FCC C2PC Test Report

FCC ID	:	**SQG-SSD50NBT**
Equipment	:	**802.11abgn 2x2 and Bluetooth 4.0 module**
Model No.	:	**SSD50NBT**
Brand Name	:	**Laird**
Applicant	:	**Laird Connectivity**
Address	:	**W66N220 Commerce Court, Cedarburg, Wisconsin 53012, USA**
Standard	:	**47 CFR FCC Part 15.407**
Received Date	:	**Nov. 12, 2019**
Tested Date	:	**Nov. 15 ~ Nov. 18, 2019**

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.

Reviewed by:

Along Chen / Assistant Manager

Approved by:

Gary Chang / Manager

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR5D1002-02	Rev. 01	Initial issue	Jan. 03, 2020

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.204MHz 60.08 (Margin -3.37dB) - QP	Pass
15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 17160.00MHz 67.72 (Margin -0.48dB) - PK	Pass
15.407(a)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(a)	RF Output Power	Max Power [dBm]: 21.15	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

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

This is a Class II Permissive Change report (C2PC).

This report is issued as a supplementary report to original ICC report no. FR5D1002AN. The modification is concerned with following item:

✧ CH144 (5720MHz) & CH142 (5710MHz) are activated by software.

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**
5470-5725	a	5720	144 [1]	1 2	6-54 Mbps
5470-5725	n (HT20)	5720	144 [1]	1 2 2	MCS 0-7 MCS 0-7 MCS 8-15
5470-5725	n (HT40)	5710	142 [1]	1 2 2	MCS 0-7 MCS 0-7 MCS 8-15
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. Note 3: The device supports TX antenna diversity function. The conducted power of single chain is same for 1TX and 2TX operating mode. Therefore, Ant1+Ant2 configuration is chosen for final testing. Note 4: S/W version: WB50_RDVK_plus_Ch144.					

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	Laird MAF94051	Dipole	RP-SMA	2.1	2.4	2.6	3.4	3.4
2	Laird NanoBlade-IP04	PCB Dipole	IPEX MHF	2	3.9	3.9	4	4
3	Laird MAF95310 Mini NanoBlade Flex	PCB Dipole	IPEX MHF	2.79	3.38	3.38	3.38	3.38
4	Laird NanoBlue-IP04	PCB Dipole	IPEX MHF	2	---	---	---	---
5	Ethertronics WLAN_1000146	Isolated Magnetic Dipole	IPEX MHF	2.5	3.5	3.5	3.5	3.5

Note: Ant. No. 1, 2 & 5 were for 5G final test.

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

802.11 a / HT20		HT40	
Channel	**Frequency(MHz)**	**Channel**	**Frequency(MHz)**
144	5720	142	5710

1.1.6 Test Tool and Duty Cycle

Test Tool	ART2 GUI, V2.3		
Duty Cycle and Duty Factor	**Mode**	**Duty cycle (%)**	**Duty factor (dB)**
	11a	99.16%	0.04
	HT20	99.10%	0.04
	HT40	98.05%	0.09

1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
11a	5720	20
HT20	5720	20
HT40	5710	21

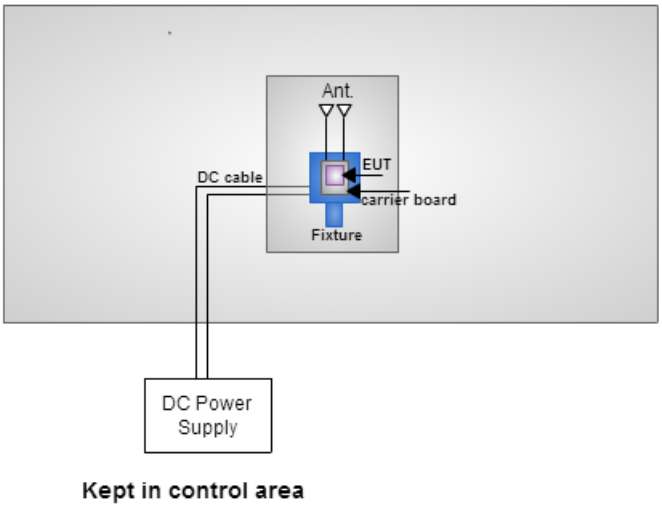
1.2 Local Support Equipment List

Support Equipment List						
No.	**Equipment**	**Brand**	**Model**	**S/N**	**FCC ID**	**Signal cable / Length (m)**
1	DC Power Supply	GW INSTEK	GPC-3060D	EM884797	---	---
2	Notebook	DELL	Latitude E6430	9ZFB4X1	DoC	---
3	Fixture	---	---	---	---	---

Note: Fixture is provided by applicant.

1.3 Test Setup Chart

Test Setup Diagram



Note: The support notebook was disconnected from EUT and removed from test table when EUT is set to transmit continuously.

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**
Receiver	R&S	ESR3	101657	Jan. 08, 2019	Jan. 07, 2020
LISN	R&S	ENV216	101579	Mar. 08, 2019	Mar. 07, 2020
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 22, 2019	Oct. 21, 2020
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	R&S	FSV40	101499	Jan. 07, 2019	Jan. 06, 2020
Receiver	R&S	ESR3	101658	Dec. 11, 2018	Dec. 10, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 17, 2019	Apr. 16, 2020
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Jan. 07, 2019	Jan. 06, 2020
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170508	Dec. 22, 2018	Dec. 21, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2019	Nov. 12, 2020
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 07, 2019	Oct. 06, 2020
Preamplifier	EMC	EMC02325	980187	Aug. 14, 2019	Aug. 13, 2020
Preamplifier	Agilent	83017A	MY53270014	Aug. 07, 2019	Aug. 06, 2020
Preamplifier	EMC	EMC184045B	980192	Aug. 01, 2019	Jul. 31, 2020
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/**4**	Sep. 27, 2019	Sep. 26, 2020
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 27, 2019	Sep. 26, 2020
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Sep. 27, 2019	Sep. 26, 2020
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Sep. 27, 2019	Sep. 26, 2020
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 27, 2019	Sep. 26, 2020
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 27, 2019	Sep. 26, 2020
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	Apr. 17, 2019	Apr. 16, 2020
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 05, 2018	Dec. 04, 2019
Power Meter	Anritsu	ML2495A	1241002	Oct. 23, 2019	Oct. 22, 2020
Power Sensor	Anritsu	MA2411B	1207366	Oct. 23, 2019	Oct. 22, 2020
DC POWER SOURCE	GW INSTEK	GPC-6030D	GES855395	Oct. 29, 2019	Oct. 28, 2020
Measurement Software	ICC	SENSE-15407_NII	V5.10	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 v02r01
FCC KDB 662911 D01 Multiple Transmitter Output v02r01
FCC KDB 412172 D01 Determining ERP and EIRP v01r01

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 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	±34.130 Hz
Conducted power	±0.808 dB
Frequency error	$\pm 1 \times 10^{-9}$
Power density	±0.583 dB
Conducted emission	±2.715 dB
AC conducted emission	±2.92 dB
Radiated emission ≤ 1GHz	±3.96 dB
Radiated emission > 1GHz	±4.51 dB
Time	±0.1%
Temperature	±0.4 ^{o}C

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	23°C / 68%	Akun Chung
Radiated Emissions	03CH03-WS	22°C / 61-65%	Roger Lu
RF Conducted	TH01-WS	21°C / 64%	Brad Wu

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
Conducted Emissions	HT40	5710	MCS 0	2
Radiated Emissions ≤1GHz	HT40	5710	MCS 0	1, 2, 3
Radiated Emissions >1GHz	11a	5720	6 Mbps	1, 2, 3
	HT20	5720	MCS 0	
	HT40	5710	MCS 0	
RF Output Power Emission Bandwidth Peak Power Spectral Density	11a	5720	6 Mbps	2
	HT20	5720	MCS 0	
	HT40	5710	MCS 0	
Frequency Stability	Un-modulation	5720	---	---

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.
2. The following antennas are used for final testing for this module: (See item 1.1.2 for more details.)
   1) Configuration 1 : Dipole antenna
   2) Configuration 2 : PCB Dipole antenna
   3) Configuration 3 : Isolated Magnetic Dipole antenna

3 Transmitter Test Results

3.1 Conducted Emissions

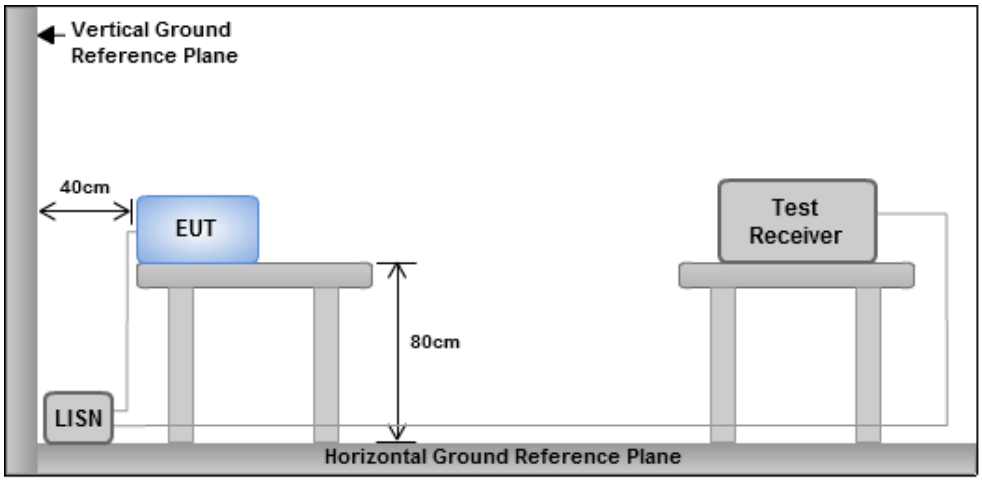
3.1.1 Limit of Conducted Emissions

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

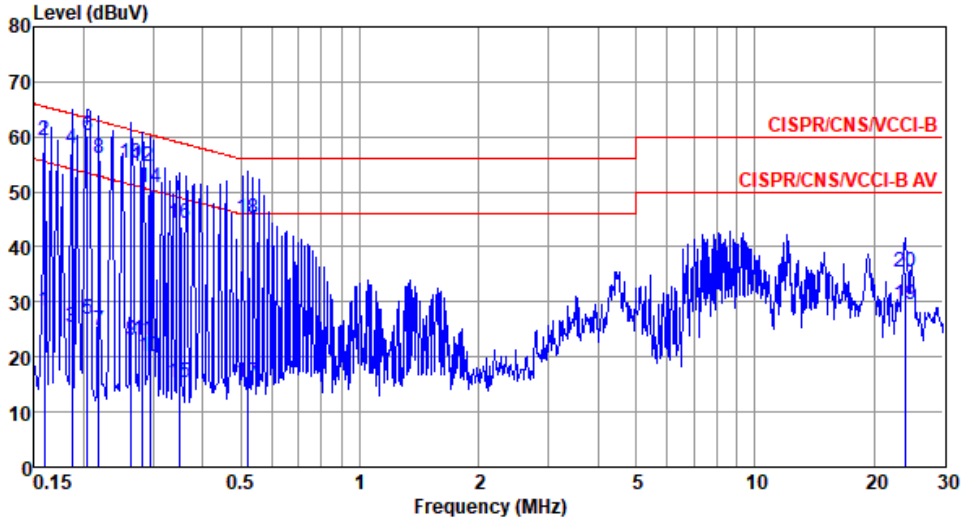
3.1.3 Test Setup



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

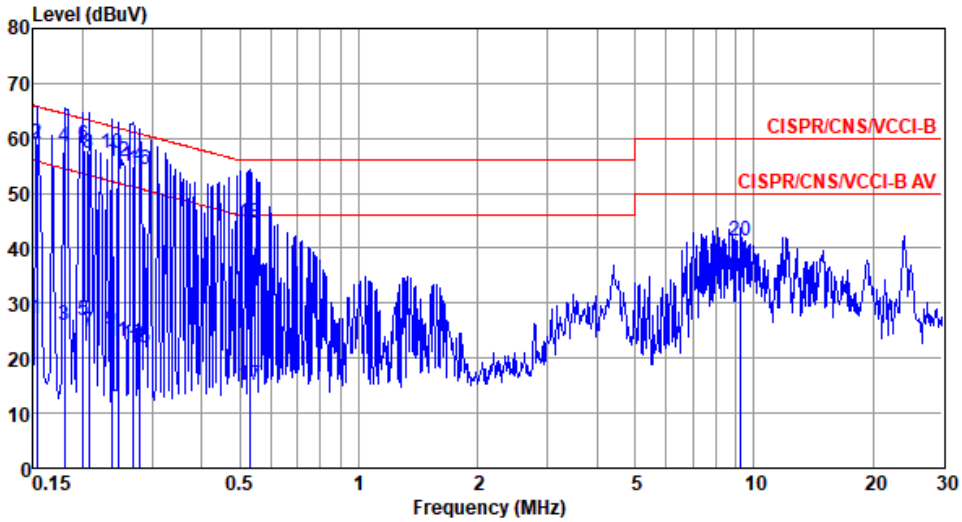
Modulation	HT40	Test Freq. (MHz)	5710
Power Phase	Line		



