

Fig.A.6.1.63 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch6, 15 GHz-20 GHz)

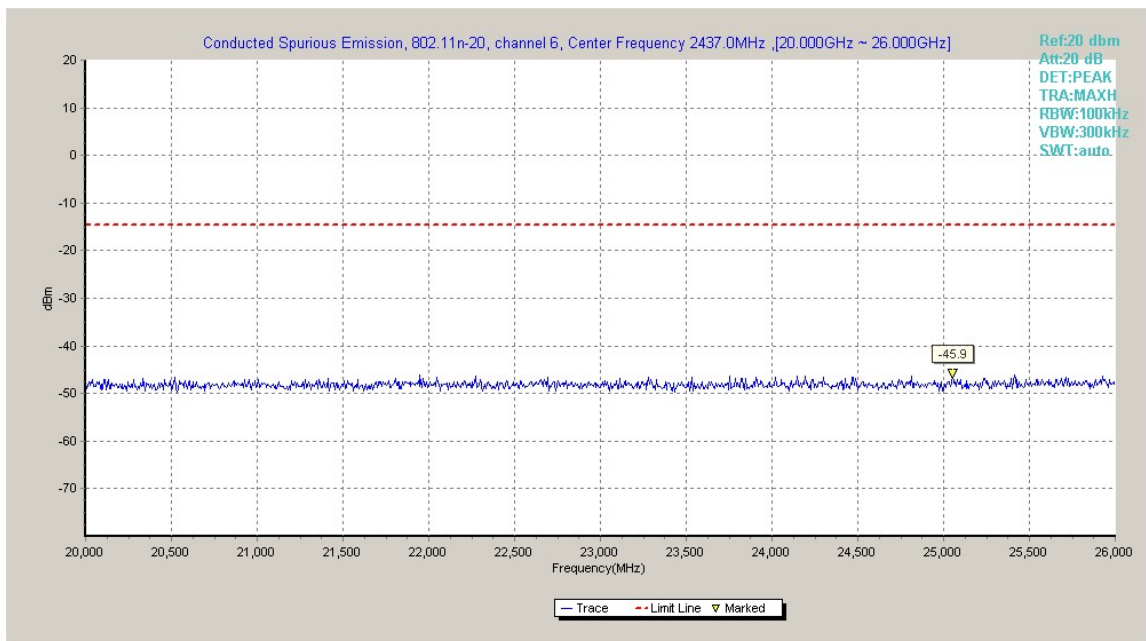


Fig.A.6.1.64 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch6, 20 GHz-26 GHz)

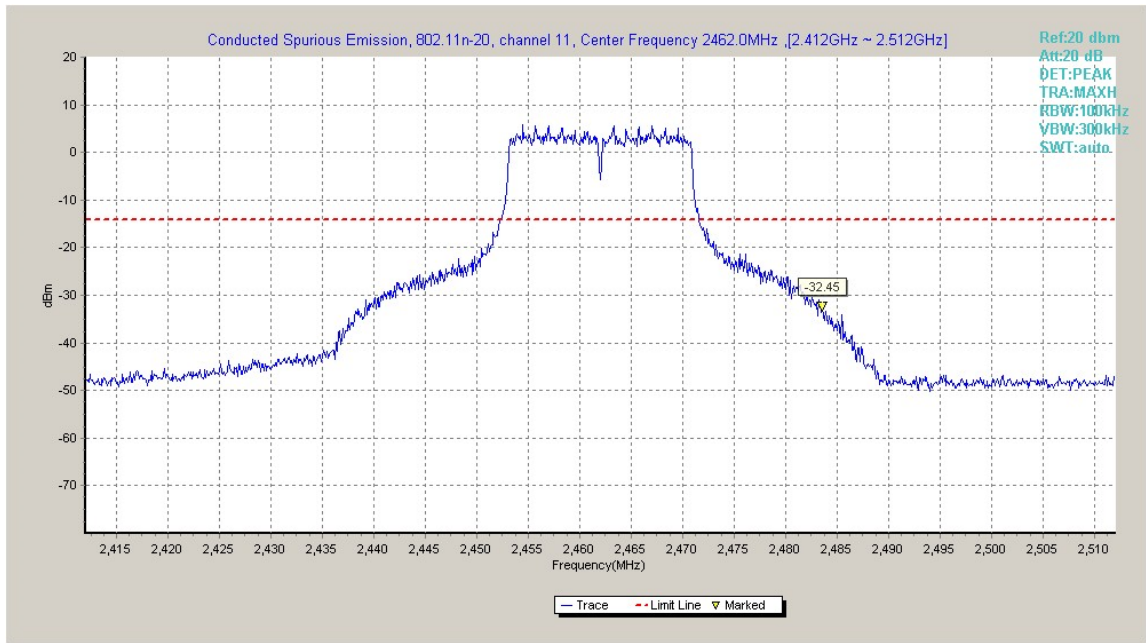


Fig.A.6.1.65 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, Center Frequency)

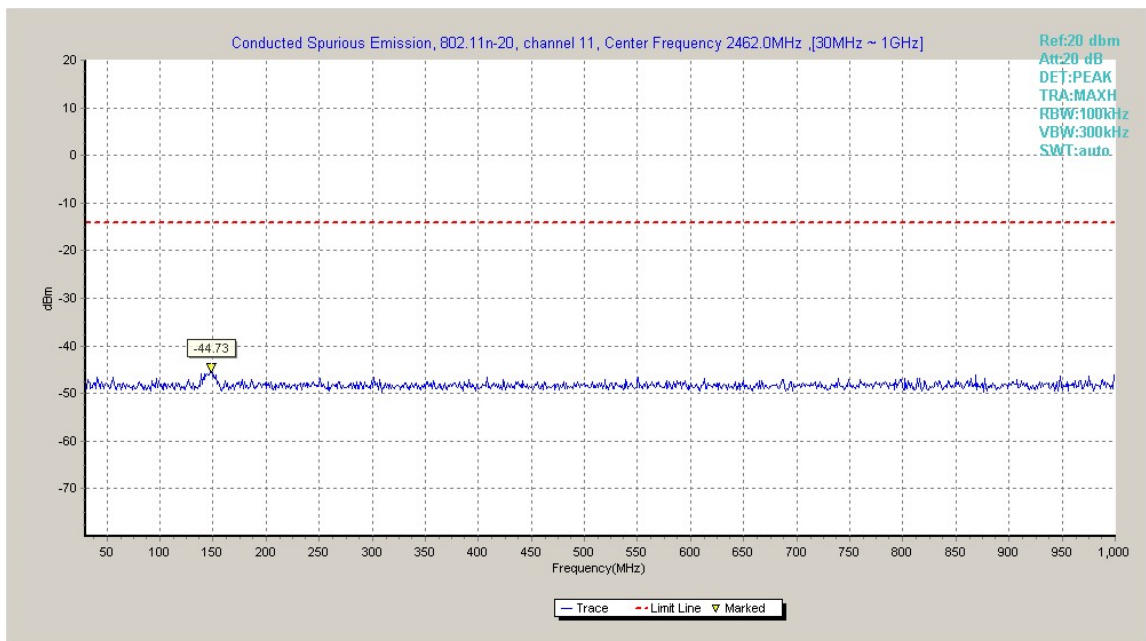


Fig.A.6.1.66 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 30 MHz-1 GHz)

