FCC TEST REPORT

(Part 24)

REPORT NO.: RF990108H03-2

MODEL NO.: DIR-456

RECEIVED: Jan. 08, 2010

TESTED: Jan. 21 to 29, 2010

ISSUED: Mar. 29, 2010

APPLICANT: D-Link Co.

ADDRESS: No.289, Shinhu 3rd Rd., Neihu District, Taipei City 114, Taiwan, R.O.C.

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

ADDRESS: No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

TABLE OF CONTENTS

1 CERTIFICATION

PRODUCT :	Residential USIM Embedded HSDPA 3G Router
BRAND :	D-Link
MODEL NO.:	DIR-456
APPLICANT :	D-Link Co.
TESTED :	Jan. 21 to 29, 2010
TEST SAMPLE :	MASS-PRODUCTION
STANDARDS :	**FCC Part 24, Subpart E** ANSI C63.4-2003

The above equipment (model: DIR-456) 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 : _____ , **DATE:** Mar. 29, 2010
(Midoli Peng, Specialist)

TECHNICAL ACCEPTANCE : _____ , **DATE:** Mar. 29, 2010
(Hank Chung, Deputy Manager)

APPROVED BY : _____ , **DATE:** Mar. 29, 2010
(May Chen, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 24 & Part 2			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
2.1047(d)	Modulation Characteristics	PASS	Meet the requirement of limit.
2.1046 24.232	Maximum Peak Output Power Limit: max. 2 watts e.i.r.p peak power	PASS	Meet the requirement of limit.
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 -35.57dB at 11415.0MHz.

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:

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

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.94 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Residential USIM Embedded HSDPA 3G Router
MODEL NO.	DIR-456
FCC ID	KA2DIR456A1
POWER SUPPLY	12V from power adapter
MODULATION TYPE	GMSK / 8PSK / BPSK
OPERATING FREQUENCY	1850MHz ~ 1910MHz
NUMBER OF CHANNEL	299 (GSM band) / 277 (WCDMA band)
MAX. EIRP POWER	GSM Mode: 32.7dBm (0.18542Watts) GPRS Mode: 32.6dBm (0.18120Watts) E-GPRS Mode: 32.5dBm (0.17708Watts) WCDMA Mode: 29.5dBm (0.8915Watts)
ANTENNA TYPE	Please see note 1
MAX. ANTENNA GAIN	Please see note 1
DATA CABLE	RJ-11 Cable (Unshielded, 1.8m) Ethernet cable (Unshielded, 1.5m)
I/O PORTS	WAN Port x1 (Ethernet (10,100Mbps)) LAN Port x1 (Ethernet (10,100Mbps)) PHONE Port x1 3G SIM Port x1
ASSOCIATED DEVICES	Adapter x1

NOTE:

1. There are two antennas provided to this EUT, please refer to the following table:

Ant.	Manufacture	ANT Type	ANT Model	Connector
Main	Auden Techno Corp.	PCB Antenna	H-0124-1	I-PEX
Aux	Auden Techno Corp.	PCB Antenna	H-0124-2	I-PEX

Antenna Gain

Ant.	Peak Gain	CELL850 (dBi)	EGSM900 (dBi)	DCS1800 (dBi)	DCS1900 (dBi)	WCDMA2100 (dBi)
Main	TX	0	0.3	1.9	3.0	3.2
	RX	0.4	-0.1	2.7	3.1	1.2
Ant.	Peak Gain	CELL850 (dBi)	EGSM900 (dBi)	DCS1800 (dBi)	DCS1900 (dBi)	WCDMA2100 (dBi)
Aux	TX	NA	NA	NA	NA	NA
	RX	0.6	-1.5	0.3	0.1	-1.4

2. The EUT's appearance has two different colors (black and white).

3. The EUT is a Residential USIM Embedded HSDPA 3G Router. The functions of EUT listed as below table:

FUNCTIONS	TEST STANDARD	REFERENCE REPORT
WLAN 802.11b/g	FCC Part 15	RF990108H03
GSM 850 / WCDMA 850	FCC Part 22	RF990108H03-1
PCS 1900 / WCDMA 1900	FCC Part 24	RF990108H03-2

4. The communicated functions of EUT listed as below:

		GSM850MHz	PCS1900MHz	WCDMA850MHz	WCDMA1900MHz
2G	GSM	√	√		
	GPRS	√	√		
	E-GPRS	√	√		
3G	WCDMA			√	√
	Release 5 HSDPA			√	√

5. The EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	Level-set
Mode B	**Tower-set**

From the above modes, the radiated emission worst case was found in **Mode B**. Therefore only the test data of the mode was recorded in this report.

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

3.2 DESCRIPTION OF TEST MODES

FOR PCS BAND:

299 channels are provided to this EUT in the PCS1900 band. 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 5.
4. The channel space is 0.2MHz.
5. The EUT is a GPRS class 12 device, 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 12 device, 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 GSM, GPRS, E-GPRS functions. After pre-testing, GSM function is the worst case for all the emission tests.

FOR WCDMA BAND:

277 channels are provided to this EUT in the WCDMA1900 band. Therefore, the low, middle and high channels are chosen for testing.

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

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. (RMC, WCDMA Inactive) mode has been chosen for the worst case to do the final test and record.

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO							DESCRIPTION
	OP	FS	OB	BE	CE	RE<1G	RE≥1G	
A	√	√	√	√	√	√	√	PCS BAND
B	√	√	√	√	√	√	√	WCDMA BAND

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, 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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
512 to 810	512, 661, 810	PCS , GPRS, E-GPRS
9262 to 9538	9262, 9400, 9538	WCDMA

FREQUENCY STABILITY MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, 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	PCS
9262 to 9538	9400	WCDMA

OCCUPIED BANDWIDTH MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, 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	PCS , GPRS, E-GPRS
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, data rates, 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	PCS , GPRS, E-GPRS
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, data rates, 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	PCS
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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
512 to 810	512	PCS
9262 to 9538	9262	WCDMA

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.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
512 to 810	512, 661, 810	PCS
9262 to 9538	9262, 9400, 9538	WCDMA

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

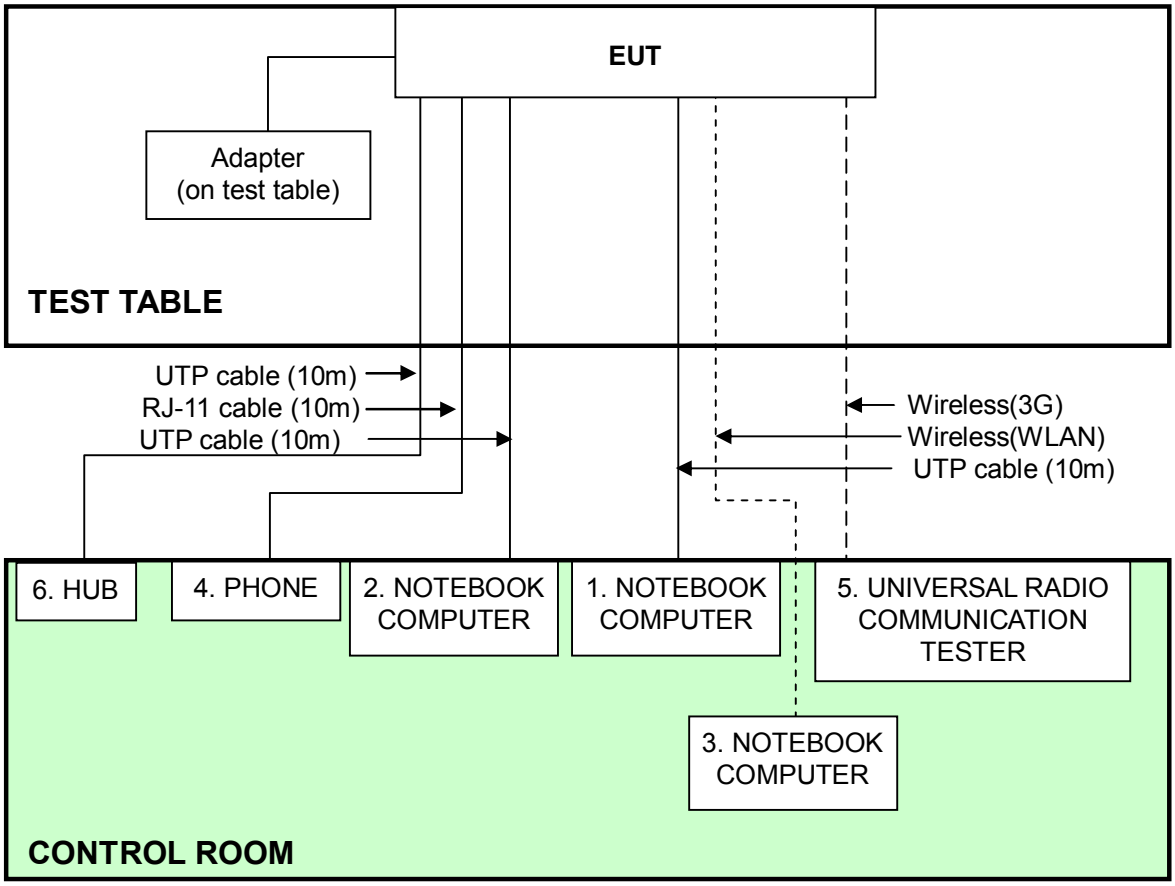
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP18L	6976685584	FCC DoC
2	NOTEBOOK COMPUTER	DELL	PP17L	CN-ONF743-48643-7AV-0124	FCC DoC
3	NOTEBOOK COMPUTER	DELL	D531	CN-0XM006-48643-86L-4472	QDS-BRCM1019
4	TELEPHONE	Romeo	TE-812	97280926	NA
5	Universal Radio Communication Tester	R&S	CMU200	101095	NA
6	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	UTP cable (Unshielded, 10m)
2	UTP cable (Unshielded, 10m)
3	NA
4	RJ-11 cable (Unshielded, 10m)
5	NA
6	UTP cable (Unshielded, 10m)

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

3.5 CONFIGURATION OF SYSTEM UNDER TEST



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.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2009	Apr. 23 , 2010
HP Pre_Amplifier	8449B	300801923	Nov. 02, 2009	Nov. 01, 2010
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 27, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 18, 2009	Dec. 17, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 21, 2010	Jan. 20, 2011
RF Switches	EMH-011	1001	NA	NA
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8DFB	STCCAB-30M-1GHz	NA	NA
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	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 horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.

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 / 9262, 9400 and 9538 (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) 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. E.I.R.P peak power 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 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 signal generator export the CW signal to the calibration antenna. Rotated the Turn Table to find the maximum radiation power. “Raw” is the spectrum reading value, “SG” is signal generator export power, “TX Gain” is calibration antenna isotropic gain value, “TX cable” is the transmitted cable loss between the calibration antenna and signal generator. The “Factor” means that the transmission path loss is equal to “SG” - “TX cable” + “TX Gain” – “Raw”.

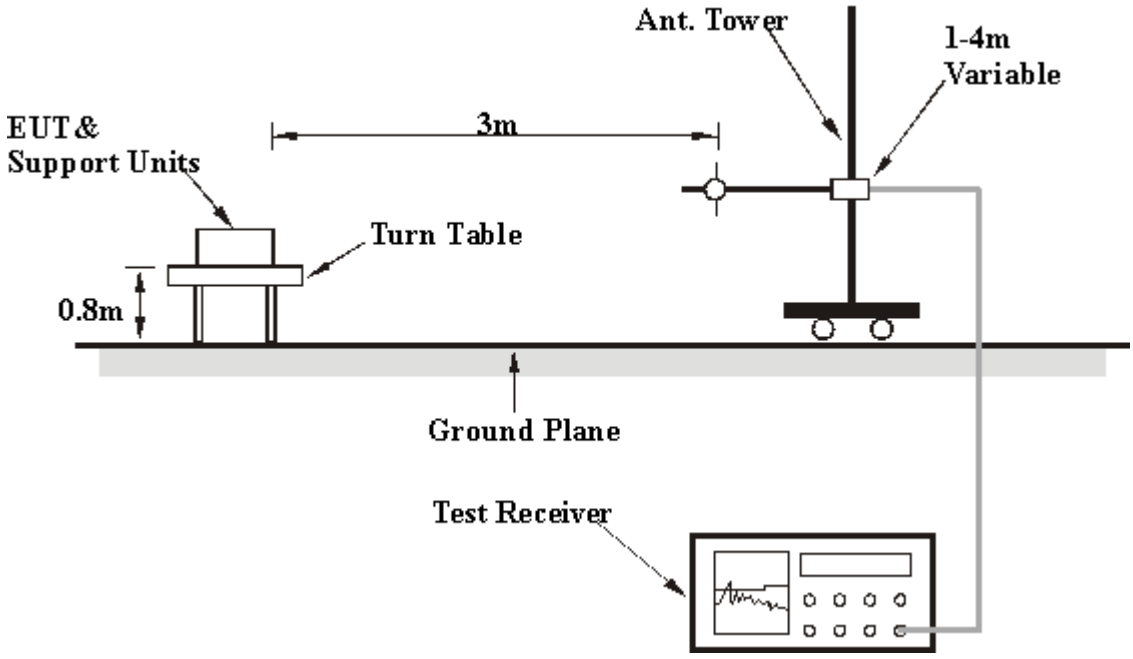
e. Actually the real E.I.R.P peak power is equal to “Read Value” + “Factor”

f. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.

NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection (PK)

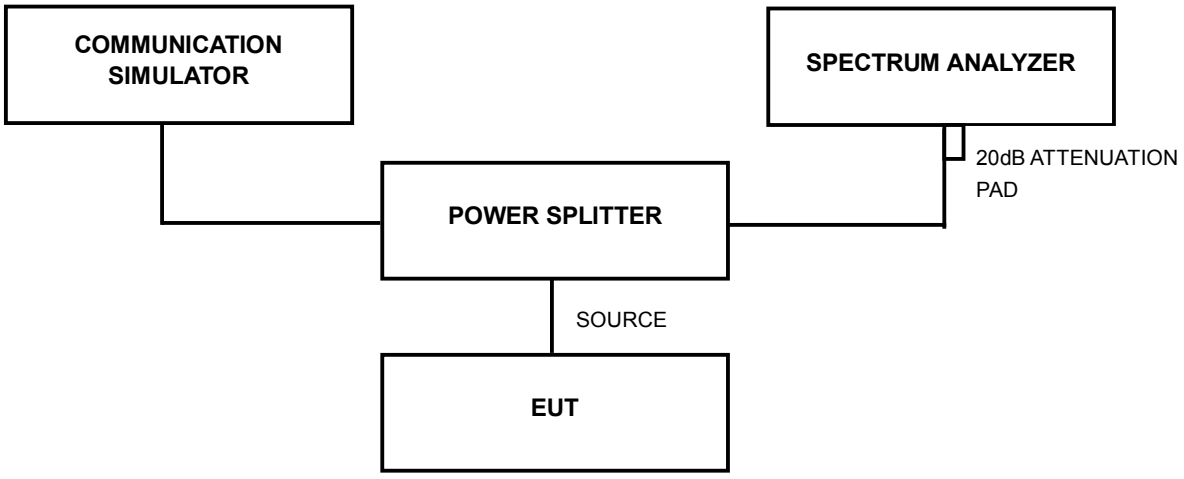
4.1.4 TEST SETUP

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

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

4.1.6 TEST RESULTS

FOR PCS BAND:

MODE	TX connected	**POWER CONTROL LEVEL**	5
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak / RMS
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	**TESTED BY**	Wen Yu

FOR GSM MODE

CONDUCTED PEAK OUTPUT POWER					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
512	1850.2	24.4	5.3	29.7	0.9333
661	1880.0	24.5	5.3	29.8	0.9550
810	1909.8	24.6	5.3	29.9	0.9772

CONDUCTED RMS OUTPUT POWER					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**RMS OUTPUT POWER**	
				dBm	**Watt**
512	1850.2	24.2	5.3	29.5	891.3
661	1880.0	24.2	5.3	29.5	891.3
810	1909.8	24.4	5.3	29.7	933.3

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

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

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	1850.2	24.3	5.3	29.6	0.9120
661	1880.0	24.4	5.3	29.7	0.9333
810	1909.8	24.5	5.3	29.8	0.9550

CONDUCTED RMS OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	RMS OUTPUT POWER	
				dBm	Watt
512	1850.2	24.1	5.3	29.4	871.0
661	1880.0	24.2	5.3	29.5	891.3
810	1909.8	24.3	5.3	29.6	912.0

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

FOR E-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	1850.2	23.9	5.3	29.2	0.8318
661	1880.0	23.9	5.3	29.2	0.8318
810	1909.8	24.1	5.3	29.4	0.8710

CONDUCTED RMS OUTPUT POWER					
CHANNEL NO.	FREQUENCY (MHz)	RAW VALUE (dBm)	CORRECTION FACTOR (dB)	RMS OUTPUT POWER	
				dBm	Watt
512	1850.2	20.3	5.3	25.6	363.1
661	1880.0	20.4	5.3	25.7	371.5
810	1909.8	20.5	5.3	25.8	380.2

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**	5
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	**TESTED BY**	Wen Yu

FOR GSM MODE

EIRP POWER					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
512	1850.2	26.1	6.6	32.7	0.18542
661	1880.0	25.5	6.7	32.2	0.16534
810	1909.8	25.9	6.7	32.6	0.18138

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

EIRP POWER					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
512	1850.2	26.0	6.6	32.6	0.18120
661	1880.0	25.5	6.7	32.2	0.16534
810	1909.8	25.8	6.7	32.5	0.17725

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

EIRP POWER					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
512	1850.2	25.9	6.6	32.5	0.17708
661	1880.0	25.4	6.7	32.1	0.16158
810	1909.8	25.7	6.7	32.4	0.17322

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).

FOR WCDMA BAND:

The following procedures were followed according to FCC “SAR Measurement Procedures for 3G Devices”, October, 2007.

Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1’s” for WCDMA/HSDPA or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) should be tabulated in the SAR report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations should be clearly identified.

MODE	TX connected	**POWER CONTROL LEVEL**	0
INPUT POWER	120Vac, 60 Hz	**DETECTOR FUNCTION**	Peak / RMS
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	**TESTED BY**	Wen Yu

CONDUCTED PEAK OUTPUT POWER (RMC, WCDMA INACTIVE)					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
9262	1852.40	20.9	5.3	26.2	0.4169
9400	1880.00	20.9	5.3	26.2	0.4169
9538	1907.60	20.7	5.3	26.0	0.3981

CONDUCTED RMS OUTPUT POWER (RMC, WCDMA INACTIVE)					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**RMS OUTPUT POWER**	
				dBm	**Watt**
9262	1852.40	17.6	5.3	22.9	0.1950
9400	1880.00	17.6	5.3	22.9	0.1950
9538	1907.60	17.4	5.3	22.7	0.1862

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 / RMS
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	**TESTED BY**	Wen Yu

CONDUCTED PEAK OUTPUT POWER (AMR, WCDMA INACTIVE)					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
9262	1852.40	20.8	5.3	26.1	0.4074
9400	1880.00	20.7	5.3	26.0	0.3981
9538	1907.60	20.8	5.3	26.1	0.4074

CONDUCTED RMS OUTPUT POWER (AMR, WCDMA INACTIVE)					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**RMS OUTPUT POWER**	
				dBm	**Watt**
9262	1852.40	17.5	5.3	22.8	0.1905
9400	1880.00	17.4	5.3	22.7	0.1862
9538	1907.60	17.5	5.3	22.8	0.1905

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 / RMS
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	**TESTED BY**	Wen Yu

CONDUCTED PEAK OUTPUT POWER (RMC, HSDPA ACTIVE)					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
9262	1852.40	20.7	5.3	26.0	0.3981
9400	1880.00	20.6	5.3	25.9	0.3890
9538	1907.60	20.7	5.3	26.0	0.3981

CONDUCTED RMS OUTPUT POWER (RMC, HSDPA ACTIVE)					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**RMS OUTPUT POWER**	
				dBm	**Watt**
9262	1852.40	17.4	5.3	22.7	0.1862
9400	1880.00	17.3	5.3	22.6	0.1820
9538	1907.60	17.4	5.3	22.7	0.1862

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	18deg. C, 63%RH, 1024 hPa	**TESTED BY**	Wen Yu

EIRP POWER					
CHANNEL NO.	**FREQUENCY (MHz)**	**RAW VALUE (dBm)**	**CORRECTION FACTOR (dB)**	**PEAK OUTPUT POWER**	
				dBm	**Watt**
9262	1852.40	22.0	6.6	28.6	0.7239
9400	1880.00	21.9	6.7	28.6	0.7318
9538	1907.60	22.8	6.7	29.5	0.8915

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 2.4235 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 DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010
OVEN	MHU-225AU	911033	Dec. 17, 2009	Dec. 16, 2010
HUBER+SUHNER	SUCOFLEX104	222684/4	Aug. 15, 2009	Aug. 14, 2010
AC POWER SOURCE	6205	1140503	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.

4.2.3 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 / 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 GSM link channel is the 661 and the WCDMA link channel is the 9538.

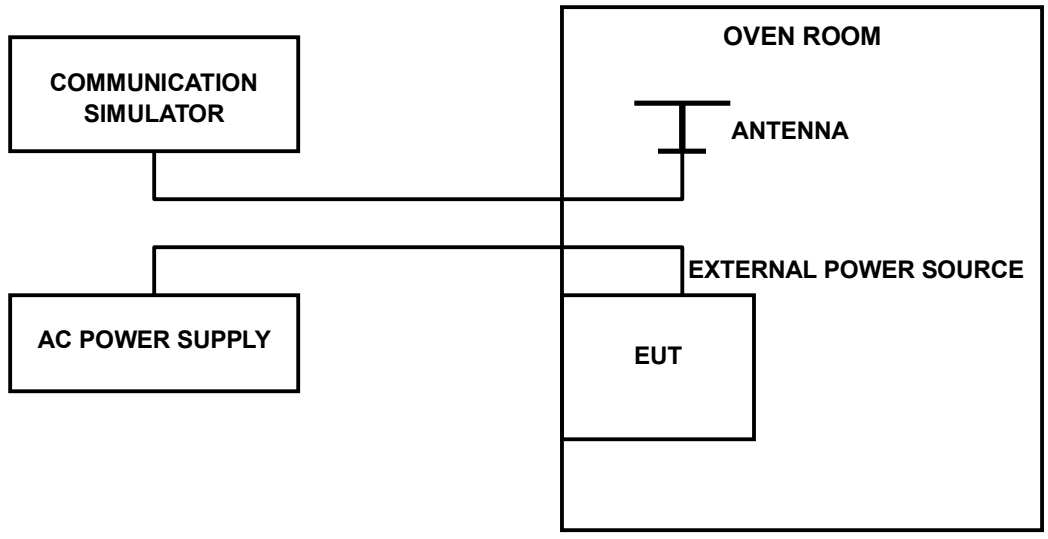
b. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error.

c. EUT is connected the external power supply to control the AC input power. The various Volts from the minimum 138 Volts to 102 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.

4.2.4 TEST SETUP



4.2.5 TEST RESULTS

FOR PCS BAND:

MODE	TX Middle channel	**POWER CONTROL LEVEL**	5
INPUT POWER	120Vac, 60 Hz	**ENVIRONMENTAL CONDITIONS**	18deg. C, 63%RH, 1024 hPa
TESTED BY	Wen Yu		

AFC FREQUENCY ERROR vs. VOLTAGE			
VOLTAGE (Volts)	**FREQUENCY ERROR (Hz)**	**FREQUENCY ERROR (ppm)**	**LIMIT (ppm)**
138	-66	-0.035	2.5
102	-58	-0.031	2.5

AFC FREQUENCY ERROR vs. TEMP.			
TEMP. (℃)	**FREQUENCY ERROR (Hz)**	**FREQUENCY ERROR (ppm)**	**LIMIT (ppm)**
50	-88	-0.047	2.5
40	-78	-0.041	2.5
30	-65	-0.035	2.5
20	-50	-0.027	2.5
10	-48	-0.026	2.5
0	-53	-0.028	2.5
-10	-61	-0.032	2.5

FOR WCDMA BAND:

MODE	TX Middle channel	POWER CONTROL LEVEL	0
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa
TESTED BY	Wen Yu		

AFC FREQUENCY ERROR vs. VOLTAGE			
VOLTAGE (Volts)	FREQUENCY ERROR (Hz)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
138	-67	-0.036	2.5
102	-59	-0.031	2.5

AFC FREQUENCY ERROR vs. TEMP.			
TEMP. (℃)	FREQUENCY ERROR (Hz)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
50	-79	-0.042	2.5
40	-75	-0.040	2.5
30	-68	-0.036	2.5
20	-58	-0.031	2.5
10	-49	-0.026	2.5
0	-59	-0.031	2.5
-10	-72	-0.038	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.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010
OVEN	MHU-225AU	911033	Dec. 17, 2009	Dec. 16, 2010
HUBER+SUHNER	SUCOFLEX104	222684/4	Aug. 15, 2009	Aug. 14, 2010
AC POWER SOURCE	6205	1140503	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

Same as Item 4.2.4 (Conducted Power Setup)

4.3.4 TEST PROCEDURES

a. The EUT was set up for the maximum peak power with GSM / WCDMA link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 / 9262, 9400 and 9538 (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 6.5dB (PCS band) / 6.5dB (WCDMA band) in the transmitted path track.

c. FCC 24.238(b) required a measurement bandwidth is the fundamental emission below 26dB bandwidth.

4.3.5 EUT OPERATING CONDITION

Same as the 4.1.5

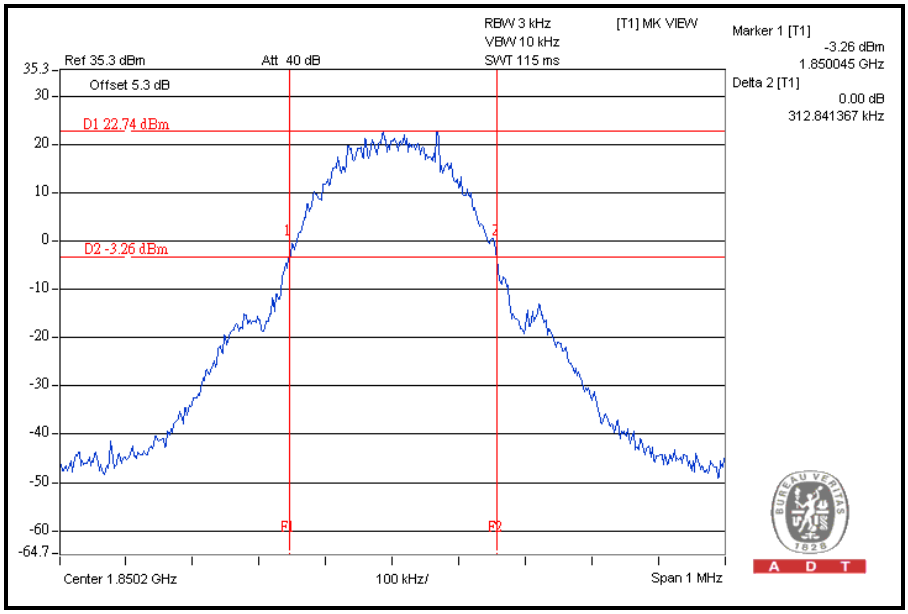
4.3.6 TEST RESULTS

FOR PCS BAND:

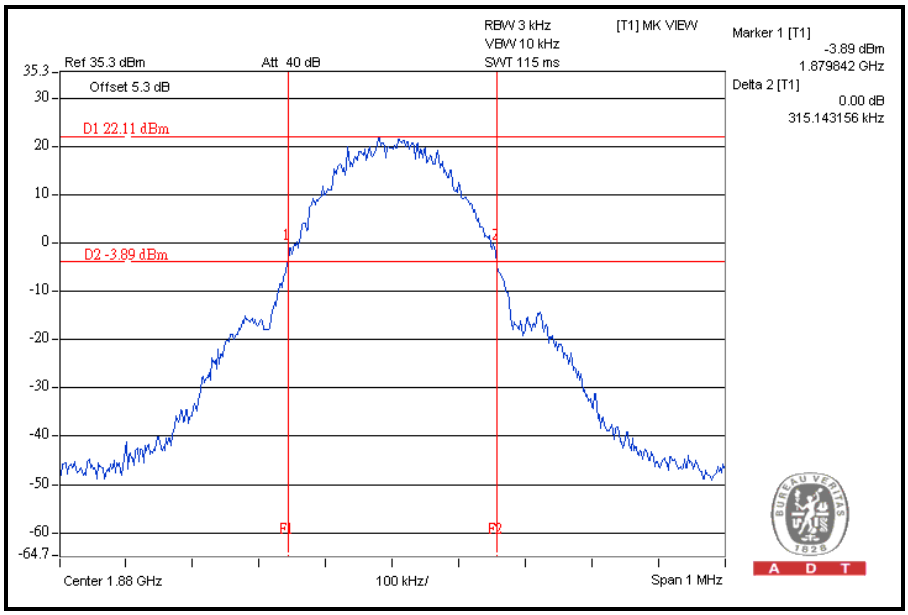
FOR GSM MODE

CHANNEL	MAX. OUTPUT POWER -26 dBc BANDWIDTH (kHz)
LOW	312
MIDDLE	315
HIGH	314

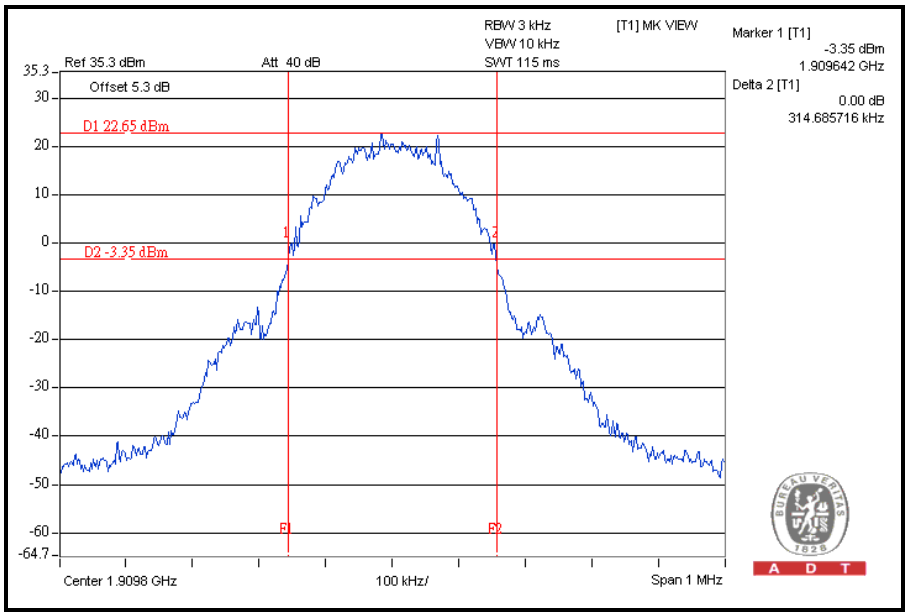
LOW CHANNEL



MIDDLE CHANNEL



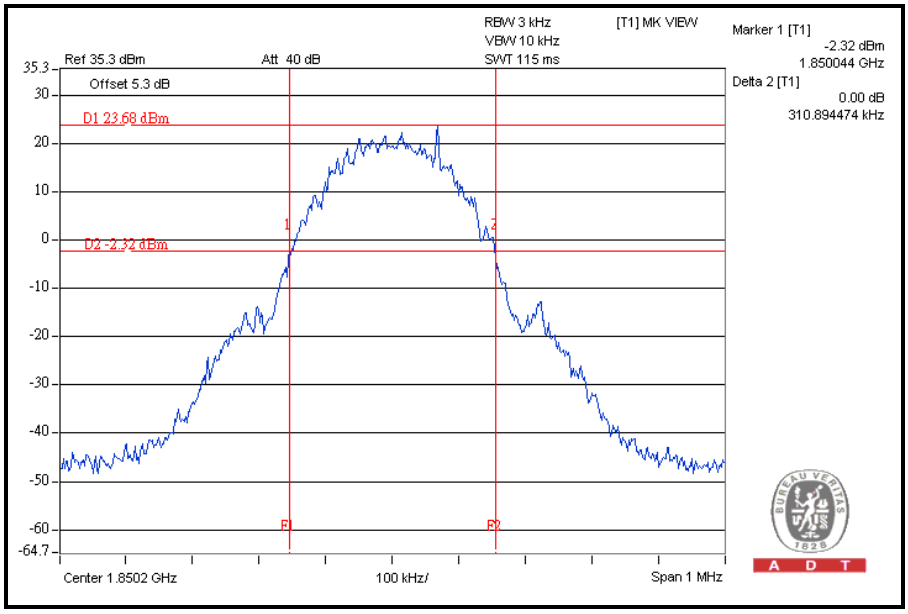
HIGH CHANNEL



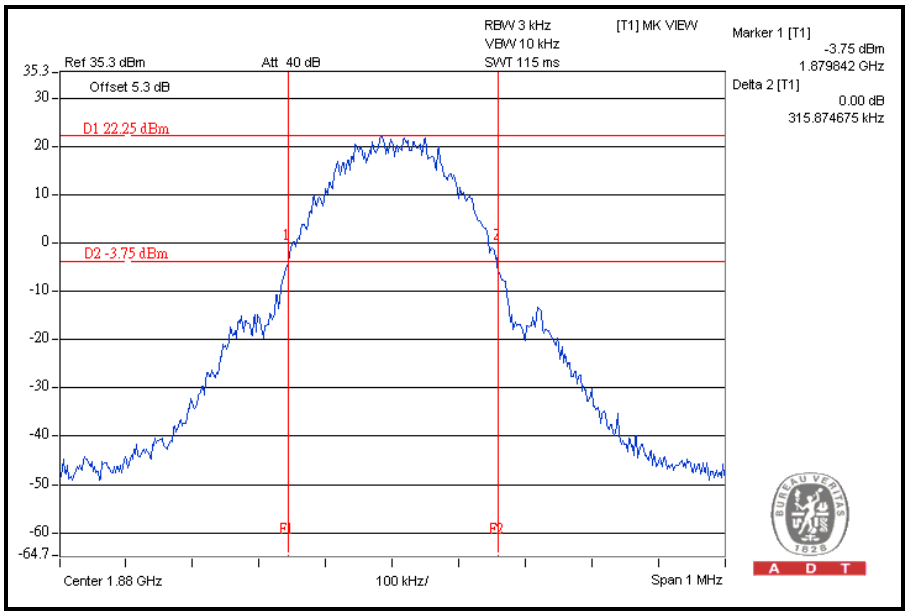
FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

CHANNEL	MAX. OUTPUT POWER -26 dBc BANDWIDTH (kHz)
LOW	310
MIDDLE	315
HIGH	309

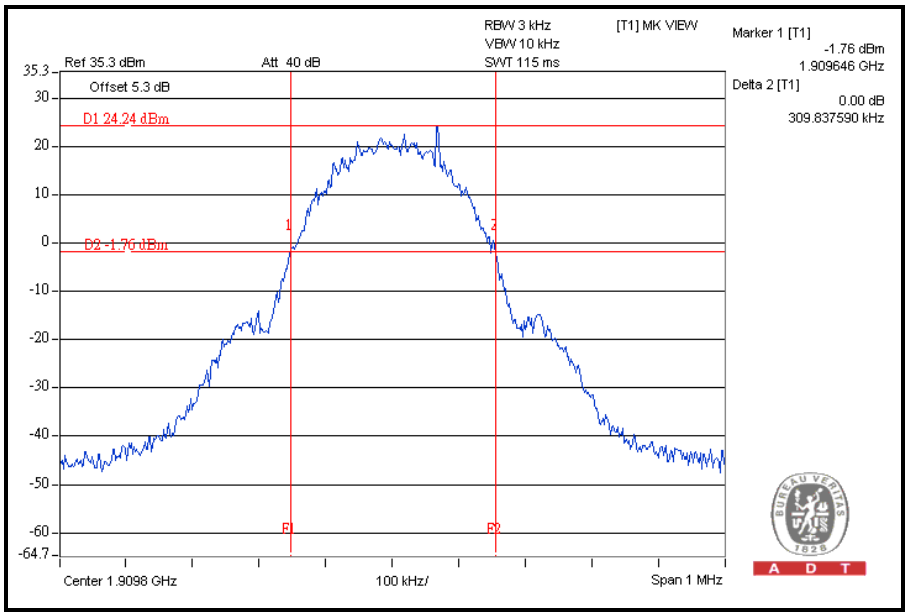
LOW CHANNEL



MIDDLE CHANNEL



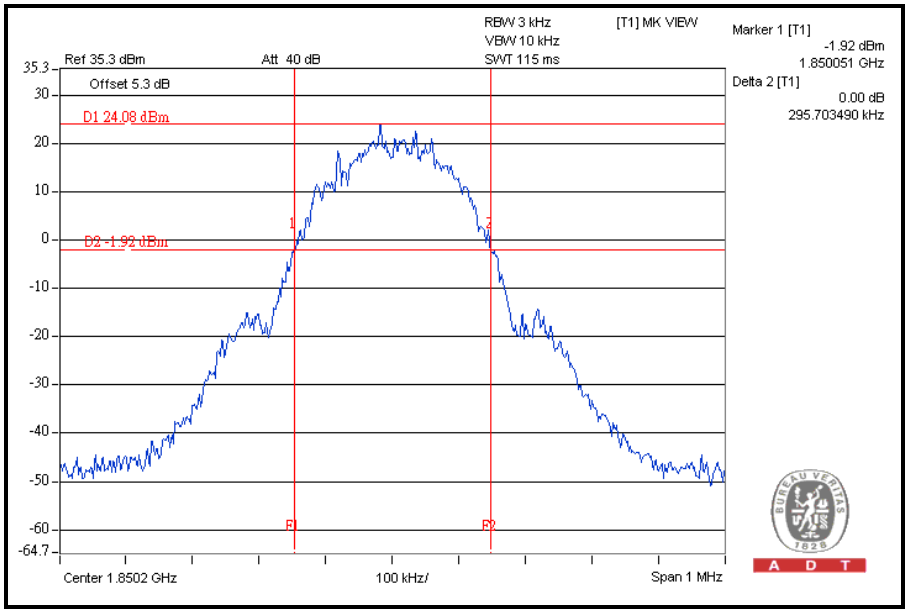
HIGH CHANNEL



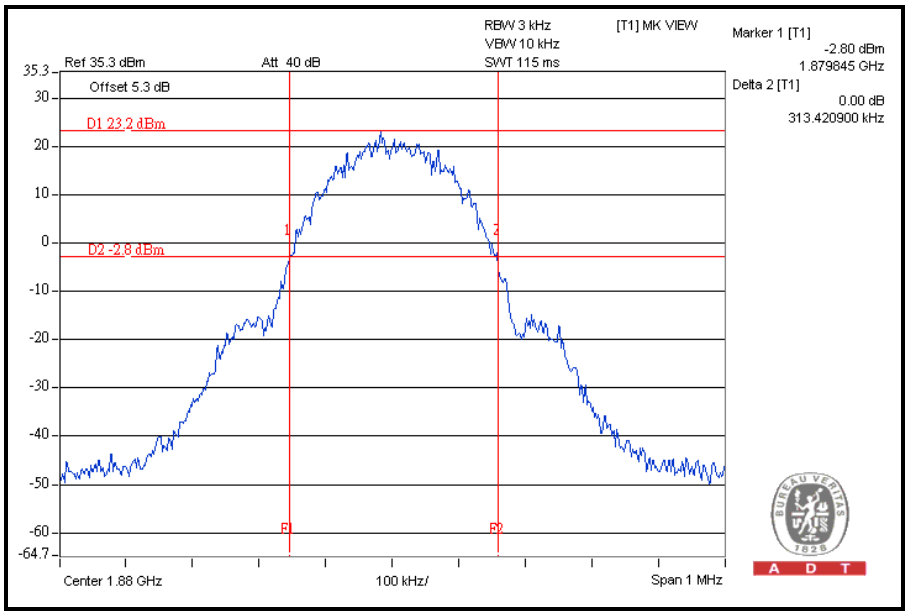
FOR E-GPRS MODE (UP-LINK WITH 1 TIME SLOT)

