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Sterling, VA 20164
United States of America

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test Report No:
4373ERM.008

Partial Test report

USA FCC Part 15.407 (U-NII), 15.209; & CANADA RSS-247, RSS-Gen
Unlicensed National Information Infrastructure Devices. General technical requirements.
License-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
General Requirements and Information for the Certification of Radio Apparatus.

(*) Identification of item tested	Infotainment Head Unit
(*) Trademark	BMW
(*) Model and /or type reference	IDC2385H
Other identification of the product	FCC ID: T8GIDC23H IC: 6434A-IDC23H
(*) Features	Bluetooth classic; BLE; Wi-Fi 2.4GHz; Wi-Fi 5GHz; GNSS
Manufacturer	Harman Becker Automotive Systems GMBH Becker-Goering-Str. 16 76307 Karlsbad Germany
Test method requested, standard	USA FCC Part 15.407 10-1-22 Edition : Unlicensed National Information Infrastructure Devices. General technical requirements. USA FCC Part 15.209 10-1-22 Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 3 (August 2023). CANADA RSS-Gen Issue 5 (April 2018). 789033 D02 General UNII Test Procedures New Rules v02r01 Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	See Appendix A
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=Dekra Certification Inc., ou=Regulatory Lab Manager, email=domingo.galvez@dekra.com, c=US
Date of issue	03-07-2024
Report template No	FDT08_23 (*) “Data provided by the client”

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Acronyms

Acronym ID	Acronym Description
	Emission Bandwidth
# of Tx Chains	Number of Transmission Chains
Avg Power	Maximum Average Conducted Output Power
DC	Duty Cycle
Freq	Frequency
Max EIRP	Maximum Burst EIRP
Mod	Modulation
Mode	Mode
Occ Ch BW	Occupied Channel Bandwidth
Operation Band	Operation Band
PSD	Power Spectrum Density
Port	Active Port
TPC	TPC

Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Certification Inc. has a calibration and maintenance program for its measurement equipment.

DEKRA Certification Inc. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Certification Inc.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Certification internal document PODT000.

Test case	Frequency (MHz)	U (k=2)	Units
RF Power and PSD	5150-5850	0.88	dB
Occupied Bandwidth		1.87	%
Band Edge		0.64	dB
Radiated Spurious Emission	30-180	4.27	dB
	180-1000	3.14	dB
	1000-18000	3.30	dB
	18000-40000	3.49	dB

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample consists of Infotainment Head Unit to be installed in vehicle with the main functionalities: Navigation, USB, voice recognition and several interfaces to the vehicle and Bluetooth / WLAN. The Head-unit provides different interfaces like: AR-CAM input, Video-out APIX3 (for the connection of an external Display), 3 USB interfaces.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples used for testing have been selected by: The client.

Sample S/01 is composed of the following element and accessories:

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/01	4373/01	Infotainment head unit	IDC2385H	HBB429P65UAARZ	01/04/2024	Element Under Test
S/01	4373/02	Harness	-	-	01/04/2024	Accessory
S/01	4373/03	BR-Adapter (Automotive converter Ethernet BroadR-R	-	-	01/04/2024	Accessory
S/01	4373/04	Power Plug cable for BR-Adapter	-	-	01/04/2024	Accessory
S/01	4373/06	HSD (male) to OABR cable	-	-	01/04/2024	Accessory
S/01	4373/07	Quad mate AXZ - High speed Fakra to SMA (male)	-	-	01/04/2024	Accessory

Sample S/01 was used for the test(s): All Conducted tests indicated in appendix A.

Sample S/02 is composed of the following elements and accessories:

Id	Control Number	Description	Model	Serial Nº	Date of Reception	Application
S/02	4373/01	Infotainment head unit	IDC2385H	HBB429P65UAARZ	01/04/2024	Element Under Test
S/02	4373/02	Harness	-	-	01/04/2024	Accessory
S/02	4373/03	BR-Adapter (Automotive converter Ethernet BroadR-R	-	-	01/04/2024	Accessory
S/02	4373/04	Power Plug cable for BR-Adapter	-	-	01/04/2024	Accessory
S/02	4373/06	HSD (male) to OABR cable	-	-	01/04/2024	Accessory
S/02	4373/07	Quad mate AXZ - High speed Fakra to SMA (male)	-	-	01/04/2024	Element Under Test
S/02	4373/08	BT/WLAN Antenna with SMA (male) connector	-	-	01/04/2024	Accessory
S/02	4373/09	BT/WLAN Antenna with SMA (male) connector	-	-	01/04/2024	Accessory
S/02	4373/10	BT/WLAN Antenna with SMA (male) connector	-	-	01/04/2024	Accessory
S/02	4373/11	BT/WLAN Antenna with SMA (male) connector	-	-	01/04/2024	Element Under Test

Sample S/02 was used for the test(s): All Radiated tests indicated in appendix A.

Test sample description

Ports…… :	Port name and description		Cable				
			Specified length [m]	Attached during test	Shielded		
	BT/Wi-fi Antenna		2m	☒	☐		
	USB1/2/3		2m	☒	☐		
	Power		2m	☒	☐		
	CID		2m	☒	☐		
	AR-Cam		2m	☒	☐		
	100 Base T1/1G Base T1/GPS/DCS/HUD/DFE		2m	☒	☐		
Supplementary information to the ports……	No Data Provided						
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 8V to 16V					
	☐	DC:					
Rated Power .....:	No Data Provided						
Clock frequencies.....:	No Data Provided						
Other parameters .....:	No Data Provided						
Software version .....:	No Data Provided						
Hardware version .....:	No Data Provided						
Dimensions in cm (W x H x D) ....:	No Data Provided						
Mounting position .....:	☐	*Tabletop equipment*					
	☐	*Wall/Ceiling mounted equipment*					
	☐	*Floor standing equipment*					
	☐	*Hand-held equipment*					
	☒	*Other: Automotive*					
Modules/parts.....:	Module/parts of test item		Type		Manufacturer		
	No Data Provided						

Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	No Data Provided		
Documents as provided by the applicant.....:	Description	File name	Issue date
	Declaration Equipment Data	FDT30_18 DeclaratEquipmData_HAR_IDC23H_HW5.2_2023-07-28	09/12/2023

Copy of marking plate:

Identification of the client

HARMAN BECKER AUTOMOTIVE SYSTEMS GMBH
BECKER-GOERING-STR. 16
76307 KARLSBAD,
GERMANY

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	01-04-2024
Date (finish)	01-10-2024

Document history

Report number	Date	Description
4373ERM.008	03-07-2024	First release.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the semi anechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Juliana Cherry, Prudhvi Kothapalli, Qi Zhang, Ivy Yousuf Moutushi and Koji Nishimoto.

List of equipment used during the test

Conducted Measurements

CONTROL NUMBER	DESCRIPTION	Serial No	LAST CALIBRATION	NEXT CALIBRATION
1039	FSV40 Signal Analyzer 40GHz	101627	2022-11-01	2024-11-01
1041	SMB100A Signal Generator	180180	2022-10-06	2024-10-06
1042	SMBV100A Vector Signal Generator	262575	2022-03-16	2024-03-16
1107	Ethernet SNMP Thermometer	60038026952	2022-08-16	2024-10-18
1313	Wireless Measurement Software R&S WMS32	-	N/A	N/A

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	Serial No	LAST CALIBRATION	NEXT CALIBRATION
878	Power supply (AMETEK / PROG-DC-PS)	1707A01783	N/A	N/A
1012	ESR26 EMI Test Receiver	101478	2022-04-12	2024-04-12
1014	FSV40 Signal Analyzer 40GHz	101626	2022-08-01	2024-08-01
1055	3116C Double-Ridged Waveguide Horn Antenna	211394	2023-02-06	2026-02-06
1377	Double Ridged Horn Antenna	103050	2021-12-01	2024-12-01
1064	3142E Biconilog antenna	208600	2021-12-13	2024-12-13
1108	Ethernet SNMP Thermometer- SAC	60038026954	2022-10-18	2024-10-18
1111	Ethernet SNMP Thermometer	60038026577	2022-10-18	2024-10-18
1179	Semi-Anechoic Chamber	F169021	N/A	N/A
1314	Wireless Measurement Software R&S Emc32	1040-OT102236	N/A	N/A
1461	Low Noise Preamplifier (1-18GHz)	2213857B	2022-06-01	2024-06-01

Testing verdicts

Fail	F
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

FCC PART 15 PARAGRAPH / RSS-247			
Requirement	**Test case**	**Verdict**	**Remark**
FCC 15.407 (a) / RSS-247 6.2	Power Limits. Maximum Output Power	P	N/A
FCC 15.407 (a) / RSS-247 6.2	Maximum Power Spectral Density	N/M	Refer 1
FCC 2.1049 / RSS-Gen 6.7	99% Occupied Bandwidth	P	N/A
FCC 15.403 / RSS-Gen 6.7	26 dB Emission Bandwidth	N/M	Refer 1
FCC 15.407 (b) / RSS-247 6.2	Band-edge Conducted Emissions	N/M	Refer 1
FCC 15.407 (e) / RSS 247 6.2.4.1	6 dB Emission Bandwidth	N/M	Refer 1
FCC 15.407 (b)(6)15.207 / RSS Gen 8.8	Emission limitations Conducted	N/M	N/A
FCC 15.407 (b), 15.205 & 15.209 / RSS-Gen 8.9 & 8.10	Undesirable radiated emissions	P	N/A
FCC 15.407 (g) / RSS-Gen 6.11 & 8.11	Frequency Stability	N/M	Refer 1

Supplementary information and remarks:

1. Partial testing has been requested.

Appendix A: Test results. Wi-Fi 5GHz

Appendix A

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PRODUCT INFORMATION

(*): The following information is provided by the client:

Information	Description
Equipment type	Wi-Fi 5GHz
DFS Operating Mode	---
TPC Function	Yes
Operating Frequency Range	5150 - 5250 MHz & 5725 - 5875 MHz
Nominal Channel Bandwidth	20/ 40/ 80 MHz
Antenna type	1/4 wave coax
RF Output Power	20 dBm
Antenna gain	-2.8 dBi
Supply Voltage	12 Vdc
Modulation:	DSSS, OFDM, MIMO-OFDM
Transmit Data Rate:	802 .11 a/n/ac/ax Rates: IEEE 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps IEEE 802.11n: MCS0-7 IEEE 802.11ac: VHT SS1 MCS 0-9 VHT SS2 MCS 0-9 IEEE 802.11ax: HE SS1 MCS8 HE SS1 MCS9 HE SS1 MCS11

TEST CONDITIONS

(*): Data provided by the client.

