Quectel Wireless Solutions Company Limited

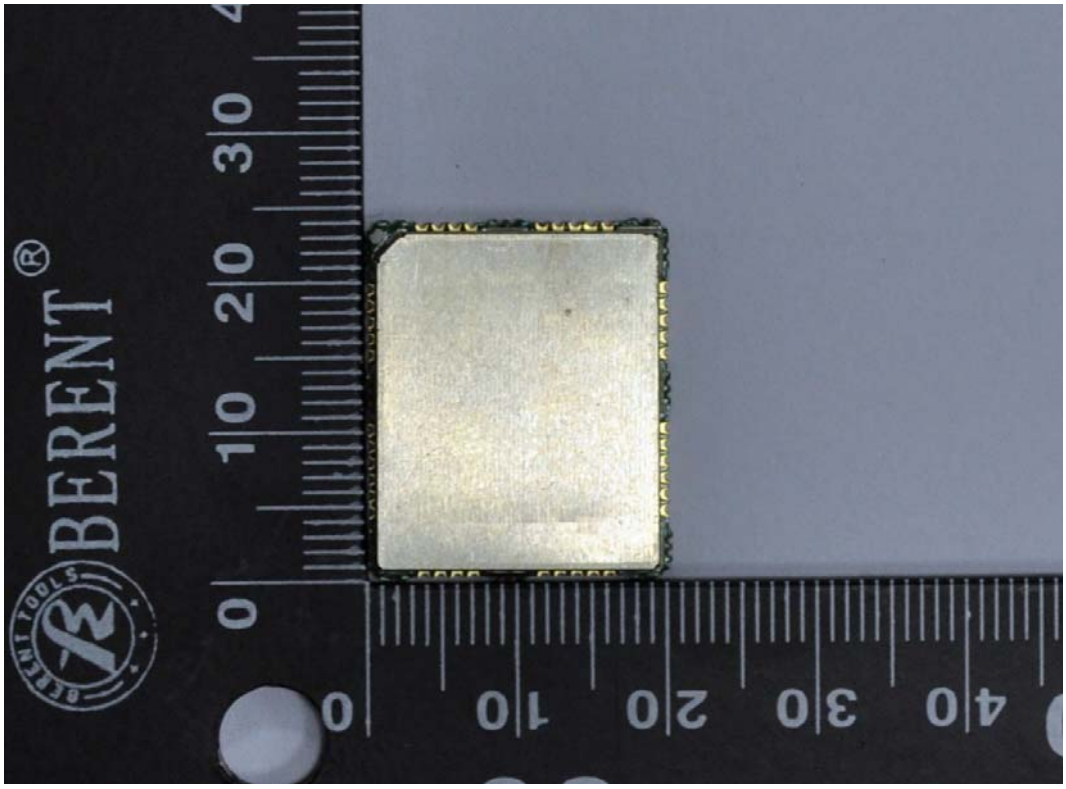
GSM/GPRS Module

Main Model:M95

March 10, 2012

Report No.: 12050015-FCC-R1-V1

(This report supersedes NONE)



Modifications made to the product : None

This Test Report is Issued Under the Authority of:		
Back Huang	Alex Liu	
Back Huang Compliance Engineer	Alex Liu Technical Manager	

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Test result presented in this test report is applicable to the representative sample only.

RF Test Report

To: FCC Part 22(H) & FCC Part 24(E): 2012

SIEMIC, INC.
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Laboratory Introduction

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Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety

Accreditations for Product Certifications

Country/Region	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC, (RCB 208)	RF , Telecom
Hong Kong	OFTA (US002)	RF , Telecom

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CONTENTS

1. EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programmed was to demonstrate compliance of the Quectel Wireless Solutions Company Limited GSM/GPRS Module and model:M95 against the current Stipulated Standards. The GSM/GPRS Module has demonstrated compliance with the FCC Part 22(H) & FCC Part 24(E): 2012.

EUT Information

EUT Description	:	GSM/GPRS Module
Main Model	:	M95
Antenna Gain	:	GSM 850: 1.5 dBi PCS 1900: 1.5 dBi
Input Power	:	SWITCHING POWER SUPPLY MODEL: P-050B INPUT: 100V-240V, 50/60Hz, 0.3A OUTPUT: 5.0V-2.0A P/N: B2152-1116
Maximum Conducted Peak Power to Antenna	:	GSM850: 32.78 dBm PCS1900: 29.19 dBm
Maximum Radiated ERP/EIRP	:	GSM850: 27.48 dBm / ERP PCS1900: 26.46 dBm / EIRP
Classification Per Stipulated Test Standard	:	FCC Part 22(H) & FCC Part 24(E): 2012

Note： Antenna gain including cable loss must not exceed 5.42 dBi of GSM850 and 3.5 dBi of PCS 1900.

2. TECHNICAL DETAILS

Purpose	Compliance testing of GSM/GPRS Module with stipulated standard
Applicant / Client	Quectel Wireless Solutions Company Limited Room 501, Building 13, No.99 TianZhou Road,Xuhui District, Shanghai
Manufacturer	Quectel Wireless Solutions Company Limited Room 501, Building 13, No.99 TianZhou Road,Xuhui District, Shanghai
Laboratory performing the tests	SIEMIC Nanjing (China) Laboratories NO.2-1,Longcang Dadao, Yuhua Economic Development Zone, Nanjing, China Tel:+86(25)86730128/86730129 Fax:+86(25)86730127 Email:info@siemic.com
Test report reference number	12050015-FCC-R1-V1
Date EUT received	February 20, 2012
Standard applied	FCC Part 22(H) & FCC Part 24(E): 2012
Dates of test	March 5, 2012 to March 7, 2012
No of Units	#1
Equipment Category	PCE
Trade Name	Quectel
RF Operating Frequency (ies)	GSM850 TX : 824.2 ~ 848.8 MHz; RX : 869.2 ~ 893.8 MHz PCS1900 TX : 1850.2 ~ 1909.8 MHz; RX : 1930.2 ~ 1989.8 MHz
Number of Channels	300CH (PCS1900) and 125CH (GSM850)
Modulation	GSM / GPRS: GMSK
GPRS Multi-slot class	8/10/12
FCC ID	XMR201202M95

