

Supplementary FCC Test Report

Report No.: RF111214E06J-1

FCC ID: UZ7MC919ZWR

Test Model: MC919ZWR

Received Date: Feb. 02, 2016

Test Date: Feb. 15 to 17, 2016

Issued Date: Mar. 02, 2016

Applicant: Zebra Technologies Corporation

Address: 1 Zebra Plaza, Holtsville, NY 11742

Manufacturer: Zebra Technologies Corporation

Address: 1 Zebra Plaza, Holtsville, NY 11742

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

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (1): E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin
Chu Hsien 307, Taiwan R.O.C.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Report Issue History Record of EUT (MC919ZWR)	4
Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	10
3.2.1 Test Mode Applicability and Tested Channel Detail	11
3.3 Duty Cycle of Test Signal	12
3.4 Description of Support Units	13
3.4.1 Configuration of System under Test	13
3.5 General Description of Applied Standard	14
4 Test Types and Results	15
4.1 Radiated Emission and Bandedge Measurement	15
4.1.1 Limits of Radiated Emission and Bandedge Measurement	15
4.1.2 Test Instruments	16
4.1.3 Test Procedure	18
4.1.4 Deviation from Test Standard	18
4.1.5 Test Setup	19
4.1.6 EUT Operating Condition	19
4.1.7 Test Results	20
4.2 Transmit Power Measurement	28
4.2.1 Limits of Transmit Power Measurement	28
4.2.2 Test Setup	28
4.2.3 Test Instruments	28
4.2.4 Test Procedure	29
4.2.5 Deviation from Test Standard	29
4.2.6 EUT Operating Condition	29
4.2.7 Test Result	30
4.3 Peak Power Spectral Density Measurement	31
4.3.1 Limits of Peak Power Spectral Density Measurement	31
4.3.2 Test Setup	31
4.3.3 Test Instruments	31
4.3.4 Test Procedure	32
4.3.5 Deviation from Test Standard	32
4.3.6 EUT Operating Condition	32
4.3.7 Test Results	33
4.4 Frequency Stability Measurement	34
4.4.1 Limits of Frequency Stability Measurement	34
4.4.2 Test Setup	34
4.4.3 Test Instruments	34
4.4.4 Test Procedure	34
4.4.5 Deviation from Test Standard	34
4.4.6 EUT Operating Condition	34
4.4.7 Test Results	35
4.5 6dB Bandwidth Measurement	36
4.5.1 Limits of 6dB Bandwidth Measurement	36
4.5.2 Test Setup	36
4.5.3 Test Instruments	36
4.5.4 Test Procedure	36

4.5.5 Deviation from Test Standard	36
4.5.6 EUT Operating Condition	36
4.5.7 Test Results	37
5 Pictures of Test Arrangements.....	38
Appendix – Information on the Testing Laboratories	39

**Report Issue History Record of EUT (MC919ZWR)**

Attachment No.	Issue Date	Description
111214E06-1	Jan. 11, 2012	Original
111214E06D-1	Apr. 03, 2013	Changed touch panel: PJ037PD-01A
111214E06J-1	Mar. 02, 2016	Upgraded the versions of the standard to section 15.407 under new rule.

Release Control Record

Issue No.	Description	Date Issued
RF111214E06J-1	Original release.	Mar. 02, 2016

1 Certificate of Conformity

Product: Hand Held RFID Reader

Brand: Symbol

Test Model: MC919ZWR


Sample Status: MASS-PRODUCTION


Applicant: Zebra Technologies Corporation

Test Date: Feb. 15 to 17, 2016

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10: 2013

The above equipment 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. 02, 2016
Claire Kuan / Specialist

Approved by : , **Date:** Mar. 02, 2016
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -2.7dB at 5715.00MHz.
15.407(a)(1/2 /3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2 /3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is Hirose not a standard connector.

Note: This report is prepared for FCC Class II change. (Upgrade the standard to section 15.407 under new rule.)

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	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.31 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.40 dB
	6GHz ~ 18GHz	3.73 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Hand Held RFID Reader
Brand	Symbol
Test Model	MC919ZWR
Status of EUT	MASS-PRODUCTION
MFD	29NOV11
Power Supply Rating	DC 7.4V from battery, DC 12V from cradle or car charger
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps
Operating Frequency	For 15.407 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50 ~ 5.7GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
Number of Channel	For 15.407 24 for 802.11a
	For 15.247 13 for 802.11b, 802.11g
Output Power	For 15.407 5.18 ~ 5.24GHz: 802.11a: 25.7mW 5.26 ~ 5.32GHz: 802.11a: 30.2mW 5.5 ~ 5.72MHz: 802.11a: 30.9mW 5.745 ~ 5.825MHz: 802.11a: 35.481mW
	For 15.247 802.11b: 52.5mW 802.11g: 162.2mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Battery x 1 (Part No.: 21-65587-03)
Data Cable Supplied	NA

