

LG 전자(주) 귀중

승인번호	SNMF0006501	ISSUE	1.0
승인번호	SNMF0006502	ISSUE	1.0

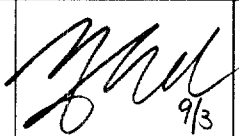
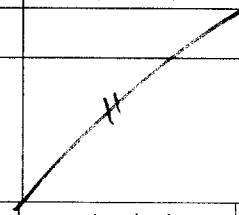
승 인 원

품 명 : Fixed Antenna
승인모델 : LG-CU8380

색상	Red	Silver
도번	SAF25047	SAF25090
품목번호	SNMF0006501	SNMF0006502

조 건 : 1. Color: Red / Silver (Spray coating)
2. Dual band (DCN+GPS)
3. _____
4. _____

상기 제품에 대해 승인합니다.

LGE 승 인	구 분	작성자	검토자	승인자
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	서 명			

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연 락 처 : 02-3445-6845



승인원 이력 LIST

이력변경	날 짜	항 목	내 용	근 거
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Antenna Specifications

(LGE CU8380)

Silver / Dark Blue / Red

B	Aug 27, 2003	Add color / change dimensions					
A	July 11, 2003	Initial Release					
Rev.	Issue Date	Changes	Initiator	RF Approval	ME Approval	Approval	Approval

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1 General

1.1 Product Description

A fixed stubby antenna system, consisting of a helical element, metal connector. A cross hole feature on contact bar section of connector for fixing on phone.

1.2 Product Number

Centurion Product Number SAF25047 for RED
 SAF25090 for SILVER GREY
 SAF25099 for DARK BLUE

Customer Product Number CU8380 antenna

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 Centurion 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

“Without mechanical damage” implies full mechanical functionality according to specification and compliance with visual requirements according to specification drawing.
 “Without permanent mechanical damage” as above but allows reversible misalignment or deformation and minor visual damage (no through-cuts or holes).

1.5 Interface

All properties are guaranteed under the condition that antenna/phone interface is designed in accordance with instructions provided by Centurion. 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 $\pm 3^{\circ}\text{C}$ and all RH tolerances are ± 5 percentage units.

Unless otherwise stated all values are valid at $+20^{\circ}\text{C}$ and 50% RH.

Unless otherwise stated all values are valid for the radio defined in 2.3

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1.7 Coordinate System

The coordinate system for the phone is defined as follows:

- Origin 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.

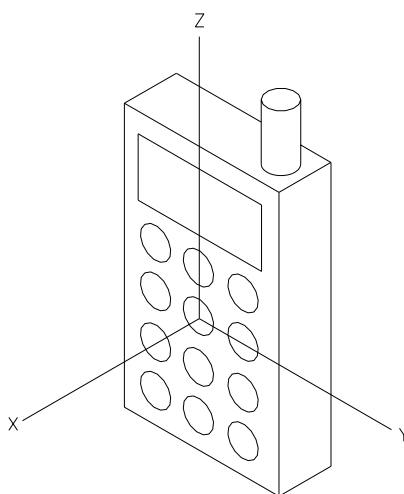


Figure 1.7-1: Coordinate system for the radio

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2 Electrical Properties

2.1 Frequency Bands

CDMA:	Tx:	824 – 849 MHz
	Rx:	869 – 894 MHz
GPS:	Rx:	1575 MHz

2.2 Impedance

2.2.1 Nominal Value

50 Ohms

2.2.2 Method

Centurion will supply engineering assistance to ensure that the impedance over the frequency bands is as close to 50 ohms as possible after matching, both in flip open and flip close status.

2.3 The Radio (Phone)

2.3.1 Radio Revision

Customer chassis I.D. number LGE CU8380

2.3.2 Matching

Values of components were for reference here, final value pending to tune by customer themselves.

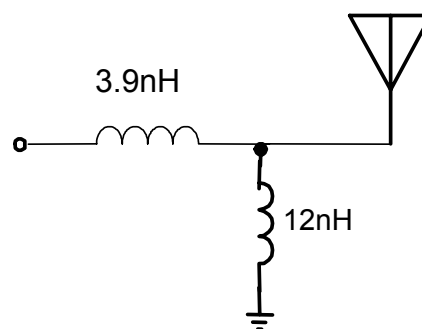


Figure 2.3-1: Matching Circuit

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2.4 VSWR

Typical value of VSWR tested with engineering samples.

2.4.1 VSWR Value (Free Space)

See below table

Mode	Band	Engineering Value	
		Flip Close	Flip open
CDMA	Tx	4.5	2.5
	Rx	3.0	2.0
GPS	Rx	2.5	2.0

2.4.2 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.

2.4.3 Electrical Performance Assurance

Sampling Plan

2.4.4 VSWR and Smith Chart

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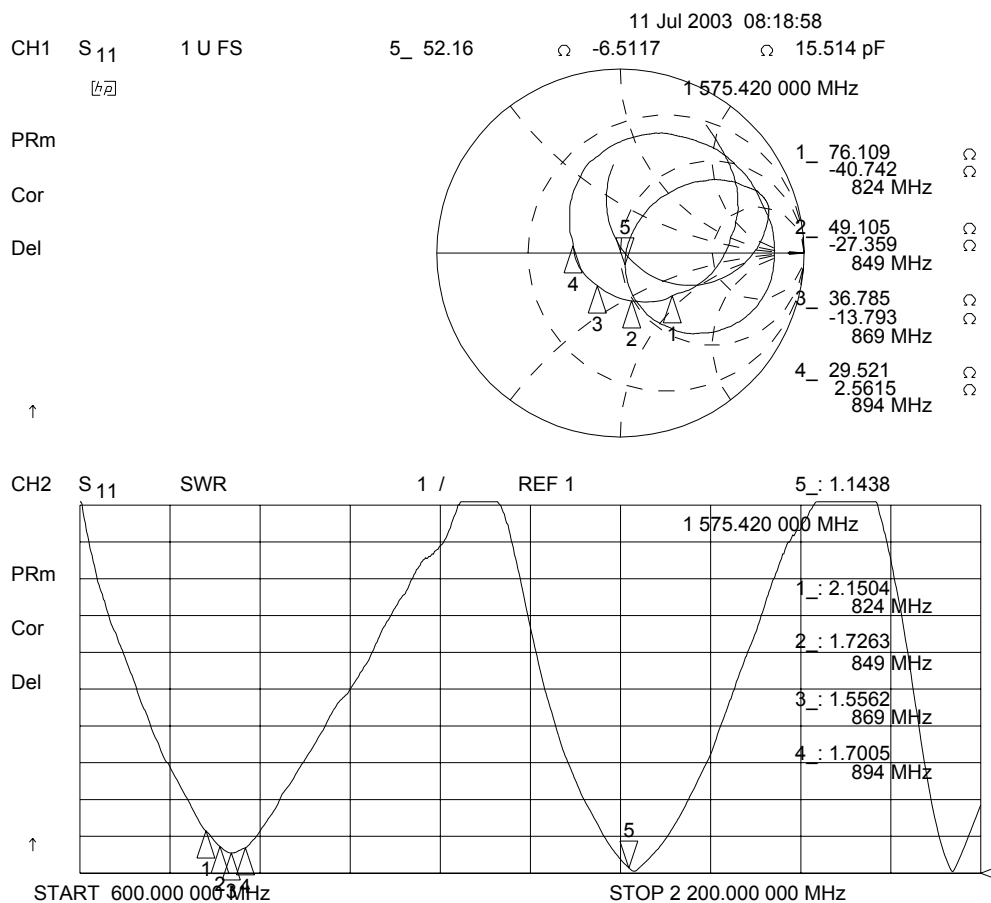


