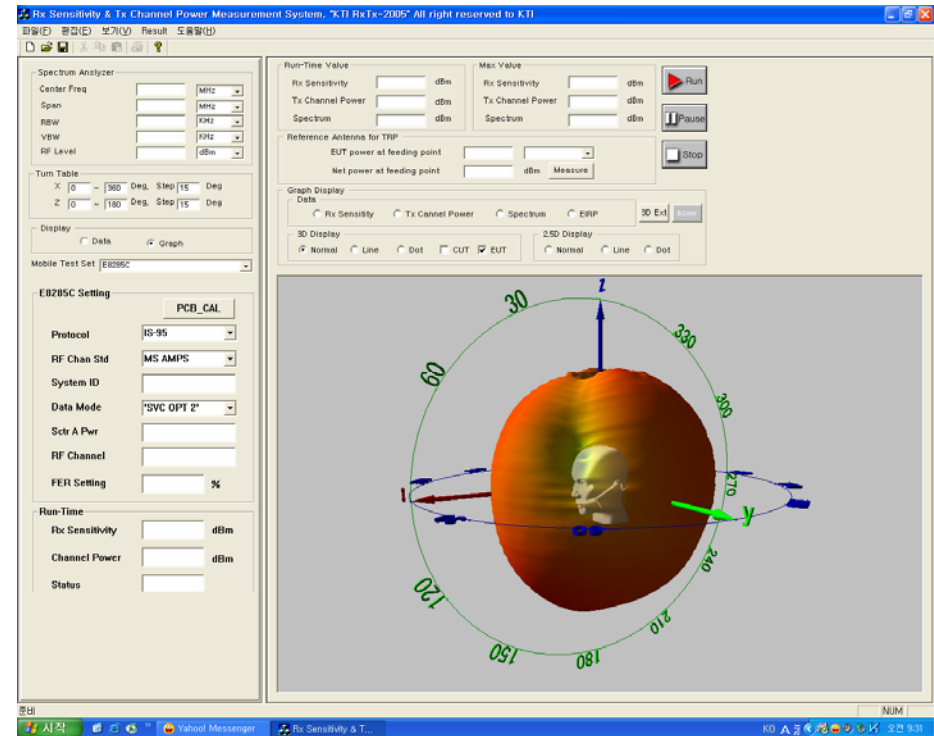
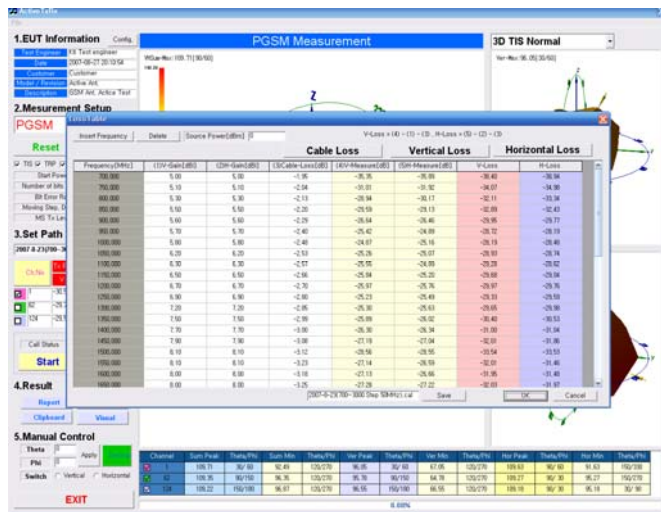
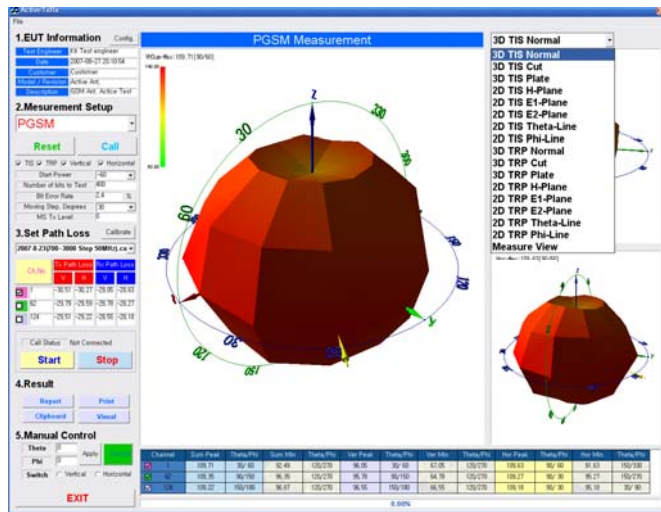


