FCC Test Report

FCC ID	:	**NKR-DNXAG1**
Equipment	:	**802.11 abgn 2x2 PCIe Module**
Model No.	:	**DNXA-G1-P1**
Brand Name	:	**WNC**
Applicant	:	**Wistron Neweb Corporation**
Address	:	**20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.**
Standard	:	**47 CFR FCC Part 15.407**
Received Date	:	**Apr. 15, 2014**
Tested Date	:	**Aug. 29 ~ Sep. 15, 2014**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:

Gary Chang / Manager

Testing Laboratory
2732

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Release Record

Report No.	Version	Description	Issued Date
FR441506AN	Rev. 01	Initial issue	Sep. 22, 2014

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.153MHz 48.29 (Margin -7.53dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 5150.00MHz 72.98 (Margin -1.02dB) - PK	Pass
15.407(a)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(a)	RF Output Power	Max Power [dBm]: 22.95	Pass
15.407(a)	Peak Power Spectral Density	Meet the requirement of limit	Pass
15.407(g)	Frequency Stability	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	**IEEE Std. 802.11**	**Ch. Freq. (MHz)**	**Channel Number**	**Transmit Chains (N_{TX})**	**Data Rate / MCS**
5150-5250	a	5180-5240	36-48 [4]	2	6-54 Mbps
5150-5250	n (HT20)	5180-5240	36-48 [4]	2	MCS 0-15
5150-5250	n (HT40)	5190-5230	38-46 [2]	2	MCS 0-15
Note 1: RF output power specifies that Maximum Conducted Output Power. Note 2: 802.11a/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.					

1.1.2 Antenna Details

Ant. No.	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)				
			2400~2483.5	**5150~5250**	**5250~5350**	**5470~5725**	**5725~5850**
1	Dipole	U.FL	4	5	5	5	4.5

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host

1.1.4 Accessories

N/A

1.1.5 Channel List

For Frequency band 5150-5250 MHz			
802.11 a / HT20		**802.11n HT40**	
Channel	**Frequency(MHz)**	**Channel**	**Frequency(MHz)**
36	5180	38	5190
40	5200	46	5230
44	5220	---	---
48	5240	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	ART2-GUI, version 2.3		
Duty Cycle and Duty Factor	**Mode**	**Duty cycle (%)**	**Duty factor (dB)**
	11a	98.65%	0.06
	HT20	98.12%	0.08
	HT40	96.07%	0.17

1.1.7 Power Setting

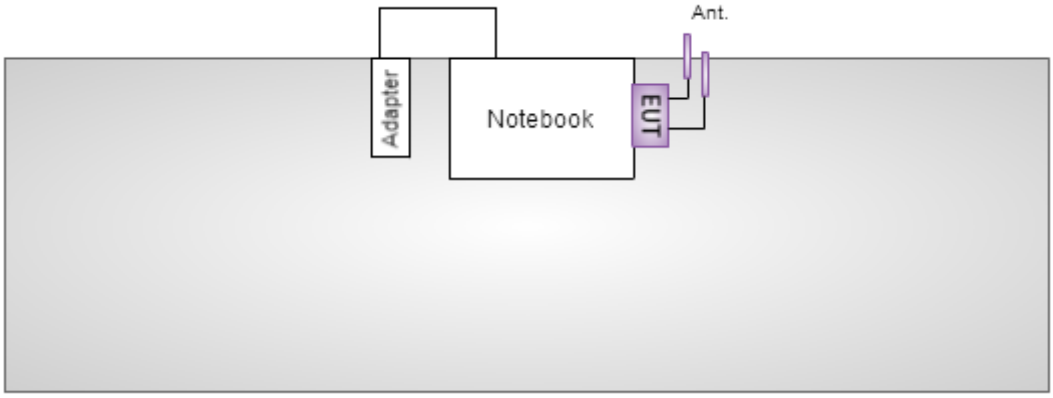
Modulation Mode	Test Frequency (MHz)	Power Set
11a	5180	16
11a	5200	23.5
11a	5240	18.5
HT20	5180	15.5
HT20	5200	23.5
HT20	5240	18.5
HT40	5190	10.5
HT40	5230	18

1.2 Local Support Equipment List

Support Equipment List						
No.	**Equipment**	**Brand**	**Model**	**S/N**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	E6430	---	---	---

1.3 Test Setup Chart

Test Setup Diagram



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
EMC Receiver	R&S	ESCS 30	100169	Oct. 15, 2013	Oct. 14, 2014
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 23, 2013	Nov. 22, 2014
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127-666	Dec. 04, 2013	Dec. 03, 2014
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Apr. 23, 2014	Apr. 22, 2015
50 ohm terminal (Support Unit)	NA	50	04	Apr. 18, 2014	Apr. 17, 2015
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber 2 / (03CH02-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101499	Feb. 08, 2014	Feb. 07, 2015
Receiver	R&S	ESR3	101657	Jan. 18, 2014	Jan. 17, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-524	Jan. 08, 2014	Jan. 07, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Jan. 07, 2014	Jan. 06, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Dec. 27, 2013	Dec. 26, 2014
Preamplifier	Burgeon	BPA-530	100218	Dec. 09, 2013	Dec. 08, 2014
Preamplifier	Agilent	83017A	MY39501309	Dec. 09, 2013	Dec. 08, 2014
Preamplifier	WM	TF-130N-R1	923365	Oct. 23, 2013	Oct. 22, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	Dec. 17, 2013	Dec. 16, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 17, 2013	Dec. 16, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 17, 2013	Dec. 16, 2014
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 17, 2013	Dec. 16, 2014
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-004	Dec. 17, 2013	Dec. 16, 2014
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Note: Calibration Interval of instruments listed above is two year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2014	Feb. 16, 2015
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 11, 2013	Dec. 10, 2014
Power Meter	Anritsu	ML2495A	1241002	Oct. 24, 2013	Oct. 23, 2014
Power Sensor	Anritsu	MA2411B	1207366	Oct. 24, 2013	Oct. 23, 2014
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Testing Applied Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.407
ANSI C63.10-2009
FCC KDB 412172 D01 Determining ERP and EIRP v01
FCC 789033 D02 General UNII Test Procedures New Rules v01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	±34.134 Hz
Conducted power	±0.808 dB
Frequency error	±34.134 Hz
Temperature	±0.6 ^{o}C
Conducted emission	±2.670 dB
AC conducted emission	±2.92 dB
Radiated emission ≤ 1GHz	±3.26 dB
Radiated emission > 1GHz	±4.94 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	23°C / 65%	Skys Huang
Radiated Emissions	03CH02-WS	25°C / 65%	Anderson Hong Aska Huang
RF Conducted	TH01-WS	21°C / 63%	Brad Wu

- FCC site registration No.: 657002
- IC site registration No.: 10807A-2

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	11a	5200	6 Mbps	---
Radiated Emissions ≤1GHz	11a	5200	6 Mbps	---
RF Output Power	11a	5180 / 5200 / 5240	6 Mbps	---
	HT20	5180 / 5200 / 5240	MCS 0	---
	HT40	5190 / 5230	MCS 0	---
Radiated Emissions >1GHz Emission Bandwidth Peak Power Spectral Density	11a	5180 / 5200 / 5240	6 Mbps	---
	HT20	5180 / 5200 / 5240	MCS 0	---
	HT40	5190 / 5230	MCS 0	---
Frequency Stability	Un-modulation	5200	---	---

3 Transmitter Test Results

3.1 Conducted Emissions

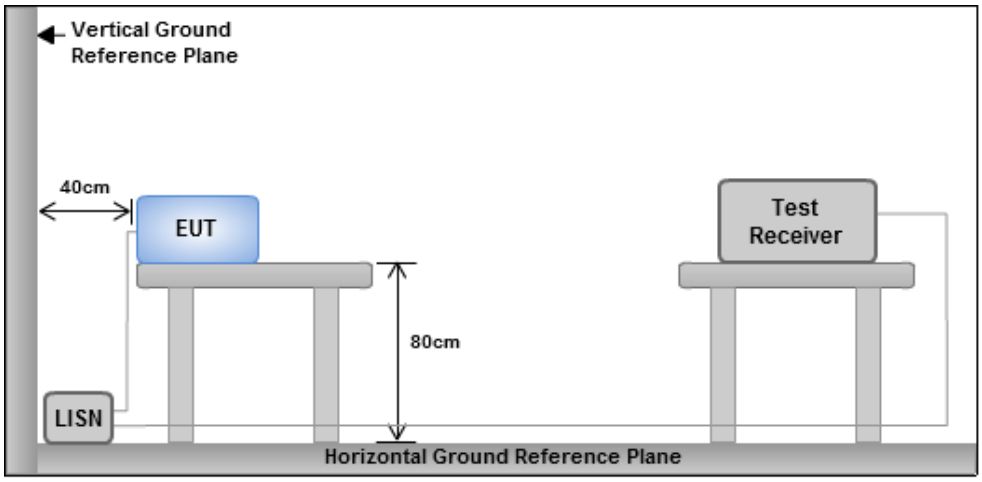
3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

