

FCC Test Report

Product Name	KENWOOD Motorsports CAM
Model No	STZ-RF200WD
FCC ID	IOMZ1059

Applicant	JVCKENWOOD Corporation
Address	3-12 Moriya-cho, Kanagawa-ku, Yokohama.Kanagawa 221-0022, Japan

Date of Receipt	Feb. 20, 2021
Issued Date	Mar. 31, 2021
Report No.	2120401R-E3032110123
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Report

Issued Date: Mar. 31, 2021

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Product Name	KENWOOD Motorsports CAM
Applicant	JVCKENWOOD Corporation
Address	3-12 Moriya-cho, Kanagawa-ku, Yokohama.Kanagawa 221-0022, Japan
Manufacturer	Altek Corporation
Model No.	STZ-RF200WD
FCC ID.	IOMZ1059
EUT Rated Voltage	DC 12V by Battery
EUT Test Voltage	DC 12V by Battery
Trade Name	JVCKENWOOD
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 789033
Test Result	Complied

Documented By :



(Senior Adm. Specialist / Genie Chang)

Tested By :



(Engineer / Yunchen Chen)

Approved By :



(Director / Vincent Lin)

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Revision History

Report No.	Version	Description	Issued Date
2120401R-E3032110123	V1.0	Initial issue of report.	2021-03-31

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	KENWOOD Motorsports CAM
Trade Name	JVCKENWOOD
FCC ID.	IOMZ1059
Model No.	STZ-RF200WD
Frequency Range	802.11a/n-20MHz: 5745-5825MHz 802.11n-40MHz: 5755-5795MHz 802.11ac-80MHz: 5775MHz
Number of Channels	802.11a/n-20MHz: 5, 802.11n-40MHz: 2, 802.11ac-80MHz: 1
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 150Mbps 802.11ac-80MHz: up to 433.3MHz
Channel Control	Auto
Type of Modulation	802.11a/n:OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna Type	Ceramic Antenna
Antenna Gain	Refer to the table “Antenna List”
Camera lens*2	MAR: JVCKENWOOD, M/N: STZ-RFUC, Shielded, 1.4m
SW unit	MAR: JVCKENWOOD, M/N: STZ-RFUS, Shielded, 1.5m
GPS Antenna	MAR: JVCKENWOOD, M/N: STZ-RTUG, Shielded, 1.6m

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	PulseLARSEN	W3006	Ceramic Antenna	4.5dBi For 5.725~5.825GHz

Note: The antenna of EUT is conform to FCC 15.203.

802.11a/n-20MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 149:	5745 MHz	Channel 153:	5765 MHz	Channel 157:	5785 MHz	Channel 161:	5805 MHz
Channel 165:	5825 MHz						

802.11n-40MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency
Channel 151:	5755 MHz	Channel 159:	5795 MHz

802.11ac-80MHz Center Working Frequency of Each Channel:

Channel	Frequency
Channel 155:	5775 MHz

Note:

1. This device is a KENWOOD Motorsports CAM with a built-in 2.4 GHz and 5 GHz WLAN transceiver , this report for 5GHz WLAN.
2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report.
5. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Mode 1: Transmit (802.11a-6Mbps) Mode 2: Transmit (802.11n-20BW 7.2Mbps) Mode 3: Transmit (802.11n-40BW 15Mbps) Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
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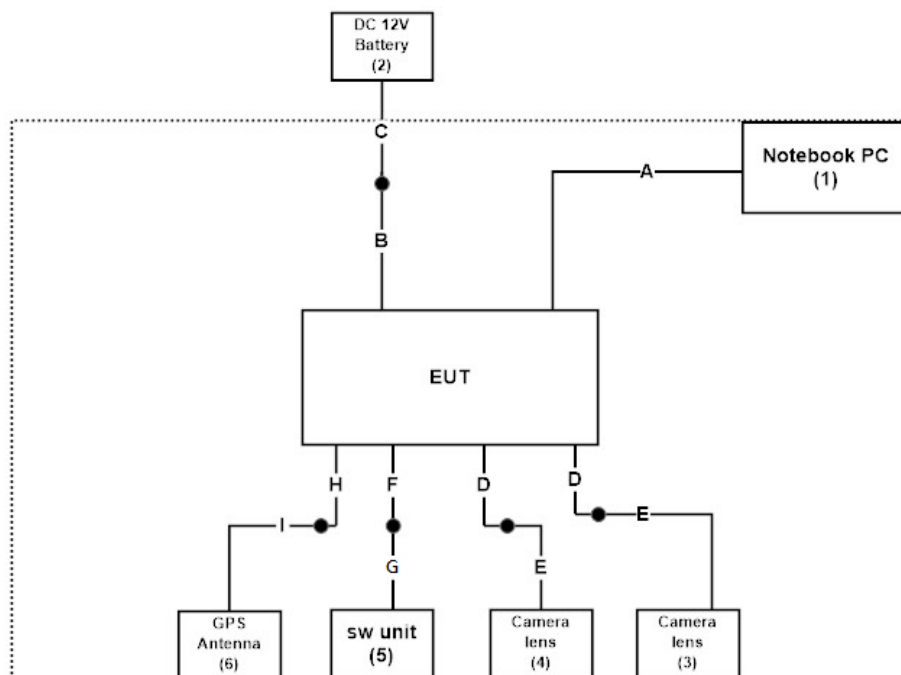
1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	Latitude E5440	B6TYTZ1	Non-shielded, 0.8m
2	DC 12V Battery	TRANE	12B50PE	N/A	N/A
3	Camera lens	JVCKENWOOD	STZ-RFUC	N/A	N/A
4	Camera lens	JVCKENWOOD	STZ-RFUC	N/A	N/A
5	SW unit	JVCKENWOOD	STZ-RFUS	N/A	N/A
6	GPS Antenna	JVCKENWOOD	STZ-RTUG	N/A	N/A

Signal Cable Type	Signal cable Description
A USB Cable	Shielded, 0.9m
B Power Cable	Shielded, 0.3m
C Power Cable	Non-shielded, 0.7m
D Signal Cable	Shielded, 0.6m, two PCS.
E Camera lens Cable	Shielded, 1.4m, two PCS.
F Signal Cable	Shielded, 0.5m
G SW unit Cable	Shielded, 1.5m
H Signal Cable	Shielded, 0.4m
I GPS Antenna Cable	Shielded, 1.6m

1.3. Configuration of tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.3.
2. Execute software “QRCT v3.0.303.0” on the EUT.
3. Configure the test mode, the test channel, and the data rate.
4. Press “OK” to start the continuous Transmit.
5. Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	18.7 °C
	Humidity (%RH)	10~90 %	59.7 %
Conductive	Temperature (°C)	10~40 °C	22 °C
	Humidity (%RH)	10~90 %	55 %

USA : FCC Registration Number: TW0023

Canada : IC Registration Number: 25880

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan, R.O.C.

Phone number : 886-2-2602-7968
Fax number : 866-2-2602-3286
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Equipment

For Conducted measurements /ASR2

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103466	2020.12.28	2021.12.27
X	Peak Power Analyzer	KEYSIGHT	8900B	MY51000539	2020.05.13	2021.05.12
X	Power Sensor	KEYSIGHT	N1923A	MY59240002	2020.05.22	2021.05.21
X	Power Sensor	KEYSIGHT	N1923A	MY59240003	2020.05.22	2021.05.21

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test System V9.0.5.

For Radiated measurements /ACB2

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	56736	2020.03.19	2021.03.18
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-953	2021.01.29	2022.01.28
X	Horn Antenna	ETS-Lindgren	3117	00203800	2020.12.22	2021.12.21
	Horn Antenna	ETS-Lindgren	3117	00203761	2020.11.23	2021.11.22
X	Horn Antenna	Com-Power	AH-840	101087	2020.06.08	2021.06.07
X	Pre-Amplifier	EMCI	EMC001330	980316	2020.06.23	2021.06.22
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2020.06.23	2021.06.22
X	Pre-Amplifier	EMCI	EMC05820SE	980310	2020.06.24	2021.06.23
X	Pre-Amplifier	EMCI	EMC184045SE	980314	2020.06.10	2021.06.09
	Filter	MICRO TRONICS	BRM50702	G251	2020.09.17	2021.09.16
X	Filter	MICRO TRONICS	BRM50716	G188	2020.09.17	2021.09.16
X	EMI Test Receiver	R&S	ESR7	101601	2020.05.28	2021.05.27
X	Spectrum Analyzer	R&S	FSV40	101148	2020.03.16	2021.03.15
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2020.07.03	2021.07.02
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2020.06.10	2021.06.09

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : DEKRA Testing System V2.0.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

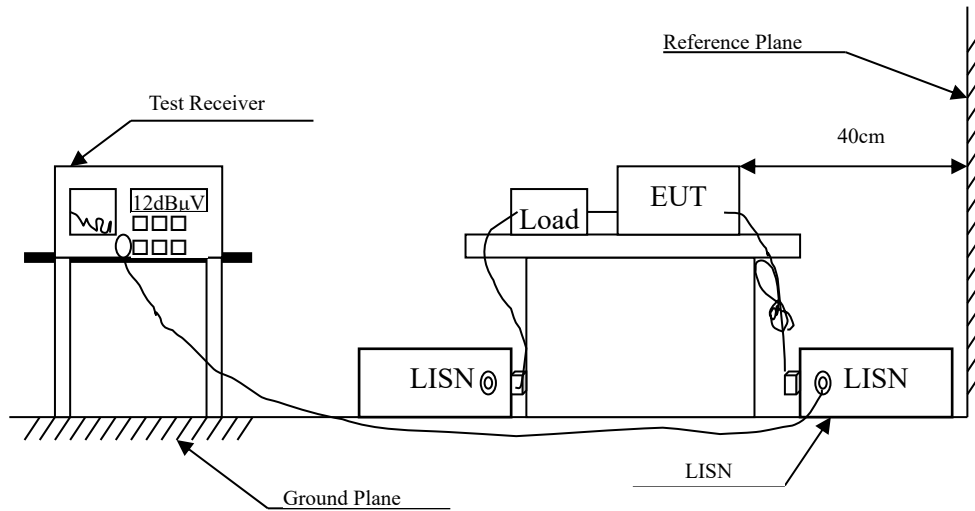
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Conducted Emission	± 3.42 dB	
Maximun conducted output power	Power Meter ± 0.91 dB	Spectrum Analyzer ± 2.53 dB
Power Density	± 2.53 dB	
Radiated Emission	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB
Band Edge	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB
Occupied Bandwidth	± 682.83 Hz	
Duty Cycle	± 2.31 ms	

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dB μ V) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

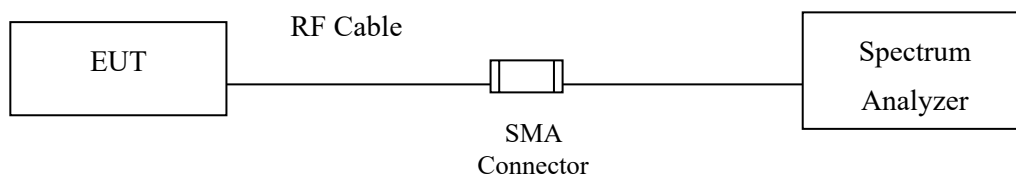
2.4. Test Result of Conducted Emission

Owing to the EUT use DC supply voltage, this test item is not performed.