3. MODIFICATION

NONE

4. TEST SUMMARY

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

PCE

Test Results Summary

Test Standard	Description	Product Class	Pass / Fail
§ 1.1307, § 2.1091	RF Exposure	See Above	Pass
§2.1046; § 22.913 (a); § 24.232 (c)	RF Output Power	See Above	Pass
§ 2.1047	Modulation Characteristics	See Above	Pass
§ 2.1049; § 22.905 § 22.917; § 24.238	99% & -26 dB Occupied Bandwidth	See Above	Pass
§ 2.1051, § 22.917 (a); § 24.238 (a)	Spurious Emissions at Antenna Terminal	See Above	Pass
§ 2.1053 § 22.917 (a); § 24.238 (a)	Field Strength of Spurious Radiation	See Above	Pass
§ 22.917 (a); § 24.238 (a)	Out of band emission, Band Edge	See Above	Pass
§ 2.1055 § 22.355; § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	See Above	Pass

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different.

5. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 §1.1307, §2.1093- RF Exposure (SAR)

Test Result: Pass

The EUT is not a portable device, please refer to 12050015-1-FCC-H1.

5.2 §2.1046 ;§22.913 (a); §24.232 (c)- RF Output Power

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : March 5, 2012
   Tested By : Back Huang

Procedures:

For Conducted Power:

1. The transmitter output port was connected to base station.
2. Set EUT at maximum power through base station.
3. Select lowest, middle, and highest channels for each band and different test mode.

For ERP/EIRP:

1. The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.

4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

   Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

   Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Result: Pass

Remark: Conducted Burst Average power for reporting purposes only

Conducted Power

Burst Average Power (dBm)								
Band	GSM850				GSM1900			
Channel	128	190	251	Tune up Power tolerant	512	661	810	Tune up Power tolerant
Frequency (MHz)	824.2	836.6	848.8	/	1850.2	1880	1909.8	/
GSM Voice (1 uplink)	**32.78**	32.75	32.66	32±1	28.26	28.68	**29.19**	28.5±1
GPRS Multi-Slot Class 8 (1 uplink)	32.75	32.68	32.59	32±1	27.98	28.47	29.05	28.5±1
GPRS Multi-Slot Class 10 (2 uplink)	32.67	32.60	32.49	32±1	27.95	28.44	29.01	28.5±1
GPRS Multi-Slot Class 12 (4 uplink)	31.72	31.58	31.48	31±1	27.88	28.34	28.88	28±1

Remark :
GPRS, CS1 coding scheme.
Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link
Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link
Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 5 working link

Note: Since GSM mode has higher power, so the test items below were not performed to GPRS mode.

ERP & EIRP (worst case)

ERP for Cellular Band (Part 22H)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Factors (dB)	Absolute Level (dBm)	Limit (dBm)
824.20	28.68	V	-1.20	27.48	38.45
824.20	27.46	H	-1.20	26.26	38.45
836.60	28.54	V	-1.20	27.34	38.45
836.60	27.31	H	-1.20	26.11	38.45
848.80	28.32	V	-1.20	27.12	38.45
848.80	27.18	H	-1.20	25.98	38.45

EIRP for PCS Band (Part 24E)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Factors (dB)	Absolute Level (dBm)	Limit (dBm)
1850.20	19.95	V	6.30	26.25	33.00
1850.20	17.92	H	6.30	24.22	33.00
1880.00	20.02	V	6.30	26.32	33.00
1880.00	18.05	H	6.30	24.35	33.00
1909.80	20.16	V	6.30	26.46	33.00
1909.80	18.07	H	6.30	24.37	33.00

Note: *Factors= Antenna Gain Correction-Cable Loss*

5.3 §2.1047 - Modulation Characteristic

According to FCC § 2.1047(d), Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

5.4 §2.1049, §22.917, §22.905 & §24.238 - Occupied Bandwidth

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyser was connected to the antenna terminal.
2. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : March 6, 2012
   Tested By : Back Huang

Procedures:

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.

2. The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers.

Test Results: Pass

Cellular Band (Part 22H)

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
190	836.6	250.2273	337.098

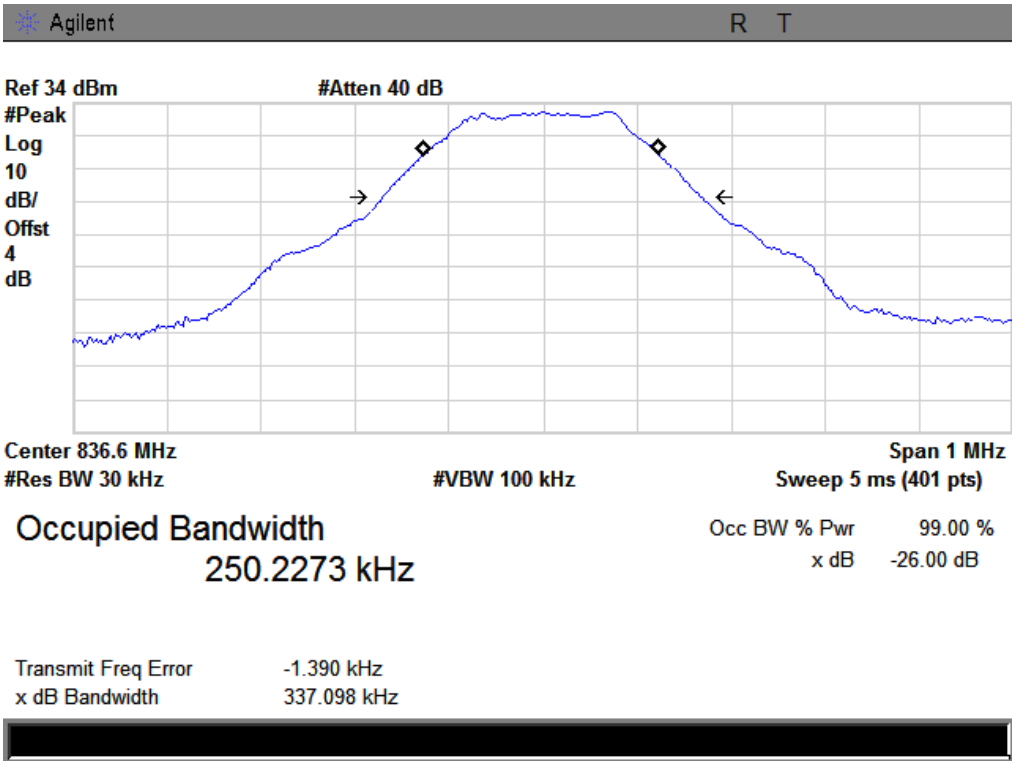
PCS Band (Part 24E)

