

FCC Test Report

(PART 24)

Report No.: RF140522E04B-4

FCC ID: MQT-XCE200T3G

Test Model: xCE-200T.3G

Series Model: xCE_E200T.3G

Received Date: July 06, 2016

Test Date: Aug. 05 to 18, 2016

Issued Date: Aug. 31, 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.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Test Site and Instruments.....	7
3 General Information	9
3.1 General Description of EUT	9
3.2 Configuration of System under Test	11
3.2.1 Description of Support Units.....	12
3.3 Test Mode Applicability and Tested Channel Detail	13
3.4 EUT Operating Conditions	14
3.5 General Description of Applied Standards	15
4 Test Types and Results	16
4.1 Output Power Measurement	16
4.1.1 Limits of Output Power Measurement.....	16
4.1.2 Test Procedures.....	16
4.1.3 Test Setup.....	17
4.1.4 Test Results	18
4.2 Frequency Stability Measurement.....	20
4.2.1 Limits of Frequency Stability Measurement.....	20
4.2.2 Test Procedure	20
4.2.3 Test Setup.....	21
4.2.4 Test Results	21
4.3 Occupied Bandwidth Measurement	22
4.3.1 Test Procedure	22
4.3.2 Test Setup.....	22
4.3.3 Test Result (-26dB Bandwidth).....	23
4.3.4 Test Result (Occupied Bandwidth)	24
4.4 Band Edge Measurement	25
4.4.1 Limits of Band Edge Measurement	25
4.4.2 Test Setup.....	25
4.4.3 Test Procedures.....	25
4.4.4 Test Results	26
4.5 Peak to Average Ratio.....	28
4.5.1 Limits of Peak to Average Ratio Measurement.....	28
4.5.2 Test Setup	28
4.5.3 Test Procedures.....	28
4.5.4 Test Results	29
4.6 Conducted Spurious Emissions	30
4.6.1 Limits of Conducted Spurious Emissions Measurement.....	30
4.6.2 Test Setup.....	30
4.6.3 Test Procedure	30
4.6.4 Test Results	31
4.7 Radiated Emission Measurement	37
4.7.1 Limits of Radiated Emission Measurement.....	37
4.7.2 Test Procedure	37
4.7.3 Deviation from Test Standard	37
4.7.4 Test Setup.....	38
4.7.5 Test Results	39

5	Pictures of Test Arrangements	45
	Appendix – Information on the Testing Laboratories	46

Release Control Record

Issue No.	Description	Date Issued
RF140522E04B-4	Original release.	Aug. 31, 2016

1 Certificate of Conformity

Product: Terminal

Brand: XAC

Test Model: xCE-200T.3G

Series Model: xCE_E200T.3G

Sample Status: ENGINEERING SAMPLE

Applicant: XAC AUTOMATION CORP.

Test Date: Aug. 05 to 18, 2016

Standards: FCC Part 24

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 : Midoli Peng , **Date:** Aug. 31, 2016
Midoli Peng / Specialist

Approved by : May Chen , **Date:** Aug. 31, 2016
May Chen / Manager

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Radiated Power	PASS	Meet the requirement of limit.
2.1046 24.232(d)	Peak To Average Ratio	PASS	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	PASS	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -15.61dB at 18800MHz.

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) (\pm)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.72 dB
	6GHz ~ 18GHz	4.00 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Test Site and Instruments

For Equivalent Isotropically Radiated Power & Radiated Spurious Emissions test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210202	Dec. 16, 2015	Dec. 15, 2016
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Jan. 07, 2016	Jan. 06, 2017
RF Cable	8D-FB	CHHCAB-001- 1	Oct. 04, 2015	Oct. 03, 2016
		CHHCAB-001- 2		
	RF-141	CHHCAB-004	Oct. 04, 2015	Oct. 03, 2016
Horn_Antenna FT-RF	HA-07M18G-N F	0000220091110	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 27, 2015	Oct. 26, 2016
RF Cable	NA	131206 131213 131215 SNMY23685/4	Jan. 15, 2016	Jan. 14, 2017
Spectrum Analyzer Agilent	E4446A	MY48250254	Nov. 25, 2015	Nov. 24, 2016
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 11, 2015	Dec. 10, 2016
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Jan. 18, 2016	Jan. 17, 2017
RF Cable	SUCOFLEX 102	36442/2 36434/2	Dec. 10, 2015	Dec. 09, 2016
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	CM100	NA	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-WD02	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 test was performed in 966 Chamber No. H.
3. The FCC Site Registration No. is 797305.
4. The CANADA Site Registration No. is IC 7450H-3.
5. Tested Date: Aug. 05 to 18, 2016

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP40	100036	Jan. 27, 2016	Jan. 26, 2017
Spectrum Analyzer Keysight	N9030A	MY54490570	July 06, 2016	July 05, 2017
AC Power Source Exttech Electronics	6502	1140503	NA	NA
Temperature & Humidity Chamber TERCHY	MHU-225AU	911033	Dec. 03, 2015	Dec. 02, 2016
DC Power Supply GOOD WILL INSTRUMENT CO., LTD.	GPC - 3030D	7700087	NA	NA
ESG Vector signal generator Agilent	E4438C	Y45094468/00 5 506 602 UK6 UNJ	Dec. 01, 2015	Nov. 30, 2016
Power meter Anritsu	ML2495A	0824006	May 26, 2016	May 25, 2017
Power sensor Anritsu	MA2411B	0738172	May 26, 2016	May 25, 2017
Software	ADT_RF Test Software V6.6.5.3	NA	NA	NA
Digital Multimeter FLUKE	87III	73680266	Nov. 10, 2015	Nov. 09, 2016

- NOTE:**
1. The test was performed in Oven room 1.
 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: Aug. 13, 2016

3 General Information

3.1 General Description of EUT

Product	Terminal	
Brand	XAC	
Test Model	xCE-200T.3G	
Series Model	xCE_E200T.3G	
Status of EUT	ENGINEERING SAMPLE	
Power Supply Rating	DC 12V from power adapter	
Modulation Type	GPRS	GMSK
	EDGE	GMSK, 8PSK
	WCDMA, HSDPA, HSUPA	BPSK
Operating Frequency	GPRS, EDGE	Uplink: 1850MHz ~1910MHz Downlink: 1930MHz ~1990MHz
	WCDMA, HSDPA, HSUPA	Uplink: 1850MHz ~1910MHz Downlink: 1930MHz ~1990MHz
Max. ERP Power	GPRS	1513.561mW
	EDGE	1513.561mW
	WCDMA	240.991mW
Emission Designator	GPRS	250KGXW
	EDGE	246KG7W
	WCDMA	4M08F9W
	HSDPA	4M10F9W
	HSUPA	4M10F9W
Antenna Type	Please see Note	
Antenna Connector	Please see Note	
Accessory Device	Adapter (Optional) x 1	
Data Cable Supplied	NA	

Note:

1. All models are listed as below.

Brand Name	Model No.	Description
XAC	xCE-200T.3G	For marketing requirement
XAC	xCE_E200T.3G	

From the above models, model: **xCE-200T.3G** was selected as representative model for the test and its data was recorded in this report.

2. The EUT could be supplied with power adapter as the following table:

Brand	Model No.	Spec.
FSP GROUP INC	FSP040-RHAN2	AC I/P: 100-240V, 50-60Hz, 1.5A AC input cable (UnShielded, 1.8m) DC O/P: 12V, 3.33A DC output cable(Unshielded, 1.5m with 1 core)

