FCC C2PC Test Report

FCC ID	:	**NKR-SP1**
Equipment	:	**11abgn WLAN/Bluetooth Combo Module**
Model No.	:	**DHUB-SP1**
Brand Name	:	**SHARP Corporation**
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	:	**May 05, 2016**
Tested Date	:	**May 09 ~ May 13, 2016**

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
FR412801-03AN	Rev. 01	Initial issue	May 20, 2016

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 22.416MHz 37.71 (Margin -12.29dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 11650.00MHz 52.99 (Margin -1.01dB) - AV [dBuV/m at 3m]: 5649.90MHz 67.19 (Margin -1.01dB) - PK	Pass
15.407(a)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(e)	6dB Bandwidth	Meet the requirement of limit	Pass
15.407(a)	RF Output Power	Max Power [dBm]: 21.96	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

This report is issued as a FCC Class II Permissive Change for complying with New U-NII rule requirement. Only test results of U-NII band 3 are recorded in this report. There is no test result of U-NII band 1/2A/2C in this report since

1) Output power of U-NII band 1 is not changed.
2) Requirement of U-NII band 2A/2C is not changed.
3) Device keeps all conditions of U-NII band 1/2A/2C as grant.

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**
5725-5850	a	5745-5825	149-165 [5]	2	6-54 Mbps
5725-5850	n (HT20)	5745-5825	149-165 [5]	2	MCS 0-15
5725-5850	n (HT40)	5755-5795	151-159 [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.	Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)				
				2400~2483.5	**5150~5250**	**5250~5350**	**5470~5725**	**5725~5850**
1	Left antenna	Printed	N/A	3.97	3.31	3.31	3.42	2.92
2	Right antenna	Printed	N/A	2.2	1.11	1.27	1.66	0.34

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from host

1.1.4 Accessories

N/A

1.1.5 Channel List

For Frequency band 5725~5850 MHz			
802.11 a / HT20		802.11n HT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
149	5745	151	5755
153	5765	159	5795
157	5785	---	---
161	5805	---	---
165	5825	---	---

1.1.6 Test Tool and Duty Cycle

Test tool	Mtool, version: 2.0.0.9
Duty Cycle Of Test Signal (%)	99.52% - IEEE 802.11a 99.23% - IEEE 802.11n (HT20) 98.13% - IEEE 802.11n (HT40)
Duty Factor	0.02 - IEEE 802.11a 0.03 - IEEE 802.11n (HT20) 0.08 - IEEE 802.11n (HT40)

1.1.7 Power Setting

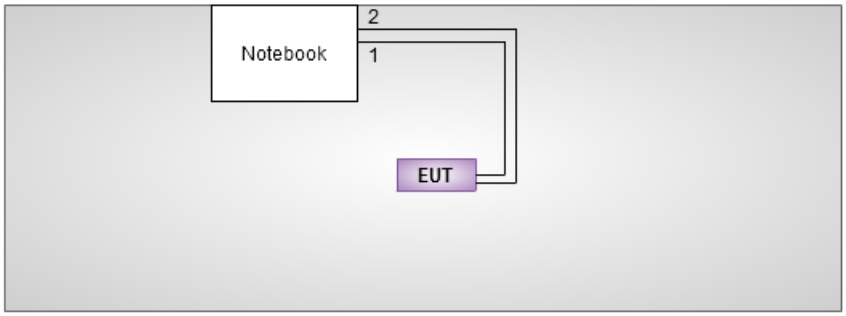
For Frequency band 5725~5850 MHz		
Modulation Mode	Test Frequency (MHz)	Power Set
11a	5745	63
11a	5785	58
11a	5825	60
HT20	5745	63
HT20	5785	60
HT20	5825	60
HT40	5755	64
HT40	5795	68

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	E5420	DoC	USB, 1.5m (x2) shielded.

1.3 Test Setup Chart

Test Setup Diagram



1-2. USB, 1.5m shielded

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. 21, 2015	Oct. 20, 2016
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 13, 2015	Nov. 12, 2016
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 21, 2015	Dec. 20, 2016
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 3 / (03CH03-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	Agilent	N9010A	MY53400091	Sep. 14, 2015	Sep. 13, 2016
Receiver	Agilent	N9038A	MY53290044	Oct. 14, 2015	Oct. 13, 2016
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 26, 2016	Apr. 25, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Feb. 24, 2016	Feb. 23, 2017
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2015	Nov. 03, 2016
Preamplifier	EMC	EMC02325	980187	Sep. 21, 2015	Sep. 20, 2016
Preamplifier	Agilent	83017A	MY53270014	Sep. 07, 2015	Sep. 06, 2016
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Feb. 05, 2016	Feb. 04, 2017
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY22600/4	Feb. 05, 2016	Feb. 04, 2017
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Feb. 05, 2016	Feb. 04, 2017
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Feb. 05, 2016	Feb. 04, 2017
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Feb. 05, 2016	Feb. 04, 2017
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Feb. 05, 2016	Feb. 04, 2017
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one 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, 2016	Feb. 16, 2017
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Nov. 27, 2015	Nov. 26, 2016
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016
DC POWER SOURCE	GW INSTEK	GPC-3060D	EM884797	Oct. 20, 2015	Oct. 19, 2016
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 C63.10-2013
FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r02
FCC KDB 644545 D03 Guidance for IEEE 802 11ac New Rules v01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
FCC KDB 412172 D01 Determining ERP and EIRP v01r01

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
Power density	±0.463 dB
Conducted emission	±2.670 dB
AC conducted emission	±2.90 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.37 dB
Time	±0.1%
Temperature	±0.6 °C

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	24°C / 62%	Howard Huang
Radiated Emissions	03CH03-WS	25°C / 60%	Allen Yu Vincent Yeh
RF Conducted	TH01-WS	20°C / 64%	Alex Huang

- FCC site registration No.: 207696
- IC site registration No.: 10807C-1

2.2 The Worst Test Modes and Channel Details

For Frequency band 5725-5850 MHz				
Test item	**Modulation Mode**	**Test Frequency (MHz)**	**Data Rate**	**Test Configuration**
Conducted Emissions	HT40	5795	MCS 0	---
Radiated Emissions ≤1GHz	HT40	5795	MCS 0	---
RF Output Power	11a HT20 HT40	5745 / 5785 / 5825 5745 / 5785 / 5825 5755 / 5795	6 Mbps MCS 0 MCS 0	---
Radiated Emissions >1GHz Emission Bandwidth 6dB bandwidth Peak Power Spectral Density	11a HT20 HT40	5745 / 5785 / 5825 5745 / 5785 / 5825 5755 / 5795	6 Mbps MCS 0 MCS 0	---
Frequency Stability	Un-modulation	5785	---	---

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.

3 Transmitter Test Results

3.1 Conducted Emissions

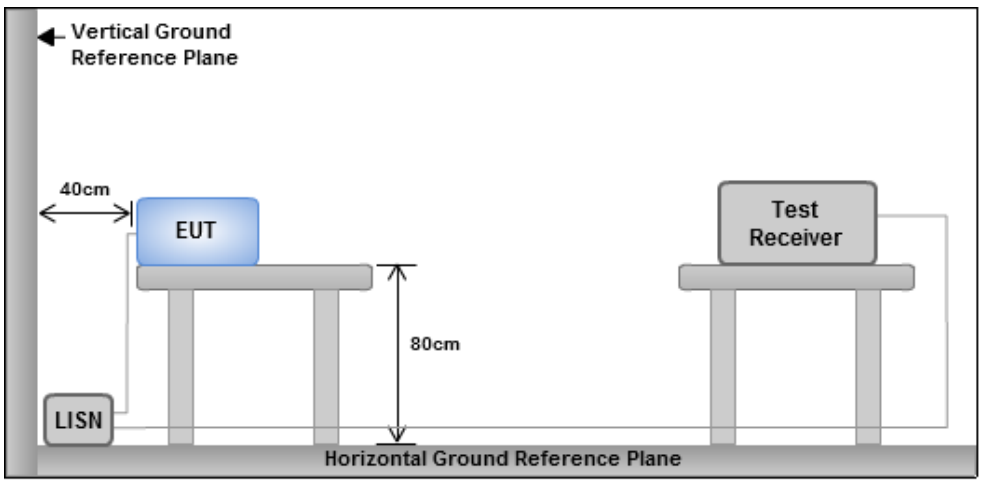
3.1.1 Limit of Conducted Emissions

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

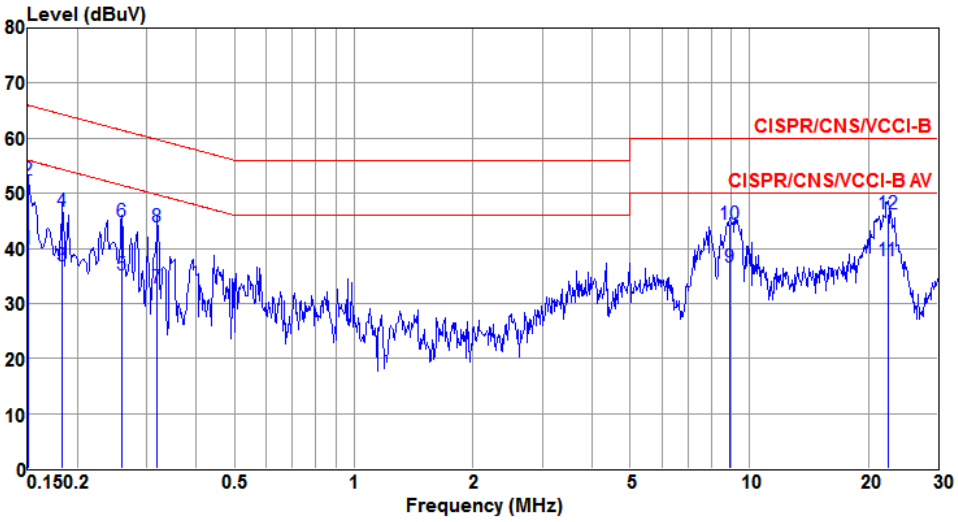


Note: 1. Support units were connected to second LISN.