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
661	1880.0	249.7699	337.005

Please refer to the following plots.

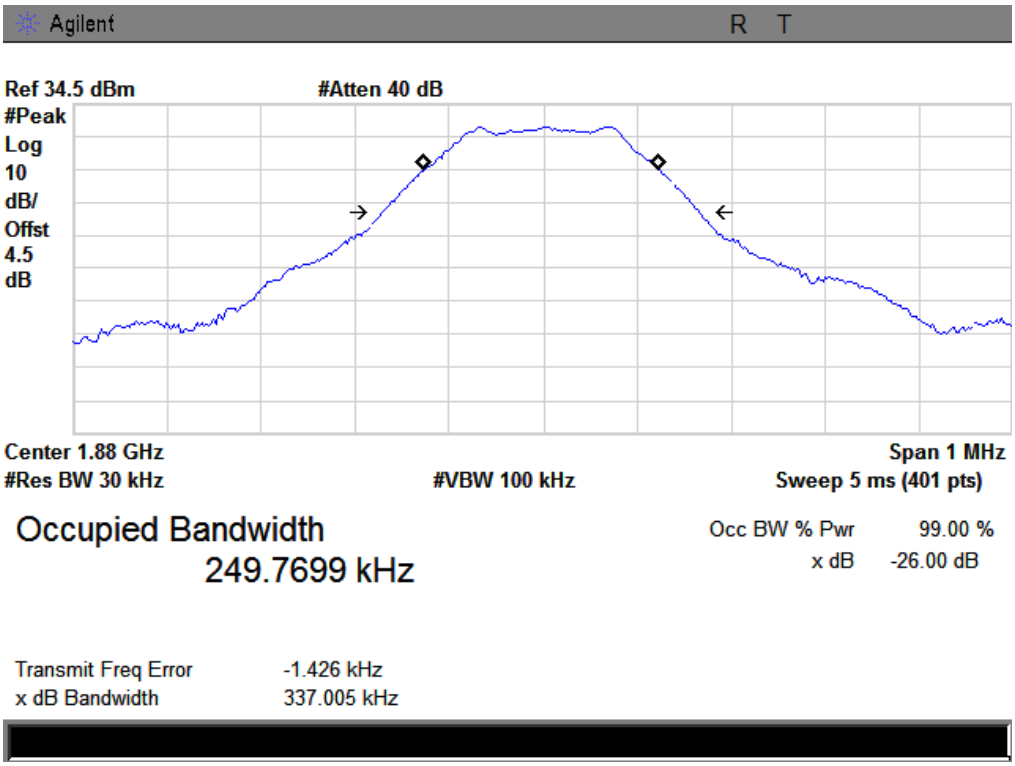
Cellular Band (Part 22H)

99% Occupied Bandwidth & 26 dB Bandwidth



PCS Band (Part 24E)

99% Occupied Bandwidth & 26 dB Bandwidth



5.5 §2.1051, §22.917(a) & §24.238(a) - Spurious Emissions at Antenna Terminals

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : March 6, 2012
   Tested By : Back Huang

Standard Requirement:

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

Procedures:

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.

