FCC TEST REPORT

(PART 24)

REPORT NO.:	RF980810L01-2
MODEL NO.:	F-03B
RECEIVED:	Aug. 10, 2009
TESTED:	Aug. 12, 2009
ISSUED:	Aug. 27, 2009

APPLICANT:	FUJITSU LIMITED
ADDRESS:	1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki 211-8588, Japan

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.

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1 CERTIFICATION

PRODUCT : Mobile phone
MODEL : F-03B
BRAND : FOMA
APPLICANT : FUJITSU LIMITED
TESTED : Aug. 12, 2009
TEST SAMPLE: ENGINEERING SAMPLE
TEST STANDARDS: **FCC Part 24, Subpart E**
ANSI C63.4-2003

The above equipment (model: F-03B) 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:** Aug. 27, 2009
Andrea Hsia / Specialist

TECHNICAL ACCEPTANCE : Long Chen , **DATE:** Aug. 27, 2009
Responsible for RF
Long Chen / Senior Engineer

APPROVED BY : Gary Chang , **DATE:** Aug. 27, 2009
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 30.41dBm at 1850.2MHz.
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 –24.68dB at 7639.20MHz.

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	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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	Mobile phone	
MODEL NO.	F-03B	
FCC ID	VQK-F03B	
POWER SUPPLY	3.7Vdc from rechargeable lithium battery 5.4Vdc from power adapter 5.0Vdc from host equipment	
MODULATION TYPE	GMSK	
OPERATING FREQUENCY	1850MHz ~ 1910MHz	
NUMBER OF CHANNEL	299	
MAX. ERP POWER	30.41dBm (1.099Watts)	
ANTENNA TYPE	Integral antenna	
MAX. ANTENNA GAIN	**EUT OPEN**	**EUT CLOSE**
	0dBi	2dBi
DATA CABLE	NA	
I/O PORTS	Refer to user's manual	
ACCESSORY DEVICES	Battery	
EUT EXTREME VOL. RANGE	3.33Vdc to 4.07Vdc	

NOTE:

1. The applicant defined the normal working voltage of the battery is from 3.33Vdc to 4.07Vdc.
2. The EUT is a Mobile phone. The functions of EUT listed as below:

	TEST STANDARD	REFERENCE REPORT
BLUETOOTH	FCC Part 15	RF980810L01
WCDMA 850	FCC Part 22	RF980810L01-1
GSM 1900	FCC Part 24	RF980810L01-2

3. The EUT is powered by the following adapter and battery.

ADAPTER (Not for sale)	
BRAND	SMK
INPUT POWER	100-240 Vac, 0.12A, 50-60Hz
OUTPUT POWER	5.4Vdc, 700mA
POWER CABLE	DC 1.5m non-shielded cable without core

BATTERY	
BRAND	Fujitsu Limited
MODEL	CA54310-0005
RATING	3.7Vdc, 770mAh

4. Refer to following table for IMEI no.:

IMEI NO.
35677502******

5. Hardware version: V2.1
6. Software version: R14.2
7. The communicated functions of EUT listed as below:

		850MHz	1900MHz	
2G	GSM		√	With Bluetooth
	GPRS		√	
3G	WCDMA	√		
	Release 5 HSDPA	√		

8. 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

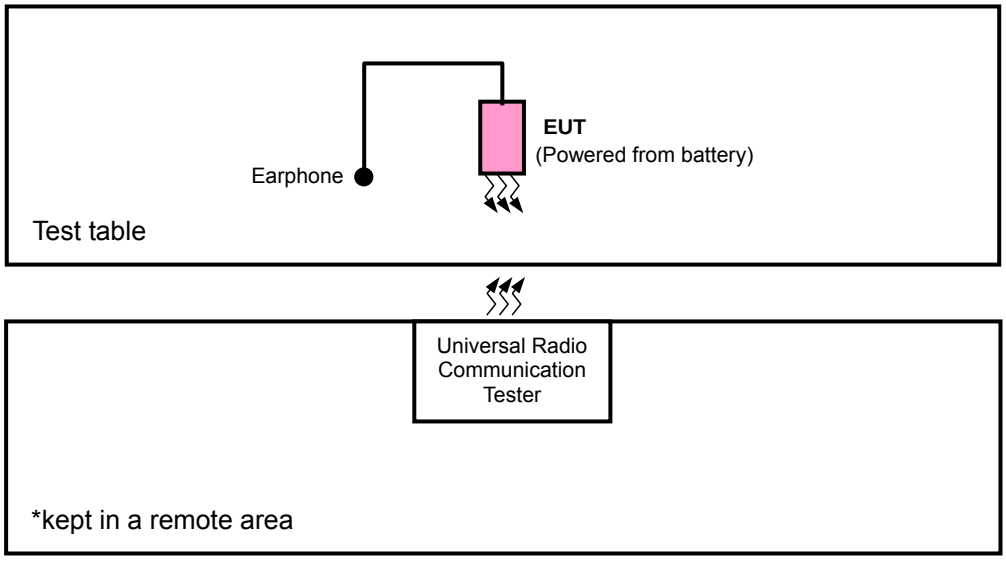
299 channels are provided to this EUT. Therefore, the low, middle and high channels are chosen for testing.

	CHANNEL	FREQUENCY	TX MODE
LOW	512	1850.2 MHz	GSM, GPRS
MIDDLE	661	1880.0 MHz	GSM, GPRS
HIGH	810	1909.8 MHz	GSM, 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. Since the EUT is considered a portable unit, it was pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Z-plane. Therefore only the test data of this Z-plane was used for radiated emission measurement test.
6. The EUT is a GPRS class 8 device (Multislot class: 8, Mobile Terminal B), which provide 1 up-link.
7. The EUT has GSM & GPRS functions. After pre-testing, GSM function is the worst case for all the emission tests.

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST



3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO							DESCRIPTION
	OP	FS	OB	BE	CE	RE<1G	RE≥1G	
-	√	√	√	√	√	√	√	-

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

OUTPUT POWER MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	AXIS
512 to 810	512, 661, 810	GSM, GPRS	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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
512 to 810	661	GSM

OCCUPIED BANDWIDTH 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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
512 to 810	512, 661, 810	GSM, GPRS

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
512 to 810	512, 810	GSM, GPRS

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	AXIS
512 to 810	512	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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	AXIS
512 to 810	512, 661, 810	GSM	Z

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

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.	CAL. DATE
1	UNIVERSAL RADIO COMMUNICATION TESTER	R&S	CMU200	104484	Feb. 02, 2010

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Item 2 acted as a 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	ESIB7	100212	May 25, 2009	May 24, 2010
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jul. 07, 2009	Jul. 06, 2010
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 30, 2009	Apr. 29, 2010
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Aug. 10, 2009	Aug. 09, 2010
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170242	Jan. 06, 2009	Jan. 05, 2010
Preamplifier Agilent	8449B	3008A01911	Sep. 10, 2008	Sep. 09, 2009
Preamplifier Agilent	8447D	2944A10638	Dec. 26, 2008	Dec. 25, 2009
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	218190/4 231241/4	May 13, 2009	May 12, 2010
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 17, 2009	Aug. 16, 2010
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn Table Controller EMCO	2090	NA	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 9.

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 460141.

5. The IC Site Registration No. is IC 7450F-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 (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, then read peak power value and record to the test. (All transmitted path loss shall be considered in the test report data.)

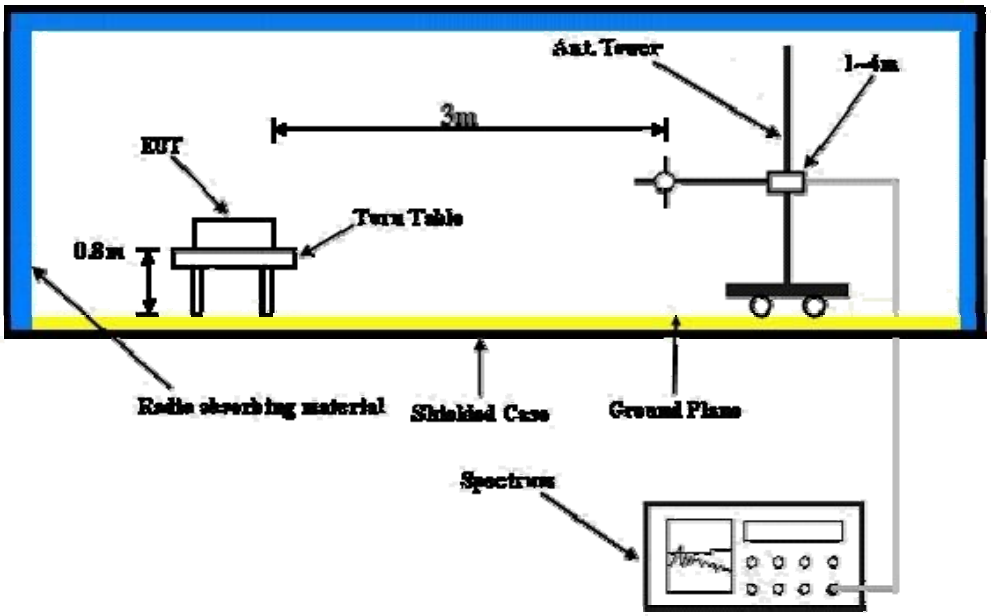
c. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 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 b. Record the power level of S.G

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

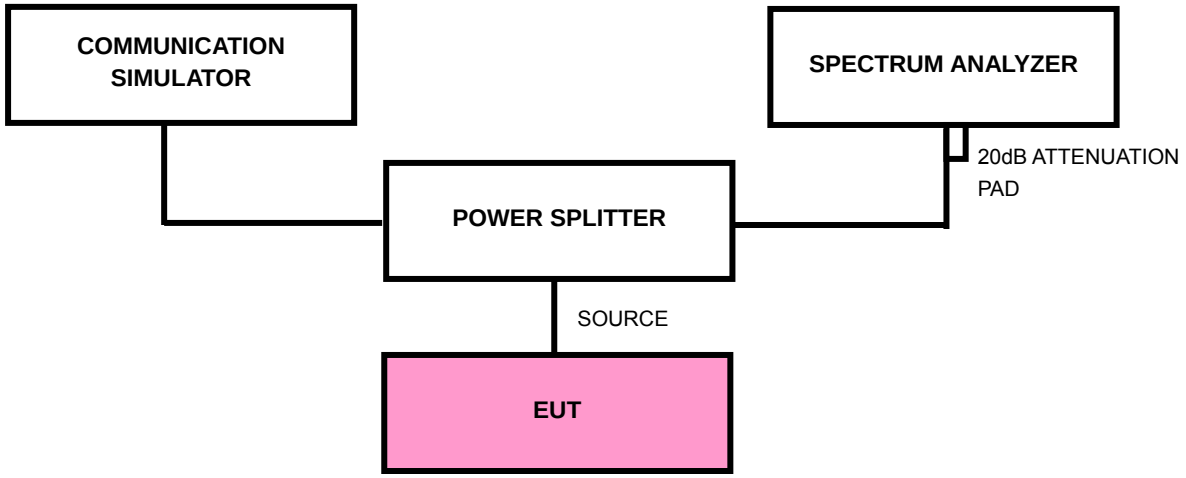
4.1.4 TEST SETUP

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 attached file (Test Setup Photo).

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

MODE	TX connected	POWER CONTROL LEVEL	0
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH, 991hPa	TESTED BY	Mark Liao

FOR GSM MODE

CONDUCTED PEAK OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	PEAK OUTPUT POWER	
				dBm	Watt
512	1850.20	25.10	4.50	29.60	0.912
661	1880.00	25.10	4.50	29.60	0.912
810	1909.80	25.50	4.50	30.00	1.000

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

CONDUCTED PEAK OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	PEAK OUTPUT POWER	
				dBm	Watt
512	1850.20	25.00	4.50	29.50	0.891
661	1880.00	25.00	4.50	29.50	0.891
810	1909.80	25.30	4.50	29.80	0.955

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

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

MODE	TX connected	**POWER CONTROL LEVEL**	0
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH, 991hPa	**TESTED BY**	Mark Liao

FOR GSM

EIRP POWER					
CHANNEL NO.	**FREQUENCY (MHz)**	**S.G VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
512	**1850.20**	**22.01**	**8.40**	**30.41**	**1.099**
661	1880.00	21.58	8.56	30.14	1.033
810	1909.80	21.39	8.50	29.89	0.975

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

EIRP POWER					
CHANNEL NO.	**FREQUENCY (MHz)**	**S.G VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
512	1850.20	21.85	8.40	30.25	1.059
661	1880.00	21.26	8.56	29.82	0.959
810	1909.80	21.23	8.50	29.73	0.940

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

2. Correction Factor (dB) = Receiver Antenna Gain (dBi) + Cable Loss (dB) + Free Space 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℃~55℃.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100041	May 13, 2009	May 12, 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: 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 ADT RF OVEN room.

