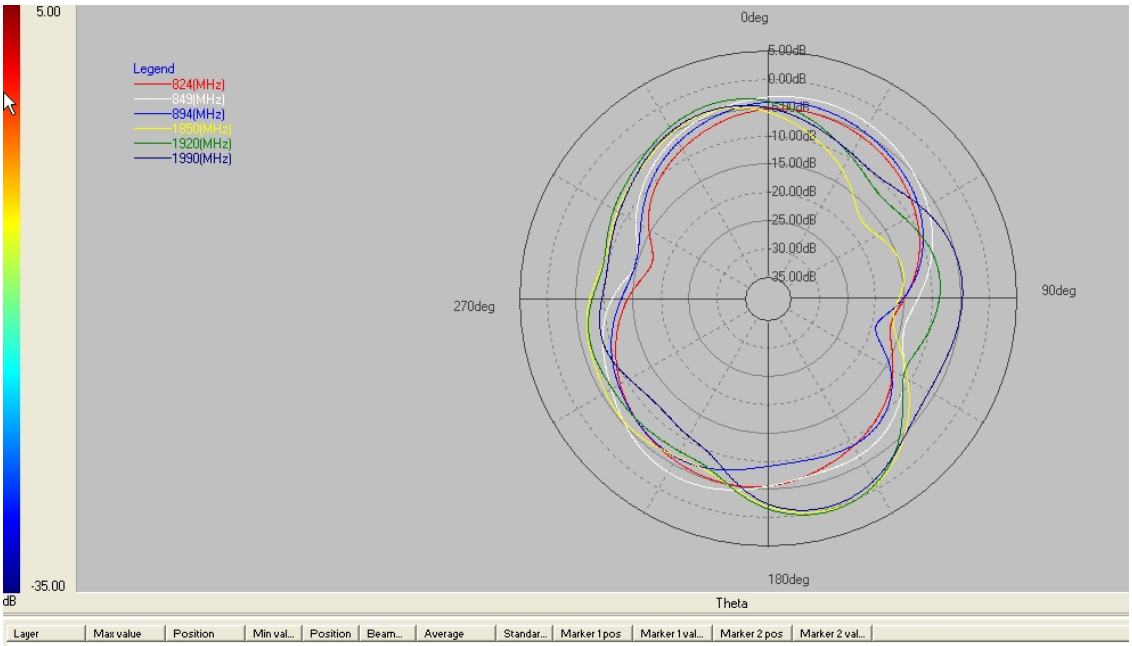
Radiation Pattern

H-PATTERN _ UP



Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-3.95 dB	60.00 deg	-7.13 dB	-145.70 ...	285.83 ...	-5.61 dB	6.53	----	----	----	----
849(MHz)	-2.00 dB	62.86 deg	-6.06 dB	174.29 d...	335.77 ...	-3.09 dB	3.95	----	----	----	----
894(MHz)	-3.65 dB	28.57 deg	-9.38 dB	177.15 d...	314.76 d...	-5.22 dB	6.12	----	----	----	----
1850(MHz)	-1.25 dB	148.57 deg	-7.41 dB	-97.15 d...	----	-3.97 dB	4.82	----	----	----	----
1920(MHz)	-0.06 dB	154.29 deg	-8.59 dB	-97.15 d...	----	-3.60 dB	4.44	----	----	----	----
1990(MHz)	0.25 dB	151.43 deg	-11.13 dB	-94.29 d...	----	-3.81 dB	4.64	----	----	----	----

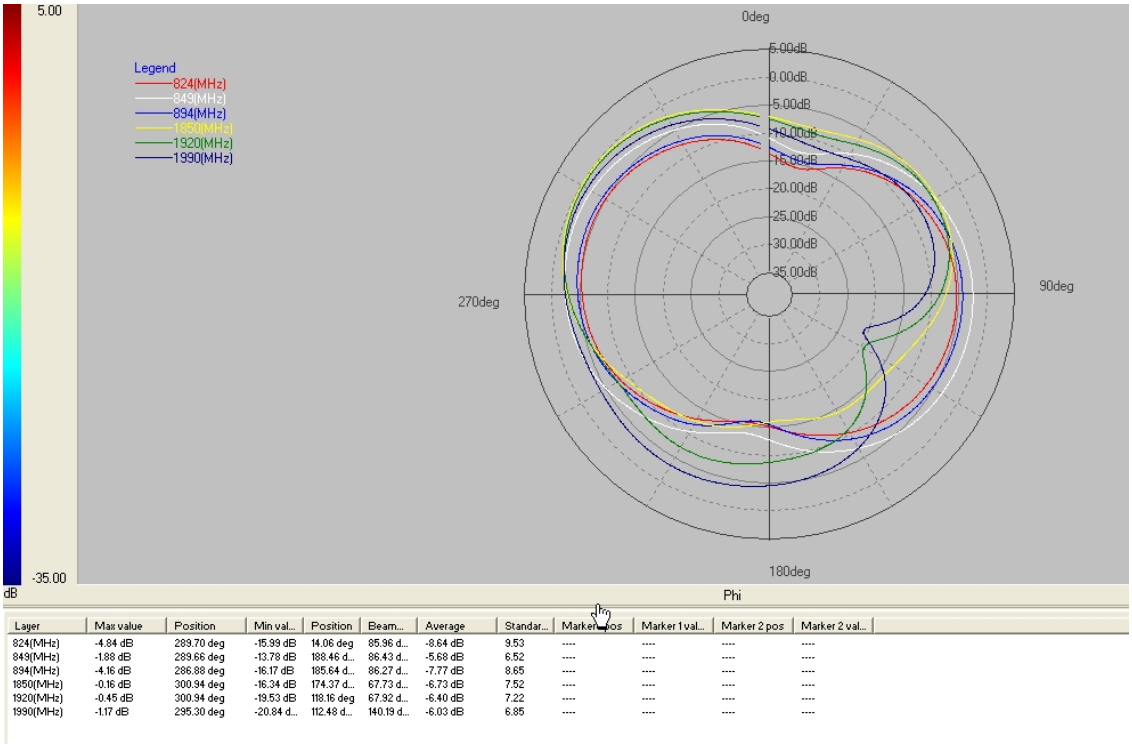
E1-PATTERN _UP



Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-5.26 dB	11.43 deg	-17.51 dB	-74.28 d...	83.04 d...	-8.96 dB	9.86	----	----	----	----
849(MHz)	-2.91 dB	14.29 deg	-14.86 dB	-74.28 d...	84.64 d...	-6.89 dB	7.76	----	----	----	----
894(MHz)	-4.04 dB	8.57 deg	-19.37 dB	105.69 d...	81.79 deg	-8.77 dB	9.66	----	----	----	----
1850(MHz)	0.03 dB	160.00 deg	-17.52 dB	51.43 deg	----	-7.03 dB	7.85	----	----	----	----
1920(MHz)	0.22 dB	162.86 deg	-12.10 dB	48.58 d...	----	-6.24 dB	7.07	----	----	----	----
1990(MHz)	-0.60 dB	162.86 deg	-11.85 dB	-134.29 ...	----	-6.33 dB	7.19	----	----	----	----