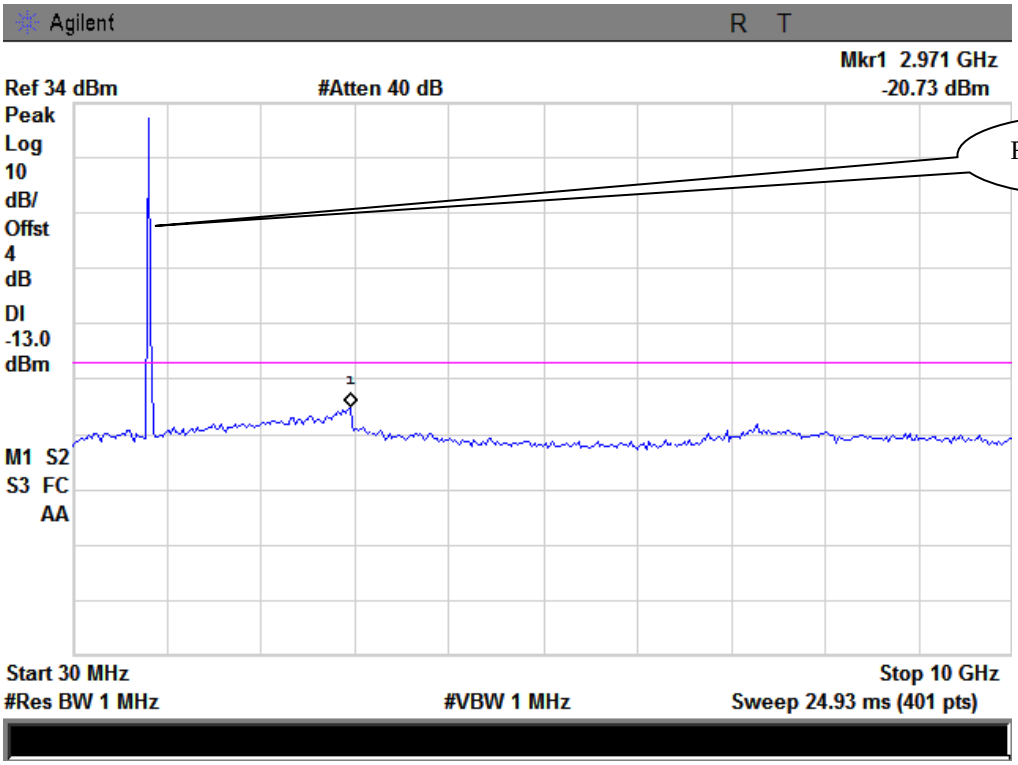
Test Result: Pass

Refer to the attached plots.

Worst Case:

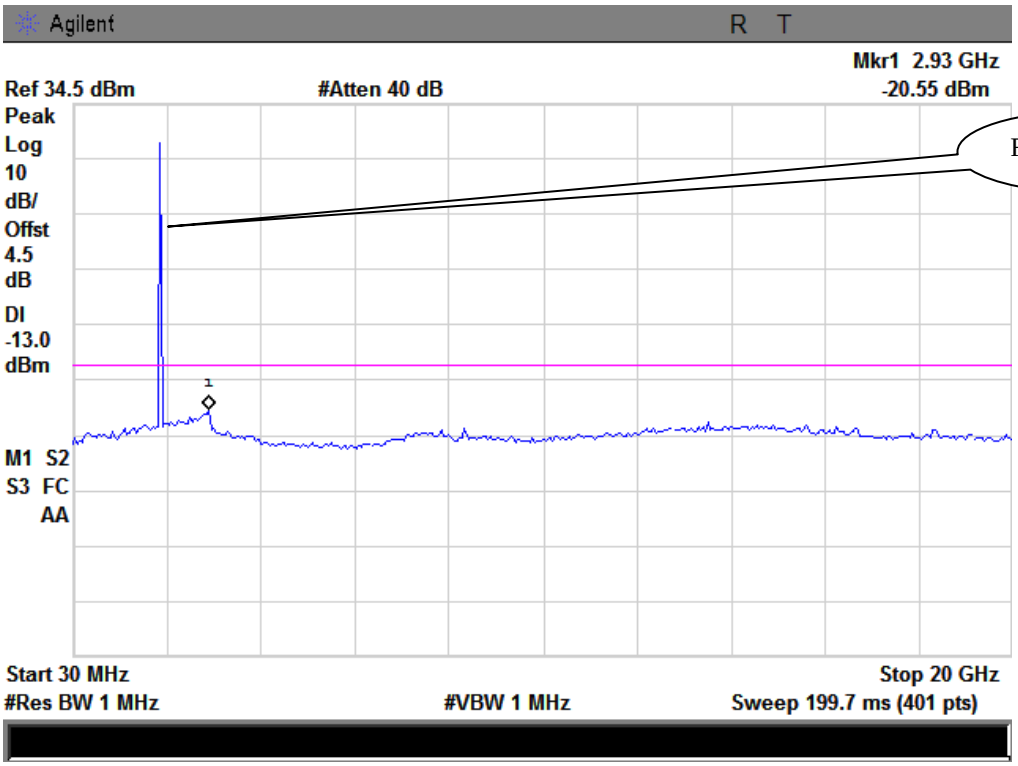
Cellular Band (Part 22H)

30MHz-10G – GSM850 Middle Channel



PCS Band (Part24E)

30MHz-20G – PCS1900 Middle Channel



5.6 §2.1053, §22.917 & §24.238 - Spurious Radiated Emissions

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 1GHz – 40GH is ±6.0dB (for EUTs < 0.5m X 0.5m X 0.5m).
4. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

5. Test date : March 7, 2012
   Tested By : Back Huang

Standard Requirement:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

Procedures:

Equipment was setup in a semi-anechoic chamber. For measurements above 1 GHz an average measurement was taken with a 10Hz video bandwidth. The EUT was tested at low, mid and high with the highest output power. An emission was scan up to 10th harmonic of the operating frequency.

Sample Calculation:

EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)

Test Result: Pass

Cellular Band (Part 22H)

Low channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
535.22	-60.59	120	1.2	V	0	0.52	0	-61.11	-13	-48.11
764.32	-62.38	110	1.2	H	0	0.61	0	-62.99	-13	-49.99
1648.4	-38.49	320	1	V	6.2	0.84	0	-33.13	-13	-20.13
1648.4	-42.24	129	1.1	H	6.2	0.84	0	-36.88	-13	-23.88

Middle channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
150.78	-58.04	332	1.2	V	0	0.26	0	-58.30	-13	-45.30
225.14	-60.00	79	1.1	H	0	0.31	0	-60.31	-13	-47.31
1673.2	-37.81	141	1.3	V	6.2	0.84	0	-32.45	-13	-19.45
1673.2	-39.44	76	1.1	H	6.2	0.84	0	-34.08	-13	-21.08

High channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
148.78	-51.1	224	1.2	V	0	0.26	0	-51.36	-13	-38.36
197.62	-54.54	316	1.1	H	0	0.3	0	-54.84	-13	-41.84
1697.6	-32.17	228	1.1	V	6.2	0.84	0	-26.81	-13	-13.81
1697.6	-34.49	167	1.1	H	6.2	0.84	0	-29.13	-13	-16.13

