FCC Test Report (PART 22)

Report No.:	RF131029E03H-2
FCC ID:	MQT-T103WIFI3GT
Test Model:	xAPT-103WiFi.3G
Series Model:	xCE_T103WiFi.3G
Received Date:	Oct. 29, 2013
Test Date:	Nov. 08 to 15, 2013; Nov. 16, 2016
Issued Date:	Dec. 07, 2016
Applicant:	XAC AUTOMATION CORP.
Address:	4F, No. 30, INDUSTRY E. RD. IX, SCIENCE-BASED INDUSTRIAL PARK,HSINCHU,TAIWAN
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF131029E03H-2	Original release.	Dec. 07, 2016

1 Certificate of Conformity

Product:	Terminal
Brand:	XAC
Test Model:	xAPT-103WiFi.3G
Series Model:	xCE_T103WiFi.3G
Sample Status:	MASS-PRODUCTION
Applicant:	XAC AUTOMATION CORP.
Test Date:	Nov. 08 to 15, 2013; Nov. 16, 2016
Standards:	FCC Part 22

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Wendy Wu , **Date:** Dec. 07, 2016

Wendy Wu / Specialist

Approved by : , **Date:** Dec. 07, 2016

May Chen / Manager

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective radiated power	PASS	Meet the requirement of limit.
---	Peak to Average Ratio	PASS	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	PASS	Meet the requirement of limit.
2.1049	Occupied Bandwidth	PASS	Meet the requirement of limit.
22.917	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -26.61dB at 1673.2MHz.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.31 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.40 dB
	6GHz ~ 18GHz	3.73 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Test Site and Instruments

For radiated spurious emissions

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 18, 2016	Aug. 17, 2017
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 07, 2016	May 06, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-156	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 02, 2016	Apr. 01, 2017
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Jan. 20, 2016	Jan. 19, 2017
Pre-Amplifier Agilent	8449B	3008A02465	Apr. 05, 2016	Apr. 04, 2017
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150317 150321 150322	Mar. 30, 2016	Mar. 29, 2017
Spectrum Analyzer Keysight	N9030A	MY54490520	July 29, 2016	July 28, 2017
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 3.
4. The FCC Site Registration No. is 147459
5 Loop antenna was used for all emissions below 30 MHz.
6. The CANADA Site Registration No. is 20331-1
7 Tested Date:Nov. 16, 2016

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100060	May 03, 2013	May 02, 2014
Spectrum Analyzer Agilent	E4446A	MY48250113	Dec. 05, 2012	Dec. 04, 2013
AC Power Source EXTECH Electronics	6502	1140503	NA	NA
Temperature & Humidity Chamber TERCHY	MHU-225AU	911033	Dec. 11, 2012	Dec. 10, 2013
DC Power Supply GOOD WILL INSTRUMENT CO., LTD.	GPC - 3030D	7700087	NA	NA
ESG Vector signal generator Agilent	E4438C	MY47271330 506 602 UNJ	Apr. 30, 2013	Apr. 29, 2014
ESG Vector signal generator Agilent	E4438C	MY45094468/0 05 506 602 UK6 UNJ	Dec. 14, 2012	Dec. 13, 2013
Power meter Anritsu	ML2495A	1014008	Apr. 23, 2013	Apr. 22, 2014
Power sensor Anritsu	MA2411B	0917122	Apr. 23, 2013	Apr. 22, 2014
Power meter Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014
Power meter Anritsu	ML2487B	0930006	Nov. 14, 2012	Nov. 13, 2013
Power sensor Anritsu	MA2491A	0845370	Nov. 14, 2012	Nov. 13, 2013
Software	Total Power Measurement Tools V7.1	NA	NA	NA
Software	ADT_RF Test Software V6.6.5.3	NA	NA	NA
Digital Multimeter FLUKE	87III	73680266	Nov. 09, 2012	Nov. 08, 2013

NOTE: 1. The test was performed in Oven room A.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Nov. 05, 2013

3 General Information

3.1 General Description of EUT

Product	Terminal	
Brand	XAC	
Test Model	xAPT-103WiFi.3G	
Series Model	xCE_T103WiFi.3G	
Status of EUT	MASS-PRODUCTION	
Power Supply Rating	DC 12V from power adapter	
Modulation Type	GPRS, EDGE	GMSK
	WCDMA, HSDPA, HSUPA	8PSK
Operating Frequency	GPRS, EDGE	824.2MHz ~848.8MHz
	WCDMA, HSDPA, HSUPA	826.4MHz ~846.6MHz
Max. ERP Power	GPRS	1584.9mW
	EDGE	891.3mW
	WCDMA	214.8mW
Emission Designator	GPRS	246KGXW
	EDGE	242KG7W
	WCDMA	4M18F9W
Antenna Type	Refer to Note	
Antenna Connector	Refer to Note	
Accessory Device	Adapter (Optional) x 1	
Data Cable Supplied	NA	

Note:

1. All models are listed as below.

Brand	Model	Difference
XAC	xAPT-103WiFi.3G	For marketing requirement
	xCE_T103WiFi.3G	

From the above models, model: **xAPT-103WiFi.3G** was selected as representative model for the test and its data was recorded in this report.

2. The EUT is a WLAN, RFID, GSM and WCDMA device.

3. WLAN, RFID, GSM and WCDMA technology cannot transmit at same time.

4. The EUT power needs to be supplied from one power adapter, the information is as below table:

Brand:	DELTA
Model No.:	ADP-36PH B
Input power :	AC100-240V, 1A, 50-60Hz AC input cable (Unshielded, 1.75m)
Output power :	DC 12V, 3A DC output cable (Unshielded, 0.9 m with one core)