Figure 2.4-1: Flip Open

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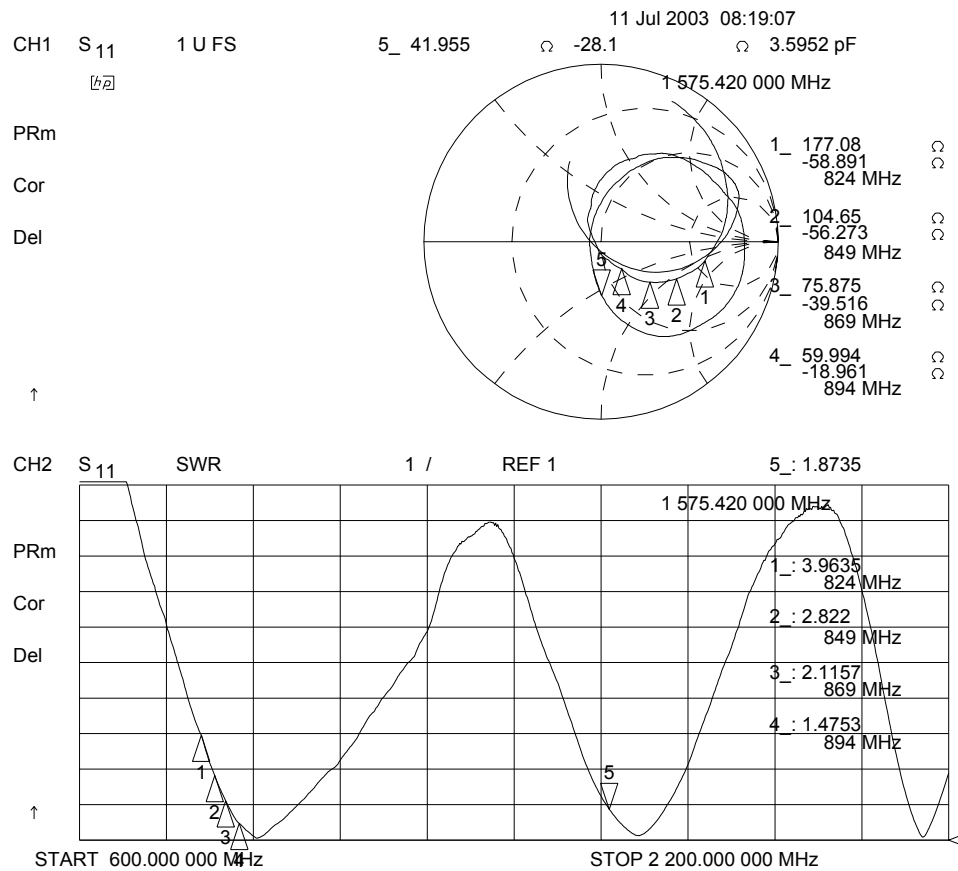


Figure 2.4-2: Flip Close

2.5 Gain

Below are typical minimum peak gain values for flip close and open.

2.5.1 Minimum Peak Values

Mode	Band	Minimum Peak Value (dBi)					
		Flip Close			Flip open		
		H-Plane	E1-Plane	E2-Plane	H-Plane	E1-Plane	E2-Plane
CDMA	Tx	-2.5	-3.0	-3.0	-1.5	-1.0	-1.0
	Rx	-2.5	-2.0	-2.0	-1.5	-1.0	-1.0
GPS	Rx	-2.0	-3.0	-2.0	-1.0	-1.0	-1.0

2.5.2 Method of Measurement

The connection is done according to 2.5.2, Radiation patterns are measured at the Tx and Rx band edges for each band defined in 2.1. The measurements are performed so as to minimize the influence of the cables. Only the coplanar polarization component is measured. The antenna is

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measure in 2 orthogonal E-planes in free space, according to Figure 2.5-1. The antenna is also measured in talk position. Calibration for absolute measurements is done with a reference antenna, which is in turn calibrated by a certified calibration company.

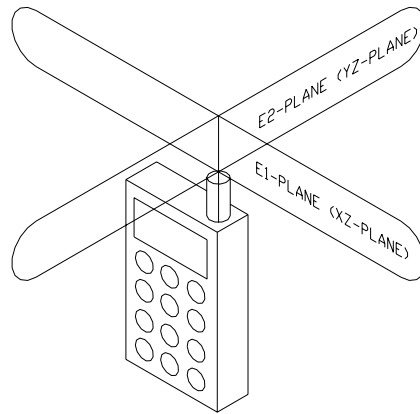


Figure 2.5-1: 2 Orthogonal E plans

E1 is also called XZ plan and E0, E2 is also called YZ plan and E90.

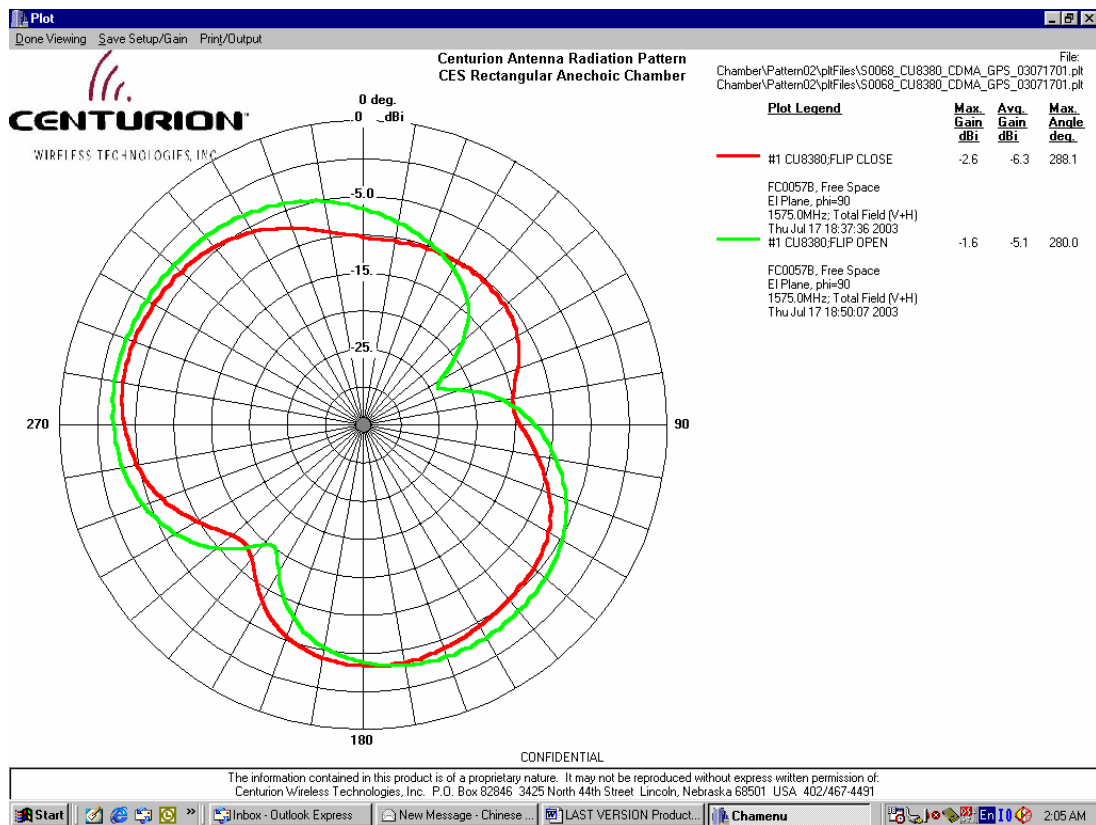
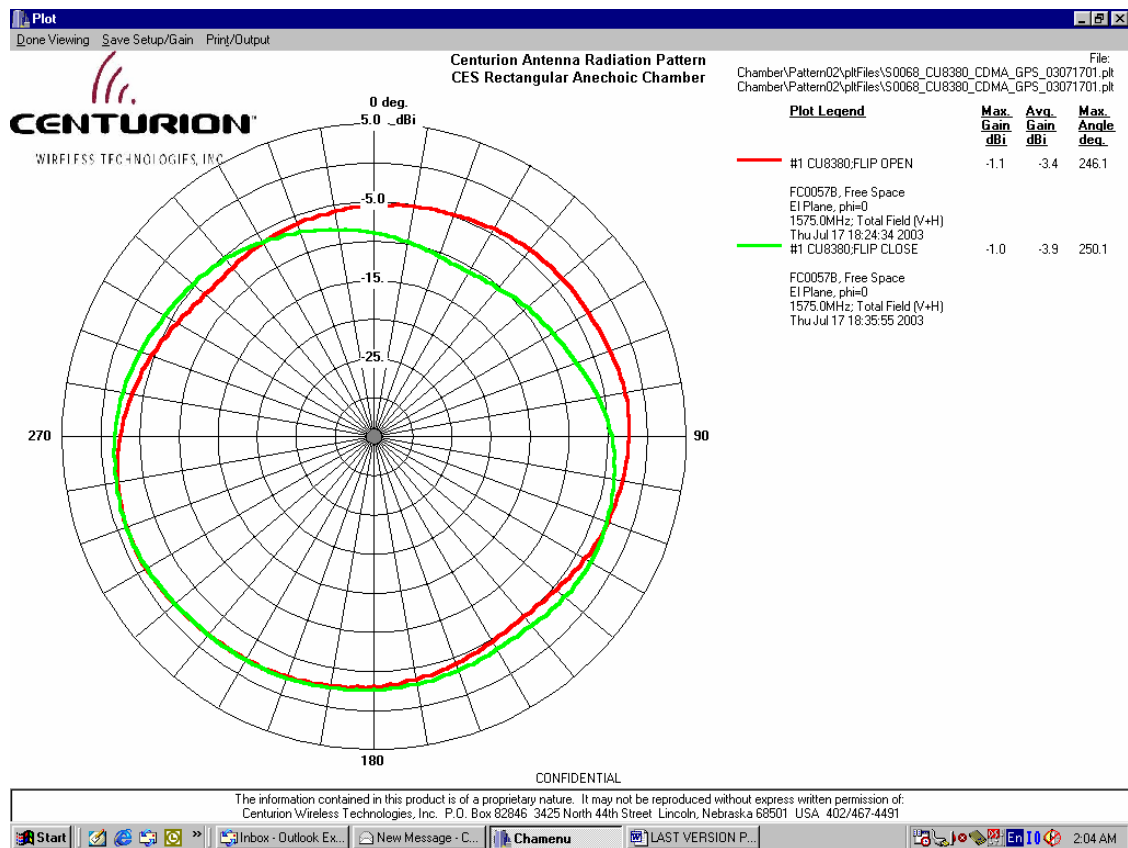
2.5.3 Radiation Pattern

The connection is done according to 2.5.2, Radiation patterns are measured.