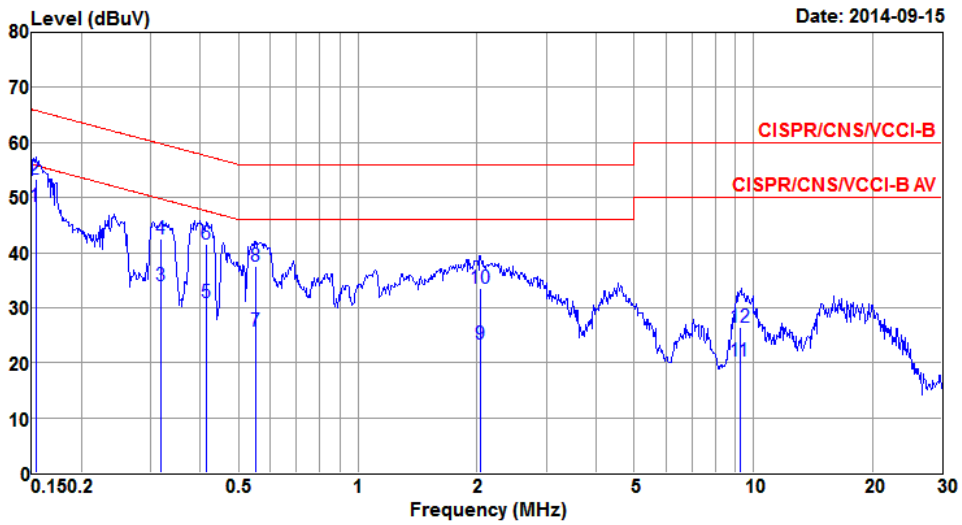
3.1.3 Test Setup



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

3.1.4 Test Result of Conducted Emissions

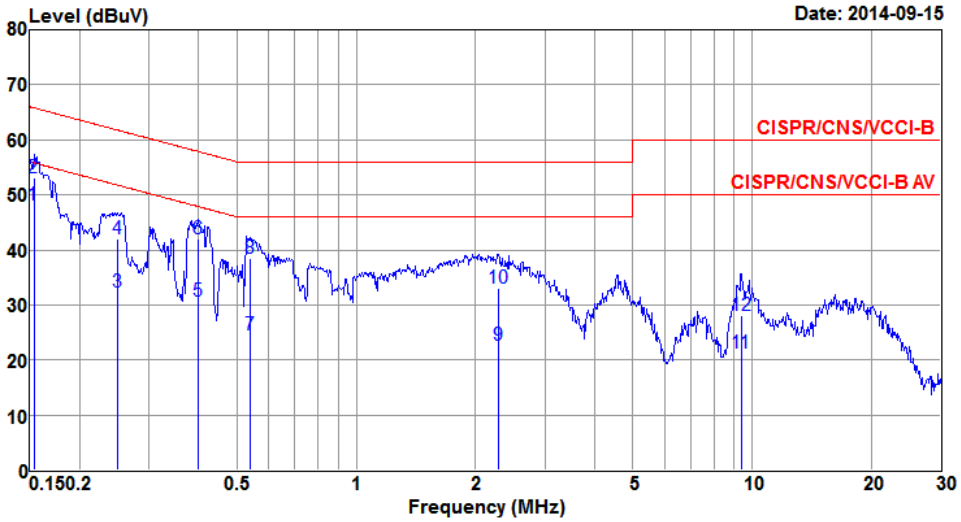
Modulation	11a	Test Freq. (MHz)	5200
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1*	0.153	48.29	55.82	-7.53	47.87	0.40	0.02	Average
2	0.153	53.42	65.82	-12.40	53.00	0.40	0.02	QP
3	0.317	34.05	49.80	-15.75	33.64	0.39	0.02	Average
4	0.317	42.42	59.80	-17.38	42.01	0.39	0.02	QP
5	0.413	30.99	47.59	-16.60	30.57	0.39	0.03	Average
6	0.413	41.57	57.59	-16.02	41.15	0.39	0.03	QP
7	0.552	25.69	46.00	-20.31	25.21	0.40	0.08	Average
8	0.552	37.62	56.00	-18.38	37.14	0.40	0.08	QP
9	2.044	23.47	46.00	-22.53	23.02	0.43	0.02	Average
10	2.044	33.48	56.00	-22.52	33.03	0.43	0.02	QP
11	9.253	20.37	50.00	-29.63	19.60	0.53	0.24	Average
12	9.253	26.52	60.00	-33.48	25.75	0.53	0.24	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	11a	Test Freq. (MHz)	5200
Power Phase	Neutral		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1*	0.153	48.07	55.82	-7.75	47.57	0.48	0.02	Average
2	0.153	53.18	65.82	-12.64	52.68	0.48	0.02	QP
3	0.249	32.38	51.78	-19.40	31.89	0.48	0.01	Average
4	0.249	41.94	61.78	-19.84	41.45	0.48	0.01	QP
5	0.400	30.63	47.86	-17.23	30.14	0.47	0.02	Average
6	0.400	42.00	57.86	-15.86	41.51	0.47	0.02	QP
7	0.538	24.45	46.00	-21.55	23.90	0.47	0.08	Average
8	0.538	38.57	56.00	-17.43	38.02	0.47	0.08	QP
9	2.285	22.72	46.00	-23.28	22.17	0.50	0.05	Average
10	2.285	33.15	56.00	-22.85	32.60	0.50	0.05	QP
11	9.401	21.27	50.00	-28.73	20.47	0.56	0.24	Average
12	9.401	27.99	60.00	-32.01	27.19	0.56	0.24	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

3.2 Emission Bandwidth

3.2.1 Test Procedures

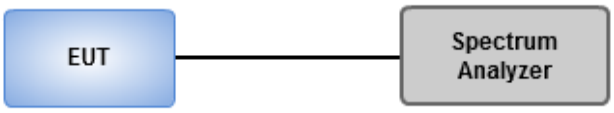
26dB Bandwidth

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW, Detector = Peak.
3. Trace mode = max hold.
4. Measure the maximum width of the emission that is 26 dB down from the peak of the emission.

Occupied Bandwidth

1. Set RBW = 1 % to 5 % of the OBW
2. Set VBW ≥ 3 RBW
3. Sample detection and single sweep mode shall be used
4. Use the 99 % power bandwidth function of the instrument

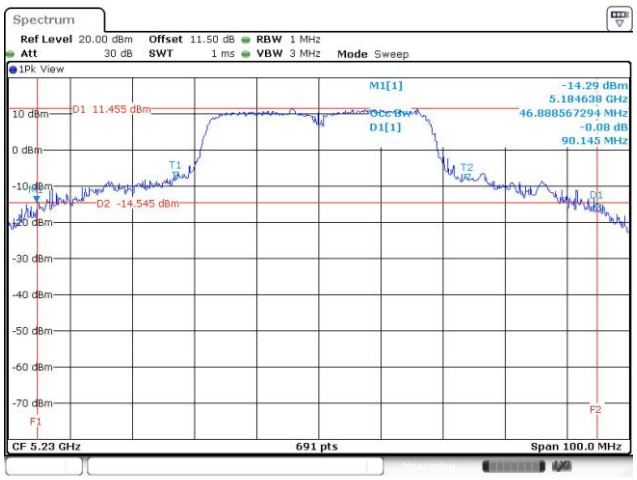
3.2.2 Test Setup



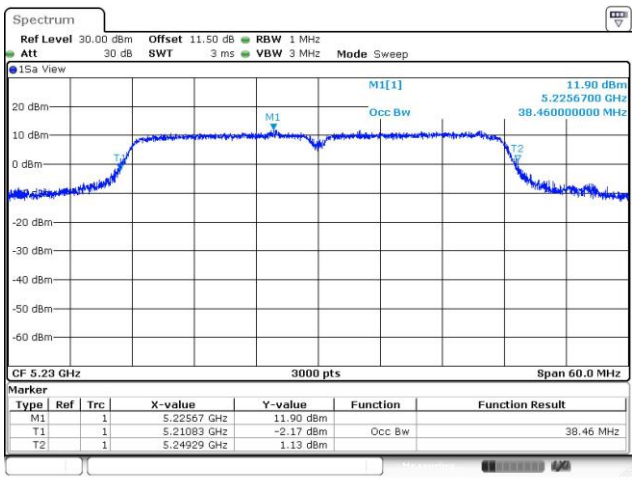
3.2.3 Test Result of Emission Bandwidth

Emission Bandwidth										
Mode	N_{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
11a	2	5180	39.42	36.52	---	---	17.43	16.96	---	---
11a	2	5200	48.87	48.78	---	---	25.47	24.94	---	---
11a	2	5240	41.88	41.74	---	---	19.61	18.38	---	---
HT20	2	5180	38.26	34.86	---	---	18.26	18.07	---	---
HT20	2	5200	51.83	56.96	---	---	25.58	25.34	---	---
HT20	2	5240	45.58	44.93	---	---	19.67	19.40	---	---
HT40	2	5190	49.39	49.86	---	---	37.06	36.94	---	---
HT40	2	5230	89.42	90.15	---	---	38.86	38.46	---	---

