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Integrated Endoscopy

TEST REPORT

SCOPE OF WORK
EMC TESTING–IE-CH1000

REPORT NUMBER
240112155GZU-002

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TEST REPORT

Applicant Name & Address	:	Integrated Endoscopy 16 Technology Dr, Ste 165, Irvine, CA 92618
Manufacturing Site	:	Tescom Photoelectric Technology (Shenzhen) Co., Ltd Bld. 2b-1415, SKYWORTH Innovation Valley, Tangtou No. 1 Rd., Baoan Shenzhen, China
Intertek Report No:		240112155GZU-002
FCC ID:		2BEMN-IECH1000

Test standards

47 CFR PART 15 Subpart E: 2021 section 15.407

Sample Description

Product	:	Nuvis® camera head
Model No.	:	IE-CH1000
Electrical Rating	:	AC 100-240V, 50-60Hz,1.5A Battery:2*4.2VDC
Serial No.	:	Not Labeled
Date Received	:	12 January 2024
Date Test Conducted	:	16 May 2024-29 May 2024

Prepared and Checked By

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TEST REPORT

CONTENT

TEST REPORT **1**

CONTENT **3**

1.0 TEST RESULT SUMMARY **4**

2.0 GENERAL DESCRIPTION **5**

2.1 PRODUCT DESCRIPTION 5
2.2 RELATED SUBMITTAL(S) GRANTS 5
2.3 TEST METHODOLOGY 6
2.4 TEST FACILITY 6

3.0 SYSTEM TEST CONFIGURATION **6**

3.1 JUSTIFICATION 6
3.2 EUT EXERCISING SOFTWARE 7
3.3 SPECIAL ACCESSORIES 7
3.4 MEASUREMENT UNCERTAINTY 8
3.5 EQUIPMENT MODIFICATION 8
3.6 SUPPORT EQUIPMENT LIST AND DESCRIPTION 8

4.0 MEASUREMENT RESULTS **9**

4.1 ANTENNA REQUIREMENT 9
4.2 DUTY CYCLE 10
4.3 26 DB BANDWIDTH 12
4.4 6 DB BANDWIDTH 16
4.5 MAXIMUM CONDUCTED OUTPUT POWER 19
4.6 MAXIMUM PEAK POWER SPECTRAL DENSITY 21
4.7 RADIATED SPURIOUS EMISSIONS 27
4.8 BAND EDGES REQUIREMENT 35
4.9 CONDUCTED EMISSION TEST 39

5.0 TEST EQUIPMENT LIST **39**

TEST REPORT

1.0 TEST RESULT SUMMARY

Test Item	Test Requirement	Test Method	Result
Antenna Requirement	FCC PART 15 C clause 15.203	FCC PART 15 C clause 15.247 (c) and clause 15.203	PASS
26 dB Bandwidth / 99% Occupied Bandwidth	FCC PART 15 E clause 15.407(a)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause C&D	PASS
6 dB Bandwidth	FCC PART 15 E clause 15.407(e) Only for band IV	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause C	PASS
Maximum Conducted Output Power	FCC PART 15 E clause 15.407(a)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause E	PASS
Maximum Peak Power Spectral Density	FCC PART 15 E clause 15.407(a)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause F	PASS
Radiated spurious emission	FCC PART 15 E clause 15.407(b)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause G	PASS
Band Edge	FCC PART 15 E clause 15.407(b)	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause G	PASS
Conducted Emissions at Mains Terminals	FCC PART 15 E section 15.207	ANSI C63.10: Clause 6.2	N/A

Remark:
N/A: not applicable. Refer to the relative section for the details.
EUT: In this whole report EUT means Equipment Under Test.
Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.
RF: In this whole report RF means Radio Frequency.
ANSI C63.10: the detail version is ANSI C63.10:2013 in the whole report
The product cannot be used while charging.

TEST REPORT

2.0 General Description

2.1 Product Description

Operating Frequency:	Band I 5150 MHz to 5250 MHz and Band IV 5725 MHz to 5850MHz
Type of Modulation:	802.11an: OFDM (BPSK/QPSK/16QAM/64QAM)
Transmit Data Rate:	802.11an(HT40): MCS0:15Mbps, MCS1:30Mbps, MCS2:45Mbps, MCS3:60Mbps, MCS4:90Mbps, MCS5:120Mbps, MCS6:135Mbps, MCS7:150Mbps
Number of Channels	Band I 5150MHz to 5250MHz: 2 Channels for Band I Band IV 5725MHz to 5850MHz: 2 Channels for Band IV
Channel Separation:	40 MHz
Antenna Type	Chip antenna
Antenna gain:	1.96 dBi
Function:	Nuvis® camera head with 5 GHz WIFI
EUT Power Supply:	Battery:2*4.2VDC
Power cord:	--

channels and frequencies list:

Band I 5150 MHz to 5250 MHz

For 802.11an(HT40): test frequencies are lowest channel 38: 5190 MHz and highest channel 46: 5230 MHz

Band I 5725 MHz to 5850 MHz

For 802.11an(HT40): test frequencies are lowest channel 151: 5755 MHz and highest channel 159: 5795 MHz

For WIFI an(HT 40)

Band I(5150MHz-5250MHz)		Band IV(5725MHz-5850MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	151	5755
46	5230	159	5795

2.2 Related Submittal(s) Grants

This is an application for certification of:
NII - Unlicensed National Information Infrastructure TX.
DXX - Part 15 Low Power Communication Device Transmitter

2.3 Test Methodology

The EUT was performed according to the procedures in FCC Part 15 E, Section15.203, 15.207, 15.209, 15.407 and ANSI C63.4:2014, method of measurement: reference to FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04.
Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10:2013. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans and final tests were performed in the semi-anechoic chamber to determine the worst case modes.
All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise.

2.4 Test Facility

All tests were performed at:
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Room102/104, No 203, KeZhu Road, Science City, GETDD Guangzhou, China
Except Conducted Emissions was performed at:
Room101/301/401/102/202/302/402/502/602/702/802, No. 7-2, Caipin Road, Huangpu District, Guangzhou, Guangdong, China

A2LA Certificate Number 0078.10
Intertek Testing Services Shenzhen Ltd. Guangzhou Branch is accredited by A2LA and Listed in FCC website. FCC accredited test labs may perform both Certification testing under Parts 15 and 18 and Declaration of Conformity testing.

3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, AC power line was manipulated to produce worst case emissions. It was powered by DC8.4V supply.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

TEST REPORT

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. The spurious emissions more than 20 dB below the permissible value are not reported.

For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Frequency range of radiated emission measurements

Lowest frequency generated in the device	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz, whichever is lower
At or above 10 GHz to below 30 GHz	5th harmonic of highest fundamental frequency or to 100 GHz, whichever is lower
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz, whichever is lower, unless otherwise specified

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

3.2 EUT Exercising Software

The IE-CH1000 is paired with the IE-BS1000 for continuous signal transmission.

3.3 Special Accessories

No special accessories used.

TEST REPORT

3.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	20 dB Bandwidth	2.3%
	6dB Bandwidth	
	99% Bandwidth	
2	Carrier Frequencies Separated	2.3%
3	Dwell Time	1.2%
4	Maximum Peak Conducted Output Power	1.5dB
5	Peak Power Spectral Density	1.5dB
6	Out of Band Conducted Emissions	1.5dB
7	Band edges measurement	1.5dB
8	Radiated Emissions	4.7 dB (25 MHz-1 GHz)
		4.8 dB (1 GHz-18 GHz)
		5.21dB (18GZH-26GHz)
9	Conducted Emissions at Mains Terminals	2.58dB
10	Temperature	0.5 °C
11	Humidity	0.4 %
12	Time	1.2%

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT.
Measurement uncertainty is calculated in accordance with ETSI TR 100 028-2001.
The measurement uncertainty is given with a confidence of 95%, k=2.
When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance – Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value

3.5 Equipment Modification

Any modifications installed previous to testing by Integrated Endoscopy will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

3.6 Support Equipment List and Description

Equipment	Model No.	Rating	Supplier
Nuvis® adapter for IE-BS1000	LY005SPS0120400W2	AC120-240V,50/60Hz	Applicant
Nuvis® wireless base station	IE-BS1000	AC120-240V,50/60Hz	Applicant

TEST REPORT

4.0 Measurement Results

4.1 Antenna Requirement

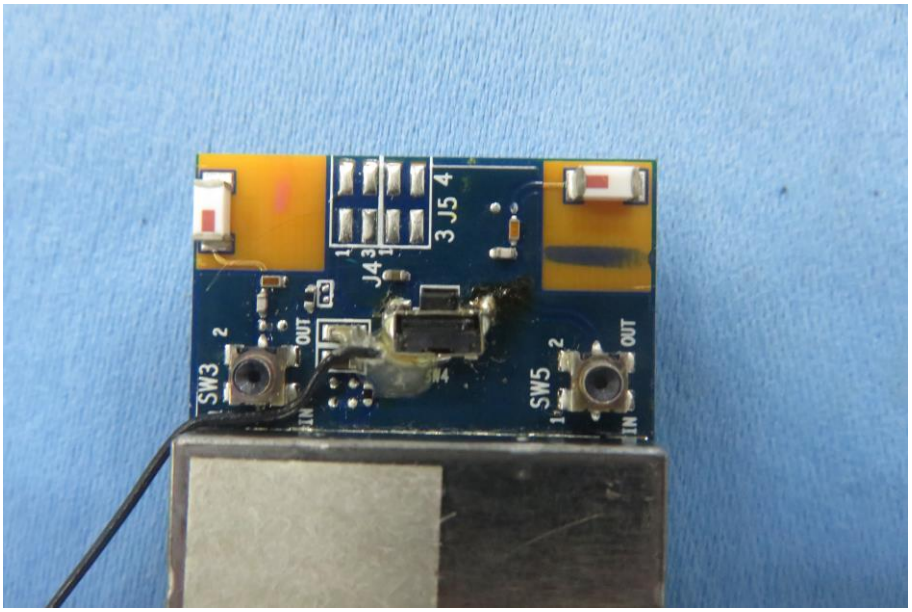
Standard requirement:

15.203 requirement:

For intentional device. According to 15.203 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.

EUT Antenna

The antenna is an integral antenna and no consideration of replacement. The best case gain of the antenna is 1.96 dBi.

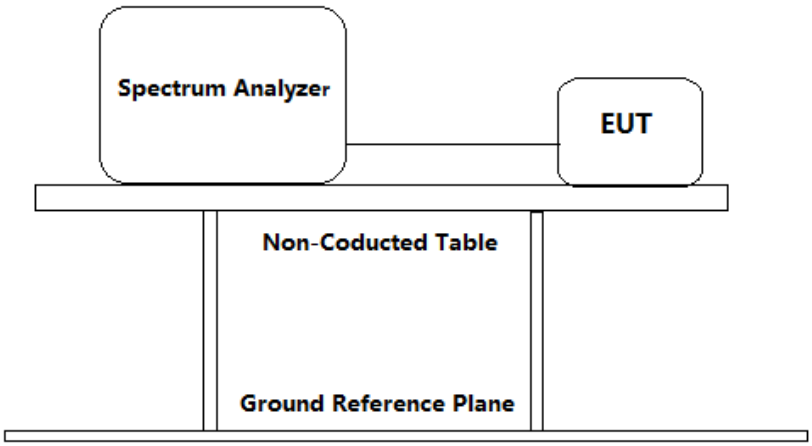


TEST REPORT

4.2 Duty Cycle

Test Requirement:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause B
Test Method:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause B
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1.3 dB , with 10 dB attenuator) from the antenna port to the spectrum.
2. Set the spectrum analyser:
   a) Set RBW ⩾ 1MHz
   b) Set the VBW ⩾ [3 x RBW]
   c) Detector =peak
   d) Span = Zero span
   e) Sweep time = 100ms
   f) Trace mode = Free run
3. Repeat until all the test status is investigated.
4. Report the worst case.

