Harman International Industries, Inc.

RF TEST REPORT

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FCC Part 15.247 RF report

Model:
AP72598V

REPORT NUMBER:
220201028SHA-001

ISSUE DATE:
March 16, 2022

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TEST REPORT

Report no.: 220201028SHA-001

Applicant:	Harman International Industries, Inc.
	8500 Balboa Blvd, Northridge, CA 91329, USA
Manufacturer:	Dalian Golden Hualu Digital Technology Co., Ltd.
	No.1 Hua Road,Qixianling,High-Tech Industrial Zone,Dalian,Liaoning, China
Manufacturing site:	Dalian Golden Hualu Digital Technology Co., Ltd.
	No.1 Hua Road,Qixianling,High-Tech Industrial Zone,Dalian,Liaoning, China
Product Name:	WiFi & BT Platform Module
Type/Model:	AP72598V
FCC ID:	APIAP72598V
IC:	6132A-AP72598V

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2020): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-247 Issue 2 (February 2017): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 5 (February 2021) Amendment 2: General Requirements for Compliance of Radio Apparatus

PREPARED BY:	**REVIEWED BY:**
Project Engineer Erick Liu	Reviewer Wakeyou Wang

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TEST REPORT

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Revision History

Report No.	Version	Description	Issued Date
220201028SHA-001	Rev. 01	Initial issue of report	March 16, 2022

Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	RSS-247 Issue 2 Clause 5.2	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	RSS-247 Issue 2 Clause 5.4	Pass
Power spectrum density	15.247(e)	RSS-247 Issue 2 Clause 5.2	Pass
Emission outside the frequency band	15.247(d)	RSS-247 Issue 2 Clause 5.5	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	RSS-Gen Issue 5 Clause 8.9&8.10	Pass
Power line conducted emission	15.207(a)	RSS-Gen Issue 5 Clause 8.8	Pass
Occupied bandwidth	-	RSS-Gen Issue 5 Clause 6.6	Tested
Antenna requirement	15.203	-	Pass

Notes: 1: NA =Not Applicable
2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.
3: Additions, Deviations and Exclusions from Standards: None.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	WiFi & BT Platform Module
Type/Model:	AP72598V
Description of EUT:	The EUT is wireless module with WiFi and Bluetooth function, it has only one model.
Rating:	4.5-5.5V DC
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	January 17, 2022
Date of test:	January 17, 2022 ~ March 17, 2022

1.2 Technical Specification

Frequency Range:	2400MHz ~ 2483.5MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20)
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS7
Channel Separation:	5 MHz

1.3 Antenna information

Antenna No.	Model	Antenna type	Antenna Gain	Note
0	-	PCB Antenna	3.19 dBi	-
1	-	PCB Antenna	3.19 dBi	-

Mode	Tx/Rx Function	Beamforming function	CDD function
802.11b	1Tx/1Rx	NO	NO
802.11g	2Tx/2Rx	NO	YES
802.11n(HT20)	2Tx/2Rx	NO	NO

Frequency band	Mode	Directional Gain	Note
2.4 GHz	802.11b	3.19 dBi	-
	802.11g	3.19 dBi	-
	802.11n20	3.19 dBi	-
Note: all transmit signals are completely uncorrelated with each other, Directional gain= G_{ANT}.			

1.4 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Address:	Building 86, No. 1198 Qinzhou Road (North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN0175
	IC Registration Lab CAB identifier.: CN0051
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

Name:	Shenzhen UnionTrust Quality and Technology Co., Ltd.
Address:	Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China, China 518109
Telephone:	+86 (0) 755 2823 0888
Telefax:	+86 (0) 755 2823 0886

The test facility is recognized, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L9069
	FCC Accredited Lab Designation Number: CN1194
	IC Registration Lab CAB identifier.: CN0032
	A2LA Accreditation Lab Certificate Number: 4312.01

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2020)
ANSI C63.10 (2013)
RSS-247 Issue 2 (February 2017)
RSS-Gen Issue 5 (February 2021) Amendment 2
KDB 558074(v05r02)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

Software name	Manufacturer	Version	Supplied by
SecureCRT.exe	Vandyke	6.5.0.380	Applicant

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
2400-2483.5	802.11b	2412	2437	2462
	802.11g	2412	2437	2462
	802.11n(HT20)	2412	2437	2462

Data rate VS Power:
The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases. After this pre-scan, we choose the following table of the data rata as the worst case.