5. The antennas provided to the EUT, please refer to the following table:

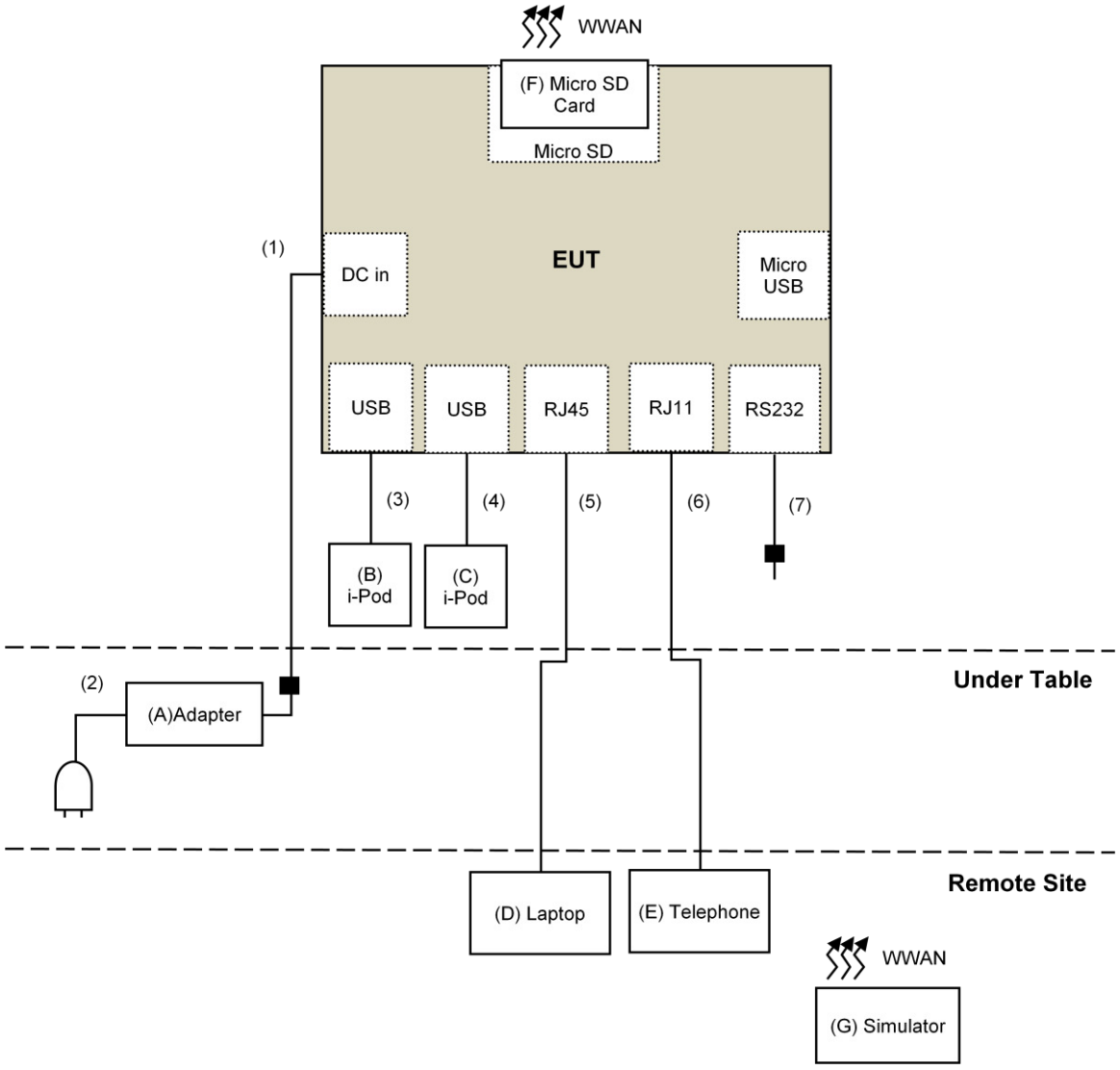
RFID Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency (MHz)
XAC	PCB ENIG ANT BOARD (W/KEY) 8006(ROHS)	Loop Antenna	NA	13	13.56

GPRS / WCDMA(UMTS) / HSDPA / EDGE Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Gain(dBi)	Frequency (MHz)
Ethertronics Inc.	T-000084-01	FPCB	NA	0.14	850
				2.57	1900

WLAN Antenna Spec.					
Brand	Model No.	Antenna Type	Antenna Connector	Antenna Gain(dBi) <Including cable loss>	Frequency (MHz)
ACX	AT3216-T2R4 PAA	Chip	NA	1.5	2400-2500

6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	Adapter	DELTA	ADP-36PH B	NA	NA	Supplied by Client
B	iPod shuffle	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab
C	iPod shuffle	Apple	MD778TA/A	CC4JMA9KF4T1	NA	Provided by Lab
D	Notebook Computer	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
E	Telephone	WONDER	WD-303	7C17KA 05211	NA	Provided by Lab
F	Simulator	R&S	CMU200	121040	NA	Provided by Lab

Note:

All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	DC Cable	1	0.9	No	1	Supplied by client
2	AC Cable	1	1.75	No	0	Supplied by client
3	USB Cable	1	0.1	Yes	0	Provided by Lab
4	USB Cable	1	0.1	Yes	0	Provided by Lab
5	RJ-45 Cable	1	10	No	0	Provided by Lab
6	RJ-11 Cable	1	10	No	0	Provided by Lab
7	Console Cable	1	1.5	No	1	Supplied by client

Note: The core(s) is(are) originally attached to the cable(s).

3.3 Test Mode Applicability and Tested Channel Detail

GSM850 MODE

Test Item	Available Channel	Tested Channel	Mode
ERP	128 to 251	128, 190, 251	GPRS, EDGE
Frequency Stability	128 to 251	190	GPRS
Occupied Bandwidth	128 to 251	128, 190, 251	GPRS, EDGE
Peak to Average Ratio	128 to 251	128, 190, 251	GPRS, EDGE
Band Edge	128 to 251	128, 251	GPRS, EDGE
Conducted Emission	128 to 251	190	GPRS, EDGE
Radiated Emission Below 1GHz	128 to 251	190	GPRS, EDGE
Radiated Emission Above 1GHz	128 to 251	190	GPRS, EDGE

WCDMA V MODE

Test Item	Available Channel	Tested Channel	Mode
ERP	4132 to 4233	4132, 4183, 4233	WCDMA
Frequency Stability	4132 to 4233	4183	WCDMA
Occupied Bandwidth	4132 to 4233	4132, 4183, 4233	WCDMA
Peak to Average Ratio	4132 to 4233	4132, 4183, 4233	WCDMA
Band Edge	4132 to 4233	4132, 4233	WCDMA
Conducted Emission	4132 to 4233	4183	WCDMA
Radiated Emission Below 1GHz	4132 to 4233	4183	WCDMA
Radiated Emission Above 1GHz	4132 to 4233	4183	WCDMA

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Frequency Stability	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Occupied Bandwidth	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Band Edge	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Peak to Average Ratio	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Condcudeted Emission	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Radiated Emission Below 1GHz	25deg. C, 67%RH	120Vac, 60Hz	Robert Cheng
Radiated Emission Above 1GHz	25deg. C, 67%RH	120Vac, 60Hz	Robert Cheng

3.4 EUT Operating Conditions

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 22

KDB 971168 D01 Power Meas License Digital Systems v02r02

ANSI/TIA/EIA-603-D 2010

NOTE: All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

a. All measurements were done at low, middle and high operational frequency range. Set the RBW ≥OBW and VBW≥3xRBW.

b. Substitution method is used for EIRP measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value“ of step b. Record the power level of S.G

d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

e. ERP power can be calculated form EIRP power by subtracting the gain of dipole, ERP power = EIPR power - 2.15dBi.

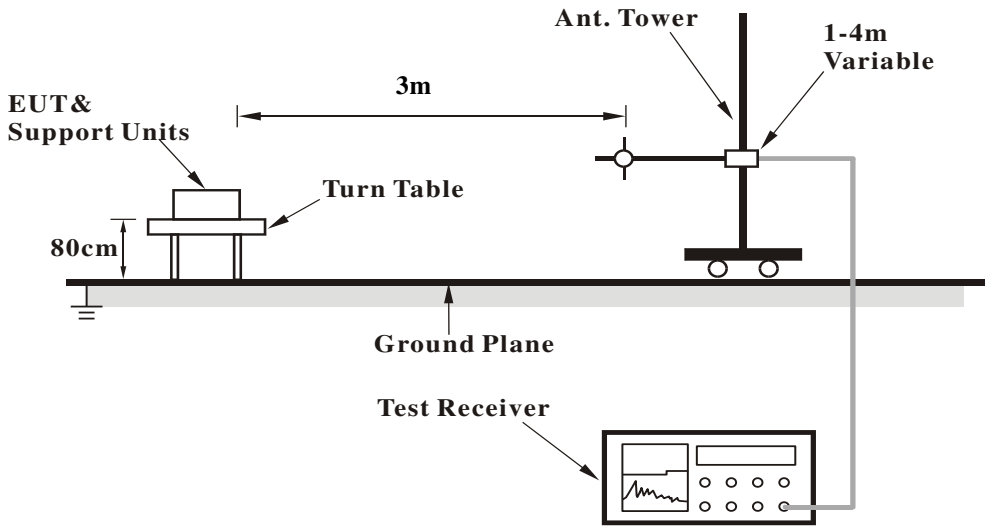
Conducted Power Measurement:

The EUT was set up for the maximum power with GPRS, EDGE, WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Note: The worst case vertical or horizontal polarization have been investigated and reported in this report.