3. Maximun conducted output power

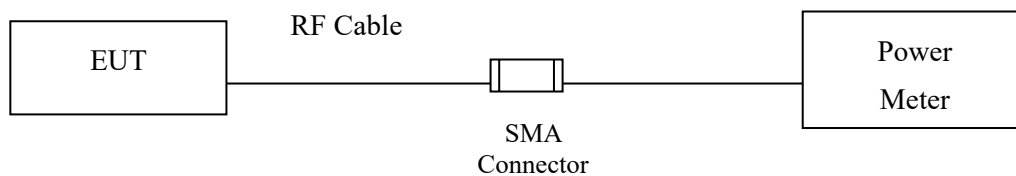
3.1. Test Setup

99% Occupied Bandwidth

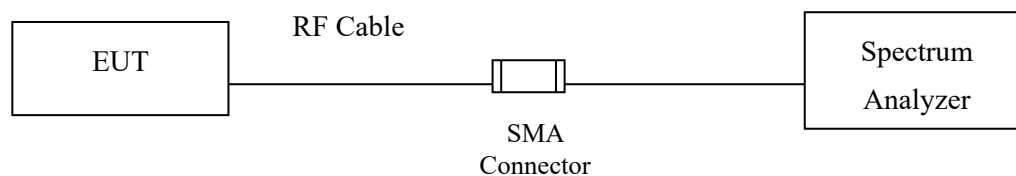


Conduction Power Measurement

Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac)



3.2. Limits

For the band 5.15-5.25 GHz,

- (i) 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. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 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).
- (ii) For an indoor 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. In addition, If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points 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. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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 $11 \text{ dBm} + 10 \log B$, where B is the 99% emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple colocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

3.3. Test Procedure

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater the 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW $\leq$ 40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)

Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D03 section D) procedure is used for measurements.

3.4. Test Result of Maximum conducted output power

Product : KENWOOD Motorsports CAM
 Test Item : Maximum conducted output power
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)
 Test Date : 2021/03/15

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
		Measurement Level (dBm)							
149	5745	11.84	--	--	--	--	--	--	--
157	5785	11.55	11.5	11.44	11.41	11.37	11.33	11.27	11.21
165	5825	11.88	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
149	5745	--	11.84	30	--
157	5785	--	11.55	30	--
165	5825	--	11.88	30	--

Note: Power Output Value =Reading value on average power meter + cable loss

Product : KENWOOD Motorsports CAM
 Test Item : Maximum conducted output power
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
 Test Date : 2021/03/15

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2
		Measurement Level (dBm)							
149	5745	11.8	--	--	--	--	--	--	--
157	5785	11.85	11.78	11.73	11.69	11.66	11.62	11.57	11.53
165	5825	11.75	--	--	--	--	--	--	--

Note: Maximum conducted output power Value = Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
149	5745	--	11.80	30	--
157	5785	--	11.85	30	--
165	5825	--	11.75	30	--

Note: Power Output Value = Reading value on average power meter + cable loss

Product : KENWOOD Motorsports CAM
 Test Item : Maximum conducted output power
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
 Test Date : 2021/03/15

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		15	30	45	60	90	120	135	150
		Measurement Level (dBm)							
151	5755	11.55	--	--	--	--	--	--	--
159	5795	11.88	11.83	11.79	11.75	11.71	11.65	11.6	11.54

Note: Maximum conducted output power Value = Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit	
				(dBm)	dBm+10log(BW)
151	5755	--	11.55	30	--
159	5795	--	11.88	30	--

Note: Power Output Value = Reading value on average power meter + cable loss

Product : KENWOOD Motorsports CAM
 Test Item : Maximum conducted output power
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
 Test Date : 2021/03/15

Cable loss=1dB		Maximum conducted output power									
Channel No	Frequency (MHz)	Data Rate (Mbps)									
		VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	VTH9
155	5775	11.96	11.91	11.88	11.84	11.78	11.73	11.68	11.62	11.55	11.49

Note: Maximum conducted output power Value = Reading value on Spectrum Analyzer + cable loss

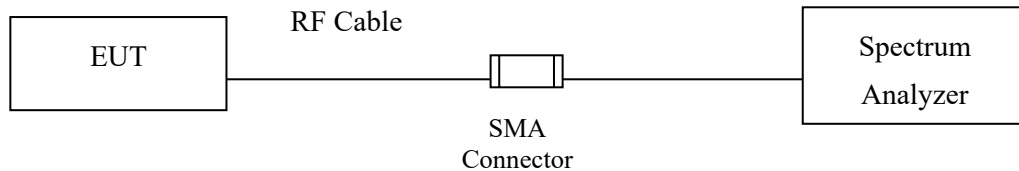
Maximum conducted output power Measurement

Channel No	Frequency Range	26dB Bandwidth	Output Power	Output Power Limit		Result
	(MHz)	(MHz)	(dBm)	(dBm)	dBm+10log(BW)	
155	5775	--	11.96	30	--	Pass

Note: Power Output Value = Reading value on Spectrum Analyzer + cable loss

4. Peak Power Spectral Density

4.1. Test Setup



4.2. Limits

For the band 5.15-5.25 GHz,

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points 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. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, 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, 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 5.25-5.35 GHz and 5.47-5.725 GHz bands, 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, 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 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

4.3. Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.

SA-1 method is selected to run the test.

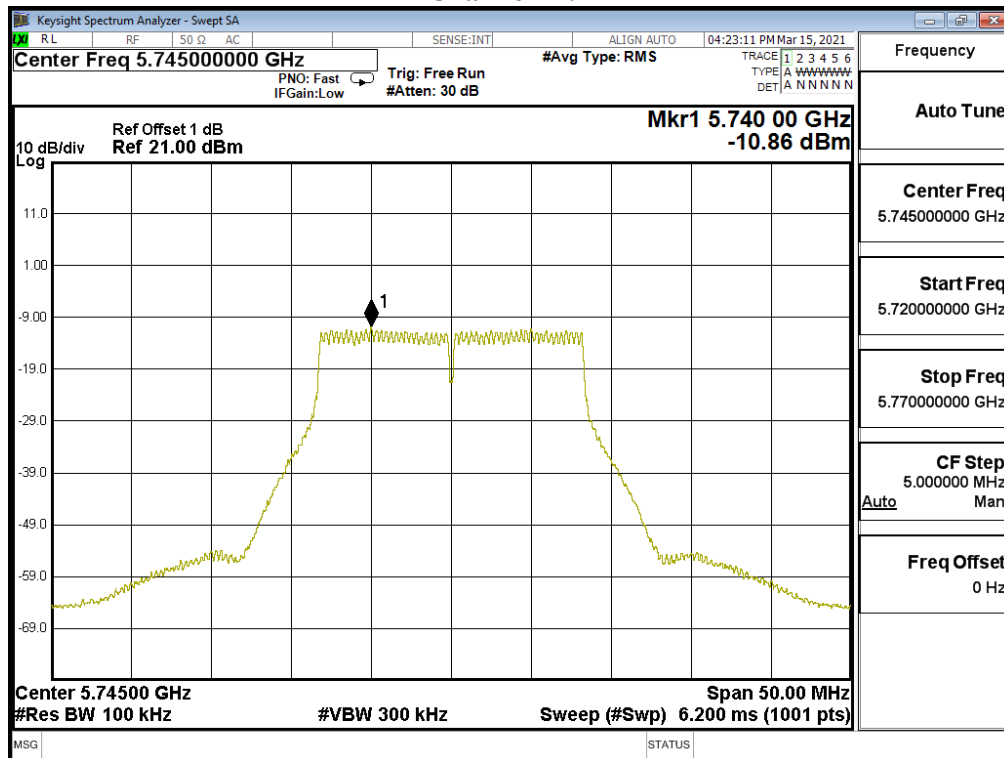
For the band 5.725-5.85 GHz, Scale the observed power level to an equivalent value in 500 kHz by adjusting (increase) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(500\text{ kHz}/100\text{ kHz}) = 6.98\text{ dB}$.

4.4. Test Result of Peak Power Spectral Density

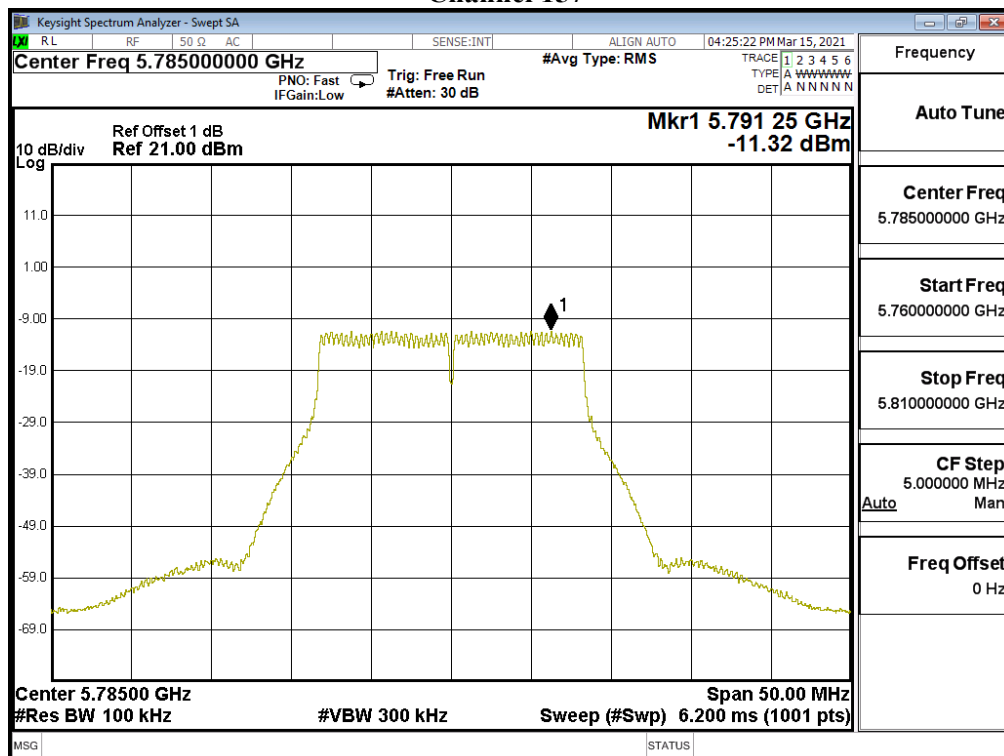
Product : KENWOOD Motorsports CAM
Test Item : Peak Power Spectral Density
Test Mode : Mode 1: Transmit (802.11a-6Mbps)
Test Date : 2021/03/15