Beyond the technical limitations for the CTIA requirements

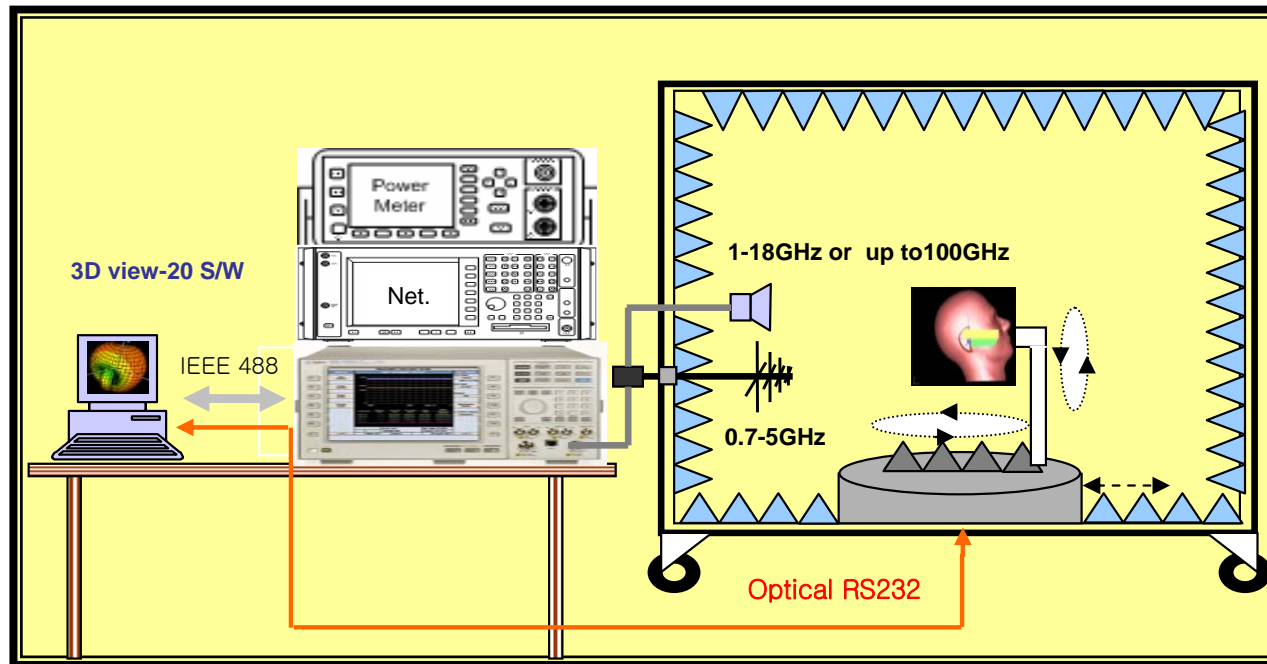
3 dimensional mobile phone and small radio equipment test



Key features and applications

- Automatic space/ path loss measurement
 - Horizontal and vertical loss considerations and anechoic chamber performance test available
 - Select the various display form, vertical + horizontal, vertical, horizontal
 - Cut view function at the max. and min value
 - EUT picture view in the 3 dimensional presentation
 - Antenna gain and antenna factor calculation functions
 - 2.5D and 3D cut view,
 - Precision outline angle display
 - Numeric and statistical data calculations for the non measured angle.
 - Various cross section display
 - All of the core 3D S/W directly developed by KTI
 - Designed by RF and EMC test special engineer
 - Visual monitoring on the one display
-
- TRP,TIS, Channel power and all...
 - EIRP/ERP measurement functions
 - Receiving sensitivity for DMB, RFID and others on the air
 - Passive inner small antenna measurement, dB_i , dB_a and AF
 - Fully meet the CTIA requirements and applicable to CDMA,WCDMA, IMT2000, GSM, DMB,BT, UWB, W-LAN, ZigBee, Wi-max and small radio equipments.
 - Additionally supply the radiated immunity test system for ETSI 301-480-1/7,YD 1169, IEC60118-13
 - The others function expanded on user demand

System setup diagram and ordering information

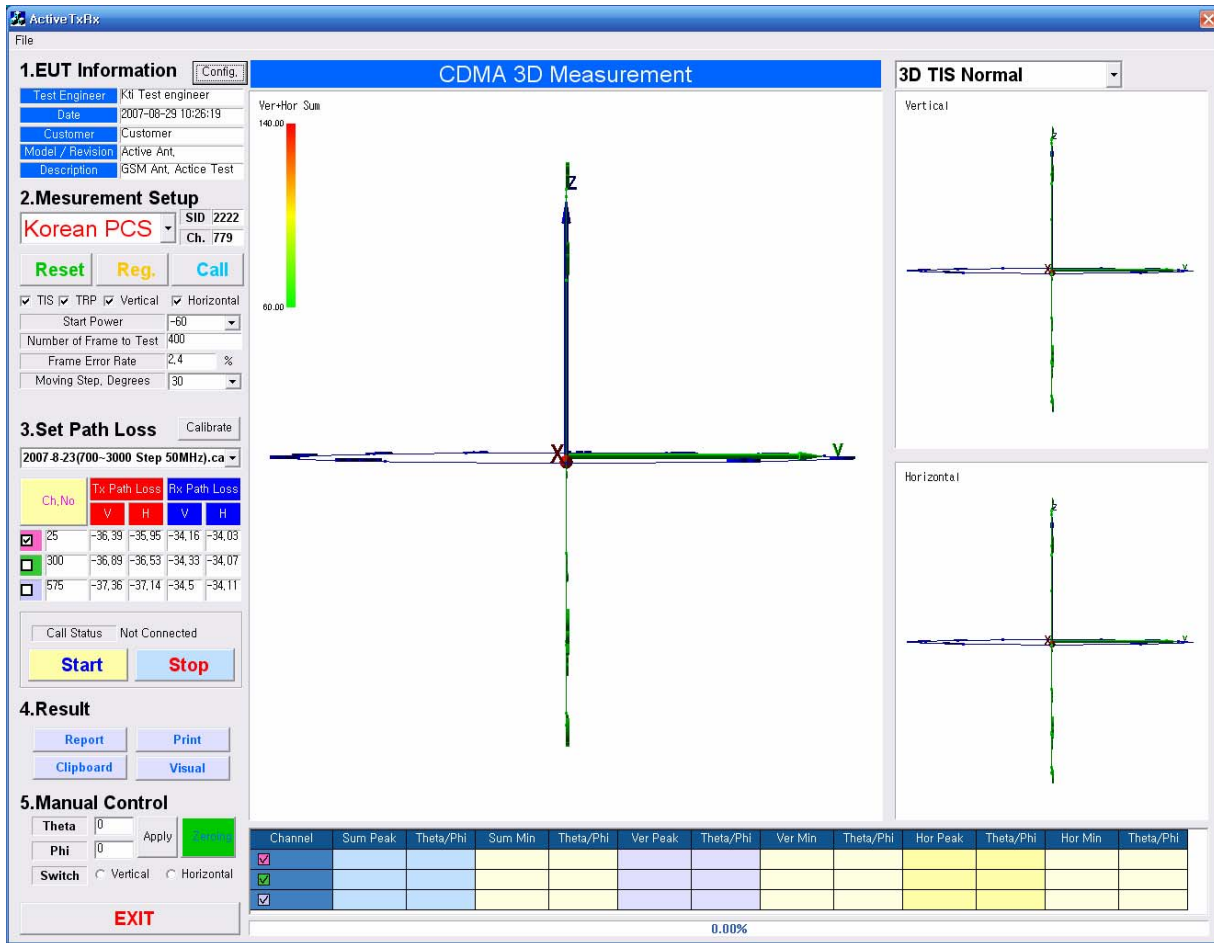


1. Antenna, 0.7-3GHz(5GHz) dual polarized horn
3. RF switch controller
5. DMB pattern generator for DMB receiving sensitivity
7. Optic 3D turn table : 3DT-15
9. System controller
11. Measuring S/W

