

FCC TEST REPORT

(Part 15, Subpart E)

Applicant:	Benq Corporation
Address:	16 Jihu Road, Neihu, Taipei 114, Taiwan

Manufacturer or Supplier:	Benq Corporation
Address:	16 Jihu Road, Neihu, Taipei 114, Taiwan
Product:	Digital Projector
Brand Name:	BenQ
Model Name:	GV1
Additional Model:	GV1+, TV1, TV533, TV200, P20033
FCC ID:	JVPGV1
Date of tests:	Sep. 14, 2018 ~ Oct. 12, 2018

The tests have been carried out according to the requirements of the following standard:

☒ **FCC Part 15, Subpart E, Section 15.407**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Roger Li Engineer / Mobile Department	Approved by Sam Tung Manager / Mobile Department
	
Date: Oct. 15, 2018	Date: Oct. 15, 2018

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**BUREAU
VERITAS**

Test Report No.: RF180913W005-3

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF180913W005-3	Original release	Oct. 15, 2018

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -11.05dB at 0.150000MHz.
15.407(b) (1/2/3/4/6)	Radiated Emission & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.39dB at 5150MHz.
15.407(a/1/2/3)	Maximum conducted output 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€	6 Db 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	No antenna connector is used.

1.1 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	2.66Db
Radiated emissions	9KHz ~ 30MHz	2.68Db
	30MHz ~ 1GMHz	3.26Db
	1GHz ~ 18GHz	4.48Db
	18GHz ~ 40GHz	4.12Db

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



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

EUT	Digital Projector
MODEL NO.	GV1
ADDITIONAL MODELS	GV1+, TV1, TV533, TV200, P20033
POWER SUPPLY	12Vdc (adapter or host equipment) 7.4Vdc (Li-ion, battery)
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to MCS7
OPERATING FREQUENCY	5180 ~ 5240MHz, 5745 ~ 5805MHz
NUMBER OF CHANNEL	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 5745 ~ 5805MHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
AVERAGE POWER	26.85mW for 5180 ~ 5240MHz 27.61smW for 5745 ~ 5805MHz
ANTENNA TYPE	FPC Antenna with 2.1dBi gain
HW VERSION	A175C
SW VERSION	v1.0.1
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB cable: non-shielded, detachable, 1.0meter

NOTE:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- The above models are identical except model number for marketing purpose.
- The EUT was powered by the following adapter:

ADAPTER	
BRAND:	FULLPOWER 
MODEL:	ICP30-120-2000
INPUT:	AC 100-240V, 800mA
OUTPUT:	DC 12V, 2000mA

- The EUT matched the following USB cable and remote control:

USB CABLE	
BRAND:	N/A
MODEL:	F.01.0401000127
SIGNAL LINE:	1.0 METER



REMOTE CONTROL	
BRAND:	BenQ
MODEL:	RCI014
OUTPUT:	DC 2.3 ~ 3.3V, 6 ~ 25mA
RANGE:	6.0 METER

5. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

MODULATION MODE	TX FUNCTION
802.11a	1TX/1RX
802.11n (20MHz)	1TX/1RX
802.11n (40MHz)	1TX/1RX

6. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.2 DESCRIPTION OF TEST MODES

FOR 5150 ~ 5250MHz

4 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

FOR 5725 ~ 5805MHz

5 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz		
157	5785 MHz		

2 channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755 MHz	159	5795 MHz

2.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	-	Powered by Adapter with wifi(5G) link
B	-	-	-	√	Powered by Battery with wifi(5G) link
C	-	-	-	-	Powered by USB with wifi(5G) link

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:

The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

NOTE: "-" 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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	MCS0
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	MCS0
A	802.11a	5725-5805	149 to 161	149, 157, 161	OFDM	BPSK	6.0
A	802.11n (20MHz)		149 to 161	149, 157, 161	OFDM	BPSK	MCS0
A	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	MCS0

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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11n (40MHz)	5180-5240	38 to 46	38	OFDM	BPSK	MCS0

POWER LINE CONDUCTED EMISSION TEST:

- ☒ 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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11n (40MHz)	5180-5240	38 to 46	38	OFDM	BPSK	MCS0

BANDEDGE MEASUREMENT:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	5180-5240	36 to 48	36, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)		36 to 48	36, 48	OFDM	BPSK	MCS0
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	MCS0
A	802.11a	5725-5805	149 to 161	149, 161	OFDM	BPSK	6.0
A	802.11n (20MHz)		149 to 161	149, 161	OFDM	BPSK	MCS0
A	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	MCS0

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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
B	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
B	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	MCS0
B	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	MCS0
B	802.11a	5725-5805	149 to 161	149, 161	OFDM	BPSK	6.0
B	802.11n (20MHz)		149 to 161	149, 161	OFDM	BPSK	MCS0
B	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	MCS0



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TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE<1G	23deg. C, 62%RH	DC 12V By Adapter	Jacky Liu
RE≥1G	23deg. C, 62%RH	DC 12V By Adapter	Jacky Liu
PLC	24deg. C, 61%RH	DC 12V By Adapter	John Wen
APCM	23.5deg. C, 60%RH	DC 7.4V By Battery	Rain Wang



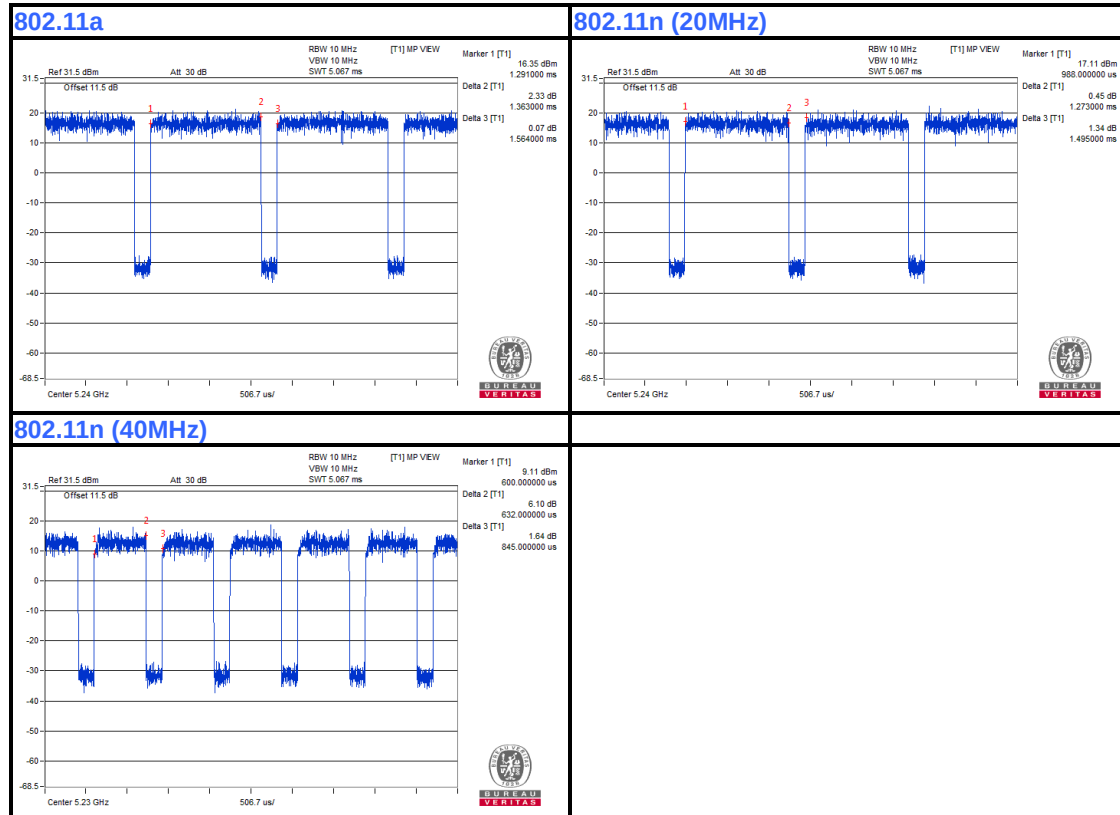
2.3 DUTY CYCLE OF TEST SIGNAL

Duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = $1.363/1.564 = 0.871$, Duty factor = $10 * \log(1/0.871) = 0.60$

802.11n (20MHz): Duty cycle = $1.273/1.495 = 0.852$, Duty factor = $10 * \log(1/0.852) = 0.70$

802.11n (40MHz): Duty cycle = $0.632/0.845 = 0.748$, Duty factor = $10 * \log(1/0.748) = 1.26$



2.4 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.

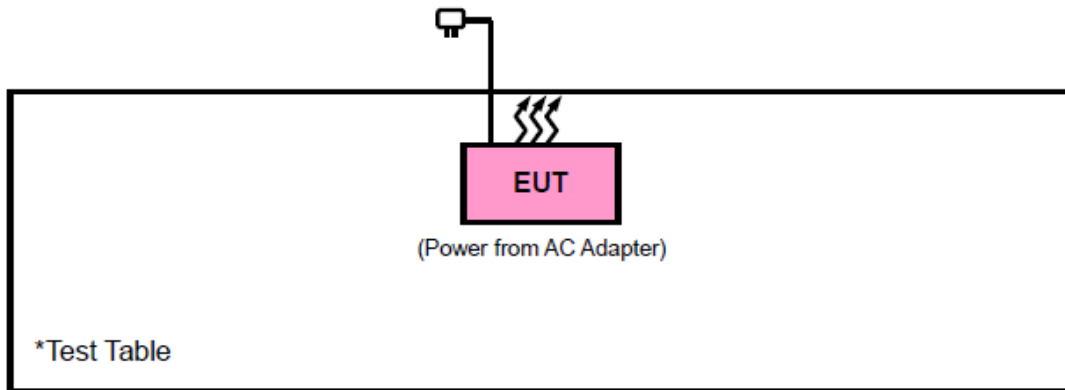
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	PC	HP	A6608CN	3CR83825X3	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 1.5m

NOTE:

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

2.4.1 CONFIGURATION OF SYSTEM UNDER TEST



2.5 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 Part 15, Subpart E (15.407)

KDB 789033 D02 General U-NII Test Procedures New Rules v02r01

ANSI C63.10-2013

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (Sdoc). The test report has been issued separately.

3 TEST TYPES AND RESULTS

3.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

3.1.1 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:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. 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.

3.1.2 LIMITS OF UNWANTED EMISSION

RESTRICTED BANDS	APPLICABLE TO	LIMIT	
	789033 D02 General UNII Test Procedures New Rules v01r04	FIELD STRENGTH AT 3m (dBµV/m)	
		PK : 74	AV : 54
OUT OF THE RESTRICTED BANDS	APPLICABLE TO	EIRP LIMIT (dBm/MHz)	EQUIVALENT FIELD STRENGTH AT 3m (dBµV/m)
	15.407(b)(1)	PK : -27	PK : 68.3
	15.407(b)(2)		
	15.407(b)(3)		
	15.407(b)(4)	See note 2 (FCC 16-24)	

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

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

2. All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.



3.1.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Apr. 21,18	Apr. 20,19
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Nov. 26,16	Nov. 25,18
Horn Antenna	ETS-LINDGREN	3117	00168728	Nov. 26,16	Nov. 25,18
Loop antenna	Daze	ZN30900A	0708	Nov. 20,17	Nov. 19,18
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Dec. 16,16	Dec. 15,18
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	ADT	ADT_Radiated V7.6.15.9.2	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SMA	1505	Jul. 09,18	Jul. 08,19
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 16,18	Mar. 15,19
Signal Pre-Amplifier	EMSI	EMC 9135	980249	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	Jul. 09,18	Jul. 08,19
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Jul. 09,18	Jul. 08,19

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 3m Chamber.
3. The FCC Site Registration No. is 525120.