Used Test Equipment List

Spectrum Analyzer. Refer to Clause 5 Test Equipment List for details.

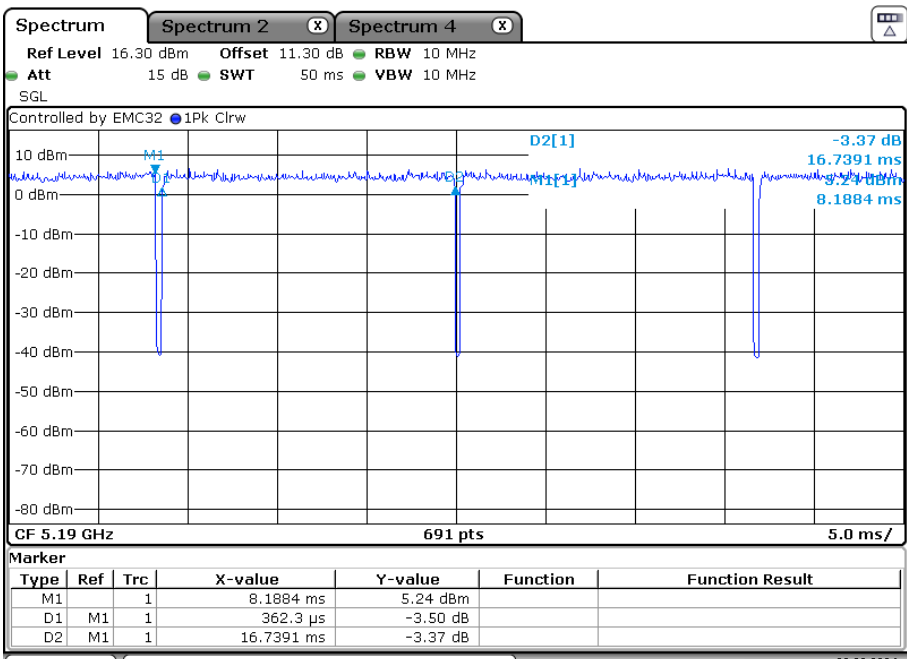
TEST REPORT

Test result:

Channel No.	Frequency (MHz)	Mode	On time (ms)	Period (ms)	Duty Cycle (%)
38	5190	802.11n (HT40)	16.377	16.739	97.84
151	5755		16.667	16.377	98.26

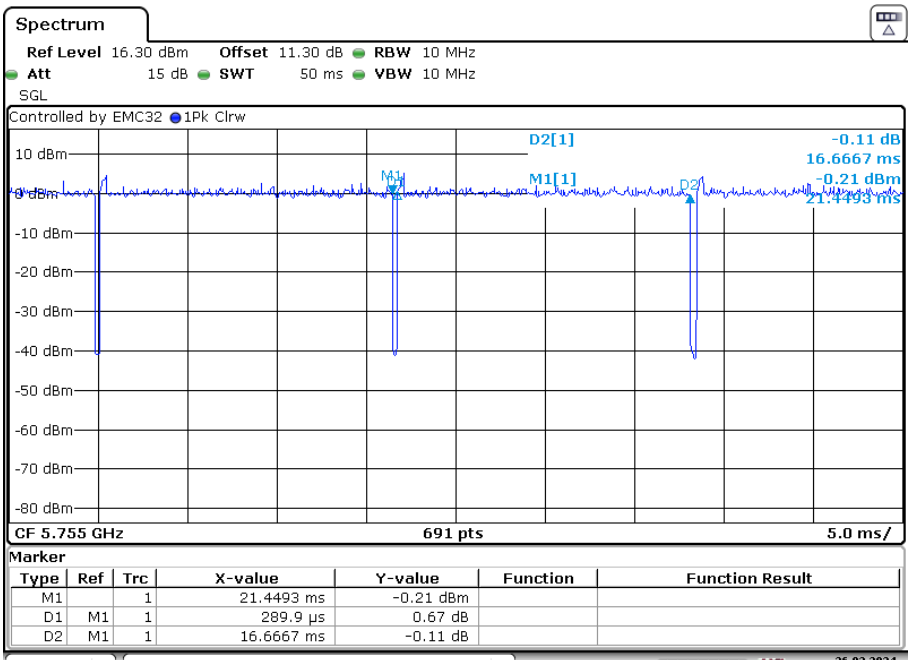
Result plot as follows:

Channel 38: 5190 MHz:



Channel 151: 5755 MHz:

TEST REPORT



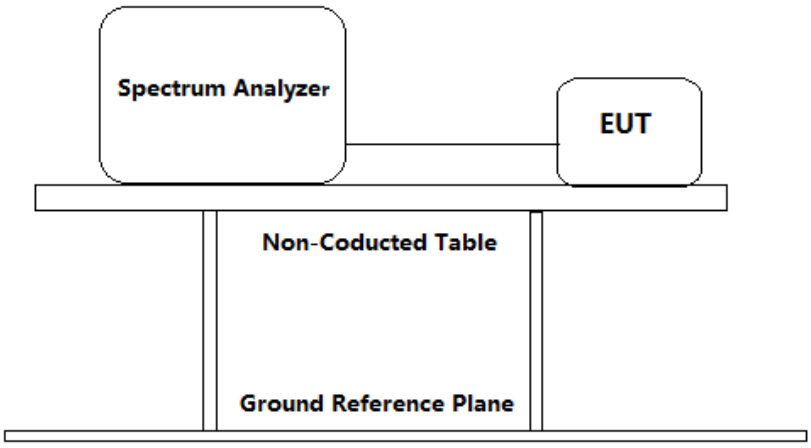
4.3 26 dB Bandwidth

Test Requirement: FCC PART 15 E clause 15.407(a)

Test Method: FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause C&D

Test Status: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

TEST REPORT

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1.3 dB, with 10 dB attenuator) from the antenna port to the spectrum.
2. Set the spectrum analyzer:
   a) Set the RBW = approximately 1% of the emission bandwidth.
   b) Set the VBW ≥ [3 × RBW].
   c) Detector = peak.
   d) Trace mode = max hold.
   e) Sweep = auto couple.
   f) Allow trace to fully 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 26 dB relative to the maximum level measured in the fundamental emission.
3. Repeat until all the test status is investigated.
4. Report the worst case.

Used Test Equipment List

Spectrum Analyzer. Refer to Clause 5 Test Equipment List for details.

ANT1

Channel No.	Frequency (MHz)	Mode	Data Rate (Mbps)	Result (MHz)
38	5190	802.11an (HT40)	15	40.463
46	5230		15	40.637

ANT1

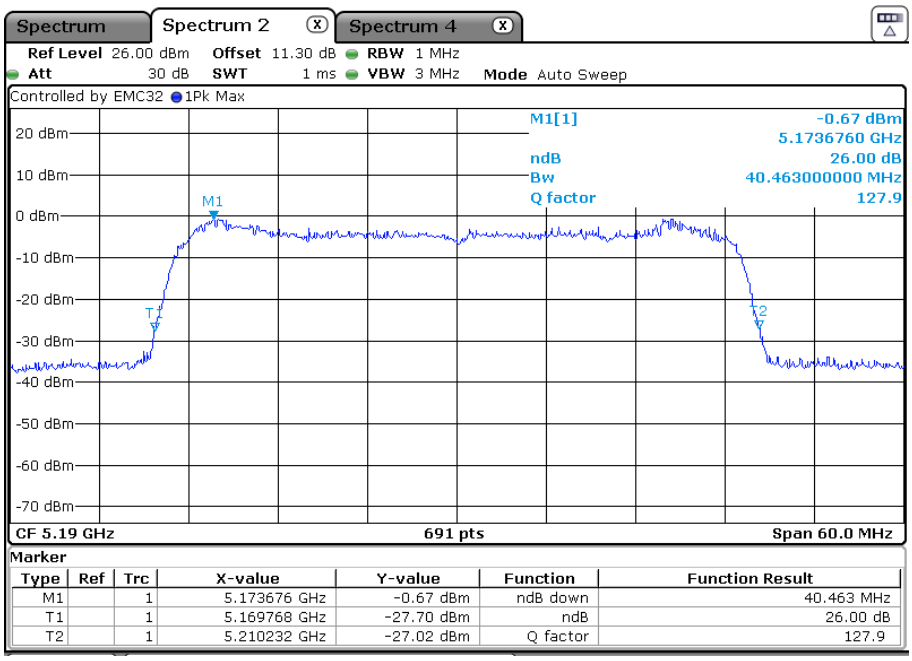
Channel No.	Frequency (MHz)	Mode	Data Rate (Mbps)	Result (MHz)
151	5755	802.11an (HT40)	15	40.289
159	5795		15	40.637

TEST REPORT

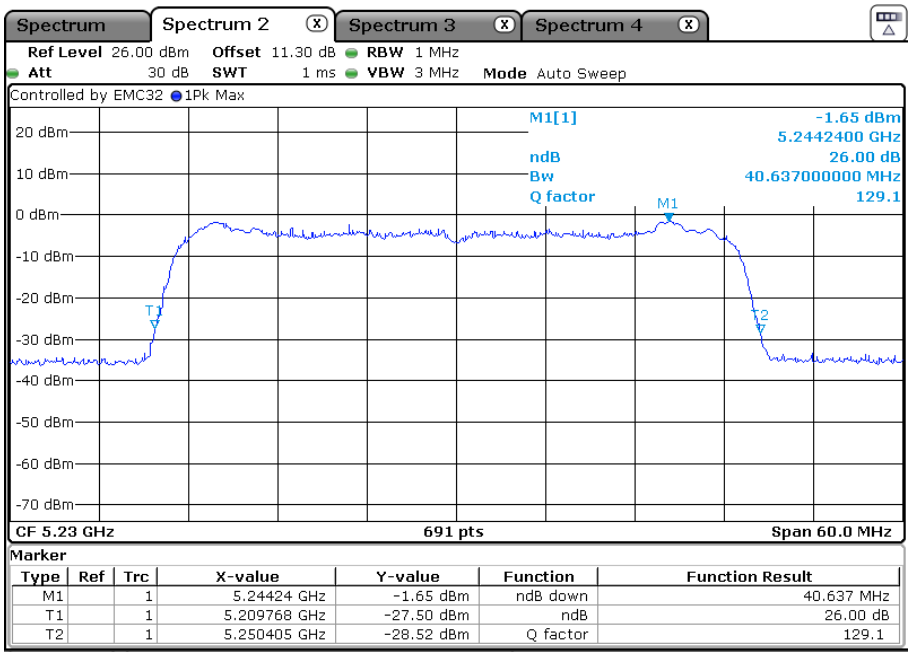
Test result: The unit does meet the FCC requirements.