Note:

- This report is prepared for FCC Class II change. The difference compared with the Report No.: RF111214E06D-1 design is as the following:
 - ◆ Upgrade the standard to section 15.407 under new rule.
- For U-NII-1, U-NII-2A and 2C Bands: There is no increase in authorized power level, so RF test data refer original test report (Report No.: RF111214E06D-1).
- According to above conditions, all test items of U-NII-3 band test item need to be performed, except for AC power conducted emission test item. And all data was verified to meet the requirements.
- There are Bluetooth technology (BT2.1+EDR), WLAN and RFID technology used for the EUT
- Bluetooth technology (BT2.1+EDR), WLAN and RFID technology can transmit at same time.
- The emission of the simultaneous operation (Bluetooth technology (BT2.1+EDR), WLAN and RFID) has been evaluated and no non-compliance was found.

7. The EUT configuration list:

Keypad	53keys
Scan	SE1524
WLAN (a/b/g)	V
BT	V
RFID	V

8. The antennas provided to the EUT, please refer to the following table:

WLAN Antenna Spec.							
2.4GHz							
Model No.	Antenna Type	Gain (dBi) < included cable loss>	Connector Type	Frequency range (MHz)	Cable Loss (dB)	Cable Length (mm)	
750353-00 (Main, Tx & Rx)	Loop	4.5	Hirose	2400~2500 5150~5850	0.082 (2.4G) 0.138 (5G)	33	
750330-00 (Aux ,Tx & Rx)	PIFA	4.5	Hirose	2400~2500 5150~5850	0.235 (2.4G) 0.394 (5G)	94	
5GHz							
Model No.	Antenna Type	Gain (dBi) < included cable loss>	Connector Type	Frequency range (MHz)	Cable Loss (dB)	Cable Length (mm)	
750353-00 (Main, Tx & Rx)	Loop	5.5	Hirose	2400~2500 5150~5850	0.082 (2.4G) 0.138 (5G)	33	
750330-00 (Aux ,Tx & Rx)	PIFA	5.5	Hirose	2400~2500 5150~5850	0.235 (2.4G) 0.394 (5G)	94	
Bluetooth							
Brand	Model	Antenna Type	Gain (dBi) < included cable loss>	Connector Type	Frequency range (MHz)		
TY	AH104F2650S1-T	Chip	-3.73	SMT	2400~2500		
RFID Antenna Spec.							
Brand	Model No.	Antenna Type	Gain (dBi) < included cable loss>	Connector Type	Frequency range (MHz)	Cable Loss (dB)	Cable Length (mm)
Auden	41-68888-05	YAGI	5	Hirose	902~928	0.304	185
Auden	41-68888-07	YAGI	5	Hirose	902~928	0.304	185

9. The Version of EUT information are as below:

Mobile Computer	OS Version	05.02.29217
	OEM Version	03.47.0002
Wireless(Fusion)	Part Number	31-FUSION-01
	Version	3.00.2.0.031R

10. The EUT could be supplied with a cradle, power adapter and battery as below table:

Cradle (not for sale together)	
Brand:	SYMBOL
Model No.:	CRD9000-1000
Part No.:	CRD9000-1001SR
Input power :	+12V ----- 9A
I/O Ports:	USB Port x 1 RS232 Port x 1
Associated Devices:	USB cable (unshielded, 1.8m with one core) USB cable (Part No.: 25-64396-01R) RJ-45 to RS232 cable (shielded, 1.85m with one core) RJ-45 to RS232 cable(Part No.: 25-63852-01R) Adapter (Part No.: 50-14000-148R)
Direct charging (Car Charger) (not for sale together)	
Brand:	SYMBOL
Part No.:	ADP9000-110R and ADP9000-100R
I/O Ports:	RS232 Port x 1
Associated Devices:	USB cable (shielded, 1.85m with one core) USB cable (Part No.: 25-62166-01R)
Adapter (for Cradle & Car Charger only, and not for sale together)	
Brand:	HIPRO
Model No.:	HP-O2040D43
Part No.:	50-14000-148R
Input power :	100-240V, 50-60Hz, 1.5A
Output power :	+12V ----- 3.33A DC output cable (unshielded, 1.8m with one core)
Battery	
Brand:	SYMBOL
Part No.:	21-65587-03
Rating:	7.4V, 2200mAh, 16.3Wh

11. The EUT incorporates a SISO function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX	1RX
802.11g	6 ~ 54Mbps	1TX	1RX
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	1TX	1RX

12. 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 5745 ~ 5825MHz:

5 channels are provided for 802.11a:

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE<1G	PLC	APCM	
A	√	√	-	-	EUT WITH MAIN ANTENNA
B	√	√	-	√	EUT WITH AUX. ANTENNA

Where **RE \geq 1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE:

