ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 24 SUBPART E REQUIREMENT

OF

Product Name:	**GSM 900/1800/1900 mobile phone**
Brand Name:	**M4X1**
Model Name:	**PANPAC M-1**
FCC ID:	**S2VM4X100**
Report No.:	**ER/2005/40008**
Issue Date:	**Apr. 08, 2005**
FCC Rule Part:	**2 & 24E**
Prepared for	**YuHua TelTech (Shanghai) Co., Ltd.** **YuHua R&D Building, 27 Xin Jin Qiao, Pudong, Shanghai 201206**
Prepared by	**SGS Taiwan Ltd.** **No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan.**

VERIFICATION OF COMPLIANCE

Applicant:	YuHua TelTech (Shanghai) Co., Ltd. YuHua R&D Building, 27 Xin Jin Qiao, Pudong, Shanghai 201206
Equipment Under Test:	GSM 900/1800/1900 mobile phone
FCC ID Number:	S2VM4X100
Brand Name:	M4X1
Model No.:	PANPAC M-1
Model Difference:	N/A
File Number:	EF/2005/40008
Date of test:	Apr. 01, 2005 ~ Apr. 07, 2005
Date of EUT Received:	Apr 01, 2005

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-1-1998 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rule FCC PART 24 subpart E.

The test results of this report relate only to the tested sample identified in this report.

Test By:	Willis Chen	***Date***	Apr. 08, 2005
	Willis Chen		
Approved By	Vincent Su	***Date***	Apr. 08, 2005
	Vincent Su		

Version

Version No.	Date
00	Apr. 08, 2005

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1. GENERAL INFORMATION

1.1 Product Description

Product	GSM 900/1800/1900 mobile phone	
Model Name	PANPAC M-1	
Model Difference:	N/A	
Trade Name	M4X1	
Frequency Range and Power	TX: 1850 MHz – 1910 MHz, RX: 1930 MHz – 1990 MHz	30 dBm
Cellular Phone Standards	GSM 900, DCS 1800, PCS1900 Mobile Phone	
Type of Emission	300KGXW	
Power Supply	5V DC by AC/DC Adapter	

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **S2VM4X100** filing to comply with Section Part 24 subpart E of the FCC CFR 47 Rules.

1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.4 (2003) and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements. Site No. 1(3 &10 meters) Registration Number: 94644, Anechoic chamber (3 meters) Registration Number: 573967

1.5 Special Accessories

Not available for this EUT intended for grant.

1.6 Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency which was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7 & 13 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 1.0 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 & 13 of ANSI C63.4-2003.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

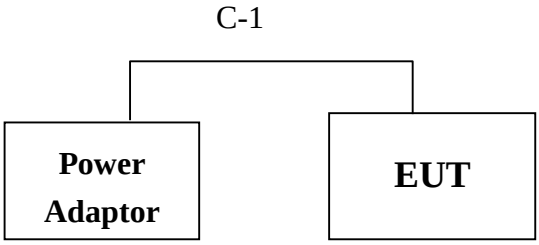


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1.	N/A						

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046	RF Power Output	Compliant
§2.1046 §24.232(a)	EIRP measurement	Compliant
§2.1049	Occupied Bandwidth	Compliant
§2.1051 §24.238(a)	Out of Band Emissions at Antenna Terminals	Compliant
§2.1053 §24.238(a)	Field Strength of Spurious Radiation	Compliant
§2.1055, §24.235	Frequency Stability vs. Temperature	Compliant
§2.1055, §24.235	Frequency Stability vs. Voltage	Compliant
§15.107; §15.207	AC Power Line Conducted Emission	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

EUT staying in continuous transmitting mode. Channel Low, Mid and High for each type and band with rated data rate are chosen for full testing.

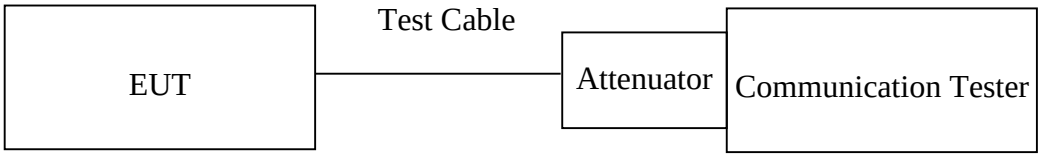
The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for both GSM and GPRS six modes. The worst-case H and E1 mode for channel Low, Mid and High at GSM mode was reported.

5. RF POWER OUTPUT MEASUREMENT

5.1 Standard Applicable

According to FCC §2.1046.

5.2 Test Set-up:



Note: *Measurement setup for testing on Antenna connector*

5.3 Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading.

5.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	ANRITSU	ML2487A	6K00002070	07/27/2004	07/26/2005
Power Sensor	ANRITSU	MA2490A	31431	06/18/2004	06/17/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S20	N/A	10/07/2004	10/06/2005

5.5 Measurement Result

EUT Mode	Frequency (MHz)	CH	Power Meter Reading (dBm)	Offset (dB)	Average Power (dBm)
PCS 1900	1850.20	512	14.33	14.30	28.63
	1880.00	661	14.68	14.30	28.98
	1909.80	810	14.87	14.30	29.17

6. ERP, EIRP MEASUREMENT

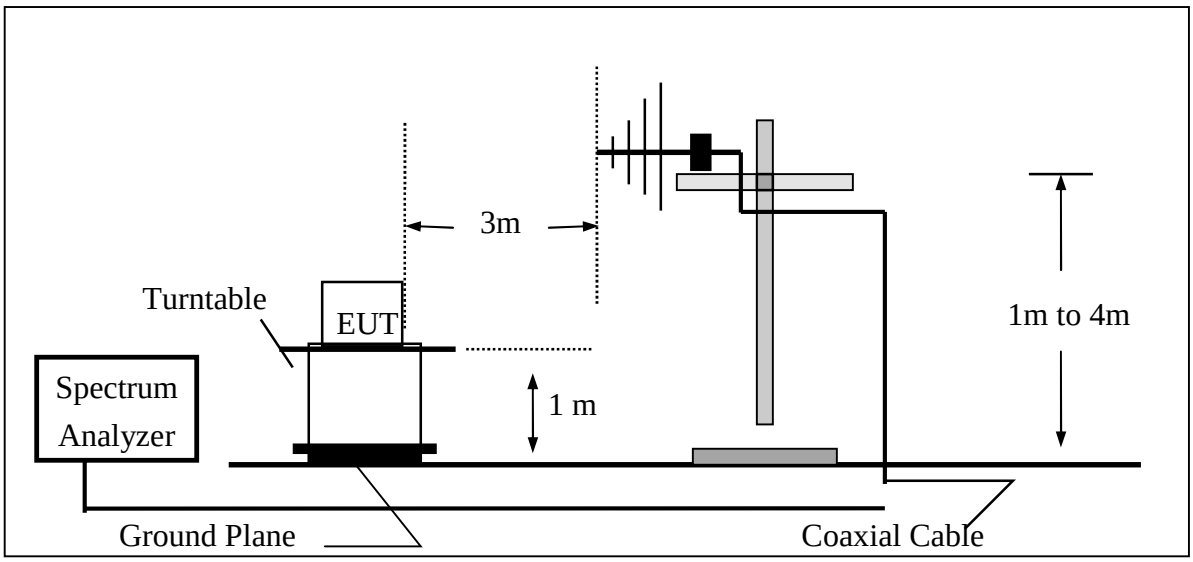
6.1 Standard Applicable

According to FCC §2.1046

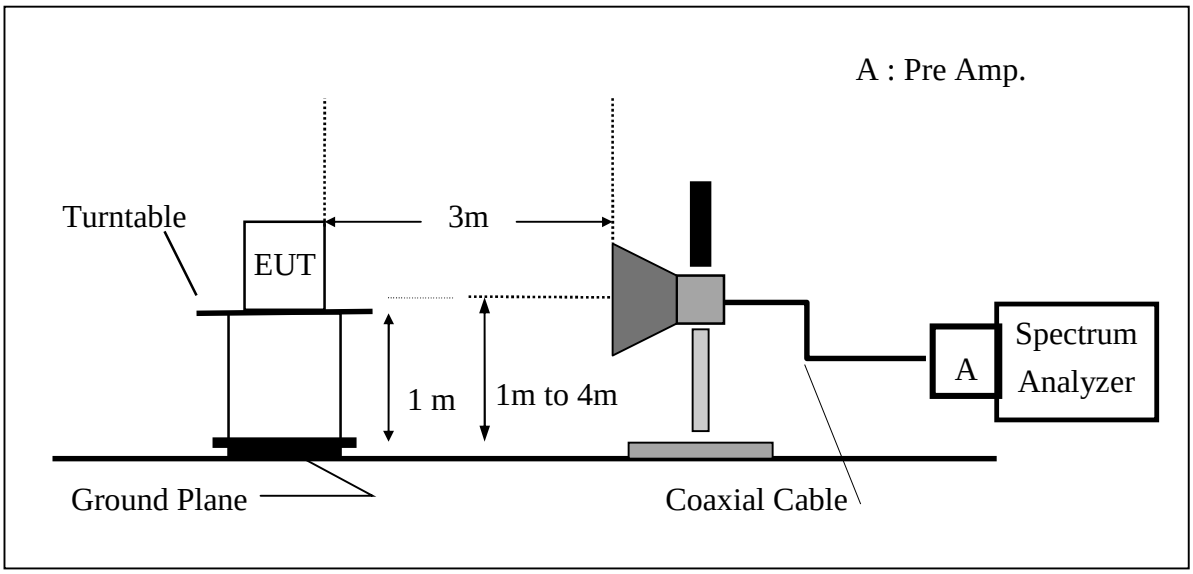
FCC 24.232(b) Mobile station are limited to 2W EIRP.

6.2 Test SET-UP (Block Diagram of Configuration)

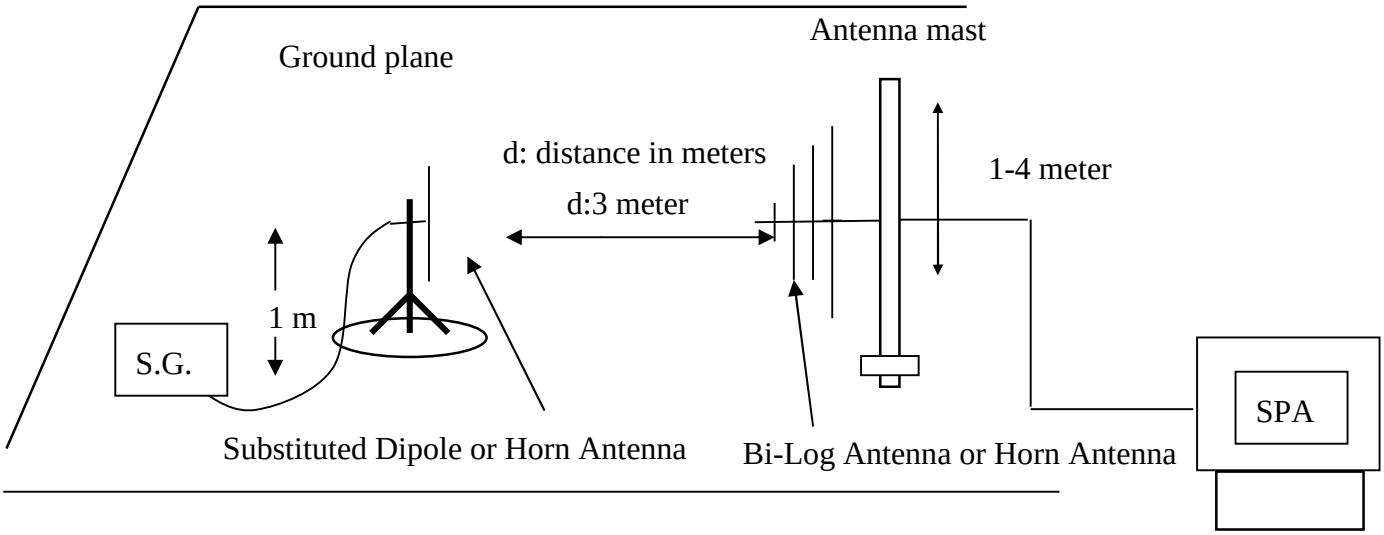
(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



(C) Substituted Method Test Set-UP



6.3 Measurement Procedure

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.