Frequency Band (MHz)	Mode	Worst case data rate
2400-2483.5	802.11b	1Mbps
	802.11g	6Mbps
	802.11n(HT20)	MCS0

The EUT will use two types antenna, and there have the following test mode:
Radiated test mode:
Mode 1: EUT transmitted signal with internal antenna;

Conducted test mode:
Mode 2: EUT transmitted signal from PCBA RF port connected to SPA directly;

We have verified all test modes, and choose the worst mode 1 for radiated test and mode 2 for conducted test as representatively to list the results in this report.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	e3	Audix	9 20151119i
Radiated emission	e3	Audix	9.160323

2.4 Test peripherals list

Item No.	Name	Band and Model	Description
1	Laptop computer	DELL 5480	-
2	RF cable	/	0.2m length; 0.5dB loss

2.5 Test environment condition:

Test items	Temperature	Humidity
Minimum 6dB Bandwidth	24.5°C	49% RH
Maximum conducted output power and e.i.r.p.		
Power spectrum density		
Emission outside the frequency band		
Occupied bandwidth		
Radiated Emissions in restricted frequency bands	24.7°C	52% RH
Power line conducted emission	25.3°C	45% RH

2.6 Instrument list

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	3M SAC	ETS-LINDGREN	3M	N/A	Jan. 22, 2021	Jan. 21, 2024
☒	Receiver	R&S	ESIB26	100114	Nov. 05, 2021	Nov. 04, 2022
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 11, 2021	Nov. 10, 2023
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 11, 2021	Nov. 10, 2023
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 11, 2021	Nov. 10, 2023
☒	Preamplifier	HP	8447F	2805A02960	Nov. 05, 2022	Nov. 04, 2022
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	Apr. 30, 2021	Apr. 29, 2023
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 14, 2020	Nov. 13, 2022
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 05, 2021	Nov. 04, 2022
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 05, 2021	Nov. 04, 2022
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 05, 2021	Nov. 04, 2022
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☒	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Apr. 22, 2021	Apr 21, 2022
☒	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Nov. 05, 2021	Nov. 04, 2022

2.7 Measurement uncertainty

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

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB
8	RF Power, Conducted	± 0.9 dB
9	Transmission Time	± 0.19 %
10	Occupied Bandwidth	± 1.86 %
11	Power Spectral Density, conducted	± 0.6 dB
12	Radio Frequency	$\pm 6.5 \times 10^{-8}$
13	Conducted out of band emission	± 2.7 dB

3 Minimum 6dB bandwidth

Test result: Pass

3.1 Limit

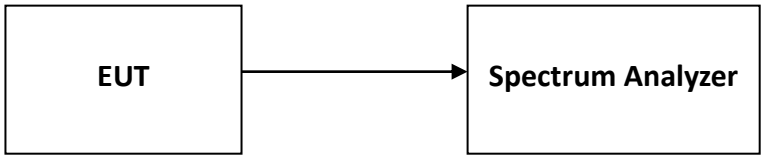
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

The minimum 6dB bandwidth is measured using the Spectrum Analyzer according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 8.2) for compliance requirements.

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

3.3 Test Configuration



3.4 Test Results of Minimum 6dB bandwidth

Please refer to Appendix A

4 Maximum conducted output power and e.i.r.p.

Test result: Pass

4.1 Limit

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

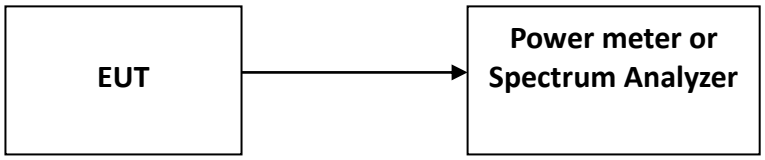
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

4.2 Measurement Procedure

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 9.2.2.4) for compliance requirements.

a) Measure the duty cycle, x, of the transmitter output signal as described in Section 6.0.
b) Set span to at least 1.5 x OBW.
c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
d) Set VBW ≥ 3 x RBW.
e) Number of points in sweep ≥ 2 x span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
f) Sweep time = auto.
g) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
h) Do not use sweep triggering. Allow the sweep to “free run”.
i) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
j) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
k) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25 %.

4.3 Test Configuration



4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

5 Power spectrum density

Test result: **Pass**

5.1 Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and 8+ (6 –antenna gain-beam forming gain).

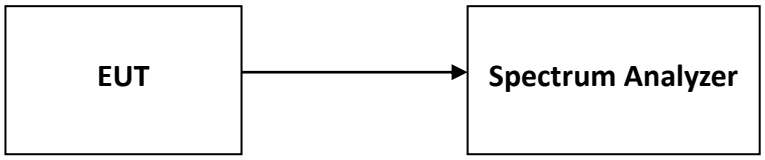
5.2 Measurement Procedure

The power output was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 10.5) for compliance requirements.

This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98 %), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ± 2 %):

a) Measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 x OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.
m) If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

5.3 Test Configuration



5.4 Test Results of Power spectrum density

Please refer to Appendix A

6 Emission outside the frequency band

Test result: **Pass**

6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

6.2 Measurement Procedure

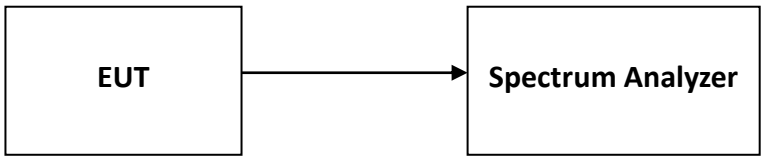
The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 11.0) for compliance requirements.