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 GSM link mode. This is accomplished with the use of the communication simulator station. The oven room could control the temperatures and humidity. The link channel is the 661.

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.

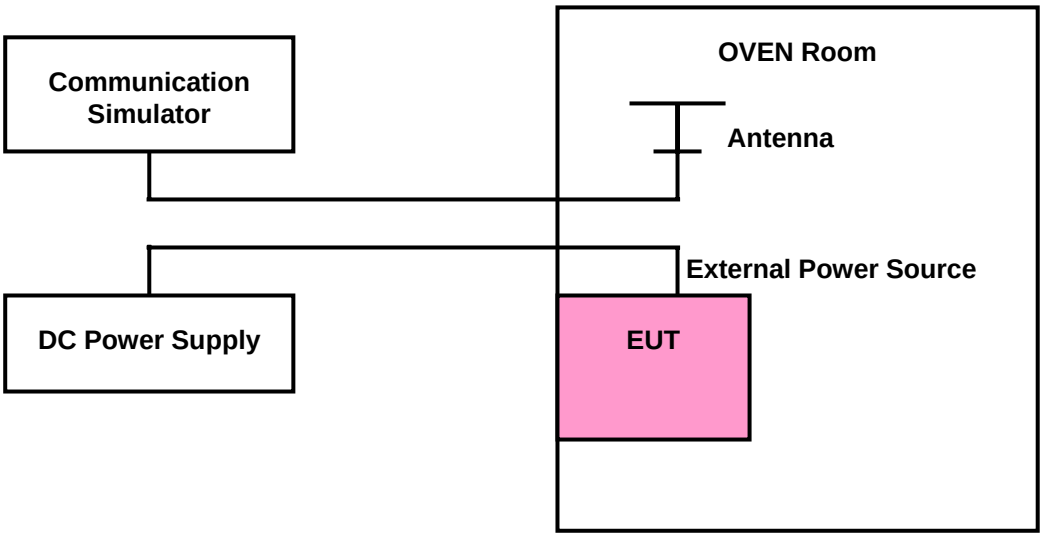
c. EUT is connected the external power supply to control the DC input power. The various Volts from the minimum 3.33 Volts to 4.07 Volts. Each step shall be record the frequency error rate.

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 communication simulator.

4.2.4 TEST SETUP



4.2.5 TEST RESULTS

MODE	TX Middle channel	POWER CONTROL LEVEL	0
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	24deg. C, 64%RH, 991hPa
TESTED BY	Mark Liao		

AFC FREQUENCY ERROR vs. VOLTAGE			
VOLTAGE (Volts)	FREQUENCY ERROR (Hz)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
4.07	-87	-0.046	2.5
3.33	-89	-0.047	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.33Vdc to 4.07Vdc.

AFC FREQUENCY ERROR vs. TEMP.			
TEMP. (℃)	FREQUENCY ERROR (Hz)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
55	-94	-0.050	2.5
50	-99	-0.053	2.5
40	-107	-0.057	2.5
30	-103	-0.055	2.5
20	-101	-0.054	2.5
10	-106	-0.056	2.5
0	-108	-0.057	2.5
-10	-109	-0.058	2.5
-20	-112	-0.060	2.5
-30	-114	-0.061	2.5

4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

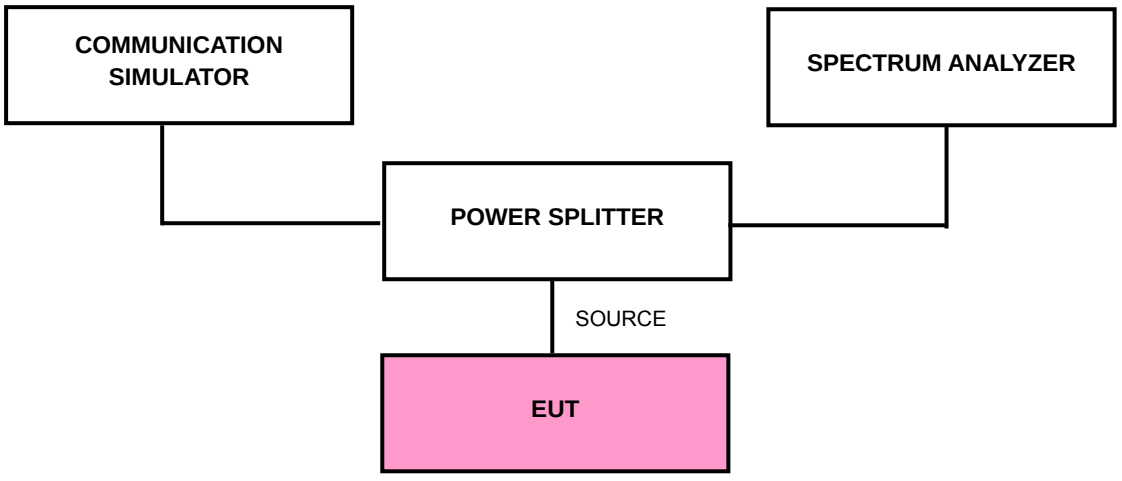
According to FCC 24.238(b) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100041	May 13, 2009	May 12, 2010
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
RF cable	SUCOFLEX 104	274403/4	Aug. 22, 2008	Aug. 21, 2009
RF cable	SUCOFLEX 104	250729/4	Aug. 21, 2008	Aug. 20, 2009
RF cable	SUCOFLEX 104	214377/4	Aug. 21, 2008	Aug. 20, 2009
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 (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 4.5dB 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. FCC 24.238(b) required a measurement bandwidth is the fundamental emission below 26dB bandwidth.

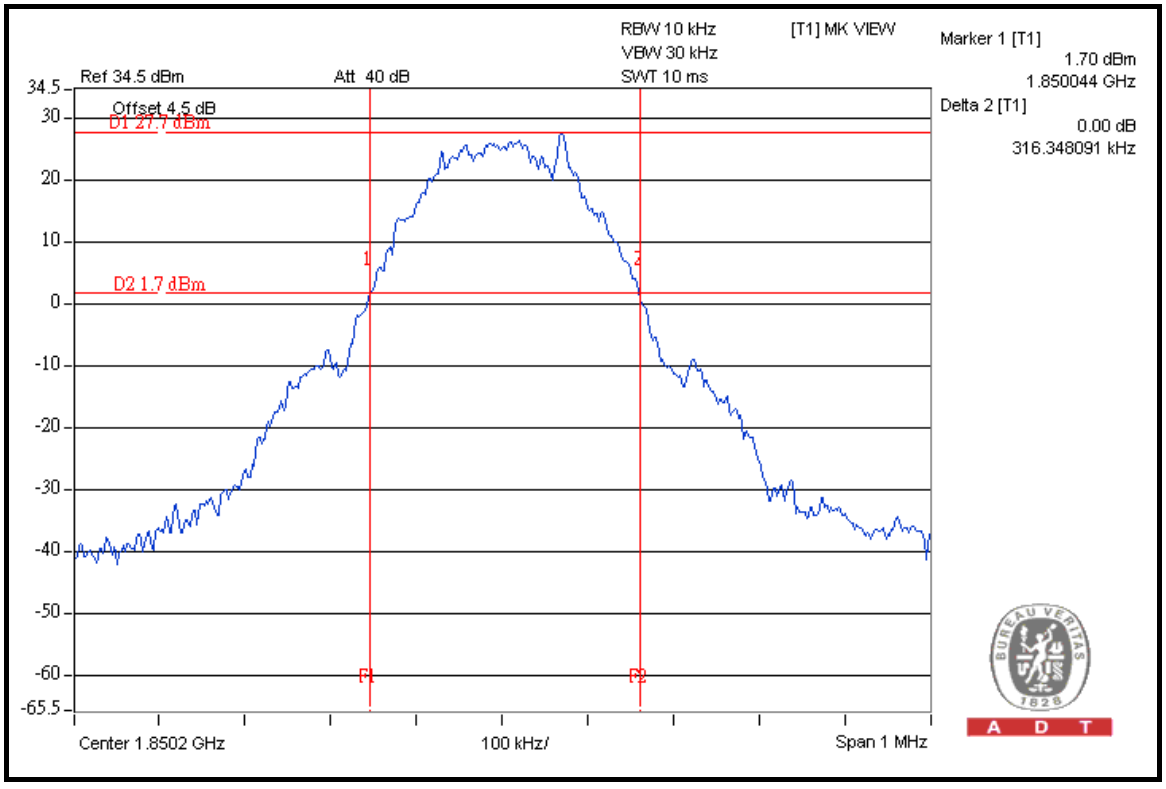
d. FCC 2.1049 (h) required a measurement bandwidth is 99% Occupied Bandwidth.