Worst Plots of 26dB Bandwidth



Worst Plots of 99% Bandwidth



3.3 RF Output Power

3.3.1 Limit of RF Output Power

Operating Mode		Limit
☐	Outdoor access point	Conducted Power: 1 W The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm)
☒	Indoor access point	Conducted Power: 1 W
☐	Fixed point-to-point access points	Conducted Power: 1 W
☐	Mobile and portable client devices	Conducted Power: 250 mW

3.3.2 Test Procedures

☒ **Method PM-G (Measurement using a gated RF average power meter)**

☒ Measurements may is performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

3.3.3 Test Setup

3.3.4 Test Result of Maximum Conducted Output Power

Mode	N_{TX}	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
11a	2	5180	17.21	15.92	---	---	91.686	19.62	30.00
11a	2	5200	20.2	19.66	---	---	197.183	**22.95**	30.00
11a	2	5240	17.64	17.62	---	---	115.886	20.64	30.00
HT20	2	5180	16.68	15.34	---	---	80.757	19.07	30.00
HT20	2	5200	19.96	19.84	---	---	195.466	22.91	30.00
HT20	2	5240	17.76	17.71	---	---	118.724	20.75	30.00
HT40	2	5190	12.60	11.02	---	---	30.844	14.89	30.00
HT40	2	5230	17.49	17.38	---	---	110.806	20.45	30.00

3.4 Peak Power Spectral Density

3.4.1 Limit of Peak Power Spectral Density

Operating Mode		Limit
☐	Outdoor access point	17 dBm / MHz
☒	Indoor access point	17 dBm / MHz
☐	Fixed point-to-point access points	17 dBm / MHz
☐	Mobile and portable client devices	11 dBm / MHz

3.4.2 Test Procedures

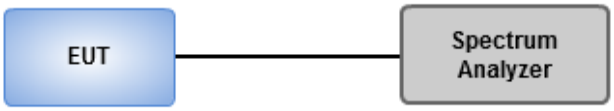
☒ Method SA-1 (For 11a / HT20)

1. Set RBW = 1 MHz, VBW = 3 MHz, Sweep time = auto, Detector = RMS.
2. Trace average 100 traces.
3. Use the peak marker function to determine the maximum amplitude level.

☒ Method SA-2 Alternative (For HT40)

1. Set RBW = 1 MHz, VBW = 3 MHz, Detector = RMS.
2. Set sweep time ≥ 10 * (number of points in sweep) * (total on/off period of the transmitted signal).
3. Perform a single sweep.
4. Use the peak marker function to determine the maximum amplitude level.
5. Add 10 log(1/x), where x is the duty cycle.

3.4.3 Test Setup

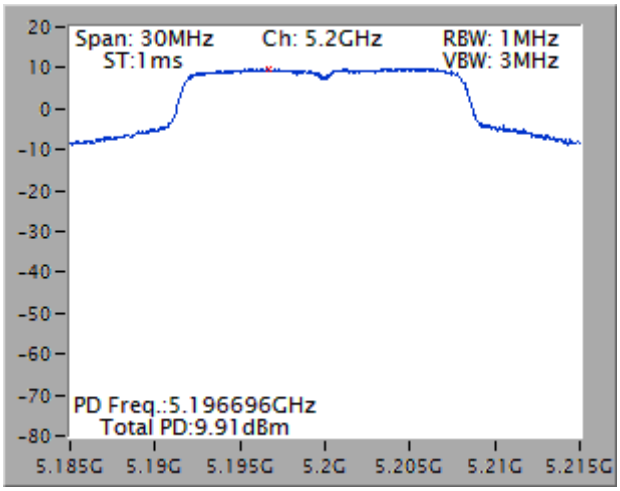


3.4.4 Test Result of Peak Power Spectral Density

Condition			Peak Power Spectral Density (dBm)			
Modulation Mode	N_{TX}	Freq. (MHz)	PPSD w/o D.F (dBm)	Duty Factor (dB)	PPSD with D.F (dBm)	PPSD Limit (dBm)
11a	2	5180	6.23	0.00	6.23	14.99
11a	2	5200	9.91	0.00	9.91	14.99
11a	2	5240	7.36	0.00	7.36	14.99
HT20	2	5180	5.70	0.00	5.70	14.99
HT20	2	5200	9.80	0.00	9.80	14.99
HT20	2	5240	7.20	0.00	7.20	14.99
HT40	2	5190	-2.03	0.17	-1.86	14.99
HT40	2	5230	3.51	0.17	3.68	14.99

Note:
1. D.F is duty factor.
2. Test result is bin-by-bin summing measured value of each TX port.
3. Directional gain = 5+10* log(2/1) = 8.01 dBi > 6 dBi.
   Limit shall be reduced to 17 dBm – (8.01 dBi – 6 dBi) = 14.99 dBm.

Worst Plots



3.5 Transmitter Radiated and Band Edge Emissions

3.5.1 Limit of Transmitter Radiated and Band Edge Emissions

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

Un-restricted band emissions above 1GHz Limit	
Operating Band	**Limit**
5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.725 - 5.825 GHz	5.715 5.725 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] 5.85 5.86 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] Other un-restricted band: e.i.r.p. -27 dBm [68.2 dBuV/m@3m]

Note 1: Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

3.5.2 Test Procedures

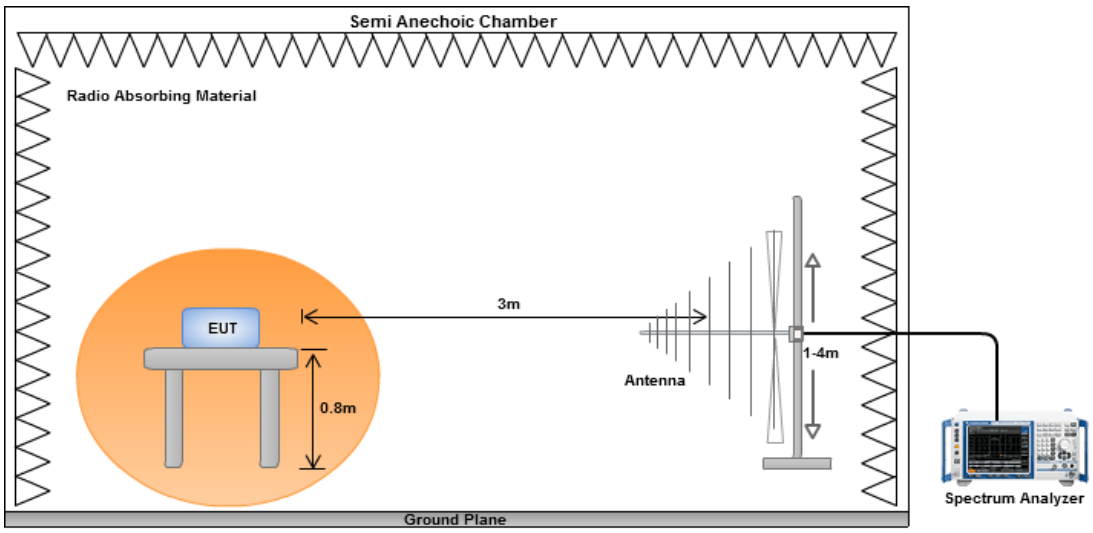
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

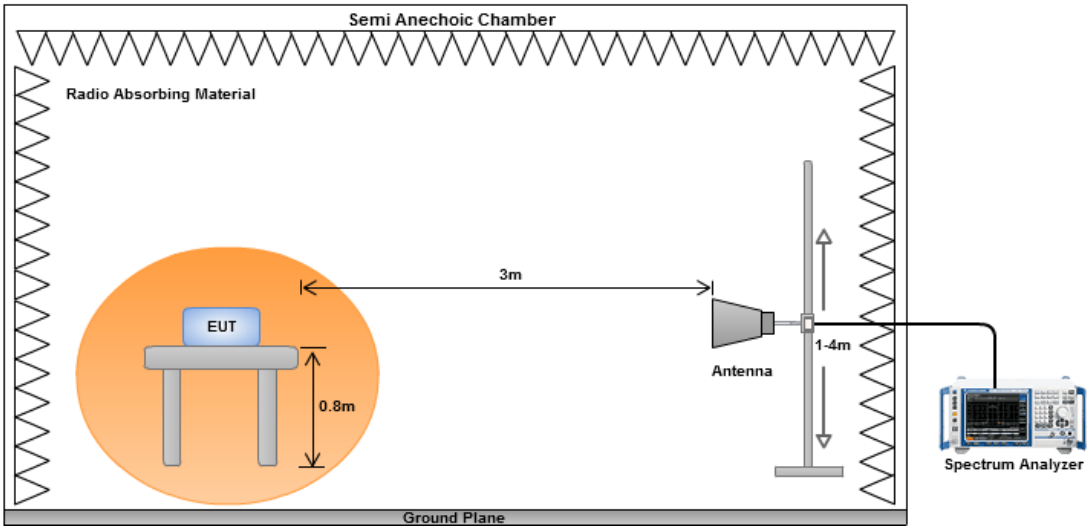
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.5.3 Test Setup