- Passive antenna measuring S/W
- 3D VIEW -20 for the mobile phone (CDMA,WCDMA, IMT2000, GSM, PGSM....)
- EIRP/ERP measuring S/W
- * Base station RF test on the air S/W
- * Radiated immunity test S/W

2. Phantom and or artificial hand
4. Call simulator, E 5515C or CMU 200
6. Bluetooth : TC 3000A
8. Network analyzer : 8753ES recommended and or...
10. Anechoic chamber : Min. 2 x 2.6 x 2m.H, option

3D VIEW-20 main view



1.EUT information

Write the test conditions and EUT Information for test report.

2. Measuring setup

-Select the EUT version, CDMA,WCDMA.PCS....

-Write the system ID for test, select number of channel.

-Mode :Reset, Reg.,Call

-Mark the test item on the user demand, TIS,TRP, Ver., Hor.

-Frame error rate; defined it's rate on the requirement.

-Moving step;

Select the angle of 3D turn table

3. Set and path loss measuring

-Actually measure the path loss function

-Call the existed path loss data

-Number of channel, Ver., Hori.selection

-Start/stop : Select start/ stop mode

Display the call status, connected or not

4. Result

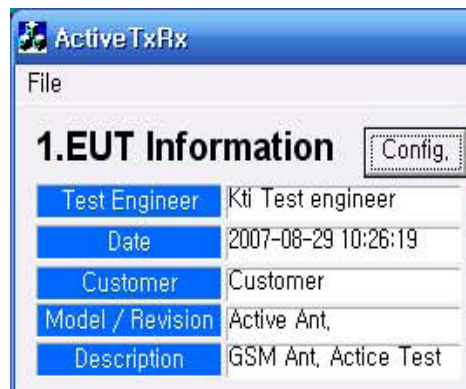
-Prepare the test report, print and clipboard for word.

-Visual : Select the display style

5.Manual control

End user could select the angle and antenna mode for the manual verification

EUT information



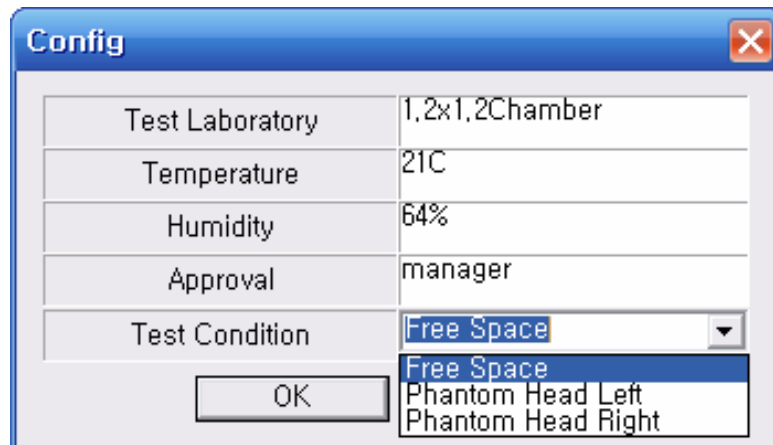
ActiveTxRx

File

1.EUT Information

Config.

Test Engineer	Kti Test engineer
Date	2007-08-29 10:26:19
Customer	Customer
Model / Revision	Active Ant,
Description	GSM Ant, Actice Test



Config

Test Laboratory	1,2x1,2Chamber
Temperature	21C
Humidity	64%
Approval	manager
Test Condition	Free Space

OK

- Free Space
- Phantom Head Left
- Phantom Head Right

. Fill in the followings;

- Test engineer
- Test date
- Customer test requested
- Model and series
- General descriptions regarding EUT set up.

. Config.

- Test laboratory and chamber size
- Temperature
- Humidity
- Approval : final approval duty for certifications
- Test condition; select the test conditions, ex.; free space, with phantom or artificial hand

Measurement setup

2.Measurement Setup

Korean PCS SID 2222
Ch. 779

Call

Horizontal

60

0

Frame Error Rate 2,4 %

Moving Step, Degrees 30

2.Measurement Setup

Korean PCS SID 2222
Ch. 779

Reset Reg. Call

TIS TRP Vertical Horizontal

Start Power -60

Number of Frame to Test 400

Frame Error Rate 2,4 %

Moving Step, Degrees 30

Select the EUT version and set the test conditions

- Select the EUT version for test, CDMA,PCS, US cellular, US PCS, IMT 2000 and GSM,PGSM and ...
- Write or select the system ID and channel for initial connection between call simulator and EUT.
- Marking the measuring item to be tested; TIS,TRP, Vertical and Horizontal.
- Select the "Start power of the call simulator"
- Number of frame to test
Select the number frame to be tested
- Write " Frame Error Rate" for measuring references
- Select the angle step of the 3D turn table
" Moving step, degree"

Set the path loss

3.Set Path Loss Calibrate

2007-8-23(700~3000 Step 50MHz).ca

Ch.No	Tx Path Loss		Rx Path Loss	
	V	H	V	H
<input checked="" type="checkbox"/> 25	-36,39	-35,95	-34,16	-34,03
<input type="checkbox"/> 300	-36,89	-36,53	-34,33	-34,07
<input type="checkbox"/> 575	-37,36	-37,14	-34,5	-34,11