1. The test mode was reference to the worst case in the original test report.
2. "-" means no effect.

Radiated Emission Test (Above 1GHz):

- ☒ 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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6

Radiated Emission Test (Below 1GHz):

- ☒ 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.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	149	OFDM	BPSK	6

Antenna Port Conducted 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, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6

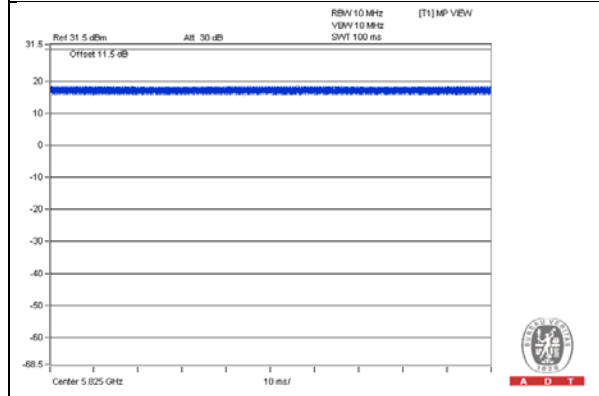
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE\geq1G	22deg. C, 63%RH	120Vac, 60Hz	JyunChun Lin
RE<1G	22deg. C, 63%RH	120Vac, 60Hz	JyunChun Lin
APCM	23deg. C, 63%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.

802.11a



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	Remark
A	NOTEBOOK COMOPUTER	DELL	PP27L	7YLB32S	FCC DoC	Provided by Lab
B	EARPHONE	Vxi	50-11300-050R	NA	NA	Supplied by Client
C	IPOD	Apple	MC749TA/A	CC4DMFJUDFDM	NA	Provided by Lab
D	CRADLE	Symbol	ADP9000-100R	NA	NA	Supplied by Client
E	ADAPTER	HIPRO	HP-O204D43	NA	NA	Supplied by Client

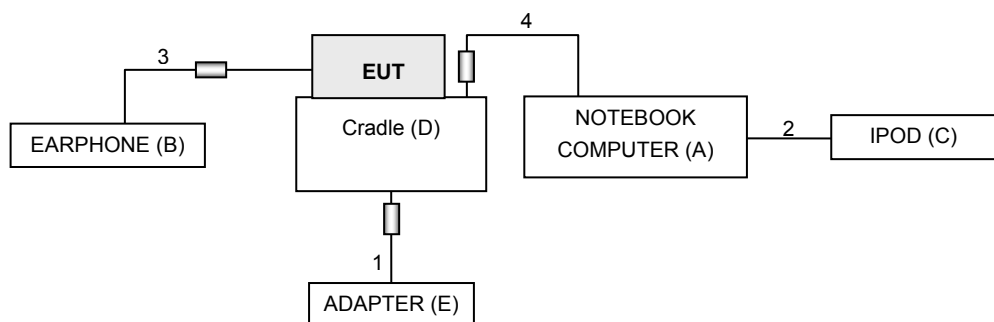
NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	DC	1	1.85	Yes	1	Supplied by client
2	Audio	1	0.1	No	0	Provided by Lab
3	Audio	1	1.1	No	1	Supplied by client
4	USB	1	1.8	Yes	1	Supplied by client

NOTE: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)

KDB 789033 D02 General UNII Test Procedure New Rules v01r01

ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedure New Rules v01r01	FIELD STRENGTH AT 3m	
	PK:74 (dBuV/m)	AV:54 (dBuV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBuV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) ^{*1} PK:-17 (dBm/MHz) ^{*2}	PK: 68.2(dBuV/m) ^{*1} PK:78.2 (dBuV/m) ^{*2}

NOTE: ^{*1} beyond 10MHz of the band edge ^{*2} within 10 MHz of band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \mu\text{V/m, where P is the eirp (Watts).}$$

4.1.2 Test Instruments

For below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY54450088	July 24, 2015	July 23, 2016
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-01	Nov. 11, 2015	Nov. 10, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 03, 2015	Apr. 02, 2016
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The FCC Site Registration No. is 292998
5. The CANADA Site Registration No. is 20331-2
6. Tested Date: Feb. 15, 2016

For above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY54450088	July 24, 2015	July 23, 2016
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A01922	Sep. 19, 2015	Sep. 18, 2016
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150318 150323 150324	Mar. 31, 2015	Mar. 30, 2016
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Spectrum Analyzer Agilent	E4446A	MY48250253	Dec. 22, 2015	Dec. 21, 2016
Power meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-S P-AR	MAA0812-008	Jan. 15, 2016	Jan. 14, 2017

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 966 Chamber No. 4.
3. The FCC Site Registration No. is 292998
4. The CANADA Site Registration No. is 20331-2
5. Tested Date: Feb. 17, 2016

4.1.3 Test Procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. 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 height of antenna 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