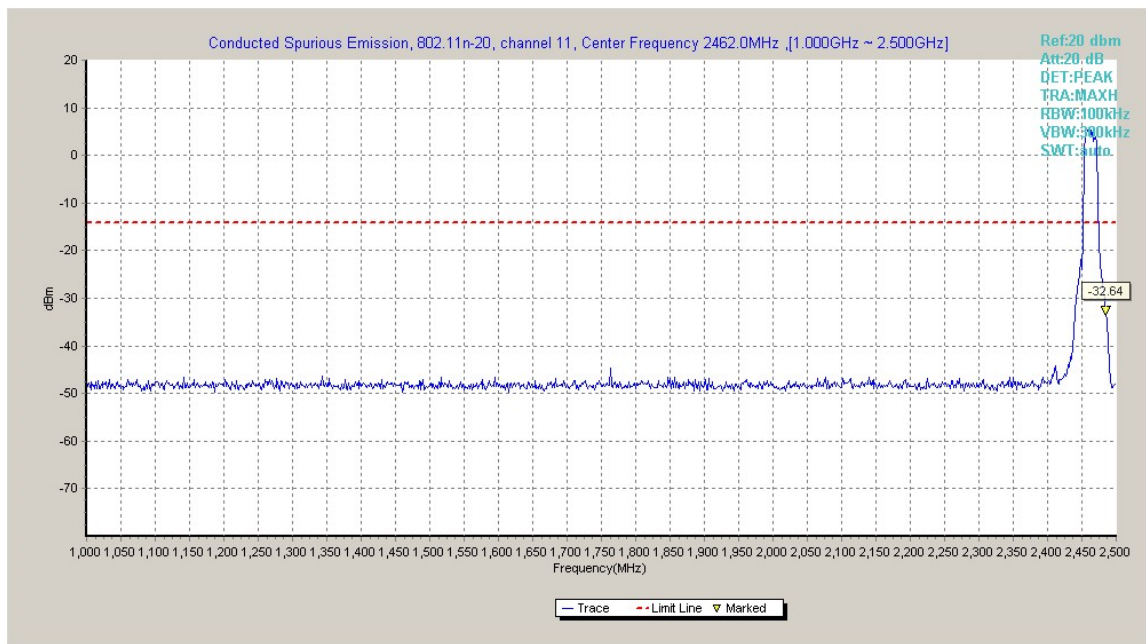


Fig.A.6.1.67 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 1 GHz-2.5 GHz)

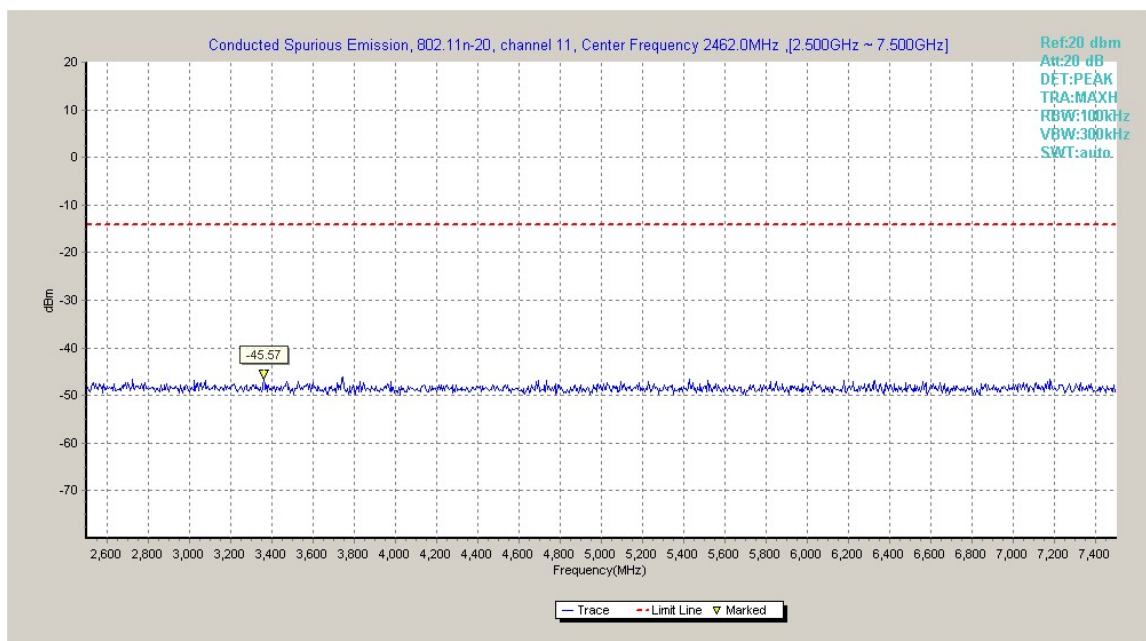


Fig.A.6.1.68 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 2.5 GHz-7.5 GHz)