4.3.5 TEST RESULTS

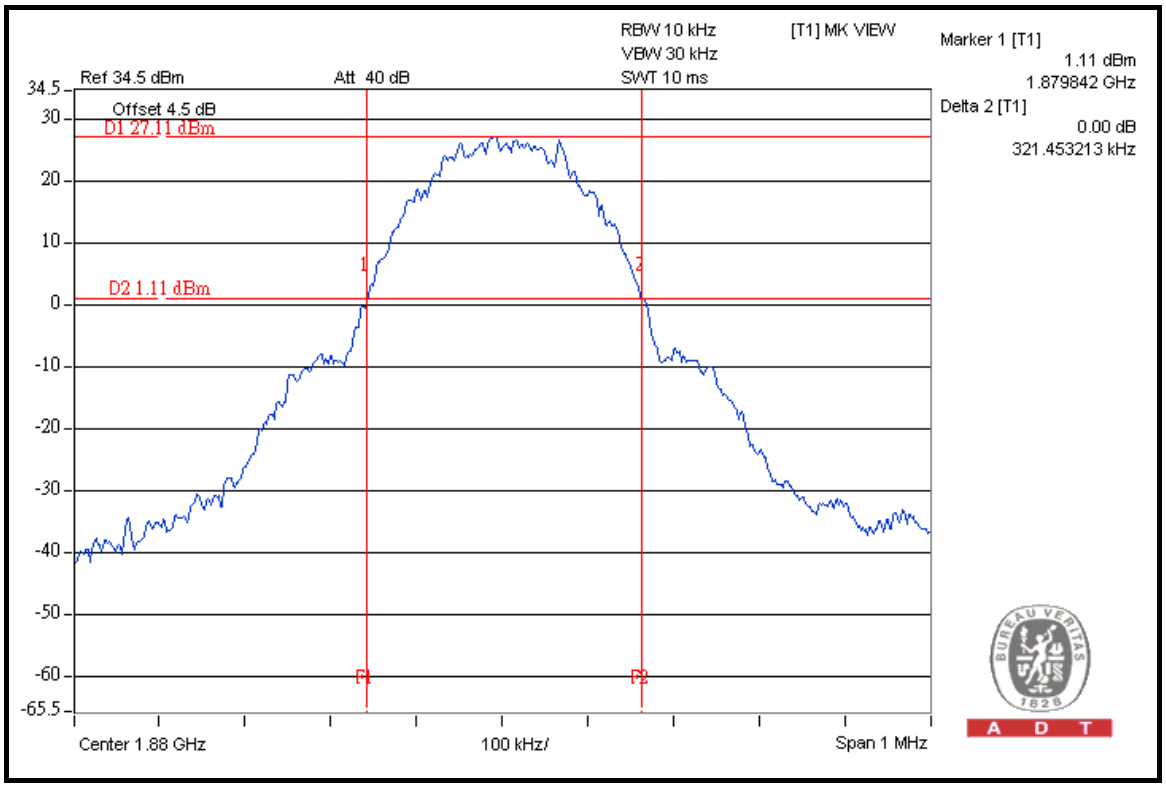
FOR GSM MODE

CHANNEL	FREQUENCY (MHz)	-26 dBc BANDWIDTH (MHz)
512	1850.2	0.316
661	1880.0	0.321
810	1909.8	0.325

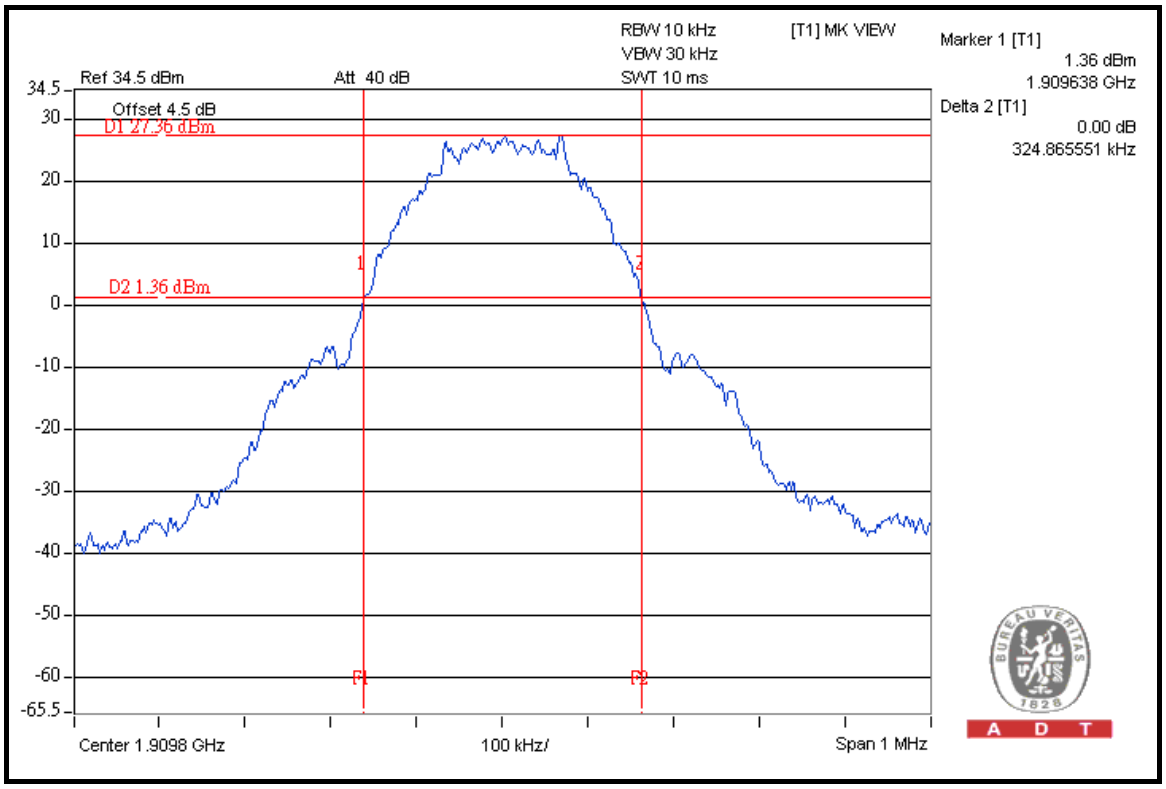
CH 512



CH 661

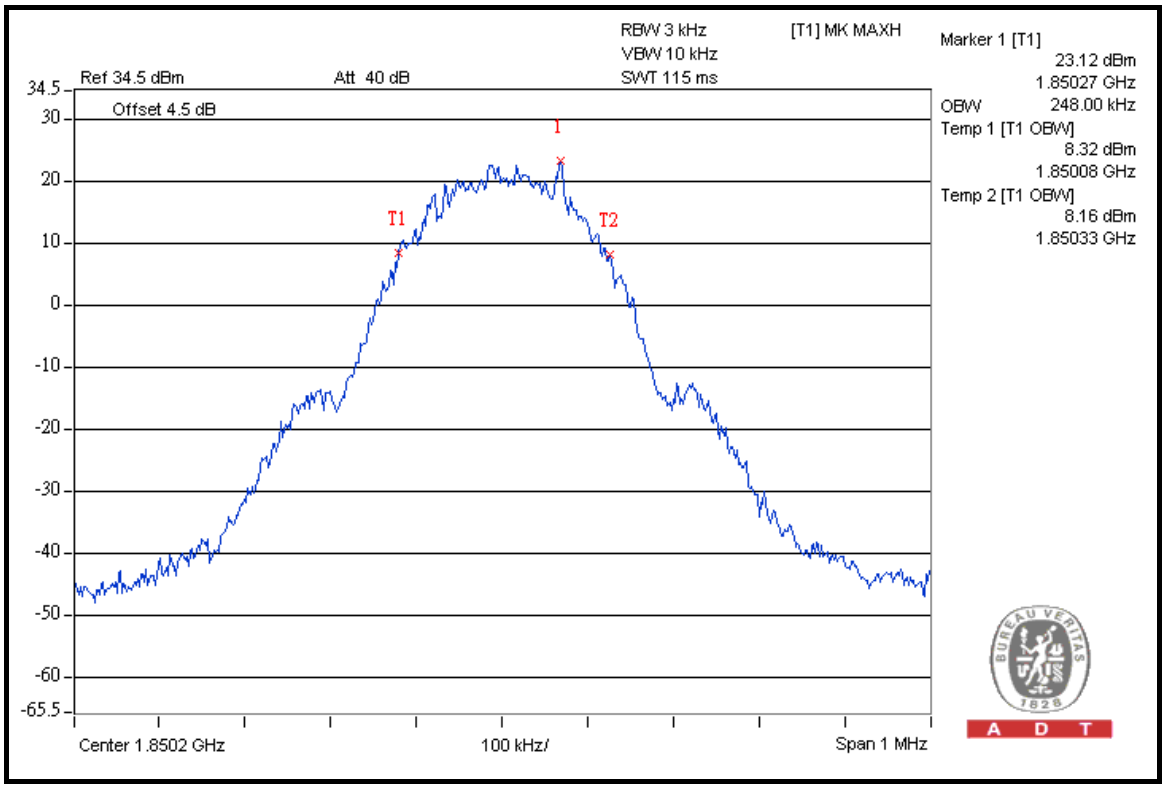

RBW 10 kHz
VBW 30 kHz
SWT 10 ms
[T1] MK VIEW
Marker 1 [T1]
1.11 dBm
1.879842 GHz
Delta 2 [T1]
0.00 dB
321.453213 kHz
Ref 34.5 dBm
Att 40 dB
Offset 4.5 dB
D1 27.11 dBm
D2 1.11 dBm
34.5
30
20
10
0
-10
-20
-30
-40
-50
-60
-65.5
Center 1.88 GHz
100 kHz/
Span 1 MHz

CH 810

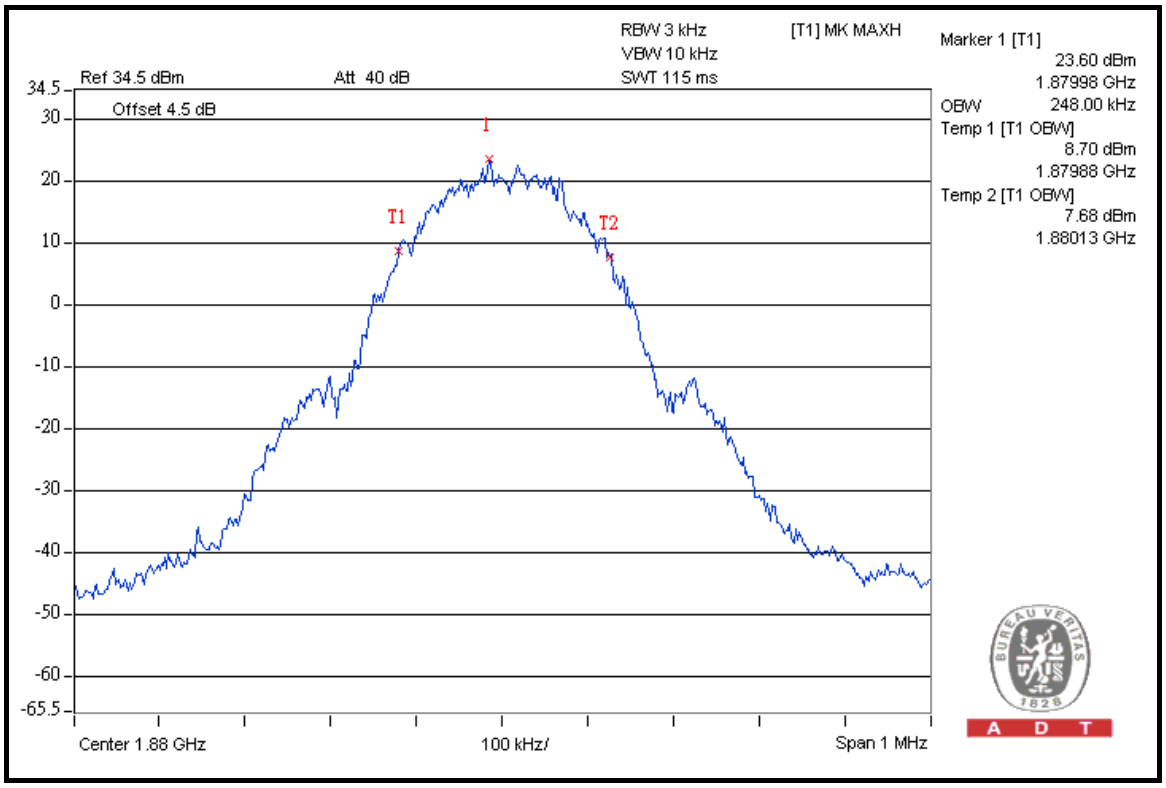

RBW 10 kHz
VBW 30 kHz
SWT 10 ms
[T1] MK VIEW
Marker 1 [T1]
1.36 dBm
1.909638 GHz
Delta 2 [T1]
0.00 dB
324.865551 kHz
Ref 34.5 dBm
Att 40 dB
Offset 4.5 dB
D1 27.36 dBm
D2 1.36 dBm
34.5
30
20
10
0
-10
-20
-30
-40
-50
-60
-65.5
Center 1.9098 GHz
100 kHz/
Span 1 MHz

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)
512	1850.2	0.248
661	1880.0	0.248
810	1909.8	0.248

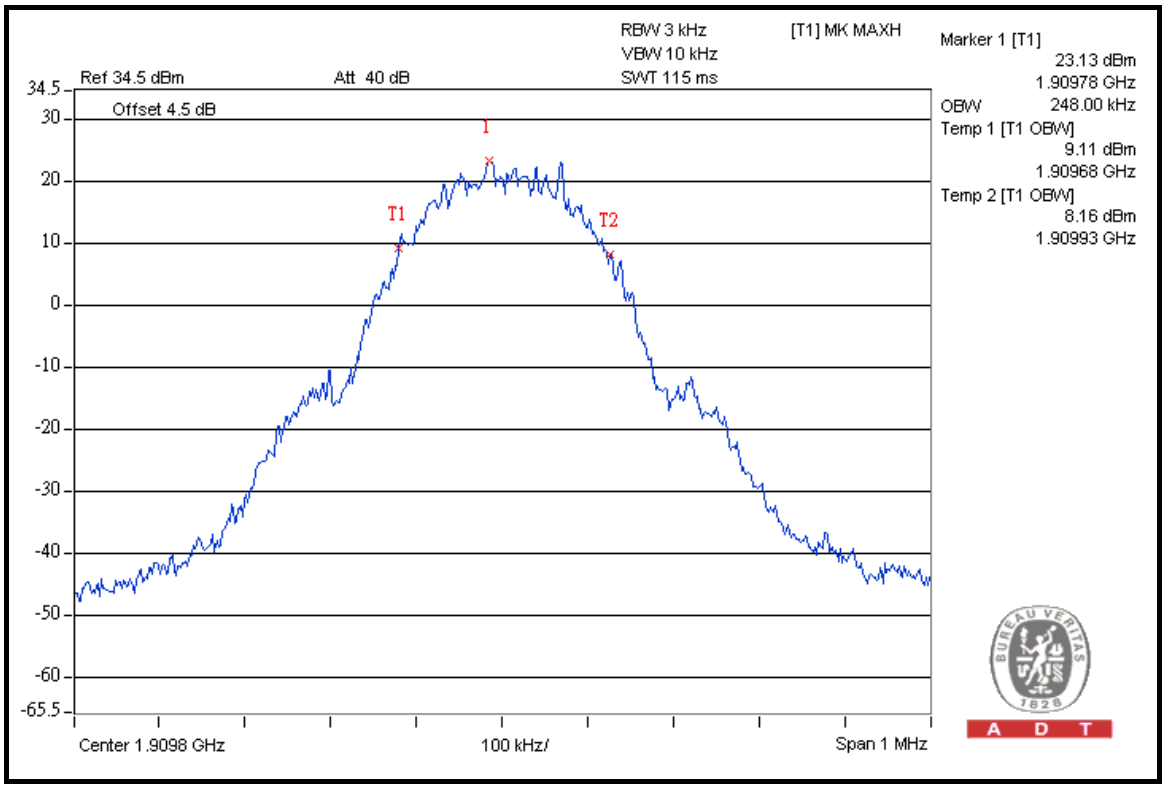
CH 512



CH 661


RBW 3 kHz
VBW 10 kHz
SWT 115 ms
[T1] MK MAXH
Marker 1 [T1]
23.60 dBm
1.87998 GHz
OBW 248.00 kHz
Temp 1 [T1 OBW]
8.70 dBm
1.87988 GHz
Temp 2 [T1 OBW]
7.68 dBm
1.88013 GHz
Ref 34.5 dBm
Att 40 dB
Offset 4.5 dB
34.5
30
20
10
0
-10
-20
-30
-40
-50
-60
-65.5
T1
T2
Center 1.88 GHz
100 kHz/
Span 1 MHz