3. There are WLAN, Bluetooth and WWAN technology used for the EUT.
 4. Simultaneously transmission condition.

Condition	Technology		
1	WLAN	Bluetooth	WWAN

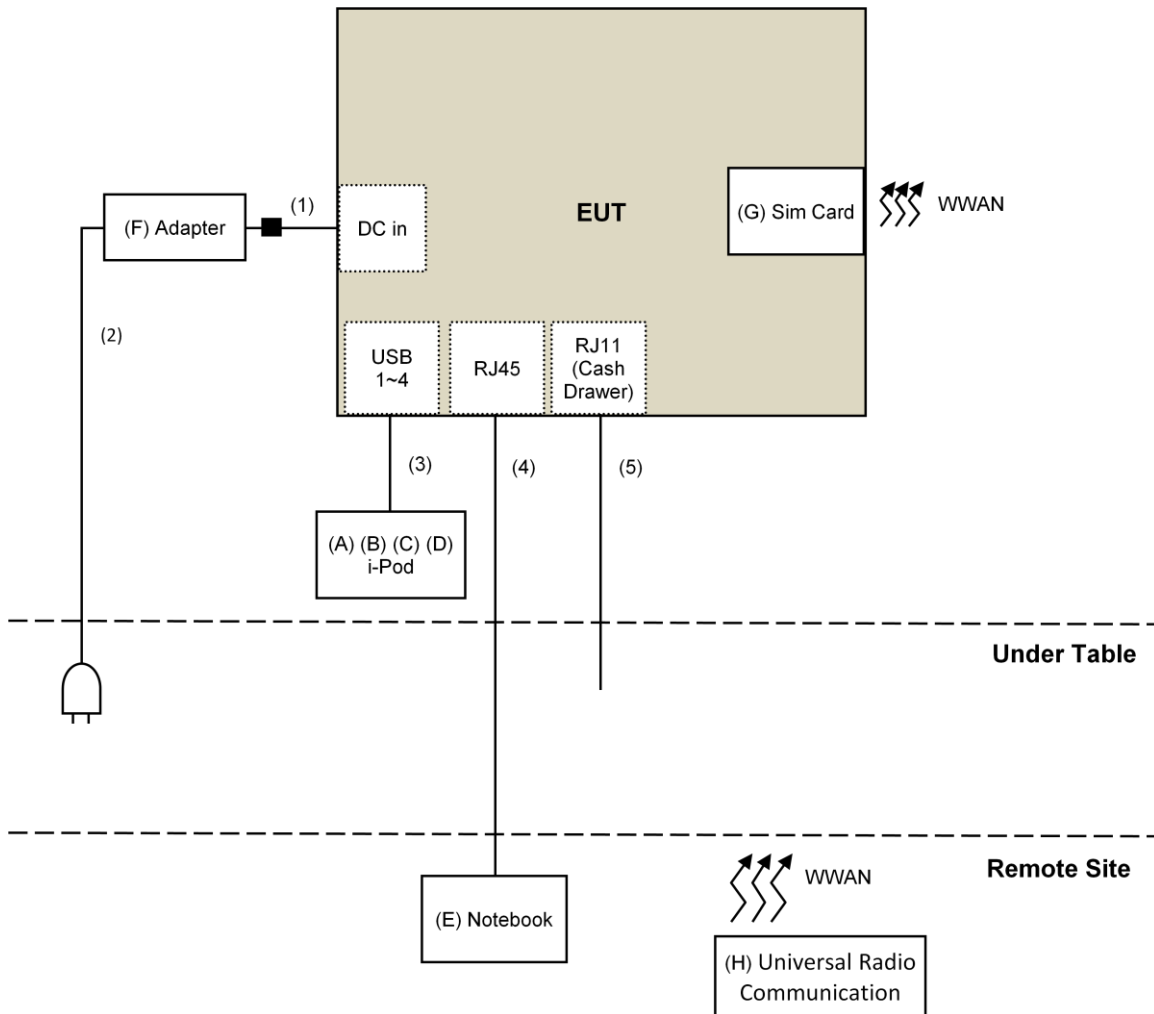
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

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

WLAN, Bluetooth					
Brand	Model	Antenna Gain (dBi)	Frequency range (GHz to GHz)	Antenna Type	Connector Type
ACX	AT3216-T2R4PAA	1.5	2.4~2.4835	Chip	NA
WWAN					
Brand	Model	Antenna Gain (dBi)	Frequency range	Antenna Type	Connector Type
INPAQ	WA-F-P5-02-011	FDD I :4.2 FDD II: 3.9 FDD V: 0.82 FDD VIII: 0.23 GSM1800: 3.68	GSM850 / FDD V (824-849 MHz) FDD I (1920-1980 MHz) GSM1800 (1710~1785 MHz) GSM1900 / FDD II (1850-1910 MHz) GSM900 / FDD VIII (880-915 MHz)	PCB	RFI-PEX MHF

6. The above EUT information was 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	iPod	Apple	MC749TA/A	CC4DMFJUDEFDM	NA	Provided by Lab
B	iPod	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab
C	iPod	Apple	MC749TA/A	CC4DN29UDFDM	NA	Provided by Lab
D	iPod	Apple	MD778TA/A	CC4JMFL0F4T1	NA	Provided by Lab
E	Notebook Computer	DELL	PP32LA	GSLB32S	FCC DoC	Provided by Lab
F	Adapter	FSP GROUP INC.	FSP040-RHAN2	NA	NA	Supplied by client
G	Sim Card	R&S	CRT-Z3	NA	NA	Provided by Lab
H	Universal Radio Communication Tester	R&S	CMU200	121040	NA	Provided by Lab

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	DC Cable	1	1.5	No	1	Supplied by client
2	AC Cable	1	1.8	No	0	Supplied by client
3	USB Cable	4	0.1	Yes	0	Provided by Lab
4	RJ45 Cable	1	10	No	0	Provided by Lab
5	RS-232 to RJ11	1	1.3	No	0	Supplied by client

NOTE: 1. The core(s) is(are) originally attached to the cable(s).

3.3 Test Mode Applicability and Tested Channel Detail

GSM1900 MODE

Test Item	Available Channel	Tested Channel	Mode
EIRP	512 to 810	512, 661, 810	GPRS, EDGE
Frequency Stability	512 to 810	661	GPRS
Occupied Bandwidth	512 to 810	512, 661, 810	GPRS, EDGE
Band Edge	512 to 810	512, 810	GPRS, EDGE
Peak To Average Ratio	512 to 810	512, 661, 810	GPRS, EDGE
Conducted Emission	512 to 810	512, 661, 810	GPRS
Radiated Emission Below 1GHz	512 to 810	661	GPRS, EDGE
Radiated Emission Above 1GHz	512 to 810	661	GPRS, EDGE

WCDMA II MODE

Test Item	Available Channel	Tested Channel	Mode
EIRP	9262 to 9538	9262, 9400, 9538	WCDMA
Frequency Stability	9262 to 9538	9400	WCDMA
Occupied Bandwidth	9262 to 9538	9262, 9400, 9538	WCDMA, HSDPA, HSUPA
Band Edge	9262 to 9538	9262, 9538	WCDMA, HSDPA, HSUPA
Peak To Average Ratio	9262 to 9538	9262, 9400, 9538	WCDMA
Conducted Emission	9262 to 9538	9262, 9400, 9538	WCDMA
Radiated Emission Below 1GHz	9262 to 9538	9400	WCDMA
Radiated Emission Above 1GHz	9262 to 9538	9400	WCDMA

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	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	24deg. C, 64%RH	120Vac, 60Hz	Robert Cheng
Condcudeted Emission	25deg. C, 63%RH	120Vac, 60Hz	Robert Cheng
Radiated Emission Below 1GHz	26deg. C, 72%RH	120Vac, 60Hz	Weiwei Lo
Radiated Emission Above 1GHz	26deg. C, 72%RH	120Vac, 60Hz	Weiwei Lo

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 24

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 2 watts e.i.r.p.

4.1.2 Test Procedures

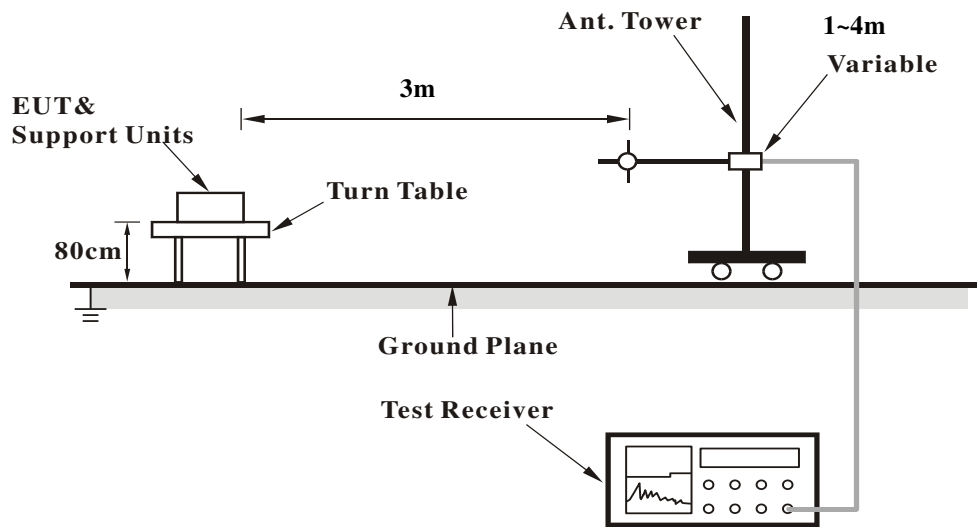
EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GPRS and 5MHz for WCDMA mode.
- 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 horn 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. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- e. ERP power can be calculated form EIRP power by subtracting the gain of dipole, $ERP \text{ power} = EIPR \text{ power} - 2.15\text{dBi}.$