Radiated Emissions below 1 GHz

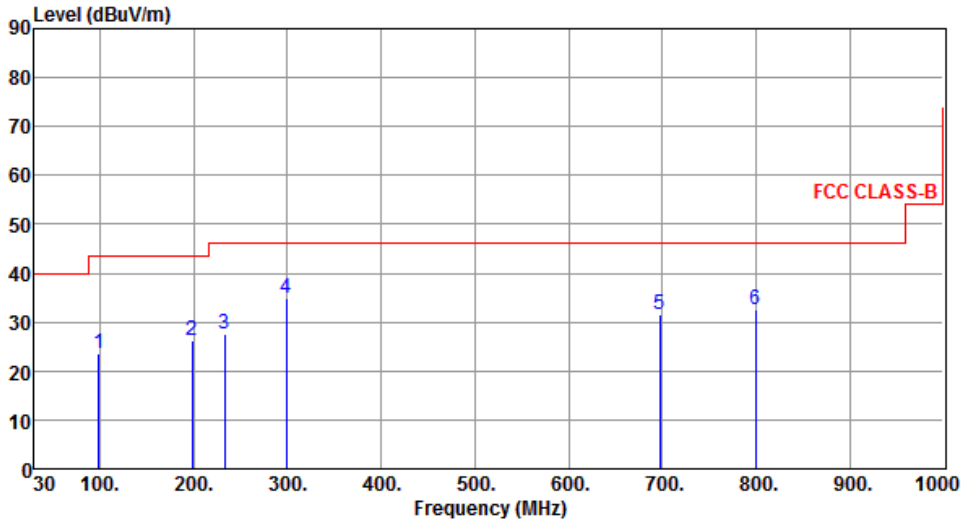


Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

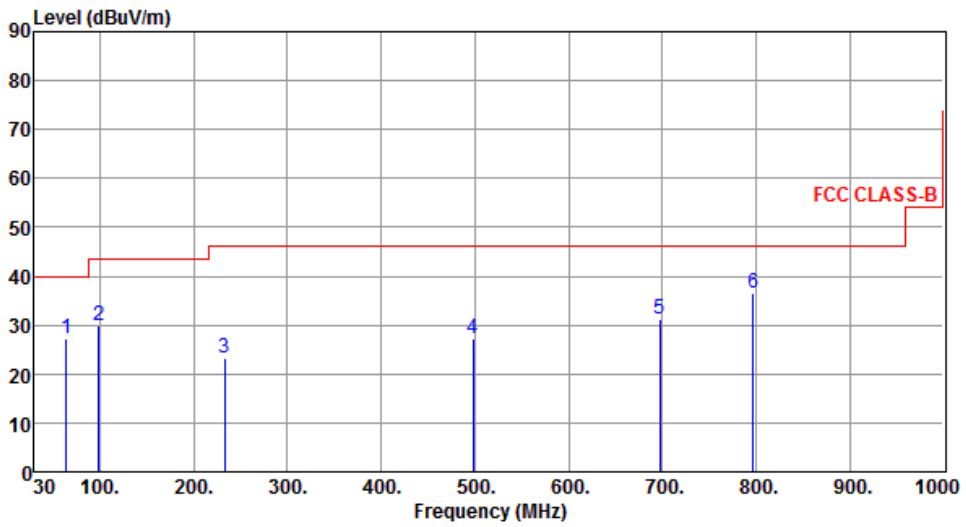
Modulation	11a	**Test Freq. (MHz)**	5200
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	98.87	23.44	43.50	-20.06	45.24	-21.80	Peak	---	---
2	198.78	26.37	43.50	-17.13	46.20	-19.83	Peak	---	---
3	232.73	27.67	46.00	-18.33	46.26	-18.59	Peak	---	---
4	298.69	35.02	46.00	-10.98	51.27	-16.25	Peak	---	---
5	697.36	31.68	46.00	-14.32	40.04	-8.36	Peak	---	---
6	799.21	32.46	46.00	-13.54	39.15	-6.69	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	11a	Test Freq. (MHz)	5200
Polarization	Vertical		

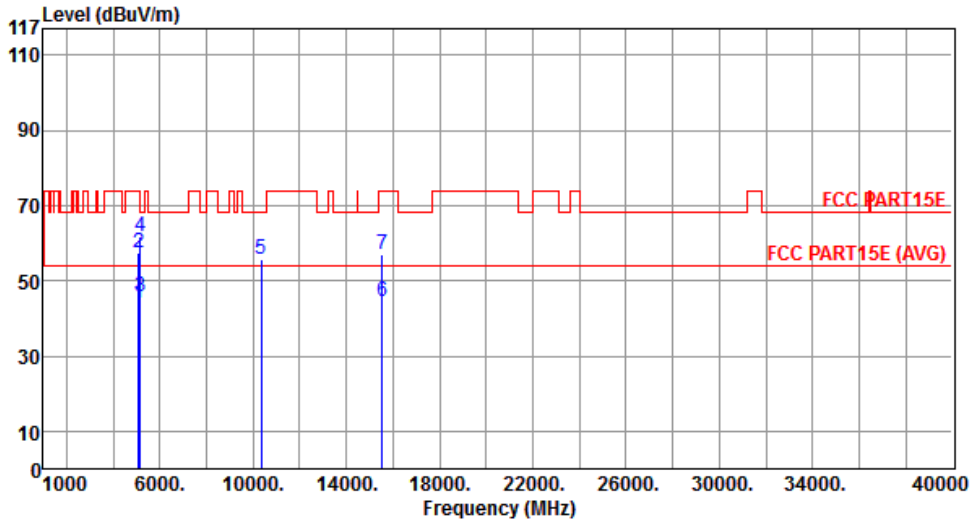


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	63.95	27.36	40.00	-12.64	45.37	-18.01	Peak	---	---
2	98.87	29.79	43.50	-13.71	51.59	-21.80	Peak	---	---
3	232.73	23.34	46.00	-22.66	41.93	-18.59	Peak	---	---
4	498.51	27.17	46.00	-18.83	38.89	-11.72	Peak	---	---
5	697.36	31.35	46.00	-14.65	39.71	-8.36	Peak	---	---
6	797.27	36.56	46.00	-9.44	43.28	-6.72	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11a

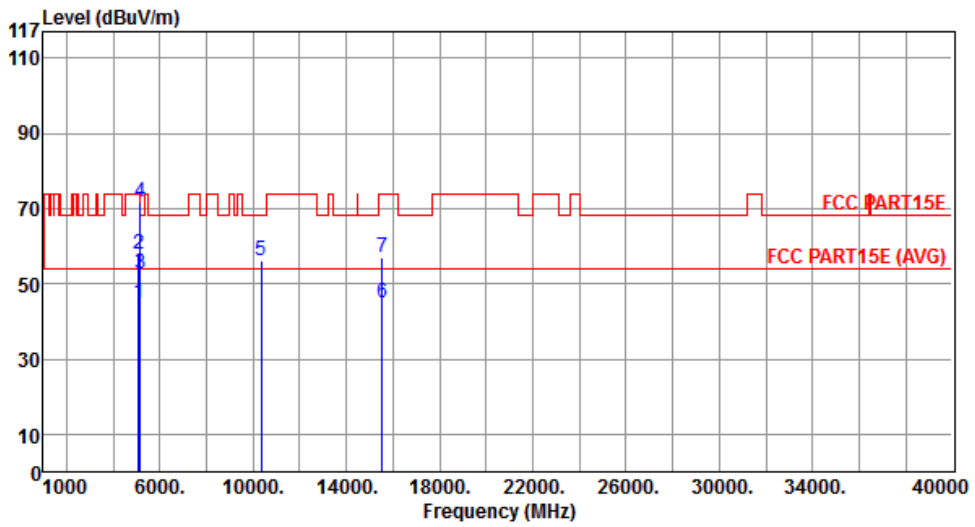
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.04	54.00	-9.96	38.47	5.57	Average	---	---
2	5080.00	57.58	74.00	-16.42	52.01	5.57	Peak	---	---
3	5150.00	45.69	54.00	-8.31	39.98	5.71	Average	---	---
4	5150.00	61.74	74.00	-12.26	56.03	5.71	Peak	---	---
5	10360.00	55.55	68.20	-12.65	41.11	14.44	Peak	---	---
6	15540.00	44.27	54.00	-9.73	28.98	15.29	Average	---	---
7	15540.00	57.10	74.00	-16.90	41.81	15.29	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