	Freq MHz	Level dBuA	Limit Line dBuA	Over Limit dB	Read Level dBuA	LISN factor dB	cable loss dB	Remark
1	0.159	28.42	55.52	-27.10	18.84	9.53	0.05	Average
2	0.159	59.45	65.52	-6.07	49.87	9.53	0.05	QP
3	0.186	25.45	54.20	-28.75	15.85	9.54	0.06	Average
4	0.186	57.94	64.20	-6.26	48.34	9.54	0.06	QP
5	0.204	27.00	53.45	-26.45	17.40	9.54	0.06	Average
6*	0.204	60.08	63.45	-3.37	50.48	9.54	0.06	QP
7	0.219	24.86	52.88	-28.02	15.26	9.54	0.06	Average
8	0.219	56.03	62.88	-6.85	46.43	9.54	0.06	QP
9	0.264	23.11	51.29	-28.18	13.49	9.55	0.07	Average
10	0.264	55.31	61.29	-5.98	45.69	9.55	0.07	QP
11	0.282	23.05	50.76	-27.71	13.42	9.56	0.07	Average
12	0.282	54.62	60.76	-6.14	44.99	9.56	0.07	QP
13	0.294	19.99	50.41	-30.42	10.36	9.56	0.07	Average
14	0.294	50.85	60.41	-9.56	41.22	9.56	0.07	QP
15	0.350	15.27	48.96	-33.69	5.63	9.56	0.08	Average
16	0.350	44.30	58.96	-14.66	34.66	9.56	0.08	QP
17	0.521	15.48	46.00	-30.52	5.81	9.58	0.09	Average
18	0.521	45.06	56.00	-10.94	35.39	9.58	0.09	QP
19	24.015	29.66	50.00	-20.34	19.32	9.64	0.70	Average
20	24.015	35.54	60.00	-24.46	25.20	9.64	0.70	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)	5710
Power Phase	Neutral		



	Freq MHz	Level dBuA	Limit Line dBuA	Over Limit dB	Read Level dBuA	LISN factor dB	cable loss dB	Remark
1	0.153	27.29	55.82	-28.53	17.67	9.57	0.05	Average
2	0.153	59.07	65.82	-6.75	49.45	9.57	0.05	QP
3	0.180	26.12	54.50	-28.38	16.48	9.58	0.06	Average
4	0.180	58.38	64.50	-6.12	48.74	9.58	0.06	QP
5	0.201	26.81	53.58	-26.77	17.17	9.58	0.06	Average
6	0.201	58.71	63.58	-4.87	49.07	9.58	0.06	QP
7	0.207	24.85	53.32	-28.47	15.21	9.58	0.06	Average
8	0.207	57.22	63.32	-6.10	47.58	9.58	0.06	QP
9	0.237	25.08	52.22	-27.14	15.43	9.59	0.06	Average
10*	0.237	57.38	62.22	-4.84	47.73	9.59	0.06	QP
11	0.246	23.12	51.91	-28.79	13.46	9.59	0.07	Average
12	0.246	55.80	61.91	-6.11	46.14	9.59	0.07	QP
13	0.267	22.47	51.20	-28.73	12.81	9.59	0.07	Average
14	0.267	54.93	61.20	-6.27	45.27	9.59	0.07	QP
15	0.279	21.81	50.85	-29.04	12.15	9.59	0.07	Average
16	0.279	54.41	60.85	-6.44	44.75	9.59	0.07	QP
17	0.532	15.16	46.00	-30.84	5.45	9.62	0.09	Average
18	0.532	44.67	56.00	-11.33	34.96	9.62	0.09	QP
19	9.221	35.50	50.00	-14.50	25.41	9.71	0.38	Average
20	9.221	41.26	60.00	-18.74	31.17	9.71	0.38	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

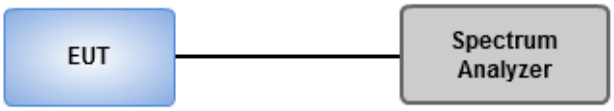
26dB Bandwidth

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

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
5.47-5.725GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	19.826M	13.719M	13M7D1D	17.261M	13.372M
802.11n HT20_Nss1,(MCS0)_2TX	19.522M	14.11M	14M1D1D	16.652M	13.98M
802.11n HT40_Nss1,(MCS0)_2TX	48.899M	33.227M	33M2D1D	40.986M	32.923M
5.725-5.85GHz	-	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	3.072M	9.551M	9M55D1D	3.072M	7.641M
802.11n HT20_Nss1,(MCS0)_2TX	3.71M	8.278M	8M28D1D	3.652M	7.41M
802.11n HT40_Nss1,(MCS0)_2TX	3.072M	22.981M	23M0D1D	3.072M	21.592M

Max-N dB = Maximum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;
Max-OBW = Maximum 99% occupied bandwidth;
Min-N dB = Minimum 6dB down bandwidth for 5.725-5.85GHz band / Maximum 26dB down bandwidth for other band;
Min-OBW = Minimum 99% occupied bandwidth;

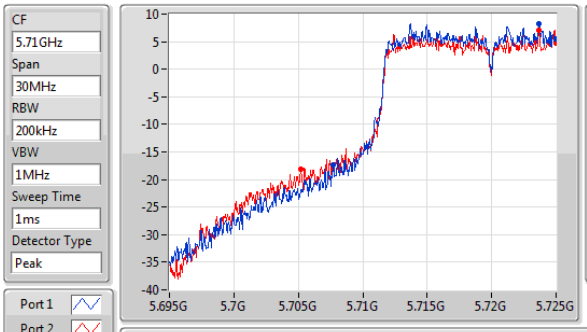
Result

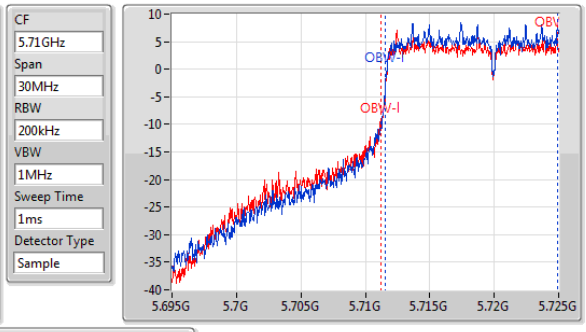
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)	Port 2-N dB (Hz)	Port 2-OBW (Hz)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
5720MHz Straddle 5.47-5.725GHz	Pass	Inf	17.261M	13.372M	19.826M	13.719M
5720MHz Straddle 5.725-5.85GHz	Pass	500k	3.072M	7.641M	3.072M	9.551M
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5720MHz Straddle 5.47-5.725GHz	Pass	Inf	16.652M	13.98M	19.522M	14.11M
5720MHz Straddle 5.725-5.85GHz	Pass	500k	3.71M	7.41M	3.652M	8.278M
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
5710MHz Straddle 5.47-5.725GHz	Pass	Inf	40.986M	32.923M	48.899M	33.227M
5710MHz Straddle 5.725-5.85GHz	Pass	500k	3.072M	21.592M	3.072M	22.981M

Port X-N dB = Port **X** 6dB down bandwidth for 5.725-5.85GHz band / 26dB down bandwidth for other band
Port X-OBW = Port **X** 99% occupied bandwidth;

802.11a_Nss1,(6Mbps)_2TX — EBW

5720MHz Straddle 5.47-5.725GHz

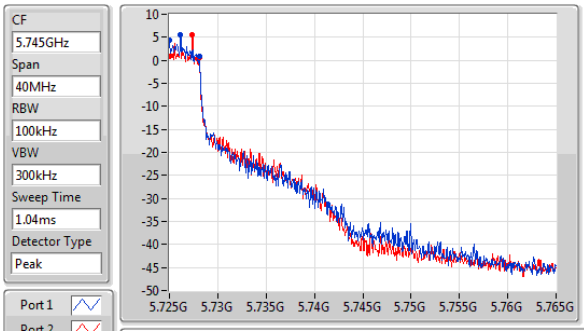


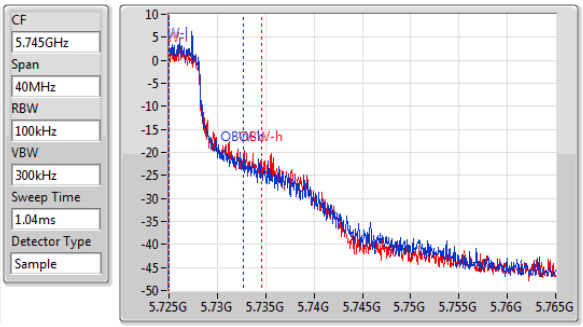


26dB(Hz)	Fl-26dB(Hz)	Fh-26dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
17.261M	5.707739G	5.725G	13.372M	5.711563G	5.724935G	Inf	1
19.826M	5.705174G	5.725G	13.719M	5.711216G	5.724935G	Inf	2

802.11a_Nss1,(6Mbps)_2TX — EBW

5720MHz Straddle 5.725-5.85GHz

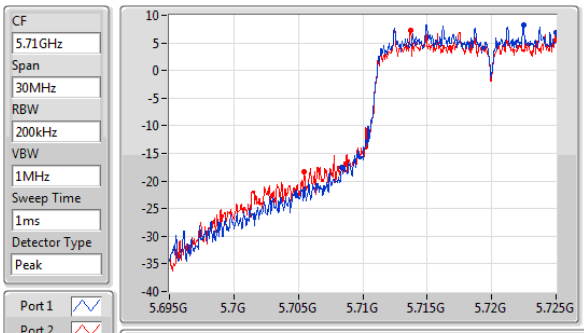


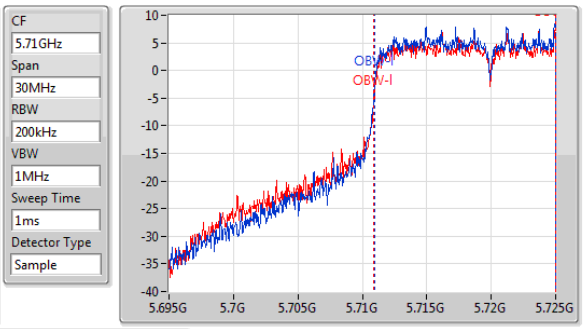


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
3.072M	5.725G	5.728072G	7.641M	5.725029G	5.73267G	500k	1
3.072M	5.725G	5.728072G	9.551M	5.725029G	5.73458G	500k	2

802.11n HT20_Nss1,(MCS0)_2TX — EBW

5720MHz Straddle 5.47-5.725GHz

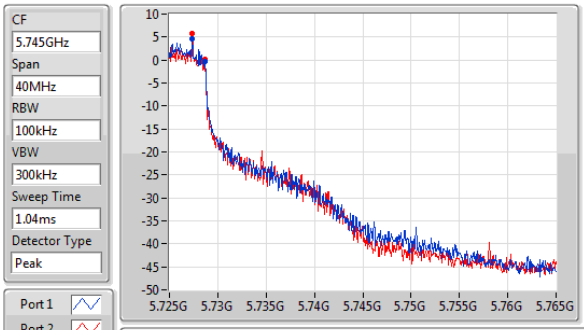


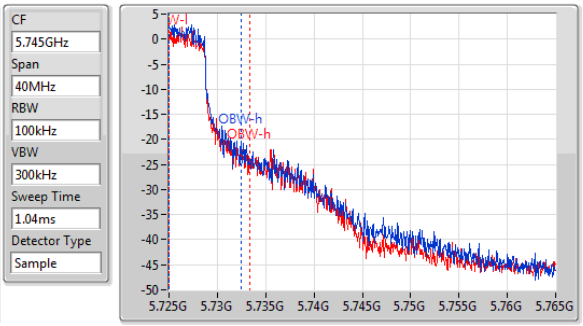


26dB(Hz)	Fl-26dB(Hz)	Fh-26dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
16.652M	5.708348G	5.725G	13.98M	5.710999G	5.724978G	Inf	1
19.522M	5.705478G	5.725G	14.11M	5.710868G	5.724978G	Inf	2

802.11n HT20_Nss1,(MCS0)_2TX — EBW

5720MHz Straddle 5.725-5.85GHz

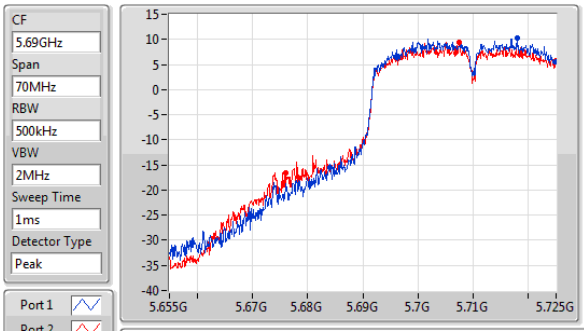


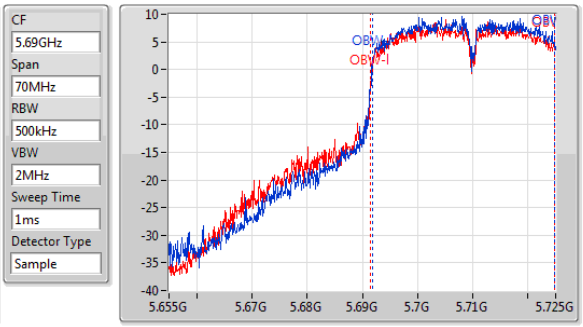


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
3.71M	5.725G	5.72871G	7.41M	5.725029G	5.732438G	500k	1
3.652M	5.725G	5.728652G	8.278M	5.725029G	5.733307G	500k	2

802.11n HT40_Nss1,(MCS0)_2TX — EBW

5710MHz Straddle 5.47-5.725GHz

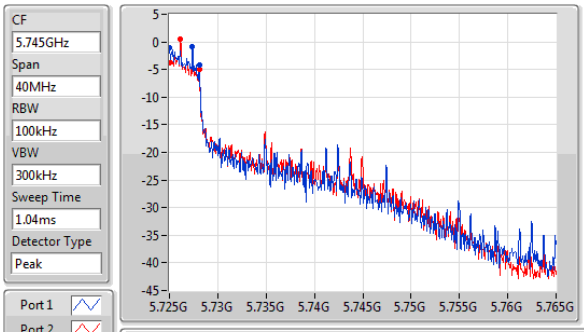


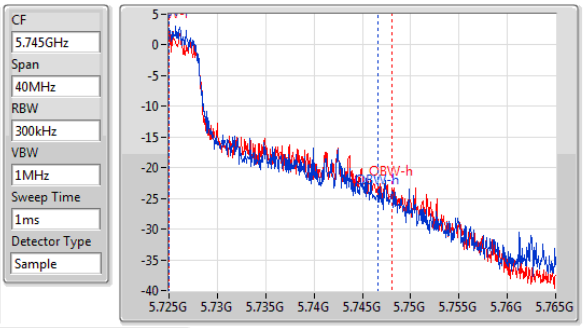


26dB(Hz)	Fl-26dB(Hz)	Fh-26dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
40.986M	5.684014G	5.725G	32.923M	5.691823G	5.724747G	Inf	1
48.899M	5.676101G	5.725G	33.227M	5.69152G	5.724747G	Inf	2

802.11n HT40_Nss1,(MCS0)_2TX — EBW

5710MHz Straddle 5.725-5.85GHz





6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
3.072M	5.725G	5.728072G	21.592M	5.725029G	5.746621G	500k	1
3.072M	5.725G	5.728072G	22.981M	5.725029G	5.74801G	500k	2

3.3 RF Output Power

3.3.1 Limit of RF Output Power

Frequency Band (MHz)		Limit
☒	5470 ~ 5725	Conducted Power: 250mW or 11dBm+10 log B
☒	5725 ~ 5850	Conducted Power: 1 W
Note: “B” is the 26dB emission bandwidth in MHz.		

