

# FCC TEST REPORT (PART 24)

 REPORT NO.:
 RF120524C18-4

 MODEL NO.:
 LEX 700

 FCC ID:
 UZ7LEX700

 RECEIVED:
 May 18, 2012

 TESTED:
 May 22 ~ Jun. 18, 2012

 ISSUED:
 Jul. 04, 2012

APPLICANT: Motorola Solutions, 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., New Taipei City, Taiwan, R.O.C.
- **TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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## **RELEASE CONTROL RECORD**

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120524C18-4	Original release	Jul. 04, 2012



## **1 CERTIFICATION**

PRODUCT:MISSION CRITICAL HANDHELDMODEL:LEX 700BRAND:MotorolaAPPLICANT:Motorola Solutions, Inc.TESTED:May 22 ~ Jun. 18, 2012TEST SAMPLE:Production UnitSTANDARDS:FCC Part 24, Subpart EFCC PART 2ANSI/TIA/EIA-603-C 2004

The above equipment (model: LEX 700) 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 / Specialist	, DATE : _	Jul. 04, 2012
APPROVED BY	Gary Chang / Technical Manager	, DATE : _	Jul. 04, 2012



## 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	RESULT	REMARK		
2.1046 24.232	Equivalent isotropically radiated power	PASS	Meet the requirement of limit.		
2.1055 24.235	Frequency Stability	PASS	Meet the requirement of limit.		
2.1049 24.238(b)	Occupied Bandwidth	PASS	Meet the requirement of limit.		
24.238(b)	Band Edge Measurements	PASS	Meet the requirement of limit.		
2.1051 24.238	Conducted Spurious Emissions	PASS	Meet the requirement of limit.		
2.1053 24.238	Radiated Spurious Emissions		Meet the requirement of limit. Minimum passing margin is -21.9dB at 9256.25MHz.		

## 2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz~30MHz	2.44 dB
	30MHz ~ 200MHz	2.93 dB
Radiated emissions	200MHz ~1000MHz	2.95 dB
Radiated emissions	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.



### 2.2 TEST SITE AND INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 19, 2012	Apr. 18, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 04, 2011	Aug. 03, 2012
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 03, 2012	Apr. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Sep. 06, 2011	Sep. 05, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 20, 2011	Jul. 19, 2012
Preamplifier Agilent	8449B	3008A01911	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8447D	2944A10638	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295013/4 283403/4	Aug. 19, 2011	Aug. 18, 2012
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 13, 2011	Aug. 12, 2012
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn Table Controller EMCO	2090	NA	NA	NA
Mini-Circuits Power Splitter	ZN2PD-9G	N/A	Mar. 23, 2012	Mar. 22, 2013
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
Universal Radio Communication Tester R&S	CMU200	104484	Dec. 30, 2011	Dec. 29, 2012

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

- 2. The test was performed in HwaYa Chamber 9.
- 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
- 4. The FCC Site Registration No. is 460141.
- 5. The IC Site Registration No. is IC 7450F-4.



## **3 GENERAL INFORMATION**

## 3.1 GENERAL DESCRIPTION OF EUT

EUT	MISSION CRITICAL HANDHELD	
MODEL NO.	LEX 700	
POWER SUPPLY	5.0Vdc (adapter or host equipment) 3.7Vdc (Li-ion battery)	
MODULATION TYPE	QPSK, OQPSK, HPSK	
FREQUENCY RANGE	1851.25MHz ~ 1908.75MHz	
MAX. EIRP POWER	0.191Watts (22.8dBm)	
ANTENNA TYPE	Main: Inverted-F antenna with 2.1dBi gain Diversity: Inverted-F antenna with 1.5dBi gain	
I/O PORTS	Refer to users' manual	
DATA CABLE	Refer to NOTE as below	
ACCESSORY DEVICES	Refer to NOTE as below	

#### NOTE:

1. The EUT has following accessories.

Battery 1

 P/N
 82-154162-01

 RATING
 3.7V, 1880mAh/7.0Wh

Battery 2

Dattery Z	
P/N	82-154162-02
RATING	3.7V. 3760mAh/13.9Wh

\*Battery 2 was the worst for final test.

### ADAPTER

ADAFTER	
BRAND	MOTOROLA
MODEL	IU08-2050120-WP
INPUT	100-240Vac, 50/60Hz, 0.2A
OUTPUT	5Vdc, 1.2A

USB charging cable			
BRAND	MOTOROLA		
MODEL	25-128458-01R		
CABLE	1.5m shielded cable without core		



2. EUT software and firmware version.

OEM NAME	Motorola LEX700
OEM VERSION	0.20.0059
WIRELESS PART NUMBER	31-FUSION-X2.00
WIRELESS FUSION	X_2.00.0.0.041E

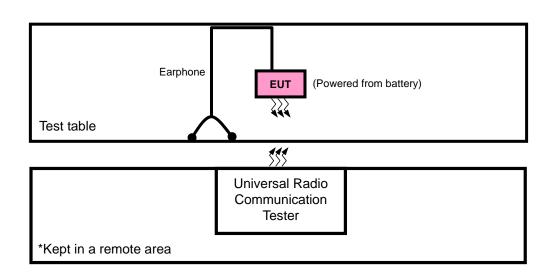
3. The following antennas for the EUT.

ltem	Туре	Gain(dBi)	Connector
Main	Inverted-F	2.1	NA
Diversity	Inverted-F	1.5	NA

\*Main antenna was the worst for the final test.