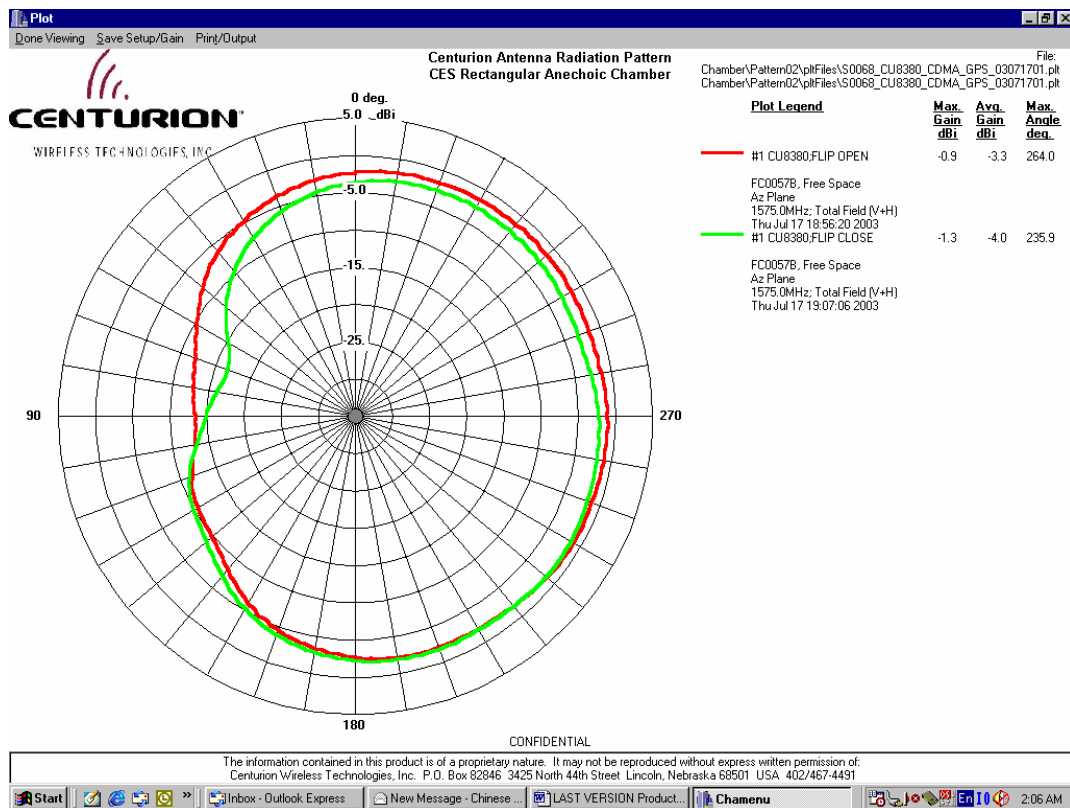
2.5.3.1 Typical Maximum Gain Value (in dBi) - GPS (1575 MHz)

OPEN / GPS (1575 MHz)			CLOSE / GPS (1575 MHz)		
E0	E90	Az	E0	E90	Az
-1.1	-1.6	-0.9	-1.0	-2.6	-1.3

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2.5.3.2 Typical Maximum Gain Value (in dBi) - CDMA

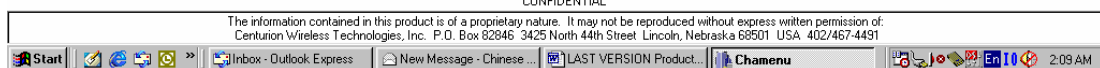
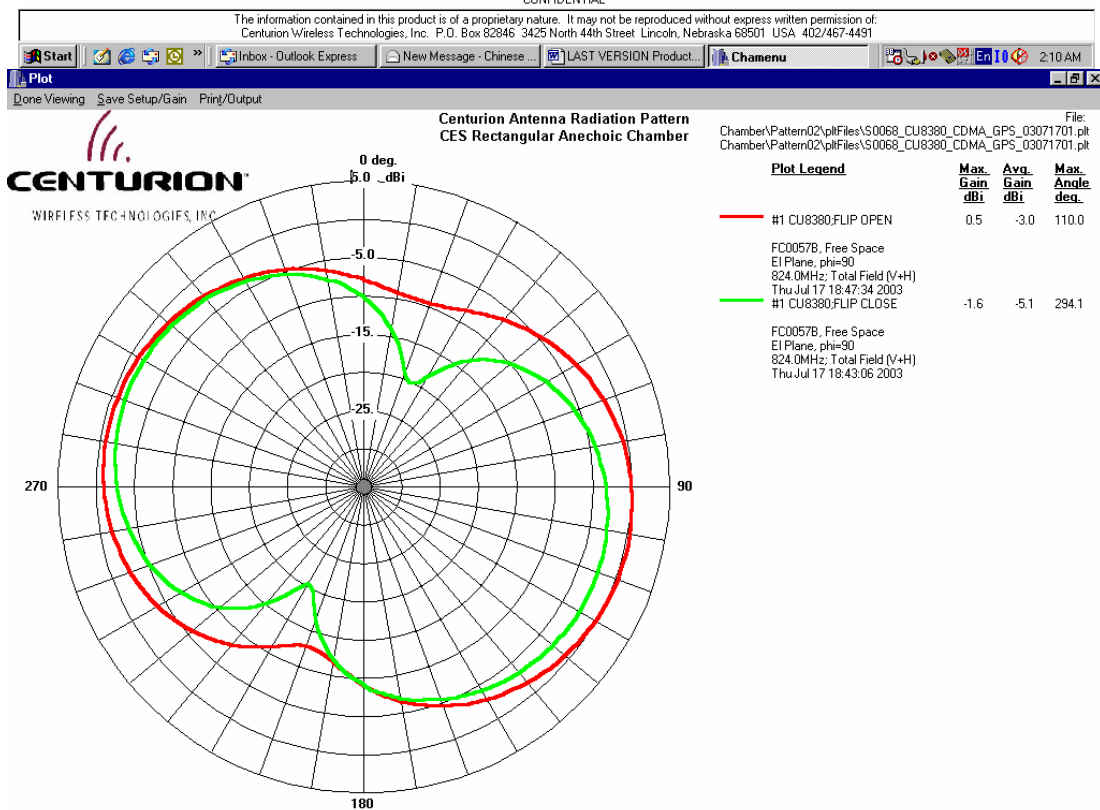
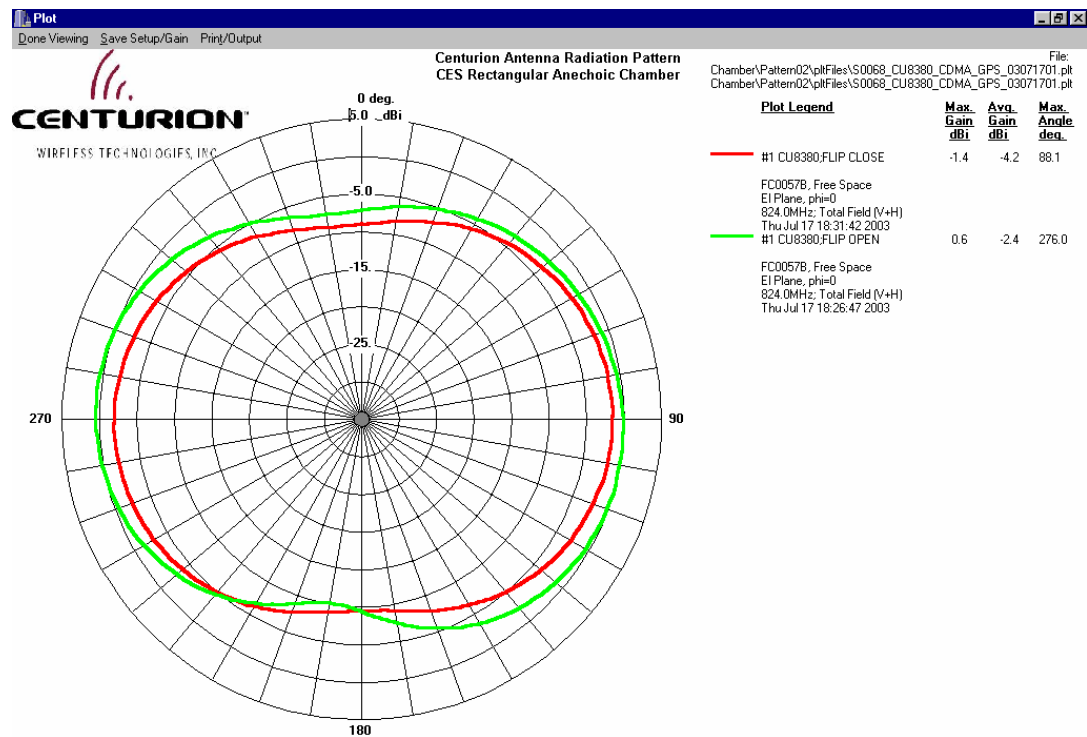
OPEN / CDMA (824 MHz)			CLOSE / CDMA (824 MHz)		
E0	E90	Az	E0	E90	Az
0.6	0.5	0.7	-1.4	-1.6	-1.8