PCS Band (Part 24E)

Low channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
541.16	-58.69	170	1.2	V	0	0.52	0	-59.21	-13	-46.21
906.88	-60.51	200	1	H	0	0.74	0	-61.25	-13	-48.25
3700.4	-38.33	70	1.1	V	6.9	1.36	0	-32.79	-13	-19.79
3700.4	-45.61	170	1.1	H	6.9	1.36	0	-40.07	-13	-27.07

Middle channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
187.68	-59.85	130	1.1	V	0	0.3	0	-60.15	-13	-47.15
226.14	-62.13	210	1.2	H	0	0.31	0	-62.44	-13	-49.44
3760	-38.29	206	1.1	V	6.9	1.36	0	-32.75	-13	-19.75
3760	-40.04	330	1.1	H	6.9	1.36	0	-34.5	-13	-21.5

High channel

Frequency (MHz)	Substituted level (dBm)	Direction (degree)	Height (cm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Amplifier (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
87.98	-59.65	80	1.2	V	0	0.24	0	-59.89	-13	-46.89
164.75	-61.37	80	1.1	H	0	0.28	0	-61.65	-13	-48.65
3815.2	-38.11	110	1	V	6.9	1.36	0	-32.57	-13	-19.57
3815.2	-39.9	170	1	H	6.9	1.36	0	-34.36	-13	-21.36

5.7 §22.917(a) & §24.238(a) - Band Edge

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	23°C
Relative Humidity	50%
Atmospheric Pressure	1019mbar

4. Test date : March 6, 2012
   Tested By : Back Huang

Standard Requirement:

The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.

Procedures:

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.

Test Result: Pass

Refer to the attached plots.

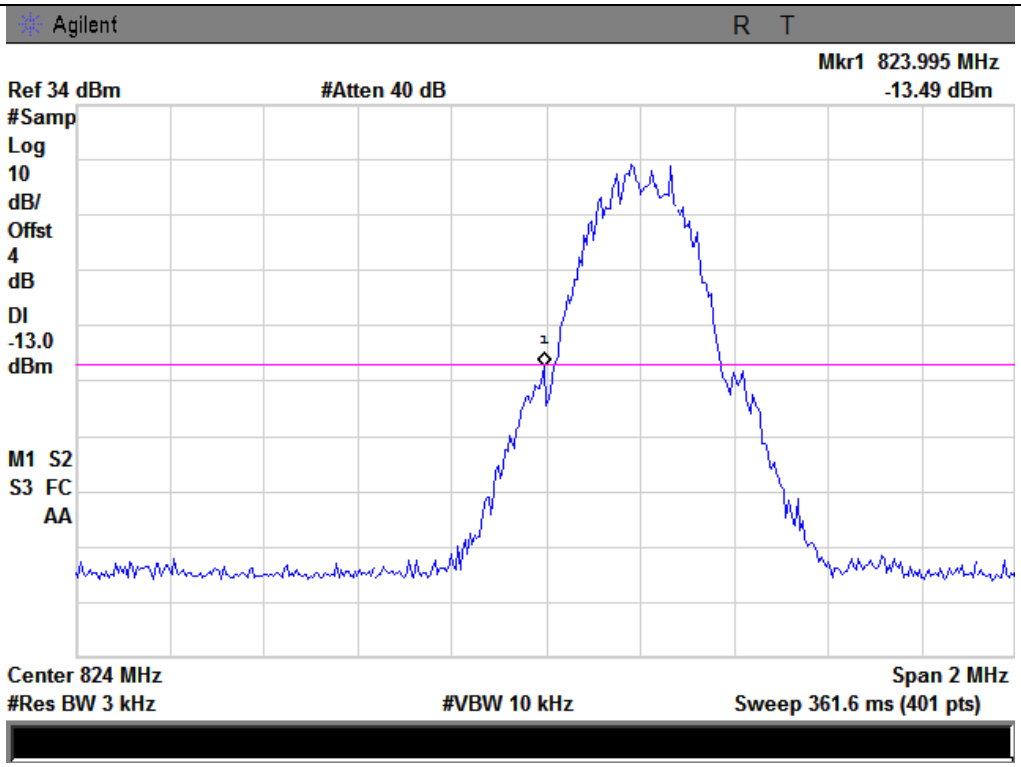
Cellular Band (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.995	-13.49	-13
849.015	-13.18	-13

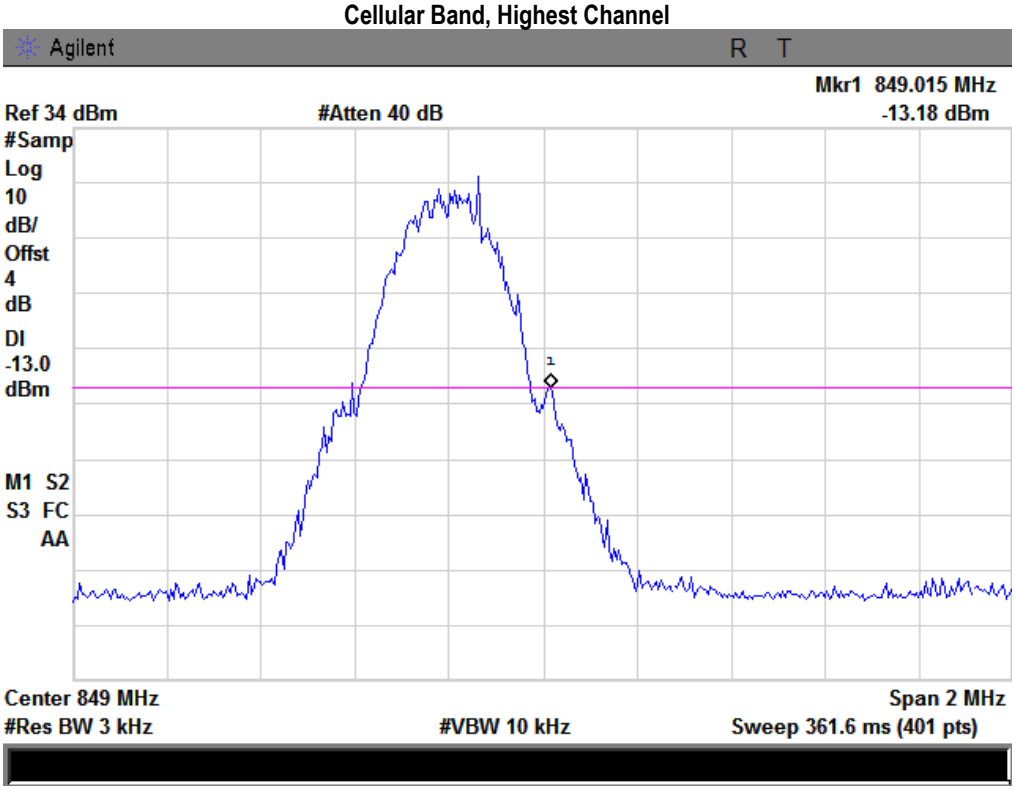
PCS Band (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.995	-14.85	-13
1910.015	-17.82	-13