During the measurement of the EUT, the resolution bandwidth was set to 1MHz and the average bandwidth was set to 1MHz. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna. The reading was recorded and the field strength (E in dBuV/m) was calculated.

EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB)

6.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2004	05/26/2005
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2004	08/26/2005
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2004	06/02/2005
Horn antenna	Schwarzbeck	BBHA 9120D	309/320	08/16/2004	08/15/2005
Pre-Amplifier	HP	8447D	2944A09469	07/19/2004	07/18/2005
Pre-Amplifier	HP	8494B	3008A00578	02/26/2005	02/25/2006
Signal Generator	R&S	SMR40	100210	02/09/2005	02/10/2006
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	10/09/2004	10/08/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	10/09/2004	10/08/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-0.5M	0.5m	10/09/2004	10/08/2005
Site NSA	SGS	966 chamber	N/A	11/17/2004	11/16/2005
Site NSA	SGS	10m Open-Site	N/A	10/02/2004	10/01/2005
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2004	10/06/2005
Temperature Chamber	TERCHY	MHG-120LF	911009	10/14/2004	10/13/2005
Dipole Antenna	Schwarzbeck	VHAP	908/909	06/10/2004	06/11/2005
Dipole Antenna	Schwarzbeck	UHAP	891/892	06/10/2004	06/11/2005
Horn antenna	Schwarzbeck	BBHA 9120D	N/A	08/16/2004	08/15/2005

6.5 Measurement Result

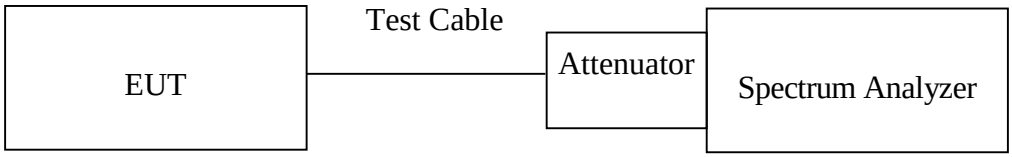
EUT Mode	Frequency (MHz)	CH	EUT Pol.	Antenna Pol.	SPA Reading (dBuV)	S.G. Output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)
PCS 1900	1850.27	512	H	V	123.05	16.09	9.90	5.41	20.58	33.00
				H	129.53	22.64	9.90	5.41	27.13	33.00
			E1	V	129.15	22.19	9.90	5.41	26.68	33.00
				H	126.85	19.96	9.90	5.41	24.45	33.00
			E2	V	128.82	21.86	9.90	5.41	26.35	33.00
				H	128.60	21.71	9.90	5.84	25.77	33.00
	1880.00	661	H	V	123.89	16.94	9.99	5.46	21.47	33.00
				H	129.40	22.53	9.99	5.46	27.06	33.00
			E1	V	126.53	19.58	9.99	5.46	24.11	33.00
				H	129.07	22.20	9.99	5.46	26.73	33.00
			E2	V	128.05	21.10	9.99	5.46	25.63	33.00
				H	128.45	21.58	9.99	5.46	26.11	33.00
	1909.80	810	H	V	122.75	15.81	10.08	5.51	20.38	33.00
				H	130.16	23.31	10.08	5.51	27.87	33.00
			E1	V	129.57	22.63	10.08	5.51	27.20	33.00
				H	125.85	19.00	10.08	5.51	23.56	33.00
			E2	V	128.24	21.30	10.08	5.51	25.87	33.00
				H	128.63	21.78	10.08	5.51	26.34	33.00

7. OCCUPIED BANDWIDTH MEASUREMENT

7.1 Standard Applicable

According to §FCC 2.1049.

7.2 Test Set-up:



Note: *Measurement setup for testing on Antenna connector*

7.3 Measurement Procedure

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW (10KHz) was set to about 1% of emission BW, VBW= 30KHz, -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

7.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2004	05/26/2005
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2004	08/26/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2004	10/06/2005

7.5 Measurement Reult:

EUT Mode	Frequency (MHz)	CH	Bandwidth (MHz)
PCS 1900	1850.20	512	0.2469
	1880.00	661	0.2485
	1909.80	810	0.2476

Figure 7-1: PCS Channel Low

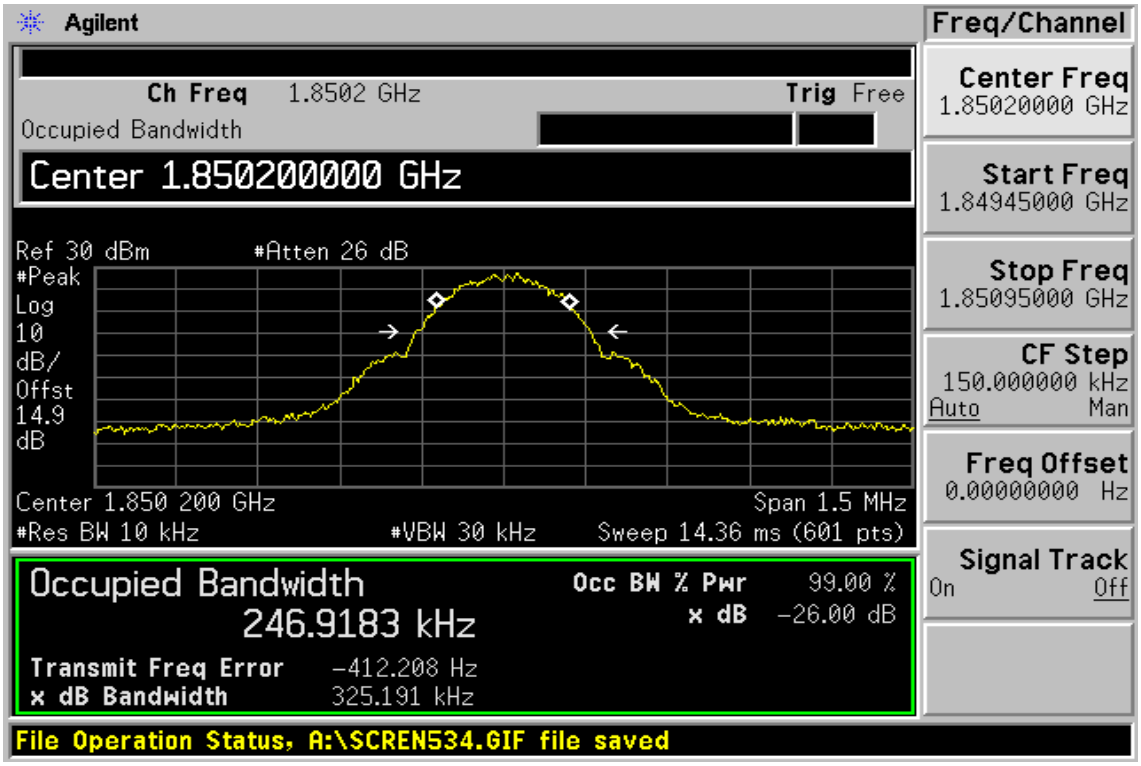


Figure 7-2 PCS Channel Mid

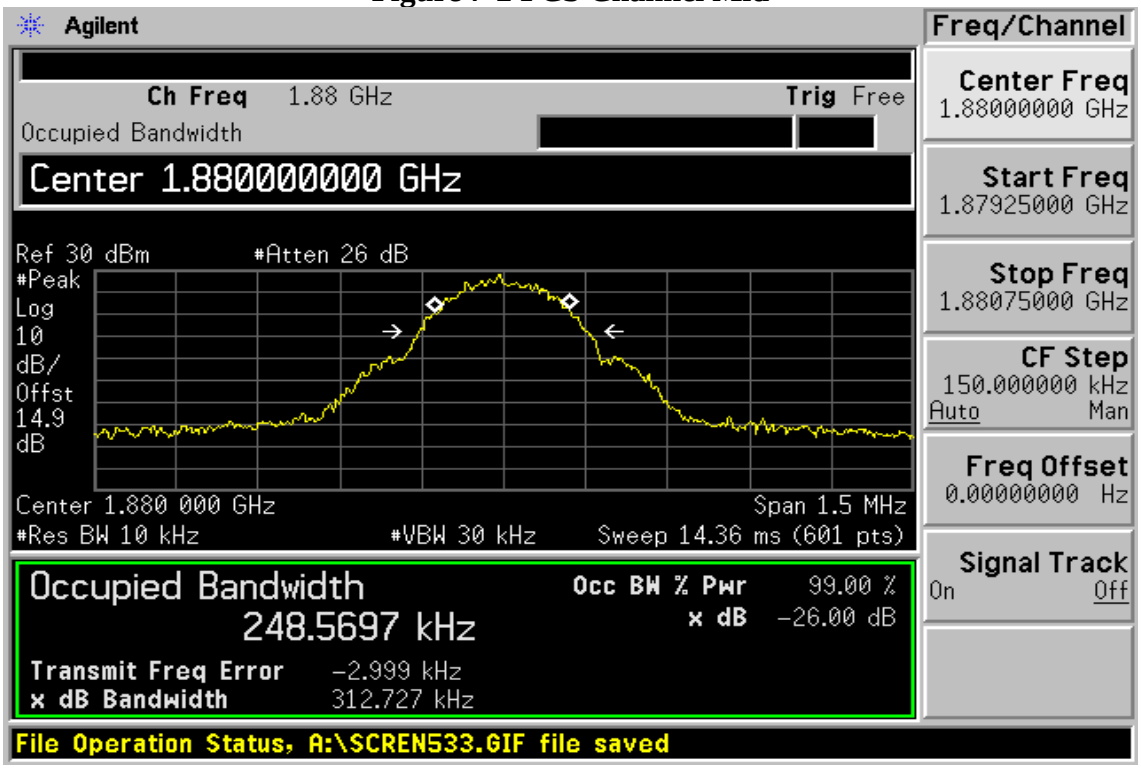
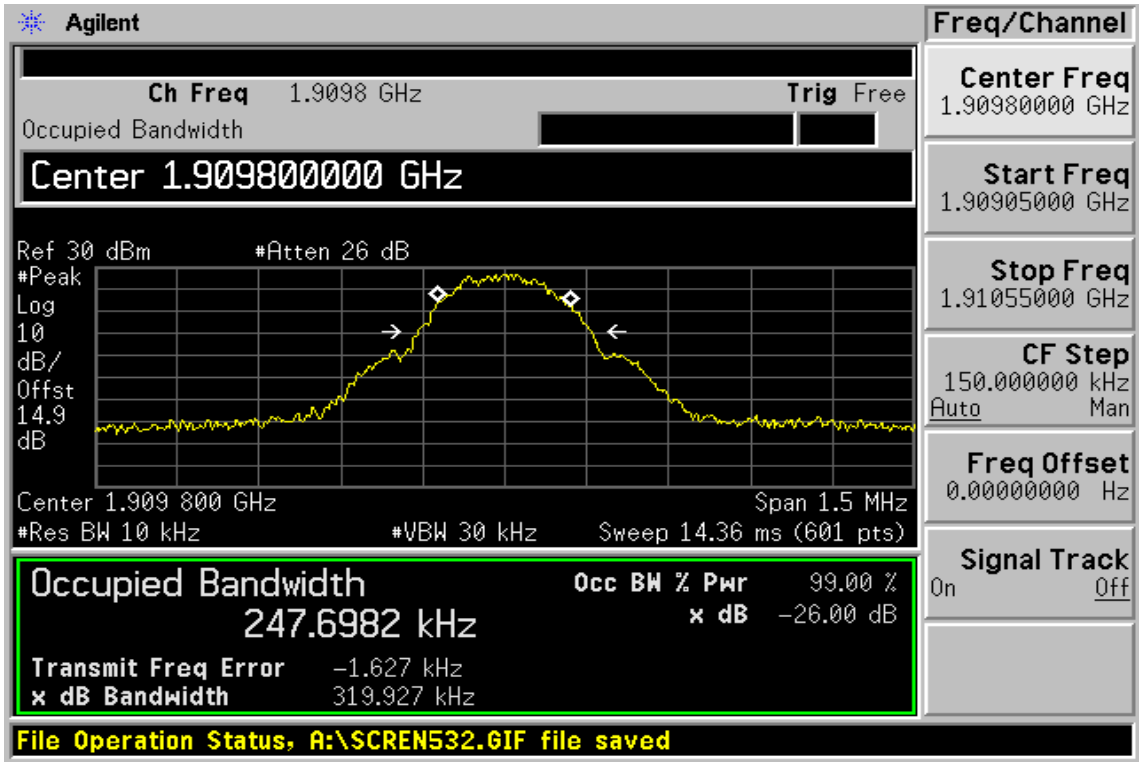


Figure 7-3: PCS Channel High



8. OUT OF BAND EMISSION AT ANTENNA TERMINALS

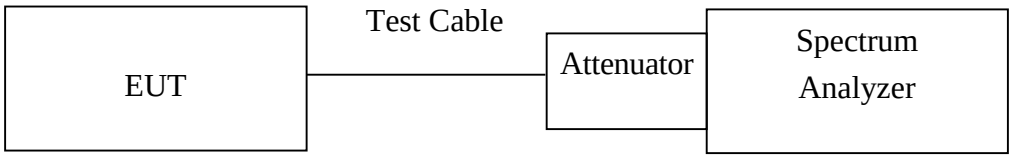
8.1 Standard Applicable

According to FCC §2.1051.

