



# FCC TEST REPORT (PART 24)

**REPORT NO.:** RF111215C07-1

**MODEL NO.:** C525

**FCC ID:** UZI-C525

**RECEIVED:** Dec. 15, 2011

**TESTED:** Dec. 17, 2011 ~ Jan. 04, 2012

**ISSUED:** Jan. 11, 2012

**APPLICANT:** BandRich Inc.

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

**LAB ADDRESS:** No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,  
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**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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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
Original release	N/A	Jan. 11, 2012



# 1 CERTIFICATION

**PRODUCT:** LTE/EVDO Rev. A USB Modem  
**MODEL NO.:** C525  
**BRAND:** BandLuxe  
**APPLICANT:** BandRich Inc.  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**TESTED:** Dec. 17, 2011 ~ Jan. 04, 2012  
**TEST STANDARDS:** **FCC Part 24, Subpart E**  
ANSI C63.4-2003

The above equipment (model: C525) 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 :** Pettie Chen , **DATE :** Jan. 11, 2012  
Pettie Chen / Specialist

**APPROVED BY :** Gary Chang , **DATE :** Jan. 11, 2012  
Gary Chang / Technical 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
2.1046 24.232	Maximum Peak Output Power Limit: max. 2 watts e.i.r.p peak power	PASS	Meet the requirement of limit. Max. e.i.r.p is 25.7dBm at 1851.25 & 1880.00MHz.
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 -22.2dB at 7635.0MHz.

### 2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 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.



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### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	LTE/EVDO Rev. A USB Modem
<b>MODEL NO.</b>	C525
<b>FCC ID</b>	UZI-C525
<b>POWER SUPPLY</b>	5.0Vdc (host equipment)
<b>MODULATION TYPE</b>	QPSK, OQPSK, HPSK
<b>FREQUENCY RANGE</b>	1851.25MHz ~ 1908.75MHz
<b>MAX. EIRP POWER</b>	25.7dBm (0.3715Watts)
<b>ANTENNA TYPE</b>	Internal monopole antenna with -3dBi gain
<b>DATA CABLE</b>	0.5m non-shielded USB cable without core
<b>I/O PORTS</b>	Refer to user's manual
<b>ACCESSORY DEVICES</b>	Refer to Note as below

**NOTE:**

1. IMEI: 35185905\*\*\*\*\*.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 DESCRIPTION OF TEST MODES

#### FOR CDMA:

1151 channels are provided to this EUT in the CDMA BC1 band. Therefore, the low, middle and high channels are chosen for testing.

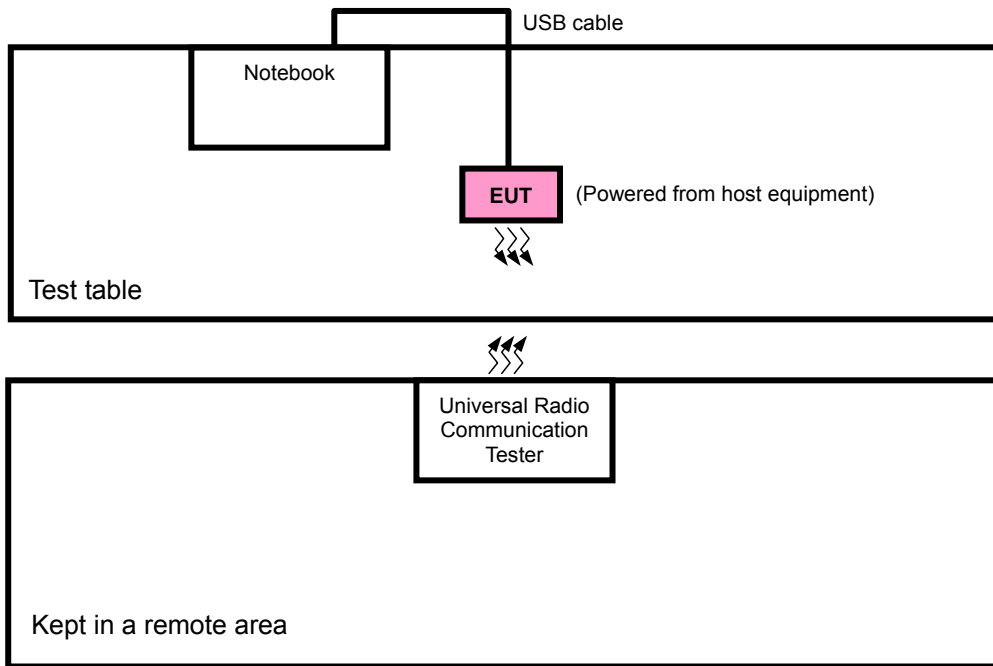
	CHANNEL	FREQUENCY	TX MODE
LOW	25	1851.25 MHz	1xEVDO Rev. A
MIDDLE	600	1880.00 MHz	1xEVDO Rev. A
HIGH	1175	1908.75 MHz	1xEVDO Rev. A

#### NOTE:

1. Below 1 GHz, the channel 25, 600 and 1175 were pre-tested in chamber. The channel 25 was the worst case and chosen for final test.
2. Above 1 GHz, the channel 25, 600 and 1175 were tested individually.
3. The channel space is 0.05MHz.
4. After pretest of output power and spurious emission under 1xEVDO Rev. A, 1xEVDO Rev. 0, CDMA mode, find the worst mode is 1xEVDO Rev. A. Therefore, select 1xEVDO Rev. A mode to do final test



### 3.2.1 CONFIGURATION OF SYSTEM UNDER TEST





### 3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

**FOR CDMA:**

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

**Where** OP: Output power  
 OB: Occupied bandwidth  
 CE: Conducted spurious emissions  
 RE≥1G: Radiated emission above 1GHz  
 FS: Frequency stability  
 BE: Band edge  
 RE<1G: Radiated emission below 1GHz

**NOTE:** Speed mode worst enable during the test

**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
25 to 1175	25, 600, 1175	CDMA, 1xEVDO Rev. A, 1xEVDO Rev. 0	Y

**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
25 to 1175	600	CDMA

**OCCUPIED BANDWIDTH MEASUREMENT:**

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
25 to 1175	25, 600, 1175	CDMA, 1xEVDO Rev. A, 1xEVDO Rev. 0

**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
25 to 1175	25, 1175	CDMA, 1xEVDO Rev. A, 1xEVDO Rev. 0

**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
25 to 1175	25, 600, 1175	1xEVDO Rev. A

**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
25 to 1175	25	1xEVDO Rev. A	Y

**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
25 to 1175	25, 600, 1175	1xEVDO Rev. A	Y

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
OP	25deg. C, 65%RH	120Vac, 60Hz	Mark Liao
FS	25deg. C, 65%RH	120Vac, 60Hz	Mark Liao
OB	25deg. C, 65%RH	120Vac, 60Hz	Mark Liao
EM	25deg. C, 65%RH	120Vac, 60Hz	Mark Liao
BE	25deg. C, 65%RH	120Vac, 60Hz	Mark Liao
CE	25deg. C, 65%RH	120Vac, 60Hz	Mark Liao
RE < 1G	25deg. C, 65%RH	120Vac, 60Hz	Kay Wu
RE ≥ 1G	25deg. C, 65%RH	120Vac, 60Hz	Kay Wu

**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.	FCC ID
1	NOTEBOOK	DELL	E5410	1HC2XM1	FCC DoC Approved
2	UNIVERSAL RADIO COMMUNICATION TESTER	R&S	CMU200	104484	NA

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

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

**NOTE 2:** Item 2 acted as a communication partner 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	Aug. 02, 2011	Aug. 01, 2012
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Jul. 21, 2011	Jul. 20, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Apr. 13, 2011	Apr. 12, 2012
HORN Antenna SCHWARZBECK	9120D	209	Aug. 25, 2011	Aug. 24, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 20, 2011	Jul. 19, 2012
Preamplifier Agilent	8447D	2944A10633	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8449B	3008A01964	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 30, 2011	Aug. 29, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 30, 2011	Aug. 29, 2012
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table ADT.	TT100.	TT93021703	NA	NA
Turn Table Controller ADT.	SC100.	SC93021703	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 3.
  3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 988962.
  5. The IC Site Registration No. is IC 7450F-3.