TEST CONDITIONS	DESCRIPTION
TC#01(1) (2) **(a mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Channel Bandwidth: 20 MHz Test Frequencies for Conducted/Radiated tests: (MIMO RADIO A + B) UNII 1-3 Frequencies: 5180,5280,5580,5825 MHz
TC#02(1) (2) **(n mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Channel Bandwidth: 20 MHz Test Frequencies for Conducted/Radiated tests: (MIMO RADIO A + B) UNII 1-3 Frequencies: 5180, 5320, 5580, 5825 MHz Channel Bandwidth: 40 MHz Test Frequencies for Conducted/Radiated tests: (MIMO RADIO A + B) UNII 1-3 Frequencies: 5230, 5270, 5670, 5755 MHz
TC#03(1) (2) **(ac mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Channel Bandwidth: 20 MHz Test Frequencies for Conducted/Radiated tests: (MIMO RADIO A + B) UNII 1-3 Frequencies: 5240, 5320, 5580, 5825 MHz Channel Bandwidth:40 MHz Test Frequencies for Conducted/Radiated tests: (Radio A, MIMO RADIO A + B) UNII 1-3 Frequencies: 5190, 5270, 5670, 5755 MHz Channel Bandwidth: 80 MHz Test Frequencies for Conducted/Radiated tests: (Radio A, MIMO RADIO A + B) UNII 1-3 Frequencies: 5210, 5290, 5610, 5775 MHz

TEST CONDITIONS	DESCRIPTION
TC#04(1)(2) **(ax mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Channel Bandwidth: 20 MHz Test Frequencies for Conducted tests: (MIMO RADIO A + B) UNII 1-3 Frequencies: 5200, 5280, 5580, 5745 MHz Channel Bandwidth:40 MHz Test Frequencies for Conducted tests: (MIMO RADIO A + B) UNII 1-3 Frequencies:5230, 5270, 5670, 5795 MHz Channel Bandwidth: 80 MHz Test Frequencies for Conducted tests: (MIMO RADIO A + B) UNII 1-3 Frequencies: 5210, 5290, 5610, 5775 MHz

Note (1): The test set-up was made in accordance to the general provisions of FCC Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017.

The EUT was tested in the following operating mode:

- Continuously transmitting with a modulated carrier at maximum power in all required channels using the supported data rates/modulation types.
- For spurious emissions for OFDM modes 802.11a, 802.11n20/40, 802.11ac20/40/80, and 11ax20/40/80 a preliminary scan was performed to determine the worst case. The following tables and plots show the results for the worst case in 802.11ac mode.
- The data rates of 54Mb/s for 802.11a, MCS 7 for 802.11n, MCS8 for 802.11ac20 and MCS9 for 802.11ac40/80, and MCS8 for ax20/40/80 were selected based on preliminary testing that identified those rates corresponding to the worst cases.
- For all modes, the EUT was configured in test mode using a software application. The application was used to enable continuous transmission and to select the test channels as required. The client supplied instructions to configure the EUT. The customer supplied a document containing the setup instructions.

Note (2): For Maximum Output Power for OFDM modes 802.11a, 802.11n20/40, 802.11ac20/40/80 and 802.11ax20/40/80 a preliminary scan was performed to determine the degradation of the performance. The test results shown are the worst case.

See below the comparison table between previous test results (test report 3669ERM.007A2) and test results with the new sample shown in this test report:

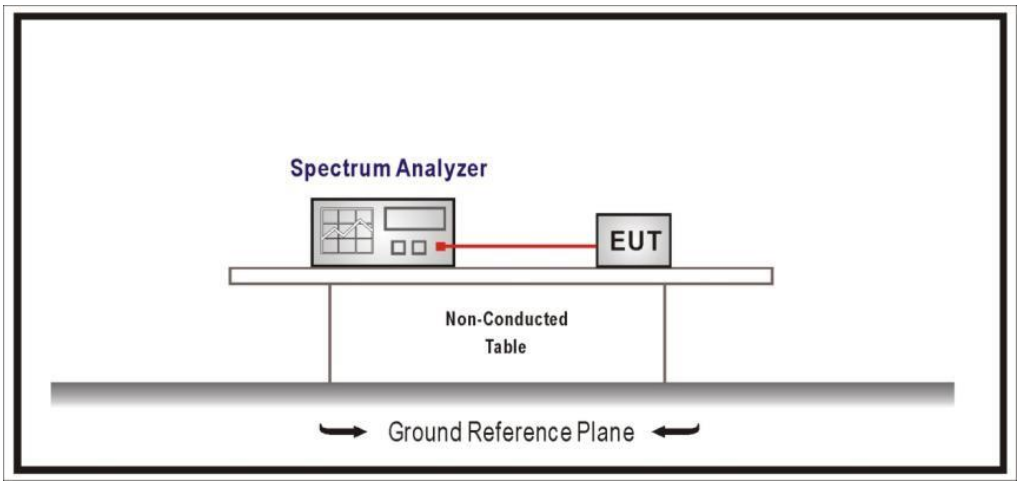
Bandwidth (MHz)	U-NII Sub-Band	Mode	Frequency (MHz)	Maximum conducted power (dBm)		Delta
				IDC23H - 3669	IDC2385H - 4373	3669 vs 4373
20	U-NII-1	a	5180	12.9	12.8	-0.1
		n	5180	12.6	12.3	-0.3
		ac	5240	12.7	12.3	-0.4
		ax	5200	10.5	9.9	-0.6
	U-NII-2A	a	5280	12.5	13.3	0.8
		n	5320	13.8	13.4	-0.4
		ac	5320	14.6	14.3	-0.3
		ax	5280	11.2	11.0	-0.2
	U-NII-2C	a	5580	12.4	13.1	0.7
		n	5580	11.0	11.4	0.4
		ac	5580	12.3	12.2	-0.1
		ax	5580	11.7	11.4	-0.3
	U-NII-3	a	5825	7.9	9.4	1.5
		n	5825	8.2	9.5	1.3
		ac	5825	8.8	9.9	1.1
		ax	5745	9.6	9.9	0.3
40	U-NII-1	n	5230	12.0	11.6	-0.4
		ac	5190	11.6	11.7	0.1
		ax	5230	10.3	10.1	-0.2
	U-NII-2A	n	5270	10.4	10.2	-0.2
		ac	5270	10.8	11.4	0.6
		ax	5270	11.2	10.7	-0.5
	U-NII-2C	n	5670	11.0	10.2	-0.8
		ac	5670	10.3	10.1	-0.2
		ax	5670	10.2	10.4	0.2
	U-NII-3	n	5755	11.0	10.5	-0.5
		ac	5755	10.5	10.5	0.0
		ax	5795	8.9	9.9	1.0
80	U-NII-1	ac	5210	9.9	9.9	0.0
		ax	5210	10.2	10.2	0.0
	U-NII-2A	ac	5290	9.0	9.0	0.0
		ax	5290	11.3	10.7	-0.6
	U-NII-2C	ac	5610	10.2	9.7	-0.5
		ax	5610	12.3	11.0	-1.3
	U-NII-3	ac	5775	11.6	11.7	0.1
		ax	5775	10.4	10.0	-0.4

Directional Antenna Gain Calculations for CDD MIMO In-Band Measurements:

For 2Tx CDD MIMO modes, in accordance with KDB 662911 D01 v02r01 Section F)2)f)i), directional gain was calculated as follows:

- For power measurements:
  Directional gain $_{POWER}$ = G_{ANT} dBi (N_{ANT} < 4)
  Directional gain $_{POWER}$ = G_{ANT} =- 2.8 dBi
  Power Antenna Gain MIMO Chain 0 & 1: - 2.8 dBi

CONDUCTED MEASUREMENTS:



RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at 3 m for the frequency range 30-1000 MHz (Bilog antenna) and 1-18 GHz (Double ridge horn antenna), and 1m for the frequency range 18 GHz- 40 GHz (Double ridge horn antenna).

For radiated emissions in the range 18 - 40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

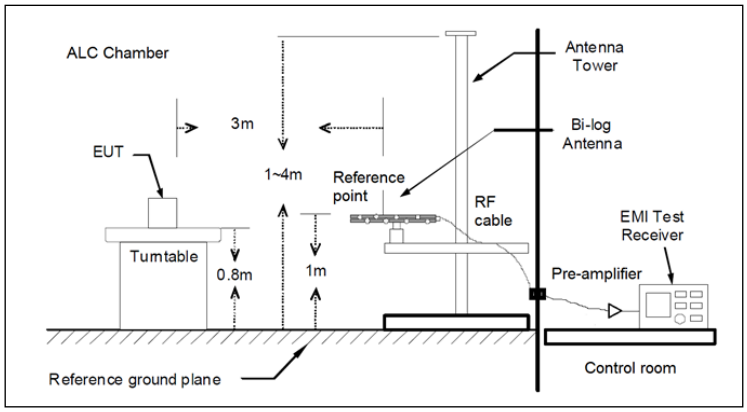


Fig A1: Radiated measurements Setup f < 1 GHz

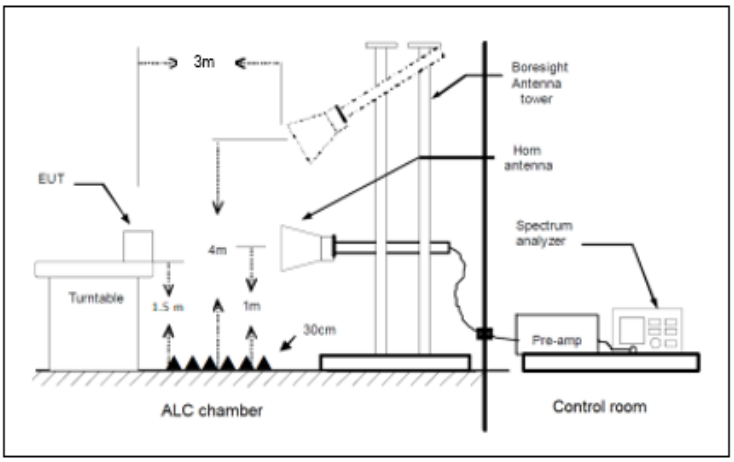


Fig A2: Radiated measurements setup f >1-18 GHz

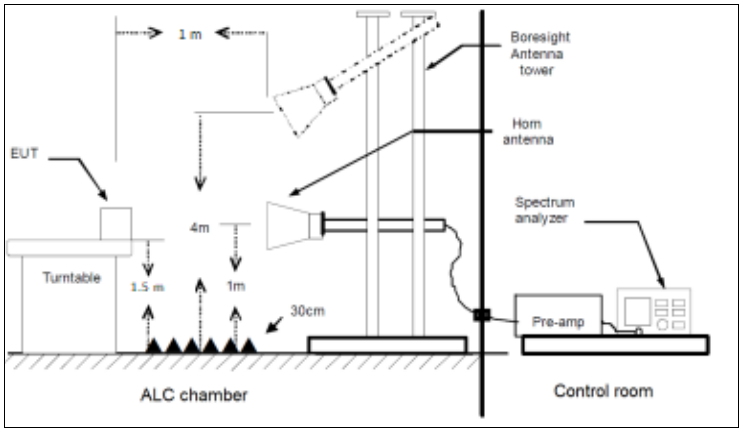


Fig A3: Radiated measurements setup f > 18 GHz

TEST CASES DETAILS

FCC 15.407 (a) / RSS-247 6.2 Power Limits. Maximum Output Power

Limits

For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-247:

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 $\log_{10}$B, dBm, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

For devices other than devices installed in vehicles:

For the band 5.15-5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW (23 dBm) or 10 + 10 $\log_{10}$ B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.

For the 5.25-5.35 GHz, 5.470-5.6 GHz, and 5.650-5.725 GHz bands, the maximum conducted output power shall not exceed 250 mW (24 dBm) or 11 + 10 $\log_{10}$B, dBm, whichever power is less. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less.