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

E2-PATTERN _ UP

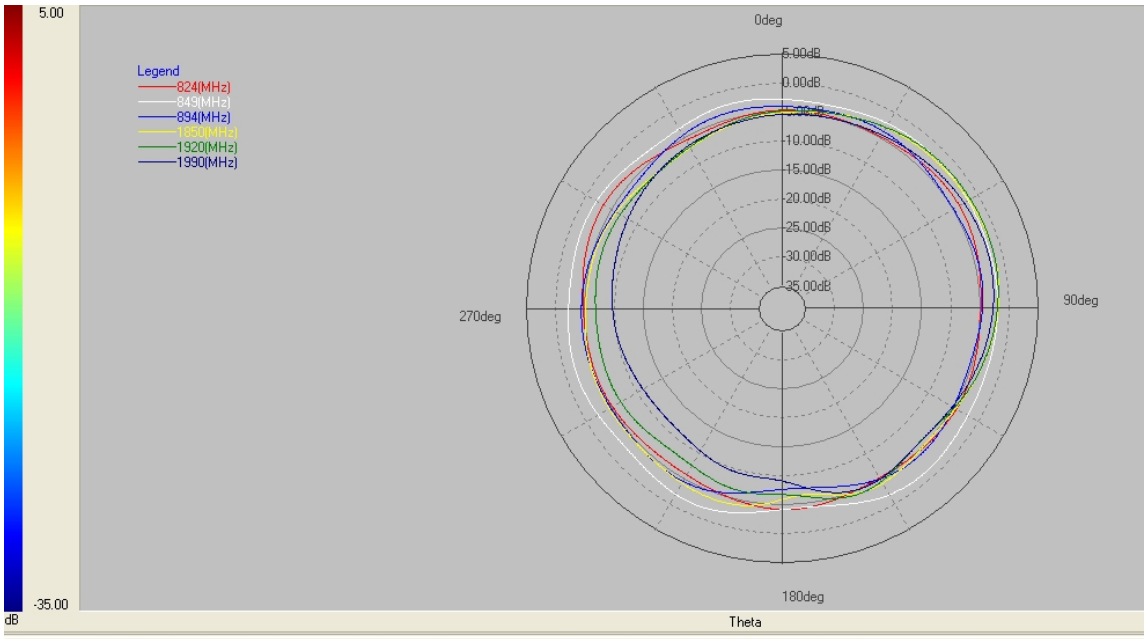


Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-4.84 dB	289.70 deg	-15.99 dB	14.06 deg	85.96 d...	-8.64 dB	9.53	----	----	----	----
849(MHz)	-1.88 dB	289.66 deg	-13.78 dB	188.46 d...	86.43 d...	-5.68 dB	6.52	----	----	----	----
894(MHz)	-4.16 dB	286.88 deg	-16.17 dB	185.64 d...	86.27 d...	-7.77 dB	8.65	----	----	----	----
1850(MHz)	-0.16 dB	300.94 deg	-16.34 dB	174.37 d...	67.73 d...	-6.73 dB	7.52	----	----	----	----
1920(MHz)	-0.45 dB	300.94 deg	-19.53 dB	118.16 deg	67.92 d...	-6.40 dB	7.22	----	----	----	----
1990(MHz)	-1.17 dB	295.30 deg	-20.84 d...	112.48 d...	140.19 d...	-6.03 dB	6.85	----	----	----	----

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

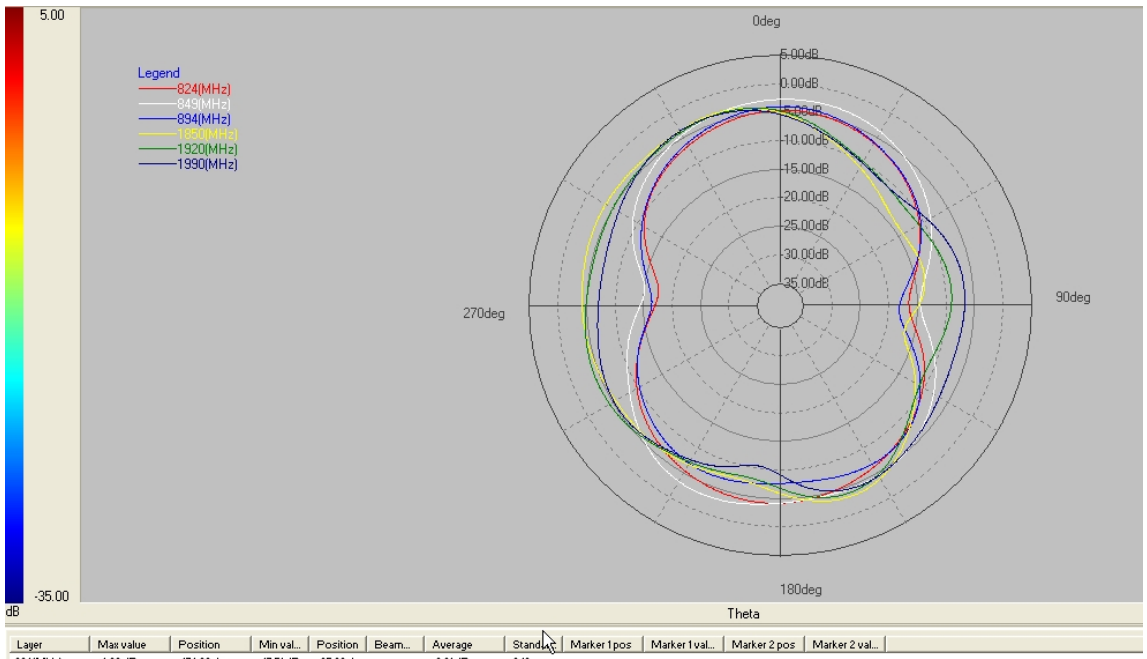
Radiation Pattern

H-PATTERN _ DOWN



Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-3.43 dB	-62.86 deg	-6.02 dB	-142.89 ...	----	-4.76 dB	5.67	----	----	----	----
849(MHz)	-1.52 dB	140.00 deg	-4.55 dB	174.29 d...	----	-2.47 dB	3.32	----	----	----	----
894(MHz)	-3.89 dB	28.57 deg	-7.92 dB	177.15 d...	333.57 ...	-4.94 dB	5.85	----	----	----	----
1850(MHz)	-1.38 dB	77.14 deg	-7.34 dB	-37.15 d...	104.20 d...	-4.37 dB	5.25	----	----	----	----
1920(MHz)	-1.38 dB	71.43 deg	-7.98 dB	-142.88 ...	102.66 d...	-5.02 dB	5.89	----	----	----	----
1990(MHz)	-2.33 dB	77.14 deg	-11.52 dB	-131.43 ...	111.58 deg	-6.37 dB	7.25	----	----	----	----