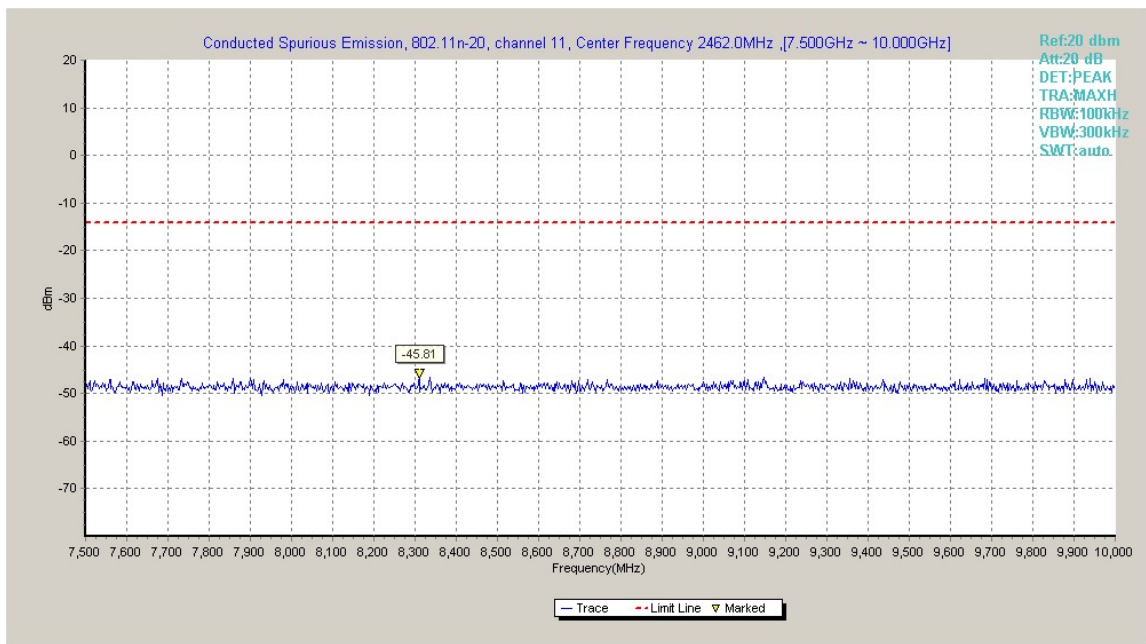


Fig.A.6.1.69 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 7.5 GHz-10 GHz)

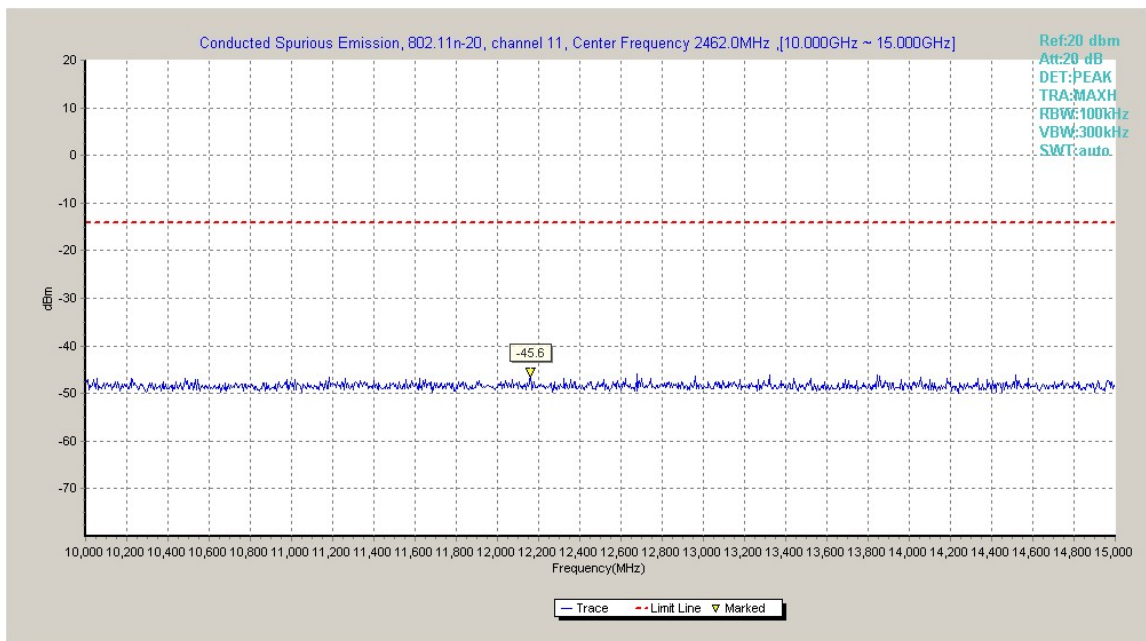


Fig.A.6.1.70 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 10 GHz-15 GHz)

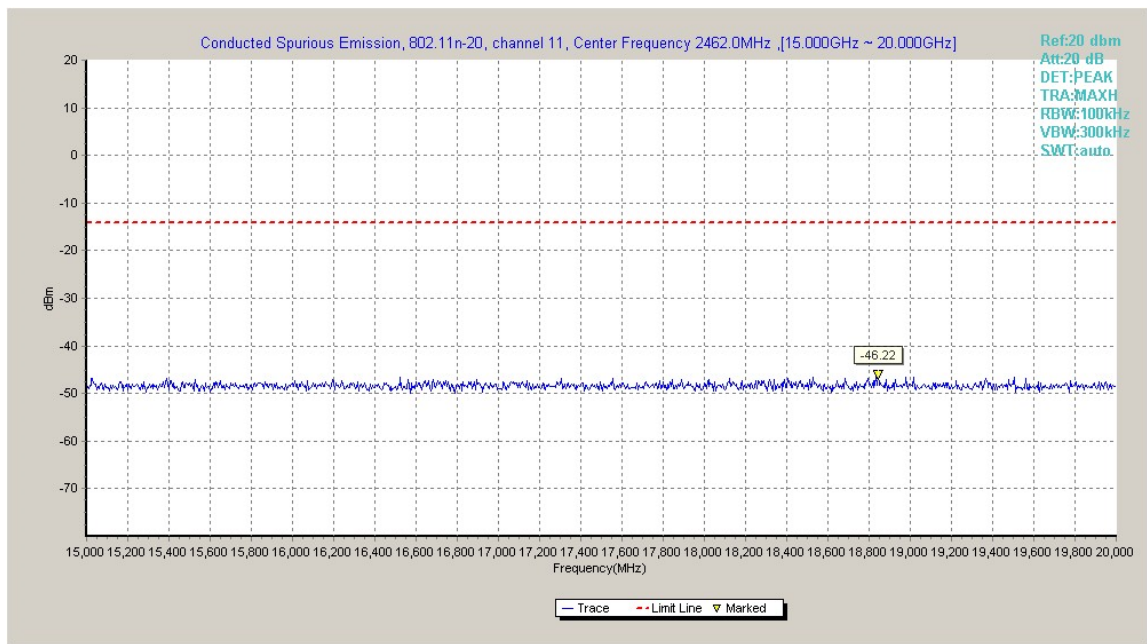


Fig.A.6.1.71 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 15 GHz-20 GHz)