For the band 5.725-5.850 GHz, the maximum conducted output power shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11a (OFDM 54 Mbit/s)

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5180.000	12.8	10.0
5280.000	13.3	10.5
5580.000	13.1	10.3
5825.000	9.4	6.6

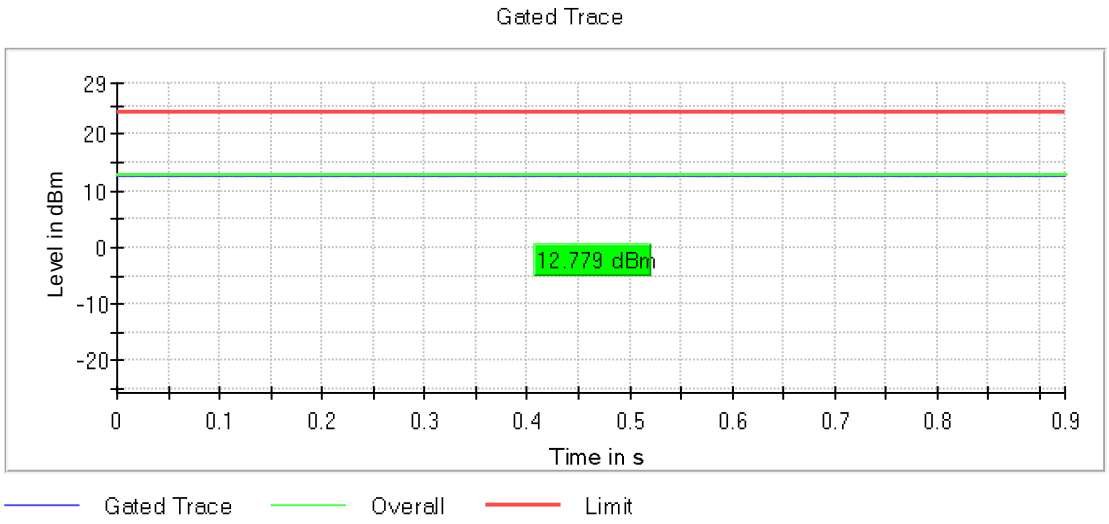
Verdict

Pass

Attachments

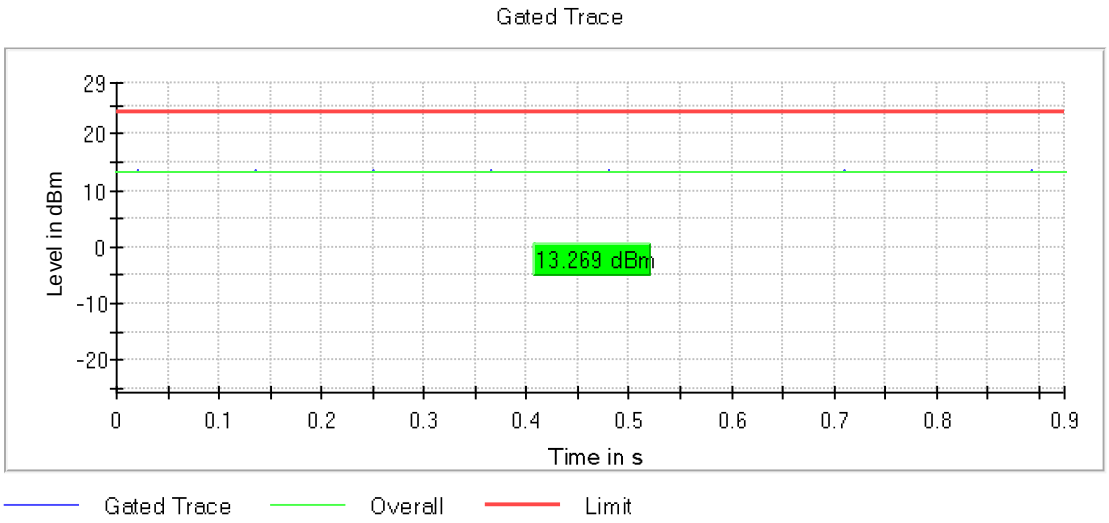
Frequency MHz = 5180.00000 Modulation = 802.11a (OFDM 54 Mbit/s)

Images:



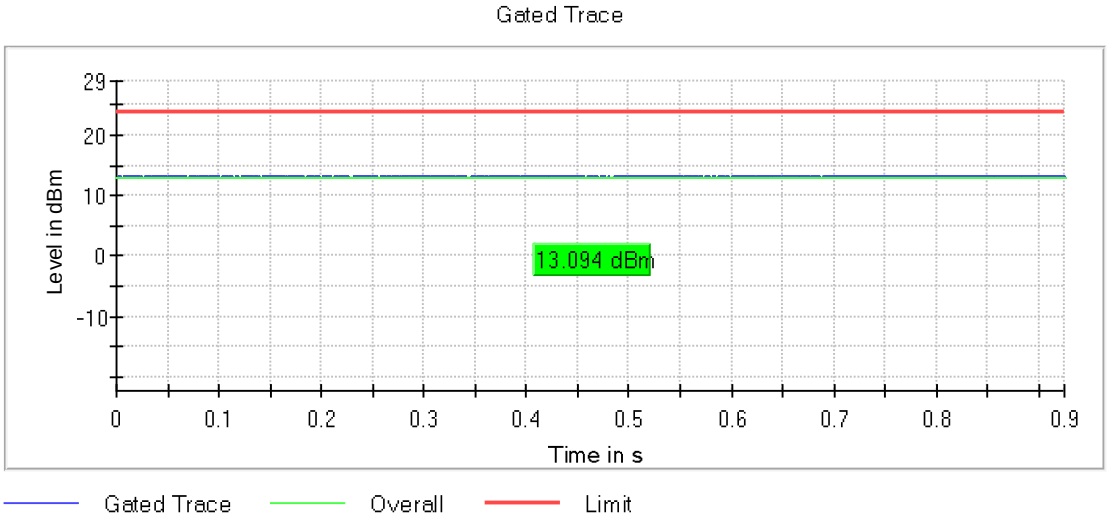
Frequency MHz = 5280.00000 Modulation = 802.11a (OFDM 54 Mbit/s)

Images:



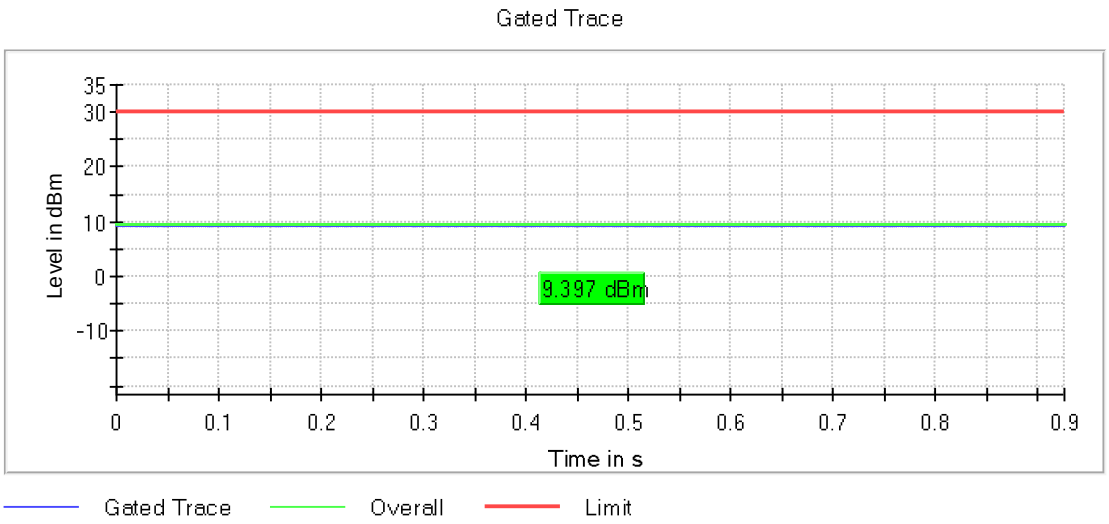
Frequency MHz = 5580.00000 Modulation = 802.11a (OFDM 54 Mbit/s)

Images:



Frequency MHz = 5825.00000 Modulation = 802.11a (OFDM 54 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11n HT20 (OFDM MCS7)

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5180.000	12.3	9.5
5320.000	13.4	10.6
5580.000	11.4	8.6
5825.000	9.5	6.7

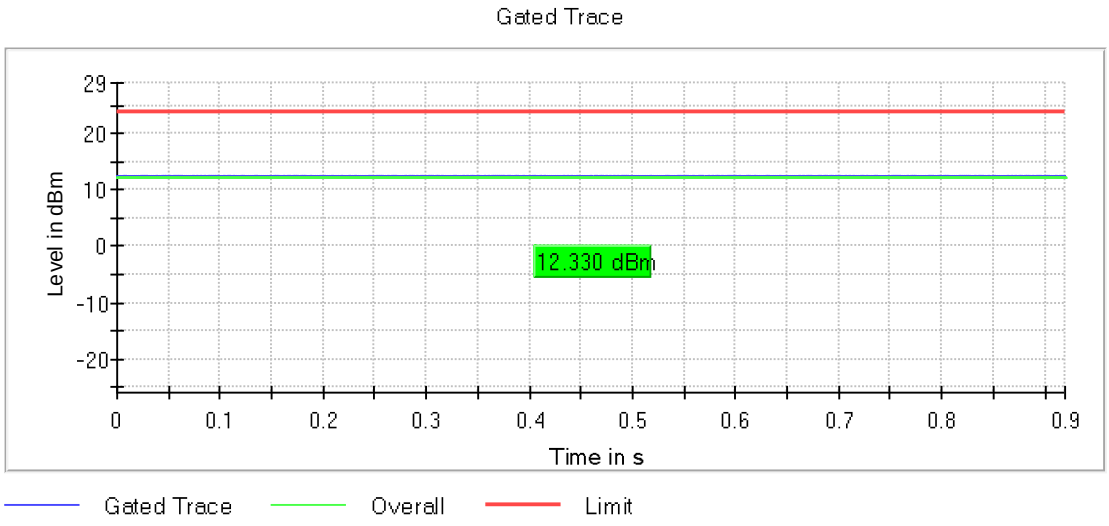
Verdict

Pass

Attachments

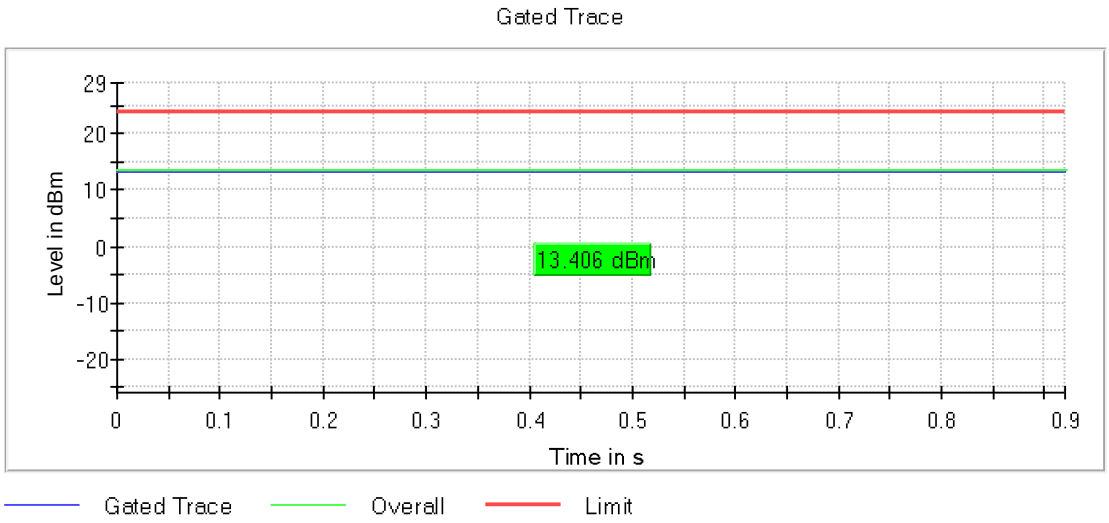
Frequency MHz = 5180.00000 Modulation = 802.11n HT20 (OFDM MCS7)