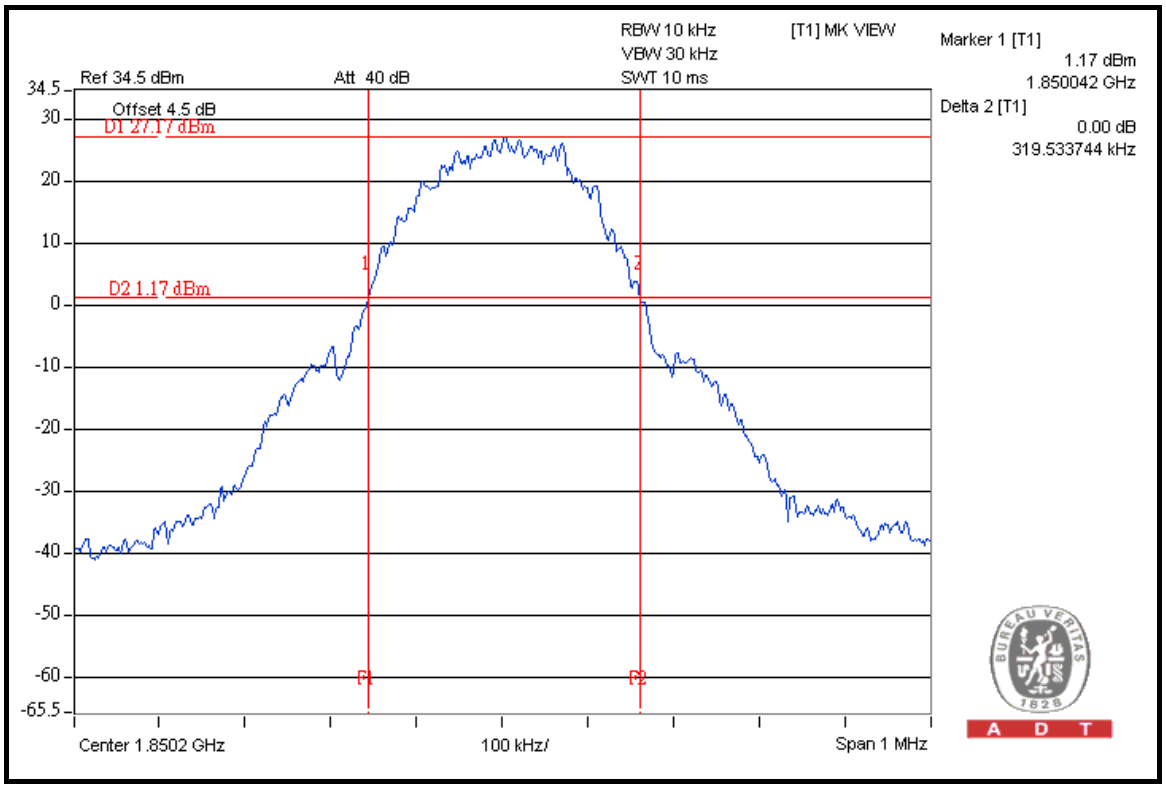
CH 810


RBW 3 kHz
VBW 10 kHz
SWT 115 ms
[T1] MK MAXH
Marker 1 [T1]
23.13 dBm
1.90978 GHz
OBW 248.00 kHz
Temp 1 [T1 OBW]
9.11 dBm
1.90968 GHz
Temp 2 [T1 OBW]
8.16 dBm
1.90993 GHz
Ref 34.5 dBm
Att 40 dB
Offset 4.5 dB
34.5
30
20
10
0
-10
-20
-30
-40
-50
-60
-65.5
T1
T2
Center 1.9098 GHz
100 kHz/
Span 1 MHz

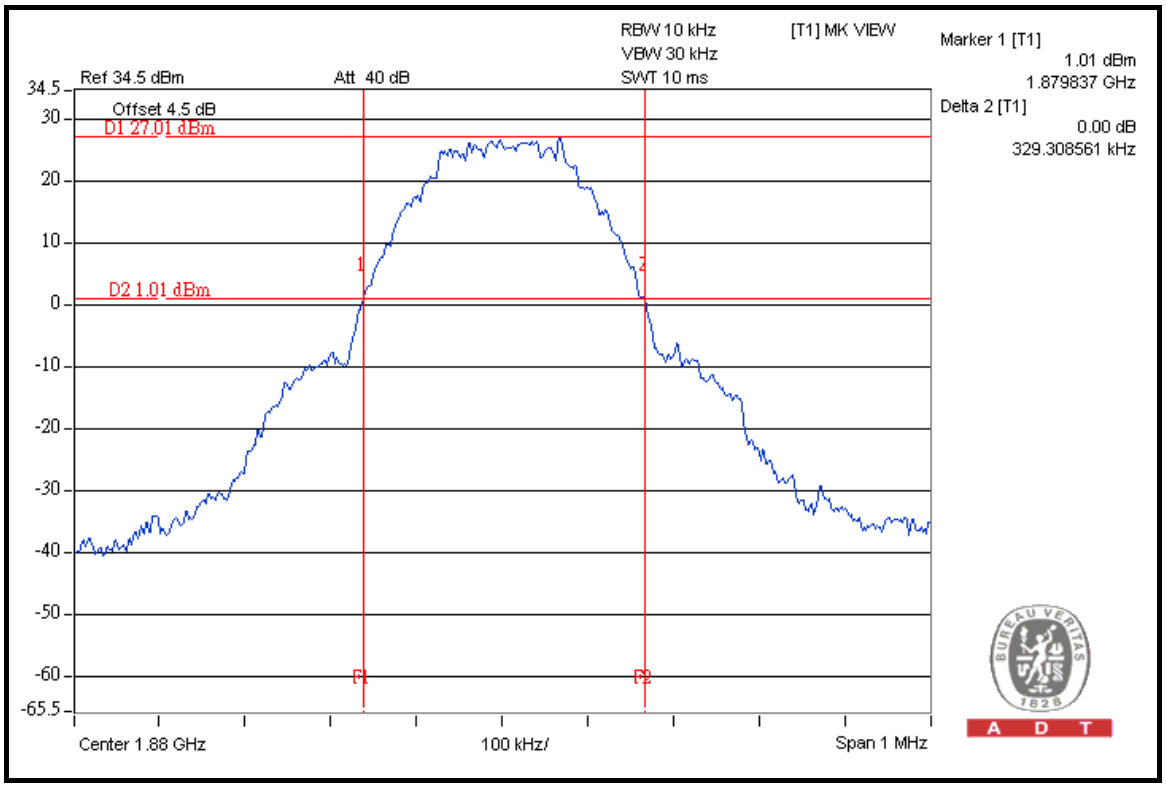
FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