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

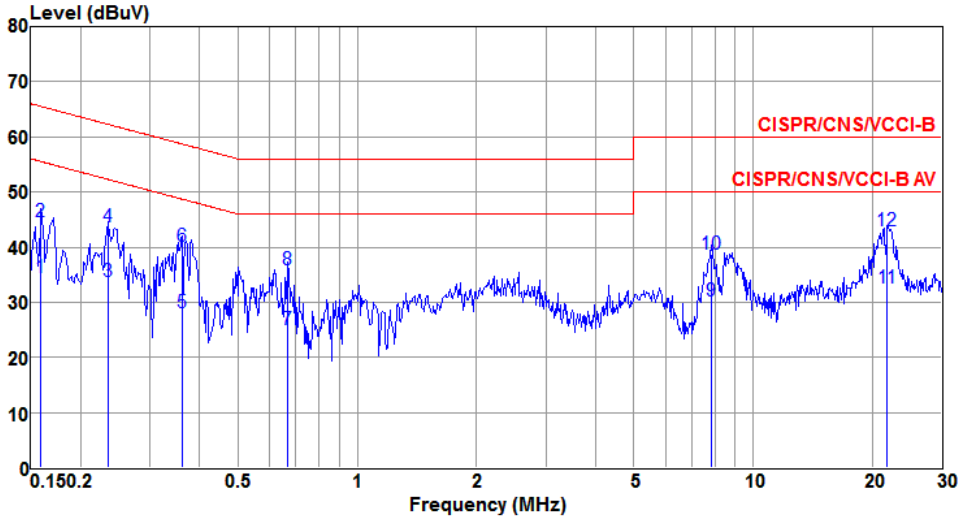
Modulation	HT40	Test Freq. (MHz)	5795
Power Phase	Line		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.150	39.82	56.00	-16.18	39.69	0.11	0.02	Average
2	0.150	52.42	66.00	-13.58	52.29	0.11	0.02	QP
3	0.183	36.87	54.33	-17.46	36.74	0.11	0.02	Average
4	0.183	46.67	64.33	-17.66	46.54	0.11	0.02	QP
5	0.259	35.19	51.47	-16.28	35.05	0.12	0.02	Average
6	0.259	44.74	61.47	-16.73	44.60	0.12	0.02	QP
7	0.318	32.71	49.75	-17.04	32.56	0.12	0.03	Average
8	0.318	43.84	59.75	-15.91	43.69	0.12	0.03	QP
9	8.916	36.63	50.00	-13.37	36.25	0.23	0.15	Average
10	8.916	44.34	60.00	-15.66	43.96	0.23	0.15	QP
11@	22.416	37.71	50.00	-12.29	37.10	0.40	0.21	Average
12	22.416	46.38	60.00	-13.62	45.77	0.40	0.21	QP

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

Modulation	HT40	Test Freq. (MHz)	5795
Power Phase	Neutral		



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.159	34.42	55.52	-21.10	34.28	0.12	0.02	Average
2	0.159	44.52	65.52	-21.00	44.38	0.12	0.02	QP
3	0.234	33.65	52.30	-18.65	33.52	0.11	0.02	Average
4	0.234	43.65	62.30	-18.65	43.52	0.11	0.02	QP
5	0.361	28.14	48.69	-20.55	27.98	0.13	0.03	Average
6	0.361	40.14	58.69	-18.55	39.98	0.13	0.03	QP
7	0.668	25.01	46.00	-20.99	24.83	0.13	0.05	Average
8	0.668	35.97	56.00	-20.03	35.79	0.13	0.05	QP
9	7.852	30.29	50.00	-19.71	29.90	0.24	0.15	Average
10	7.852	38.68	60.00	-21.32	38.29	0.24	0.15	QP
11	21.830	32.61	50.00	-17.39	31.99	0.42	0.20	Average
12@	21.830	42.91	60.00	-17.09	42.29	0.42	0.20	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 Limit of Emission Bandwidth

The minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

3.2.2 Test Procedures

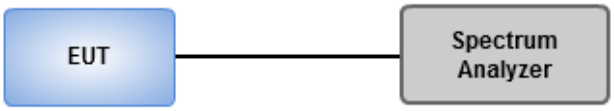
26dB Bandwidth

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 maximum of the emission.

6dB Bandwidth

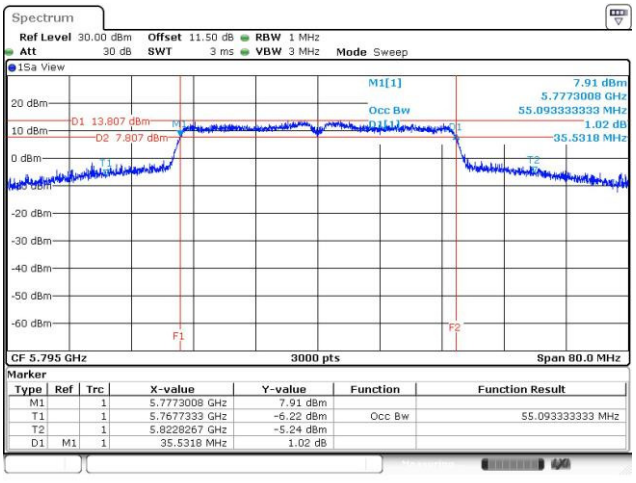
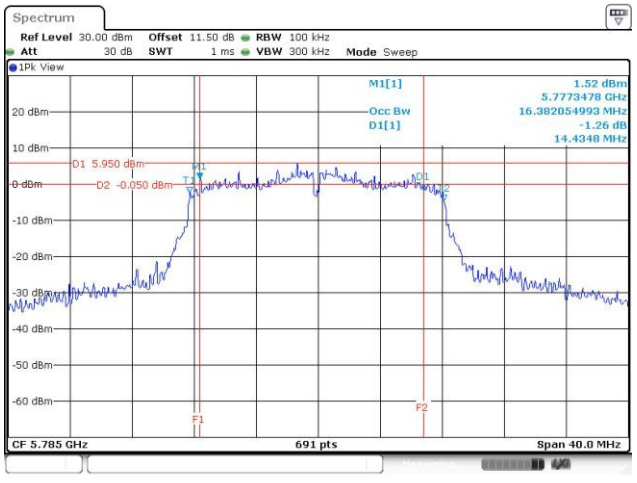
1. Set RBW = 100 kHz, video bandwidth = 300 kHz
2. Detector = Peak, Trace mode = max hold, Sweep = auto couple, Allow the trace to stabilize
3. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

3.2.3 Test Setup



3.2.4 Test Result of Emission Bandwidth

For Frequency band 5725-5850 MHz											
Emission Bandwidth											
Mode	N_{TX}	Freq. (MHz)	OBW Bandwidth (MHz)				6dB Bandwidth (MHz)				
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	6dB BW Limit (MHz)
11a	2	5745	17.57	17.68	---	---	15.13	15.07	---	---	0.5
11a	2	5785	16.80	17.20	---	---	14.43	14.96	---	---	0.5
11a	2	5825	17.03	17.19	---	---	15.13	15.07	---	---	0.5
HT20	2	5745	17.97	18.60	---	---	14.43	15.07	---	---	0.5
HT20	2	5785	17.85	17.85	---	---	14.67	17.57	---	---	0.5
HT20	2	5825	17.87	18.07	---	---	14.49	15.07	---	---	0.5
HT40	2	5755	38.83	38.99	---	---	35.13	35.13	---	---	0.5
HT40	2	5795	49.31	55.09	---	---	35.13	35.13	---	---	0.5

Worst Plot of 99% Bandwidth	Worst Plot of 6dB Bandwidth
	

3.3 RF Output Power

3.3.1 Limit of RF Output Power

The maximum conducted output power over the frequency band of operation shall not exceed 1 W

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

For Frequency band 5725-5850 MHz									
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	5745	17.39	17.55	---	---	111.713	20.48	30.00
11a	2	5785	16.96	16.64	---	---	95.791	19.81	30.00
11a	2	5825	17.05	17.04	---	---	101.282	20.06	30.00
HT20	2	5745	17.26	17.48	---	---	109.187	20.38	30.00
HT20	2	5785	16.90	16.95	---	---	98.523	19.94	30.00
HT20	2	5825	16.86	17.34	---	---	102.729	20.12	30.00
HT40	2	5755	17.6	17.72	---	---	116.700	20.67	30.00
HT40	2	5795	18.8	19.1	---	---	157.141	**21.96**	30.00

3.4 Peak Power Spectral Density

3.4.1 Limit of Peak Power Spectral Density

The maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.

3.4.2 Test Procedures

☒ Method SA-1

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.

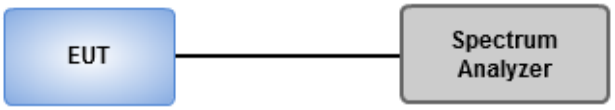
☐ Method SA-2

1. Set RBW = 1 MHz, VBW = 3 MHz, Sweep time = auto, Detector = RMS.
2. Trace average at 100 traces
3. Use the peak marker function to determine the maximum amplitude level.
4. Add 10 log(1/x), where x is the duty cycle

☐ Method SA-2 Alternative

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

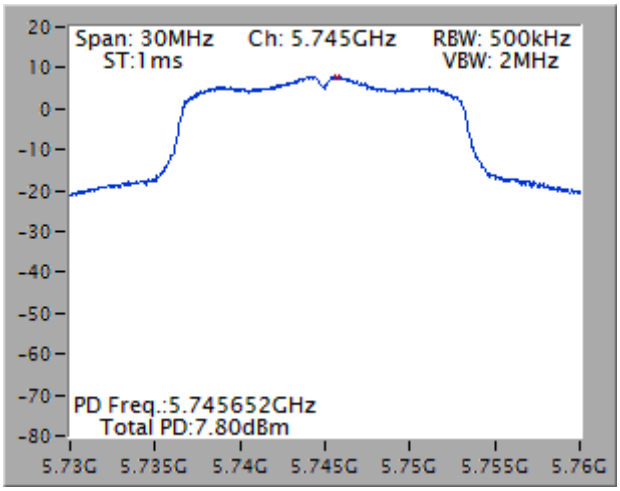


3.4.4 Test Result of Peak Power Spectral Density

For Frequency band 5725-5850 MHz						
Condition			Peak Power Spectral Density (dBm/500kHz)			
Modulation Mode	N_{TX}	Freq. (MHz)	PPSD w/o D.F (dBm/500kHz)	Duty Factor (dB)	PPSD with D.F (dBm/500kHz)	PPSD Limit (dBm/500kHz)
11a	2	5745	7.80	0.00	7.80	30.00
11a	2	5785	6.88	0.00	6.88	30.00
11a	2	5825	7.65	0.00	7.65	30.00
HT20	2	5745	7.66	0.00	7.66	30.00
HT20	2	5785	7.29	0.00	7.29	30.00
HT20	2	5825	7.44	0.00	7.44	30.00
HT40	2	5755	4.14	0.00	4.14	30.00
HT40	2	5795	5.30	0.00	5.30	30.00

Note:
1. D.F is duty factor.
2. Test result is bin-by-bin summing measured value of each TX port.

Worst Plot



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]	
5.725 - 5.850 GHz	☒	15.407(b)(4)(i) 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.
	☐	15.407(b)(4)(ii) ,compliance with the emission limits in § 15.247(d) Shall be at least 30dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,. Attenuation below the general limits specified in §15.209(a) is not required. In addition,radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see § 15.205(c))
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

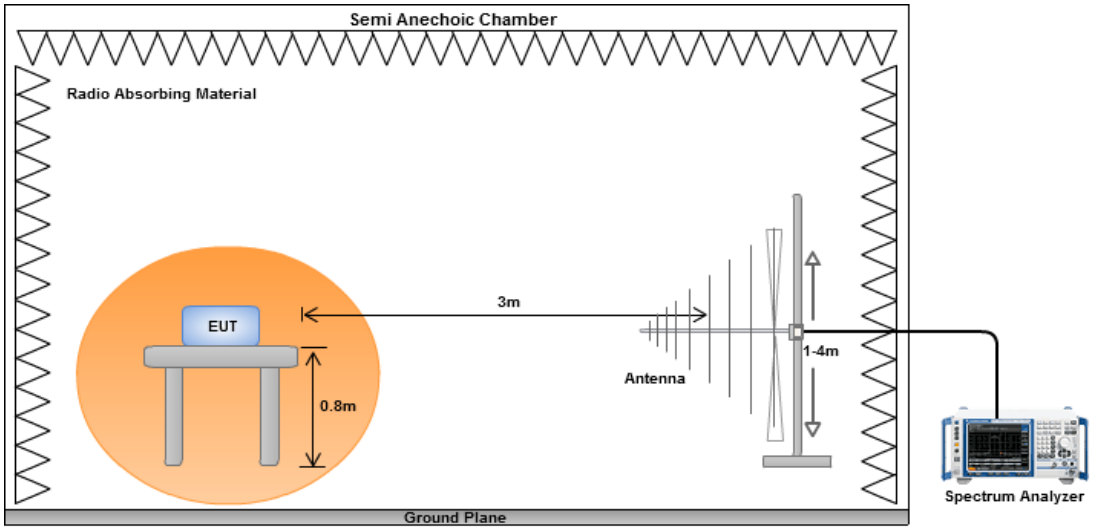
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m.
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:

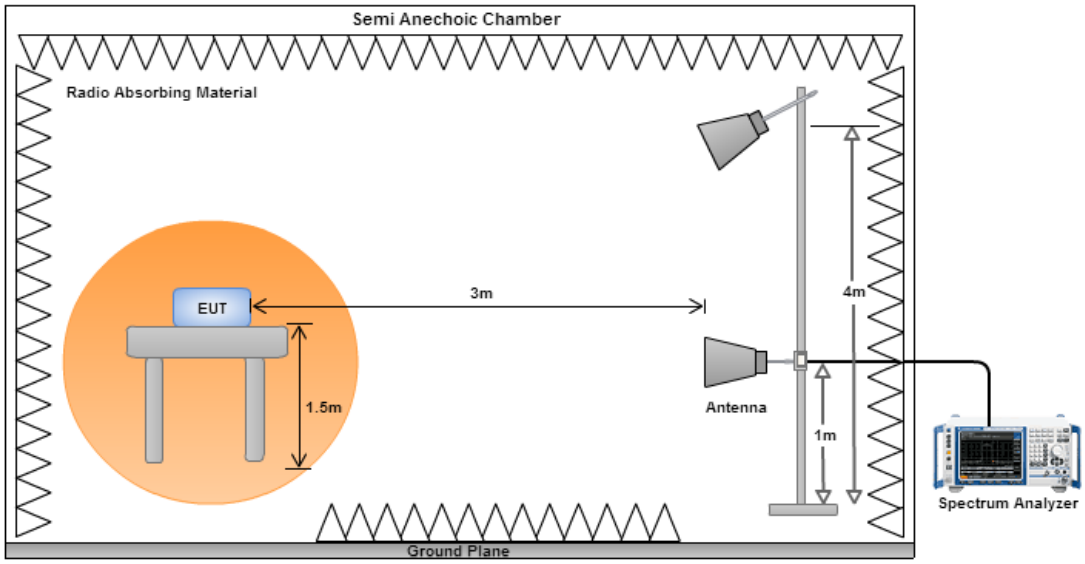
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz

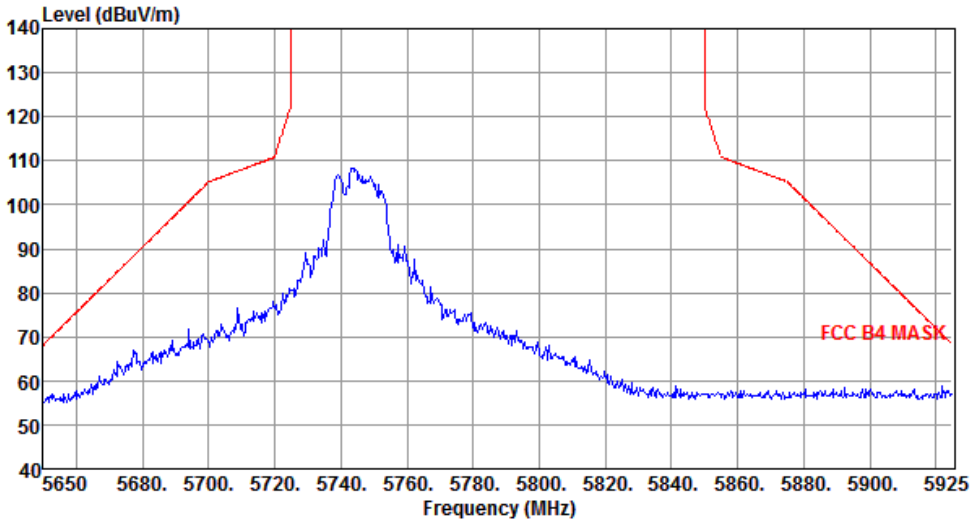


Radiated Emissions above 1 GHz

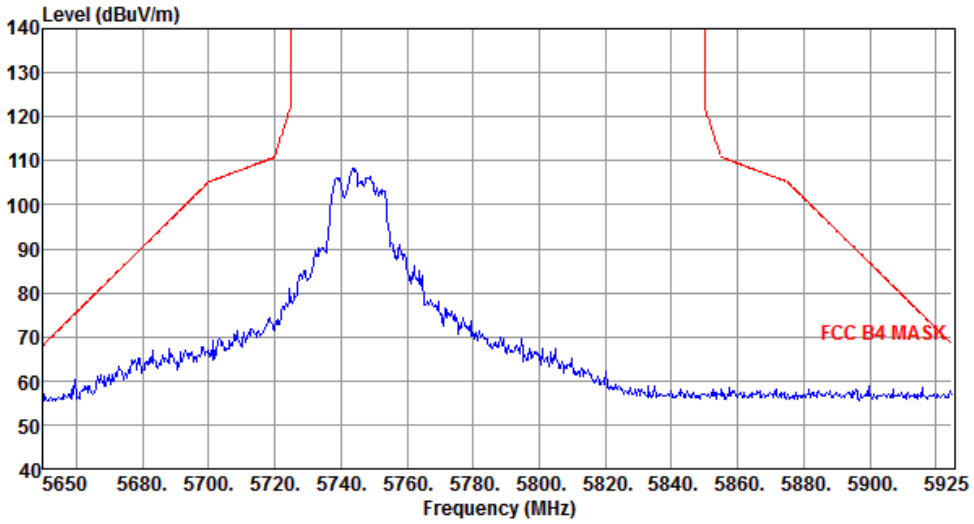


3.5.4 Transmitter Radiated Band Edge for 11a

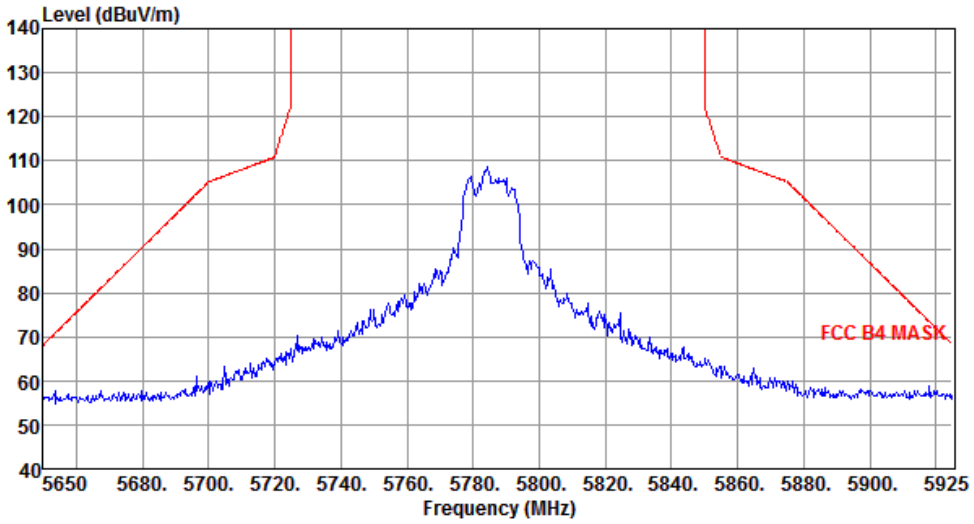
Modulation	11a	Test Freq. (MHz)	5745
Polarization	Horizontal		



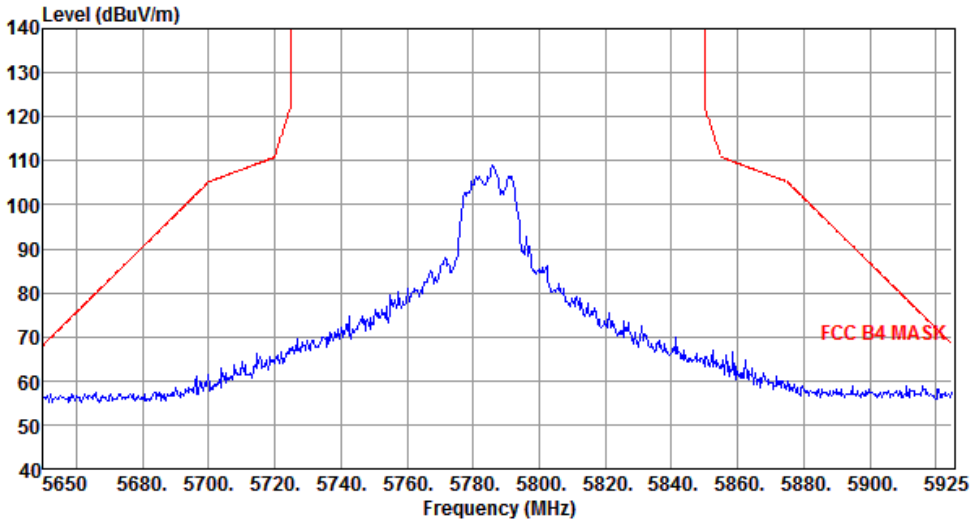
Modulation	11a	**Test Freq. (MHz)**	5745
Polarization	Vertical		



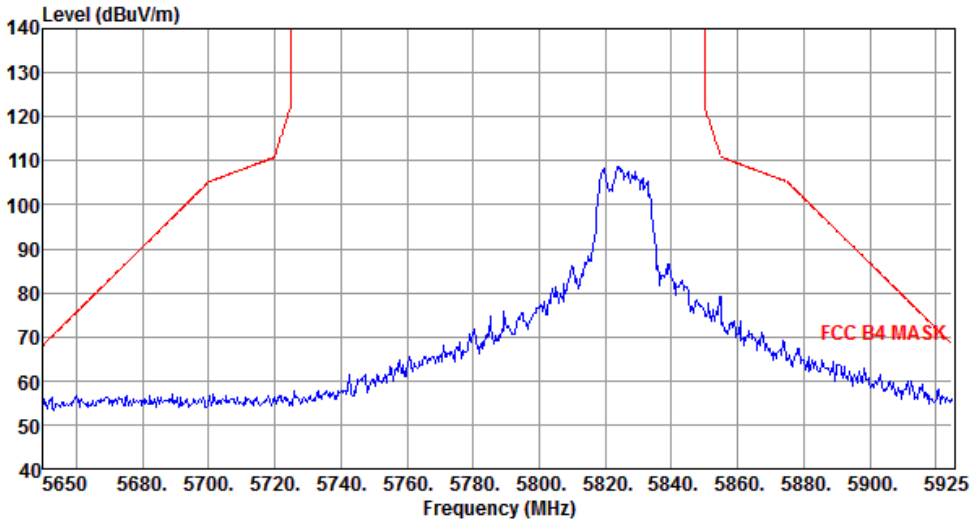
Modulation	11a	**Test Freq. (MHz)**	5785
Polarization	Horizontal		



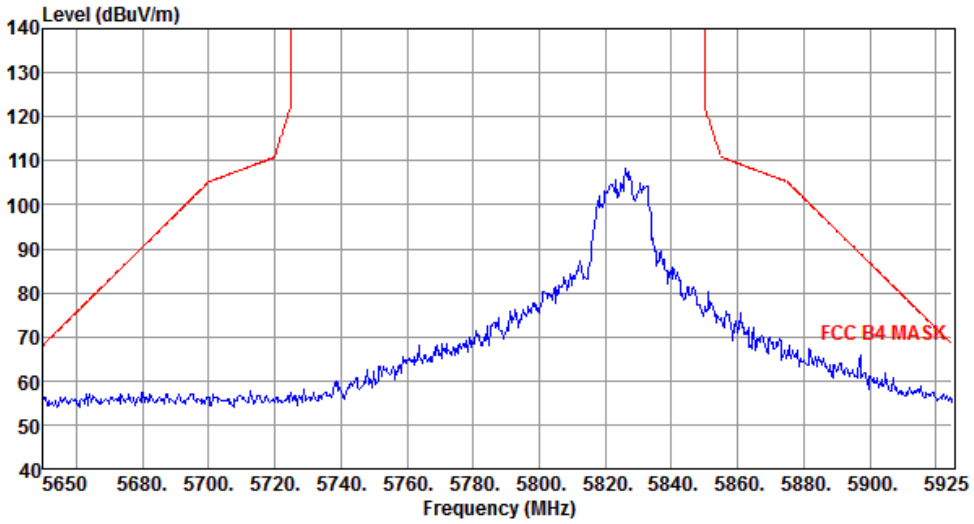
Modulation	11a	**Test Freq. (MHz)**	5785
Polarization	Vertical		