Images:



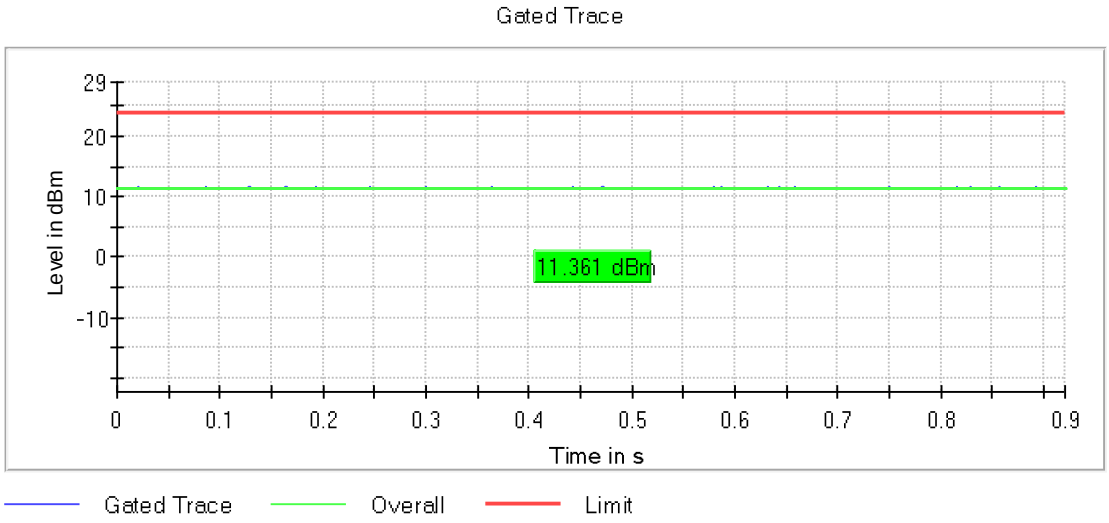
Frequency MHz = 5320.00000 Modulation = 802.11n HT20 (OFDM MCS7)

Images:



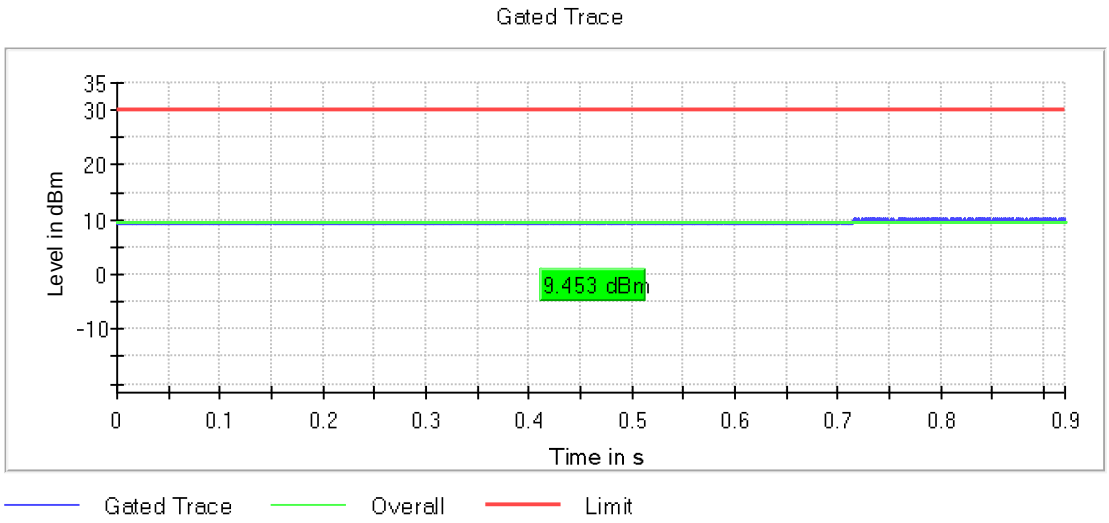
Frequency MHz = 5580.00000 Modulation = 802.11n HT20 (OFDM MCS7)

Images:



Frequency MHz = 5825.00000 Modulation = 802.11n HT20 (OFDM MCS7)

Images:



Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11n HT40 (OFDM MCS7)

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5230.000	11.6	8.8
5270.000	10.2	7.4
5670.000	10.2	7.4
5755.000	10.5	7.7

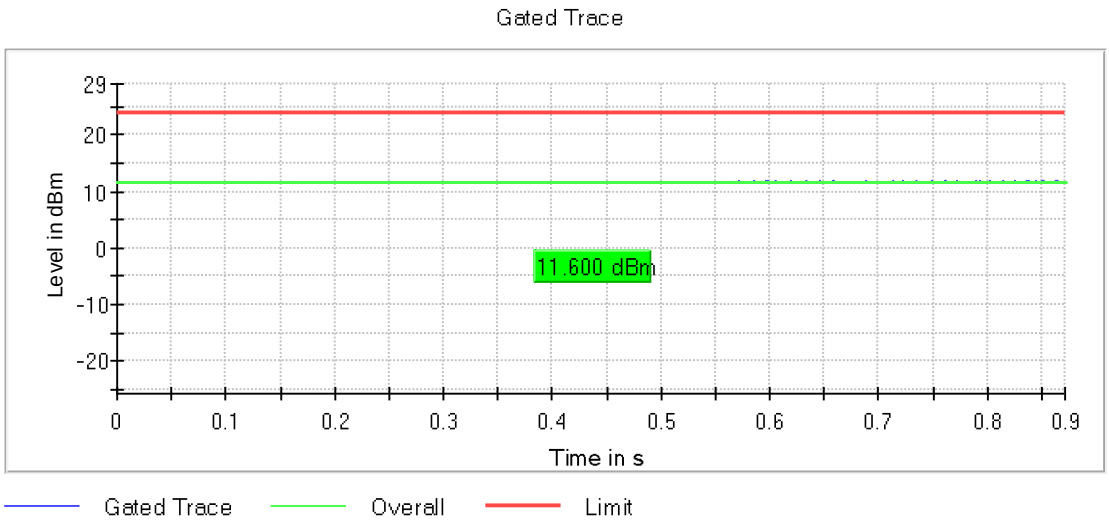
Verdict

Pass

Attachments

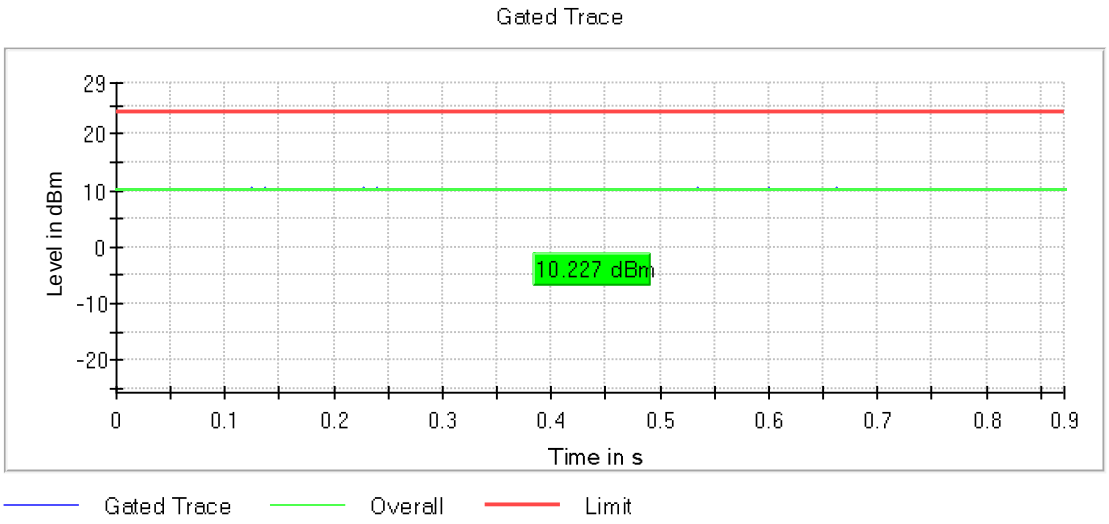
Frequency MHz = 5320.00000 Modulation = 802.11n HT40 (OFDM MCS7)

Images:



Frequency MHz = 5270.00000 Modulation = 802.11n HT40 (OFDM MCS7)

Images:



Frequency MHz = 5670.00000 Modulation = 802.11n HT40 (OFDM MCS7)

Images:

Frequency MHz = 5755.00000 Modulation = 802.11n HT40 (OFDM MCS7)

Images:

Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11ac VHT20 SS1 (OFDM MCS8)

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5240.000	12.3	9.5
5320.000	14.3	11.5
5580.000	12.2	9.4
5825.000	9.9	7.1

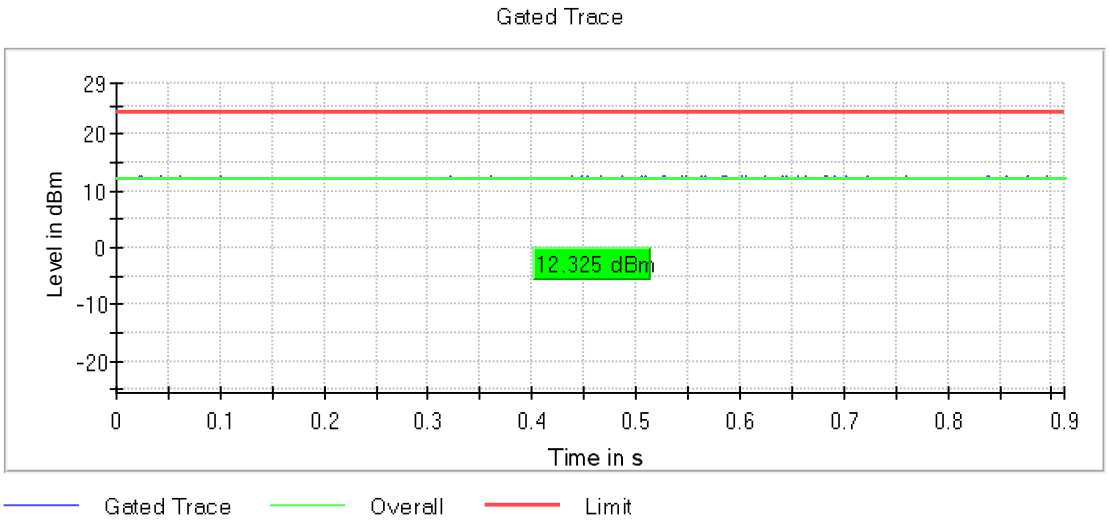
Verdict

Pass

Attachments

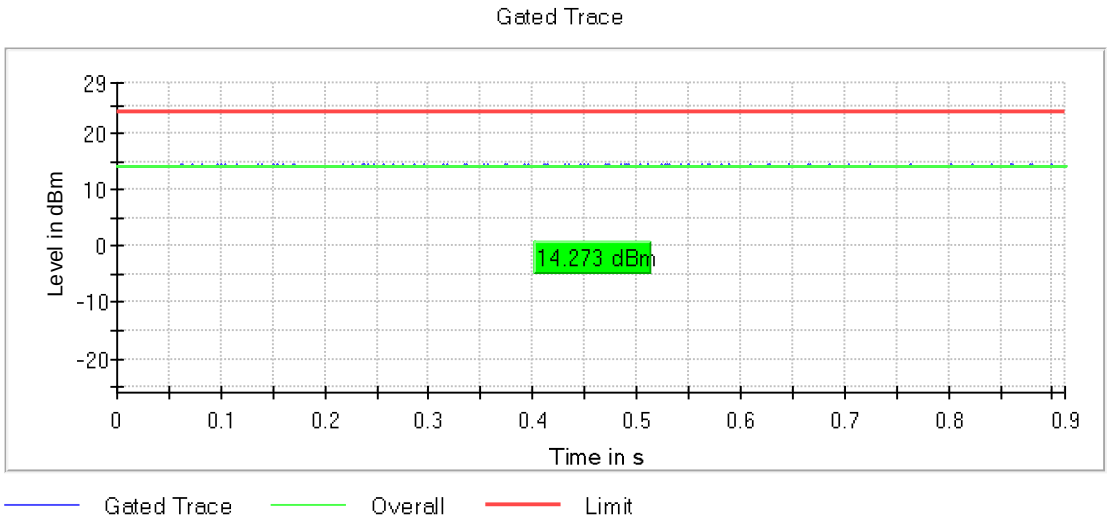
Frequency MHz = 5240.00000 Modulation = 802.11ac VHT20 SS1 (OFDM MCS8)