Channel Number	Frequency (MHz)	Data Rate (Mbps)	PPSD (dBm)	BWCF (dB)	Duty Factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
149	5745	6	-10.86	6.98	0.58	-3.30	<30	Pass
157	5785	6	-11.32	6.98	0.58	-3.76	<30	Pass
165	5825	6	-11.15	6.98	0.58	-3.59	<30	Pass

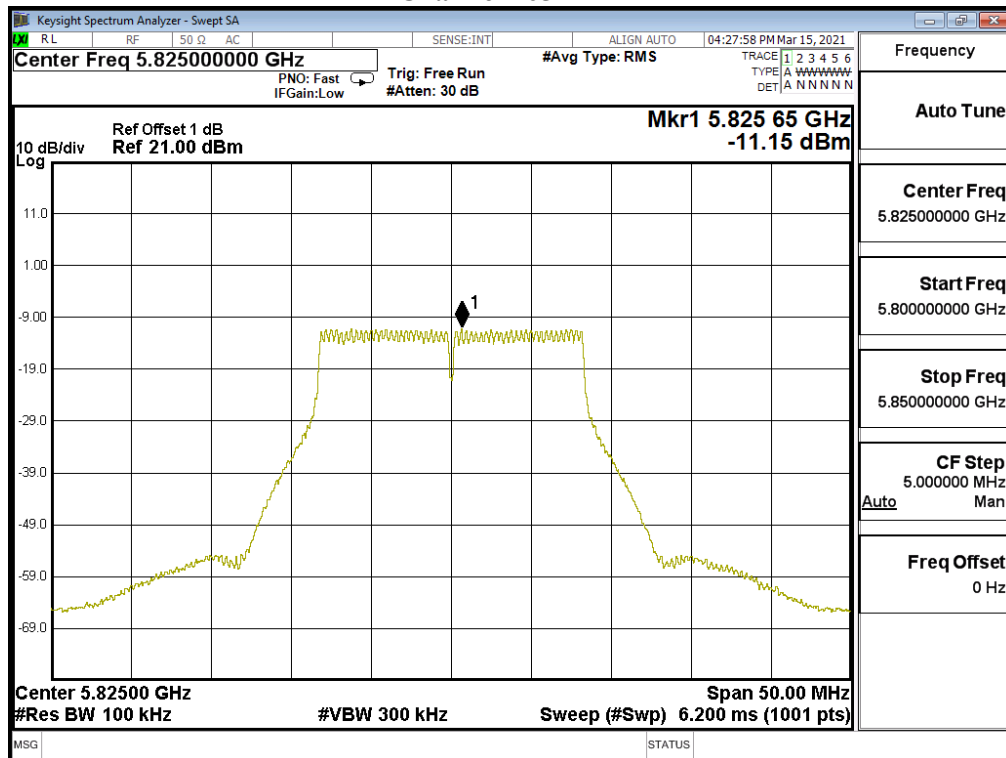
Channel 149



Channel 157



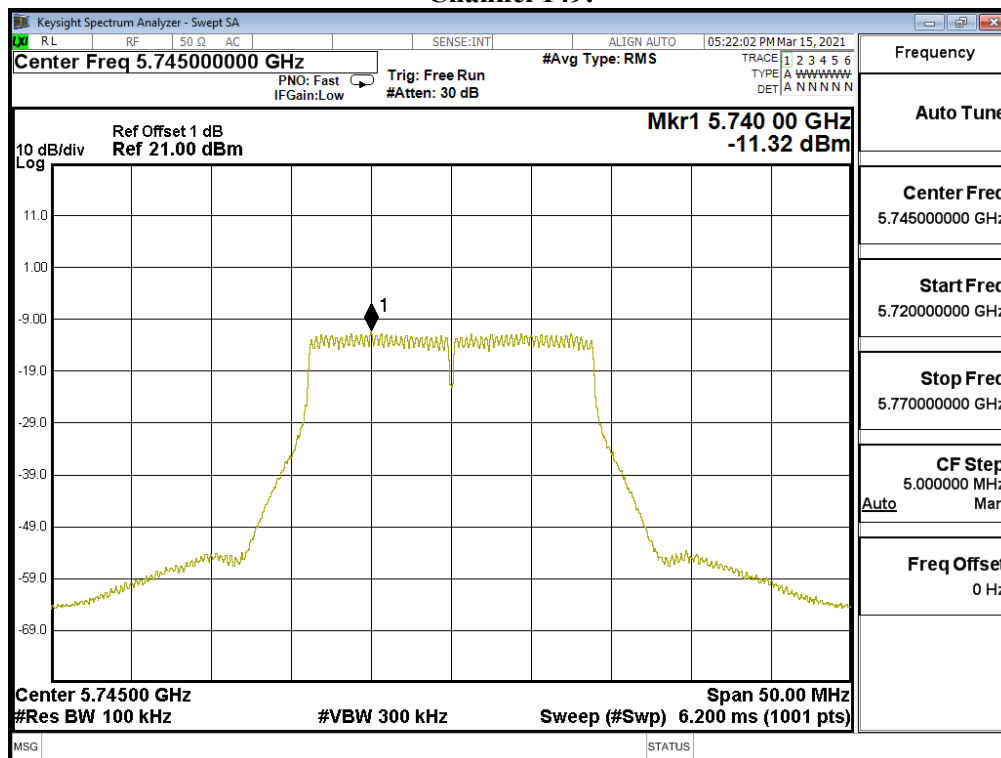
Channel 165



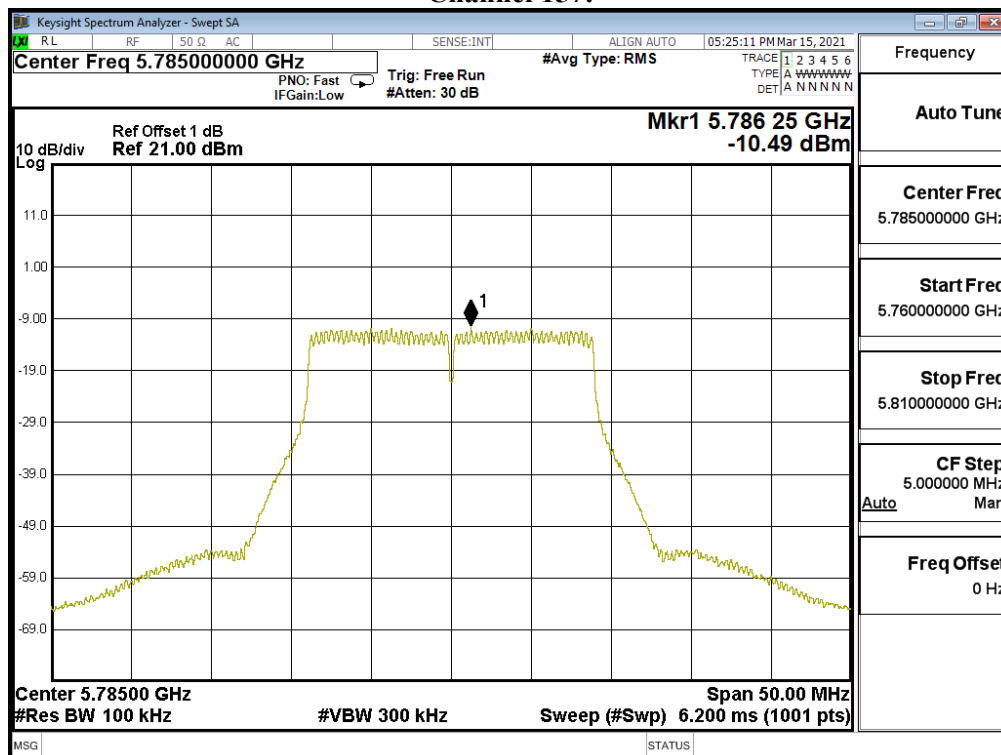
Product : KENWOOD Motorsports CAM
Test Item : Peak Power Spectral Density
Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
Test Date : 2021/03/15

Channel Number	Frequency (MHz)	Data Rate (Mbps)	PPSD (dBm)	BWCF (dB)	Duty Factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
149	5745	HT0	-11.32	6.98	0.64	-3.70	<30	Pass
157	5785	HT0	-10.49	6.98	0.64	-2.87	<30	Pass
165	5825	HT0	-11.35	6.98	0.64	-3.73	<30	Pass

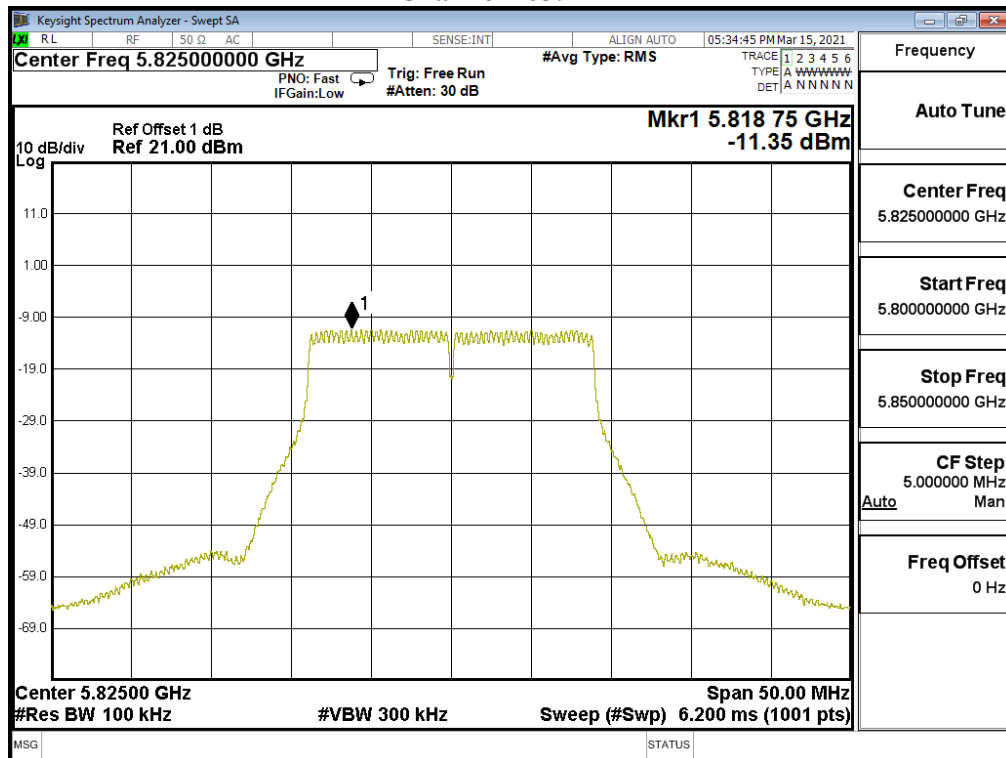
Channel 149:



