FCC TEST REPORT

(Part 24)

REPORT NO.:	RF981215L24-2
MODEL NO.:	VA121V-Q
RECEIVED:	Dec. 15, 2009
TESTED:	May 13 ~ May 26, 2010
ISSUED:	Jun. 03, 2010

APPLICANT:	Gemtek Technology Co., Ltd.
ADDRESS:	No.15-1, Zhonghua Rd, Hsinchu Industrial Park , Hsinchu County, Taiwan, R.O.C. 303

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan, R.O.C.
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

TABLE OF CONTENTS

1 CERTIFICATION

PRODUCT:	VoloAccess; 3G+ Convergent Wireless Terminal
MODEL:	VA121V-Q
BRAND:	Vololink
APPLICANT:	Gemtek Technology Co., Ltd.
TESTED:	May 13 ~ May 26, 2010
TEST SAMPLE:	ENGINEERING SAMPLE
TEST STANDARDS:	**FCC Part 24, Subpart E** ANSI C63.4-2003

The above equipment (model: VA121V-Q) 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 : Andrea Hsia , **DATE:** Jun. 03, 2010
Andrea Hsia / Specialist

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Jun. 03, 2010
Responsible for RF Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** Jun. 03, 2010
Gary Chang / Assistant Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 24 & Part 2 / IC RSS-133			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
2.1046 24.232	Maximum Peak Output Power Limit: max. 2 watts e.i.r.p peak power	PASS	Meet the requirement of limit. Minimum passing margin is 32.8dBm at 1880.0MHz.
2.1055 24.235	Frequency Stability AFC Freq. Error vs. Voltage AFC Freq. Error vs. Temperature Limit: max. ±2.5ppm	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 –6.9dB at 3760.0MHz.

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	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44dB
Radiated emissions	30MHz ~ 200MHz	3.19dB
	200MHz ~1000MHz	3.21dB
	1GHz ~ 18GHz	2.26dB
	18GHz ~ 40GHz	1.94dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	VoloAccess; 3G+ Convergent Wireless Terminal
MODEL NO.	VA121V-Q
FCC ID	MXF-VA121VQ
NOMINAL VOLTAGE	12Vdc (Adapter)
MODULATION TYPE	GMSK, 8PSK (for GSM, GPRS, E-GPRS) BPSK (for WCDMA)
FREQUENCY RANGE	1850.2MHz ~ 1909.8MHz (for GSM, GPRS, E-GPRS) 1852.4MHz ~ 907.6MHz (for WCDMA)
NUMBER OF CHANNEL	299 (for GSM, GPRS, E-GPRS) 277 (for WCDMA)
MAX. EIRP POWER	GSM Mode: 32.8dBm (1.906Watts) GPRS Mode: 32.1dBm (1.622Watts) E-GPRS Mode: 27.8dBm (0.603Watts) WCDMA Mode: 24.1dBm (0.257Watts)
ANTENNA TYPE	Dipole
MAX. ANTENNA GAIN	1.8dBi
DATA CABLE	1.4m non-shielded RJ45 cable without core
I/O PORTS	RJ45, USB, RJ11
ACCESSORY DEVICES	Adapter

NOTE:

1. The EUT is a VoloAccess; 3G+ Convergent Wireless Terminal. The functions of EUT listed as below:

	TEST STANDARD	REFERENCE REPORT
WLAN 802.11b/g/n	FCC Part 15, Subpart C (Section 15.247)	RF981215L24
GSM 850 / WCDMA 850	FCC Part 22	RF981215L24-1
PCS 1900 / WCDMA 1900	FCC Part 24	RF981215L24-2

2. The EUT were powered by the following adapters:

Adapter 1	
BRAND:	UNIFIVE
MODEL:	UTI324-1220
INPUT:	100-240Vac, 50-60Hz, 0.6A
OUTPUT:	12Vdc, 2A
POWER LINE:	DC 1.9m non-shielded cable without core AC 1.8m non-shielded cable without core

Adapter 2	
BRAND:	UNIFIVE
MODEL:	UTL324-1220
INPUT:	100-240Vac, 50/60Hz, 0.6A
OUTPUT:	12Vdc, 2A
POWER LINE:	DC 1.9m non-shielded cable without core

3. The communicated functions of EUT listed as below:

		GSM (850&1900MHz)	WCDMA (850&1900MHz)	
2G	GSM	√		With 802.1b/g/n
	GPRS	√		
	EDGE	√		
3G	WCDMA		√	
	Release 5 HSDPA		√	
	Release 6 HSUPA		√	

4. IMEI cord: 359173020018075.
5. SW: version=1.09_1
6. HW: H20T (101B0)
7. 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 DESCRIPTION OF TEST MODES

FOR GSM, GPRS & E-GPRS:

299 channels are provided to this EUT. Therefore, the low, middle and high channels are chosen for testing.

	CHANNEL	FREQUENCY	TX MODE
LOW	512	1850.2 MHz	GSM, GPRS, E-GPRS
MIDDLE	661	1880.0 MHz	GSM, GPRS, E-GPRS
HIGH	810	1909.8 MHz	GSM, GPRS, E-GPRS

NOTE:

1. Below 1 GHz, the channel 512, 661, and 810 were pre-tested in chamber. The channel 512 was chosen for final test.
2. Above 1 GHz, the channel 512, 661, and 810 were tested individually.
3. The worst case for final test is chosen when the power control level set 0.
4. The channel space is 0.2MHz.
5. The EUT is a GPRS class 10 device (Multislot class: 12, Mobile Terminal B), which provide 4 up-link. After pre-tested both functions, found up-link with 1 time slot is worse, therefore, test results of output power, frequency stability, occupied bandwidth and band edge tests came out from this.
6. The EUT is an E-GPRS class 10 device (Multislot class: 12, Mobile Terminal B), which provide 4 up-link. After pre-tested both functions, found up-link with 1 time slot is worse, therefore, test results of output power, frequency stability, occupied bandwidth and band edge tests came out from this.
7. The EUT has GPRS & E-GPRS functions. After pre-testing, GSM function is the worst case for all the emission tests.

FOR WCDMA:

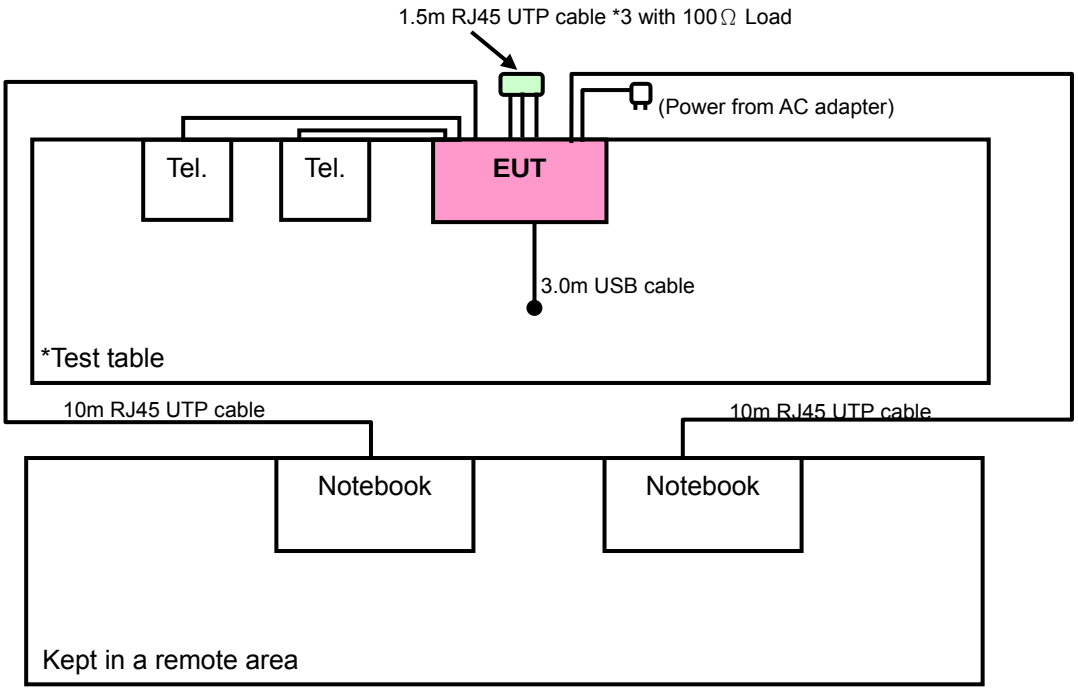
277 channels are provided to this EUT. Therefore, the low, middle and high channels are chosen for testing.

	CHANNEL	FREQUENCY	TX MODE
LOW	9262	1852.4 MHz	WCDMA, HSDPA, HSUPA
MIDDLE	9400	1880.0 MHz	WCDMA, HSDPA, HSUPA
HIGH	9538	1907.6 MHz	WCDMA, HSDPA, HSUPA

NOTE:

1. Below 1 GHz, the channel 9262, 9400 and 9538 were pre-tested in chamber. The channel 9262 was chosen for final test.
2. Above 1 GHz, the channel 9262, 9400 and 9538 were tested individually.
3. The channel space is 0.2MHz.
4. After pretest of output power and spurious emission under WCDMA,HSDPA AND HSUPA mode, find the worst mode is WCDMA . Therefore, select WCDMA mode to do final test

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR GSM, GPRS & E-GPRS:

EUT CONFIGURE MODE	APPLICABLE TO							DESCRIPTION
	OP	FS	OB	BE	CE	RE<1G	RE≥1G	
A	√	√	√	√	√	√	√	Power from Adapter 1
B	-	-	-	-	-	√	-	Power from Adapter 2

Where **OP:** Output power **FS:** Frequency stability
OB: Occupied bandwidth **BE:** Band edge
CE: Conducted spurious emissions **RE<1G:** Radiated emission below 1GHz
RE≥1G: Radiated emission above 1GHz **NOTE:** "-" means no effect.

OUTPUT POWER MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	ANT. AXIS
A	512 to 810	512, 661, 810	GSM, GPRS, EGPRS	Z

FREQUENCY STABILITY MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
A	512 to 810	661	GSM

OCCUPIED BANDWIDTH MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
A	512 to 810	512, 661, 810	GSM, GPRS, EGPRS

BAND EDGE MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
A	512 to 810	512, 810	GSM, GPRS, EGPRS

CONDUCTED SPURIOUS EMISSIONS MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
A	512 to 810	512, 661, 810	GSM

RADIATED EMISSION MEASUREMENT (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	ANT. AXIS
A & B	512 to 810	661	GSM	Z

RADIATED EMISSION MEASUREMENT (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	ANT. AXIS
A	512 to 810	512, 661, 810	GSM	Z

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
OP	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
FS	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
OB	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
EM	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
BE	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
CE	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
RE < 1G	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Match Tsui
RE ≥ 1G	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang

FOR WCDMA:

EUT CONFIGURE MODE	APPLICABLE TO							DESCRIPTION
	OP	FS	OB	BE	CE	RE<1G	RE≥1G	
A	√	√	√	√	√	√	√	Power from Adapter 1
B	-	-	-	-	-	√	-	Power from Adapter 2

Where **OP:** Output power **FS:** Frequency stability
OB: Occupied bandwidth **BE:** Band edge
CE: Conducted spurious emissions **RE<1G:** Radiated emission below 1GHz
RE≥1G: Radiated emission above 1GHz **NOTE:** "-" means no effect.

OUTPUT POWER MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	ANT. AXIS
A	9262 to 9538	9262, 9400, 9538	WCDMA	Z

FREQUENCY STABILITY MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
A	9262 to 9538	9400	WCDMA

OCCUPIED BANDWIDTH MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
A	9262 to 9538	9262, 9400, 9538	WCDMA

BAND EDGE MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
A	9262 to 9538	9262, 9538	WCDMA

CONDUCTED SPURIOUS EMISSIONS MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
A	9262 to 9538	9262, 9400, 9538	WCDMA

RADIATED EMISSION MEASUREMENT (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	ANT. AXIS
A & B	9262 to 9538	9400	WCDMA	Z

RADIATED EMISSION MEASUREMENT (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	ANT. AXIS
A & B	9262 to 9538	9262, 9400, 9538	WCDMA	Z

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
OP	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
FS	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
OB	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
EM	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
BE	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
CE	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Dean Wang
RE < 1G	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Match Tsui
RE ≥ 1G	24deg. C, 64%RH, 1008 hPa	120Vac, 60Hz	Match Tsui

3.3 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

IC RSS-133

ANSI C63.4-2003

ANSI/TIA/EIA-603-C 2004

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

3.4 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
1	NOTEBOOK	DELL	D531	CN-0XM006-48643-81U-2786	QDS-BRCM1020
2	NOTEBOOK	DELL	D820	21498926752	NA
3	TELEPHONE	WONDER	WD-303	1F01520	NA
4	TELEPHONE	WONDER	WD-303	1F01007	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable
2	10m RJ45 UTP cable
3	1.8 m non-shielded cable, RJ11 connector, w/o core.
4	1.8 m non-shielded cable, RJ11 connector, w/o core.

NOTE 1: All power cords of the above support units are non shielded (1.8m).
NOTE 2: Item 1 ~ 2 acted as communication partners to transfer data.

4 TEST TYPES AND RESULTS

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

The radiated peak output power shall be according to the specific rule Part 24.232(b) that “Mobile / Portable station are limited to 2 watts e.i.r.p” and 24.232(c) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESI7	838496/016	Dec. 29, 2009	Dec. 28, 2010
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jan. 11, 2010	Jan. 10, 2011
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Apr. 28, 2010	Apr. 27, 2011
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-209	Jul. 01, 2009	Jun. 30, 2010
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Dec. 25, 2009	Dec. 24, 2010
Preamplifier Agilent	8449B	3008A01961	Nov. 04, 2009	Nov. 03, 2010
Preamplifier Agilent	8447D	2944A10738	Nov. 04, 2009	Nov. 03, 2010
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	274041/4	Aug. 28, 2009	Aug. 27, 2010
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	283397/4	Aug. 28, 2009	Aug. 27, 2010
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table ADT.	TT100.	TT93021704	NA	NA
Turn Table Controller ADT.	SC100.	SC93021704	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 HwaYa Chamber 4.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 988962.

5. The IC Site Registration No. is IC7450F-4.

4.1.3 TEST PROCEDURES

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (GSM, GPRS & E-GPRS) / 9262, 9400 and 9538 (WCDMA) (low, middle and high operational frequency range.)

b. The conducted peak output power used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. The path loss included the splitter loss, cable loss and 20dB pad loss. The spectrum set RB/VB 1MHz (GSM, GPRS & E-GPRS), and 5MHz (WCDMA), then read peak power value and record to the test. (All transmitted path loss shall be considered in the test report data.)