3.Set Path Loss Calibrate

2007-8-23(700~3000 Step 50MHz).ca

2007-8-23(700~3000 Step 50MHz).cal
 2007-8-24(700~3000 Step 50MHz).cal
 2007-8-25(700~3000 Step 50MHz).cal
 800~3000Schwarzbeck.cal

<input checked="" type="checkbox"/> 25	-36,39	-35,95	-34,16	-34,03
--	--------	--------	--------	--------

-Call the path loss data

Path loss measurement setup and it's results

Loss Table

Insert Frequency Delete Source Power[dBm] 0

V-Loss = (4) - (1) - (3) , H-Loss = (5) - (2) - (3)

Cable Loss Vertical Loss Horizontal Loss

Frequency[MHz]	(1)V-Gain[dBI]	(2)H-Gain[dBI]	(3)Cable-Loss[dB]	(4)V-Measure[dB]	(5)H-Measure[dB]	V-Loss	H-Loss
700,000	5,00	5,00	-1,95	-35,35	-35,89	-38,40	-38,94
750,000	5,10	5,10	-2,04	-31,01	-31,92	-34,07	-34,98
800,000	5,30	5,30	-2,13	-28,94	-30,17	-32,11	-33,34
850,000	5,50	5,50	-2,20	-29,59	-29,13	-32,89	-32,43
900,000	5,60	5,60	-2,29	-26,64	-26,46	-29,95	-29,77
950,000	5,70	5,70	-2,40	-25,42	-24,89	-28,72	-28,19
1000,000	5,80	5,80	-2,48	-24,87	-25,16	-28,19	-28,48
1050,000	6,20	6,20	-2,53	-25,26	-25,07	-28,93	-28,74
1100,000	6,30	6,30	-2,57	-25,55	-24,89	-29,28	-28,62
1150,000	6,50	6,50	-2,66	-25,84	-25,20	-29,68	-29,04
1200,000	6,70	6,70	-2,70	-25,97	-25,76	-29,97	-29,76
1250,000	6,90	6,90	-2,80	-25,23	-25,49	-29,33	-29,59
1300,000	7,20	7,20	-2,85	-25,30	-25,63	-29,65	-29,98
1350,000	7,50	7,50	-2,99	-25,89	-26,02	-30,40	-30,53
1400,000	7,70	7,70	-3,00	-26,30	-26,34	-31,00	-31,04
1450,000	7,90	7,90	-3,08	-27,19	-27,04	-32,01	-31,86
1500,000	8,10	8,10	-3,12	-28,56	-28,55	-33,54	-33,53
1550,000	8,10	8,10	-3,23	-27,14	-26,59	-32,01	-31,46
1600,000	8,00	8,00	-3,18	-27,13	-26,66	-31,95	-31,48
1650,000	8,00	8,00	-3,25	-27,28	-27,22	-32,03	-31,97

2007-8-23(700~3000 Step 50MHz).cal Save OK Cancel

Path loss measurement

1. Setup the reference antenna which has a calibrated gain at the EUT position
2. Fill in the frequencies and it's gain
3. Measuring a cable loss using a Network analyzer at defined frequencies
4. Measuring a path loss data using a Network analyzer after cable connection
5. Measuring a vertical path loss and horizontal path loss in according to the antenna polarization
6. Internal frequencies between selected frequency and the other could be numerically calculated by binominal equation.
7. All of the frequencies, gain and cable loss are could be changed by end user definition.
8. Recommended times for path loss measurement is one time per day or every time when measuring setup are moved before actual test.
9. **Approximated leading time** : about 10 min. for all frequencies.
10. **For the path loss measurement, antenna axis and distance should be settled by laser measuring set.**
11. **For the more information regarding path loss measurement, contact to the KTI by way of ktimin@chol.com**

Results “ Report, Print, Clipboard, Visual”

Microsoft Excel - aaa.xls

3D TEST RESULTS OF THE RADIO EQUIPMENTS ON THE AIR

Thu 23/Aug/2007 16:13:52

EUT Information & Test Conditions

Report Number	Active Ant.	Test Laboratory	
EUT Model	Customer	Temperature	
Applied Standard		Humidity	
Uncertainty		Antenna Type	GSM Ant. Active Test

Test Results

Total Radiated Power(TRP)					Total Isotropic Sensitivity(TIS)				
Band	USC	USC	USC	AVG	Band	USC	USC	USC	AVG
Channel	1011	363	779		Channel	1011	363	779	
TX Frequency [MHz]	869.64	881.49	893.37		RX Frequency [MHz]	824.64	836.49	848.37	
TRP [dBm]	13.70	13.01	12.47	13.06	TIS [dBm]	98.94	99.14	101.82	99.97
TRP Limit [dBm]					TIS Limit [dBm]				
Pass/Fail					Pass/Fail				
TRP _{avg} /TRP _{avg} [dB]	0.64	-0.05	-0.59		TIS _{avg} /TIS _{avg} [dB]	-1.03	-0.82	1.85	
Limit [dB]					Limit [dB]				
Pass/Fail					Pass/Fail				
Feeding Power [dBm]					Conducted Sensitivity[dBm]				
TRP _{max} [dBm]	7.34	6.40	1.23	4.99	TIS _{max} [dBm]	88.67	90.95	92.68	90.77
TRP _{min} [dBm]	12.56	11.95	12.13	12.21	TIS _{min} [dBm]	98.51	98.43	101.25	99.40
UHRP [dBm]	11.89	11.10	10.78	11.26	UHS [dBm]	97.50	97.62	100.35	98.49
Peak EIRP [dBm]	15.92	15.80	15.22	15.65	Peak EIS [dBm]	101.45	101.99	105.16	102.86
Directivity [dB]					Directivity [dB]	-2.50	-2.85	-3.34	-2.90
Efficiency [dB]	2.22	2.75	2.75	2.58	Efficiency [dB]				
Efficiency [%]					Efficiency [%]				
Antenna Gain [dBi]					Antenna Factor				
IHRP±30(π/3) [dBm]	11.83	10.76	10.29	10.89	IHPIS±30(π/6) [dBm]	97.02	97.21	99.75	97.99
IHRP±60(π/6) [dBm]	13.42	12.72	12.15	12.76	IHPIS±60(π/3) [dBm]	98.69	98.88	101.49	99.69
Minimum Power [dBm]	0.96	0.59	2.22	1.26	Minimum Sensitivity [dBm]	84.10	88.42	93.75	88.76
Test Condition					Test Condition				

FS=Free Space, PH-L=Phantom Head Left, PH-R=Phantom Head Right

The test is sincerely conducted in accordance with the upper applied standard based on ISO17025, and it shall be only applicable to above serial EUT.

