

FCC C2PC Test Report

FCC ID : MXF-F240WA
Equipment : 7368 ISAM CPE
Model No. : F-240W-A
Brand Name : Alcatel-Lucent
Applicant : Gemtek Technology Co., Ltd.
Address : No. 15-1 Zhonghua Road, Hsinchu Industrial
Park, Hukou, Hsinchu, Taiwan, 30352.
Standard : 47 CFR FCC Part 15.407
Received Date : Jun. 10, 2015
Tested Date : Jul. 02 ~ Aug. 03, 2015

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



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Release Record

Report No.	Version	Description	Issued Date
FR561002-01AN	Rev. 01	Initial issue	Sep. 22, 2015

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.437MHz 38.50 (Margin -8.61dB) - AV	Pass
15.407(b) 15.209	Radiated Emissions	Non-beamforming mode [dBuV/m at 3m]: 5470.00MHz 53.50 (Margin -0.50dB) – AV Beamforming mode [dBuV/m at 3m]: 5470.00MHz 67.16 (Margin -1.04dB) – PK	Pass
15.407(a)	Emission Bandwidth	Meet the requirement of limit	Pass
15.407(a)	RF Output Power	Max Power [dBm]: Non-beamforming mode 5250~5350MHz: 23.10 5470~5725MHz: 23.13 Beamforming mode 5250~5350MHz: 19.02 5470~5725MHz: 19.41	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. The modification is only concerned with adding 5250~5350MHz and 5470~5725 MHz band by software setting.

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
5250-5350 5470-5725	n (HT40)	5270-5310 5510-5710	54-62 [2] 102-142 [4]	4	MCS 0-31
5250-5350 5470-5725	ac (VHT40)	5270-5310 5510-5710	54-62 [2] 102-142 [4]	4	MCS 0-9
5250-5350 5470-5725	ac (VHT80)	5290 5530-5690	58 [1] 106-138 [2]	4	MCS 0-9
Note 1: RF output power specifies that Maximum Conducted Output Power. Note 2: 802.11n/ac uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM, 256QAM modulation. Note 3: The device has disabled the 5600-5650MHz band by S/W to avoid 5600-5650MHz band.					

1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Operating Frequency (MHz) / Gain (dBi)	
				5250~5350	5470~5725
1	WVVDDB-104ACN Wi-Fi ant_4	Dipole	IPEX	4.47	4.15
2	WVVDDB-104ACN Wi-Fi ant_5	Dipole	IPEX	3.78	4.03
3	WVVDDB-104ACN Wi-Fi ant_6	Dipole	IPEX	4.71	4.84
4	WVVDDB-104ACN Wi-Fi ant_7	Dipole	IPEX	4.13	4.8

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from AC adapter
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1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	AC Adapter	Brand Name: FSP GROUP INC Model Name: FSP090-AHAT2 I/P: 100-240Vac, 50-60Hz, 1.2A O/P: 12Vdc, 7.5A Power Line: DC 1.92m non-shielded cable with one core AC 1.5m non-shielded cable w/o core
2	RJ45 cable	1.45m non-shielded cable w/o core
3	RJ11 - A	1.76m non-shielded cable w/o core
4	RJ11 - B	1.45m non-shielded cable w/o core
5	Cradle	---

1.1.5 Channel List

HT40 / VHT40		VHT80	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
54	5270	58	5290
62	5310	106	5530
102	5510	138	5690
110	5550	---	---
134	5670	---	---
142	5710	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	telnet				
Duty Cycle and Duty Factor	Mode	Beamforming		Non-Beamforming	
		Duty cycle (%)	Duty factor (dB)	Duty cycle (%)	Duty factor (dB)
	VHT40	88.60%	0.53	99.30%	0.03
	VHT80	86.57%	0.63	92.33%	0.35

1.1.7 Power Setting

For Frequency band 5250~5350 MHz			
Modulation Mode	Test Frequency (MHz)	Power Set	
		Beamforming	Non-Beamforming
HT40	5270	---	17.00
HT40	5310	---	15.00
VHT40	5270	13.00	17.00
VHT40	5310	15.00	15.00
VHT80	5290	15.00	15.00

For Frequency band 5470~5725 MHz			
Modulation Mode	Test Frequency (MHz)	Power Set	
		Beamforming	Non-Beamforming
HT40	5510	---	15.00
HT40	5550	---	16.00
HT40	5670	---	16.00
VHT40	5510	15.00	15.00
VHT40	5550	13.00	16.00
VHT40	5670	13.00	16.00
VHT80	5530	15.00	13.00

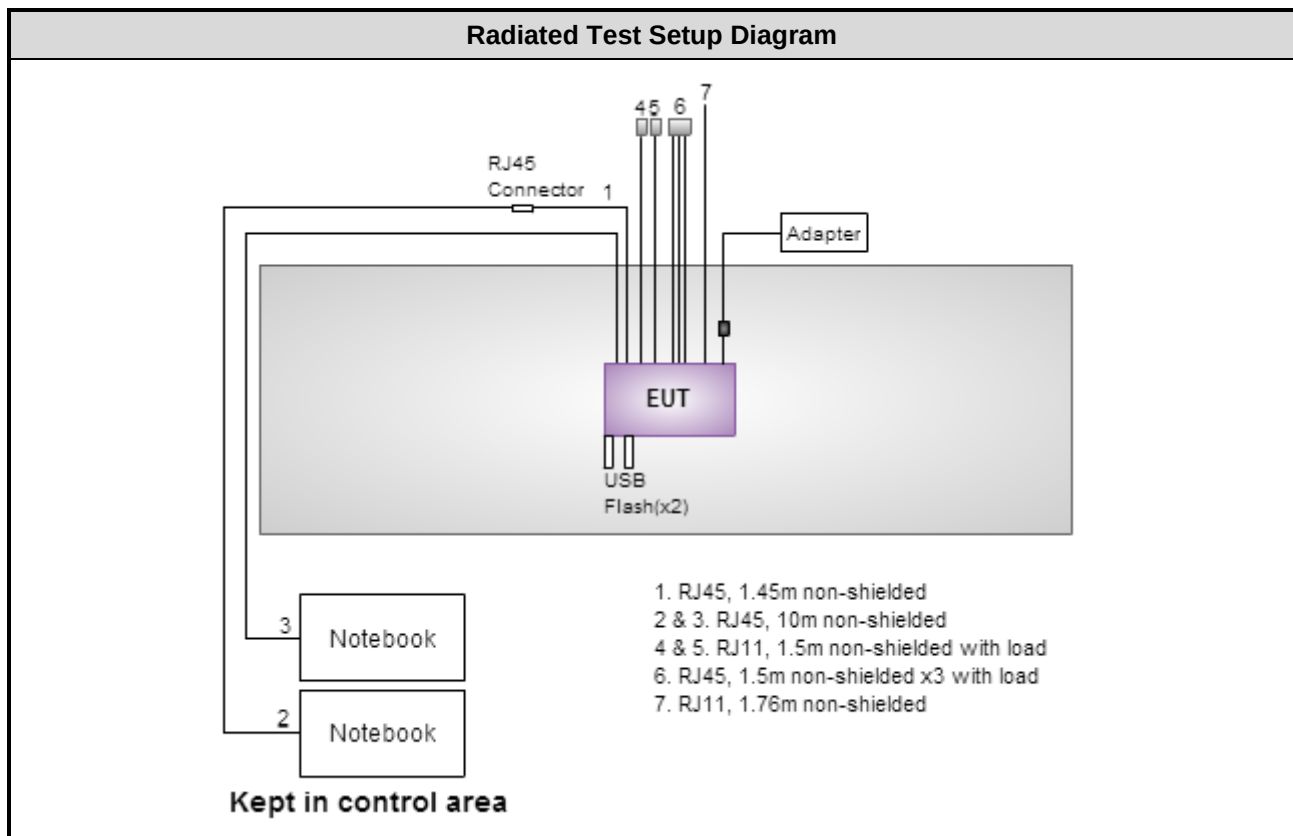
Channel that extends across the 5.725 GHz boundary

For Frequency band 5470~5725 MHz			
Modulation Mode	Test Frequency (MHz)	Power Set	
		Beamforming	Non-Beamforming
HT40	5710	---	16
VHT40	5710	12	16
VHT80	5690	13	17

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Signal cable / Length (m)
1	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded.
2	Notebook	DELL	Latitude E5420	DoC	RJ45, 10m non-shielded.
3	USB 2.0 flash	Kingston	DTSE9	---	---
4	USB 2.0 flash	Kingston	DTSE9	---	---

1.3 Test Setup Chart



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. 17, 2014	Oct. 16, 2015
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 17, 2014	Nov. 16, 2015
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127-666	Nov. 26, 2014	Nov. 25, 2015
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 31, 2014	Dec. 30, 2015
50 ohm terminal (Support Unit)	NA	50	04	Apr. 15, 2015	Apr. 14, 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 chamber1 / (O3CH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 09, 2014	Dec. 08, 2015
Receiver	R&S	ESR3	101658	Nov. 10, 2014	Nov. 09, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Sep. 05, 2014	Sep. 04, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 11, 2014	Dec. 10, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 10, 2014	Nov. 09, 2015
Loop Antenna	R&S	HFH2-Z2	11900	Nov. 10, 2014	Nov. 09, 2015
Preamplifier	Burgeon	BPA-530	SN:100219	Sep. 09, 2014	Sep. 08, 2015
Preamplifier	Agilent	83017A	MY39501308	Oct. 09, 2014	Oct. 08, 2015
Preamplifier	EMC	EMC184045B	980192	Aug. 26, 2014	Aug. 25, 2015
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 15, 2014	Dec. 14, 2015
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 15, 2014	Dec. 14, 2015
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 15, 2014	Dec. 14, 2015
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 15, 2014	Dec. 14, 2015
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 15, 2014	Dec. 14, 2015
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. 03, 2015	Feb. 02, 2016
Power Meter	Anritsu	ML2495A	1241002	Sep. 29, 2014	Sep. 28, 2015
Power Sensor	Anritsu	MA2411B	1207366	Sep. 29, 2014	Sep. 28, 2015
Signal Generator	R&S	SMB100A	175727	Oct. 08, 2014	Oct. 07, 2015
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 v01

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	± 2.92 dB
Radiated emission ≤ 1 GHz	± 3.72 dB
Radiated emission > 1 GHz	± 5.65 dB
Time	$\pm 0.1\%$
Temperature	± 0.6 °C

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	23°C / 64%	Kevin Ma
Radiated Emissions	03CH01-WS	22°C / 63-65%	Felix Sung Warren Lee Brad Wu Aska Huang
RF Conducted	TH01-WS	24°C / 64%	Brad Wu

- FCC site registration No.: 657002
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Non-beamforming mode

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	VHT40	5270	MCS 0	---
Radiated Emissions ≤1GHz	VHT40	5270	MCS 0	---
RF Output Power	HT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0	---
	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0	
	VHT80	5290 / 5530 / 5690	MCS 0	
Radiated Emissions >1GHz Emission Bandwidth Peak Power Spectral Density	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0	---
	VHT80	5290 / 5530 / 5690	MCS 0	
Frequency Stability	Un-modulation	5320	---	---
NOTE: The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.				