CHANNEL	FREQUENCY (MHz)	-26 dBc BANDWIDTH (MHz)
512	1850.2	0.320
661	1880.0	0.329
810	1909.8	0.326

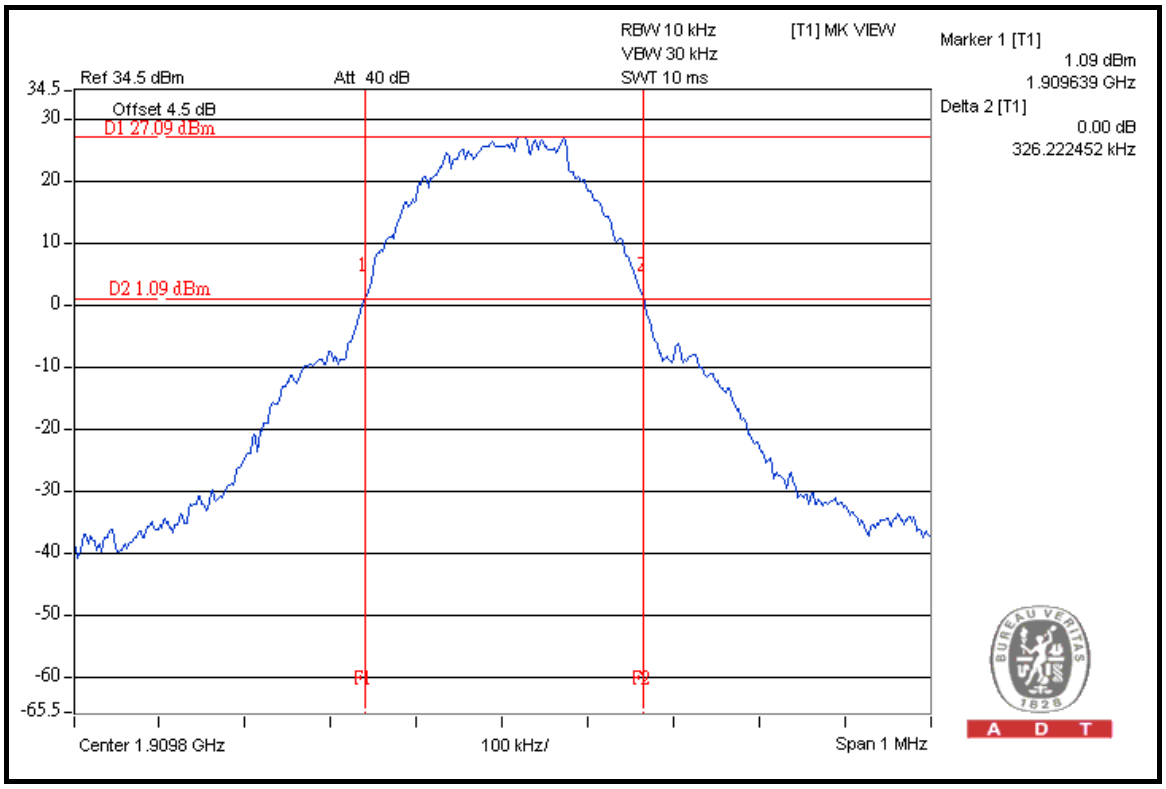
CH 512



CH 661

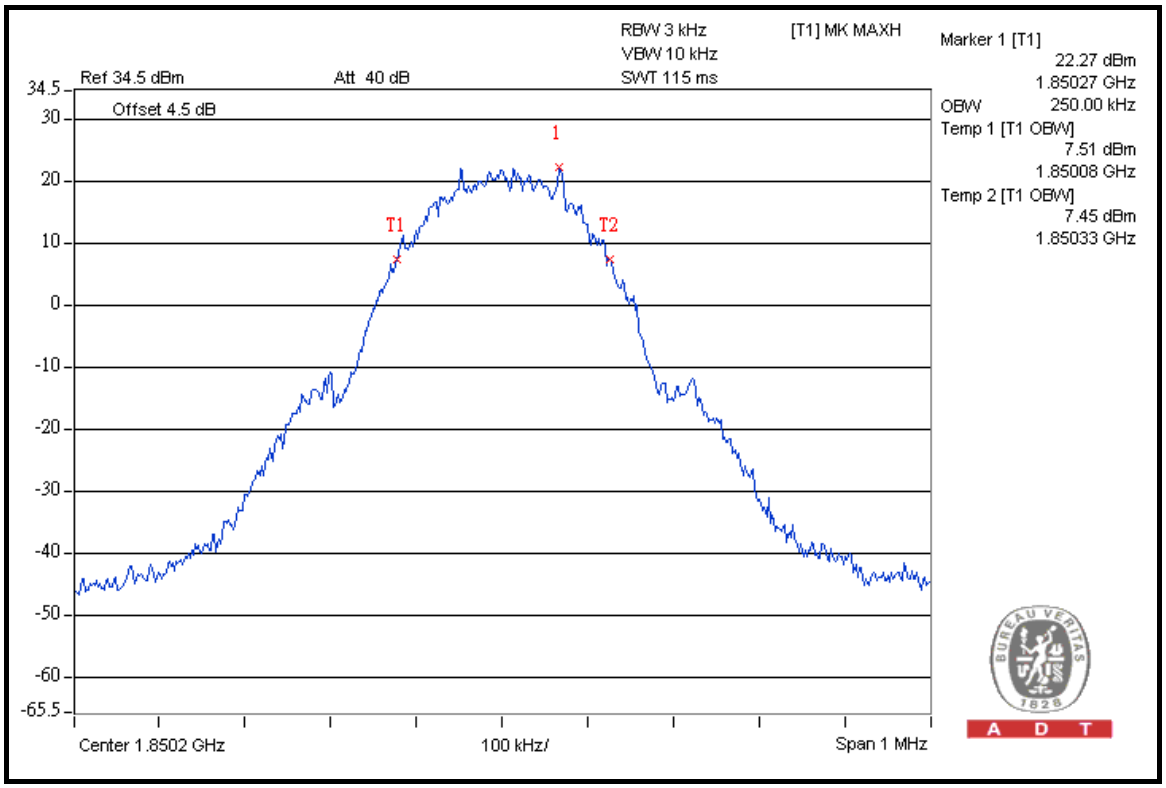

RBW 10 kHz
VBW 30 kHz
SWT 10 ms
[T1] MK VIEW
Marker 1 [T1]
1.01 dBm
1.879837 GHz
Delta 2 [T1]
0.00 dB
329.308561 kHz
Ref 34.5 dBm
Att 40 dB
Offset 4.5 dB
D1 27.01 dBm
D2 1.01 dBm
34.5
30
20
10
0
-10
-20
-30
-40
-50
-60
-65.5
Center 1.88 GHz
100 kHz/
Span 1 MHz

CH 810

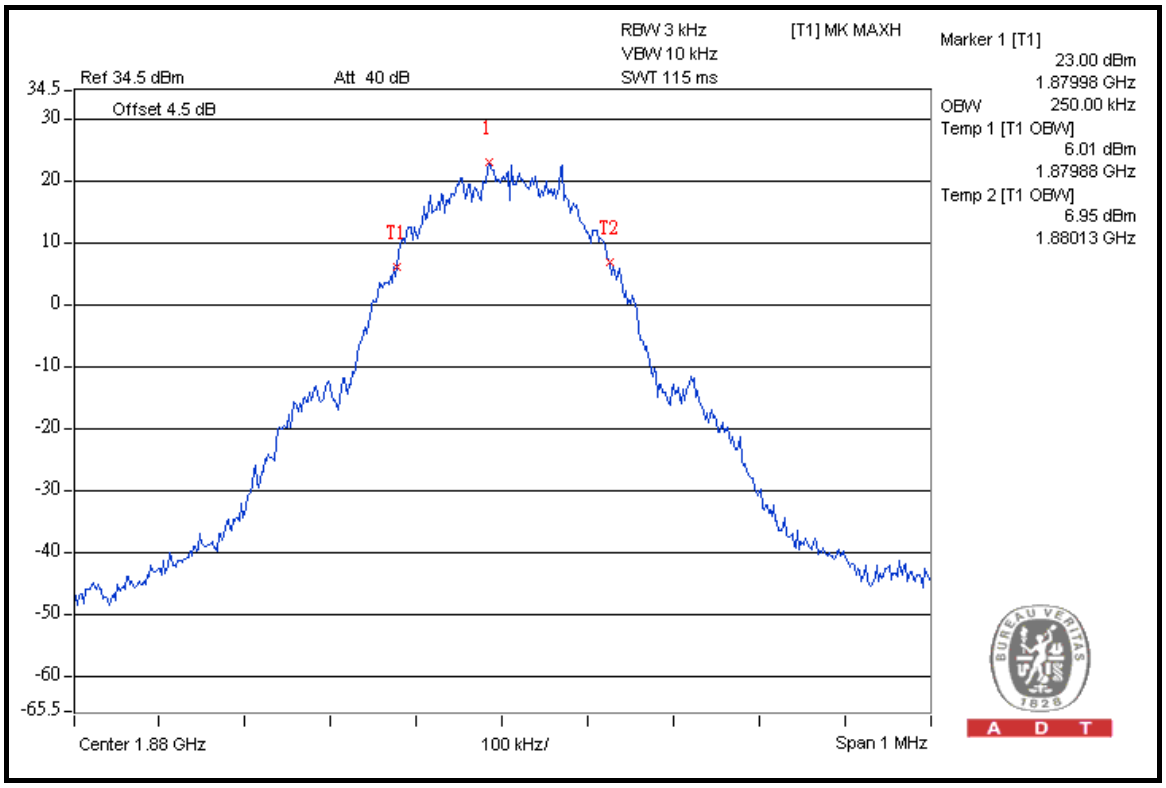

RBW 10 kHz
VBW 30 kHz
SWT 10 ms
[T1] MK VIEW
Marker 1 [T1]
1.09 dBm
1.909639 GHz
Delta 2 [T1]
0.00 dB
326.222452 kHz
Ref 34.5 dBm
Att 40 dB
Offset 4.5 dB
D1 27.09 dBm
D2 1.09 dBm
34.5
30
20
10
0
-10
-20
-30
-40
-50
-60
-65.5
Center 1.9098 GHz
100 kHz/
Span 1 MHz

CHANNEL	FREQUENCY (MHz)	99% OCUPPIED BANDWIDTH (MHz)
512	1850.2	0.250
661	1880.0	0.250
810	1909.8	0.250

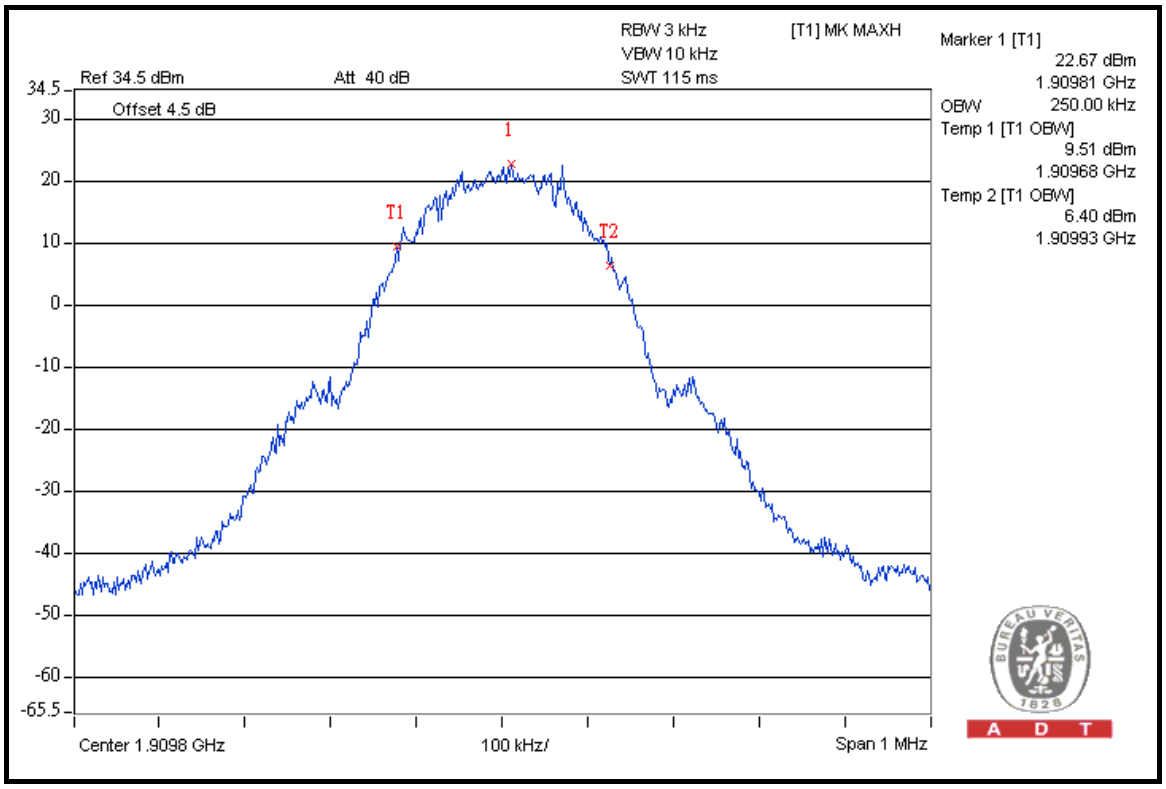
CH 512



CH 661


RBW 3 kHz
VBW 10 kHz
SWT 115 ms
[T1] MK MAXH
Marker 1 [T1]
23.00 dBm
1.87998 GHz
OBW 250.00 kHz
Temp 1 [T1 OBW]
6.01 dBm
1.87988 GHz
Temp 2 [T1 OBW]
6.95 dBm
1.88013 GHz
Ref 34.5 dBm
Att 40 dB
Offset 4.5 dB
34.5
30
20
10
0
-10
-20
-30
-40
-50
-60
-65.5
1
T1
T2
Center 1.88 GHz
100 kHz/
Span 1 MHz

CH 810


RBW 3 kHz
VBW 10 kHz
SWT 115 ms
[T1] MK MAXH
Marker 1 [T1]
22.67 dBm
1.90981 GHz
OBW 250.00 kHz
Temp 1 [T1 OBW]
9.51 dBm
1.90968 GHz
Temp 2 [T1 OBW]
6.40 dBm
1.90993 GHz
Ref 34.5 dBm
Att 40 dB
Offset 4.5 dB
34.5
30
20
10
0
-10
-20
-30
-40
-50
-60
-65.5
1
T1
T2
Center 1.9098 GHz
100 kHz/
Span 1 MHz

4.4 BAND EDGE MEASUREMENT

4.4.1 LIMITS OF BAND EDGE MEASUREMENT

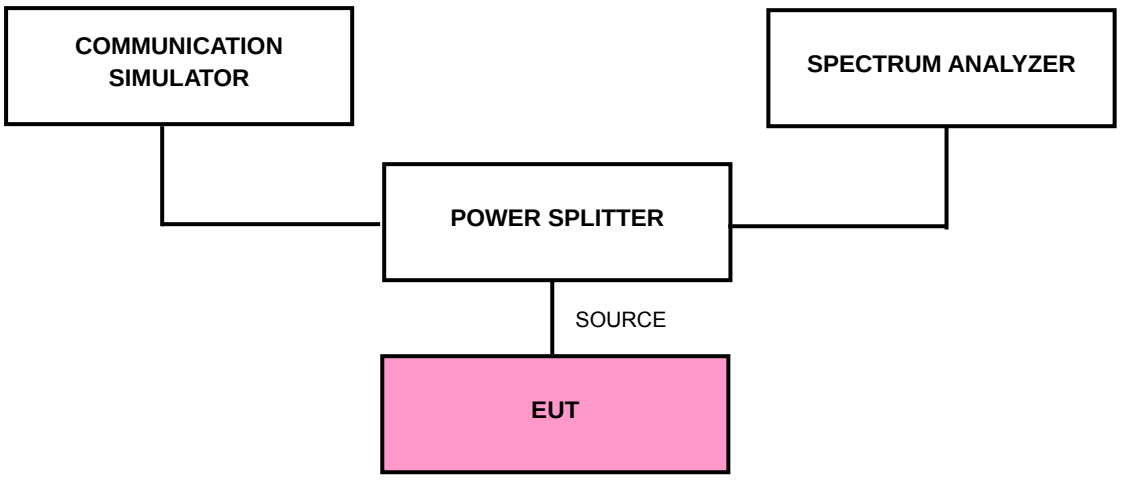
The PCS frequency bands refer to the FCC 24.229 rule. According to FCC 24.238(a) specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside 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	E4446A	MY44360128	Dec. 06, 2008	Dec. 07, 2009
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
RF cable	SUCOFLEX 104	274403/4	Aug. 22, 2008	Aug. 21, 2009
RF cable	SUCOFLEX 104	250729/4	Aug. 21, 2008	Aug. 20, 2009
RF cable	SUCOFLEX 104	214377/4	Aug. 21, 2008	Aug. 20, 2009
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 was set up for the maximum peak power with GSM link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 512 and 810 (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 4.5dB in the transmitted path track.

c. 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.