Reference level measurement
Establish a reference level by using the following procedure:
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum PSD level.

Emission level measurement
a) Set the center frequency and span to encompass frequency range to be measured.
b) Set the RBW = 100 kHz.
c) Set the VBW ≥ 3 x RBW.
d) Detector = peak.
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.

6.3 Test Configuration



6.4 The results of Emission outside the frequency band

Please refer to Appendix A

7 Radiated Emissions in restricted frequency bands

Test result: **Pass**

7.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

7.2 Measurement Procedure

For Radiated emission below 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c) Both X and Y axes of the antenna are set to make the measurement.
d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz:

a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

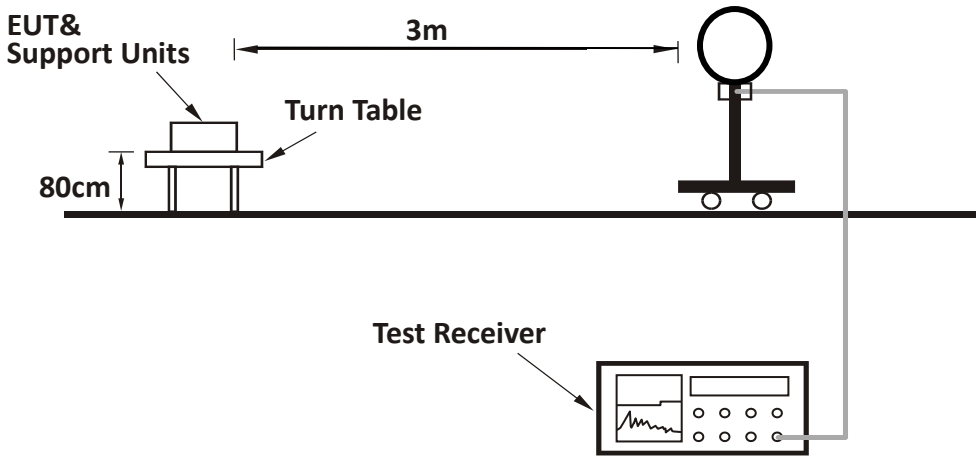
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

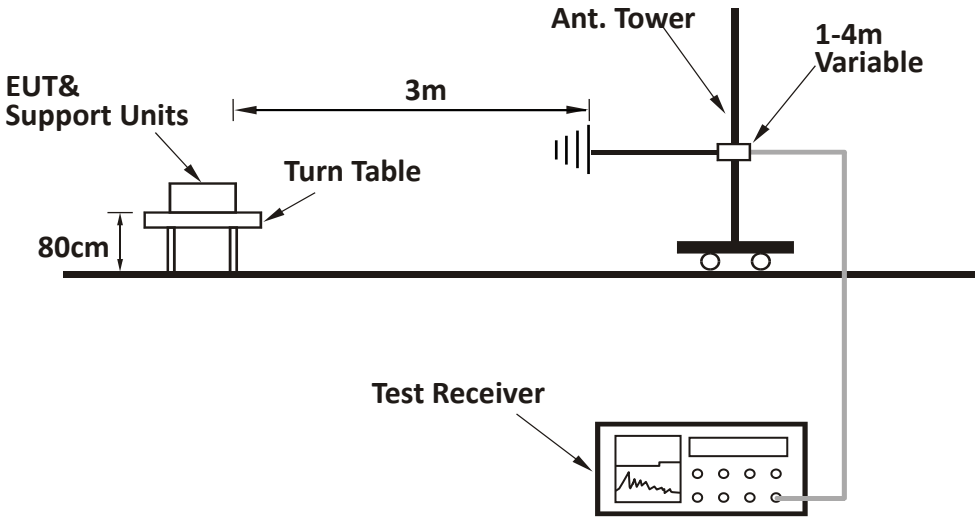
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported

7.3 Test Configuration

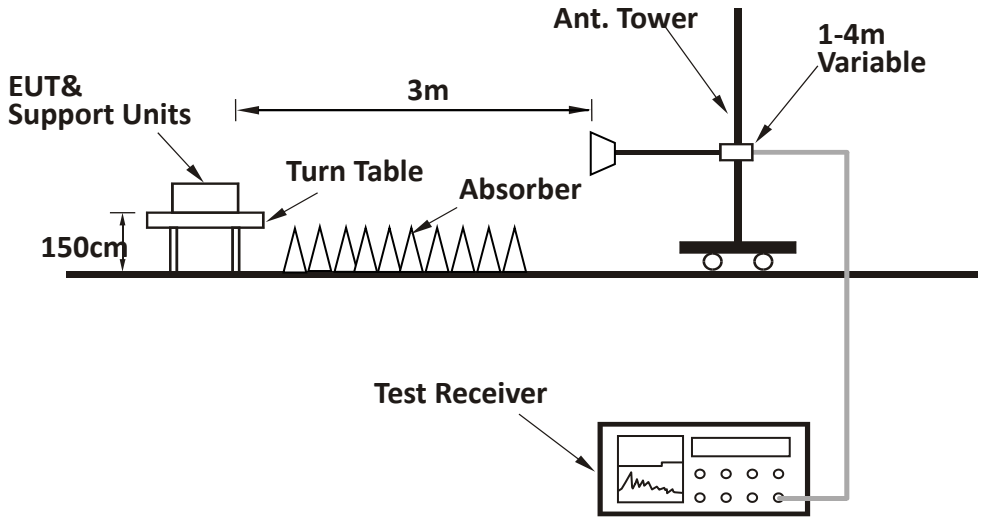
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



For Radiated emission above 1GHz:

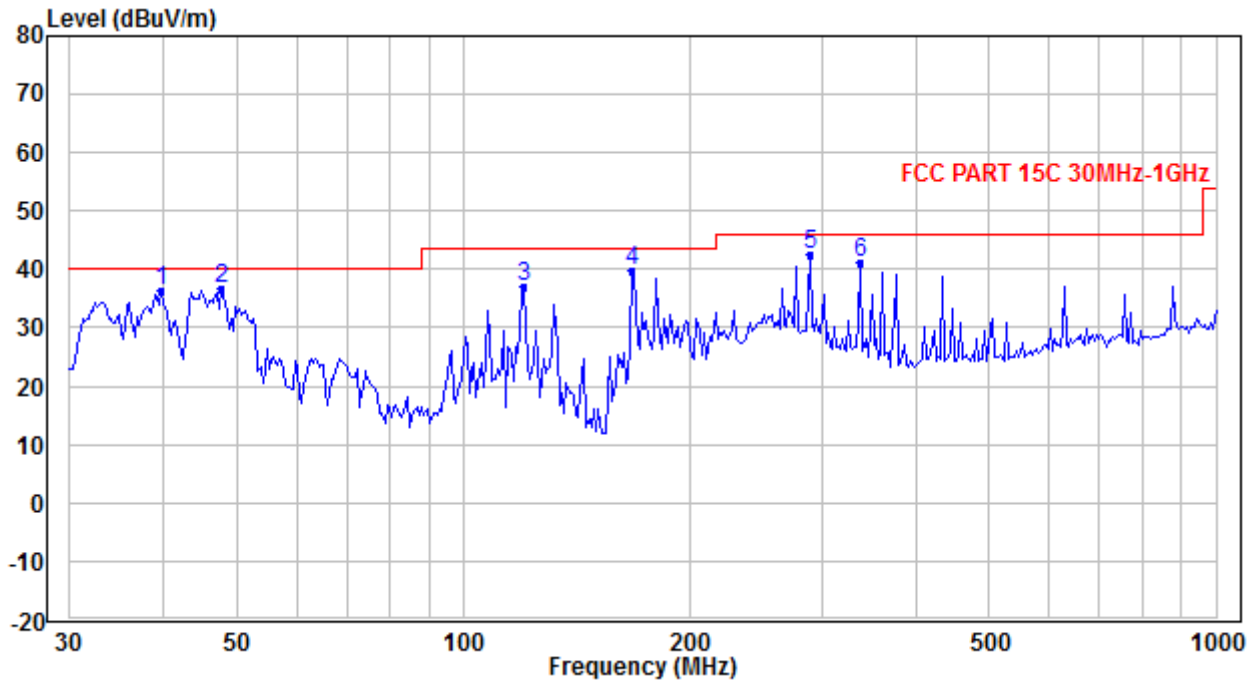


7.4 Test Results of Radiated Emissions

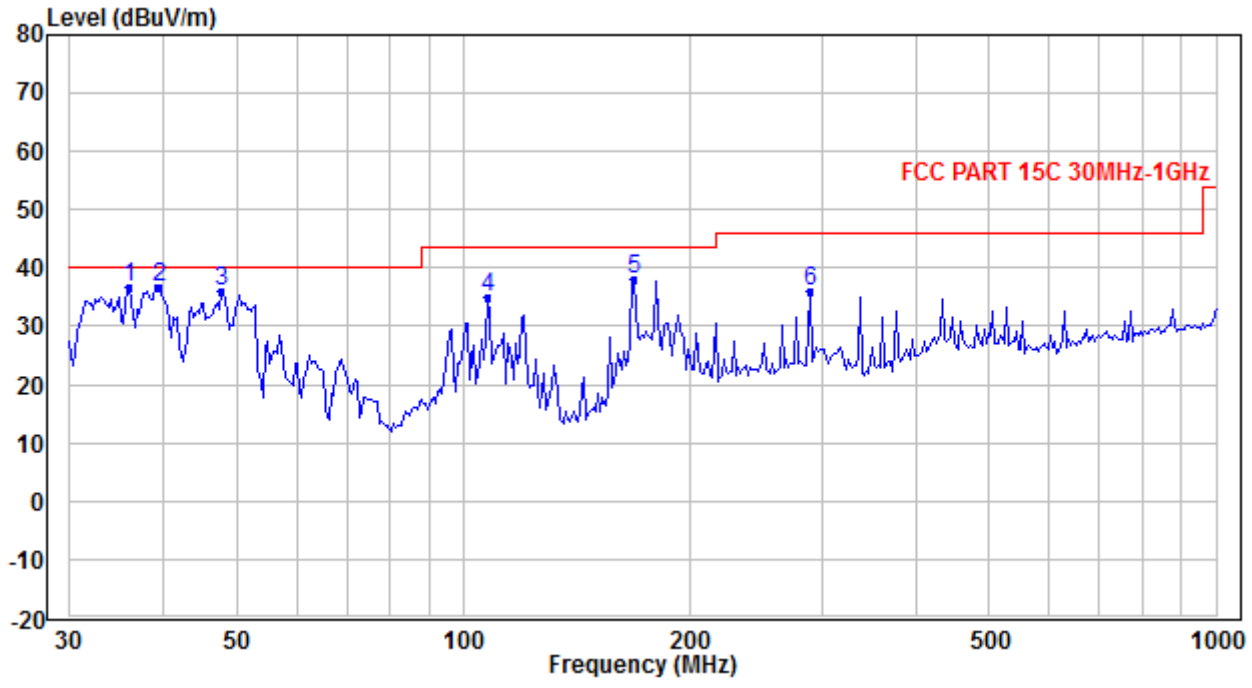
Radiated Emission Test Data (30 MHz ~ 1 GHz):

Worst-Case Configuration

Horizontal



Vertical



TEST REPORT

Polarization	Frequency (MHz)	Measured level (dBμV/m)	Factor (dB/m)	Limits (dBμV/m)	Margin (dB)	Detector
H	39.737	36.35	-8.08	40.00	-3.65	QP
	47.703	36.78	-13.18	40.00	-3.22	QP
	120.612	36.94	-16.02	43.50	-6.56	QP
	167.814	39.81	-12.21	43.50	-3.69	QP
	288.284	42.70	-7.06	46.00	-3.30	QP
	336.482	41.26	-5.82	46.00	-4.74	QP
V	36.014	36.61	-5.63	40.00	-3.39	QP
	39.459	36.84	-7.94	40.00	-3.16	QP
	47.703	35.94	-13.18	40.00	-4.06	QP
	107.785	35.07	-16.17	43.50	-8.43	QP
	168.997	38.21	-11.95	43.50	-5.29	QP
	288.284	35.98	-7.06	46.00	-10.02	QP

Remark:

1. Factor= Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Measured level= Original Receiver Reading + Factor
3. Margin = Limit – Measured level
4. All possible modes of operation were investigated, only the worst-case emissions reported.
5. Pre-scan test indicated that QP level is less than Peak level about 5dB in same frequency and same Polarization direction, so not all data was recorded by QP detector.

Radiated Emission Test Data (Above 1GHz):

SISO_ Chain 0_IEEE 802.11b_ Channel 1:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	42.93	-2.33	40.60	74.00	-33.40	Peak	Horizontal
2	7236.00	44.15	1.47	45.62	74.00	-28.38	Peak	Horizontal
3	4824.00	45.29	-2.33	42.96	74.00	-31.04	Peak	Vertical
4	7236.00	44.64	1.47	46.11	74.00	-27.89	Peak	Vertical

SISO_ Chain 0_IEEE 802.11b_ Channel 6:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	41.46	-2.29	39.17	74.00	-34.83	Peak	Horizontal
2	7311.00	43.45	1.60	45.05	74.00	-28.95	Peak	Horizontal
3	4874.00	41.07	-2.29	38.78	74.00	-35.22	Peak	Vertical
4	7311.00	42.31	1.60	43.91	74.00	-30.09	Peak	Vertical

SISO_ Chain 0_IEEE 802.11b_ Channel 11:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	42.27	-2.26	40.01	74.00	-33.99	Peak	Horizontal
2	7386.00	41.57	1.72	43.29	74.00	-30.71	Peak	Horizontal
3	4924.00	42.11	-2.26	39.85	74.00	-34.15	Peak	Vertical
4	7386.00	41.73	1.72	43.45	74.00	-30.55	Peak	Vertical