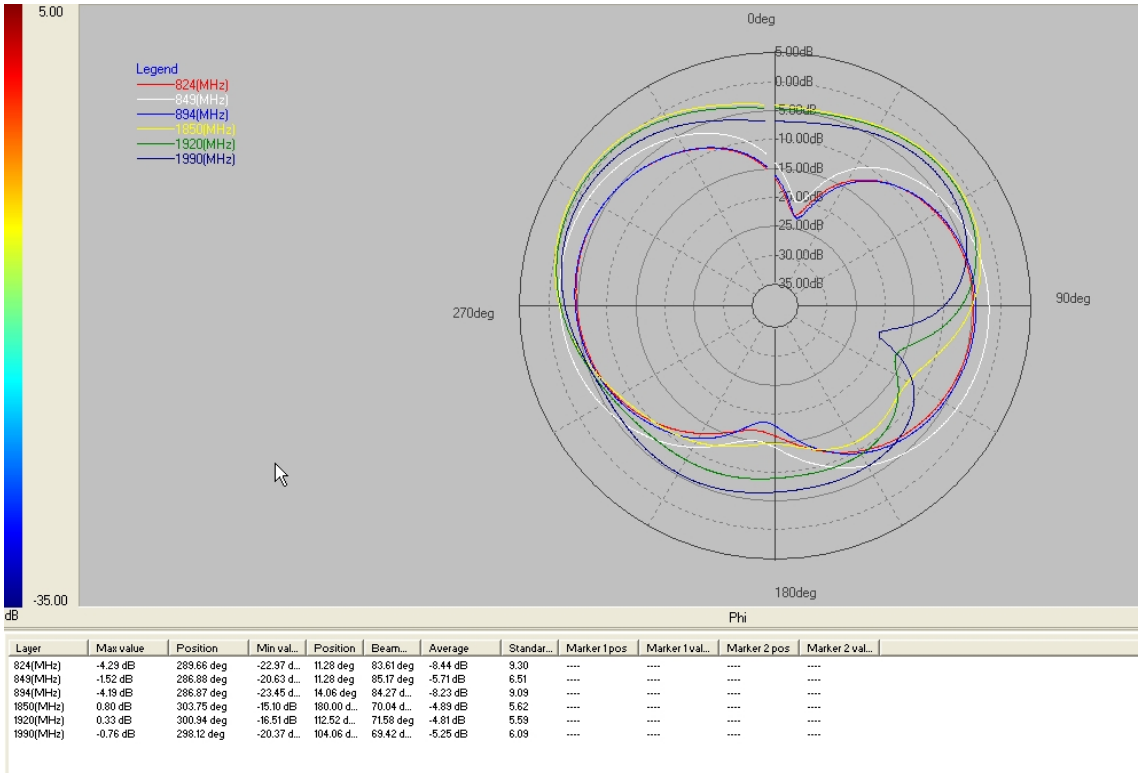
E1-PATTERN _ DOWN



Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-4.32 dB	-174.29 deg	-17.51 dB	-85.69 d...	----	-8.31 dB	9.19	----	----	----	----
849(MHz)	-2.91 dB	8.57 deg	-15.07 dB	-85.69 d...	86.75 d...	-6.50 dB	7.36	----	----	----	----
894(MHz)	-4.24 dB	2.86 deg	-18.19 dB	91.43 deg	77.58 d...	-8.83 dB	9.72	----	----	----	----
1850(MHz)	-3.37 dB	160.00 deg	-16.83 dB	100.03 d...	----	-6.82 dB	7.68	----	----	----	----
1920(MHz)	-3.81 dB	-20.00 deg	-11.32 dB	51.39 deg	154.63 d...	-6.61 dB	7.51	----	----	----	----
1990(MHz)	-3.75 dB	-25.71 deg	-11.03 dB	42.83 d...	72.51 deg	-6.68 dB	7.59	----	----	----	----

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

E2-PATTERN _ DOWN



Layer	Max value	Position	Min val...	Position	Beam...	Average	Standar...	Marker 1 pos	Marker 1 val...	Marker 2 pos	Marker 2 val...
824(MHz)	-4.29 dB	289.66 deg	-22.97 d...	11.28 deg	83.61 deg	-8.44 dB	9.30	----	----	----	----
849(MHz)	-1.52 dB	286.88 deg	-20.63 d...	11.28 deg	85.17 deg	-5.71 dB	6.51	----	----	----	----
894(MHz)	-4.19 dB	286.87 deg	-23.45 d...	14.06 deg	84.27 d...	-8.23 dB	9.09	----	----	----	----
1850(MHz)	0.80 dB	303.75 deg	-15.10 dB	180.00 d...	70.04 d...	-4.89 dB	5.62	----	----	----	----
1920(MHz)	0.33 dB	300.94 deg	-16.51 dB	112.52 d...	71.58 deg	-4.81 dB	5.59	----	----	----	----
1990(MHz)	-0.76 dB	298.12 deg	-20.37 d...	104.06 d...	69.42 d...	-5.25 dB	6.09	----	----	----	----

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

3 ELECTRICAL 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 3 times drop per every each 6sides from 1.5m heights on to a steel plate.

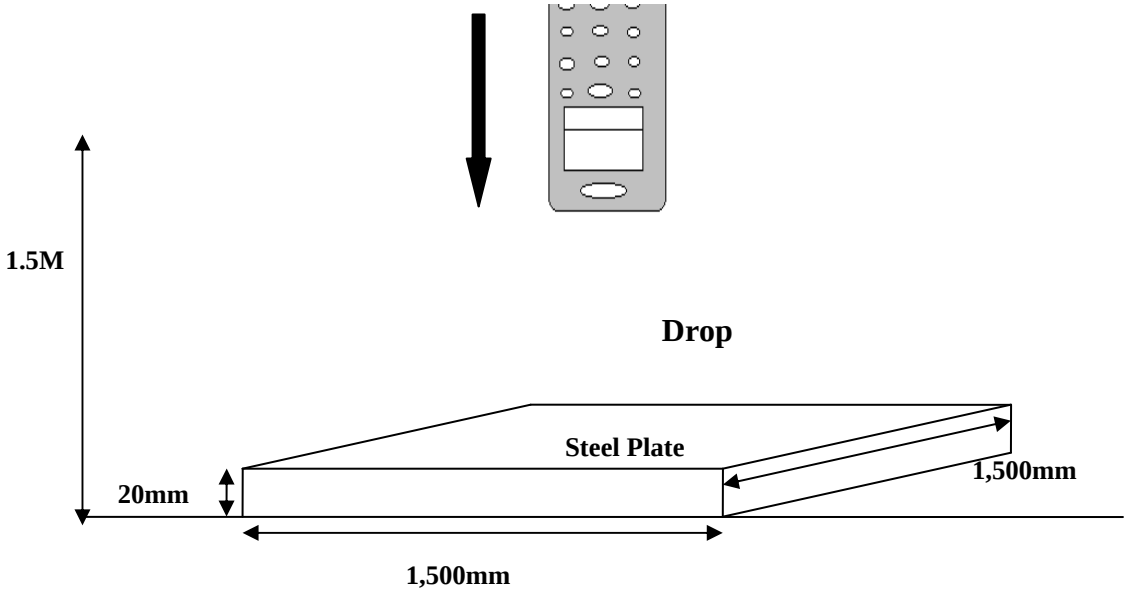


Figure 3-1: Drop

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	Date	Rev	Reference
UTStarcom	July. 22. 2008	1.0	

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(1.51mm) by 500 times. And than deformation is not more than 20%.

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	Date	Rev	Reference
UTStarcom	July. 22. 2008	1.0	

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.

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		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

5. PACKING

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 per 1 tray. Add empty tray above top of product. (optional)
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)	-