Result plot as follows:

Channel 38: 5190 MHz:



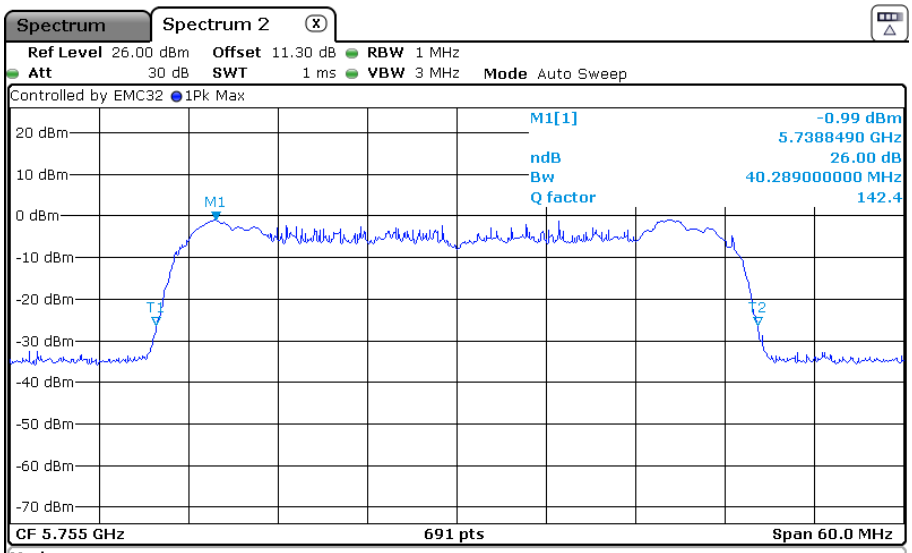
Channel 46: 5190 MHz:



TEST REPORT

Result plot as follows:

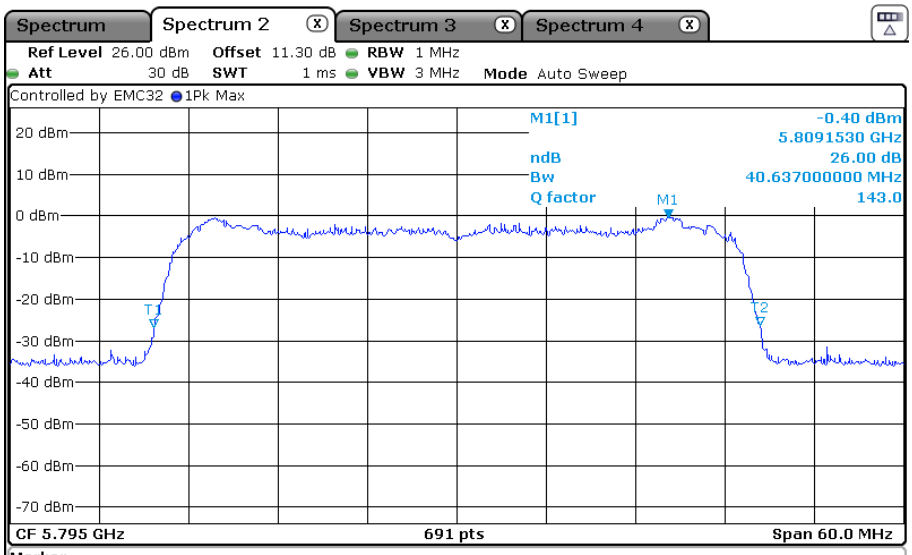
Channel 151: 5755 MHz:



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.738849 GHz	-0.99 dBm	ndB down	40.289 MHz
T1		1	5.734855 GHz	-26.40 dBm	ndB	26.00 dB
T2		1	5.775145 GHz	-26.44 dBm	Q factor	142.4

Channel 159: 5795 MHz:



Marker

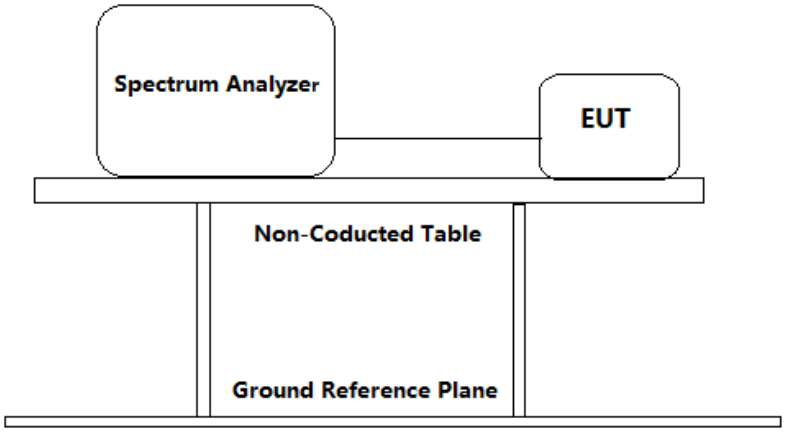
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	5.809153 GHz	-0.40 dBm	ndB down	40.637 MHz
T1		1	5.774682 GHz	-26.97 dBm	ndB	26.00 dB
T2		1	5.815318 GHz	-26.32 dBm	Q factor	143.0

TEST REPORT

4.4 6 dB Bandwidth

Test Requirement:	FCC PART 15 E clause 15.407(e) Within the 5.725–5.85 GHz band the minimum 6 dB bandwidth of U–NII devices shall be at least 500 kHz.
Test Method:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause C
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

1. Remove the antenna from the EUT and then connect a low attention attenuation RF cable(cable loss =1.3 dB, with 10 dB attenuator) from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer:
   a) Set RBW = 100 kHz.
   b) Set 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.
   h) Span=2*BW~5*BW.
3. Repeat until all the test status is investigated.
4. Report the worst case.

TEST REPORT

Used Test Equipment List

Spectrum Analyzer. Refer to Clause 5 Test Equipment List for details.

Test result:

ANT2

Channel No.	Frequency (MHz)	Mode	Data Rate (Mbps)	6dB bandwidth (MHz)	Limit	Result
151	5755	802.11an (HT40)	15	35.514	>500 kHz	Pass
159	5795		15	35.514		Pass

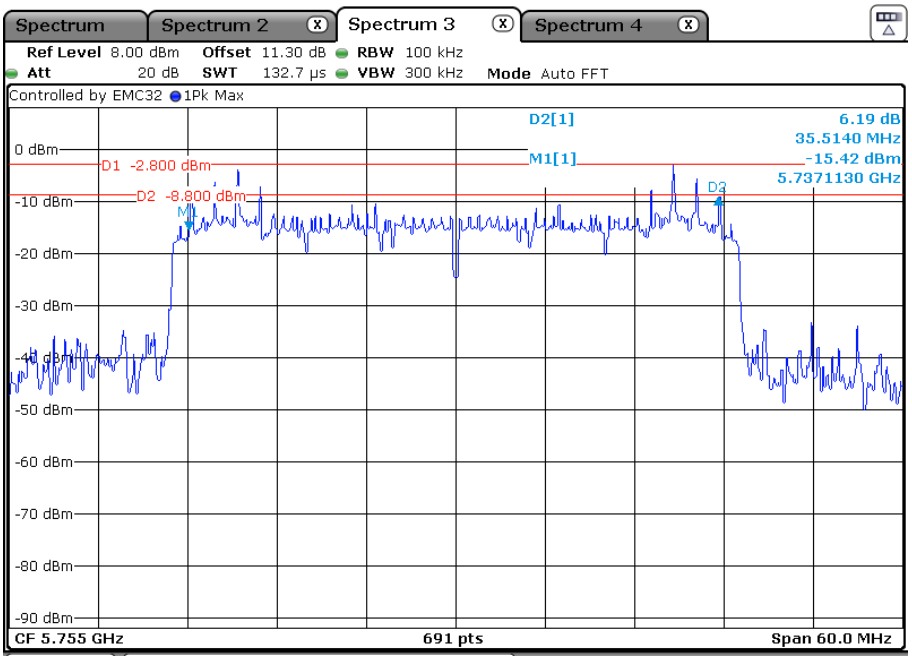
Test result: The unit does meet the FCC requirements

TEST REPORT

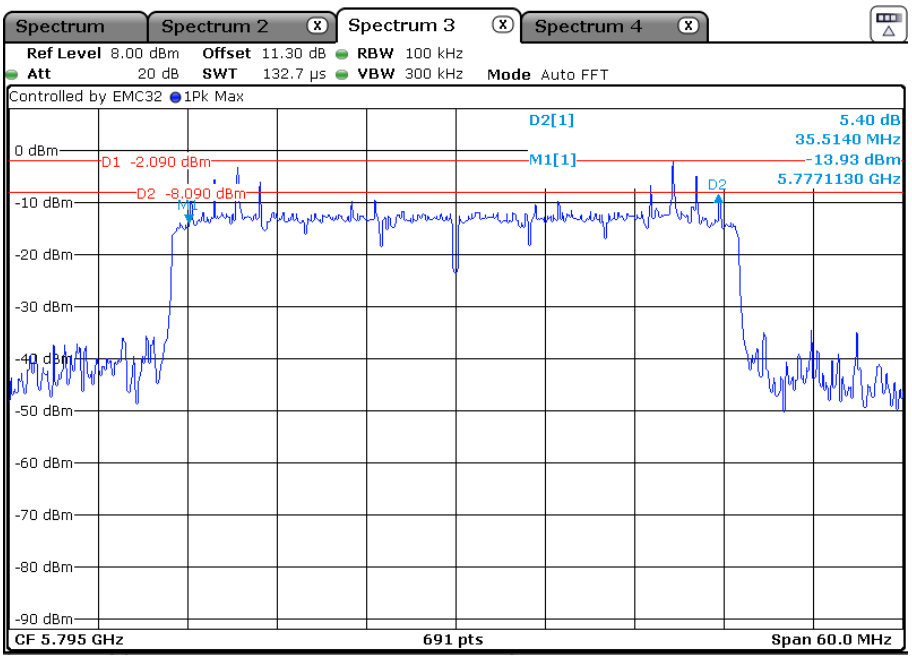
Result plot as follows:

802.11an(HT 40)

Channel 151: 5755 MHz:



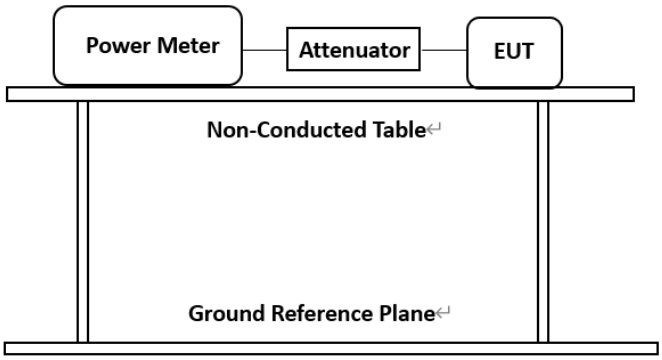
Channel 159: 5795 MHz:



TEST REPORT

4.5 Maximum Conducted Output Power

Test Requirement:	FCC Part 15 E clause 15.407(a)
Test Method:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause E
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test Configuration:	



Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable (cable loss =1.3dB, with 10 dB attenuator) from the antenna port to the spectrum analyzer.
2. The EUT is configured to transmit continuously or to transmit with a constant duty cycle Repeat until all the test status is investigated.
3. If the EUT is transmitting at all times, it must be transmitting at its maximum power control level.
4. If the EUT does not transmit continuously, measure the duty cycle and adjust the measurement in dBm by adding 10log(1/x) where x is the duty cycle of transmitter output signal. This measurement is an average over both the ON and OFF periods of the transmitter.
5. Report the worst case.

Used Test Equipment List

Power meter. Refer to Clause 5 Test Equipment List for details.