Conducted Power Measurement:

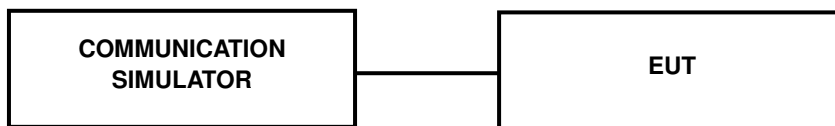
The EUT was set up for the maximum power with GPRS & WCDMA link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 Test Setup
EIRP / ERP MEASUREMENT:



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

CONDUCTED POWER MEASUREMENT:



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

4.1.4 Test Results

CONDUCTED OUTPUT POWER (dBm)

Band	GPRS1900		
Channel	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8
GPRS	28.44	28.62	28.60
EDGE	28.35	28.52	28.54

Band	WCDMA II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
RMC	23.78	23.82	23.76
HSDPA Subtest-1	23.71	23.74	23.70
HSDPA Subtest-2	23.67	23.62	23.61
HSDPA Subtest-3	23.57	23.45	23.61
HSDPA Subtest-4	23.42	23.43	23.41
HSUPA Subtest-1	23.39	23.37	23.27
HSUPA Subtest-2	23.45	23.41	23.45
HSUPA Subtest-3	23.40	23.41	23.39
HSUPA Subtest-4	23.37	23.45	23.36
HSUPA Subtest-5	23.45	23.38	23.36

EIRP POWER (dBm)

GPRS

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)
512	1850.2	24.99	6.63	31.62	1452.112
661	1880.0	25.12	6.68	31.80	1513.561
810	1909.8	24.65	6.74	31.39	1377.209

EDGE

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)
512	1850.2	24.68	6.63	31.31	1352.073
661	1880.0	24.88	6.68	31.56	1432.188
810	1909.8	25.06	6.74	31.80	1513.561

WCDMA

Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)
9262	1852.4	16.78	7.00	23.78	238.781
9400	1880.0	17.14	6.68	23.82	240.991
9538	1907.6	17.09	6.67	23.76	237.684

- REMARKS:** 1. Output Power (dBm) = SPA Reading (dBm) + Correction Factor (dB).
 2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss.

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

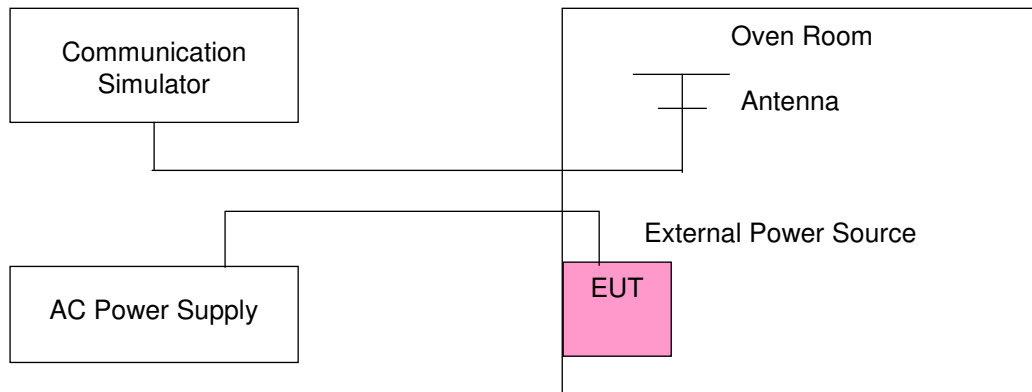
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

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 °C 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	WCDMA	
102	0.006	0.011	2.5
138	0.007	0.009	2.5

Frequency Error vs. Temperature.

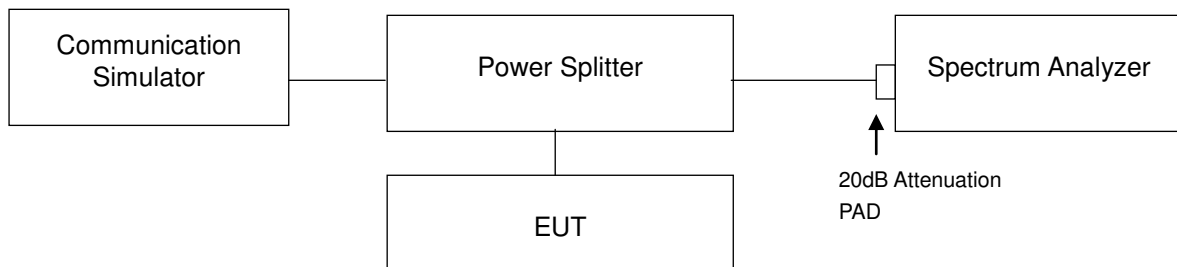
TEMP. (°C)	Frequency Error (ppm)		Limit (ppm)
	GPRS	WCDMA	
75	0.016	0.017	2.5
70	0.015	0.017	2.5
60	0.015	0.013	2.5
50	0.013	0.014	2.5
40	0.012	0.011	2.5
30	0.010	0.010	2.5
20	0.008	0.011	2.5
10	0.007	0.011	2.5
0	0.010	0.012	2.5
-10	0.011	0.013	2.5
-20	0.014	0.014	2.5
-30	0.018	0.015	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

The EUT makes a call to the communication simulator. 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.

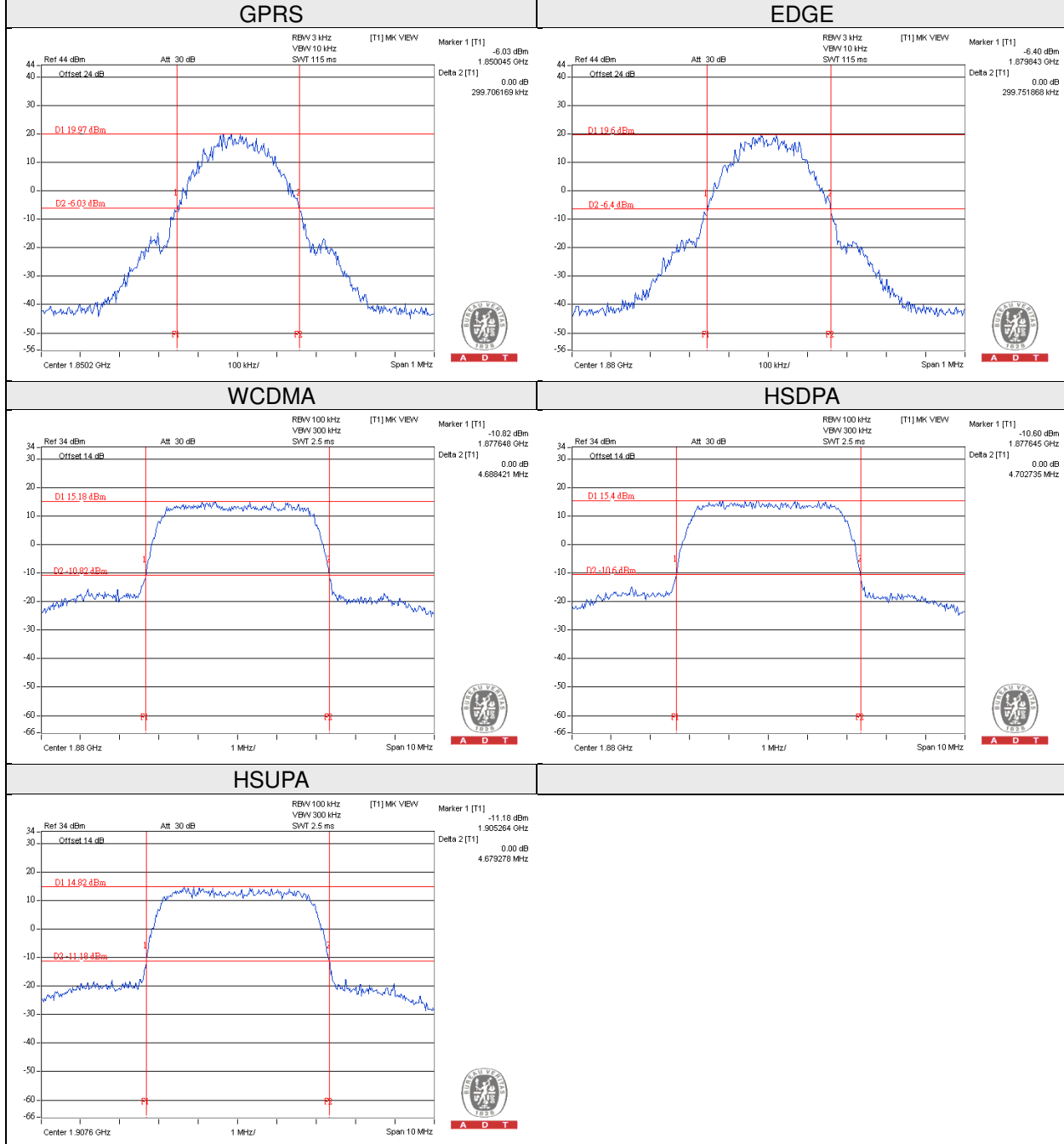
4.3.2 Test Setup



4.3.3 Test Result (-26dB Bandwidth)

Channel	Frequency (MHz)	-26dB Bandwidth (kHz)		Channel	FREQ. (MHz)	-26dB Bandwidth (MHz)		
		GPRS	GPRS			WCDMA	HSDPA	HSUPA
512	1850.2	299.706	299.727	9262	1852.4	4.668	4.650	4.664
661	1880.0	299.128	299.752	9400	1880.0	4.688	4.703	4.657
810	1909.8	299.567	299.174	9538	1907.6	4.676	4.670	4.679