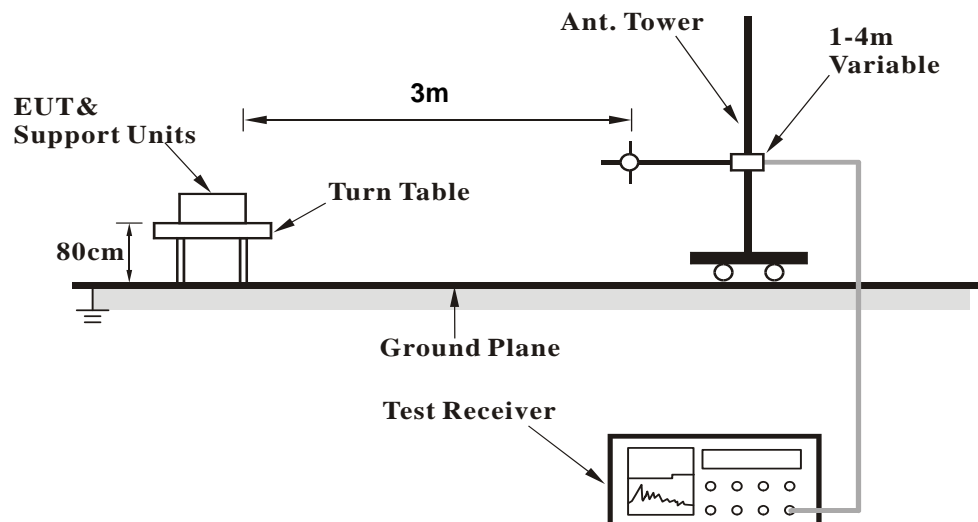
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

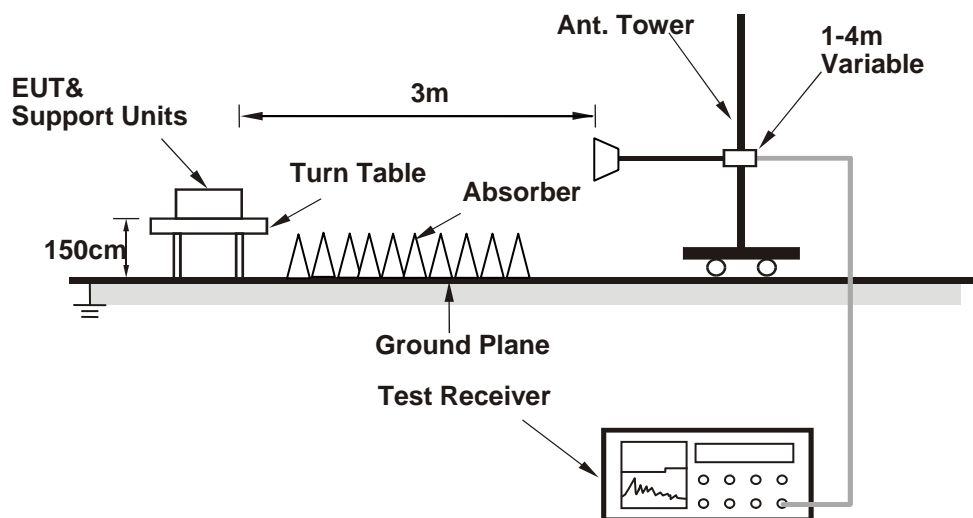
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Condition

1. Turn on the power of EUT.
2. The EUT run test program "CEcTxRx [1/1/09]" to enable EUT under transmission / receiver condition continuously at specific channel frequency.

4.1.7 Test Results (Mode 1)

Above 1GHz Data

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	64.2 PK	74.0	-9.8	1.53 H	93	62.53	1.67
2	#5715.00	49.3 AV	54.0	-4.7	1.53 H	93	47.63	1.67
3	#5725.00	71.8 PK	78.2	-6.4	1.53 H	93	70.12	1.68
4	*5745.00	101.8 PK			1.53 H	93	100.09	1.71
5	*5745.00	92.4 AV			1.53 H	93	90.69	1.71
6	11490.00	53.2 PK	74.0	-20.8	1.62 H	168	40.60	12.60
7	11490.00	40.5 AV	54.0	-13.5	1.62 H	168	27.90	12.60
8	#17235.00	57.0 PK	74.0	-17.0	1.70 H	155	39.45	17.55
9	#17235.00	44.2 AV	54.0	-9.8	1.70 H	155	26.65	17.55
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	66.3 PK	74.0	-7.7	2.26 V	168	64.63	1.67
2	#5715.00	51.2 AV	54.0	-2.8	2.26 V	168	49.53	1.67
3	#5725.00	73.9 PK	78.2	-4.3	2.26 V	168	72.22	1.68
4	*5745.00	108.1 PK			2.26 V	168	106.39	1.71
5	*5745.00	98.4 AV			2.26 V	168	96.69	1.71
6	11490.00	53.2 PK	74.0	-20.8	1.95 V	144	40.60	12.60
7	11490.00	40.2 AV	54.0	-13.8	1.95 V	144	27.60	12.60
8	#17235.00	56.4 PK	74.0	-17.6	2.01 V	150	38.85	17.55
9	#17235.00	43.8 AV	54.0	-10.2	2.01 V	150	26.25	17.55