4.1.3 Test Setup

ERP/EIRP MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

CONDUCTED POWER MEASUREMENT:

4.1.4 Test Results

CONDUCTED OUTPUT POWER (dBm)

Band	GSM850		
Channel	128	190	251
Frequency (MHz)	824.2	836.6	848.8
GPRS 8	32.1	32.2	**32.3**
GPRS 10	29.5	29.6	29.6
GPRS 11	27.6	27.7	27.5
GPRS 12	26.6	26.5	26.5
EDGE 8 (MCS9)	26.4	26.2	27.4
EDGE 10 (MCS9)	24.5	24.6	24.7
EDGE 11 (MCS9)	23.1	23.0	23.1
EDGE 12 (MCS9)	22.1	21.8	21.7

Band	WCDMA V		
Channel	4132	4183	4233
Frequency (MHz)	826.4	836.6	846.6
RMC	23.6	23.6	23.3
HSDPA Subtest-1	23.3	23.4	23.2
HSDPA Subtest-2	23.3	23.2	23.2
HSDPA Subtest-3	23.4	23.4	23.1
HSDPA Subtest-4	23.2	23.3	23.1
HSUPA Subtest-1	23.4	23.5	23.1
HSUPA Subtest-2	23.5	23.4	23.2
HSUPA Subtest-3	23.5	23.5	23.2
HSUPA Subtest-4	23.2	23.5	23.2
HSUPA Subtest-5	23.3	23.5	23.3

ERP POWER (dBm)

GPRS

Channel	Frequency (MHz)	Antenna Polarization	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)
128	824.2	H	27.5	1.3	28.8	758.6
190	836.6	H	29.2	1.2	30.4	1096.5
251	848.8	H	31.0	1.0	32.0	1584.9

EDGE

Channel	Frequency (MHz)	Antenna Polarization	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)
128	824.2	H	25.3	1.3	26.6	457.1
190	836.6	H	26.9	1.2	28.1	645.7
251	848.8	H	28.5	1.0	29.5	891.3

WCDMA

Channel	Frequency (MHz)	Antenna Polarization	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)
4132	826.4	H	20.1	1.3	21.4	136.8
4183	836.6	H	20.8	1.2	22.0	157.8
4233	846.6	H	22.3	1.0	23.3	214.8

REMARKS: 1. EIRP Output Power (dBm) = SPA Reading (dBm) + Correction Factor (dB).

2. ERP power = EIPR power - 2.15dBi.
3. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss.

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stabiliity Measurement

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.2.2 Test Procedure

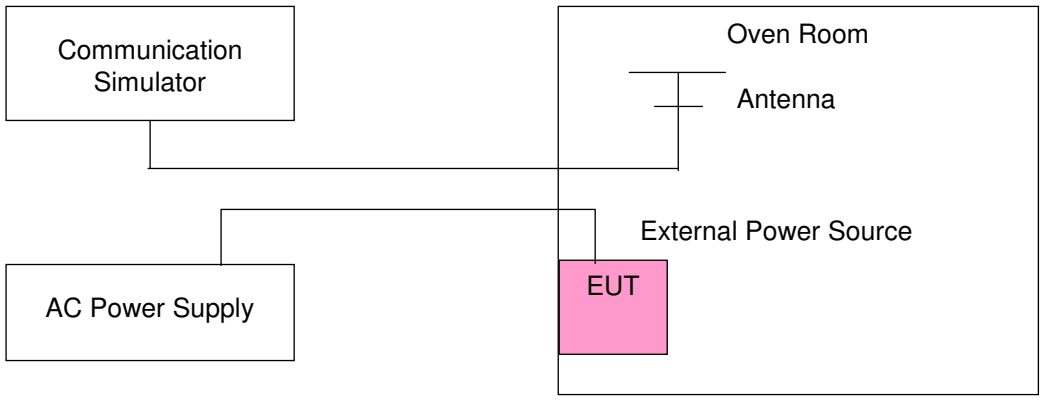
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the AC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	Frequency Error (ppm)			Limit (ppm)
	GPRS	EDGE	WCDMA	
102	0.014	0.019	0.005	2.5
138	0.016	0.020	0.005	2.5

Frequency Error vs. Temperature.

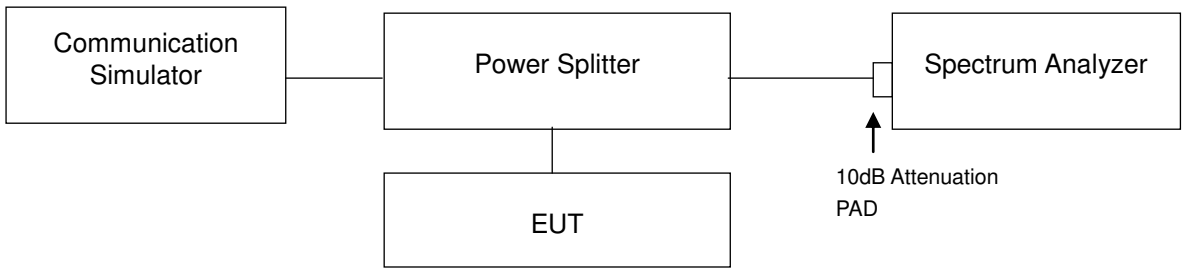
TEMP. (℃)	Frequency Error (ppm)			Limit (ppm)
	GPRS	EDGE	WCDMA	
50	0.031	0.036	0.014	2.5
40	0.026	0.035	0.013	2.5
30	0.024	0.032	0.012	2.5
20	0.022	0.026	0.011	2.5
10	0.022	0.025	0.010	2.5
0	0.025	0.024	0.011	2.5
-10	0.032	0.030	0.014	2.5
-20	0.031	0.031	0.017	2.5
-30	0.033	0.032	0.020	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Setup

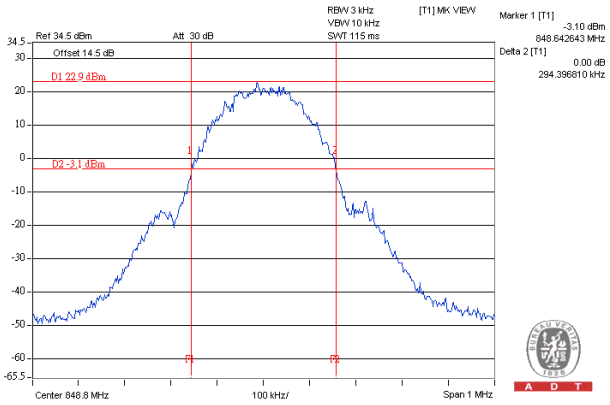


4.3.3 Test Result (-26dB Bandwidth)

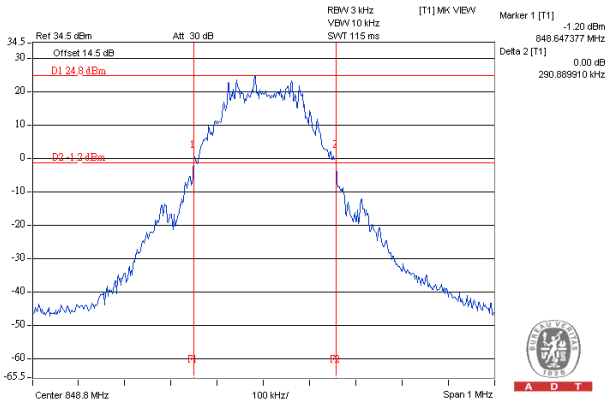
Channel	Frequency (MHz)	-26dB Bandwidth (kHz)		Channel	FREQ. (MHz)	-26dB Bandwidth (MHz)
		GPRS	EDGE			WCDMA
128	824.2	293	288	4132	826.4	4.65
189	836.4	294	285	4182	836.4	4.65
251	848.8	294	290	4233	846.6	4.67