SISO_ Chain 1_IEEE 802.11b_ Channel 1:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	42.09	-2.33	39.76	74.00	-34.24	Peak	Horizontal
2	7236.00	41.01	1.47	42.48	74.00	-31.52	Peak	Horizontal
3	4824.00	41.93	-2.33	39.60	74.00	-34.40	Peak	Vertical
4	7236.00	40.43	1.47	41.90	74.00	-32.10	Peak	Vertical

SISO_ Chain 1_IEEE 802.11b_ Channel 6:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	42.31	-2.29	40.02	74.00	-33.98	Peak	Horizontal
2	7311.00	41.50	1.60	43.10	74.00	-30.90	Peak	Horizontal
3	4874.00	42.13	-2.29	39.84	74.00	-34.16	Peak	Vertical
4	7311.00	43.30	1.60	44.90	74.00	-29.10	Peak	Vertical

SISO_ Chain 1_IEEE 802.11b_ Channel 11:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	40.48	-2.26	38.22	74.00	-35.78	Peak	Horizontal
2	7386.00	42.15	1.72	43.87	74.00	-30.13	Peak	Horizontal
3	4924.00	40.28	-2.26	38.02	74.00	-35.98	Peak	Vertical
4	7386.00	41.54	1.72	43.26	74.00	-30.74	Peak	Vertical

SISO_ Chain 0_IEEE 802.11g_ Channel 1:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	42.52	-2.33	40.19	74.00	-33.81	Peak	Horizontal
2	7236.00	43.45	1.47	44.92	74.00	-29.08	Peak	Horizontal
3	4824.00	42.20	-2.33	39.87	74.00	-34.13	Peak	Vertical
4	7236.00	42.30	1.47	43.77	74.00	-30.23	Peak	Vertical

SISO_ Chain 0_IEEE 802.11g_ Channel 6:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	42.48	-2.29	40.19	74.00	-33.81	Peak	Horizontal
2	7311.00	43.41	1.60	45.01	74.00	-28.99	Peak	Horizontal
3	4874.00	41.99	-2.29	39.70	74.00	-34.30	Peak	Vertical
4	7311.00	42.44	1.60	44.04	74.00	-29.96	Peak	Vertical

SISO_ Chain 0_IEEE 802.11g_ Channel 11:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	42.33	-2.26	40.07	74.00	-33.93	Peak	Horizontal
2	7386.00	41.85	1.72	43.57	74.00	-30.43	Peak	Horizontal
3	4924.00	40.81	-2.26	38.55	74.00	-35.45	Peak	Vertical
4	7386.00	42.62	1.72	44.34	74.00	-29.66	Peak	Vertical

SISO_ Chain 1_IEEE 802.11g_ Channel 1:

No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	41.26	-2.33	38.93	74.00	-35.07	Peak	Horizontal
2	7236.00	42.03	1.47	43.50	74.00	-30.50	Peak	Horizontal
3	4824.00	41.93	-2.33	39.60	74.00	-34.40	Peak	Vertical
4	7236.00	42.73	1.47	44.20	74.00	-29.80	Peak	Vertical

SISO_ Chain 1_IEEE 802.11g_ Channel 6:								
No.	Frequency (MHz)	Reading (dBµV/m)	Correction factor (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	41.62	-2.29	39.33	74.00	-34.67	Peak	Horizontal
2	7311.00	42.88	1.60	44.48	74.00	-29.52	Peak	Horizontal
3	4874.00	41.29	-2.29	39.00	74.00	-35.00	Peak	Vertical
4	7311.00	43.39	1.60	44.99	74.00	-29.01	Peak	Vertical
SISO_ Chain 1_IEEE 802.11g_ Channel 11:								
No.	Frequency (MHz)	Reading (dBµV/m)	Correction factor (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	43.05	-2.26	40.79	74.00	-33.21	Peak	Horizontal
2	7386.00	40.11	1.72	41.83	74.00	-32.17	Peak	Horizontal
3	4924.00	41.53	-2.26	39.27	74.00	-34.73	Peak	Vertical
4	7386.00	42.19	1.72	43.91	74.00	-30.09	Peak	Vertical
MIMO_ Chain 0+1_IEEE 802.11n-HT20_ Channel 1:								
No.	Frequency (MHz)	Reading (dBµV/m)	Correction factor (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	41.73	-2.33	39.40	74.00	-34.60	Peak	Horizontal
2	7236.00	41.44	1.47	42.91	74.00	-31.09	Peak	Horizontal
3	4824.00	42.56	-2.33	40.23	74.00	-33.77	Peak	Vertical
4	7236.00	43.14	1.47	44.61	74.00	-29.39	Peak	Vertical
MIMO_ Chain 0+1_IEEE 802.11n-HT20_ Channel 6:								
No.	Frequency (MHz)	Reading (dBµV/m)	Correction factor (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	40.52	-2.29	38.23	74.00	-35.77	Peak	Horizontal
2	7311.00	42.05	1.60	43.65	74.00	-30.35	Peak	Horizontal
3	4874.00	41.93	-2.29	39.64	74.00	-34.36	Peak	Vertical
4	7311.00	41.02	1.60	42.62	74.00	-31.38	Peak	Vertical
MIMO_ Chain 0+1_IEEE 802.11n-HT20_ Channel 11:								
No.	Frequency (MHz)	Reading (dBµV/m)	Correction factor (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	41.62	-2.26	39.36	74.00	-34.64	Peak	Horizontal
2	7386.00	40.54	1.72	42.26	74.00	-31.74	Peak	Horizontal
3	4924.00	41.53	-2.26	39.27	74.00	-34.73	Peak	Vertical
4	7386.00	39.64	1.72	41.36	74.00	-32.64	Peak	Vertical