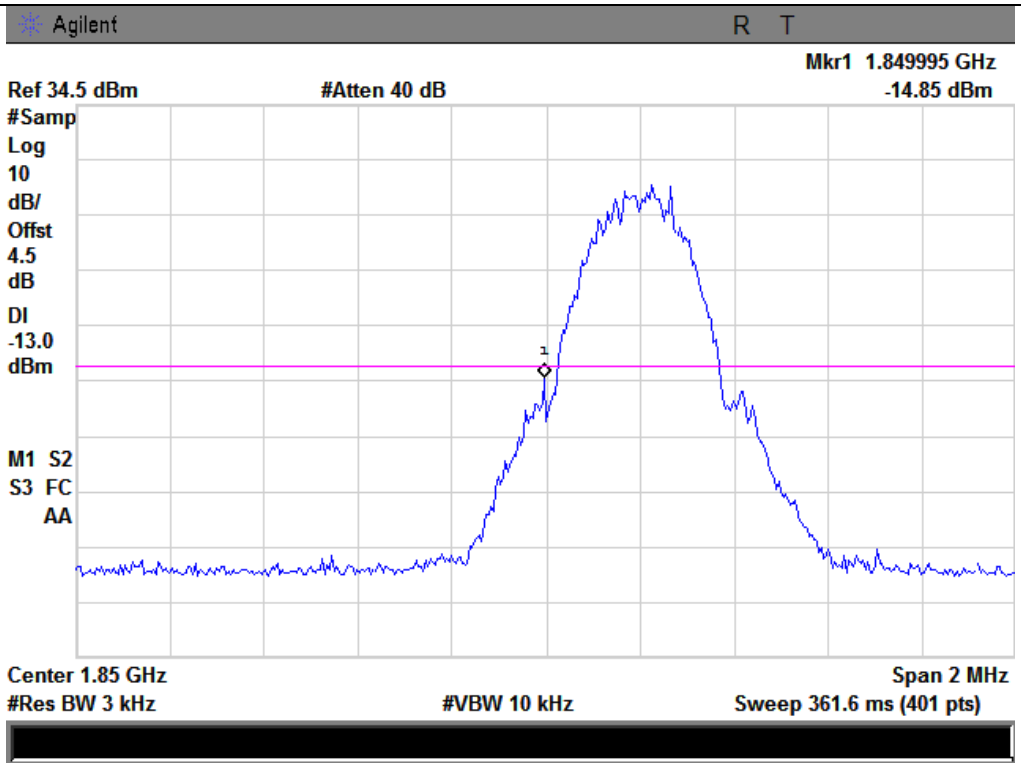
Cellular Band, Lowest Channel



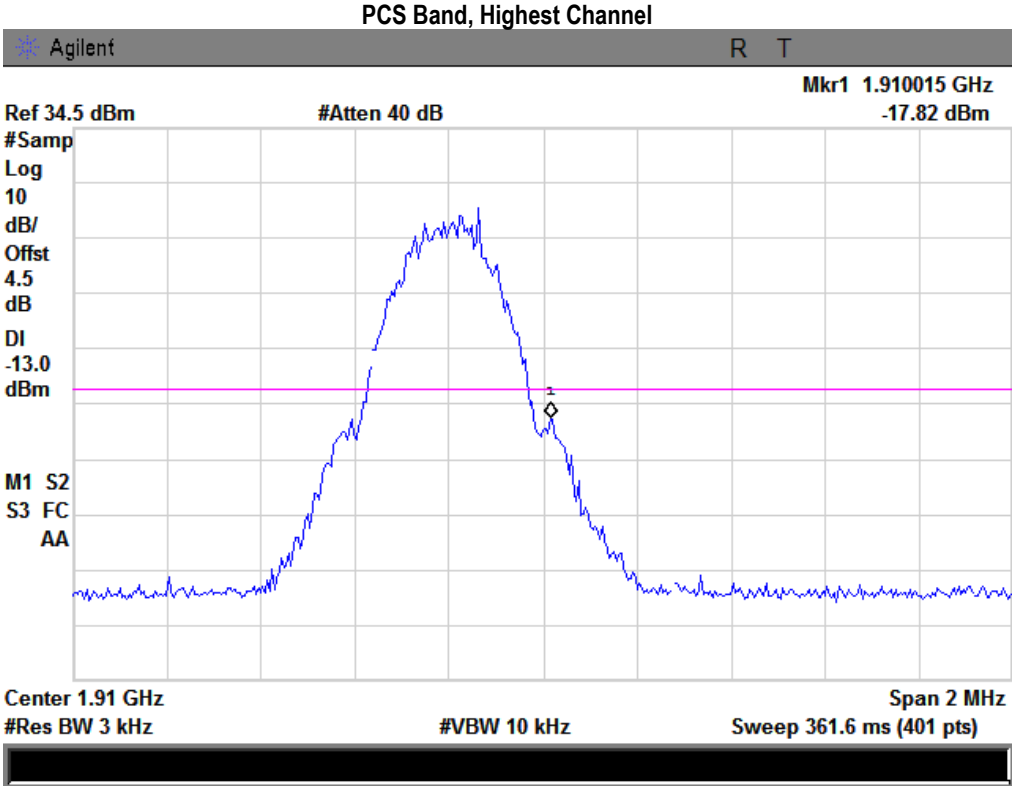
Cellular Band, Highest Channel



PCS Band, Lowest Channel



PCS Band, Highest Channel



5.8 §2.1055, §22.355 & §24.235 - Frequency Stability

1.	Environmental Conditions	Temperature	23°C
		Relative Humidity	50%
		Atmospheric Pressure	1019mbar
2.	Test date : March 7, 2012 Tested By : Back Huang		

Standard Requirement:

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.

Procedures:

A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage.

Limit: The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

Test Results: Pass

Frequency Stability versus Temperature: The Frequency tolerance of the carrier signal shall be maintained within 2.5ppm of the operating frequency over a temperature variation of -10ºC to +55ºC at normal supply voltage.

Cellular Band (Part 22H)

Middle Channel, f_o = 836.6 MHz				
Temperature (℃)	Power Supplied (V_{AC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	120	18	0.0215	2.5
0		17	0.0203	2.5
10		21	0.0251	2.5
20		21	0.0251	2.5
30		21	0.0251	2.5
40		15	0.0179	2.5
50		16	0.0191	2.5
55		18	0.0215	2.5
25	132	17	0.0203	2.5
	108	20	0.0239	2.5

PCS Band (Part 24E)

Middle Channel, f_o = 1880 MHz				
Temperature (℃)	Power Supplied (V_{AC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	120	26	0.0138	2.5
0		25	0.0133	2.5
10		31	0.0165	2.5
20		31	0.0165	2.5
30		29	0.0154	2.5
40		27	0.0144	2.5
50		30	0.0160	2.5
55		26	0.0138	2.5