Modulation	11a	Test Freq. (MHz)	5825
Polarization	Horizontal		

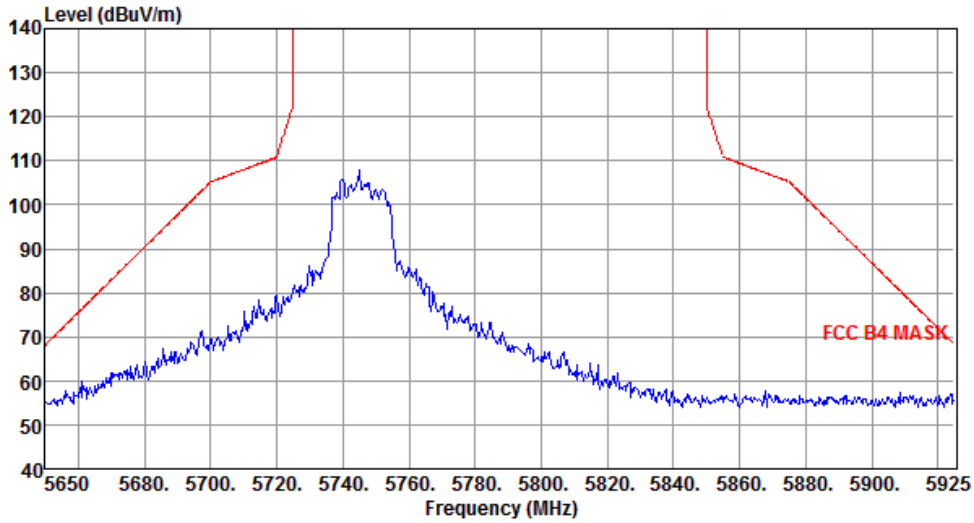


Modulation	11a	**Test Freq. (MHz)**	5825
Polarization	Vertical		

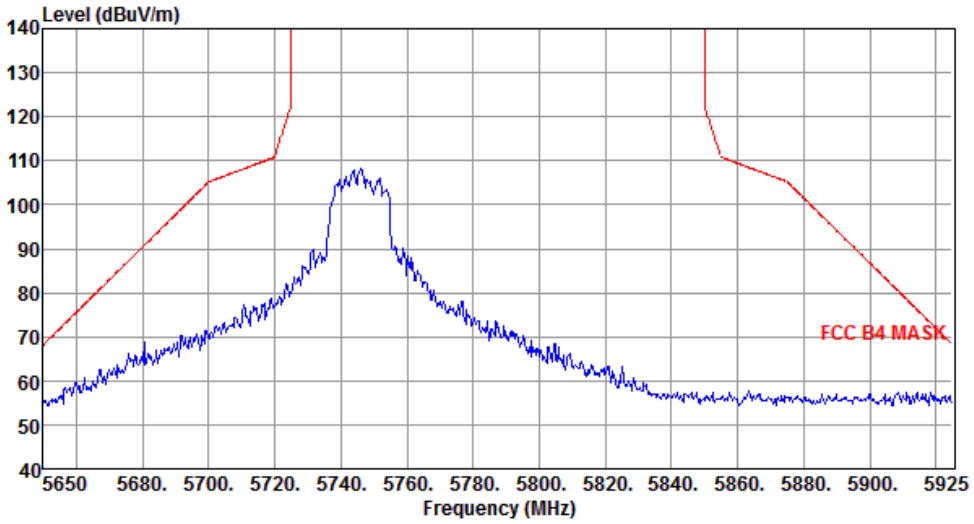


3.5.5 Transmitter Radiated Band Edge for HT20

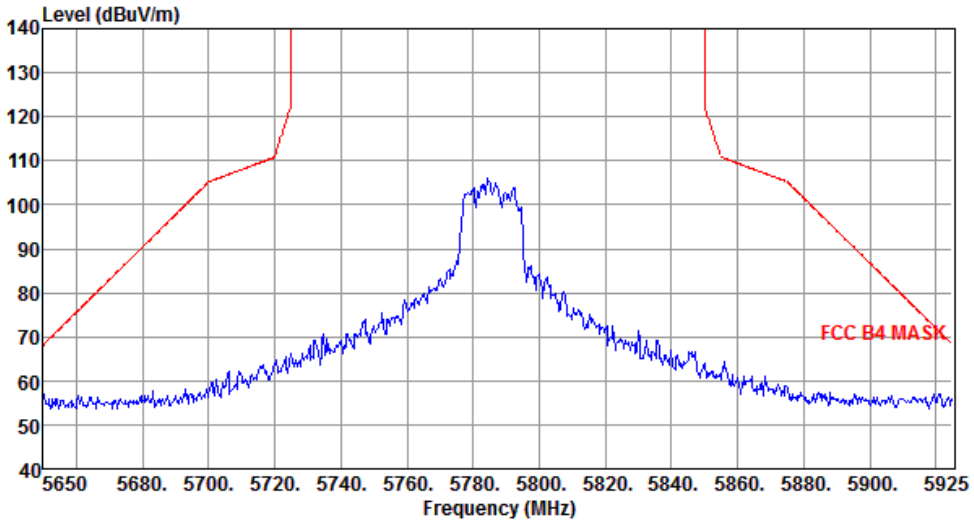
Modulation	HT20	Test Freq. (MHz)	5745
Polarization	Horizontal		



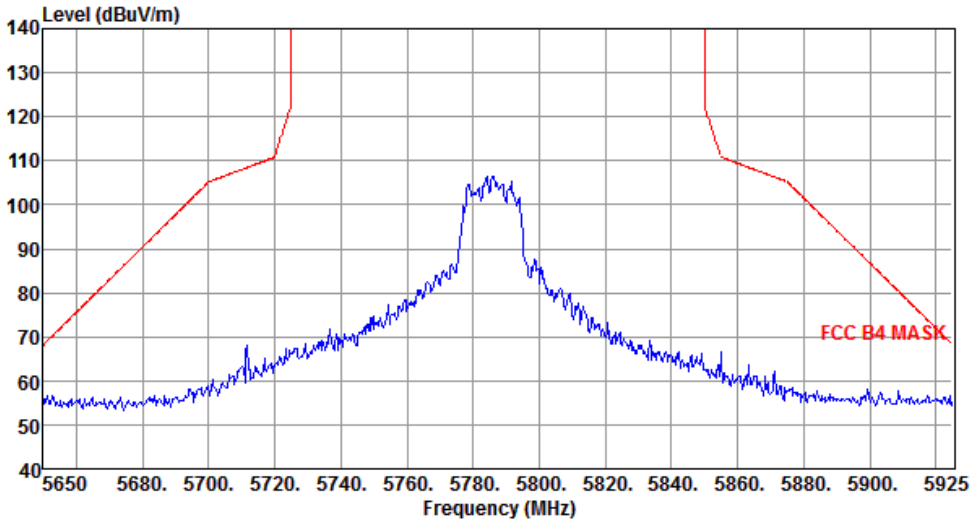
Modulation	HT20	**Test Freq. (MHz)**	5745
Polarization	Vertical		



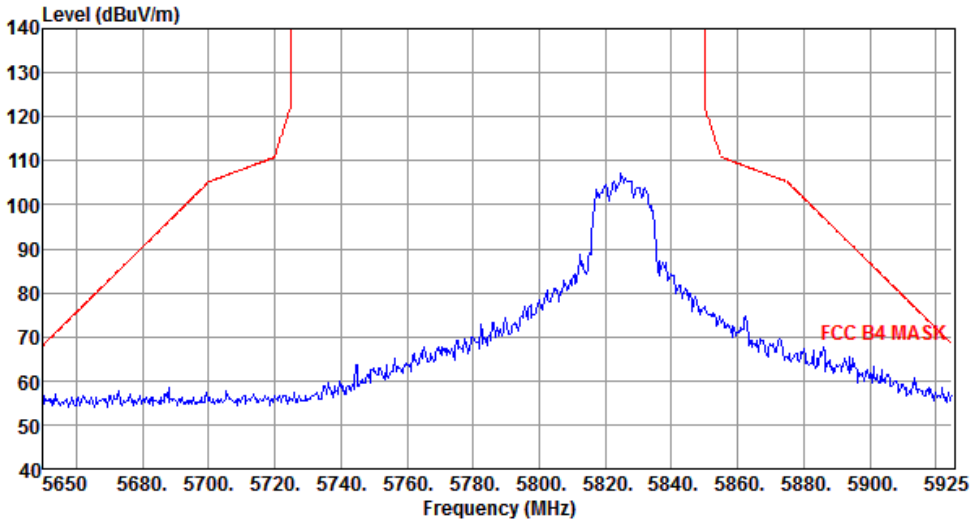
Modulation	HT20	Test Freq. (MHz)	5785
Polarization	Horizontal		



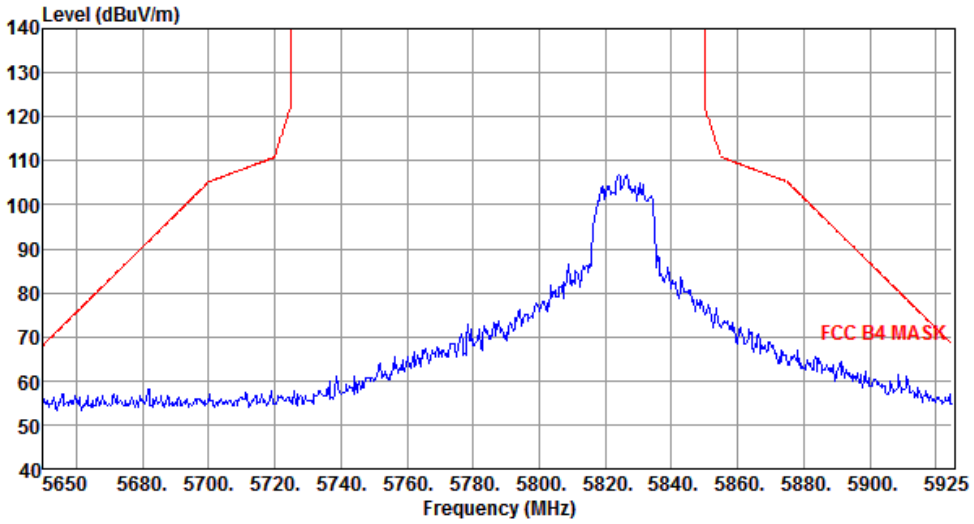
Modulation	HT20	**Test Freq. (MHz)**	5785
Polarization	Vertical		