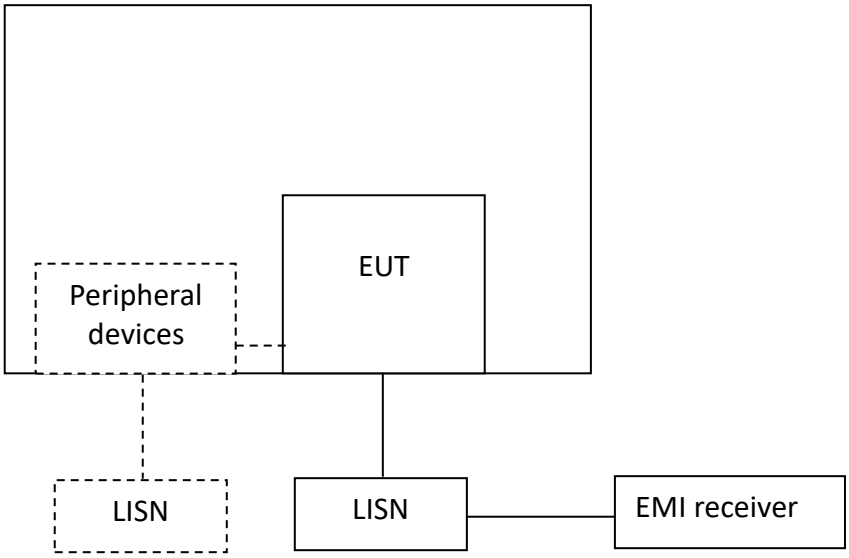
8 Power line conducted emission

Test result: **Pass**

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

8.2 Test Configuration



8.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

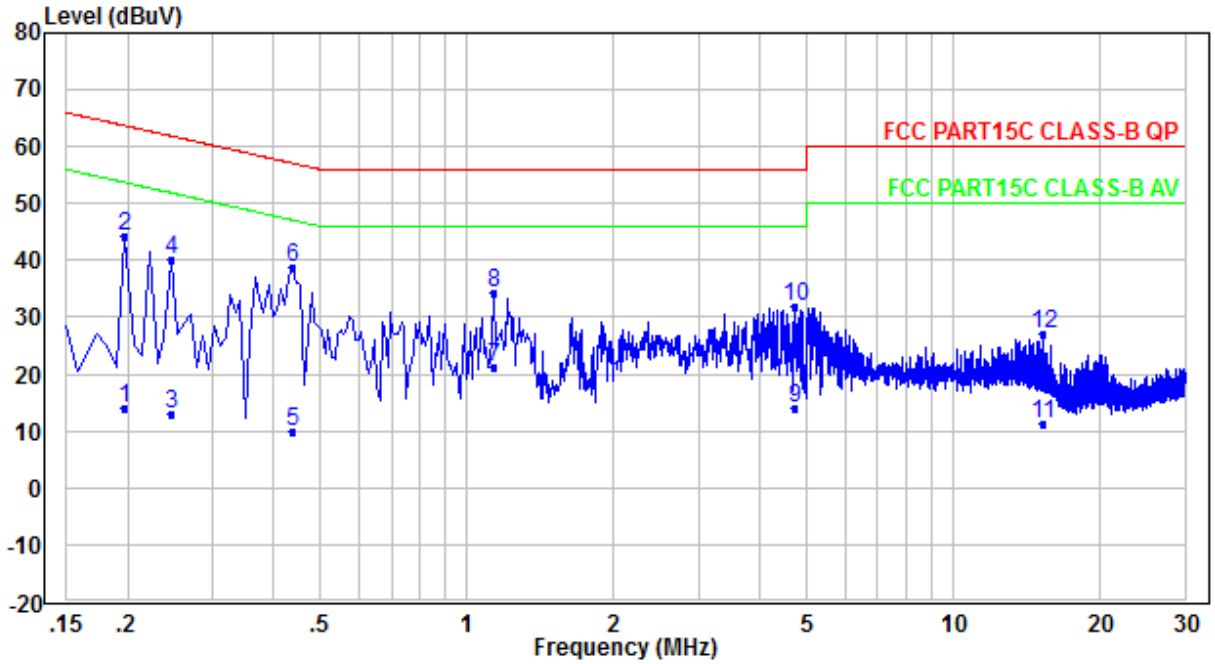
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