FCC §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than 43 + 10 log (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm)

8.2 Test SET-UP

Out of band emission at antenna terminals:



8.3 Measurement Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10 th harmonic. Limit = -13dBm

Band Edge Requirements(1850MHz and 1910MHz) : In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2004	05/26/2005
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2004	08/26/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2004	10/06/2005

8.4 Measurement Result

Figure 8-1: Out of Band emission at antenna terminals– PCS Channel Low

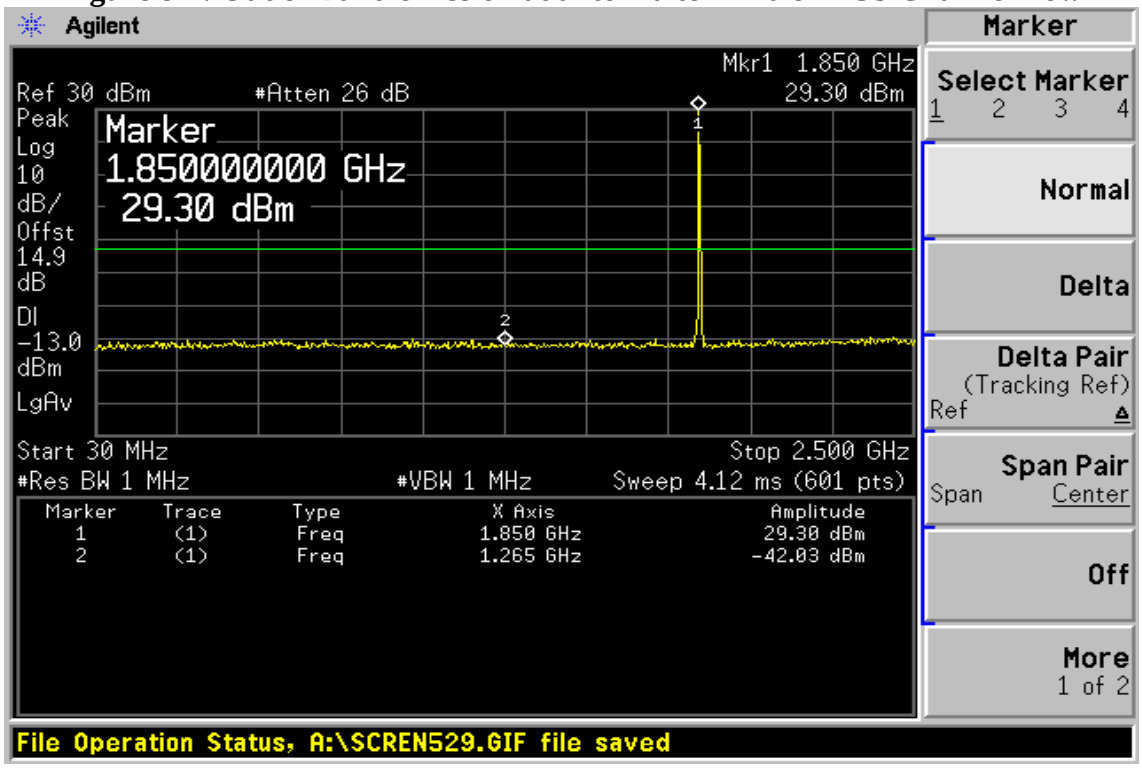