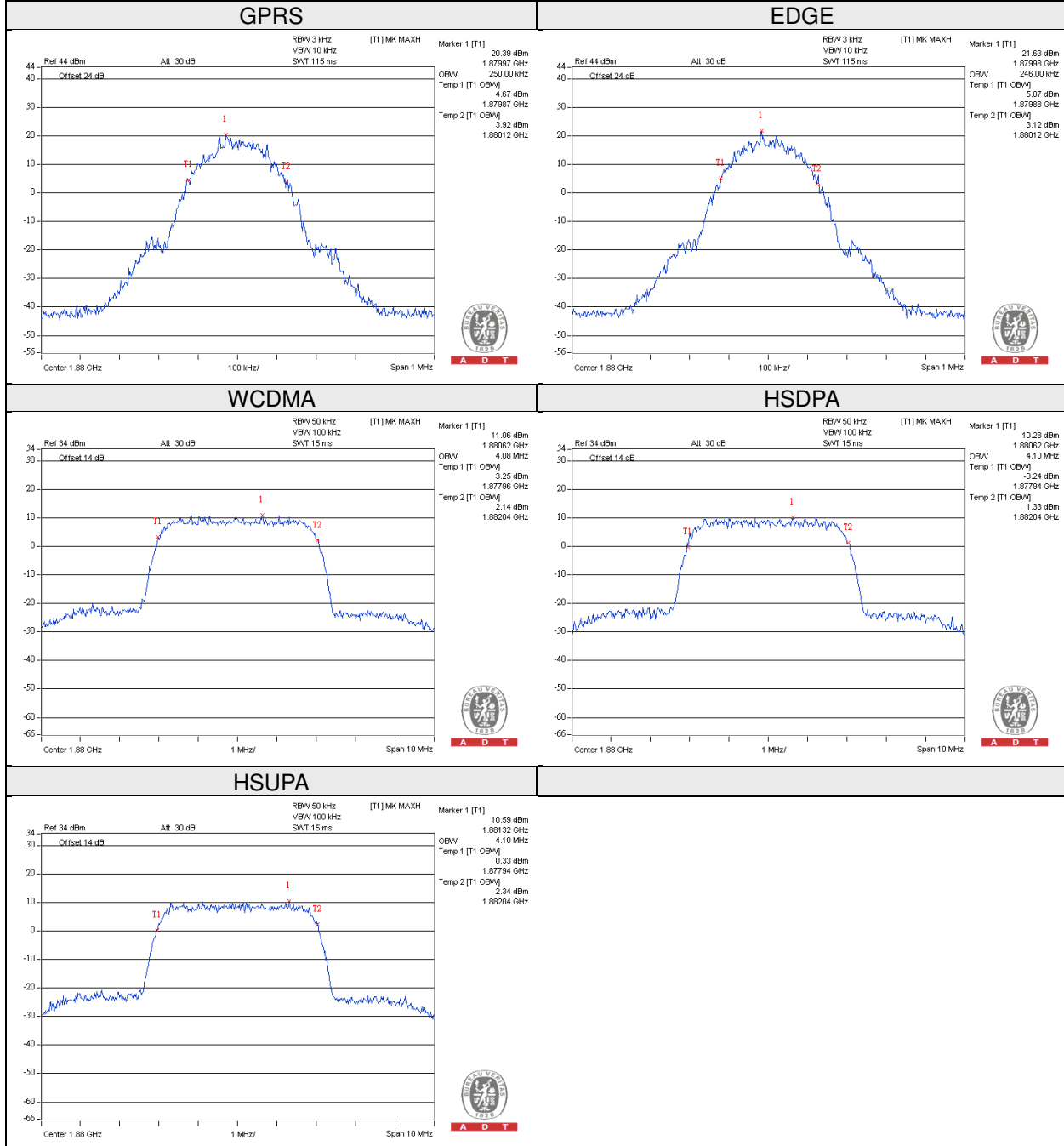
Spectrum Plot Of Worst Value



4.3.4 Test Result (Occupied Bandwidth)

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)		Channel	FREQ. (MHz)	99% Occupied Bandwidth (MHz)		
		GPRS	GPRS			WCDMA	HSDPA	HSUPA
512	1850.2	242	246	9262	1852.4	4.06	4.08	4.08
661	1880.0	250	246	9400	1880.0	4.08	4.10	4.10
810	1909.8	244	246	9538	1907.6	4.08	4.08	4.06

Spectrum Plot Of Worst Value

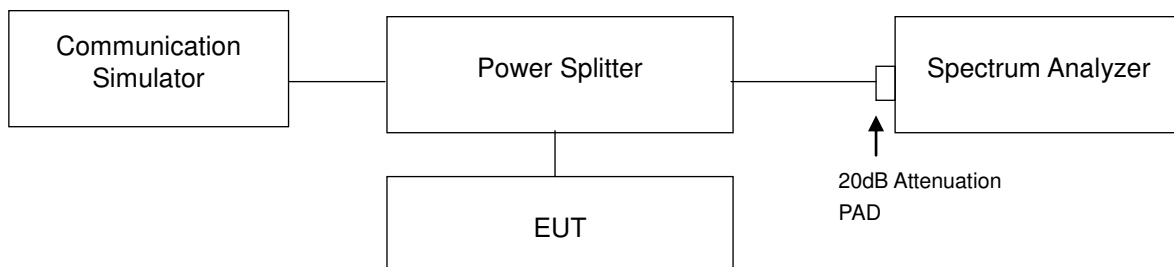


4.4 Band Edge Measurement

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.