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

## 3.2 CONFIGURATION OF SYSTEM UNDER TEST



#### 3.3 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	Earphone	Nokia	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS

1 1.4m shielded cable without core

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

2. Item 1 was provided by client.



## 3.4 TEST ITEM AND TEST CONFIGURATION

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 The worst case was found when positioned on Z-plane for EIRP and Z-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
-	EIRP	25 to 1175	25, 600, 1175	CDMA, 1xEVDO Rev. 0 & 1xEVDO Rev. A
-	FREQUENCY STABILITY	25 to 1175	600	CDMA
-	OCCUPIED BANDWIDTH	25 to 1175	25, 600, 1175	CDMA, 1xEVDO Rev. 0 & 1xEVDO Rev. A
-	BAND EDGE	25 to 1175	25, 1175	CDMA, 1xEVDO Rev. 0 & 1xEVDO Rev. A
-	CONDCUDETED EMISSION	25 to 1175	25, 600, 1175	CDMA, 1xEVDO Rev. 0 & 1xEVDO Rev. A
-	RADIATED EMISSION<1G	25 to 1175	25	1xEVDO Rev. 0
-	RADIATED EMISSION≥1G	25 to 1175	25, 600, 1175	1xEVDO Rev. 0

#### **TEST CONDITION:**

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	25deg. C, 68%RH	3.7Vdc	Anderson Hong
FREQUENCY STABILITY	25deg. C, 65%RH	3.7Vdc	Mark Liao
OCCUPIED BANDWIDTH	25deg. C, 68%RH	3.7Vdc	Anderson Hong
BAND EDGE	25deg. C, 68%RH	3.7Vdc	Anderson Hong
CONDCUDETED EMISSION	25deg. C, 68%RH	3.7Vdc	Anderson Hong
RADIATED EMISSION	25deg. C, 65%RH	3.7Vdc	Anderson Hong

#### 3.5 EUT OPERATING CONDITIONS

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

## 3.6 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/TIA/EIA-603-C 2004

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



## 4 TEST TYPES AND RESULTS

#### 4.1 OUTPUT POWER MEASUREMENT

#### 4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile and portable stations are limited to 2 watts EIRP

#### 4.1.2 TEST PROCEDURES

#### EIRP MEASUREMENT:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 5MHz for CDMA mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G
- d. EIRP = Output power level of S.G TX cable loss + Antenna gain of substitution horn.

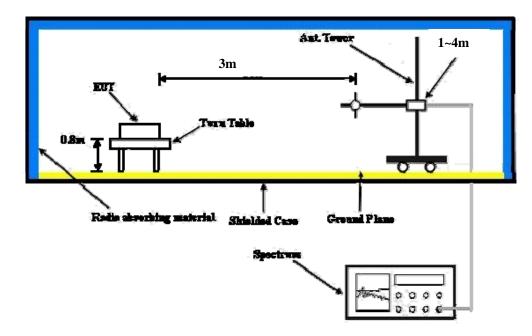
#### CONDUCTED POWER MEASUREMENT:

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



#### 4.1.3 TEST SETUP

#### EIRP MEASUREMENT:



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

#### CONDUCTED POWER MEASUREMENT:



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



## 4.1.4 TEST RESULTS

#### CONDUCTED OUTPUT POWER (dBm)

Band	CDMA2000 BC1				
Channel	25	600	1175		
Frequency (MHz)	1851.25	1880	1908.75		
RC1+SO55	22.02	21.81	21.11		
RC3+SO55	22.09	21.85	21.16		
RC3+SO32(+ F-SCH)	22.01	21.71	21.08		
RC3+SO32(+SCH)	21.77	21.25	20.27		
RTAP 153.6	22.23	22.41	21.40		
<b>RETAP 4096</b>	22.48	22.35	21.38		



#### EIRP POWER (dBm)

#### FOR CDMA MODE:

Channel	Freq. (MHz)	Antenna polarity	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
25	1851.25	Н	-17.4	21.1	1.1	22.2	33	-10.8
25	1851.25	V	-20.2	16.4	1.1	17.5	33	-15.5
600	1880	Н	-17.2	21.5	1.1	22.6	33	-10.4
600	1880	V	-20.3	16	1.1	17.1	33	-15.9
1175	1908.75	Н	-17.7	21.4	1.1	22.5	33	-10.5
1175	1908.75	V	-19.9	16	1.1	17.1	33	-15.9

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

#### FOR 1xEVDO Rev. 0 MODE:

Channel	Freq. (MHz)	Antenna polarity	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
25	1851.25	Н	-17.9	20.6	1.1	21.7	33	-11.3
25	1851.25	V	-20.7	15.9	1.1	17.0	33	-16.0
600	1880	Н	-17.0	21.7	1.1	22.8	33	-10.2
600	1880	V	-20.1	16.2	1.1	17.3	33	-15.7
1175	1908.75	Н	-18.7	20.4	1.1	21.5	33	-11.5
1175	1908.75	V	-20.9	15.0	1.1	16.1	33	-16.9