Modulation	HT20	**Test Freq. (MHz)**	5825
Polarization	Horizontal		

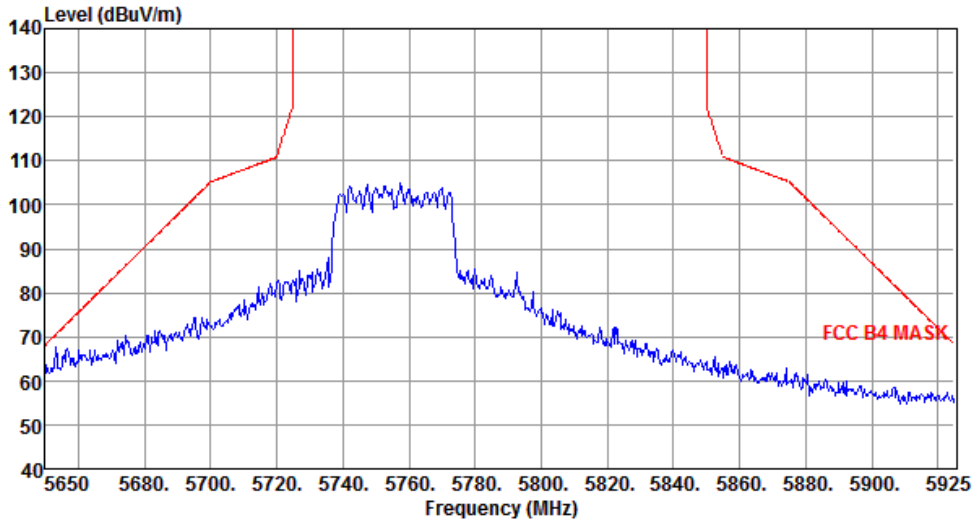


Modulation	HT20	**Test Freq. (MHz)**	5825
Polarization	Vertical		

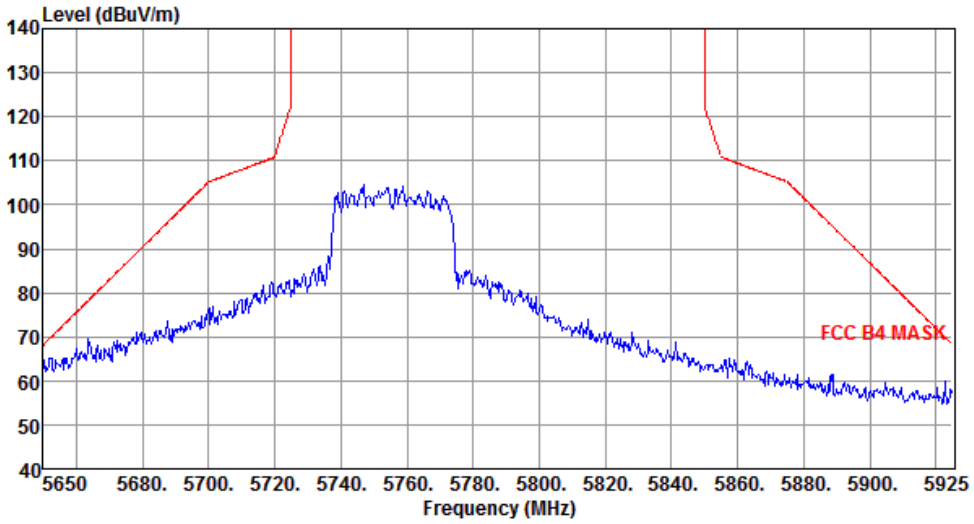


3.5.6 Transmitter Radiated Band Edge for HT40

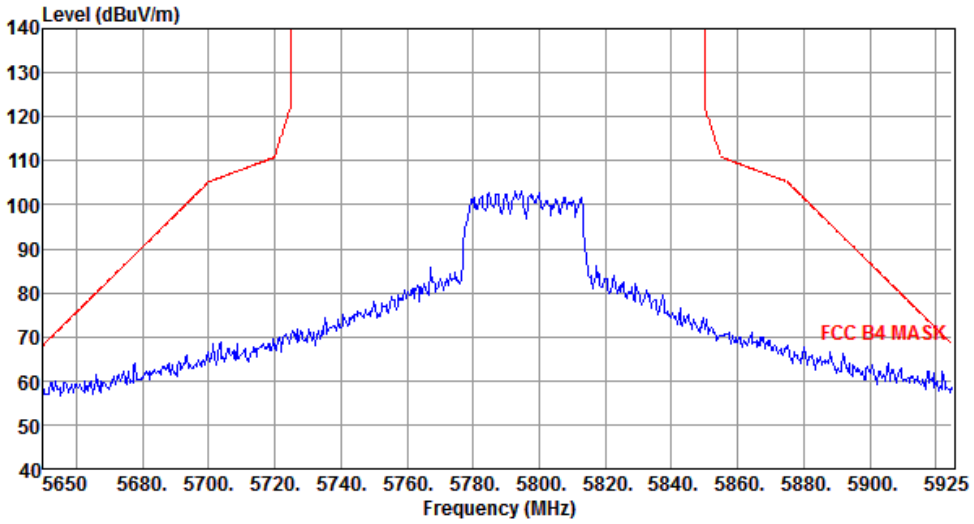
Modulation	HT40	Test Freq. (MHz)	5755
Polarization	Horizontal		



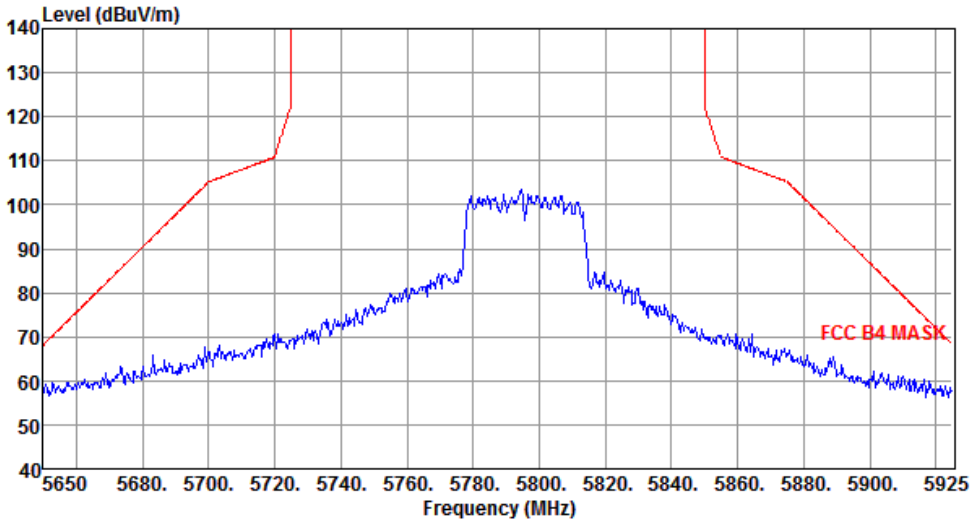
Modulation	HT40	**Test Freq. (MHz)**	5755
Polarization	Vertical		



Modulation	HT40	**Test Freq. (MHz)**	5795
Polarization	Horizontal		

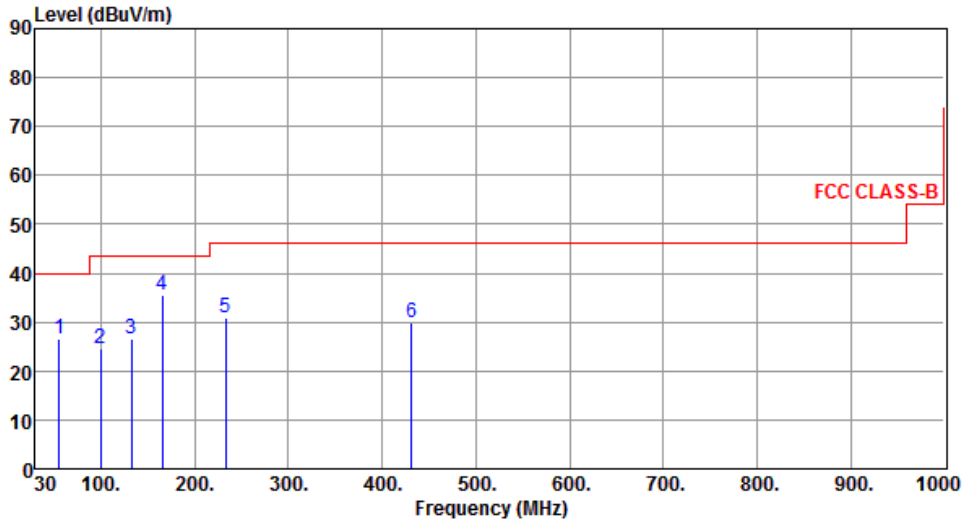


Modulation	HT40	**Test Freq. (MHz)**	5795
Polarization	Vertical		



3.5.7 Transmitter Radiated Unwanted Emissions (Below 1GHz)

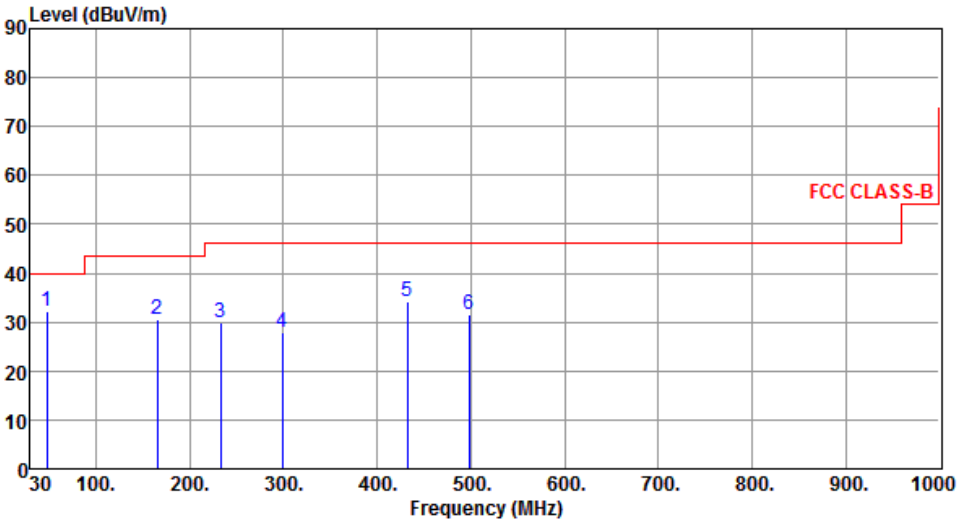
Modulation	HT40	**Test Freq. (MHz)**	5790
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	55.22	26.72	40.00	-13.28	34.91	-8.19	Peak	---	---
2	99.84	24.52	43.50	-18.98	37.79	-13.27	Peak	---	---
3	132.82	26.41	43.50	-17.09	35.79	-9.38	Peak	---	---
4	165.80	35.41	43.50	-8.09	43.63	-8.22	Peak	---	---
5	232.73	30.88	46.00	-15.12	40.94	-10.06	Peak	---	---
6	431.58	29.89	46.00	-16.11	34.00	-4.11	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	HT40	Test Freq. (MHz)	5790
Polarization	Vertical		

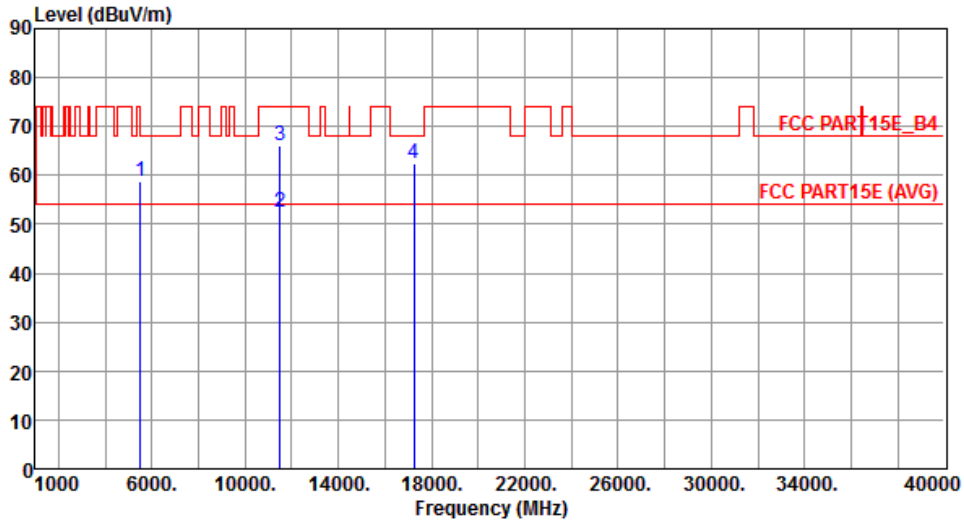


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	47.46	32.07	40.00	-7.93	39.91	-7.84	Peak	---	---
2	165.80	30.61	43.50	-12.89	38.83	-8.22	Peak	---	---
3	232.73	29.87	46.00	-16.13	39.93	-10.06	Peak	---	---
4	298.69	27.78	46.00	-18.22	35.54	-7.76	Peak	---	---
5	432.55	34.35	46.00	-11.65	38.44	-4.09	Peak	---	---
6	498.51	31.52	46.00	-14.48	34.43	-2.91	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.