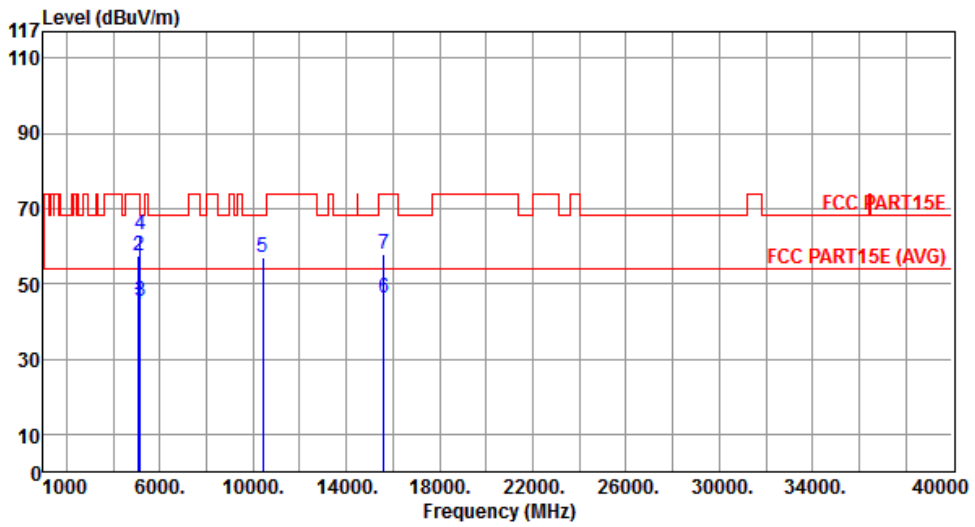
Modulation	11a	Test Freq. (MHz)	5180
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.84	54.00	-9.16	39.27	5.57	Average	---	---
2	5080.00	57.97	74.00	-16.03	52.40	5.57	Peak	---	---
3	5150.00	52.60	54.00	-1.40	46.89	5.71	Average	---	---
4	5150.00	71.62	74.00	-2.38	65.91	5.71	Peak	---	---
5	10360.00	56.14	68.20	-12.06	41.70	14.44	Peak	---	---
6	15540.00	44.82	54.00	-9.18	29.53	15.29	Average	---	---
7	15540.00	57.01	74.00	-16.99	41.72	15.29	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

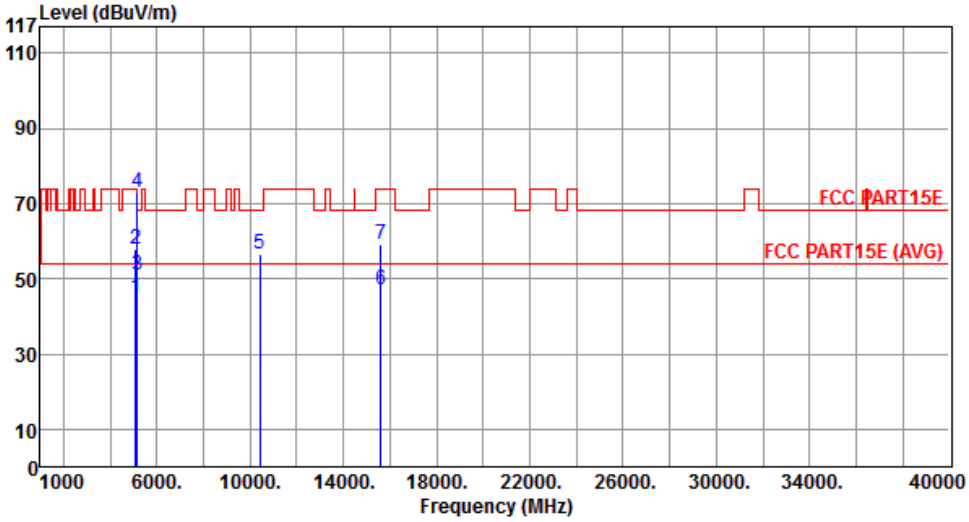
Modulation	11a	Test Freq. (MHz)	5200
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.59	54.00	-9.41	39.02	5.57	Average	---	---
2	5080.00	57.23	74.00	-16.77	51.66	5.57	Peak	---	---
3	5150.00	45.39	54.00	-8.61	39.68	5.71	Average	---	---
4	5150.00	62.95	74.00	-11.05	57.24	5.71	Peak	---	---
5	10400.00	57.02	68.20	-11.18	42.52	14.50	Peak	---	---
6	15600.00	46.25	54.00	-7.75	31.08	15.17	Average	---	---
7	15600.00	58.01	74.00	-15.99	42.84	15.17	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

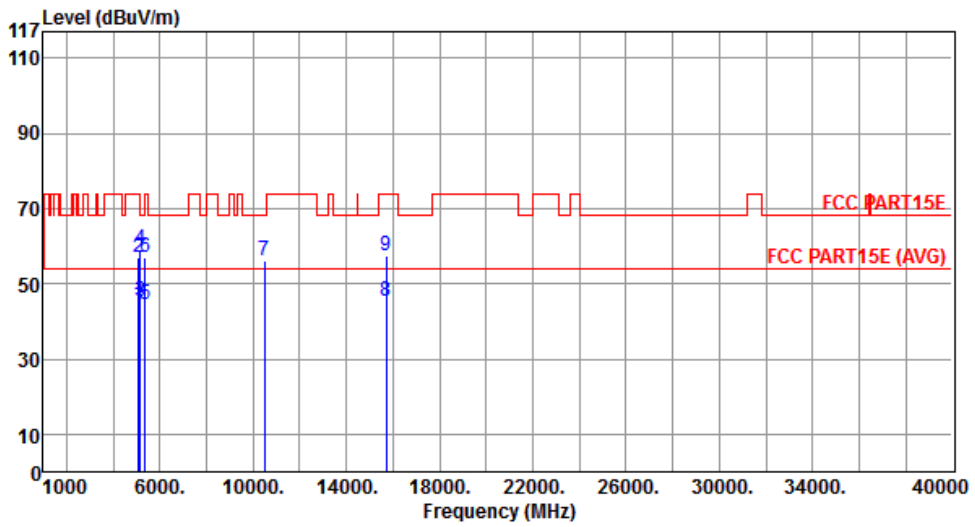
Modulation	11a	Test Freq. (MHz)	5200
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.92	54.00	-9.08	39.35	5.57	Average	---	---
2	5080.00	58.01	74.00	-15.99	52.44	5.57	Peak	---	---
3	5150.00	50.93	54.00	-3.07	45.22	5.71	Average	---	---
4	5150.00	72.98	74.00	-1.02	67.27	5.71	Peak	---	---
5	10400.00	56.40	68.20	-11.80	41.90	14.50	Peak	---	---
6	15600.00	47.01	54.00	-6.99	31.84	15.17	Average	---	---
7	15600.00	59.26	74.00	-14.74	44.09	15.17	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

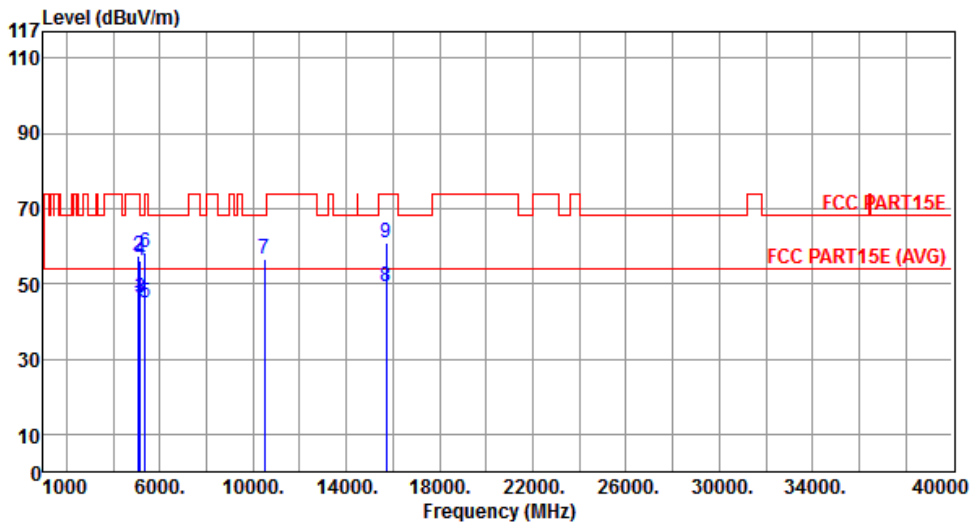
Modulation	11a	Test Freq. (MHz)	5240
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.48	54.00	-9.52	38.91	5.57	Average	---	---
2	5080.00	56.80	74.00	-17.20	51.23	5.57	Peak	---	---
3	5150.00	45.30	54.00	-8.70	39.59	5.71	Average	---	---
4	5150.00	58.98	74.00	-15.02	53.27	5.71	Peak	---	---
5	5350.00	44.34	54.00	-9.66	38.35	5.99	Average	---	---
6	5350.00	57.14	74.00	-16.86	51.15	5.99	Peak	---	---
7	10480.00	56.01	68.20	-12.19	41.38	14.63	Peak	---	---
8	15720.00	45.47	54.00	-8.53	30.55	14.92	Average	---	---
9	15720.00	57.39	74.00	-16.61	42.47	14.92	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	11a	Test Freq. (MHz)	5240
Polarization	Vertical		