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

#### FOR 1xEVDO Rev. A MODE:

Channel	Freq. (MHz)	Antenna polarity	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)		Limit (dBm)	Margin (dB)
25	1851.25	Н	-17.6	20.9	1.1	22.0	33	-11.0
25	1851.25	V	-20.4	16.2	1.1	17.3	33	-15.7
600	1880	Н	-17.1	21.6	1.1	22.7	33	-10.3
600	1880	V	-20.2	16.1	1.1	17.2	33	-15.8
1175	1908.75	Н	-18	21.1	1.1	22.2	33	-10.8
1175	1908.75	V	-20.2	15.7	1.1	16.8	33	-16.2

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



## 4.2 FREQUENCY STABILITY MEASUREMENT

### 4.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

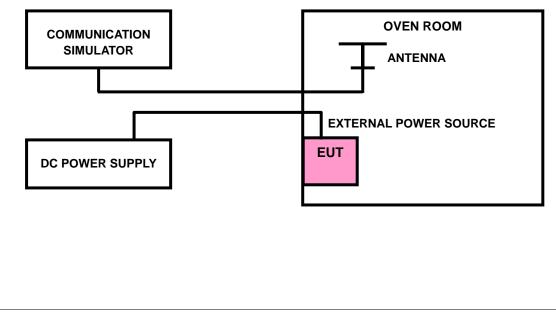
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### 4.2.2 TEST PROCEDURE

- a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}$ C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

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

## 4.2.3 TEST SETUP





## 4.2.4 TEST RESULTS

#### FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (Hz)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
4.255	12	0.006	2.5
3.18	8	0.004	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.18Vdc to 4.255Vdc.

#### FREQUENCY ERROR vs. TEMPERATURE.

<b>TEMP. (</b> ℃)	FREQUENCY ERROR (Hz)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
60	24	0.013	2.5
50	22	0.012	2.5
40	19	0.010	2.5
30	16	0.009	2.5
20	14	0.007	2.5
10	13	0.007	2.5
0	10	0.005	2.5
-10	12	0.006	2.5
-20	11	0.006	2.5
-30	16	0.009	2.5

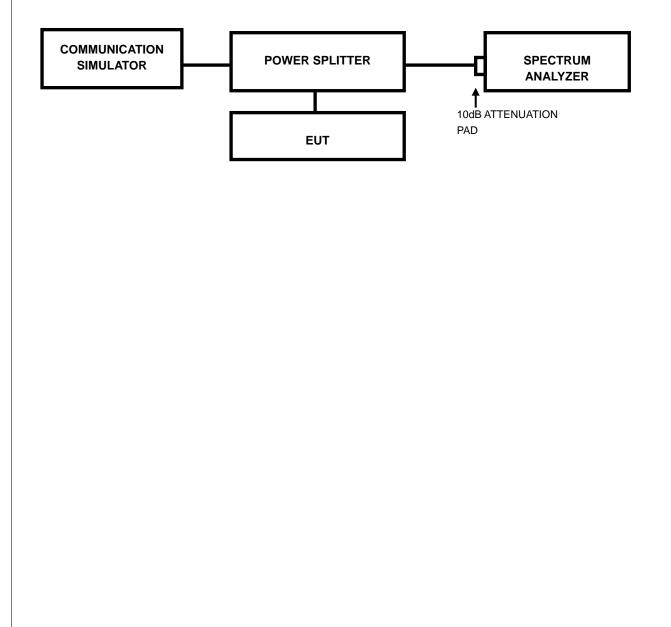


## 4.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 4.3.1 TEST PROCEDURES

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

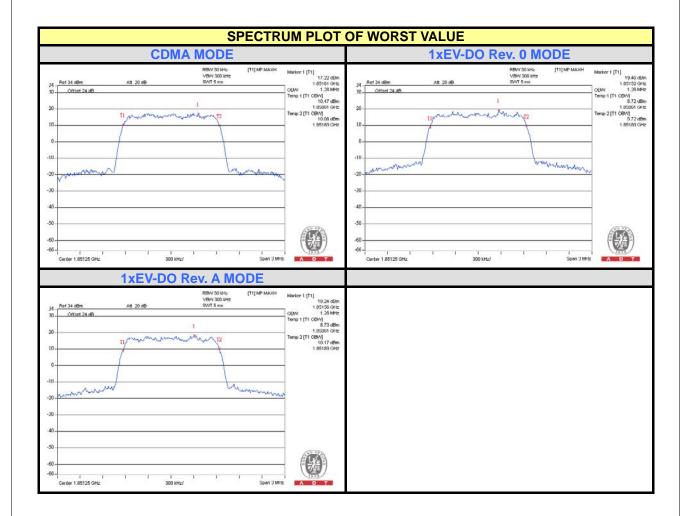
## 4.3.2 TEST SETUP





### 4.3.3 TEST RESULTS

		99% OCCUPIED BANDWIDTH (MHz)			
CHANNEL	FREQUENCY (MHz)	CDMA MODE	1xEV-DO Rev. 0 MODE	1xEV-DO Rev. A MODE	
25	1851.25	1.28	1.28	1.28	
600	1880	1.27	1.28	1.27	
1175	1908.75	1.28	1.28	1.28	