CHANNEL	MAX. OUTPUT POWER -26 dBc BANDWIDTH (kHz)
LOW	295
MIDDLE	313
HIGH	310

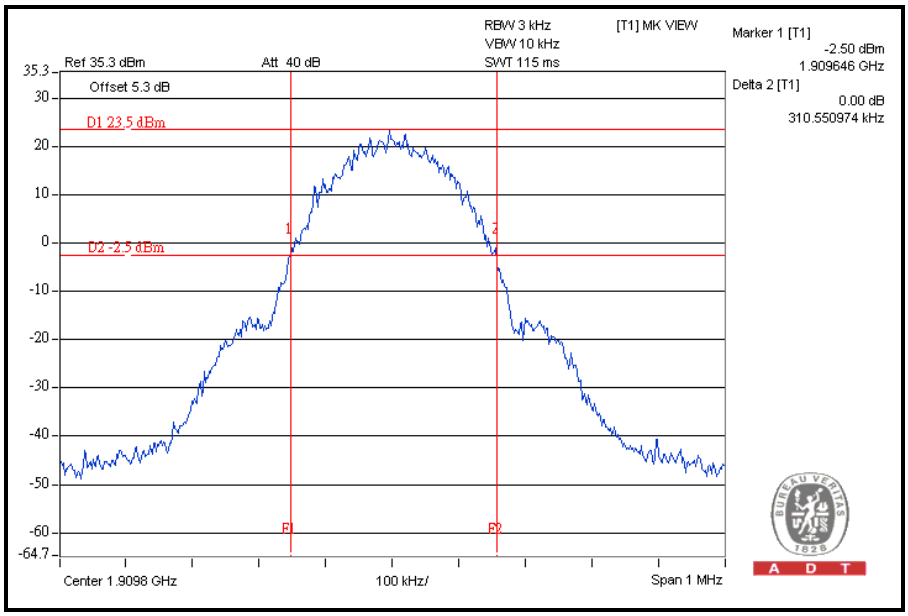
LOW CHANNEL



MIDDLE CHANNEL



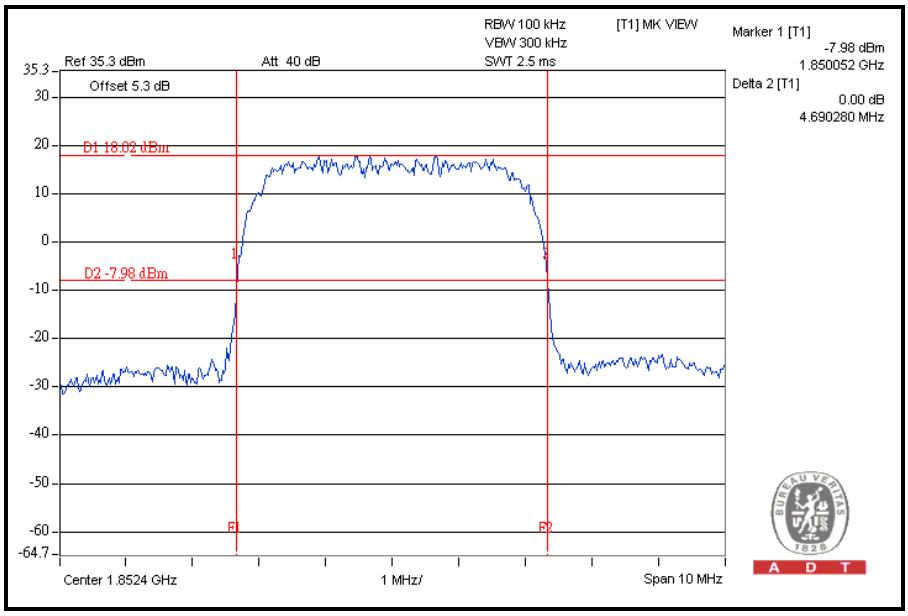
HIGH CHANNEL



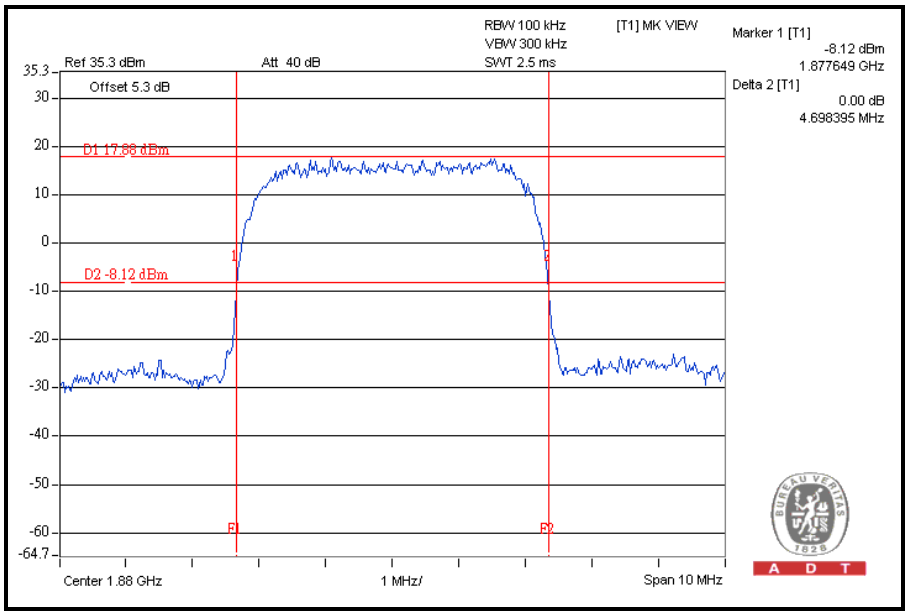
FOR WCDMA BAND:

CHANNEL	MAX. OUTPUT POWER -26 dBc BANDWIDTH (MHz)
LOW	4.69
MIDDLE	4.69
HIGH	4.68

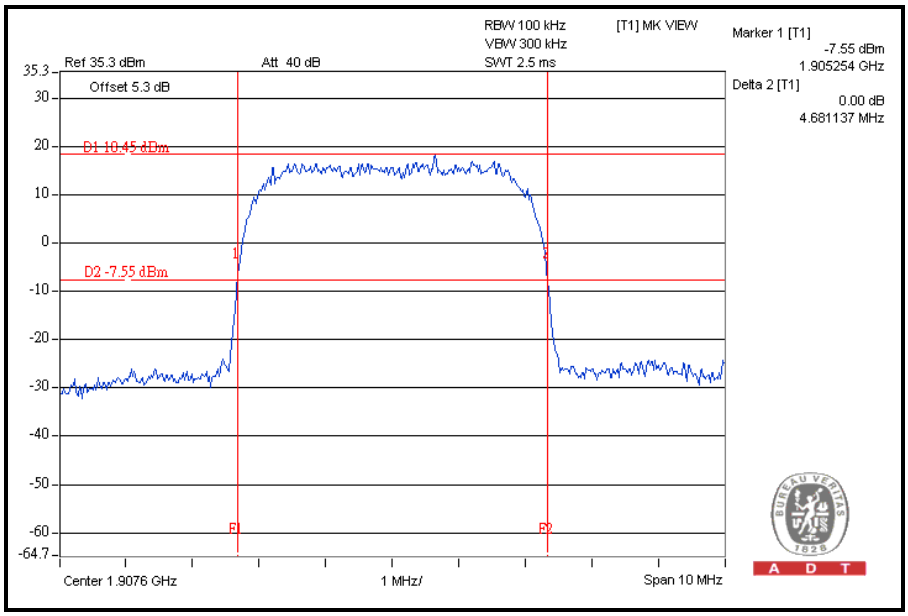
LOW CHANNEL



MIDDLE CHANNEL



HIGH CHANNEL



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.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010
OVEN	MHU-225AU	911033	Dec. 17, 2009	Dec. 16, 2010
HUBER+SUHNER	SUCOFLEX104	222684/4	Aug. 15, 2009	Aug. 14, 2010
AC POWER SOURCE	6205	1140503	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

Same as Item 4.2.4 (Conducted Power Setup)

4.4.4 TEST PROCEDURES

a. The EUT was set up for the maximum peak power with GSM / WCDMA link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 512 and 810 / 9262 and 9538 (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 6.5dB (PCS band) / 6.5dB (WCDMA band) 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 (for PCS band).

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 (for WCDMA band).

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

4.4.5 EUT OPERATING CONDITION

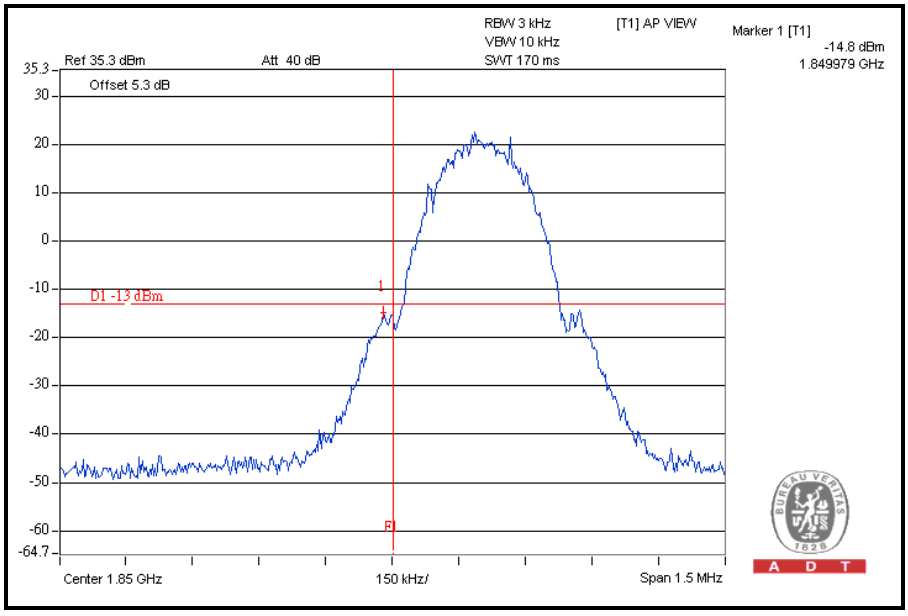
Same as the 4.1.5

4.4.6 TEST RESULTS

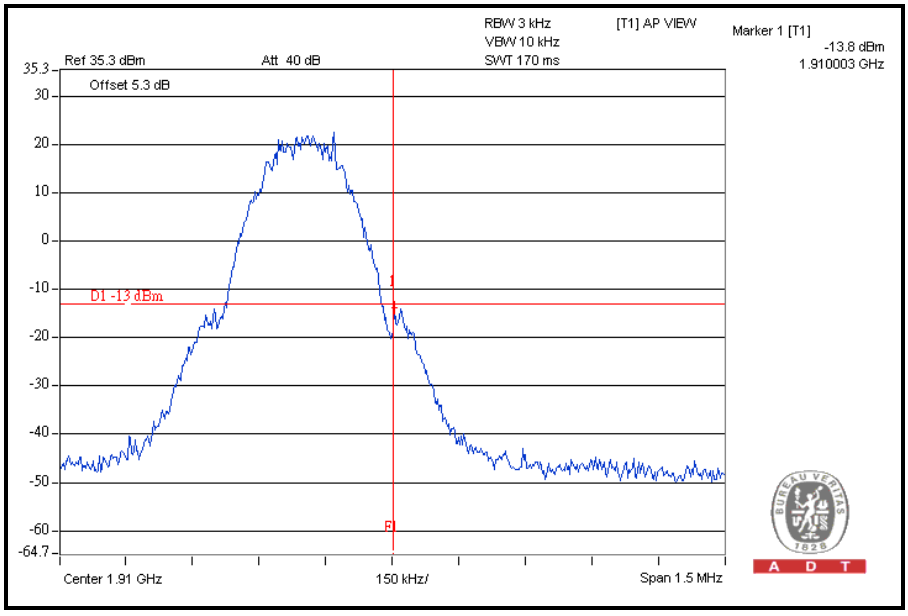
FOR PCS BAND:

FOR GSM MODE

LOWER BAND EDGE

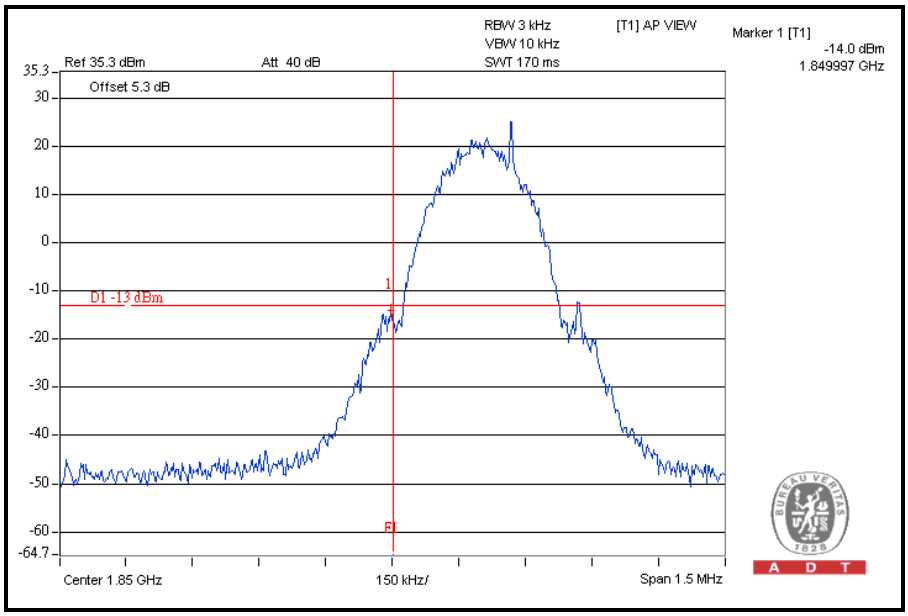


HIGHER BAND EDGE

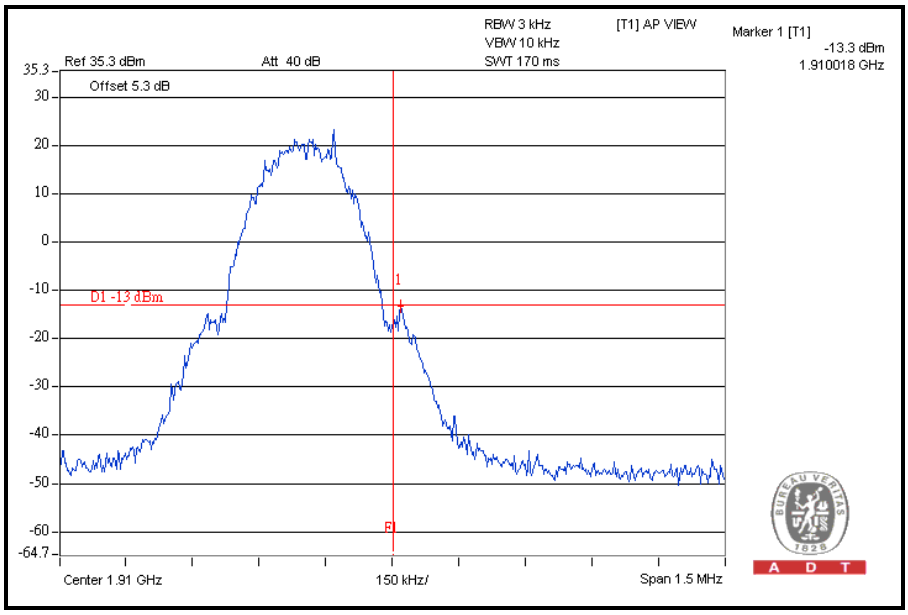


FOR GPRS MODE (UP-LINK WITH 1 TIME SLOT)