Images:



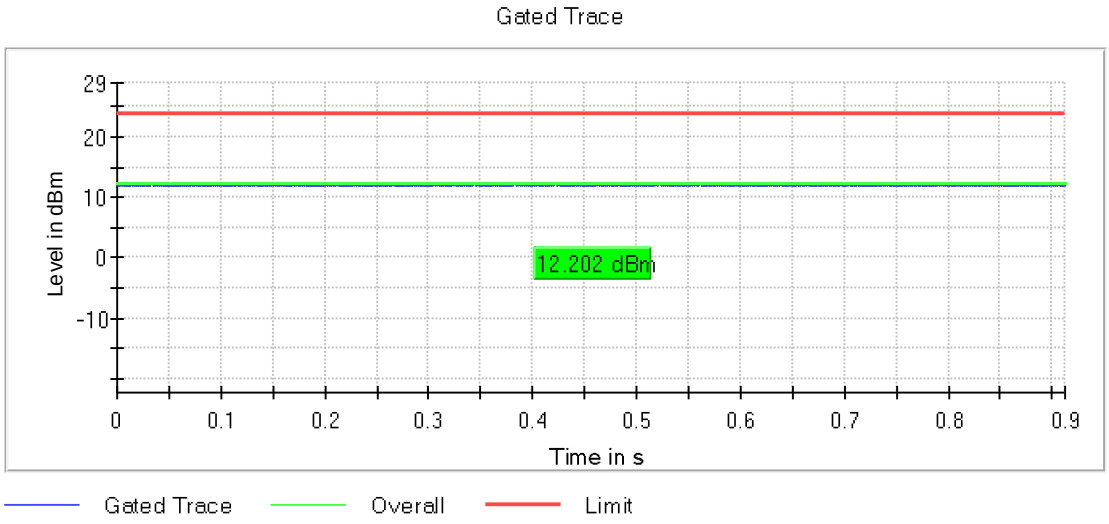
Frequency MHz = 5320.00000 Modulation = 802.11ac VHT20 SS1 (OFDM MCS8)

Images:



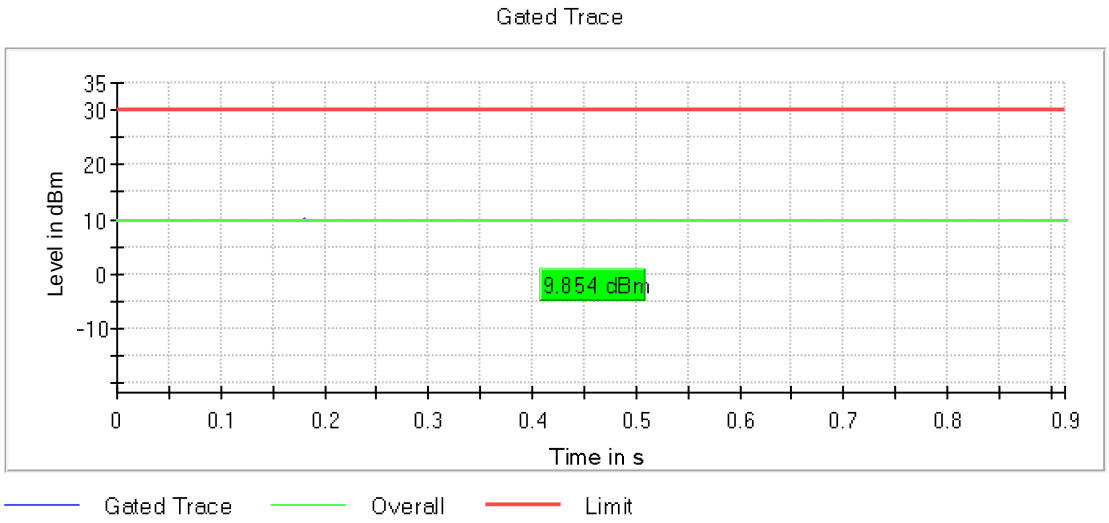
Frequency MHz = 5580.00000 Modulation = 802.11ac VHT20 SS1 (OFDM MCS8)

Images:



Frequency MHz = 5825.00000 Modulation = 802.11ac VHT20 SS1 (OFDM MCS8)

Images:



Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11ac VHT40 SS1 (OFDM MCS9)

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5190.00000	11.7	8.9
5270.00000	11.4	8.6
5670.00000	10.1	7.3
5755.00000	10.5	7.7

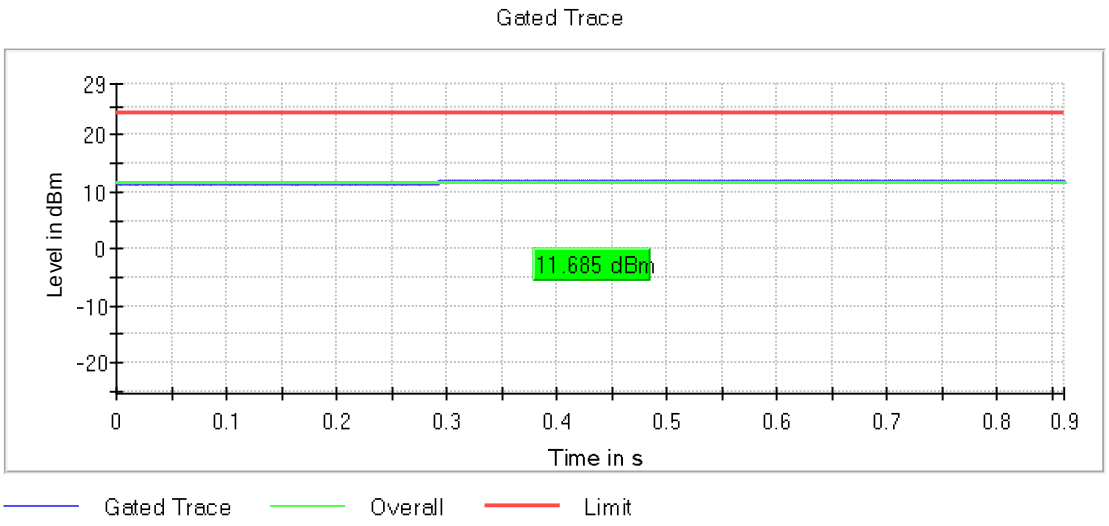
Verdict

Pass

Attachments

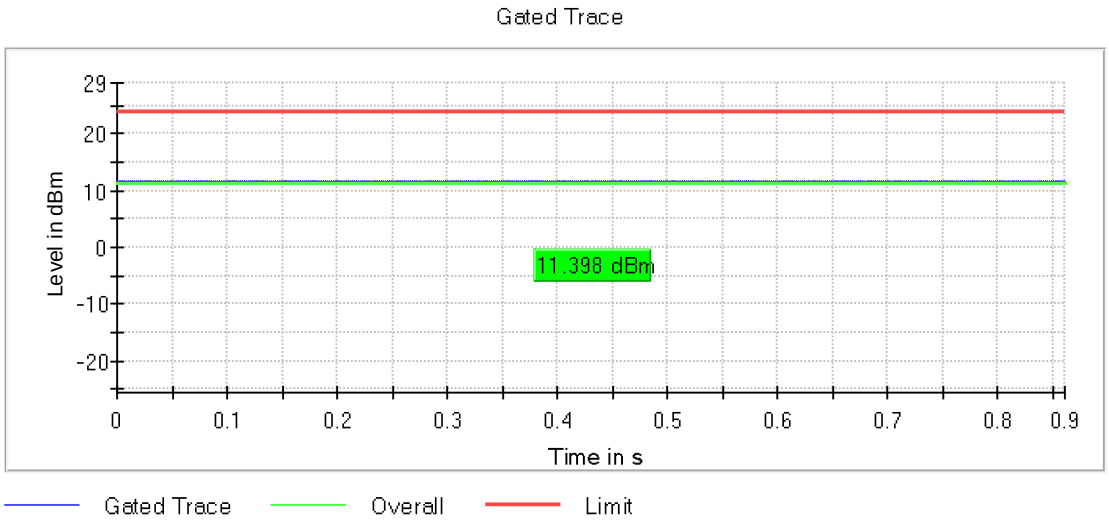
Frequency MHz = 5190.00000 Modulation = 802.11ac VHT40 SS1 (OFDM MCS9)

Images:



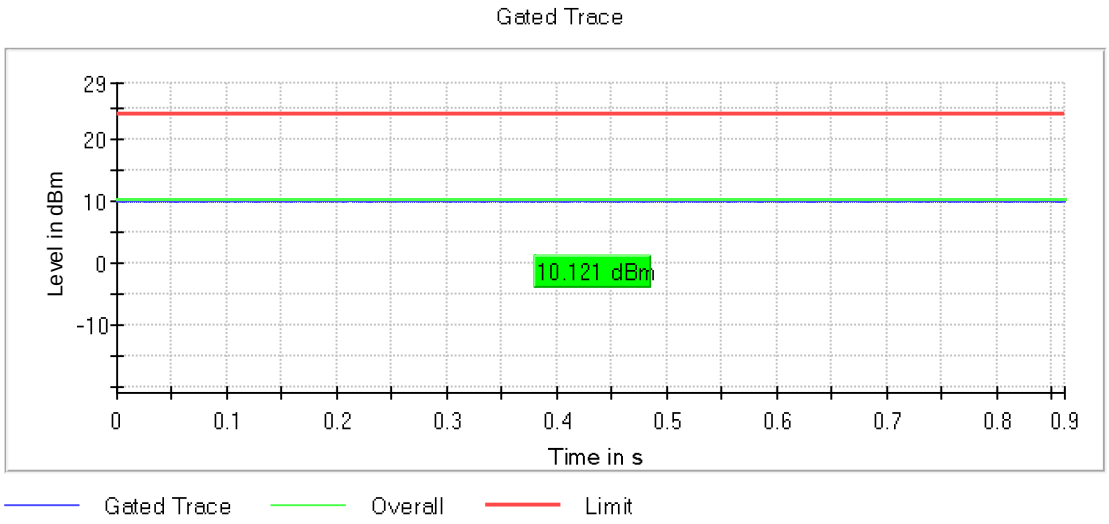
Frequency MHz = 5270.00000 Modulation = 802.11ac VHT40 SS1 (OFDM MCS9)