Spectrum Plot Of Worst Value

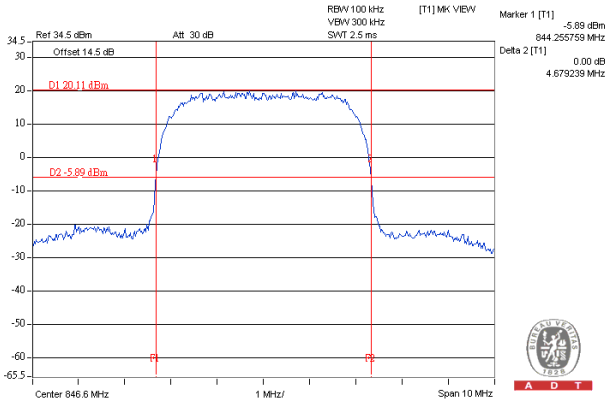
GPRS



EDGE



WCDMA

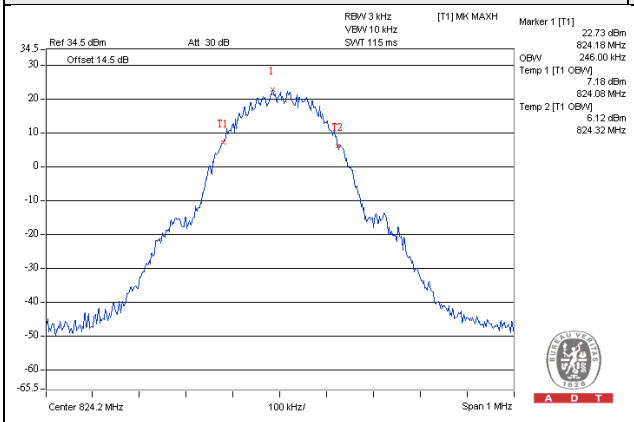


4.3.4 Test Result (Occupied Bandwidth)

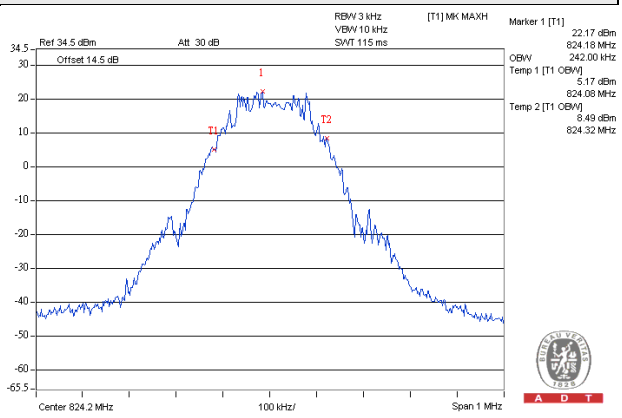
Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)		Channel	FREQ. (MHz)	99% Occupied Bandwidth (MHz)
		GPRS	EDGE			WCDMA
128	824.2	246	242	4132	826.4	4.18
190	836.6	242	238	4183	836.6	4.16
251	848.8	246	238	4233	846.6	4.14