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	55.8 PK	74.0	-18.2	1.55 H	86	54.13	1.67
2	#5715.00	43.2 AV	54.0	-10.8	1.55 H	86	41.53	1.67
3	*5785.00	102.8 PK			1.55 H	86	101.04	1.76
4	*5785.00	93.5 AV			1.55 H	86	91.74	1.76
5	#5860.00	55.7 PK	74.0	-18.3	1.55 H	86	53.93	1.77
6	#5860.00	42.1 AV	54.0	-11.9	1.55 H	86	40.33	1.77
7	11570.00	54.2 PK	74.0	-19.8	1.68 H	172	41.86	12.34
8	11570.00	41.3 AV	54.0	-12.7	1.68 H	172	28.96	12.34
9	#17355.00	56.8 PK	74.0	-17.2	1.73 H	159	38.63	18.17
10	#17355.00	44.2 AV	54.0	-9.8	1.73 H	159	26.03	18.17

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	58.0 PK	74.0	-16.0	2.28 V	156	56.33	1.67
2	#5715.00	45.3 AV	54.0	-8.7	2.28 V	156	43.63	1.67
3	*5785.00	109.1 PK			2.28 V	156	107.34	1.76
4	*5785.00	99.5 AV			2.28 V	156	97.74	1.76
5	#5860.00	57.9 PK	74.0	-16.1	2.28 V	156	56.13	1.77
6	#5860.00	44.2 AV	54.0	-9.8	2.28 V	156	42.43	1.77
7	11570.00	52.9 PK	74.0	-21.1	1.99 V	154	40.56	12.34
8	11570.00	40.4 AV	54.0	-13.6	1.99 V	154	28.06	12.34
9	#17355.00	55.6 PK	74.0	-18.4	2.07 V	160	37.43	18.17
10	#17355.00	43.2 AV	54.0	-10.8	2.07 V	160	25.03	18.17

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	102.0 PK			1.51 H	105	100.22	1.78
2	*5825.00	93.0 AV			1.51 H	105	91.22	1.78
3	#5850.00	69.5 PK	78.2	-8.7	1.51 H	105	67.73	1.77
4	#5860.00	64.0 PK	74.0	-10.0	1.51 H	105	62.23	1.77
5	#5860.00	48.4 AV	54.0	-5.6	1.51 H	105	46.63	1.77
6	11650.00	53.5 PK	74.0	-20.5	1.59 H	177	41.34	12.16
7	11650.00	40.5 AV	54.0	-13.5	1.59 H	177	28.34	12.16
8	#17475.00	56.5 PK	74.0	-17.5	1.66 H	157	37.76	18.74
9	#17475.00	43.9 AV	54.0	-10.1	1.66 H	157	25.16	18.74

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	108.3 PK			2.26 V	152	106.52	1.78
2	*5825.00	99.0 AV			2.26 V	152	97.22	1.78
3	#5850.00	71.5 PK	78.2	-6.7	2.26 V	152	69.73	1.77
4	#5860.00	66.1 PK	74.0	-7.9	2.26 V	152	64.33	1.77
5	#5860.00	50.5 AV	54.0	-3.5	2.26 V	152	48.73	1.77
6	11650.00	52.4 PK	74.0	-21.6	1.89 V	147	40.24	12.16
7	11650.00	39.8 AV	54.0	-14.2	1.89 V	147	27.64	12.16
8	#17475.00	56.6 PK	74.0	-17.4	1.97 V	135	37.86	18.74
9	#17475.00	43.8 AV	54.0	-10.2	1.97 V	135	25.06	18.74

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	399.18	30.7 QP	46.0	-15.3	1.00 H	50	36.21	-5.48
2	419.85	35.3 QP	46.0	-10.7	1.00 H	165	40.11	-4.81
3	491.90	33.8 QP	46.0	-12.2	2.00 H	137	36.94	-3.16
4	561.40	32.4 QP	46.0	-13.6	1.50 H	126	34.14	-1.77
5	630.10	34.1 QP	46.0	-11.9	1.50 H	184	34.16	-0.03
6	839.81	36.0 QP	46.0	-10.1	1.50 H	229	33.00	2.95
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.06	31.8 QP	40.0	-8.2	1.00 V	325	41.60	-9.78
2	111.85	27.2 QP	43.5	-16.3	1.50 V	43	38.45	-11.26
3	345.01	32.7 QP	46.0	-13.3	1.50 V	297	39.54	-6.83
4	419.95	30.2 QP	46.0	-15.8	1.00 V	196	34.96	-4.80
5	629.92	30.0 QP	46.0	-16.0	1.00 V	301	30.04	-0.03
6	839.73	33.4 QP	46.0	-12.6	1.50 V	33	30.44	2.95