Images:



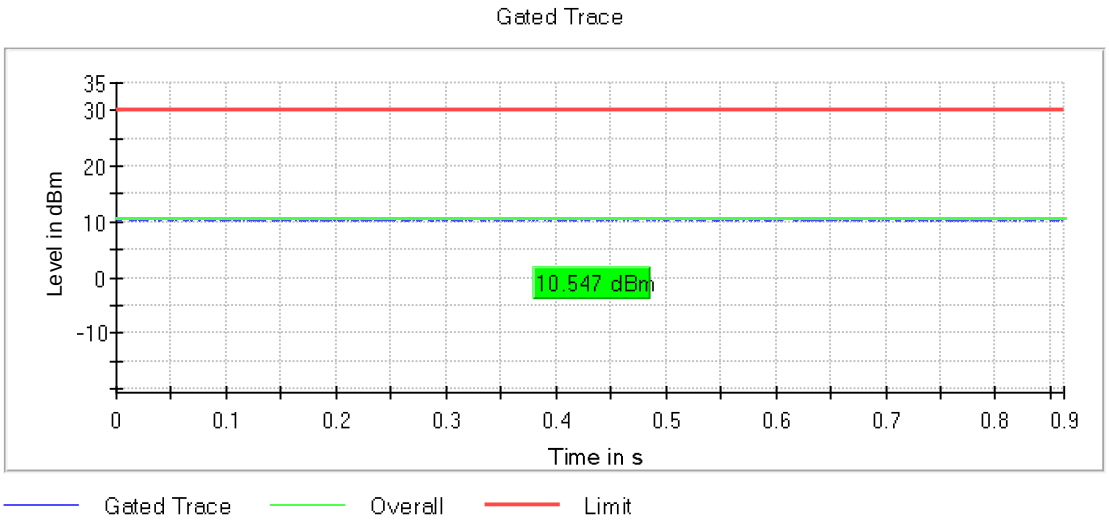
Frequency MHz = 5670.00000 Modulation = 802.11ac VHT40 SS1 (OFDM MCS9)

Images:



Frequency MHz = 5755.00000 Modulation = 802.11ac VHT40 SS1 (OFDM MCS9)

Images:



Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11ac VHT80 SS1 (OFDM MCS9)

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5210.00000	9.9	7.1
5290.00000	9.0	6.2
5610.00000	9.7	6.9
5775.00000	11.7	8.9

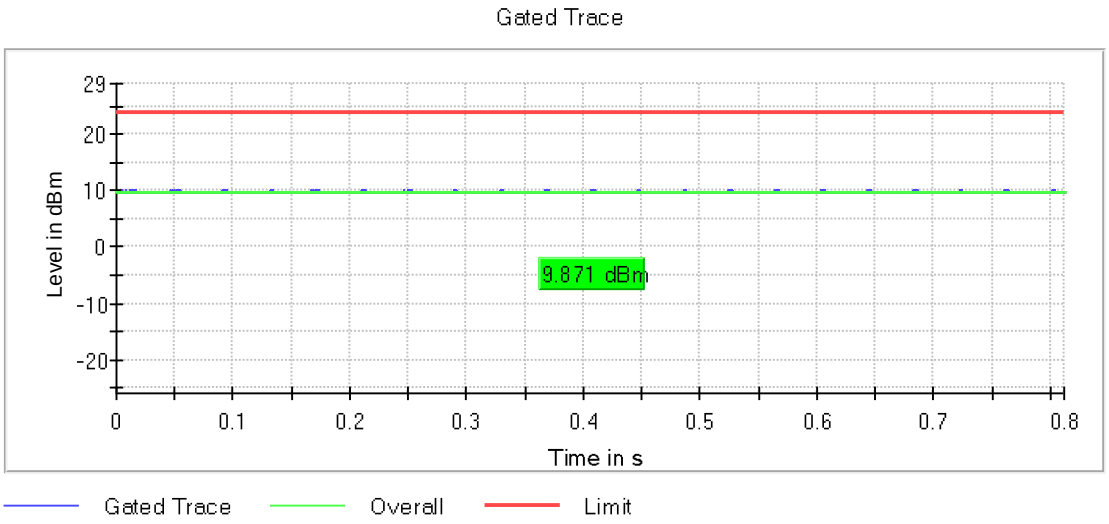
Verdict

Pass

Attachments

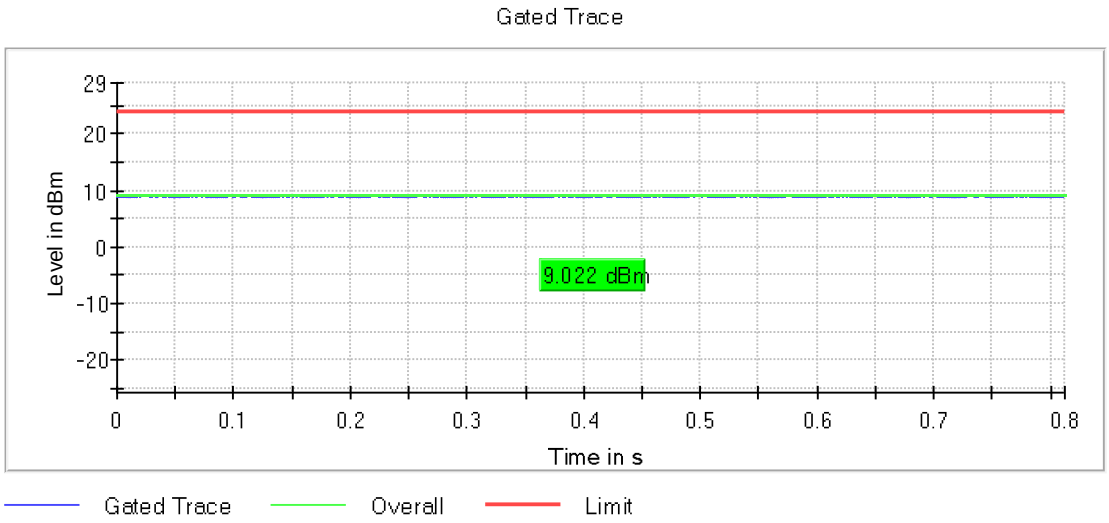
Frequency MHz = 5210.00000 Modulation = 802.11ac VHT80 SS1 (OFDM MCS9)

Images:



Frequency MHz = 5290.00000 Modulation = 802.11ac VHT80 SS1 (OFDM MCS9)

Images:



Frequency MHz = 5610.00000 Modulation = 802.11ac VHT80 SS1 (OFDM MCS9)

Images:

Frequency MHz = 5775.00000 Modulation = 802.11ac VHT80 SS1 (OFDM MCS9)

Images:

Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11ax HE20 SS1 (OFDMA MCS8) - Full RU

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5200.00000	9.9	7.1
5280.00000	11.0	8.2
5580.00000	11.4	8.6
5745.00000	9.9	7.1

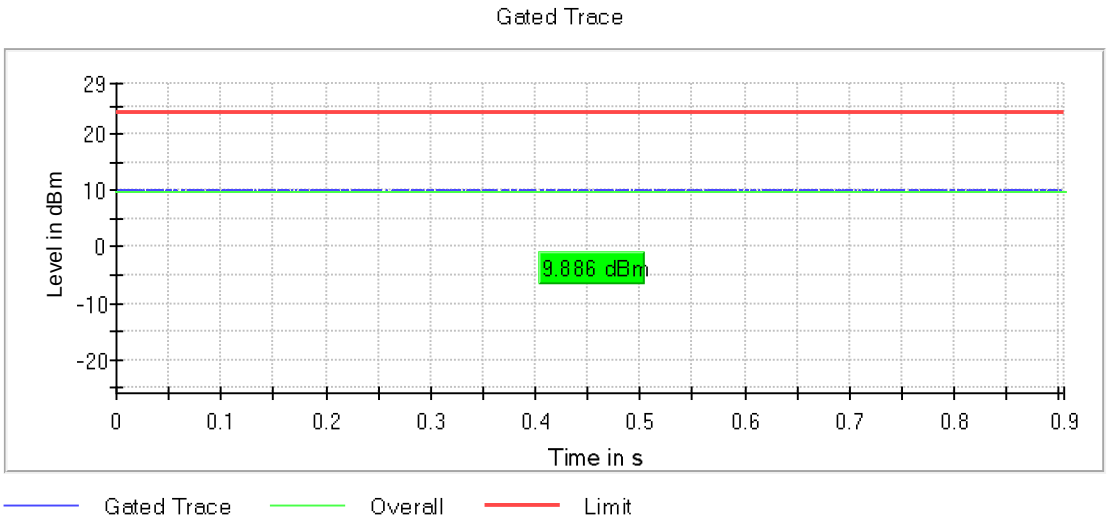
Verdict

Pass

Attachments

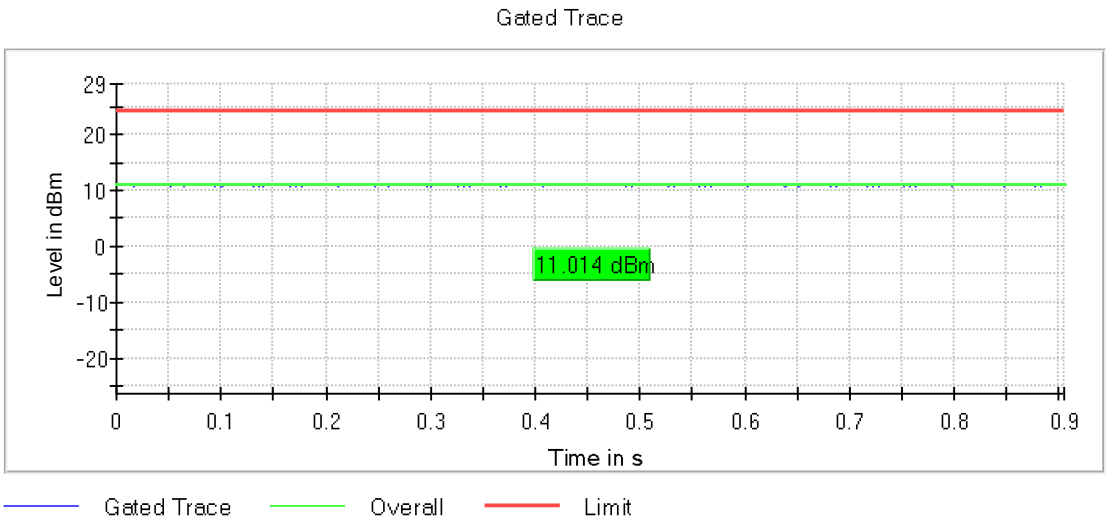
Frequency MHz = 5200.00000 Modulation = 802.11ax HE20 SS1 (OFDMA MCS8)

Images:



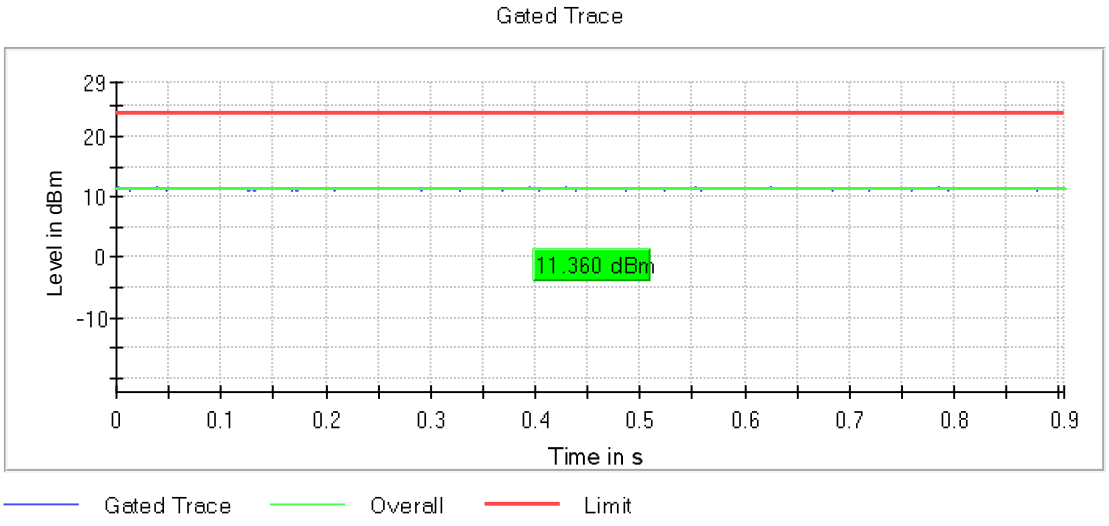
Frequency MHz = 5280.00000 Modulation = 802.11ax HE20 SS1 (OFDMA MCS8)

Images:



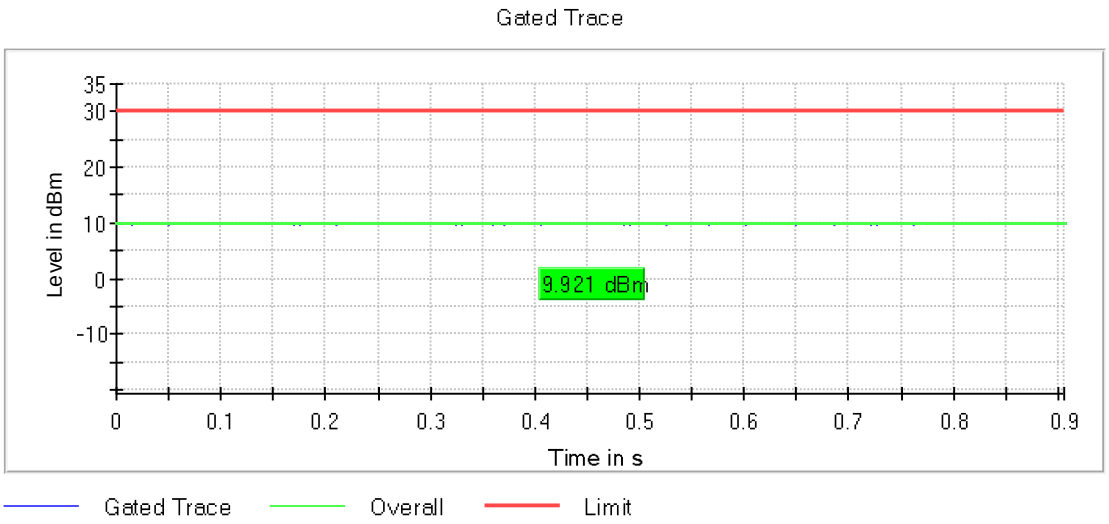
Frequency MHz = 5580.00000 Modulation = 802.11ax HE20 SS1 (OFDMA MCS8)

Images:



Frequency MHz = 5745.00000 Modulation = 802.11ax HE20 SS1 (OFDMA MCS8)

Images:



Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11ax HE40 SS1 (OFDMA MCS9) – Full RU

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5230.00000	10.1	7.3
5270.00000	10.7	7.9
5670.00000	10.4	7.6
5795.00000	9.9	7.1

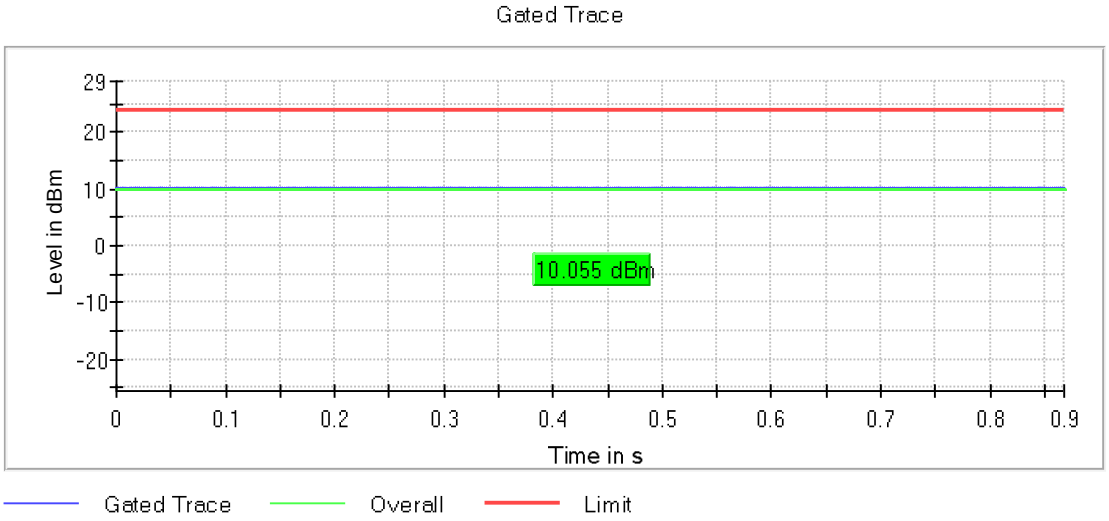
Verdict

Pass

Attachments

Frequency MHz = 5230.00000 Modulation = 802.11ax HE40 SS1 (OFDMA MCS9)

Images:



Frequency MHz = 5270.00000 Modulation = 802.11ax HE40 SS1 (OFDMA MCS9)

Images:

Frequency MHz = 5670.00000 Modulation = 802.11ax HE40 SS1 (OFDMA MCS9)

Images:

Frequency MHz = 5795.00000 Modulation = 802.11ax HE40 SS1 (OFDMA MCS9)

Images:

Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

Antenna gain: -2.8 dBi

Mode: MIMO CCD Mode 2x2

Modulation: 802.11ax HE80 SS1 (OFDMA MCS11) – Full RU

Results

Freq (MHz)	Avg Power (dBm)	Max EIRP (dBm)
5210.00000	10.2	7.4
5290.00000	10.7	7.9
5610.00000	11.0	8.2
5775.00000	10.0	7.2

Verdict

Pass

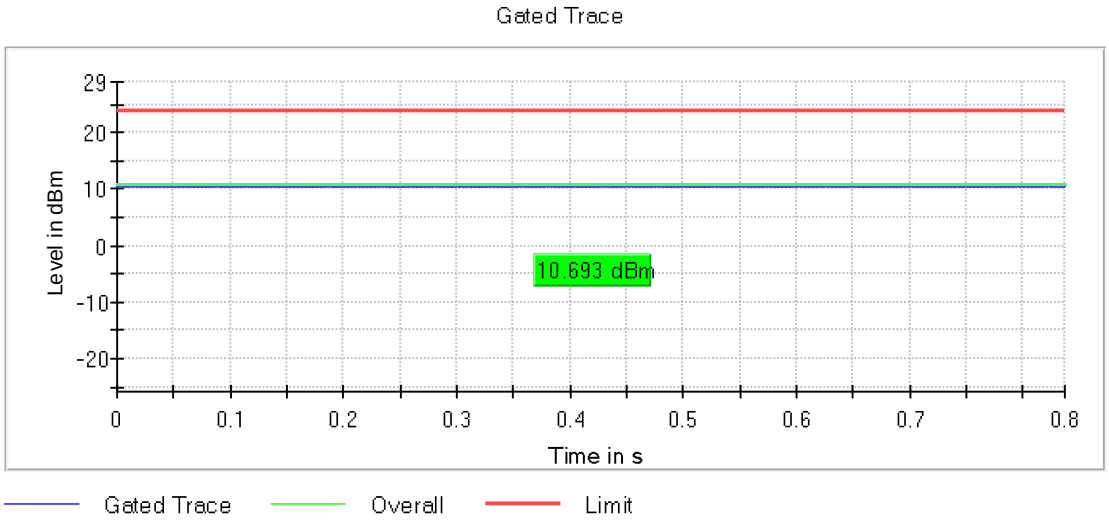
Attachments

Frequency MHz = 5210.00000 Modulation = 802.11ax HE80 SS1 (OFDMA MCS11)

Images:

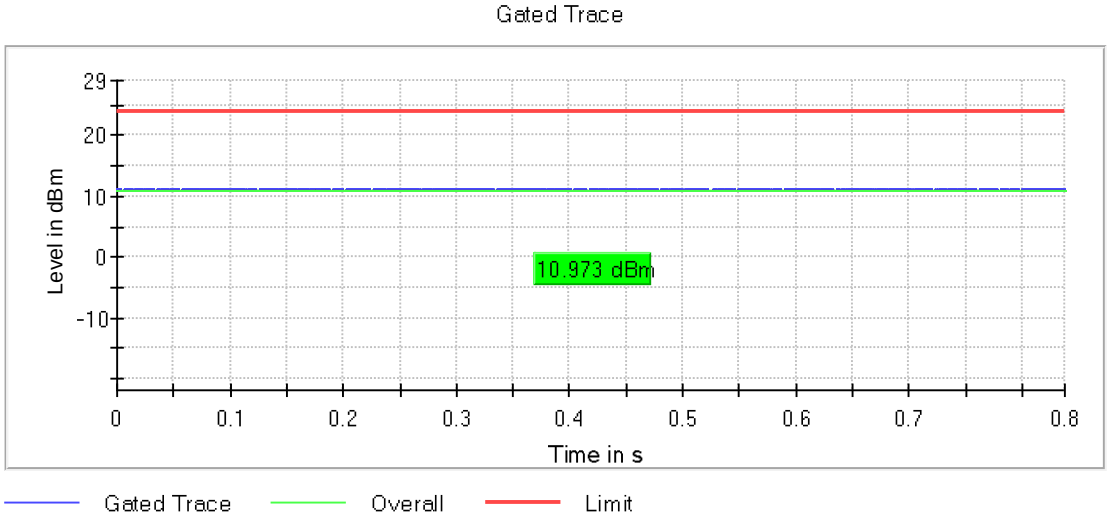
Frequency MHz = 5290.00000 Modulation = 802.11ax HE80 SS1 (OFDMA MCS11)

Images:



Frequency MHz = 5610.00000 Modulation = 802.11ax HE80 SS1 (OFDMA MCS11)

Images:



Frequency MHz = 5775.00000 Modulation = 802.11ax HE80 SS1 (OFDMA MCS11)

Images:

Tables:

Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

FCC 15.407 (b), 15.205 & 15.209 / RSS-Gen 8.9 & 8.10 Undesirable radiated emissions

Limits

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)):

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 40000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

Results

Frequency range 0.03 - 1 GHz

The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

Modulation: 802.11ac20 (OFDM MCS0)

Results:

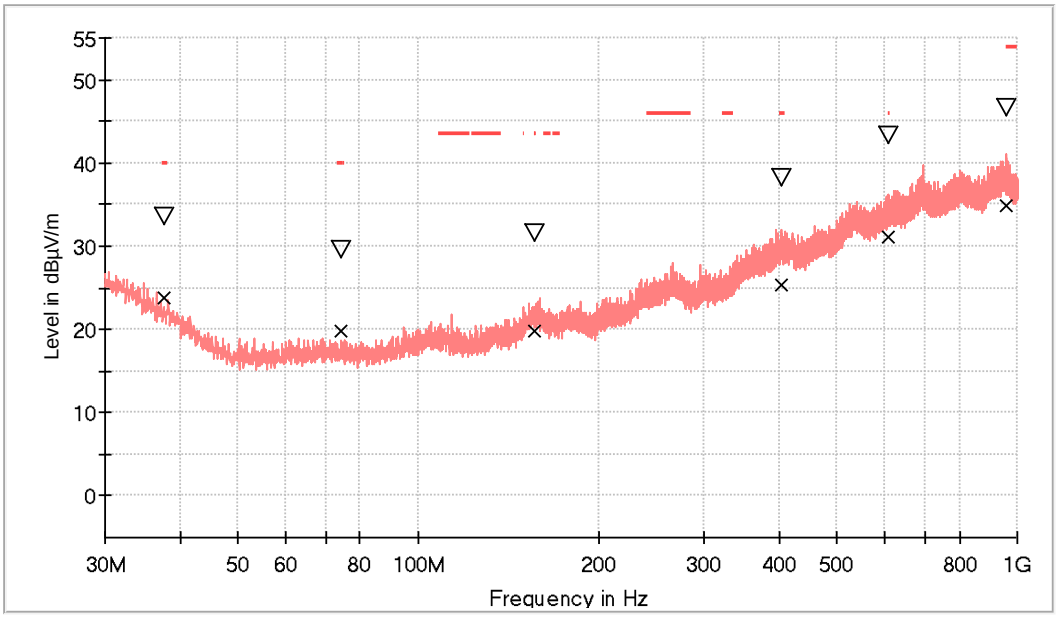
Verdict

Pass

Lowest Channel

Active Port = 2, Frequency Range GHz = [0.03, 1], Frequency MHz = 5320.00000, Modulation = 802.11ac (OFDM MCS0), MODE = MIMO,

Images:

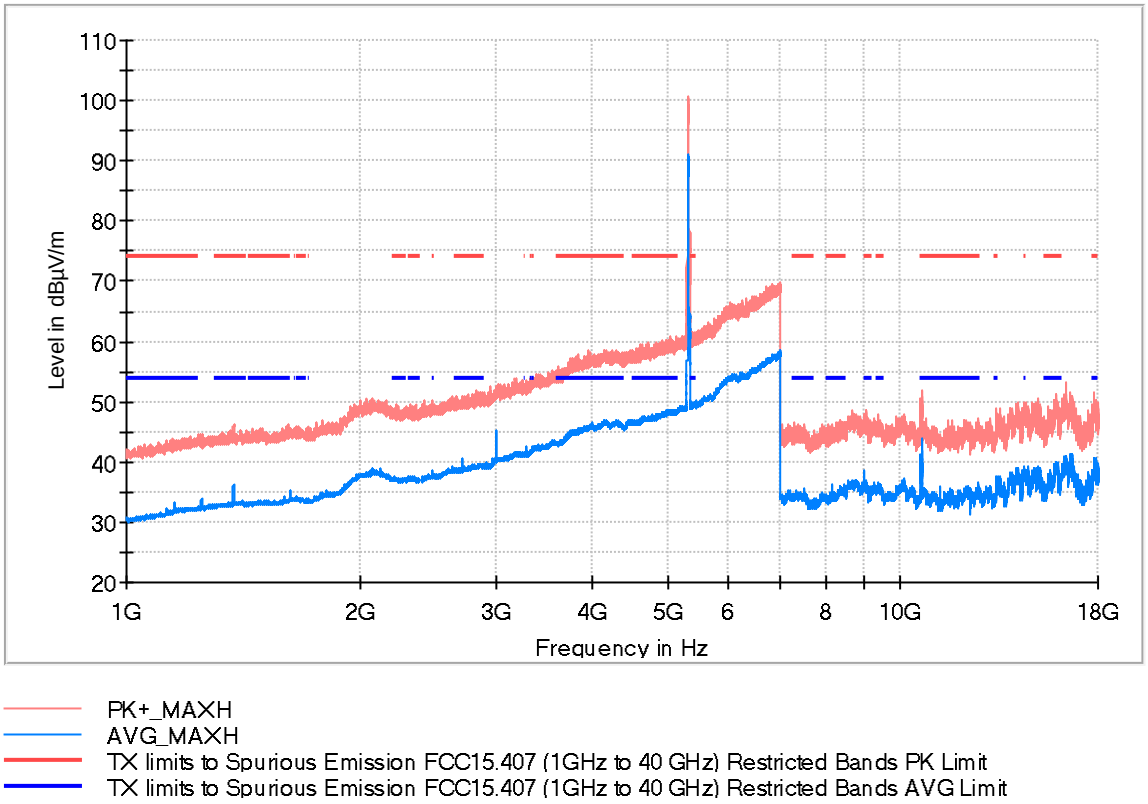


Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
37.614500	33.6	23.8	V	16.2	40.0
74.523000	29.5	19.8	H	20.2	40.0
156.779000	31.6	19.8	V	23.8	43.5
402.771000	38.1	25.4	H	20.6	46.0
608.023000	43.2	31.0	H	15.0	46.0
960.957500	46.7	34.9	H	19.1	54.0

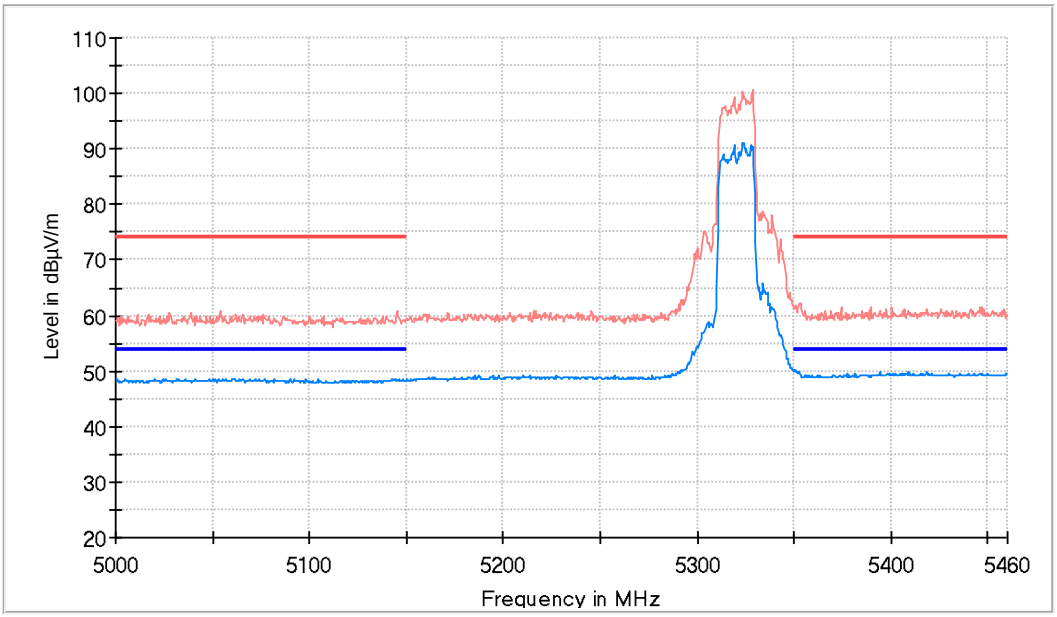
Frequency range 1 - 18 GHz

Frequency Range GHz = [1, 18], Frequency MHz = 5320.00000, Modulation = 802.11ac (OFDM MCS0), Mode = MIMO CCD Mode 2x2

Images:

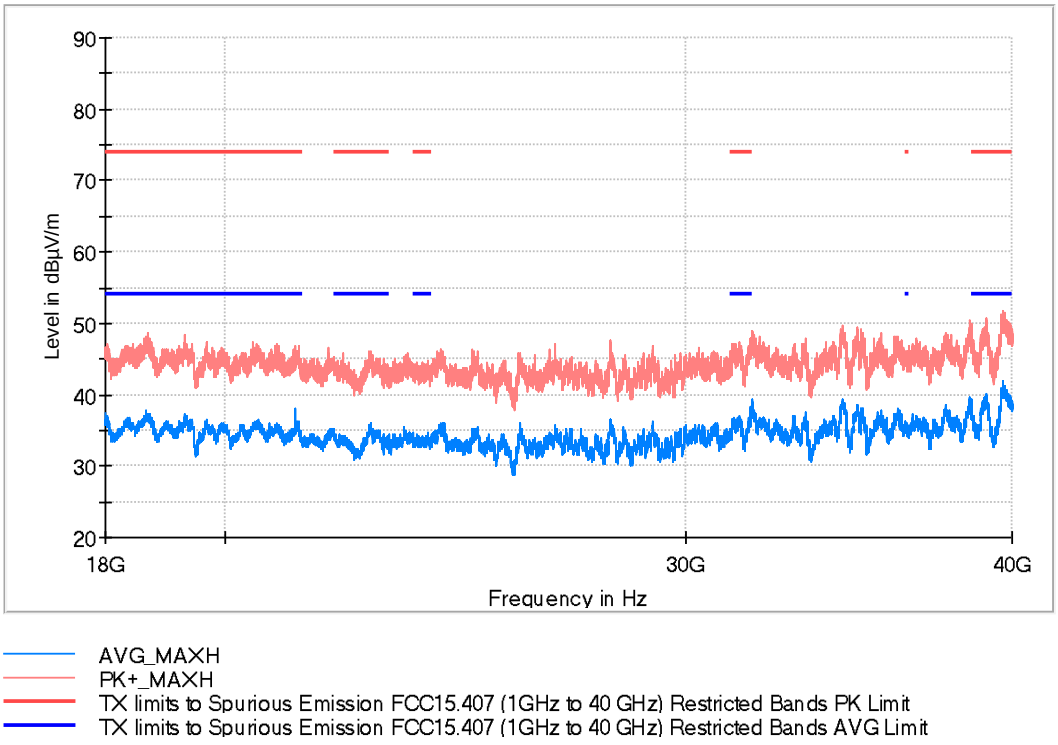


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
1375.000000	45.8	36.3	H	17.7	54.0	
5323.500000	100.4	91.0	H	---	---	Fundamental
10641.000000	51.9	43.8	H	10.2	54.0	2nd Harmonic
17774.500000	51.6	40.2	H	13.8	54.0	


110
100
90
80
70
60
50
40
30
20
Level in dBµV/m
5000
5100
5200
5300
5400
5460
Frequency in MHz
PK+_MAXH
AVG_MAXH
TX limits to Spurious Emission FCC15.407 (1GHz to 40 GHz) Restricted Bands PK Limit
TX limits to Spurious Emission FCC15.407 (1GHz to 40 GHz) Restricted Bands AVG Limit

Frequency Range GHz = [18, 40], Frequency MHz = 5320.00000, Modulation = 802.11ac (OFDM MCS0), Mode = MIMO CCD Mode 2x2

Images:



Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
21280.062500	46.0	38.1	V	15.9	54.0	4th Harmonic
31790.562500	47.9	38.2	H	15.8	54.0	
39706.437500	50.6	41.9	H	12.1	54.0	

Measurements

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48.5 kHz	PK+	100 kHz	1 s	20 dB
1 GHz - 7 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	20 dB
7 GHz - 18 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	20 dB
18 GHz - 40 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	20 dB