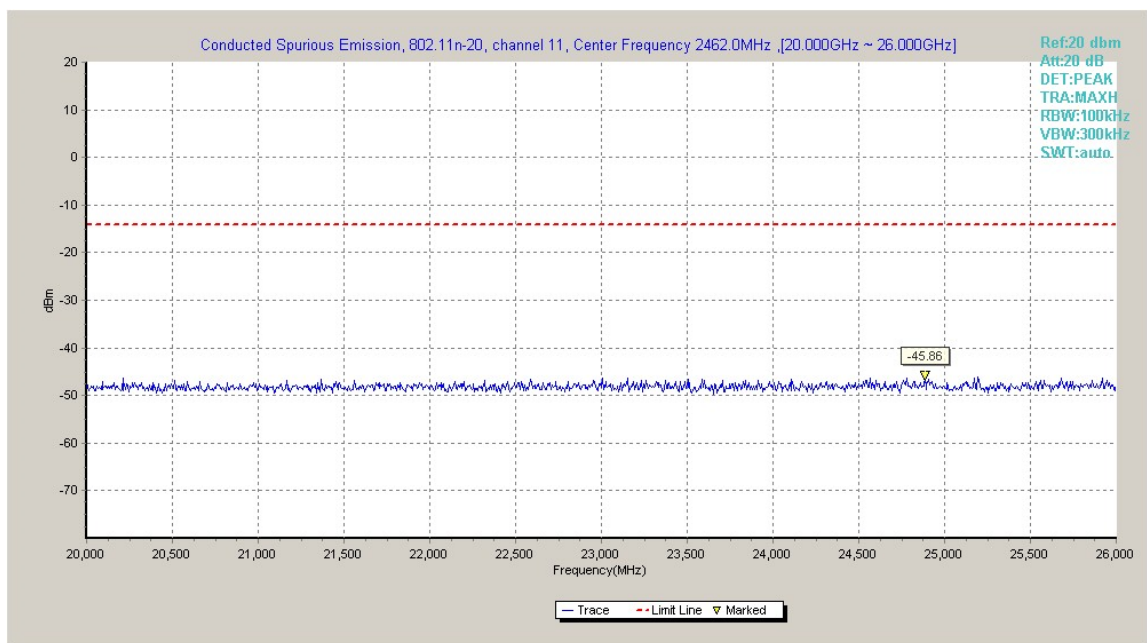


Fig.A.6.1.72 Transmitter Spurious Emission - Conducted (802.11n-HT20, Ch11, 20 GHz-26 GHz)



A.6.2 Transmitter Spurious Emission - Radiated

Method of Measurement: See ANSI C63.10-2013-clause 6.4 &6.5 & 6.6

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength(uV/m)	Field strength(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Frequency (MHz)	Field strength(µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

Test Condition

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100KHz/300KHz	5
1000-4000	1MHz/1MHz	15
4000-18000	1MHz/1MHz	40
18000-26500	1MHz/1MHz	20

EUT ID: EUT1

Measurement Results:

802.11b mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11b	Power	2.38GHz ~2.45GHz	Fig.A.6.2.1	P
	Power	2.45GHz ~2.5GHz	Fig.A.6.2.2	P

802.11g mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11g	Power	2.38GHz ~2.43GHz	Fig.A.6.2.3	P
	Power	2.45GHz ~2.5GHz	Fig.A.6.2.4	P

802.11n-HT20 mode

Mode	Channel	Frequency Range	Test Results	Conclusion
802.11n (HT20)	Power	2.38GHz ~2.45GHz	Fig.A.6.2.5	P
	Power	2.45GHz ~2.5GHz	Fig.A.6.2.6	P

Conclusion: Pass

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

P_{Mea} is the field strength recorded from the instrument.

The measurement results are obtained as described below:

$$\text{Result} = P_{Mea} + A_{Rpl} = P_{Mea} + \text{Cable Loss} + \text{Antenna Factor}$$



Peak
802.11b
Ch1

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2388.345	52.4	-38.8	27.7	63.500	H
17995.500	48.4	-17.7	45.6	20.500	H
17986.500	48.3	-17.7	45.6	20.400	V
17871.000	48.1	-18.5	45.6	21.000	H
17737.500	48.0	-18.5	45.6	20.900	H
17604.000	47.9	-18.9	45.6	21.200	H

Ch6

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
17937.000	47.6	-17.7	45.6	19.700	H
17842.500	47.6	-18.5	45.6	20.500	H
17802.000	47.5	-18.5	45.6	20.400	V
17686.500	47.5	-18.9	45.6	20.800	H
17947.500	47.5	-17.7	45.6	19.600	H
17986.500	47.3	-17.7	45.6	19.400	H

Ch11

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2483.745	52.5	-38.9	27.7	63.700	H
17850.000	47.8	-18.5	45.6	20.700	H
17992.500	47.8	-17.7	45.6	19.900	V
17865.000	47.7	-18.5	45.6	20.600	H
17892.000	47.7	-18.5	45.6	20.600	H
17946.000	47.6	-17.7	45.6	19.700	H



802.11g

Ch1

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2389.365	68.8	-14.3	27.2	55.942	H
17254.500	47.7	-19.5	41.5	25.700	H
17895.000	47.5	-18.5	45.6	20.400	V
17896.500	47.4	-18.5	45.6	20.300	H
17961.000	47.3	-17.7	45.6	19.400	H
17775.000	47.3	-18.5	45.6	20.200	H

Ch6

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
17790.000	48.6	-18.5	45.6	21.500	H
17767.500	48.0	-18.5	45.6	20.900	H
17826.000	48.0	-18.5	45.6	20.900	V
17758.500	47.7	-18.5	45.6	20.600	H
17970.000	47.6	-17.7	45.6	19.700	H
17940.000	47.4	-17.7	45.6	19.500	H

Ch11

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2483.945	68.6	-38.9	27.7	79.800	H
17791.500	48.1	-18.5	45.6	21.000	H
17631.000	48.0	-18.9	45.6	21.300	V
17947.500	47.9	-17.7	45.6	20.000	H
17985.000	47.8	-17.7	45.6	19.900	H
17698.500	47.7	-18.9	45.6	21.000	H



802.11n-HT20

Ch1

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2389.105	71.1	-38.8	27.7	82.200	H
17980.500	48.5	-17.7	45.6	20.600	H
17791.500	48.2	-18.5	45.6	21.100	V
17911.500	48.2	-18.5	45.6	21.100	H
17773.500	47.9	-18.5	45.6	20.800	H
17883.000	47.8	-18.5	45.6	20.700	H