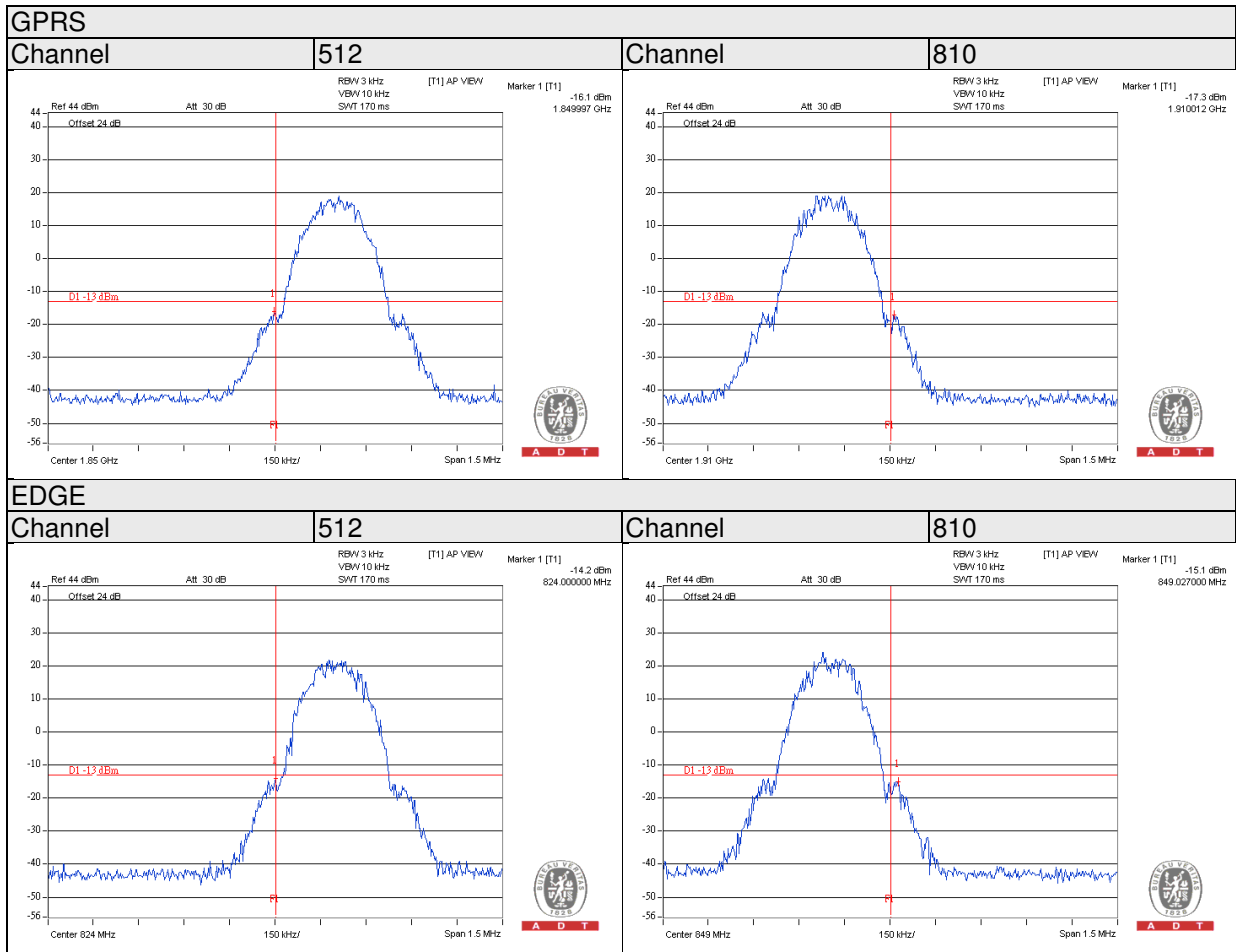
4.4.2 Test Setup



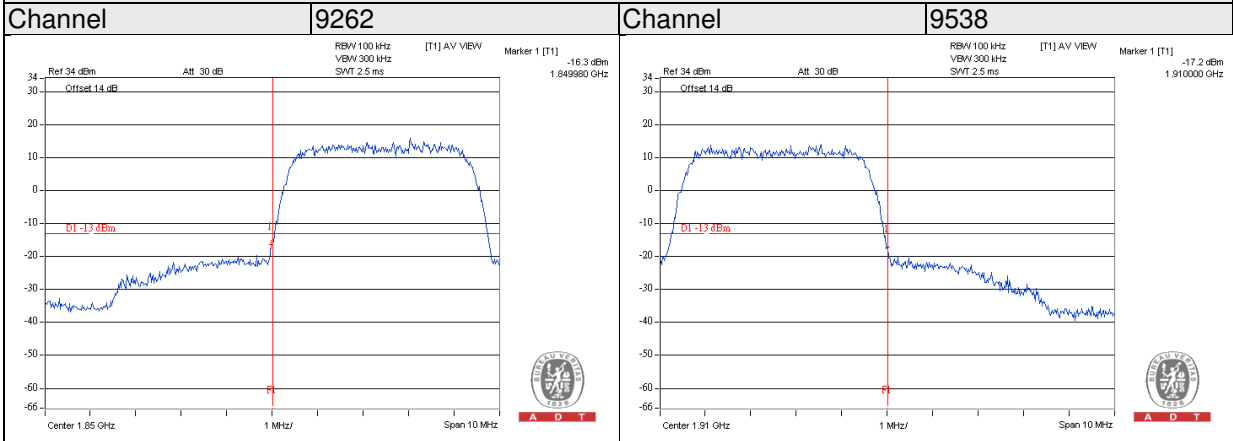
4.4.3 Test Procedures

- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 1.5MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GPRS).
- c. The center frequency of spectrum is the band edge frequency and span is 10MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (WCDMA).
- d. Record the max trace plot into the test report.

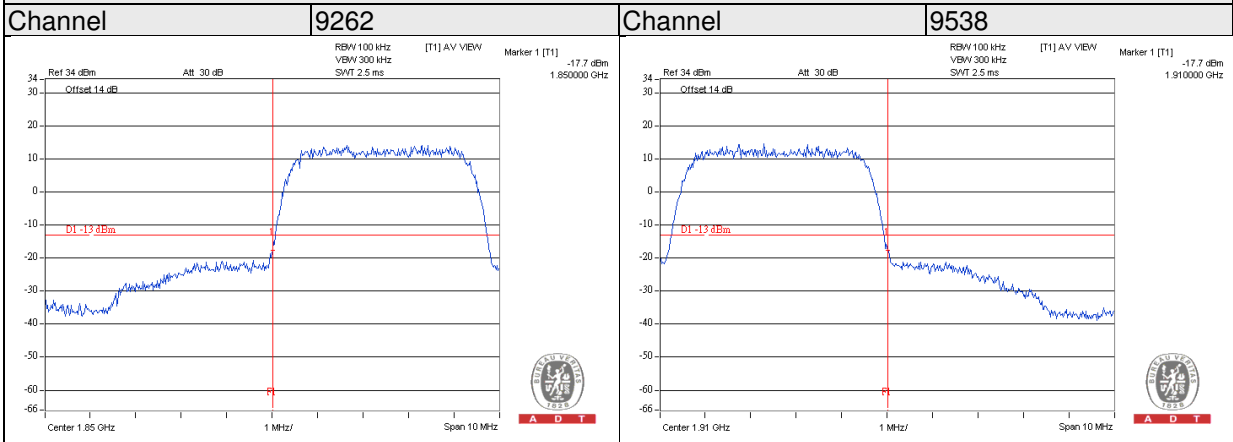
4.4.4 Test Results



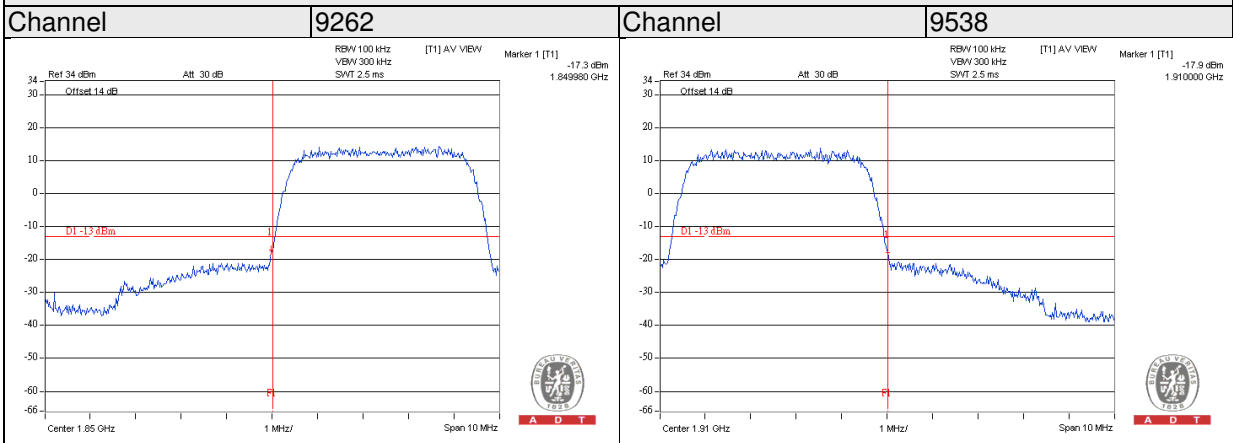
WCDMA



HSDPA



HSUPA

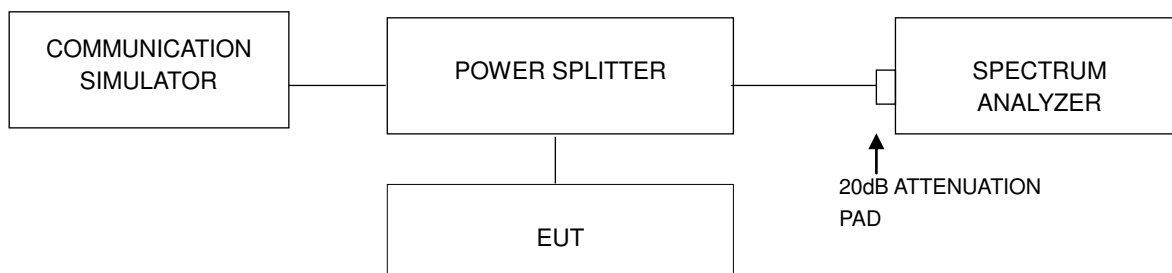


4.5 Peak to Average Ratio

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 \geq 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			
512	1850.2	0.14	0.13	9262	1852.4	2.87
661	1880.0	0.14	0.13	9400	1880	2.73
810	1909.8	0.17	0.16	9538	1907.6	2.83