### 4.1.3 TEST PROCEDURES

#### **EIRP MEASUREMENT:**

- a. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 25, 600 and 1175 (CDMA) (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 c. Record the power level of S.G
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn.}$

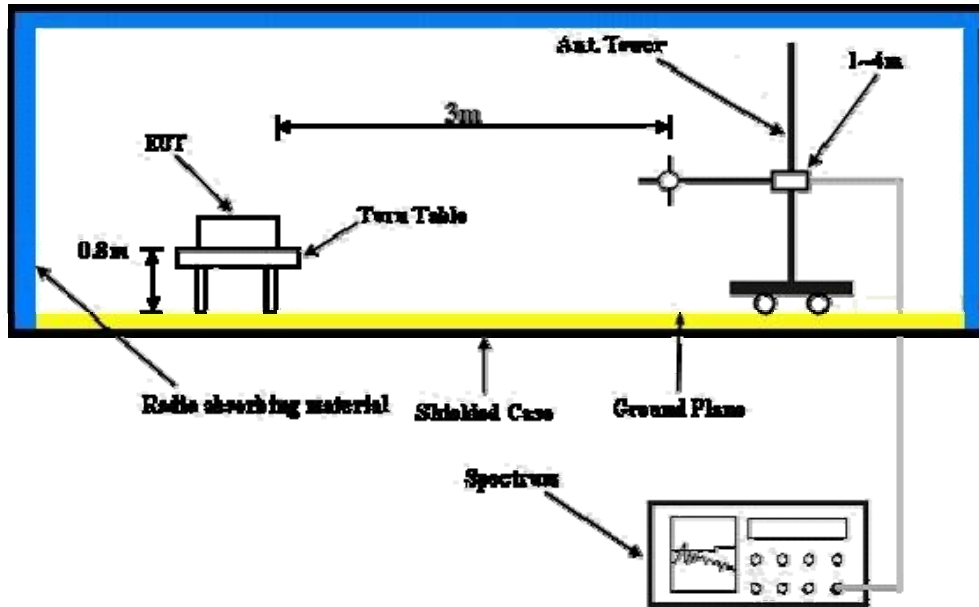
#### **CONDUCTED POWER MEASUREMENT:**

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



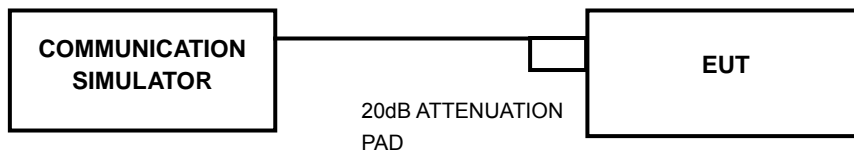
#### 4.1.4 TEST SETUP

##### 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 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.



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#### 4.1.6 TEST RESULTS

##### CONDUCTED OUTPUT POWER (dBm)

Band	CDMA		
	25	600	1175
Channel	25	600	1175
Frequency (MHz)	1851.25	1880	1908.75
RC1+SO55	24.20	24.27	24.03
RC3+SO55	24.15	24.30	23.95
RC3+SO32(+F-SCH)	24.24	24.27	23.93
RC3+SO32(+SCH)	24.17	24.21	23.96
1x EV-DO Rev. 0	24.33	24.30	24.20
1x EV-DO Rev. A	24.05	24.27	24.21



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**FOR CDMA:**

**FOR CDMA MODE**

MODE		TX channel 25					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1851.25	-12.7	23.4	1.1	24.5	33.0	-8.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1851.25	-12.2	22.7	1.1	23.8	33.0	-9.2

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

MODE		TX channel 600					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1880.00	-12.3	23.2	1.1	24.3	33.0	-8.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1880.00	-11.9	22.5	1.1	23.6	33.0	-9.4

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

MODE		TX channel 1175					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1908.75	-11.1	24.3	1.1	25.4	33.0	-7.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1908.75	-11.9	23.4	1.1	24.5	33.0	-8.5

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



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**FOR 1xEVDO Rev. A MODE**

MODE		TX channel 25					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1851.25	-11.5	24.6	1.1	25.7	33.0	-7.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1851.25	-11.2	23.7	1.1	24.8	33.0	-8.2

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

MODE		TX channel 600					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1880.00	-10.9	24.6	1.1	25.7	33.0	-7.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1880.00	-10.3	24.1	1.1	25.2	33.0	-7.8

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

MODE		TX channel 1175					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1908.75	-11.3	24.1	1.1	25.2	33.0	-7.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1908.75	-11.9	23.4	1.1	24.5	33.0	-8.5

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



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**FOR 1xEVDO Rev. 0 MODE**

MODE		TX channel 25					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1851.25	-12.1	24	1.1	25.1	33.0	-7.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1851.25	-11.7	23.2	1.1	24.3	33.0	-8.7

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

MODE		TX channel 600					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1880.00	-11.6	23.9	1.1	25.0	33.0	-8.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1880.00	-10.9	23.5	1.1	24.6	33.0	-8.4

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

MODE		TX channel 1175					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1908.75	-11.4	24	1.1	25.1	33.0	-7.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1908.75	-11.8	23.5	1.1	24.6	33.0	-8.4

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



## 4.2 FREQUENCY STABILITY MEASUREMENT

### 4.2.1 LIMITS OF FREQUENCY STABILITY 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)  $-30^{\circ}\text{C} \sim 55^{\circ}\text{C}$ .

### 4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent	E4446A	MY43360128	Feb. 22, 2011	Feb. 21, 2012
Hewlett Packard RF cable	8120-6192	01428251	NA	NA
RF cable	SUCOFLEX 104	257029	Sep. 11, 2011	Sep. 10, 2012
WIT Standard Temperature & Humidity Chamber	MHU-225AU	920842	Jun. 15, 2011	Jun. 14, 2012

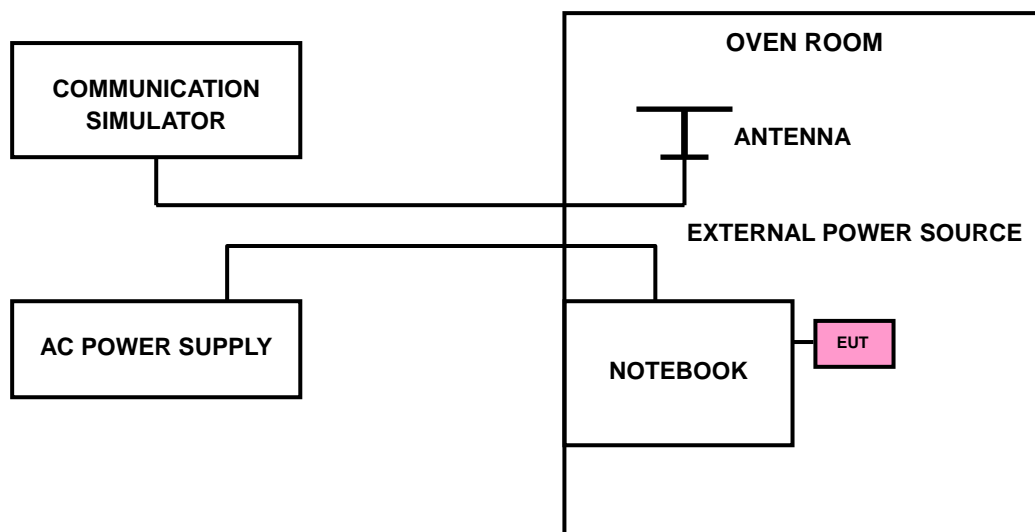
**NOTE:** The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

#### 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 CDMA link mode. This is accomplished with the use of the R&S CMU200 simulator station. The oven room could control the temperatures and humidity. The CDMA link channel is the 600.
- 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 93.5Volts to 126.5Volts. Each step shall be record the frequency error rate.
- d. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  during the measurement testing.
- e. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

**NOTE:** The frequency error was recorded frequency error from the GSM simulator.

#### 4.2.4 TEST SETUP



#### 4.2.5 TEST RESULTS

##### FOR CDMA:

AFC FREQUENCY ERROR vs. VOLTAGE			
VOLTAGE (Volts)	FREQUENCY ERROR (Hz)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
126.5	-9	-0.005	2.5
93.5	-4	-0.002	2.5

**NOTE:** The applicant defined the normal working voltage of the host equipment is from 93.5Vac to 126.5Vac.

AFC FREQUENCY ERROR vs. TEMP.			
TEMP. (°C)	FREQUENCY ERROR (Hz)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
55	-8	-0.004	2.5
50	-7	-0.004	2.5
40	-5	-0.003	2.5
30	-4	-0.002	2.5
20	-2	-0.001	2.5
10	-1	-0.001	2.5
0	-2	-0.001	2.5
-10	-3	-0.002	2.5
-20	-4	-0.002	2.5
-30	-6	-0.003	2.5