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.1.8 Test Results (Mode 2)

Above 1GHz Data

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	66.1 PK	74.0	-7.9	1.84 H	79	64.43	1.67
2	#5715.00	51.3 AV	54.0	-2.7	1.84 H	79	49.63	1.67
3	#5725.00	74.6 PK	78.2	-3.6	1.84 H	79	72.92	1.68
4	*5745.00	108.0 PK			1.84 H	79	106.29	1.71
5	*5745.00	98.5 AV			1.84 H	79	96.79	1.71
6	11490.00	53.2 PK	74.0	-20.8	2.22 H	52	40.60	12.60
7	11490.00	40.4 AV	54.0	-13.6	2.22 H	52	27.80	12.60
8	#17235.00	56.9 PK	74.0	-17.1	2.15 H	255	39.35	17.55
9	#17235.00	44.0 AV	54.0	-10.0	2.15 H	255	26.45	17.55
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	60.7 PK	74.0	-13.3	1.79 V	53	59.03	1.67
2	#5715.00	46.4 AV	54.0	-7.6	1.79 V	53	44.73	1.67
3	#5725.00	69.7 PK	78.2	-8.5	1.79 V	53	68.02	1.68
4	*5745.00	103.4 PK			1.79 V	53	101.69	1.71
5	*5745.00	94.0 AV			1.79 V	53	92.29	1.71
6	11490.00	53.7 PK	74.0	-20.3	1.51 V	223	41.10	12.60
7	11490.00	40.9 AV	54.0	-13.1	1.51 V	223	28.30	12.60
8	#17235.00	56.8 PK	74.0	-17.2	1.51 V	196	39.25	17.55
9	#17235.00	43.9 AV	54.0	-10.1	1.51 V	196	26.35	17.55

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	58.1 PK	74.0	-15.9	1.84 H	86	56.43	1.67
2	#5715.00	45.1 AV	54.0	-8.9	1.84 H	86	43.43	1.67
3	*5785.00	109.3 PK			1.84 H	86	107.54	1.76
4	*5785.00	99.7 AV			1.84 H	86	97.94	1.76
5	#5860.00	58.3 PK	74.0	-15.7	1.84 H	86	56.53	1.77
6	#5860.00	44.5 AV	54.0	-9.5	1.84 H	86	42.73	1.77
7	11570.00	52.9 PK	74.0	-21.1	2.23 H	52	40.56	12.34
8	11570.00	40.3 AV	54.0	-13.7	2.23 H	52	27.96	12.34
9	#17355.00	56.1 PK	74.0	-17.9	2.16 H	266	37.93	18.17
10	#17355.00	43.6 AV	54.0	-10.4	2.16 H	266	25.43	18.17

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	52.8 PK	74.0	-21.2	1.82 V	40	51.13	1.67
2	#5715.00	41.4 AV	54.0	-12.6	1.82 V	40	39.73	1.67
3	*5785.00	104.7 PK			1.82 V	40	102.94	1.76
4	*5785.00	95.3 AV			1.82 V	40	93.54	1.76
5	#5860.00	53.9 PK	74.0	-20.1	1.82 V	40	52.13	1.77
6	#5860.00	42.4 AV	54.0	-11.6	1.82 V	40	40.63	1.77
7	11570.00	53.9 PK	74.0	-20.1	1.47 V	243	41.56	12.34
8	11570.00	41.0 AV	54.0	-13.0	1.47 V	243	28.66	12.34
9	#17355.00	57.0 PK	74.0	-17.0	1.54 V	205	38.83	18.17
10	#17355.00	44.2 AV	54.0	-9.8	1.54 V	205	26.03	18.17

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	108.8 PK			1.84 H	86	107.02	1.78
2	*5825.00	99.3 AV			1.84 H	86	97.52	1.78
3	#5850.00	71.8 PK	78.2	-6.4	1.84 H	86	70.03	1.77
4	#5860.00	65.6 PK	74.0	-8.4	1.84 H	86	63.83	1.77
5	#5860.00	50.1 AV	54.0	-3.9	1.84 H	86	48.33	1.77
6	11650.00	52.8 PK	74.0	-21.2	2.22 H	39	40.64	12.16
7	11650.00	40.2 AV	54.0	-13.8	2.22 H	39	28.04	12.16
8	#17475.00	56.7 PK	74.0	-17.3	2.20 H	270	37.96	18.74
9	#17475.00	44.0 AV	54.0	-10.0	2.20 H	270	25.26	18.74