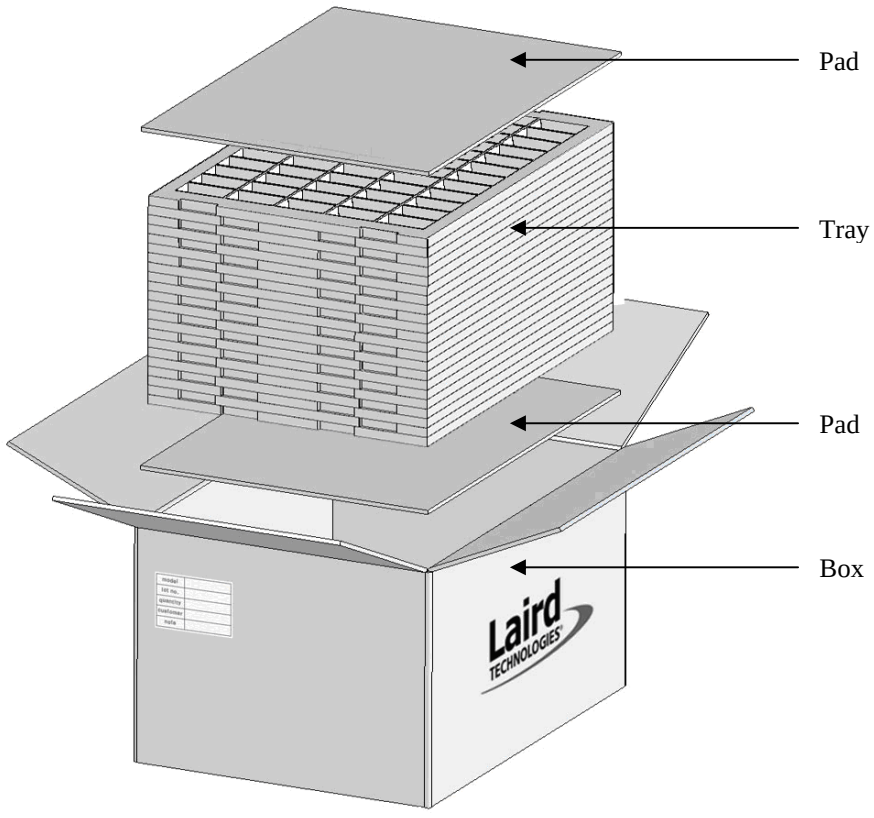


Figure 5-1: Packing

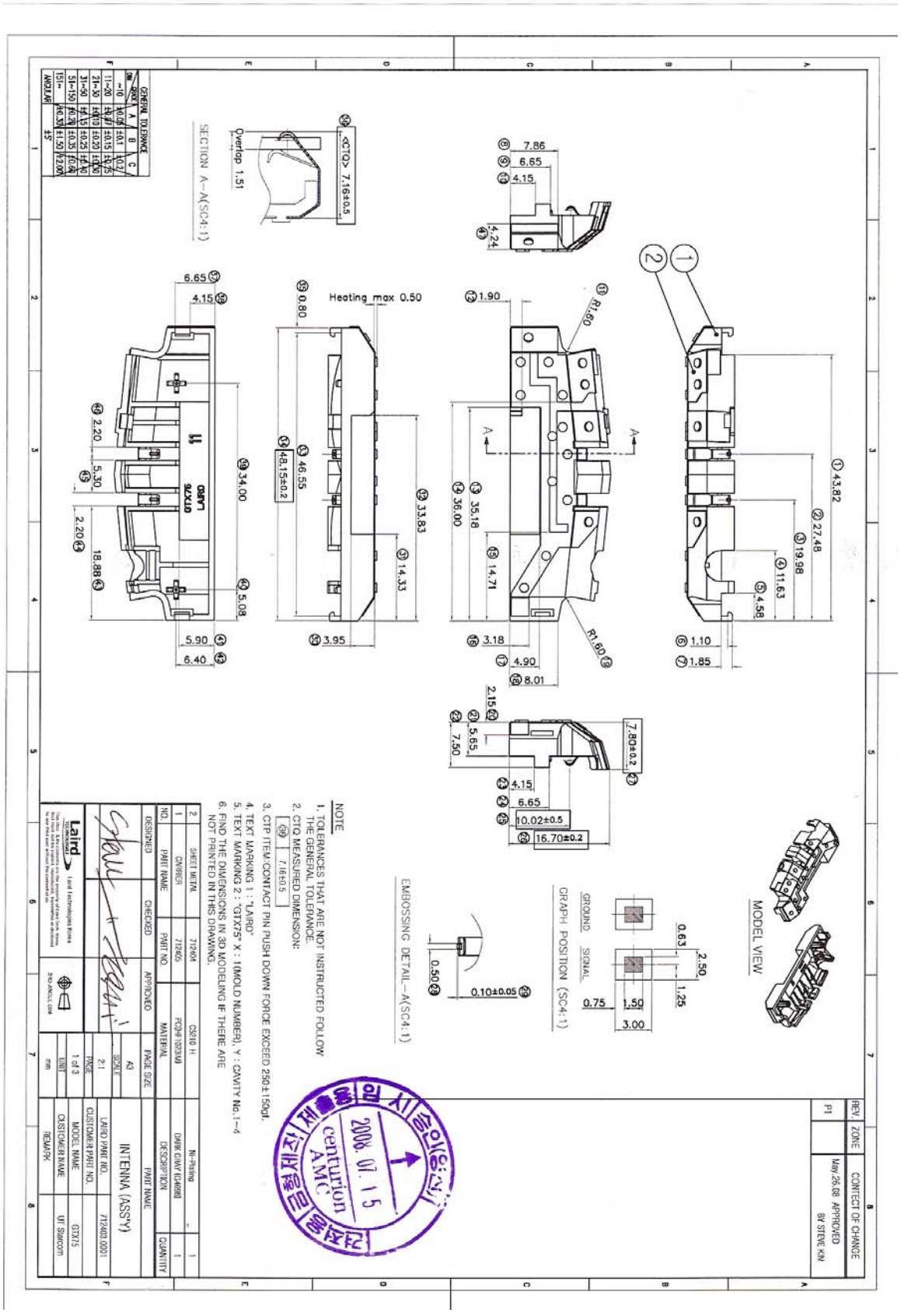
Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

6. SPECIFICATIONS DRAWINGS

No.	PART NAME	Material	Part No.	Quantity
1	Carrier	PC(HF1023IM)	712405	1
2	Sheet Metal	C5210 H	712404	1

[Part List]

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	



[Assembly Drawing]

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

7. TEST REPORT

Test Report	Tested By	Approved By
		

1. Test Summary **Date : 22-Jul-08**

Report No	2008-B4-TR015	**Test Date**	7/18 ~ 7/22	**Tested By**	Kisu Byun
Test Purpose	Qualification for GTX-75, Internal Antenna				
Model	GTX-75	**Type**	Internal Antenna	**Customer**	UTstarcom
Test Category	■ Electrical ■ Mechanical ■ Environmental □ Coating Requirements				
Parts Description	1. Carrier : PC HF1023IM (G4698) 2. Sheet Metal : C5210 H 0.15T 3. Ni + Au (Electroplating)				
Test Result	■ **ACCEPT** □ **REJECT**				

2. Test Requirements

No	Test	Test Method & Conditions	Requirements	Result	Remark
1	DROP TEST	See Page 1/8	– All tests shall be performed according to test conditions as provided by antenna specifications. – There shall be no visual deterioration, and unbroken without any deformation. – No appreciable degradation pre / post electrical performance.	OK	
2	CONTACT FORCE TEST	See Page 2/8		OK	
3	CONTACT RESTITUTION TEST	See Page 3/8		OK	
4	HIGH TEMPERATURE TEST	See Page 4/8		OK	
5	LOW TEMPERATURE TEST	See Page 5/8		OK	
6	HUMIDITY TEST	See Page 6/8		OK	
7	SALT SPRAY TEST	See Page 7/8		OK	
8	THERMAL SHOCK TEST	See Page 8/8		OK	

3. Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

TEST RESULT

Page 1/8

1. Drop Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
DROP TEST	● Height : 1.5m ● Weight : 134.8g ● Cycle : 3Cycle (Total 18 Times)	● All tests shall be performed according to test conditions as provided by antenna specifications. ● There shall be no visual deterioration, and unbroken without any deformation. ● No Appreciable Degradation Pre / Post Electrical Performance
Equipment	Drop Tester	

2) Test Result

- Slide Down

No	Sample	Before (VSWR) Slide Down				After (VSWR) Slide Down				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
1	X1	3.2316	3.8586	1.2081	3.0015	3.3728	3.8815	1.1796	2.9757	OK	OK
	X2	2.9778	4.2049	1.2009	2.9957	2.9384	3.8544	1.2239	2.8743	OK	OK
	X3	2.9582	3.9024	1.2260	2.8684	2.7972	4.2986	1.1740	2.9132	OK	OK
	X4	2.9309	3.8704	1.1718	2.8872	3.0208	3.8164	1.1573	2.9356	OK	OK
	X5	3.2199	4.0551	1.1710	2.9597	2.8853	4.0088	1.1972	2.9237	OK	OK
USL		5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
LSL											
$\overline{X}$		3.064	3.978	1.196	2.943	3.003	3.972	1.186	2.925		
Max		3.232	4.205	1.226	3.002	3.373	4.299	1.224	2.976		
Min		2.931	3.859	1.171	2.868	2.797	3.816	1.157	2.874		
R		0.301	0.346	0.055	0.133	0.576	0.482	0.067	0.101		
StDev		0.149	0.149	0.024	0.062	0.222	0.196	0.025	0.037		

- Slide Up

No	Sample	Before (VSWR) Slide Up				After (VSWR) Slide Up				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
1	X1	3.4966	3.6561	1.6999	2.2110	3.2404	3.6491	1.7023	2.1442	OK	OK
	X2	3.2840	3.6860	1.7194	2.1236	3.7584	3.4520	1.7011	2.1132	OK	OK
	X3	3.6679	3.4390	1.7195	2.1018	3.5486	3.6050	1.6852	2.1917	OK	OK
	X4	3.3683	3.3857	1.6837	2.0943	3.4883	3.5923	1.6884	2.2189	OK	OK
	X5	3.4332	3.5738	1.6914	2.2028	3.7057	3.3943	1.6956	2.1898	OK	OK
USL		5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
LSL											
$\overline{X}$		3.450	3.548	1.703	2.147	3.548	3.539	1.695	2.172		
Max		3.668	3.686	1.720	2.211	3.758	3.649	1.702	2.219		
Min		3.284	3.386	1.684	2.094	3.240	3.394	1.685	2.113		
R		0.384	0.300	0.036	0.117	0.518	0.255	0.017	0.106		
StDev		0.145	0.132	0.016	0.056	0.205	0.109	0.008	0.042		