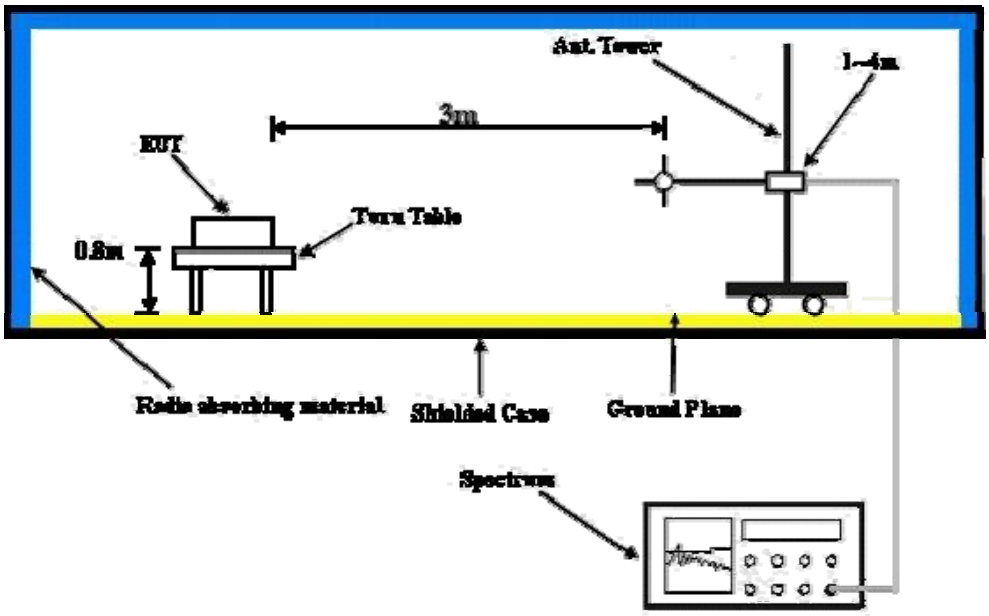
c. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from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

d. 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 c. Record the power level of S.G

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

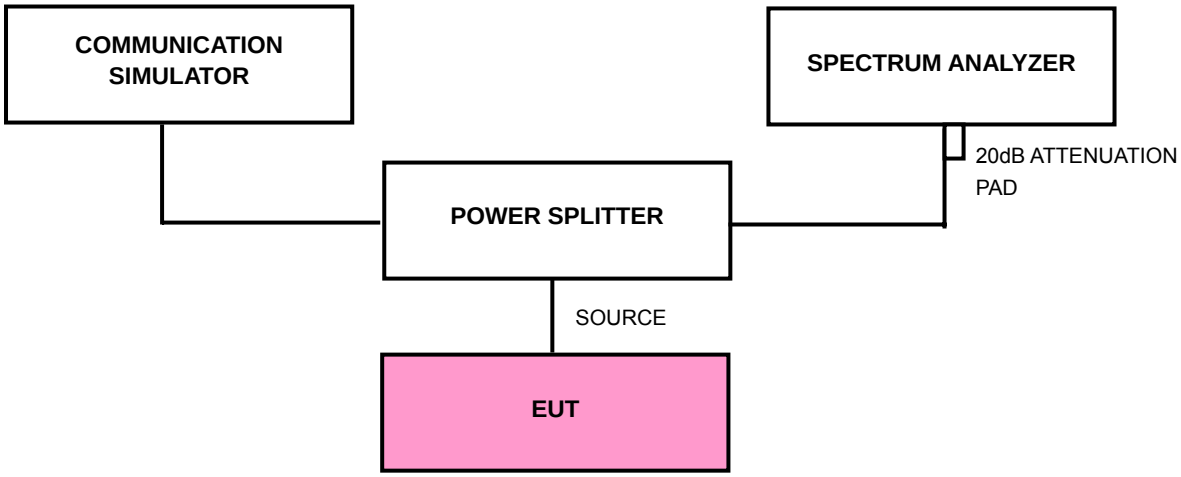
4.1.4 TEST SETUP

EIRP POWER 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 related item – Photographs of the Test Configuration.

4.1.5 EUT OPERATING CONDITIONS

a. The EUT makes a phone call to the communication simulator.

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

4.1.6 TEST RESULTS

FOR GSM, GPRS & E-GPRS:

FOR GSM

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
512	1850.2	4.85	25.00	29.85	0.966
661	1880.0	4.64	25.00	29.64	0.920
810	1909.8	4.26	25.00	29.26	0.843

FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
512	1850.2	4.84	25.00	29.84	0.964
661	1880.0	4.61	25.00	29.61	0.914
810	1909.8	4.24	25.00	29.24	0.840

FOR E-GPRS MODE (UP-LINK WITH 1 TIME SLOT)

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
512	1850.2	1.43	25.00	26.43	0.440
661	1880.0	1.28	25.00	26.28	0.425
810	1909.8	0.94	25.00	25.94	0.393

REMARKS: 1. Peak Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Power Splitter Loss (dB) + Cable Loss (dB).

FOR GSM

EIRP POWER					
CHANNEL NO.	FREQUENCY (MHz)	S.G VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
512	1850.2	23.2	8.4	31.6	1.445
661	1880.0	24.2	8.6	32.8	1.906
810	1909.8	24.2	8.5	32.7	1.862

FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

EIRP POWER					
CHANNEL NO.	FREQUENCY (MHz)	S.G VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
512	1850.2	22.6	8.4	31.0	1.259
661	1880.0	23.5	8.6	32.1	1.622
810	1909.8	23.3	8.5	31.8	1.514

FOR E-GPRS MODE (UP-LINK WITH 1 TIME SLOT)

EIRP POWER					
CHANNEL NO.	FREQUENCY (MHz)	S.G VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
512	1850.2	19.1	8.4	27.5	0.562
661	1880.0	19.2	8.6	27.8	0.603
810	1909.8	19.1	8.5	27.6	0.575

REMARKS: 1. Peak Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).

2. Correction Factor (dB) = TX Antenna Gain (dBi) + Cable Loss (dB)

FOR WCDMA:

WCDMA-AMR MODE

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-2.94	25.00	22.06	0.161
9400	1880.00	-2.77	25.00	22.23	0.167
9538	1907.60	-2.86	25.00	22.14	0.164

WCDMA-RMC MODE

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-2.75	25.00	22.25	0.168
9400	1880.00	-2.72	25.00	22.28	0.169
9538	1907.60	-2.83	25.00	22.17	0.165

HSDPA MODE-Release 5 Subtest 1

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.04	25.00	21.96	0.157
9400	1880.00	-2.92	25.00	22.08	0.161
9538	1907.60	-2.97	25.00	22.03	0.160

HSDPA MODE-Release 5 Subtest 2

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.24	25.00	21.76	0.150
9400	1880.00	-3.17	25.00	21.83	0.152
9538	1907.60	-3.21	25.00	21.79	0.151

REMARKS: 1. Peak Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).

2. Correction Factor (dB) = Power Splitter Loss (dB) + Cable Loss (dB).

HSDPA MODE-Release 5 Subtest 3

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.42	25.00	21.58	0.144
9400	1880.00	-3.39	25.00	21.61	0.145
9538	1907.60	-3.45	25.00	21.55	0.143

HSDPA MODE-Release 5 Subtest 4

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.63	25.00	21.37	0.137
9400	1880.00	-3.52	25.00	21.48	0.141
9538	1907.60	-3.64	25.00	21.36	0.137

HSUPA MODE-Release 6 Subtest 1

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.15	25.00	21.85	0.153
9400	1880.00	-3.09	25.00	21.91	0.155
9538	1907.60	-3.12	25.00	21.88	0.154

HSUPA MODE-Release 6 Subtest 2

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.38	25.00	21.62	0.145
9400	1880.00	-3.27	25.00	21.73	0.149
9538	1907.60	-3.39	25.00	21.61	0.145

REMARKS: 1. Peak Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Power Splitter Loss (dB) + Cable Loss (dB).

HSUPA MODE-Release 6 Subtest 3

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.57	25.00	21.43	0.139
9400	1880.00	-3.48	25.00	21.52	0.142
9538	1907.60	-3.56	25.00	21.44	0.139

HSUPA MODE-Release 6 Subtest 4

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.72	25.00	21.28	0.134
9400	1880.00	-3.69	25.00	21.31	0.135
9538	1907.60	-3.71	25.00	21.29	0.135

HSUPA MODE-Release 6 Subtest 5

CONDUCTED OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	-3.95	25.00	21.05	0.127
9400	1880.00	-3.87	25.00	21.13	0.130
9538	1907.60	-3.91	25.00	21.09	0.129

REMARKS: 1. Peak Output Power (dBm) = Raw Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Power Splitter Loss (dB) + Cable Loss (dB).

WCDMA-RMC MODE

EIRP POWER					
CHANNEL NO.	FREQUENCY (MHz)	S.G VALUE (dBm)	CORRECTION FACTOR (dB)	OUTPUT POWER	
				dBm	Watt
9262	1852.40	14.6	8.4	23.0	0.200
9400	1880.00	15.5	8.6	24.1	0.257
9538	1907.60	14.9	8.5	23.4	0.219

REMARKS: 1. Peak Output Power (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = TX Antenna Gain (dBi) + Cable Loss (dB)

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

According to the FCC part 24.235 shall be tested the frequency stability. The rule is defined that" The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The frequency error rate is according to the JTC standard that the frequency error rate shall be accurate to within 2.5ppm of the received frequency from the base station. The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with the 2.1055(a)(1) –30℃~50℃.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010
Hewlett Packard RF cable	8120-6192	01428251	NA	NA
Suhner RF cable	Sucoflex104	204850/4	NA	NA
WIT Standard Temperature & Humidity Chamber	TH-4S-C	W981030	Jun. 29, 2009	Jun. 28, 2010

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.2.3 TEST PROCEDURE

a. Because of the measure the carrier frequency under the condition of the AFC lock, it shall be used the mobile station in the GPRS / WCDMA link mode. This is accomplished with the use of the R&S CMU200 / JRC NJZ-2000 simulator station. The oven room could control the temperatures and humidity. The GPRS link channel is the 661 and the WCDMA link channel is the 9538.

b. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.

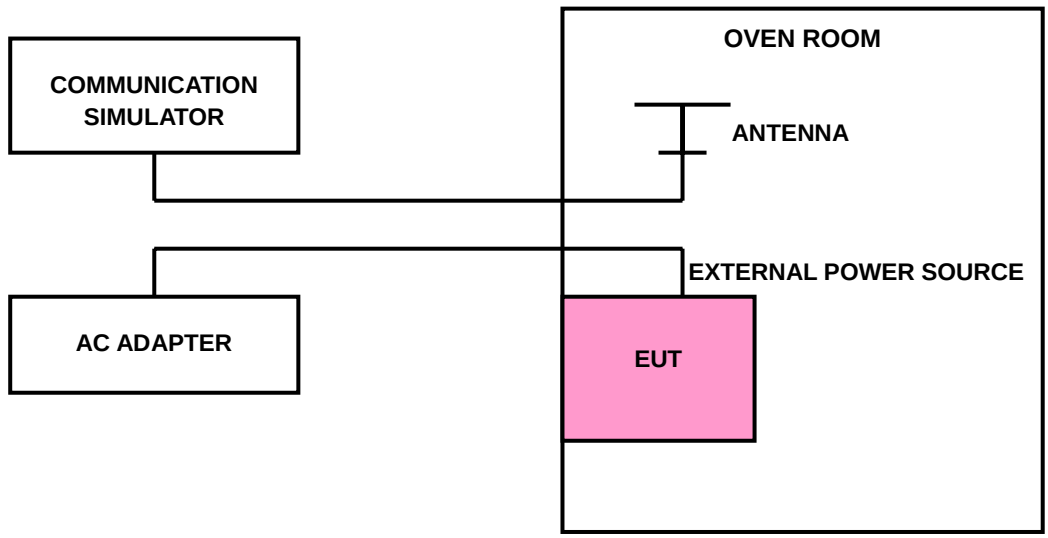
c. EUT is connected the external power supply to control the AC Adapter. The various Volts from the minimum 93.5Volts to 126.5Volts. Each step shall be record the frequency error rate.

d. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing.

e. 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 GSM simulator.

4.2.4 TEST SETUP



4.2.5 TEST RESULTS

FOR GSM:

AFC FREQUENCY ERROR vs. VOLTAGE			
VOLTAGE (Volts)	**FREQUENCY ERROR (Hz)**	**FREQUENCY ERROR (ppm)**	**LIMIT (ppm)**
126.5	24	0.013	2.5
93.5	23	0.012	2.5

NOTE: The applicant defined the normal working voltage of the AC adapter is from 93.5Vac to 126.5Vac.

AFC FREQUENCY ERROR vs. TEMP.			
TEMP. (℃)	**FREQUENCY ERROR (Hz)**	**FREQUENCY ERROR (ppm)**	**LIMIT (ppm)**
50	34	0.018	2.5
40	36	0.019	2.5
30	33	0.018	2.5
20	38	0.020	2.5
10	39	0.021	2.5
0	34	0.018	2.5
-10	32	0.017	2.5
-20	30	0.016	2.5
-30	36	0.019	2.5

FOR WCDMA:

AFC FREQUENCY ERROR vs. VOLTAGE			
VOLTAGE (Volts)	**FREQUENCY ERROR (Hz)**	**FREQUENCY ERROR (ppm)**	**LIMIT (ppm)**
126.5	22	0.012	2.5
93.5	18	0.010	2.5

NOTE: The applicant defined the normal working voltage of the AC adapter is from 93.5Vac to 126.5Vac.

AFC FREQUENCY ERROR vs. TEMP.			
TEMP. (℃)	**FREQUENCY ERROR (Hz)**	**FREQUENCY ERROR (ppm)**	**LIMIT (ppm)**
50	26	0.014	2.5
40	24	0.013	2.5
30	22	0.012	2.5
20	21	0.011	2.5
10	24	0.013	2.5
0	25	0.013	2.5
-10	28	0.015	2.5
-20	27	0.014	2.5
-30	29	0.015	2.5

4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

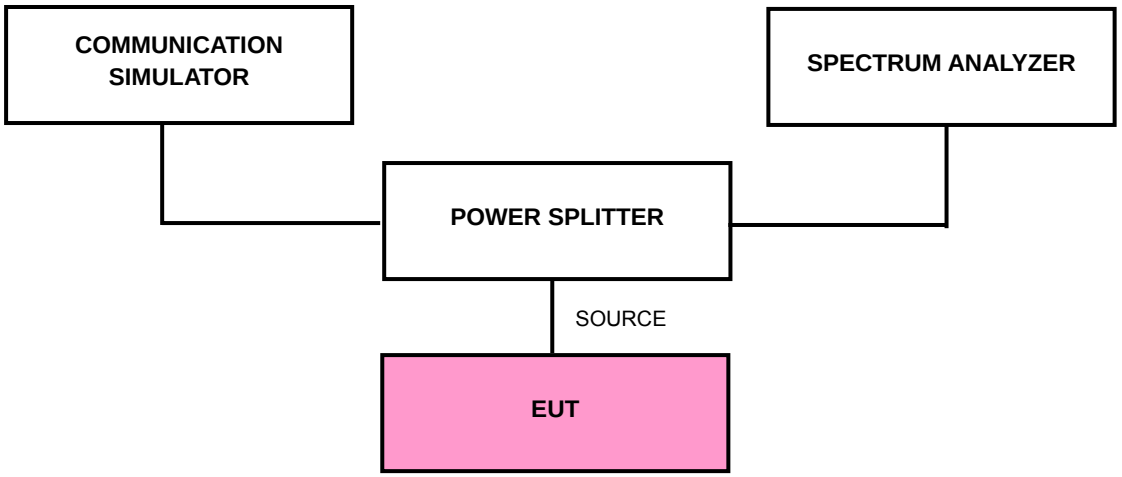
According to FCC 24.238(b) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
RF cable	SUCOFLEX 104	274403/4	Aug. 21, 2009	Aug. 20, 2010
RF cable	SUCOFLEX 104	250729/4	Aug. 20, 2009	Aug. 19, 2010
RF cable	SUCOFLEX 104	214377/4	Aug. 20, 2009	Aug. 19, 2010
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST SETUP



4.3.4 TEST PROCEDURES

a. The EUT makes a phone call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (GSM, GPRS, E-GPRS) / 9262, 9400 and 9538 (WCDMA) (low, middle and high operational frequency range.)

b. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 23.8dB in the transmitted path track.

c. 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.