		26dB BANDWIDTH (MHz)				
CHANNEL	FREQUENCY (MHz)	CDMA MODE	1xEV-DO Rev. 0 MODE	1xEV-DO Rev. A MODE		
25	1851.25	1.441	1.455	1.452		
600	1880	1.430	1.424	1.438		
1175	1908.75	1.427	1.434	1.434		

	CDM	IA MODE			1xEV-DO Rev. 0 MODE				
Ref 34 dBm	Att 20 dB	RBW 30 kHz VBW 300 kHz SWT 5 ms	[T1] MP VIEW	Marker 1 [T1] -7.12 dBm 1.050530 GHz	34 _Ref 34 dBm	Att 20 dB	RBW 30 kHz VBW 300 kHz SWT 5 ms	[T1] MP VIEW	Marker 1 [T1] .7.94 1.050522
Offset 24 dB	-			Deta 2 [11] 0.00 dB 1.441013 MHz	30 Offset 24 dB	-			Deta 2 [T1] 0 1.45498
D1 10 99 4Dm	mon	www.		1.441013 MHz	20-0118.160Bm	manum	muning		1.42430
	1				0-	1	1		
D2 -7.12 dBm	1			_	-10	1	1		
and man man	1	h	home manage	-	-20- month have the second	× .	~	www.www.	
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i i Center 1.85125 GHz	Р. 1 1 1 300 кн		i i Span J Mit		-60 - -66 - 1 Certer 1.85125 CHz	FL 1 1 300 kHz	, 1 1 ,	i i Span 3 MHz	
l l Center 1.85125 GHz Bet 34 ABm	1xEV-DO	Rev. A M	24967-25267	Marker 1 [T1] -0.47 dBm	-60	6) 1 1 1 300 kHz	, I I I	I I Span 3 MHz	
	1967-000	Rev. A M	ODE	Marker 1 [T1]	-60	е) 300 кHz	, 1 1	i i Span 3 MHz	
Ref 34 dBm Offset 24 dB	1xEV-DO	Rev. A M RBW 30 Hz VBW 300 Hz SWT 5 ms	ODE	Marker 1 [71] .9.47 cBm 1.850536 GHz Deta 2 [71]	-60	е) 300 кHz	,	i i Span 3 Métz	
Ref 34 dBm	1xEV-DO	Rev. A M RBW 30 Hz VBW 300 Hz SWT 5 ms	ODE	Marker 1 [T1] 	-60	е) 300 кHz	, 1	J J Saan 7 Meta	
Ref 34 dBm Offset 24 dB	1xEV-DO	Rev. A M RBW 30 Hz VBW 300 Hz SWT 5 ms	ODE	Marker 1 [T1] 	-60	е) 1 1 1 1 300 кнг	, 1 1	i i Span 3 Mrts	
Ret 34 dBm Offact 24 dB DT 17.534Dm	1xEV-DO	Rev. A M RBW 30 Hz VBW 300 Hz SWT 5 ms	ODE	Marker 1 [T1] 	-60	с) 300 кHz	, 1 1	i i Span 3 Mrts	
Ret 34 dBm Offnet 24 dB DT 17.53 dDm D2 -0.47 dBm	AR 20 dB	Rev. A M RBW 2014r VBW 2014r SWT 5 ms	ODE (trijwe vew	Marker 1 [11] .04.7 cBin 1.050535 GHz Dete 2 [11] 0.00.45 1.452019 MHz	-60	с) 300 мHz	,	i i Span 3 Mrts	
Ret 34 dBm Offset 24 dB OI 17.53 dDm D2 -0.47 dBm	AR 20 dB	Rev. A M RBW 2014r VBW 2014r SWT 5 ms	ODE	Marker 1 [11] .04.7 cBin 1.050535 GHz Dete 2 [11] 0.00.45 1.452019 MHz	-60	0 300 MHz	, 1	i i Span 3 Mrts	
Ret 34 dBm Offinet 24 dB D1 17 53 dBm D2 -047 dBm	AR 20 dB	Rev. A M RBW 2014r VBW 2014r SWT 5 ms	ODE (trijwe vew	Marker 1 [11] .04.7 cBin 1.050535 GHz Dete 2 [11] 0.00.45 1.452019 MHz	-60	0 300 NHz		i i Span 3 MHz	
Ret 34 dBm Officet 24 dB D1 1753 dBm D2 -0-47 dBm	AR 20 dB	Rev. A M RBW 2014r VBW 3014r SWT 5 ms	ODE (trijwe vew	Marker 1 [11] .04.7 cBin 1.050535 GHz Dete 2 [11] 0.00.45 1.452019 MHz	-60	с) 300 мн/		i i Span 3 Metz	
Ref 34 dBm Offaet 24 dB DT 17 53 8Dm	AR 20 dB	Rev. A M RBW 2014r VBW 3014r SWT 5 ms	ODE (trijwe vew	Marker 1 [11] .04.7 cBin 1.050535 GHz Dete 2 [11] 0.00.45 1.452019 MHz	-60	с) 300 мн/		i i Span 3 MHz	
Ret 34 dBm Offset 24 dB OI 17.53 dDm D2 -0.47 dBm	AR 20 dB	Rev. A M RBW 2014r VBW 3014r SWT 5 ms	ODE (trijwe vew	Marker 1 [11] .04.7 cBin 1.050535 GHz Dete 2 [11] 0.00.45 1.452019 MHz	-60	с 300 мHz		i i Span 3 Metz	