### 4.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 4.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

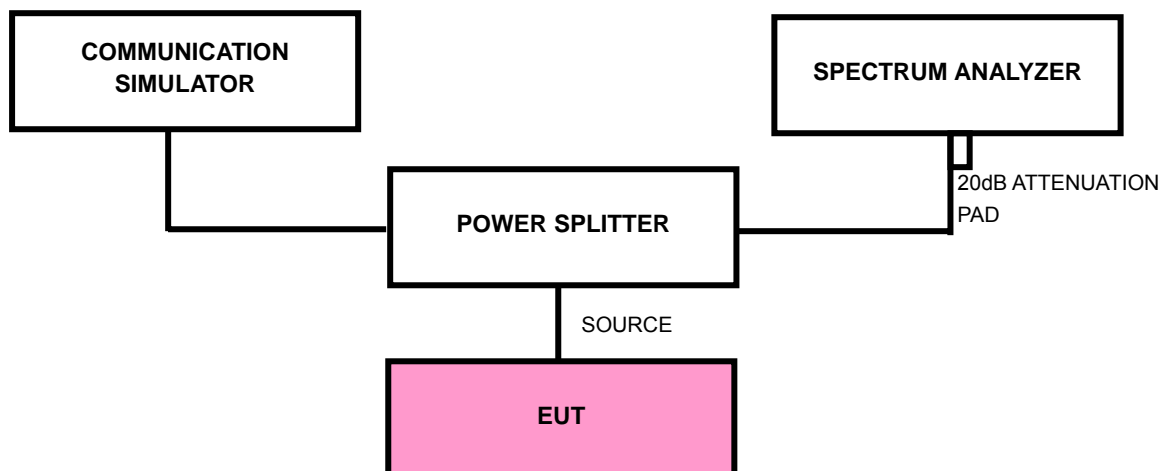
The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

#### 4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100039	Jan. 11, 2011	Jan. 10, 2012
Mini-Circuits Power Splitter	ZN2PD-9G	NA	May 25, 2011	May 24, 2012
RF cable	SUCOFLEX 104	274403/4	Aug. 20, 2011	Aug. 19, 2012
RF cable	SUCOFLEX 104	250729/4	Aug. 19, 2011	Aug. 18, 2012
RF cable	SUCOFLEX 104	214377/4	Aug. 19, 2011	Aug. 18, 2012
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 call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 25, 600 and 1175 (CDMA) (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 24.3 dB in the transmitted path track.
- c. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

#### 4.3.5 EUT OPERATING CONDITION

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

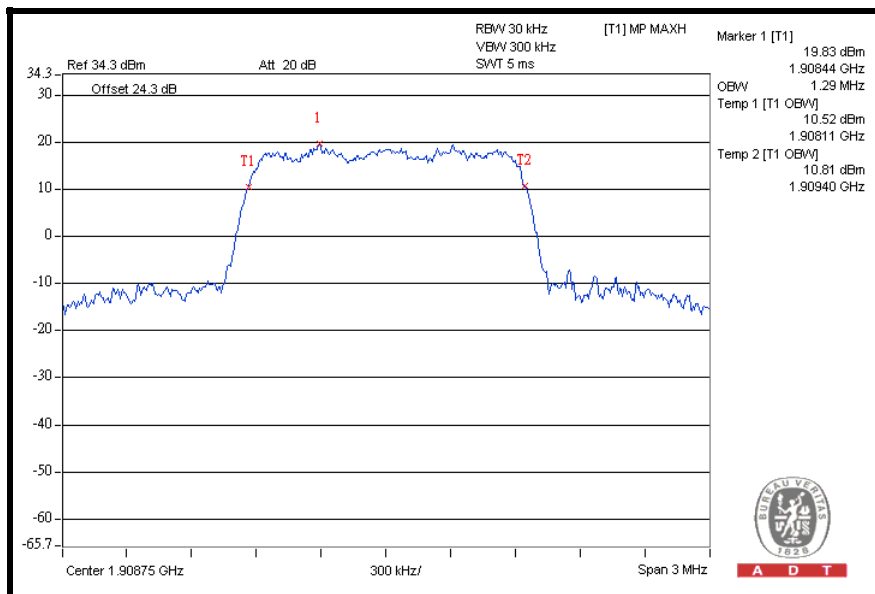
### 4.3.6 TEST RESULTS

**FOR CDMA:**

**FOR SO32:**

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)
25	1851.25	1.28
600	1880.00	1.28
1175	1908.75	1.29

#### CH 1175



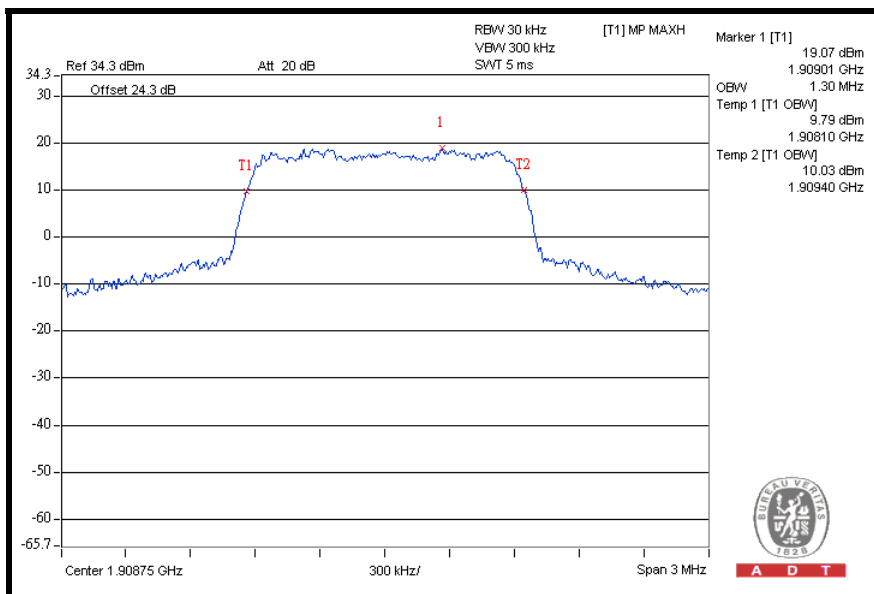


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FOR EV-DO Rev. A:

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)
25	1851.25	1.28
600	1880.00	1.28
1175	1908.75	1.30

CH 1175



A D T

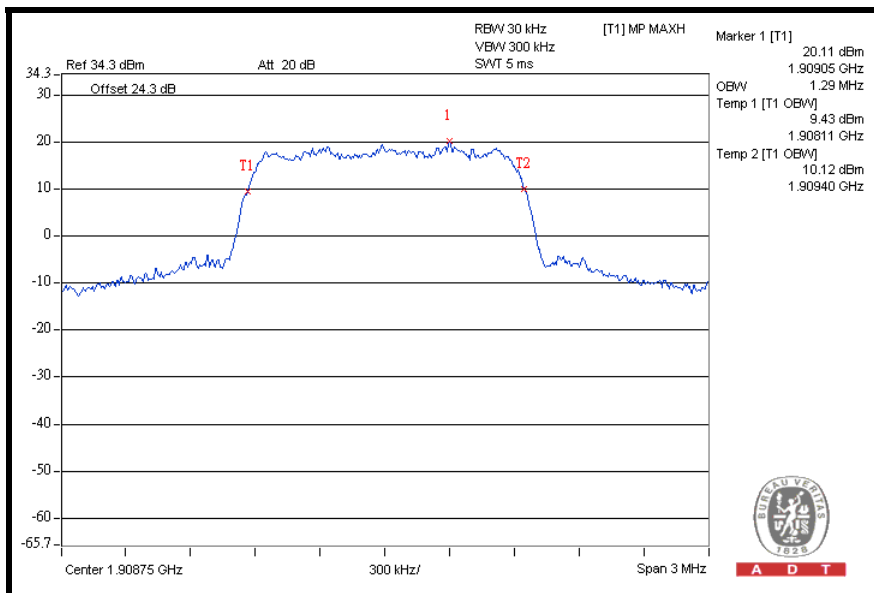


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FOR EV-DO Rev. 0:

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)
25	1851.25	1.28
600	1880.00	1.28
1175	1908.75	1.29