■ **ACCEPT** ☐ **REJECT**

3) Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

TEST RESULT

Page **2/8**

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.	● All tests shall be performed according to test conditions as provided by antenna specifications. ● 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	204	202	204	205	205	Overlap 1.51mm
	Contact B		205	202	198	196	202	
Visual			OK	OK	OK	OK	OK	
Result			OK	OK	OK	OK	OK	

■ **ACCEPT** ☐ **REJECT**

3) Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

TEST RESULT

Page 3/8

3. Contact Restitution Test

1) Test Requirements

Test	Test Method & Conditions	Requirements
CONTACT RESTITUTION TEST	● Cycle : 500 Times ● Deformation is not more than 20%	● All tests shall be performed according to test conditions as provided by antenna specifications. ● 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
Contact Position	Contact A	Contact B	Contact A	Contact B	Contact A	Contact B	Contact A	Contact B	Contact A	Contact B	
Before	1.50	1.53	1.50	1.55	1.45	1.51	1.49	1.46	1.49	1.51	
After (500 Times)	1.24	1.29	1.33	1.41	1.30	1.36	1.23	1.28	1.24	1.31	- Overlap 1.51mm
Deformation Ratio	17.3%	15.7%	11.3%	9.0%	10.3%	9.9%	17.4%	12.3%	16.8%	13.2%	
Visual	OK		OK		OK		OK		OK		
Result	OK		OK		OK		OK		OK		

■ **ACCEPT** ☐ **REJECT**

3) Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

TEST RESULT

Page 4/8

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.	● All tests shall be performed according to test conditions as provided by antenna specifications. ● 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

- Slide Down

No	Sample	Before (VSWR) Slide Down				After (VSWR) Slide Down				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
1	X1	2.7660	4.1207	1.2577	2.8917	2.8375	4.0240	1.2009	2.9380	OK	OK
	X2	2.7893	3.9176	1.2669	2.9245	3.1846	3.8915	1.2041	2.9909	OK	OK
	X3	3.3391	4.1203	1.2319	2.9357	3.1319	4.1551	1.2490	2.8985	OK	OK
	X4	2.9901	4.1839	1.1791	2.9289	2.9624	3.9990	1.1820	2.9028	OK	OK
	X5	2.8338	3.9164	1.2154	2.8967	2.8187	3.8495	1.2142	2.9678	OK	OK
USL		5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
LSL											
$\overline{X}$		2.944	4.052	1.230	2.916	2.987	3.984	1.210	2.940		
Max		3.339	4.184	1.267	2.936	3.185	4.155	1.249	2.991		
Min		2.766	3.916	1.179	2.892	2.819	3.850	1.182	2.899		
R		0.573	0.268	0.088	0.044	0.366	0.306	0.067	0.092		
StDev		0.238	0.126	0.035	0.020	0.167	0.120	0.025	0.040		

- Slide Up

No	Sample	Before (VSWR) Slide Up				After (VSWR) Slide Up				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
1	X1	3.5511	3.6142	1.6972	2.1542	3.1937	3.6012	1.6752	2.0969	OK	OK
	X2	3.2940	3.4305	1.6763	2.2072	3.7231	3.7404	1.7148	2.2360	OK	OK
	X3	3.0951	3.4689	1.7046	2.0959	3.5822	3.5412	1.7040	2.1313	OK	OK
	X4	3.7110	3.6067	1.7177	2.1710	3.5614	3.3874	1.6886	2.1712	OK	OK
	X5	3.5421	3.7203	1.7064	2.1450	3.5360	3.4275	1.6918	2.2068	OK	OK
USL		5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
LSL											
$\overline{X}$		3.439	3.568	1.700	2.155	3.519	3.540	1.695	2.168		
Max		3.711	3.720	1.718	2.207	3.723	3.740	1.715	2.236		
Min		3.095	3.431	1.676	2.096	3.194	3.387	1.675	2.097		
R		0.616	0.290	0.041	0.111	0.529	0.353	0.040	0.139		
StDev		0.243	0.118	0.015	0.041	0.196	0.141	0.015	0.056		

■ **ACCEPT** ☐ **REJECT**

3) Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

TEST RESULT

Page 5/8

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.	● All tests shall be performed according to test conditions as provided by antenna specifications. ● 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

- Slide Down

No	Sample	Before (VSWR) Slide Down				After (VSWR) Slide Down				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
1	X1	3.0819	4.0902	1.2409	2.9248	2.9564	4.1414	1.2252	2.9454	OK	OK
	X2	3.0518	3.9435	1.1949	2.9939	3.2009	4.0125	1.2329	3.0113	OK	OK
	X3	3.2170	3.8942	1.1908	2.9569	2.7512	4.2765	1.2538	3.0071	OK	OK
	X4	2.9257	4.2133	1.2263	2.9276	3.1137	4.1140	1.2764	2.8684	OK	OK
	X5	2.9062	4.0756	1.2100	2.9068	2.8370	3.8931	1.2680	2.9343	OK	OK
USL		5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
LSL											
$\overline{X}$		3.037	4.043	1.213	2.942	2.972	4.088	1.251	2.953		
Max		3.217	4.213	1.241	2.994	3.201	4.277	1.276	3.011		
Min		2.906	3.894	1.191	2.907	2.751	3.893	1.225	2.868		
R		0.311	0.319	0.050	0.087	0.450	0.383	0.051	0.143		
StDev		0.127	0.127	0.021	0.034	0.187	0.144	0.022	0.059		

- Slide Up

No	Sample	Before (VSWR) Slide Up				After (VSWR) Slide Up				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
1	X1	3.5513	3.6927	1.6841	2.1170	3.5534	3.5190	1.6776	2.1821	OK	OK
	X2	3.5791	3.5744	1.6958	2.1712	3.5049	3.6806	1.7186	2.2045	OK	OK
	X3	3.2672	3.5277	1.7199	2.1570	3.3980	3.5018	1.7209	2.1246	OK	OK
	X4	3.3967	3.4238	1.6994	2.1163	3.5464	3.5681	1.6766	2.2275	OK	OK
	X5	3.8087	3.5882	1.6874	2.1520	3.1719	3.5558	1.7000	2.1594	OK	OK
USL		5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
LSL											
$\overline{X}$		3.521	3.561	1.697	2.143	3.435	3.565	1.699	2.180		
Max		3.809	3.693	1.720	2.171	3.553	3.681	1.721	2.228		
Min		3.267	3.424	1.684	2.116	3.172	3.502	1.677	2.125		
R		0.542	0.269	0.036	0.055	0.382	0.179	0.044	0.103		
StDev		0.204	0.098	0.014	0.025	0.160	0.070	0.021	0.040		

■ **ACCEPT** ☐ **REJECT**

3) Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

TEST RESULT

Page 6/8

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.	● All tests shall be performed according to test conditions as provided by antenna specifications. ● 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

- Slide Down

No	Sample	Before (VSWR) Slide Down				After (VSWR) Slide Down				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
1	X1	2.8839	3.9838	1.2642	2.8771	2.9493	3.8012	1.2699	2.9364	OK	OK
	X2	3.2829	3.9085	1.2053	2.9891	2.8449	3.8503	1.2269	2.9235	OK	OK
	X3	3.1204	4.1430	1.1896	3.0088	3.3248	4.0007	1.2323	3.0103	OK	OK
	X4	3.0922	3.9688	1.1840	2.9537	3.0115	4.2180	1.2664	2.9955	OK	OK
	X5	3.1016	4.1561	1.2347	2.8808	3.0117	3.7979	1.1964	2.9135	OK	OK
USL		5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
LSL											
$\overline{X}$		3.096	4.032	1.216	2.942	3.028	3.934	1.238	2.956		
Max		3.283	4.156	1.264	3.009	3.325	4.218	1.270	3.010		
Min		2.884	3.909	1.184	2.877	2.845	3.798	1.196	2.914		
R		0.399	0.248	0.080	0.132	0.480	0.420	0.074	0.097		
StDev		0.142	0.111	0.034	0.061	0.179	0.179	0.030	0.044		