8.4 Test Results of Power line conducted emission

Test Curve:

L Line



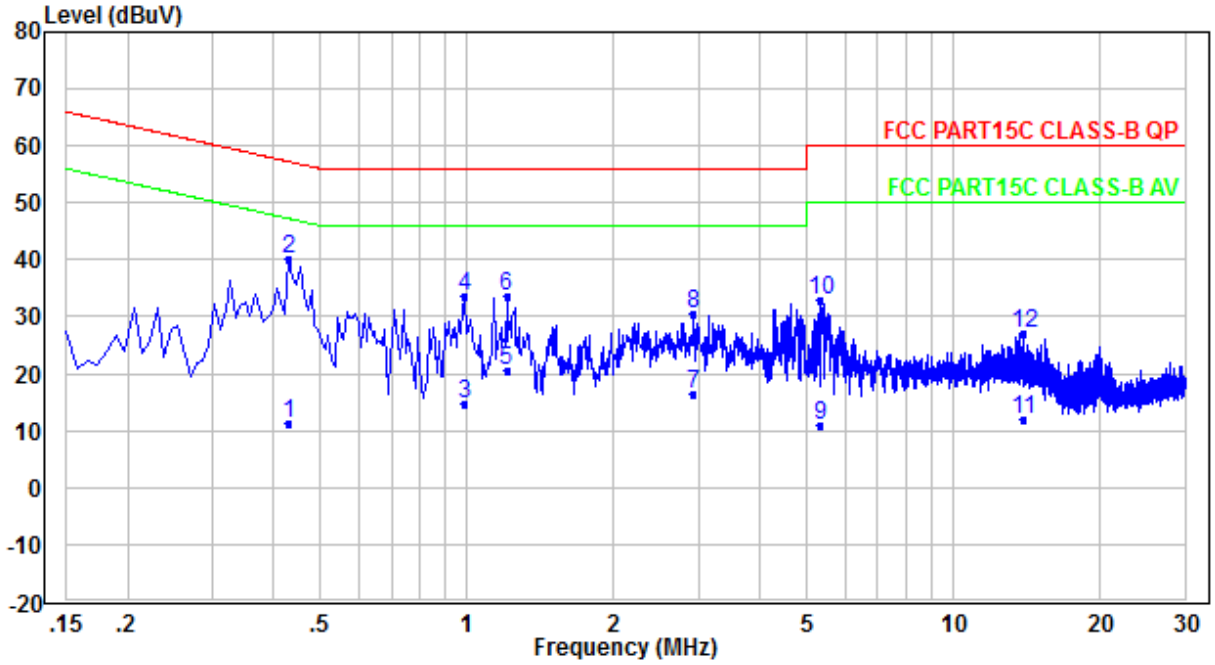
Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.198	44.12	63.69	-19.57	14.12	53.69	-39.57
0.246	40.05	61.89	-21.84	13.05	51.89	-38.84
0.438	38.73	57.10	-18.37	9.73	47.10	-37.37
1.134	34.22	56.00	-21.78	21.22	46.00	-24.78
4.709	31.92	56.00	-24.08	13.92	46.00	-32.08
15.323	27.15	60.00	-32.85	11.15	50.00	-38.85

TEST REPORT

Test Curve:

N Line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.430	40.13	57.25	-17.12	11.13	47.25	-36.12
0.990	33.56	56.00	-22.44	14.56	46.00	-31.44
1.206	33.48	56.00	-22.52	20.48	46.00	-25.52
2.917	30.50	56.00	-25.50	16.50	46.00	-29.50
5.333	32.81	60.00	-27.19	10.81	50.00	-39.19
13.963	26.97	60.00	-33.03	11.97	50.00	-38.03

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

9 Occupied Bandwidth

Test result: **Tested**

9.1 Limit

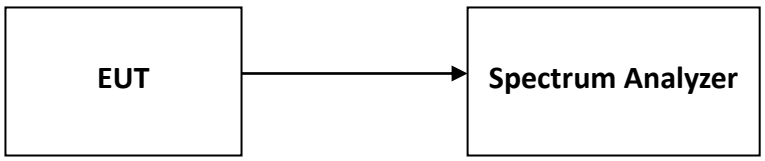
None

9.2 Measurement Procedure

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

9.3 Test Configuration



9.4 The results of Occupied Bandwidth

Please refer to Appendix A

10 Antenna requirement

Requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Result:
EUT uses a unique coupling to the intentional radiator, so it can comply with the provisions of this section.

********** END **********