Channel 157:



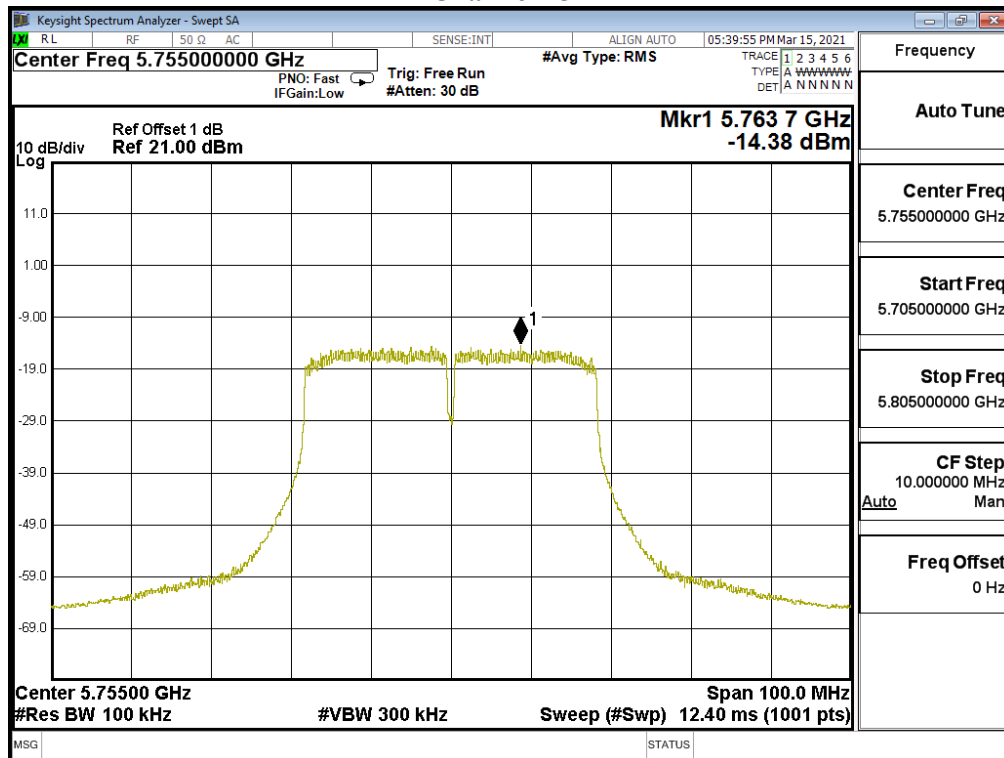
Channel 165:



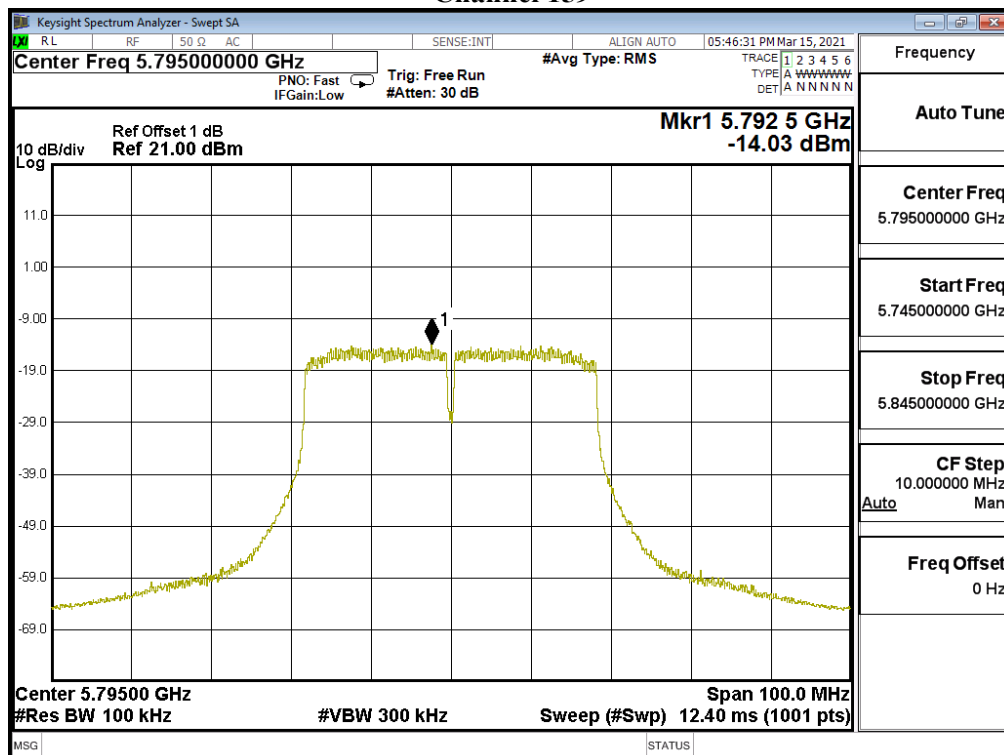
Product : KENWOOD Motorsports CAM
Test Item : Peak Power Spectral Density
Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
Test Date : 2021/03/15

Channel Number	Frequency (MHz)	Data Rate (Mbps)	PPSD (dBm)	BWCF (dB)	Duty Factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
151	5755	HT0	-14.38	6.98	1.23	-6.17	<30	Pass
159	5795	HT0	-14.03	6.98	1.23	-5.82	<30	Pass

Channel 151



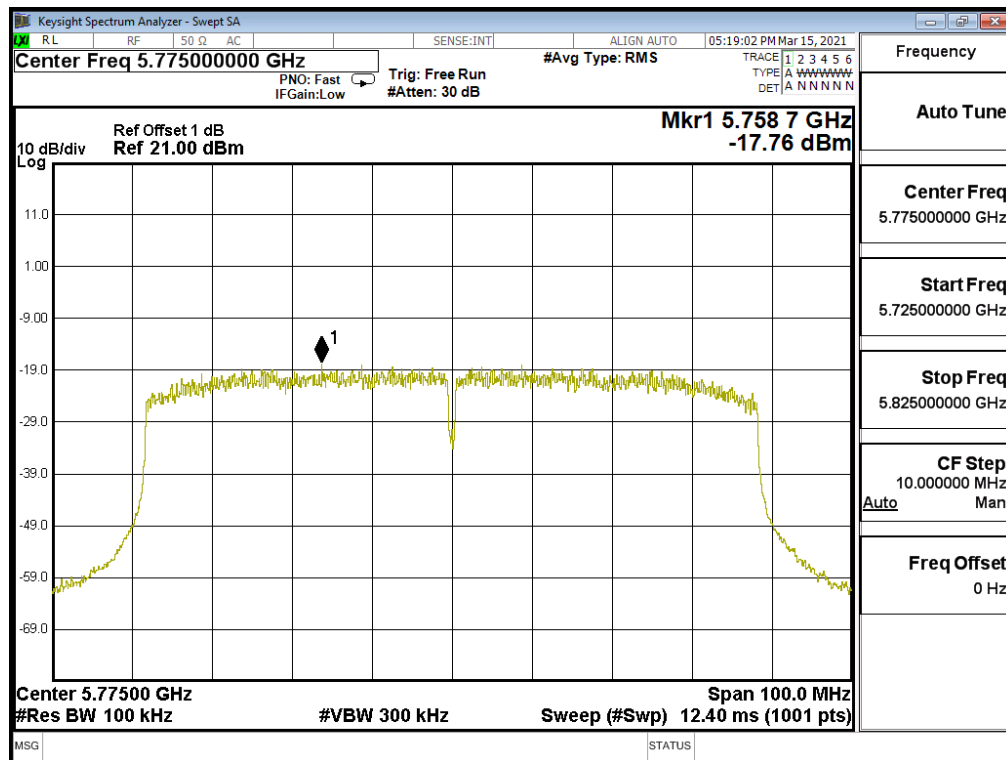
Channel 159



Product : KENWOOD Motorsports CAM
Test Item : Peak Power Spectral Density
Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
Test Date : 2021/03/15

Channel Number	Frequency (MHz)	Data Rate (Mbps)	PPSD (dBm)	BWCF (dB)	Duty Factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
155ac80	5775	VHT0	-17.76	6.98	2.58	-8.20	<30	Pass