TEST REPORT

Test result:

Maximum Conducted Output Power
Band I (5150MHz-5250MHz)

Channel No.	Frequency (MHz)	Mode	Data Rate (Mbps)	ANT1 (dBm)	ANT2 (dBm)	Maximum Conducted output power (dBm)Total	Limit dBm	Result
38	5190	802.11an (HT40)	15	2.1	2.2	5.16	24	Pass
46	5230		15	1.7	2.4	5.07		Pass

Band IV (5725MHz-5850MHz)

Channel No.	Frequency (MHz)	Mode	Data Rate (Mbps)	ANT1 (dBm)	ANT2 (dBm)	Maximum Conducted output power (dBm)Total	Limit dBm	Result
151	5755	802.11an (HT40)	15	1.7	2.0	4.86	30	Pass
159	5795		15	1.7	1.7	4.71		Pass

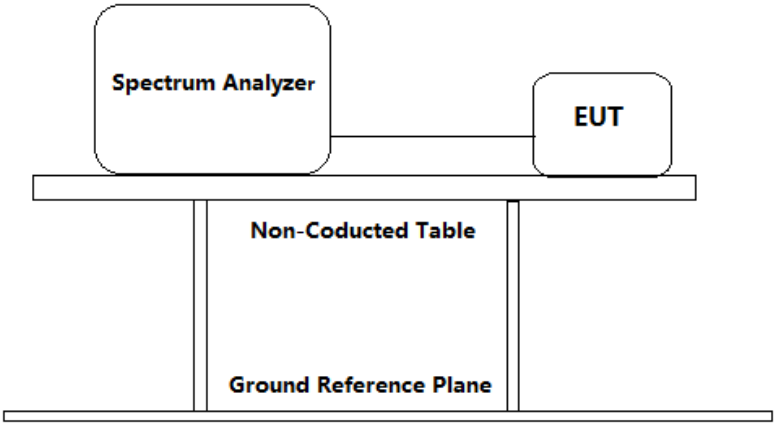
Remark: Level = Read Level + Cable Loss (1.3 dB).
The unit does meet the FCC requirements.

TEST REPORT

4.6 Maximum Peak Power Spectral Density

Test Requirement:	FCC Part 15 E clause 15.407(a)
Test Method:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause F
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.

Test Configuration:



Test Procedure:

6. Remove the antenna from the EUT and then connect a low attention attenuation RF cable (cable loss =1.3 dB , with 10 dB attenuator) from the antenna port to the spectrum analyzer.
7. Set the spectrum analyzer:

   For Band I (5150MHz-5250MHz)
   a) Set the RBW = 1MHz.
   b) Set the VBW ≥ [3 × RBW].
   c) Set the span ≥ 26 dB Bandwidth
   d) Detector = peak
   e) Sweep time = auto couple.
   f) Trace mode = max hold.
   g) Allow trace to fully stabilize.
   i) Use the peak marker function to determine the maximum amplitude level within the RBW.

For Band IV (5725MHz-5850MHz)
a) Set the RBW = 500kHz.
b) Set the VBW ≥ [3 × RBW].
c) Set the span ≥ 26 dB Bandwidth.

d) Detector = peak
e) Sweep time = auto couple.
f) Trace mode = max hold.
g) Allow trace to fully stabilize.
i) Use the peak marker function to determine the maximum amplitude level within the RBW. Measure the Power Spectral Density of the test frequency with special test status.

8. Measure the Power Spectral Density of the test frequency with special test status.
9. Repeat until all the test status is investigated.
10. Report the worst case.

Used Test Equipment List
Spectrum Analyzer. Refer to Clause 5 Test Equipment List for details.

Band I (5150MHz-5250MHz)

Channel No.	Frequency (MHz)	Mode	Data Rate (Mbps)	ANT1 (dBm/MHz)	ANT2 (dBm/MHz)	Maximum Conducted output power (dBm/MHz)Total	Limit	Result
38	5190	802.11an (HT40)	15	-0.66	-1.49	1.96	10dBm/MHz	Pass
46	5230		15	-1.84	-2.12	1.03		Pass

Band IV (5725MHz-5850MHz)

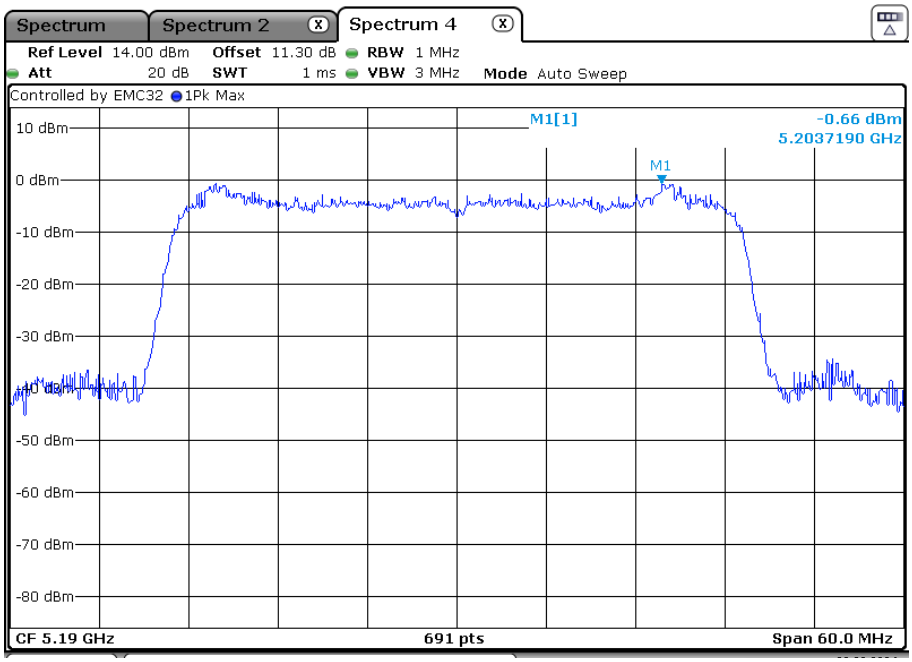
Channel No.	Frequency (MHz)	Mode	Data Rate (Mbps)	ANT1 (dBm/500KHz)	ANT2 (dBm/500KHz)	Maximum Conducted output power (dBm/500KHz) Total	Limit	Result
151	5755	802.11an (HT40)	15	-3.15	-2.89	-0.08	30dBm/500kHz	Pass
159	5795		15	-2.85	-1.89	0.67		Pass

Test result: Level = Read Level + Cable Loss(2dB).
The unit does meet the FCC requirements

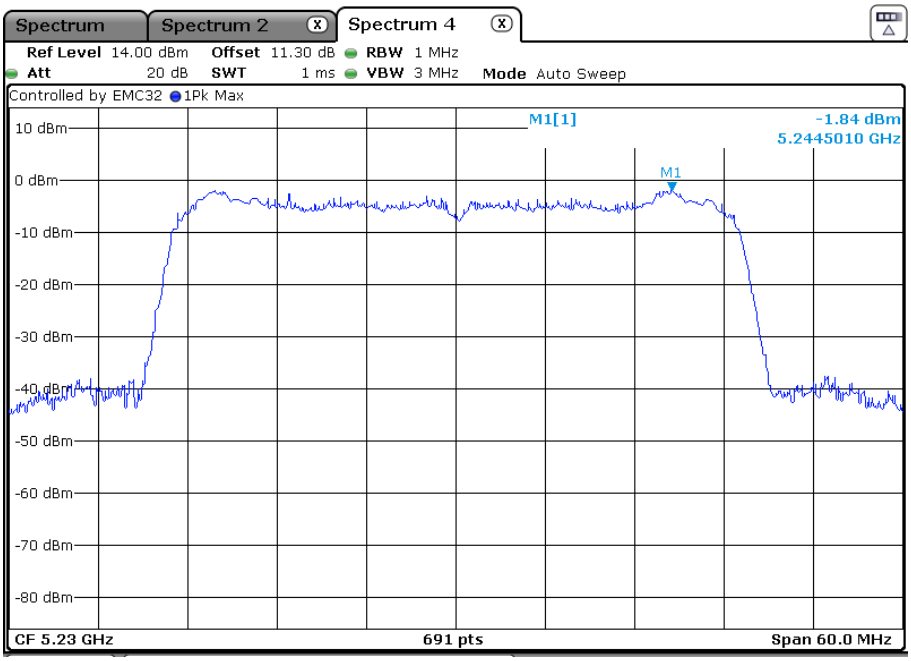
TEST REPORT

ANT1
Result plot as follows:

Channel 38: 5190 MHz:

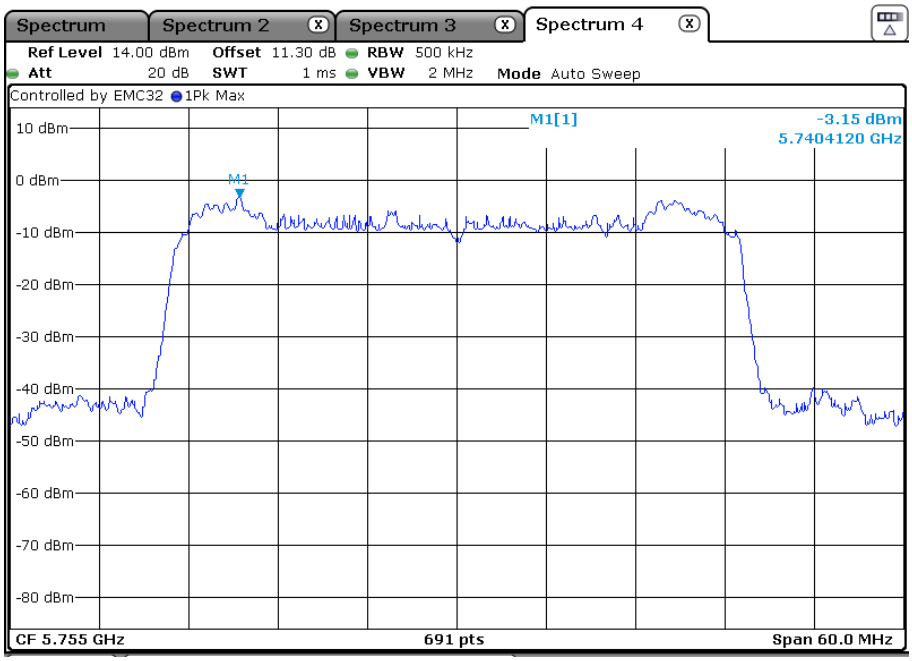


Channel 46: 5190 MHz:

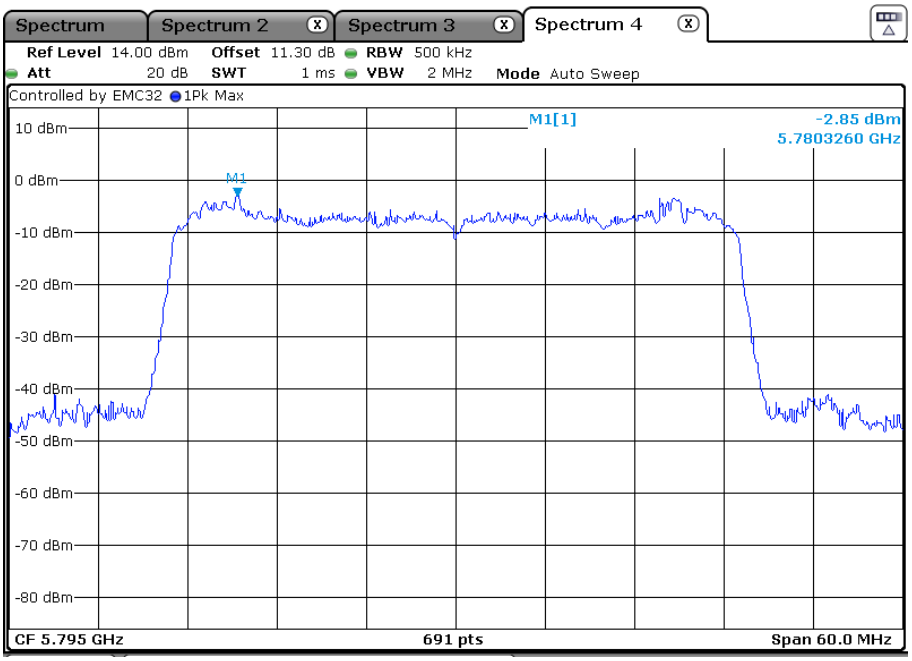


TEST REPORT

Channel 151: 5755 MHz:



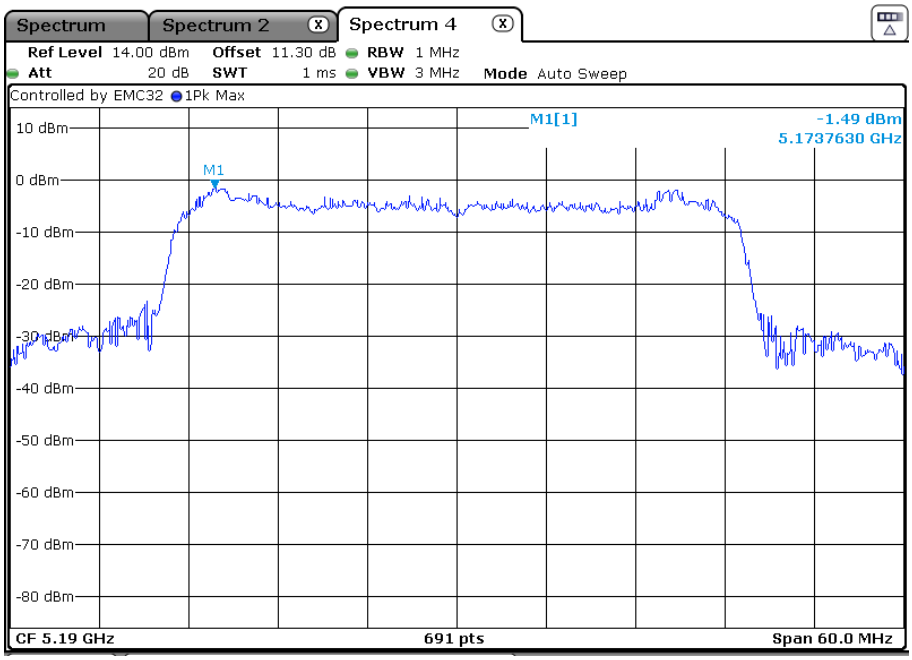
Channel 159: 5795 MHz:



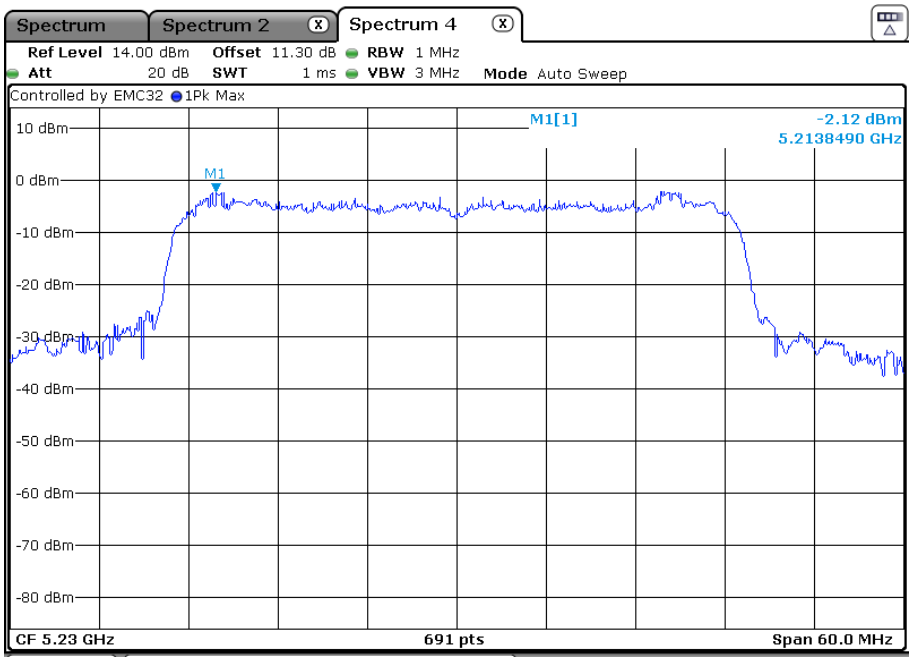
TEST REPORT

ANT2
Result plot as follows:

Channel 38: 5190 MHz:

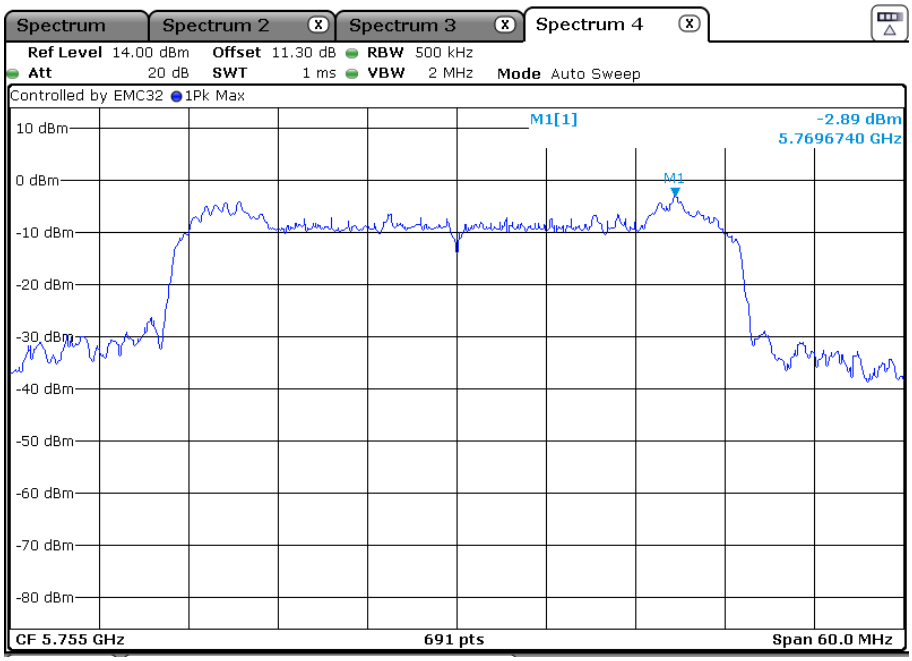


Channel 46: 5190 MHz:

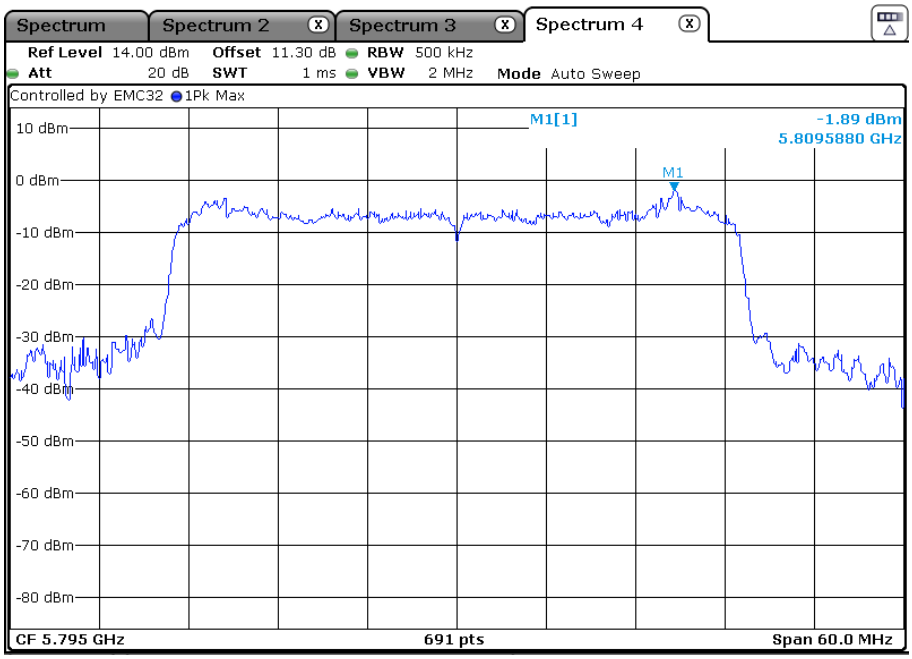


TEST REPORT

Channel 151: 5755 MHz:



Channel 159: 5795 MHz:



4.7 Radiated Spurious Emissions

Test Requirement:	FCC Part 15 E clause 15.407(b) In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04,Clause G
Test Status:	Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture). Following channel(s) was (were) selected for the final test as listed below.
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)
Limit:	40.0 dBμV/m between 30MHz & 88MHz; 43.5 dBμV/m between 88MHz & 216MHz; 46.0 dBμV/m between 216MHz & 960MHz; 54.0 dBμV/m above 960MHz.
Detector:	For Peak and Quasi-Peak value: RBW = 1 MHz for f ≥ 1 GHz, 200 Hz for 9 kHz to 150 kHz 9 kHz for 150 kHz to 30 MHz 120 kHz for 30 MHz to 1GHz VBW ≥ RBW Sweep = auto Detector function = peak for f ≥ 1 GHz, QP for f < 1 GHz Trace = max hold For AV value: RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz VBW=10 Hz Sweep = auto Trace = max hold
Field Strength Calculation:	The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below: FS = RA + AF + CF - AG + PD + AV

FS = RA + Correct Factor + AV

Where:

FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
AF = Antenna Factor in dB
CF = Cable Attenuation Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in –dB
Correct Factor = AF + CF – AG + PD

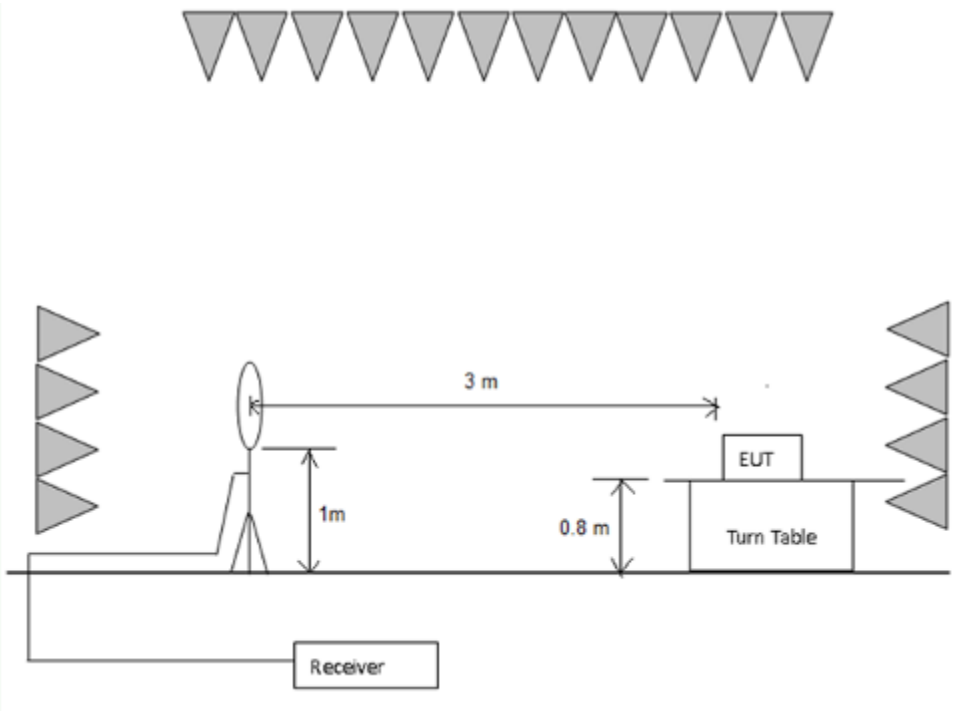
In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:
FS = RA + AF + CF - AG + PD + AV
Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m.
RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB
Correct Factor = 7.4 + 1.6 – 29.0 + 0 = -20 dB
FS = 62 + (-20) + (-10) = 32 dBµV/m