LOWER BAND EDGE

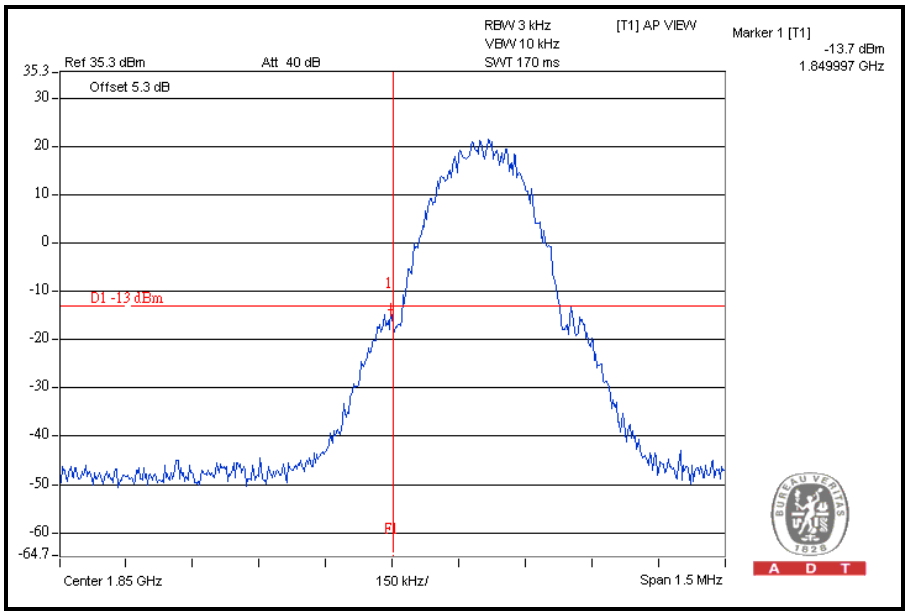


HIGHER BAND EDGE

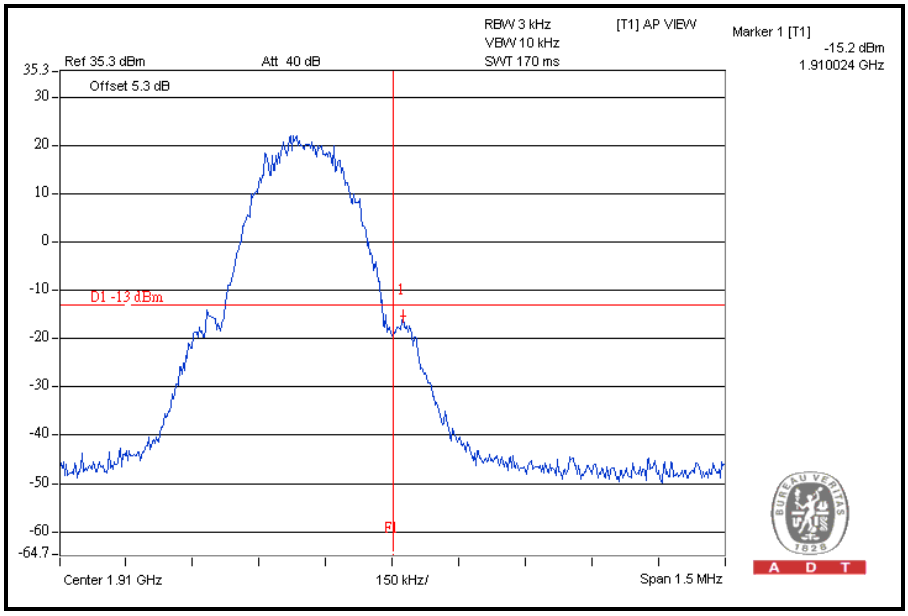


FOR E-GPRS MODE (UP-LINK WITH 1 TIME SLOT)

LOWER BAND EDGE

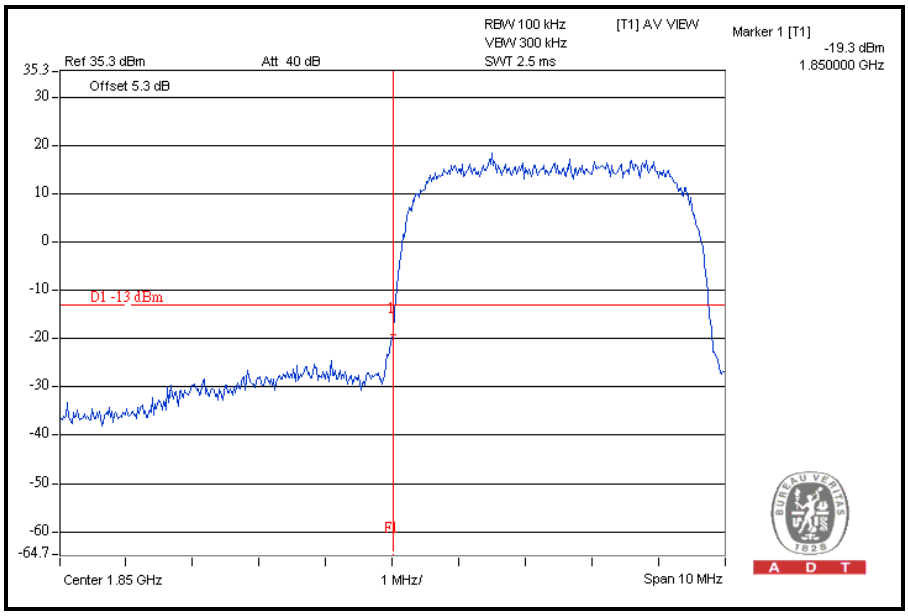


HIGHER BAND EDGE

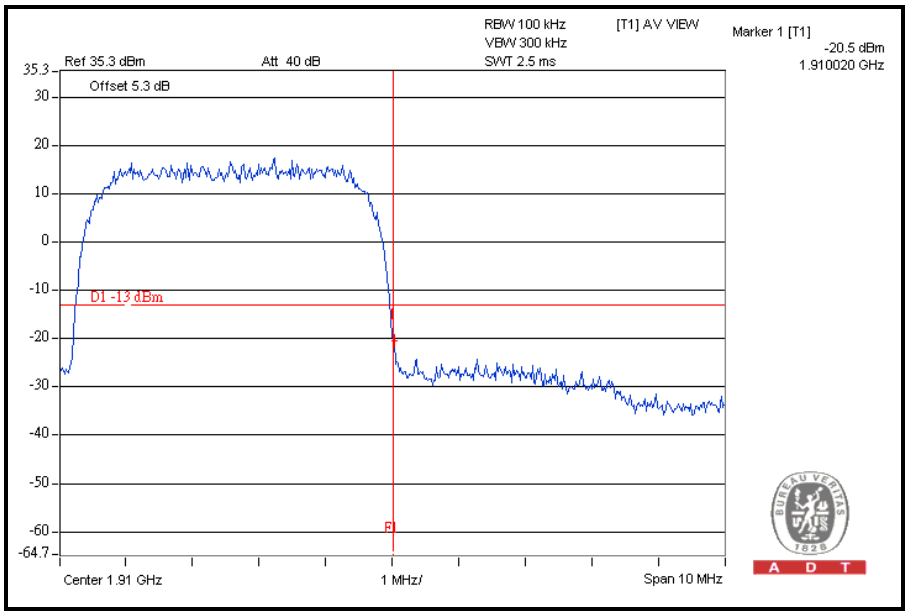


FOR WCDMA BAND:

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.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010
OVEN	MHU-225AU	911033	Dec. 17, 2009	Dec. 16, 2010
HUBER+SUHNER	SUCOFLEX104	222684/4	Aug. 15, 2009	Aug. 14, 2010
AC POWER SOURCE	6205	1140503	NA	NA
Wainwright Instruments Band Reject Filter	WRCG1850/1910-1830/1930-60/10SS	SN1	NA	NA
* Wainwright Instruments High Pass Filter	WHK3.1/18G-10SS	SN1	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

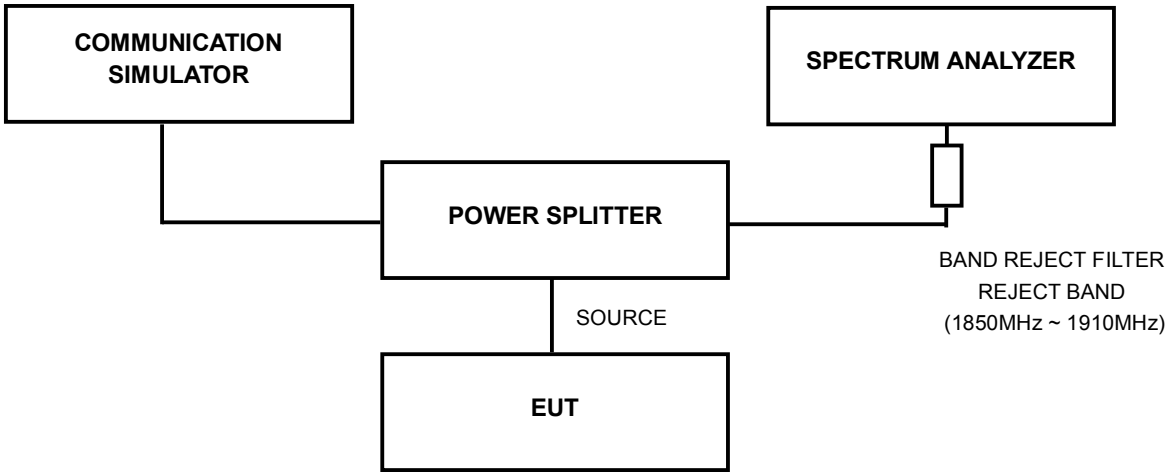
a. The EUT was set up for the maximum peak power with GSM / WCDMA link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 / 9262, 9400 and 9538 (low, middle and high operational frequency range.)

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 6.5dB (PCS band) / 6.5dB (WCDMA band) 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 (GSM band) / RB=1MHz, VB=1MHz (WCDMA band).

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

4.5.4 TEST SETUP



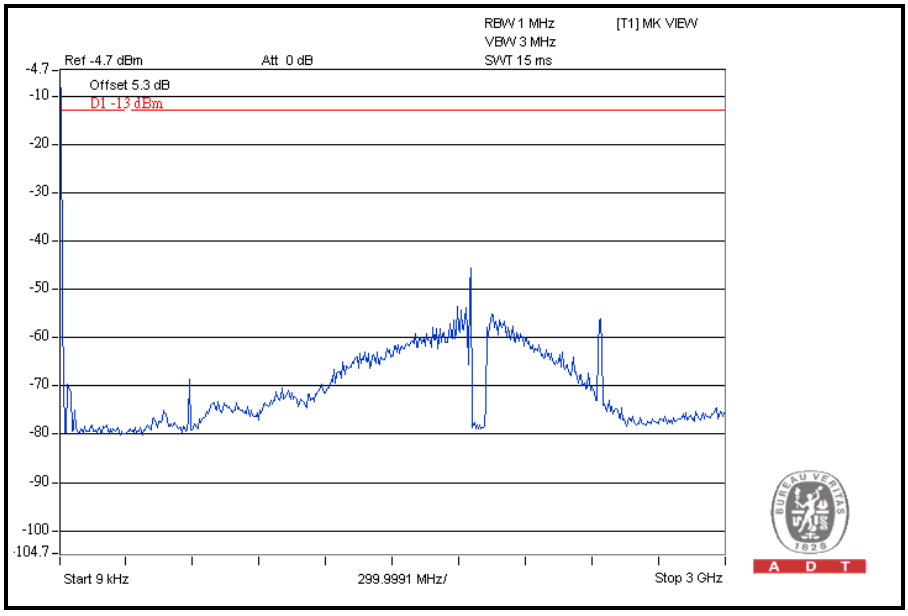
4.5.5 EUT OPERATING CONDITIONS

Same as the 4.1.5

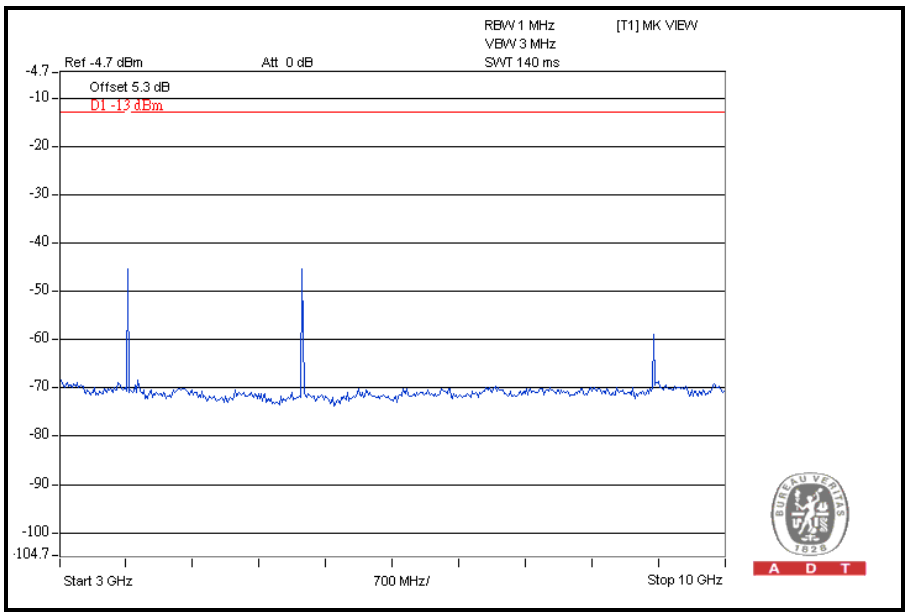
4.5.6 TEST RESULTS

FOR PCS BAND:

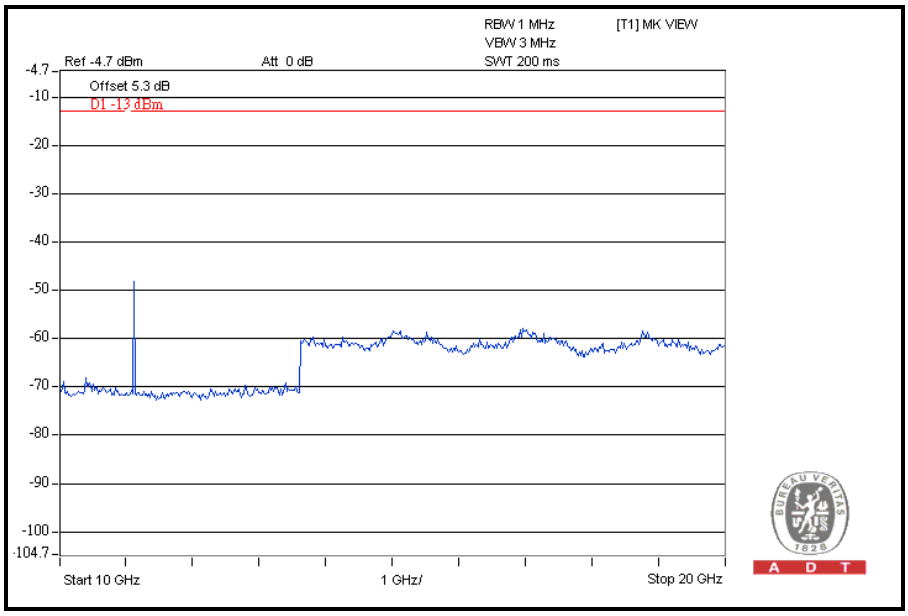
CH 512: 9kHz ~ 3GHz



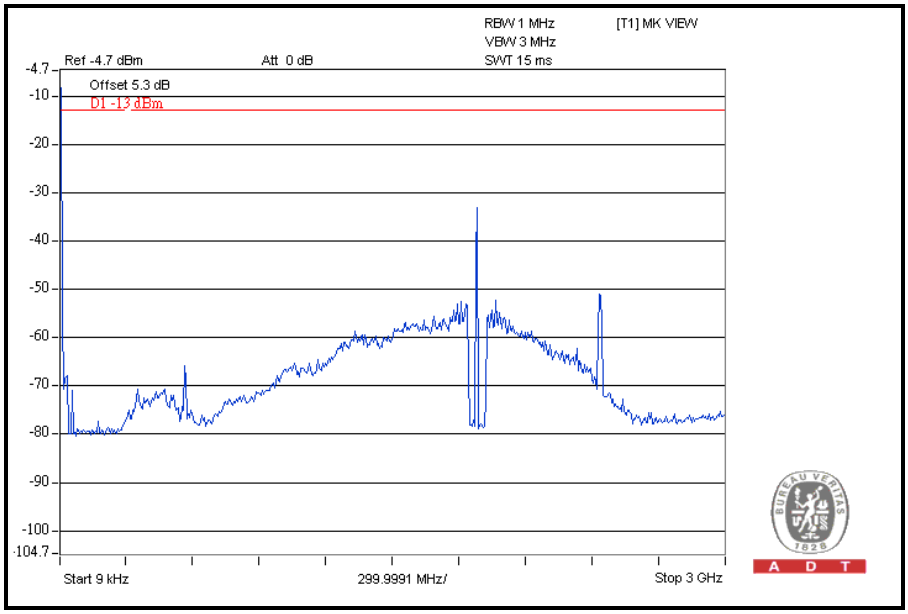
3GHz ~ 10GHz



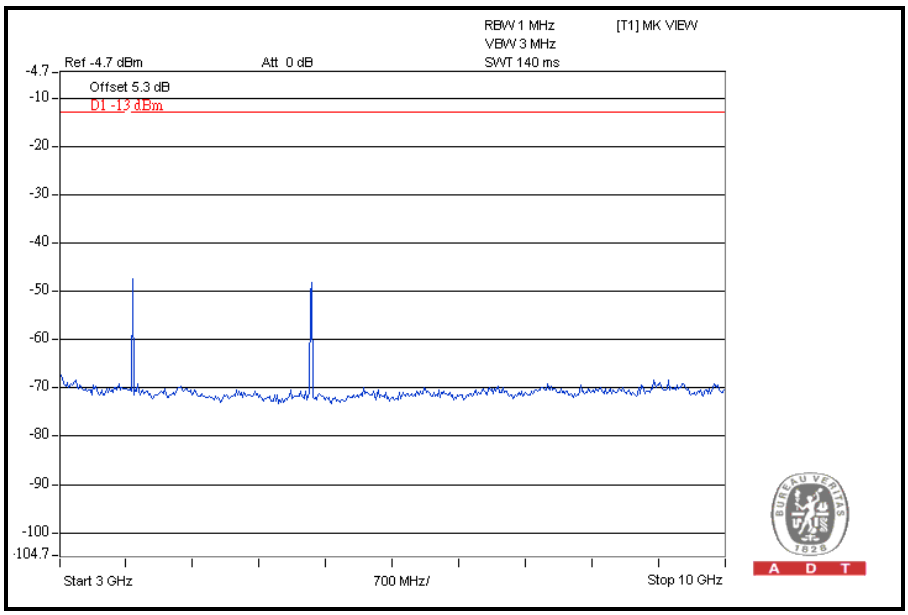
10GHz ~ 20GHz


RBW 1 MHz
VBW 3 MHz
SWT 200 ms
[T1] MK VIEW
Ref -4.7 dBm
Att 0 dB
Offset 5.3 dB
D1 -13 dBm
-4.7
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-104.7
Start 10 GHz
1 GHz/
Stop 20 GHz

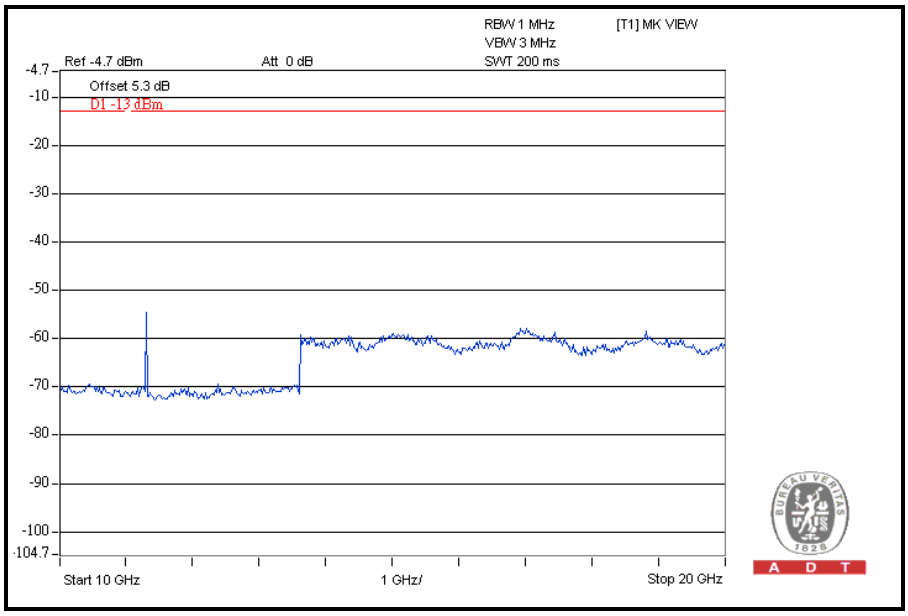
CH 661: 9kHz ~ 3GHz



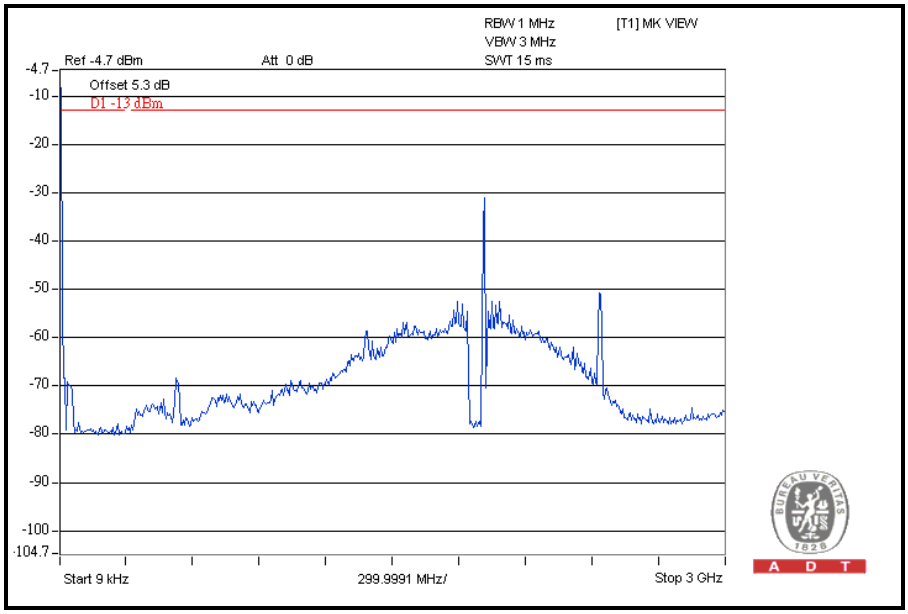
3GHz ~ 10GHz



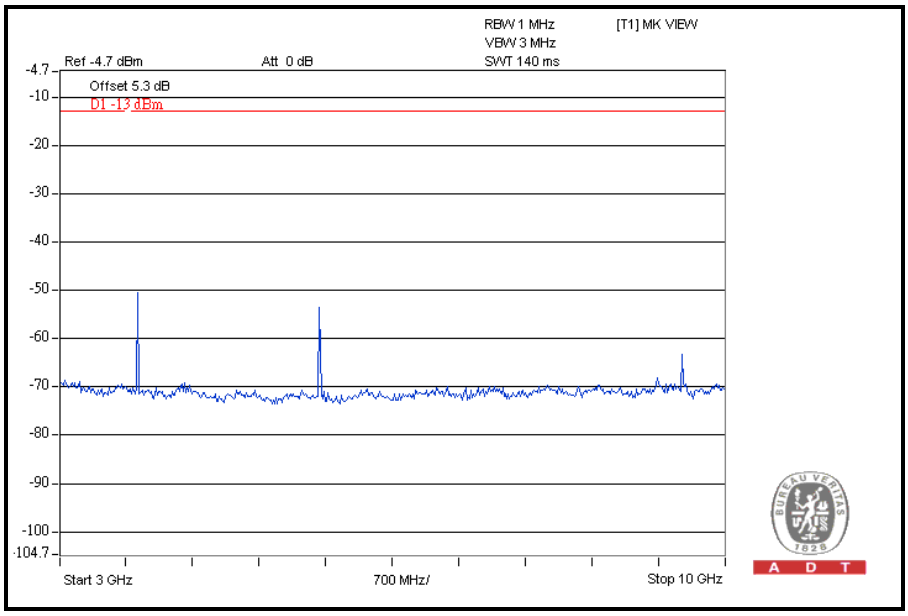
10GHz ~ 20GHz


RBW 1 MHz
VBW 3 MHz
SWT 200 ms
[T1] MK VIEW
Ref -4.7 dBm
Att 0 dB
Offset 5.3 dB
D1 -13 dBm
-4.7
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-104.7
Start 10 GHz
1 GHz/
Stop 20 GHz

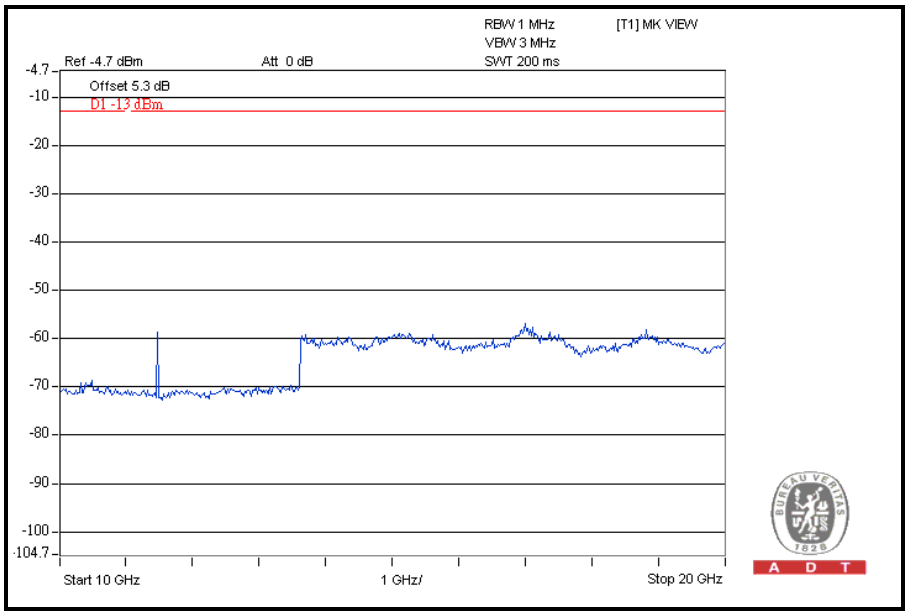
CH 810: 9kHz ~ 3GHz



3GHz ~ 10GHz

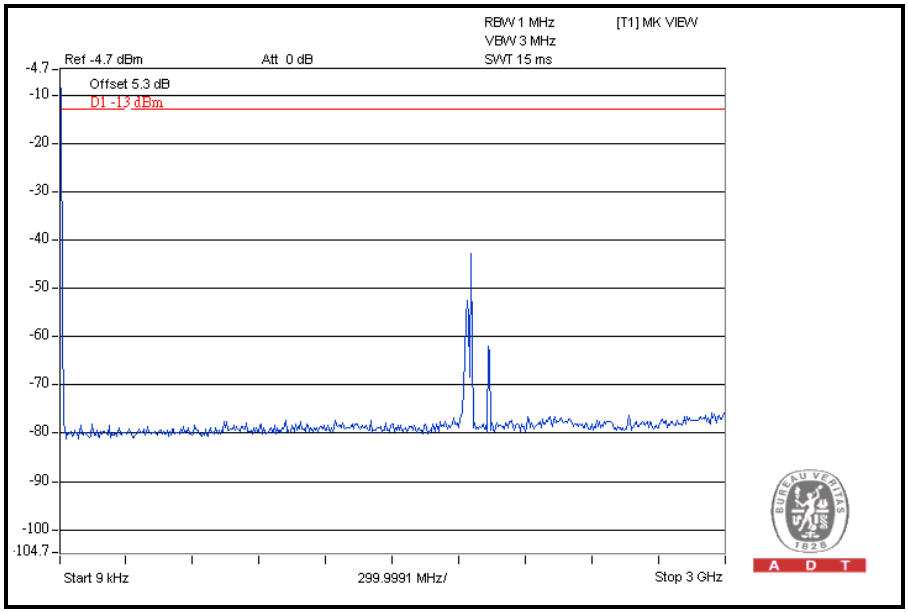


10GHz ~ 20GHz

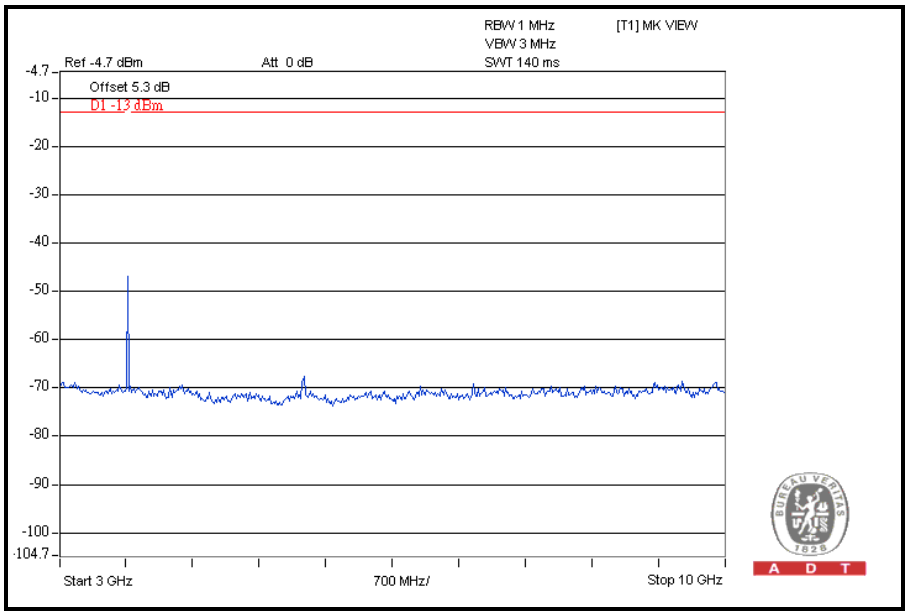

RBW 1 MHz
VBW 3 MHz
SWT 200 ms
[T1] MK VIEW
Ref -4.7 dBm
Att 0 dB
Offset 5.3 dB
D1 -13 dBm
-4.7
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-104.7
Start 10 GHz
1 GHz/
Stop 20 GHz