OPEN / CDMA (849 MHz)			CLOSE / CDMA (849 MHz)		
E0	E90	Az	E0	E90	Az
0.6	0.5	0.7	-1.4	-1.6	-1.8

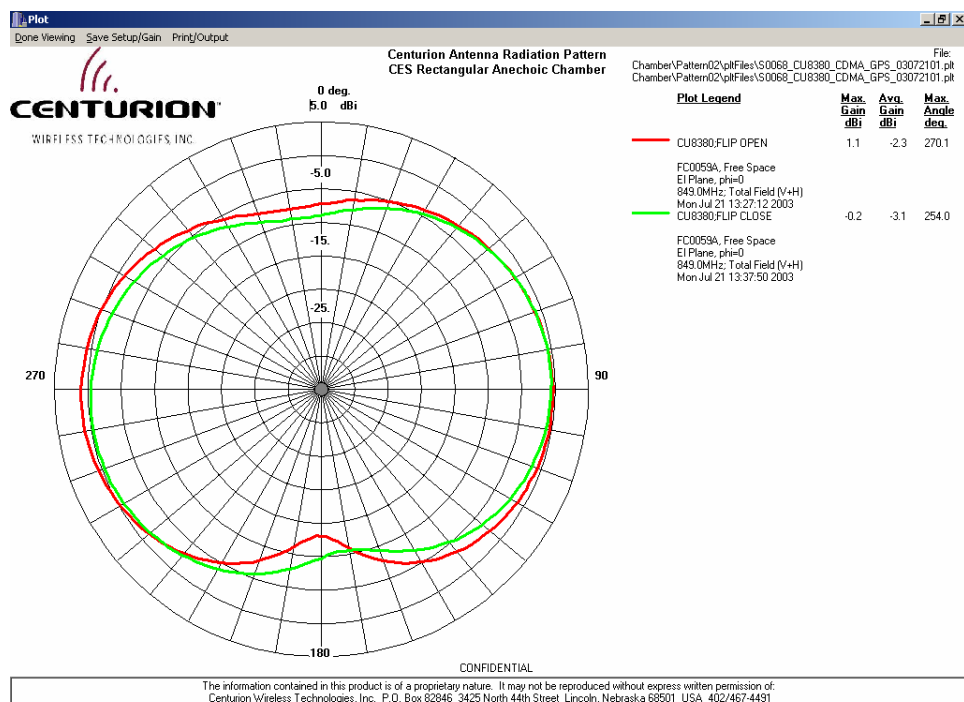
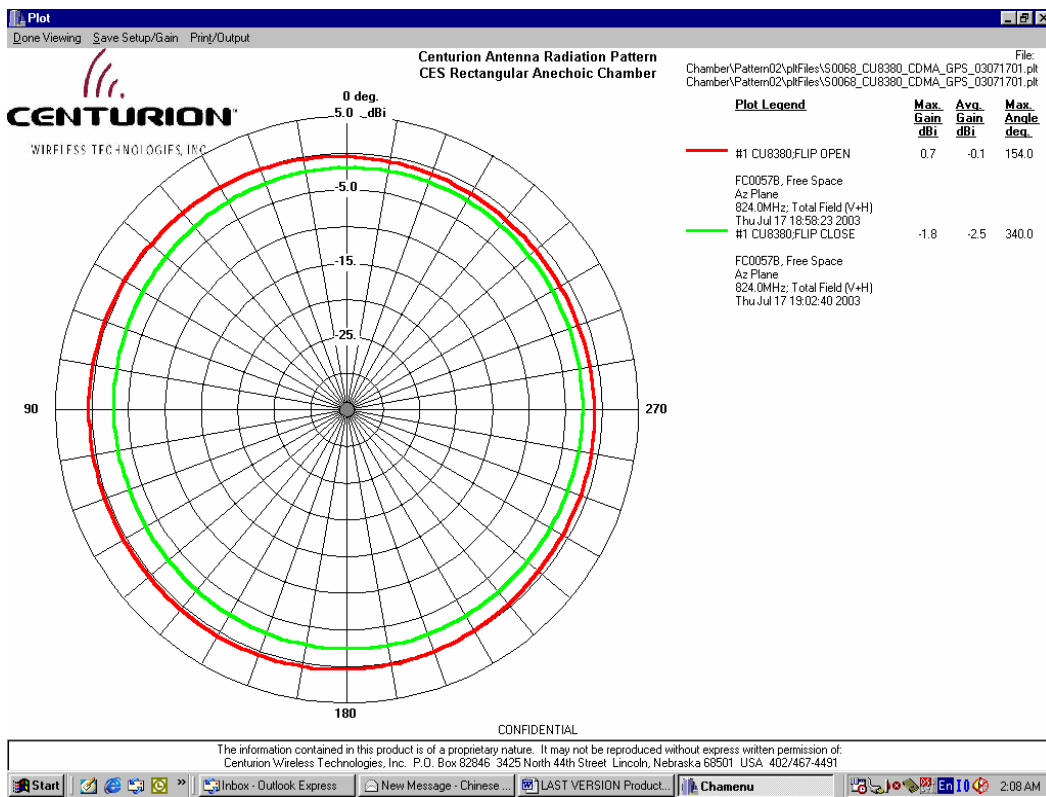
OPEN / CDMA (869 MHz)			CLOSE / CDMA (869 MHz)		
E0	E90	Az	E0	E90	Az
0.2	0.4	1.2	-1.5	-0.6	-0.4