3.1.4 TEST PROCEDURES

- 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 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 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

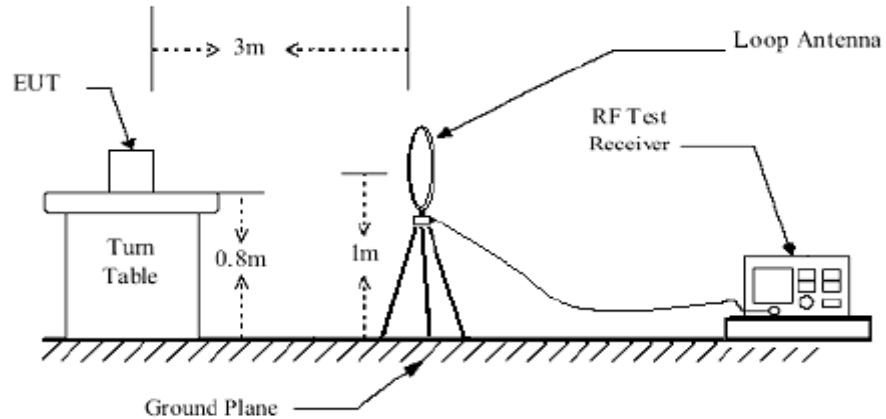
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

3.1.5 DEVIATION FROM TEST STANDARD

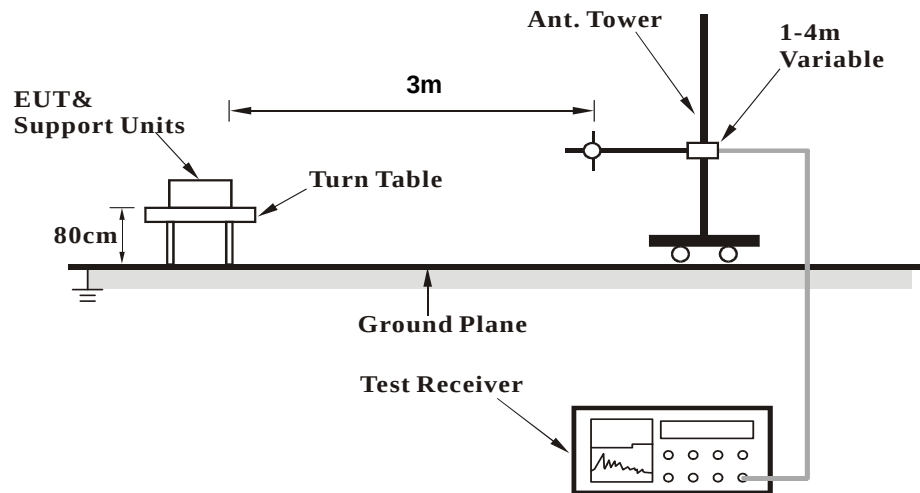
No deviation.

3.1.6 TEST SETUP

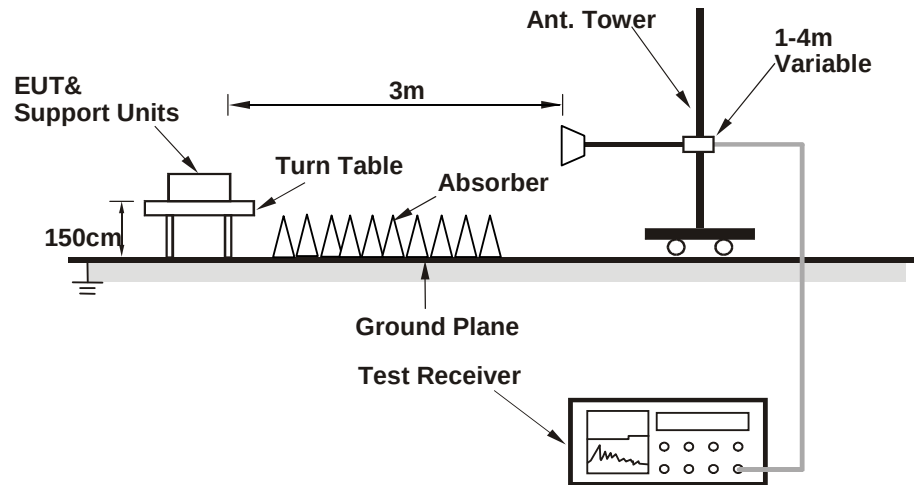
< Frequency Range below 30MHz >



< Frequency Range 30MHz~1GHz >



<Frequency Range above 1GHz>



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

3.1.7 EUT OPERATING CONDITION

- Set the EUT under full load condition and placed them on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the EUT in full functions.



3.1.8 TEST RESULTS

BELOW 1GHz WORST-CASE DATA:

9 KHz – 30 MHz data: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

30 MHz – 1 GHz data:

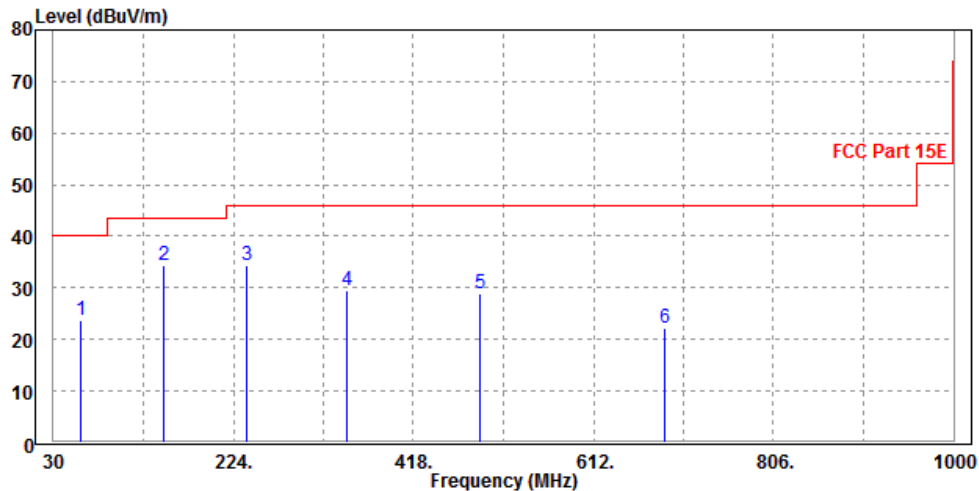
802.11n (40MHz)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
60.31	23.8	53.52	40	-16.2	6.42	1.18	37.32	100	248	QP
148.67	34.37	60.26	43.5	-9.13	9.04	1.87	36.8	100	15	QP
238.76	34.46	56.71	46	-11.54	11.88	2.39	36.52	100	31	QP
345.96	29.52	48.27	46	-16.48	14.93	2.92	36.6	100	222	QP
489.65	29.05	44.28	46	-16.95	18.28	3.43	36.94	100	289	QP
689.54	22.22	32.51	46	-23.78	22.81	4.25	37.35	100	321	QP

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



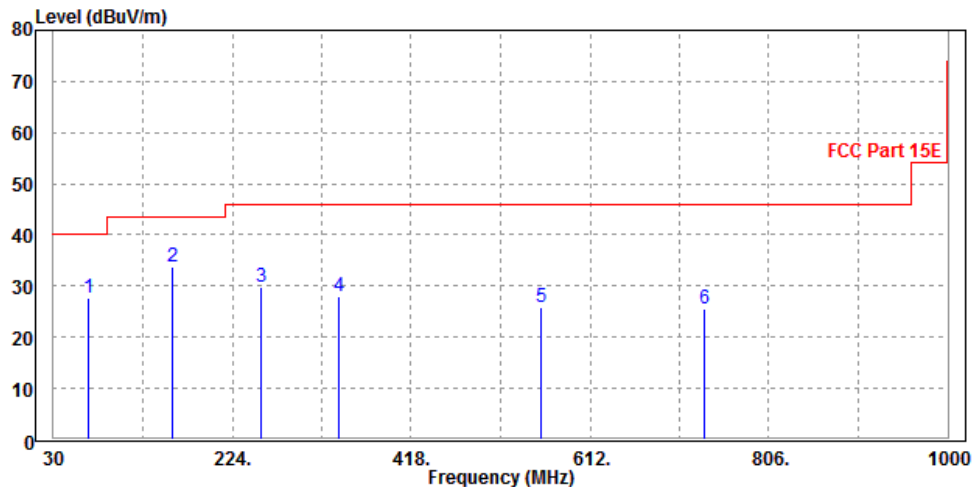


CHANNEL	Channel 38	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
68.59	27.68	56.85	40	-12.32	6.83	1.27	37.27	100	124	QP
158.48	33.88	58.66	43.5	-9.62	10.05	1.92	36.75	100	302	QP
254.58	29.77	51.37	46	-16.23	12.45	2.47	36.52	100	196	QP
340.4	28.1	47.1	46	-17.9	14.7	2.89	36.59	100	269	QP
558.64	25.86	39.7	46	-20.14	19.51	3.78	37.13	100	33	QP
735.58	25.6	35.57	46	-20.4	23.06	4.42	37.45	100	114	QP

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.





ABOVE 1GHz WORST-CASE DATA:

Note: For higher frequency, the emission is too low to be detected.

Band 1

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	50.71	55.02	54	-3.29	34.48	7.42	46.21	100	8	Average
5150	61.63	65.94	74	-12.37	34.48	7.42	46.21	100	8	Peak
5180	96.3	100.57			34.52	7.43	46.22	100	8	Average
5180	108.74	113.01			34.52	7.43	46.22	100	8	Peak
5350	47.29	51.35	54	-6.71	34.72	7.47	46.25	100	8	Average
5350	58.47	62.53	74	-15.53	34.72	7.47	46.25	100	8	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	50.25	54.56	54	-3.75	34.48	7.42	46.21	100	290	Average
5150	59.24	63.55	74	-14.76	34.48	7.42	46.21	100	290	Peak
5180	93.97	98.24			34.52	7.43	46.22	100	290	Average
5180	108.16	112.43			34.52	7.43	46.22	100	290	Peak
5350	45.48	49.54	54	-8.52	34.72	7.47	46.25	130	255	Average
5350	57.45	61.51	74	-16.55	34.72	7.47	46.25	100	290	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5180MHz: Fundamental frequency.



**BUREAU
VERITAS**

Test Report No.: RF180913W005-3

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	46.5	50.81	54	-7.5	34.48	7.42	46.21	100	18	Average
5150	55.88	60.19	74	-18.12	34.48	7.42	46.21	100	18	Peak
5200	92.33	96.58			34.54	7.43	46.22	100	18	Average
5200	102.96	107.21			34.54	7.43	46.22	100	18	Peak
5350	47.41	51.47	54	-6.59	34.72	7.47	46.25	100	18	Average
5350	57.57	61.63	74	-16.43	34.72	7.47	46.25	100	18	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	45.48	49.79	54	-8.52	34.48	7.42	46.21	100	295	Average
5150	55.82	60.13	74	-18.18	34.48	7.42	46.21	100	295	Peak
5200	93.93	98.18			34.54	7.43	46.22	100	295	Average
5200	103.35	107.6			34.54	7.43	46.22	100	295	Peak
5350	46.47	50.53	54	-7.53	34.72	7.47	46.25	100	295	Average
5350	57.55	61.61	74	-16.45	34.72	7.47	46.25	100	295	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5200MHz: Fundamental frequency.



CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	47.45	51.76	54	-6.55	34.48	7.42	46.21	100	20	Average
5150	57.88	62.19	74	-16.12	34.48	7.42	46.21	100	20	Peak
5240	92.36	96.56			34.59	7.44	46.23	100	20	Average
5240	102.94	107.14			34.59	7.44	46.23	100	20	Peak
5350	46.23	50.29	54	-7.77	34.72	7.47	46.25	100	20	Average
5350	56.77	60.83	74	-17.23	34.72	7.47	46.25	100	20	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	46.42	50.73	54	-7.58	34.48	7.42	46.21	100	292	Average
5150	57.25	61.56	74	-16.75	34.48	7.42	46.21	100	292	Peak
5240	92.97	97.17			34.59	7.44	46.23	100	292	Average
5240	104.58	108.78			34.59	7.44	46.23	100	292	Peak
5350	45.35	49.41	54	-8.65	34.72	7.47	46.25	100	292	Average
5350	56.72	60.78	74	-17.28	34.72	7.47	46.25	100	292	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5240MHz: Fundamental frequency.