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

4.4.5 EUT OPERATING CONDITION

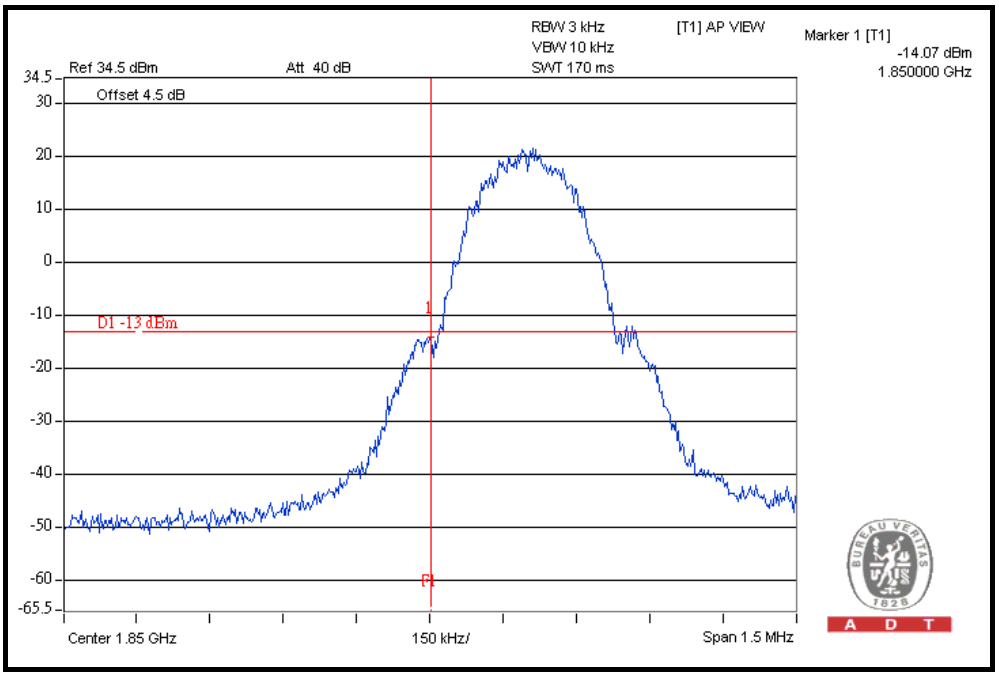
a. The EUT makes a phone call to the communication simulator.

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

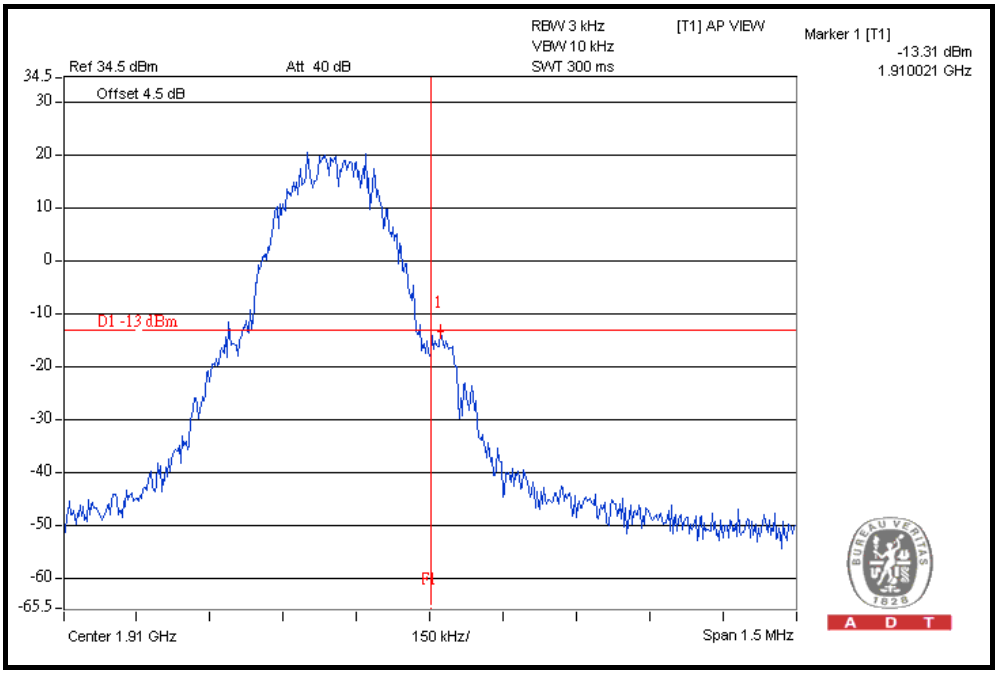
4.4.6 TEST RESULTS

FOR GSM MODE

LOWER BAND EDGE

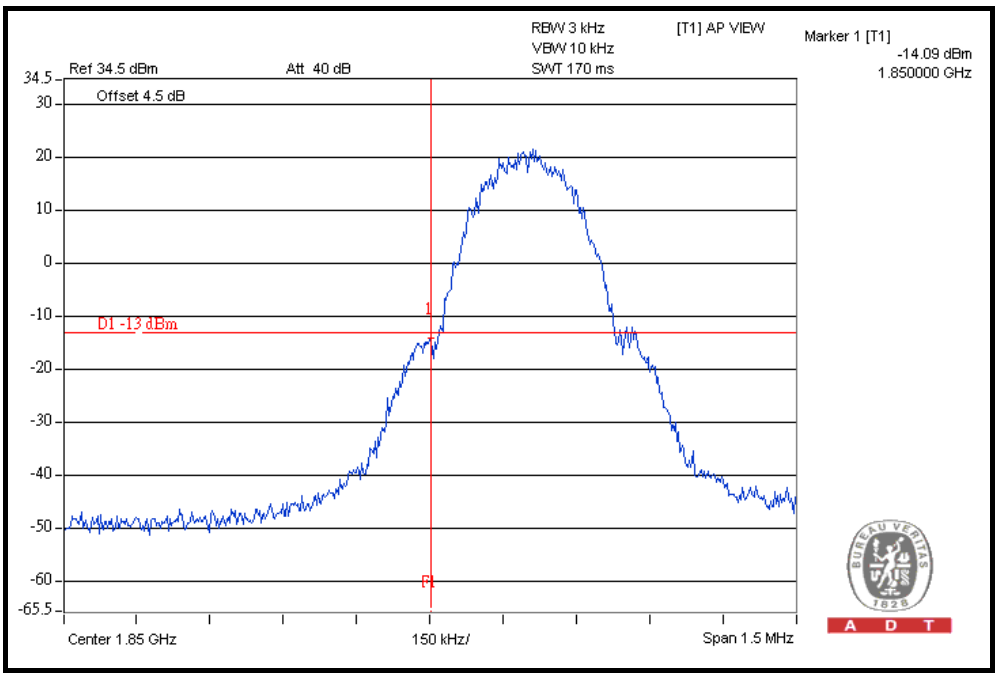


HIGHER BAND EDGE

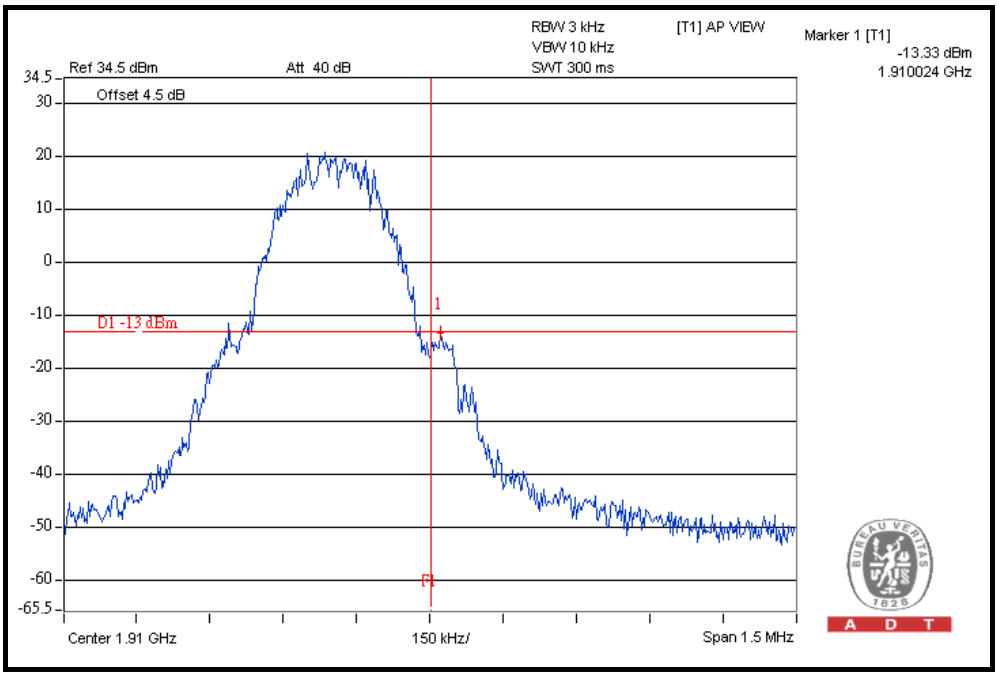


FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

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 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	100041	May 13, 2009	May 12, 2010
Wainwright Instruments Band Reject Filter	WRCG 1850/1910-1830/1930 -60/9SS	SN1	Mar. 26, 2009	Mar. 25, 2010
WI Highpass filter	WHK3.1/18G-10SS	SN1	Apr. 13, 2009	Apr. 12, 2010
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jun. 26, 2009	Jun. 25, 2010
RF cable	SUCOFLEX 104	274403/4	Aug. 22, 2008	Aug. 21, 2009
RF cable	SUCOFLEX 104	250729/4	Aug. 21, 2008	Aug. 20, 2009
RF cable	SUCOFLEX 104	214377/4	Aug. 21, 2008	Aug. 20, 2009
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

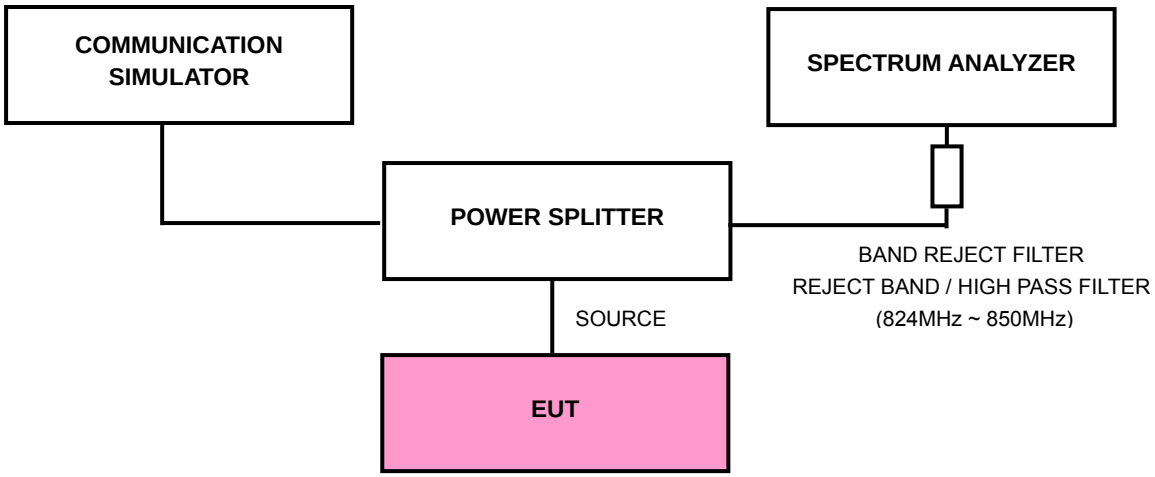
a. The EUT was set up for the maximum peak power with GSM link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (low, middle and high operational frequency range.)

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 4.5dB in the transmitted path track.

c. When the spectrum scanned from 9kHz to 3GHz, it shall be connected to the band reject filter attenuated the carried frequency. The spectrum set RB=1MHz, VB=3MHz.

d. When the spectrum scanned from 3GHz to 20GHz, it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB=1MHz, VB=3MHz.