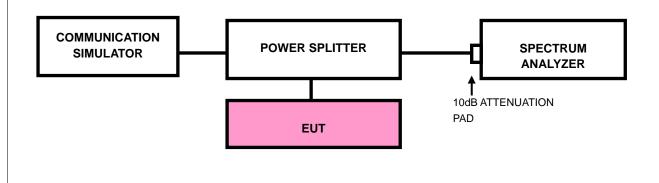


## 4.4 BAND EDGE MEASUREMENT

#### 4.4.1 LIMITS OF BAND EDGE MEASUREMENT

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

#### 4.4.2 TEST SETUP

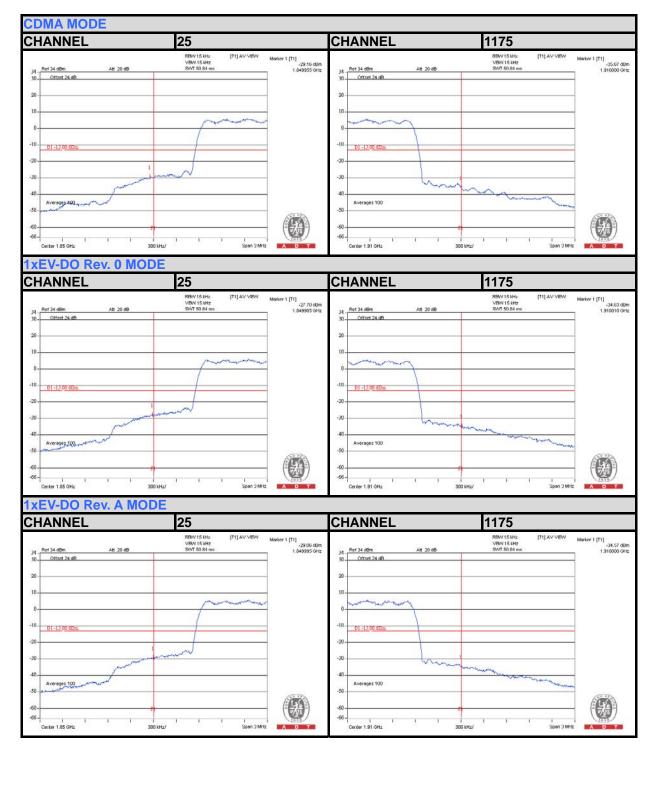


#### 4.4.3 TEST PROCEDURES

- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 15kHz and VB of the spectrum is 15kHz.
- c. Record the max trace plot into the test report.



## 4.4.4 TEST RESULTS





## 4.5 CONDUCTED SPURIOUS EMISSIONS

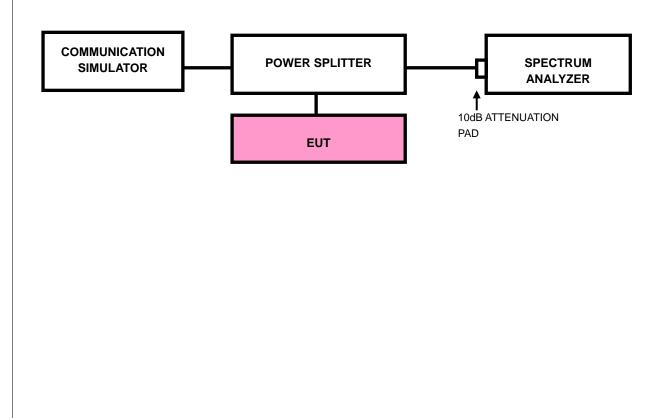
#### 4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P) dB$ . The emission limit equal to -13dBm.

#### 4.5.2 TEST PROCEDURE

- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 30MHz to 19.1GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

### 4.5.3 TEST SETUP





## 4.5.4 TEST RESULTS

REQUENCY RANGE : 91	kHz~3GHz	FREQUENC	CY RANGE	: 3GHz~10GHz	
4.         Ref 34 dbm         All 20 dB           0         Officet 24 dD         0           0         0         0           0 <t< th=""><th>BBW11 MHz         [T1] MP VEW           VBW23 MHz         SWT 15 ms</th><th>34 Ref 34 dBm 30 Offset 24 dD 20</th><th>AII: 20 dB</th><th>RBW 1 MHz [T1] MP VEW VBV3 MHz 3W/ 140 ms</th><th></th></t<>	BBW11 MHz         [T1] MP VEW           VBW23 MHz         SWT 15 ms	34 Ref 34 dBm 30 Offset 24 dD 20	AII: 20 dB	RBW 1 MHz [T1] MP VEW VBV3 MHz 3W/ 140 ms	
Na         Ref 34 dBm         Att 10 dB           Officet 24 dB         0           0         -           0         -           0         -           0         -           0         -           0         -           0         -           0         -           0         -           0         -           0         -           0         -           0         -	RBv11 MHz         [T1] MP VEW           VBv12 MHz	)			