Figure 8-2: Out of Band emission at antenna terminals–PCS Channel Low

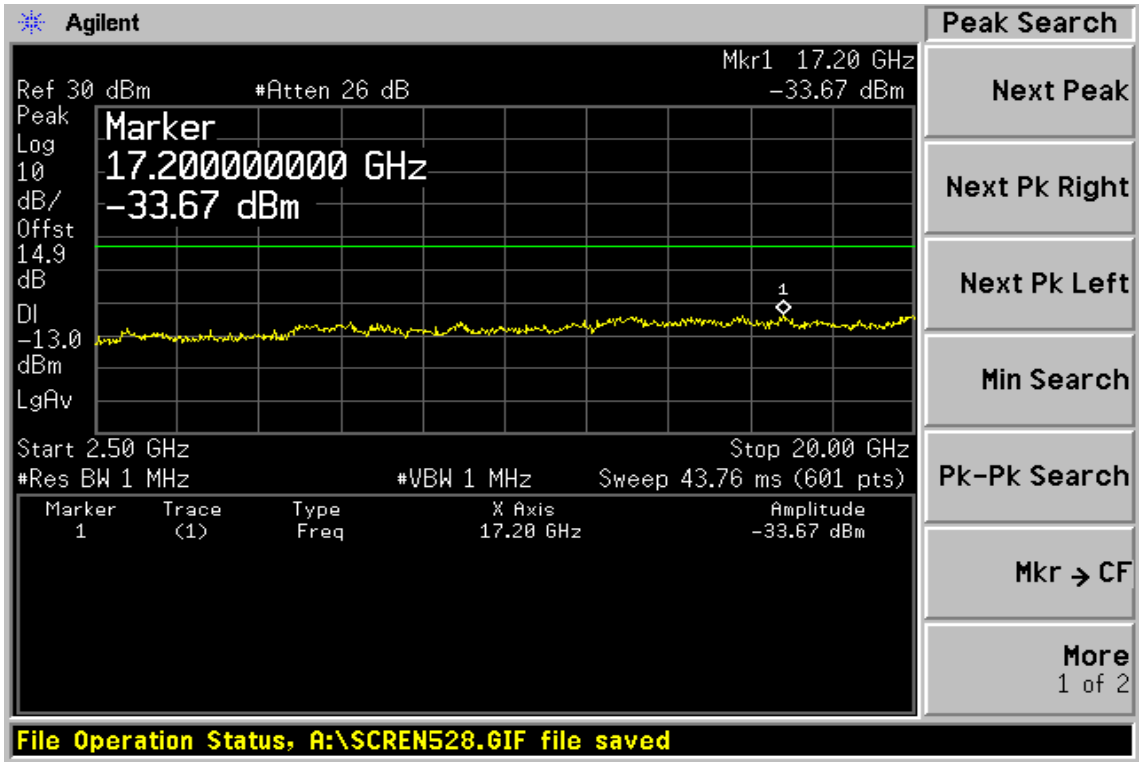


Figure 8-3: Out of Band emission at antenna terminals –PCS Channel Mid

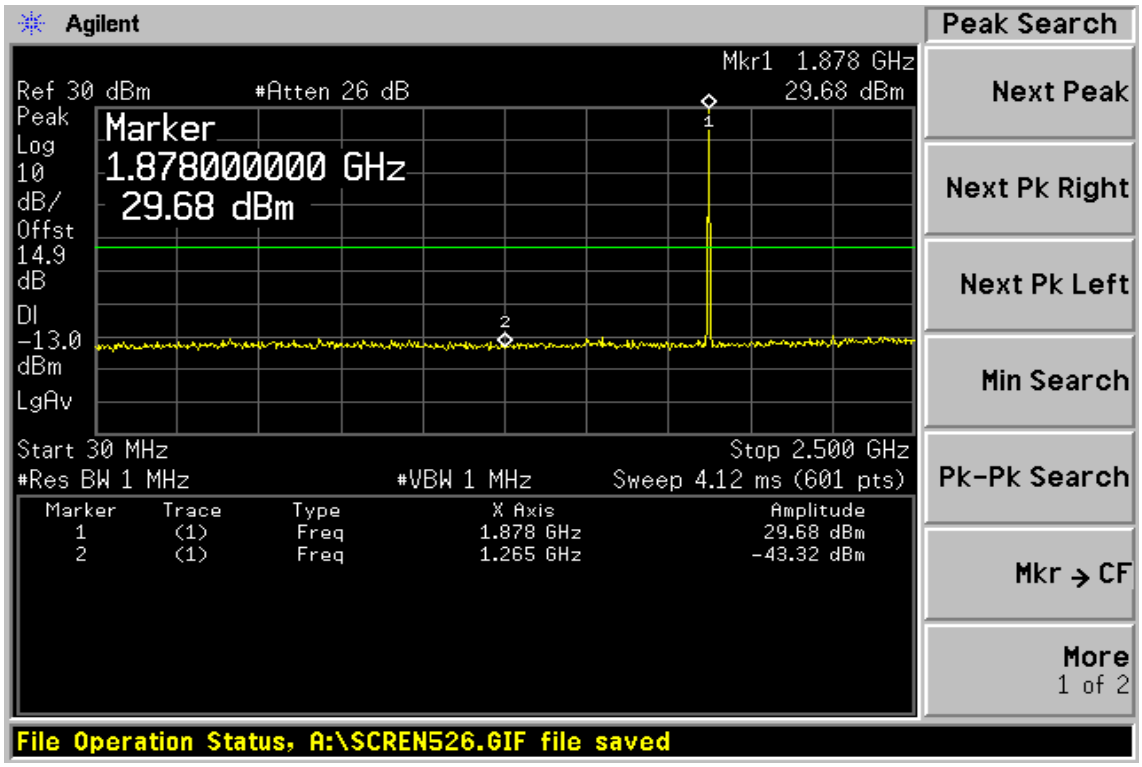


Figure 8-4: Out of Band emission at antenna terminals –PCS Channel Mid

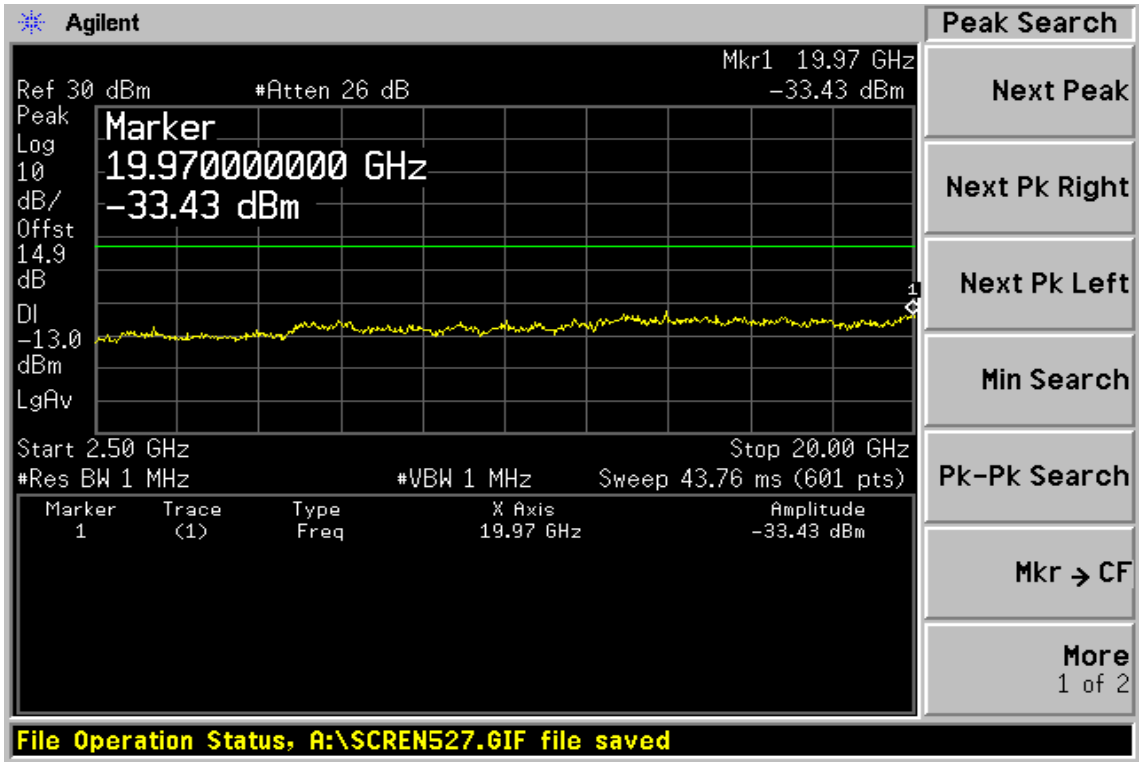


Figure 8-5: Out of Band emission at antenna terminals–PCS Channel High

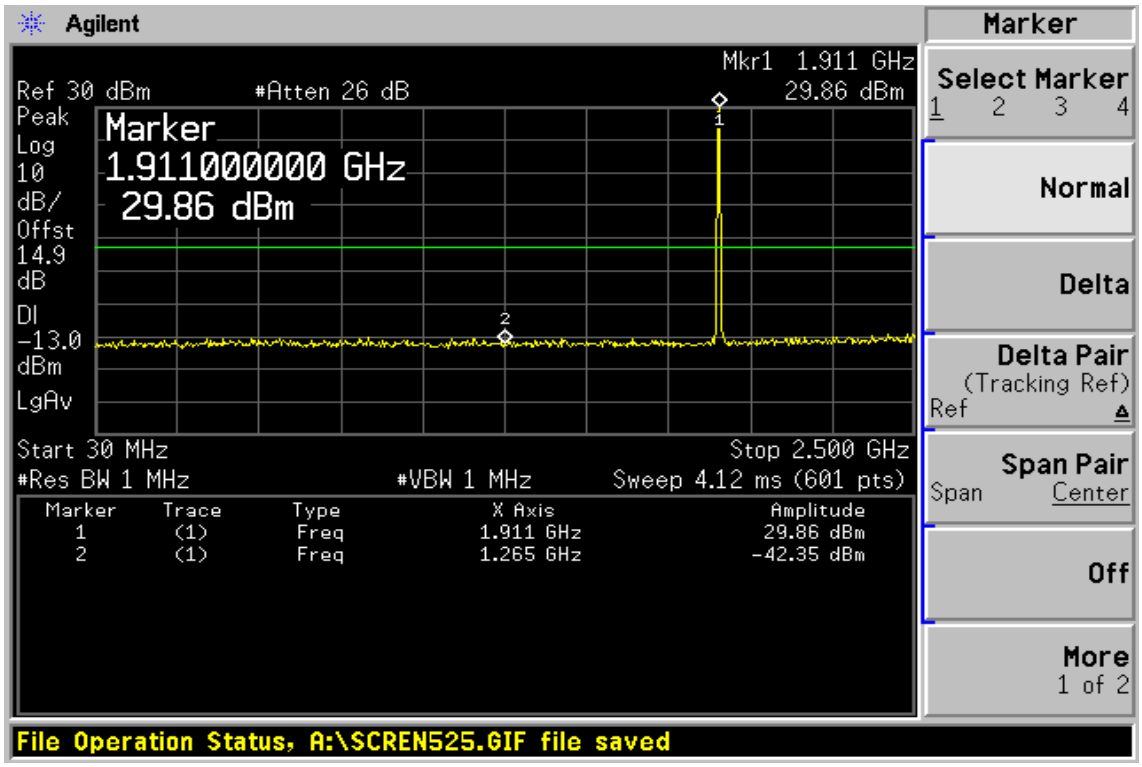


Figure 8-6: Out of Band emission at antenna terminals– PCS Channel High

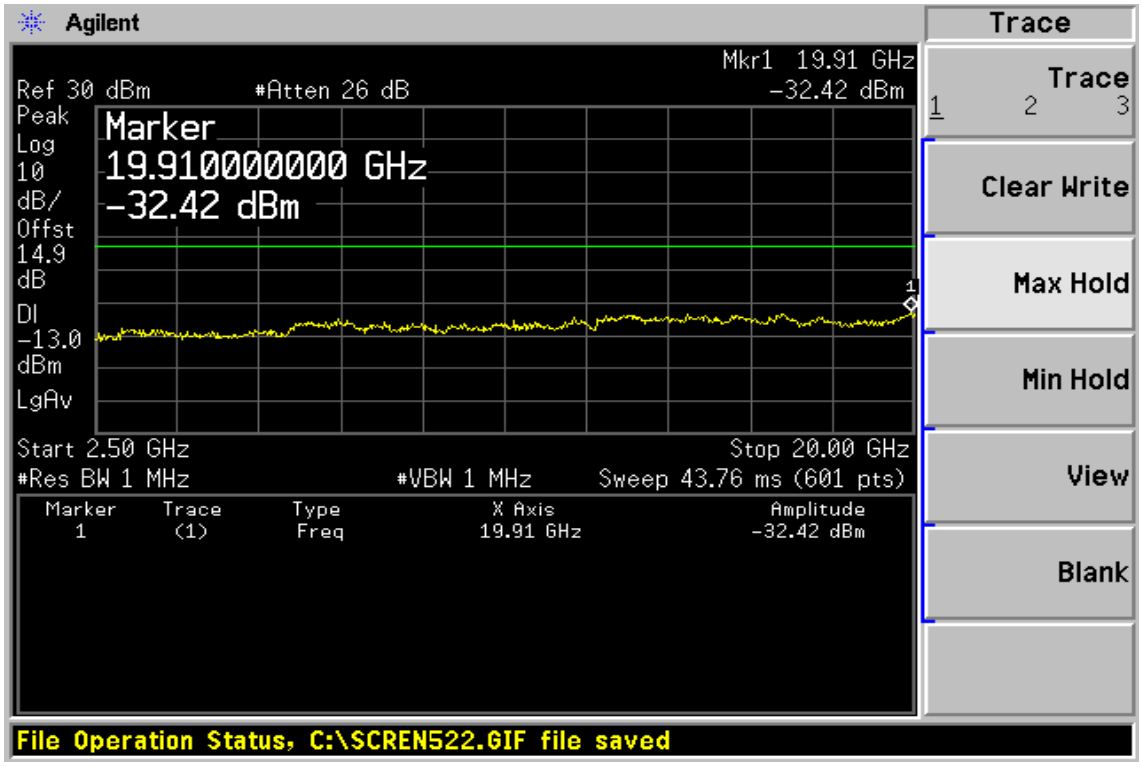


Figure 8-7: Bad edge emission at antenna terminals – PCS CH 512

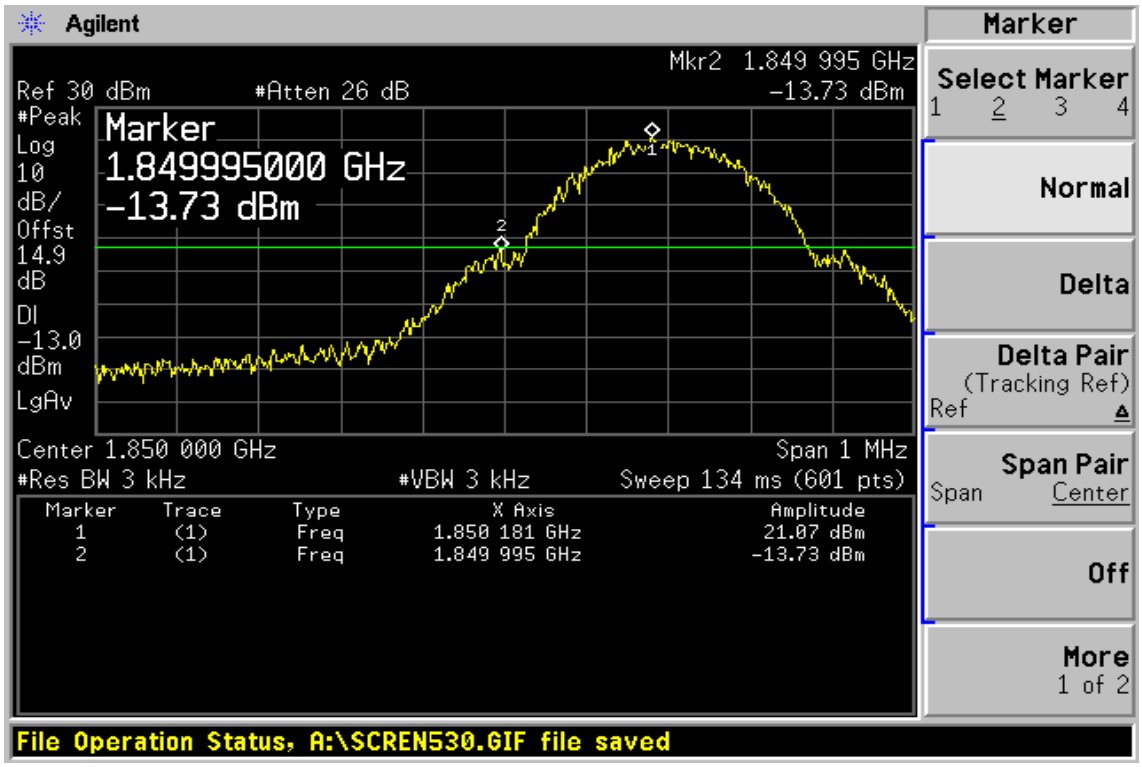
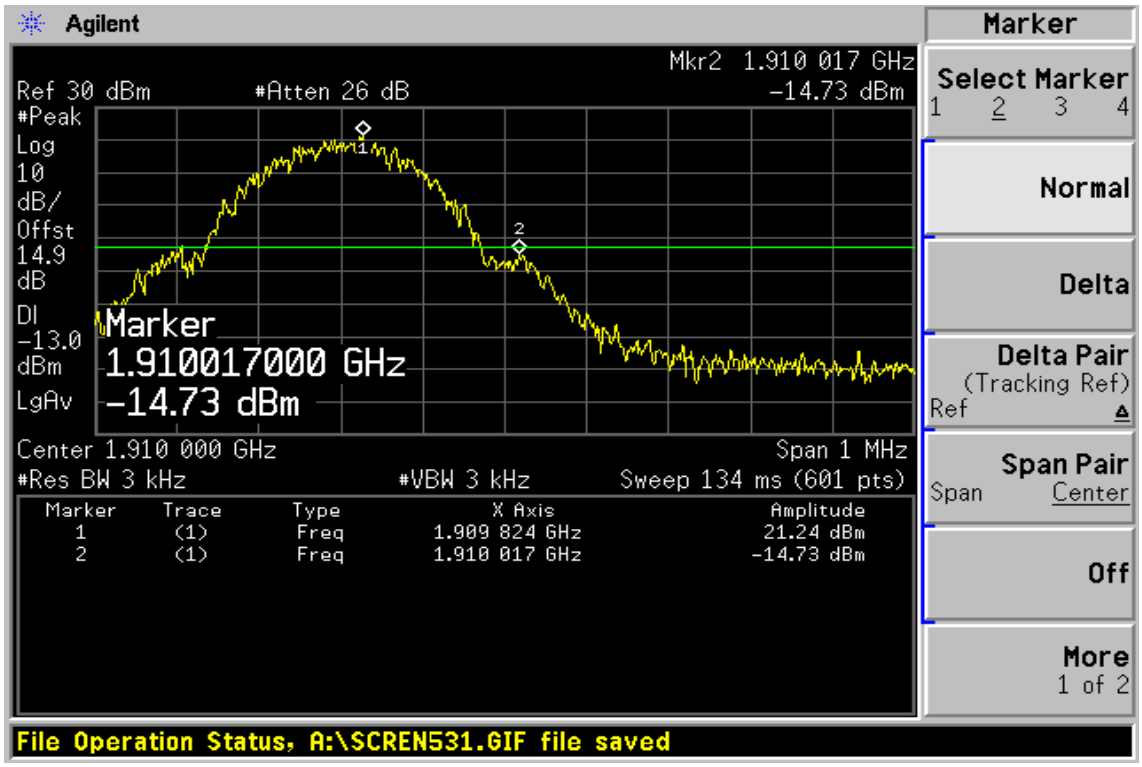