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	104.2 PK			1.88 V	40	102.42	1.78
2	*5825.00	94.8 AV			1.88 V	40	93.02	1.78
3	#5850.00	66.8 PK	78.2	-11.4	1.88 V	40	65.03	1.77
4	#5860.00	60.3 PK	74.0	-13.7	1.88 V	40	58.53	1.77
5	#5860.00	44.8 AV	54.0	-9.2	1.88 V	40	43.03	1.77
6	11650.00	53.4 PK	74.0	-20.6	1.50 V	234	41.24	12.16
7	11650.00	40.7 AV	54.0	-13.3	1.50 V	234	28.54	12.16
8	#17475.00	56.5 PK	74.0	-17.5	1.52 V	201	37.76	18.74
9	#17475.00	43.7 AV	54.0	-10.3	1.52 V	201	24.96	18.74

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	398.94	30.8 QP	46.0	-15.2	1.00 H	13	36.32	-5.48
2	419.87	35.4 QP	46.0	-10.6	1.00 H	129	40.22	-4.80
3	491.89	33.9 QP	46.0	-12.1	2.00 H	134	37.06	-3.16
4	561.41	32.2 QP	46.0	-13.9	1.50 H	123	33.91	-1.76
5	630.11	34.3 QP	46.0	-11.7	1.50 H	150	34.36	-0.03
6	839.83	35.6 QP	46.0	-10.4	1.50 H	266	32.63	2.95
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.01	31.5 QP	40.0	-8.5	1.00 V	359	41.32	-9.79
2	111.87	26.9 QP	43.5	-16.6	1.50 V	5	38.14	-11.26
3	345.03	32.4 QP	46.0	-13.7	1.50 V	300	39.18	-6.83
4	419.96	30.4 QP	46.0	-15.7	1.00 V	238	35.15	-4.80
5	629.90	29.7 QP	46.0	-16.3	1.00 V	277	29.74	-0.03
6	839.76	33.2 QP	46.0	-12.8	1.50 V	9	30.23	2.95

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

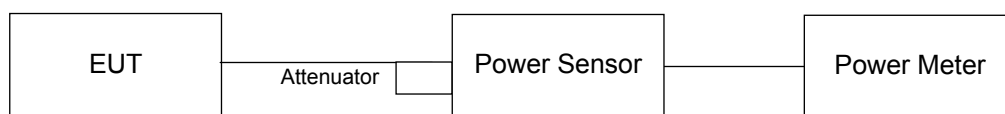
4.2 Transmit Power Measurement

4.2.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p \leq 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
		Mobile and Portable client device	250mW (24 dBm)
U-NII-2A			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Result

802.11a

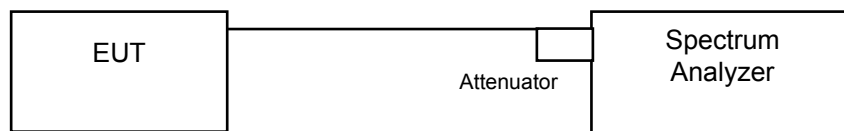
Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
149	5745	34.356	15.36	30	Pass
157	5785	35.481	15.50	30	Pass
165	5825	33.884	15.30	30	Pass

4.3 Peak Power Spectral Density Measurement

4.3.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
		Mobile and Portable client device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW \geq 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500 \text{ kHz}/300\text{kHz})$
5. Sweep time = auto, trigger set to "free run".
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value

4.3.5 Deviation from Test Standard

No deviation.

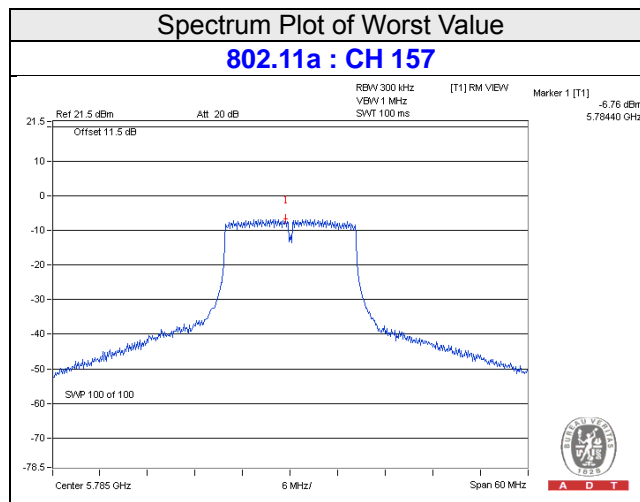
4.3.6 EUT Operating Condition

Same as Item 4.2.6.