CHANNEL 600							
FREQUENCY RANGE : 9	kHz~3GHz		FREQUENC	Y RANGE :	3GHz~1	0GHz	
24 Ref 34 dBm Att 20 dB 30 Offset 24 dB	RBW11MHz [T1]MP VIEW VBW3MHz SWI15ms		34 _ Ref 34 dBm 30 _ Offset 24 dB	Att 20 dB	RBW 1 MHz VBW 3 MHz SWT 140 ms	(T1) MP VIEW	
20			20				
-10- <u>D1-13.00 dDm</u>			-10- <u>D1-13.00 dBm</u>				
-30-	a barbotto and a south south		-30-5-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-6-	anter anter statute a statute as statu	ad fan Anne af Marken e	- Annon	
-50 -60 -56 - 200 0001 MHz/	Stop 3 OHz		-50 -60 -66	1 1 1 700 MHz/	. IC - CI	Stop 10 GHz	
FREQUENCY RANGE : 1							
34 Ref 34 dBm Alt 10 dB 30 Officet 24 dD	RBW11MHz [T1] MP V/EW VBW31MHz SWT 200 ms						
20							
0							
10	per manual man						
-50							
-66	Stop 20 GHz	A D T					



CHANNEL 1175						
FREQUENCY RANGE : 9	kHz~3GHz		FREQUENC	Y RANGE : 3	GHz~10GH	z
34 Ref 34 dBm All 20 dB 30 Offset 24 dD	RBW1 MHz [T1] MP VIEW VBW3 MHz SWI15 mb		34 Ref 34 dBm 30 Offset 24 dB	Att 20 dB	RBW 1 MHz [T1] MP VBW73 MHz SWF 140 ma	VEW
20			20			
0- -10			0			
-20			-30-0000000000000000000000000000000000	and an and the file of the stand and and and and and and and and and	10 miles and a second second	manda
-50	and lane-particular and a second second second		-50			
-60	I I I I I Stop 3 GHz		-60	1 1 1 700 MHz/	I I I S	lop 10 GHz A D T
FREQUENCY RANGE : 1	OGHz~20GHz RBW 1 MHz [T1] MP VBW VBW 3 MHz SWT 200 ms					
30 Offset 24 60						
10- 0-						
-10 - 01 -13 00 8Dm -20 -						
30-	and the second of the second of the second s					
-50-						
-66 - 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Stop 20 GHz	A D T				



1xEV-DO Rev. 0 MODE						
CHANNEL 25						
FREQUENCY RANGE : 9kF	Iz∼3GHz	FREQUENC	Y RANGE	: 3GHz~10	)GHz	
v	136	34         Ref 34 dBm           30         Offset 24 dD           20         0           10         0           -0         0           -0         0           -0         0           -0         0           -00 </th <th>All 20 dB</th> <th>1 1</th> <th>[11] MP VEW</th> <th></th>	All 20 dB	1 1	[11] MP VEW	
R V	BM 1 M42 [T1] NP VEW BM 3 M42 W1 200 ms					



CHANNEL 600						
FREQUENCY RANGE : 9k	kHz~3GHz	FREQUENC	Y RANGE : 3	BGHz~10	GHz	
34 Ref 34 dBm Alt 20 dB 30 Officet 24 dB	RBW1 MHz [T1] MP V/EW VBW3 MHz SWIT 15 ms	34 Ref 34 dBm 30 Offset 24 dD	Att 20 dB	RBW 1 MHz VBW 3 MHz SWT 140 ms	(T1) MP VEV4	
20		20				
-10		-10 - <u>D1 -13 00 dBm</u>				
-30 -	and have made any form	40 -	and a second	enserve en Malante	mannah	
-50 -60 -564 -51wr 9 HHz 299 9991 Metz/	I I I I Stop 3 GHz	-50 -60 -66	1 1 1 700 MHz/	1 1 1	Stop 10 GHz	
FREQUENCY RANGE : 10						
34 Ref 34 dBm Alt 10 dB 30 Offset 24 db	RBW1 MHz [T1] MP VIEW VBW3 MHz SWT 200 ms					
20						
0						
	and the stand an					
40 - Parkan regtore region through the						
60	Stop 20 GHz					