3.3.2 Test Procedures

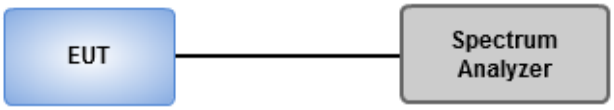
Method PM-G (Measurement using a gated RF average power meter)

Measurements 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.

Spectrum analyzer (For channel that extends across the 5.725 GHz boundary)

1. Set RBW = 1MHz, VBW = 3MHz, Sweep time = Auto, Detector = RMS.
2. Trace average at least 100 traces in power averaging mode.
3. Compute power by integrating the spectrum across the 26 dB EBW.
4. Add 10 log(1/X, X:duty cycle) if duty cycle is <98%).

3.3.3 Test Setup



3.3.4 Test Result of Maximum Conducted Output Power

Summary

Mode	Total Power (dBm)	Total Power (W)	EIRP (dBm)	EIRP (W)
5.47-5.725GHz	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	19.35	0.08610	23.35	0.21627
802.11n HT20_Nss1,(MCS0)_2TX	19.41	0.08730	23.41	0.21928
802.11n HT40_Nss1,(MCS0)_2TX	21.15	0.13032	25.15	0.32734
5.725-5.85GHz	-	-	-	-
802.11a_Nss1,(6Mbps)_2TX	12.58	0.01811	16.58	0.04550
802.11n HT20_Nss1,(MCS0)_2TX	13.28	0.02128	17.28	0.05346
802.11n HT40_Nss1,(MCS0)_2TX	7.68	0.00586	11.68	0.01472

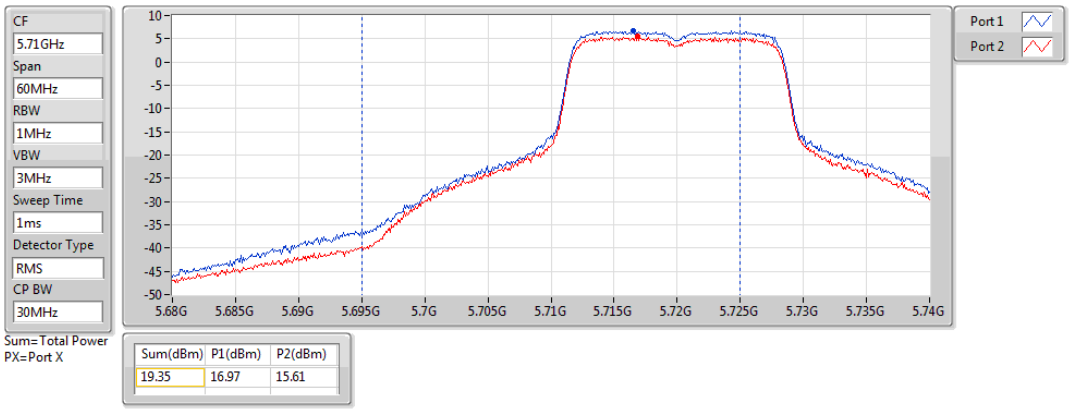
Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Port 2 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
5720MHz Straddle 5.47-5.725GHz	Pass	4.00	16.97	15.61	19.35	23.37	23.35	29.37
5720MHz Straddle 5.725-5.85GHz	Pass	4.00	10.19	8.85	12.58	30.00	16.58	36.00
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5720MHz Straddle 5.47-5.725GHz	Pass	4.00	16.84	15.91	19.41	23.21	23.41	29.21
5720MHz Straddle 5.725-5.85GHz	Pass	4.00	10.93	9.50	13.28	30.00	17.28	36.00
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5710MHz Straddle 5.47-5.725GHz	Pass	4.00	18.47	17.78	21.15	24.00	25.15	30.00
5710MHz Straddle 5.725-5.85GHz	Pass	4.00	5.26	3.98	7.68	30.00	11.68	36.00

DG = Directional Gain;**Port X** = Port X output power

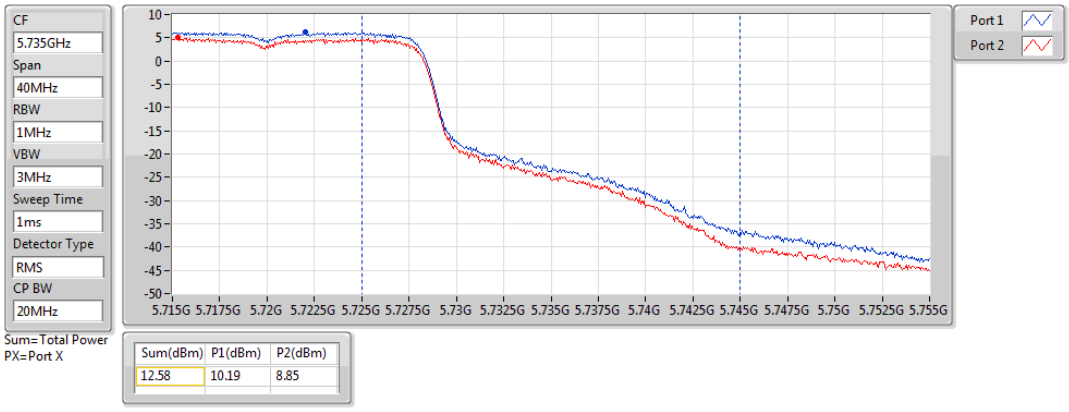
802.11a_Nss1,(6Mbps)_2TX **AV Power**

5720MHz Straddle 5.47-5.725GHz



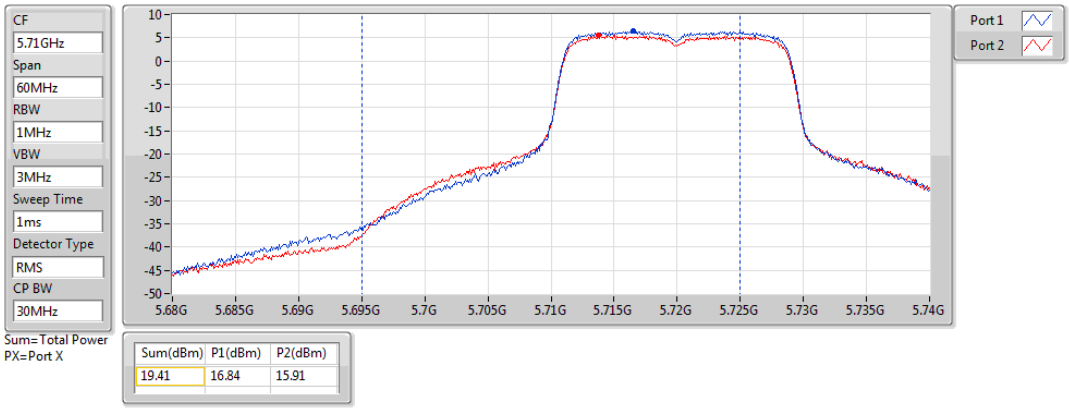
802.11a_Nss1,(6Mbps)_2TX **AV Power**

5720MHz Straddle 5.725-5.85GHz



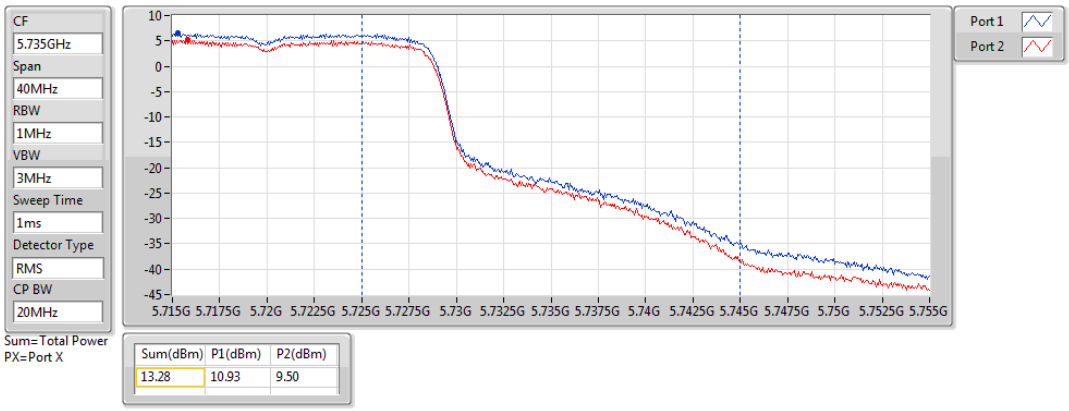
802.11n HT20_Nss1,(MCS0)_2TX **AV Power**

5720MHz Straddle 5.47-5.725GHz



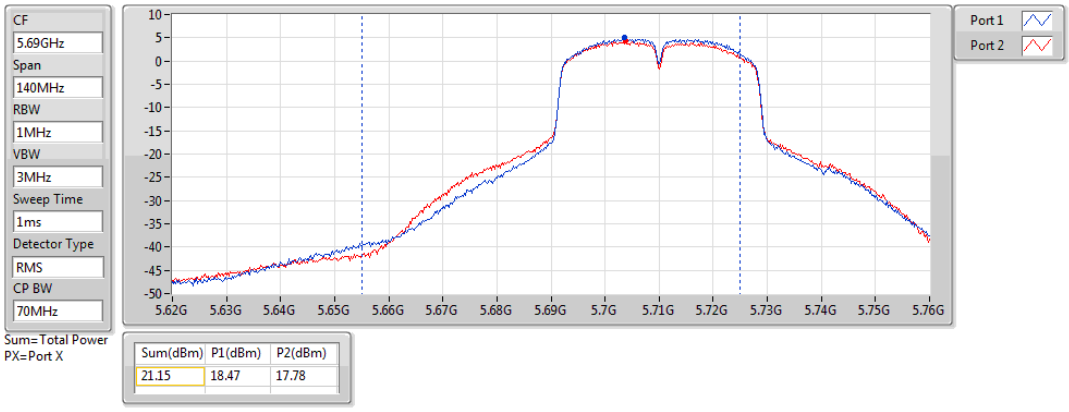
802.11n HT20_Nss1,(MCS0)_2TX **AV Power**

5720MHz Straddle 5.725-5.85GHz



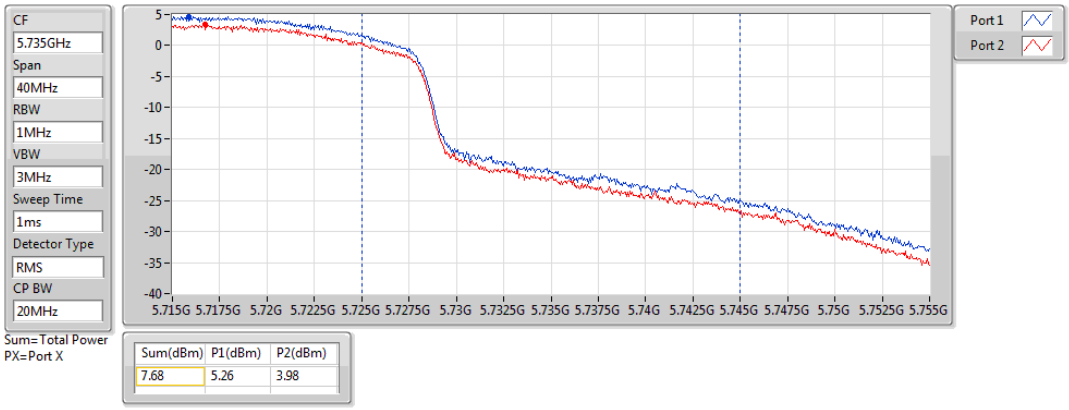
802.11n HT40_Nss1,(MCS0)_2TX **AV Power**

5710MHz Straddle 5.47-5.725GHz



802.11n HT40_Nss1,(MCS0)_2TX **AV Power**

5710MHz Straddle 5.725-5.85GHz



3.4 Peak Power Spectral Density

3.4.1 Limit of Peak Power Spectral Density

Frequency Band (MHz)		Limit
☒	5470 ~ 5725	11 dBm / MHz
☒	5725 ~ 5850	30 dBm / 500 kHz

3.4.2 Test Procedures

For 5470 ~ 5725 MHz

Duty cycle ≥ 98 %

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.