FOR WCDMA BAND:

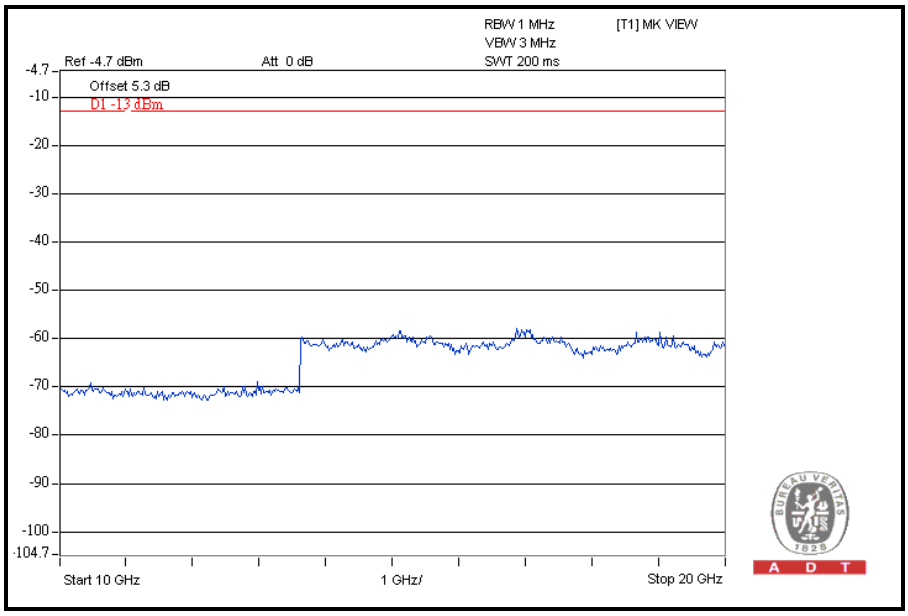
CH 9262: 9kHz ~ 3GHz



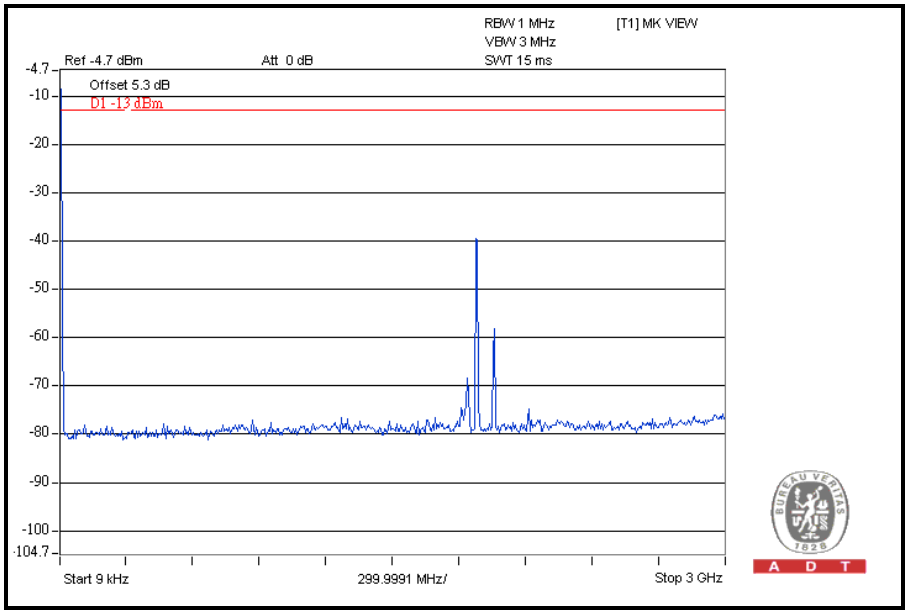
3GHz ~ 10GHz



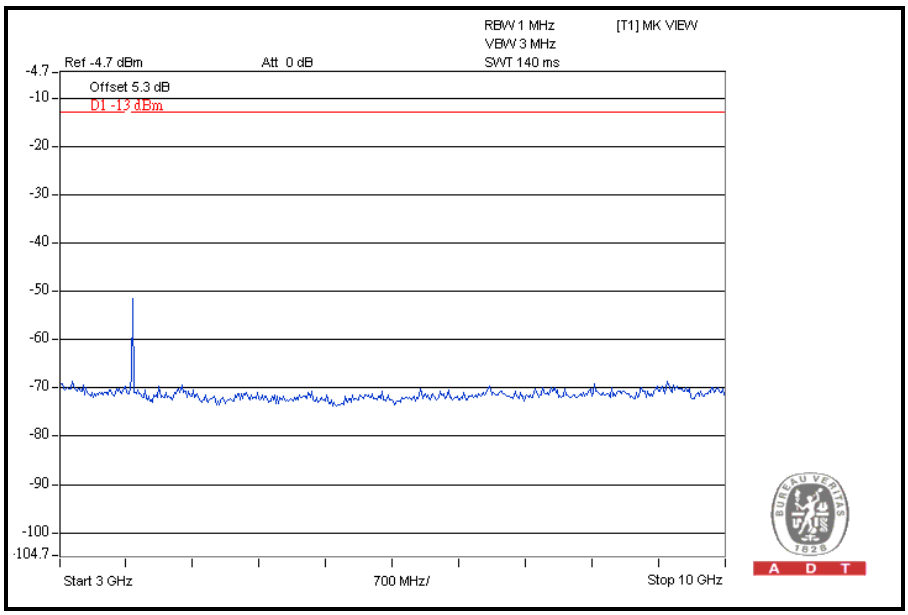
10GHz ~ 20GHz


RBW 1 MHz
VBW 3 MHz
SWT 200 ms
[T1] MK VIEW
Ref -4.7 dBm
Att 0 dB
Offset 5.3 dB
D1 -13 dBm
-4.7
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-104.7
Start 10 GHz
1 GHz/
Stop 20 GHz

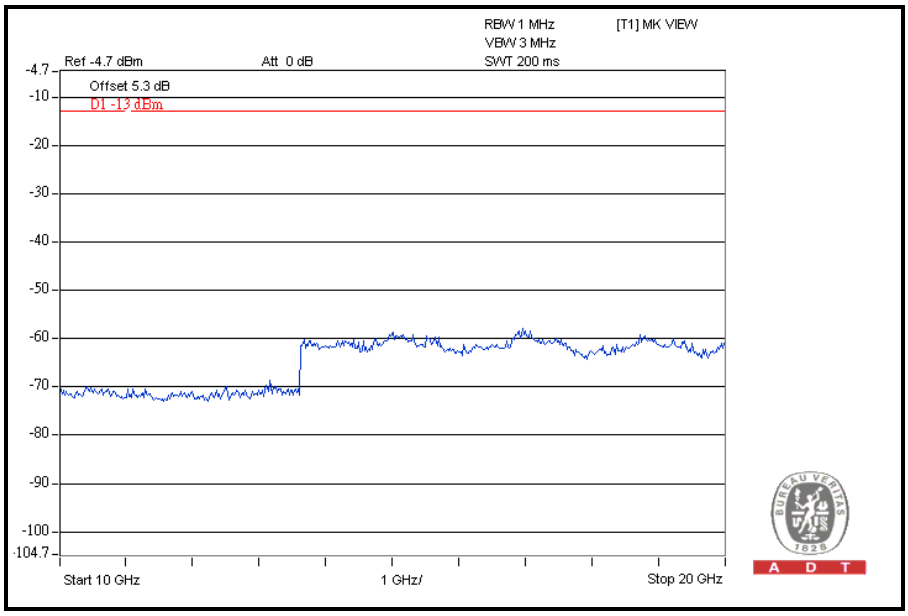
CH 9400: 9kHz ~ 3GHz



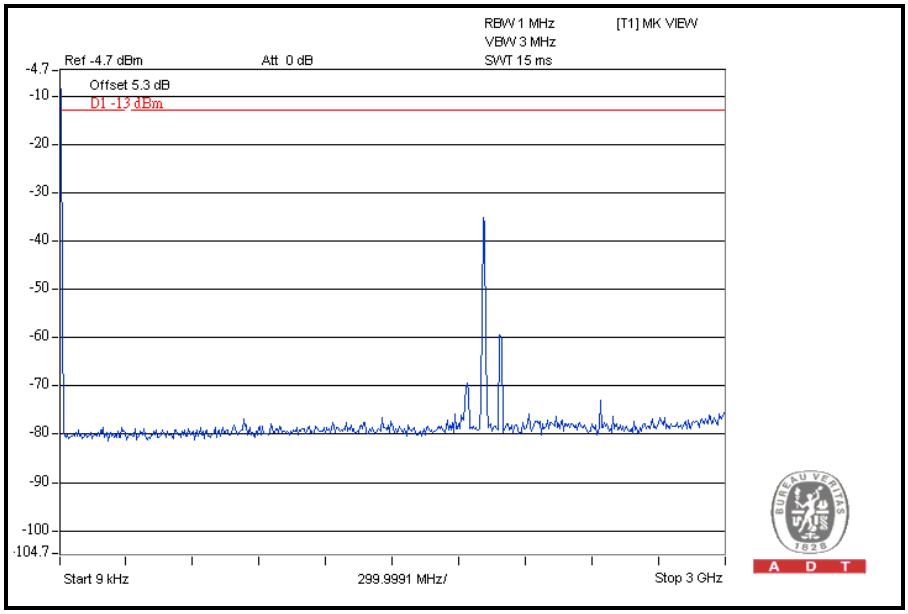
3GHz ~ 10GHz



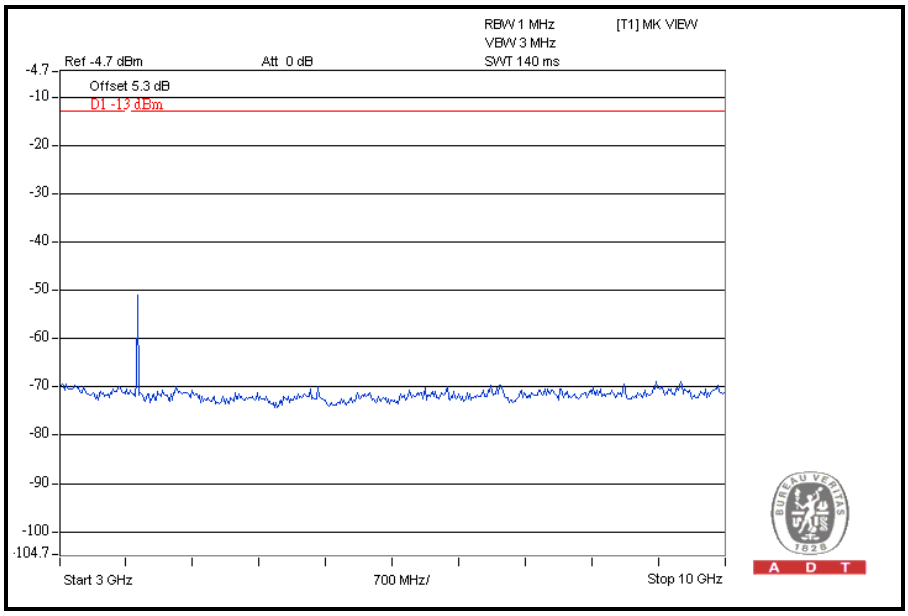
10GHz ~ 20GHz


RBW 1 MHz
VBW 3 MHz
SWT 200 ms
[T1] MK VIEW
Ref -4.7 dBm
Att 0 dB
Offset 5.3 dB
D1 -13 dBm
-4.7
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-104.7
Start 10 GHz
1 GHz/
Stop 20 GHz

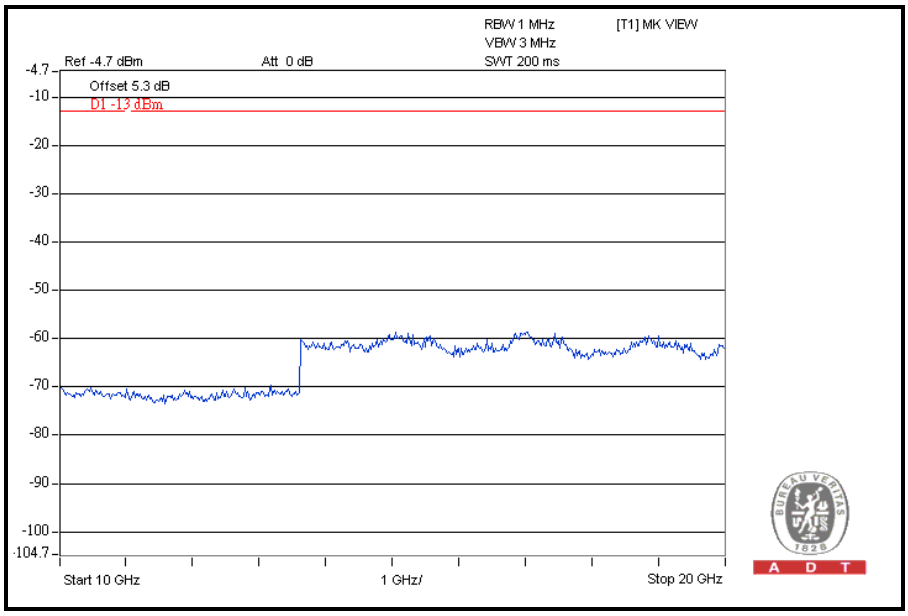
CH 9538: 9kHz ~ 3GHz



3GHz ~ 10GHz



10GHz ~ 20GHz


RBW 1 MHz
VBW 3 MHz
SWT 200 ms
[T1] MK VIEW
Ref -4.7 dBm
Att 0 dB
Offset 5.3 dB
D1 -13 dBm
-4.7
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-104.7
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	82.22

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	170100022	Nov. 18, 2009	Nov. 17, 2010
ADVANTEST Spectrum Analyzer	U3772	160100280	Sep. 21, 2009	Sep. 20, 2010
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2009	Sep. 24, 2010
ROHDE & SCHWARZ Test Receiver	ESCS 30	100027	May 05, 2009	May 04, 2010
SCHWARZBECK Broadband Antenna	VULB-9168	263	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D123	Sep. 21, 2009	Sep. 20, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2010	Jan. 21, 2011
RF Switches	EM-H-01-1	1009	Aug. 10, 2009	Aug. 09, 2010
RF Cable	8DFB	STACAB-30M-1GHz-091	Feb. 19, 2009	Feb. 18, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	TT100	ADT01	NA	NA
CORCOM AC Filter	MRI2030	107/108	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 horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.