- Slide Up

No	Sample	Before (VSWR) Slide Up				After (VSWR) Slide Up				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
1	X1	3.2270	3.7205	1.7031	2.1449	3.5859	3.5807	1.7045	2.1318	OK	OK
	X2	3.1656	3.6737	1.6793	2.1413	3.0929	3.5562	1.7065	2.1013	OK	OK
	X3	3.3988	3.7227	1.7102	2.2039	3.1011	3.3700	1.6876	2.1232	OK	OK
	X4	3.0831	3.3830	1.7118	2.0970	3.2001	3.3693	1.7138	2.2040	OK	OK
	X5	3.4651	3.7390	1.7084	2.1644	3.3976	3.3812	1.6839	2.1378	OK	OK
USL		5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
LSL											
$\overline{X}$		3.268	3.648	1.703	2.150	3.276	3.451	1.699	2.140		
Max		3.465	3.739	1.712	2.204	3.586	3.581	1.714	2.204		
Min		3.083	3.383	1.679	2.097	3.093	3.369	1.684	2.101		
R		0.382	0.356	0.033	0.107	0.493	0.211	0.030	0.103		
StDev		0.160	0.150	0.013	0.039	0.213	0.107	0.013	0.039		

■ **ACCEPT** ☐ **REJECT**

3) Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

TEST RESULT

Page 7/8

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.	● All tests shall be performed according to test conditions as provided by antenna specifications. ● 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

- Slide Down

No	Sample	Before (VSWR) Slide Down				After (VSWR) Slide Down				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
1	X1	2.8349	3.8953	1.1985	2.9901	3.3661	3.8471	1.1974	2.9421	OK	OK
	X2	3.0566	4.0448	1.2240	2.9740	3.2247	4.1800	1.2314	2.8838	OK	OK
	X3	3.1874	3.8961	1.2092	2.9680	3.3724	4.1282	1.2096	2.9118	OK	OK
	X4	2.9498	4.0199	1.2675	2.9494	3.0726	3.8858	1.2269	2.9579	OK	OK
	X5	3.1347	4.2415	1.2368	2.9067	3.0398	4.1461	1.1851	2.8682	OK	OK
USL		5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
LSL											
$\overline{X}$		3.033	4.020	1.227	2.958	3.215	4.037	1.210	2.913		
Max		3.187	4.242	1.268	2.990	3.372	4.180	1.231	2.958		
Min		2.835	3.895	1.199	2.907	3.040	3.847	1.185	2.868		
R		0.353	0.346	0.069	0.083	0.333	0.333	0.046	0.090		
StDev		0.142	0.142	0.027	0.032	0.157	0.158	0.020	0.038		

- Slide Up

No	Sample	Before (VSWR) Slide Up				After (VSWR) Slide Up				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
1	X1	3.5652	3.4518	1.7075	2.1151	3.8093	3.3709	1.6791	2.1484	OK	OK
	X2	3.4868	3.7278	1.6812	2.1983	3.5017	3.5548	1.6926	2.1969	OK	OK
	X3	3.1335	3.3791	1.7032	2.2150	3.7413	3.5289	1.7126	2.1275	OK	OK
	X4	3.2799	3.6837	1.6881	2.1188	3.6891	3.7028	1.6920	2.1680	OK	OK
	X5	3.6921	3.3884	1.6959	2.1666	3.2103	3.4764	1.6770	2.1433	OK	OK
USL		5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
LSL											
$\overline{X}$		3.432	3.526	1.695	2.163	3.590	3.527	1.691	2.157		
Max		3.692	3.728	1.708	2.215	3.809	3.703	1.713	2.197		
Min		3.134	3.379	1.681	2.115	3.210	3.371	1.677	2.128		
R		0.559	0.349	0.026	0.100	0.599	0.332	0.036	0.069		
StDev		0.224	0.167	0.011	0.045	0.241	0.121	0.014	0.027		

■ **ACCEPT** ☐ **REJECT**

3) Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

TEST RESULT

Page 8/8

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.	● All tests shall be performed according to test conditions as provided by antenna specifications. ● 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

- Slide Down

No	Sample	Before (VSWR) Slide Down				After (VSWR) Slide Down				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
1	X1	3.0520	4.2546	1.2647	2.9933	3.1019	4.1509	1.2087	2.9833	OK	OK
	X2	3.0147	4.0052	1.2273	2.9900	2.9414	4.1849	1.1800	2.9928	OK	OK
	X3	2.7878	4.1669	1.1908	2.9658	3.3693	4.2427	1.2482	2.9379	OK	OK
	X4	2.8769	3.9738	1.2491	2.9580	2.7947	4.0479	1.2370	2.8988	OK	OK
	X5	3.3593	4.1634	1.2399	3.0076	3.0688	3.9040	1.2593	2.9354	OK	OK
USL		5.0	5.0	2.5	4.5	5.0	5.0	2.5	4.5		
LSL											
$\overline{X}$		3.018	4.113	1.234	2.983	3.055	4.106	1.227	2.950		
Max		3.359	4.255	1.265	3.008	3.369	4.243	1.259	2.993		
Min		2.788	3.974	1.191	2.958	2.795	3.904	1.180	2.899		
R		0.572	0.281	0.074	0.050	0.575	0.339	0.079	0.094		
StDev		0.218	0.119	0.028	0.021	0.213	0.133	0.032	0.038		

- Slide Up

No	Sample	Before (VSWR) Slide Up				After (VSWR) Slide Up				Result	
		824Mhz	894Mhz	1850Mhz	1990Mhz	824Mhz	894Mhz	1850Mhz	1990Mhz	Visual	Electrical
	Less than	5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
1	X1	3.5205	3.7298	1.6972	2.1753	3.4732	3.4038	1.6959	2.1998	OK	OK
	X2	3.6168	3.7269	1.7034	2.2124	3.4169	3.6573	1.6947	2.1430	OK	OK
	X3	3.6495	3.5410	1.7123	2.1723	3.4670	3.7366	1.6872	2.1032	OK	OK
	X4	3.7869	3.6790	1.6850	2.1498	3.6573	3.7298	1.7205	2.1460	OK	OK
	X5	3.3262	3.5728	1.7084	2.1745	3.5143	3.3669	1.7149	2.1558	OK	OK
USL		5.8	4.8	3.1	3.6	5.8	4.8	3.1	3.6		
LSL											
$\overline{X}$		3.580	3.650	1.701	2.177	3.506	3.579	1.703	2.150		
Max		3.787	3.730	1.712	2.212	3.657	3.737	1.721	2.200		
Min		3.326	3.541	1.685	2.150	3.417	3.367	1.687	2.103		
R		0.461	0.189	0.027	0.063	0.240	0.370	0.033	0.097		
StDev		0.171	0.088	0.011	0.022	0.092	0.180	0.014	0.035		