4.3.5 EUT OPERATING CONDITION

a. The EUT makes a phone call to the communication simulator.

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

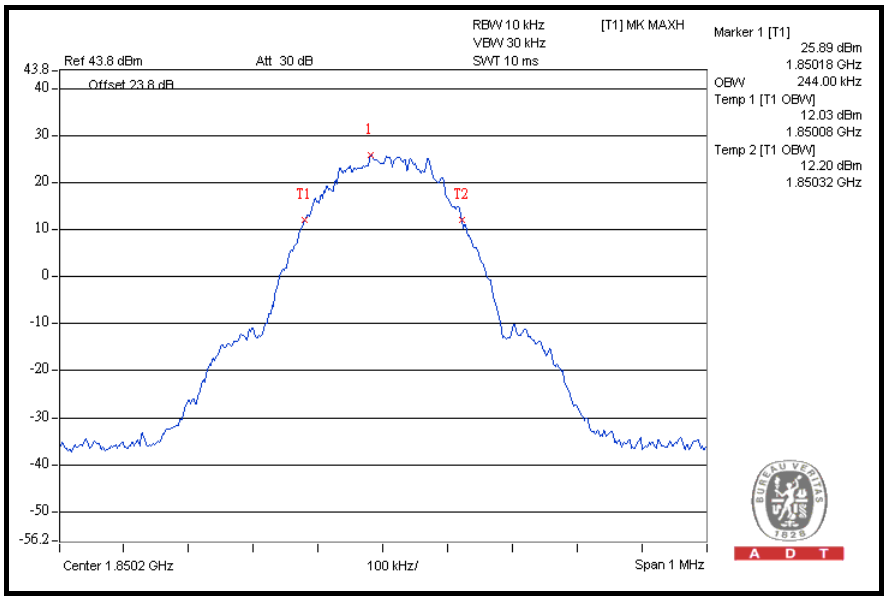
4.3.6 TEST RESULTS

FOR GSM, GPRS & E-GPRS:

FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (kHz)
512	1850.2	244
661	1880.0	244
810	1909.8	244

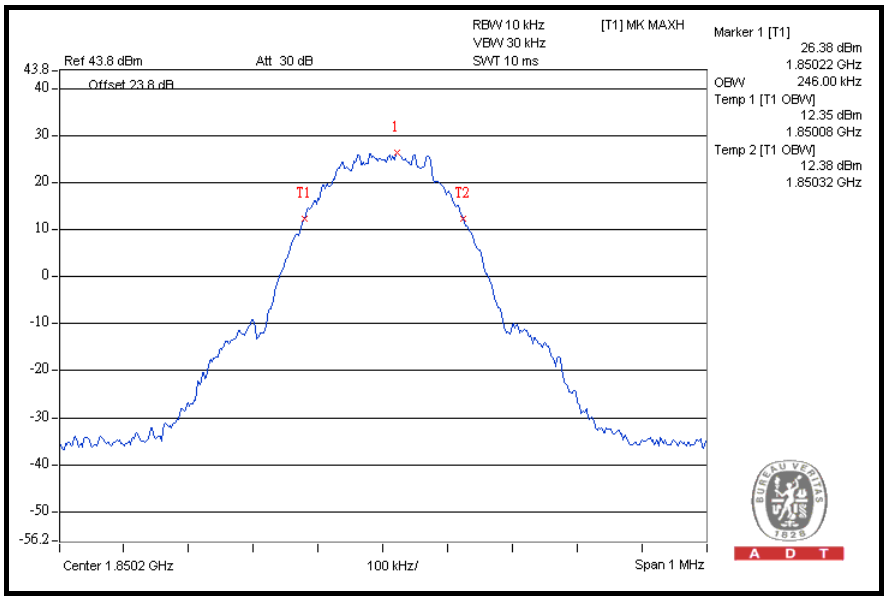
CH 512



FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (kHz)
512	1850.2	246
661	1880.0	244
810	1909.8	244

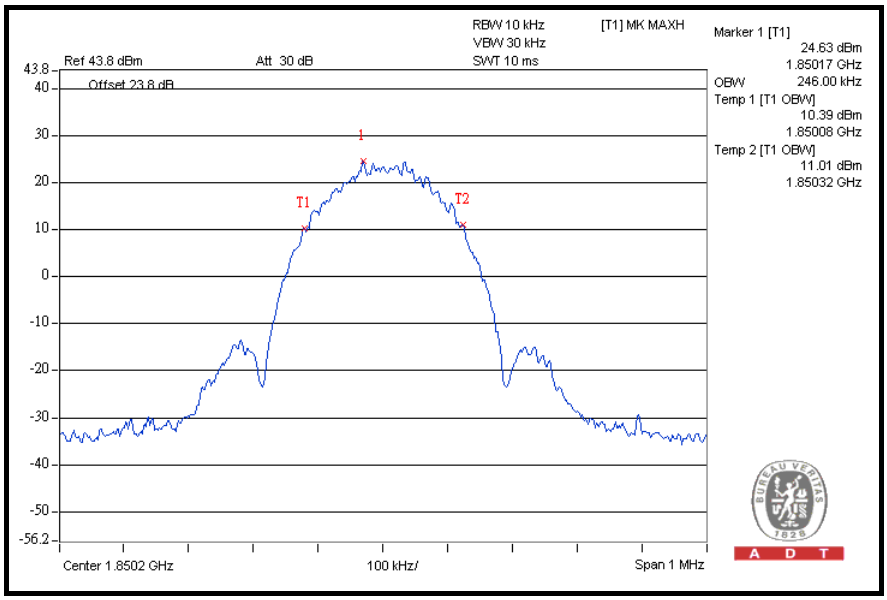
CH 512



FOR E-GPRS MODE (UP-LINK WITH 1 TIME SLOT)

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (kHz)
512	1850.2	246
661	1880.0	246
810	1909.8	246

CH 512

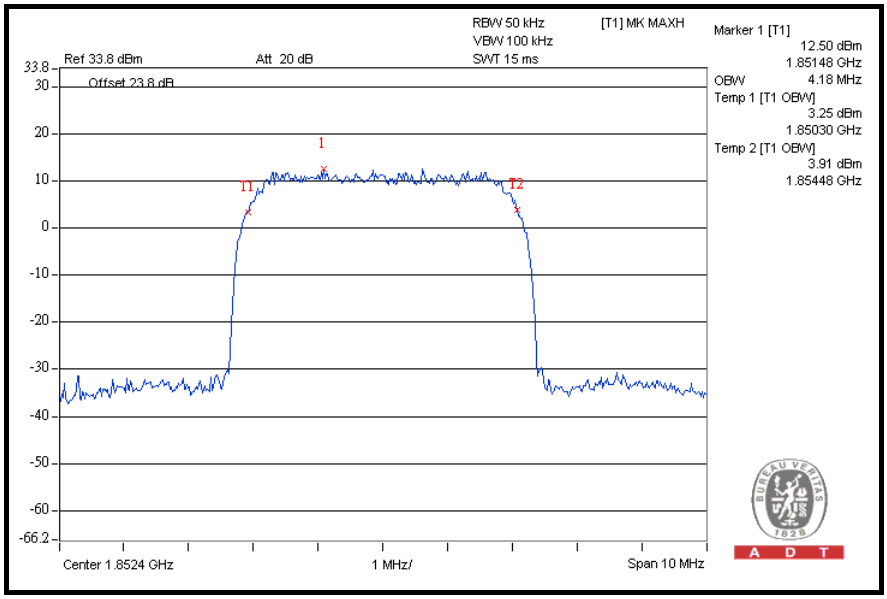


FOR WCDMA

FOR WCDMA:

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)
9262	1852.4	4.18
9400	1880.0	4.18
9538	1907.6	4.18

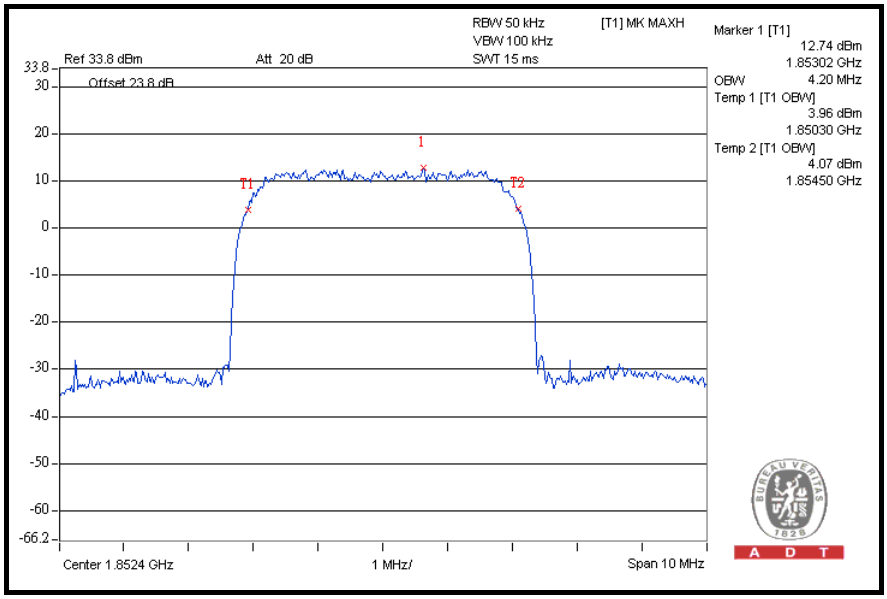
CH 9262



FOR HSDPA:

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)
9262	1852.4	4.20
9400	1880.0	4.18
9538	1907.6	4.18

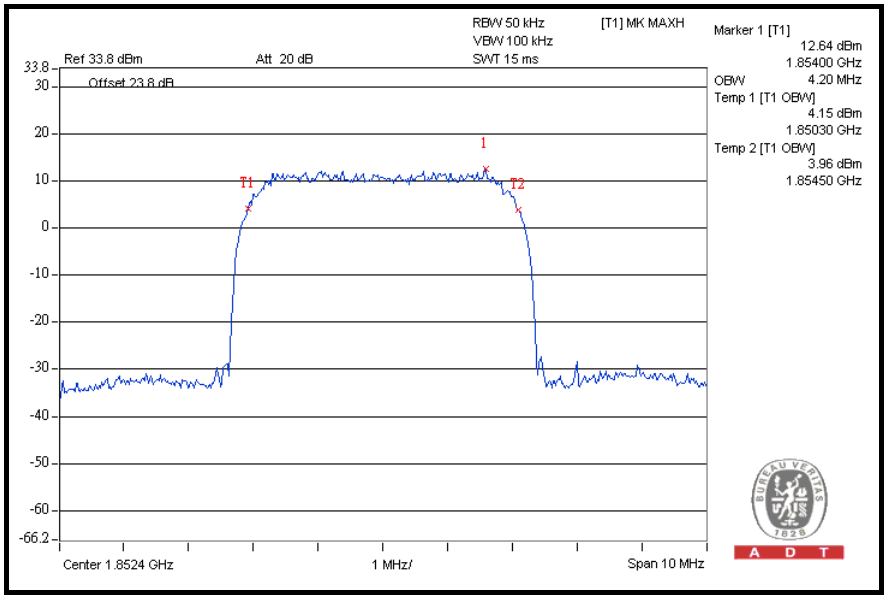
CH 9262



FOR HSUPA:

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)
9262	1852.4	4.20
9400	1880.0	4.18
9538	1907.6	4.18

CH 9262



4.4 BAND EDGE MEASUREMENT

4.4.1 LIMITS OF BAND EDGE MEASUREMENT

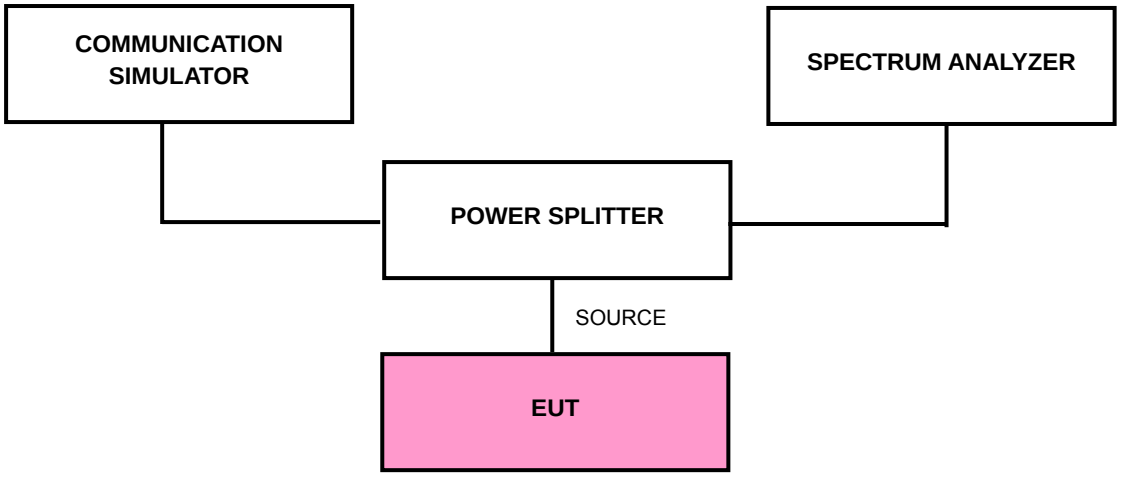
According to FCC 24.238(a) specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
RF cable	SUCOFLEX 104	274403/4	Aug. 21, 2009	Aug. 20, 2010
RF cable	SUCOFLEX 104	250729/4	Aug. 20, 2009	Aug. 19, 2010
RF cable	SUCOFLEX 104	214377/4	Aug. 20, 2009	Aug. 19, 2010
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST SETUP



4.4.4 TEST PROCEDURES

a. The EUT makes a phone call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 512 and 810 (GSM, GPRS, E-GPRS) / 9262 and 9538 (WCDMA) (low and high operational frequency range.)

b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 23.8dB in the transmitted path track.

c. The center frequency of spectrum is the band edge frequency and span is 1.5 MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GSM, GPRS, E-GPRS).

d. The center frequency of spectrum is the band edge frequency and span is 10 MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (WCDMA).

e. Record the max trace plot into the test report.

4.4.5 EUT OPERATING CONDITION

a. The EUT makes a phone call to the communication simulator.