CH 1175



## 4.4 BAND EDGE MEASUREMENT

### 4.4.1 LIMITS OF BAND EDGE MEASUREMENT

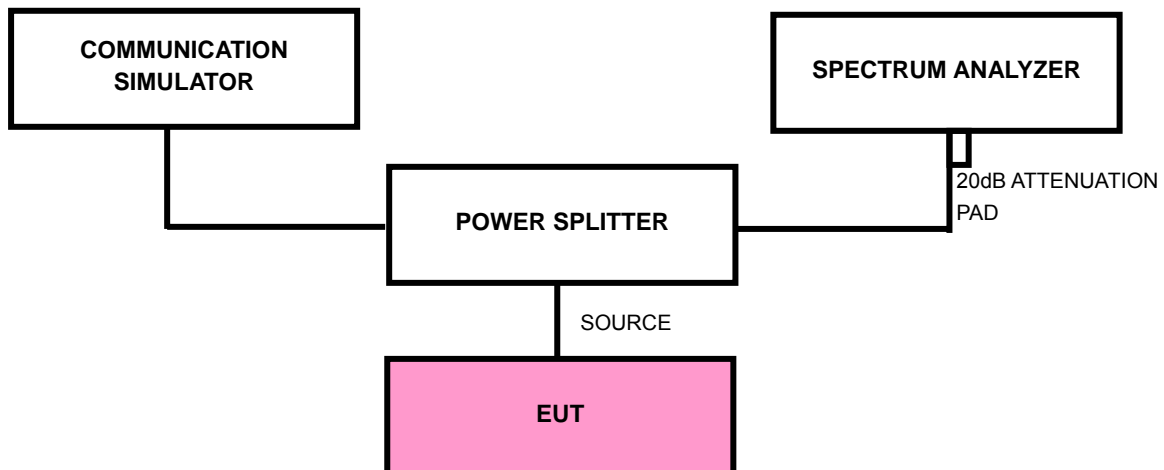
According to FCC 24.238(a) specified that power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution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

### 4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100039	Jan. 11, 2011	Jan. 10, 2012
Mini-Circuits Power Splitter	ZN2PD-9G	NA	May 25, 2011	May 24, 2012
RF cable	SUCOFLEX 104	274403/4	Aug. 20, 2011	Aug. 19, 2012
RF cable	SUCOFLEX 104	250729/4	Aug. 19, 2011	Aug. 18, 2012
RF cable	SUCOFLEX 104	214377/4	Aug. 19, 2011	Aug. 18, 2012
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

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

### 4.4.3 TEST SETUP



#### 4.4.4 TEST PROCEDURES

- a. The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 25 and 1175 (CDMA) (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.
- c. The center frequency of spectrum is the band edge frequency and span is 3 MHz. RB of the spectrum is 15kHz and VB of the spectrum is 15kHz (CDMA).
- d. Record the max trace plot into the test report.

#### 4.4.5 EUT OPERATING CONDITION

- a. The EUT makes a 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.



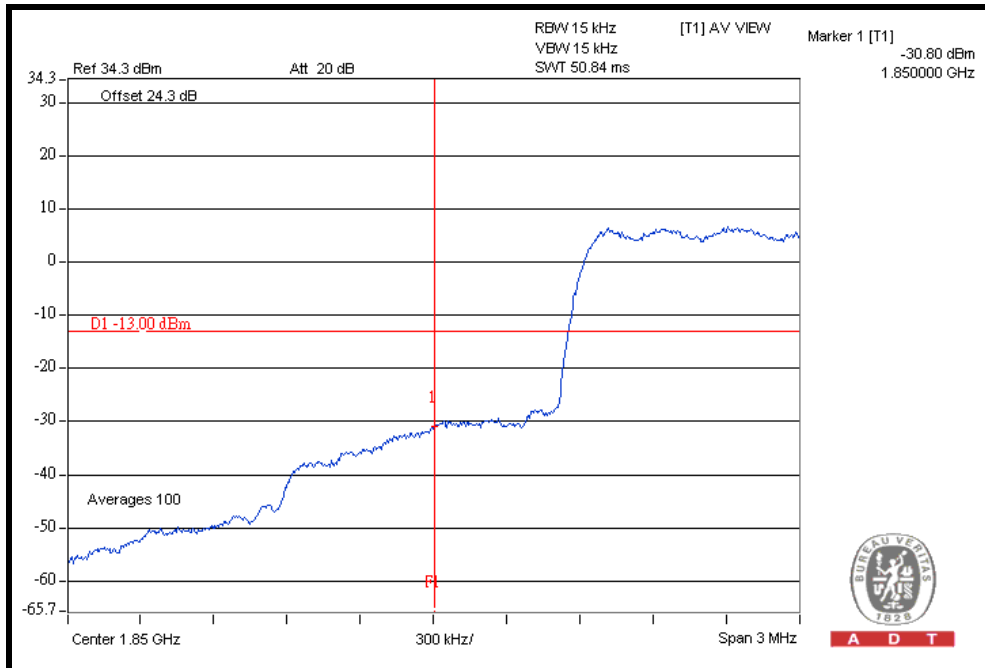
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#### 4.4.6 TEST RESULTS

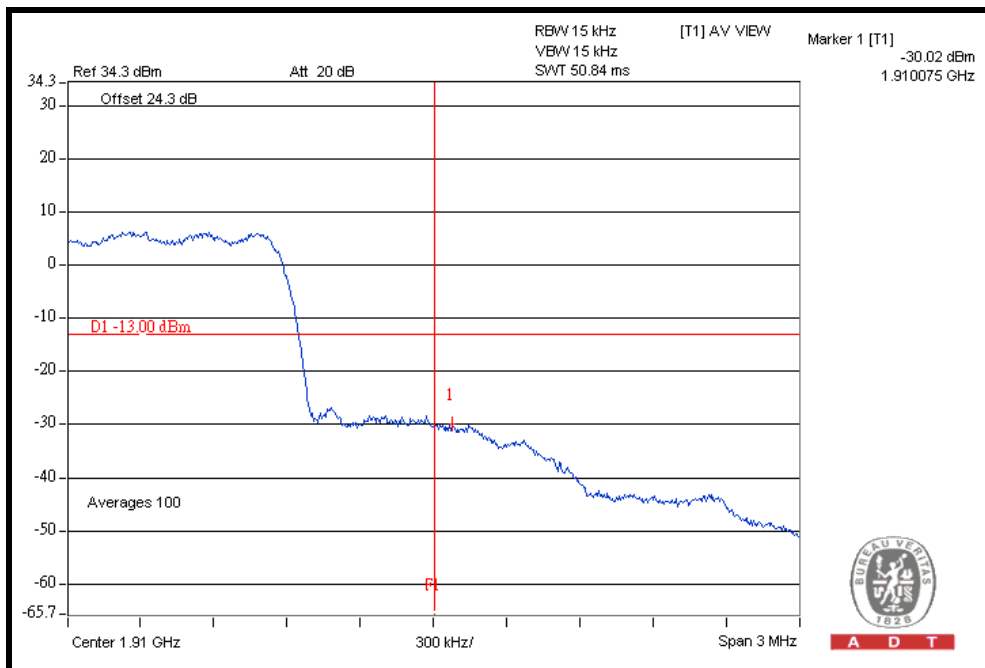
FOR CDMA:

FOR SO32:

LOWER BAND EDGE



HIGHER BAND EDGE

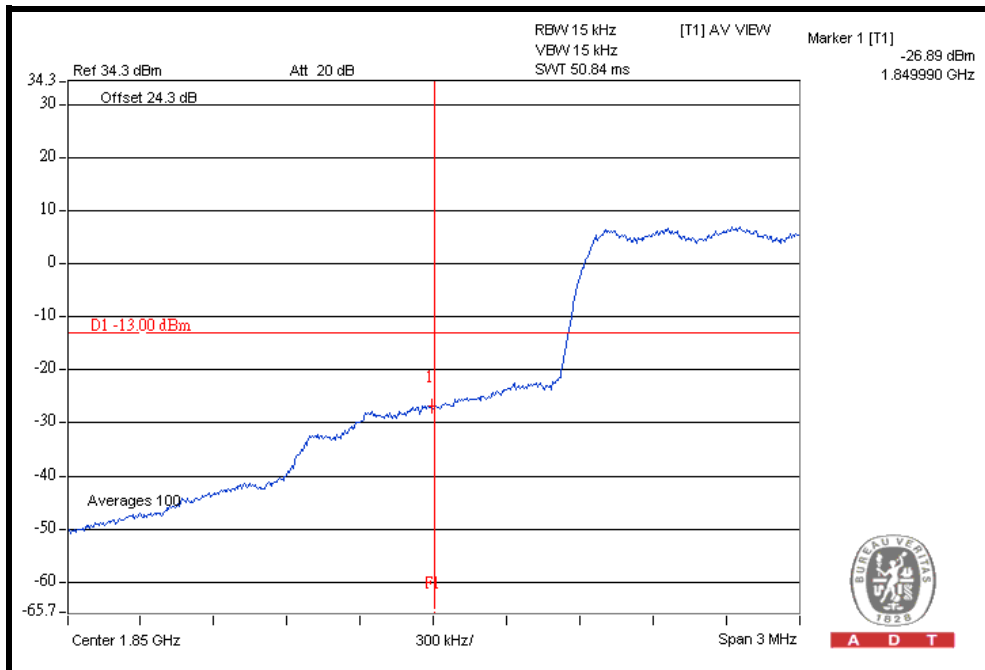






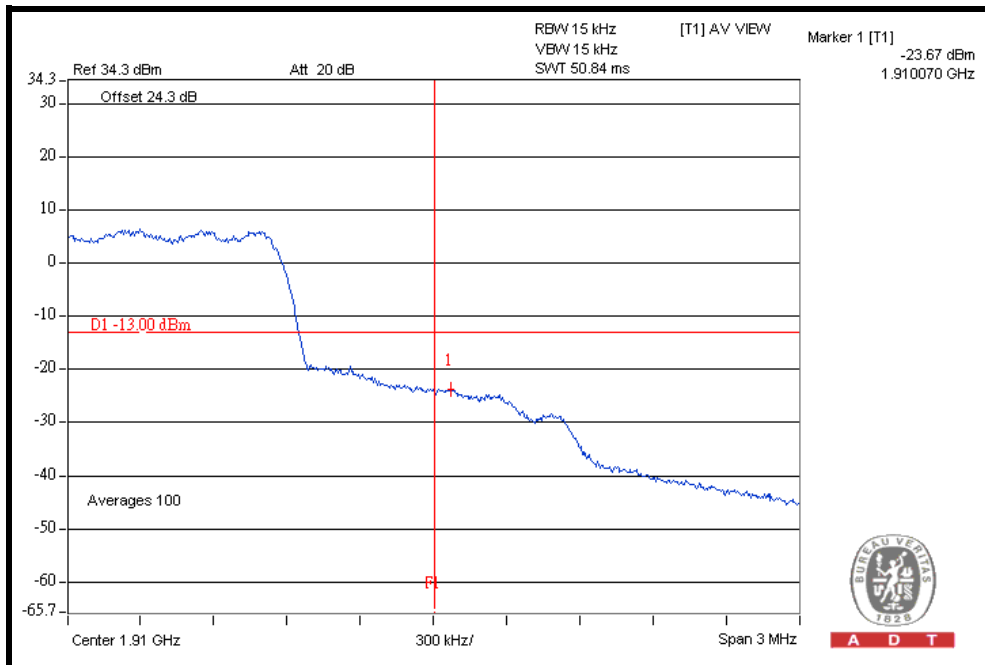
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### FOR EV-DO Rev. A: LOWER BAND EDGE



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### HIGHER BAND EDGE

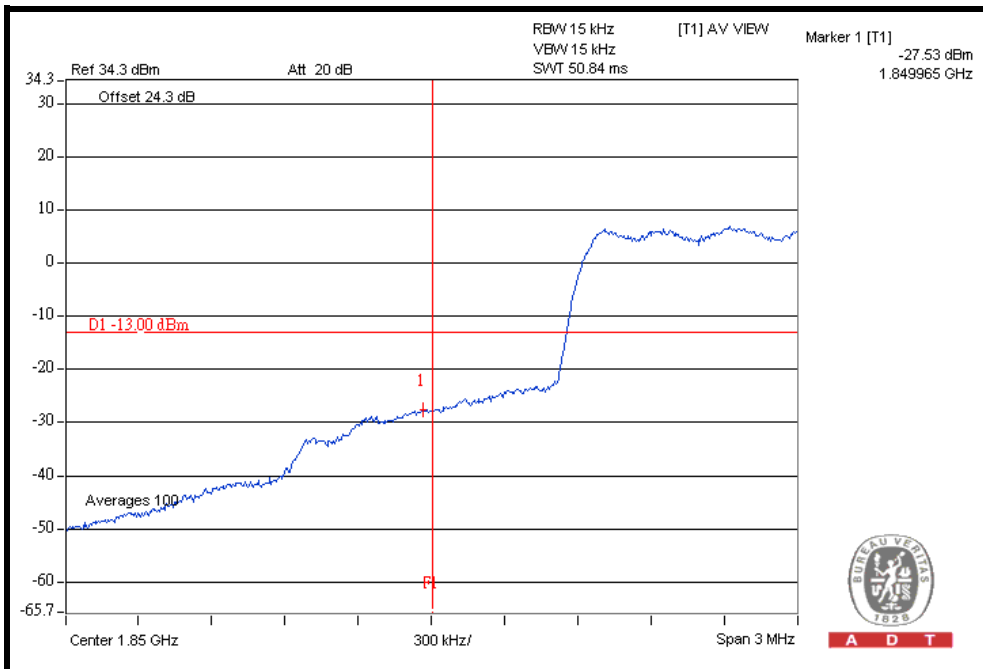


A D T



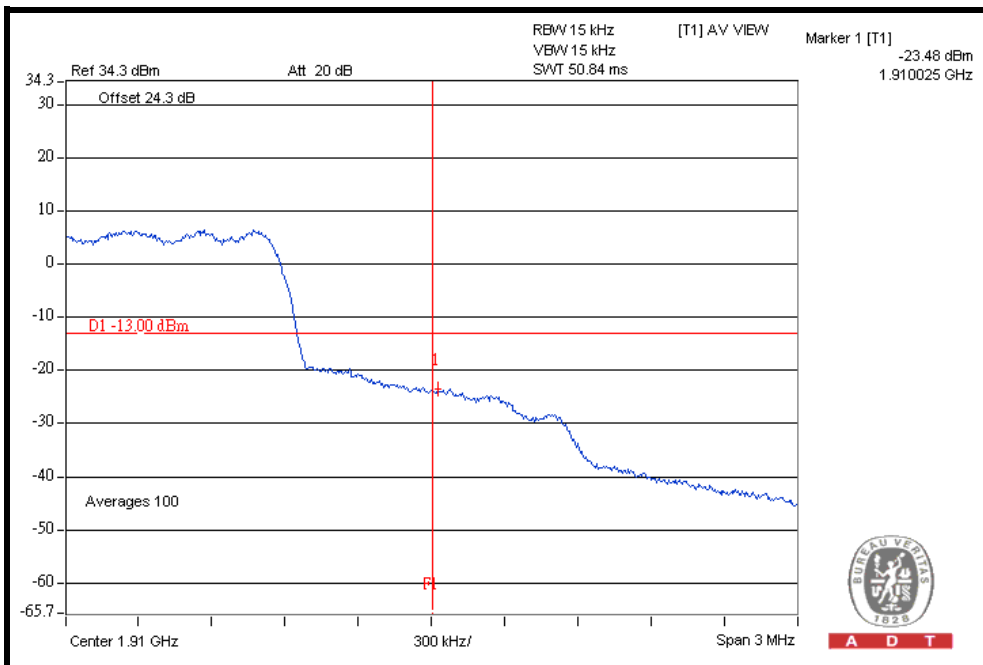
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### FOR EV-DO Rev. 0: LOWER BAND EDGE



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### HIGHER BAND EDGE



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## 4.5 CONDUCTED SPURIOUS EMISSIONS

### 4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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

### 4.5.2 TEST INSTRUMENTS

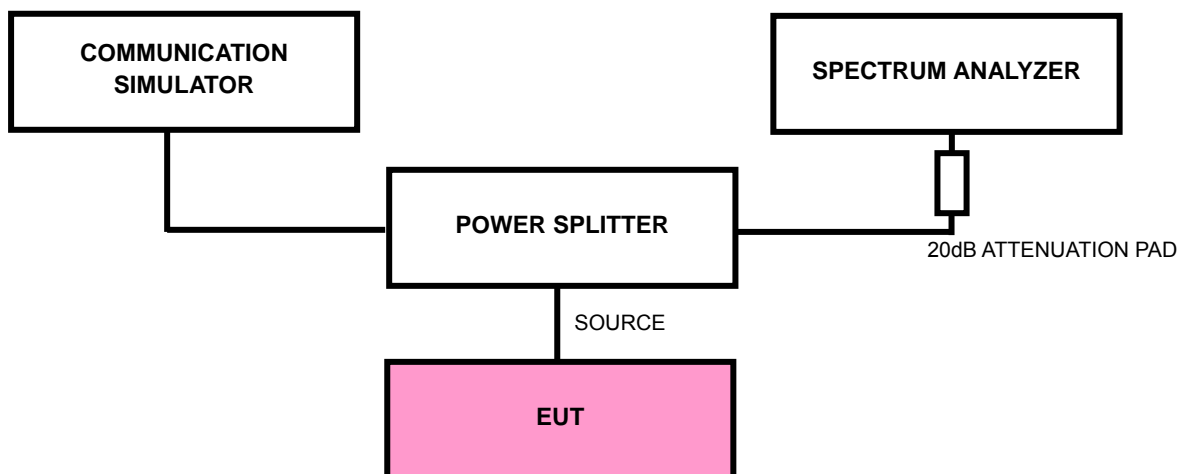
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
SPECTRUM ANALYZER R&S	FSP40	100039	Feb. 23, 2011	Feb. 22, 2012
Mini-Circuits Power Splitter	ZN2PD-9G	NA	May 25, 2011	May 24, 2012
RF cable	SUCOFLEX 104	274403/4	Aug. 20, 2011	Aug. 19, 2012
RF cable	SUCOFLEX 104	250729/4	Aug. 19, 2011	Aug. 18, 2012
RF cable	SUCOFLEX 104	214377/4	Aug. 19, 2011	Aug. 18, 2012
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA

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

### 4.5.3 TEST PROCEDURE

- a. The EUT makes a phone call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 25, 600 and 1175 (CDMA) (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.
- c. When the spectrum scanned from 9kHz to 20GHz, it shall be connected to spectrum analyzer with a 20dB attenuation pad. The spectrum set RB=1MHz, VB=3MHz.