OPEN / CDMA (894 MHz)			CLOSE / CDMA (894 MHz)		
E0	E90	Az	E0	E90	Az
0.4	0.2	0.7	0.0	-0.1	0.2

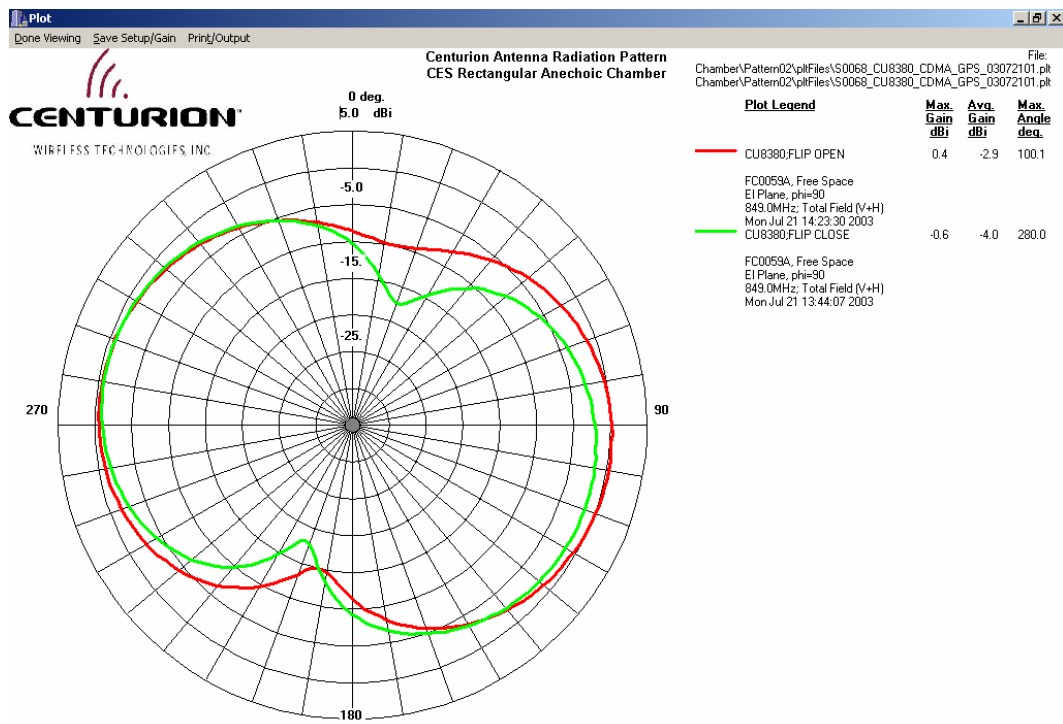
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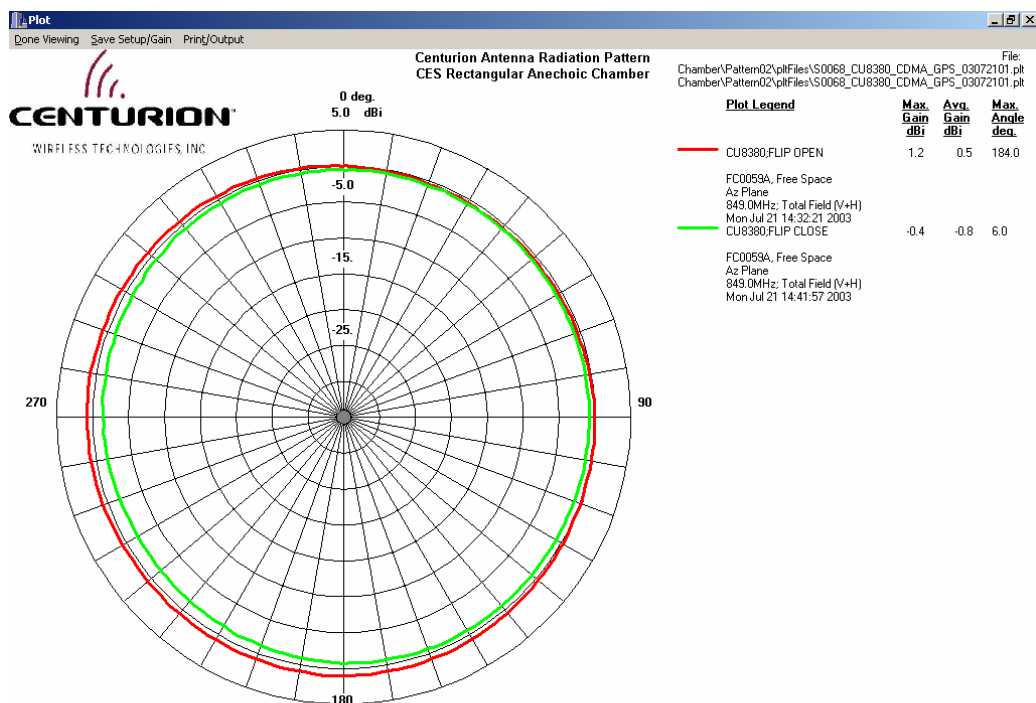


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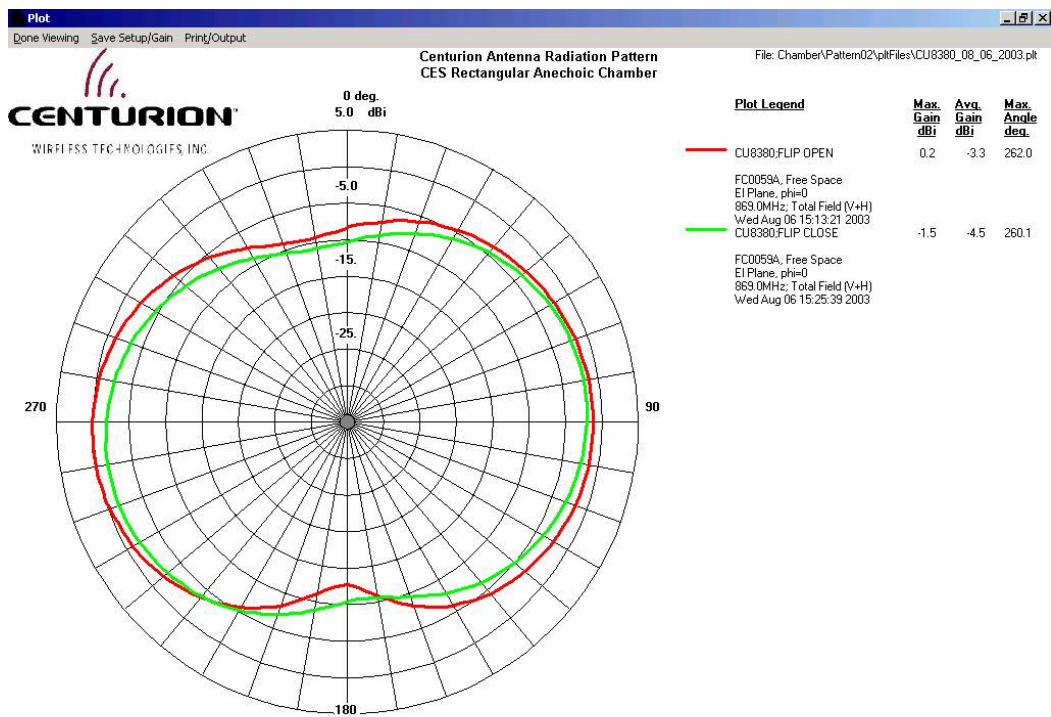
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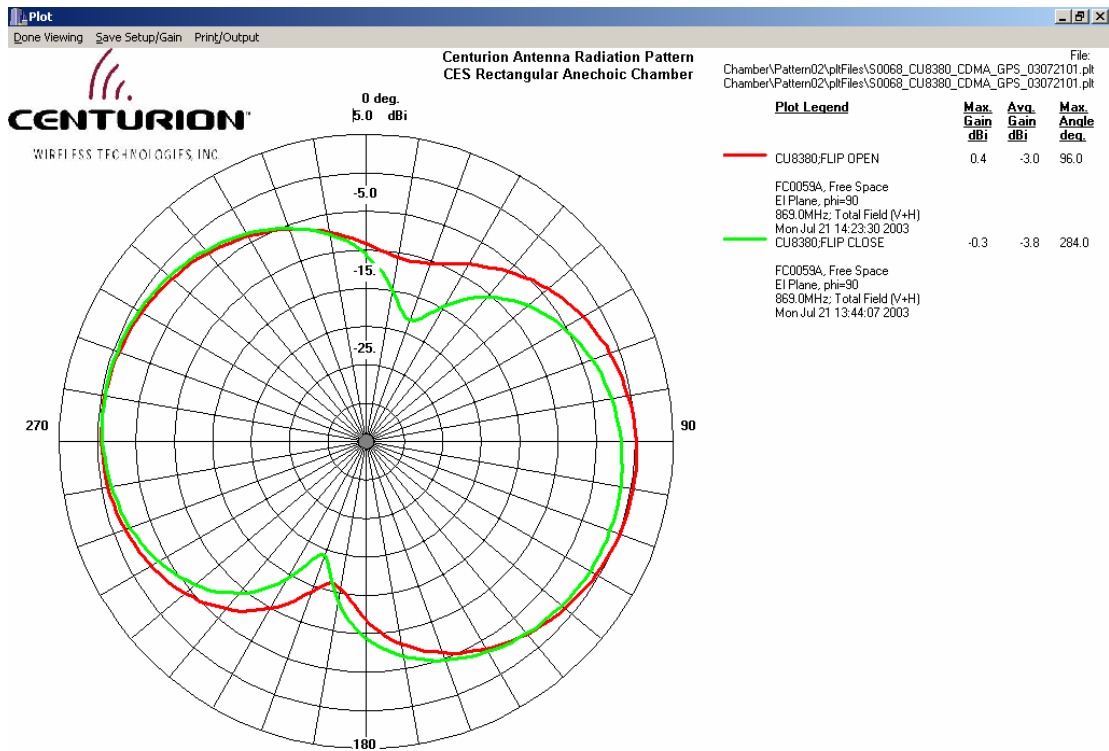
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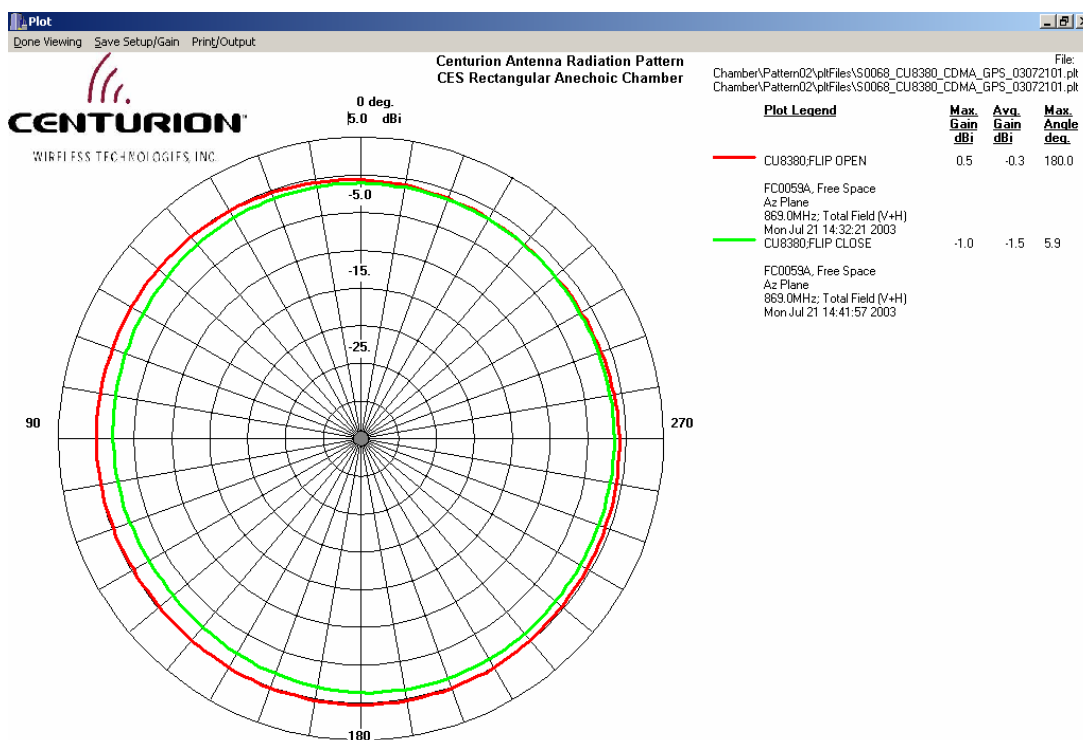