Ch6

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
17986.500	48.7	-17.7	45.6	20.800	H
17835.000	48.5	-18.5	45.6	21.400	H
17458.500	48.0	-19.2	41.5	25.700	V
17841.000	48.0	-18.5	45.6	20.900	H
17724.000	47.8	-18.9	45.6	21.100	H
17847.000	47.7	-18.5	45.6	20.600	H

Ch11

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2484.565	70.4	-38.9	27.7	81.600	H
17947.500	49.2	-17.7	45.6	21.300	H
17833.500	48.6	-18.5	45.6	21.500	V
17967.000	48.5	-17.7	45.6	20.600	H
17992.500	48.4	-17.7	45.6	20.500	H
17590.500	48.4	-18.9	45.6	21.700	H



Average

802.11b

Ch1

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2388.570	41.3	-38.8	27.7	52.400	H
17959.500	36.1	-17.7	45.6	8.200	H
17839.500	36.0	-18.5	45.6	8.900	V
17941.500	36.0	-17.7	45.6	8.100	H
17953.500	36.0	-17.7	45.6	8.100	H
17967.000	36.0	-17.7	45.6	8.100	H

Ch6

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
17958.000	35.5	-17.7	45.6	7.600	H
17982.000	35.5	-17.7	45.6	7.600	H
17950.500	35.4	-17.7	45.6	7.500	V
17998.500	35.4	-17.7	45.6	7.500	H
17851.500	35.4	-18.5	45.6	8.300	H
17965.500	35.4	-17.7	45.6	7.500	H

Ch11

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2483.800	42.0	-38.9	27.7	53.200	H
17953.500	35.6	-17.7	45.6	7.700	H
17935.500	35.6	-17.7	45.6	7.700	V
17937.000	35.6	-17.7	45.6	7.700	H
17973.000	35.6	-17.7	45.6	7.700	H
17962.500	35.5	-17.7	45.6	7.600	H



802.11g

Ch1

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2389.365	49.9	-14.3	27.2	37.042	H
17968.500	35.6	-17.7	45.6	7.700	H
17959.500	35.6	-17.7	45.6	7.700	V
17949.000	35.6	-17.7	45.6	7.700	H
17928.000	35.6	-17.7	45.6	7.700	H
17970.000	35.5	-17.7	45.6	7.600	H

Ch6

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
17944.500	35.7	-17.7	45.6	7.800	H
18000.000	35.7	-45.6	44.5	36.766	H
17989.500	35.7	-17.7	45.6	7.800	V
17953.500	35.6	-17.7	45.6	7.700	H
17959.500	35.6	-17.7	45.6	7.700	H
17985.000	35.6	-17.7	45.6	7.700	H

Ch11

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2483.535	53.0	-38.9	27.7	64.200	H
17938.500	35.9	-17.7	45.6	8.000	H
17956.500	35.8	-17.7	45.6	7.900	V
17952.000	35.8	-17.7	45.6	7.900	H
17949.000	35.8	-17.7	45.6	7.900	H
17986.500	35.7	-17.7	45.6	7.800	H

802.11n-HT20

Ch1

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2389.955	53.8	-38.8	27.7	64.900	H
17880.000	35.7	-18.5	45.6	8.600	H
17976.000	35.7	-17.7	45.6	7.800	V
17961.000	35.6	-17.7	45.6	7.700	H
17877.000	35.6	-18.5	45.6	8.500	H
17950.500	35.6	-17.7	45.6	7.700	H

Ch6

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
17992.500	35.9	-17.7	45.6	8.000	H
17847.000	35.8	-18.5	45.6	8.700	H
17893.500	35.8	-18.5	45.6	8.700	V
17874.000	35.8	-18.5	45.6	8.700	H
17958.000	35.7	-17.7	45.6	7.800	H
17862.000	35.7	-18.5	45.6	8.600	H

Ch11

Frequency(MHz)	Result (dBuV/m)	Cable Loss(dB)	Antenna Factor	P _{Mea} (dBuV/m)	Polarization
2483.525	52.7	-38.9	27.7	63.900	H
17950.500	36.0	-17.7	45.6	8.100	H
17874.000	36.0	-18.5	45.6	8.900	V
17974.500	36.0	-17.7	45.6	8.100	H
17943.000	36.0	-17.7	45.6	8.100	H
17853.000	35.9	-18.5	45.6	8.800	H

Test graphs as below:

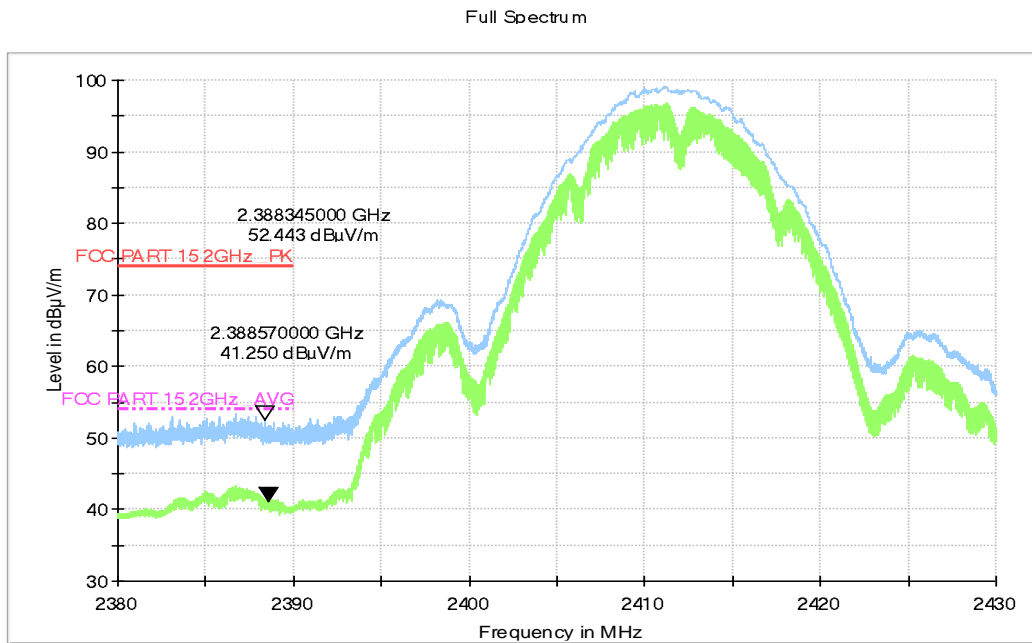


Fig.A.6.2.1 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch1, 2.38 GHz – 2.45GHz