Beamforming mode

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	VHT40	5510	MCS 0	---
Radiated Emissions ≤1GHz	VHT40	5510	MCS 0	---
RF Output Power	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0	---
	VHT80	5290 / 5530 / 5690	MCS 0	
Radiated Emissions >1GHz Emission Bandwidth Peak Power Spectral Density	VHT40	5270 / 5310 5510 / 5550 / 5670 / 5710	MCS 0	---
	VHT80	5290 / 5530 / 5690	MCS 0	
Frequency Stability	Un-modulation	5320	---	---
NOTE: The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The X-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

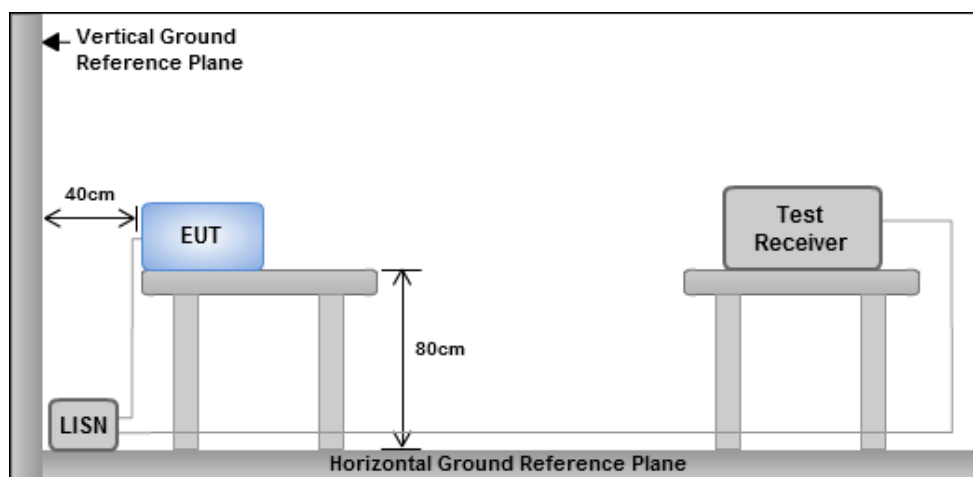
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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

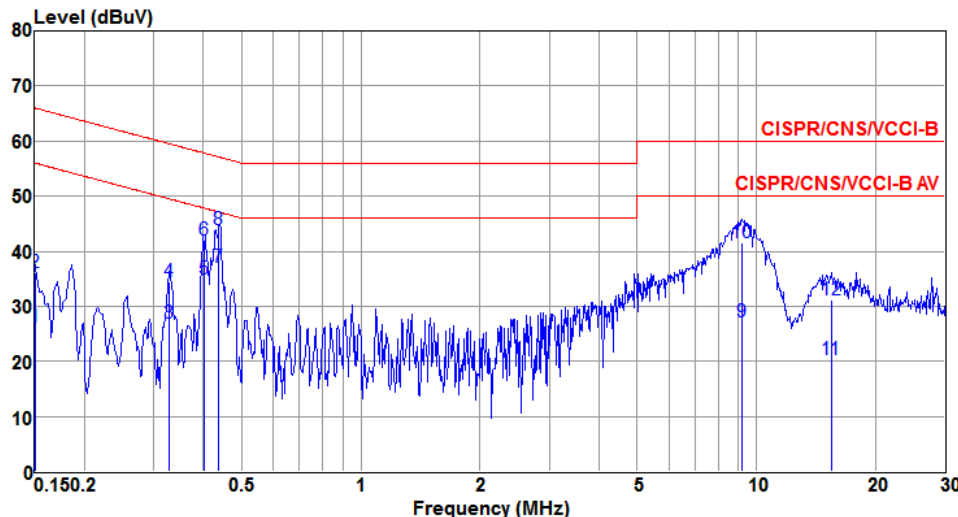


- Note: 1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

Non- beamforming mode

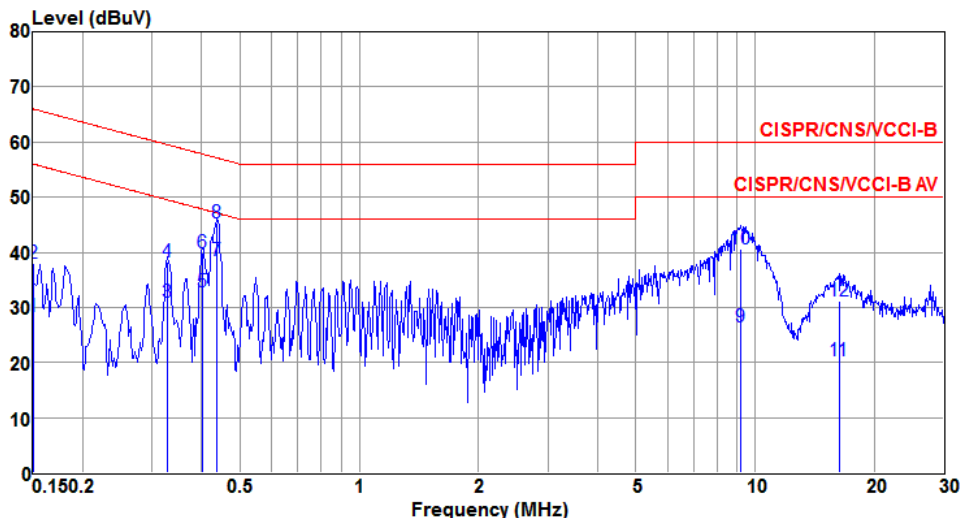
Modulation	VHT40	Test Freq. (MHz)	5270
Power Phase	Line		



Freq MHz	Level dBUV	Limit Line dBUV	Over Limit dB	Read Level dBUV	LISN factor dB	cable loss dB	Remark	
1	0.150	26.26	56.00	-29.74	26.11	0.07	0.08	Average
2	0.150	36.21	66.00	-29.79	36.06	0.07	0.08	QP
3	0.328	26.97	49.50	-22.53	26.80	0.07	0.10	Average
4	0.328	34.43	59.50	-25.07	34.26	0.07	0.10	QP
5	0.401	35.04	47.82	-12.78	34.86	0.07	0.11	Average
6	0.401	41.96	57.82	-15.86	41.78	0.07	0.11	QP
7*	0.438	37.12	47.10	-9.98	36.94	0.07	0.11	Average
8	0.438	43.88	57.10	-13.22	43.70	0.07	0.11	QP
9	9.204	27.04	50.00	-22.96	26.54	0.20	0.30	Average
10	9.204	41.49	60.00	-18.51	40.99	0.20	0.30	QP
11	15.470	20.22	50.00	-29.78	19.76	0.28	0.18	Average
12	15.470	31.17	60.00	-28.83	30.71	0.28	0.18	QP

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

Modulation	VHT40	Test Freq. (MHz)	5270
Power Phase	Neutral		

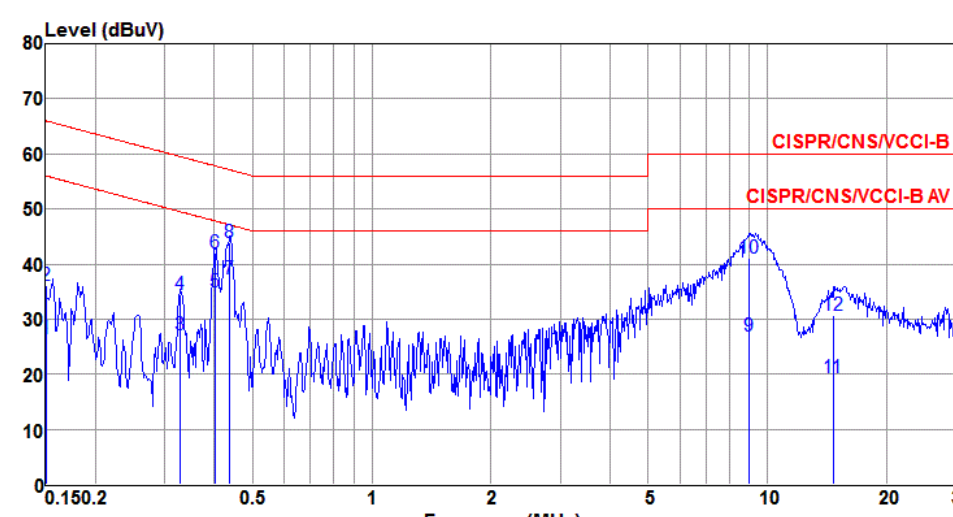


	Freq MHz	Level dBUV	Limit Line dBUV	Over Limit dB	Read Level dBUV	LISN factor dB	cable loss dB	Remark
1	0.150	28.39	56.00	-27.61	28.24	0.07	0.08	Average
2	0.150	37.96	66.00	-28.04	37.81	0.07	0.08	QP
3	0.328	30.84	49.50	-18.66	30.67	0.07	0.10	Average
4	0.328	38.14	59.50	-21.36	37.97	0.07	0.10	QP
5	0.401	32.86	47.83	-14.97	32.68	0.07	0.11	Average
6	0.401	39.92	57.83	-17.91	39.74	0.07	0.11	QP
7*	0.437	38.50	47.11	-8.61	38.32	0.07	0.11	Average
8	0.437	45.21	57.11	-11.90	45.03	0.07	0.11	QP
9	9.204	26.52	50.00	-23.48	26.00	0.22	0.30	Average
10	9.204	40.70	60.00	-19.30	40.18	0.22	0.30	QP
11	16.312	20.35	50.00	-29.65	19.89	0.31	0.15	Average
12	16.312	31.17	60.00	-28.83	30.71	0.31	0.15	QP

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

Beamforming mode

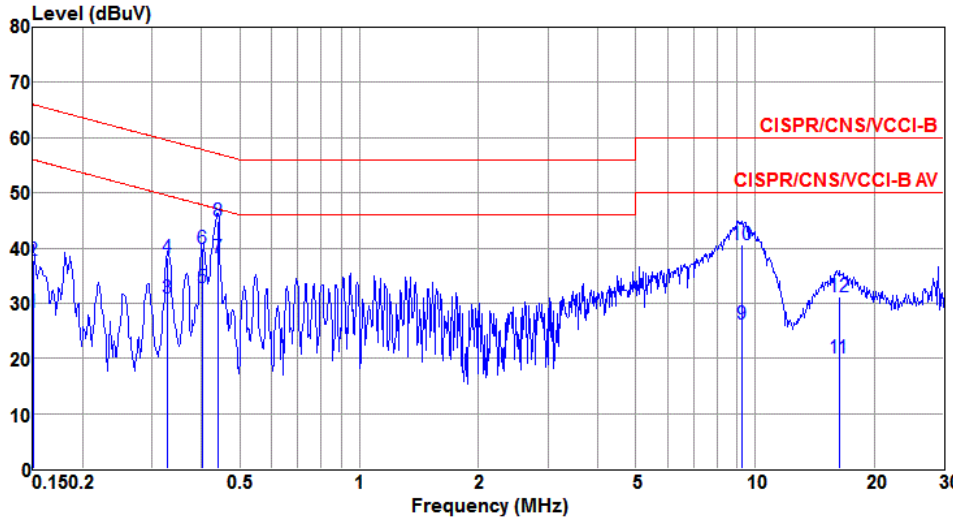
Modulation	VHT40	Test Freq. (MHz)	5510
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.150	26.33	56.00	-29.67	26.18	0.07	0.08	Average
2	0.150	36.23	66.00	-29.77	36.08	0.07	0.08	QP
3	0.328	27.09	49.50	-22.41	26.92	0.07	0.10	Average
4	0.328	34.55	59.50	-24.95	34.38	0.07	0.10	QP
5	0.401	35.05	47.83	-12.78	34.87	0.07	0.11	Average
6	0.401	42.05	57.83	-15.78	41.87	0.07	0.11	QP
7*	0.437	37.38	47.12	-9.74	37.20	0.07	0.11	Average
8	0.437	44.01	57.12	-13.11	43.83	0.07	0.11	QP
9	8.964	26.80	50.00	-23.20	26.30	0.20	0.30	Average
10	8.964	40.97	60.00	-19.03	40.47	0.20	0.30	QP
11	14.672	19.32	50.00	-30.68	18.84	0.27	0.21	Average
12	14.672	30.70	60.00	-29.30	30.22	0.27	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	VHT40	Test Freq. (MHz)	5510
Power Phase	Neutral		



	Freq	Level	Limit	Over	Read	LISN	cable	
	MHz	dBuV	Line	Limit	Level	factor	loss	Remark
			dBuV	dB	dBuV	dB	dB	
1	0.150	28.34	56.00	-27.66	28.19	0.07	0.08	Average
2	0.150	37.85	66.00	-28.15	37.70	0.07	0.08	QP
3	0.328	30.84	49.50	-18.66	30.67	0.07	0.10	Average
4	0.328	38.12	59.50	-21.38	37.95	0.07	0.10	QP
5	0.401	32.86	47.82	-14.96	32.68	0.07	0.11	Average
6	0.401	39.94	57.82	-17.88	39.76	0.07	0.11	QP
7*	0.438	38.13	47.09	-8.96	37.95	0.07	0.11	Average
8	0.438	44.96	57.09	-12.13	44.78	0.07	0.11	QP
9	9.253	26.16	50.00	-23.84	25.64	0.22	0.30	Average
10	9.253	40.57	60.00	-19.43	40.05	0.22	0.30	QP
11	16.312	20.13	50.00	-29.87	19.67	0.31	0.15	Average
12	16.312	31.13	60.00	-28.87	30.67	0.31	0.15	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

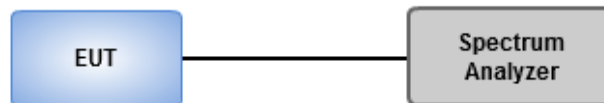
26dB Bandwidth

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 $\geq$ 3 RBW
3. Sample detection and single sweep mode shall be used
4. Use the 99 % power bandwidth function of the instrument