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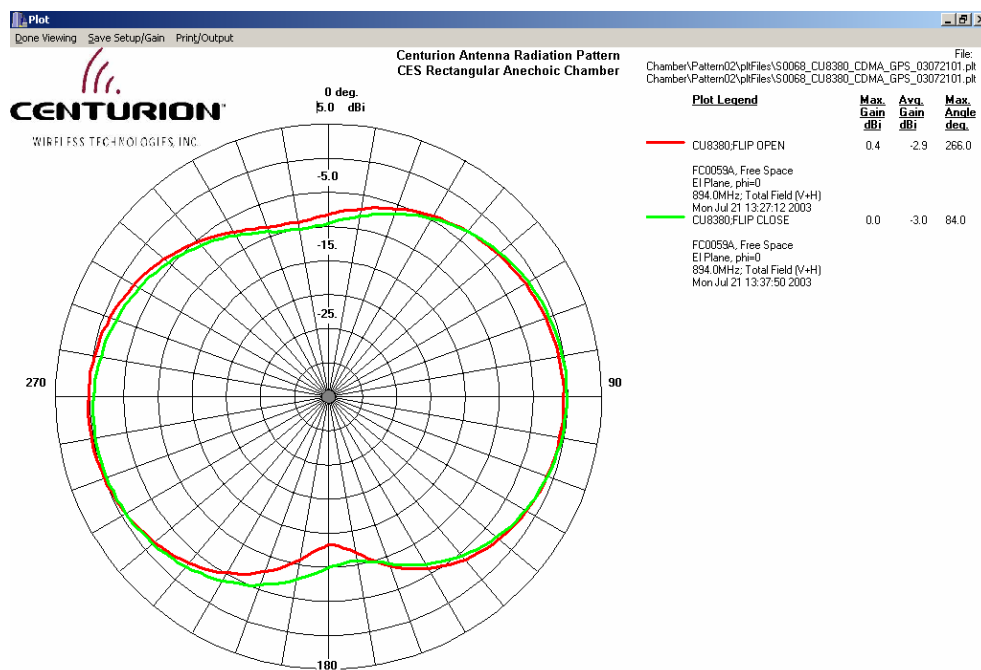


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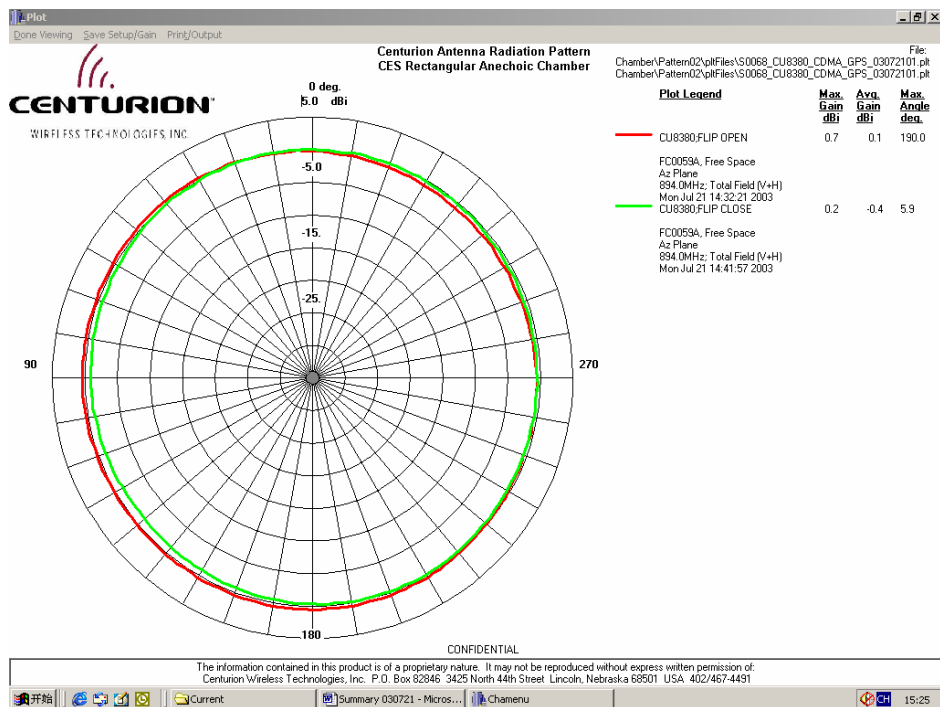
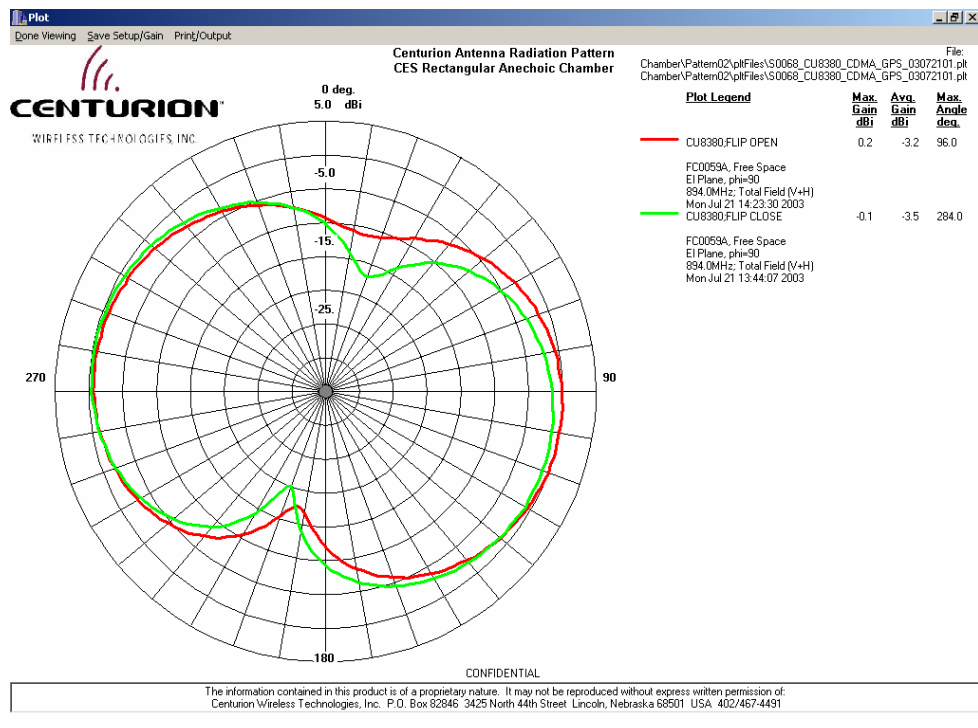


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2.6 Power Rating

2.6.1 *Maximum Value*

P=2W (CW)

2.6.2 *Post Test Requirements*

Nor mechanical damage neither electrical performance reduction has been observed after 2.5.1, 2.4.1 and 2.5.1.