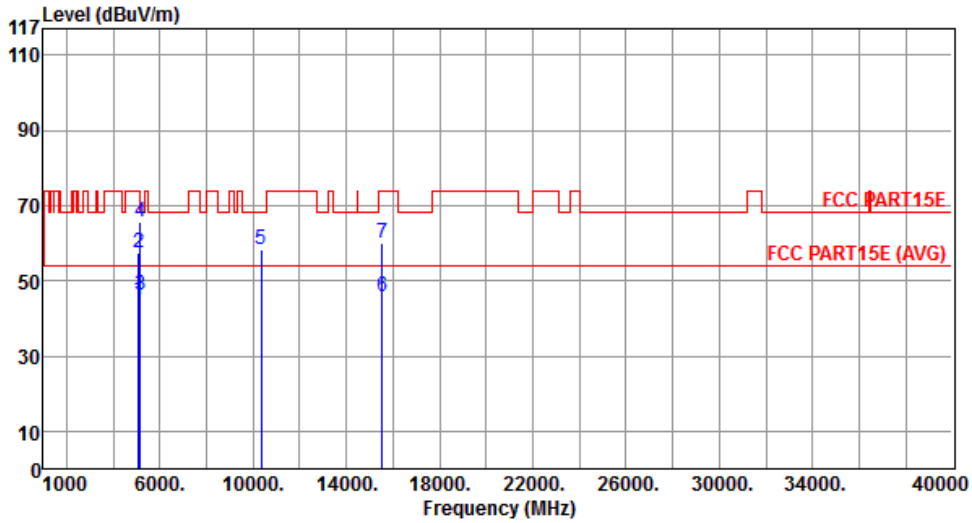


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.97	54.00	-9.03	39.40	5.57	Average	---	---
2	5080.00	57.45	74.00	-16.55	51.88	5.57	Peak	---	---
3	5150.00	46.18	54.00	-7.82	40.47	5.71	Average	---	---
4	5150.00	56.03	74.00	-17.97	50.32	5.71	Peak	---	---
5	5350.00	44.72	54.00	-9.28	38.73	5.99	Average	---	---
6	5350.00	58.25	74.00	-15.75	52.26	5.99	Peak	---	---
7	10480.00	56.68	68.20	-11.52	42.05	14.63	Peak	---	---
8	15720.00	49.07	54.00	-4.93	34.15	14.92	Average	---	---
9	15720.00	60.93	74.00	-13.07	46.01	14.92	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20

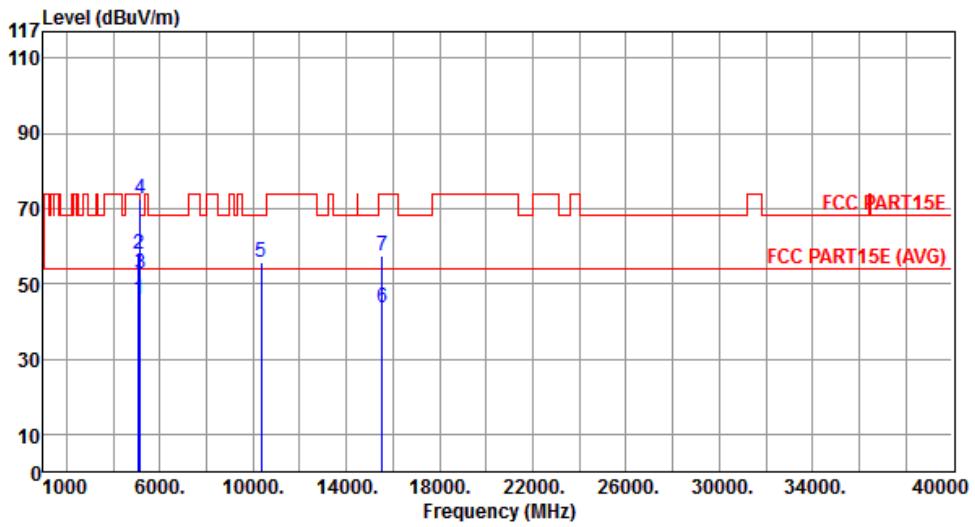
Modulation	HT20	**Test Freq. (MHz)**	5180
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.76	54.00	-9.24	39.19	5.57	Average	---	---
2	5080.00	57.33	74.00	-16.67	51.76	5.57	Peak	---	---
3	5150.00	46.08	54.00	-7.92	40.37	5.71	Average	---	---
4	5150.00	65.63	74.00	-8.37	59.92	5.71	Peak	---	---
5	10360.00	58.29	68.20	-9.91	43.85	14.44	Peak	---	---
6	15540.00	45.66	54.00	-8.34	30.37	15.29	Average	---	---
7	15540.00	59.89	74.00	-14.11	44.60	15.29	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

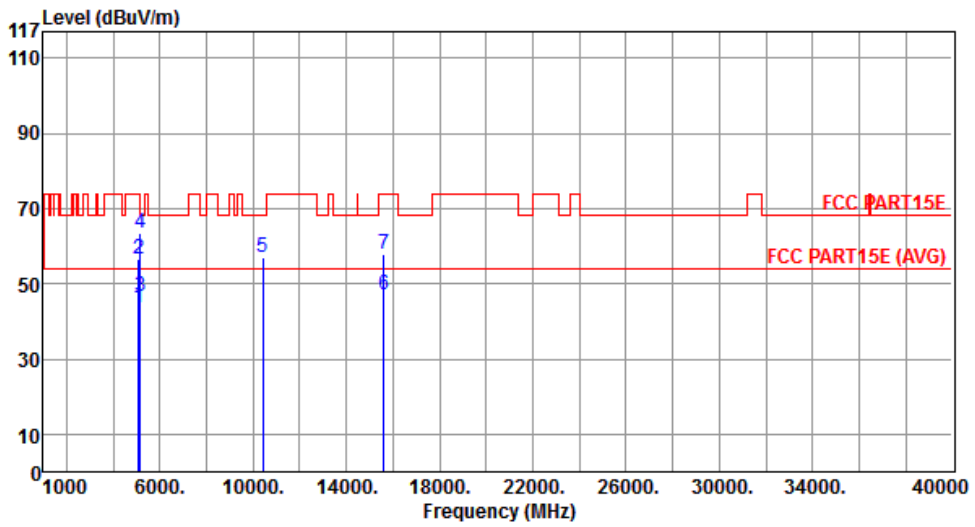
Modulation	HT20	Test Freq. (MHz)	5180
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	45.59	54.00	-8.41	40.02	5.57	Average	---	---
2	5080.00	58.04	74.00	-15.96	52.47	5.57	Peak	---	---
3	5150.00	52.87	54.00	-1.13	47.16	5.71	Average	---	---
4	5150.00	72.74	74.00	-1.26	67.03	5.71	Peak	---	---
5	10360.00	55.72	68.20	-12.48	41.28	14.44	Peak	---	---
6	15540.00	43.56	54.00	-10.44	28.27	15.29	Average	---	---
7	15540.00	57.57	74.00	-16.43	42.28	15.29	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

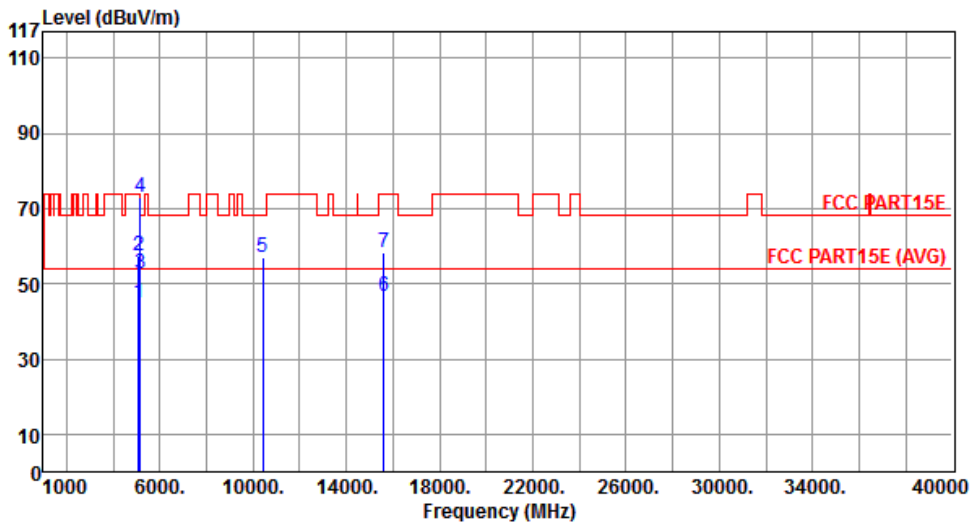
Modulation	HT20	Test Freq. (MHz)	5200
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	43.79	54.00	-10.21	38.22	5.57	Average	---	---
2	5080.00	56.42	74.00	-17.58	50.85	5.57	Peak	---	---
3	5150.00	46.59	54.00	-7.41	40.88	5.71	Average	---	---
4	5150.00	63.39	74.00	-10.61	57.68	5.71	Peak	---	---
5	10400.00	56.82	68.20	-11.38	42.32	14.50	Peak	---	---
6	15600.00	47.08	54.00	-6.92	31.91	15.17	Average	---	---
7	15600.00	57.92	74.00	-16.08	42.75	15.17	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