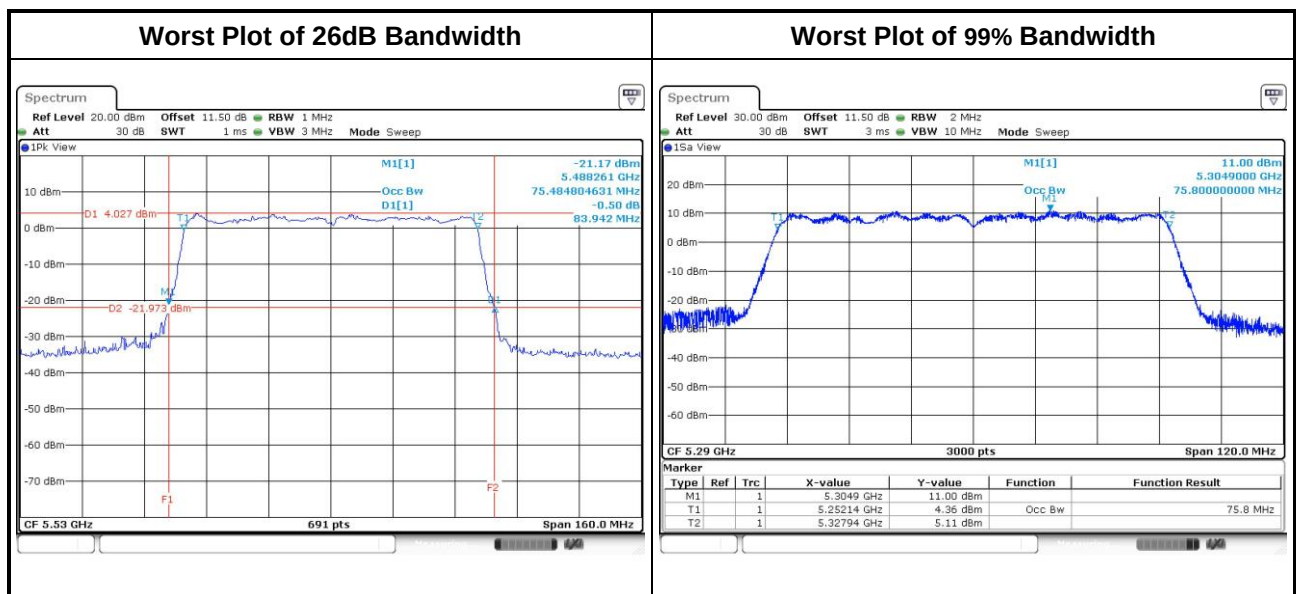
3.2.2 Test Setup



3.2.3 Test Result of Emission Bandwidth

Non- beamforming mode

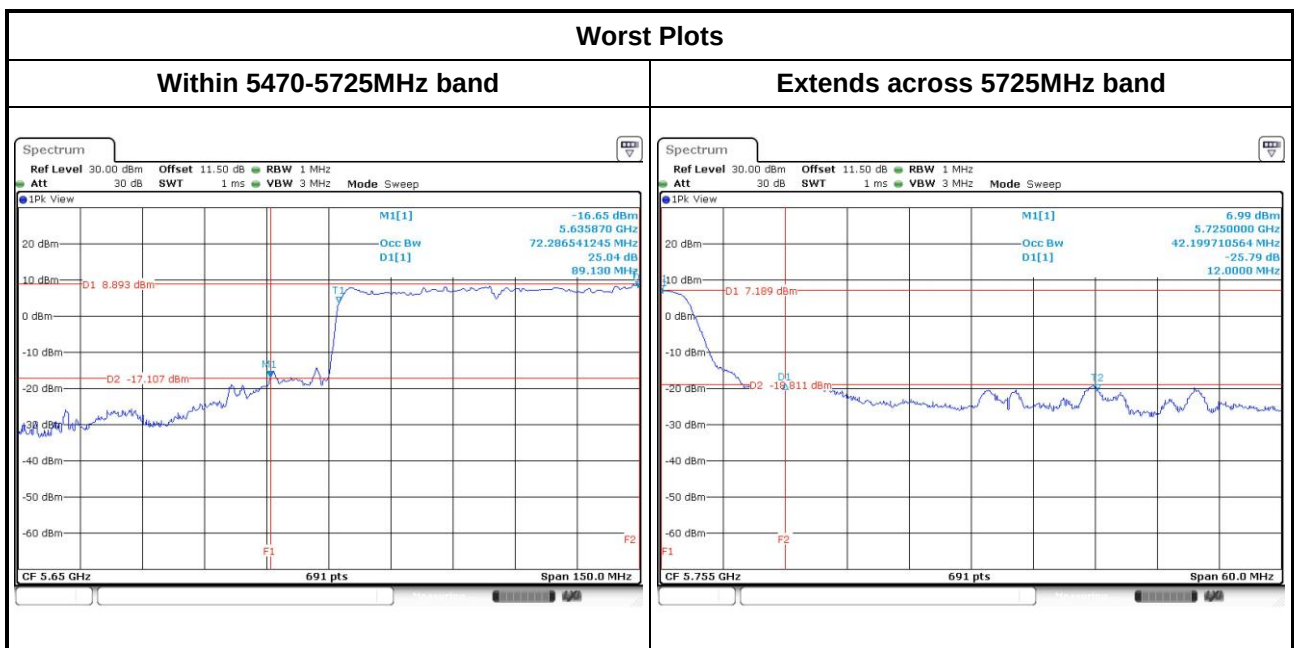
Emission Bandwidth												
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)				Power Limit (dBm)	
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	26dB BW	99%OBW
VHT40	4	5270	44.41	44.52	43.94	43.83	37.24	36.90	37.08	36.86	24.00	24.00
VHT40	4	5310	44.29	43.71	44.17	43.83	37.26	36.86	37.06	36.84	24.00	24.00
VHT80	4	5290	83.71	81.62	83.94	83.25	75.64	75.36	75.64	75.80	24.00	24.00
VHT40	4	5510	44.64	44.06	44.17	43.71	37.22	36.86	36.76	36.82	24.00	24.00
VHT40	4	5550	44.52	44.64	44.17	43.83	37.24	36.84	37.00	36.80	24.00	24.00
VHT40	4	5670	44.52	44.41	44.29	44.06	37.22	36.82	37.04	36.78	24.00	24.00
VHT80	4	5530	83.94	81.39	83.48	83.25	75.64	75.32	75.56	75.76	24.00	24.00



Channel that extends across the 5.725 GHz boundary

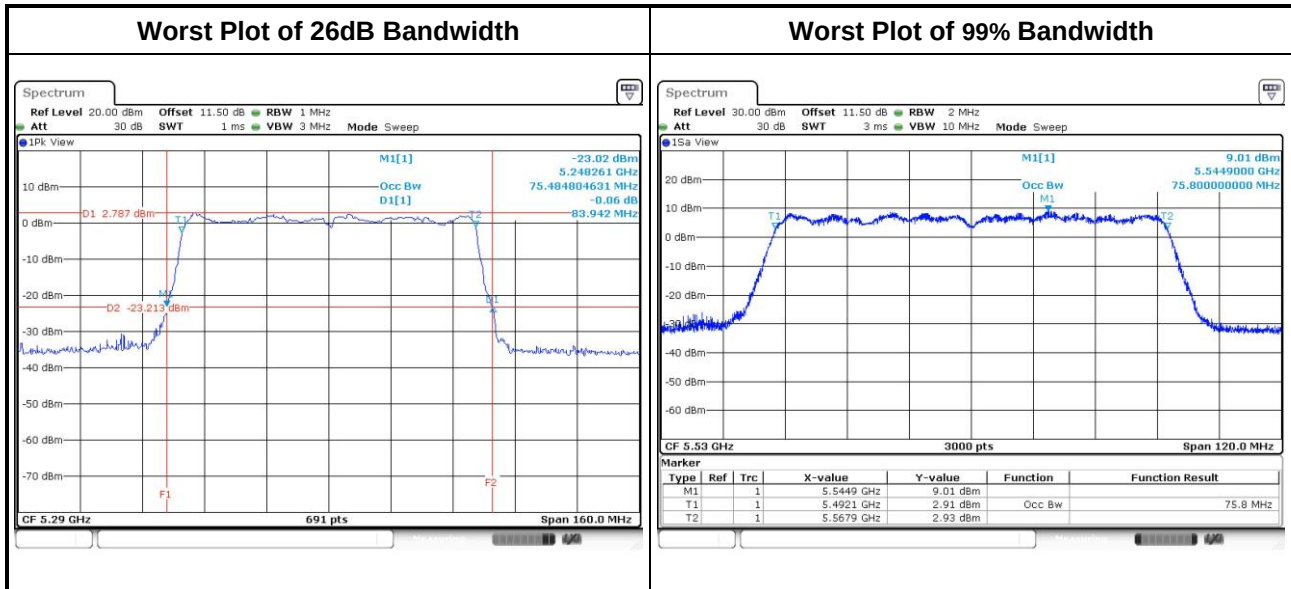
UNII Emission Bandwidth Result (Within 5470-5725MHz band)												
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)				Power Limit (dBm)	
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	26dB BW	99% BW
VHT40	4	5710	37.23	37.33	36.93	36.93	33.65	33.33	33.49	33.35	24.00	24.00
VHT80	4	5690	88.70	89.13	89.13	77.83	72.94	72.62	72.94	72.82	24.00	24.00

UNII Emission Bandwidth Result (Extends across 5725MHz band)										
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
VHT40	4	5710	7.25	7.19	7.30	7.13	3.47	3.47	3.57	3.45
VHT80	4	5690	7.48	7.22	12.00	7.48	2.66	2.74	2.66	2.90



Beamforming mode

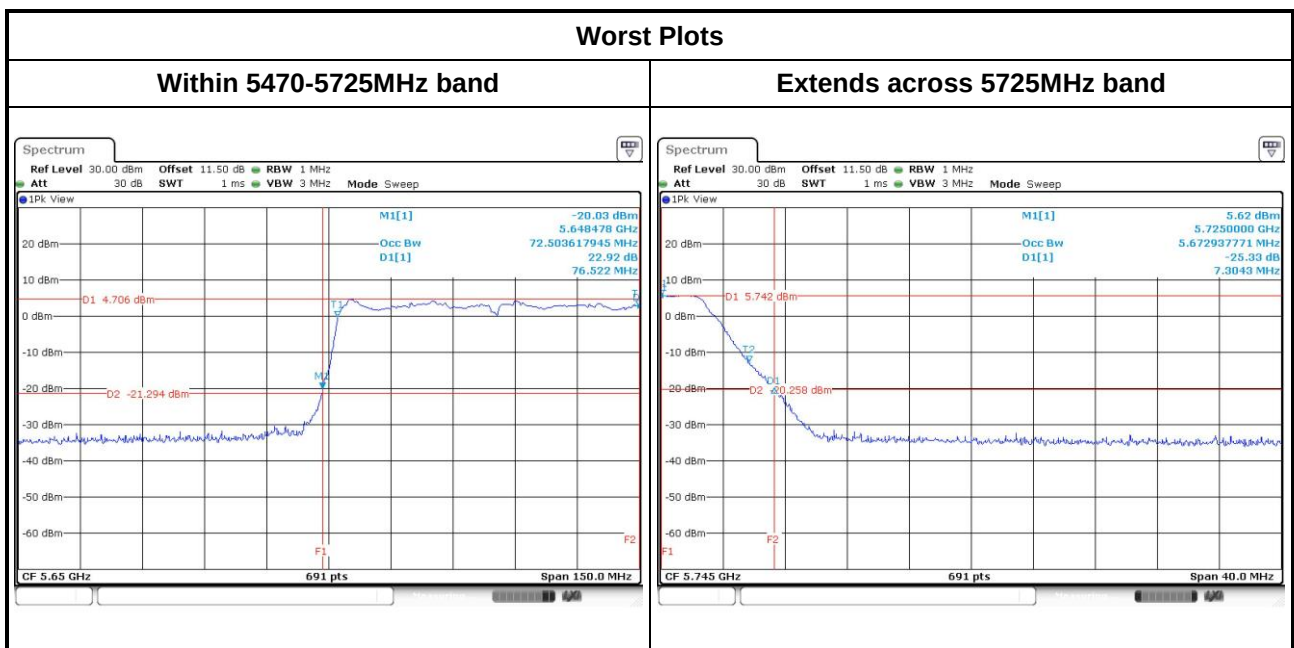
Emission Bandwidth												
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)				Power Limit (dBm)	
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	26dB BW	99%OBW
VHT40	4	5270	44.41	43.94	43.94	43.71	37.24	36.86	36.98	36.80	24.00	24.00
VHT40	4	5310	44.41	44.06	43.94	43.71	37.28	36.84	37.04	36.82	24.00	24.00
VHT80	4	5290	83.94	80.46	83.01	83.25	75.64	75.36	75.64	75.76	24.00	24.00
VHT40	4	5510	44.52	44.17	44.29	44.06	37.16	36.86	36.94	36.78	24.00	24.00
VHT40	4	5550	44.52	43.48	44.29	43.83	37.10	36.80	36.96	36.78	24.00	24.00
VHT40	4	5670	44.64	43.83	44.29	43.71	37.16	36.84	36.98	36.78	24.00	24.00
VHT80	4	5530	83.71	81.39	83.71	83.01	75.68	75.32	75.64	75.80	24.00	24.00