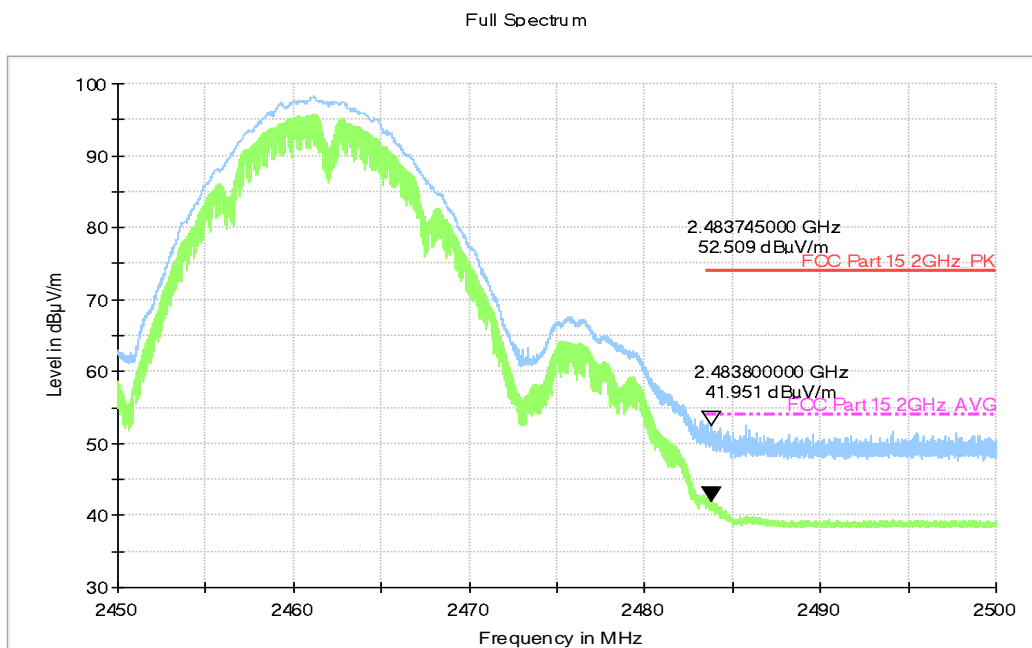


Fig.A.6.2.2 Transmitter Spurious Emission - Radiated (Power): 802.11b, ch11, 2.45 GHz - 2.50GHz

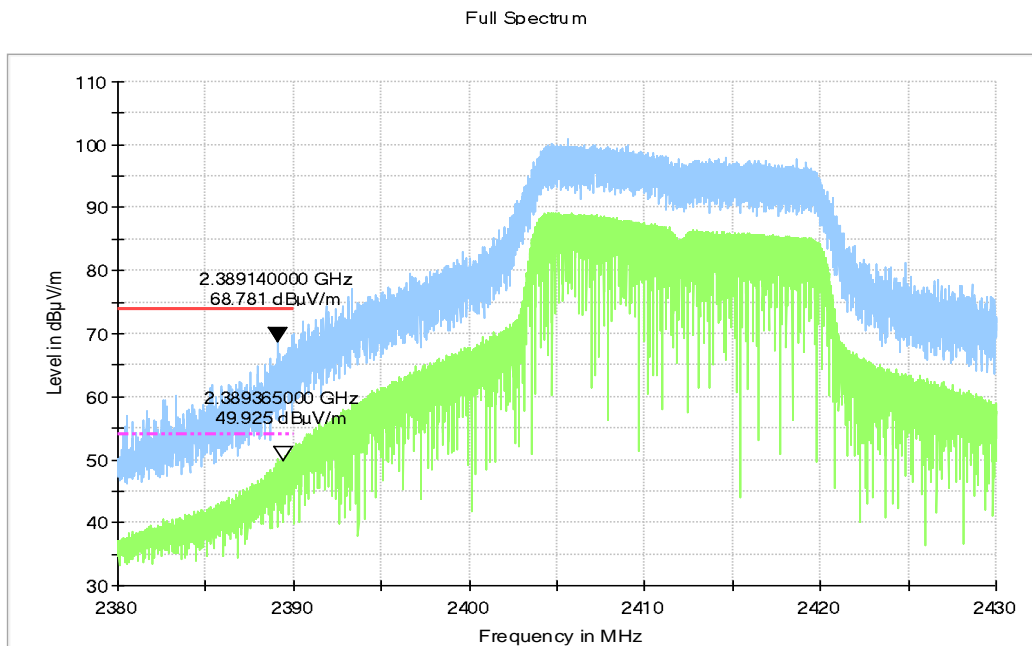


Fig.A.6.2.3 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch1, 2.38 GHz - 2.45GHz

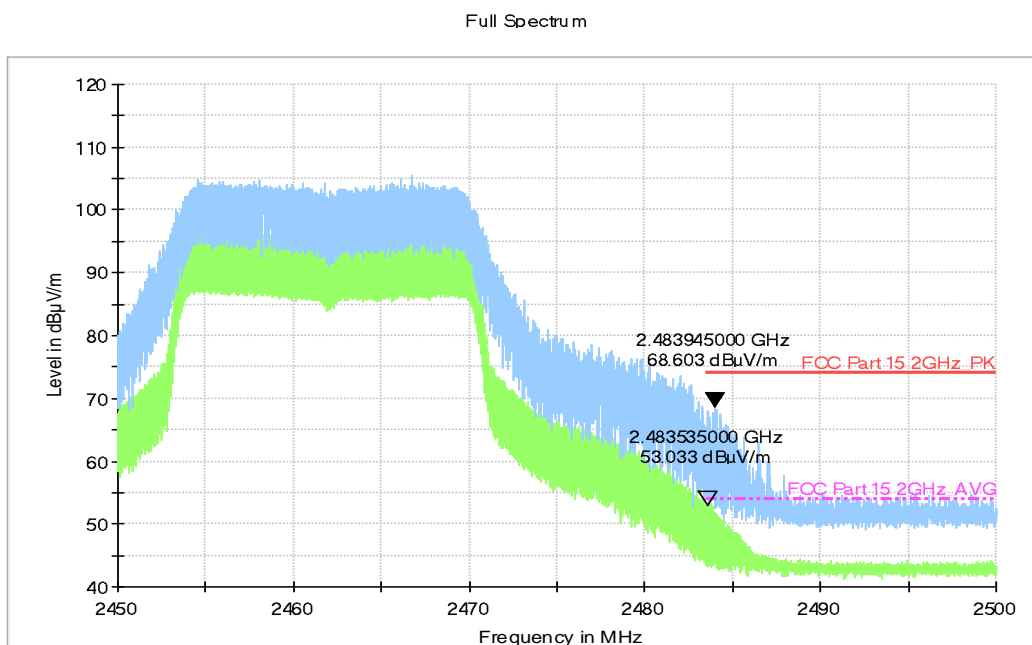


Fig.A.6.2.4 Transmitter Spurious Emission - Radiated (Power): 802.11g, ch11, 2.45 GHz - 2.50GHz