CHANNEL 1175							
FREQUENCY RANGE : 9	kHz~3GHz		FREQUENC	Y RANGE : 3	3GHz~10	0GHz	
34 Ref 34 dBm Alt 20 dB 30 Offset 24 dB	RBW 1 MHz [T1] MP VIEW VBW 3 MHz SWT 15 ms		34 Ref 34 dBm 30 Offset 24 dB	Alt 20 dB	RBW1 MHz VBW3 MHz SWT140 ms	(T1) MP VIEW	
20 10			20				
-10- -01-13:00 dBm			0				
-20 - 	and the same and the same street the same		20- -30-	annew manute and	whenter	manna	
-50 -60			-50				
Start 9 JH12 200 9000 HH1/ FREQUENCY RANGE : 1	RBW 1 MHz [T1] MP VIEW VBW 3 MHz	A D T	Start 3 GHz	700 MHz/		Stop 10 GHz	A D T
34 Ref 34 dBm All 10 dB 00 Offset 24 dD 20 -	SWE 200 ms						
10							
-10 - 01 -13 00 dBm							
40 - warren were worked	marken and and						
-60 -66 -51art 10 OHz 1 OHz/	Stop 20 GHz						



1xEV-DO Rev. A MODE							
CHANNEL 25							
FREQUENCY RANGE : 9kHz~3GHz		FREQUENCY RANGE : 3GHz~10GHz					
Ref 31 dBm         All 20 dB         TITI MP VEW           30         Ottest 23 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 24 dB         Ottest 24 dB         Ottest 24 dB           30         Ottest 34 dB         Ottest 34 dB         Ottest 34 dB <t< th=""><th></th><th>Ref 54 dBm         Alt 20 dB         SWI 1 M4z         [11] MP VEW           30         Offset 24 dB         SWI 140 ms         Image: Constraint of the second secon</th></t<>		Ref 54 dBm         Alt 20 dB         SWI 1 M4z         [11] MP VEW           30         Offset 24 dB         SWI 140 ms         Image: Constraint of the second secon					
Resolution         Resolut							



CHANNEL 600							
FREQUENCY RANGE : 9	kHz~3GHz		FREQUENCY	RANGE : 3	GHz~10	GHz	
34 - Ref 34 dBm Att 20 dB 30 - Offset 24 dB	RBW 1 MHz [T1] MP V/BW VBW 3 MHz SWT 15 ma		34 Ref 34 dBm // 30 Offset 24 dD	₩ 20 <del>48</del>	RBW1 MHz VBW3 MHz SWT140 ms	[T1] MP VIEW	
20			20				
-10 - <u>D1 -13 00 dBm</u> 20 -			-10 - <u>D1 - 13 00 dBm</u>				
	en constant and a state of the		-30	and a share and	murade	manspelt	
60- -66- Start 0 MHz 299 9991 MHz	Stop 3 OHz		60- -66- Start 3 CHz	700 MHz/	0 01 1	Stop 10 GHz	A D T
FREQUENCY RANGE : 1	RBW1 MHz [T1] MP VBW VBW3 MHz SWT 200 ms						
20							
0							
30	ado and a management						
-50							
Start 10 GHz 1 GHz/	Stop 20 GHz	A D T					



CHANNEL 1175							
FREQUENCY RANGE : 9	kHz~3GHz		FREQUENC	Y RANGE : 3	BGHz~100	GHz	
34 Ref 34 dBm All 20 dB 30 Offset 24 dD	RBW 1 MHz [T1] MP VIEW VBW 3 MHz SWIT 15 ms		34 Ref 34 dBm 30 Offset 24 dB	Alt 20 dB	RBW 1 MHz VBW 3 MHz SWT 140 ms	[T1] MP VIEW	
20			20				
0			0				
	and have been weather approximately and the		30 mannama	ale the same the the	when the man and a star the start and a	white	
40			-50				
		A D T	-66 - 1 1 1 Start 3 OHz	1 1 1 700 MHz/	1: (1 1)	Stop 10 GHz	A D T
FREQUENCY RANGE : 1	RBW1 MHz [T1] MP VIEW VBW2 MHz SWT 200 ms						
30 - Officet 24 d0 20 -							
10- 0- -10-							
-10 <u>01-1300 dBm</u> -20							
40	m man and and a second						
60-							
Start 10 GHz 1 GHz/	Stop 20 GHz	A D T					



## 4.6 RADIATED EMISSION MEASUREMENT

#### 4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P) dB$ . The emission limit equal to -13dBm.

#### 4.6.2 TEST PROCEDURES

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

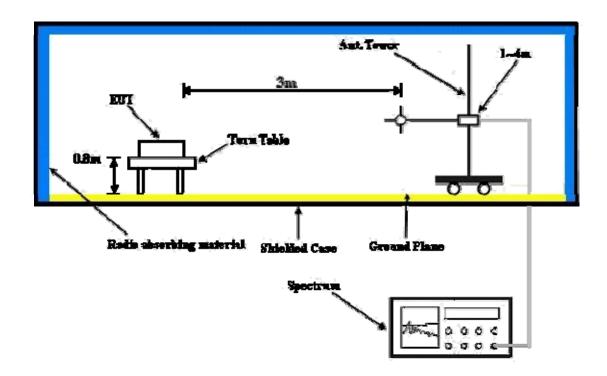
**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

## 4.6.3 DEVIATION FROM TEST STANDARD

No deviation



#### 4.6.4 TEST SETUP



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



### 4.6.5 TEST RESULTS

#### FOR 1xEVDO Rev. 0 MODE:

Below 1GHz
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BCION TOTIL			
MODE	TX channel 25	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	24deg. C, 65%RH	INPUT POWER	120Vac, 60 Hz
TESTED BY	Haru Yang		