Channel that extends across the 5.725 GHz boundary

UNII Emission Bandwidth Result (Within 5470-5725MHz band)												
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)				Power Limit (dBm)	
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3	26dB BW	99% BW
VHT40	4	5710	37.33	37.03	37.23	36.73	33.67	33.33	33.43	33.33	24.00	24.00
VHT80	4	5690	76.52	75.65	76.52	76.30	72.94	72.58	72.94	72.86	24.00	24.00

UNII Emission Bandwidth Result (Extends across 5725MHz band)										
Mode	N _{TX}	Freq. (MHz)	26dB Bandwidth (MHz)				99% Bandwidth (MHz)			
			Chain 0	Chain 1	Chain 2	Chain 3	Chain 0	Chain 1	Chain 2	Chain 3
VHT40	4	5710	7.19	7.01	7.30	7.01	3.53	3.45	3.51	3.43
VHT80	4	5690	7.22	5.39	7.22	7.30	2.70	2.74	2.62	2.94



3.3 RF Output Power

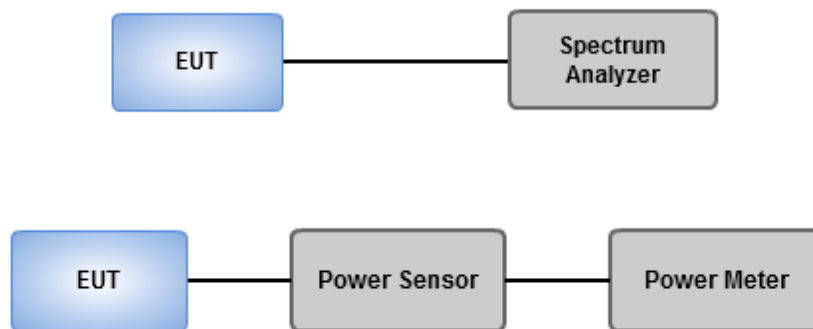
3.3.1 Limit of RF Output Power

Frequency Band (MHz)		Limit
☒	5250 ~ 5350	250mW or 11dBm+10 log B
☒	5470 ~ 5725	250mW or 11dBm+10 log B
Note: "B" is the 26dB emission bandwidth in MHz.		

3.3.2 Test Procedures

- ☒ Power meter (For channel that does not extends across the 5.725 GHz boundary)
 - ☒ 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

3.3.3 Test Setup



3.3.4 Test Result of Maximum Conducted Output Power

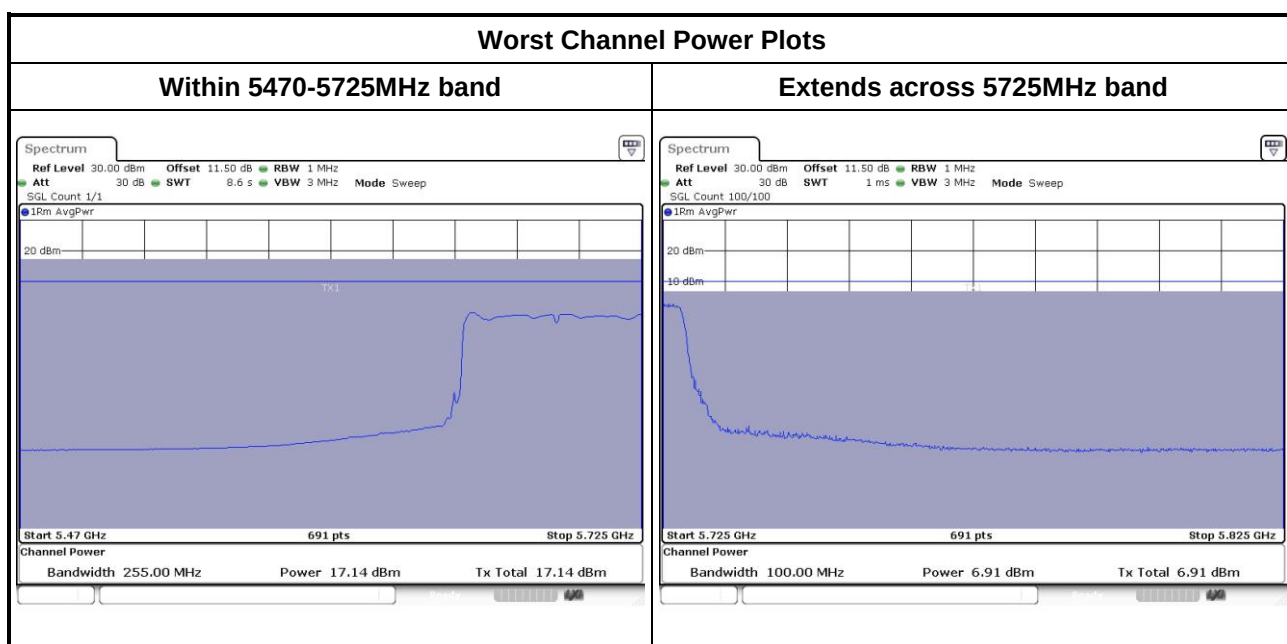
Non- beamforming mode

Mode	N _{TX}	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
HT40	4	5270	16.48	17.29	16.84	17.18	198.588	22.98	24.00
HT40	4	5310	14.13	15.09	14.86	15.25	122.283	20.87	24.00
VHT40	4	5270	16.58	17.41	16.98	17.29	204.048	23.10	24.00
VHT40	4	5310	14.22	15.18	14.97	15.36	125.146	20.97	24.00
VHT80	4	5290	13.92	14.88	14.86	15.23	119.384	20.77	24.00
HT40	4	5510	15.76	15.66	15.51	15.42	144.880	21.61	24.00
HT40	4	5550	16.52	16.46	16.39	16.35	175.836	22.45	24.00
HT40	4	5670	16.12	16.21	16.16	15.72	161.339	22.08	24.00
VHT40	4	5510	15.89	15.78	15.62	15.54	148.944	21.73	24.00
VHT40	4	5550	16.65	16.57	16.50	16.48	180.764	22.57	24.00
VHT40	4	5670	16.25	16.34	16.27	15.84	165.957	22.20	24.00
VHT80	4	5530	13.72	13.46	13.45	13.03	87.954	19.44	24.00

Channel that extends across the 5.725 GHz boundary

Maximum Conducted Output Power (Within 5470-5725MHz band)											
Mode	N _{TX}	Freq. (MHz)	Conducted Power without duty factor					Duty factor (dB)	Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)				
HT40	4	5710	16.36	16.51	16.50	16.83	22.57	0.00	180.886	22.57	24.00
VHT40	4	5710	16.40	16.57	16.47	16.67	22.55	0.00	179.858	22.55	24.00
VHT80	4	5690	17.14	16.89	16.58	16.39	22.78	0.35	205.595	23.13	24.00

Maximum Conducted Output Power (Extends across 5725MHz band)											
Mode	N _{TX}	Freq. (MHz)	Conducted Power without duty factor					Duty factor (dB)	Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)				
HT40	4	5710	6.33	6.66	6.37	6.85	12.58	0.00	18.107	12.58	30.00
VHT40	4	5710	6.09	6.49	6.30	6.91	12.48	0.00	17.696	12.48	30.00
VHT80	4	5690	3.90	4.27	3.71	4.37	10.09	0.35	11.070	10.44	30.00



Note: Above plots are without duty factor.

Beamforming mode

Mode	N _{TX}	Freq. (MHz)	Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3			
VHT40	4	5270	12.10	13.15	13.09	13.55	79.889	19.02	19.70
VHT40	4	5310	11.92	13.35	13.06	13.12	77.929	18.92	19.70
VHT80	4	5290	11.98	12.95	12.98	13.30	76.741	18.85	19.70
VHT40	4	5510	13.51	13.53	13.46	13.04	87.300	19.41	19.52
VHT40	4	5550	13.63	13.31	13.38	13.15	86.927	19.39	19.52
VHT40	4	5670	13.44	13.10	13.29	13.25	84.963	19.29	19.52
VHT80	4	5530	13.02	13.16	13.56	12.84	82.676	19.17	19.52

Note:

- For 5250~5350MHz band:
Directional gain = $10 * \log((10^{4.47/20} + 10^{3.78/20} + 10^{4.71/20} + 10^{4.13/20})^2 / 4) = 10.30 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $24 \text{ dBm} - (10.30 \text{ dBi} - 6 \text{ dBi}) = 19.70 \text{ dBm}$.
- For 5470~5725MHz band:
Directional gain = $10 * \log((10^{4.15/20} + 10^{4.03/20} + 10^{4.84/20} + 10^{4.80/20})^2 / 4) = 10.48 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $24 \text{ dBm} - (10.48 \text{ dBi} - 6 \text{ dBi}) = 19.52 \text{ dBm}$.

Channel that extends across the 5.725 GHz boundary

Maximum Conducted Output Power (Within 5470-5725MHz band)											
Mode	N _{TX}	Freq. (MHz)	Conducted Power without duty factor					Duty factor (dB)	Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)				
VHT40	4	5710	12.14	12.58	12.30	12.59	18.43	0.53	78.655	18.96	19.52
VHT80	4	5690	12.42	12.35	12.37	12.39	18.40	0.63	80.042	19.03	19.52

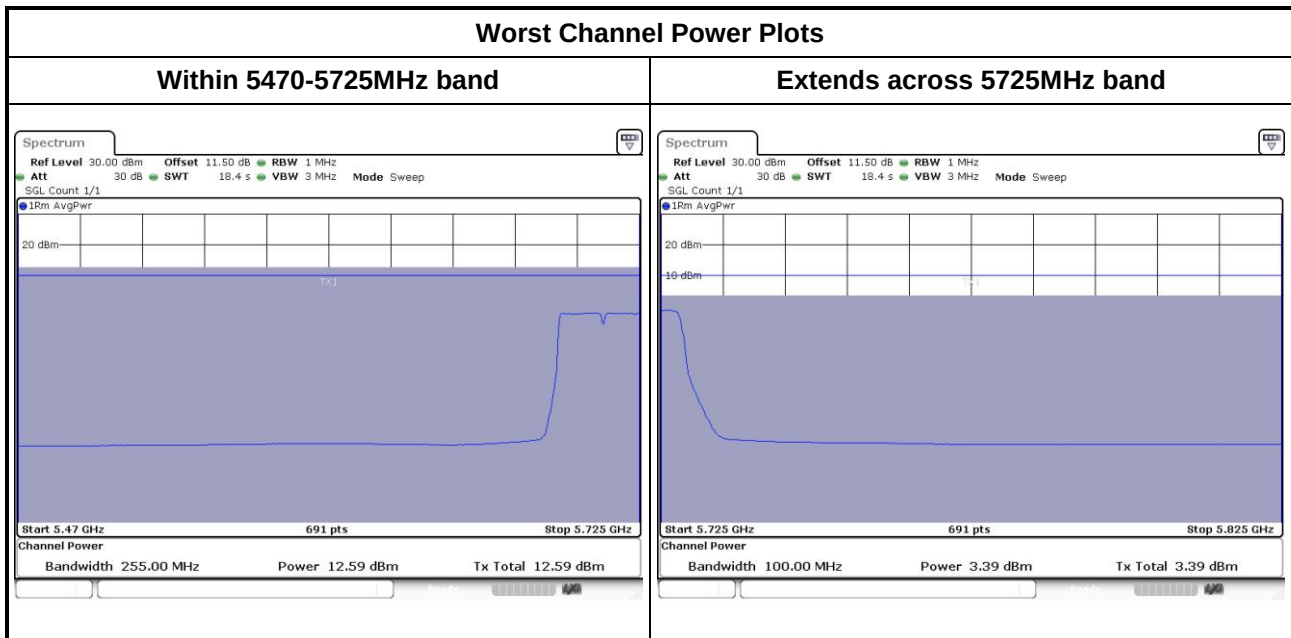
Note:

- Directional gain = $10 * \log((10^{4.15/20} + 10^{4.03/20} + 10^{4.84/20} + 10^{4.80/20})^2 / 4) = 10.48 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $24 \text{ dBm} - (10.48 \text{ dBi} - 6 \text{ dBi}) = 19.52 \text{ dBm}$.