Figure 8-8: Band edge emission at antenna terminals – PCS CH 810



9. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

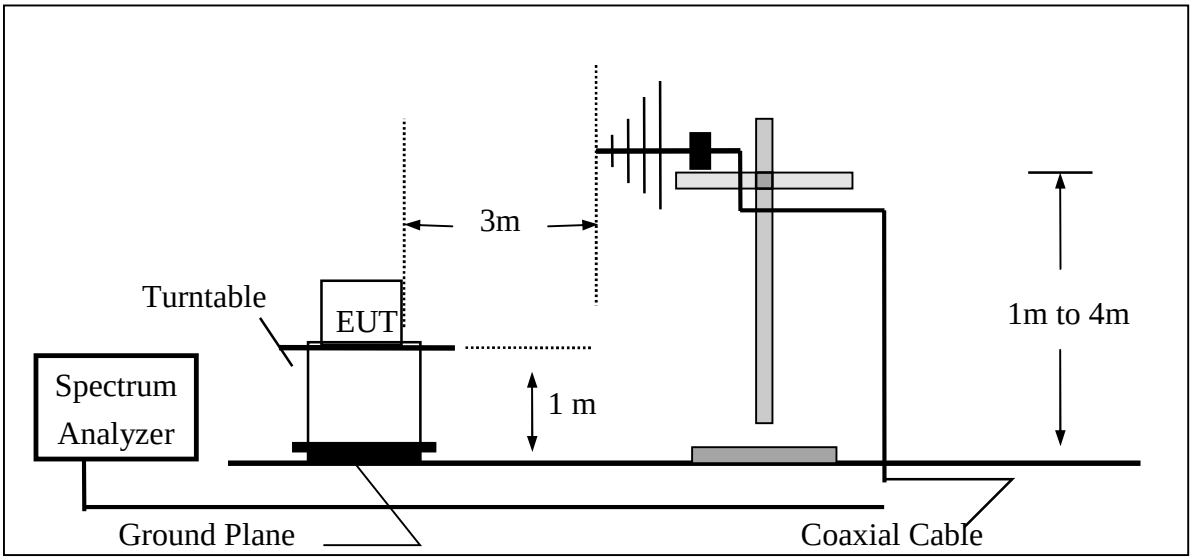
9.1 Standard Applicable

According to FCC §2.1053,

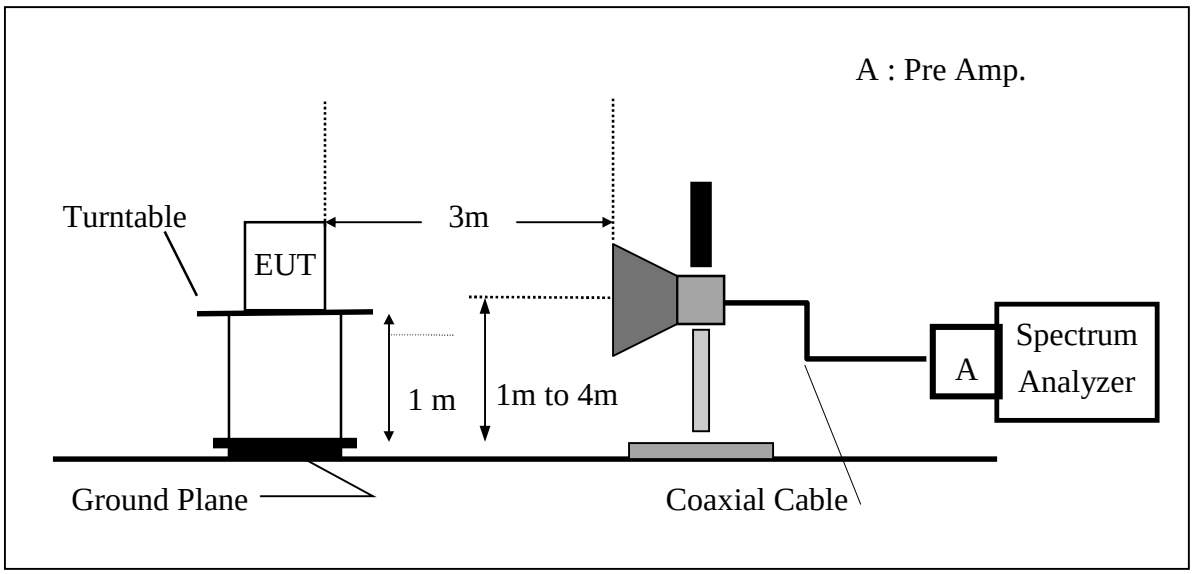
FCC §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than 43 + 10 log (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm)

9.2 EUT Setup (Block Diagram of Configuration)

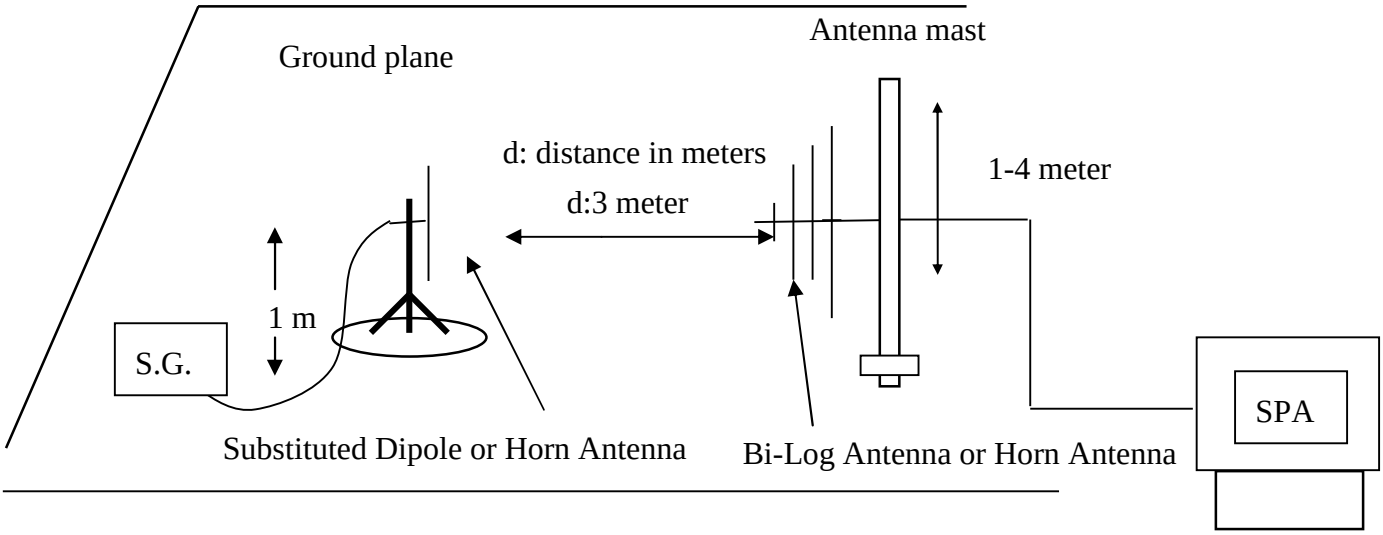
(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



(C) Substituted Method Test Set-UP



9.3 Measurement Procedure

The EUT was placed on a non-conductive, The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission were identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

EIRP = S.G. output (dBm) + Antenna Gain(dBi) – Cable Loss (dB)

9.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2004	05/26/2005
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2004	08/26/2005
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2004	06/02/2005
Horn antenna	Schwarzbeck	BBHA 9120D	309/320	08/16/2004	08/15/2005
Pre-Amplifier	HP	8447D	2944A09469	07/19/2004	07/18/2005
Pre-Amplifier	HP	8494B	3008A00578	02/26/2005	02/25/2006
Signal Generator	R&S	SMR40	100210	02/09/2005	02/10/2006
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	10/09/2004	10/08/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	10/09/2004	10/08/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-0.5M	0.5m	10/09/2004	10/08/2005
Site NSA	SGS	966 chamber	N/A	11/17/2004	11/16/2005
Site NSA	SGS	10m Open-Site	N/A	10/02/2004	10/01/2005
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2004	10/06/2005
Temperature Chamber	TERCHY	MHG-120LF	911009	10/14/2004	10/13/2005
Dipole Antenna	Schwarzbeck	VHAP	908/909	06/10/2004	06/11/2005
Dipole Antenna	Schwarzbeck	UHAP	891/892	06/10/2004	06/11/2005
Horn antenna	Schwarzbeck	BBHA 9120D	N/A	08/16/2004	08/15/2005

9.5 Measurement Result

Refer to attach tabular data sheets.

Radiated Spurious Emission Measurement Result

Operation Mode : TX CH Low H Mode
Fundamental Frequency : 1850.20MHz
Temperature : 25℃
Humidity : 65%

Test Date Apr. 06, 2005
Test By: Willis
Pol: Ver. / Hor.

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Output (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/ EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
3700.40	56.46	V	-45.12	12.61	7.73	-40.24	-13.00	-27.24
5550.60	51.86	V	-43.35	13.23	9.68	-39.81	-13.00	-26.81
7400.80	60.14	V	-25.86	11.50	11.28	-25.63	-13.00	-12.63
9251.00	52.72	V	-30.11	11.92	13.10	-31.29	-13.00	-18.29
11101.20	46.91	V	-30.54	11.66	14.33	-33.20	-13.00	-20.20
12951.40	---	V	---	---	---	---	-13.00	---
14801.60	---	V	---	---	---	---	-13.00	---
16651.80	---	V	---	---	---	---	-13.00	---
18502.00	---	V	---	---	---	---	-13.00	---
3700.40	56.82	H	-44.54	12.61	7.73	-39.66	-13.00	-26.66
5550.60	47.59	H	-47.54	13.23	9.68	-43.99	-13.00	-30.99
7400.80	54.93	H	-31.13	11.50	11.28	-30.91	-13.00	-17.91
9251.00	50.87	H	-31.77	11.92	13.10	-32.95	-13.00	-19.95
11101.20	46.05	H	-31.26	11.66	14.33	-33.93	-13.00	-20.93
12951.40	---	H	---	---	---	---	-13.00	---
14801.60	---	H	---	---	---	---	-13.00	---
16651.80	---	H	---	---	---	---	-13.00	---
18502.00	---	H	---	---	---	---	-13.00	---

Remark：

1 The emission behaviour belongs to narrowband spurious emission.

2 Remark"---" means that the emission level is too low to be measured

3 The result basic equation calculation is as follows:

4 ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dBd/dBi) – Cable loss (dB)

Radiated Spurious Emission Measurement Result

Operation Mode : TX CH Mid H Mode
Fundamental Frequency : 1880MHz
Temperature : 25℃
Humidity : 65%

Test Date Apr. 06, 2005
Test By: Willis
Pol: Ver. / Hor.

Freq.	SPA. Reading	Ant.Pol.	S.G Output	Antenna Gain	Cable Loss	ERP/ EIRP	Limit	Safe Margin
(MHz)	(dBuV)	H/V	(dBm)	(dB/dBi)	(dB)	(dBm)	(dBm)	(dBm)
3760.00	58.00	V	-43.30	12.60	7.82	-38.52	-13.00	-25.52
5640.00	53.63	V	-41.33	13.36	9.73	-37.70	-13.00	-24.70
7520.00	60.79	V	-24.82	11.45	11.33	-24.71	-13.00	-11.71
9400.00	52.18	V	-30.34	11.93	13.15	-31.56	-13.00	-18.56
11280.00	47.29	V	-30.14	11.92	14.56	-32.78	-13.00	-19.78
13160.00	---	V	---	---	---	---	-13.00	---
15040.00	---	V	---	---	---	---	-13.00	---
16920.00	---	V	---	---	---	---	-13.00	---
18800.00	---	V	---	---	---	---	-13.00	---
3760.00	59.78	H	-41.33	12.60	7.82	-36.54	-13.00	-23.54
5640.00	48.68	H	-46.21	13.36	9.73	-42.58	-13.00	-29.58
7520.00	56.55	H	-29.14	11.45	11.33	-29.02	-13.00	-16.02
9400.00	46.63	H	-35.63	11.93	13.15	-36.86	-13.00	-23.86
11280.00	---	H	---	---	---	---	-13.00	---
13160.00	---	H	---	---	---	---	-13.00	---
15040.00	---	H	---	---	---	---	-13.00	---
16920.00	---	H	---	---	---	---	-13.00	---
18800.00	---	H	---	---	---	---	-13.00	---

Remark：

1 The emission behaviour belongs to narrowband spurious emission.
2 Remark"---" means that the emission level is too low to be measured
3 The result basic equation calculation is as follows:
4 ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dBd/dBi) – Cable loss (dB)

Radiated Spurious Emission Measurement Result

Operation Mode : TX CH High H Mode
Fundamental Frequency : 1909.8 MHz
Temperature : 25℃
Humidity : 65%

Test Date Apr. 06, 2005
Test By: Willis
Pol: Ver. / Hor.