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Test Report No.: RF180913W005-3

802.11n (20MHz)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	51.46	55.77	54	-2.54	34.48	7.42	46.21	100	25	Average
5150	61.91	66.22	74	-12.09	34.48	7.42	46.21	100	25	Peak
5180	92.45	96.72			34.52	7.43	46.22	100	25	Average
5180	103.58	107.85			34.52	7.43	46.22	100	25	Peak
5350	47.58	51.64	54	-6.42	34.72	7.47	46.25	100	25	Average
5350	58.49	62.55	74	-15.51	34.72	7.47	46.25	100	25	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	50.51	54.82	54	-3.49	34.48	7.42	46.21	100	295	Average
5150	61.36	65.67	74	-12.64	34.48	7.42	46.21	100	295	Peak
5180	93.52	97.79			34.52	7.43	46.22	100	295	Average
5180	104.28	108.55			34.52	7.43	46.22	100	295	Peak
5350	46.47	50.53	54	-7.53	34.72	7.47	46.25	100	295	Average
5350	57.75	61.81	74	-16.25	34.72	7.47	46.25	100	295	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5180MHz: Fundamental frequency.



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	45.54	49.85	54	-8.46	34.48	7.42	46.21	100	20	Average
5150	56.22	60.53	74	-17.78	34.48	7.42	46.21	100	20	Peak
5200	93.06	97.31			34.54	7.43	46.22	100	20	Average
5200	102.32	106.57			34.54	7.43	46.22	100	20	Peak
5350	46.52	50.58	54	-7.48	34.72	7.47	46.25	100	20	Average
5350	57.3	61.36	74	-16.7	34.72	7.47	46.25	100	20	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	45.57	49.88	54	-8.43	34.48	7.42	46.21	100	290	Average
5150	55.76	60.07	74	-18.24	34.48	7.42	46.21	100	290	Peak
5200	91.9	96.15			34.54	7.43	46.22	100	290	Average
5200	103.23	107.48			34.54	7.43	46.22	100	290	Peak
5350	46.6	50.66	54	-7.4	34.72	7.47	46.25	100	290	Average
5350	58.9	62.96	74	-15.1	34.72	7.47	46.25	100	290	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5200MHz: Fundamental frequency.



CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	46.5	50.81	54	-7.5	34.48	7.42	46.21	100	26	Average
5150	57.64	61.95	74	-16.36	34.48	7.42	46.21	100	26	Peak
5240	90.96	95.16			34.59	7.44	46.23	100	26	Average
5240	101.85	106.05			34.59	7.44	46.23	100	26	Peak
5350	46.26	50.32	54	-7.74	34.72	7.47	46.25	100	26	Average
5350	57.87	61.93	74	-16.13	34.72	7.47	46.25	100	26	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	46.51	50.82	54	-7.49	34.48	7.42	46.21	100	300	Average
5150	55.96	60.27	74	-18.04	34.48	7.42	46.21	100	300	Peak
5240	90.97	95.17			34.59	7.44	46.23	100	300	Average
5240	102.35	106.55			34.59	7.44	46.23	100	300	Peak
5350	47.31	51.37	54	-6.69	34.72	7.47	46.25	100	300	Average
5350	58.29	62.35	74	-15.71	34.72	7.47	46.25	100	300	Peak

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
- 5240MHz: Fundamental frequency.



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Test Report No.: RF180913W005-3

802.11n (40MHz)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	52.62	56.93	54	-1.38	34.48	7.42	46.21	100	18	Average
5150	63.32	67.63	74	-10.68	34.48	7.42	46.21	100	18	Peak
5190	85.52	89.78			34.53	7.43	46.22	100	18	Average
5190	97.65	101.91			34.53	7.43	46.22	100	18	Peak
5350	45.51	49.57	54	-8.49	34.72	7.47	46.25	100	18	Average
5350	56.68	60.74	74	-17.32	34.72	7.47	46.25	100	18	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	51.7	56.01	54	-2.3	34.48	7.42	46.21	100	292	Average
5150	60.14	64.45	74	-13.86	34.48	7.42	46.21	100	292	Peak
5190	85.2	89.46			34.53	7.43	46.22	100	292	Average
5190	95.65	99.91			34.53	7.43	46.22	100	292	Peak
5350	45.73	49.79	54	-8.27	34.72	7.47	46.25	100	292	Average
5350	55.65	59.71	74	-18.35	34.72	7.47	46.25	100	292	Peak

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
- 5190MHz: Fundamental frequency.



CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	46.4	50.71	54	-7.6	34.48	7.42	46.21	100	25	Average
5150	57.55	61.86	74	-16.45	34.48	7.42	46.21	100	25	Peak
5230	90.82	95.03			34.58	7.44	46.23	100	25	Average
5230	101.93	106.14			34.58	7.44	46.23	100	25	Peak
5350	46.96	51.02	54	-7.04	34.72	7.47	46.25	100	25	Average
5350	58.4	62.46	74	-15.6	34.72	7.47	46.25	100	25	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5150	47.47	51.78	54	-6.53	34.48	7.42	46.21	100	290	Average
5150	57.47	61.78	74	-16.53	34.48	7.42	46.21	100	290	Peak
5230	92.03	96.24			34.58	7.44	46.23	100	290	Average
5230	103	107.21			34.58	7.44	46.23	100	290	Peak
5350	46.46	50.52	54	-7.54	34.72	7.47	46.25	100	290	Average
5350	57.54	61.6	74	-16.46	34.72	7.47	46.25	100	290	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5230MHz: Fundamental frequency.



**BUREAU
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Test Report No.: RF180913W005-3

Band 4

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5745	89.35	90.23			37.55	7.75	46.18	154	67	Average
5745	101.37	102.25			37.55	7.75	46.18	154	67	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5745	92.79	93.67			37.55	7.75	46.18	200	113	Average
5745	102.79	103.67			37.55	7.75	46.18	200	113	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5745MHz: Fundamental frequency.



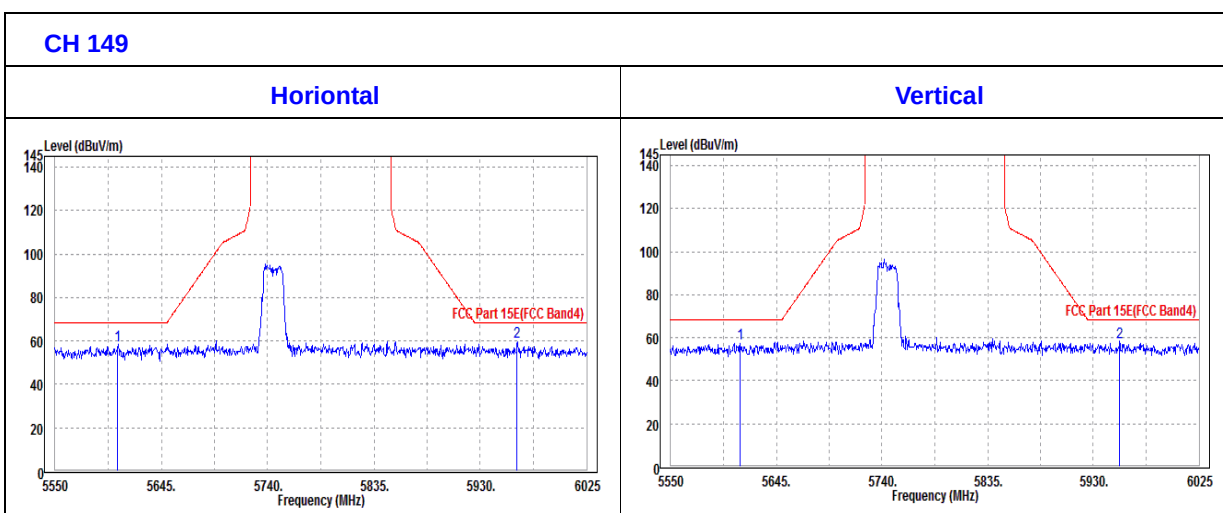
**BUREAU
VERITAS**

Test Report No.: RF180913W005-3

OOBE DATA

802.11a

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5605.89	57.98	59.13	68.3	-10.32	37.46	7.61	46.22	154	67	Peak
5962.97	59.54	60.01	68.3	-8.76	37.68	7.97	46.12	154	67	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5612.51	57.48	58.62	68.3	-10.82	37.47	7.61	46.22	154	67	Peak
5953.75	57.98	58.47	68.3	-10.32	37.67	7.96	46.12	154	67	Peak





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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5785	91.03	91.84			37.57	7.79	46.17	200	77	Average
5785	105.18	105.99			37.57	7.79	46.17	200	77	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5785	91.7	92.51			37.57	7.79	46.17	200	188	Average
5785	103.42	104.23			37.57	7.79	46.17	200	188	Peak

REMARKS:

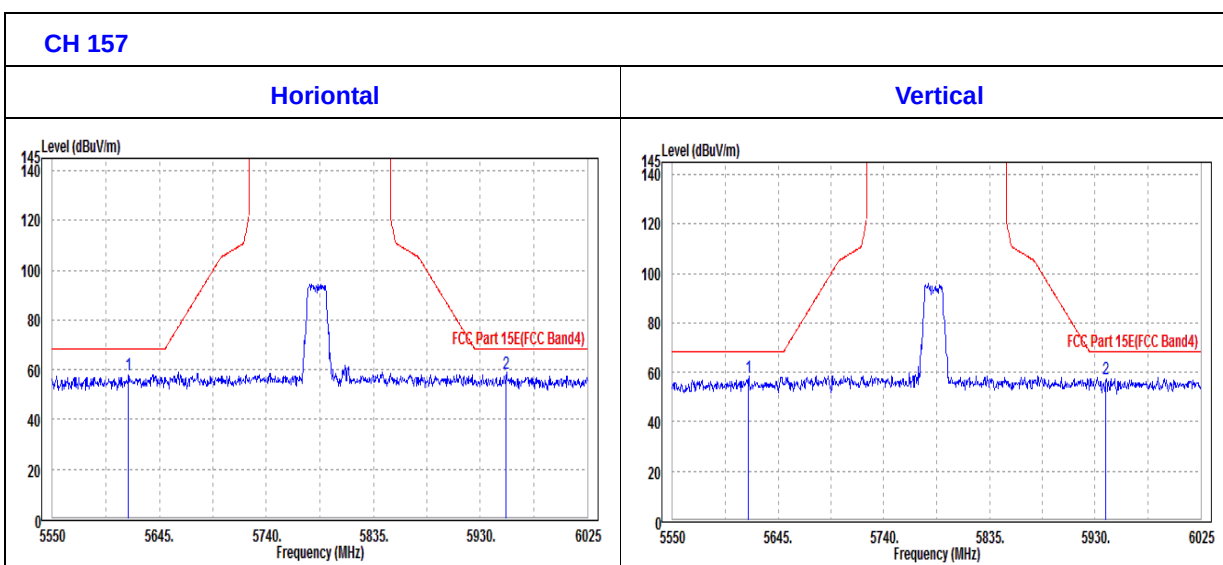
1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5785MHz: Fundamental frequency.



OOBE DATA

802.11a

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5617.26	57.99	59.12	68.3	-10.31	37.47	7.62	46.22	154	67	Peak
5952.87	58.69	59.18	68.3	-9.61	37.67	7.96	46.12	154	67	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5617.95	58.02	59.15	68.3	-10.28	37.47	7.62	46.22	154	67	Peak
5939.58	57.38	57.9	68.3	-10.92	37.66	7.95	46.13	154	67	Peak





CHANNEL	TX Channel 161	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5805	91.72	92.49			37.58	7.81	46.16	100	50	Average
5805	101.76	102.53			37.58	7.81	46.16	100	50	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5805	92.1	92.87			37.58	7.81	46.16	100	75	Average
5805	103.05	103.82			37.58	7.81	46.16	100	75	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5805MHz: Fundamental frequency.