Report \CH1(30deg)\CH2(30deg)\CH3(30deg)

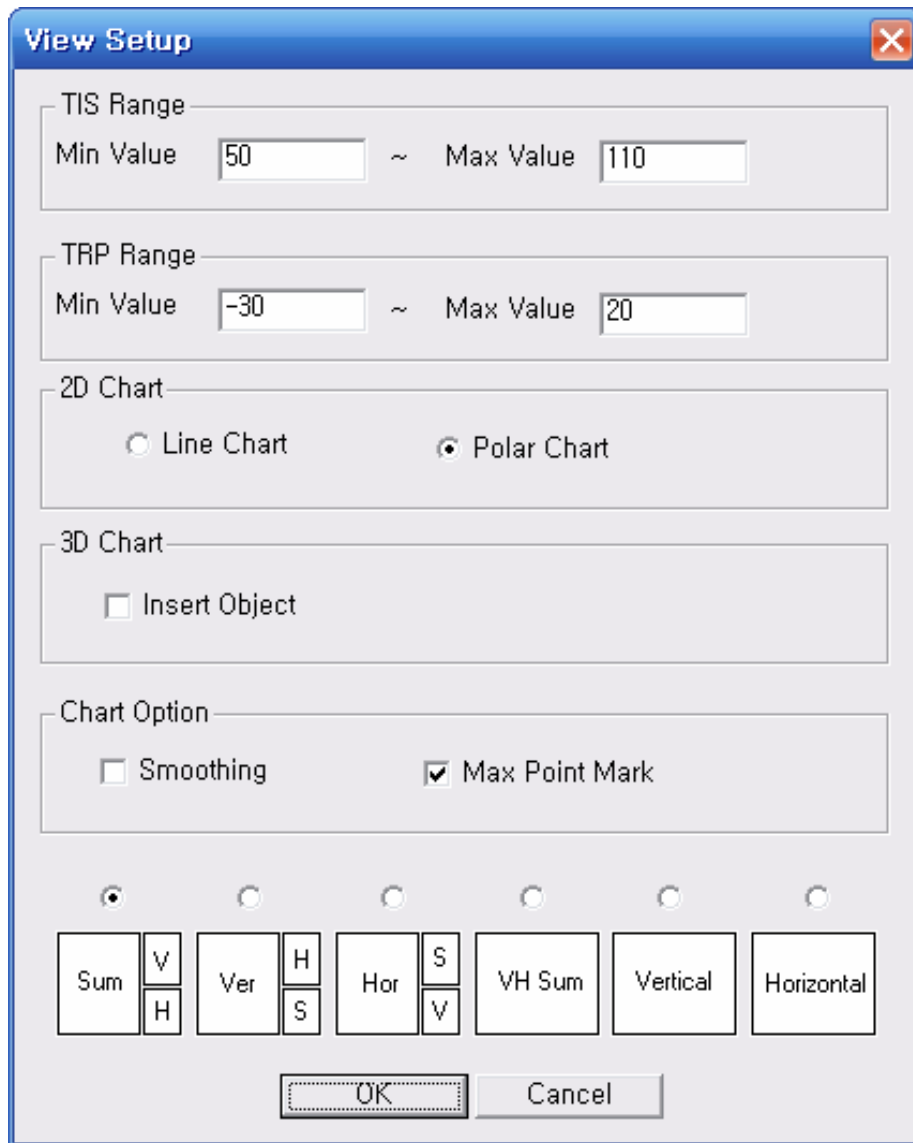
Contents of the main report

1. EUT general information and conditions
2. TRP,TIS results on the lower, medium, higher frequencies.
3. Pass/fail decision
4. Antenna gain, Antenna factor measuring results if conducted output power were manually measured.
5. Test condition and other

Print, Clipboard

- **Print** : printing function
- **Clipboard** : this function is activated when end user want to work the Word

Results “ Report, Print, Clipboard, Visual”



TIS, TRP Range

–End user set available the Min. and Max value on the chart in order to optimize the display form

2D chart

- Line chart
- Polar chart

3D chart

This mode selected the object insert on the 3D view, right or left head phantom head, artificial hand shape.

Chart option

–Smoothing

This mode make a smoothing 3D view which was measured on the random angle using a numerical sine equation method