Freq.	SPA. Reading	Ant.Pol.	S.G Output	Antenna Gain	Cable Loss	ERP/ EIRP	Limit	Safe Margin
(MHz)	(dBuV)	H/V	(dBm)	(dB/dBi)	(dB)	(dBm)	(dBm)	(dBm)
3819.60	56.91	V	-44.12	12.60	7.92	-39.43	-13.00	-26.43
5729.40	51.96	V	-42.74	13.49	9.78	-39.03	-13.00	-26.03
7639.20	58.95	V	-26.22	11.40	11.48	-26.29	-13.00	-13.29
9549.00	48.23	V	-33.94	11.95	13.22	-35.20	-13.00	-22.20
11458.80	48.50	V	-28.90	12.17	14.79	-31.52	-13.00	-18.52
13368.60	---	V	---	---	---	---	-13.00	---
15278.40	---	V	---	---	---	---	-13.00	---
17188.20	---	V	---	---	---	---	-13.00	---
19098.00	---	V	---	---	---	---	-13.00	---
1484.00	51.19	H	-55.96	8.75	4.77	-51.98	-13.00	-38.98
1468.00	57.95	H	-49.25	8.66	4.73	-45.33	-13.00	-32.33
3819.60	46.91	H	-53.95	12.60	7.92	-49.26	-13.00	-36.26
5729.40	53.68	H	-40.97	13.49	9.78	-37.26	-13.00	-24.26
7639.20	47.63	H	-37.66	11.40	11.48	-37.74	-13.00	-24.74
9549.00	---	H	---	---	---	---	-13.00	---
11458.80	---	H	---	---	---	---	-13.00	---
13368.60	---	H	---	---	---	---	-13.00	---
15278.40	---	H	---	---	---	---	-13.00	---
17188.20	---	H	---	---	---	---	-13.00	---
19098.00	---	H	---	---	---	---	-13.00	---

Remark：

1 The emission behaviour belongs to narrowband spurious emission.
2 Remark"---" means that the emission level is too low to be measured
3 The result basic equation calculation is as follows:
4 ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dBd/dBi) – Cable loss (dB)

Radiated Spurious Emission Measurement Result

Operation Mode : TX CH Low E1 Mode
Fundamental Frequency : 1850.20MHz
Temperature : 25℃
Humidity : 65%

Test Date Apr. 06, 2005
Test By: Willis
Pol: Ver. / Hor.

Freq.	SPA. Reading	Ant.Pol.	S.G Output	Antenna Gain	Cable Loss	ERP/ EIRP	Limit	Safe Margin
(MHz)	(dBuV)	H/V	(dBm)	(dB/dBi)	(dB)	(dBm)	(dBm)	(dBm)
1407.00	46.77	V	-60.31	8.31	4.62	-56.62	-13.00	-43.62
3700.40	53.39	V	-48.19	12.61	7.73	-43.31	-13.00	-30.31
5550.60	67.38	V	-27.83	13.23	9.68	-24.29	-13.00	-11.29
7400.80	49.25	V	-36.75	11.50	11.28	-36.52	-13.00	-23.52
9251.00	47.53	V	-35.30	11.92	13.10	-36.48	-13.00	-23.48
11101.20	45.38	V	-32.07	11.66	14.33	-34.73	-13.00	-21.73
12951.40	---	V	---	---	---	---	-13.00	---
14801.60	---	V	---	---	---	---	-13.00	---
16651.80	---	V	---	---	---	---	-13.00	---
18502.00	---	V	---	---	---	---	-13.00	---
3700.40	55.09	H	-46.27	12.61	7.73	-41.39	-13.00	-28.39
5550.60	62.37	H	-32.76	13.23	9.68	-29.21	-13.00	-16.21
7400.80	58.30	H	-27.76	11.50	11.28	-27.54	-13.00	-14.54
9251.00	54.60	H	-28.04	11.92	13.10	-29.22	-13.00	-16.22
11101.20	46.91	H	-30.40	11.66	14.33	-33.07	-13.00	-20.07
12951.40	---	H	---	---	---	---	-13.00	---
14801.60	---	H	---	---	---	---	-13.00	---
16651.80	---	H	---	---	---	---	-13.00	---
18502.00	---	H	---	---	---	---	-13.00	---

Remark：

1 The emission behaviour belongs to narrowband spurious emission.
2 Remark"---" means that the emission level is too low to be measured
3 The result basic equation calculation is as follows:
4 ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dBd/dBi) – Cable loss (dB)

Radiated Spurious Emission Measurement Result

Operation Mode : TX CH Mid E1 Mode
Fundamental Frequency : 1880MHz
Temperature : 25℃
Humidity : 65%

Test Date Apr. 06, 2005
Test By: Willis
Pol: Ver. / Hor.

Freq.	SPA. Reading	Ant.Pol.	S.G Output	Antenna Gain	Cable Loss	ERP/ EIRP	Limit	Safe Margin
(MHz)	(dBuV)	H/V	(dBm)	(dB/dBi)	(dB)	(dBm)	(dBm)	(dBm)
3760.00	51.74	V	-49.56	12.60	7.82	-44.78	-13.00	-31.78
5640.00	65.58	V	-29.38	13.36	9.73	-25.75	-13.00	-12.75
7520.00	54.73	V	-30.88	11.45	11.33	-30.77	-13.00	-17.77
9400.00	48.27	V	-34.25	11.93	13.15	-35.47	-13.00	-22.47
11280.00	46.36	V	-31.07	11.92	14.56	-33.71	-13.00	-20.71
13160.00	---	V	---	---	---	---	-13.00	---
15040.00	---	V	---	---	---	---	-13.00	---
16920.00	---	V	---	---	---	---	-13.00	---
18800.00	---	V	---	---	---	---	-13.00	---
3760.00	56.25	H	-44.86	12.60	7.82	-40.07	-13.00	-27.07
5640.00	63.62	H	-31.27	13.36	9.73	-27.64	-13.00	-14.64
7520.00	60.23	H	-25.46	11.45	11.33	-25.34	-13.00	-12.34
9400.00	54.79	H	-27.47	11.93	13.15	-28.70	-13.00	-15.70
11280.00	46.41	H	-30.92	11.92	14.56	-33.56	-13.00	-20.56
13160.00	---	H	---	---	---	---	-13.00	---
15040.00	---	H	---	---	---	---	-13.00	---
16920.00	---	H	---	---	---	---	-13.00	---
18800.00	---	H	---	---	---	---	-13.00	---

Remark：

1 The emission behaviour belongs to narrowband spurious emission.
2 Remark"---" means that the emission level is too low to be measured
3 The result basic equation calculation is as follows:
4 ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dBd/dBi) – Cable loss (dB)

Radiated Spurious Emission Measurement Result

Operation Mode : TX CH High E1 Mode
Fundamental Frequency : 1909.8 MHz
Temperature : 25℃
Humidity : 65%

Test Date Apr. 06, 2005
Test By: Willis
Pol: Ver. / Hor.

Freq.	SPA. Reading	Ant.Pol.	S.G Output	Antenna Gain	Cable Loss	ERP/ EIRP	Limit	Safe Margin
(MHz)	(dBuV)	H/V	(dBm)	(dB/dBi)	(dB)	(dBm)	(dBm)	(dBm)
1484.00	47.31	V	-59.79	8.75	4.77	-55.80	-13.00	-42.80
3819.60	51.26	V	-49.77	12.60	7.92	-45.08	-13.00	-32.08
5729.40	66.59	V	-28.11	13.49	9.78	-24.40	-13.00	-11.40
7639.20	51.93	V	-33.24	11.40	11.48	-33.31	-13.00	-20.31
9549.00	46.32	V	-35.85	11.95	13.22	-37.11	-13.00	-24.11
11458.80	---	V	---	---	---	---	-13.00	---
13368.60	---	V	---	---	---	---	-13.00	---
15278.40	---	V	---	---	---	---	-13.00	---
17188.20	---	V	---	---	---	---	-13.00	---
19098.00	---	V	---	---	---	---	-13.00	---
1468.00	58.66	H	-48.54	8.66	4.73	-44.62	-13.00	-31.62
3819.60	64.18	H	-36.68	12.60	7.92	-31.99	-13.00	-18.99
5729.40	61.42	H	-33.23	13.49	9.78	-29.52	-13.00	-16.52
7639.20	51.49	H	-33.80	11.40	11.48	-33.88	-13.00	-20.88
9549.00	47.47	H	-34.42	11.95	13.22	-35.68	-13.00	-22.68
11458.80	---	H	---	---	---	---	-13.00	---
13368.60	---	H	---	---	---	---	-13.00	---
15278.40	---	H	---	---	---	---	-13.00	---
17188.20	---	H	---	---	---	---	-13.00	---
19098.00	---	H	---	---	---	---	-13.00	---

Remark：

1 The emission behaviour belongs to narrowband spurious emission.
2 Remark"---" means that the emission level is too low to be measured
3 The result basic equation calculation is as follows:
4 ERP/EIRP (dBm) = SG Setting(dBm) + Antenna Gain (dBd/dBi) – Cable loss (dB)

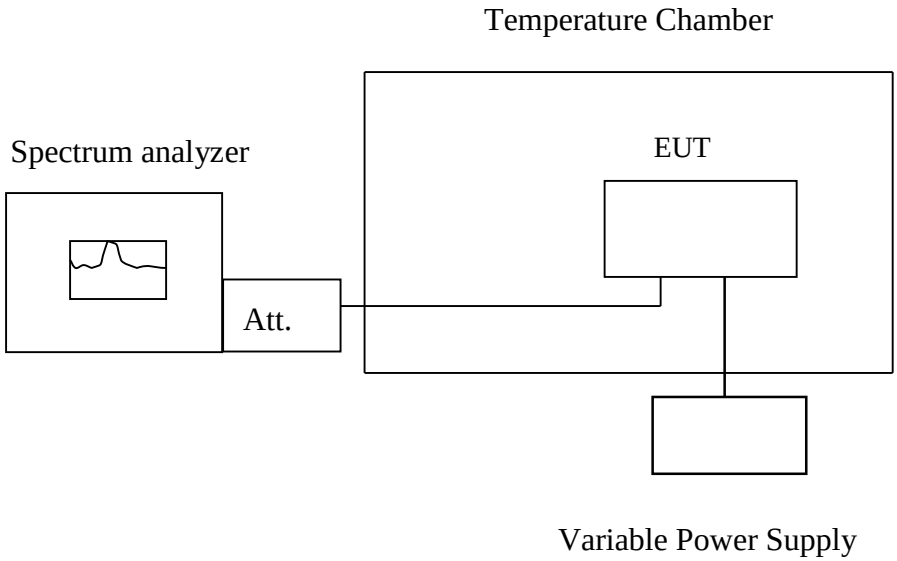
10. FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

10.1 Standard Applicable

According to FCC §2.1055, FCC §24.235.