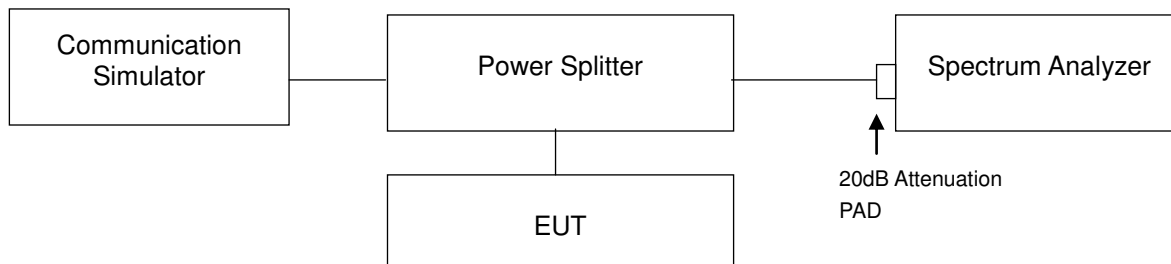


4.6 Conducted Spurious Emissions

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

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 20GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

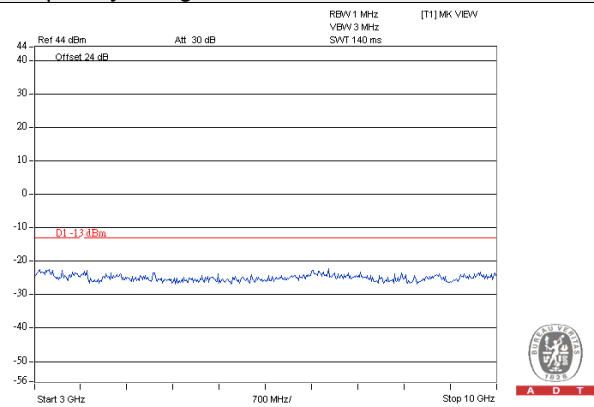
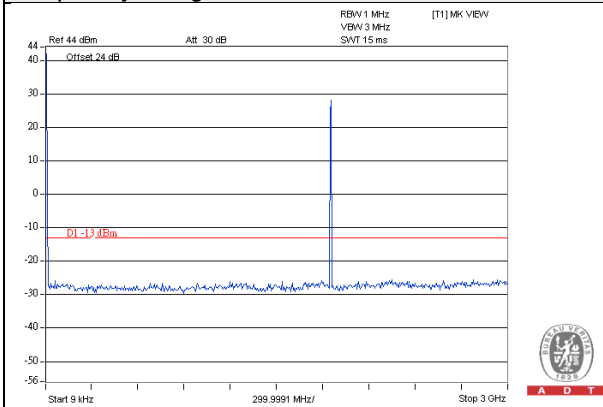
4.6.4 Test Results