Maximum Conducted Output Power (Extends across 5725MHz band)											
Mode	N _{TX}	Freq. (MHz)	Conducted Power without duty factor					Duty factor (dB)	Total Power (mW)	Total Power (dBm)	Limit (dBm)
			Chain 0	Chain 1	Chain 2	Chain 3	Total Power (dBm)				
VHT40	4	5710	2.66	3.39	2.85	2.81	8.96	0.53	8.886	9.49	25.52
VHT80	4	5690	-1.07	-1.17	-1.44	-1.12	4.82	0.63	3.510	5.45	25.52

Note:

- Directional gain = $10 * \log((10^{4.15/20} + 10^{4.03/20} + 10^{4.84/20} + 10^{4.80/20})^2 / 4) = 10.48 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $30 \text{ dBm} - (10.48 \text{ dBi} - 6 \text{ dBi}) = 25.52 \text{ dBm}$.



Note: Above plots are without duty factor.

3.4 Peak Power Spectral Density

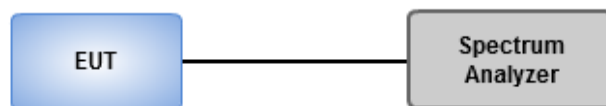
3.4.1 Limit of Peak Power Spectral Density

Frequency Band (MHz)		Limit
☒	5250 ~ 5350	11 dBm / MHz
☒	5470 ~ 5725	11 dBm / MHz

3.4.2 Test Procedures

- ☒ Method SA-1 (Non-Beam forming 11ac VHT40)
 - Set RBW = 1 MHz, VBW = 3 MHz, Sweep time = auto, Detector = RMS.
 - Trace average 100 traces.
 - Use the peak marker function to determine the maximum amplitude level.
- ☒ Method SA-2 Alternative (Non-Beam forming 11ac VHT80 / Beam forming 11ac VHT40/80)
 - Set RBW = 1 MHz, VBW = 3 MHz, Detector = RMS.
 - Set sweep time $\geq 10 * (\text{number of points in sweep}) * (\text{total on/off period of the transmitted signal})$.
 - Perform a single sweep.
 - Use the peak marker function to determine the maximum amplitude level.
 - Add $10 \log(1/x)$, where x is the duty cycle.

3.4.3 Test Setup



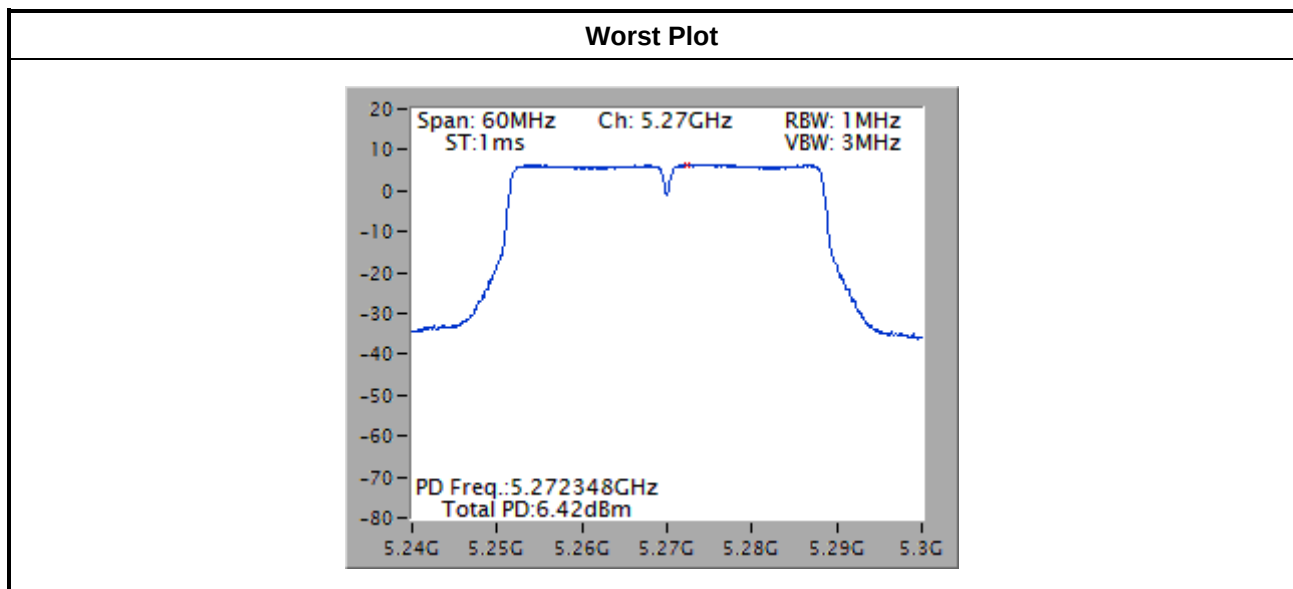
3.4.4 Test Result of Peak Power Spectral Density

Non- beamforming mode

Condition			Peak Power Spectral Density (dBm)			
Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm)	Duty Factor (dB)	PPSD with D.F (dBm)	PPSD Limit (dBm)
VHT40	4	5270	6.42	0.00	6.42	6.7
VHT40	4	5310	4.30	0.00	4.30	6.7
VHT80	4	5290	1.16	0.35	1.51	6.7
VHT40	4	5510	4.73	0.00	4.73	6.52
VHT40	4	5550	6.24	0.00	6.24	6.52
VHT40	4	5670	5.59	0.00	5.59	6.52
VHT40	4	5710	5.96	0.00	5.96	6.52
VHT80	4	5530	-0.24	0.35	0.11	6.52
VHT80	4	5690	3.41	0.35	3.76	6.52

Note:

1. D.F is duty factor.
2. Test result is bin-by-bin summing measured value of each TX port.
3. For 5250~5350MHz band:
 $\text{Directional gain} = 10 * \log((10^{4.47/20} + 10^{3.78/20} + 10^{4.71/20} + 10^{4.13/20})^2 / 4) = 10.30 \text{ dBi} > 6 \text{ dBi}$.
 Limit shall be reduced to 11 dBm – (10.30 dBi – 6 dBi) = 6.7 dBm.
4. For 5470~5725MHz band:
 $\text{Directional gain} = 10 * \log((10^{4.15/20} + 10^{4.03/20} + 10^{4.84/20} + 10^{4.80/20})^2 / 4) = 10.48 \text{ dBi} > 6 \text{ dBi}$.
 Limit shall be reduced to 11 dBm – (10.48 dBi – 6 dBi) = 6.52 dBm.

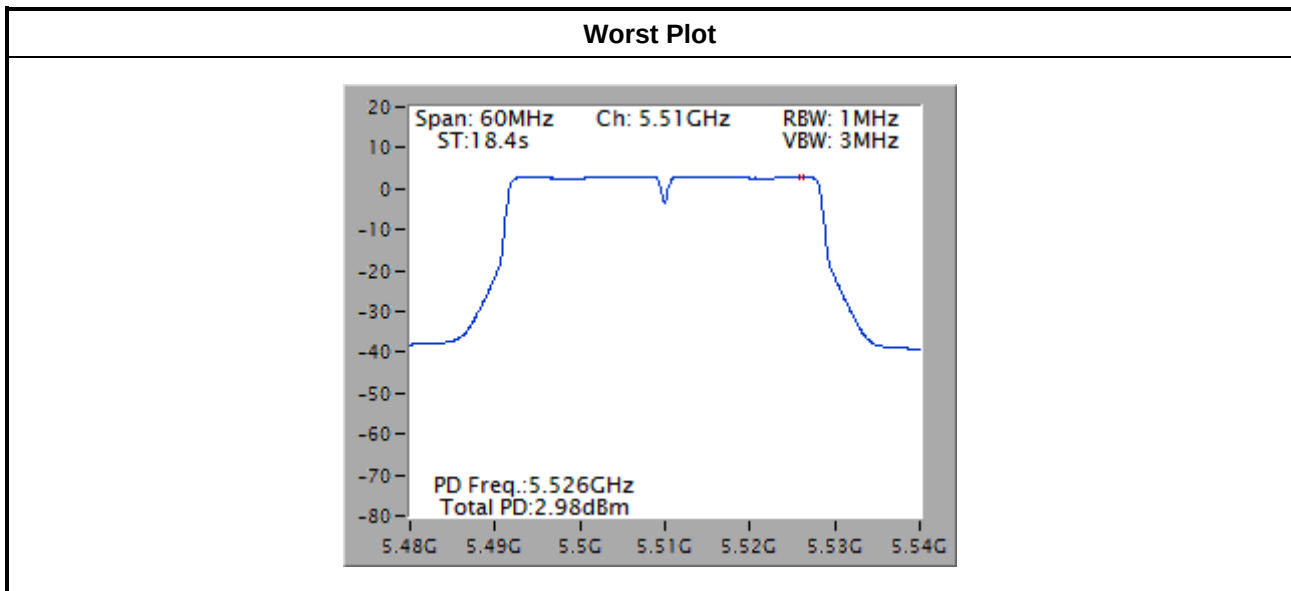


Beamforming mode

Condition			Peak Power Spectral Density (dBm)			
Mode	N _{TX}	Freq. (MHz)	PPSD w/o D.F (dBm)	Duty Factor (dB)	PPSD with D.F (dBm)	PPSD Limit (dBm)
VHT40	4	5270	2.50	0.53	3.03	6.7
VHT40	4	5310	2.31	0.53	2.84	6.7
VHT80	4	5290	-0.47	0.63	0.16	6.7
VHT40	4	5510	2.98	0.53	3.51	6.52
VHT40	4	5550	2.79	0.53	3.32	6.52
VHT40	4	5670	2.47	0.53	3.00	6.52
VHT40	4	5710	2.08	0.53	2.61	6.52
VHT80	4	5530	0.08	0.63	0.71	6.52
VHT80	4	5690	-0.31	0.63	0.32	6.52

Note:

1. D.F is duty factor.
2. Test result is bin-by-bin summing measured value of each TX port.
3. For 5250~5350MHz band:
Directional gain = $10 * \log((10^{4.47/20} + 10^{3.78/20} + 10^{4.71/20} + 10^{4.13/20})^2 / 4) = 10.30 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $11 \text{ dBm} - (10.30 \text{ dBi} - 6 \text{ dBi}) = 6.7 \text{ dBm}$.
4. For 5470~5725MHz band:
Directional gain = $10 * \log((10^{4.15/20} + 10^{4.03/20} + 10^{4.84/20} + 10^{4.80/20})^2 / 4) = 10.48 \text{ dBi} > 6 \text{ dBi}$.
Limit shall be reduced to $11 \text{ dBm} - (10.48 \text{ dBi} - 6 \text{ dBi}) = 6.52 \text{ dBm}$.



Note: Power density plot without duty factor.

3.5 Transmitter Radiated and Band Edge Emissions

3.5.1 Limit of Transmitter Radiated and Band Edge Emissions

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

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

Un-restricted band emissions above 1GHz Limit	
Operating Band	Limit
5.15 - 5.25 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.25 - 5.35 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.47 - 5.725 GHz	e.i.r.p. -27 dBm [68.2 dBuV/m@3m]
5.725 - 5.850 GHz	5.715 5.725 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] 5.825 5.835 GHz: e.i.r.p. -17 dBm [78.2 dBuV/m@3m] Other un-restricted band: e.i.r.p. -27 dBm [68.2 dBuV/m@3m]

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

3.5.2 Test Procedures

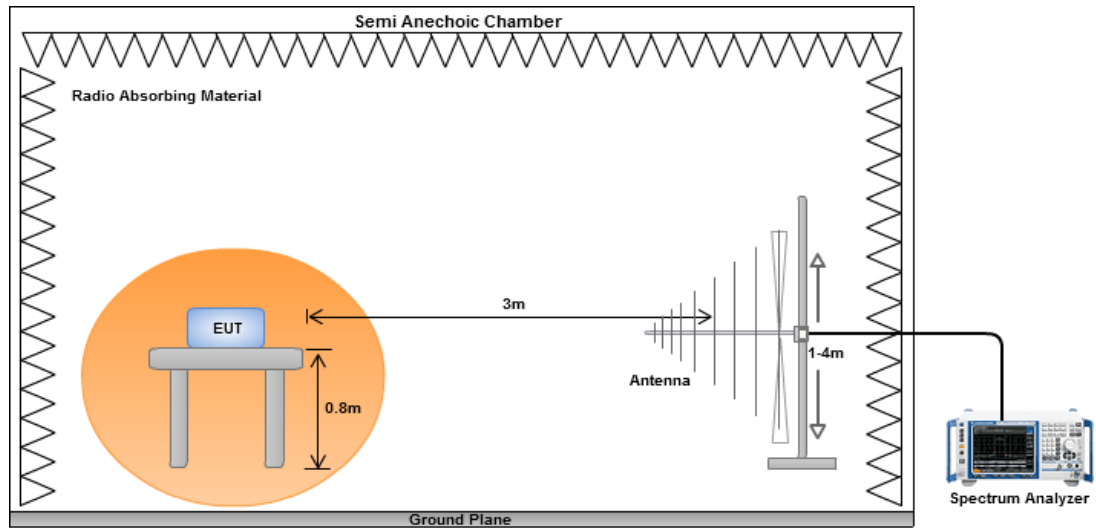
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360° . A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