Duty cycle < 98 %

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.

For 5725 ~ 5850 MHz

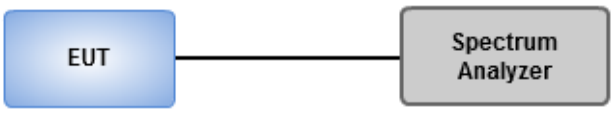
Duty cycle ≥ 98 %

1. Set RBW = 500 kHz, 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.

Duty cycle < 98 %

1. Set RBW = 500 kHz, 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

Summary

Mode	PD (dBm/RBW)	EIRP PD (dBm/RBW)
5.47-5.725GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	7.93	14.94
802.11n HT20_Nss1,(MCS0)_2TX	7.37	14.38
802.11n HT40_Nss1,(MCS0)_2TX	5.93	12.94
5.725-5.85GHz	-	-
802.11a_Nss1,(6Mbps)_2TX	5.79	12.80
802.11n HT20_Nss1,(MCS0)_2TX	5.47	12.48
802.11n HT40_Nss1,(MCS0)_2TX	0.77	7.78

RBW = 500kHz for 5.725-5.85GHz band / 1MHz for other band;

Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	Port 2 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)	EIRP PD (dBm/RBW)	EIRP PD Limit (dBm/RBW)
802.11a_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
5720MHz Straddle 5.47-5.725GHz	Pass	7.01	5.46	4.58	7.93	9.99	14.94	17.00
5720MHz Straddle 5.725-5.85GHz	Pass	7.01	3.42	2.37	5.79	28.99	12.80	36.00
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5720MHz Straddle 5.47-5.725GHz	Pass	7.01	4.85	4.02	7.37	9.99	14.38	17.00
5720MHz Straddle 5.725-5.85GHz	Pass	7.01	3.09	1.81	5.47	28.99	12.48	36.00
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
5710MHz Straddle 5.47-5.725GHz	Pass	7.01	3.39	2.60	5.93	9.99	12.94	17.00
5710MHz Straddle 5.725-5.85GHz	Pass	7.01	-1.80	-2.48	0.77	28.99	7.78	36.00

DG = Directional Gain; **RBW** = 500kHz for 5.725-5.85GHz band / 1MHz for other band;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port Xpower density;

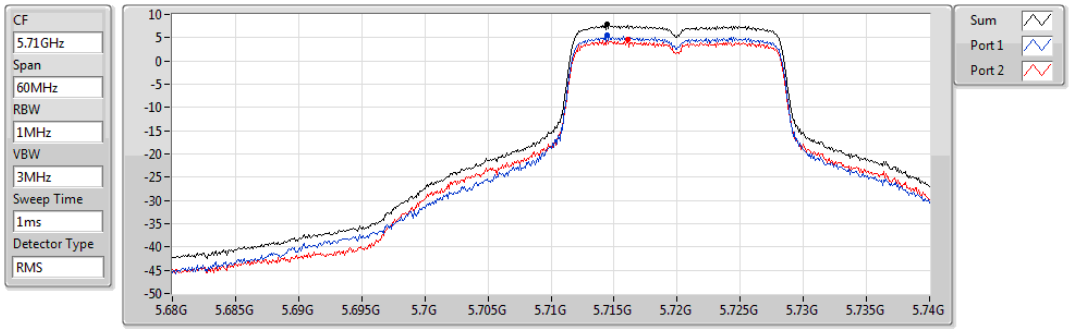
Directional gain = 4 + 10 * log(2/1) = 7.01 dBi > 6 dBi

For 5.47 ~ 5.725 GHz, PD limit shall be reduced to 11 dBm – (7.01 dBi – 6 dBi) = 9.99 dBm

For 5.725 ~ 5.85 GHz, PD limit shall be reduced to 30 dBm – (7.01 dBi – 6 dBi) = 28.99 dBm

802.11a_Nss1,(6Mbps)_2TX **PSD**

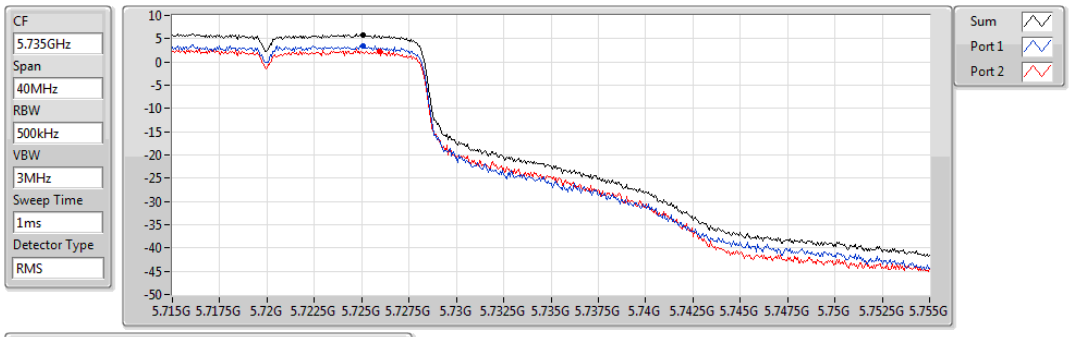
5720MHz Straddle 5.47-5.725GHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
7.93	7.93	5.46	4.58

802.11a_Nss1,(6Mbps)_2TX **PSD**

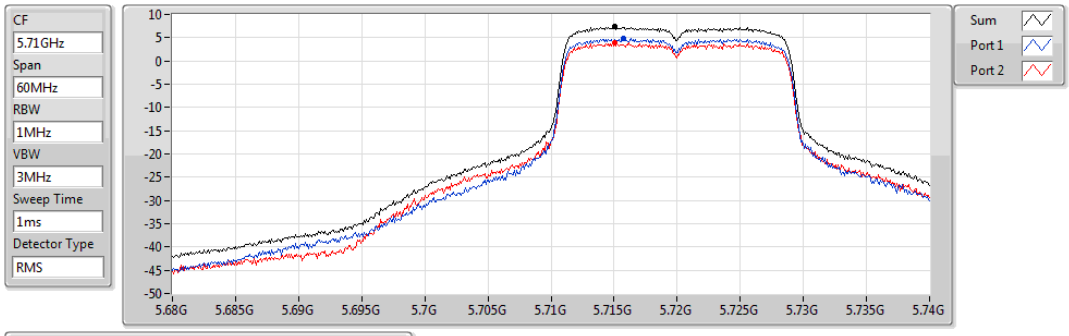
5720MHz Straddle 5.725-5.85GHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
5.79	5.79	3.42	2.37

802.11n HT20_Nss1,(MCS0)_2TX **PSD**

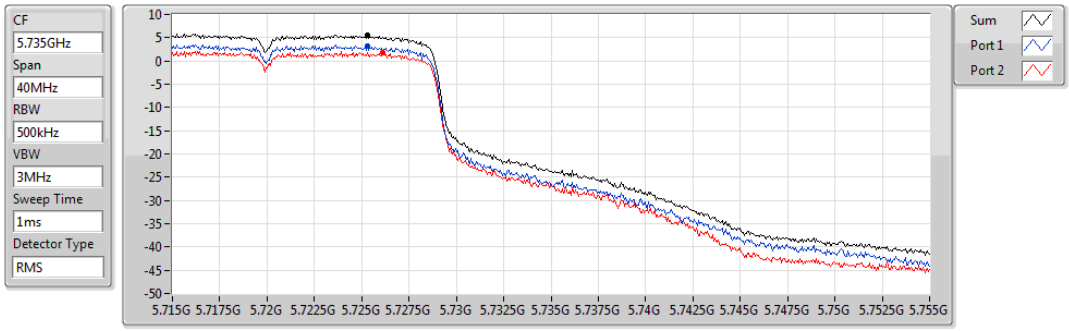
5720MHz Straddle 5.47-5.725GHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
7.37	7.37	4.85	4.02

802.11n HT20_Nss1,(MCS0)_2TX **PSD**

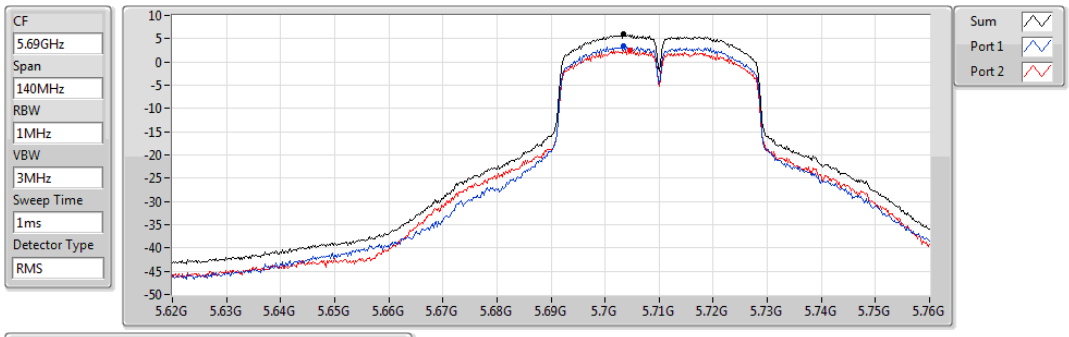
5720MHz Straddle 5.725-5.85GHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
5.47	5.47	3.09	1.81

802.11n HT40_Nss1,(MCS0)_2TX **PSD**

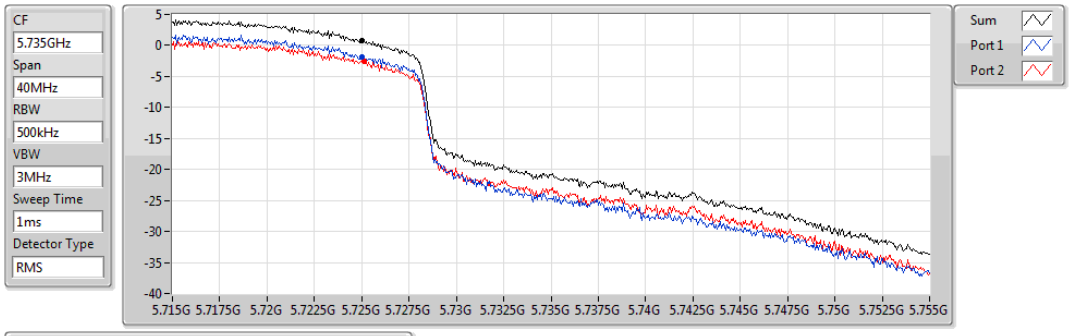
5710MHz Straddle 5.47-5.725GHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
5.93	5.93	3.39	2.60

802.11n HT40_Nss1,(MCS0)_2TX **PSD**

5710MHz Straddle 5.725-5.85GHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
0.77	0.77	-1.80	-2.48

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**
5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.725 - 5.850 GHz	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.

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

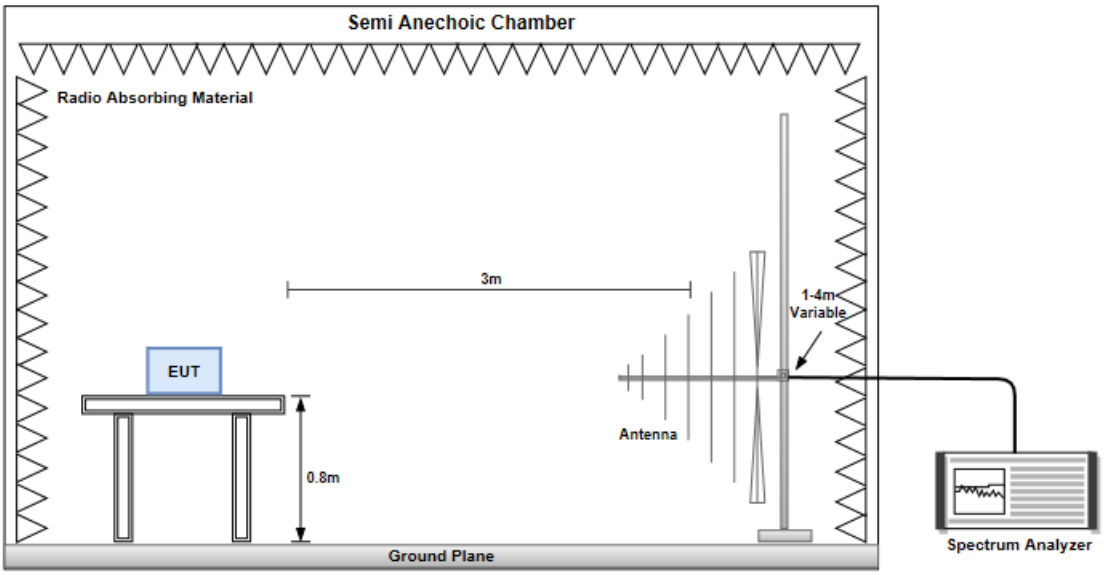
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission 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:

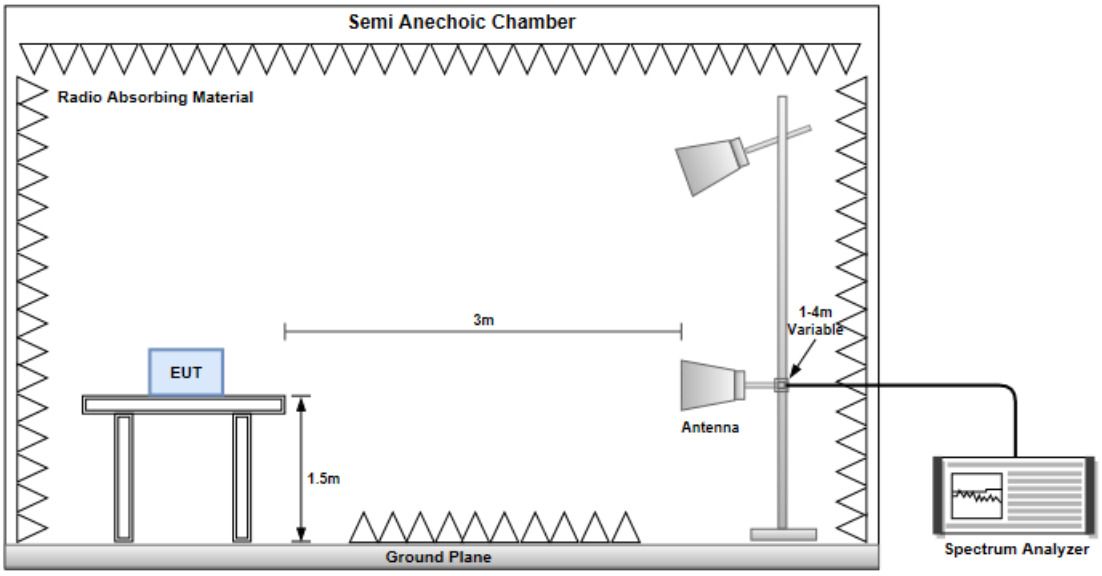
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz



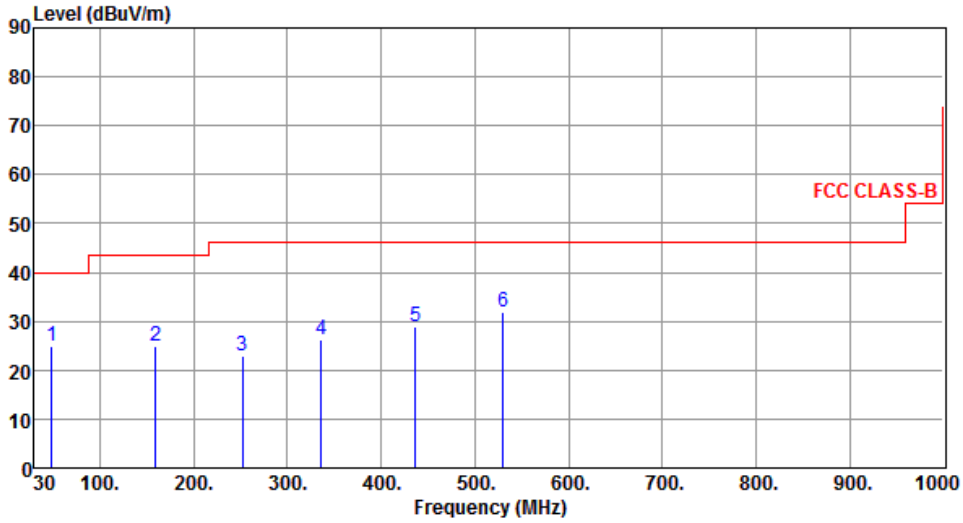
Radiated Emissions above 1 GHz



Test Configuration 1: Dipole antenna

3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

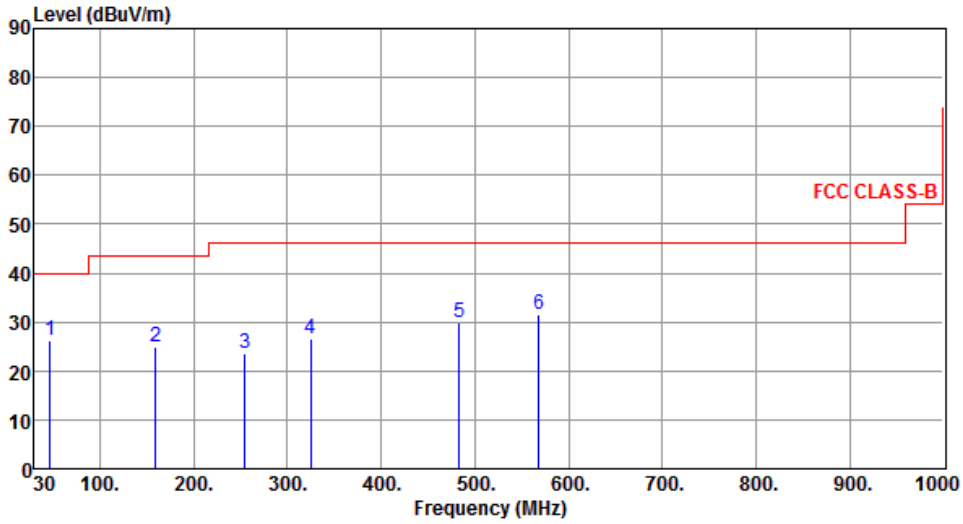
Modulation	HT40	**Test Freq. (MHz)**	5710
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	48.43	24.75	40.00	-15.25	33.36	-8.61	Peak	---	---
2	159.01	24.81	43.50	-18.69	33.33	-8.52	Peak	---	---
3	252.13	22.92	46.00	-23.08	32.85	-9.93	Peak	---	---
4	336.52	26.14	46.00	-19.86	33.26	-7.12	Peak	---	---
5	436.43	28.78	46.00	-17.22	33.15	-4.37	Peak	---	---
6	530.52	31.72	46.00	-14.28	34.16	-2.44	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)	5710
Polarization	Vertical		

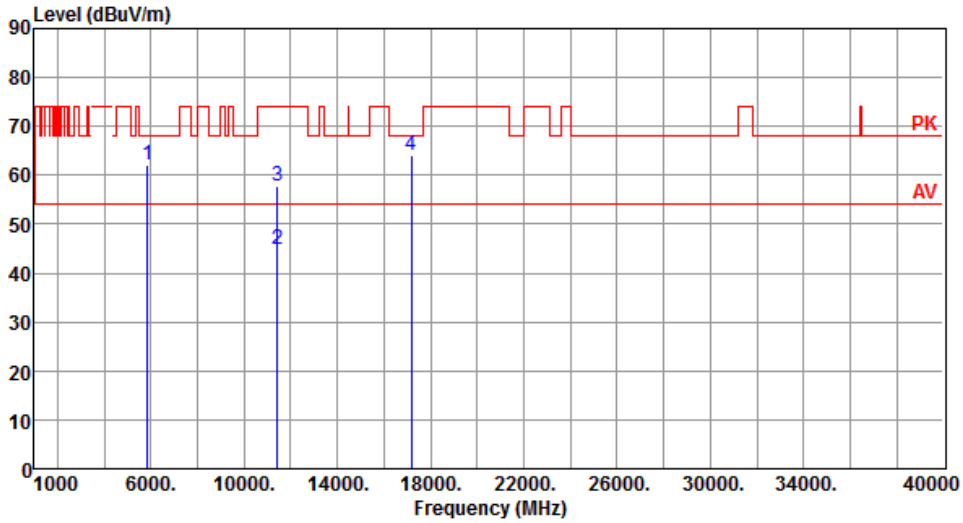


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	46.49	26.09	40.00	-13.91	34.69	-8.60	Peak	---	---
2	159.01	24.96	43.50	-18.54	33.48	-8.52	Peak	---	---
3	255.04	23.66	46.00	-22.34	33.58	-9.92	Peak	---	---
4	324.88	26.42	46.00	-19.58	33.81	-7.39	Peak	---	---
5	482.99	29.81	46.00	-16.19	33.23	-3.42	Peak	---	---
6	568.35	31.65	46.00	-14.35	33.38	-1.73	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

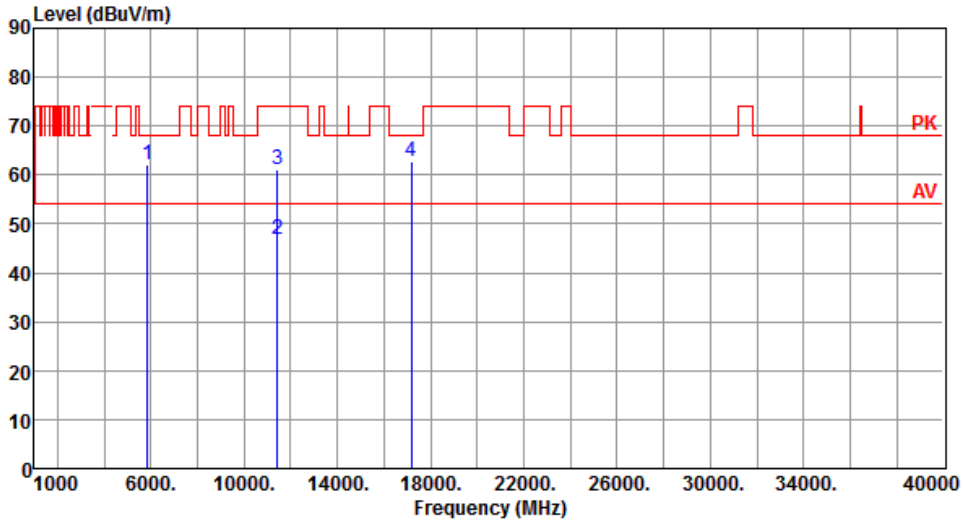
Modulation	11a	**Test Freq. (MHz)**	5720
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.14	68.20	-6.06	54.02	8.12	Peak	100	203
2	11440.00	44.90	54.00	-9.10	28.12	16.78	Average	100	40
3	11440.00	57.87	74.00	-16.13	41.09	16.78	Peak	100	40
4	17160.00	64.12	68.20	-4.08	45.62	18.50	Peak	100	289

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)	5720
Polarization	Vertical		

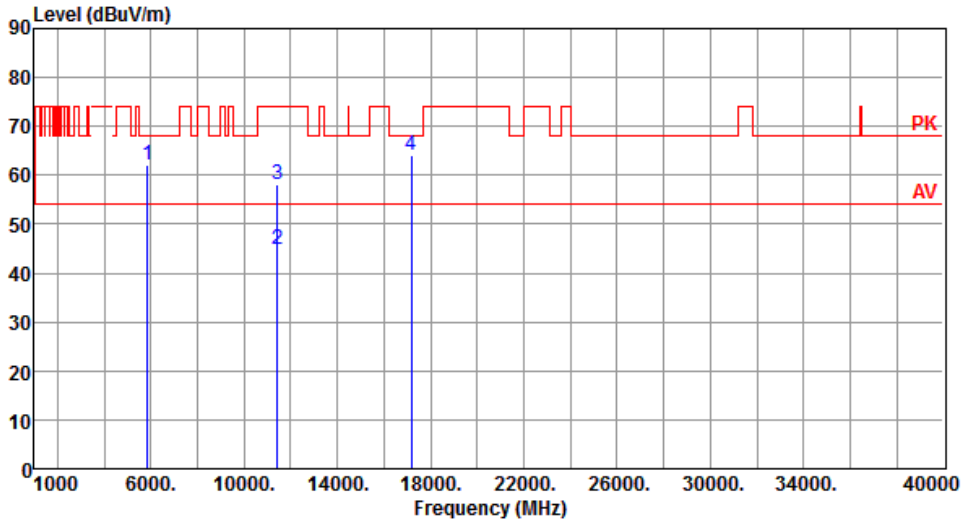


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.24	68.20	-5.96	54.12	8.12	Peak	113	335
2	11440.00	46.97	54.00	-7.03	30.19	16.78	Average	116	1
3	11440.00	61.09	74.00	-12.91	44.31	16.78	Peak	116	1
4	17160.00	62.61	68.20	-5.59	44.11	18.50	Peak	100	30

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

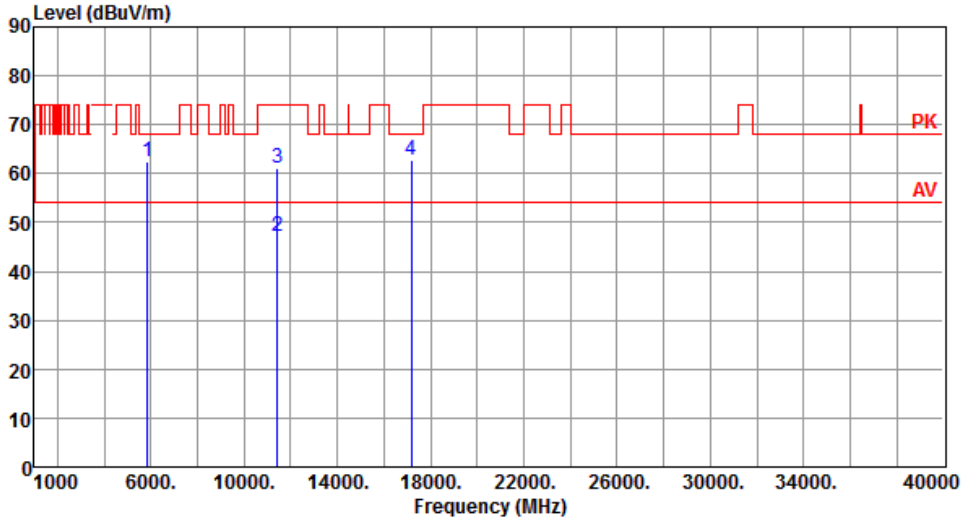
Modulation	HT20	**Test Freq. (MHz)**	5720
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.18	68.20	-6.02	54.06	8.12	Peak	100	205
2	11440.00	44.99	54.00	-9.01	28.21	16.78	Average	100	60
3	11440.00	57.99	74.00	-16.01	41.21	16.78	Peak	100	60
4	17160.00	64.04	68.20	-4.16	45.54	18.50	Peak	100	288