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

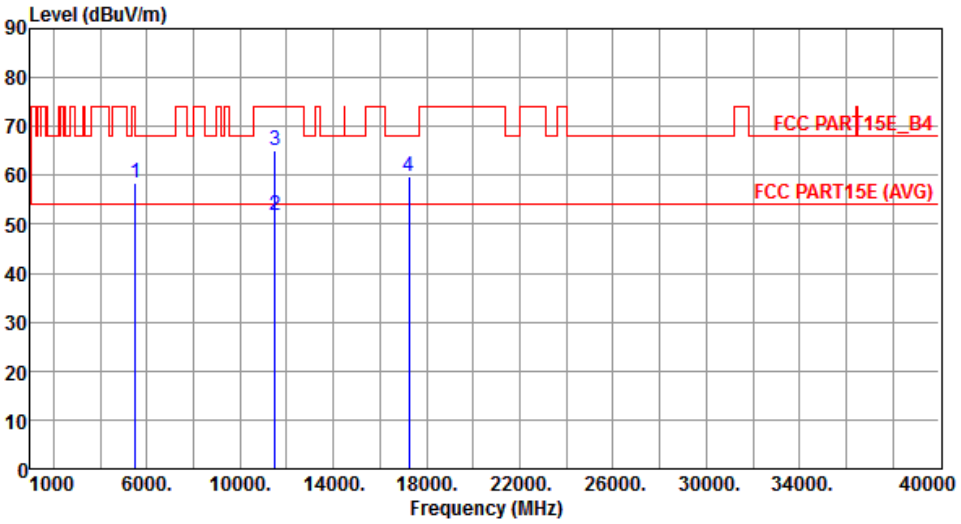
Modulation	11a	Test Freq. (MHz)	5745
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5519.00	58.81	68.20	-9.39	52.38	6.43	Peak	210	228
2	11490.00	52.59	54.00	-1.41	36.57	16.02	Average	191	12
3	11490.00	65.93	74.00	-8.07	49.91	16.02	Peak	191	12
4	17235.00	62.47	68.20	-5.73	44.03	18.44	Peak	102	357

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).

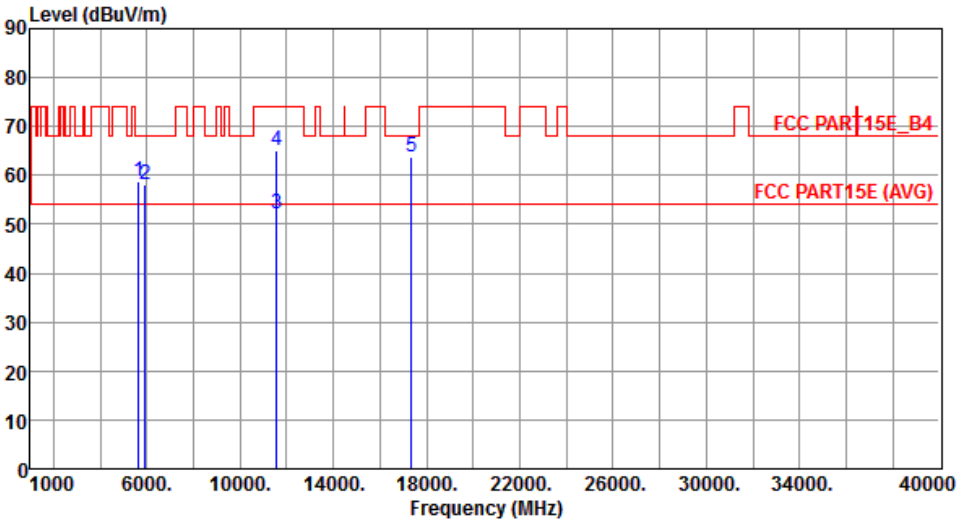
Modulation	11a	Test Freq. (MHz)	5745
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5519.00	58.43	68.20	-9.77	52.00	6.43	Peak	388	258
2	11490.00	51.69	54.00	-2.31	35.67	16.02	Average	191	127
3	11490.00	65.22	74.00	-8.78	49.20	16.02	Peak	191	127
4	17235.00	59.93	68.20	-8.27	41.49	18.44	Peak	100	40

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).

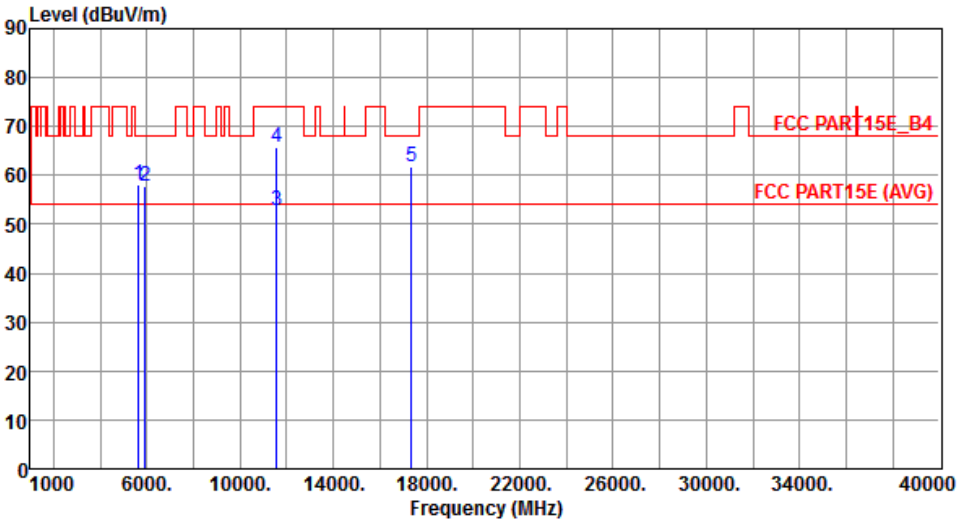
Modulation	11a	Test Freq. (MHz)	5785
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5649.90	58.73	68.20	-9.47	52.09	6.64	Peak	206	226
2	5925.10	58.22	68.20	-9.98	50.87	7.35	Peak	206	226
3	11570.00	52.06	54.00	-1.94	36.16	15.90	Average	185	14
4	11570.00	65.08	74.00	-8.92	49.18	15.90	Peak	185	14
5	17355.00	63.62	68.20	-4.58	44.78	18.84	Peak	179	50

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).

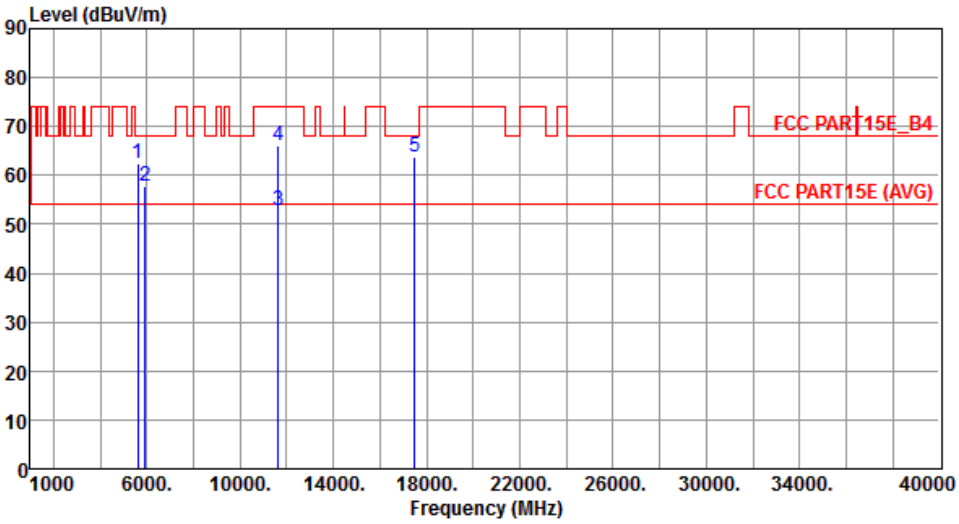
Modulation	11a	Test Freq. (MHz)	5785
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5649.90	58.23	68.20	-9.97	51.59	6.64	Peak	100	248
2	5925.10	57.66	68.20	-10.54	50.31	7.35	Peak	100	248
3	11570.00	52.83	54.00	-1.17	36.93	15.90	Average	271	146
4	11570.00	65.79	74.00	-8.21	49.89	15.90	Peak	271	146
5	17355.00	61.70	68.20	-6.50	42.86	18.84	Peak	100	142

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).

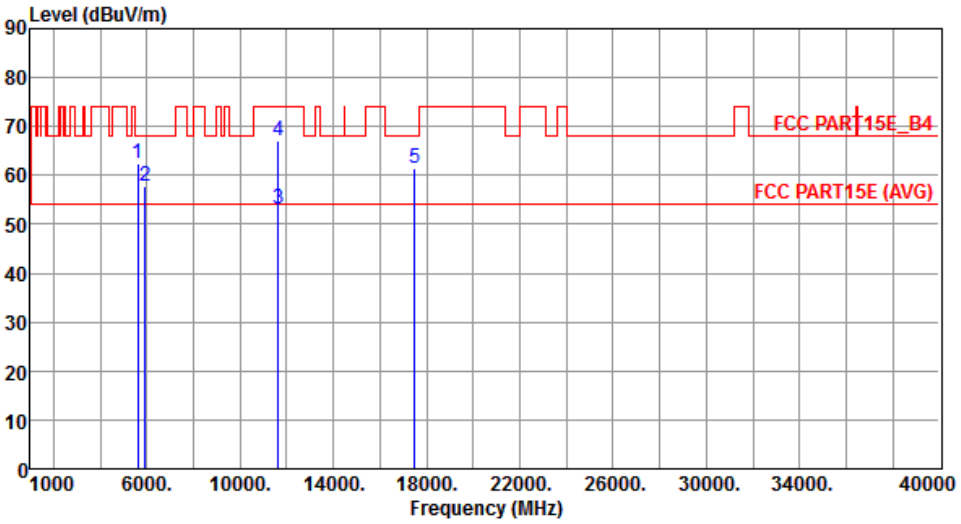
Modulation	11a	Test Freq. (MHz)	5825
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5600.00	62.57	68.20	-5.63	56.07	6.50	Peak	206	229
2	5925.10	57.90	68.20	-10.30	50.55	7.35	Peak	206	229
3	11650.00	52.69	54.00	-1.31	36.94	15.75	Average	181	16
4	11650.00	66.06	74.00	-7.94	50.31	15.75	Peak	181	16
5	17475.00	63.78	68.20	-4.42	44.53	19.25	Peak	176	50