GPRS

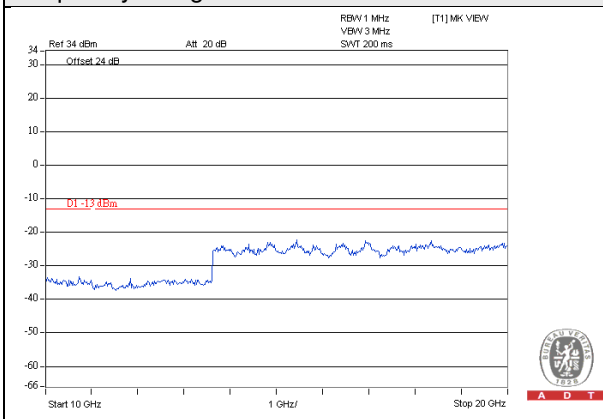
Channel 512

Frequency Range : 9kHz~3GHz

Frequency Range : 3GHz~10GHz



Frequency Range : 10GHz~20GHz

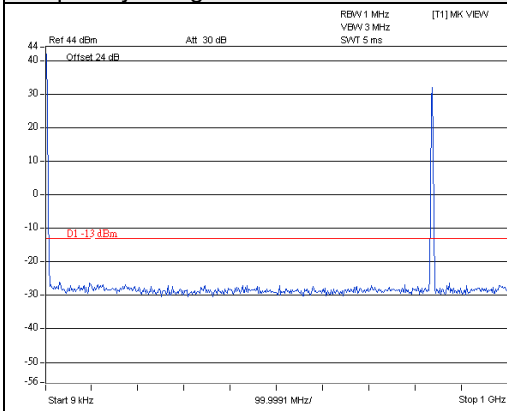


GPRS

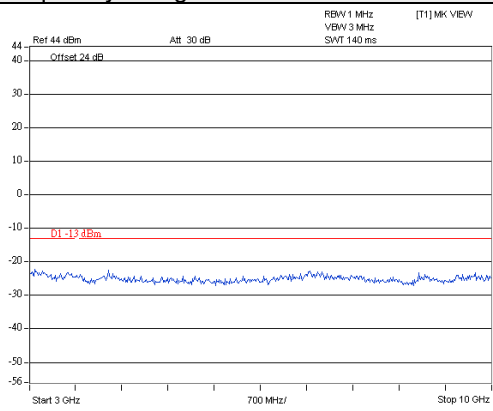
Channel 661

Frequency Range : 9kHz~1GHz

Frequency Range : 1GHz~10GHz

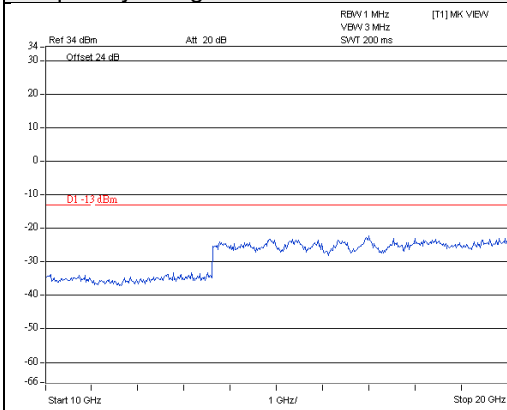


A D T



A D T

Frequency Range : 10GHz~20GHz



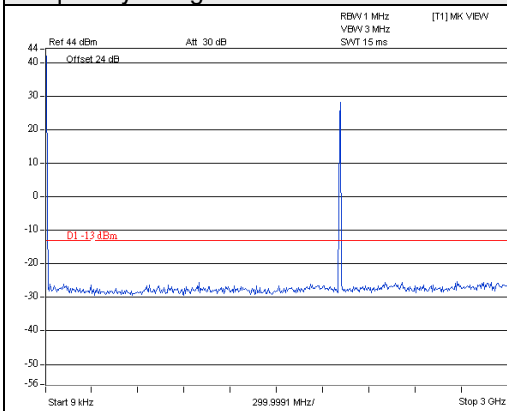
A D T

GPRS

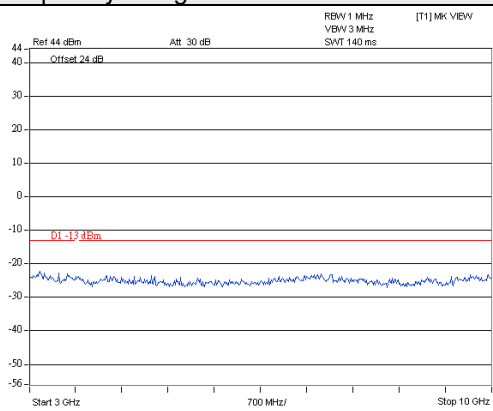
Channel 810

Frequency Range : 9kHz~3GHz

Frequency Range : 3GHz~10GHz

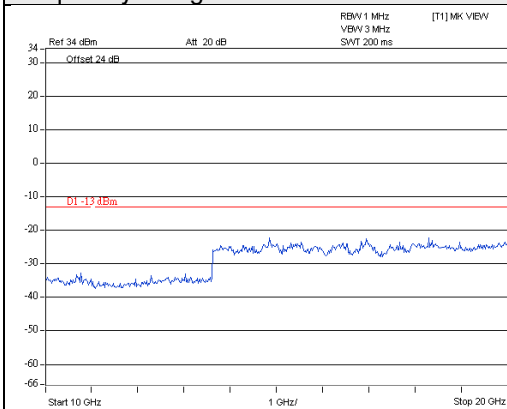


A D T



A D T

Frequency Range : 10GHz~20GHz



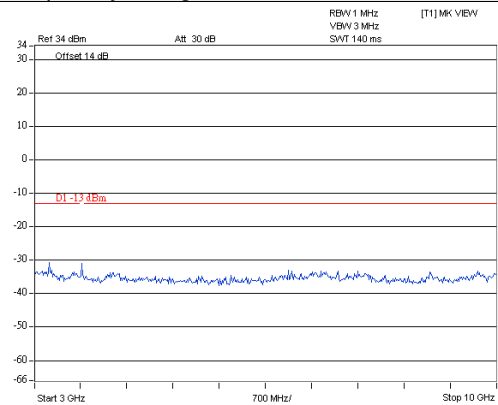
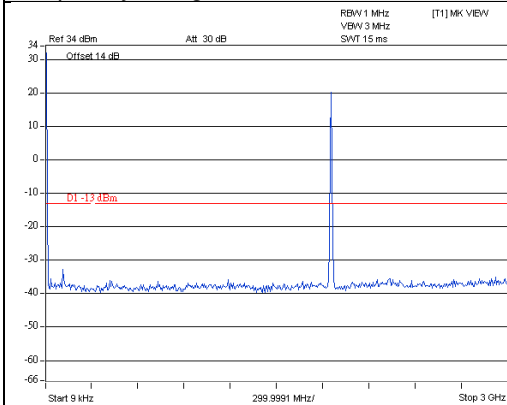
A D T

WCDMA

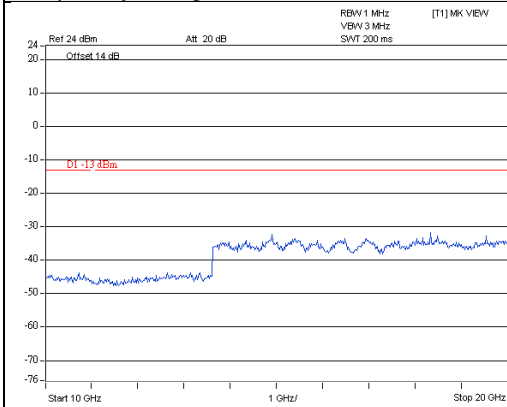
Channel 9262

Frequency Range : 9kHz~3GHz

Frequency Range : 3GHz~10GHz



Frequency Range : 10GHz~20GHz

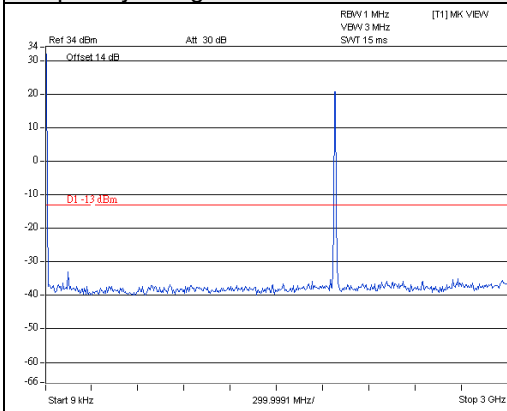


WCDMA

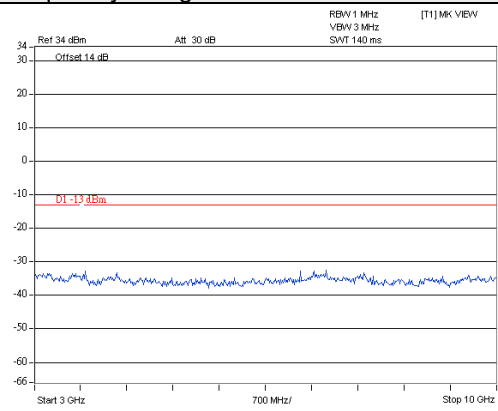
Channel 9400

Frequency Range : 9kHz~3GHz

Frequency Range : 3GHz~10GHz

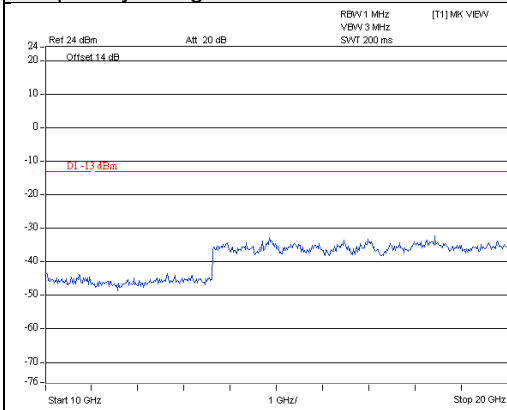


A D T



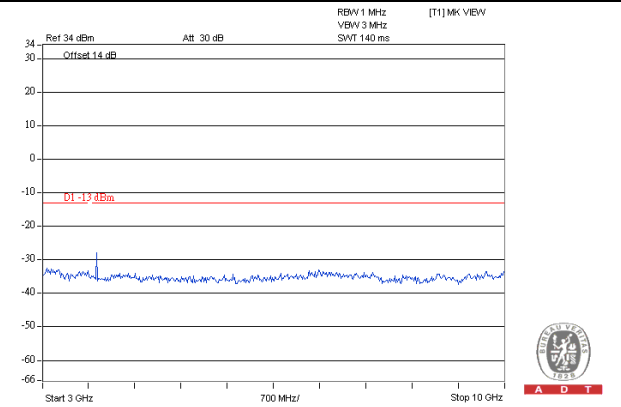
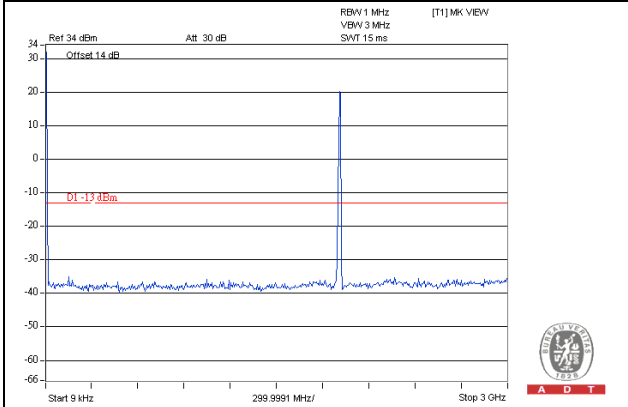
A D T

Frequency Range : 10GHz~20GHz

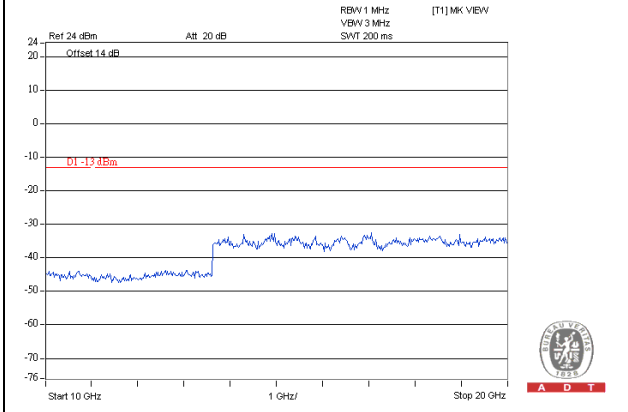


A D T

WCDMA
Channel 9538
Frequency Range : 9kHz~3GHz **Frequency Range : 3GHz~10GHz**



Frequency Range : 10GHz~20GHz



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

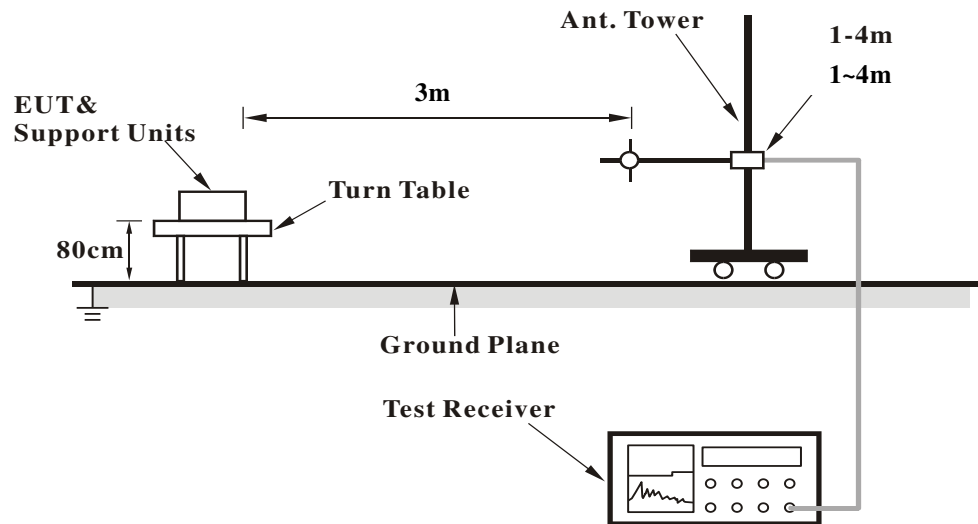
- a. Substitution method is used for EIRP measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn 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 a. Record the power level of S.G
- c. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
- d. ERP power can be calculated form EIRP power by subtracting the gain of dipole, $\text{ERP power} = \text{EIPR power} - 2.15\text{dBi}$.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.7.3 Deviation from Test Standard

No deviation.