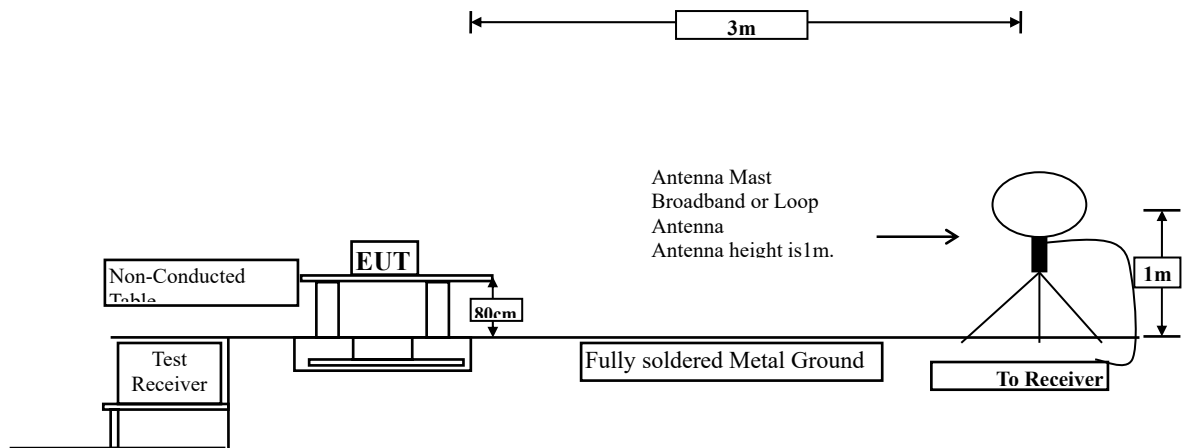
Channel 155



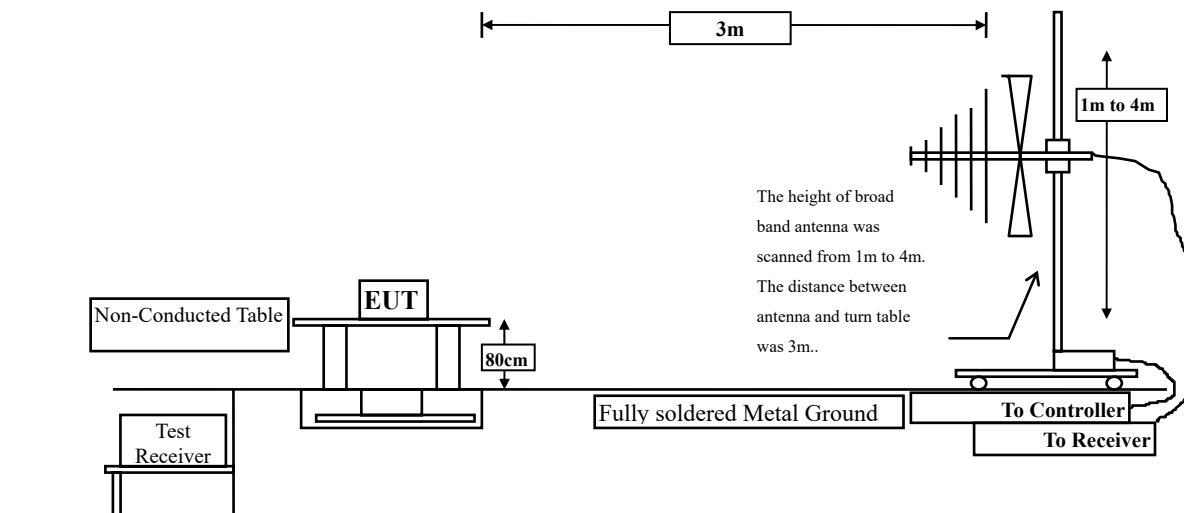
5. Radiated Emission

5.1. Test Setup

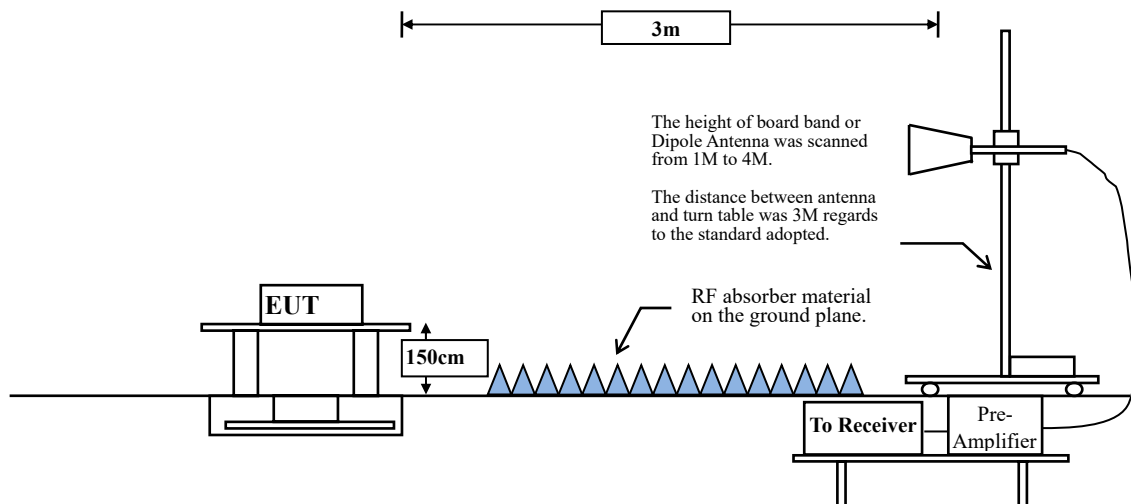
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



5.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dB μ V/m) = 20 log E field strength (uV/m)

5.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions
Measurements above 1000 MHz.

RBW = 1MHz.

VBW $\geq$ 3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions
Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq$ 98 %

VBW $\geq$ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

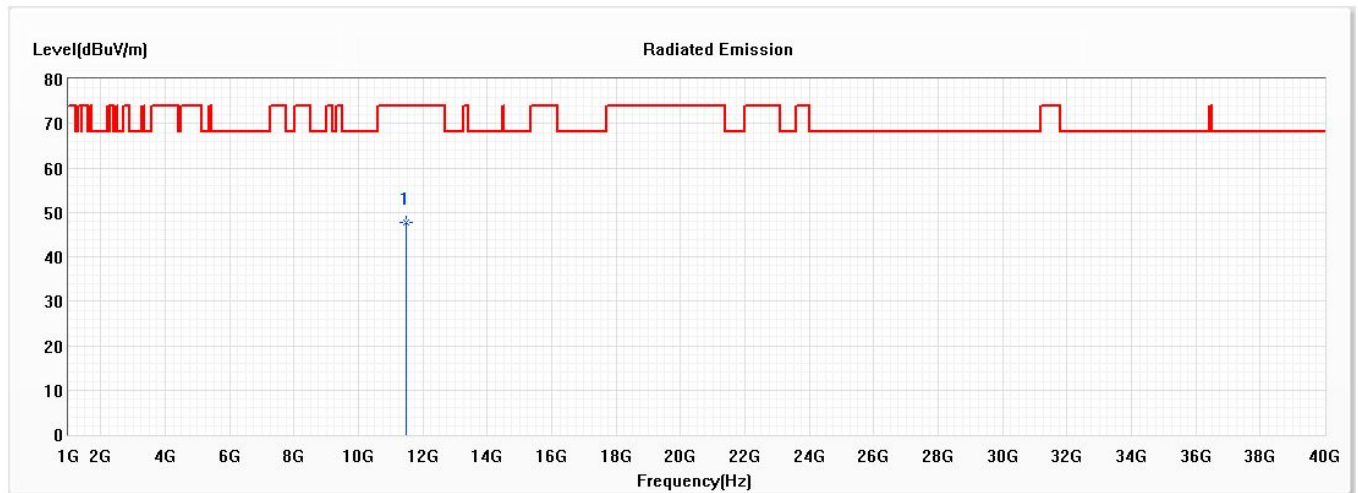
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	87.42	1.3594	736	1k
802.11n20	86.25	1.2725	786	1k
802.11n40	75.26	0.6348	1575	2k
802.11ac80	55.20	0.2464	4059	5k

Note: Duty Cycle Refer to Section 8

5.4. Test Result of Radiated Emission

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5745MHz)
 Test Date : 2021/03/11

Horizontal



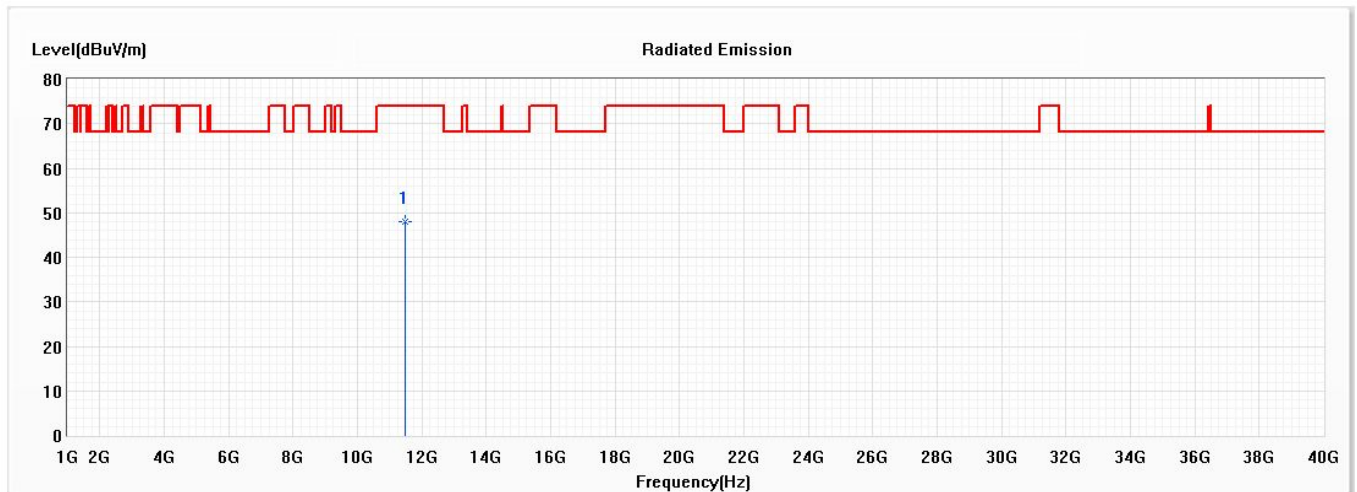
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11490.000	47.79	74.00	-26.21	41.79	6.00	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5745MHz)
 Test Date : 2021/03/11

Vertical



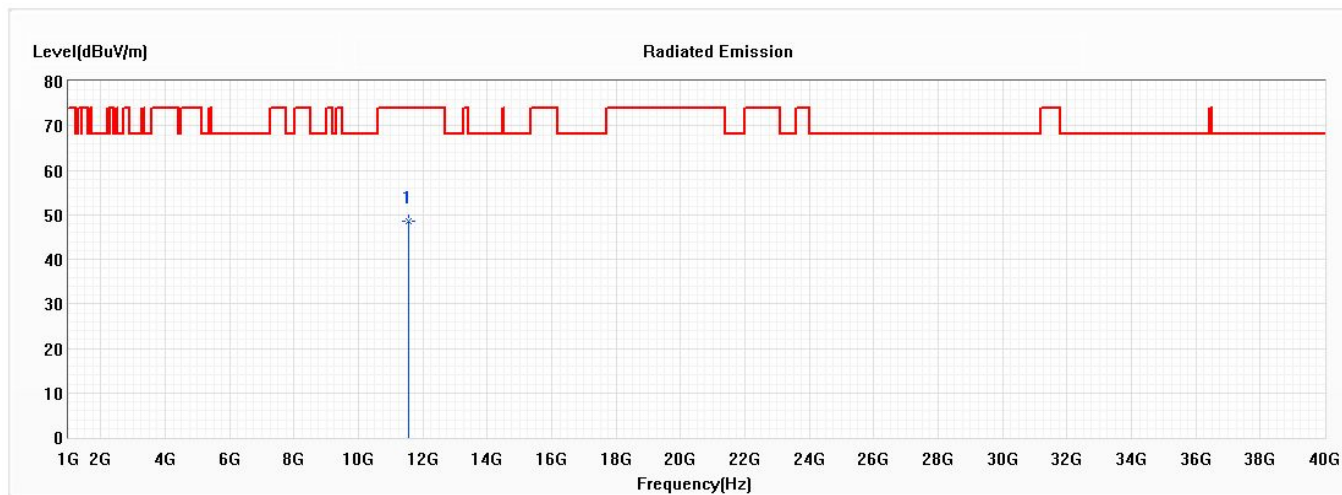
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11490.000	48.09	74.00	-25.91	42.09	6.00	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5785MHz)
 Test Date : 2021/03/11