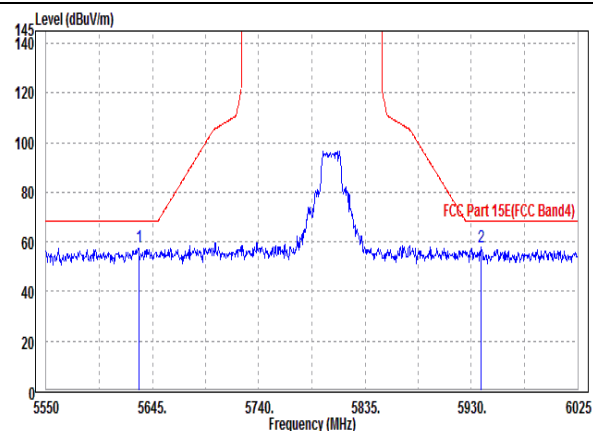
OOBE DATA

802.11a

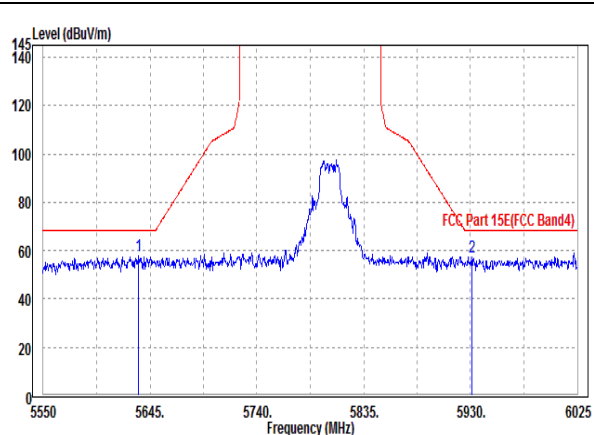
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5632.79	57.77	58.86	68.3	-10.53	37.48	7.64	46.21	100	10	Peak
5938.79	57.67	58.19	68.3	-10.63	37.66	7.95	46.13	100	10	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5634.89	57.86	58.95	68.3	-10.44	37.48	7.64	46.21	100	80	Peak
5930.95	57.61	58.14	68.3	-10.69	37.66	7.94	46.13	100	80	Peak

CH 161

Horizontal



Vertical





802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5745	90.87	91.75			37.55	7.75	46.18	154	67	Average
5745	101.7	102.58			37.55	7.75	46.18	154	67	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5745	90.11	90.99			37.55	7.75	46.18	200	113	Average
5745	101.59	102.47			37.55	7.75	46.18	200	113	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5745MHz: Fundamental frequency.



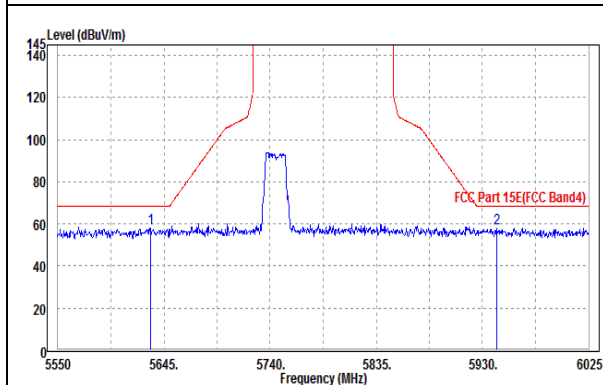
OOBE DATA

802.11n (20MHZ)

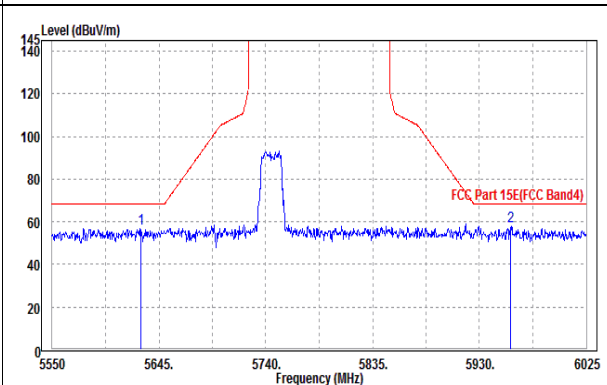
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5632.65	58.12	59.21	68.3	-10.18	37.48	7.64	46.21	100	81	Peak
5942.58	57.84	58.35	68.3	-10.46	37.67	7.95	46.13	100	81	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5628.65	56.91	58.01	68.3	-11.39	37.48	7.63	46.21	100	81	Peak
5957.86	57.63	58.11	68.3	-10.67	37.67	7.97	46.12	100	81	Peak

CH 149

Horizontal



Vertical





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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5785	88.93	89.74			37.57	7.79	46.17	200	77	Average
5785	101.12	101.93			37.57	7.79	46.17	200	77	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5785	92.53	93.34			37.57	7.79	46.17	200	188	Average
5785	102.16	102.97			37.57	7.79	46.17	200	188	Peak

REMARKS:

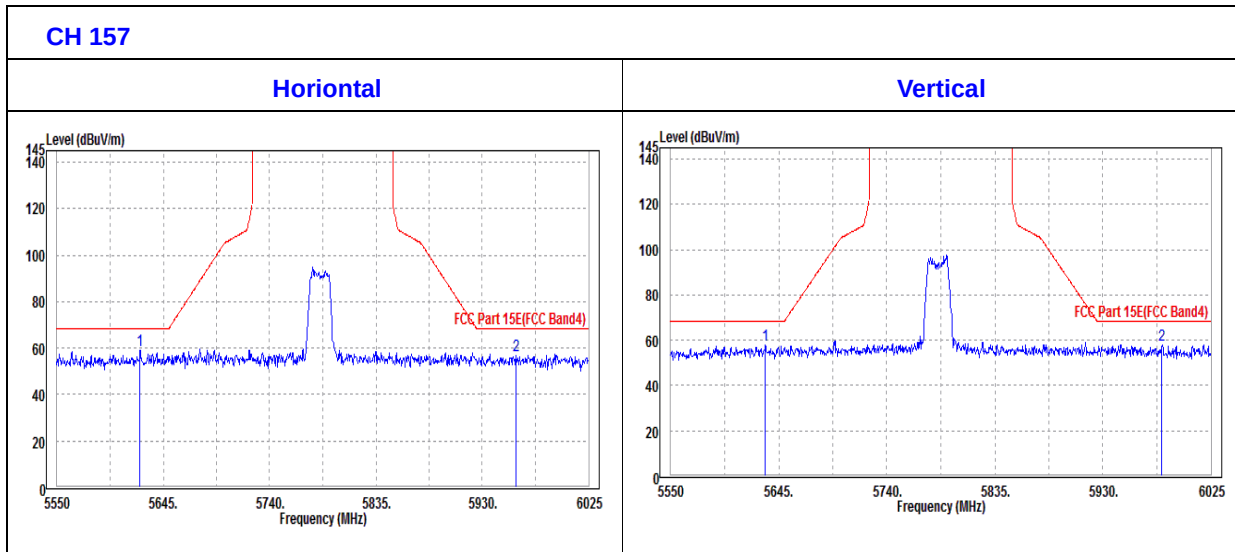
1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5785MHz: Fundamental frequency.



OUBE DATA

802.11n (20MHZ)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5623.85	58.98	60.1	68.3	-9.32	37.47	7.63	46.22	200	77	Peak
5960.12	56.8	57.27	68.3	-11.5	37.68	7.97	46.12	200	77	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5633.13	58.04	59.13	68.3	-10.26	37.48	7.64	46.21	200	77	Peak
5981.98	58.05	58.49	68.3	-10.25	37.69	7.99	46.12	200	77	Peak





CHANNEL	TX Channel 161	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5805	92.92	93.69			37.58	7.81	46.16	143	25	Average
5805	101.64	102.41			37.58	7.81	46.16	143	25	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5805	91.48	92.25			37.58	7.81	46.16	100	72	Average
5805	102.68	103.45			37.58	7.81	46.16	100	72	Peak

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
- 5805MHz: Fundamental frequency.



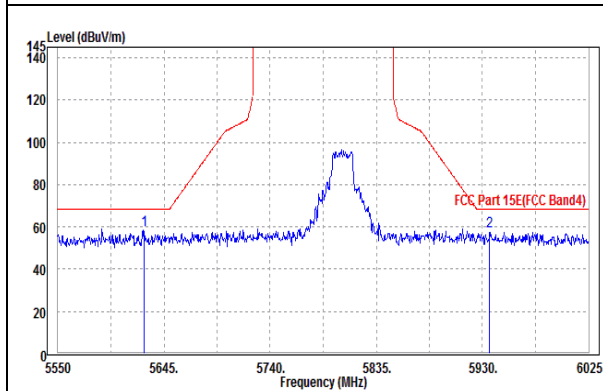
OOBE DATA

802.11n (20MHZ)

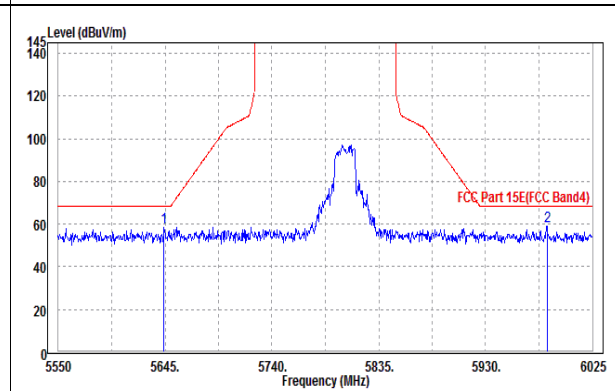
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5626.89	58.47	59.57	68.3	-9.83	37.48	7.63	46.21	143	32	Peak
5936.35	57.62	58.14	68.3	-10.68	37.66	7.95	46.13	143	32	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5643.86	58.18	59.25	68.3	-10.12	37.49	7.65	46.21	100	21	Peak
5984.58	58.84	59.27	68.3	-9.46	37.69	7.99	46.11	100	21	Peak

CH 161

Horizontal



Vertical





802.11n (40MHz)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5755	91.82	92.69			37.55	7.76	46.18	200	113	Average
5755	100.32	101.19			37.55	7.76	46.18	200	113	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5755	91.82	92.69			37.55	7.76	46.18	200	113	Average
5755	100.32	101.19			37.55	7.76	46.18	200	113	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 5755MHz: Fundamental frequency.