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)	5825
Polarization	Vertical		

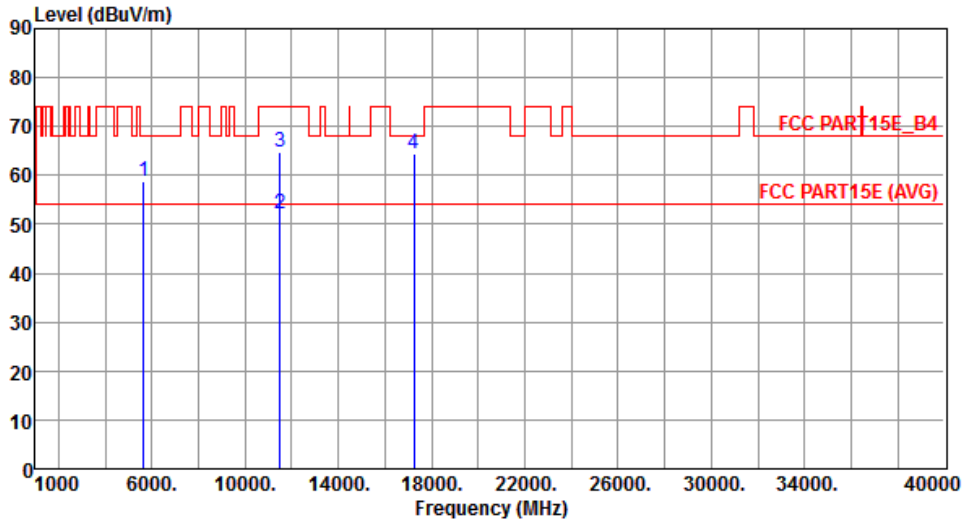


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5600.00	62.41	68.20	-5.79	55.91	6.50	Peak	100	238
2	5925.10	57.88	68.20	-10.32	50.53	7.35	Peak	100	238
3	11650.00	52.99	54.00	-1.01	37.24	15.75	Average	287	142
4	11650.00	67.20	74.00	-6.80	51.45	15.75	Peak	287	142
5	17475.00	61.45	68.20	-6.75	42.20	19.25	Peak	100	141

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).

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

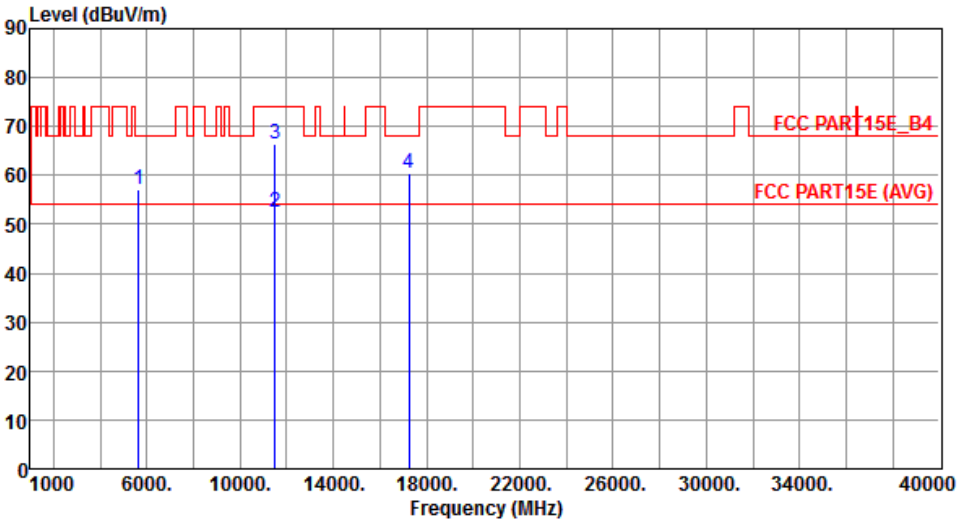
Modulation	HT20	**Test Freq. (MHz)**	5745
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5649.90	58.79	68.20	-9.41	52.15	6.64	Peak	210	229
2	11490.00	52.20	54.00	-1.80	36.18	16.02	Average	100	30
3	11490.00	64.84	74.00	-9.16	48.82	16.02	Peak	100	30
4	17235.00	64.38	68.20	-3.82	45.94	18.44	Peak	178	57

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).

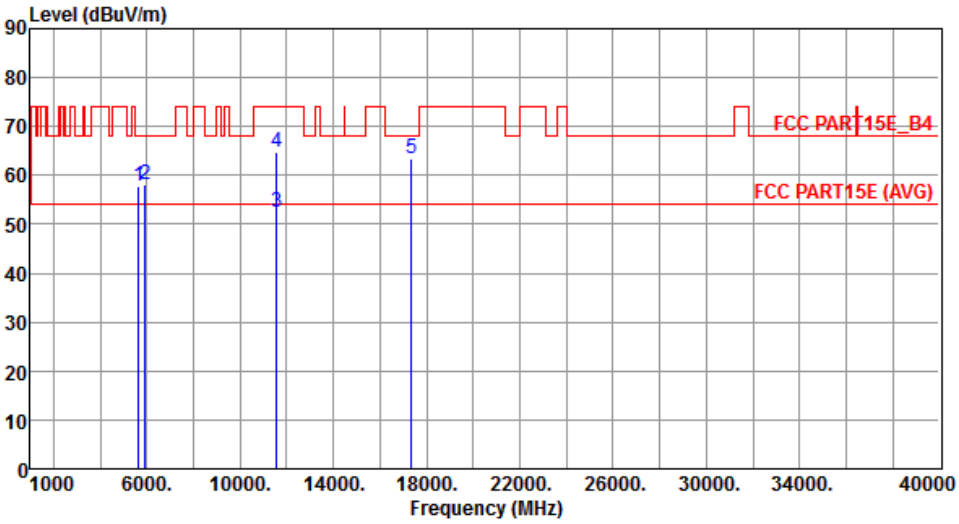
Modulation	HT20	Test Freq. (MHz)	5745
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5649.90	56.96	68.20	-11.24	50.32	6.64	Peak	100	255
2	11490.00	52.50	54.00	-1.50	36.48	16.02	Average	286	142
3	11490.00	66.55	74.00	-7.45	50.53	16.02	Peak	286	142
4	17235.00	60.43	68.20	-7.77	41.99	18.44	Peak	163	136

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).

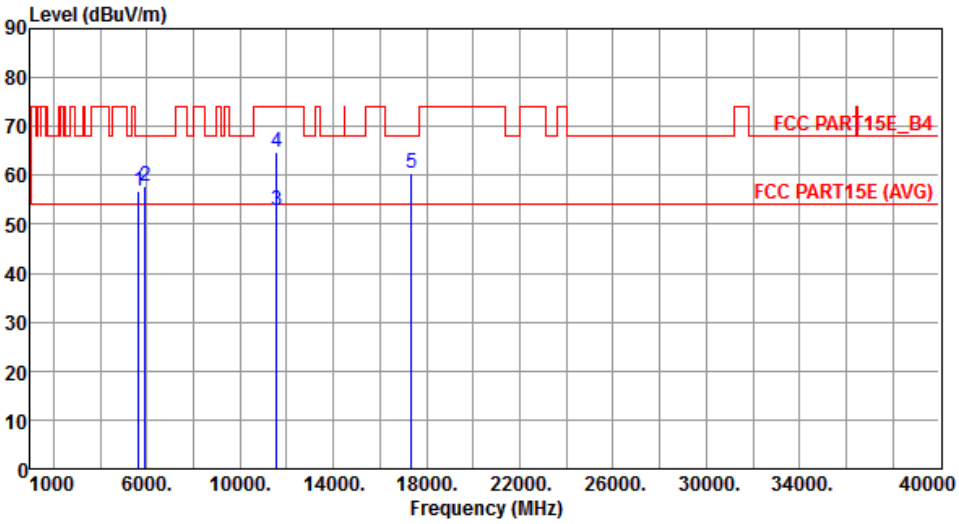
Modulation	HT20	Test Freq. (MHz)	5785
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5649.90	57.69	68.20	-10.51	51.05	6.64	Peak	211	227
2	5925.10	58.16	68.20	-10.04	50.81	7.35	Peak	211	227
3	11570.00	52.49	54.00	-1.51	36.59	15.90	Average	186	13
4	11570.00	64.67	74.00	-9.33	48.77	15.90	Peak	186	13
5	17355.00	63.58	68.20	-4.62	44.74	18.84	Peak	174	55

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).

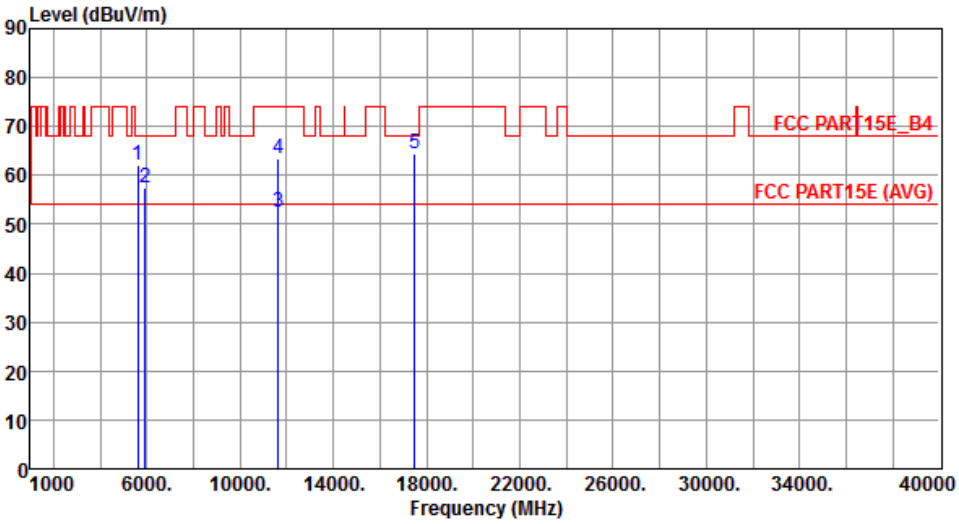
Modulation	HT20	Test Freq. (MHz)	5785
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5649.90	56.81	68.20	-11.39	50.17	6.64	Peak	100	142
2	5925.10	57.77	68.20	-10.43	50.42	7.35	Peak	100	142
3	11570.00	52.90	54.00	-1.10	37.00	15.90	Average	271	141
4	11570.00	64.61	74.00	-9.39	48.71	15.90	Peak	271	141
5	17355.00	60.38	68.20	-7.82	41.54	18.84	Peak	100	142

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).