TEST REPORT

Section 15.205 Restricted bands of operation.
(a) Except as shown in paragraph (d) of this section. Only spurious emissions are permitted in any of the frequency bands listed below:

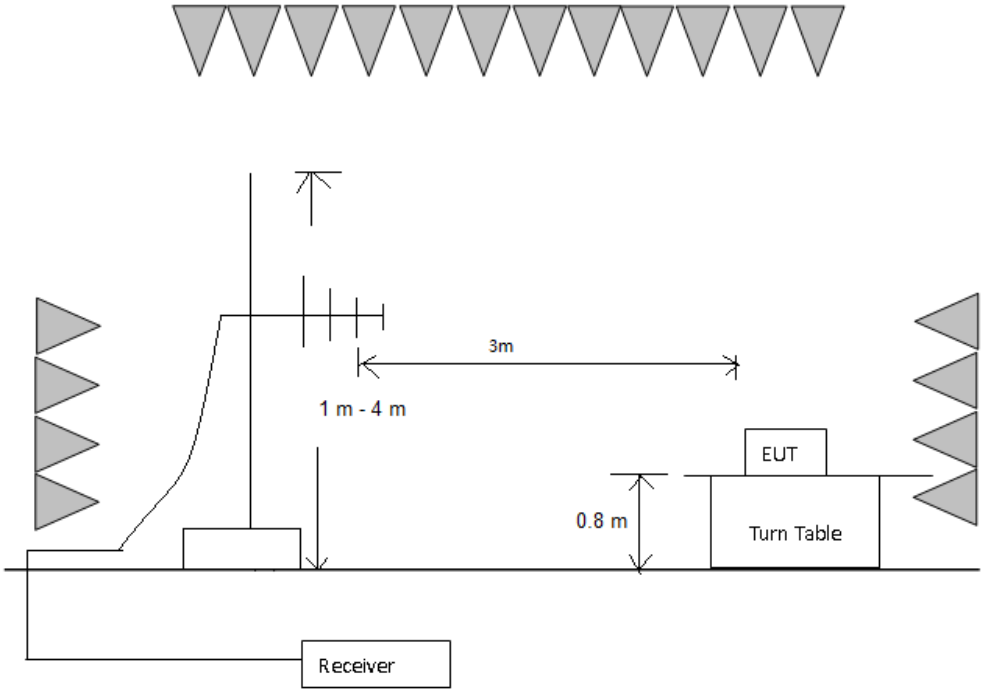
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
10.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	
13.36 - 13.41	322 - 335.4		

Test Configuration:
1) 9 kHz to 30 MHz emissions:

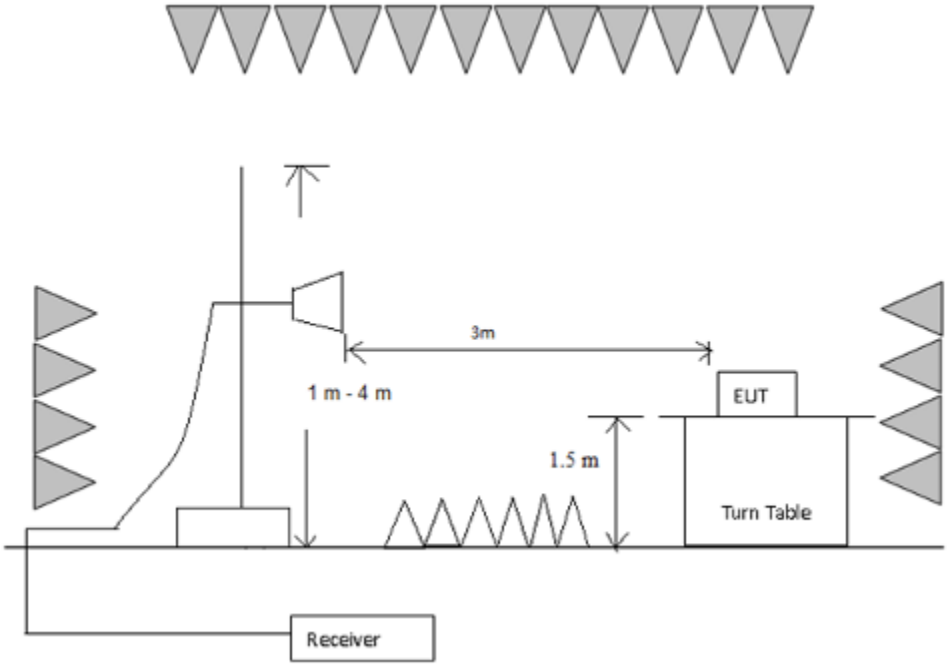


2) 30 MHz to 1 GHz emissions:

TEST REPORT



3) 1 GHz to 40 GHz emissions:



Test Procedure:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2010 was used to perform radiated emission test above 1 GHz.

The receiver was scanned from 9 kHz to 25 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators,

TEST REPORT

measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

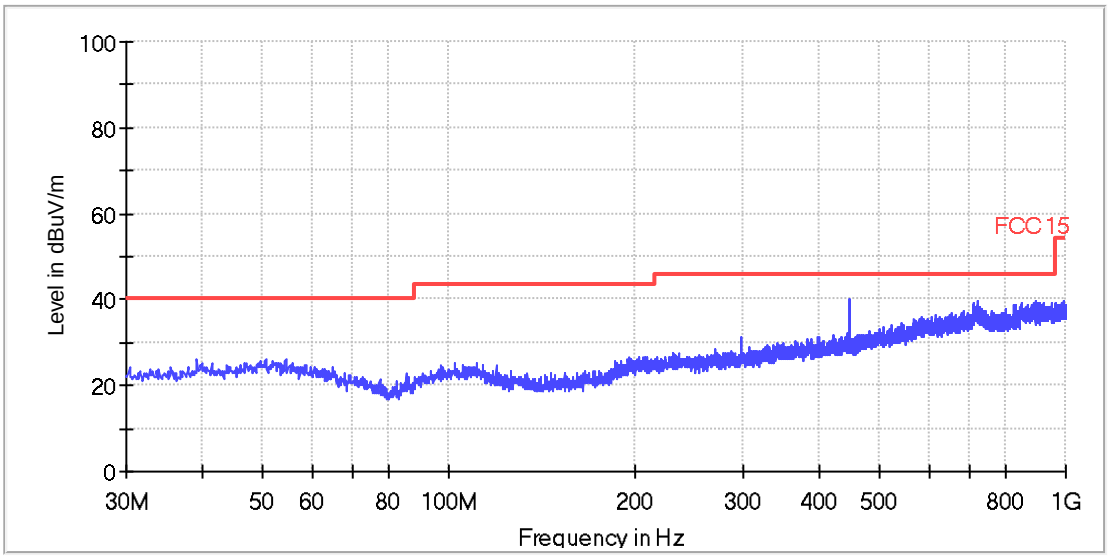
Used Test Equipment List:
3m Semi-Anechoic Chamber, EMI Test Receiver (9 kHz~7 GHz), Signal and Spectrum Analyzer (10 Hz~40 GHz), Loop antenna (9 kHz-30 MHz). TRILOG Super Broadband test Antenna(30 MHz-3 GHz）(RX), Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)(RX) and High Frequency Antenna & preamplifier(18 GHz~26.5 GHz) (RX). Refer to Clause 5 Test Equipment List for details.

9 kHz~30 MHz Field Strength of Unwanted Emissions for Quasi-Peak Measurement
The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement.

Pretest on all channel for each mode of the brand I and brand IV.
The below data test on mode WIFI an (HT40) channel 38: 5140MHz was the worst case of all test record.

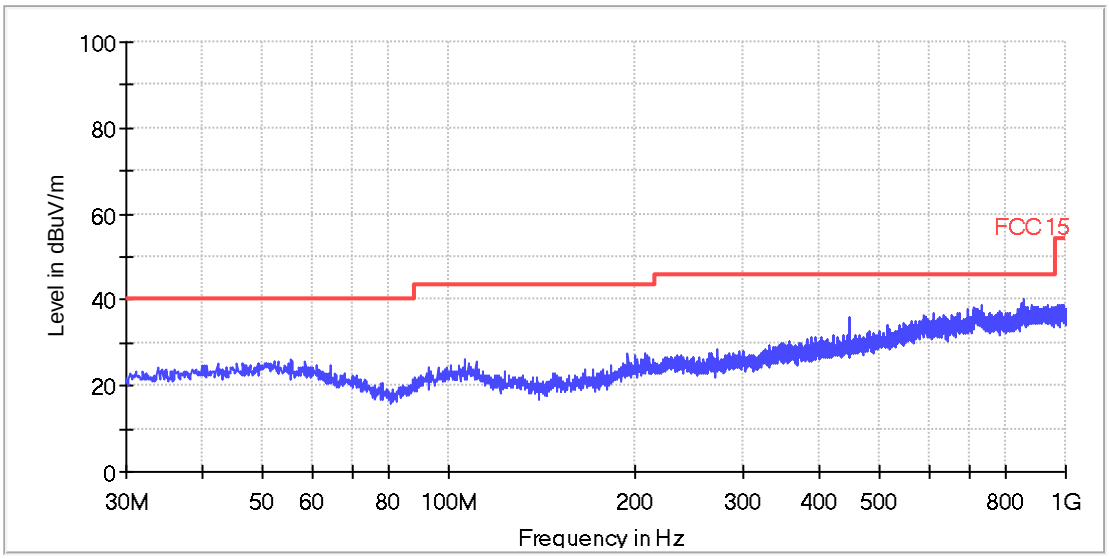
Horizontal:



All emission levels are more than 6dB below the limit.

TEST REPORT

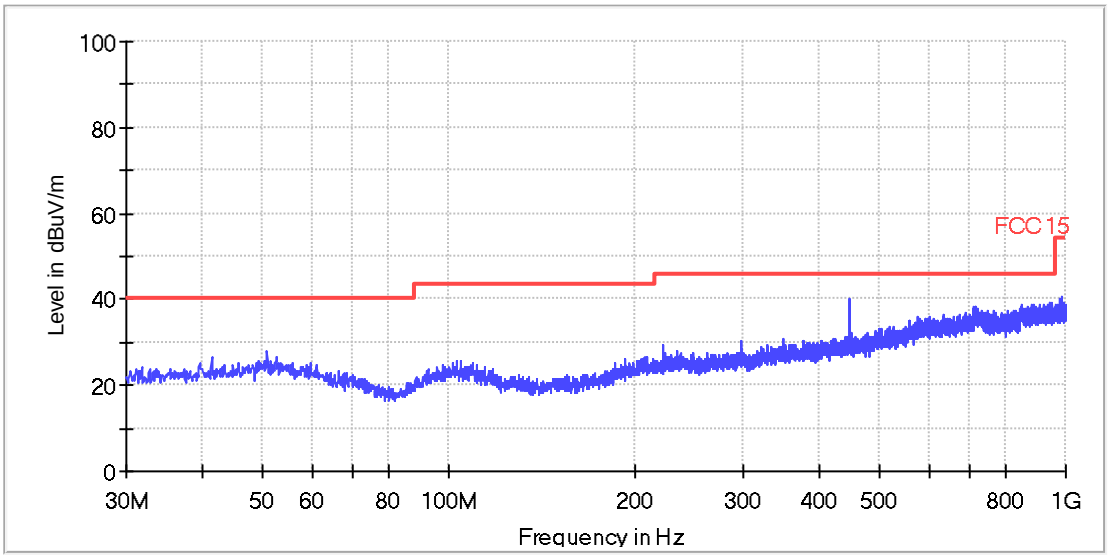
Vertical:



All emission levels are more than 6dB below the limit.