4.5.4 TEST SETUP



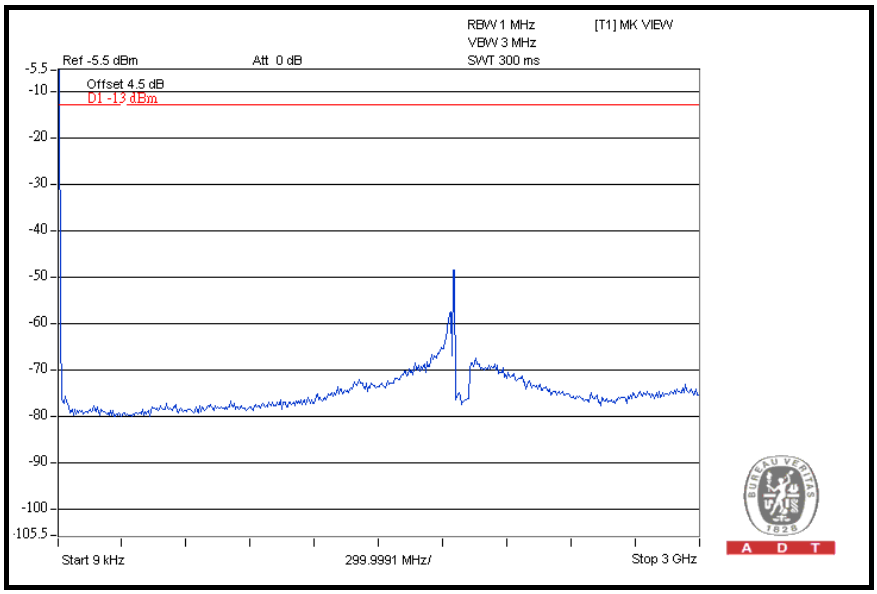
4.5.5 EUT OPERATING CONDITIONS

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

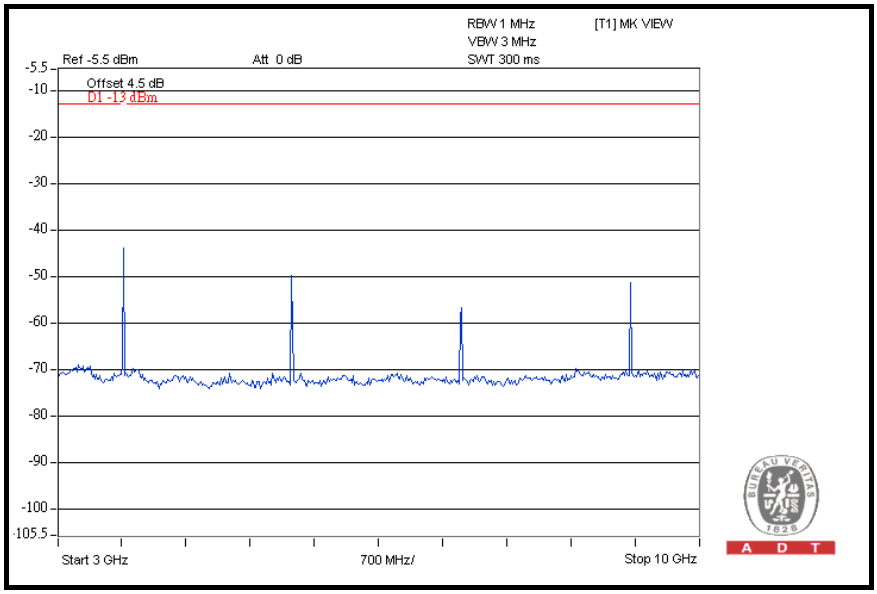
b. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