Horizontal



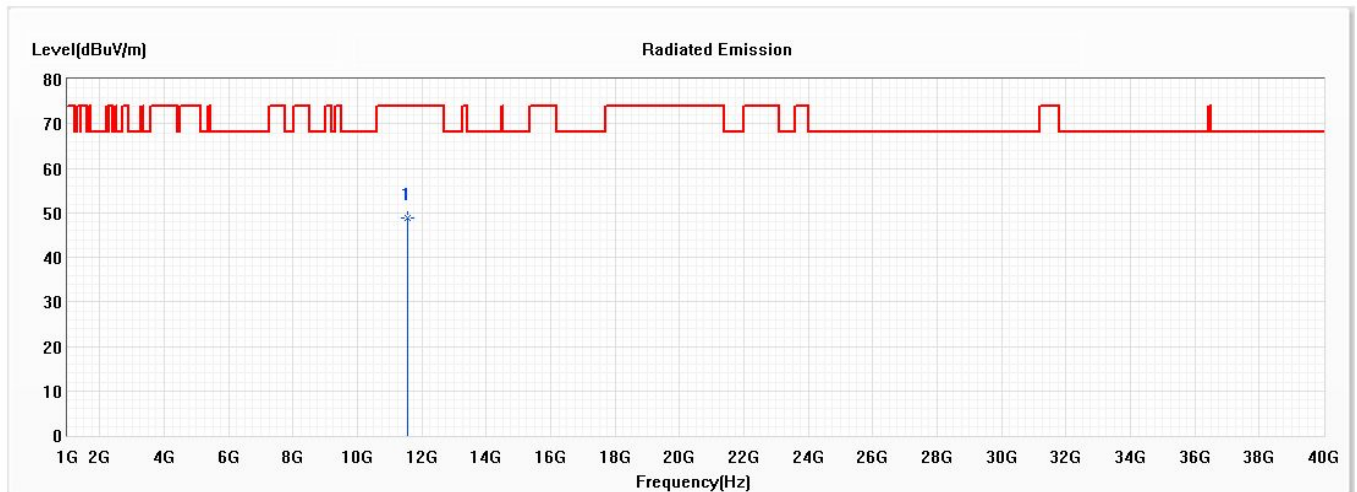
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11570.000	48.46	74.00	-25.54	42.28	6.18	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5785MHz)
 Test Date : 2021/03/11

Vertical



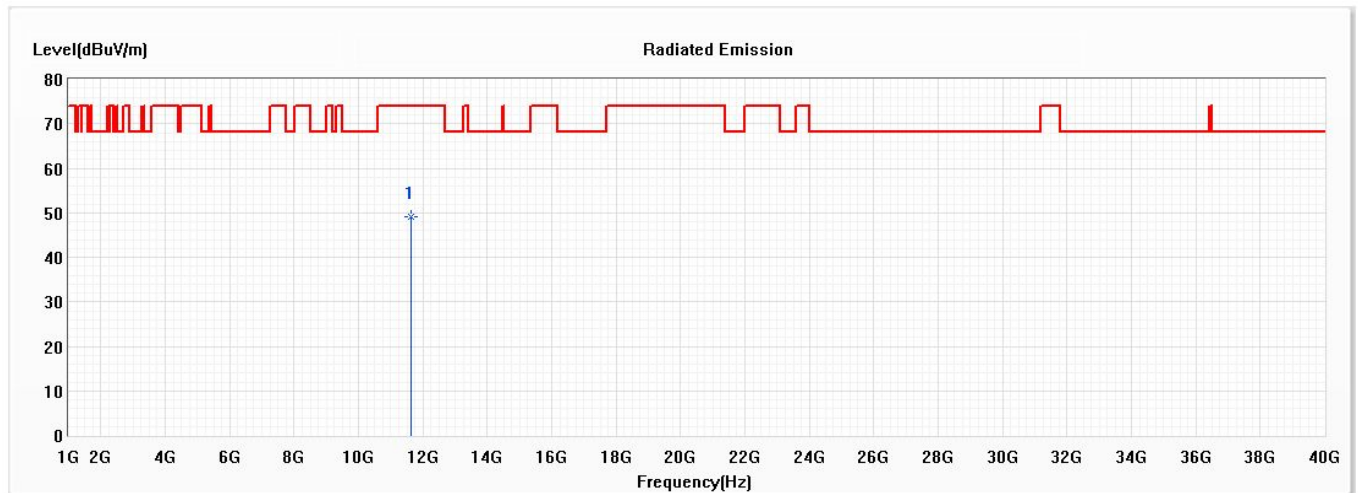
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11570.000	48.85	74.00	-25.15	42.67	6.18	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5825MHz)
 Test Date : 2021/03/11

Horizontal



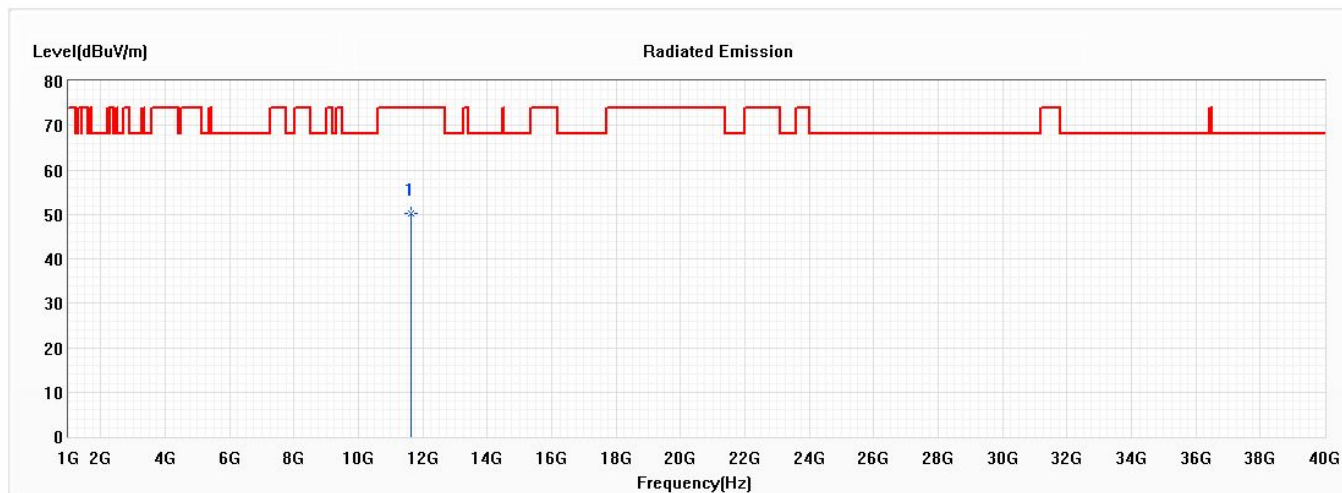
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11650.000	49.21	74.00	-24.79	42.92	6.29	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5825MHz)
 Test Date : 2021/03/11

Vertical



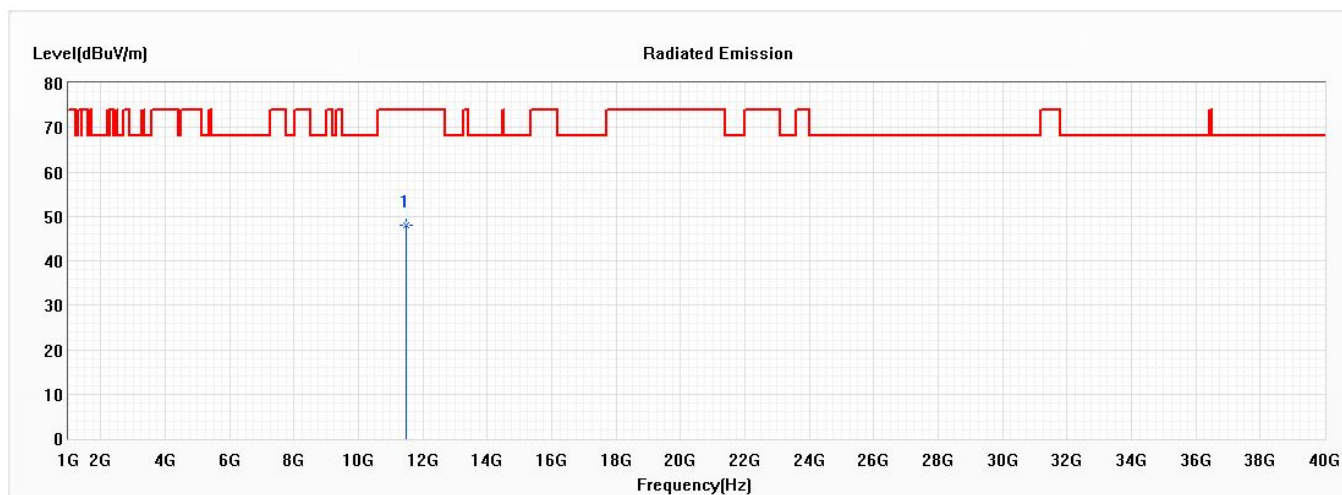
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11650.000	50.21	74.00	-23.79	43.92	6.29	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5745MHz)
 Test Date : 2021/03/11

Horizontal



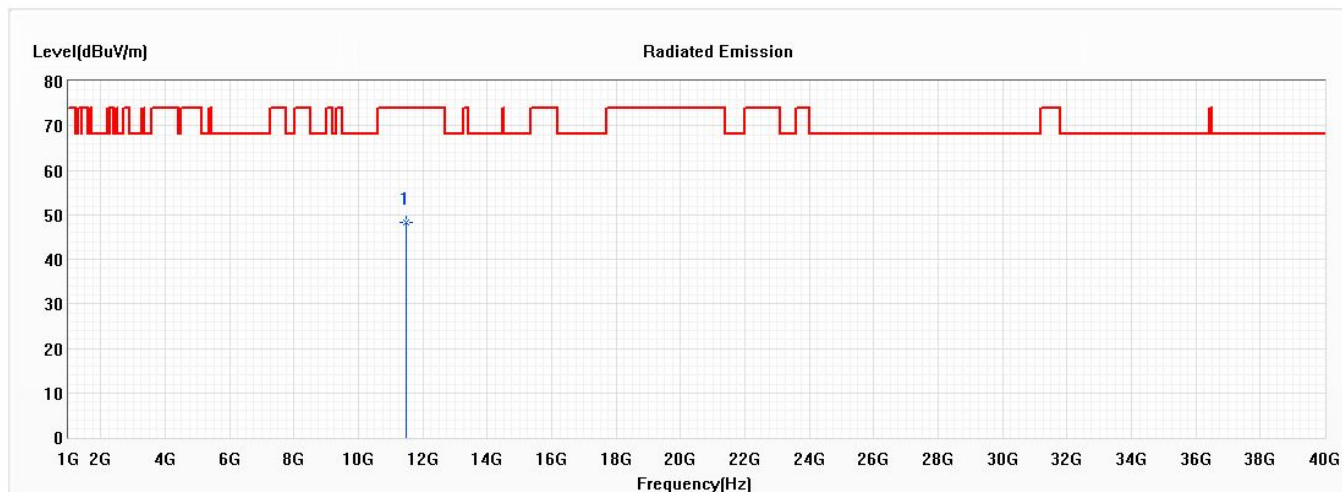
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11490.000	47.94	74.00	-26.06	41.94	6.00	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5745MHz)
 Test Date : 2021/03/11