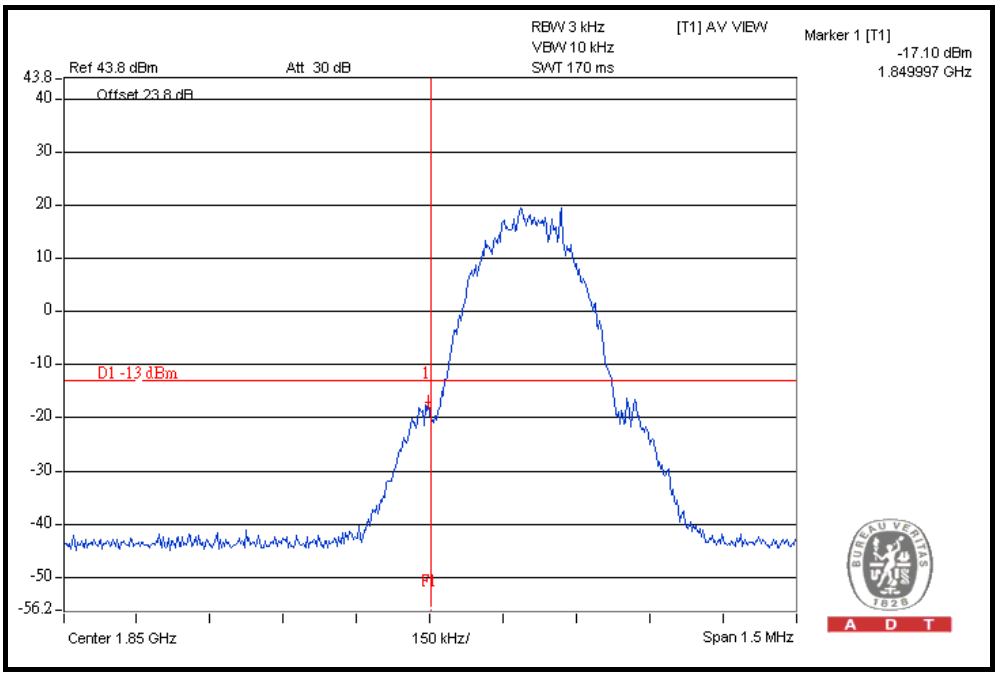
b. The communication simulator station system controlled an EUT to export maximum output power under transmission mode and specific channel frequency.

4.4.6 TEST RESULTS

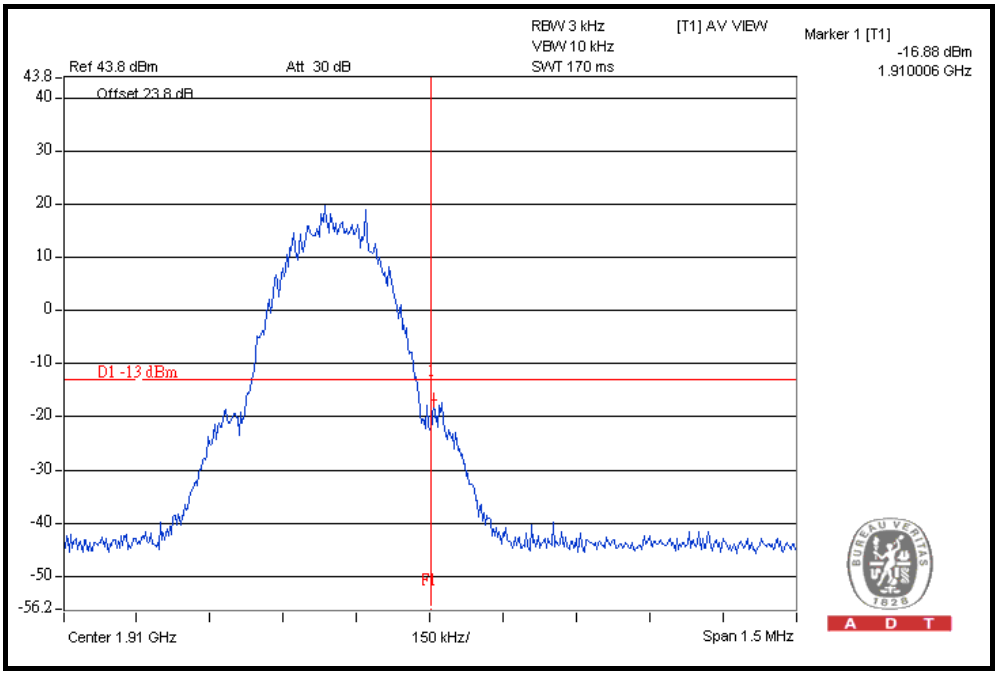
FOR GSM, GPRS, E-GPRS:

FOR GSM

LOWER BAND EDGE

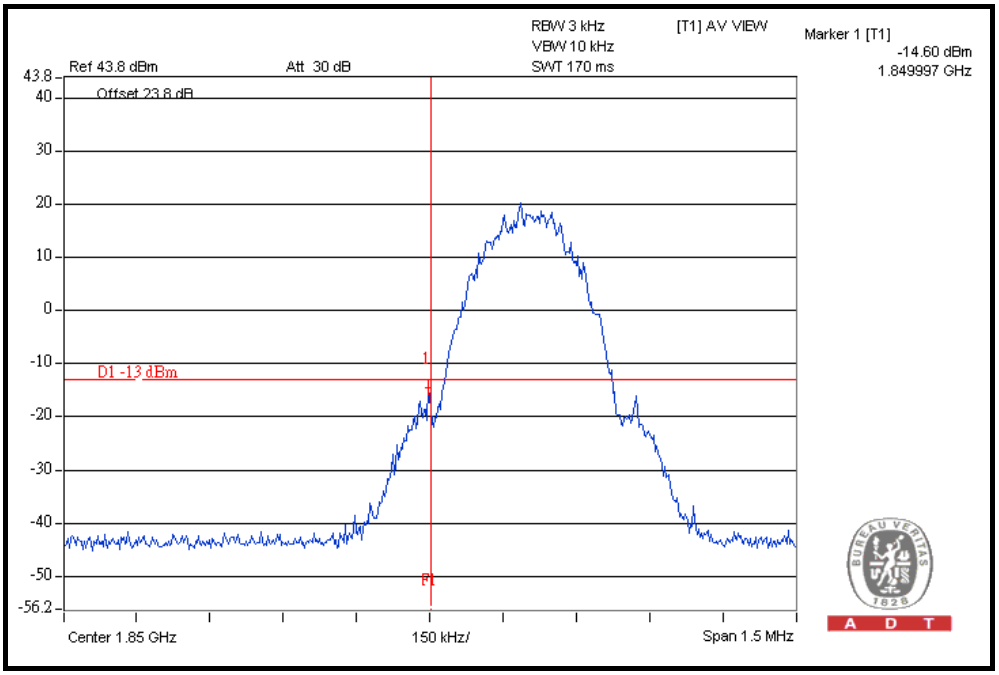


HIGHER BAND EDGE

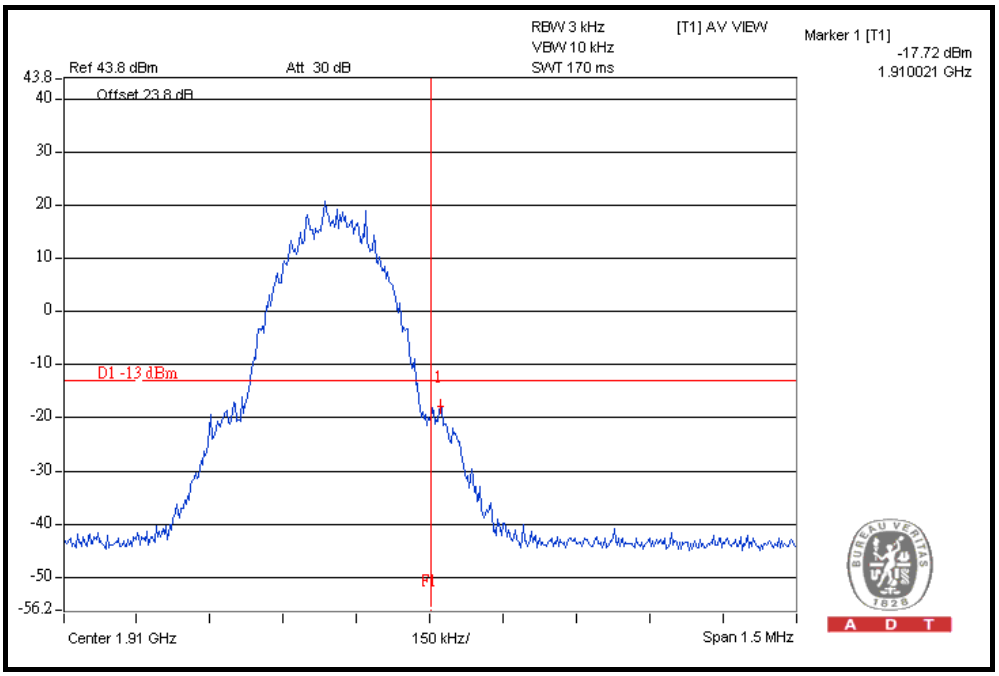


FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

LOWER BAND EDGE

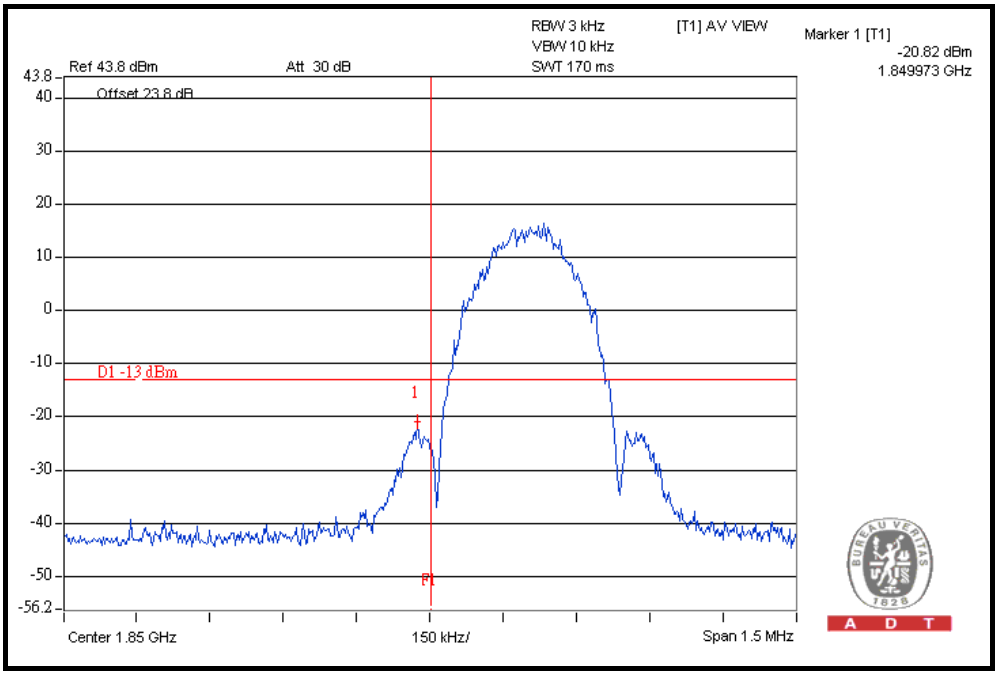


HIGHER BAND EDGE

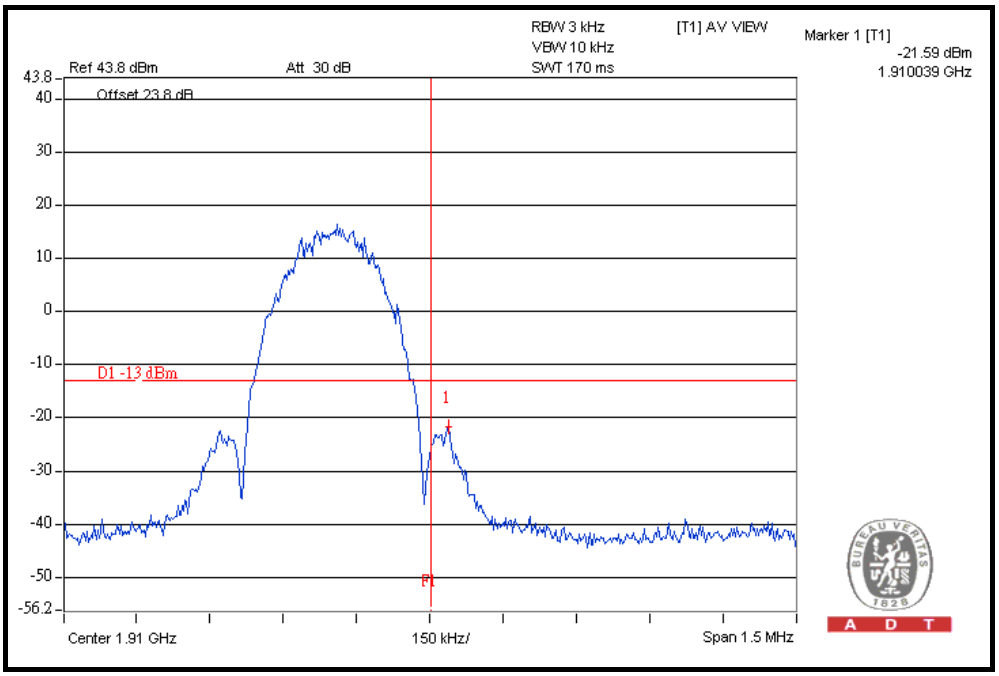


FOR E-GPRS MODE (UP-LINK WITH 1 TIME SLOT)