4.5.6 TEST RESULTS

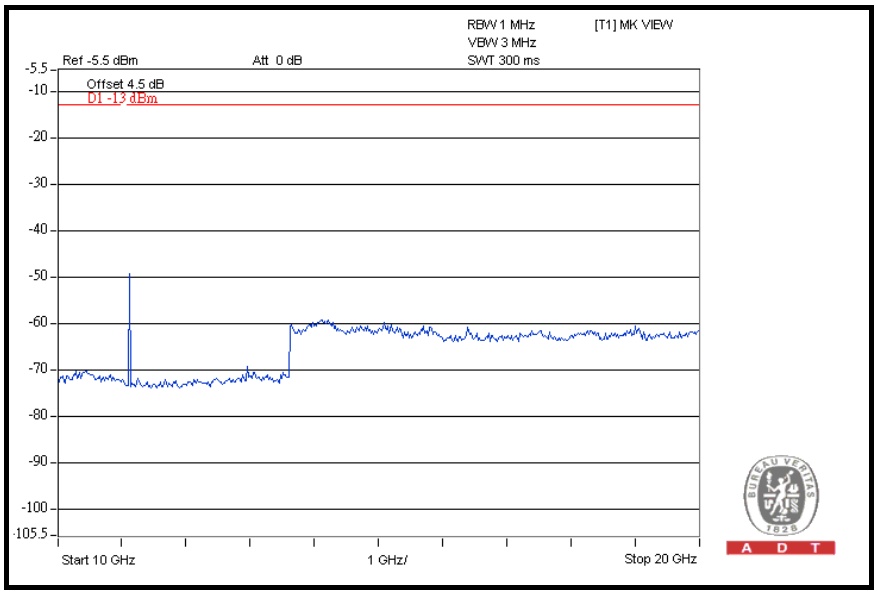
CH 512: 9kHz ~ 3GHz



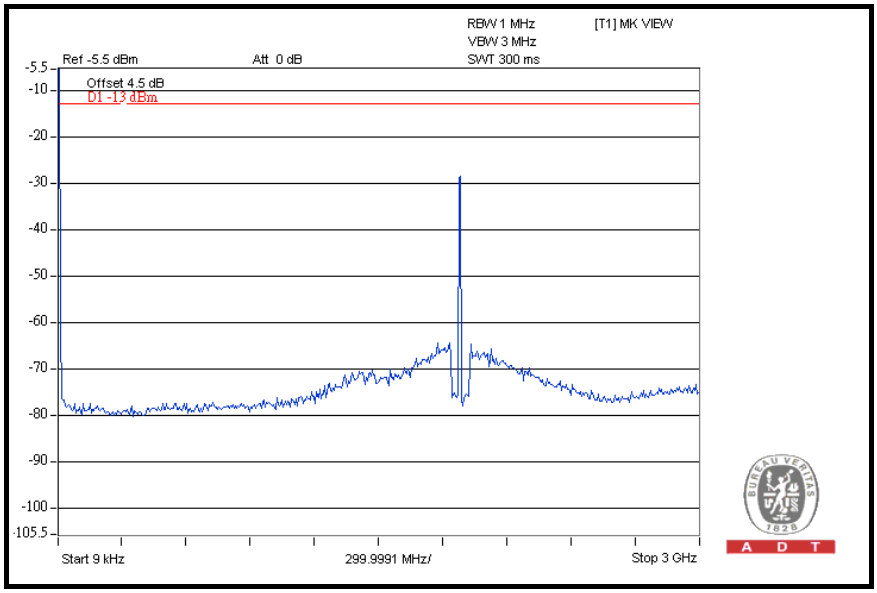
3GHz ~ 10GHz



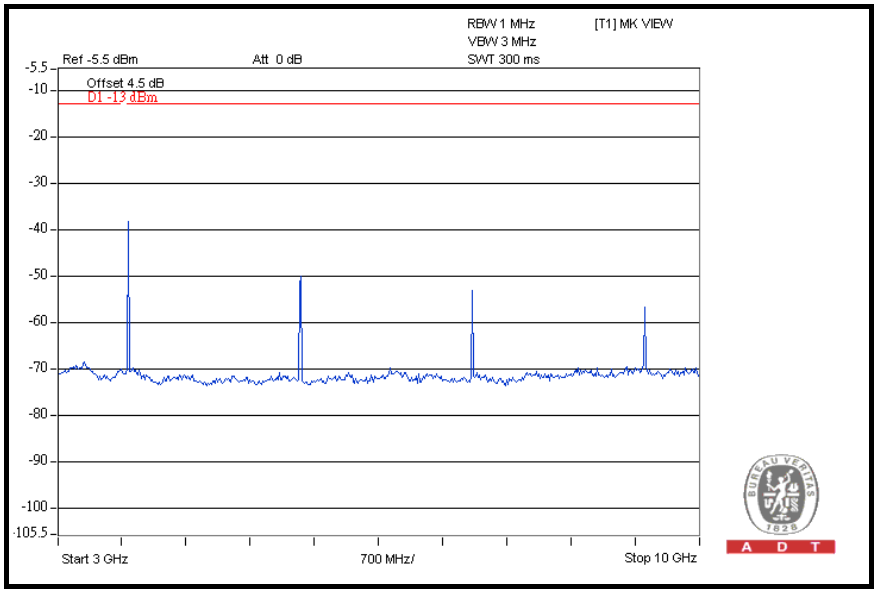
10GHz ~ 20GHz



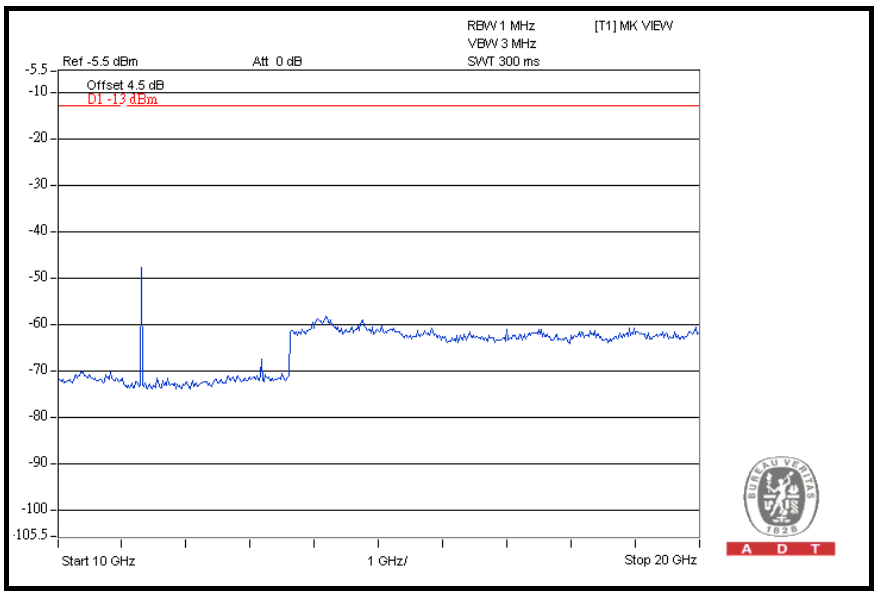
CH 661: 9kHz ~ 3GHz



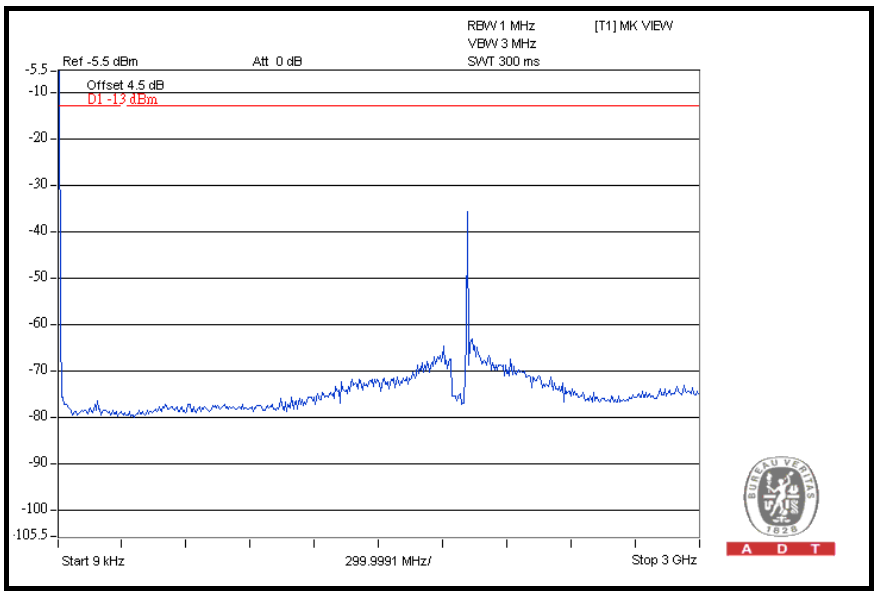
3GHz ~ 10GHz



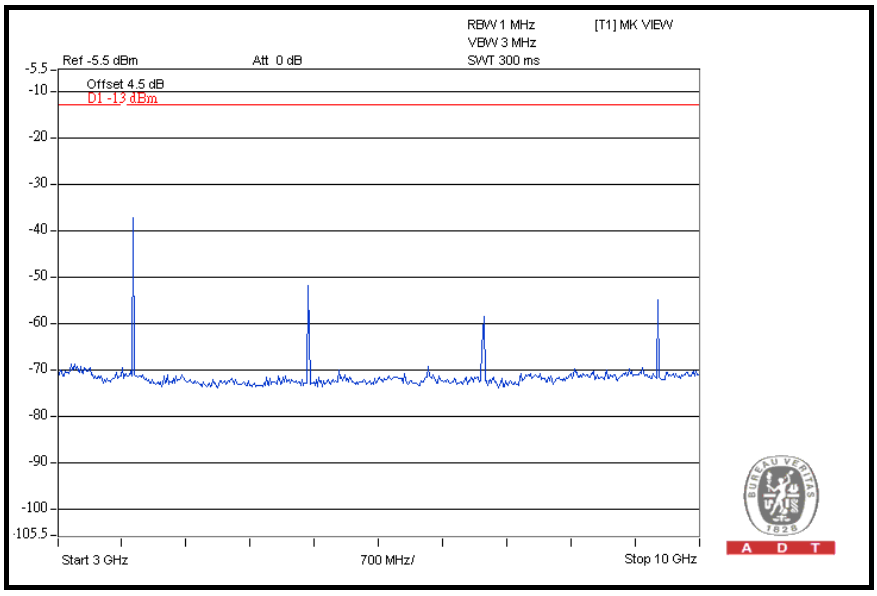
10GHz ~ 20GHz



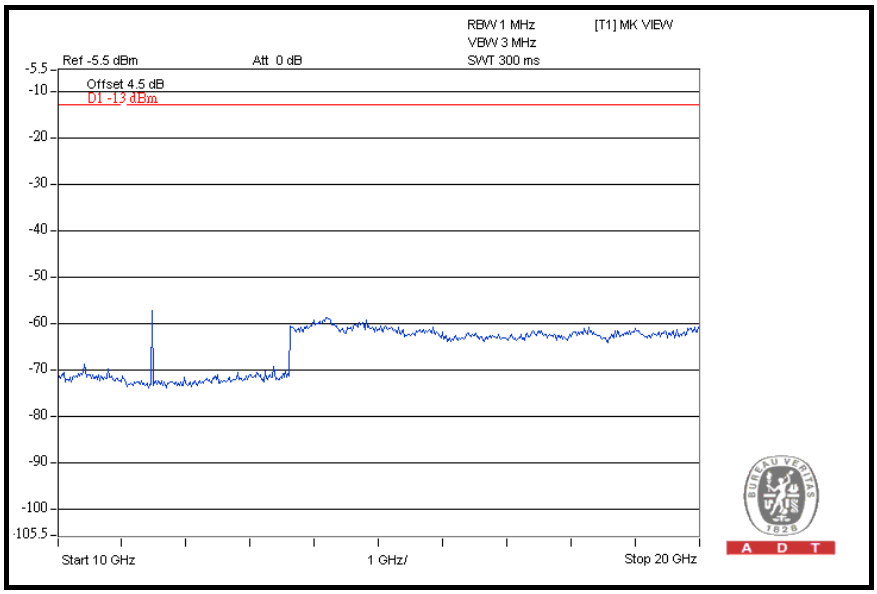
CH 810: 9kHz ~ 3GHz



3GHz ~ 10GHz



10GHz ~ 20GHz


RBW 1 MHz
VBW 3 MHz
SWT 300 ms
[T1] MK VIEW
Ref -5.5 dBm
Att 0 dB
Offset 4.5 dB
D1 -13 dBm
-5.5
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-105.5
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 limit of emission 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	82.22

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

E = [1000000√ (30P)] / 3 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.

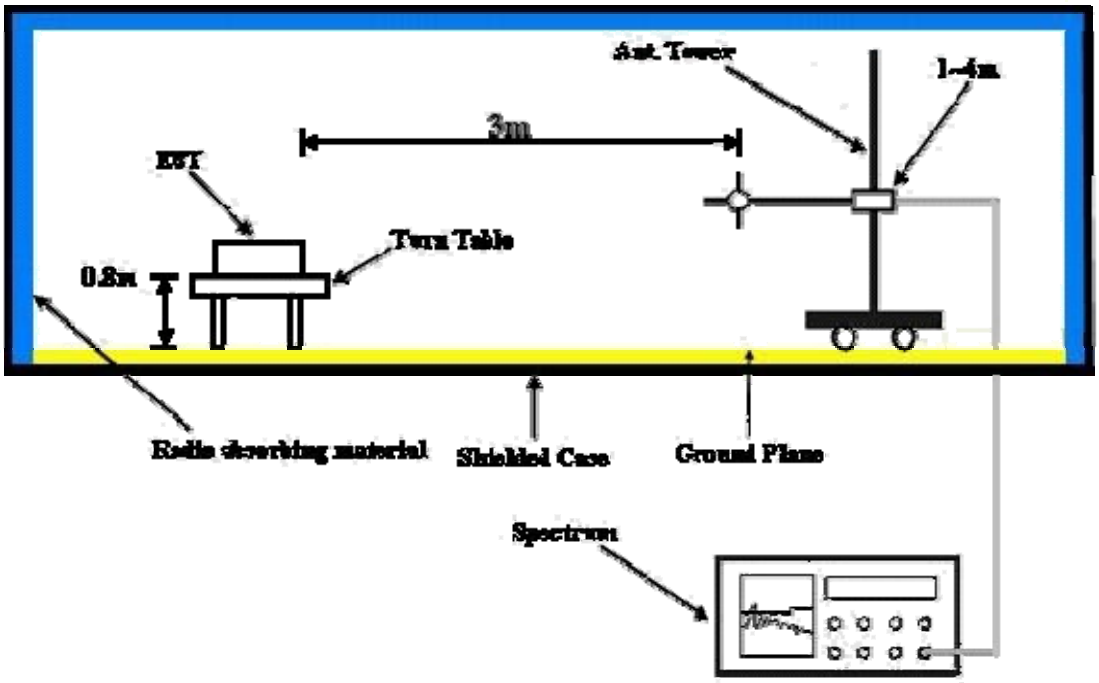
f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data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

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

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

MODE	TX channel 512	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH, 982hPa	INPUT POWER	120Vac, 60Hz
TESTED BY	Lori Chiu		

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	543.19	46.84	82.22	-35.38	1.00 H	10	26.28	20.56
2	782.34	44.51	82.22	-37.71	1.25 H	259	19.68	24.83
3	819.28	46.24	82.22	-35.98	2.00 H	163	20.80	25.44
4	865.94	46.50	82.22	-35.72	1.00 H	226	20.72	25.78
5	922.33	46.82	82.22	-35.40	1.25 H	82	20.54	26.28
6	947.60	55.94	82.22	-26.28	1.50 H	301	29.47	26.47

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	737.62	43.77	82.22	-38.45	2.00 V	286	20.13	23.64
2	778.45	43.80	82.22	-38.42	1.50 V	121	19.07	24.73
3	801.78	45.74	82.22	-36.48	1.25 V	244	20.41	25.33
4	827.06	45.97	82.22	-36.25	1.25 V	175	20.48	25.49
5	864.00	47.25	82.22	-34.97	1.50 V	190	21.49	25.76
6	912.61	46.21	82.22	-36.01	1.00 V	232	20.00	26.21

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 limit of emission equal to –13dBm.

4.7.2 TEST INSTRUMENTS

Same as 4.1.2.

4.7.3 TEST PROCEDURES

a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels: 512, 661 and 810 (low, middle and high operational frequency range.)

b. 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.

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

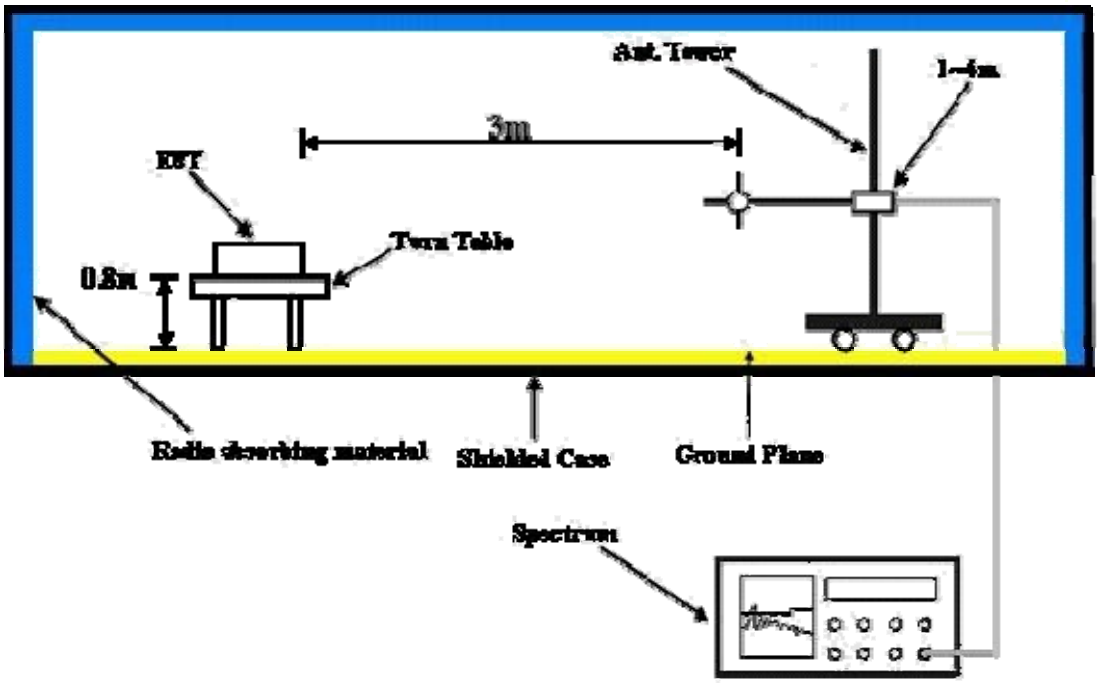
d. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.

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

MODE	Channel 512	FREQUENCY RANGE	Above 1000MHz
INPUT POWER	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	23deg°C, 70%RH, 988hPa
TESTED BY	Mark Liao		

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	3700.40	51.69	-13.00	-53.11	9.90	-43.21
2	5550.60	50.98	-13.00	-53.76	9.71	-44.05
3	7400.80	56.18	-13.00	-47.11	7.86	-39.25

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	3700.40	50.79	-13.00	-53.92	9.90	-44.02
2	5550.60	52.99	-13.00	-51.73	9.71	-42.02
3	7400.80	55.95	-13.00	-47.41	7.86	-39.55

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

MODE	Channel 661	**FREQUENCY RANGE**	Above 1000MHz
INPUT POWER	120Vac, 60Hz	**ENVIRONMENTAL CONDITIONS**	23deg°C, 70%RH, 988hPa
TESTED BY	Mark Liao		

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	3760.00	52.10	-13.00	-52.73	9.88	-42.85
2	5640.00	52.02	-13.00	-52.48	9.64	-42.84
3	7520.00	55.54	-13.00	-47.80	7.82	-39.98

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	3760.00	51.12	-13.00	-53.53	9.88	-43.65
2	5640.00	55.10	-13.00	-49.26	9.64	-39.62
3	7520.00	56.32	-13.00	-47.25	7.82	-39.43

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

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MODE	Channel 810	FREQUENCY RANGE	Above 1000MHz
INPUT POWER	120Vac, 60Hz	ENVIRONMENTAL CONDITIONS	23deg°C, 70%RH, 988hPa
TESTED BY	Mark Liao		

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	3819.60	52.03	-13.00	-52.61	9.85	-42.76
2	5729.40	51.47	-13.00	-52.87	9.62	-43.25
3	7639.20	57.60	-13.00	-45.78	7.79	-37.99

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	3819.60	51.14	-13.00	-53.10	9.85	-43.25
2	5729.40	53.89	-13.00	-50.17	9.62	-40.55
3	**7639.20**	**58.03**	**-13.00**	**-45.47**	**7.79**	**-37.68**

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

5 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 by the following approval agencies according to ISO/IEC 17025.

USA	FCC, NVLAP
GERMANY	TUV Rheinland
JAPAN	VCCI
NORWAY	NEMKO
CANADA	INDUSTRY CANADA , CSA
R.O.C.	TAF, BSMI, NCC
NETHERLANDS	Telefication
SINGAPORE	GOST-ASIA (MOU)
RUSSIA	CERTIS (MOU)

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:

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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.

6 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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