Frequency Tolerance: 2.5 ppm

10.2 Test Set-up:



Note : Measurement setup for testing on Antenna connector

10.3 Measurement Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to –30°C. After the temperature stabilized for approximately 30 minutes re-corded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

10.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2004	05/26/2005
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2004	08/26/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2004	10/06/2005

10.5 Measurement Result

Reference Frequency: PCS Mid Channel 1880 MHz @ 25℃				
Limit: +/- 2.5 ppm = 4700 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (℃)	(MHz)		
3.7	25	1880.00125	10.00	4700
3.7	-30	1880.00137	-110.00	4700
3.7	-20	1880.00134	-80.00	4700
3.7	-10	1880.00121	50.00	4700
3.7	0	1880.00123	30.00	4700
3.7	10	1880.00133	-70.00	4700
3.7	20	1880.00126	0.00	4700
3.7	30	1880.00125	10.00	4700
3.7	40	1880.00124	20.00	4700
3.7	50	1880.00131	-50.00	4700

Note: The battery is rated 3.7V dc.

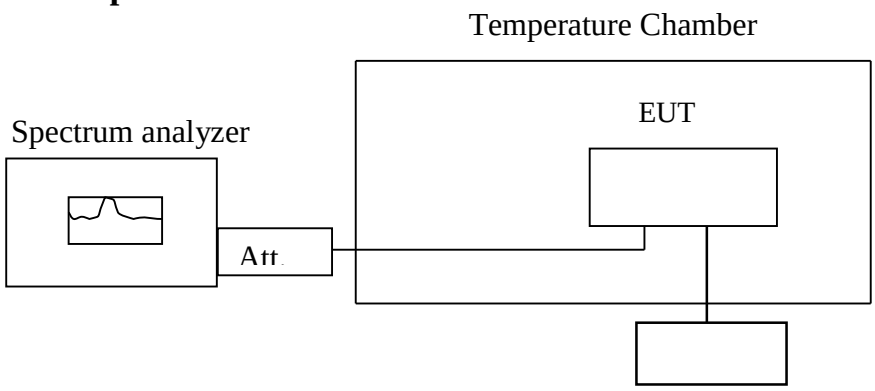
11. FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

11.1 Standard Applicable

According to FCC §2.1055, FCC §24.235,

Frequency Tolerance: 2.5 ppm

11.2 Test Set-up:



Note: *Measurement setup for testing on Antenna connector*

11.3 Measurement Procedure

Set chamber temperature to 25℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

11.4 Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2004	05/26/2005
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2004	08/26/2005
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2004	10/06/2005

11.5 Measurement Result

Reference Frequency: PCS Mid Channel 1880 MHz @ 25℃				
Limit: +/- 2.5 ppm = 4700 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (℃)	(MHz)		
4.26	25	1880.00121	40.00	4700
3.7	25	1880.00125	0.00	4700
3.14	25	1880.00124	10.00	4700
2.9 (End Point)	25	1880.00120	50.00	4700

Note: The battery is rated 3.7V dc.

12. AC POWER LINE CONDUCTED EMISSION TEST

12.1 Standard Applicable

According to §15.207. The emission value for frequency within 150KHz to 30MHz shall not exceed criteria of below chart.

Frequency range MHz	Limits dB(uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

12.2 EUT Setup

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2001.
2. The EUT was plug-in DC power adaptort and was placed on the center of the back edge on the test table. The peripherals like earphone was placed on the side of the EUT. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The Power adaptor was connected with 110Vac/60Hz power source.

12.3 Measurement Procedure

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

12.4 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMC Analyzer	HP	8594EM	3624A00203	12/31/2004	12/30/2005
EMI Test Receiver	R&S	ESCS30	828985/004	01/15/2005	01/14/2006
LISN	Rolf-Heine	NNB-2/16Z	99012	12/30/2004	12/29/2005
LISN	Rolf-Heine	NNB-2/16Z	99013	11/06/2004	11/05/2005

12.5 Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Normal Operating			Test Date :	Apr. 07, 2005
Temperature :	23 ℃	Humidity :	60 %	Test By:	Willis

FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.400	53.03	41.00	57.85	47.85	-4.82	-6.85	L1
0.911	51.39	35.08	56.00	46.00	-4.61	-10.92	L1
1.216	52.71	33.62	56.00	46.00	-3.29	-12.38	L1
1.396	53.70	34.27	56.00	46.00	-2.30	-11.73	L1
1.712	51.09	32.03	56.00	46.00	-4.91	-13.97	L1
2.458	53.67	32.47	56.00	46.00	-2.33	-13.53	L1
0.903	48.91	32.35	56.00	46.00	-7.09	-13.65	L2
1.208	49.92	30.73	56.00	46.00	-6.08	-15.27	L2
1.407	49.91	27.75	56.00	46.00	-6.09	-18.25	L2
1.579	45.39	26.96	56.00	46.00	-10.61	-19.04	L2
2.849	52.66	33.44	56.00	46.00	-3.34	-12.56	L2
2.978	51.97	36.35	56.00	46.00	-4.03	-9.65	L2

Remark：

(1) Measuring frequencies from 0.15 MHz to 30MHz。

(2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Qusia-Peak detector and Average detector.

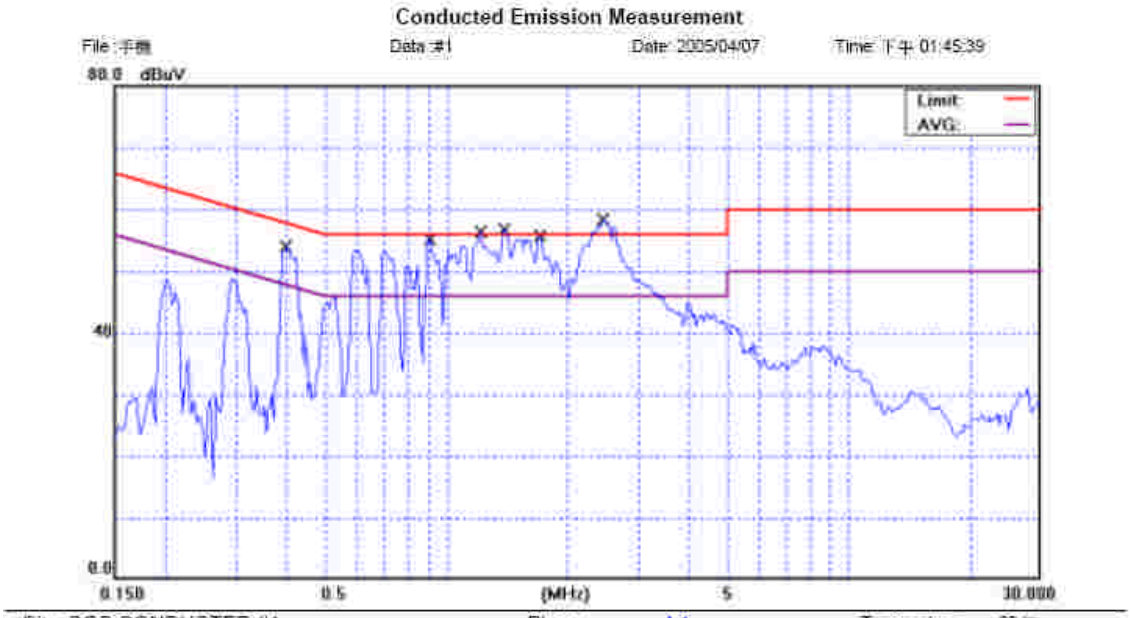
(3) "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.

(4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz;
The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;

(5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

Conducted Emission Test Plot

臺灣檢驗科技股份有限公司-電子暨通訊服務部
台北縣五股工業區五工路134號
電話：（02）22993279 傳真：（02）22982698



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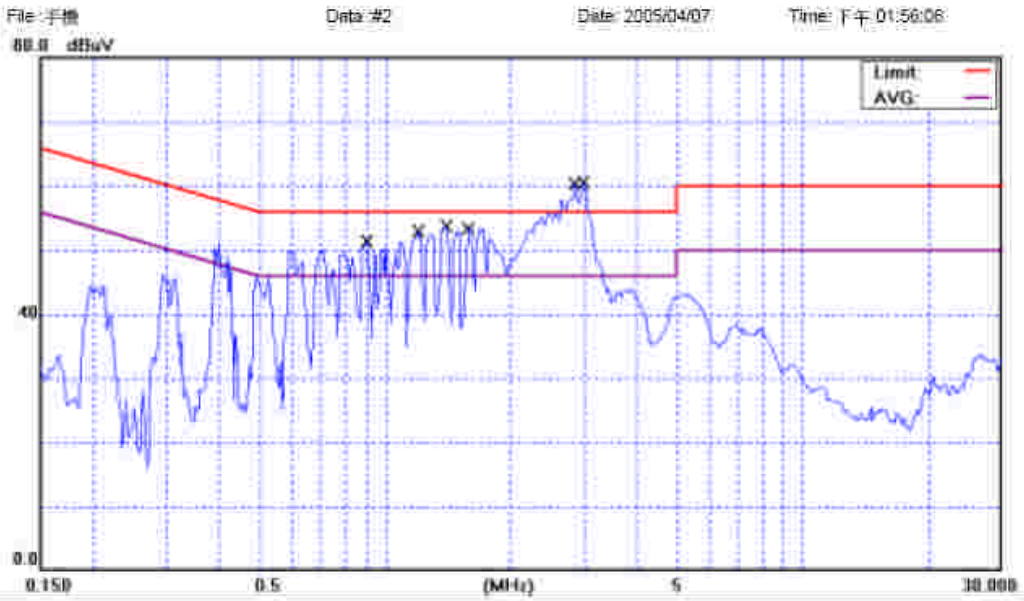
Conducted Emission Measurement



Site: SGS CONDUCTED #1	Phase: N	Temperature: 23 ℃
Limit: EN55022 Class B Conduction(QP)	Power: AC 110V/60Hz	Humidity: 60 %
EUT: PHONE	Distance:	Air Pressure: hpa
M/N:		
Note: CHARGE		