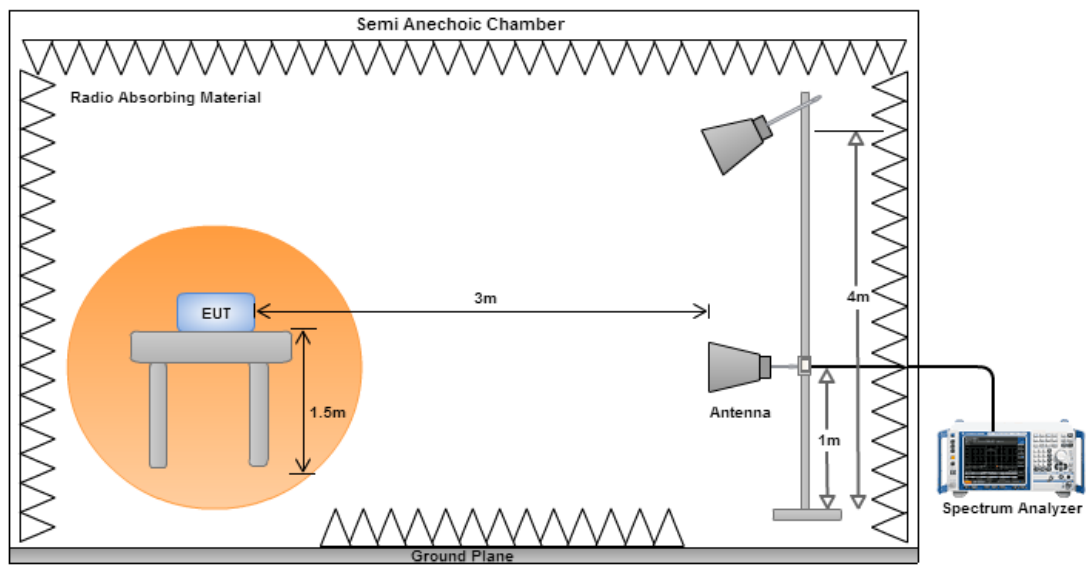
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



Non- beamforming mode

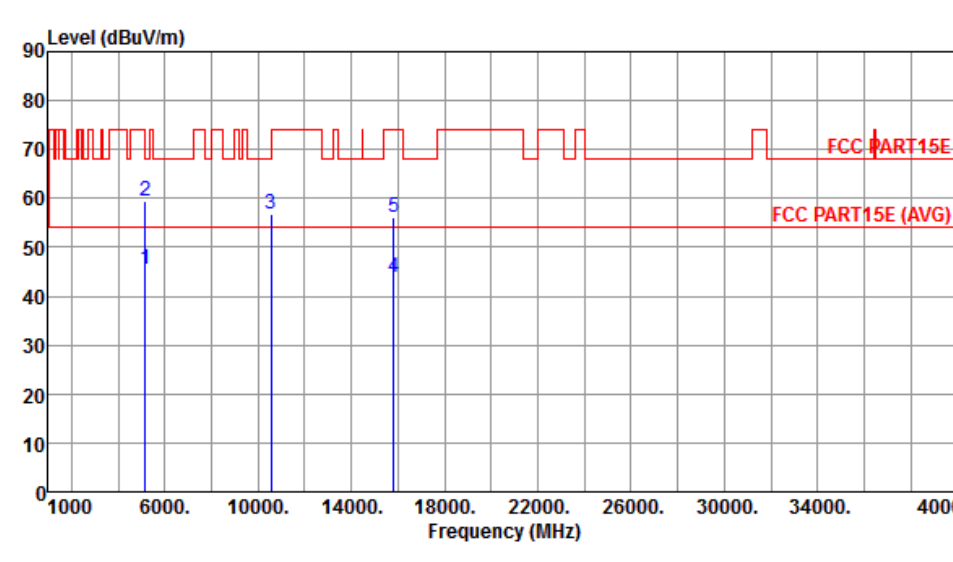
3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	VHT40	Test Freq. (MHz)	5270
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5270
Polarization	Vertical		
Level (dBuV/m) </			

3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT40

Modulation	VHT40	Test Freq. (MHz)	5270
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	5150.00	45.52	54.00	-8.48	40.06	5.46	Average	150	258
2	5150.00	59.42	74.00	-14.58	53.96	5.46	Peak	150	258
3	10540.00	56.63	68.20	-11.57	40.73	15.90	Peak	150	22
4	15810.00	43.75	54.00	-10.25	29.00	14.75	Average	150	211
5	15810.00	56.05	74.00	-17.95	41.30	14.75	Peak	150	211

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	VHT40	Test Freq. (MHz)	5270
Polarization	Vertical		
Level (dBuV/m) </			

Modulation	VHT40	Test Freq. (MHz)	5310
Polarization	Horizontal		
Level (dBUV/m) </			

Modulation	VHT40	Test Freq. (MHz)	5310
Polarization	Vertical		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5510
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5510
Polarization	Vertical		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5550
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5550
Polarization	Vertical		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5670
Polarization	Horizontal		
Level (dBUV/m)			

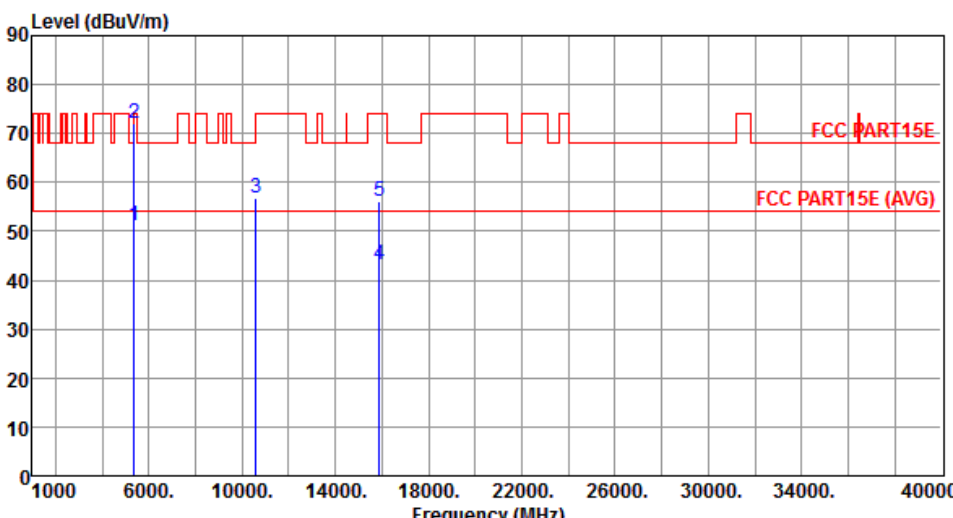
Modulation	VHT40	Test Freq. (MHz)	5670
Polarization	Vertical		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5710
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5710
Polarization	Vertical		
Level (dBuV/m)			

3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT80

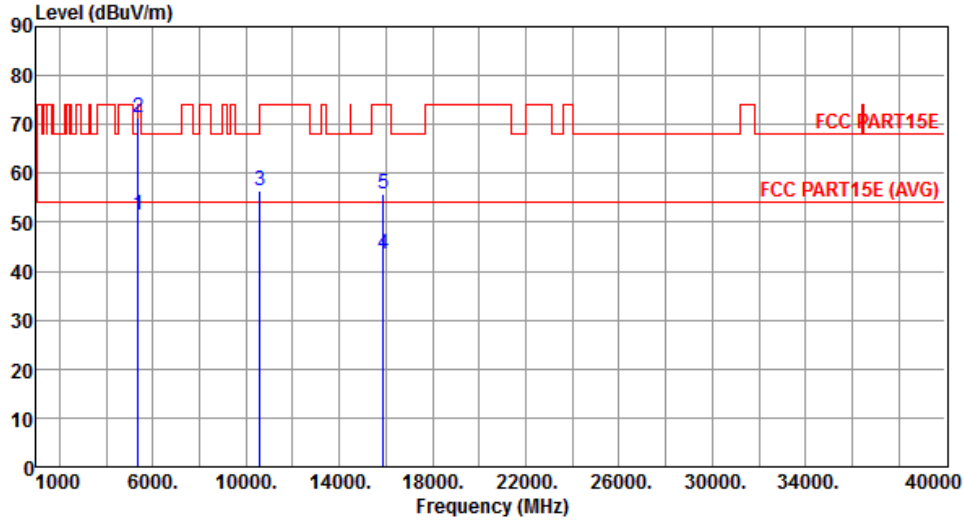
Modulation	VHT80	Test Freq. (MHz)	5290
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5350.00	51.27	54.00	-2.73	44.24	7.03	Average	150	254
2	5350.00	72.19	74.00	-1.81	65.16	7.03	Peak	150	254
3	10580.00	56.63	68.20	-11.57	39.86	16.77	Peak	150	111
4	15870.00	43.07	54.00	-10.93	26.14	16.93	Average	150	234
5	15870.00	56.10	74.00	-17.90	39.17	16.93	Peak	150	234

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	VHT80	Test Freq. (MHz)	5290
Polarization	Vertical		



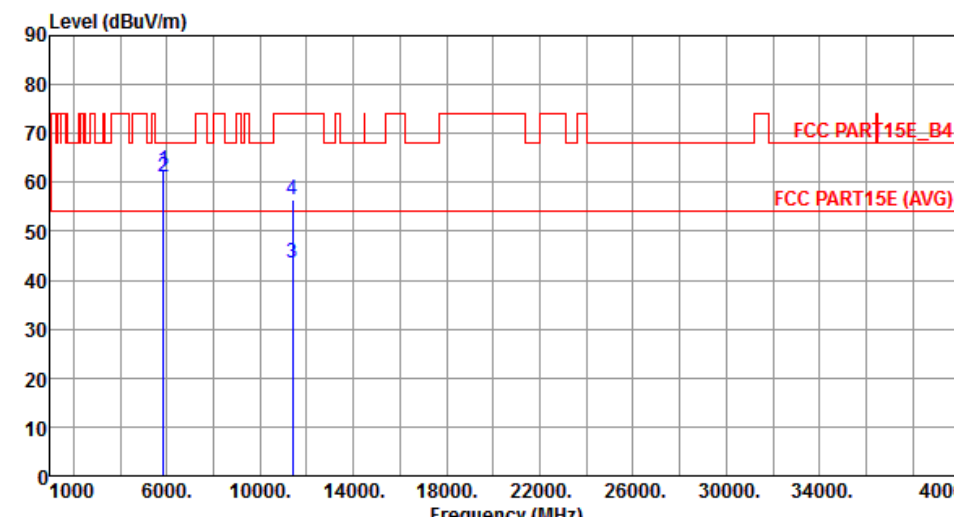
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5350.00	51.34	54.00	-2.66	44.31	7.03	Average	255	264
2	5350.00	71.24	74.00	-2.76	64.21	7.03	Peak	255	264
3	10580.00	56.43	68.20	-11.77	39.66	16.77	Peak	212	158
4	15870.00	43.65	54.00	-10.35	26.72	16.93	Average	212	166
5	15870.00	55.85	74.00	-18.15	38.92	16.93	Peak	212	166

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	VHT80	Test Freq. (MHz)	5530
Polarization	Horizontal		
Level (dBUV/m)			