LOWER BAND EDGE



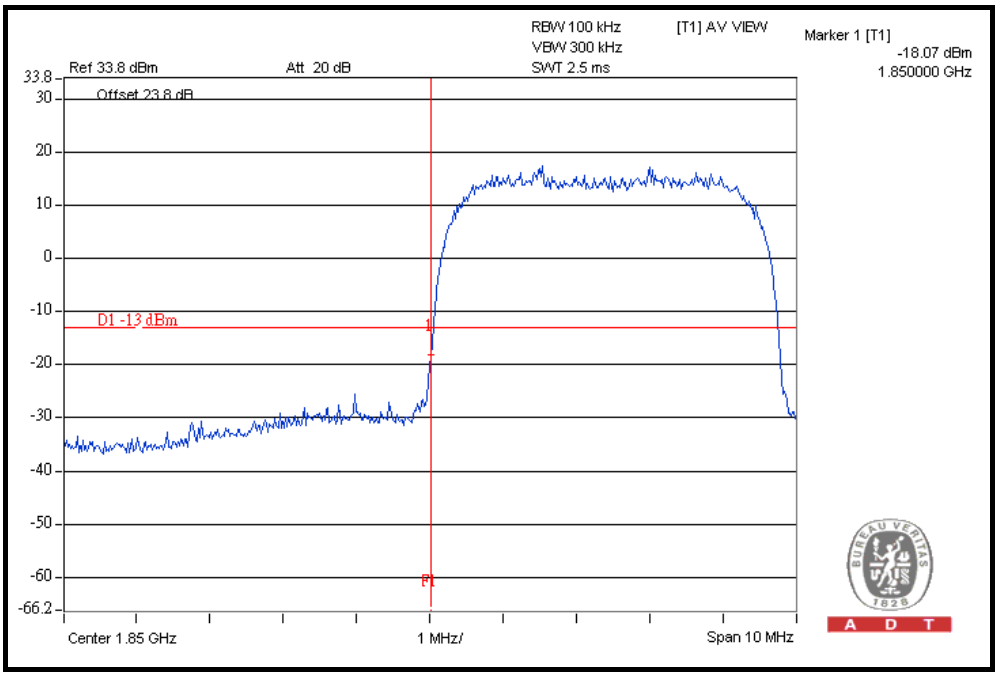
HIGHER BAND EDGE



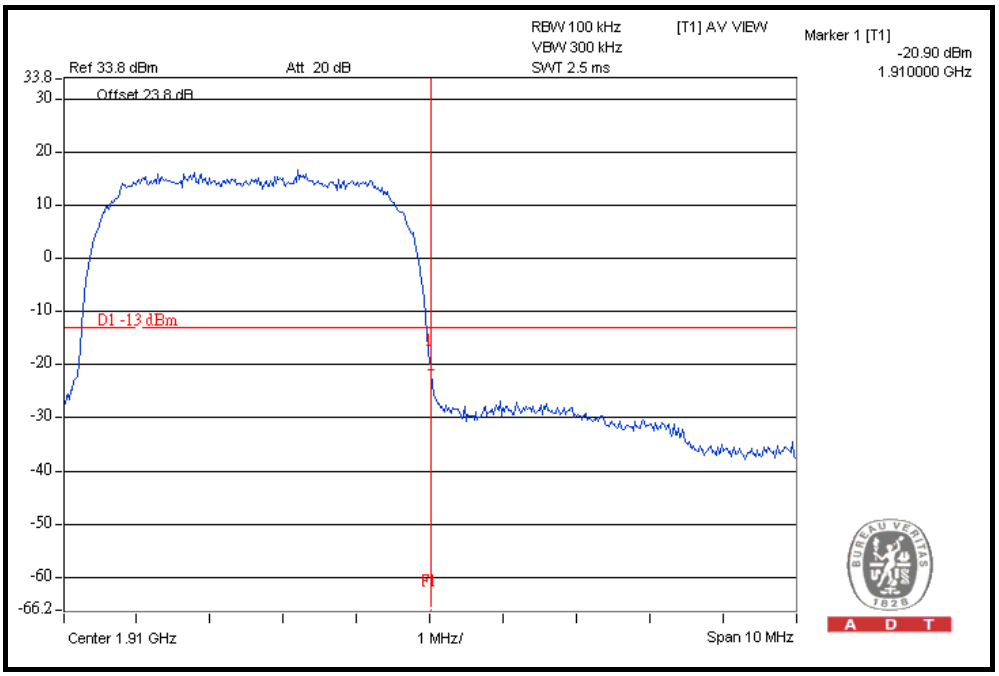
FOR WCDMA:

WCDMA MODE

LOWER BAND EDGE

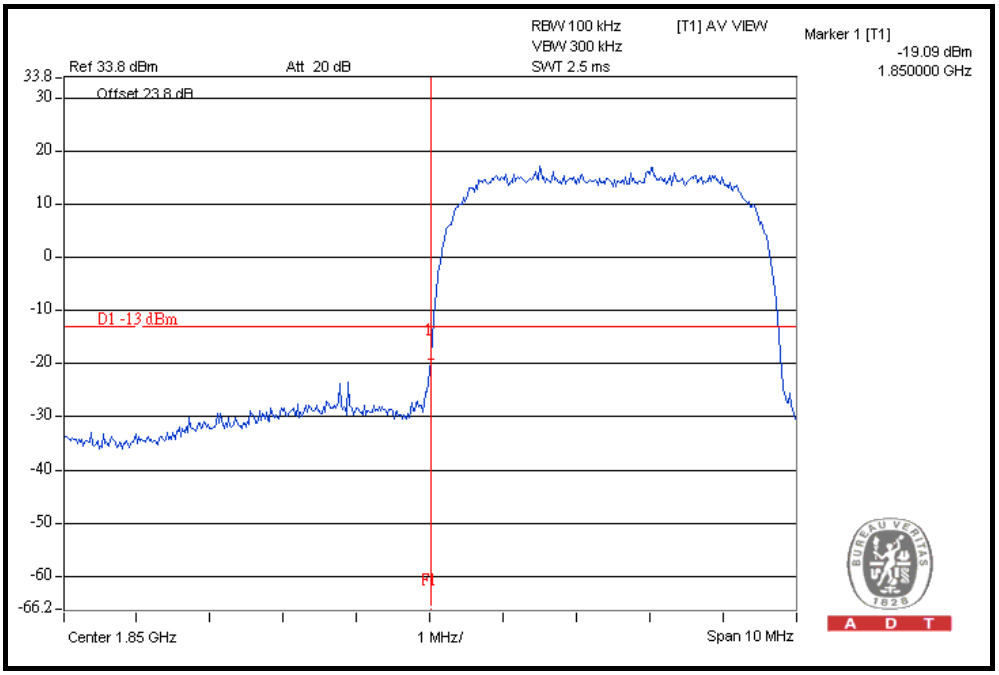


HIGHER BAND EDGE

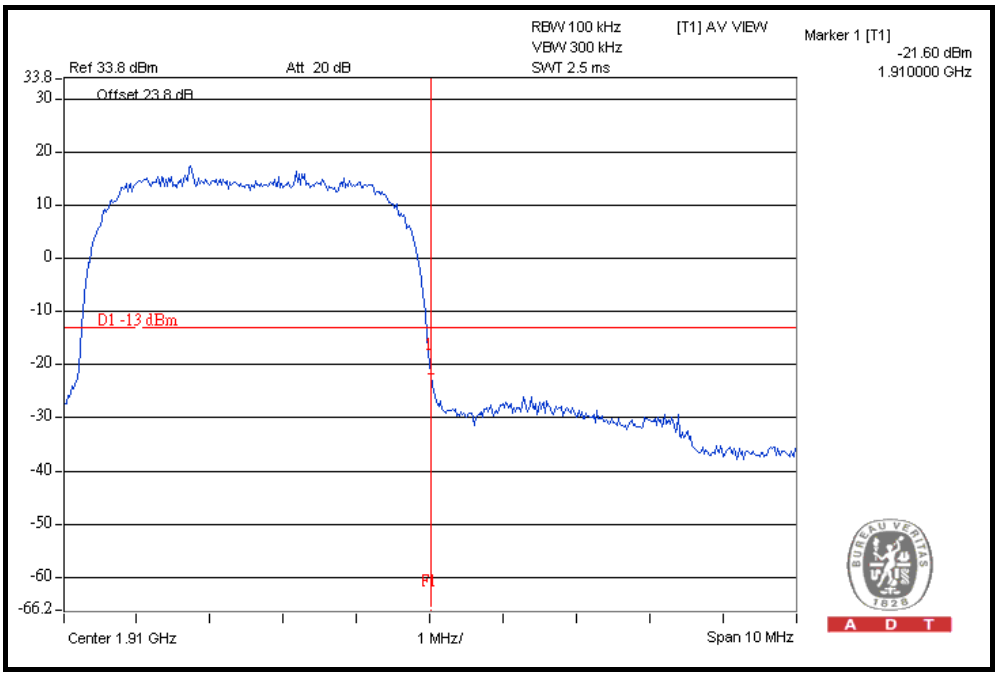


FOR HSDPA MODE

LOWER BAND EDGE

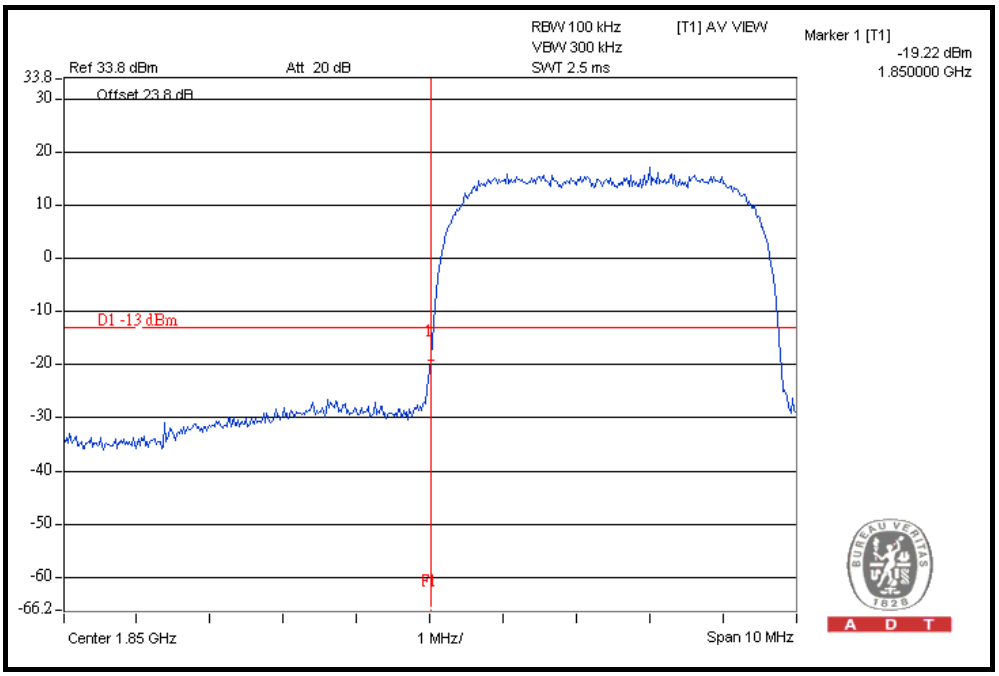


HIGHER BAND EDGE

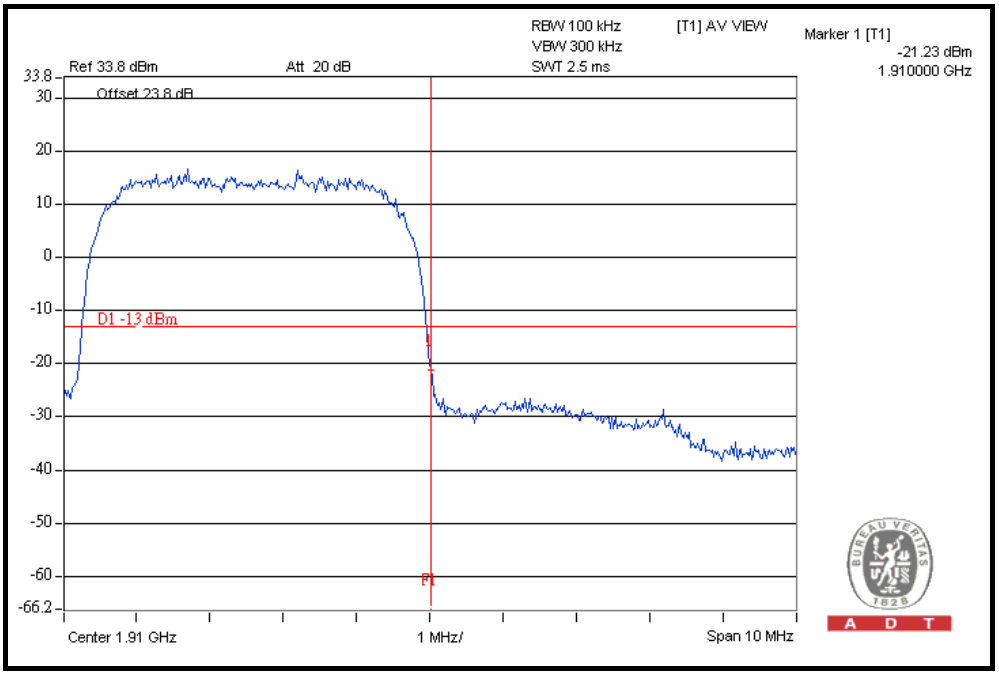


FOR HSUPA MODE

LOWER BAND EDGE



HIGHER BAND EDGE



4.5 CONDUCTED SPURIOUS EMISSIONS

4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P) dB. The specified minimum attenuation becomes 43dB and the limit of emission equal to –13dBm.

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010
Wainwright Instruments Band Reject Filter	WRCG 824/849-810/ 863-60/9SS	SN1	Mar. 25, 2010	Mar. 24, 2011
WI Highpass filter	WHK1.5/15G-10ST	SN1	Mar. 30, 2010	Mar. 29, 2011
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
RF cable	SUCOFLEX 104	274403/4	Aug. 21, 2009	Aug. 20, 2010
RF cable	SUCOFLEX 104	250729/4	Aug. 20, 2009	Aug. 19, 2010
RF cable	SUCOFLEX 104	214377/4	Aug. 20, 2009	Aug. 19, 2010
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

NOTE: The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

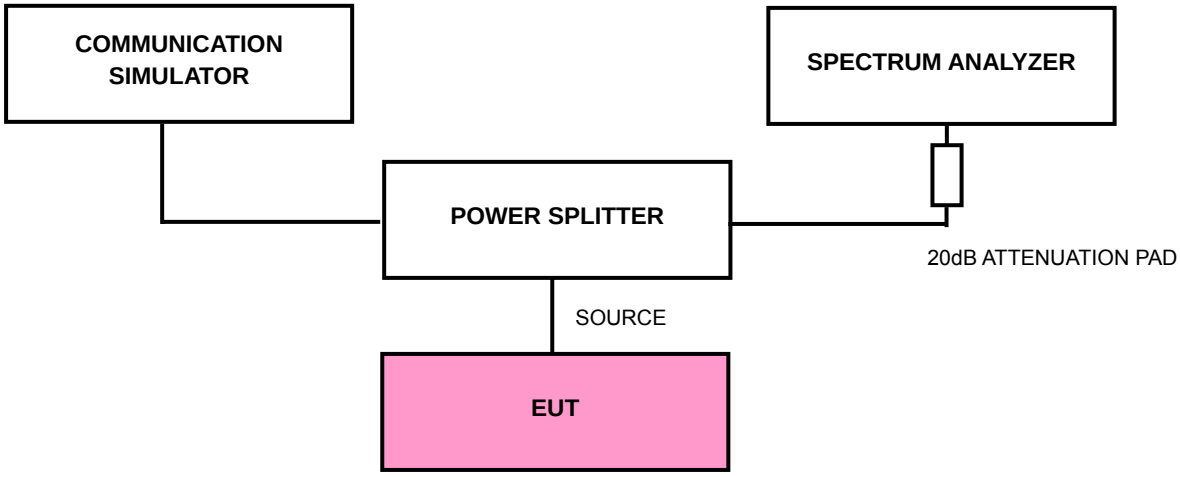
4.5.3 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (GSM) / 9262, 9400 and 9538 (WCDMA) (low, middle and high operational frequency range.)

b. The conducted spurious emission used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 23.8dB in the transmitted path track.

c. When the spectrum scanned from 9kHz to 20GHz, it shall be connected to 20dB Pad. The spectrum set RB=1MHz, VB=3MHz.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

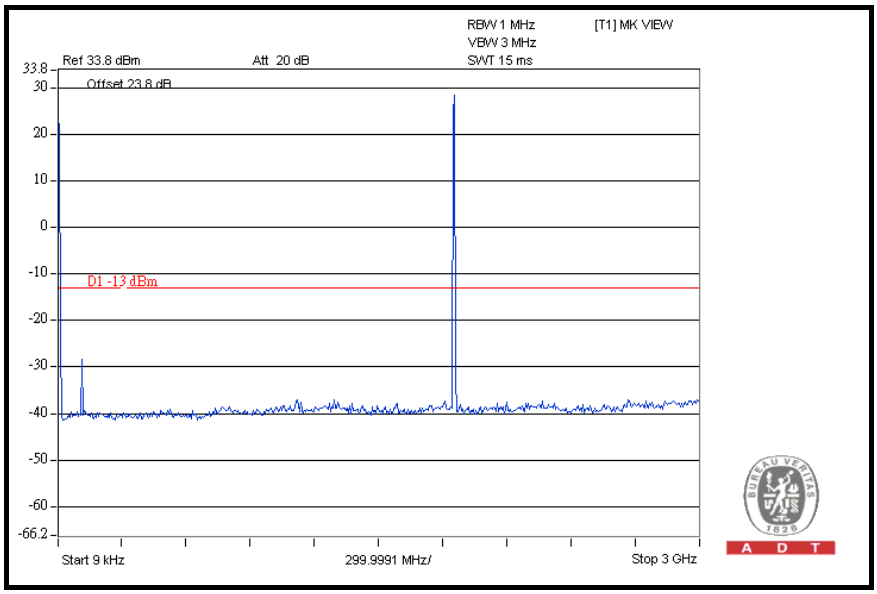
a. The EUT makes a phone call to the communication simulator.