Spectrum Plot Of Worst Value

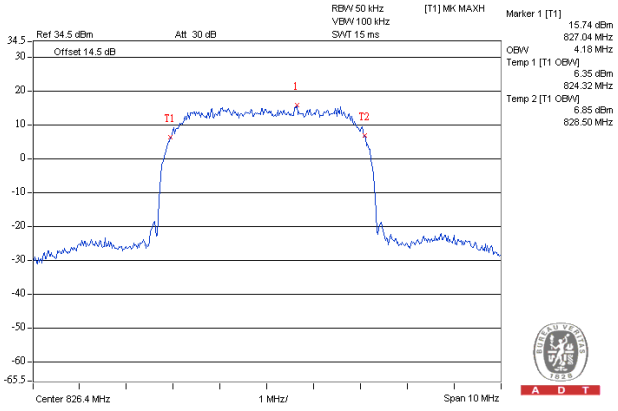
GPRS



EDGE



WCDMA

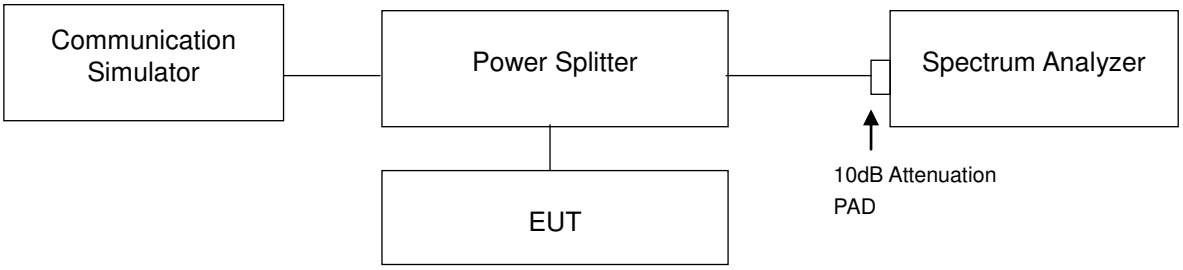


4.4 Band Edge Measurement

4.4.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

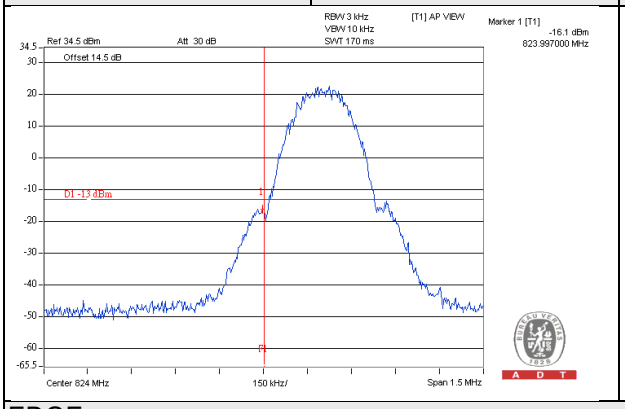
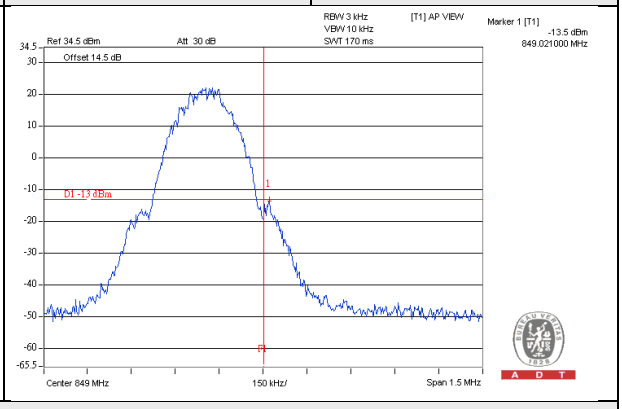
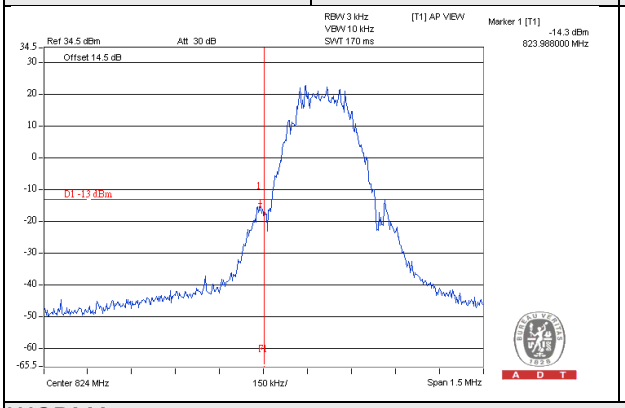
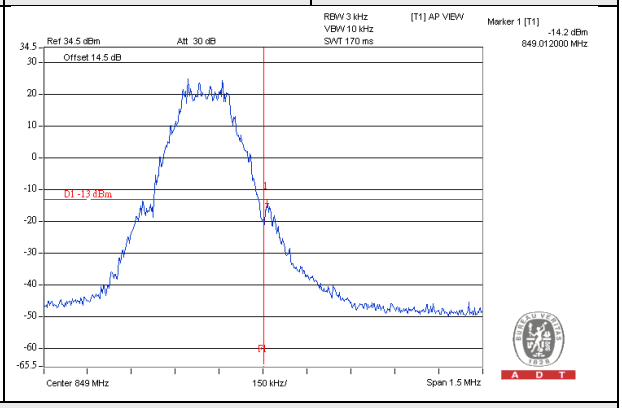
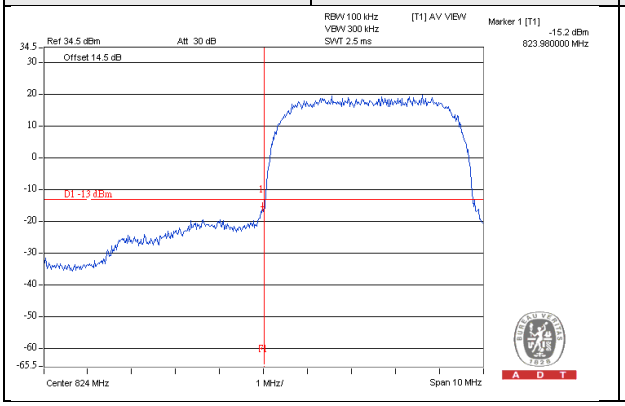
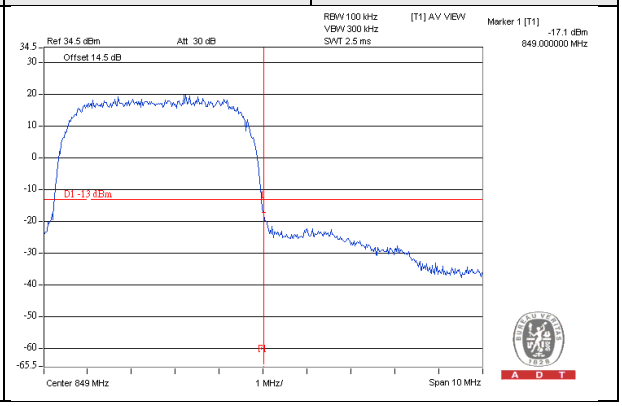
4.4.2 Test Setup



4.4.3 Test Procedures

a. All measurements were done at low and high operational frequency range.
b. The center frequency of spectrum is the band edge frequency and s RB of the spectrum is >1% EMISSION BANDWIDTH and VB of the spectrum is ≧ 3*RB.
c. Record the max trace plot into the test report.

4.4.4 Test Results

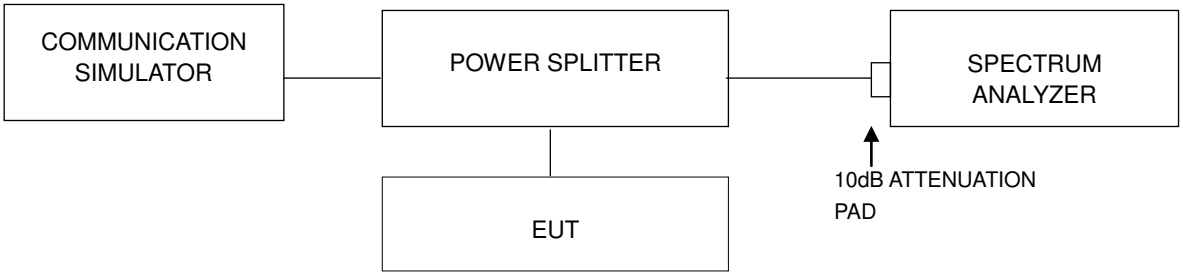
GPRS			
Channel	128	Channel	251
			
EDGE			
Channel	128	Channel	251
			
WCDMA			
Channel	4132	Channel	4233
			

4.5 Peak to Average Ratio

4.5.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

4.5.2 Test Setup



4.5.3 Test Procedures

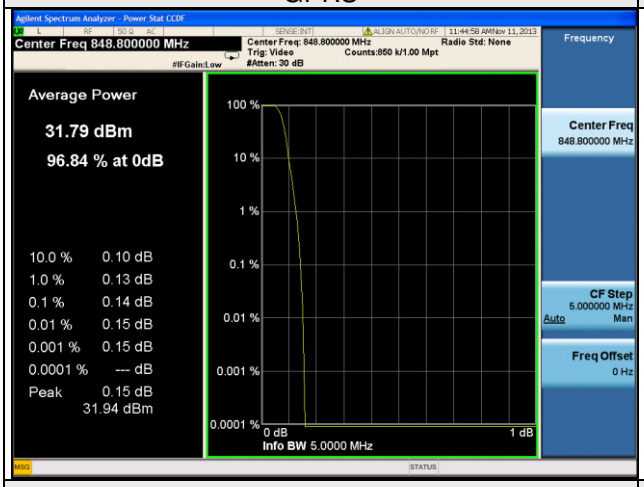
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

4.5.4 Test Results

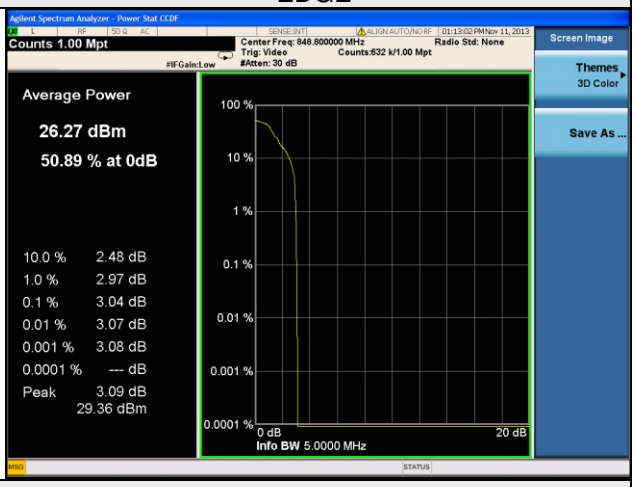
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Freq. (MHz)	Peak to Average Ratio (dB)
		GPRS	EDGE			WCDMA
128	824.2	0.12	2.95	4132	826.4	3.32
190	836.6	0.13	3	4183	836.6	3.17
251	848.8	0.14	3.04	4233	846.6	3.21