2.6.3 *Method of Measurement*

The connection is done according to 2.5.2. The specified power, P, is applied for 10 minutes at the middle frequency of each Tx band defined in 2.1. Immediately after the test the VSWR is measured.

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3 Mechanical Properties

3.1 Appearance

The appearance shall be according to specification drawing and CES generic antenna inspection work instruction. See attached for drawing.

3.2 Helix Deformation

3.2.1 Bending Force:

$$F_b = 5 \text{ Kgf}$$

3.2.2 Post Test Requirements:

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

3.2.3 Measuring Method

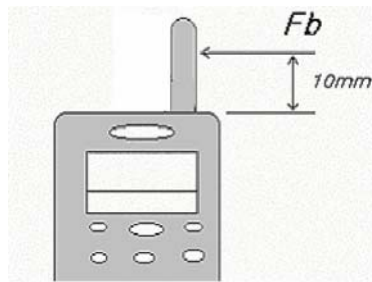


Figure 3.2-1

3.3 Torque

3.3.1 Minimum Value:

$$T = 3 \text{ Kgf.Cm}$$

3.3.2 Post Test Requirements:

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

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3.3.3 Measuring Method

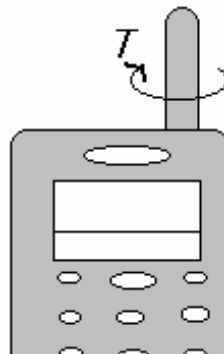


Figure 3.3-1

3.4 Tensile strength

3.4.1 Minimum Value:

$$F = 5 \text{ Kgf}$$

3.4.2 Post Test Requirements

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

3.4.3 Measuring Method

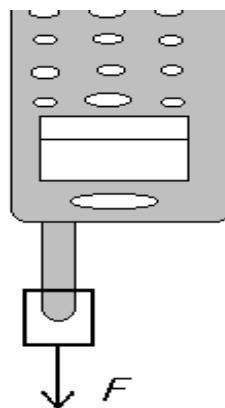


Figure 3.4-1

3.5 Drop

3.5.1 Post Test Requirements

No major visual, fitting or mold change has been observed during the drop test. Scratch mark on plated cap was acceptable.
The antenna satisfied the electrical data.

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3.5.2 Measuring Method (Shown as below figure)

Drop height : 1.5 m

Drop angle: 45° and 90°

Hand set weight: 150 gram, test with real phone bound metal blocks to specified weight.

Cycles: 5 Cycles

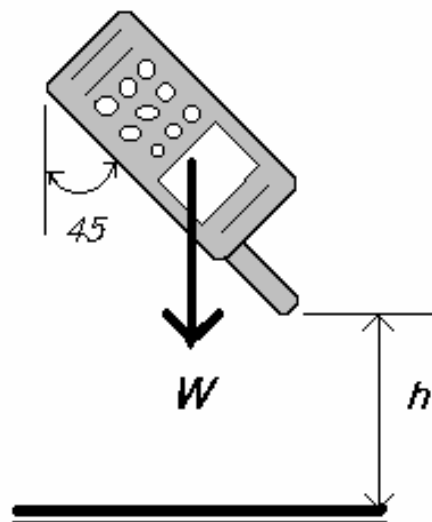


Figure 3.5-1

3.6 Antenna Weight:

2.8 grams

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4 Environmental Resistance Properties

4.1 Operating Temperature

4.1.1 Temperature:

— 30°C ~ +80°C

4.1.2 Time:

each 24 hours

4.1.3 Post Test Requirements

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

4.2 Storage Temperature

4.2.1 Temperature:

— 35°C ~ +95°C

4.2.2 Time:

Each 96 hours

4.2.3 Post Test Requirements

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

4.3 Temperature Cycling

4.3.1 Low Cycling Temperature:

TLC = —40°C

4.3.2 High Cycling Temperature:

THC = +80°C

4.3.3 Post Test Requirements

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

4.3.4 Measuring method

The antenna is placed in a climatic chamber. The temperature is cycled as follows:

The temperature is kept constantly at TLC for 1 hour, increased to THC during 1.5 hour, kept constantly at THC for 1 hour and then decreased to TLC during 1.5 hour. This procedure is repeated 10 times according to Figure 4.3-1.

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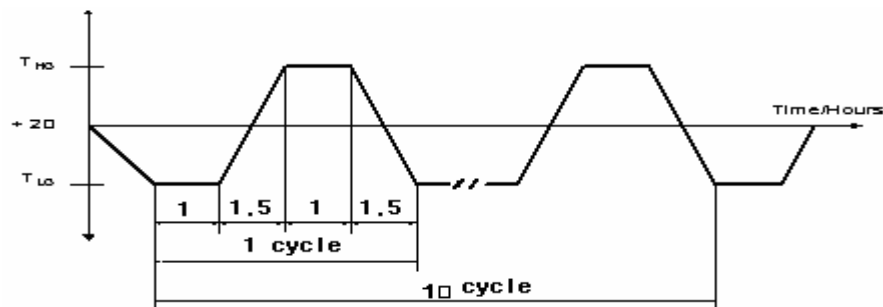


Figure 4.3-1

4.4 Humidity

4.4.1 Condition:

95% RH / +55°C

4.4.2 Measuring method

The antenna is placed in climatic chamber for 24 hours. The antenna is taken out from the chamber and measured after another 24 hours in room temperature.

4.5 Sinusoidal Vibration

4.5.1 Vibration Frequencies:

8 - 25 - 8 Hz (1 cycle)

4.5.2 Sweep Rate:

1 octave/min (logarithmic)

4.5.3 Maximum Amplitude:

A – 1.5 mm

4.5.4 Maximum Acceleration:

2 g

4.5.5 Measuring method

The antenna is assembled in the test equipment. The vibration is done both in x- and z- directions, according to Figure 4.5-1, with a duration of 1 hour in each direction.

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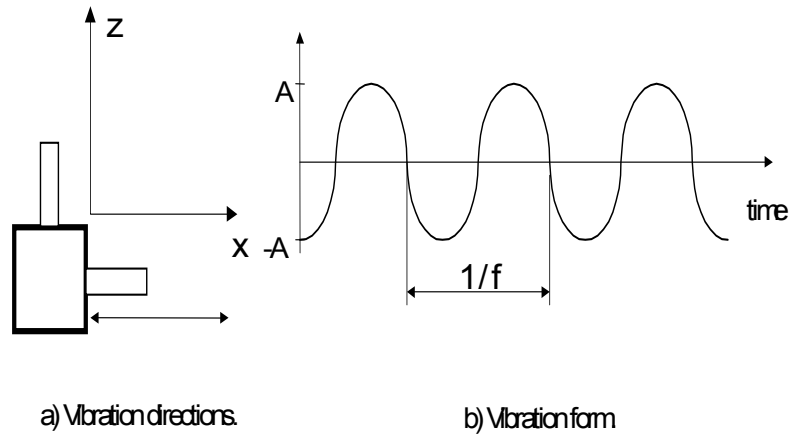


Figure 4.5-1

4.6 Corrosion (Salt spray test)

4.6.1 Time:

96 hours

4.6.2 Temperature:

35°C

4.6.3 Corrosion solution:

5% (by weight) Sodium Chloride

4.6.4 Post Test Requirements

No visual change and the fitting and mold shall be unchanged mechanically during the test.

The antenna shall satisfy the electrical data

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5 UV Painting Reliability

5.1 Samples Size

10 PCS

5.2 Initial coating reliability prior to test resistance of cosmetics

5.2.1 Ethanol rubbing:

5.2.1.1 Test method:

Loading: 500g Speed: 25 times/min,
Part of test: Edge
Cycles: 150 times (go and return)

5.2.1.2 Post Test Requirements:

Color and gloss changes were unobvious and acceptable.

5.2.2 Adhesion (Cross Cutting):

5.2.2.1 Test method:

Gap: 1 mm
Number of line: horizontally, vertically 11 pcs
Tape: 3M #610
Angle: 90°
Times: 5 Times

5.2.2.2 Post Test Requirements:

Damaged size is within 5 % of the whole size.
Damaged area is within 1/5 of the whole area.

5.2.3 Pencil hardness:

5.2.3.1 Test method:

Loading: 1 Kg
Angel: 45°
Speed: 3 mm/sec
Length: 10 mm,
Times: 5 times

5.2.3.2 Post Test Requirements:

Judge the point (5 mm from starting point), more than H for UV coating.