25	132	26	0.0138	2.5
	108	26	0.0138	2.5

Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Calibration Date	Calibration Due Date
AC Line Conducted Emissions			
R&S EMI Test Receiver	ESPI3	05/25/2011	05/25/2012
Com-Power LISN	LI-115	05/25/2011	05/25/2012
A-INFOMW Antenna(1 ~18GHz)	JXTXLB-10180	06/02/2011	06/02/2012
Universal Radio Communication Tester	CMU200	02/22/2012	02/22/2013
Radiated Emissions			
Hp Spectrum Analyzer	8563E	01/10/2012	01/10/2013
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	10/25/2011	10/25/2012
R&S EMI Receiver	ESPI3	05/18/2011	05/18/2012
Antenna (30MHz~2GHz)	JB1	05/25/2011	05/25/2012
ETS-Lindgren Antenna(1 ~18GHz)	3115	06/02/2011	06/02/2012
A-INFOMW Antenna(1 ~18GHz)	JXTXLB-10180	06/02/2011	06/02/2012
Horn Antenna (18~40GHz)	AH-840	07/23/2011	07/23/2013
Microwave Pre-Amp (18~40GHz)	PA-840	Every 2000 Hours	
Hp Agilent Pre-Amplifier	8447F	05/25/2011	05/25/2012
MITEQ Pre-Amplifier(1 ~ 18GHz)	AMF-7D-00101800-30-10P	05/25/2011	05/25/2012
Universal Radio Communication Tester	CMU200	02/22/2012	02/22/2013
Chamber	3m	04/13/2011	04/13/2012

Annex A. ii. RADIATED EMISSIONS TEST DESCRIPTION

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 1GHz (for FCC tests, until the 10th harmonic for operating frequencies ≥ 108MHz),, was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

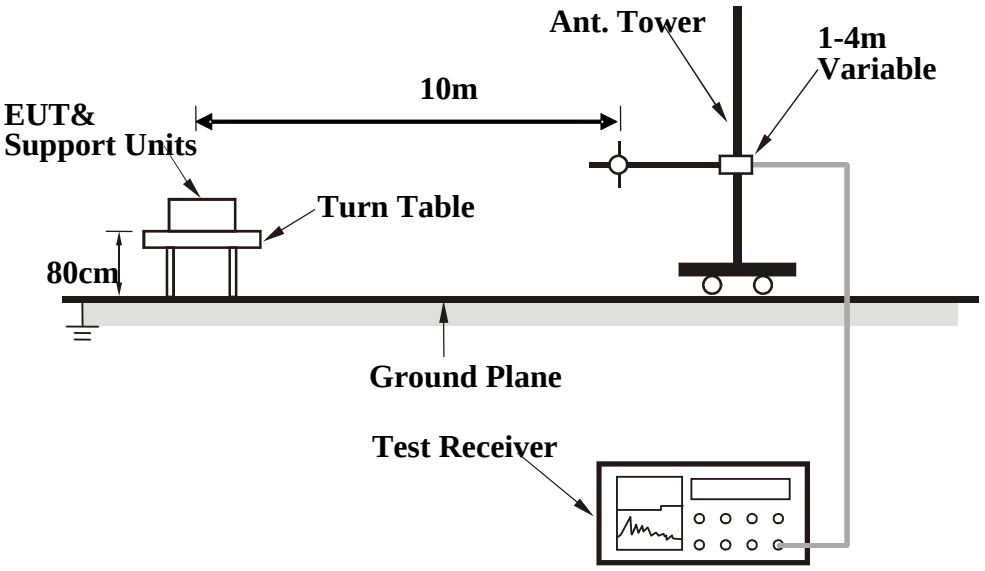
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m or 10m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS) or EMC 3m chamber.

Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



Test Method

The following procedure was performed to determine the maximum emission axis of EUT:

1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement

1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site or EMC 10m chamber. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ◦ to 360 ◦ with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.
5. Repeat step 4 until all frequencies need to be measured were complete.
6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Description of Radiated Emission Program

This EMC Measurement software run LabView automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the scan on four different antenna heights, 2 antenna polarity, and 360 degrees table rotation. For example, the program was set to run 30 MHz to 1 GHz scan; the program will first start from a meter antenna height and divide the 30 MHz to 1 GHz into 10 separate parts of maximum hold sweeps. Each parts of maximum hold sweep, the program will collect the data from 0 degree to 360 degrees table rotation. After the program complete the 1m scan, the antenna continues to rise to 2m and continue the scan. The step will repeated for all specified antenna height and polarity. This program will perform the Quasi Peak measurement after the signal maximization process and pre-scan routine. The final measurement will be base on the pre-scan data reduction result.

Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where

Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

And the average value is

Average = Peak Value + Duty Factor or

Set RBW = 1MHz, VBW = 10Hz.

Note:

If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.

Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Please see the attachment

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

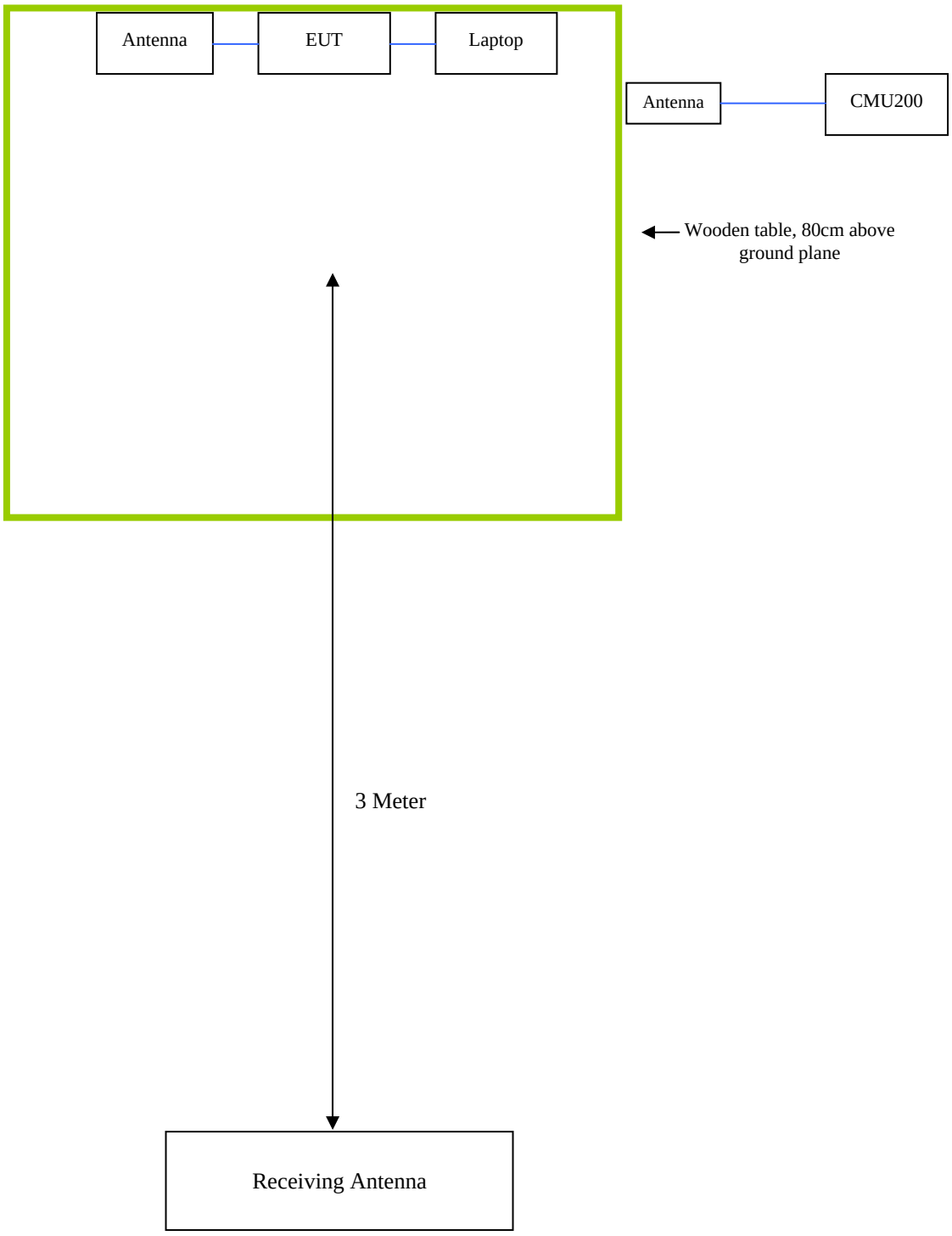
EUT TEST CONDITIONS

Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description (Including Brand Name)	Model & Serial Number	Calibration Date	Calibration Due Date
A-INFOMW	Horn Antenna	JXTXLB-10180	06/02/2011	06/02/2012
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	02/22/2012	02/22/2013

Block Configuration Diagram for Radiated Emissions



Annex C.ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions Testing	The EUT was communicating with base station and set to work at maximum output power.
Others Testing	The EUT was communicating with base station and set to work at maximum output power.

Annex D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PART LIST

Please see attachment

Annex E. DECLARATION OF SIMILARITY

Please see attachment