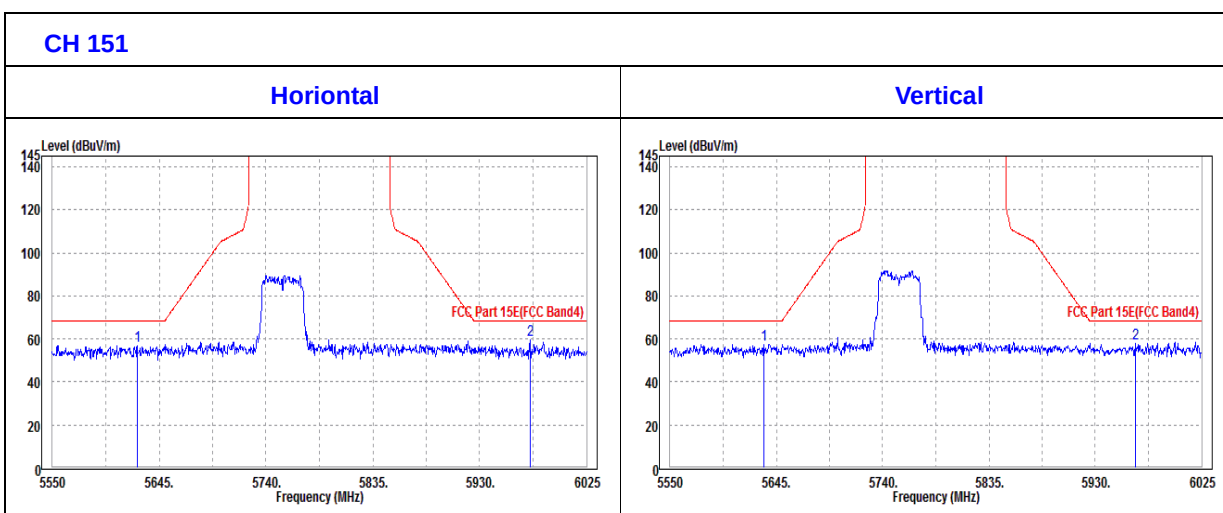
**BUREAU
VERITAS**

Test Report No.: RF180913W005-3

Oobe Data

802.11n (40MHz)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5625.53	56.72	57.82	68.3	-11.58	37.48	7.63	46.21	154	67	Peak
5974.96	59.67	60.13	68.3	-8.63	37.68	7.98	46.12	154	67	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5634.08	57.46	58.55	68.3	-10.84	37.48	7.64	46.21	154	67	Peak
5965.85	57.78	58.24	68.3	-10.52	37.68	7.98	46.12	154	67	Peak





CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5795	89.72	90.51			37.58	7.8	46.17	197	108	Average
5795	102.69	103.48			37.58	7.8	46.17	197	108	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5795	92.24	93.03			37.58	7.8	46.17	200	188	Average
5795	101.27	102.06			37.58	7.8	46.17	200	188	Peak

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
- 5795MHz: Fundamental frequency.



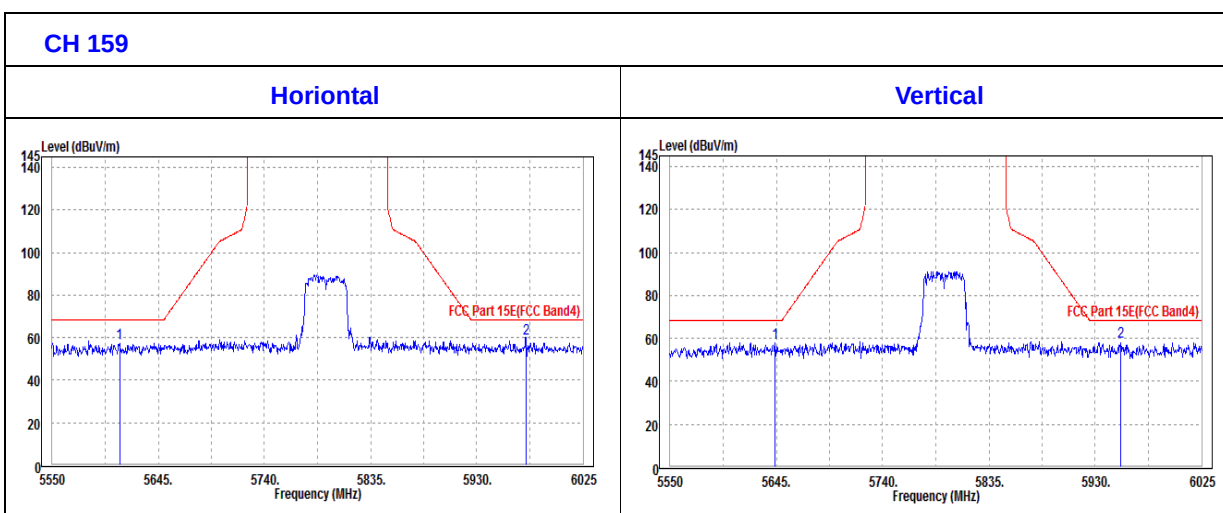
**BUREAU
VERITAS**

Test Report No.: RF180913W005-3

Oobe Data

802.11n (40MHz)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5610.33	57.53	58.67	68.3	-10.77	37.47	7.61	46.22	154	67	Peak
5974.21	59.7	60.16	68.3	-8.6	37.68	7.98	46.12	154	67	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB /m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
5643.89	57.7	58.77	68.3	-10.6	37.49	7.65	46.21	154	67	Peak
5952.57	58.27	58.76	68.3	-10.03	37.67	7.96	46.12	154	67	Peak



3.2 CONDUCTED EMISSION MEASUREMENT

3.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR3	101900	Mar. 15,18	Mar. 14,19
EMC32 test software	Rohde&Schwarz	EMC32	NA	NA	NA
LISN network	Rohde&Schwarz	ENV216	101922	Mar. 15,18	Mar. 14,19

- NOTE:**
1. The test was performed in CE shielded room.
 2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

3.2.3 TEST PROCEDURES

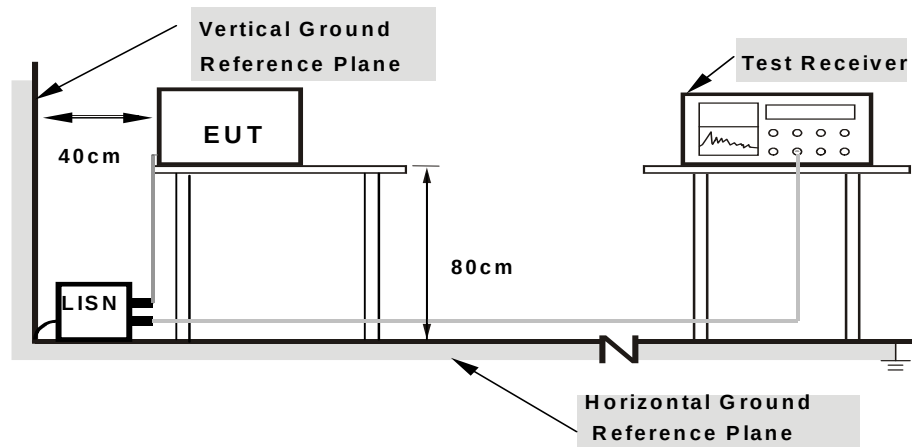
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

3.2.4 DEVIATION FROM TEST STANDARD

No deviation.

3.2.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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

3.2.6 EUT OPERATING CONDITIONS

Same as 3.1.6.



3.2.7 TEST RESULTS

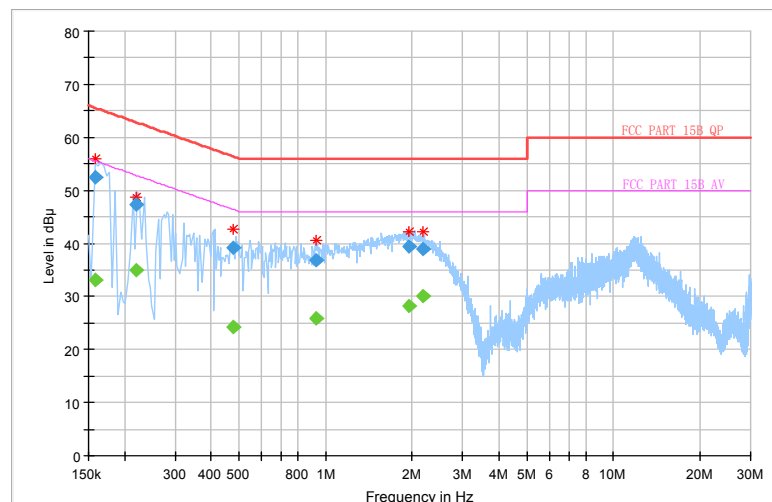
CONDUCTED WORST-CASE DATA :

Frequency Range	150KHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	24Vac, 43Hz	Environmental Conditions	24deg. C, 55RH
Tested By	John Wen	TEST DATE	2018/09/21

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.158000	---	33.06	55.57	-22.51	L1	ON	9.6
0.158000	52.56	---	65.57	-13.01	L1	ON	9.6
0.220000	---	34.88	52.82	-17.94	L1	ON	9.7
0.220000	47.28	---	62.82	-15.54	L1	ON	9.7
0.480000	---	24.23	46.34	-22.11	L1	ON	9.7
0.480000	39.12	---	56.34	-17.22	L1	ON	9.7
0.932000	---	25.92	46.00	-20.08	L1	ON	9.7
0.932000	36.84	---	56.00	-19.16	L1	ON	9.7
1.948000	---	28.30	46.00	-17.70	L1	ON	9.7
1.948000	39.33	---	56.00	-16.67	L1	ON	9.7
2.188000	---	29.99	46.00	-16.01	L1	ON	9.7
2.188000	38.84	---	56.00	-17.16	L1	ON	9.7

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.

Full Spectrum

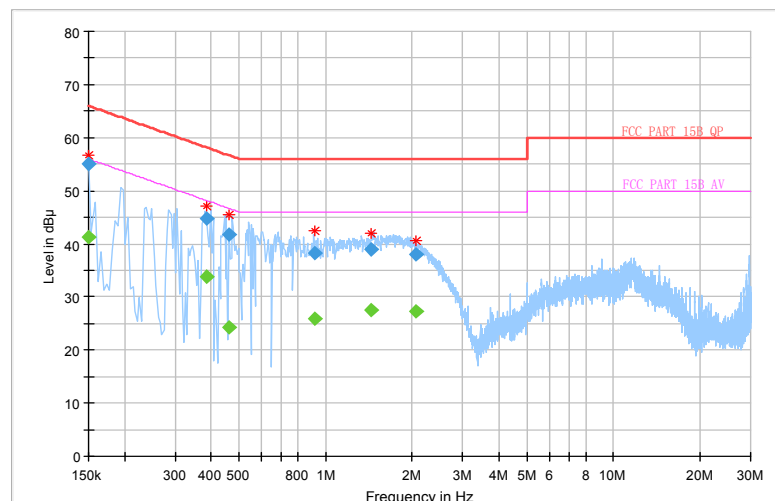


Frequency Range	150KHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	24Vac, 43Hz	Environmental Conditions	24deg. C, 55RH
Tested By	John Wen	TEST DATE	2018/09/21

Frequency (MHz)	QuasiPeak (dBUV)	CAverage (dBUV)	Limit (dBUV)	Margin (dB)	Line	Filter	Corr. (dB)
0.150000	---	41.39	56.00	-14.61	N	ON	9.8
0.150000	54.95	---	66.00	-11.05	N	ON	9.8
0.384000	---	33.84	48.19	-14.35	N	ON	10.1
0.384000	44.87	---	58.19	-13.32	N	ON	10.1
0.460000	---	24.26	46.69	-22.43	N	ON	10.1
0.460000	41.71	---	56.69	-14.98	N	ON	10.1
0.920000	---	26.00	46.00	-20.00	N	ON	9.9
0.920000	38.28	---	56.00	-17.72	N	ON	9.9
1.440000	---	27.50	46.00	-18.50	N	ON	9.9
1.440000	38.88	---	56.00	-17.12	N	ON	9.9
2.068000	---	27.19	46.00	-18.81	N	ON	9.8
2.068000	37.99	---	56.00	-18.01	N	ON	9.8

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value = Emission level - Limit value
 5. Correction factor = Insertion loss + Cable loss
 6. Emission Level = Correction Factor + Reading Value.

Full Spectrum



3.3 MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

3.3.1 LIMITS OF MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

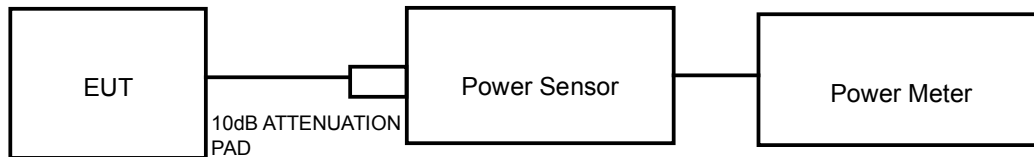
Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Client devices	250mW (24 dBm)
U-NII-3	√		1 Watt (30 dBm)

NOTE: Where B is the 26dB emission bandwidth in MHz.