Spectrum Plot Of Worst Value

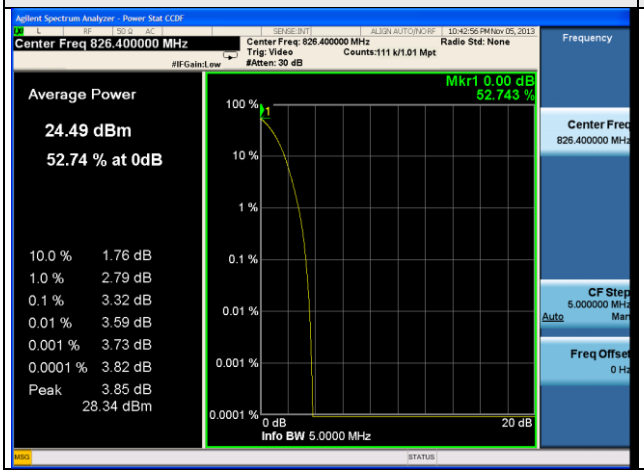
GPRS



EDGE



WCDMA

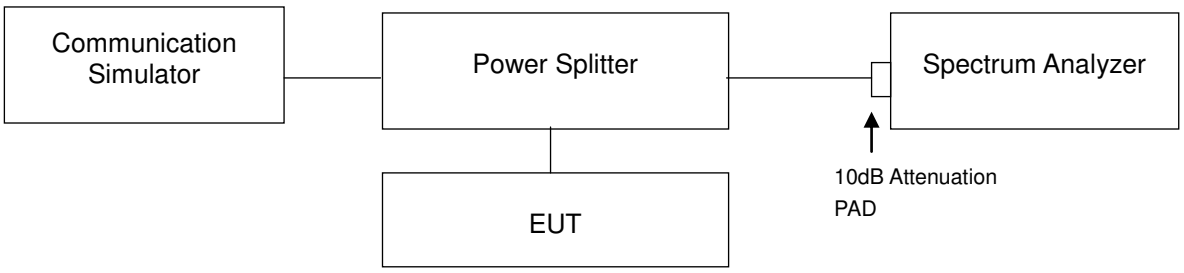


4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

4.6.2 Test Setup

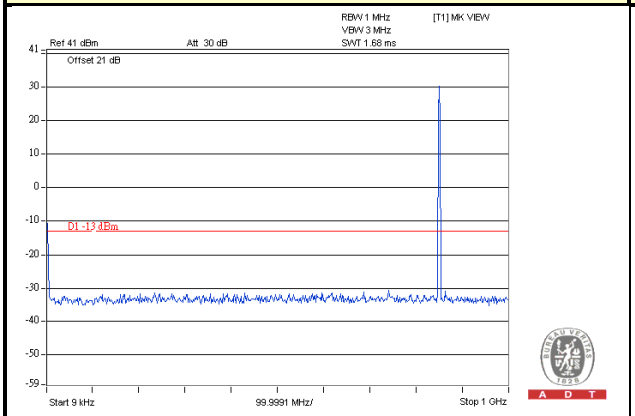
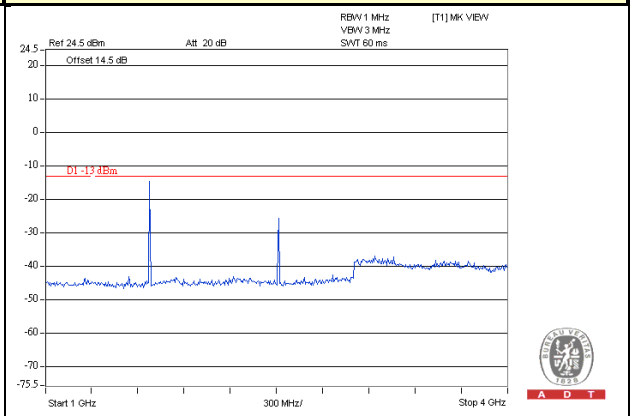
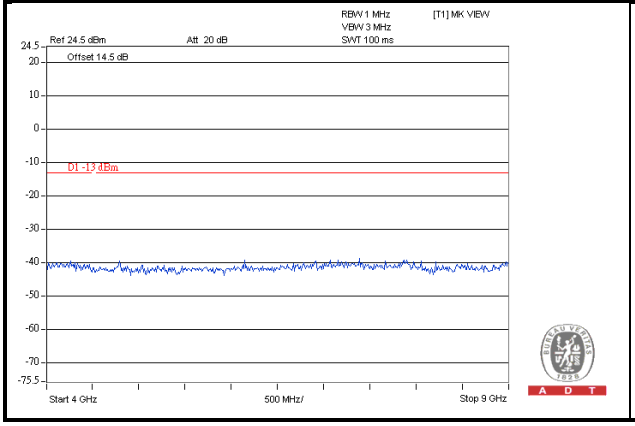


4.6.3 Test Procedure

a. All measurements were done at low, middle and high operational frequency range.

b. Measuring frequency range is from 9 kHz to 10GHz. 10dB attenuation pad is connected with spectrum. RBW:1MHz if the measuring frequency range is at or below 1 GHz and 1 MHz if the measuring frequency range is above 1 GHz .VBW=3*RBW is used for measurement.