■ **ACCEPT** ☐ **REJECT**

3) Remark

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

8. DIMENSION MEASURMENT DATA

GTX-75 _ Dimension Measurment Data

Dimension															
No.	-	-	-	Left	Right	-	-	-	-	CTQ		-	-	Appear-ance	Result
	2	**3**	**6**	**25**	**25**	**26**	**27**	**33**	**34**	**36**	**36**	**39**	**42**		
Nominal Print Dim	27.48	19.98	1.10	10.02	10.02	16.70	7.80	46.55	48.15	7.16	7.16	34.00	6.40		
Print tol(+)	0.2	0.15	0.1	0.5	0.5	0.2	0.2	0.25	0.2	0.5	0.5	0.25	0.1		
Print tol(-)	0.2	0.15	0.1	0.5	0.5	0.2	0.2	0.25	0.2	0.5	0.5	0.25	0.1		
Instrument	V/M	V/M	V/M	V/M	V/M	V/M	V/M	V/M	V/M	V/M	V/M	V/M	V/M		
1	27.55	19.99	1.10	9.99	10.04	16.71	7.86	46.50	48.16	7.28	7.28	34.03	6.40	OK	OK
2	27.54	19.98	1.09	10.02	10.05	16.69	7.94	46.49	48.17	7.31	7.33	34.02	6.43	OK	OK
3	27.59	20.03	1.10	9.97	10.09	16.67	7.93	46.49	48.15	7.24	7.23	34.02	6.43	OK	OK
4	27.51	19.95	1.10	9.96	10.00	16.66	7.88	46.51	48.16	7.25	7.29	33.99	6.42	OK	OK
5	27.54	19.94	1.09	9.98	10.19	16.70	7.92	46.48	48.16	7.28	7.34	33.99	6.43	OK	OK
6	27.56	20.00	1.09	9.94	10.18	16.66	7.90	46.49	48.15	7.27	7.33	33.99	6.42	OK	OK
7	27.57	19.97	1.11	10.10	10.07	16.63	7.89	46.50	48.16	7.39	7.38	34.00	6.40	OK	OK
8	27.57	19.95	1.09	10.02	10.05	16.66	7.92	46.49	48.15	7.33	7.35	33.99	6.40	OK	OK
9	27.52	20.02	1.09	9.98	10.08	16.67	7.91	46.49	48.15	7.29	7.26	33.99	6.43	OK	OK
10	27.58	19.94	1.11	9.96	10.05	16.69	7.90	46.49	48.15	7.30	7.36	34.00	6.42	OK	OK
11	27.55	19.99	1.10	10.08	10.10	16.67	7.93	46.50	48.16	7.33	7.30	34.01	6.43	OK	OK
12	27.58	20.00	1.10	10.04	10.12	16.68	7.89	46.48	48.16	7.24	7.29	34.00	6.41	OK	OK
13	27.55	20.03	1.10	10.01	10.07	16.69	7.87	46.51	48.16	7.29	7.34	34.01	6.41	OK	OK
14	27.54	19.96	1.10	10.00	10.06	16.66	7.93	46.48	48.16	7.39	7.36	34.02	6.41	OK	OK
15	27.55	19.95	1.09	9.99	10.13	16.63	7.90	46.48	48.15	7.31	7.30	34.00	6.42	OK	OK
16	27.52	19.97	1.10	10.04	10.07	16.66	7.88	46.50	48.17	7.31	7.37	34.01	6.42	OK	OK
17	27.51	19.94	1.09	9.94	10.14	16.68	7.91	46.50	48.16	7.26	7.26	34.01	6.42	OK	OK
18	27.52	20.00	1.10	10.09	10.10	16.70	7.93	46.50	48.16	7.35	7.37	34.00	6.42	OK	OK
19	27.58	19.99	1.09	9.95	10.12	16.70	7.92	46.50	48.16	7.36	7.32	33.99	6.41	OK	OK
20	27.58	19.99	1.10	9.97	10.17	16.71	7.87	46.49	48.15	7.33	7.38	34.01	6.42	OK	OK
USL	27.68	20.13	1.20	10.52	10.52	16.90	8.00	46.80	48.35	7.66	7.66	34.25	6.50		
LSL	27.28	19.83	1.00	9.52	9.52	16.50	7.60	46.30	47.95	6.66	6.66	33.75	6.30		
Xbar	27.551	19.980	1.097	10.002	10.094	16.687	7.909	46.499	48.158	7.306	7.322	34.004	6.416		
Max	27.59	20.03	1.11	10.10	10.19	16.71	7.94	46.51	48.17	7.39	7.38	34.03	6.43		
Min	27.51	19.94	1.09	9.94	10.00	16.63	7.86	46.48	48.15	7.24	7.23	33.99	6.40		
R	0.08	0.09	0.02	0.16	0.19	0.08	0.08	0.03	0.02	0.15	0.15	0.04	0.03		
StDev	0.025	0.029	0.007	0.048	0.050	0.023	0.024	0.009	0.006	0.045	0.044	0.012	0.010		
Cpk	1.70	1.70	4.92	3.33	2.83	2.52	1.35	6.91	10.05	2.65	2.56	6.66	2.70		

9. ROHS REPORT

9.1 Carrier(1/3) _PC HF1023IM G4698

SGS

Test Report No. F690501/LF-CTSAYA07-15227 Issued Date: July 09, 2007 Page 1 of 3

To: CHEIL INDUSTRIES INC.
332-2
Gocheon-dong
Uiwang-city
GYEONGGI-DO 437-711
Korea

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

Product Name	: HF-1023IM
SGS File No.	: AYA07-15227
Received Date	: July 03, 2007
Test Performing Date	: July 04, 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)

SGS Testing Korea Co. Ltd.

Pluto Kim
Monet Jeong
Billy Oh / Testing Person

Jeff Jang / Chemical Lab Mgr

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

9.1 Carrier(2/3)

SGS

Test Report No. F690501/LF-CTSAYA07-15227 Issued Date: July 09, 2007 Page 2 of 3

Sample No. : AYA07-15227.001
Sample Description : HF-1023IM
Item No./Part No. : N/A

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) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) ** = Qualitative analysis (No Unit)
(6) Negative = Undetectable / Positive = Detectable

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

9.1 Carrier(3/3)

SGS

Test Report No. F690501/LF-CTSAYA07-15227 Issued Date: July 09, 2007 Page 3 of 3

Picture of Sample as Received:

*** 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

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

9.2 Sheet Metal(1/2)_C5210 H 0.15T

FITI Eco - Testing Center
FITI Testing & Research Institute
892-64 Jegi2-dong, Dongdaemun-gu, Seoul, Korea, 130-864
Tel : +82-2-3299-8006/9 Fax : +82-2-3299-8150/1
www.fiti.re.kr

TEST REPORT

APPLICANT : MILLENNIUM TECH CO., LTD.

REPORT NO. : N215-07-01024
SAMPLE RECEIVED DATE : 2007-12-10
TEST STARTED DATE : 2007-12-10
REPORT ISSUED DATE : 2007-12-14
PAGE : 1 OF 2

SAMPLE DESCRIPTION : ONE(1) PIECE OF SUBMITTED CUTTING SAID TO BE METAL.

ITEM : C5210 H 0.15T

TEST CONDUCTED : AS REQUESTED BY THE APPLICANT, FOR DETAILS PLEASE SEE ATTACHED PAGES.

※ THE ATTACHED TEST RESULT WAS CONDUCTED WITH 2002/95/EC RoHS(Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) REGULATION FOR ELECTRONIC PRODUCT.

MANAGER OF THE DEPT. OF
ECO-TESTING CENTER
YOUN SOO SHIN
YOUN SOO, SHIN

EXECUTIVE DIRECTOR
Woo Jung Shim
WOO-JUNG SHIM

FITI TESTING & RESEARCH INSTITUTE

e-DOCUMENT SERVICE

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

9.2 Sheet Metal(2/2)

FITI Eco - Testing Center
FITI Testing & Research Institute
892-64 Jegi2-dong, Dongdaemun-gu, Seoul, Korea, 130-864
Tel : +82-2-3299-8006/9 Fax : +82-2-3299-8150/1
www.fiti.re.kr

REPORT NO. : N216-07-01024
PAGE : 2 OF 2

TEST CONDUCTED TEST RESULT

(01) HEAVY METAL'S CONTENT : mg/kg

ELEMENT	TEST RESULTS	TEST METHOD	DETECTION LIMIT
CADMIUM (Cd)	NOT DETECTED	USEPA 3050B	1.0mg/kg
LEAD (Pb)	NOT DETECTED	USEPA 3052	
MERCURY (Hg)	NOT DETECTED	USEPA 3052	
CHROMIUM VI (Cr VI)	NOT DETECTED	USEPA 3060A	0.1mg/kg

NOTE) WITH REFERENCE TO EACH TEST METHOD FOLLOWED BY ACID/ALKALINE DIGESTION AND MEASURED BY INDUCTIVELY COUPLED PLASMA SPECTROMETRY(ICP) AND UV-VIS SPECTROMETER.