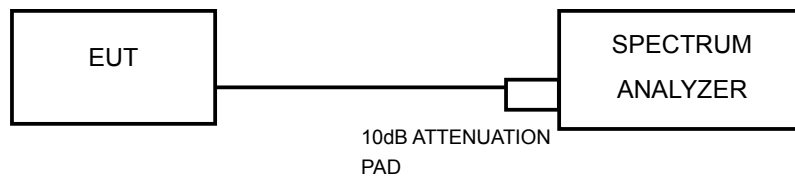
3.3.2 TEST SETUP

FOR POWER OUTPUT MEASUREMENT

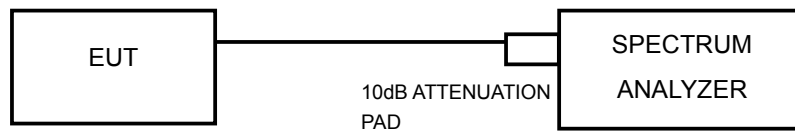
802.11a, 802.11n (20MHz), 802.11n (40MHz) TEST CONFIGURATION



11ac TEST CONFIGURATION



FOR 26dB BANDWIDTH



3.3.3 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Power Meter	ANRITSU	ML2495A	1506002	Mar. 02,18	Mar. 01,19
EXA Signal Analyzer	KEYSIGHT	N9010A-526	MY54510523	Mar. 16,18	Mar. 15,19
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510332	Mar. 16,18	Mar. 15,19
Power Sensor	ANRITSU	MA2411B	1339352	Mar. 16,18	Mar. 15,19

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.

3.3.4 TEST PROCEDURE

FOR POWER MEASUREMENT

For 802.11a, 802.11n (20MHz), 802.11n (40MHz)

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.

For 802.11ac (80MHz)

1. Measure the duty cycle, x , of the transmitter output signal as described in II.B.
2. Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
3. Set RBW = 1 MHz.
4. Set VBW $\geq$ 3 MHz.
5. Number of points in sweep $\geq 2 \times \text{span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
6. Sweep time = auto.
7. Detector = power averaging (rms), if available. Otherwise, use sample detector mode.
8. Do not use sweep triggering. Allow the sweep to “free run.”
9. Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.
10. Add $10 \log (1/x)$, where x is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add $10 \log (1/0.25) = 6 \text{ dB}$ if the duty cycle is 25%.

FOR 99 PERCENT OCCUPIED BANDWIDTH

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW $\geq 3 \cdot$ RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

FOR 26dB BANDWIDTH

- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

FOR 6dB BANDWIDTH

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3.3.5 DEVIATION FROM TEST STANDARD

No deviation.

3.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



3.3.7 TEST RESULTS

OUTPUT POWER:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVERAGE POWER (mW)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	14.01	25.18	24	PASS
40	5200	14.05	25.41	24	PASS
48	5240	14.06	25.47	24	PASS
149	5745	14.17	26.12	30	PASS
157	5785	14.19	26.24	30	PASS
161	5805	14.37	27.35	30	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVERAGE POWER (mW)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	14.24	26.55	24	PASS
40	5200	14.17	26.12	24	PASS
48	5240	14.18	26.18	24	PASS
149	5745	14.16	26.06	30	PASS
157	5785	14.01	25.18	30	PASS
161	5805	14.27	26.73	30	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVERAGE POWER (mW)	POWER LIMIT (dBm)	PASS/FAIL
38	5190	14.29	26.85	24	PASS
46	5230	14.16	26.06	24	PASS
151	5755	14.09	25.64	30	PASS
159	5795	14.41	27.61	30	PASS

99% OCCUPIED BANDWIDTH & 26dB BANDWIDTH/6dB BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	26dB BANDWIDTH (MHz)	PASS/FAIL
36	5180	17.04	26.71	PASS
40	5200	17.04	25.06	PASS
48	5240	17.04	21.97	PASS
CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	6dB BANDWIDTH (MHz)	PASS/FAIL
149	5745	18.90	16.26	PASS
157	5785	19.92	16.56	PASS
161	5805	18.96	17.53	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	26dB BANDWIDTH (MHz)	PASS/FAIL
36	5180	18.12	26.72	PASS
40	5200	18.18	29.65	PASS
48	5240	18.12	23.50	PASS
CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	6dB BANDWIDTH (MHz)	PASS/FAIL
149	5745	18.24	17.59	PASS
157	5785	18.18	17.56	PASS
161	5805	18.24	17.58	PASS

802.11n (40MHz)

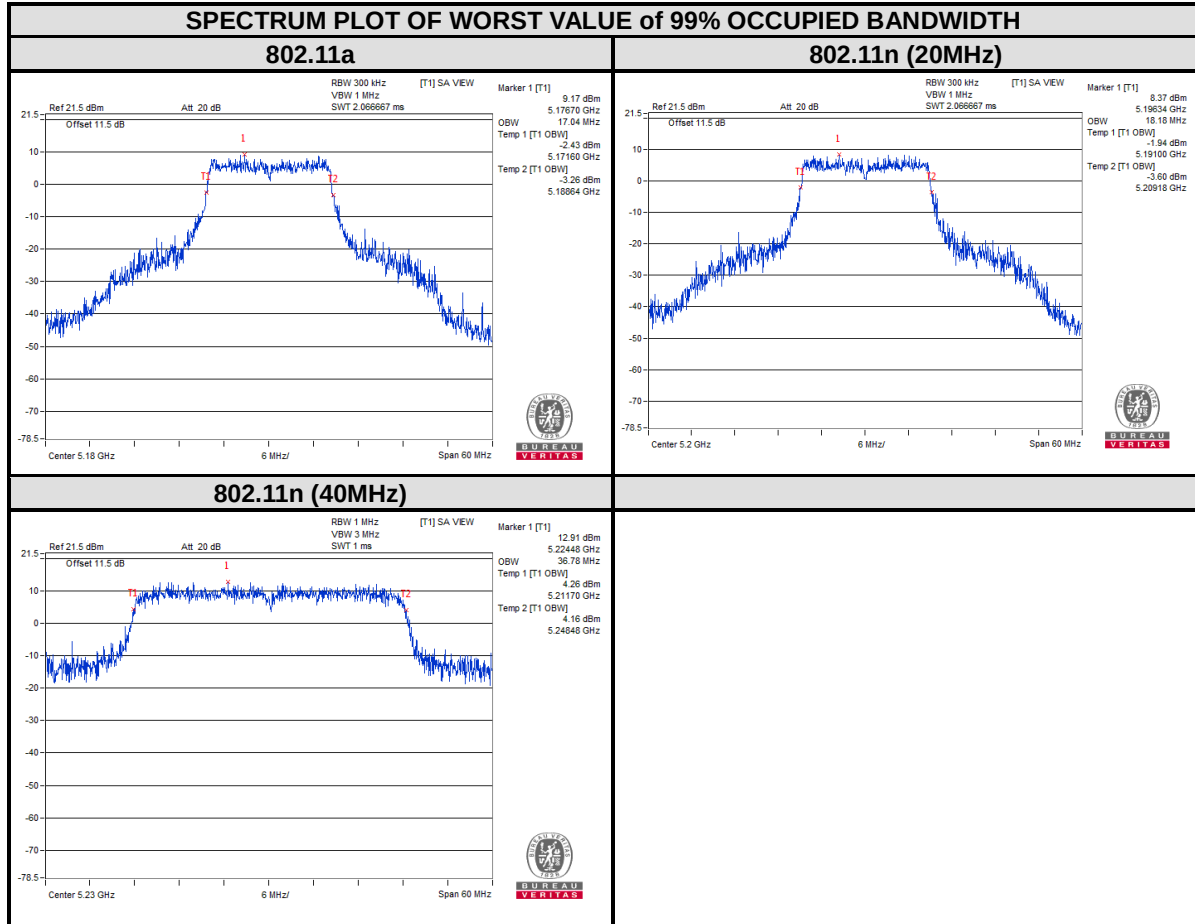
CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	26dB BANDWIDTH (MHz)	PASS/FAIL
38	5190	36.84	66.95	PASS
46	5230	36.78	75.14	PASS
CHANNEL	CHANNEL FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH	6dB BANDWIDTH (MHz)	PASS/FAIL
151	5755	44.16	36.12	PASS
159	5795	40.02	35.16	PASS



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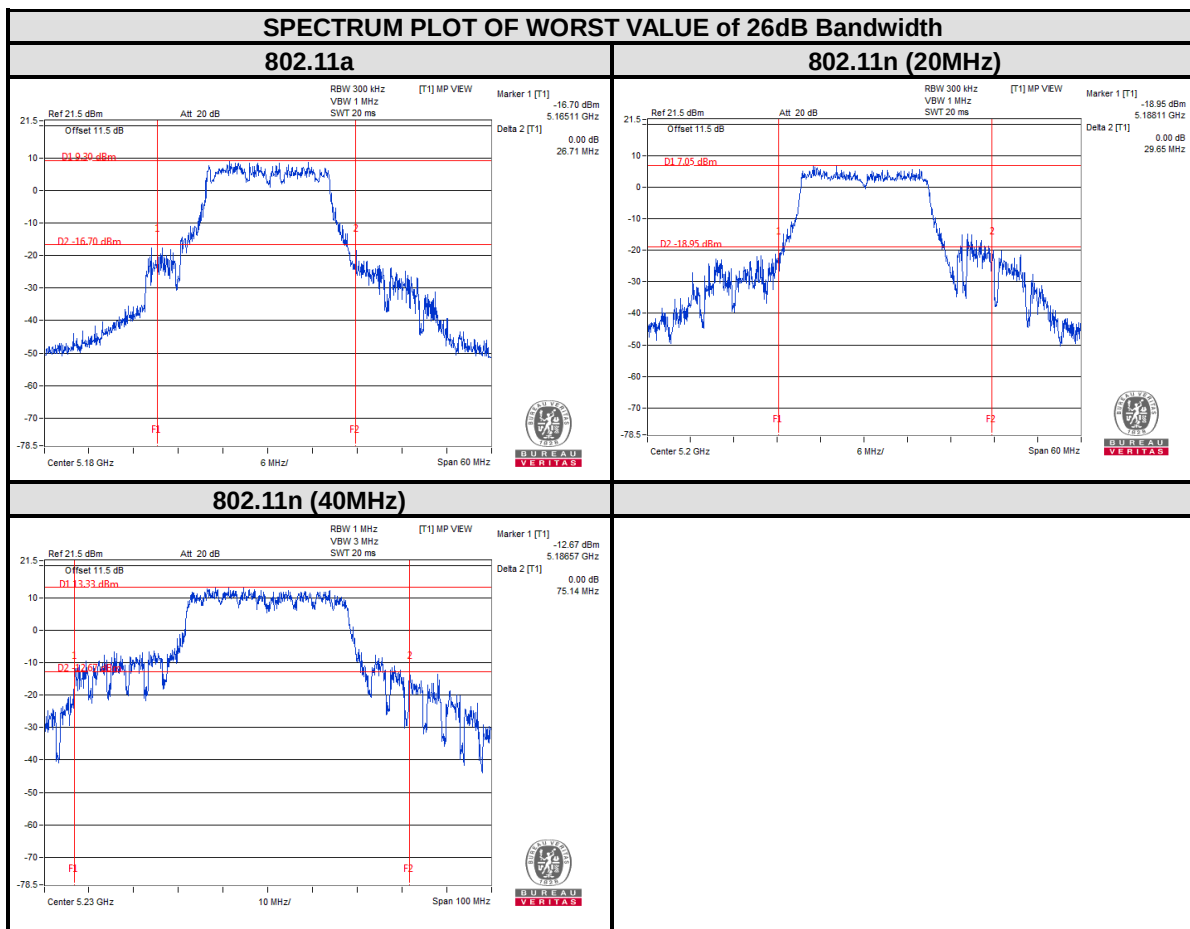
For U-NII-1:





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Test Report No.: RF180913W005-3

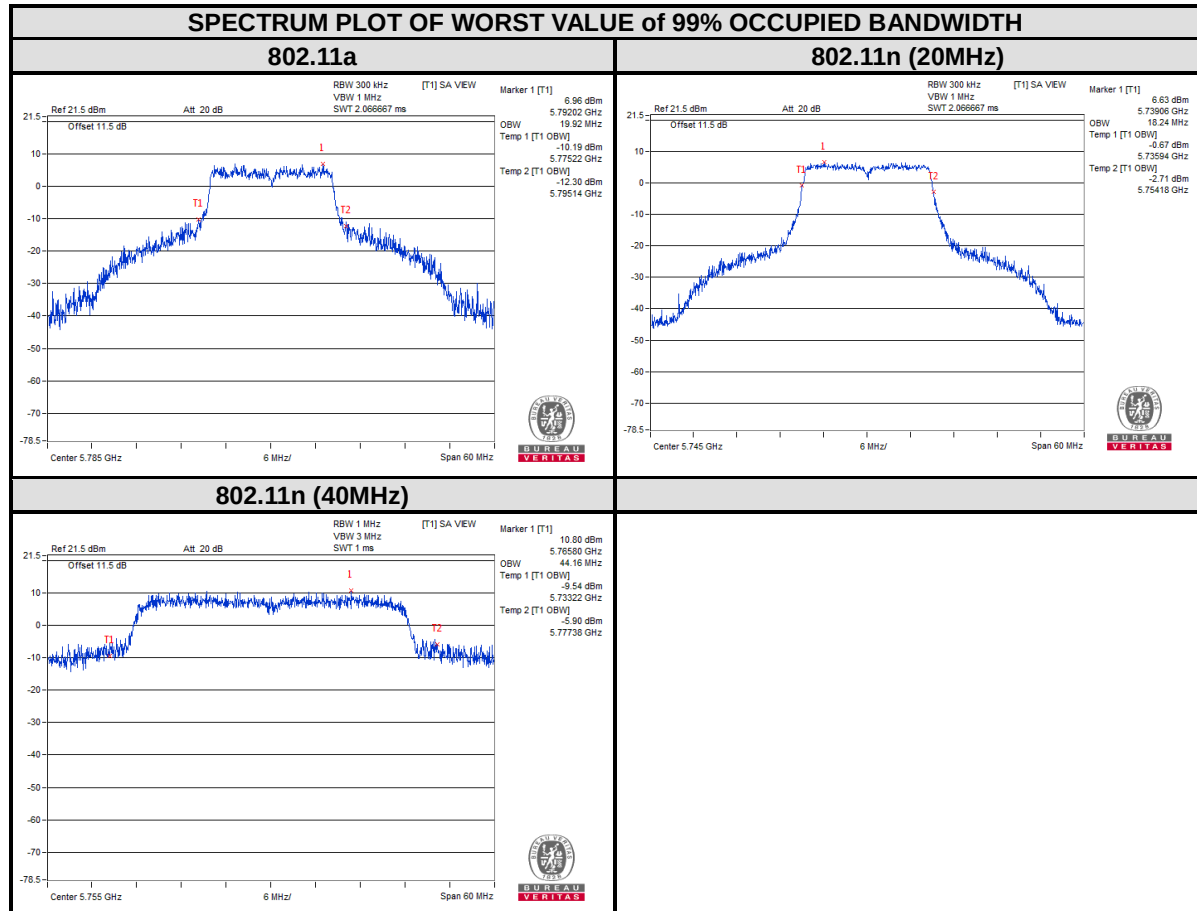




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Test Report No.: RF180913W005-3

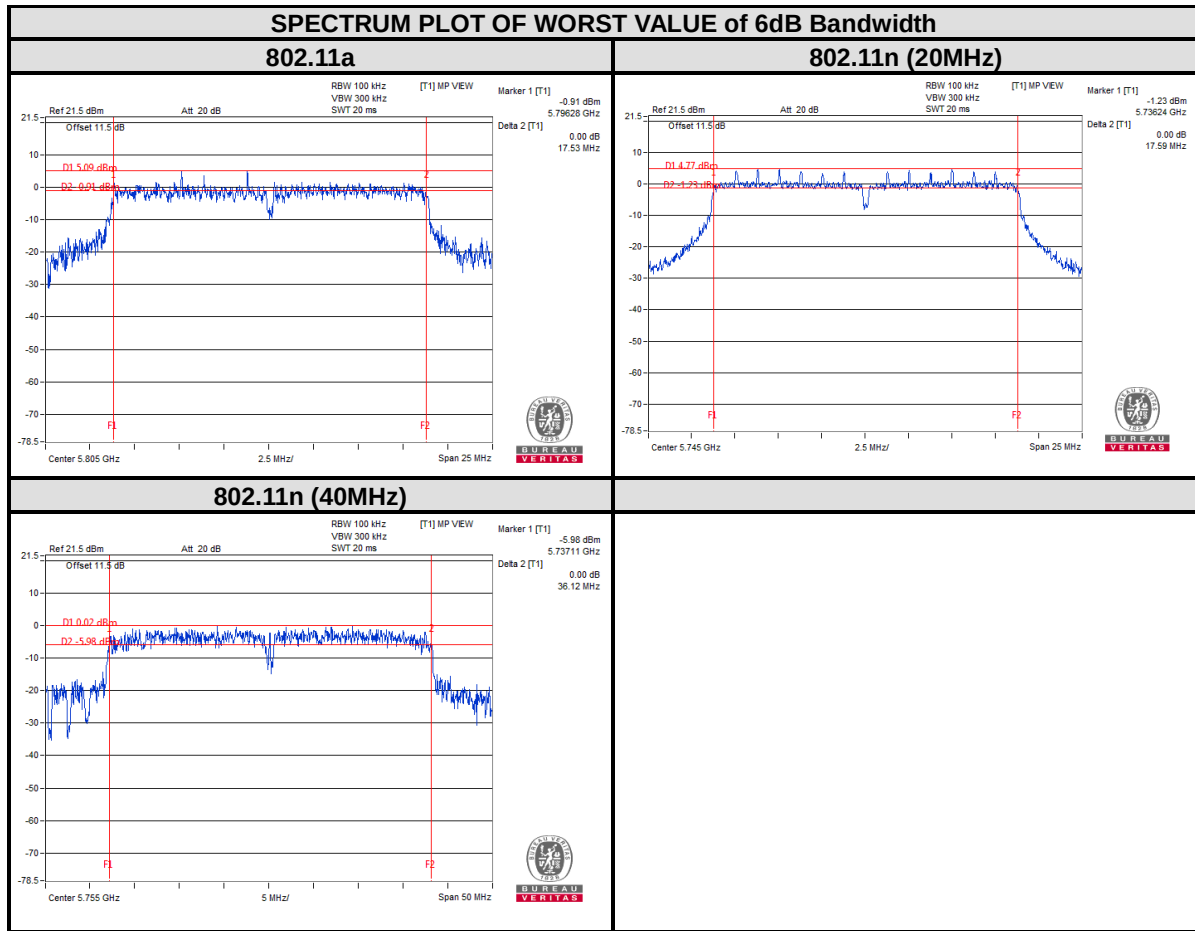
For U-NII-3:





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Test Report No.: RF180913W005-3

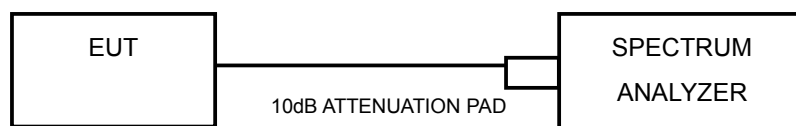


3.4 MAXIMUM POWER SPECTRAL DENSITY MEASUREMENT

3.4.1 LIMITS OF MAXIMUM 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	
	√	Client devices	11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

3.4.2 TEST SETUP



3.4.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

3.4.4 TEST PROCEDURES

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 1 MHz, Set VBW $\geq$ 3 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission).
- 7) Record the max value

3.4.5 DEVIATION FROM TEST STANDARD

No deviation.

3.4.6 EUT OPERATING CONDITIONS

Same as 3.1.6.

3.4.7 TEST RESULTS

For U-NII-1 :

802.11a

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	Duty Factor	PSD with Duty Factor (dBm/MHz)	MAXIMUM LIMIT (dBm/MHz)	PASS/FAIL
36	5180	1.89	0.60	2.49	11	PASS
40	5200	0.80	0.60	1.40	11	PASS
48	5240	2.37	0.60	2.97	11	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	Duty Factor	PSD with Duty Factor (dBm/MHz)	MAXIMUM LIMIT (dBm/MHz)	PASS/FAIL
36	5180	2.05	0.70	2.75	11	PASS
40	5200	2.08	0.70	2.78	11	PASS
48	5240	2.46	0.70	3.16	11	PASS

802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	Duty Factor	PSD with Duty Factor (dBm/MHz)	MAXIMUM LIMIT (dBm/MHz)	PASS/FAIL
38	5190	-1.53	1.26	-0.27	11	PASS
46	5230	-1.55	1.26	-0.29	11	PASS



For U-NII-3:

802.11a

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	PSD w/o Duty Factor (dBm/500kHz)	Duty Factor	PSD with Duty Factor (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
149	5745	13.96	10.95	0.60	11.55	30	PASS
157	5785	13.25	10.24	0.60	10.84	30	PASS
161	5805	13.64	10.63	0.60	11.23	30	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	PSD w/o Duty Factor (dBm/500kHz)	Duty Factor	PSD with Duty Factor (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
149	5745	13.24	10.23	0.70	10.93	30	PASS
157	5785	12.10	9.09	0.70	9.79	30	PASS
161	5805	12.87	9.86	0.70	10.56	30	PASS

802.11n (40MHz)