2.4GHz and 5G are transmitted simultaneously.

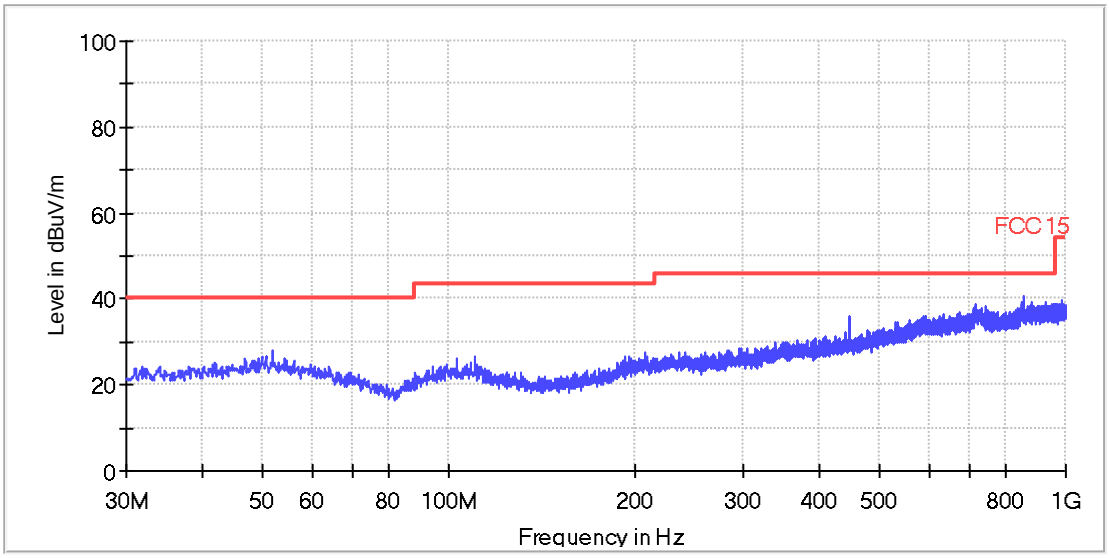
Horizontal



All emission levels are more than 6dB below the limit.

TEST REPORT

Vertical



All emission levels are more than 6dB below the limit.

1~40 GHz Radiated Emissions.
5190MHz

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
1484.5	59.4	-12.1	47.3	74	V
7855.3	41.1	3.6	44.7	68.2	V
1633.3	58.0	-11.3	46.7	68.2	H
7891.4	42.0	3.7	45.7	68.2	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

5230 MHz

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
1765.0	56.9	-10.7	46.2	68.2	V
10439.3	44.9	6.9	51.8	68.2	V
1484.5	61.9	-12.1	49.8	74	H
2415.3	54.2	-8.1	46.1	68.2	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

TEST REPORT

5755 MHz

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
1484.5	65.5	-12.1	53.4	74	V
11491.1	41.8	6.5	48.3	74	V
1484.5	65.4	-12.1	53.3	74	H
2969.9	50.4	-6.1	44.3	68.2	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

5795 MHz

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
1484.5	59.5	-12.1	47.4	74	V
9421.4	42.0	4.7	46.7	74	V
1484.5	58.8	-12.1	46.7	74	H
8888.0	41.1	4.5	45.6	68.2	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

2.4GHz and 5G are transmitted simultaneously.

Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
8001.9	41.8	3.9	45.7	68.2	V
11591.0	42.7	6.5	49.2	74	V
6799.1	43.4	1.8	45.2	68.2	H
9889.5	41.8	6.2	48.0	68.2	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

The field strength is calculated by adding the Antenna Factor. Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading + Antenna Factor + Cable Loss –Preamplifier Factor.

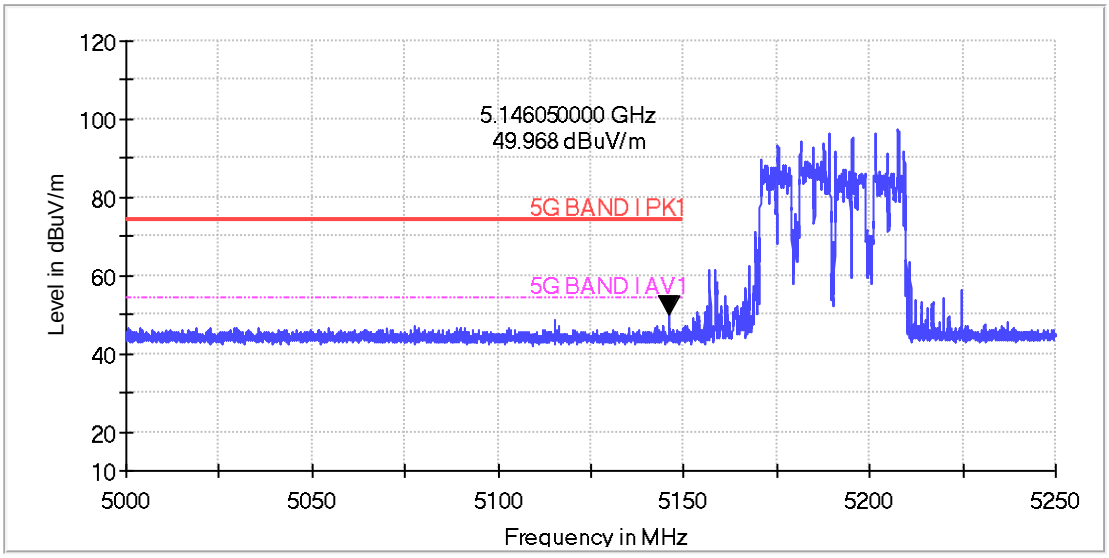
As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

No any other emissions level which are attenuated less than 20dB below the limit.

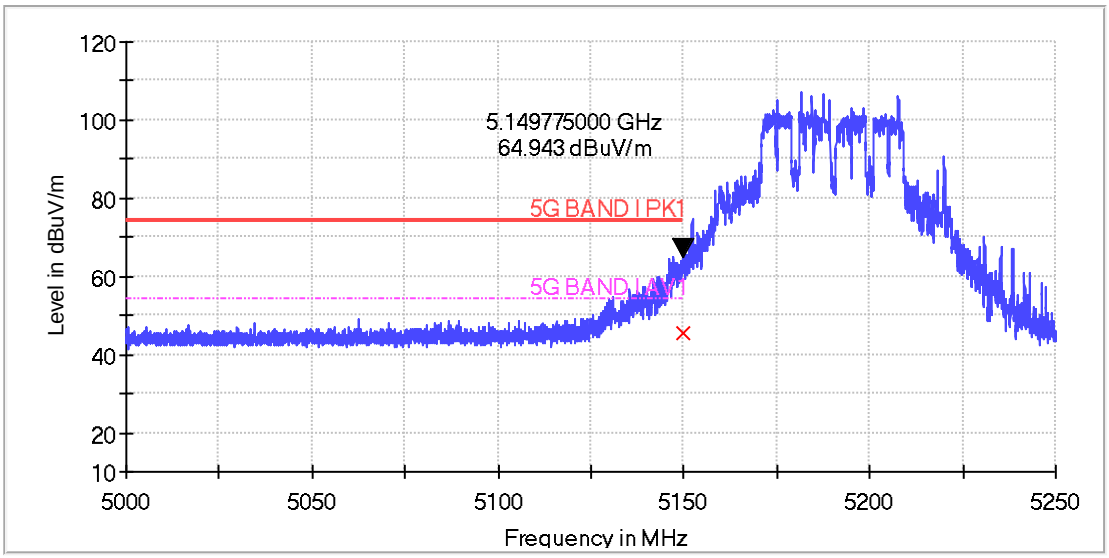
TEST REPORT

4.8 Band Edges Requirement

5190MHz
Horizontal



Vertical



Peak Measurement:

Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
5149.8	65.5	-0.6	64.9	74	V
5146.0	50.6	-0.6	50.0	74	H

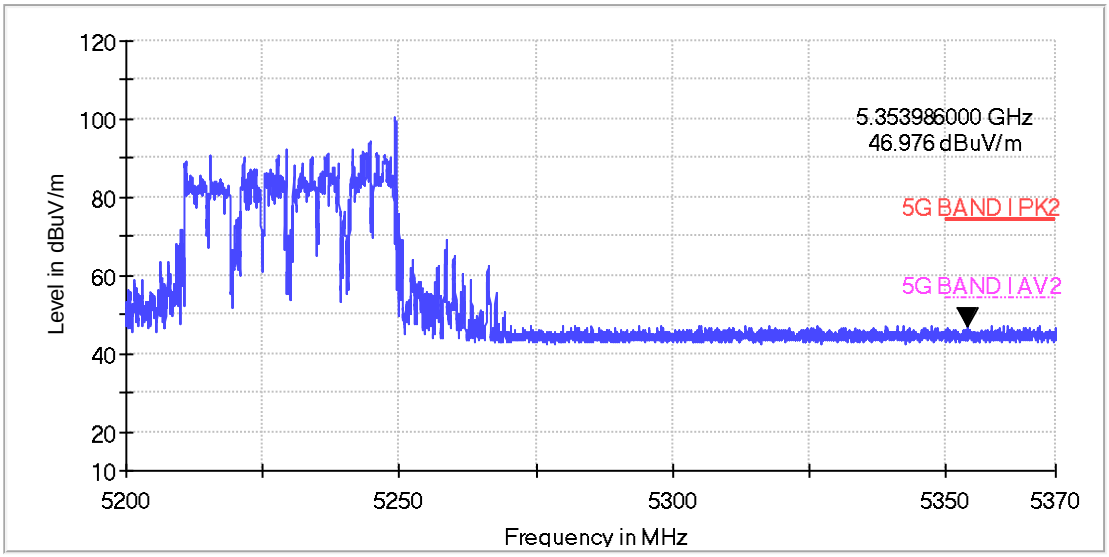
TEST REPORT

AV Measurement:

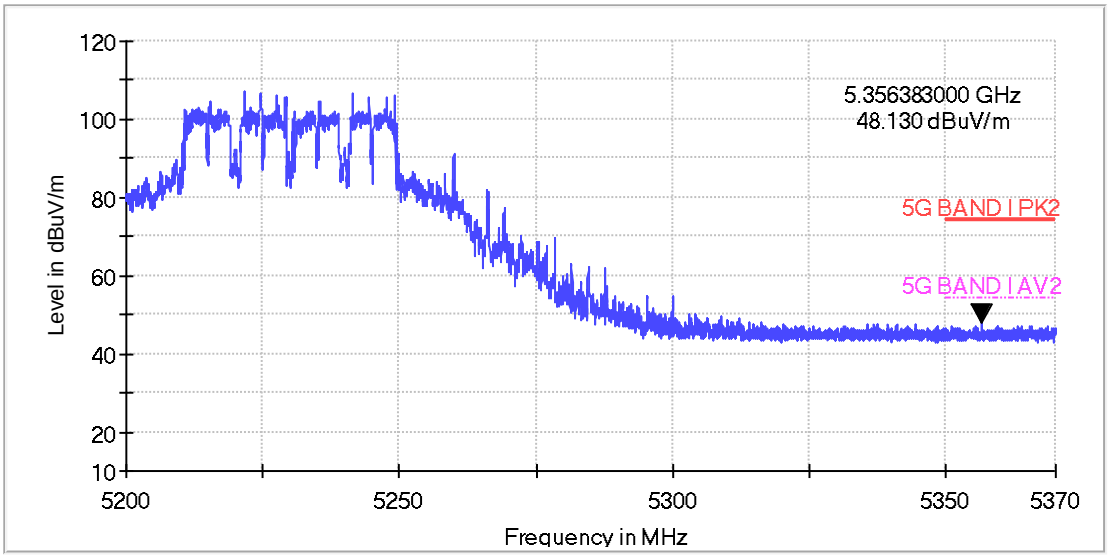
Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
5149.8	46.3	-0.6	45.7	54	V
5146.0	/	-0.6	/	54	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