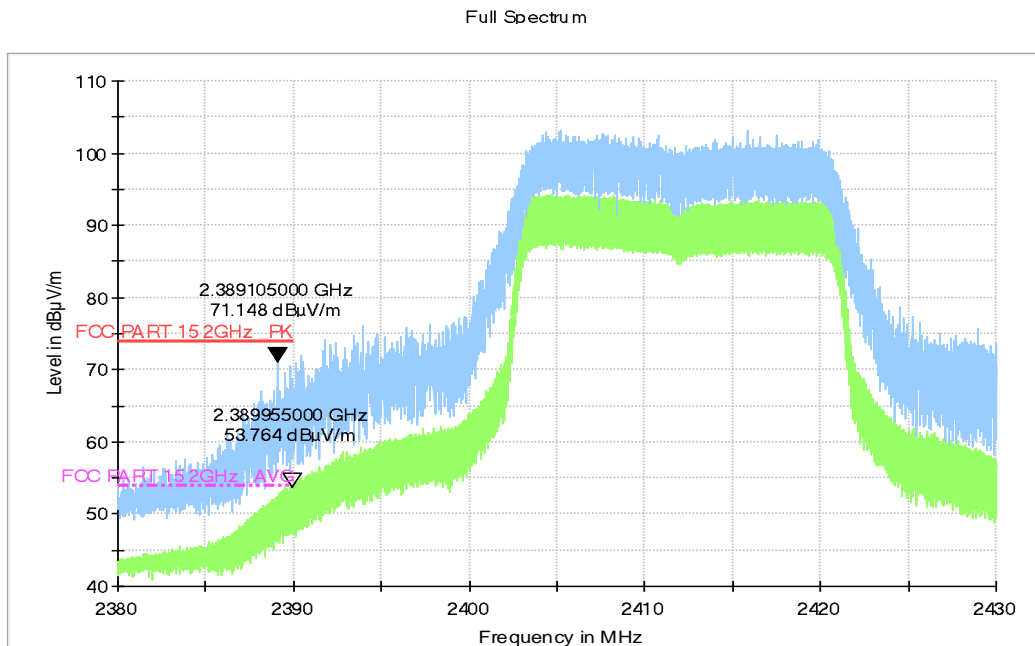


Fig.A.6.2.5 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch1, 2.38 GHz - 2.45GHz

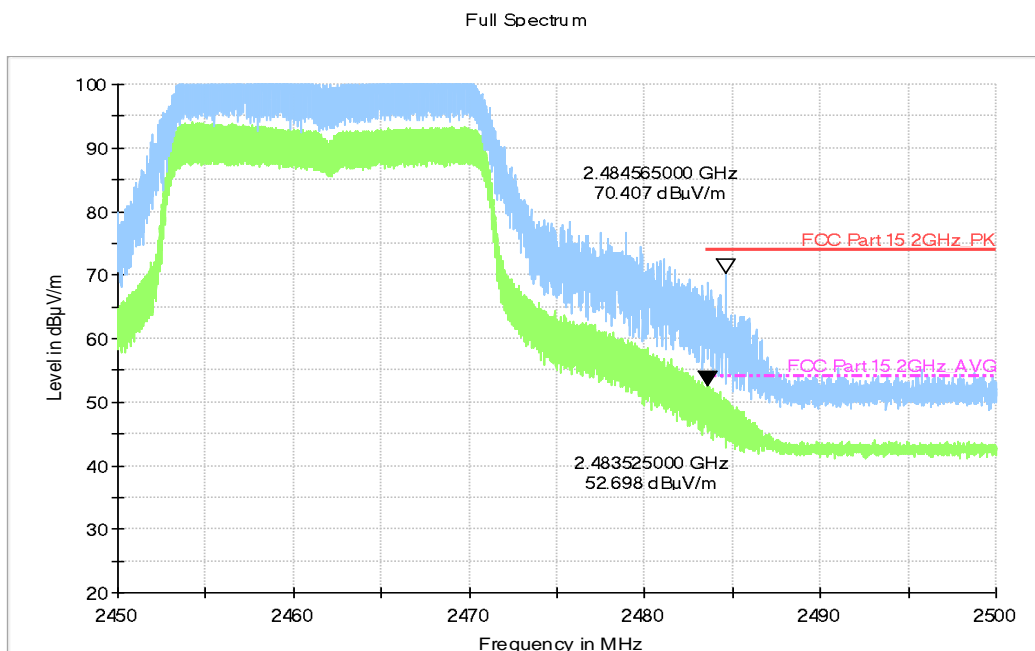


Fig.A.6.2.6 Transmitter Spurious Emission - Radiated (Power): 802.11n-HT20, ch11, 2.45 GHz - 2.50GHz



A.7. AC Power-line Conducted Emission

Method of Measurement: See ANSI C63.10-2013-clause 6.2

- 1 The one EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit is selected for the final measurement, while applying the appropriate modulating signal to the EUT.
- 2 If the EUT is relocated from an exploratory test site to a final test site, the highest emissions shall be remaximized at the final test location before final ac power-line conducted emission measurements are performed.
- 3 The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment in the system) is then performed for the full frequency range for which the EUT is being tested for compliance without further variation of the EUT arrangement, cable positions, or EUT mode of operation.
- 4 If the EUT is comprised of equipment units that have their own separate ac power connections, e.g., floor-standing equipment with independent power cords for each shelf that are able to connect directly to the ac power network, each current-carrying conductor of one unit is measured while the other units are connected to a second (or more) LISN(s). All units shall be separately measured. If a power strip is provided by the manufacturer, to supply all of the units making up the EUT, only the conductors in the power cord of the power strip shall be measured.
- 5 If the EUT uses a detachable antenna, these measurements shall be made with a suitable dummy load connected to the antenna output terminals; otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended. When measuring the ac conducted emissions from a device that operates between 150 kHz and 30 MHz a non-detachable antenna may be replaced with a dummy load for the measurements within the fundamental emission band of the transmitter, but only for those measurements.³⁶ Record the six highest EUT emissions relative to the limit of each of the current-carrying conductors of the power cords of the equipment that comprises the EUT over the frequency range specified by the procuring or regulatory agency. Diagram or photograph the test setup that was used. See Clause 8 for full reporting requirements.