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)	5720
Polarization	Vertical		

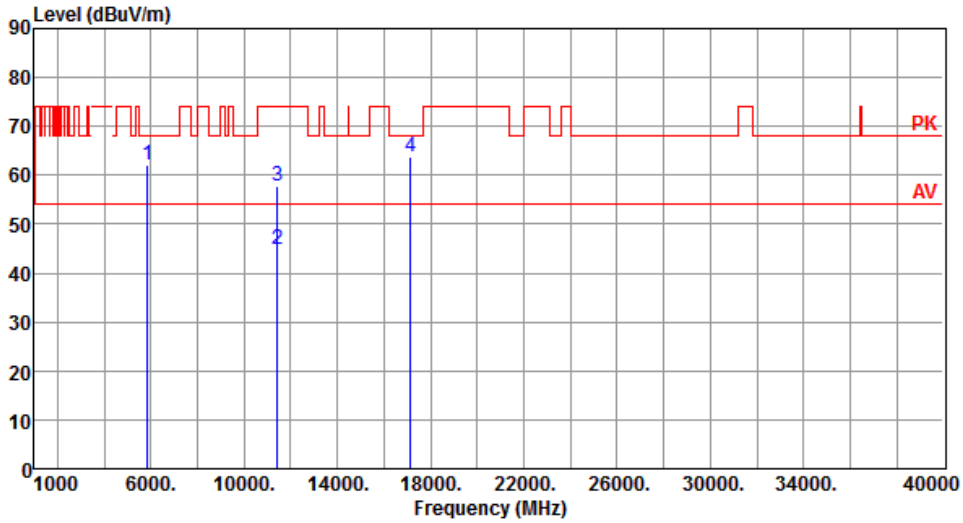


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.28	68.20	-5.92	54.16	8.12	Peak	115	335
2	11440.00	47.00	54.00	-7.00	30.22	16.78	Average	117	1
3	11440.00	61.03	74.00	-12.97	44.25	16.78	Peak	117	1
4	17160.00	62.74	68.20	-5.46	44.24	18.50	Peak	100	25

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

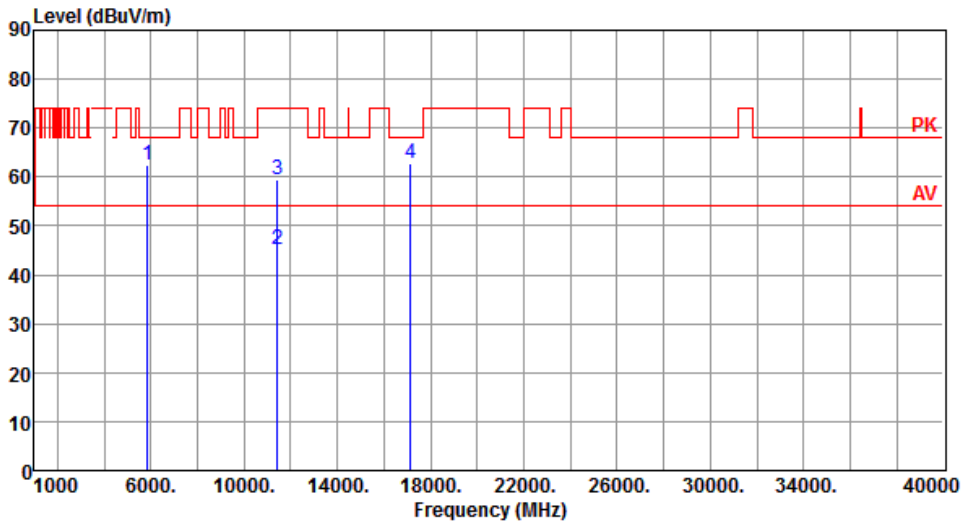
Modulation	HT40	**Test Freq. (MHz)**	5710
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.13	68.20	-6.07	54.01	8.12	Peak	100	202
2	11420.00	44.90	54.00	-9.10	28.15	16.75	Average	100	50
3	11420.00	57.82	74.00	-16.18	41.07	16.75	Peak	100	50
4	17130.00	63.86	68.20	-4.34	45.35	18.51	Peak	100	287

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)	5710
Polarization	Vertical		



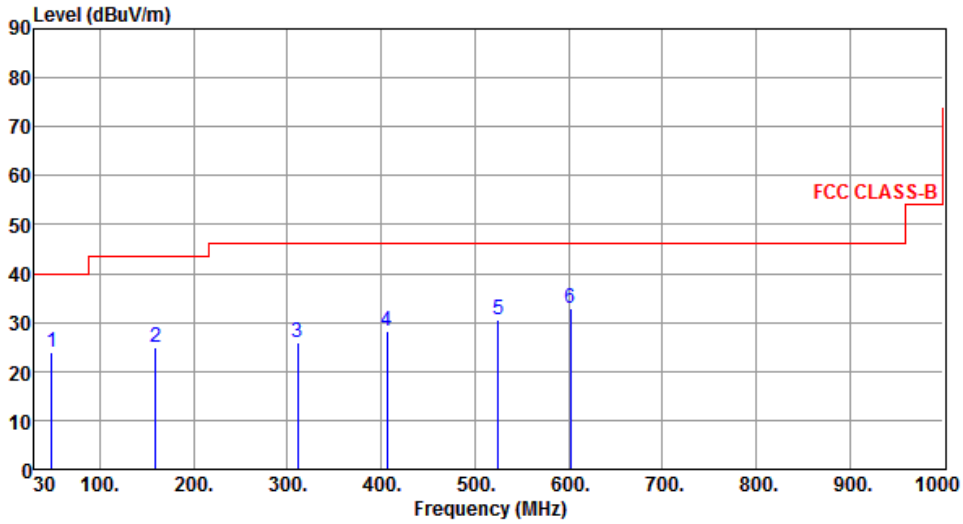
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.31	68.20	-5.89	54.19	8.12	Peak	115	336
2	11420.00	45.20	54.00	-8.80	28.45	16.75	Average	100	5
3	11420.00	59.31	74.00	-14.69	42.56	16.75	Peak	100	5
4	17130.00	62.66	68.20	-5.54	44.15	18.51	Peak	100	20

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).

Test Configuration 2 : PCB Dipole antenna

3.5.8 Transmitter Radiated Unwanted Emissions (Below 1GHz)

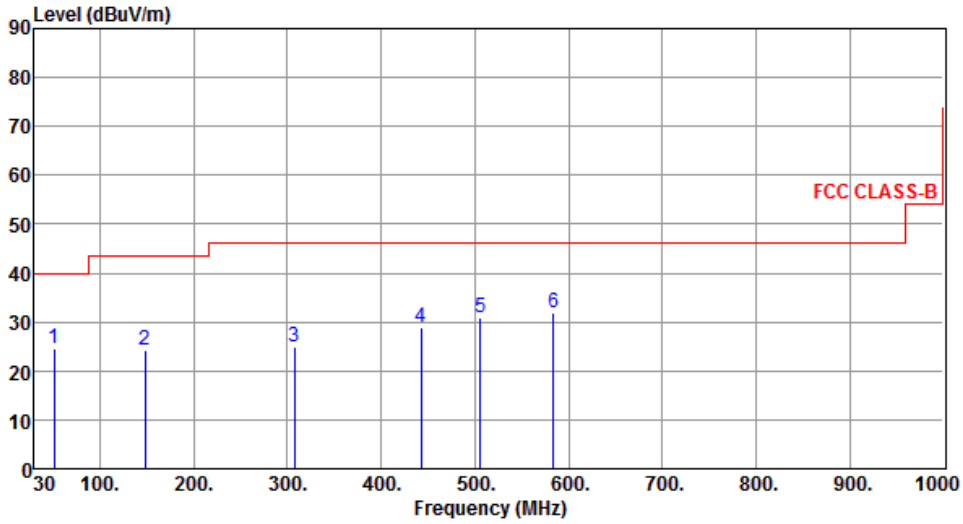
Modulation	HT40	**Test Freq. (MHz)**	5710
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	48.43	23.83	40.00	-16.17	32.44	-8.61	Peak	---	---
2	159.01	24.80	43.50	-18.70	33.32	-8.52	Peak	---	---
3	311.30	25.81	46.00	-20.19	33.73	-7.92	Peak	---	---
4	406.36	28.27	46.00	-17.73	33.74	-5.47	Peak	---	---
5	524.70	30.71	46.00	-15.29	33.18	-2.47	Peak	---	---
6	602.30	32.74	46.00	-13.26	33.24	-0.50	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)	5710
Polarization	Vertical		

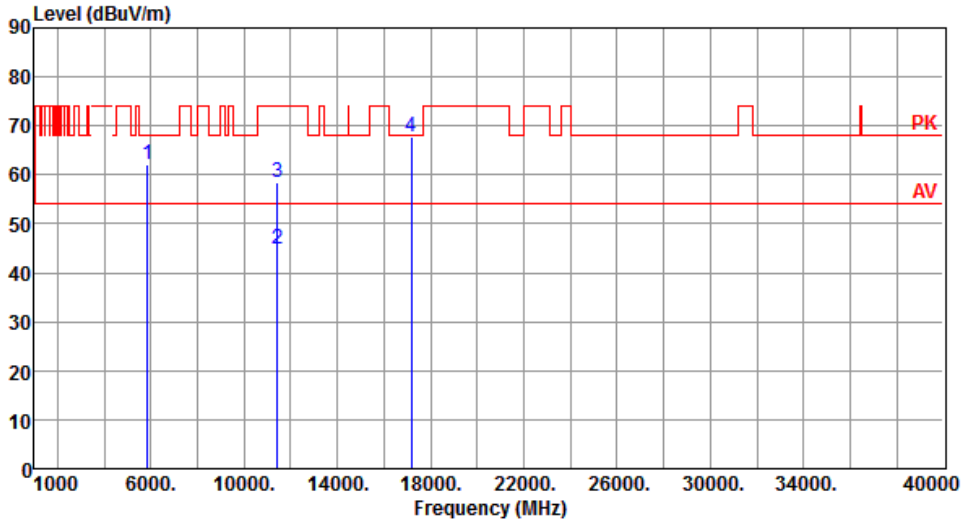


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	51.34	24.44	40.00	-15.56	33.10	-8.66	Peak	---	---
2	148.34	24.40	43.50	-19.10	33.15	-8.75	Peak	---	---
3	307.42	25.04	46.00	-20.96	33.13	-8.09	Peak	---	---
4	442.25	29.02	46.00	-16.98	33.18	-4.16	Peak	---	---
5	506.27	30.97	46.00	-15.03	33.86	-2.89	Peak	---	---
6	583.87	31.82	46.00	-14.18	33.10	-1.28	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.

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

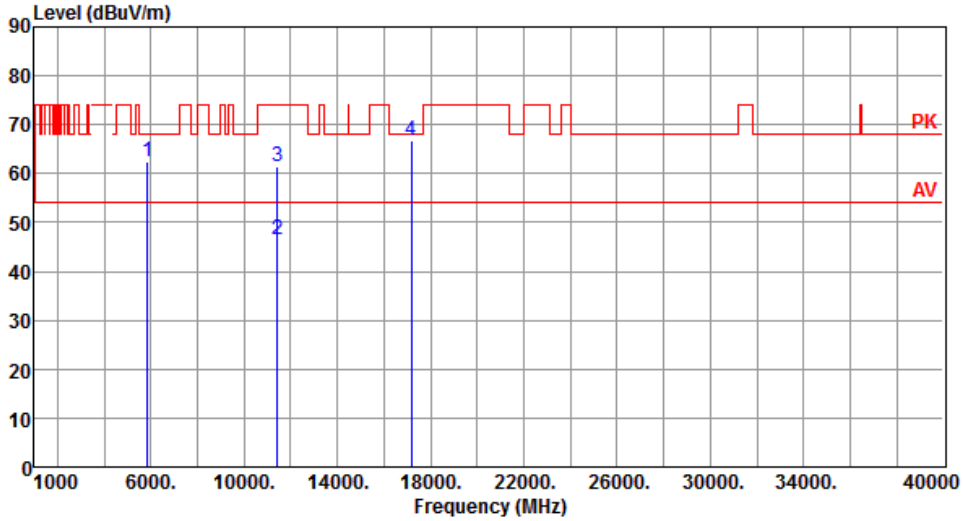
Modulation	11a	**Test Freq. (MHz)**	5720
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.24	68.20	-5.96	54.12	8.12	Peak	100	357
2	11440.00	44.96	54.00	-9.04	28.18	16.78	Average	100	30
3	11440.00	58.43	74.00	-15.57	41.65	16.78	Peak	100	30
4	17160.00	67.72	68.20	-0.48	49.22	18.50	Peak	266	317

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)	5720
Polarization	Vertical		