4.6.3 TEST PROCEDURES

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

b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.

c. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading and recorded the value.

d. The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission.

e. The signal generator level has to be adjusted to have the same emission nature.

f. The radiated power can be calculated via the factor and antenna gain.

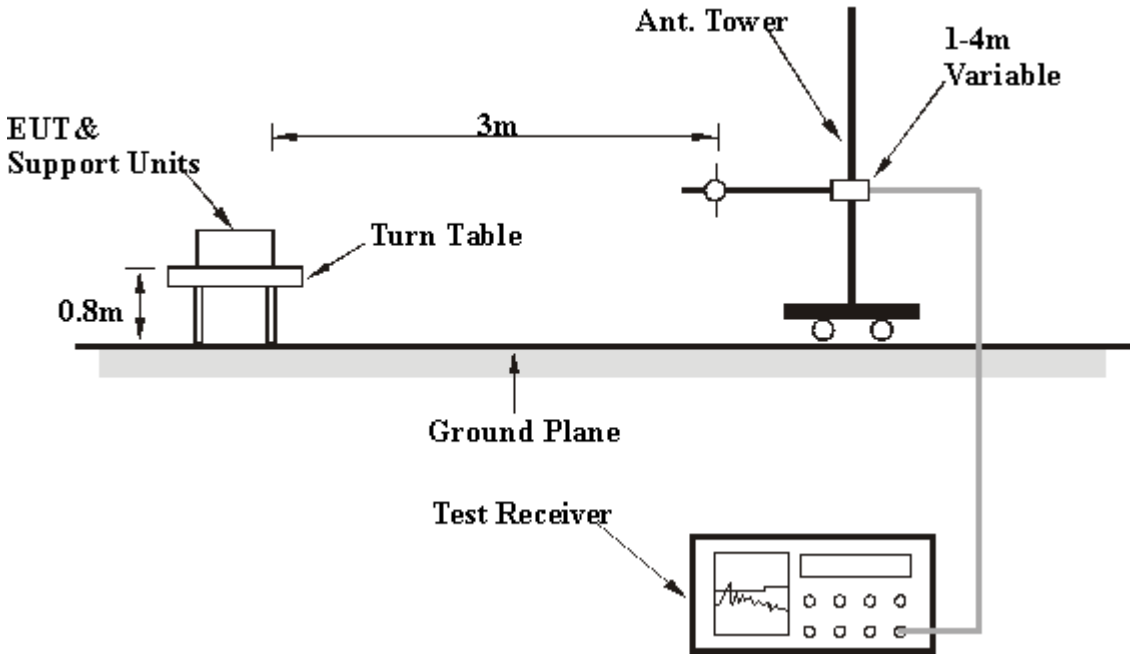
g. Repeat step a ~ f for horizontal polarization.

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

Same as the 4.1.5

4.6.7 TEST RESULTS

FOR PCS BAND:

MODE	TX channel 810	DETECTOR FUNCTION	Quasi-Peak
FREQUENCY RANGE	Below 1000 MHz	INPUT POWER (SYSTEM)	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH, 1024 hPa	TESTED BY	Wen Yu

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	212.5	29.6	-13	-65.85	4.18	-61.67
2	426.66	35.7	-13	-62.36	3.05	-59.31
3	500.03	34.8	-13	-60.72	2.89	-57.83
4	639.99	33.9	-13	-61.02	1.75	-59.27
5	853.32	39.7	-13	-55.22	1.00	-54.23
6	959.99	40.8	-13	-57.03	0.39	-56.64

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	213.33	32.7	-13	-62.75	4.17	-58.58
2	320	33.9	-13	-62.72	3.67	-59.05
3	375	30.5	-13	-67.35	3.46	-63.89
4	426.66	34.7	-13	-63.36	3.05	-60.31
5	500.03	29.6	-13	-65.92	2.89	-63.03
6	853.32	36.7	-13	-58.22	1.00	-57.23
7	959.99	37.5	-13	-60.33	0.39	-59.94

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

FOR WCDMA BAND:

MODE	TX channel 9262	DETECTOR FUNCTION	Quasi-Peak
FREQUENCY RANGE	Below 1000 MHz	INPUT POWER (SYSTEM)	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	22deg. C, 69%RH, 1024 hPa	TESTED BY	Wen Yu

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	212.5	29.7	-13	-65.75	4.18	-61.57
2	426.66	35.6	-13	-62.46	3.05	-59.41
3	500.03	34.2	-13	-61.32	2.89	-58.43
4	639.99	33.8	-13	-61.12	1.75	-59.37
5	853.32	39.4	-13	-55.52	1.00	-54.53
6	959.99	40.9	-13	-56.93	0.39	-56.54

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	213.33	32.5	-13	-62.95	4.17	-58.78
2	320	33.7	-13	-62.92	3.67	-59.25
3	375	30.4	-13	-67.45	3.46	-63.99
4	426.66	34.9	-13	-63.16	3.05	-60.11
5	500.03	29.3	-13	-66.22	2.89	-63.33
6	853.32	36.6	-13	-58.32	1.00	-57.33
7	959.99	37.8	-13	-60.03	0.39	-59.64

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

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

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	170100022	Nov. 18, 2009	Nov. 17, 2010
ADVANTEST Spectrum Analyzer	U3772	160100280	Sep. 21, 2009	Sep. 20, 2010
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2009	Sep. 24, 2010
ROHDE & SCHWARZ Test Receiver	ESCS 30	100027	May 05, 2009	May 04, 2010
SCHWARZBECK Broadband Antenna	VULB-9168	263	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D123	Sep. 21, 2009	Sep. 20, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2010	Jan. 21, 2011
RF Switches	EM-H-01-1	1009	Aug. 10, 2009	Aug. 09, 2010
RF Cable	8DFB	STACAB-30M-1GHz-091	Feb. 19, 2009	Feb. 18, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	TT100	ADT01	NA	NA
CORCOM AC Filter	MRI2030	107/108	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 horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.

4.7.3 TEST PROCEDURES

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

b. The EUT was set 3 meters away from the receiving antenna, which was mounted on antenna tower and its position at 0.8 m above the ground.

c. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading and recorded the value.

d. The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission.

e. The signal generator level has to be adjusted to have the same emission nature.

f. The radiated power can be calculated via the factor and antenna gain.

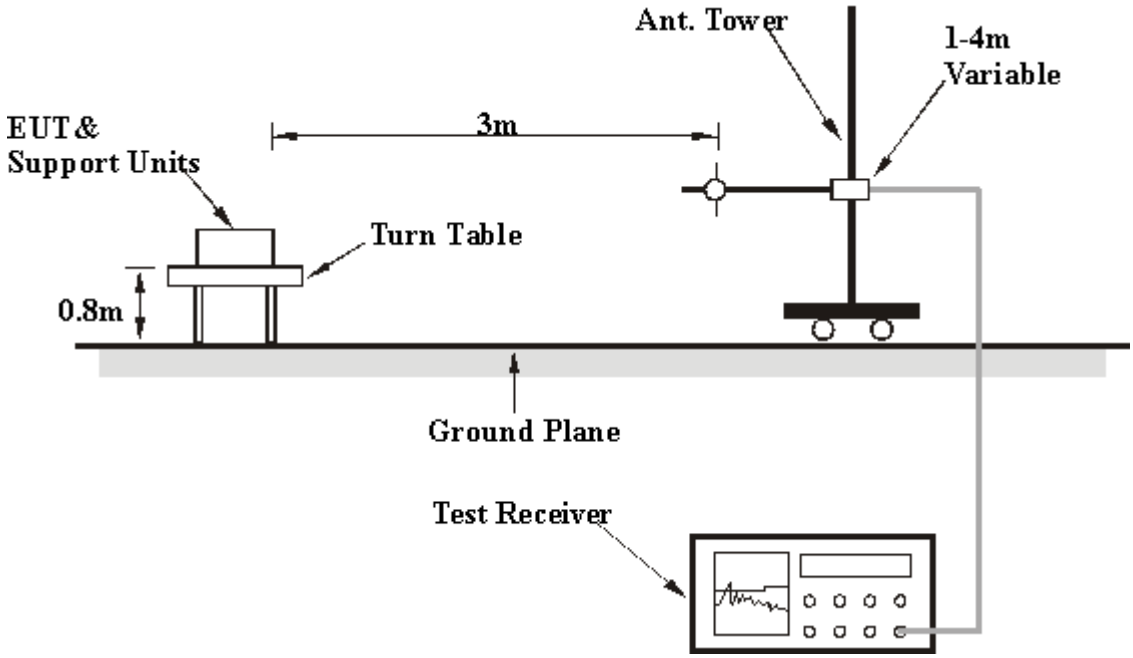
g. Repeat step a ~ f for horizontal polarization.

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

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

Same as the 4.1.5

4.7.7 TEST RESULTS

FOR PCS BAND:

MODE	TX channel 512	DETECTOR FUNCTION	Above 1000 MHz
FREQUENCY RANGE	Below 1000 MHz	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	TESTED BY	Wen Yu

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	53.9	-13	-50.03	7.72	-42.32
2	3805	61.4	-13	-42.92	7.65	-35.27
3	5550.6	52	-13	-52.89	7.08	-45.81
4	5707.5	62.1	-13	-42.53	6.97	-35.56
5	7400.8	57	-13	-45.50	4.63	-40.87
6	7610	61.2	-13	-41.42	4.45	-36.97
7	9513.4	63.4	-13	-38.22	4.19	-34.03
8	11101.2	65.3	-13	-36.23	3.23	-33.00
9	**11415**	**65.9**	**-13**	**-35.57**	**3.67**	**-31.90**

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	51.7	-13	-52.23	7.72	-44.52
2	3805	60.6	-13	-43.72	7.65	-36.07
3	5550.6	51.9	-13	-52.99	7.08	-45.91
4	5707.5	64.1	-13	-40.53	6.97	-33.56
5	7400.8	56.8	-13	-45.70	4.63	-41.07
6	7610	65	-13	-37.62	4.45	-33.17
7	9513.4	64.1	-13	-37.52	4.19	-33.33
8	11101.2	63.4	-13	-38.13	3.23	-34.90
9	11415	65.5	-13	-35.97	3.67	-32.30

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

MODE	TX channel 661	DETECTOR FUNCTION	Above 1000 MHz
FREQUENCY RANGE	Below 1000 MHz	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	TESTED BY	Wen Yu

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	52.1	-13	-52.05	7.68	-44.37
2	5640	51.8	-13	-52.94	7.02	-45.92
3	7520	57.3	-13	-45.32	4.53	-40.79
4	11280	64.3	-13	-37.19	3.48	-33.71

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	51.5	-13	-52.65	7.68	-44.97
2	5640	52	-13	-52.74	7.02	-45.72
3	7520	57.8	-13	-44.82	4.53	-40.29
4	11280	62.5	-13	-38.99	3.48	-35.51

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

MODE	TX channel 810	DETECTOR FUNCTION	Above 1000 MHz
FREQUENCY RANGE	Below 1000 MHz	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	TESTED BY	Wen Yu

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	46.4	-13	-57.97	7.64	-50.33
2	5729.4	44.7	-13	-59.89	6.96	-52.93
3	7639.2	47.1	-13	-55.52	4.43	-51.09
4	11458	62.1	-13	-39.36	3.73	-35.63

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	42.5	-13	-61.87	7.64	-54.23
2	5729.4	45.8	-13	-58.79	6.96	-51.83
3	7639.2	47.5	-13	-55.12	4.43	-50.69
4	11458	59.6	-13	-41.86	3.73	-38.13

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

FOR WCDMA BAND:

MODE	TX channel 9262	DETECTOR FUNCTION	Above 1000 MHz
FREQUENCY RANGE	Below 1000 MHz	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	TESTED BY	Wen Yu

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	52.8	-13	-51.15	7.71	-43.44
2	3800	47.63	-13	-56.67	7.65	-49.02
3	5700.267	60	-13	-44.64	6.98	-37.66
4	5557.2	42.4	-13	-62.48	7.08	-55.40
5	7409.6	47.2	-13	-55.31	4.62	-50.69
6	7600	59.6	-13	-43.02	4.46	-38.56
7	9500	60	-13	-41.62	4.19	-37.43
8	11400	63.3	-13	-38.17	3.65	-34.52
9	13300	59.7	-13	-40.69	3.69	-37.01

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	48.5	-13	-55.45	7.71	-47.74
2	3800	60.3	-13	-44.00	7.65	-36.35
3	5700.267	63	-13	-41.64	6.98	-34.66
4	5557.2	42.3	-13	-62.58	7.08	-55.50
5	7409.6	47	-13	-55.51	4.62	-50.89
6	7600	63.4	-13	-39.22	4.46	-34.76
7	9500	61.5	-13	-40.12	4.19	-35.93
8	11400	62.3	-13	-39.17	3.65	-35.52
9	13300	60	-13	-40.39	3.69	-36.71

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

MODE	TX channel 9400	DETECTOR FUNCTION	Above 1000 MHz
FREQUENCY RANGE	Below 1000 MHz	INPUT POWER	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	TESTED BY	Wen Yu

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	47.4	-13	-56.75	7.68	-49.07
2	5640	42.4	-13	-62.34	7.02	-55.32
3	7520	47.1	-13	-55.52	4.53	-50.99

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	3760	42.8	-13	-61.35	7.68	-53.67
2	5640	42.3	-13	-62.44	7.02	-55.42
3	7520	46.9	-13	-55.72	4.53	-51.19

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

MODE	TX channel 9538	DETECTOR FUNCTION	Above 1000 MHz
FREQUENCY RANGE	Below 1000 MHz	INPUT POWER (SYSTEM)	120Vac, 60 Hz
ENVIRONMENTAL CONDITIONS	18deg. C, 63%RH, 1024 hPa	TESTED BY	Wen Yu

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	46.9	-13	-57.45	7.64	-49.81
2	5722.8	42.7	-13	-61.91	6.96	-54.94
3	7630.4	46.9	-13	-55.72	4.43	-51.29

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	43.9	-13	-60.45	7.64	-52.81
2	5722.8	42.5	-13	-62.11	6.96	-55.14
3	7630.4	46.7	-13	-55.92	4.43	-51.49

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.

---END---