### 4.5.4 TEST SETUP



### 4.5.5 EUT OPERATING CONDITIONS

- a. The EUT makes a 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.

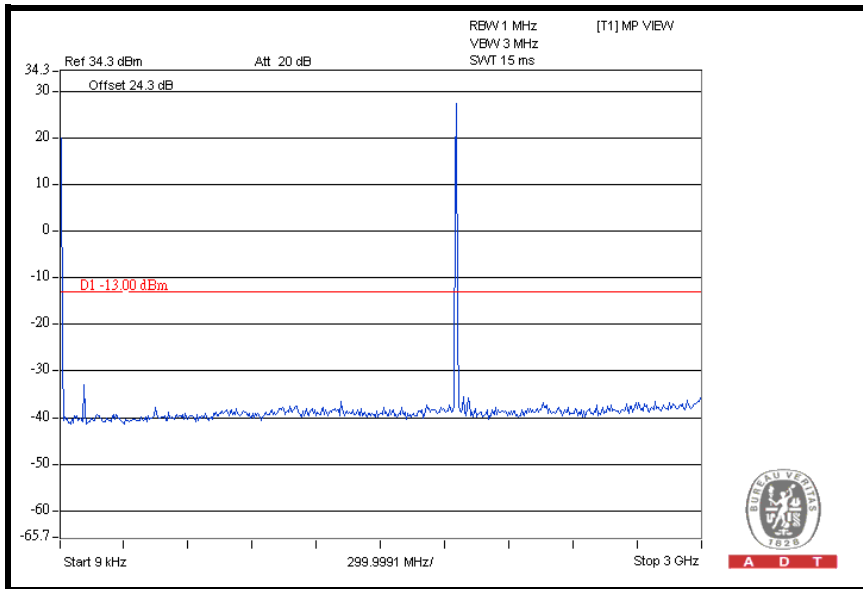


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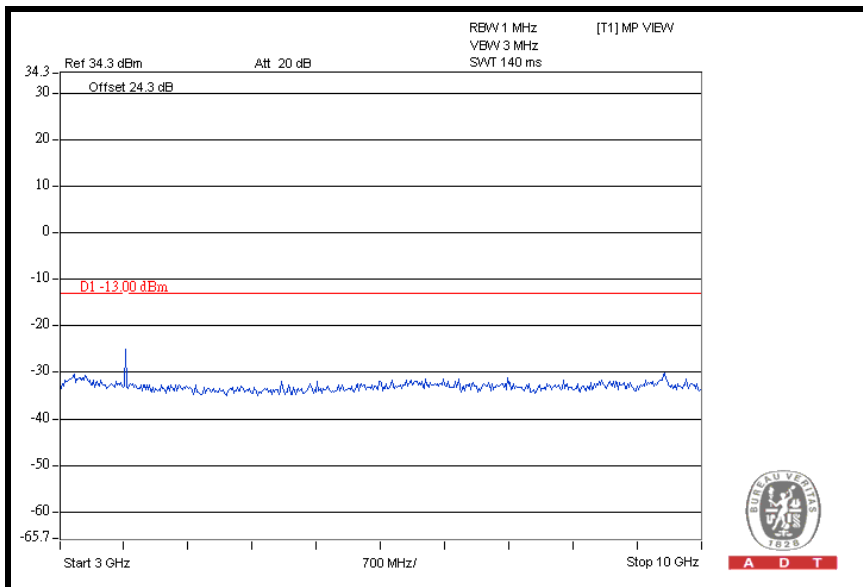
## 4.5.6 TEST RESULTS