Vertical



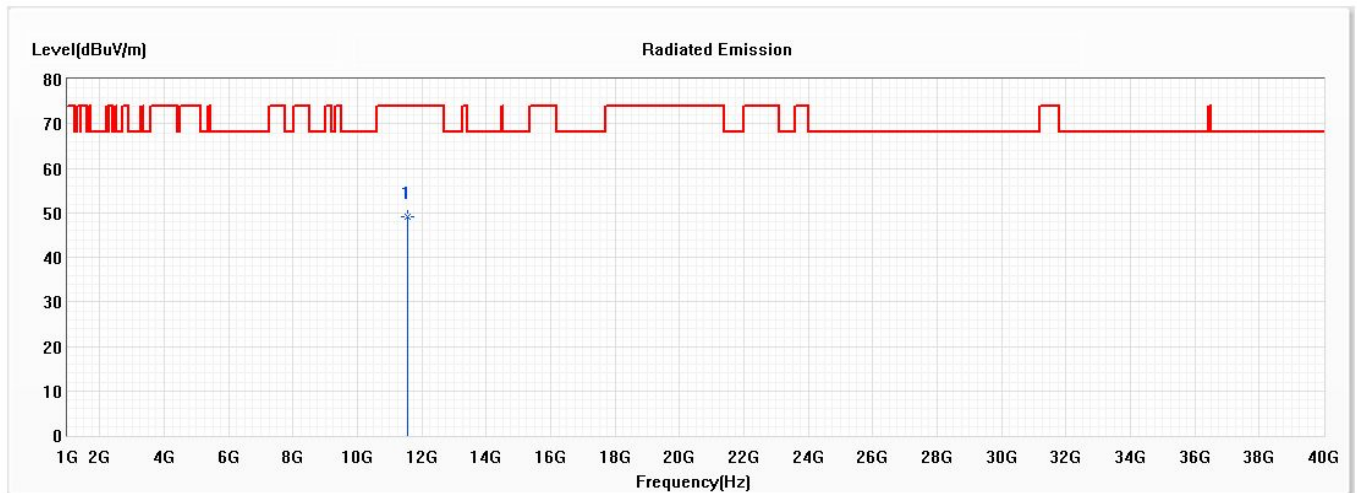
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11490.000	48.21	74.00	-25.79	42.21	6.00	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5785MHz)
 Test Date : 2021/03/11

Horizontal



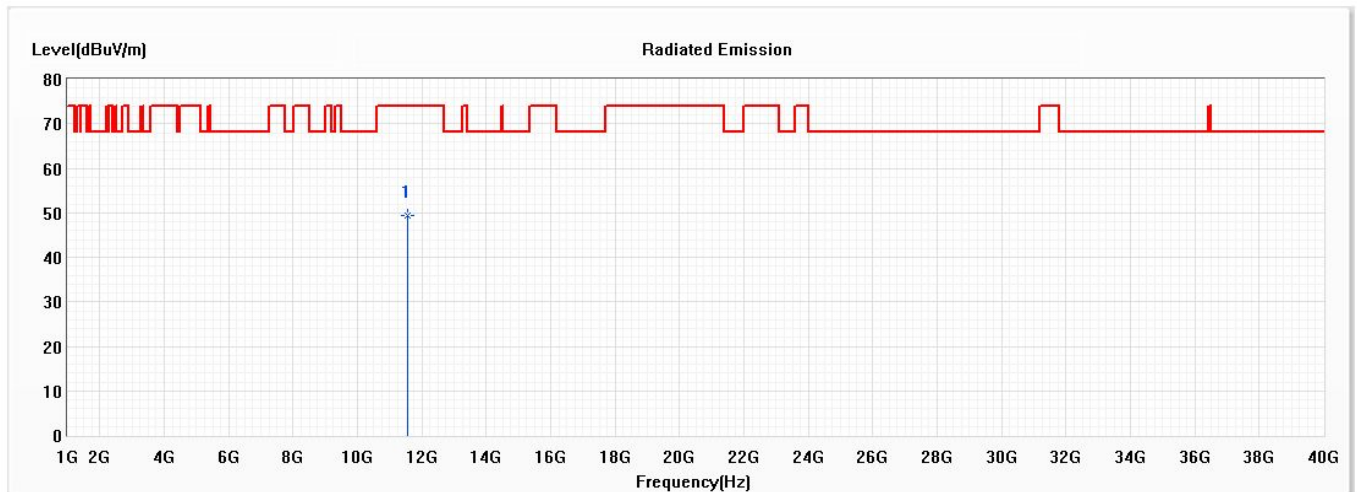
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11570.000	49.11	74.00	-24.89	42.93	6.18	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5785MHz)
 Test Date : 2021/03/11

Vertical



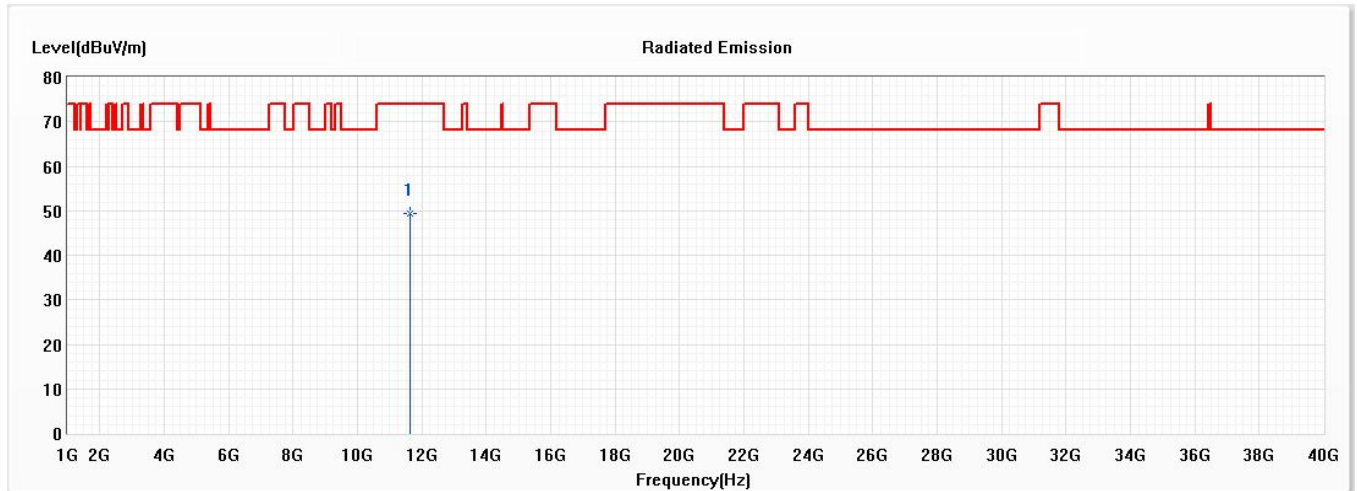
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11570.000	49.37	74.00	-24.63	43.19	6.18	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5825MHz)
 Test Date : 2021/03/11

Horizontal



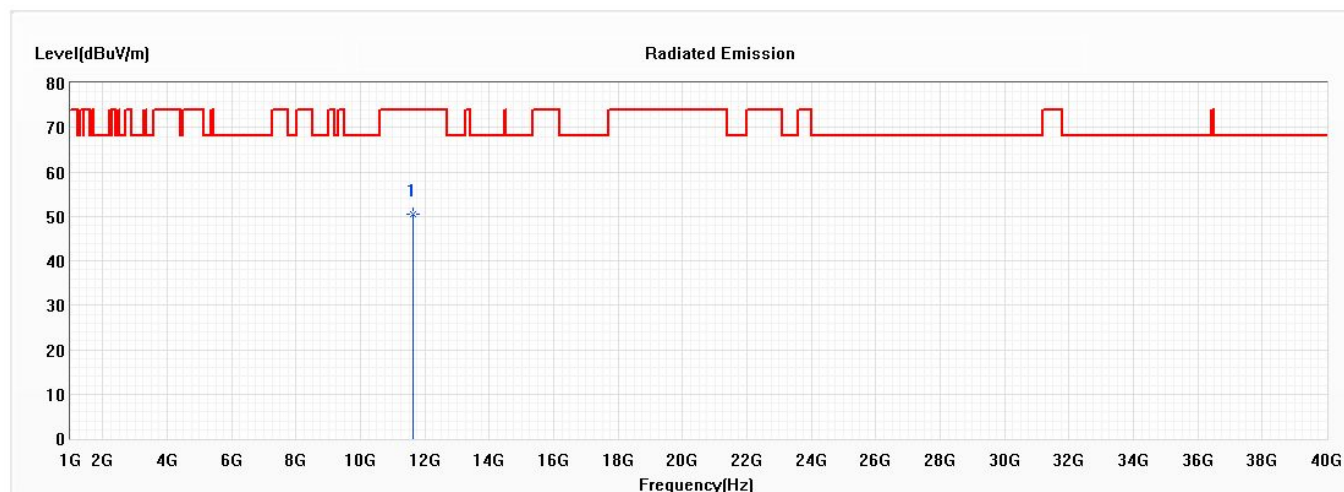
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11650.000	49.29	74.00	-24.71	43.00	6.29	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5825MHz)
 Test Date : 2021/03/11