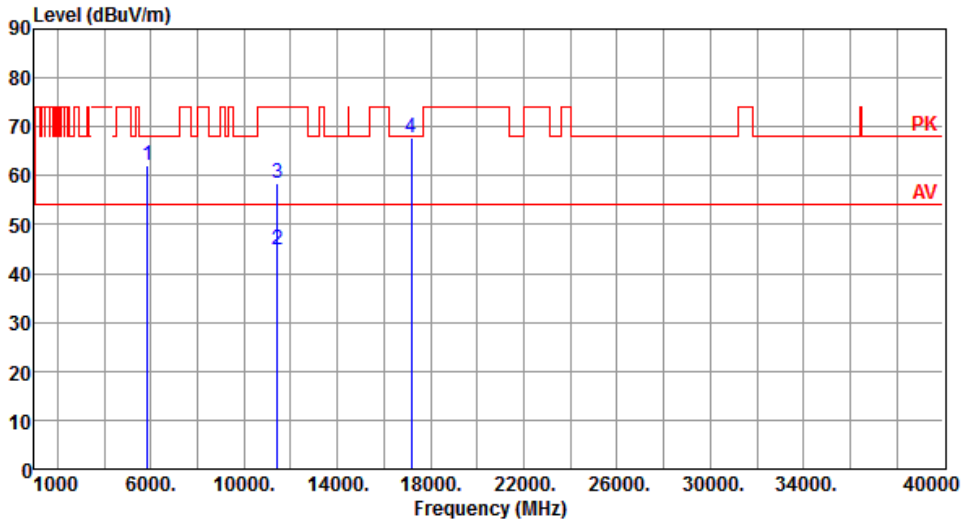


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.38	68.20	-5.82	54.26	8.12	Peak	104	138
2	11440.00	46.44	54.00	-7.56	29.66	16.78	Average	164	351
3	11440.00	61.58	74.00	-12.42	44.80	16.78	Peak	164	351
4	17160.00	66.82	68.20	-1.38	48.32	18.50	Peak	147	354

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 HT20

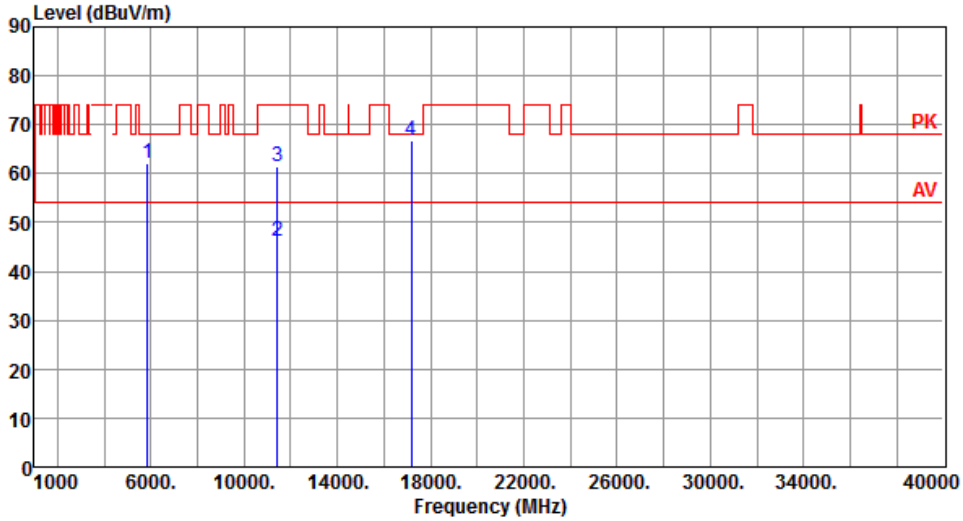
Modulation	HT20	**Test Freq. (MHz)**	5720
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.27	68.20	-5.93	54.15	8.12	Peak	100	359
2	11440.00	44.94	54.00	-9.06	28.16	16.78	Average	100	50
3	11440.00	58.33	74.00	-15.67	41.55	16.78	Peak	100	50
4	17160.00	67.64	68.20	-0.56	49.14	18.50	Peak	266	320

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)	5720
Polarization	Vertical		

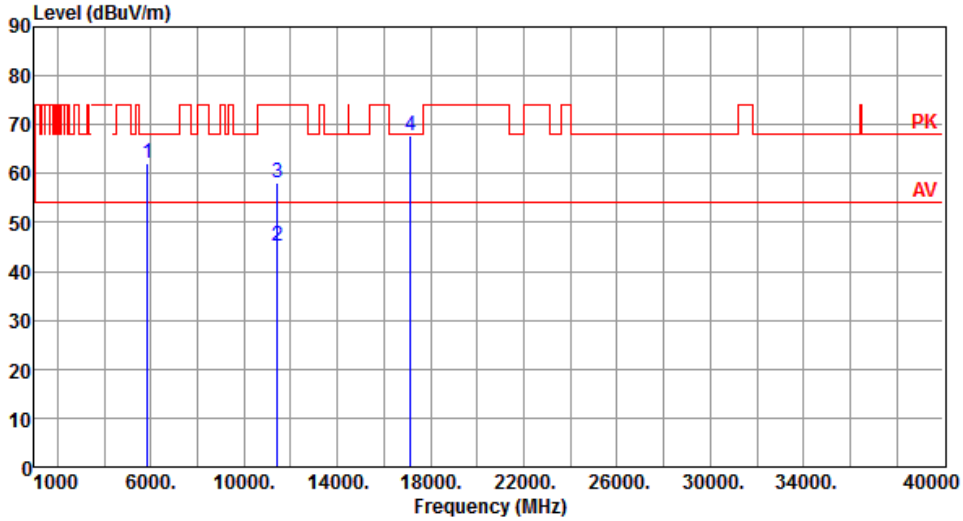


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.24	68.20	-5.96	54.12	8.12	Peak	100	138
2	11440.00	46.32	54.00	-7.68	29.54	16.78	Average	165	351
3	11440.00	61.44	74.00	-12.56	44.66	16.78	Peak	165	351
4	17160.00	66.75	68.20	-1.45	48.25	18.50	Peak	153	355

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).

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

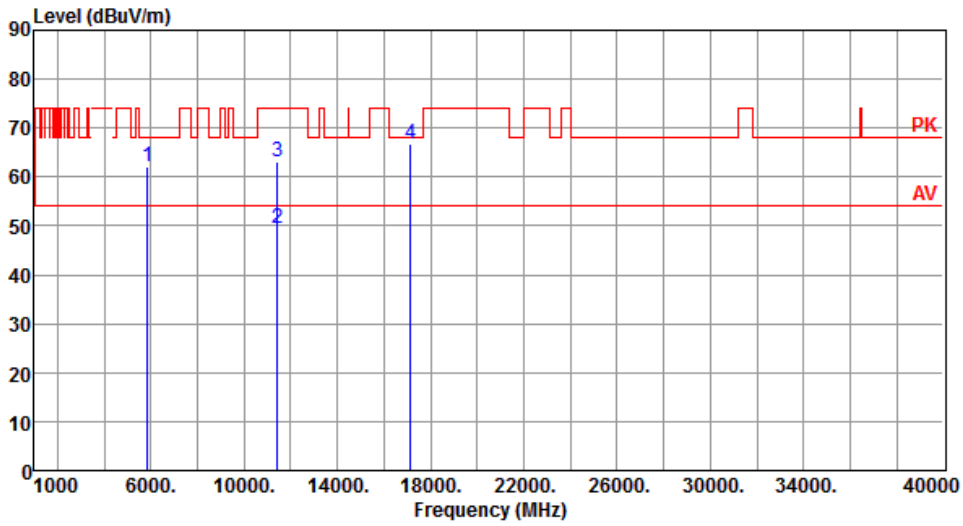
Modulation	HT40	**Test Freq. (MHz)**	5710
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.24	68.20	-5.96	54.12	8.12	Peak	100	351
2	11420.00	45.01	54.00	-8.99	28.26	16.75	Average	100	50
3	11420.00	58.12	74.00	-15.88	41.37	16.75	Peak	100	50
4	17130.00	67.63	68.20	-0.57	49.12	18.51	Peak	245	321

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)	5710
Polarization	Vertical		



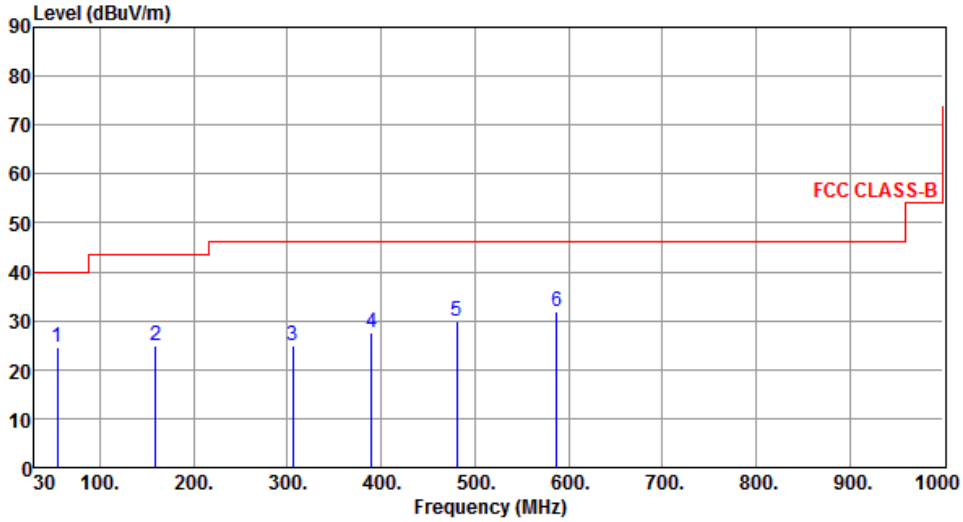
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.14	68.20	-6.06	54.02	8.12	Peak	181	348
2	11440.00	49.40	54.00	-4.60	32.62	16.78	Average	167	351
3	11440.00	63.23	74.00	-10.77	46.45	16.78	Peak	167	351
4	17130.00	66.77	68.20	-1.43	48.26	18.51	Peak	181	348

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).

Test Configuration 3 : Isolated Magnetic Dipole antenna

3.5.12 Transmitter Radiated Unwanted Emissions (Below 1GHz)

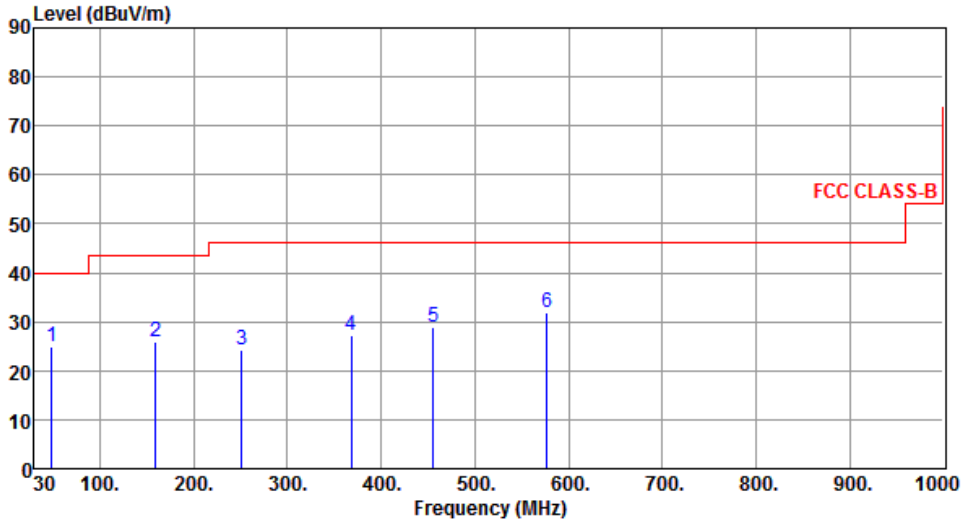
Modulation	HT40	**Test Freq. (MHz)**	5710
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	54.25	24.62	40.00	-15.38	33.40	-8.78	Peak	---	---
2	159.01	24.97	43.50	-18.53	33.49	-8.52	Peak	---	---
3	305.48	24.91	46.00	-21.09	33.10	-8.19	Peak	---	---
4	389.87	27.72	46.00	-18.28	33.50	-5.78	Peak	---	---
5	481.05	29.84	46.00	-16.16	33.26	-3.42	Peak	---	---
6	587.75	31.83	46.00	-14.17	32.96	-1.13	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)	5710
Polarization	Vertical		

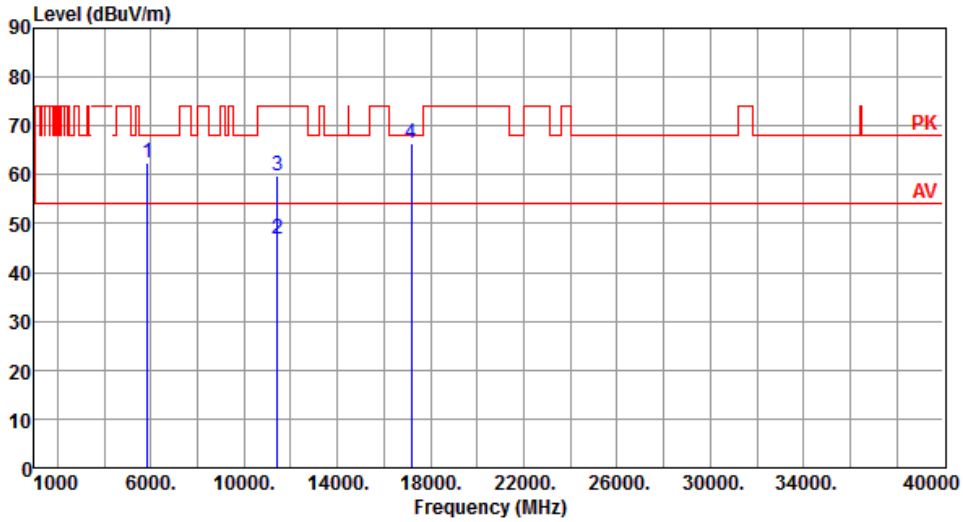


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	48.43	24.82	40.00	-15.18	33.43	-8.61	Peak	---	---
2	159.01	25.87	43.50	-17.63	34.39	-8.52	Peak	---	---
3	251.16	24.26	46.00	-21.74	34.20	-9.94	Peak	---	---
4	368.53	27.11	46.00	-18.89	33.61	-6.50	Peak	---	---
5	455.83	28.78	46.00	-17.22	32.59	-3.81	Peak	---	---
6	577.08	31.94	46.00	-14.06	33.44	-1.50	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.