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

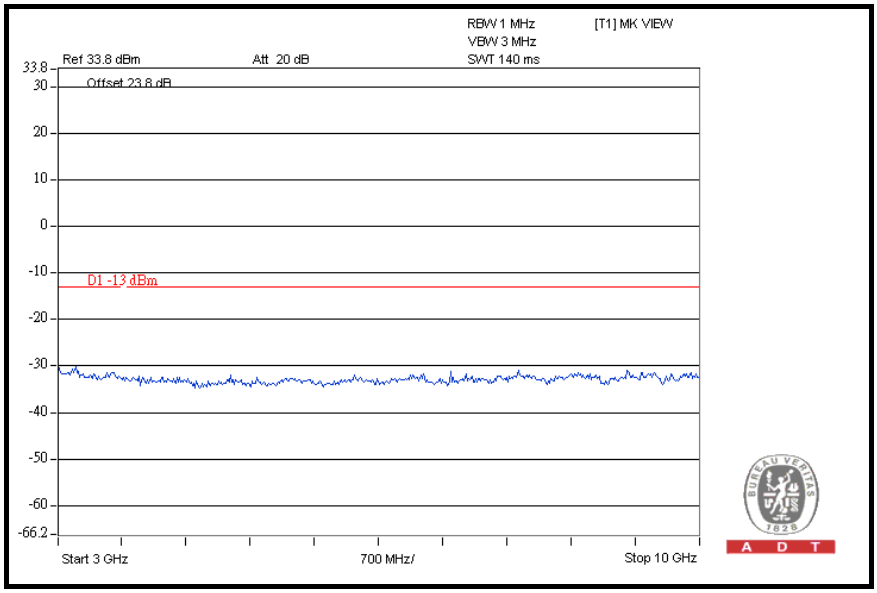
4.5.6 TEST RESULTS

FOR GSM:

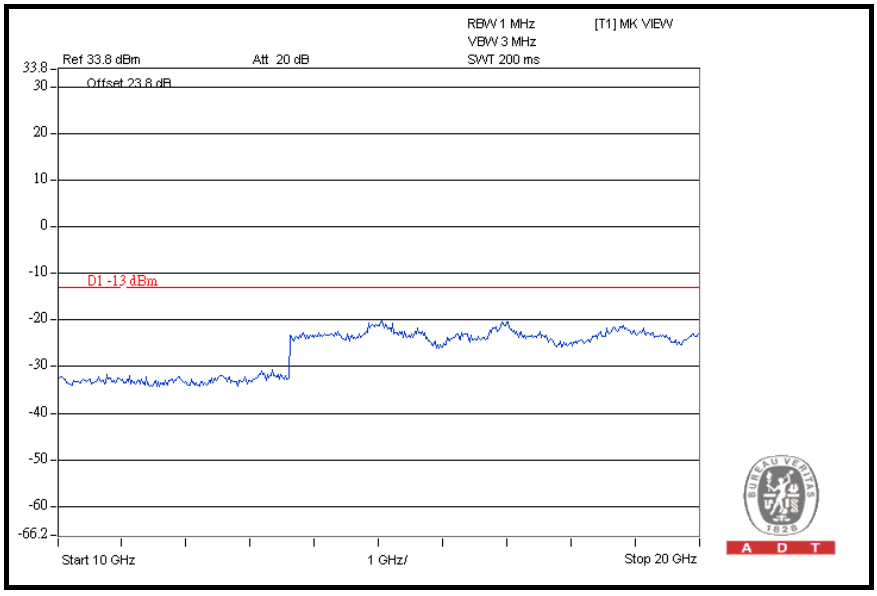
CH 512: 9kHz ~ 3GHz



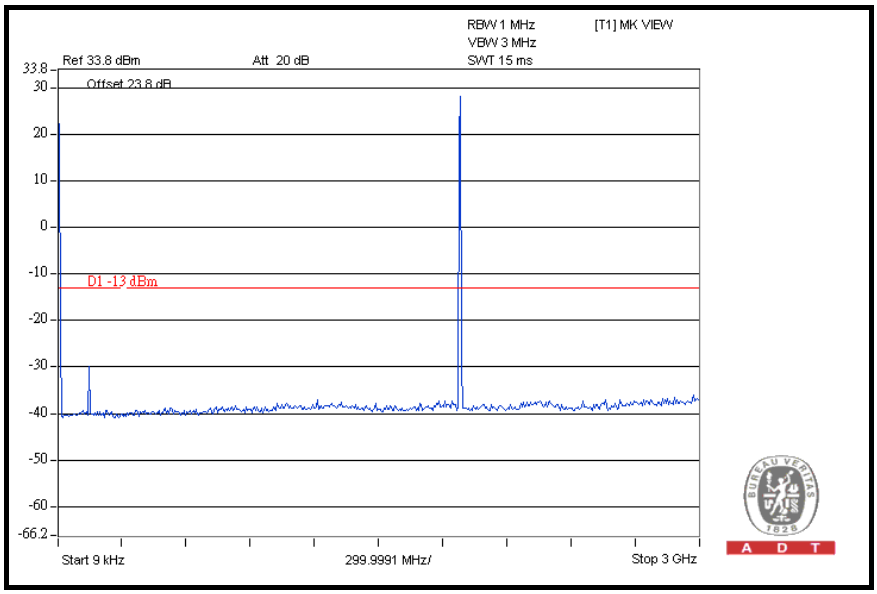
3GHz ~ 10GHz



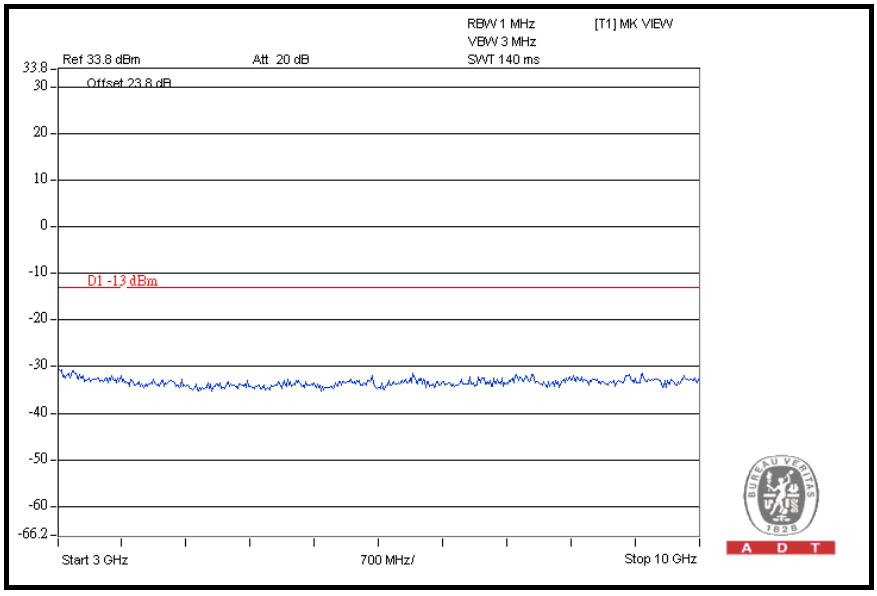
10GHz ~ 20GHz



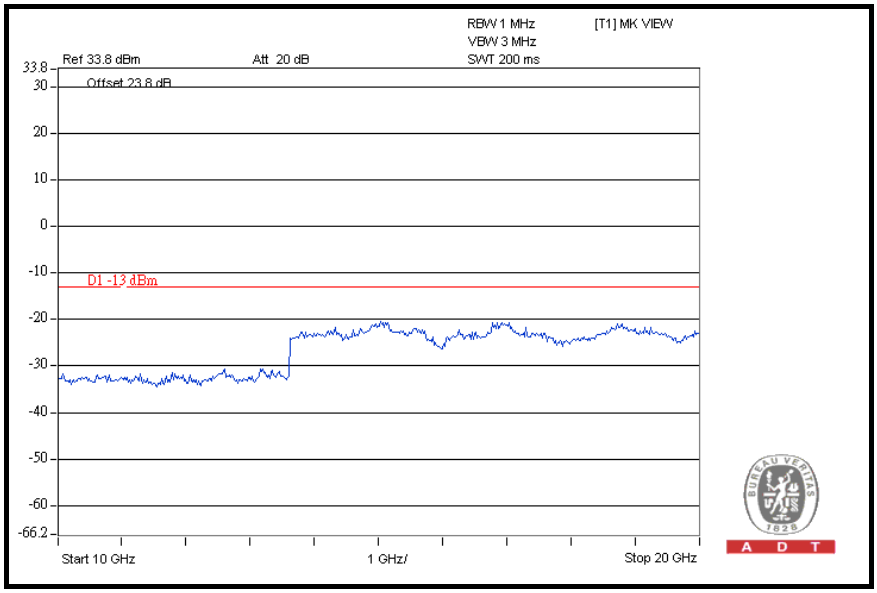
CH 661: 9kHz ~ 3GHz



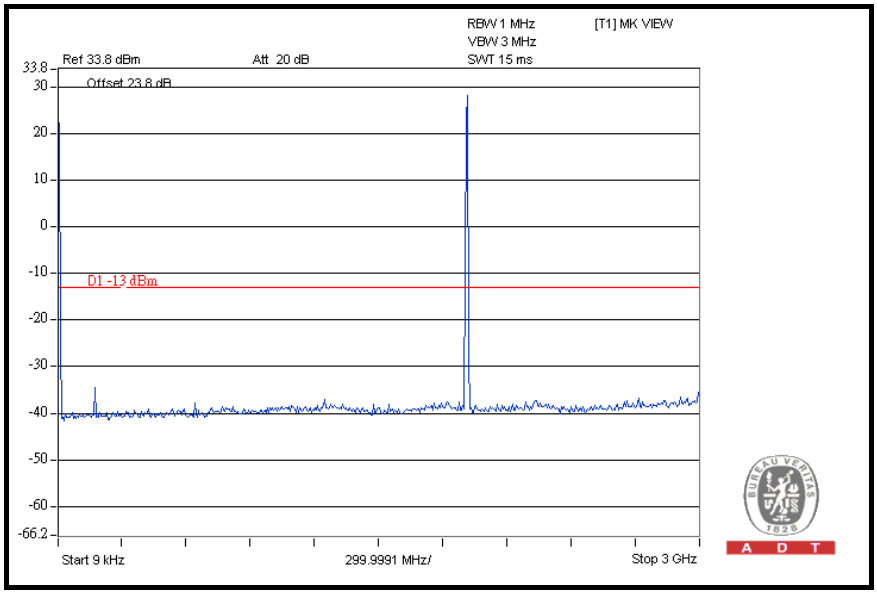
3GHz ~ 10GHz



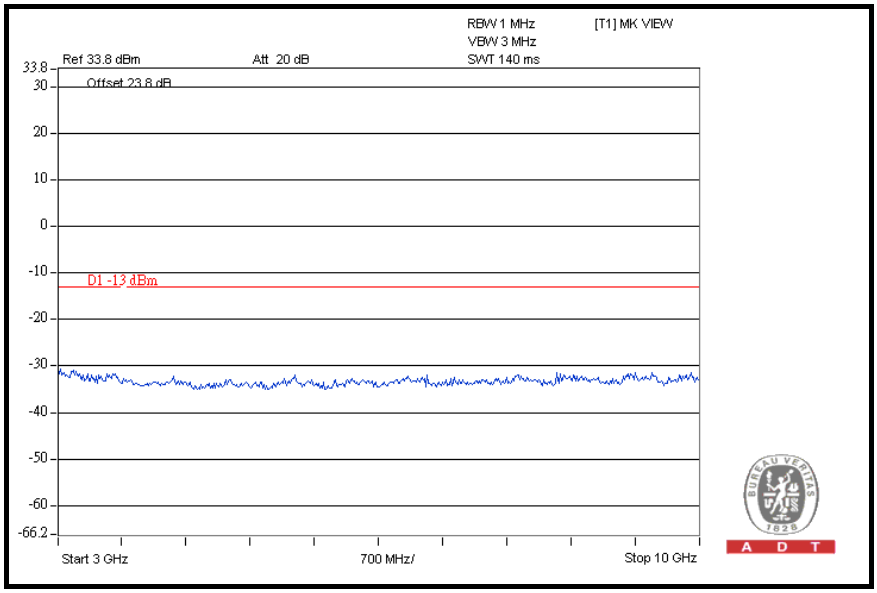
10GHz ~ 20GHz



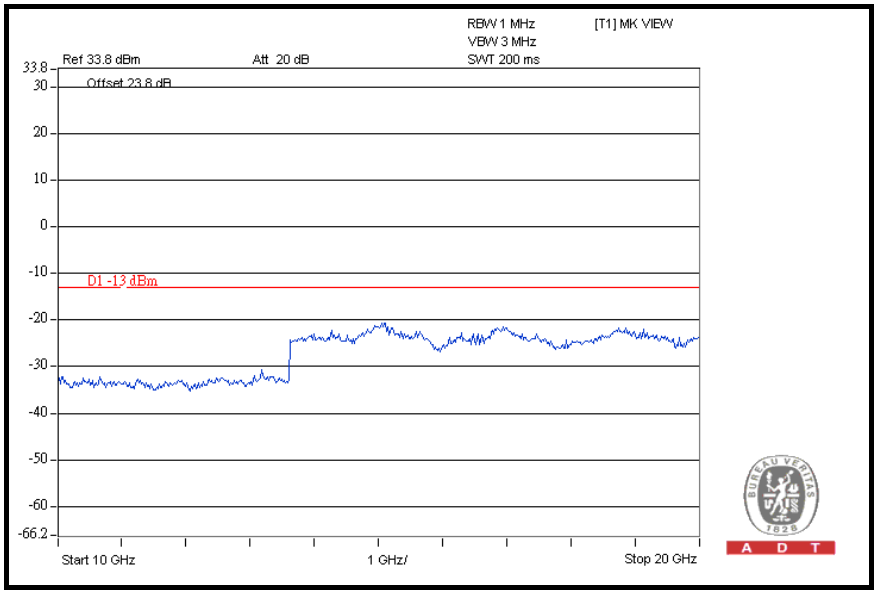
CH 810: 9kHz ~ 3GHz



3GHz ~ 10GHz

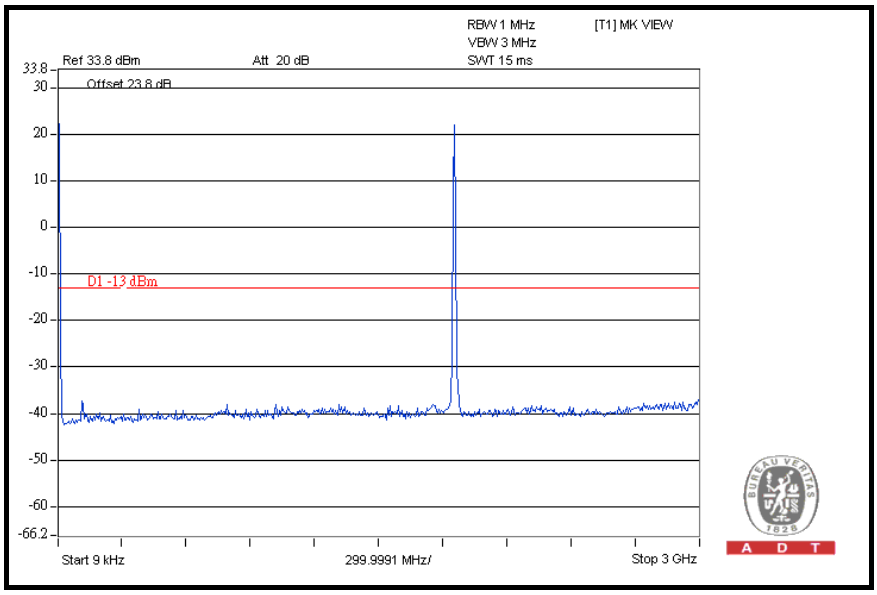


10GHz ~ 20GHz

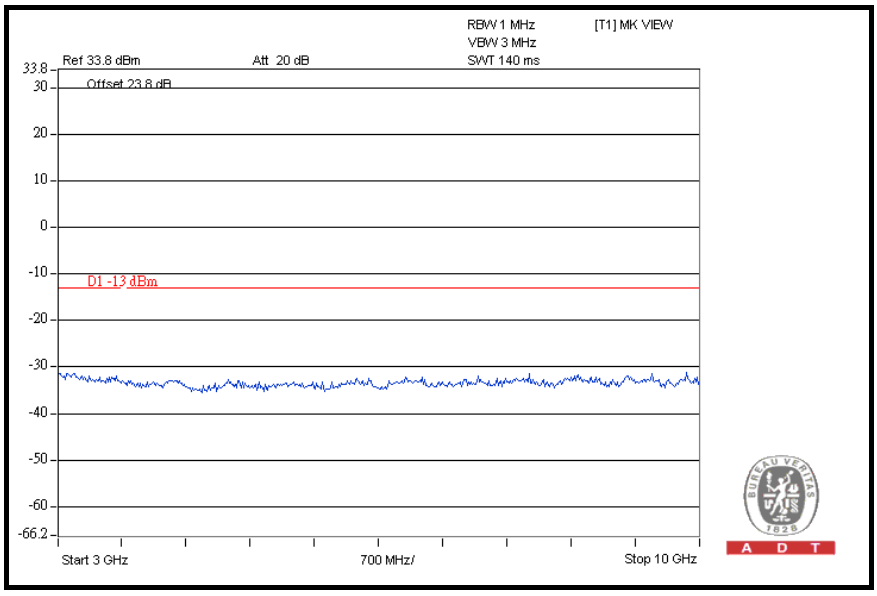

RBW 1 MHz
VBW 3 MHz
SWT 200 ms
[T1] MK VIEW
Ref 33.8 dBm
Att 20 dB
Offset 23.8 dB
33.8
30
20
10
0
-10
-20
-30
-40
-50
-60
-66.2
D1 -13 dBm
Start 10 GHz
1 GHz/
Stop 20 GHz

FOR WCDMA:

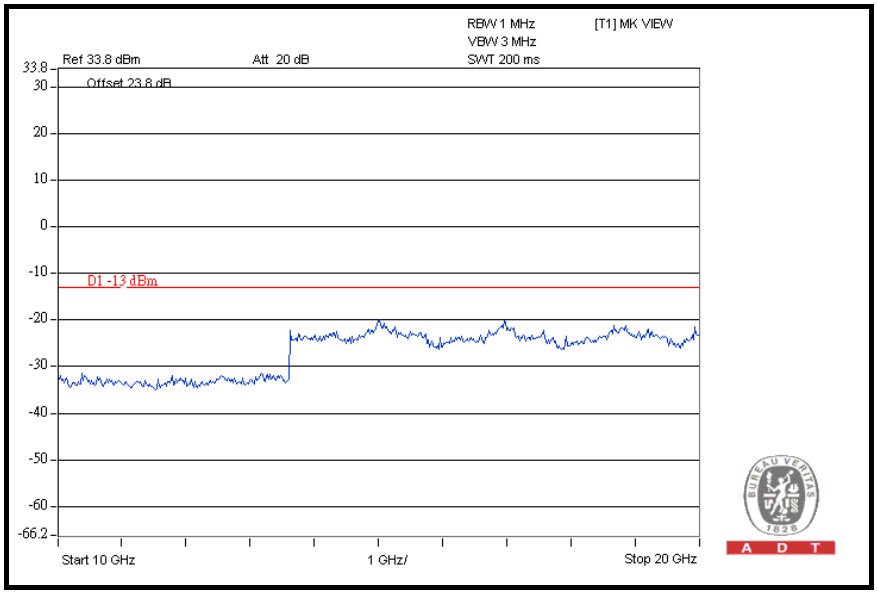
CH 9262: 9kHz ~ 3GHz



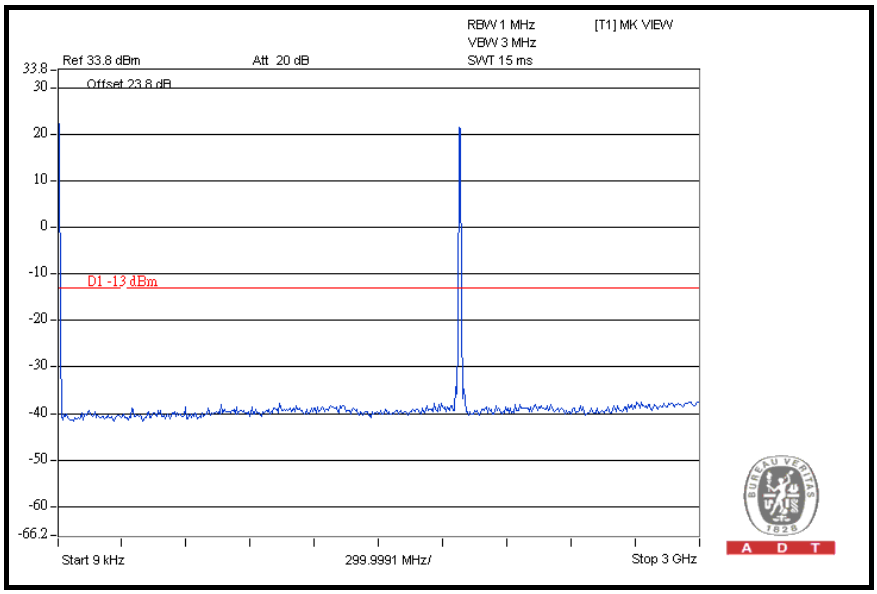
3GHz ~ 10GHz



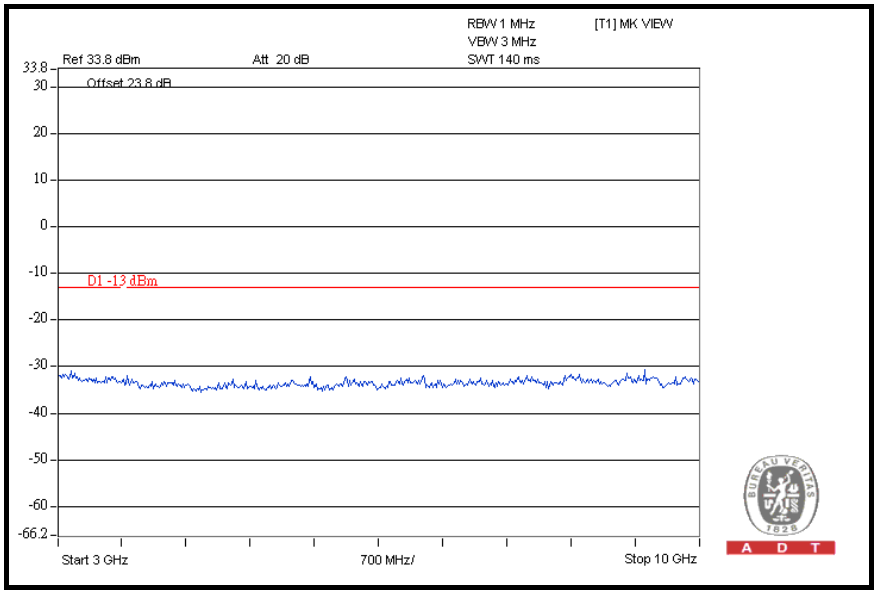
10GHz ~ 20GHz



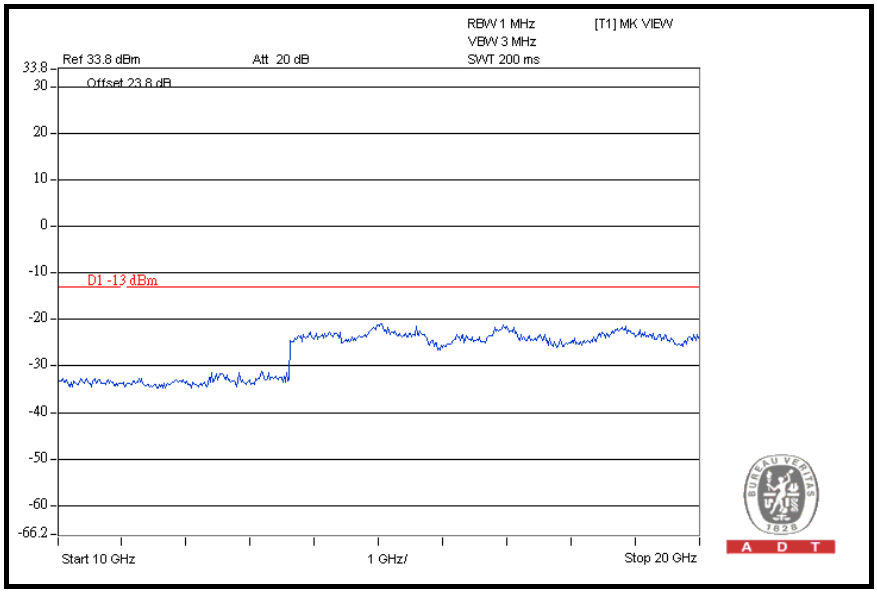
CH 9400: 9kHz ~ 3GHz



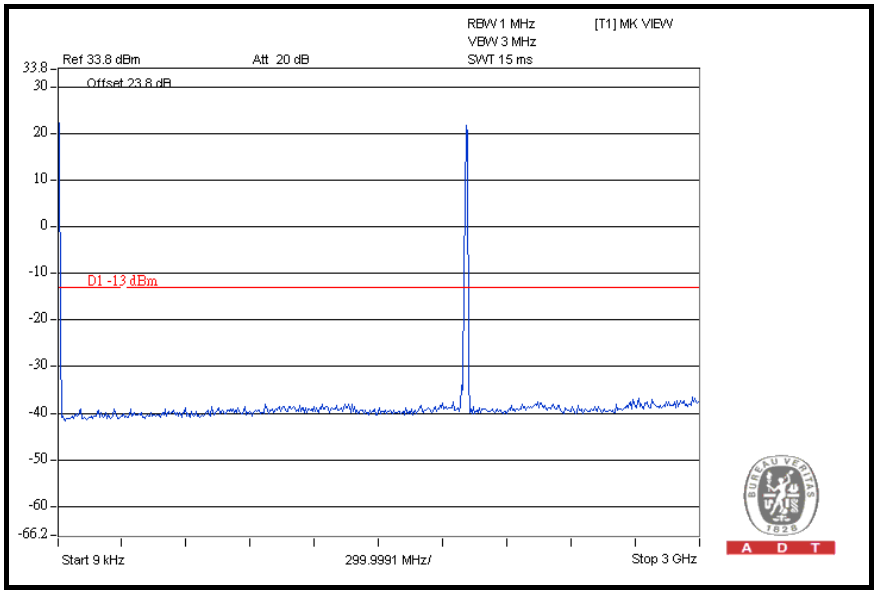
3GHz ~ 10GHz



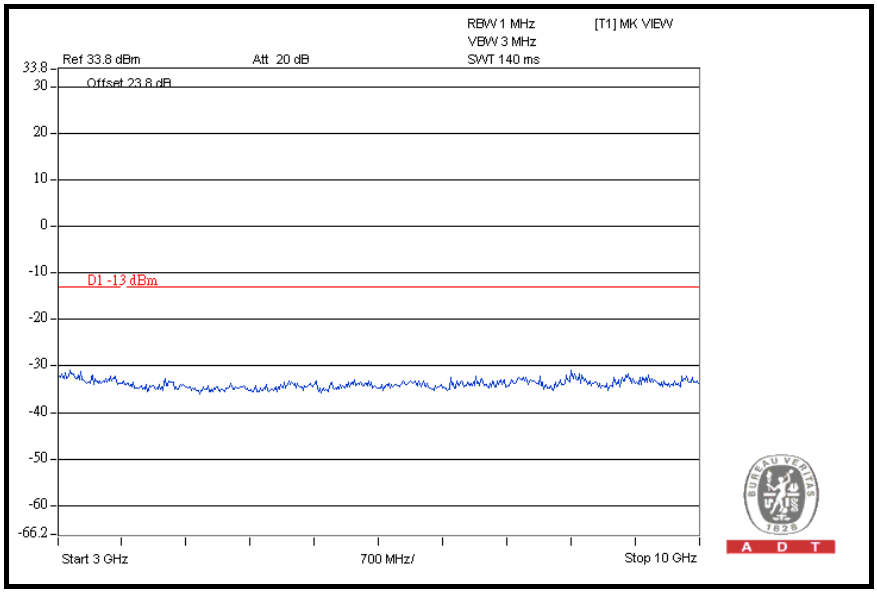
10GHz ~ 20GHz



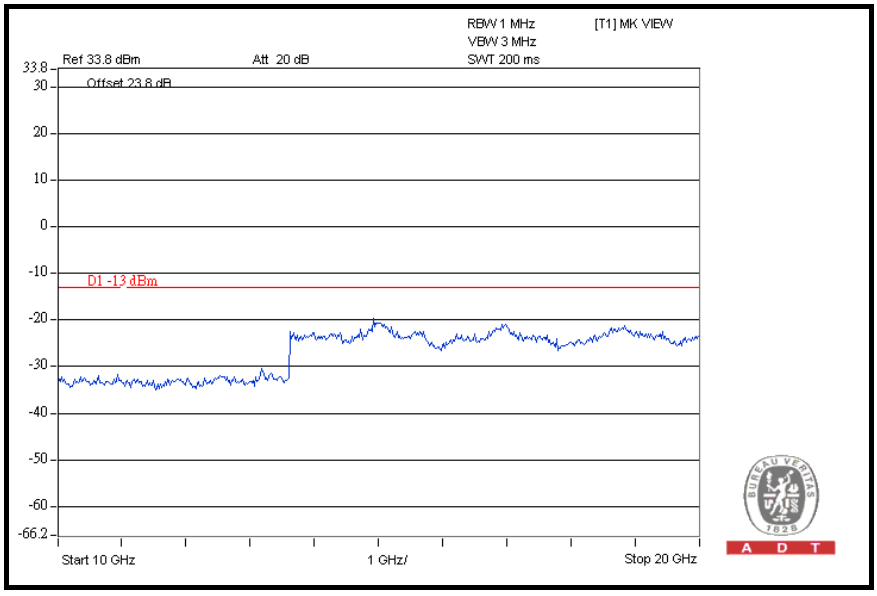
CH 9538: 9kHz ~ 3GHz



3GHz ~ 10GHz



10GHz ~ 20GHz


RBW 1 MHz
VBW 3 MHz
SWT 200 ms
[T1] MK VIEW
Ref 33.8 dBm
Att 20 dB
Offset 23.8 dB
33.8
30
20
10
0
-10
-20
-30
-40
-50
-60
-66.2
D1 -13 dBm
Start 10 GHz
1 GHz/
Stop 20 GHz

4.6 RADIATED EMISSION MEASUREMENT (BELOW 1GHz)

4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P) dB. The emission of limit equal to –13dBm. So the limit of emission is the same absolute specified line.

LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBuV/m) (NOTE)
-13	82.2

NOTE: The following formula is used to convert the equipment radiated power to field strength.

$$E = [1000000\sqrt{(30P)}] / 3 \text{ uV/m, where P is Watts.}$$

4.6.2 TEST INSTRUMENTS

Same as 4.1.2.

4.6.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

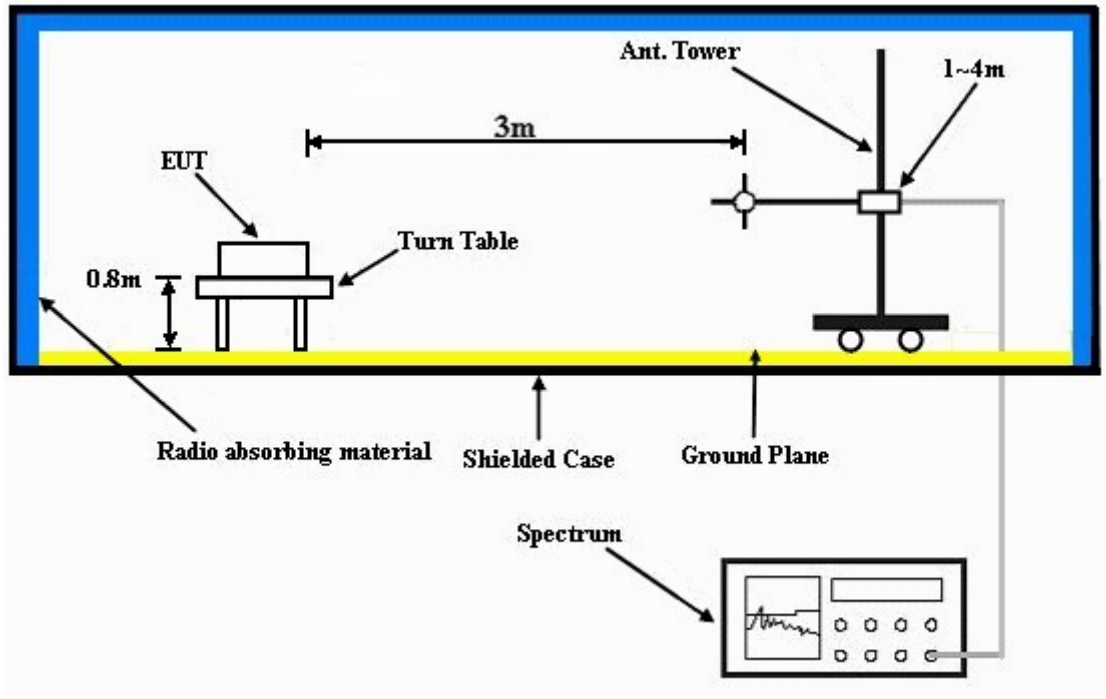
f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



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

4.6.6 EUT OPERATING CONDITIONS

a. The EUT makes a phone call to the communication simulator.

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

4.6.7 TEST RESULTS

FOR GSM:

MODE	TX channel 661	FREQUENCY RANGE	Below 1000 MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 1008hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Match Tsui

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	48.0	82.2	-34.2	2.00 H	247	35.10	12.90
2	152.46	48.6	82.2	-33.6	1.25 H	286	34.00	14.60
3	893.09	53.3	82.2	-28.9	1.00 H	1	25.20	28.10
4	924.19	47.6	82.2	-34.6	1.00 H	10	19.10	28.50
5	951.40	49.3	82.2	-32.9	1.00 H	10	20.60	28.70
6	996.11	52.3	82.2	-29.9	1.25 H	310	22.90	29.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	47.4	82.2	-34.8	2.00 V	253	34.50	12.90
2	152.46	48.2	82.2	-34.0	2.00 V	274	33.60	14.60
3	362.40	47.4	82.2	-34.8	1.00 V	238	30.30	17.10
4	900.86	53.6	82.2	-28.6	1.00 V	10	25.30	28.30
5	951.40	50.0	82.2	-32.2	1.25 V	346	21.30	28.70
6	998.06	50.7	82.2	-31.5	1.25 V	316	21.30	29.40

NOTE:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. This is valid for all 3 channels.

MODE	TX channel 661	FREQUENCY RANGE	Below 1000 MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 1008hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Match Tsui

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	80.54	47.2	82.2	-35.0	2.00 H	88	37.40	9.80
2	189.40	49.9	82.2	-32.3	2.00 H	139	37.70	12.20
3	366.29	48.7	82.2	-33.5	1.00 H	136	31.50	17.20
4	566.51	47.4	82.2	-34.8	2.00 H	187	25.00	22.40
5	891.14	53.1	82.2	-29.1	1.50 H	352	25.00	28.10
6	1000.00	50.3	82.2	-31.9	1.00 H	319	20.90	29.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	35.83	63.4	82.2	-18.8	1.00 V	124	50.40	13.00
2	63.05	48.5	82.2	-33.7	1.00 V	103	35.60	12.90
3	364.35	47.6	82.2	-34.6	1.50 V	79	30.50	17.10
4	560.68	48.2	82.2	-34.0	1.50 V	163	25.90	22.30
5	900.86	49.4	82.2	-32.8	2.00 V	10	21.10	28.30
6	947.52	46.3	82.2	-35.9	1.50 V	1	17.60	28.70

NOTE:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. This is valid for all 3 channels.

FOR WCDMA:

MODE	TX channel 9400	FREQUENCY RANGE	Below 1000 MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 65%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	A	TESTED BY	Brad Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.00	47.2	82.2	-35.0	2.00 H	259	34.30	12.90
2	152.46	48.9	82.2	-33.3	1.50 H	295	34.30	14.60
3	368.24	47.7	82.2	-34.5	1.00 H	238	30.50	17.20
4	893.09	53.6	82.2	-28.6	1.00 H	10	25.50	28.10
5	949.46	48.6	82.2	-33.6	1.50 H	7	19.90	28.70
6	996.11	49.1	82.2	-33.1	1.50 H	349	19.70	29.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	31.94	65.5	82.2	-16.7	1.50 V	178	52.70	12.80
2	63.05	53.5	82.2	-28.7	1.00 V	61	40.60	12.90
3	103.87	47.4	82.2	-34.8	1.00 V	118	37.50	9.90
4	138.86	48.2	82.2	-34.0	1.00 V	88	34.60	13.60
5	366.29	48.4	82.2	-33.8	1.25 V	286	31.20	17.20
6	898.92	47.4	82.2	-34.8	1.00 V	10	19.20	28.20

NOTE:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. This is valid for all 3 channels.

MODE	TX channel 9400	FREQUENCY RANGE	Below 1000 MHz
ENVIRONMENTAL CONDITIONS	26deg. C, 65%RH, 991hPa	INPUT POWER (SYSTEM)	120Vac, 60 Hz
TEST MODE	B	TESTED BY	Brad Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	78.60	48.0	82.2	-34.2	2.00 H	115	37.80	10.20
2	189.40	49.5	82.2	-32.7	1.50 H	127	37.30	12.20
3	364.35	49.0	82.2	-33.2	1.00 H	148	31.90	17.10
4	891.14	52.5	82.2	-29.7	1.50 H	1	24.40	28.10
5	951.40	51.2	82.2	-31.0	1.00 H	310	22.50	28.70
6	994.17	51.3	82.2	-30.9	1.50 H	325	22.00	29.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	37.78	63.2	82.2	-19.0	1.00 V	130	49.80	13.40
2	63.05	48.4	82.2	-33.8	1.00 V	10	35.50	12.90
3	189.40	45.5	82.2	-36.7	1.00 V	262	33.30	12.20
4	366.29	48.2	82.2	-34.0	1.50 V	79	31.00	17.20
5	893.09	48.5	82.2	-33.7	1.00 V	10	20.40	28.10
6	951.40	46.6	82.2	-35.6	1.00 V	10	17.90	28.70

NOTE:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. This is valid for all 3 channels.

4.7 RADIATED EMISSION MEASUREMENT (ABOVE 1GHz)

4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

In the FCC 24.238(a), On any frequency outside a licensee's frequency block within USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 +10 log (P) dB. The specified minimum attenuation becomes 43dB and the limit of emission equal to –13dBm.

4.7.2 TEST INSTRUMENTS

Same as 4.1.2.

4.7.3 TEST PROCEDURES

a. Substitution method is used for E.I.R.P 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

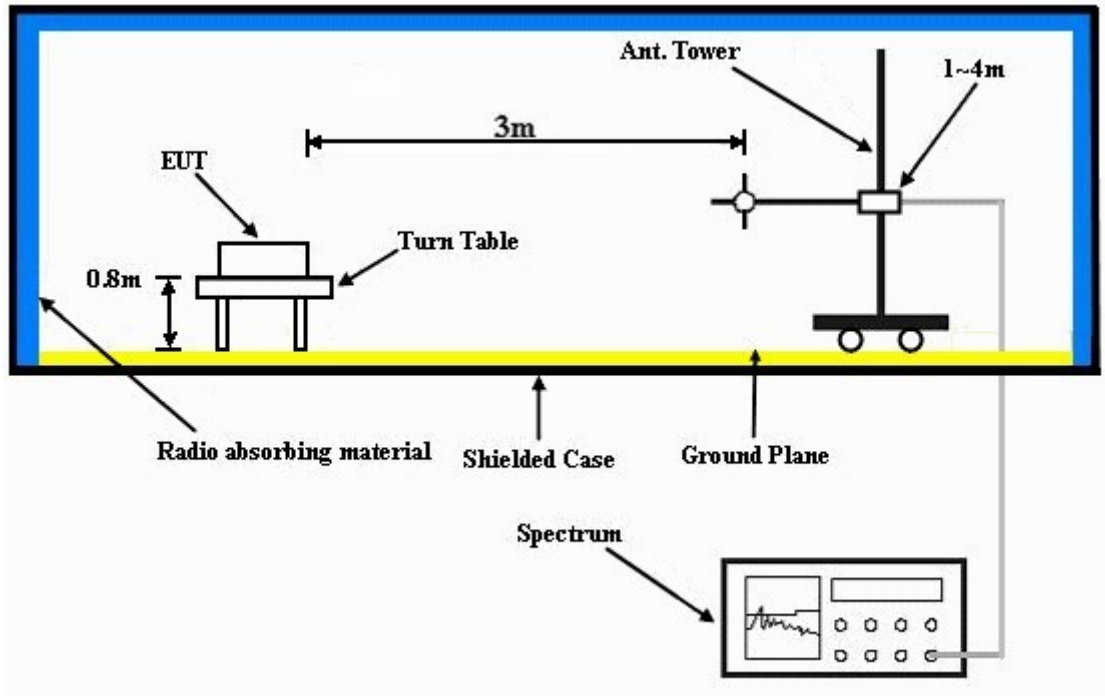
c. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

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

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



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

4.7.6 EUT OPERATING CONDITIONS

a. The EUT makes a phone call to the communication simulator.

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

4.7.7 TEST RESULTS

FOR GSM:

MODE	TX channel 512	**FREQUENCY RANGE**	Above 1000 MHz
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1008hPa
TESTED BY	Dean Wang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3700.4	69.8	-13.0	-34.7	9.9	-24.8
2	5550.6	70.0	-13.0	-34.3	9.7	-24.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3700.4	72.0	-13.0	-32.3	9.9	-22.4
2	5550.6	68.0	-13.0	-35.9	9.7	-26.2

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

MODE	TX channel 661	**FREQUENCY RANGE**	Above 1000 MHz
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1008hPa
TESTED BY	Dean Wang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3760.0	70.2	-13.0	-33.6	9.9	-23.7
2	5640.0	70.8	-13.0	-32.9	9.6	-23.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	**3760.0**	**74.5**	**-13.0**	**-29.8**	**9.9**	**-19.9**
2	5640.0	70.8	-13.0	-33.5	9.6	-23.9

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

MODE	TX channel 810	**FREQUENCY RANGE**	Above 1000 MHz
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1008hPa
TESTED BY	Dean Wang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3819.6	69.6	-13.0	-34.7	9.9	-24.8
2	5729.4	69.5	-13.0	-34.2	9.6	-24.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3819.6	73.3	-13.0	-30.4	9.9	-20.5
2	5729.4	71.1	-13.0	-32.7	9.6	-23.1

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

FOR WCDMA:

MODE	TX channel 9262	**FREQUENCY RANGE**	Above 1000 MHz
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1008hPa
TESTED BY	Dean Wang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3704.8	51.6	-13.0	-52.8	9.9	-42.9
2	5557.2	54.1	-13.0	-50.3	9.7	-40.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3704.8	52.9	-13.0	-51.7	9.9	-41.8
2	5557.2	55.4	-13.0	-49.3	9.7	-39.6

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

MODE	TX channel 9400	**FREQUENCY RANGE**	Above 1000 MHz
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1008hPa
TESTED BY	Dean Wang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3760.0	52.1	-13.0	-52.5	9.9	-42.6
2	5640.0	53.5	-13.0	-50.7	9.6	-41.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3760.0	53.5	-13.0	-51.2	9.9	-41.3
2	5640.0	56.5	-13.0	-47.6	9.6	-38.0

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

MODE	TX channel 9538	**FREQUENCY RANGE**	Above 1000 MHz
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	24deg. C, 64%RH, 1008hPa
TESTED BY	Dean Wang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3815.2	51.5	-13.0	-53.0	9.9	-43.1
2	5722.8	52.5	-13.0	-51.8	9.6	-42.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M						
No.	**Freq. (MHz)**	**Emission Level (dBuV)**	**Limit (dBm)**	**S.G Power Value (dBm)**	**Correction Factor (dB)**	**Power Value (dBm)**
1	3815.2	53.1	-13.0	-51.1	9.9	-41.2
2	5722.8	56.0	-13.0	-48.5	9.6	-38.9

NOTE: Power Value (dBum) = S.G Power Value (dBm) + Correction Factor (dB).

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6 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.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.
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 Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

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

7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

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