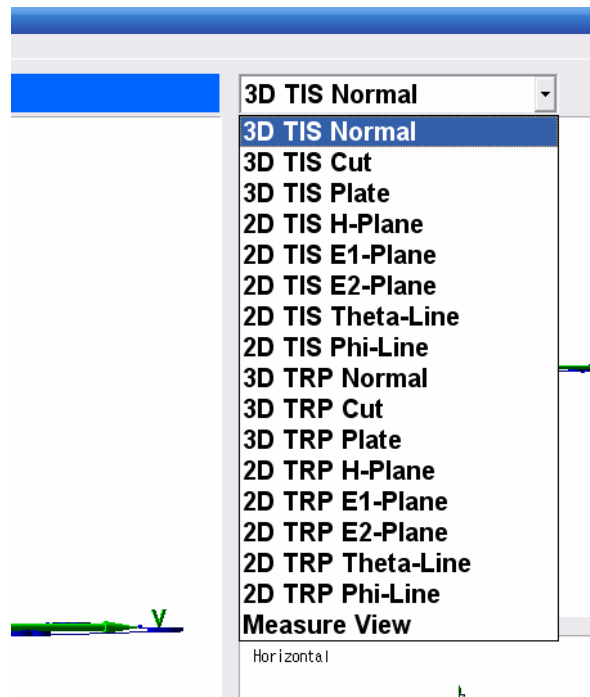
–Max point mark

It make a mark on the peak point of measured values

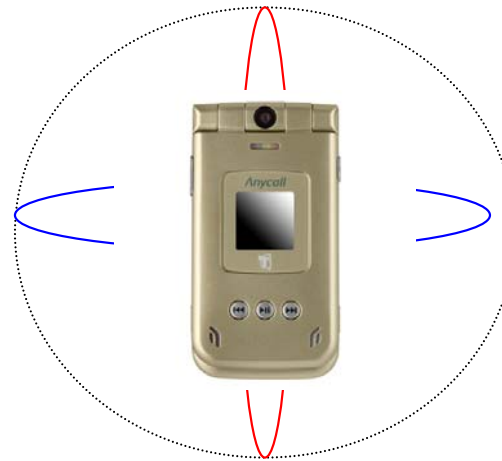
Display mode

It could be selected an one of six display mode

Special view selection of the end user required

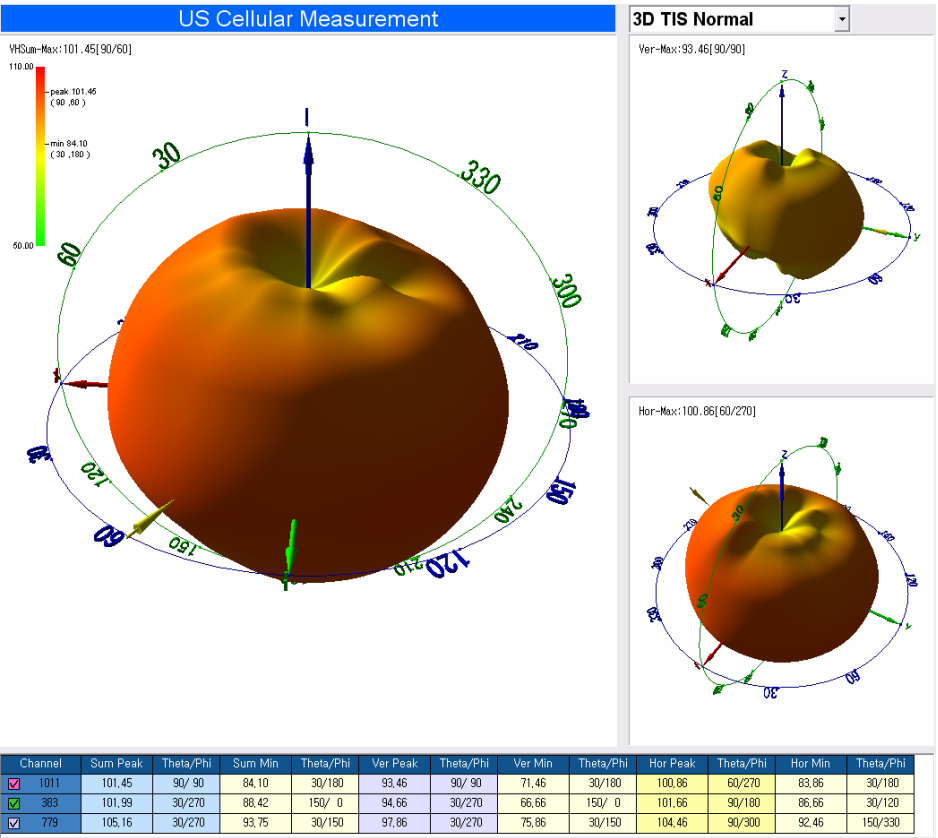
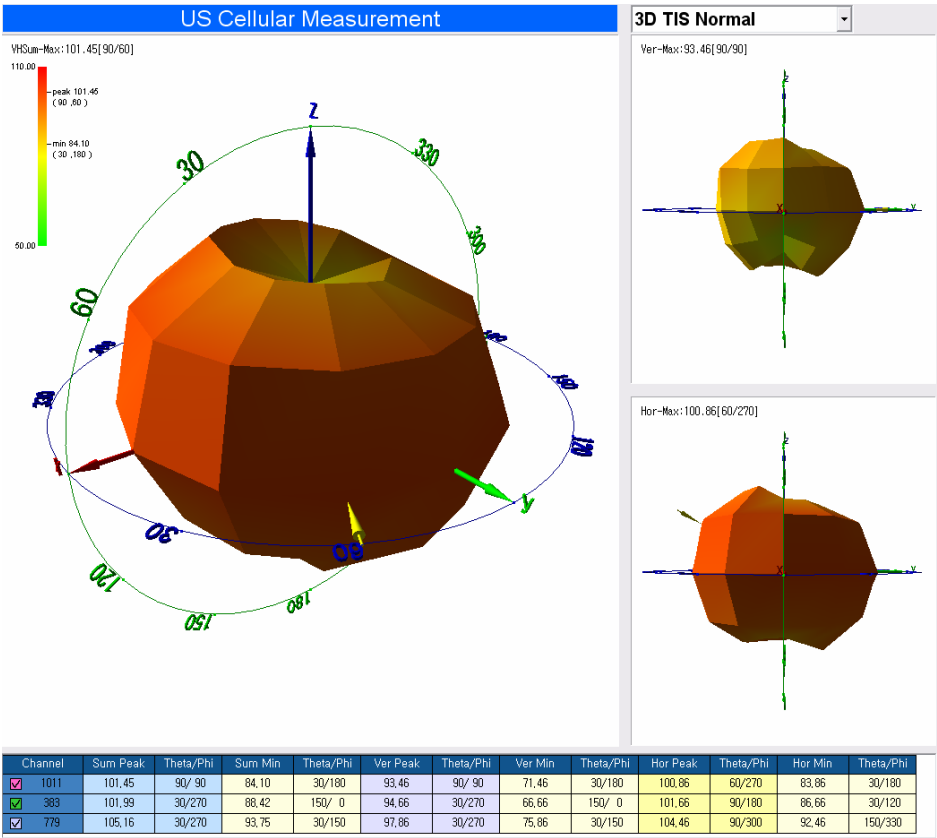


This mode offer the special view selection according to the end user demand by way of measured data treatment.