4.7.4 Test Setup



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 661	Frequency Range	Below 1000 MHz
Tested By	Nick Hsu		

Antenna Polarity & Test Distance: Horizontal at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	234.02	36.80	-58.79	3.77	-55.02	-13	-42.02
2	276.02	37.20	-57.86	3.87	-53.99	-13	-40.99
3	286.01	36.50	-58.70	3.75	-54.95	-13	-41.95
4	300.02	40.30	-55.48	3.71	-51.77	-13	-38.77
5	312	37.60	-58.68	3.68	-55.00	-13	-42.00
6	338	38.20	-59.67	3.66	-56.01	-13	-43.01

Antenna Polarity & Test Distance: Vertical at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	234.02	30.40	-65.19	3.77	-61.42	-13	-48.42
2	276.02	32.30	-62.76	3.87	-58.89	-13	-45.89
3	286.01	34.30	-60.90	3.75	-57.15	-13	-44.15
4	300	37.10	-58.68	3.71	-54.97	-13	-41.97
5	338	33.60	-64.27	3.66	-60.61	-13	-47.61
6	498.15	35.40	-60.14	2.90	-57.24	-13	-44.24

Remarks:

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

EDGE:

Mode	TX channel 661	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)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	234.02	36.40	-59.19	3.77	-55.42	-13	-42.42
2	276.03	38.50	-56.56	3.87	-52.69	-13	-39.69
3	286.01	37.40	-57.80	3.75	-54.05	-13	-41.05
4	300.02	38.10	-57.68	3.71	-53.97	-13	-40.97
5	312	36.20	-60.08	3.68	-56.40	-13	-43.40
6	338.01	39.10	-58.77	3.66	-55.11	-13	-42.11

Antenna Polarity & Test Distance: Vertical at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	234.02	32.40	-63.19	3.77	-59.42	-13	-46.42
2	276.02	32.60	-62.46	3.87	-58.59	-13	-45.59
3	286.01	33.60	-61.60	3.75	-57.85	-13	-44.85
4	300	36.30	-59.48	3.71	-55.77	-13	-42.77
5	338	33.20	-64.67	3.66	-61.01	-13	-48.01
6	498.17	32.20	-63.34	2.90	-60.44	-13	-47.44

Remarks:

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

WCDMA:

Mode	TX channel 9400	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)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	224.02	38.90	-57.08	3.69	-53.39	-13	-40.39
2	273.02	37.40	-57.57	3.89	-53.68	-13	-40.68
3	280.01	37.40	-57.55	3.76	-53.79	-13	-40.79
4	300	40.20	-55.58	3.71	-51.87	-13	-38.87
5	309	39.30	-56.86	3.69	-53.17	-13	-40.17
6	343	39.70	-58.17	3.63	-54.54	-13	-41.54

Antenna Polarity & Test Distance: Vertical at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	236.02	33.40	-62.11	3.78	-58.33	-13	-45.33
2	266.02	32.50	-62.26	3.93	-58.32	-13	-45.32
3	286.01	35.00	-60.20	3.75	-56.45	-13	-43.45
4	306	37.20	-58.83	3.70	-55.13	-13	-42.13
5	348	35.30	-62.57	3.61	-58.96	-13	-45.96
6	508.15	35.60	-59.82	2.83	-56.99	-13	-43.99

ABOVE 1GHz

GPRS:

Mode	TX channel 661	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)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3760	51.89	-52.26	7.68	-44.58	-13	-31.58
2	5640	55.17	-49.57	7.02	-42.55	-13	-29.55
3	7520	45.71	-56.91	4.53	-52.38	-13	-39.38
4	9400	47.15	-54.72	4.21	-50.52	-13	-37.52
5	11280	49.1	-52.39	3.48	-48.91	-13	-35.91
6	13160	51.74	-48.87	4.06	-44.80	-13	-31.80
7	15040	56	-41.35	3.70	-37.65	-13	-24.65
8	16920	56.35	-41.00	3.70	-37.30	-13	-24.30
9	18800	56.43	-40.92	3.70	-37.22	-13	-24.22

Antenna Polarity & Test Distance: Vertical at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3760	49.29	-54.86	7.68	-47.18	-13	-34.18
2	5640	49.63	-55.11	7.02	-48.09	-13	-35.09
3	7520	47.9	-54.72	4.53	-50.19	-13	-37.19
4	9400	48.46	-53.41	4.21	-49.21	-13	-36.21
5	11280	50.84	-50.65	3.48	-47.17	-13	-34.17
6	13160	53.85	-46.76	4.06	-42.69	-13	-29.69
7	15040	56.37	-40.98	3.70	-37.28	-13	-24.28
8	16920	55.49	-41.86	3.70	-38.16	-13	-25.16
9	18800	58.6	-38.75	3.70	-35.05	-13	-22.05

Remarks:

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

EDGE:

Mode	TX channel 661	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)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3760	52.92	-51.23	7.68	-43.55	-13	-30.55
2	5640	55.59	-49.15	7.02	-42.13	-13	-29.13
3	7520	46.14	-56.48	4.53	-51.95	-13	-38.95
4	9400	46.25	-55.62	4.21	-51.42	-13	-38.42
5	11280	49.86	-51.63	3.48	-48.15	-13	-35.15
6	13160	52.83	-47.78	4.06	-43.71	-13	-30.71
7	15040	54.9	-42.45	3.70	-38.75	-13	-25.75
8	16920	56.6	-40.75	3.70	-37.05	-13	-24.05
9	18800	57.28	-40.07	3.70	-36.37	-13	-23.37

Antenna Polarity & Test Distance: Vertical at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3760	50.21	-53.94	7.68	-46.26	-13	-33.26
2	5640	48.41	-56.33	7.02	-49.31	-13	-36.31
3	7520	47.79	-54.83	4.53	-50.30	-13	-37.30
4	9400	49.73	-52.14	4.21	-47.94	-13	-34.94
5	11280	50.42	-51.07	3.48	-47.59	-13	-34.59
6	13160	53.96	-46.65	4.06	-42.58	-13	-29.58
7	15040	57.61	-39.74	3.70	-36.04	-13	-23.04
8	16920	55.07	-42.28	3.70	-38.58	-13	-25.58
9	18800	59.65	-37.70	3.70	-34.00	-13	-21.00

Remarks:

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

WCDMA:

Mode	TX channel 9400	Frequency Range	Above 1000MHz
Environmental Conditions	21deg. C, 71%RH	Input Power	120Vac, 60 Hz
Tested By	Nick Hsu		

Antenna Polarity & Test Distance: Horizontal at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3760	51.35	-52.80	7.68	-45.12	-13	-32.12
2	5640	64.23	-40.51	7.02	-33.49	-13	-20.49
3	7520	46.63	-55.99	4.53	-51.46	-13	-38.46
4	9400	49.76	-52.11	4.21	-47.91	-13	-34.91
5	11280	52.51	-48.98	3.48	-45.50	-13	-32.50
6	13160	53.52	-47.09	4.06	-43.02	-13	-30.02
7	15040	56.01	-41.34	3.70	-37.64	-13	-24.64
8	16920	59.83	-37.52	3.70	-33.82	-13	-20.82
9	18800	65.04	-32.31	3.70	-28.61	-13	-15.61

Antenna Polarity & Test Distance: Vertical at 3 M

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3760	48.44	-55.71	7.68	-48.03	-13	-35.03
2	5640	58.52	-46.22	7.02	-39.20	-13	-26.20
3	7520	43.49	-59.13	4.53	-54.60	-13	-41.60
4	9400	44.98	-56.89	4.21	-52.69	-13	-39.69
5	11280	47.29	-54.20	3.48	-50.72	-13	-37.72
6	13160	49.91	-50.70	4.06	-46.63	-13	-33.63
7	15040	52.86	-44.49	3.70	-40.79	-13	-27.79
8	16920	56.94	-40.41	3.70	-36.71	-13	-23.71
9	18800	63.88	-33.47	3.70	-29.77	-13	-16.77

Remarks:

- Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
- 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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---