Modulation	VHT80	Test Freq. (MHz)	5530																																																																																																				
Polarization	Vertical																																																																																																						
Level (dBuV/m) <table><tr><th></th><th>Freq.</th><th>Emission</th><th>Limit</th><th>Margin</th><th>SA</th><th>Factor</th><th>Remark</th><th>ANT</th><th>Turn</th></tr><tr><th></th><th>MHz</th><th>level</th><th></th><th></th><th>reading</th><th></th><th></th><th>High</th><th>Table</th></tr><tr><th></th><th></th><th>dBuV/m</th><th>dBuV/m</th><th>dB</th><th>dBuV</th><th>dB</th><th></th><th>cm</th><th>deg</th></tr><tr><td>1</td><td>5460.00</td><td>49.07</td><td>54.00</td><td>-4.93</td><td>43.47</td><td>5.60</td><td>Average</td><td>280</td><td>260</td></tr><tr><td>2</td><td>5460.00</td><td>61.92</td><td>74.00</td><td>-12.08</td><td>56.32</td><td>5.60</td><td>Peak</td><td>280</td><td>260</td></tr><tr><td>3</td><td>5470.00</td><td>67.40</td><td>68.20</td><td>-0.80</td><td>61.80</td><td>5.60</td><td>Peak</td><td>280</td><td>260</td></tr><tr><td>4</td><td>5725.00</td><td>46.25</td><td>54.00</td><td>-7.75</td><td>40.61</td><td>5.64</td><td>Average</td><td>280</td><td>234</td></tr><tr><td>5</td><td>5725.00</td><td>58.98</td><td>68.20</td><td>-9.22</td><td>53.34</td><td>5.64</td><td>Peak</td><td>280</td><td>234</td></tr><tr><td>6</td><td>11060.00</td><td>44.28</td><td>54.00</td><td>-9.72</td><td>28.67</td><td>15.61</td><td>Average</td><td>241</td><td>163</td></tr><tr><td>7</td><td>11060.00</td><td>57.24</td><td>74.00</td><td>-16.76</td><td>41.63</td><td>15.61</td><td>Peak</td><td>241</td><td>163</td></tr></table>					Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn		MHz	level			reading			High	Table			dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg	1	5460.00	49.07	54.00	-4.93	43.47	5.60	Average	280	260	2	5460.00	61.92	74.00	-12.08	56.32	5.60	Peak	280	260	3	5470.00	67.40	68.20	-0.80	61.80	5.60	Peak	280	260	4	5725.00	46.25	54.00	-7.75	40.61	5.64	Average	280	234	5	5725.00	58.98	68.20	-9.22	53.34	5.64	Peak	280	234	6	11060.00	44.28	54.00	-9.72	28.67	15.61	Average	241	163	7	11060.00	57.24	74.00	-16.76	41.63	15.61	Peak	241	163
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn																																																																																														
	MHz	level			reading			High	Table																																																																																														
		dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg																																																																																														
1	5460.00	49.07	54.00	-4.93	43.47	5.60	Average	280	260																																																																																														
2	5460.00	61.92	74.00	-12.08	56.32	5.60	Peak	280	260																																																																																														
3	5470.00	67.40	68.20	-0.80	61.80	5.60	Peak	280	260																																																																																														
4	5725.00	46.25	54.00	-7.75	40.61	5.64	Average	280	234																																																																																														
5	5725.00	58.98	68.20	-9.22	53.34	5.64	Peak	280	234																																																																																														
6	11060.00	44.28	54.00	-9.72	28.67	15.61	Average	241	163																																																																																														
7	11060.00	57.24	74.00	-16.76	41.63	15.61	Peak	241	163																																																																																														
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).																																																																																																							

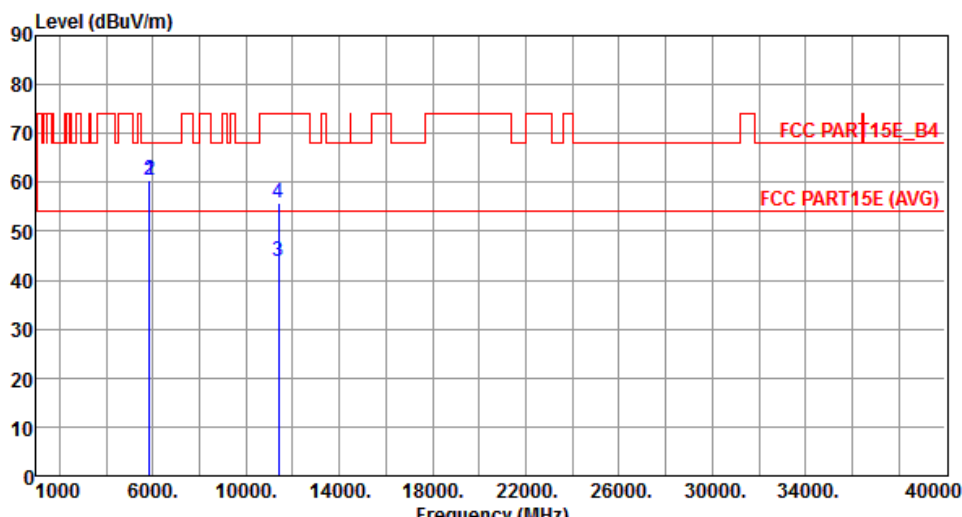
Modulation	VHT80	Test Freq. (MHz)	5690
Polarization	Horizontal		



	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	62.58	78.20	-15.62	54.69	7.89	Peak	165	96
2	5860.00	61.22	68.20	-6.98	53.31	7.91	Peak	156	108
3	11380.00	43.35	54.00	-10.65	26.11	17.24	Average	256	21
4	11380.00	56.61	74.00	-17.39	39.37	17.24	Peak	256	21

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	VHT80	Test Freq. (MHz)	5690
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	60.53	78.20	-17.67	52.64	7.89	Peak	273	46
2	5860.00	60.40	68.20	-7.80	52.49	7.91	Peak	245	158
3	11380.00	43.90	54.00	-10.10	26.66	17.24	Average	156	35
4	11380.00	55.83	74.00	-18.17	38.59	17.24	Peak	156	35

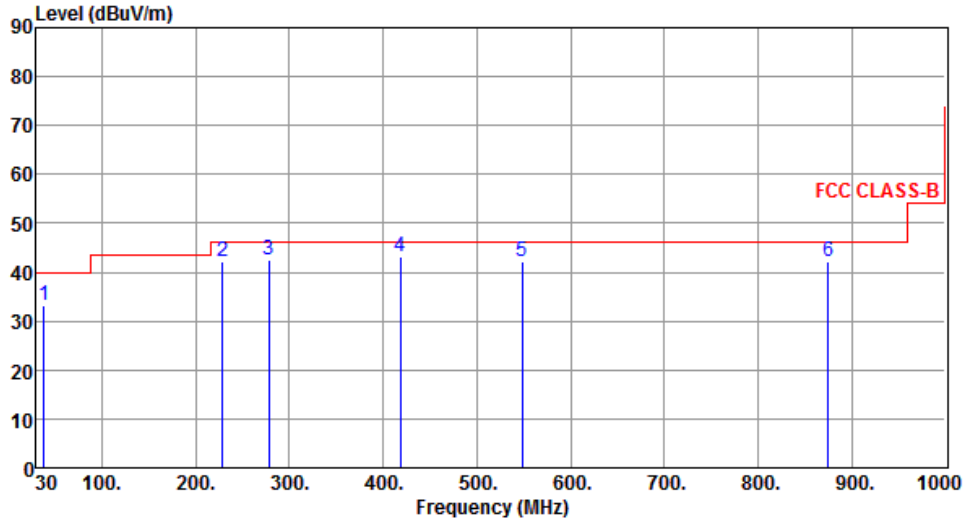
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Beamforming mode

3.5.7 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	VHT40	Test Freq. (MHz)	5510
Polarization	Horizontal		
Level (dBuV/m) <			

Modulation	VHT40	Test Freq. (MHz)	5510
Polarization	Vertical		



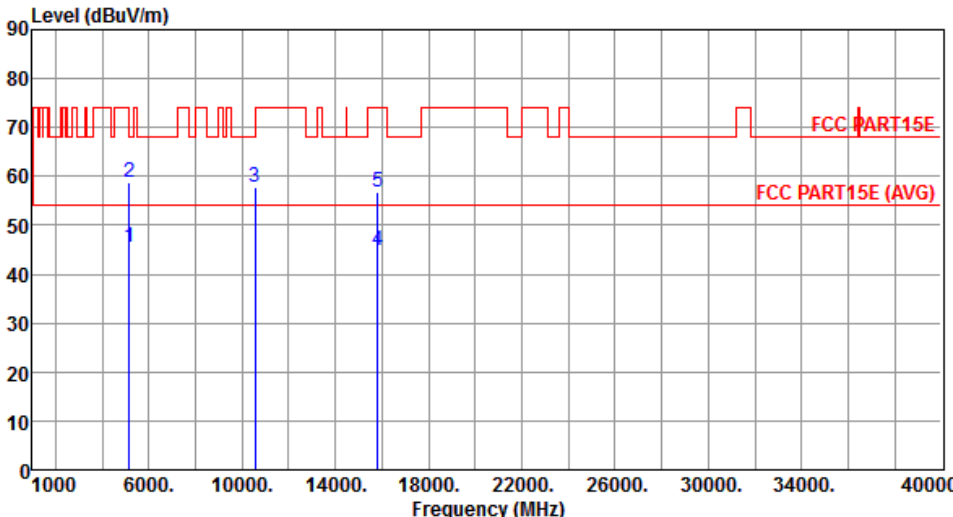
The graph displays the emission level in dBuV/m against frequency in MHz. A red line indicates the FCC CLASS-B limit, which is 40 dBuV/m from 30 MHz to 100 MHz, 45 dBuV/m from 100 MHz to 900 MHz, and 55 dBuV/m from 900 MHz to 1000 MHz. Six blue vertical lines represent measured peaks at the following frequencies: 37.85 MHz, 228.45 MHz, 278.25 MHz, 418.53 MHz, 548.53 MHz, and 875.16 MHz. The measured levels are 33.34, 42.31, 42.65, 43.08, 42.20, and 42.20 dBuV/m respectively.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	37.85	33.34	40.00	-6.66	50.21	-16.87	QP	---	---
2	228.45	42.31	46.00	-3.69	60.48	-18.17	Peak	---	---
3	278.25	42.65	46.00	-3.35	59.12	-16.47	QP	---	---
4	418.53	43.08	46.00	-2.92	56.21	-13.13	Peak	---	---
5	548.53	42.20	46.00	-3.80	52.66	-10.46	Peak	---	---
6	875.16	42.20	46.00	-3.80	47.96	-5.76	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 VHT40

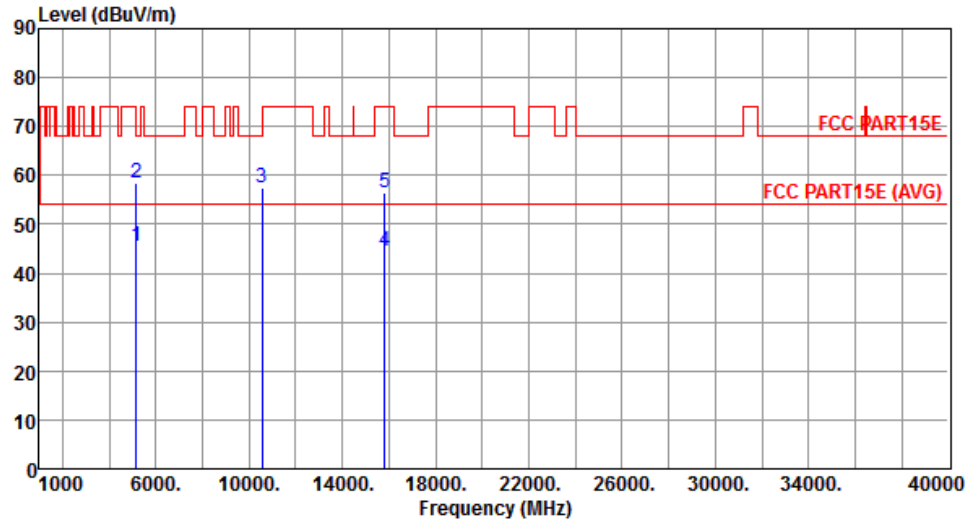
Modulation	VHT40	Test Freq. (MHz)	5270
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5150.00	45.62	54.00	-8.38	40.16	5.46	Average	154	255
2	5150.00	58.91	74.00	-15.09	53.45	5.46	Peak	154	255
3	10540.00	57.62	68.20	-10.58	41.72	15.90	Peak	165	148
4	15810.00	44.82	54.00	-9.18	30.07	14.75	Average	156	235
5	15810.00	56.91	74.00	-17.09	42.16	14.75	Peak	156	235

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	VHT40	Test Freq. (MHz)	5270
Polarization	Vertical		



The graph shows the emission level in dBUV/m across a frequency range from 1000 to 40000 MHz. The y-axis ranges from 0 to 90 dBUV/m. The x-axis ranges from 1000 to 40000 MHz. A red stepped line represents the emission level, and a solid red line represents the FCC PART15E (AVG) limit. Blue vertical lines with markers 1 through 5 indicate specific frequency points.

Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	5150.00	45.36	54.00	-8.64	39.90	5.46	Average	232 269
2	5150.00	58.61	74.00	-15.39	53.15	5.46	Peak	232 269
3	10540.00	57.46	68.20	-10.74	41.56	15.90	Peak	189 274
4	15810.00	44.38	54.00	-9.62	29.63	14.75	Average	122 94
5	15810.00	56.49	74.00	-17.51	41.74	14.75	Peak	122 94

	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB		cm	deg
1	5150.00	45.36	54.00	-8.64	39.90	5.46	Average	232	269
2	5150.00	58.61	74.00	-15.39	53.15	5.46	Peak	232	269
3	10540.00	57.46	68.20	-10.74	41.56	15.90	Peak	189	274
4	15810.00	44.38	54.00	-9.62	29.63	14.75	Average	122	94
5	15810.00	56.49	74.00	-17.51	41.74	14.75	Peak	122	94

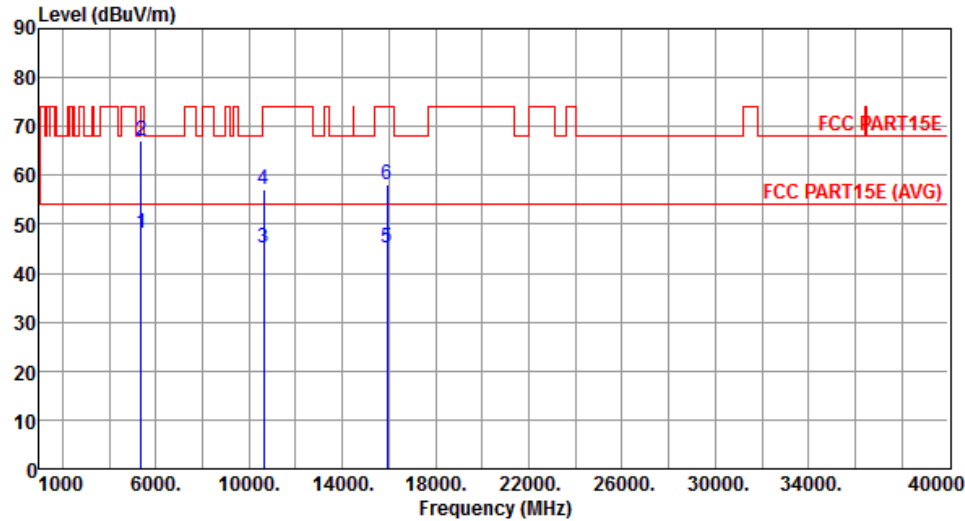
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT40	Test Freq. (MHz)	5310
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	VHT40	Test Freq. (MHz)	5310
Polarization	Vertical		



	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn
	MHz	level	dBuV/m	dB	reading	dB		High	Table
								cm	deg
1	5350.00	48.09	54.00	-5.91	42.53	5.56	Average	270	265
2	5350.00	67.24	74.00	-6.76	61.68	5.56	Peak	270	265
3	10620.00	45.32	54.00	-8.68	29.48	15.84	Average	185	99
4	10620.00	57.24	74.00	-16.76	41.40	15.84	Peak	185	99
5	15930.00	45.21	54.00	-8.79	30.93	14.28	Average	190	53
6	15930.00	58.21	74.00	-15.79	43.93	14.28	Peak	190	53

Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

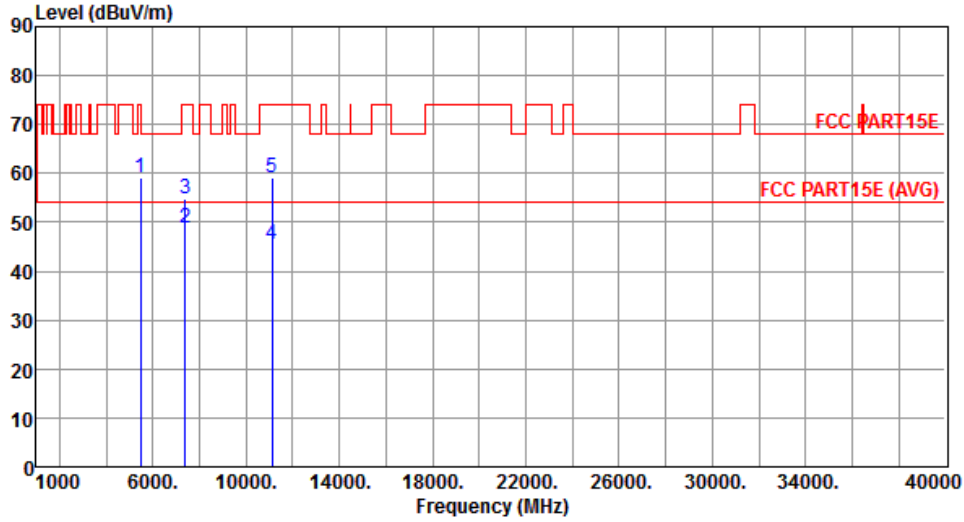
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT40	Test Freq. (MHz)	5510
Polarization	Horizontal		
Level (dBuV/m) <			

Modulation	VHT40	Test Freq. (MHz)	5510
Polarization	Vertical		
Level (dBUV/m) </			

Modulation	VHT40	Test Freq. (MHz)	5550
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	VHT40	Test Freq. (MHz)	5550
Polarization	Vertical		

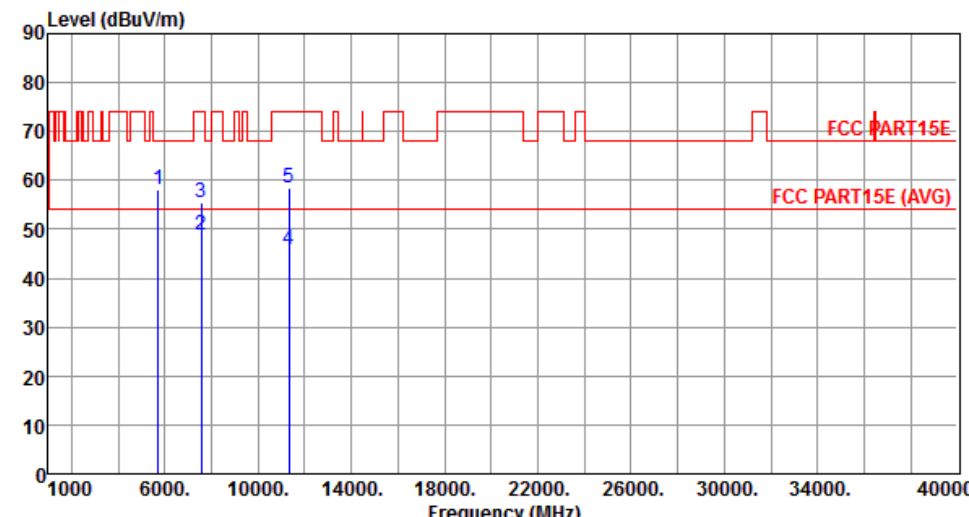


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	5470.00	59.04	68.20	-9.16	53.44	5.60	Peak	258	250
2	7400.00	48.77	54.00	-5.23	39.08	9.69	Average	250	138
3	7400.00	54.72	74.00	-19.28	45.03	9.69	Peak	250	138
4	11100.00	45.59	54.00	-8.41	29.96	15.63	Average	216	158
5	11100.00	59.12	74.00	-14.88	43.49	15.63	Peak	216	158

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	VHT40	Test Freq. (MHz)	5670
Polarization	Horizontal		
Level (dBuV/m) </			

Modulation	VHT40	Test Freq. (MHz)	5670
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	5725.00	58.15	68.20	-10.05	52.51	5.64	Peak	282	249
2	7560.00	48.94	54.00	-5.06	38.85	10.09	Average	244	138
3	7560.00	55.34	74.00	-18.66	45.25	10.09	Peak	244	138
4	11340.00	45.88	54.00	-8.12	30.06	15.82	Average	150	185
5	11340.00	58.61	74.00	-15.39	42.79	15.82	Peak	150	185

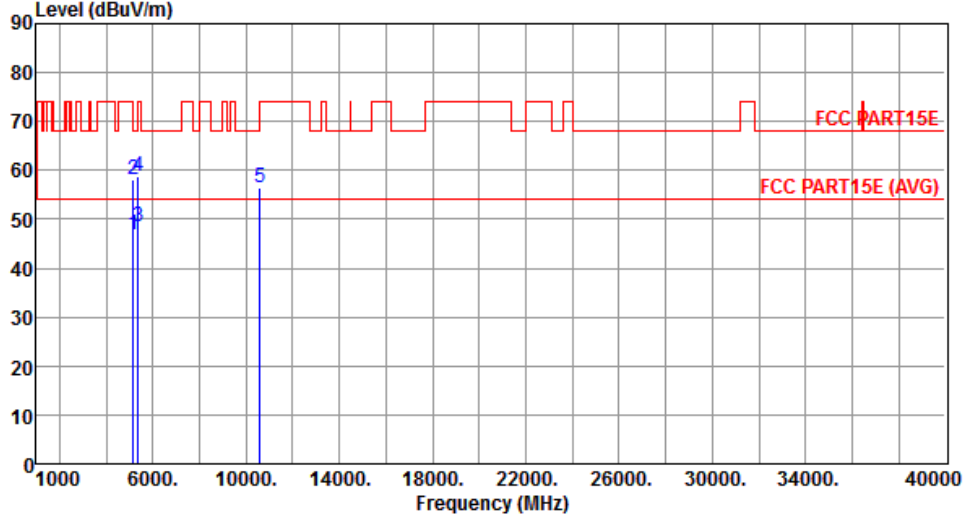
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

Modulation	VHT40	Test Freq. (MHz)	5710
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	VHT40	Test Freq. (MHz)	5710
Polarization	Vertical		
Level (dBuV/m)			

3.5.9 Transmitter Radiated Unwanted Emissions (Above 1GHz) for VHT80

Modulation	VHT80	Test Freq. (MHz)	5290
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	5150.00	46.71	54.00	-7.29	41.25	5.46	Average	150	252
2	5150.00	58.25	74.00	-15.75	52.79	5.46	Peak	150	252
3	5350.00	48.43	54.00	-5.57	42.87	5.56	Average	150	252
4	5350.00	58.71	74.00	-15.29	53.15	5.56	Peak	150	252
5	10580.00	56.60	68.20	-11.60	40.73	15.87	Peak	150	252

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	VHT80	Test Freq. (MHz)	5290
Polarization	Vertical		
Level (dBuV/m)			

Modulation	VHT80	Test Freq. (MHz)	5530
Polarization	Horizontal		
Level (dBUV/m) <			

Modulation	VHT80	Test Freq. (MHz)	5530
Polarization	Vertical		
Level (dBUV/m) </			

Modulation	VHT80	Test Freq. (MHz)	5690
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	VHT80	Test Freq. (MHz)	5690
Polarization	Vertical		
Level (dBuV/m) <			

3.6 Frequency Stability

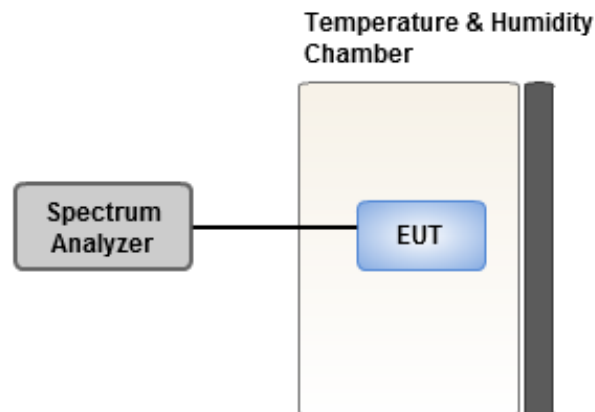
3.6.1 Limit of Frequency Stability

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

3.6.2 Test Procedures

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

3.6.3 Test Setup



3.6.4 Test Result of Frequency Stability

Frequency: 5320 MHz	Frequency Drift (ppm)			
Temperature (°C)	0 minute	2 minutes	5 minutes	10 minutes
T20°C Vmax	4.59	5.25	4.91	4.89
T20°C Vmin	4.42	4.71	3.97	4.40
T50°C Vnom	3.74	3.63	4.09	3.27
T40°C Vnom	3.95	4.63	4.13	3.93
T30°C Vnom	3.34	3.12	3.45	3.98
T20°C Vnom	2.61	2.73	2.70	2.20
T10°C Vnom	2.73	2.40	2.74	2.85
T0°C Vnom	3.19	3.11	3.77	4.03
T-10°C Vnom	1.99	2.73	2.08	2.50
T-20°C Vnom	0.42	0.76	0.28	0.73
T-30°C Vnom	0.50	0.68	1.27	0.59
Vnom [Vac]: 120		Vmax [Vac]: 138		Vmin [Vac]: 102
Tnom [°C]: 20		Tmax [°C]: 50		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

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin Kou
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R.O.C.

Kwei Shan

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd
St., Kwei Shan Hsiang, Tao Yuan
Hsien 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd
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