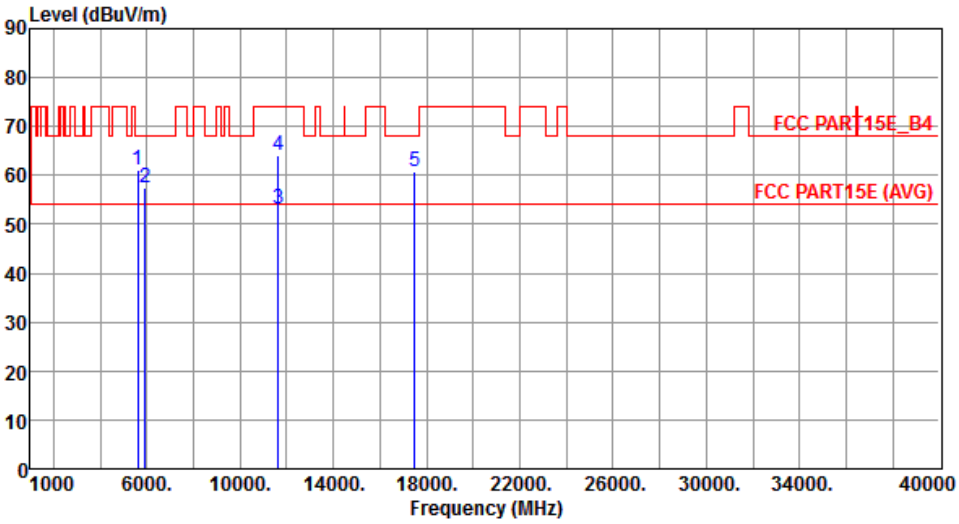
Modulation	HT20	Test Freq. (MHz)	5825
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5600.00	62.01	68.20	-6.19	55.51	6.50	Peak	218	227
2	5925.10	57.50	68.20	-10.70	50.15	7.35	Peak	218	227
3	11650.00	52.59	54.00	-1.41	36.84	15.75	Average	181	7
4	11650.00	63.52	74.00	-10.48	47.77	15.75	Peak	181	7
5	17475.00	64.36	68.20	-3.84	45.11	19.25	Peak	174	57

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)	5825
Polarization	Vertical		

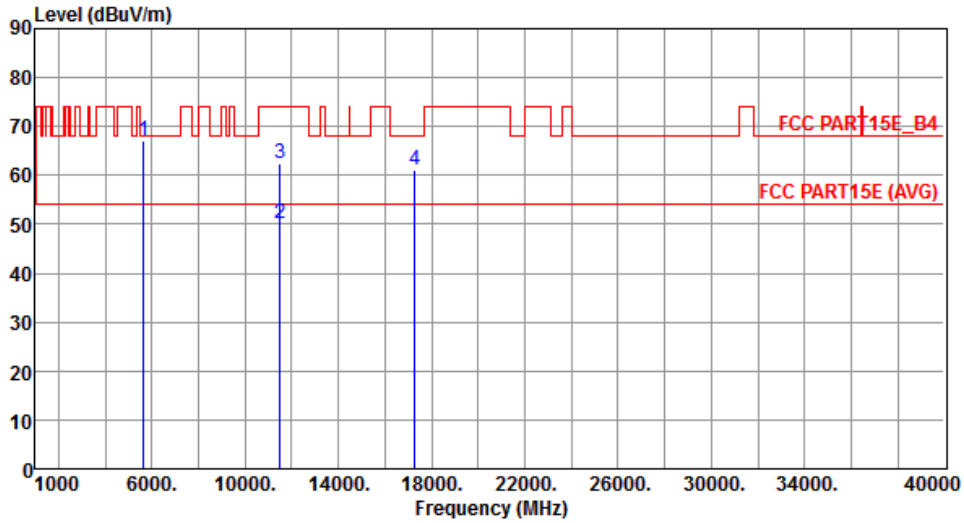


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5600.00	61.07	68.20	-7.13	54.57	6.50	Peak	100	239
2	5925.10	57.61	68.20	-10.59	50.26	7.35	Peak	100	239
3	11650.00	52.99	54.00	-1.01	37.24	15.75	Average	269	138
4	11650.00	63.98	74.00	-10.02	48.23	15.75	Peak	269	138
5	17475.00	60.82	68.20	-7.38	41.57	19.25	Peak	100	143

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).

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

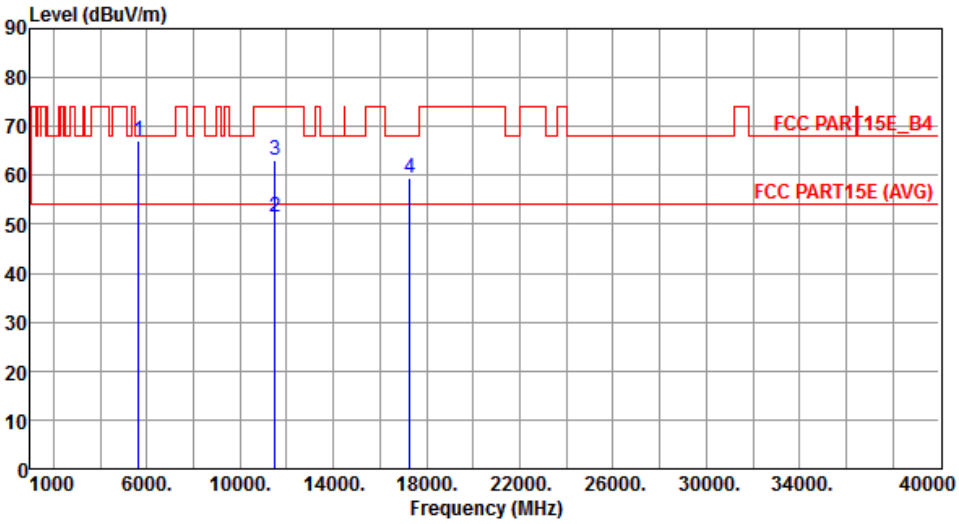
Modulation	HT40	Test Freq. (MHz)	5755
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5649.90	67.19	68.20	-1.01	60.55	6.64	Peak	211	225
2	11510.00	50.02	54.00	-3.98	34.01	16.01	Average	100	23
3	11510.00	62.36	74.00	-11.64	46.35	16.01	Peak	100	23
4	17265.00	61.12	68.20	-7.08	42.60	18.52	Peak	178	53

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).

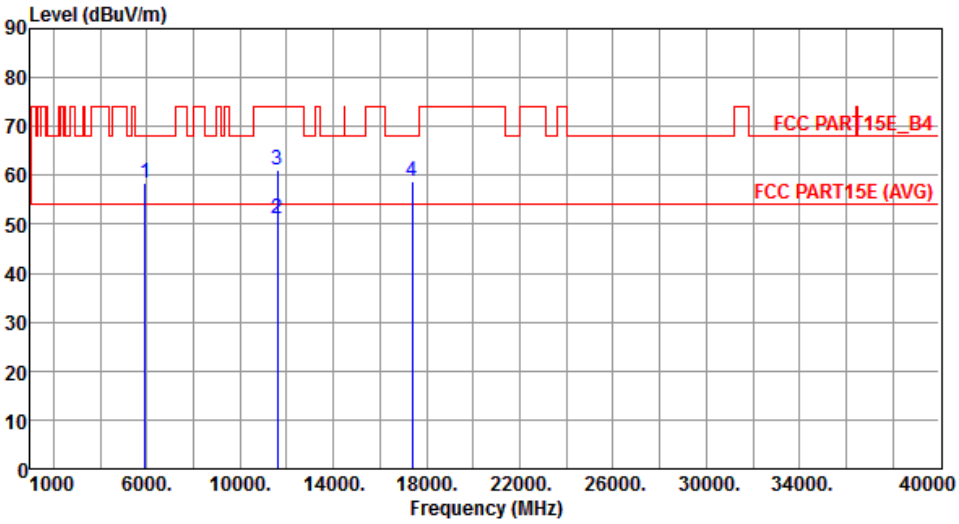
Modulation	HT40	Test Freq. (MHz)	5755
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5649.90	67.17	68.20	-1.03	60.53	6.64	Peak	100	254
2	11510.00	51.33	54.00	-2.67	35.32	16.01	Average	185	139
3	11510.00	63.25	74.00	-10.75	47.24	16.01	Peak	185	139
4	17265.00	59.41	68.20	-8.79	40.89	18.52	Peak	100	141

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).

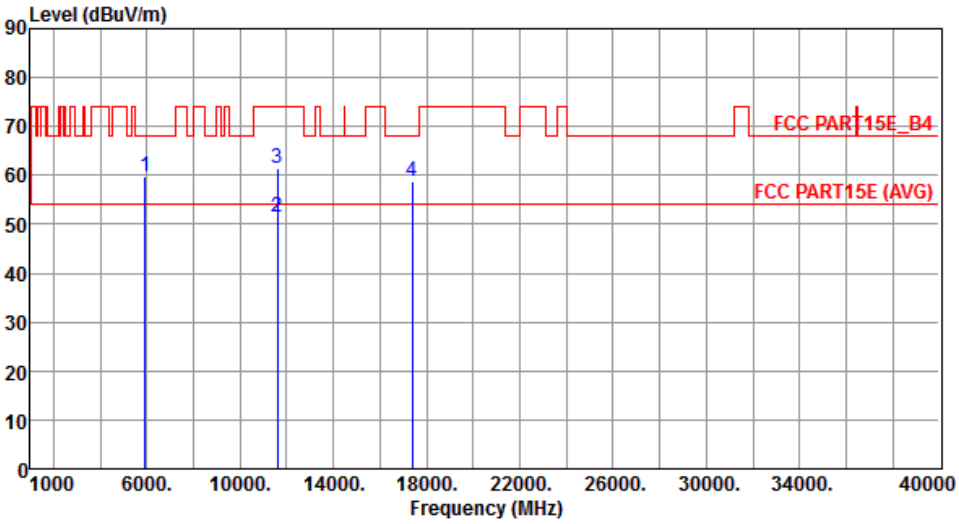
Modulation	HT40	Test Freq. (MHz)	5795
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5925.10	58.35	68.20	-9.85	51.00	7.35	Peak	208	229
2	11590.00	51.03	54.00	-2.97	35.17	15.86	Average	189	17
3	11590.00	61.23	74.00	-12.77	45.37	15.86	Peak	189	17
4	17385.00	58.76	68.20	-9.44	39.81	18.95	Peak	100	222

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)	5795
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	5925.10	59.85	68.20	-8.35	52.50	7.35	Peak	216	233
2	11590.00	51.60	54.00	-2.40	35.74	15.86	Average	290	145
3	11590.00	61.42	74.00	-12.58	45.56	15.86	Peak	290	145
4	17385.00	58.89	68.20	-9.31	39.94	18.95	Peak	100	342

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

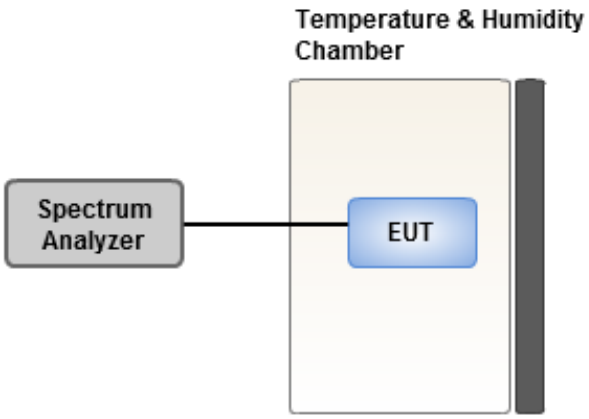
3.6.1 Limit of Frequency Stability

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 60centigrade 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: 5785 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°CVmax	1.02	1.69	1.13	1.12
T20°CVmin	1.02	1.64	1.11	1.09
T60°CVnom	1.01	1.57	1.10	1.07
T50°CVnom	1.00	1.47	1.07	1.06
T40°CVnom	-0.27	-0.05	0.12	-0.17
T30°CVnom	0.48	0.63	0.86	1.11
T20°CVnom	-0.34	-0.64	0.17	-0.63
T10°CVnom	0.58	0.52	0.84	0.66
T0°CVnom	-0.02	0.31	0.17	0.35
T-10°CVnom	0.13	0.76	0.23	0.76
T-20°CVnom	0.26	0.63	0.98	0.67
T-30°CVnom	0.16	0.02	0.07	0.34
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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