	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	70.74	-45.7	-47.7	-4.8	-52.5	-13.0	-39.5	
2	189.08	-46.0	-56.0	4.1	-51.9	-13.0	-38.9	
3	324.88	-46.4	-53.8	5.2	-48.6	-13.0	-35.6	
4	390.84	-48.2	-53.1	5.2	-47.9	-13.0	-34.9	
5	524.70	-46.3	-50.8	4.8	-46.0	-13.0	-33.0	
6	757.50	-46.7	-45.3	4.5	-40.8	-13.0	-27.8	
	Α	NTENNA PO	LARITY & TE	ST DISTANC	E: VERTICA	LAT3M		
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	
1	105.66	-51.7	-47.6	0.6	-47.0	-13.0	-34.0	
2	121.18	-50.1	-46.6	0.0	-46.6	-13.0	-33.6	
3	189.08	-60.1	-58.4	4.1	-54.3	-13.0	-41.3	
4	216.24	-64.1	-61.9	5.5	-56.4	-13.0	-43.4	
5	241.46	-62.6	-60.8	5.4	-55.4	-13.0	-42.4	
6	416.06	-65.0	-67.0	5.2	-61.8	-13.0	-48.8	

#### **REMARKS**:

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).



#### Above 1GHz

MODE	Channel 25	FREQUENCY RANGE	Above 1000MHz	
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	
TESTED BY	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	3702.50	-52.5	-50.8	7.2	-43.6	-13.0	-30.6		
2	5553.75	-56.7	-48.8	6.8	-42.0	-13.0	-29.0		
3	7405.00	-57.2	-43.8	4.3	-39.5	-13.0	-26.5		
4	9256.25	-54.9	-39.2	4.3	-34.9	-13.0	-21.9		
	A	NTENNA PO	LARITY & TE	ST DISTANC	E: VERTICA	LAT3M			
No.	No. Freq. (MHz) Reading (dBm) S.G Power Correction (dBm) Factor (dB) EIRP (dBm) Limit (dBm) Margin (dB								
1	3702.50	-51.7	-50.5	7.2	-43.3	-13.0	-30.3		
2	5553.75	-55.3	-50.4	6.8	-43.6	-13.0	-30.6		
3	7405.00	-57.3	-44.4	4.3	-40.1	-13.0	-27.1		
4	9256.25	-56.9	-43.1	4.3	-38.8	-13.0	-25.8		

#### **REMARKS**:

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).



MODE	Channel 600	FREQUENCY RANGE	Above 1000MHz	
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH	
TESTED BY	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	3760.00	-53.7	-51.7	7.1	-44.6	-13.0	-31.6		
2	5640.00	-55.1	-47.0	6.8	-40.2	-13.0	-27.2		
3	7520.00	-57.4	-43.9	4.2	-39.7	-13.0	-26.7		
4	9400.00	-55.1	-39.2	4.1	-35.1	-13.0	-22.1		
	A	NTENNA PO	LARITY & TE	ST DISTANC	E: VERTICA	LAT3M			
No.	No.         Freq. (MHz)         Reading (dBm)         S.G Power         Correction         EIRP (dBm)         Limit (dBm)         Margin (dBm)								
1	3760.00	-52.8	-51.5	7.1	-44.4	-13.0	-31.4		
2	5640.00	-54.9	-49.7	6.8	-42.9	-13.0	-29.9		
3	7520.00	-56.2	-42.9	4.2	-38.7	-13.0	-25.7		
4	9400.00	-57.7	-43.5	4.1	-39.4	-13.0	-26.4		

#### **REMARKS**:

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).



MODE	Channel 1175	FREQUENCY RANGE	Above 1000MHz	
INPUT POWER	120Vac, 60 Hz ENVIRONMENTAL CONDITIONS		25deg. C, 68%RH	
TESTED BY	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	3817.50	-53.4	-51.2	7.1	-44.1	-13.0	-31.1	
2	5726.25	-57.2	-48.8	6.7	-42.1	-13.0	-29.1	
3	7635.00	-57.7	-44.0	4.2	-39.8	-13.0	-26.8	
4	9543.75	-56.1	-40.0	4.0	-36.0	-13.0	-23.0	
	Α	NTENNA PO	LARITY & TE	ST DISTANC	E: VERTICA	LAT3M		
No.	No.         Freq. (MHz)         Reading (dBm)         S.G Power         Correction Factor (dB)         EIRP (dBm)         Limit (dBm)         Margin (dB)							
1	3817.50	-52.3	-51.0	7.1	-43.9	-13.0	-30.9	
2	5726.25	-56.6	-51.1	6.7	-44.4	-13.0	-31.4	
3	7635.00	-57.4	-43.9	4.2	-39.7	-13.0	-26.7	
4	9543.75	-58.0	-43.5	4.0	-39.5	-13.0	-26.5	

#### **REMARKS:**

1. Power Value (dBm) = 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.

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: 886-3-3270892 Email: service.adt@tw.bureauveritas.com 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 were made to the EUT by the lab during the test.

---END----