APPENDIX 1

PHOTOGRPHS OF SET UP

Radiated Emission Set up Photos

Conducted Emission Set Up Photos

APPENDIX 2

PHOTOGRPHS OF EUT

All of EUT

Front View of EUT – 1

Front View of EUT – 2

Back View of EUT – 1

Back View of EUT – 2

Left View of EUT

Right View of EUT

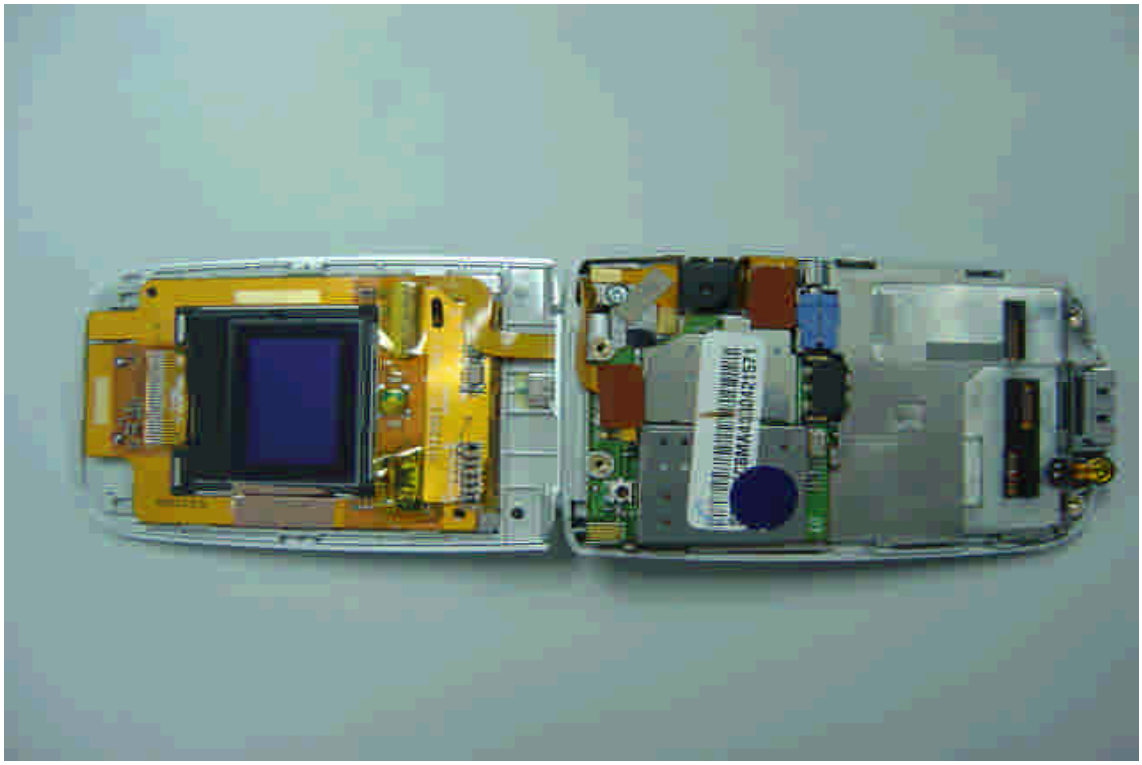
Top View of EUT

Bottom View of EUT

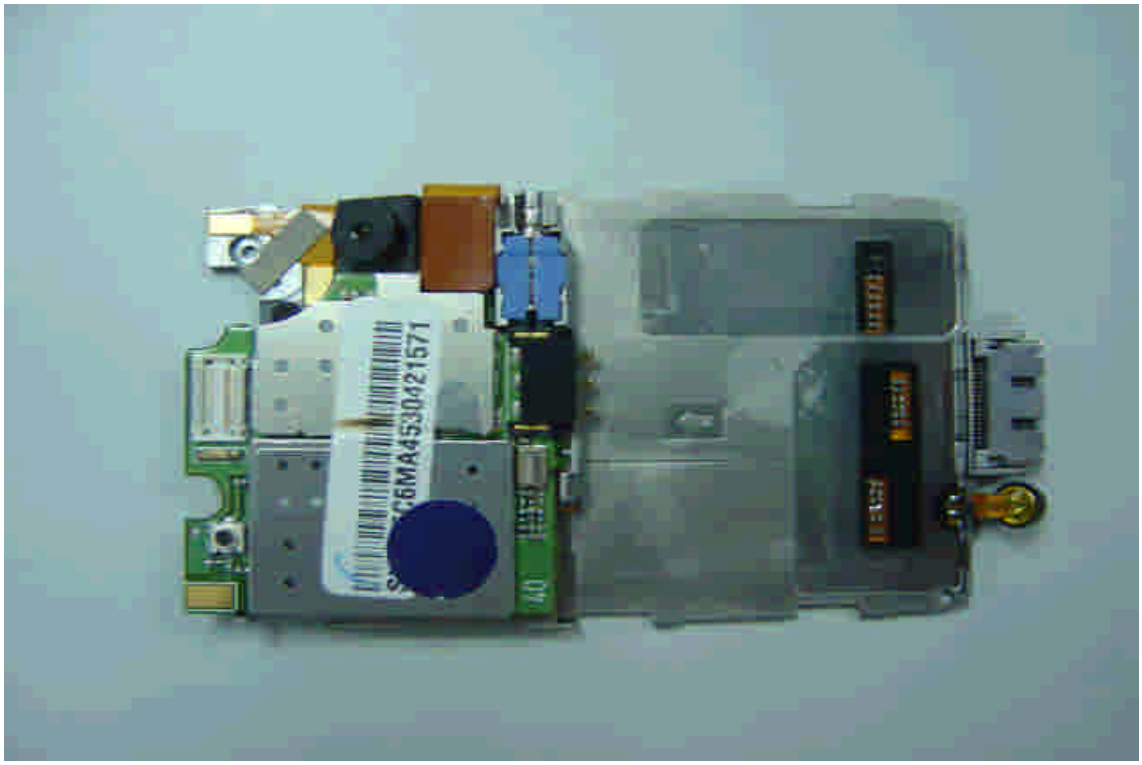
Open View of EUT – 1

Open View of EUT - 2

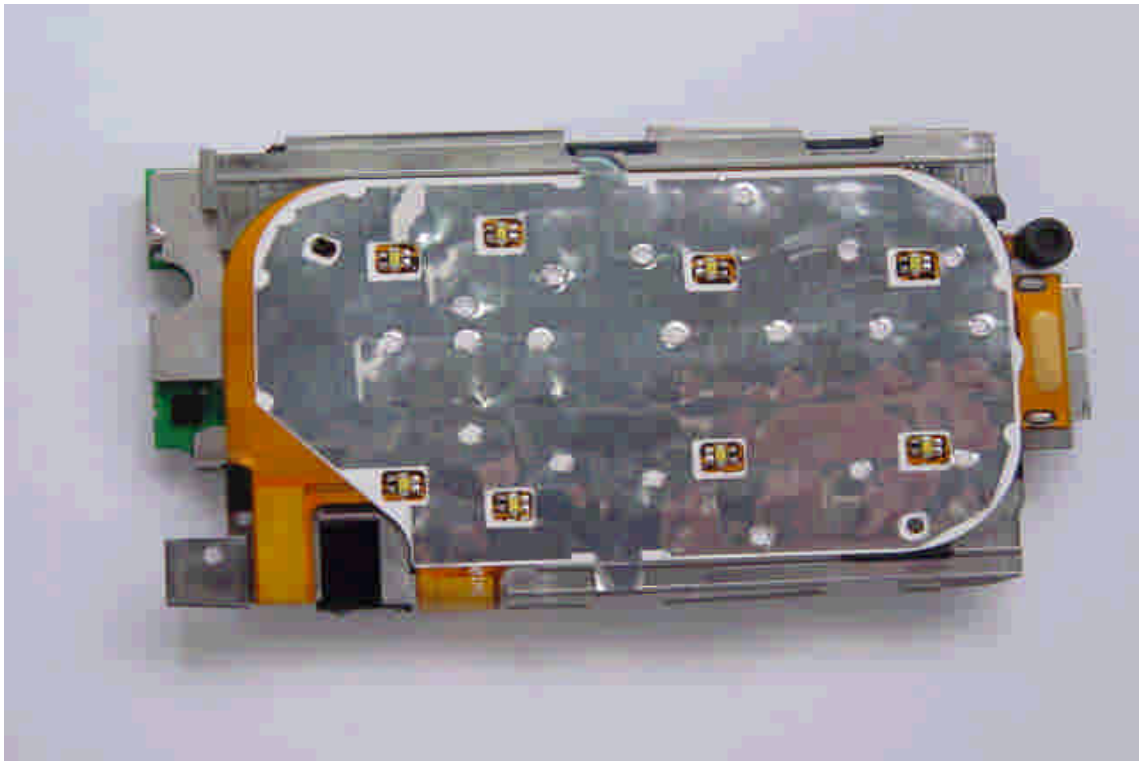
Internal of EUT --- 1



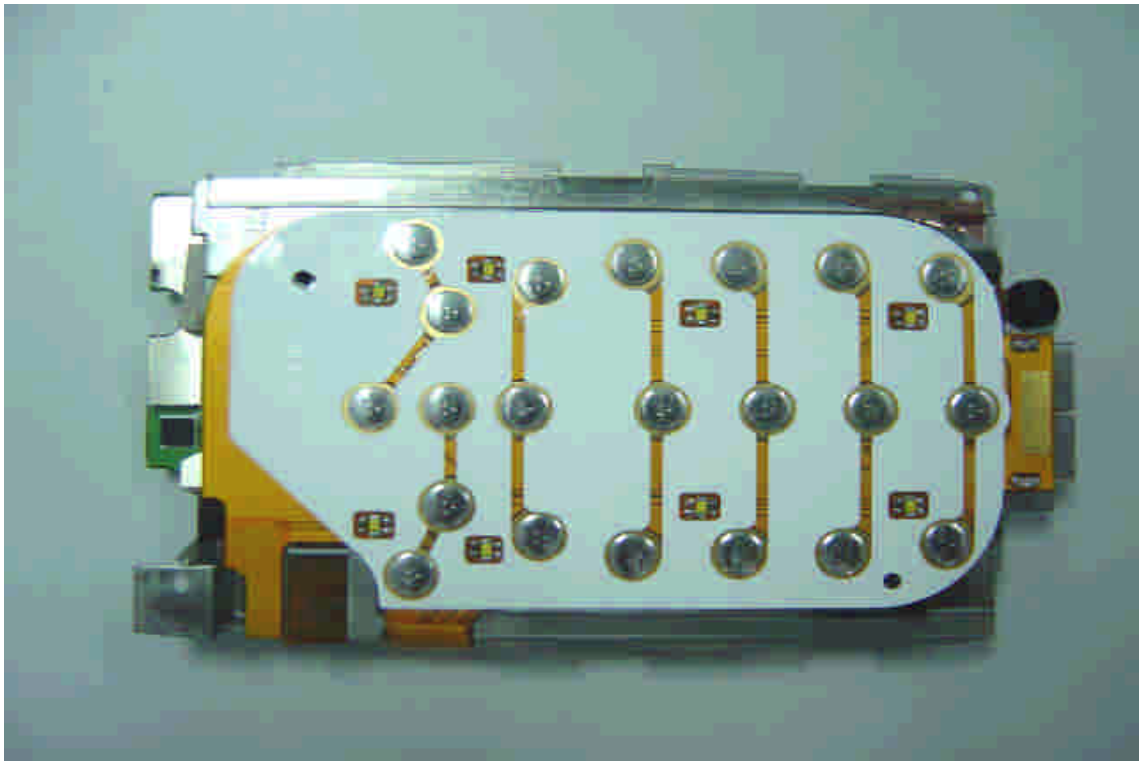
Internal of EUT --- 2



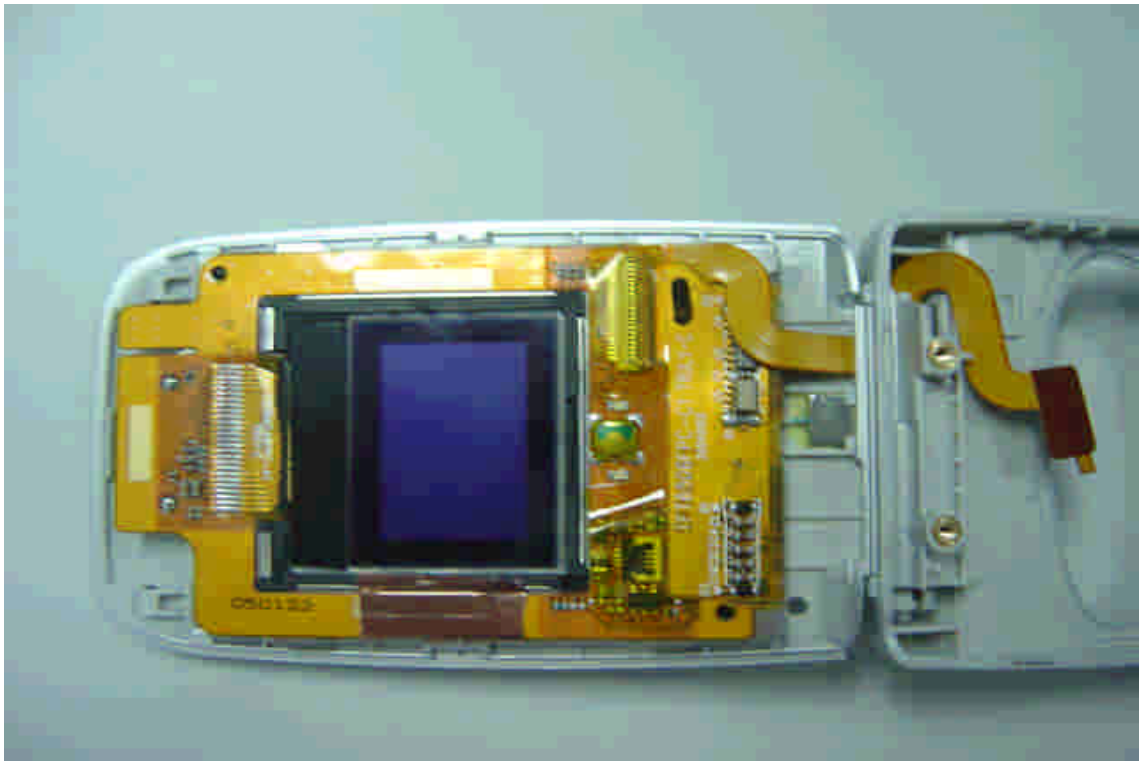
Internal of EUT --- 3



Internal of EUT --- 4



Internal of EUT --- 5



Internal of EUT --- 6