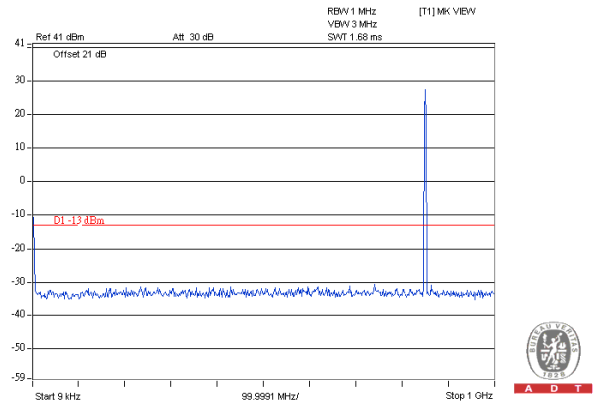
4.6.4 Test Results

GPRS	
CHANNEL 190	
FREQUENCY RANGE : 9kHz~1GHz	**FREQUENCY RANGE : 1GHz~4GHz**
	
FREQUENCY RANGE : 4GHz~9GHz	
	

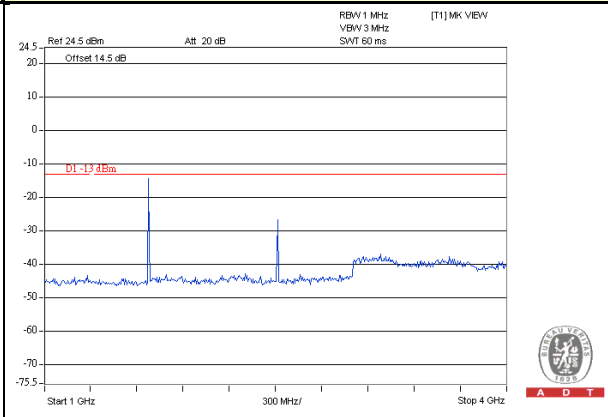
EDGE

CHANNEL 190

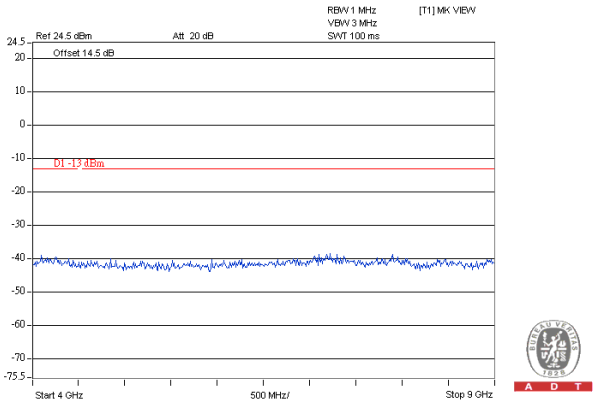
FREQUENCY RANGE : 9kHz~1GHz



FREQUENCY RANGE : 1GHz~4GHz



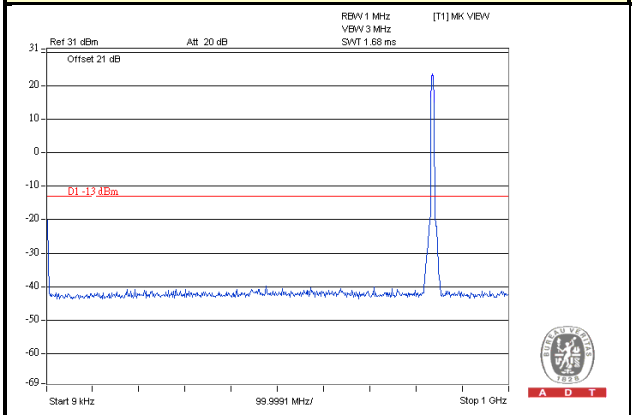
FREQUENCY RANGE : 4GHz~9GHz



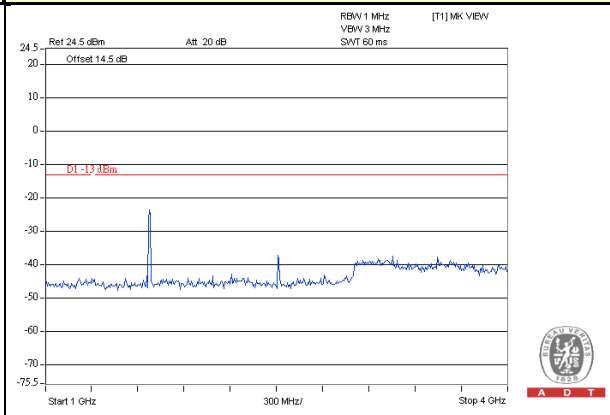
WCDMA

CHANNEL 4183

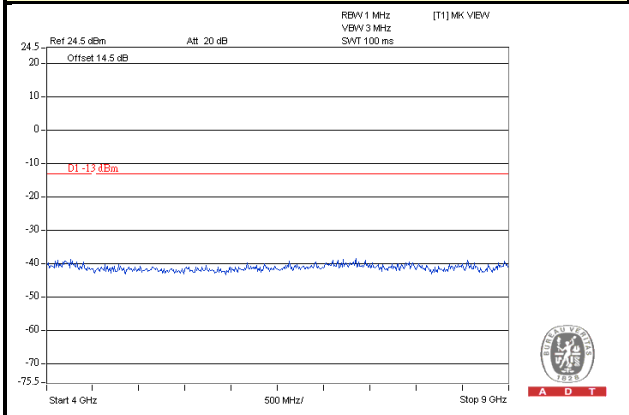
FREQUENCY RANGE : 9kHz~1GHz



FREQUENCY RANGE : 1GHz~4GHz



FREQUENCY RANGE : 4GHz~9GHz



4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

4.7.2 Test Procedure

a. The power was measured with Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high channel of operational frequency range.)

b. Substitution method is used for EIRP measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

c. The substitution antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step b. Record the power level of S.G

d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution antenna.

e. ERP power can be calculated form EIRP power by subtracting the gain of dipole, ERP power = EIPR power - 2.15dBi.

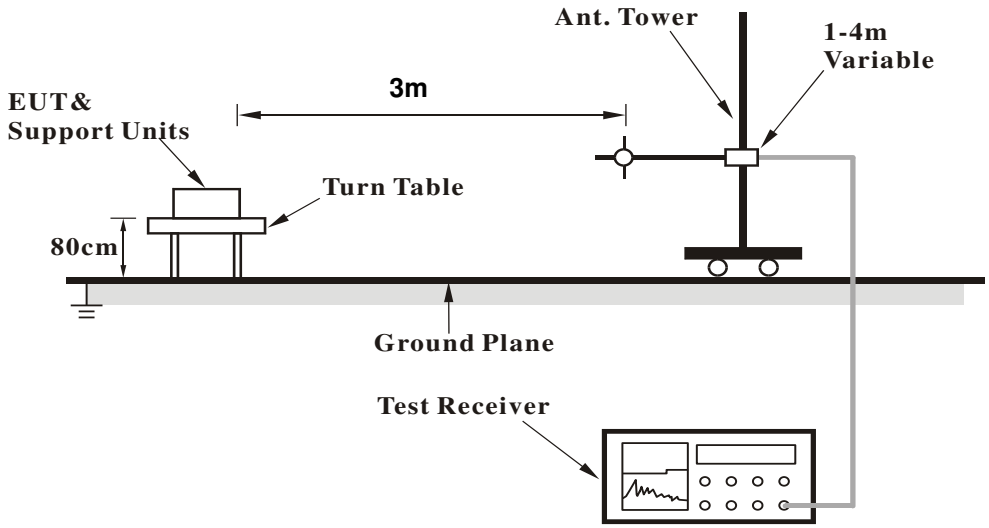
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz/300kHz.

4.7.3 Deviation from Test Standard

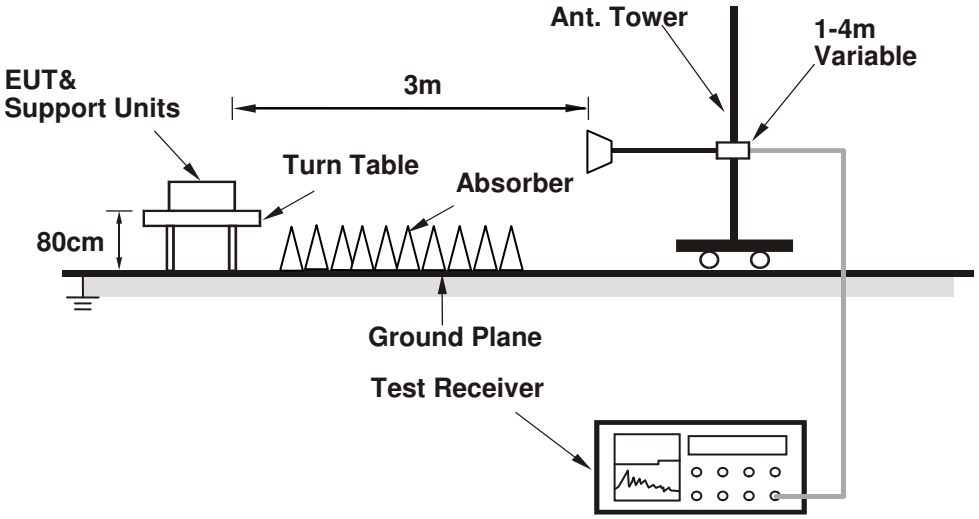
No deviation.