5.2.4 Resistance of Cosmetics:

5.2.4.1 Test method:

After spreading sun block lotion (SPF 20)
Room temperature 2 HR→80°C, 80%, 24 hours→Aging at Room temperature for 4 hours

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5.2.4.2 *Post Test Requirements:*
No erosion, No crack, No peeling, No bending, No bubbling.
Satisfied adhesion, RCA and other items in 5.3

5.2.5 *Bending test for coating:*

5.2.5.1 *Test method:*
Apply 5 Kgf at 10 mm, as figure 5.2.1
Bending Force : $F_b = 5 \text{ Kgf}$
Demands : No visual change and the fitting and mold shall be unchanged mechanically during the test.
The antenna shall satisfy the electrical data.
Measuring Method

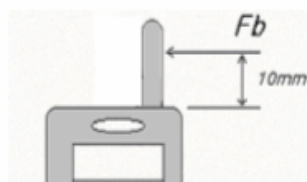


Figure 5.2-1

5.2.5.2 *Post Test Requirements:*
No bubble, No peeling

5.2.6 *Resistance of Abrasion (RCA):*

5.2.6.1 *Test method:*
Loading: 275g continuous mode, 10 times confirmation
Cycle: 50 times

5.2.6.2 *Post Test Requirements:*
No major damage after testing

5.3 **Coating reliability Post testing of resistance of cosmetics**

5.3.1 *Ethanol rubbing:*

5.3.1.1 *Test method:*
Loading: 500g Speed: 25 times/min,
Part of test: Edge
Cycles: 150 times (go and return)

5.3.1.2 *Post Test Requirements:*
Color and gloss changes were unobvious and acceptable.

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5.3.2 Adhesion (Cross Cutting):

5.3.2.1 *Test method:*
Gap: 1mm
Number of line: horizontally, vertically 11pcs
Tape: 3M #610
Angle: 90°
Times: 5 Times

5.3.2.2 *Post Test Requirements:*
Damaged size is within 5% of the whole size.
Damaged area is within 1/5 of the whole area.

5.3.3 Pencil hardness:

5.3.3.1 *Test method:*
Loading: 1 Kg
Angel: 45°
Speed: 3 mm/sec
Length: 10 mm,
Times: 5 times

5.3.3.2 *Post Test Requirements:*
Judge the point (5 mm from starting point), more than H for UV coating.

5.3.4 Bending test for coating:

5.3.4.1 *Test method:*
Apply 5 kgf at 10 mm, as Figure 5.2-1

5.3.4.2 *Post Test Requirements:*
No bubble, No erosion, No peeling

5.3.5 Resistance of Abrasion(RCA):

5.3.5.1 *Test method:*
Loading: 275g continuous mode, 10 times confirmation
Cycle: 50 times

5.3.5.2 *Post Test Requirements:*
No major damage after testing

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6 Packaging

Antenna to be individually placed in compartmentalized plastic tray. 88 pieces antenna packed per tray. 20 trays packed per carton. 1760 pcs antenna packed per carton. Size of carton is 320x320x280mm. See Figure 6-1

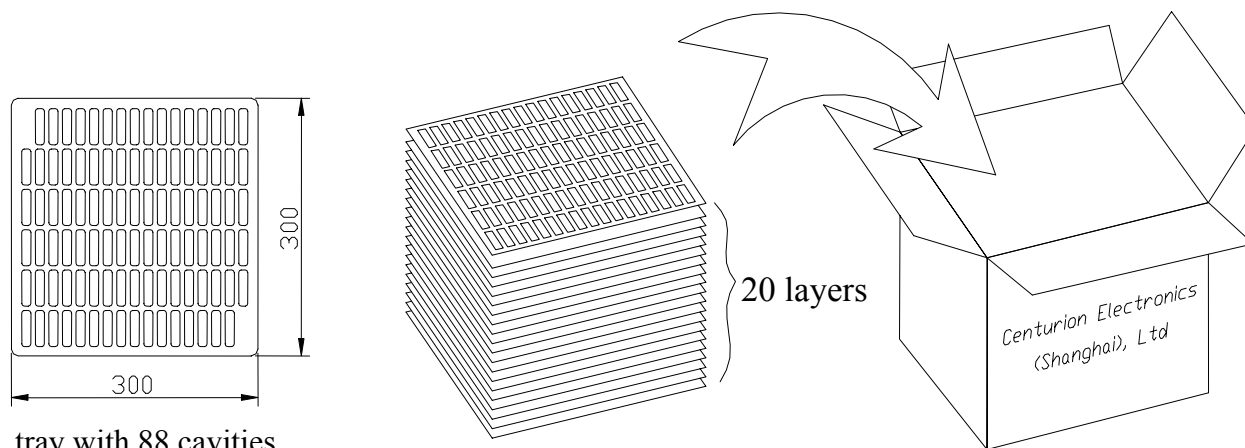
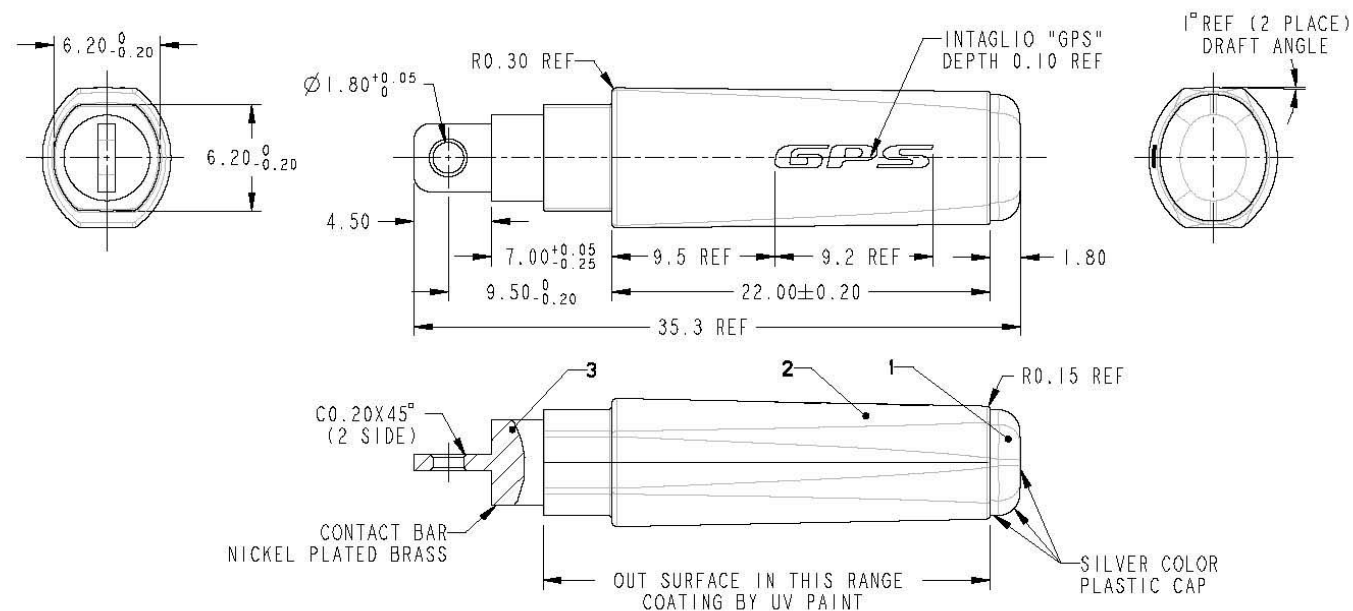


Figure 6-1: Packaging

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7 Specifications Drawing

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NOTES:

CENTURION PART NUMBER	CUSTOMER PART NUMBER	FREQUENCY RANGE
SAF25047	CU8380 ANT/RED	CDMA800/GPS
SAF25090	CU8380 ANT/SILVER GRAY	CDMA800/GPS
SAF25099	CU8380 ANT/DARK BLUE	CDMA800/GPS

2. MATERIAL AND FINISH OF VISIBLE PART

NUM	PART NAME	MATERIAL	SURFACE FINISH
1	CAP (KNOB)	ABS	SILVER COLOR
2	HELICAL BODY	ABS	UV COATING
3	CONTACT BAR	BRASS	NICKEL PLATING

3. DIMENSION WITH "REF" FOR REFERENCE ONLY, NOT BE MEASURED FOR INSPECTION REPORT

DIMENSIONS ARE IN MILLIMETERS
THIS DRAWING WAS GENERATED
VIA PRO/ENGINEER

REV.	DESCRIPTION	DATE	CK	APP	SCALE: 3.000	TOL. UNLESS NOTED
D1	FIX DESIGN	07/01	BL	MFM	DR:ROB C CK:	.X = ± 0.30 .XX = ± 0.10 ANGULAR = ± 30°
D2	ADD NOTES	07/11	BL	BB	CENTURION ELEC. SH.	PH: 86-21-58550827 FAX: 86-21-58550934 ZIP: 201203 Padong Shanghai China
D3	CHANGE TOL	08/06	BL	BB	ANTENNA CU8380	
D4	CHANGE TOL	08/19			MATERIAL: N/A	
					DATE: 8/19/2003	DWG. NO.: SAF25047
						PG. 1/3
						REV D4

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