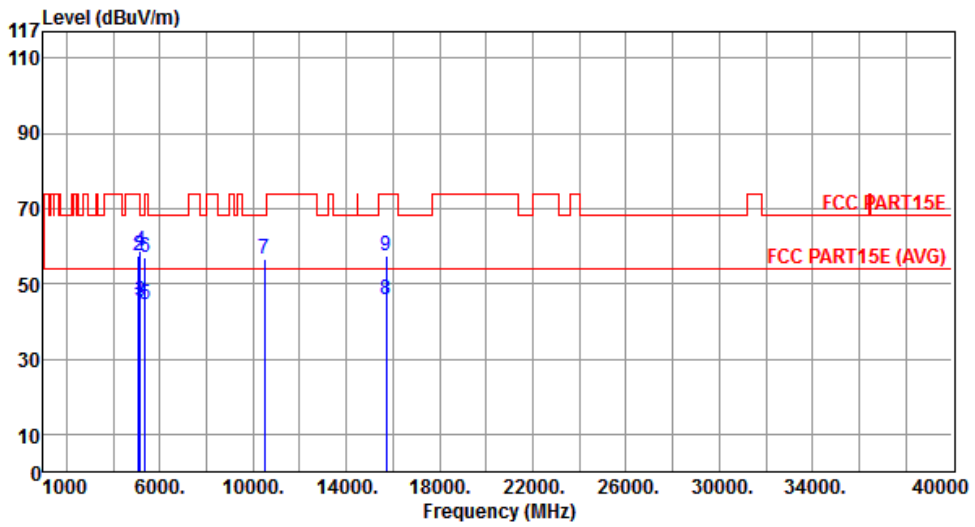
Modulation	HT20	Test Freq. (MHz)	5200
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.85	54.00	-9.15	39.28	5.57	Average	---	---
2	5080.00	57.59	74.00	-16.41	52.02	5.57	Peak	---	---
3	5150.00	52.87	54.00	-1.13	47.16	5.71	Average	---	---
4	5150.00	72.93	74.00	-1.07	67.22	5.71	Peak	---	---
5	10400.00	56.90	68.20	-11.30	42.40	14.50	Peak	---	---
6	15600.00	46.53	54.00	-7.47	31.36	15.17	Average	---	---
7	15600.00	58.45	74.00	-15.55	43.28	15.17	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

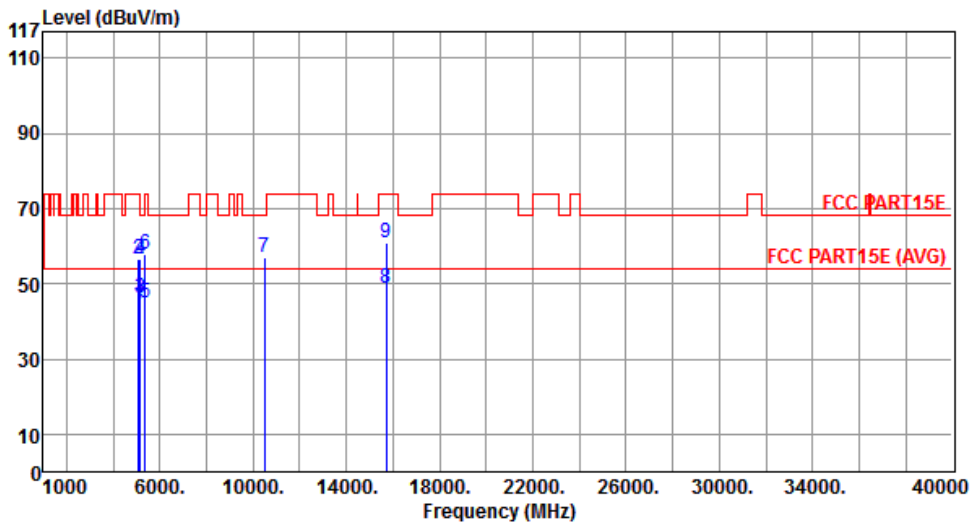
Modulation	HT20	Test Freq. (MHz)	5240
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.64	54.00	-9.36	39.07	5.57	Average	---	---
2	5080.00	57.26	74.00	-16.74	51.69	5.57	Peak	---	---
3	5150.00	45.39	54.00	-8.61	39.68	5.71	Average	---	---
4	5150.00	58.93	74.00	-15.07	53.22	5.71	Peak	---	---
5	5350.00	44.42	54.00	-9.58	38.43	5.99	Average	---	---
6	5350.00	56.83	74.00	-17.17	50.84	5.99	Peak	---	---
7	10480.00	56.59	68.20	-11.61	41.96	14.63	Peak	---	---
8	15720.00	45.72	54.00	-8.28	30.80	14.92	Average	---	---
9	15720.00	57.63	74.00	-16.37	42.71	14.92	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	HT20	Test Freq. (MHz)	5240
Polarization	Vertical		

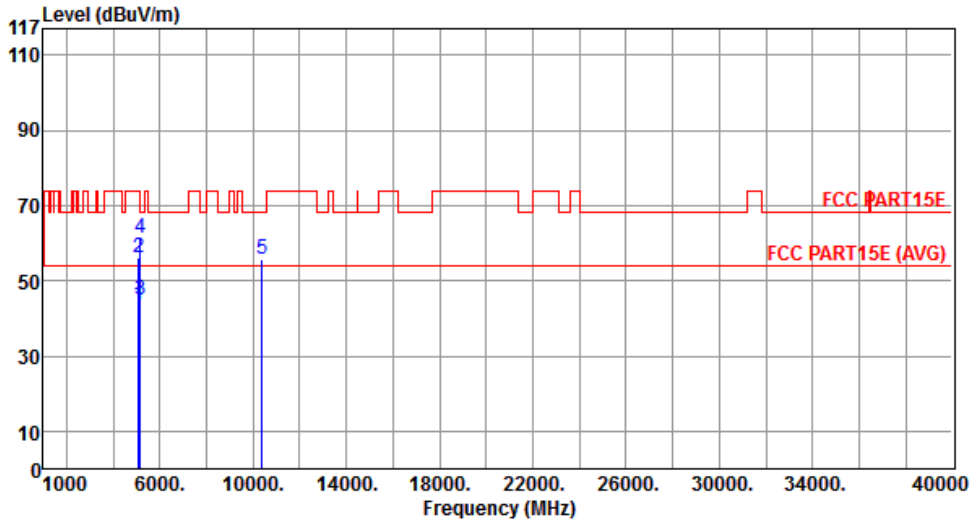


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.47	54.00	-9.53	38.90	5.57	Average	---	---
2	5080.00	56.70	74.00	-17.30	51.13	5.57	Peak	---	---
3	5150.00	46.30	54.00	-7.70	40.59	5.71	Average	---	---
4	5150.00	56.49	74.00	-17.51	50.78	5.71	Peak	---	---
5	5350.00	44.95	54.00	-9.05	38.96	5.99	Average	---	---
6	5350.00	57.98	74.00	-16.02	51.99	5.99	Peak	---	---
7	10480.00	57.20	68.20	-11.00	42.57	14.63	Peak	---	---
8	15720.00	48.90	54.00	-5.10	33.98	14.92	Average	---	---
9	15720.00	61.04	74.00	-12.96	46.12	14.92	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40