4.7.4 Test Setup

For Below 1GHz



For Above 1GHz:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.7.5 Test Results

BELOW 1GHz

GPRS:

Mode	TX channel 190	Frequency Range	Below 1000 MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	92.29	40.78	-51.22	-1.07	-52.29	-13	-39.29
2	236.95	40.52	-54.85	3.86	-50.99	-13	-37.99
3	289.05	37.69	-57.76	3.78	-53.98	-13	-40.98
4	346.58	37.78	-59.94	3.60	-56.34	-13	-43.34
5	470.63	40.23	-56.90	2.84	-54.06	-13	-41.06
6	736.68	35.33	-61.04	1.03	-60.01	-13	-47.01
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	68.89	38.04	-49.41	-5.00	-54.41	-13	-41.41
2	94.15	37.41	-54.27	-0.96	-55.23	-13	-42.23
3	129.25	33.16	-58.45	-1.24	-59.69	-13	-46.69
4	238.35	36.38	-58.98	3.84	-55.14	-13	-42.14
5	509.92	37.08	-58.32	2.82	-55.51	-13	-42.51
6	609.36	37.97	-56.72	1.78	-54.94	-13	-41.94

Remarks:
1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

EDGE:

Mode	TX channel 190	Frequency Range	Below 1000 MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	93.15	39.44	-52.41	-1.02	-53.43	-13	-40.43
2	237.43	40.37	-54.99	3.85	-51.14	-13	-38.14
3	289.44	36.24	-59.22	3.78	-55.44	-13	-42.44
4	347.16	36.58	-61.17	3.60	-57.57	-13	-44.57
5	469.93	39.59	-57.58	2.84	-54.74	-13	-41.74
6	735.92	33.83	-62.53	1.04	-61.49	-13	-48.49
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	68.11	37.00	-49.98	-5.23	-55.21	-13	-42.21
2	93.78	37.38	-54.36	-0.99	-55.35	-13	-42.35
3	129.19	32.86	-58.73	-1.24	-59.97	-13	-46.97
4	237.42	35.72	-59.64	3.85	-55.79	-13	-42.79
5	510.7	36.87	-58.52	2.81	-55.71	-13	-42.71
6	609.48	37.46	-57.23	1.78	-55.45	-13	-42.45

Remarks:
1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

WCDMA:

Mode	TX channel 4183	Frequency Range	Below 1000 MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	92.25	40.65	-51.36	-1.07	-52.43	-13	-39.43
2	236.63	40.03	-55.34	3.86	-51.48	-13	-38.48
3	289.34	36.35	-59.11	3.78	-55.33	-13	-42.33
4	345.85	36.96	-60.73	3.60	-57.13	-13	-44.13
5	471.4	38.99	-58.09	2.84	-55.25	-13	-42.25
6	736.8	34.93	-61.44	1.03	-60.41	-13	-47.41
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	69.64	36.76	-51.14	-4.78	-55.92	-13	-42.92
2	93.74	36.30	-55.45	-0.99	-56.44	-13	-43.44
3	128.71	31.97	-59.52	-1.24	-60.76	-13	-47.76
4	238.84	36.27	-59.09	3.83	-55.26	-13	-42.26
5	510.34	35.87	-59.53	2.81	-56.71	-13	-43.71
6	610.35	36.91	-57.79	1.78	-56.01	-13	-43.01

Remarks:
1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

ABOVE 1GHz

GPRS:

Mode	TX channel 190	Frequency Range	Above 1000MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	1673.2	55.77	-49.03	7.43	-41.61	-13	-28.61
2	2509.8	39.70	-64.44	6.20	-58.24	-13	-45.24
3	3346.4	43.47	-59.15	4.20	-54.95	-13	-41.95
4	4183	44.84	-57.21	3.51	-53.70	-13	-40.70
5	5019.6	47.37	-53.96	4.38	-49.59	-13	-36.59
6	5856.2	47.36	-49.80	3.78	-46.02	-13	-33.02
7	6692.8	53.64	-45.39	3.00	-42.39	-13	-29.39
8	7529.4	53.47	-46.89	3.71	-43.18	-13	-30.18
9	8366	53.92	-57.65	4.12	-53.54	-13	-40.54
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	1673.2	57.77	-47.03	7.43	-39.61	-13	-26.61
2	2509.8	40.39	-63.75	6.20	-57.55	-13	-44.55
3	3346.4	42	-60.62	4.20	-56.42	-13	-43.42
4	4183	41.61	-60.44	3.51	-56.93	-13	-43.93
5	5019.6	45.35	-55.98	4.38	-51.61	-13	-38.61
6	5856.2	48.55	-49.13	3.39	-45.74	-13	-32.74
7	6692.8	49.84	-49.19	3.00	-46.19	-13	-33.19
8	7529.4	51.83	-48.53	3.71	-44.82	-13	-31.82
9	8366	53.13	-58.44	4.12	-54.33	-13	-41.33

Remarks:

1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

EDGE:

Mode	TX channel 190	Frequency Range	Above 1000MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	1673.2	56.17	-48.59	7.41	-41.18	-13	-28.18
2	2509.8	39.69	-64.45	6.10	-58.35	-13	-45.35
3	3346.4	43.51	-59.13	4.21	-54.91	-13	-41.91
4	4183	44.3	-57.63	3.41	-54.22	-13	-41.22
5	5019.6	45.68	-55.47	4.40	-51.06	-13	-38.06
6	5856.2	46.83	-50.33	3.78	-46.55	-13	-33.55
7	6692.8	53.24	-45.93	2.95	-42.99	-13	-29.99
8	7529.4	53.95	-46.52	3.77	-42.74	-13	-29.74
9	8366	55.65	-56.98	4.16	-52.82	-13	-39.82
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	1673.2	55.01	-49.75	7.41	-42.34	-13	-29.34
2	2509.8	40.53	-63.61	6.10	-57.51	-13	-44.51
3	3346.4	41.78	-60.86	4.21	-56.64	-13	-43.64
4	4183	41.57	-60.36	3.41	-56.95	-13	-43.95
5	5019.6	44.78	-56.37	4.40	-51.96	-13	-38.96
6	5856.2	47.05	-50.41	3.60	-46.81	-13	-33.81
7	6692.8	49.1	-50.07	2.95	-47.13	-13	-34.13
8	7529.4	49.6	-50.87	3.77	-47.09	-13	-34.09
9	8366	52.09	-60.54	4.16	-56.38	-13	-43.38

Remarks:
1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

WCDMA:

Mode	TX channel 4183	Frequency Range	Above 1000MHz

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	1673.2	54.36	-50.36	7.39	-42.97	-13	-29.97
2	2509.8	41.01	-63.13	6.00	-57.13	-13	-44.13
3	3346.4	44.94	-57.74	4.22	-53.52	-13	-40.52
4	4183	46.34	-55.48	3.32	-52.16	-13	-39.16
5	5019.6	48.36	-52.60	4.43	-48.17	-13	-35.17
6	5856.2	50.69	-46.47	3.78	-42.69	-13	-29.69
7	6692.8	53.62	-45.69	2.89	-42.81	-13	-29.81
8	7529.4	53.83	-46.75	3.84	-42.91	-13	-29.91
9	8366	55.41	-58.28	4.20	-54.08	-13	-41.08
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	Emission Value (dBm)	Limit (dBm)	Margin (dB)
1	1673.2	56.81	-47.91	7.39	-40.52	-13	-27.52
2	2509.8	40.49	-63.65	6.00	-57.65	-13	-44.65
3	3346.4	43.04	-59.64	4.22	-55.42	-13	-42.42
4	4183	45.2	-56.62	3.32	-53.30	-13	-40.30
5	5019.6	47.99	-52.97	4.43	-48.54	-13	-35.54
6	5856.2	49.46	-47.79	3.80	-43.98	-13	-30.98
7	6692.8	53.54	-45.77	2.89	-42.89	-13	-29.89
8	7529.4	54.42	-46.16	3.84	-42.32	-13	-29.32
9	8366	55.38	-58.31	4.20	-54.11	-13	-41.11

Remarks:
1. Emission Value (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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