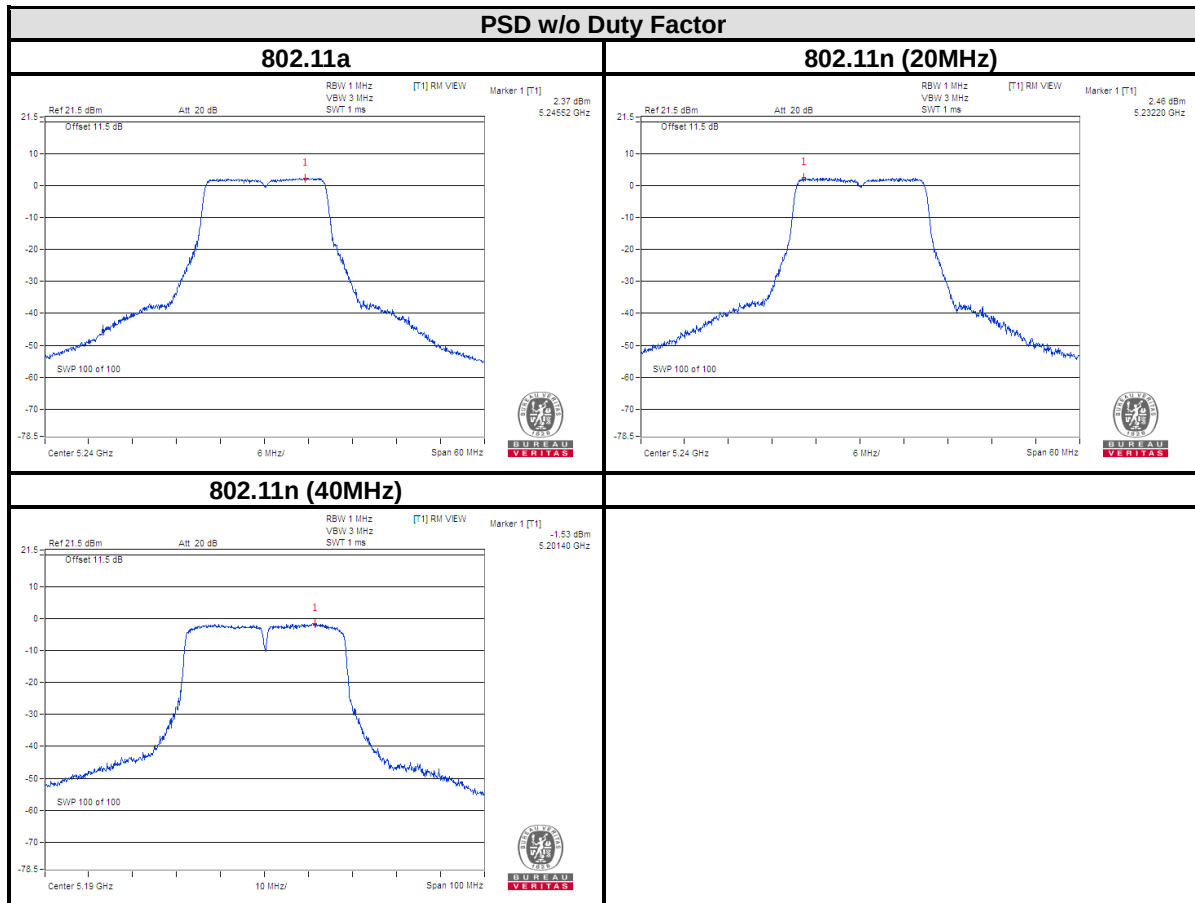
CHANNEL	FREQUENCY (MHz)	PSD w/o Duty Factor (dBm/MHz)	PSD w/o Duty Factor (dBm/500kHz)	Duty Factor	PSD with Duty Factor (dBm/500kHz)	LIMIT (dBm/500kHz)	PASS /FAIL
151	5755	11.62	8.61	1.26	9.87	30	PASS
159	5795	12.02	9.01	1.26	10.27	30	PASS



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Test Report No.: RF180913W005-3

For 5180~5240MHz

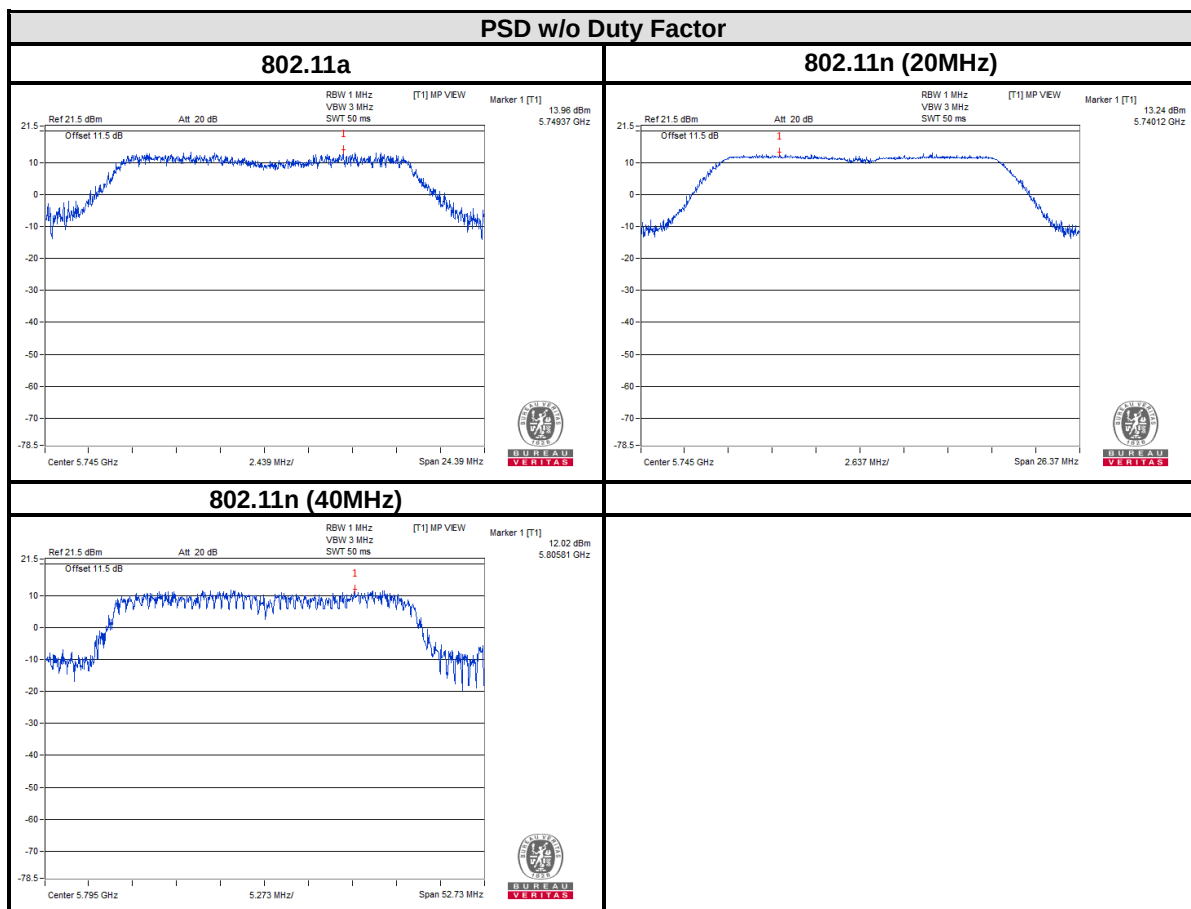




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Test Report No.: RF180913W005-3

For 5745~5805MHz

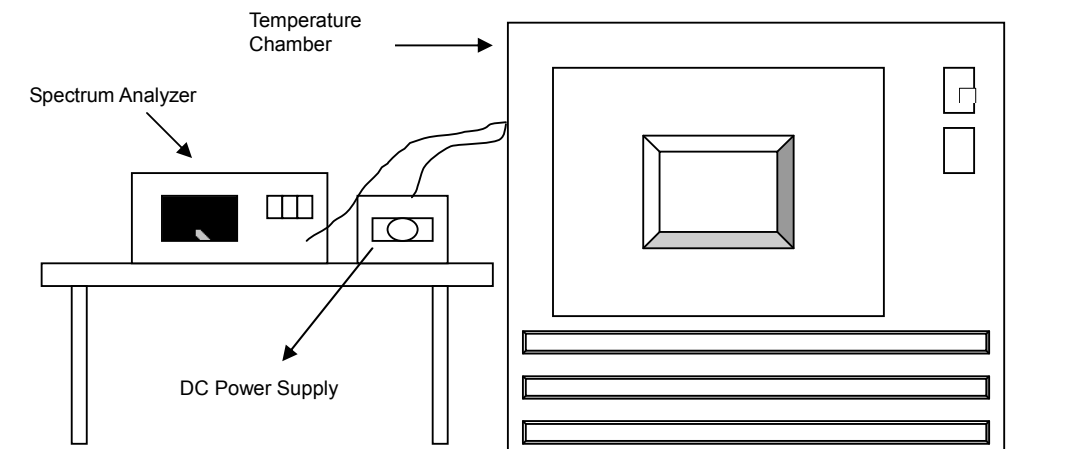


3.5 FREQUENCY STABILITY

3.5.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

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

3.5.2 TEST SETUP



3.5.3 TEST INSTRUMENTS

Refer to section 3.3.3 to get information of above instrument.

3.5.4 TEST PROCEDURE

- a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- b. Turn the EUT on and couple its output to a spectrum analyzer.
- c. Turn the EUT off and set the chamber to the highest temperature specified.
- d. 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.
- e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- f. 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.

3.5.5 DEVIATION FROM TEST STANDARD

No deviation.

3.5.6 EUT OPERATING CONDITION

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



3.5.7 TEST RESULTS

FREQUENCY STABILITY VERSUS TEMP.										RESULT
OPERATING FREQUENCY: 5180MHz										
TEMP. (°C)	Power Supply (Vdc)	0 MINUTE		2 MINUTES		5 MINUTES		10 MINUTE		
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	
50	120	5179.9837	-3.147	5179.989	-2.124	5179.9871	-2.490	5179.9848	-2.934	PASS
40	120	5180.0073	1.409	5180.0007	0.135	5180.0048	0.927	5180.0083	1.602	PASS
30	120	5179.9979	-0.405	5179.9988	-0.232	5180.0021	0.405	5179.9992	-0.154	PASS
20	120	5180.0016	0.309	5180.0065	1.255	5180.0112	2.162	5180.0097	1.873	PASS
10	120	5180.0038	0.734	5180.0077	1.486	5180.0039	0.753	5180.0111	2.143	PASS
0	120	5180.0215	4.151	5180.0162	3.127	5180.0191	3.687	5180.0266	5.135	PASS
-10	120	5180.0008	0.154	5179.9975	-0.483	5179.9993	-0.135	5180.0003	0.058	PASS
-20	120	5179.9756	-4.710	5179.9743	-4.961	5179.9779	-4.266	5179.9773	-4.382	PASS
-30	120	5180.0025	0.483	5180	0.000	5180.009	1.737	5180.0075	1.448	PASS

FREQUENCY STABILITY VERSUS VOLTAGE										RESULT
OPERATING FREQUENCY: 5180MHz										
TEMP. (°C)	Power Supply (Vdc)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE		
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	
20	138	5180.0015	0.290	5180.0063	1.216	5180.0118	2.278	5180.0083	1.602	PASS
	120	5180.0016	0.309	5180.0065	1.255	5180.0112	2.162	5180.0097	1.873	PASS
	102	5180.0031	0.598	5180.0078	1.506	5180.0109	2.104	5180.0092	1.776	PASS



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Test Report No.: RF180913W005-3

FREQUENCY STABILITY VERSUS TEMP.										RESULT
OPERATING FREQUENCY: 5805MHz										
TEMP. (°C)	Power Supply (Vdc)	0 MINUTE		2 MINUTES		5 MINUTES		10 MINUTE		
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	
50	120	5804.9891	-1.878	5804.991	-1.550	5804.9904	-1.654	5804.9836	-2.825	PASS
40	120	5804.9914	-1.481	5804.9851	-2.567	5804.994	-1.034	5804.9902	-1.688	PASS
30	120	5805.0062	1.068	5805.0013	0.224	5805.0101	1.740	5805.0047	0.810	PASS
20	120	5804.9928	-1.240	5804.9937	-1.085	5804.9906	-1.619	5804.9989	-0.189	PASS
10	120	5805.0269	4.634	5805.018	3.101	5805.0273	4.703	5805.0155	2.670	PASS
0	120	5805.0048	0.827	5805.0057	0.982	5805.0108	1.860	5805.0106	1.826	PASS
-10	120	5805.0009	0.155	5804.9945	-0.947	5804.9959	-0.706	5804.9961	-0.672	PASS
-20	120	5804.9965	-0.603	5804.9962	-0.655	5805.0012	0.207	5804.9959	-0.706	PASS
-30	120	5805.0204	3.514	5805.0162	2.791	5805.015	2.584	5805.0154	2.653	PASS

FREQUENCY STABILITY VERSUS VOLTAGE										RESULT
OPERATING FREQUENCY: 5805MHZ										
TEMP. (°C)	Power Supply (Vdc)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE		
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	
20	138	5804.9935	-1.120	5804.9941	-1.016	5804.9901	-1.705	5804.9992	-0.138	PASS
	120	5804.9928	-1.240	5804.9937	-1.085	5804.9906	-1.619	5804.9989	-0.189	PASS
	102	5804.9931	-1.189	5804.9931	-1.189	5804.9921	-1.361	5804.9999	-0.017	PASS

4 PHOTOGRAPHS OF THE TEST CONFIGURATION

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



Test Report No.: RF180913W005-3

5 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---