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

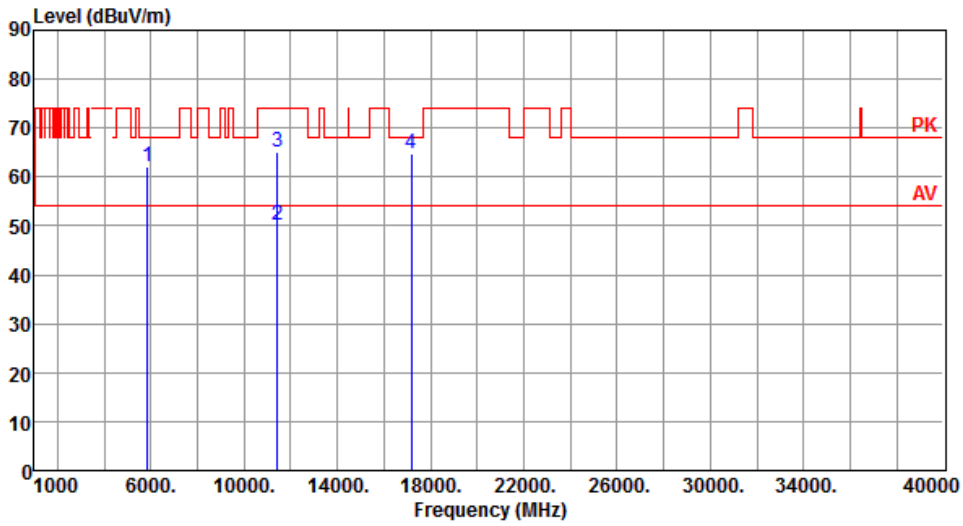
Modulation	11a	**Test Freq. (MHz)**	5720
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.28	68.20	-5.92	54.16	8.12	Peak	100	217
2	11440.00	46.80	54.00	-7.20	30.02	16.78	Average	106	294
3	11440.00	59.83	74.00	-14.17	43.05	16.78	Peak	106	294
4	17160.00	66.34	68.20	-1.86	47.84	18.50	Peak	106	289

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)	5720
Polarization	Vertical		

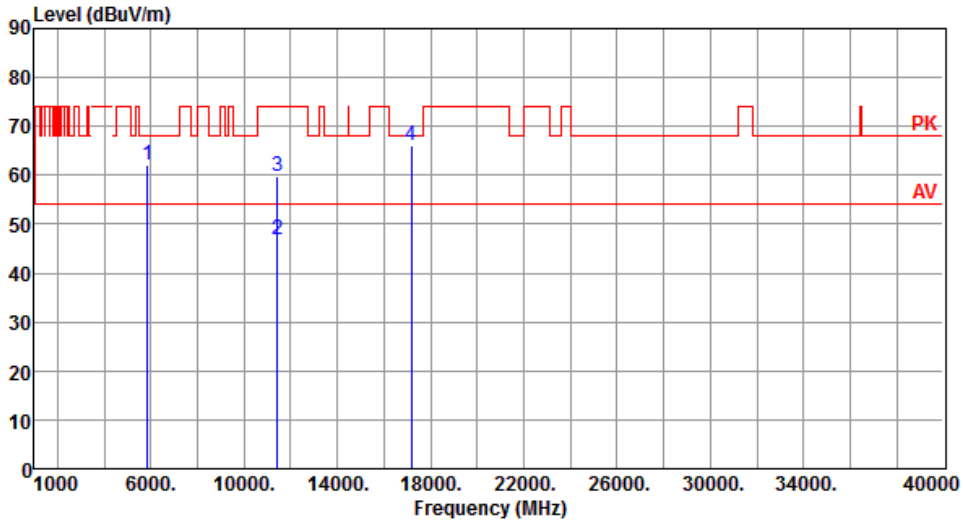


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.14	68.20	-6.06	54.02	8.12	Peak	112	185
2	11440.00	50.31	54.00	-3.69	33.53	16.78	Average	131	2
3	11440.00	65.04	74.00	-8.96	48.26	16.78	Peak	131	2
4	17160.00	64.82	68.20	-3.38	46.32	18.50	Peak	124	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).

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

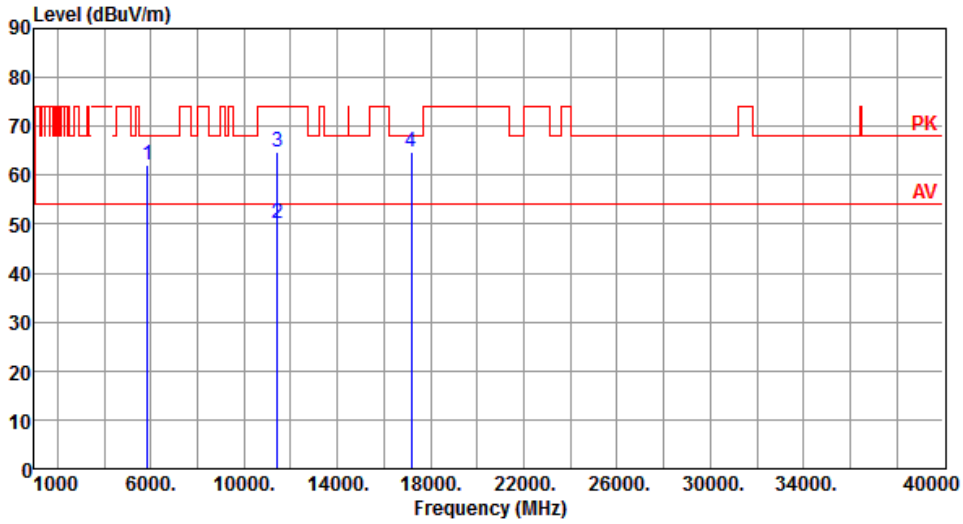
Modulation	HT20	**Test Freq. (MHz)**	5720
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.26	68.20	-5.94	54.14	8.12	Peak	100	215
2	11440.00	46.93	54.00	-7.07	30.15	16.78	Average	107	296
3	11440.00	59.93	74.00	-14.07	43.15	16.78	Peak	107	296
4	17160.00	66.15	68.20	-2.05	47.65	18.50	Peak	103	288

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)	5720
Polarization	Vertical		

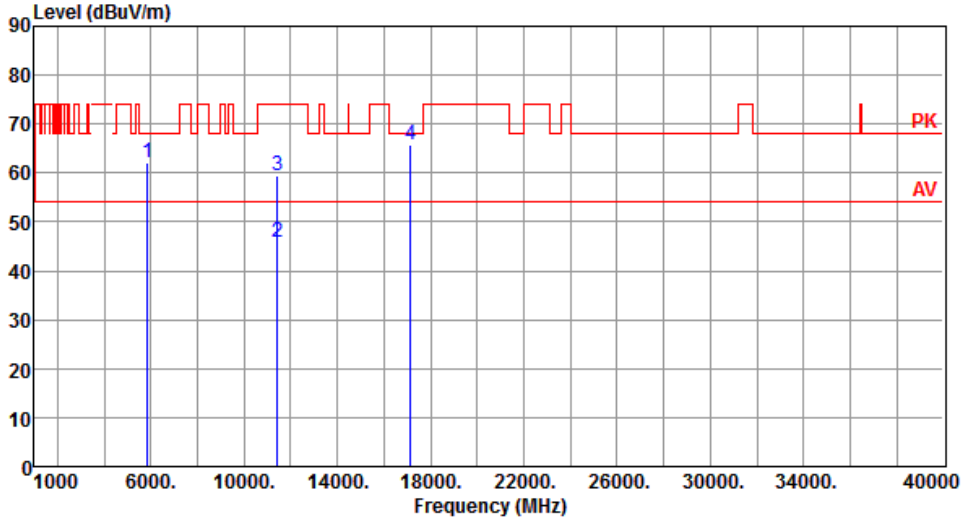


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.13	68.20	-6.07	54.01	8.12	Peak	113	185
2	11440.00	50.23	54.00	-3.77	33.45	16.78	Average	135	2
3	11440.00	64.91	74.00	-9.09	48.13	16.78	Peak	135	2
4	17160.00	64.70	68.20	-3.50	46.20	18.50	Peak	125	358

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).

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

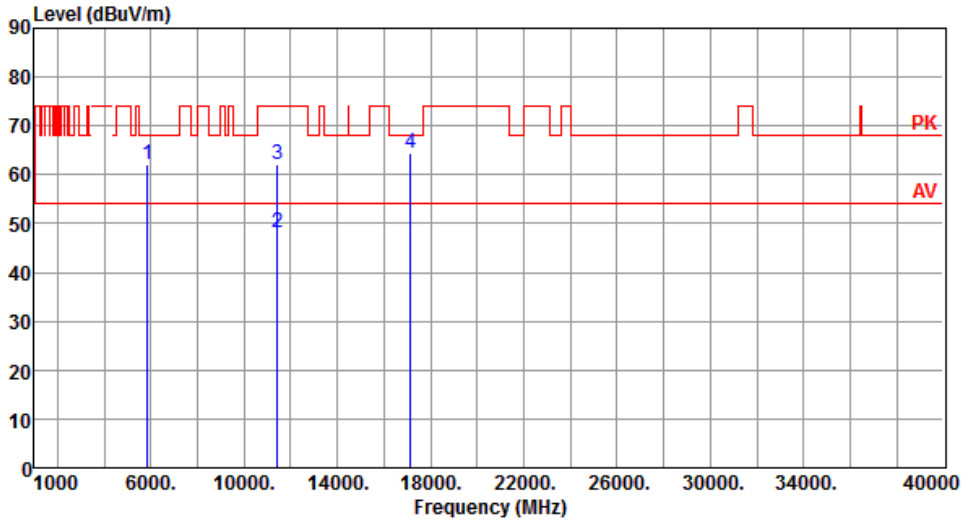
Modulation	HT40	**Test Freq. (MHz)**	5710
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5850.00	62.15	68.20	-6.05	54.03	8.12	Peak	100	214
2	11420.00	45.85	54.00	-8.15	29.10	16.75	Average	100	295
3	11420.00	59.40	74.00	-14.60	42.65	16.75	Peak	100	295
4	17130.00	65.72	68.20	-2.48	47.21	18.51	Peak	105	284

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)	5710
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	5850.00	62.18	68.20	-6.02	54.06	8.12	Peak	113	187
2	11420.00	48.17	54.00	-5.83	31.42	16.75	Average	135	3
3	11420.00	62.09	74.00	-11.91	45.34	16.75	Peak	135	3
4	17130.00	64.38	68.20	-3.82	45.87	18.51	Peak	122	355

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

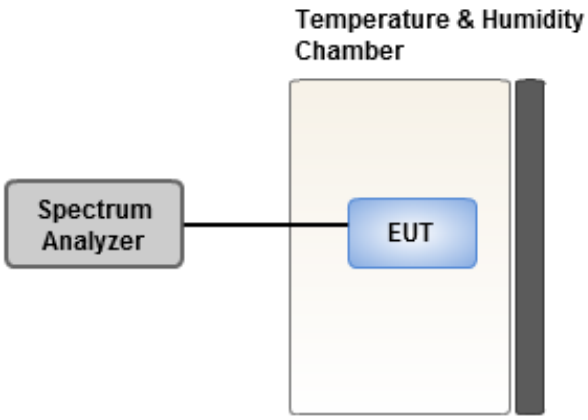
3.6.1 Limit of Frequency Stability

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 20 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 normal and extreme condition for temperature and voltage.

3.6.3 Test Setup



3.6.4 Test Result of Frequency Stability

Frequency: 5720 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°CVmax	-0.09	0.13	-0.24	0.23
T20°CVmin	0.14	0.40	0.53	0.05
T85°CVnom	-0.25	-0.38	0.08	-0.19
T80°CVnom	0.30	0.46	0.08	0.61
T70°CVnom	0.63	0.93	0.85	1.22
T60°CVnom	-0.75	-0.39	-0.08	-0.86
T50CVnom	0.21	-0.19	0.41	0.20
T40°CVnom	-0.24	-0.58	0.06	0.58
T30°CVnom	-0.74	-1.05	-0.71	-0.64
T20°CVnom	0.14	0.21	0.32	0.09
T10°CVnom	-2.95	-3.13	-3.04	-2.62
T0°CVnom	-4.46	-4.78	-4.54	-4.08
T-10°CVnom	-2.19	-2.67	-1.93	-2.13
T-20°CVnom	-6.31	-6.36	-6.08	-6.26
T-30°CVnom	-8.80	-8.68	-8.77	-9.16
T-40°CVnom	-8.25	-7.95	-7.95	-8.46
Vnom [Vdc]: 3.3		Vmax [Vdc]: 3.795		Vmin [Vdc]: 2.805
Tnom [°C]: 20		Tmax [°C]: 85		Tmin [°C]: -40

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 (EMC and Wireless Communication Laboratory), 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 District. 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 District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 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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