5230MHz
Horizontal



Vertical



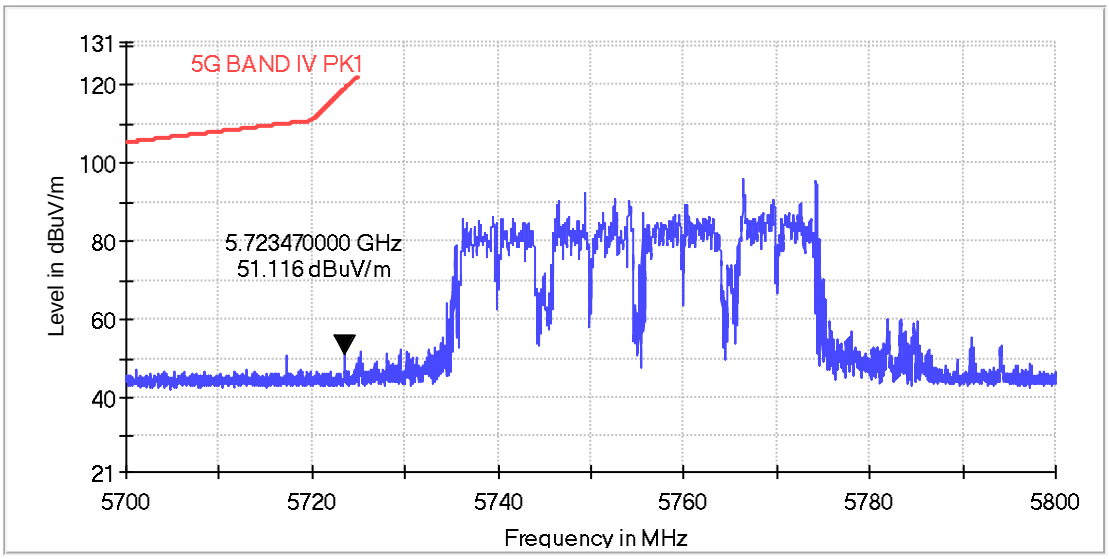
TEST REPORT

Peak Measurement:

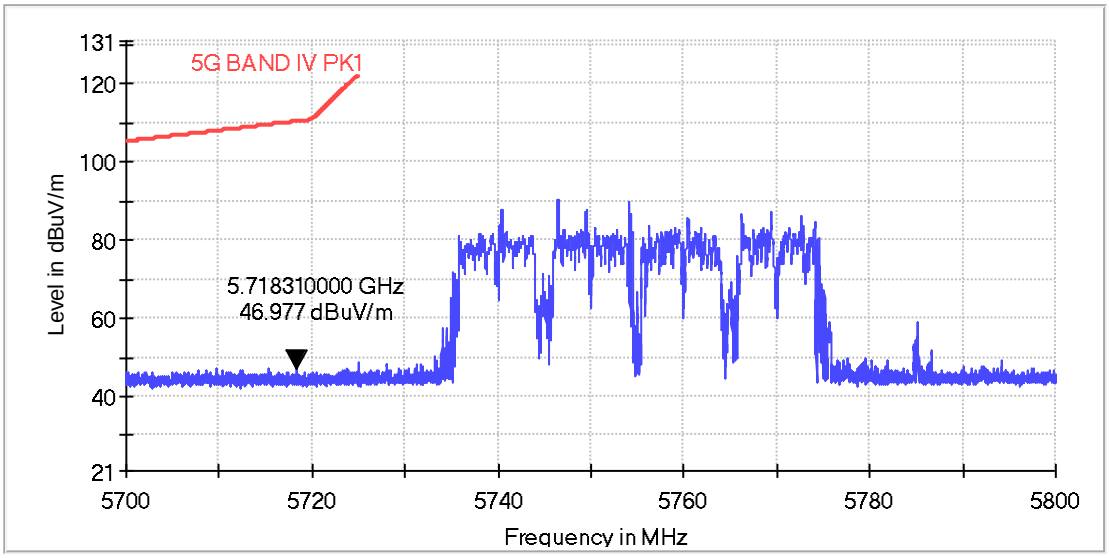
Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
5354.0	47.3	-0.3	47.0	74	V
5356.4	48.4	-0.3	48.1	74	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

5755MHz
Horizontal



Vertical



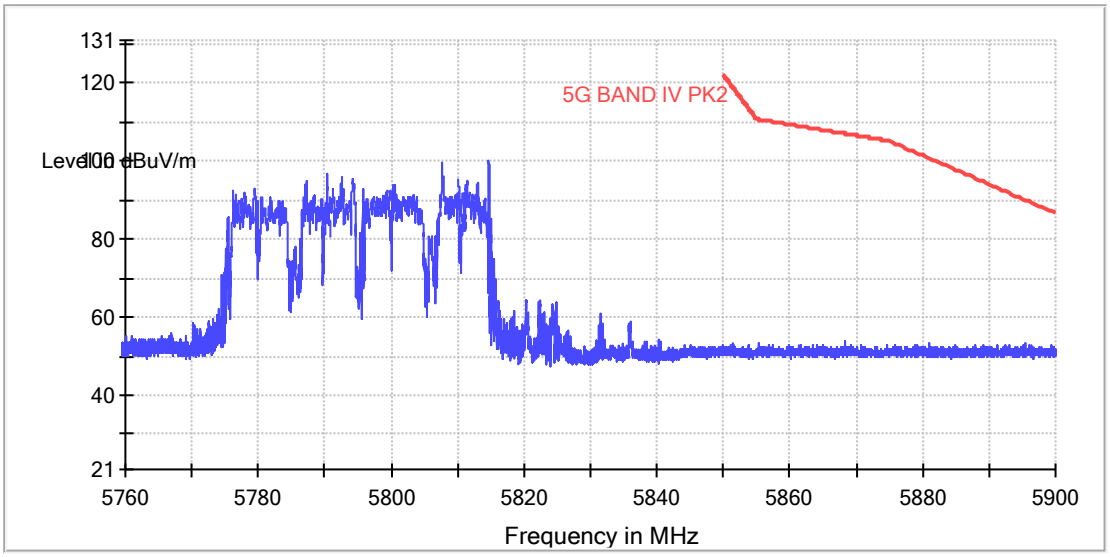
TEST REPORT

Peak Measurement:

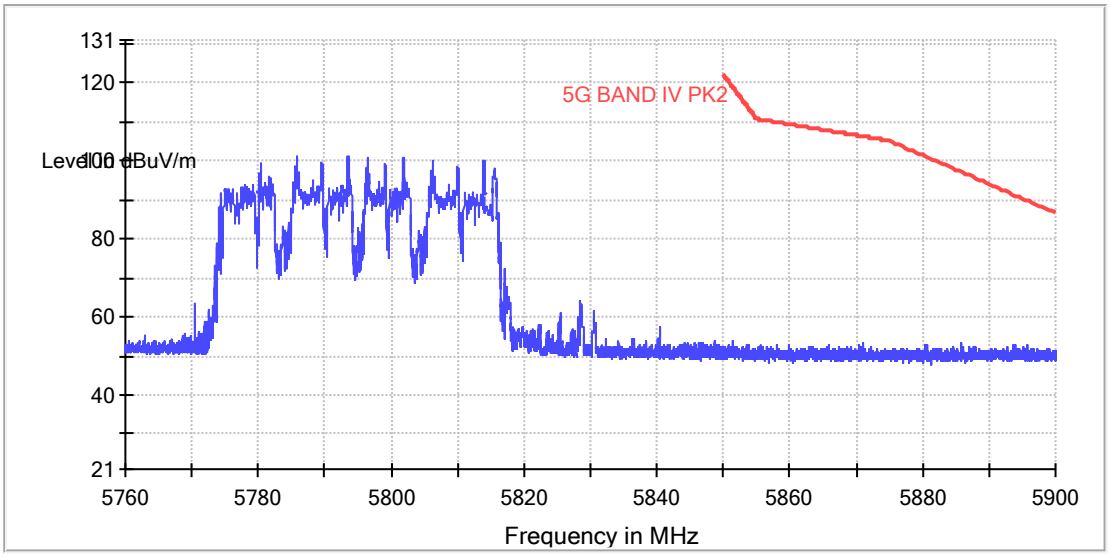
Frequency (MHz)	Reading Level (dBμV)	Correct Factor	Emission Level (dBμV/m)	Limit (dBμV/m)	Antenna polarization
5723.5	50.8	0.3	51.1	122.2	V
5718.3	46.7	0.3	47.0	110.8	H

Remark: When Peak emission level was below AV limit, the AV emission level did not be recorded.

5795MHz
Horizontal



All emission levels are more than 6dB below the limit.
Vertical



All emission levels are more than 6dB below the limit.

4.9 Conducted Emission Test

N/A

5.0 Test Equipment List

Radiated Emission/Radio					
Equipment No.	Equipment	Model	Manufacturer	Cal. Due date (YYYY-MM-DD)	Calibration Interval
EM030-04	3m Semi-Anechoic Chamber	9×6×6 m^3	ETS• LINDGREN	2025-04-09	1Y
EM031-02	EMI Test Receiver (9 kHz~7 GHz)	R&S ESR7	R&S	2024-11-15	1Y
EM031-03	Signal and Spectrum Analyzer (10 Hz~40 GHz)	R&S FSV40	R&S	2024-11-12	1Y
EM011-04	Loop antenna (9 kHz-30 MHz)	HFH2-Z2	R&S	2024-07-02	1Y
EM033-01	TRILOG Super Broadband test Antenna(30 MHz-3 GHz）(RX)	VULB 9163	SCHWARZBECK	2024-12-05	1Y
EM033-02	Bouble-Ridged Waveguide Horn Antenna (800 MHz-18 GHz)(RX)	R&S HF907	R&S	2024-07-02	1Y
EM033-03	High Frequency Antenna & preamplifier(18 GHz~26.5 GHz) (RX)	R&S SCU-26	R&S	2025-04-22	1Y
EM033-04	High Frequency Antenna & preamplifier (26 GHz-40 GHz)	R&S SCU-40	R&S	2025-04-22	1Y
EM031-02-01	Coaxial cable(9 kHz-1 GHz)	N/A	R&S	2025-04-09	1Y
EM033-02-02	Coaxial cable(1 GHz-18 GHz)	N/A	R&S	2025-04-09	1Y
EM033-04-02	Coaxial cable(18 GHz~40 GHz)	N/A	R&S	2025-04-25	1Y
EM031-01	Signal Generator (9 kHz~6 GHz)	SMB100A	R&S	2025-03-17	1Y
EM040-01	Band Reject/Notch Filter	WRHFV	Wainwright	N/A	1Y
EM040-02	Band Reject/Notch Filter	WRCGV	Wainwright	N/A	1Y
EM040-03	Band Reject/Notch Filter	WRCGV	Wainwright	N/A	1Y
EM022-03	2.45 GHz Filter	BRM50702	Micro-Tronics	2025-05-15	1Y
SA016-29	Climatic Test Chamber	MHU-80L	JIANQIAO	2025-01-03	1Y
EM046-05	Power meter	NPR6A	R&S	2025-04-22	1Y
EM046-06	Power meter	NPR6A	R&S	2025-05-09	1Y
EM045-01-01	EMC32 software (RE/RS)	V10.01.00	R&S	N/A	N/A

**********End of the test report**********