Test Condition:

Voltage (V)	Frequency (Hz)
120	60



Measurement Result and limit:

WLAN (Quasi-peak Limit)

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		With charger		
		802.11b	Idle	
0.15 to 0.5	66 to 56	Fig.A.7.1	Fig.A.7.2	P
0.5 to 5	56			
5 to 30	60			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

WLAN (Average Limit)

Frequency range (MHz)	Average Limit (dB μ V)	Result (dB μ V)		Conclusion
		With charger		
		802.11b	Idle	
0.15 to 0.5	56 to 46	Fig.A.7.1	Fig.A.7.2	P
0.5 to 5	46			
5 to 30	50			

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

Conclusion: Pass

Test graphs as below:

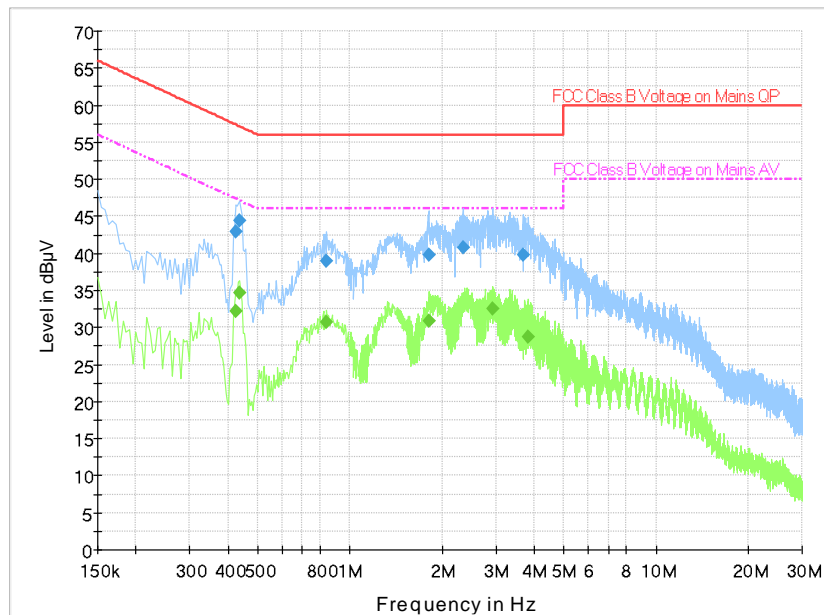


Fig.A.7.1 AC Powerline Conducted Emission-802.11b

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.424500	43.0	GND	L1	19.8	14.4	57.4
0.438000	44.4	GND	L1	19.8	12.7	57.1
0.838500	39.0	GND	L1	19.7	17.0	56.0
1.810500	39.8	GND	L1	19.6	16.2	56.0
2.337000	40.8	GND	L1	19.6	15.2	56.0
3.669000	39.9	GND	L1	19.6	16.1	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.424500	32.2	GND	L1	19.8	15.2	47.4
0.438000	34.7	GND	L1	19.8	12.4	47.1
0.838500	30.7	GND	L1	19.7	15.3	46.0
1.810500	30.9	GND	L1	19.6	15.1	46.0
2.926500	32.5	GND	L1	19.6	13.5	46.0
3.835500	28.7	GND	L1	19.6	17.3	46.0

Note: The measurement result showed here are worst cases of the combinations of different chargers and USB cables.

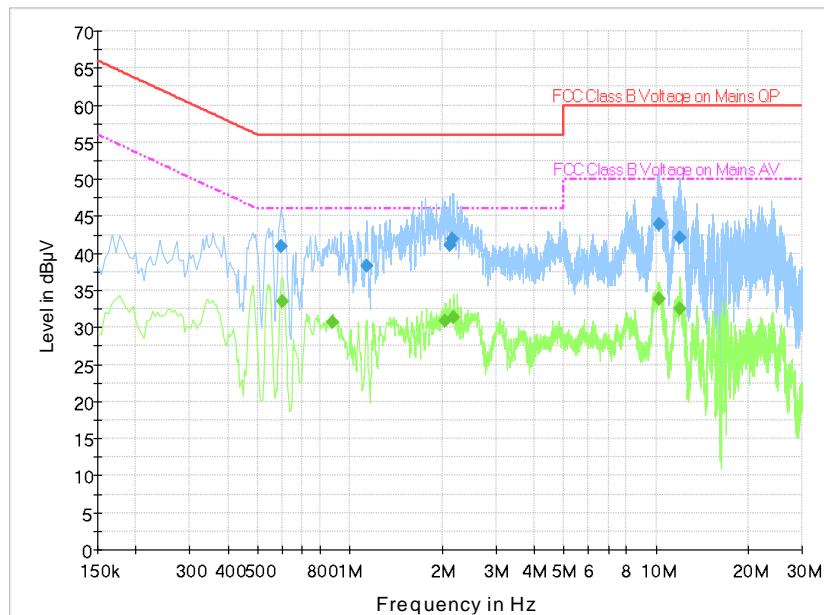


Fig.A.7.2 AC Powerline Conducted Emission-Idle

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Final Result 1


Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	39.2	GND	L1	19.8	18.3	57.5
0.438000	45.0	GND	L1	19.8	12.1	57.1
1.077000	34.9	GND	L1	19.7	21.1	56.0
1.905000	41.0	GND	L1	19.6	15.0	56.0
2.877000	42.5	GND	L1	19.6	13.5	56.0
3.768000	41.0	GND	L1	19.6	15.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.415500	29.6	GND	L1	19.8	17.9	47.5
0.474000	26.4	GND	L1	19.8	20.1	46.4
0.960000	29.6	GND	L1	19.7	16.4	46.0
2.085000	30.8	GND	L1	19.6	15.2	46.0
2.211000	30.4	GND	L1	19.6	15.6	46.0
3.885000	30.1	GND	L1	19.6	15.9	46.0

Note: The measurement result showed here are worst cases of the combinations of different chargers and USB cables.

ANNEX B: Accreditation Certificate

United States Department of Commerce National Institute of Standards and Technology	
	
<hr/> Certificate of Accreditation to ISO/IEC 17025:2005 <hr/>	
NVLAP LAB CODE: 600118-0	
Telecommunication Technology Labs, CAICT Beijing China	
<i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:</i>	
Electromagnetic Compatibility & Telecommunications	
<i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i>	
<hr/> 2018-09-28 through 2019-09-30 <i>Effective Dates</i>	 For the National Voluntary Laboratory Accreditation Program

*****END OF REPORT*****