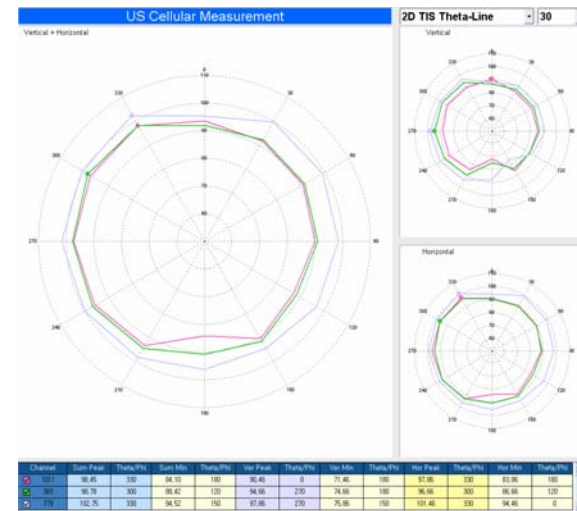
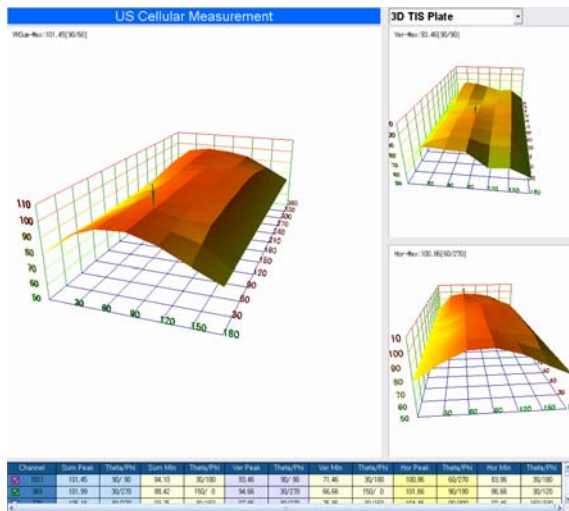
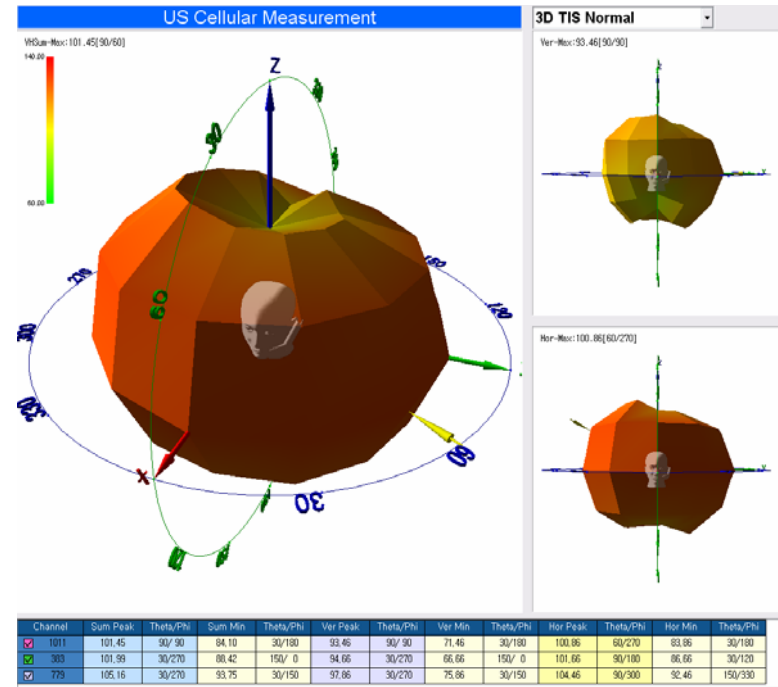
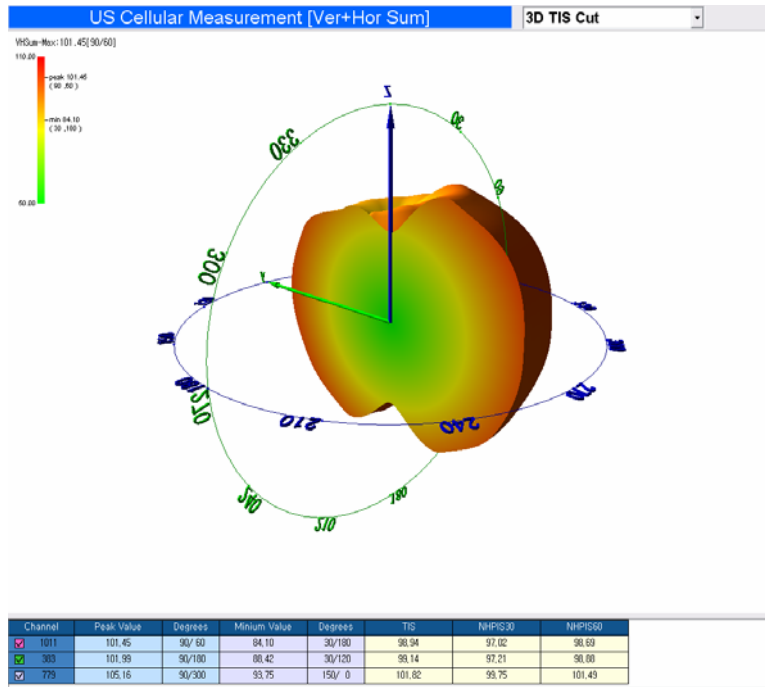