4.3.7 Test Results

802.11a

Chan.	Chan. Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
149	5745	-6.77	-4.55	30	Pass
157	5785	-6.76	-4.54	30	Pass
165	5825	-7.03	-4.81	30	Pass

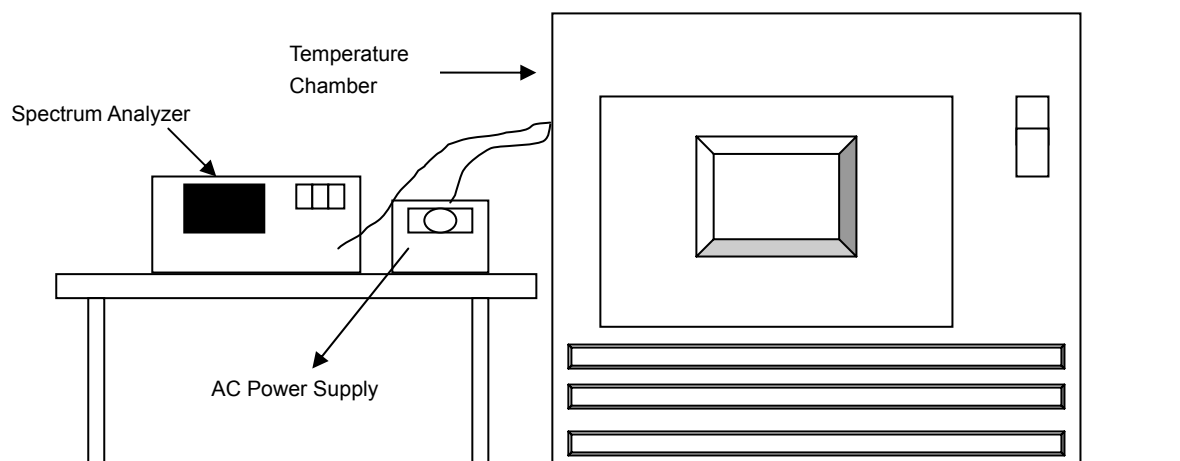


4.4 Frequency Stability Measurement

4.4.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.4.7 Test Results

FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5745MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5745.0173	0.00030	5745.0125	0.00022	5745.0158	0.00028	5745.015	0.00026
40	120	5744.977	-0.00040	5744.973	-0.00047	5744.9778	-0.00039	5744.9734	-0.00046
30	120	5744.9967	-0.00006	5744.9993	-0.00001	5744.997	-0.00005	5745	0.00000
20	120	5745.0174	0.00030	5745.0176	0.00031	5745.0193	0.00034	5745.0218	0.00038
10	120	5744.987	-0.00023	5744.9887	-0.00020	5744.987	-0.00023	5744.9861	-0.00024
0	120	5745.0087	0.00015	5745.006	0.00010	5745.0089	0.00015	5745.0093	0.00016
-10	120	5745.0284	0.00049	5745.0261	0.00045	5745.0293	0.00051	5745.0255	0.00044
-20	120	5745.0065	0.00011	5745.0076	0.00013	5745.0047	0.00008	5745.0035	0.00006
-30	120	5745.0064	0.00011	5745.0043	0.00007	5745.008	0.00014	5745.0084	0.00015

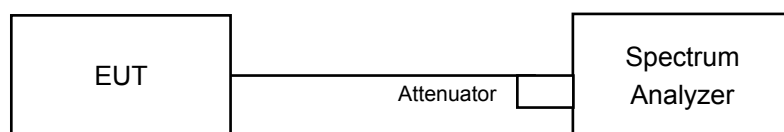
FREQUENCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5745MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5745.0175	0.00030	5745.0181	0.00032	5745.019	0.00033	5745.0218	0.00038
	120	5745.0174	0.00030	5745.0176	0.00031	5745.0193	0.00034	5745.0218	0.00038
	102	5745.0184	0.00032	5745.0173	0.00030	5745.02	0.00035	5745.0207	0.00036

4.5 6dB Bandwidth Measurement

4.5.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.5.5 Deviation from Test Standard

No deviation.

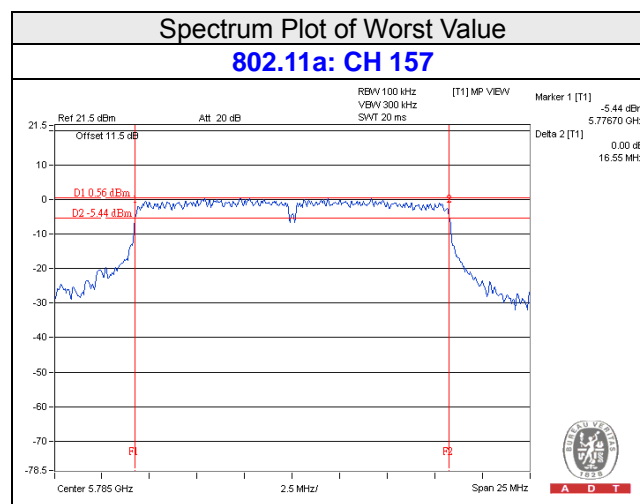
4.5.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	16.60	0.5	Pass
157	5785	16.55	0.5	Pass
165	5825	16.60	0.5	Pass



5 Pictures of Test Arrangements

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

Appendix – 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/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---