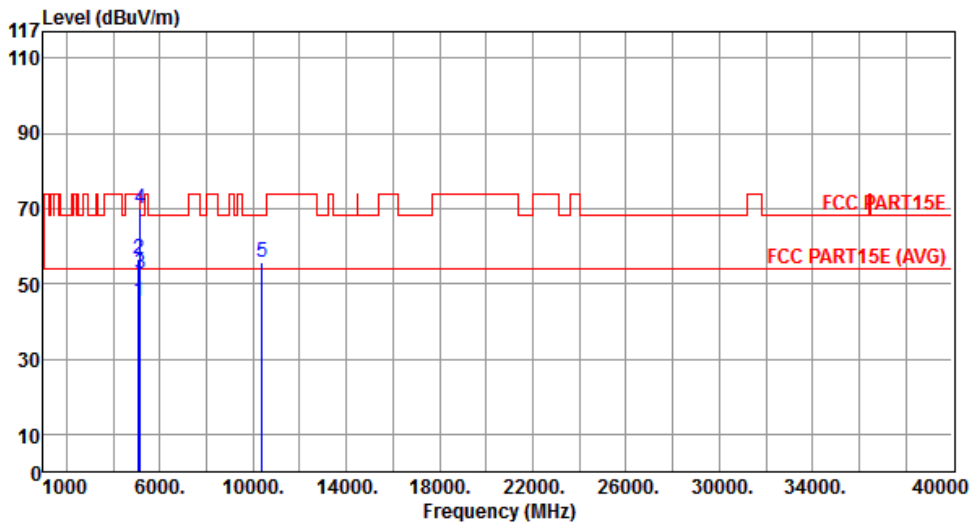
Modulation	HT40	**Test Freq. (MHz)**	5190
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	43.72	54.00	-10.28	38.15	5.57	Average	---	---
2	5080.00	55.91	74.00	-18.09	50.34	5.57	Peak	---	---
3	5150.00	45.07	54.00	-8.93	39.36	5.71	Average	---	---
4	5150.00	61.12	74.00	-12.88	55.41	5.71	Peak	---	---
5	10380.00	55.82	68.20	-12.38	41.36	14.46	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

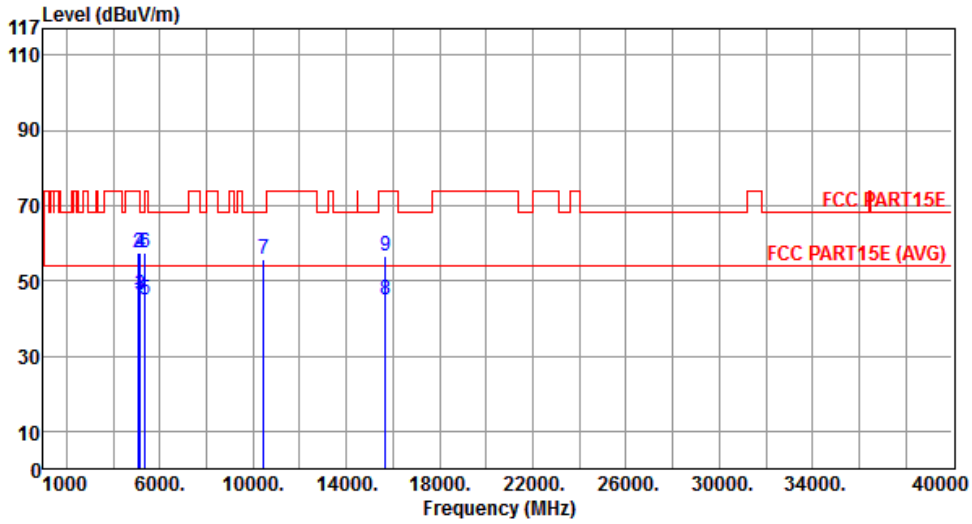
Modulation	HT40	Test Freq. (MHz)	5190
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	45.30	54.00	-8.70	39.73	5.57	Average	---	---
2	5080.00	56.67	74.00	-17.33	51.10	5.57	Peak	---	---
3	5150.00	52.62	54.00	-1.38	46.91	5.71	Average	---	---
4	5150.00	70.07	74.00	-3.93	64.36	5.71	Peak	---	---
5	10380.00	55.82	68.20	-12.38	41.36	14.46	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

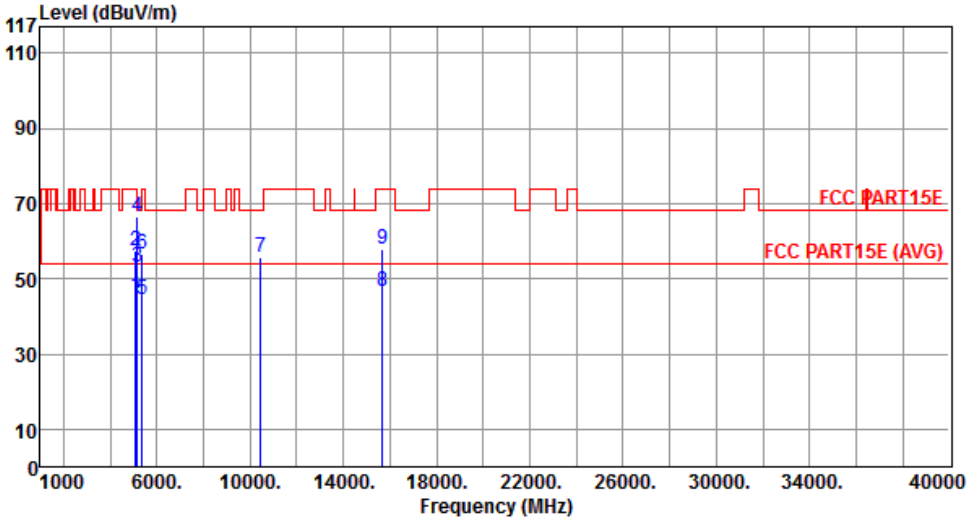
Modulation	HT40	Test Freq. (MHz)	5230
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	44.94	54.00	-9.06	39.37	5.57	Average	---	---
2	5080.00	57.30	74.00	-16.70	51.73	5.57	Peak	---	---
3	5150.00	46.25	54.00	-7.75	40.54	5.71	Average	---	---
4	5150.00	57.45	74.00	-16.55	51.74	5.71	Peak	---	---
5	5350.00	45.10	54.00	-8.90	39.11	5.99	Average	---	---
6	5350.00	57.63	74.00	-16.37	51.64	5.99	Peak	---	---
7	10460.00	55.60	68.20	-12.60	41.00	14.60	Peak	---	---
8	15690.00	45.06	54.00	-8.94	30.08	14.98	Average	---	---
9	15690.00	56.43	74.00	-17.57	41.45	14.98	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	HT40	Test Freq. (MHz)	5230
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5080.00	45.35	54.00	-8.65	39.78	5.57	Average	---	---
2	5080.00	57.27	74.00	-16.73	51.70	5.57	Peak	---	---
3	5150.00	52.91	54.00	-1.09	47.20	5.71	Average	---	---
4	5150.00	66.33	74.00	-7.67	60.62	5.71	Peak	---	---
5	5350.00	44.64	54.00	-9.36	38.65	5.99	Average	---	---
6	5350.00	56.72	74.00	-17.28	50.73	5.99	Peak	---	---
7	10460.00	55.88	68.20	-12.32	41.28	14.60	Peak	---	---
8	15690.00	46.52	54.00	-7.48	31.54	14.98	Average	---	---
9	15690.00	57.72	74.00	-16.28	42.74	14.98	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.6 Frequency Stability

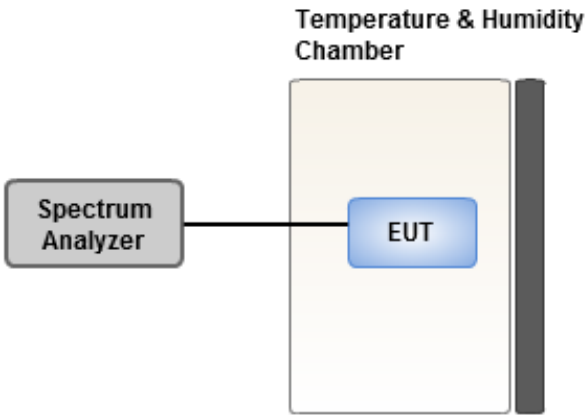
3.6.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

3.6.2 Test Procedures

1. The EUT is installed in an environment test chamber with external power source.
2. Set the chamber to operate at 50 centigrade and external power source to output at nominal voltage of EUT.
3. A sufficient stabilization period at each temperature is used prior to each frequency measurement.
4. When temperature is stabled, measure the frequency stability.
5. The test shall be performed under -30 to 50 centigrade and 85 to 115 percent of the nominal voltage. Change setting of chamber and external power source to complete all conditions.

3.6.3 Test Setup



3.6.4 Test Result of Frequency Stability

Frequency: 5200 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°CVmax	2.64	2.42	2.37	1.42
T20°CVmin	4.91	4.90	4.85	4.86
T60°CVnom	4.66	3.18	4.71	4.74
T50°CVnom	3.52	3.44	3.97	4.18
T40°CVnom	4.30	4.87	4.35	4.55
T30°CVnom	2.90	2.63	3.67	3.30
T20°CVnom	2.64	2.75	2.95	3.48
T10°CVnom	1.56	2.02	1.46	1.84
T0°CVnom	0.93	1.54	1.16	0.74
T-10°CVnom	0.80	1.09	0.93	1.18
T-20°CVnom	1.25	1.62	0.70	0.81
T-30°CVnom	3.10	3.01	3.59	2.98
Vnom [Vac]: 120	Vmax [Vac]: 138	Vmin [Vac]: 102		
Tnom [°C]: 20	Tmax [°C]: 60	Tmin [°C]: -30		

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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