- 3D Normal : Nominal 3D spherical display of the measured data
- 3D Cut : 3D cut view on the end user defined angle
- 3D Plate : 2.5D display of the measured data
- 2D H Plane : Display the H plane data (see the upper descriptions, Blue line)
- 2D E1 Plane : Display the E1 Plane (see the upper descriptions, Red line)
- 2D E2 Plane : Display the E2 Plane (see the upper descriptions, Black dot line)
- 2D Theta line : Display the 2D depend on the user discretions on of the theta data)
- 2D Phi line : Display the 2D depend on the user discretions on the phi data
- Measure View : A special function of the EUT's picture view in the progress

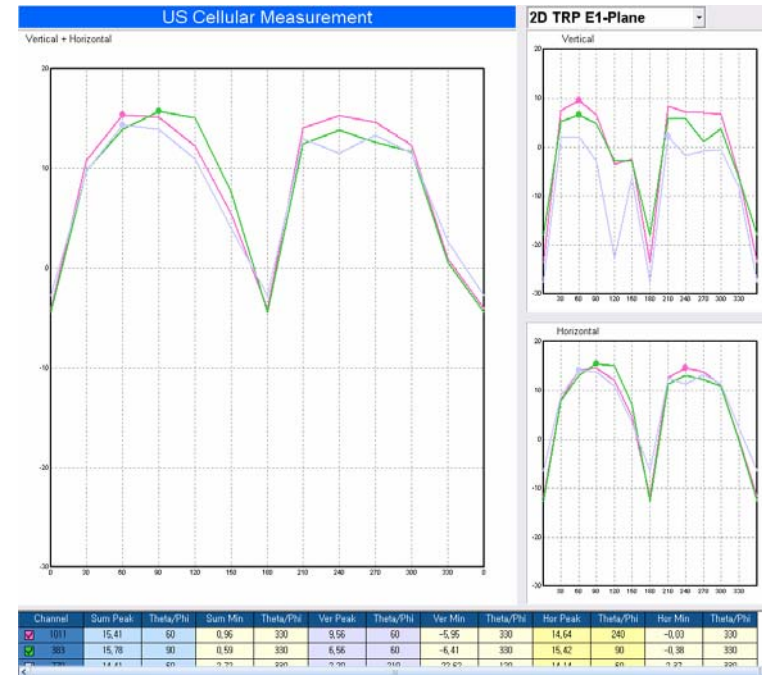
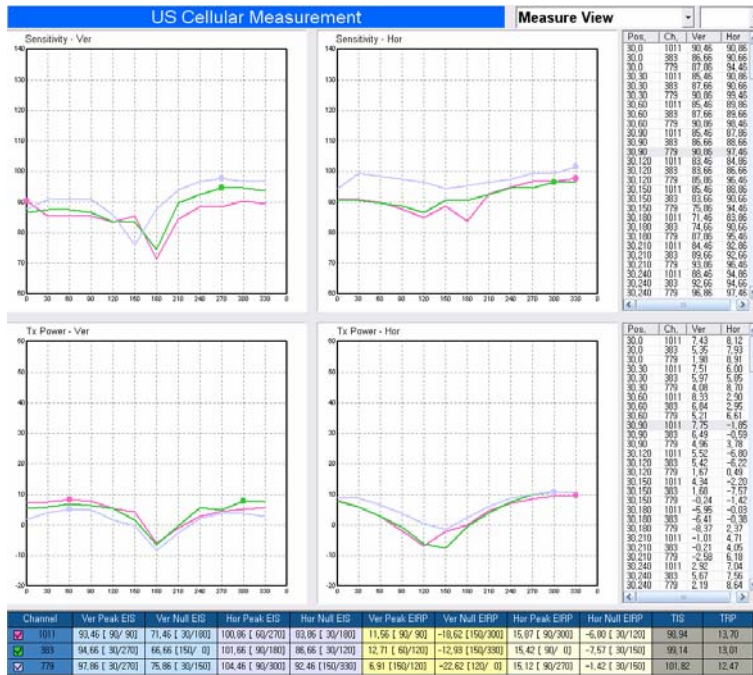
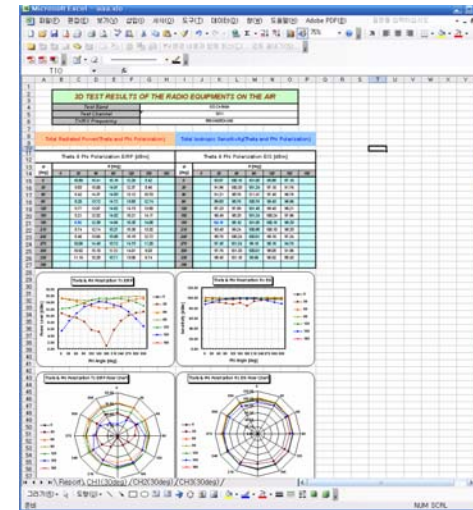
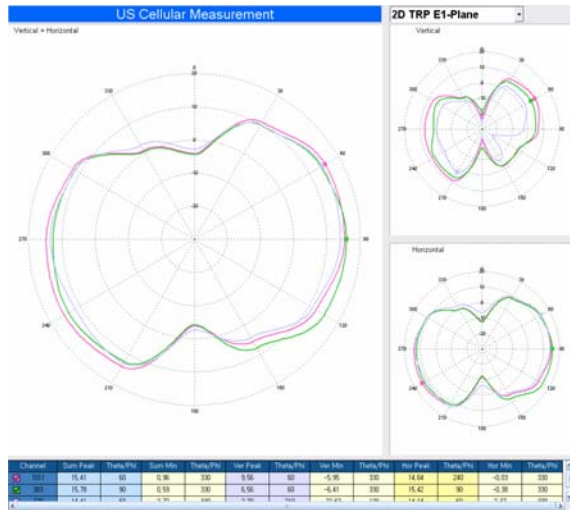
Example display of the 3D VIEW 20



Example display of the 3D VIEW 20



Example display of the 3D VIEW 20



Test environments and accessories