### FOR 1xEVDO Rev. A:

#### CH 25: 9kHz ~ 3GHz



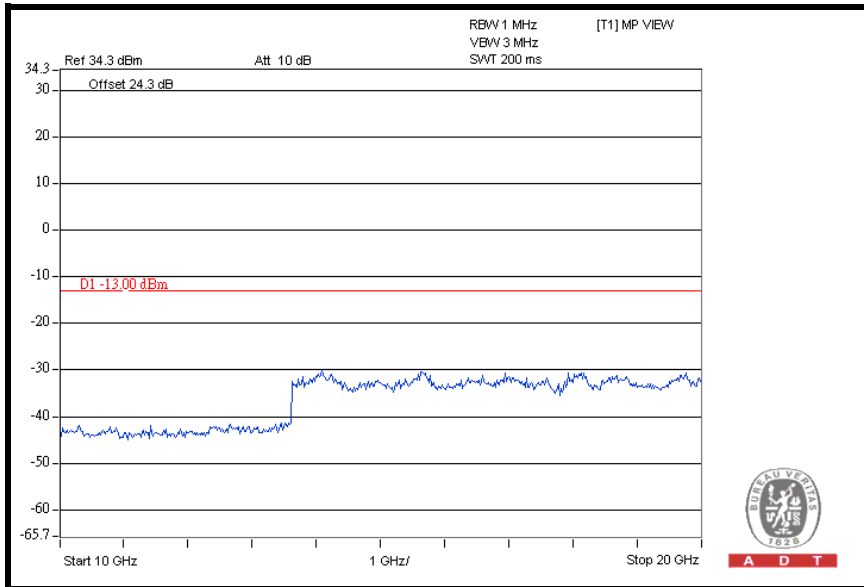
#### 3GHz ~ 10GHz



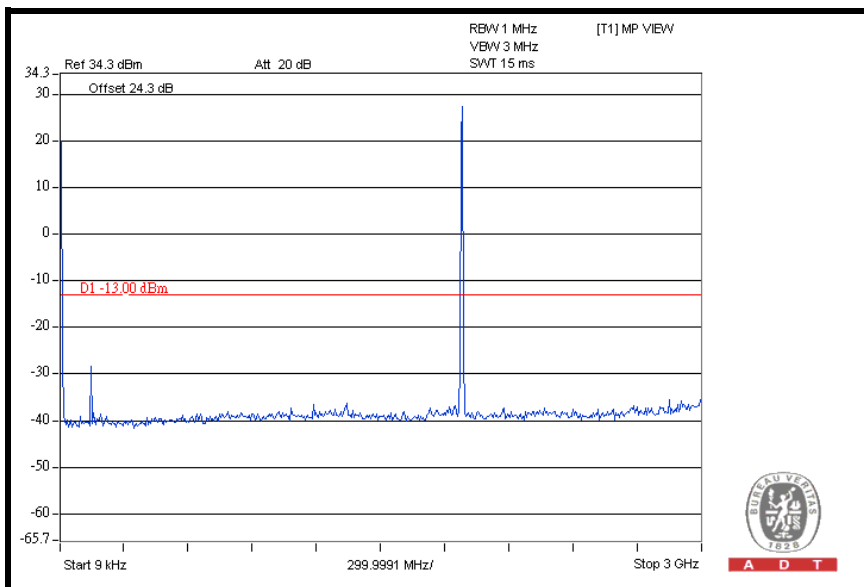


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### 10GHz ~ 20GHz



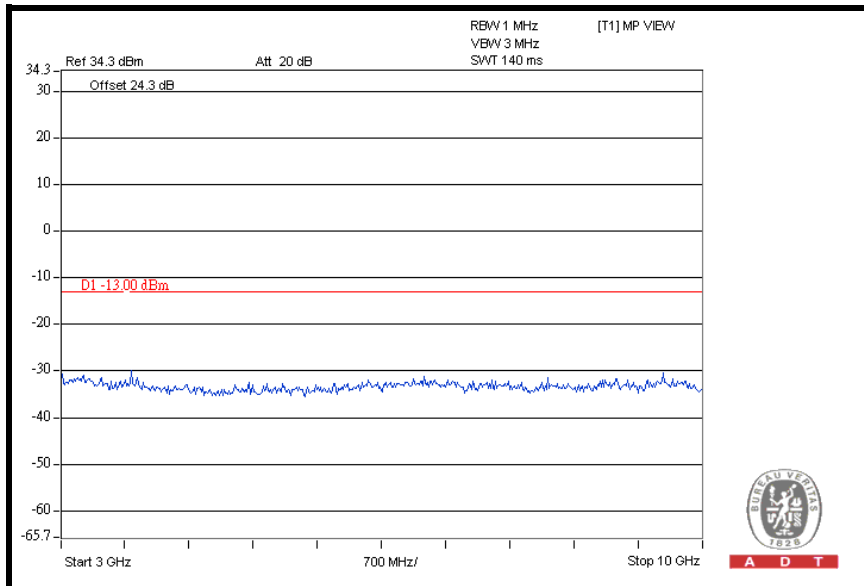
### CH 600: 9kHz ~ 3GHz



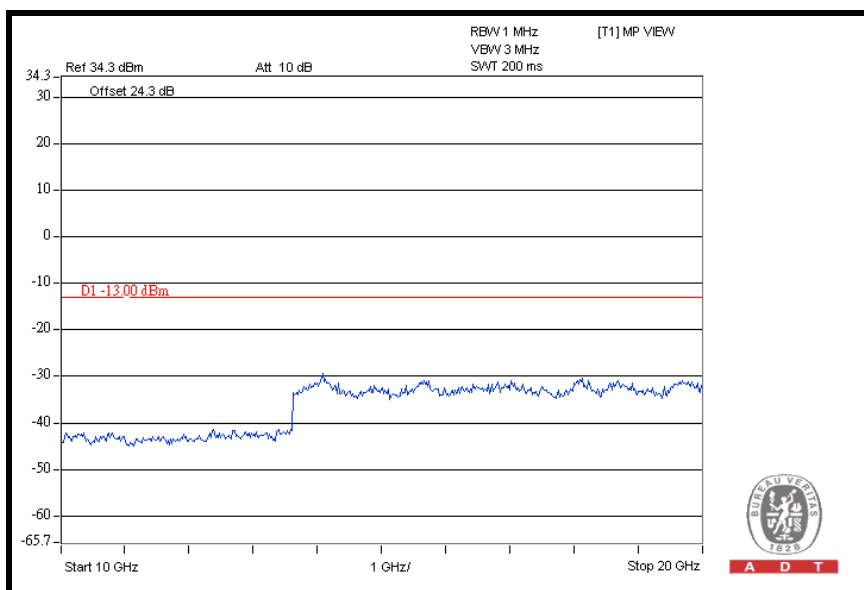


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### 3GHz ~ 10GHz



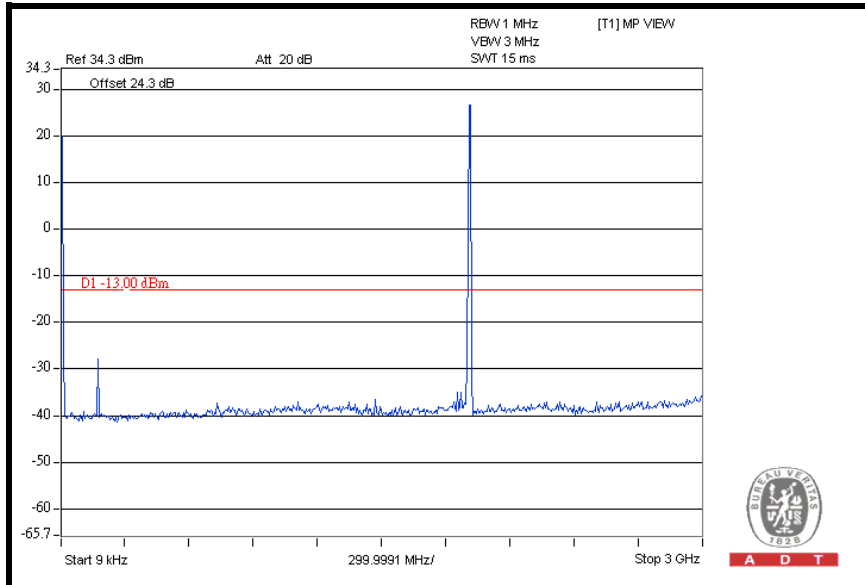
### 10GHz ~ 20GHz



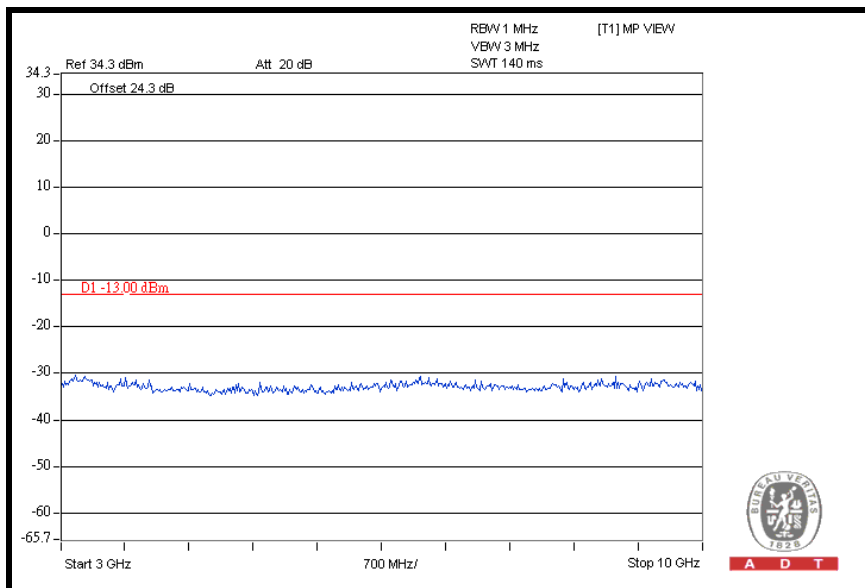


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### CH 1175: 9kHz ~ 3GHz



### 3GHz ~ 10GHz

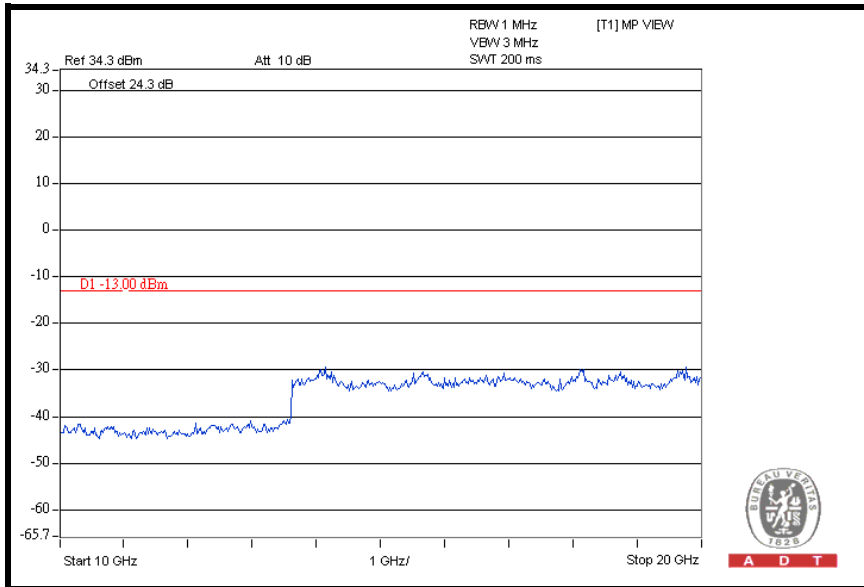






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### 10GHz ~ 20GHz



## 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  $-13$ dBm. So the limit of emission is the same absolute specified line.

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

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

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

### 4.6.2 TEST INSTRUMENTS

Same as 4.1.2.