SAMPLE PHOTO :

e-DOCUMENT SERVICE

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

9.3 Ni Plating (1/3)_Ni Solution

SGS

Test Report No. F690501/LF-CTSAYA08-01004 Issued Date: January 16, 2008 Page 1 of 3

To: KOREA PROTECH CO., LTD.
19BI 8Lot, Namdong Industrial complex
432-4, Nonhyun-dong
Namdong-gu
INCHEON
Korea

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

Product Name	: Nickel Solution
SGS File No.	: AYA08-01004
Received Date	: January 10, 2008
Test Performing Date	: January 11, 2008
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)

SGS Testing Korea Co. Ltd.

Pluto Kim
Monet Jeong
Billy Oh / Testing Person

Jeff Jang / Chemical Lab Mgr

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

9.3 Ni Plating (2/3)

SGS

Test Report No. F690501/LF-CTSAYA08-01004 Issued Date: January 15, 2008 Page 2 of 3

Sample No. : AYA08-01004.001
Sample Description : Nickel Solution
Item No./Part No. : N/A

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

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

9.3 Ni Plating (3/3)

SGS

Test Report No. F650501/LF-CTSAYA08-01004 Issued Date: January 16, 2008 Page 3 of 3

Picture of Sample as Received:

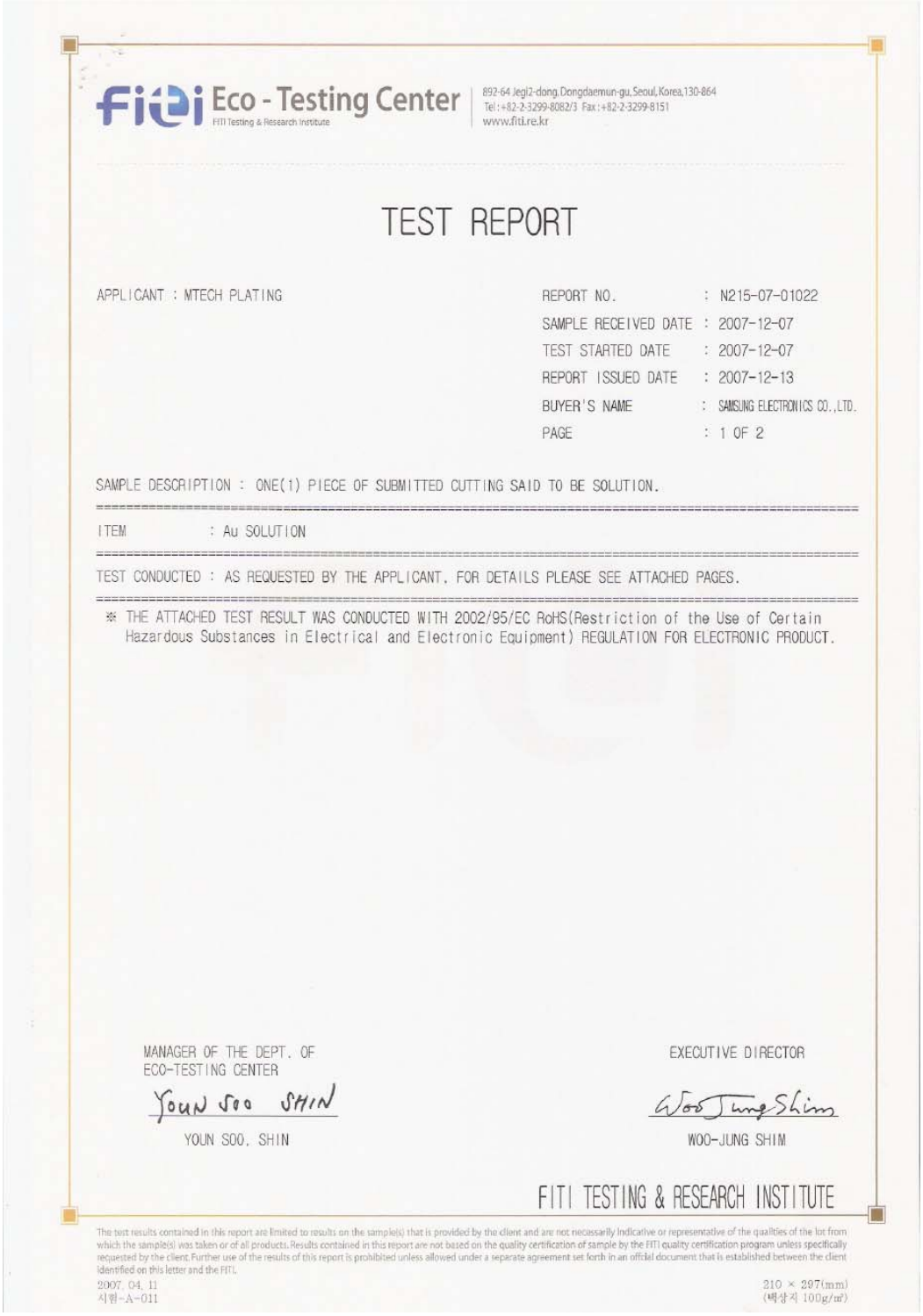
Sample Color : Yellow

*** 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

F082 Version:2

9.4 Au Plating (1/2)_Au Solution



FITI Eco - Testing Center
FITI Testing & Research Institute

892-64 Jegi2-dong, Dongdaemun-gu, Seoul, Korea, 130-864
Tel : +82-2-3299-8082/3 Fax : +82-2-3299-8151
www.fiti.re.kr

TEST REPORT

APPLICANT : MTECH PLATING

REPORT NO. : N215-07-01022
SAMPLE RECEIVED DATE : 2007-12-07
TEST STARTED DATE : 2007-12-07
REPORT ISSUED DATE : 2007-12-13
BUYER'S NAME : SAMSUNG ELECTRONICS CO.,LTD.
PAGE : 1 OF 2

SAMPLE DESCRIPTION : ONE(1) PIECE OF SUBMITTED CUTTING SAID TO BE SOLUTION.

ITEM : Au SOLUTION

TEST CONDUCTED : AS REQUESTED BY THE APPLICANT. FOR DETAILS PLEASE SEE ATTACHED PAGES.

※ THE ATTACHED TEST RESULT WAS CONDUCTED WITH 2002/95/EC RoHS(Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) REGULATION FOR ELECTRONIC PRODUCT.

MANAGER OF THE DEPT. OF
ECO-TESTING CENTER
YOUN SOO SHIN
YOUN SOO. SHIN

EXECUTIVE DIRECTOR
Woo Jung Shim
WOO-JUNG SHIM

FITI TESTING & RESEARCH INSTITUTE

The test results contained in this report are limited to results on the sample(s) that is provided by the client and are not necessarily indicative or representative of the qualities of the lot from which the sample(s) was taken or of all products. Results contained in this report are not based on the quality certification of sample by the FITI quality certification program unless specifically requested by the client. Further use of the results of this report is prohibited unless allowed under a separate agreement set forth in an official document that is established between the client identified on this letter and the FITI.

2007. 04. 11
시험-A-011

210 × 297(mm)
(백상지 100g/m²)

Specification No.	Description		
2008-B4-015	Antenna Product Specification		
Customer	**Date**	**Rev**	**Reference**
UTStarcom	July. 22. 2008	1.0	

9.4 Au Plating (2/2)

Eco - Testing Center

REPORT NO. : K215-07-01022
PAGE : 2 OF 2

TEST CONDUCTED TEST RESULT

(01) HEAVY METAL'S CONTENT : mg/kg

ELEMENT	TEST RESULTS	TEST METHOD	DETECTION LIMIT
CADMIUM (Cd)	NOT DETECTED	USEPA 3052	1.0mg/kg
LEAD (Pb)	NOT DETECTED	USEPA 3052	
MERCURY (Hg)	NOT DETECTED	USEPA 3052	
CHROMIUM VI (Cr VI)	NOT DETECTED	USEPA 3060A	0.1mg/kg

NOTE) WITH REFERENCE TO EACH TEST METHOD FOLLOWED BY ACID/ALKALINE DIGESTION AND MEASURED BY INDUCTIVELY COUPLED PLASMA SPECTROMETRY(ICP) AND UV-VIS SPECTROMETER.
LIQUID CONTENT IN BOTTLE.

SAMPLE PHOTO :