#### 4.6.3 TEST PROCEDURES

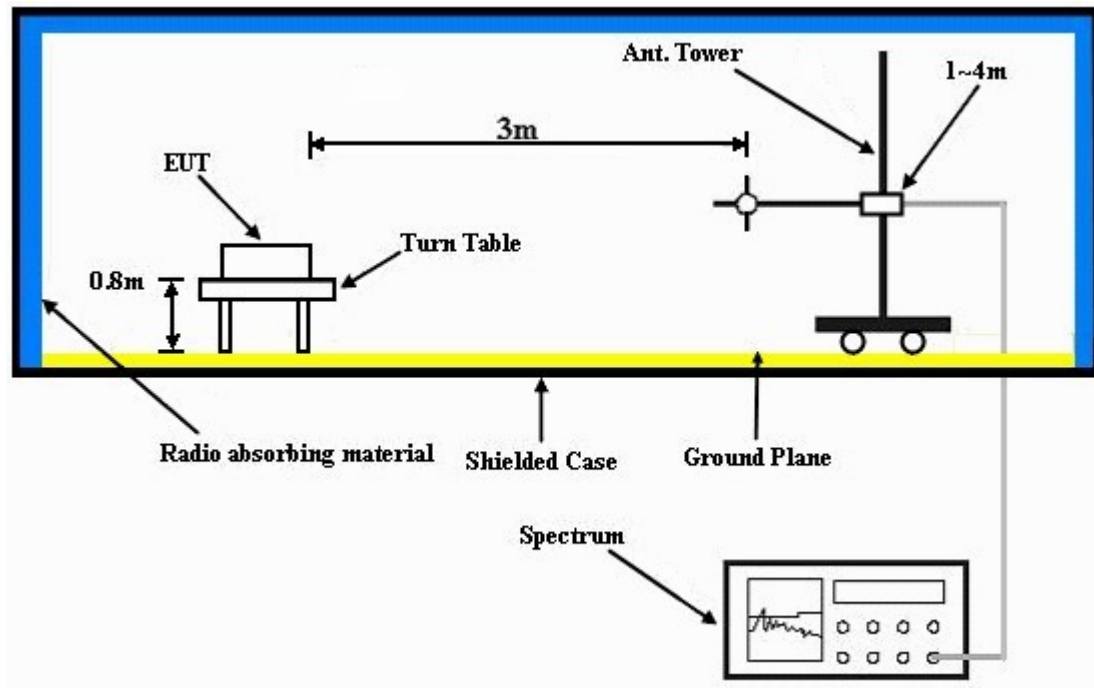
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

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

#### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.5 TEST SETUP



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

#### 4.6.6 EUT OPERATING CONDITIONS

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

#### 4.6.7 TEST RESULTS

##### FOR 1xEV-DO Rev. A:

<b>MODE</b>	TX channel 25	<b>FREQUENCY RANGE</b>	Below 1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 75%RH	<b>INPUT POWER</b>	120Vac, 60 Hz
<b>TESTED BY</b>	Anderson Hong		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	127.19	-58.3	-60.4	-0.1	-60.5	-13.0	-47.5
2	344.91	-59.2	-66.6	5.2	-61.4	-13.0	-48.4
3	480.98	-53.8	-61.0	5.0	-56.0	-13.0	-43.0
4	599.56	-56.1	-62.7	4.4	-58.3	-13.0	-45.3
5	722.02	-53.6	-60.8	5.0	-55.8	-13.0	-42.8
6	786.17	-53.2	-59.6	4.2	-55.4	-13.0	-42.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	98.04	-60.4	-56.3	0.9	-55.4	-13.0	-42.4
2	189.40	-59.7	-57.9	4.1	-53.8	-13.0	-40.8
3	218.56	-59.4	-57.2	5.5	-51.7	-13.0	-38.7
4	276.87	-60.1	-58.8	5.2	-53.6	-13.0	-40.6
5	346.85	-61.4	-61.3	5.2	-56.1	-13.0	-43.1
6	562.63	-55.8	-59.9	4.6	-55.3	-13.0	-42.3

##### NOTE:

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).
2. The other emission levels were very low against the limit.
3. Margin value = EIRP value – Limit value.
4. This is valid for all 3 channels.

## 4.7 RADIATED EMISSION MEASUREMENT (ABOVE 1GHz)

### 4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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

### 4.7.2 TEST INSTRUMENTS

Same as 4.1.2.

#### 4.7.3 TEST PROCEDURES

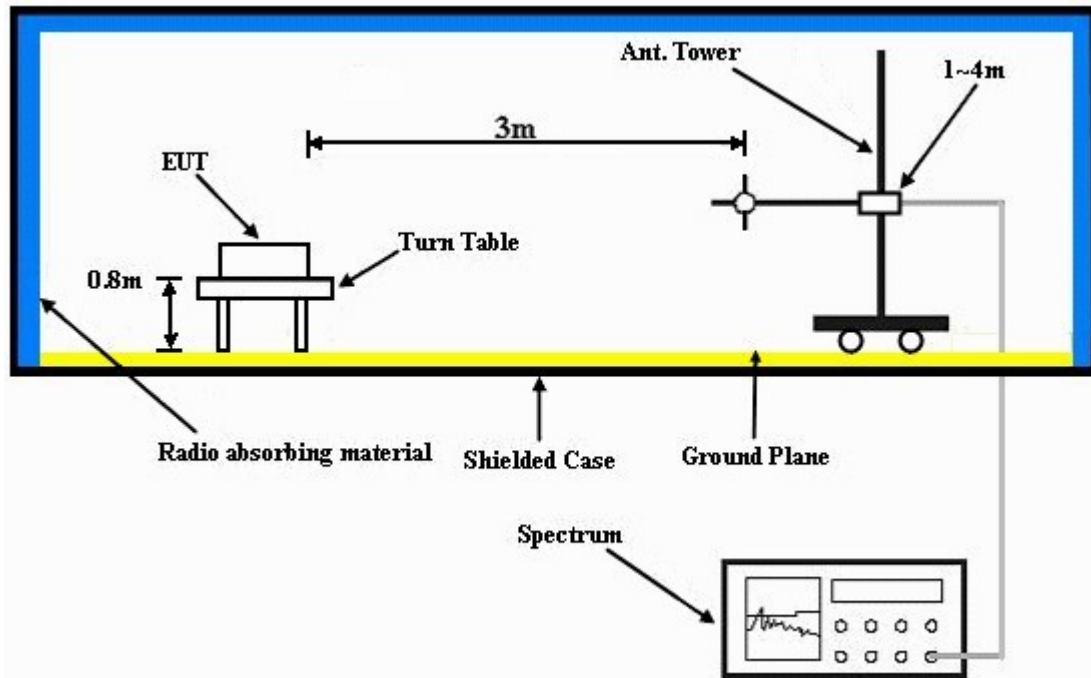
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value“ of step a. Record the power level of S.G
- c.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn.}$

**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 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.





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#### 4.7.7 TEST RESULTS

##### FOR 1xEV-DO Rev. A:

<b>MODE</b>	Channel 25	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 65%RH
<b>TESTED BY</b>	David Huang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3817.5	-52.8	-48.2	7.1	-41.1	-13.0	-28.1
2	5726.3	-57.9	-46.8	6.7	-40.1	-13.0	-27.1
3	7635.0	-58.5	-40.7	4.2	-36.5	-13.0	-23.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3817.5	-53.0	-48.9	7.1	-41.8	-13.0	-28.8
2	5726.3	-55.9	-45.8	6.7	-39.1	-13.0	-26.1
3	7635.0	-58.5	-41.6	4.2	-37.4	-13.0	-24.4

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



**A D T**

<b>MODE</b>	Channel 600	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 65%RH
<b>TESTED BY</b>	David Huang		

<b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b>							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3760.0	-51.4	-47.0	7.1	-39.9	-13.0	-26.9
2	5640.0	-59.6	-48.6	6.8	-41.8	-13.0	-28.8
3	7520.0	-57.6	-40.0	4.2	-35.8	-13.0	-22.8
<b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b>							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3760.0	-57.0	-53.0	7.1	-45.9	-13.0	-32.9
2	5640.0	-59.0	-49.3	6.8	-42.5	-13.0	-29.5
3	7520.0	-59.3	-42.5	4.2	-38.3	-13.0	-25.3

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



**A D T**

<b>MODE</b>	Channel 1175	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 65%RH
<b>TESTED BY</b>	David Huang		

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3817.5	-56.7	-52.1	7.1	-45.0	-13.0	-32.0
2	5726.3	-59.3	-48.2	6.7	-41.5	-13.0	-28.5
3	7635.0	-59.0	-41.2	4.2	-37.0	-13.0	-24.0

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3817.5	-50.1	-46.0	7.1	-38.9	-13.0	-25.9
2	5726.3	-57.2	-47.1	6.7	-40.4	-13.0	-27.4
<b>3</b>	<b>7635.0</b>	<b>-56.3</b>	<b>-39.4</b>	<b>4.2</b>	<b>-35.2</b>	<b>-13.0</b>	<b>-22.2</b>

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



A D T

## 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 and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5.phtml](http://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

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**Web Site:** [www.adt.com.tw](http://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 modifications were made to the EUT by the lab during the test.

**---END---**