Vertical



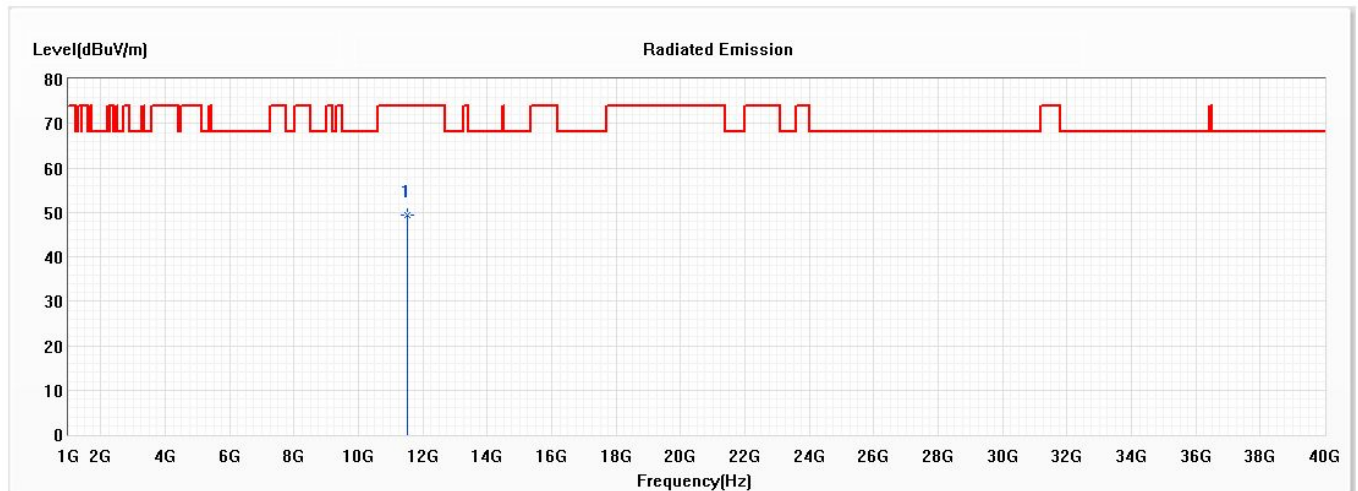
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11650.000	50.39	74.00	-23.61	44.10	6.29	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5755MHz)
 Test Date : 2021/03/11

Horizontal



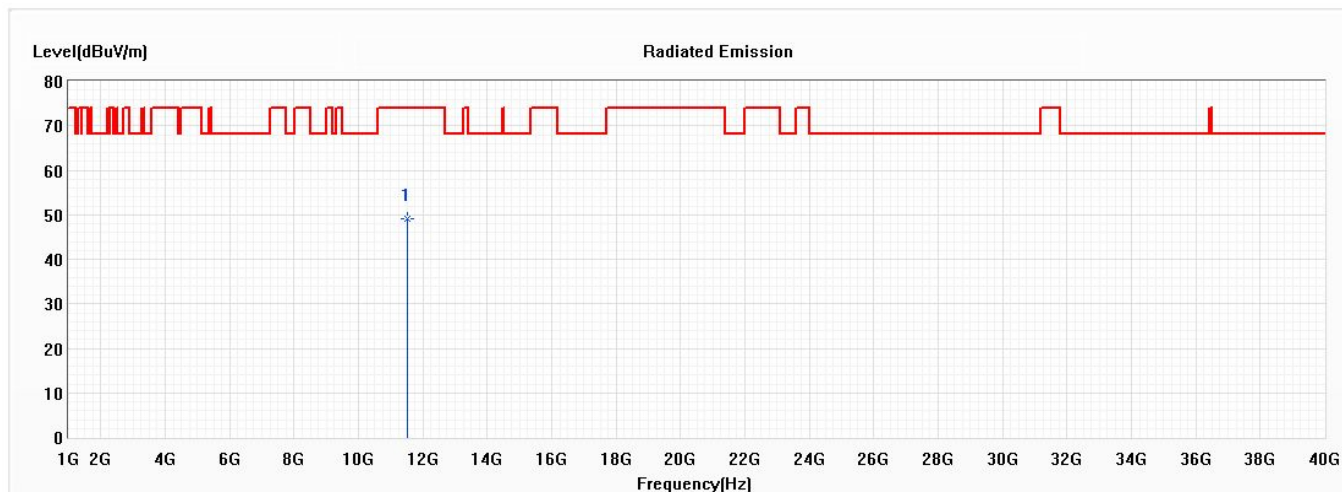
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11510.000	49.37	74.00	-24.63	43.27	6.10	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5755MHz)
 Test Date : 2021/03/11

Vertical



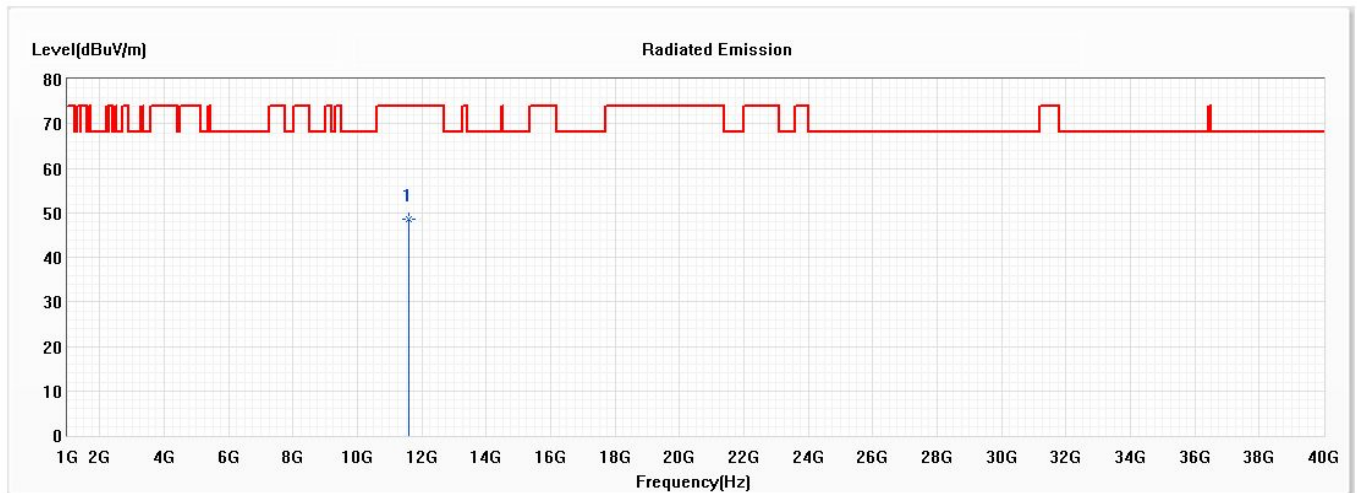
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11510.000	49.05	74.00	-24.95	42.95	6.10	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
 Test Date : 2021/03/11

Horizontal



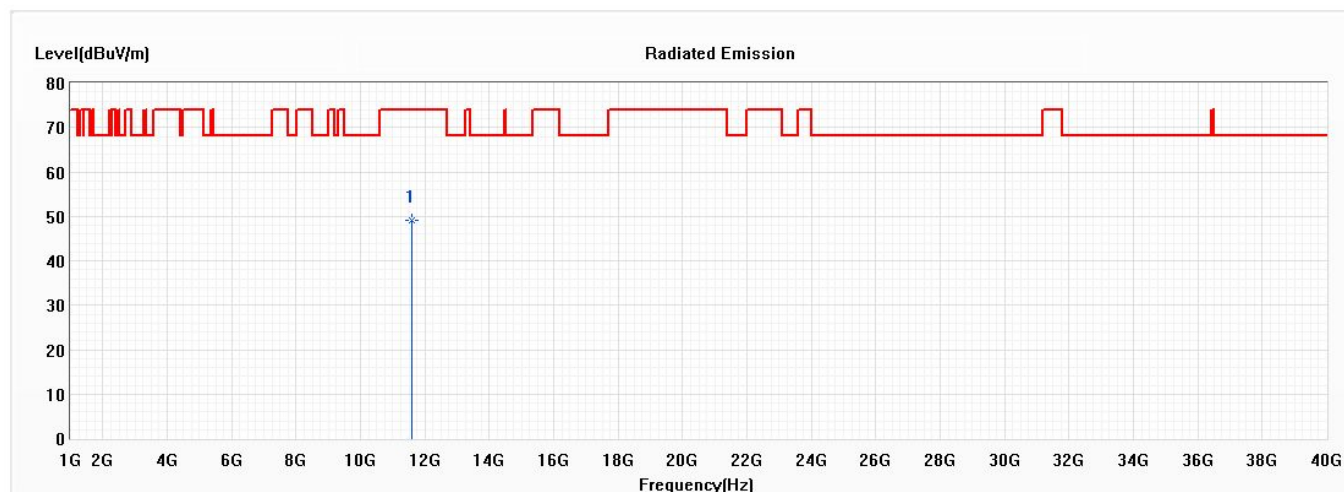
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11590.000	48.60	74.00	-25.40	42.39	6.21	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
 Test Date : 2021/03/11

Vertical



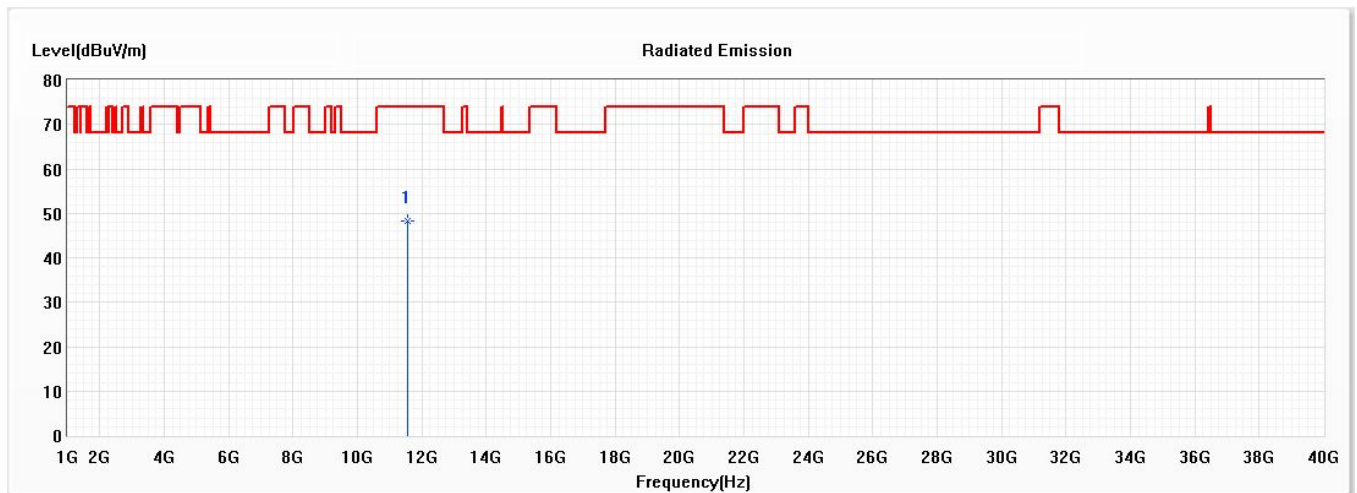
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11590.000	49.05	74.00	-24.95	42.84	6.21	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5775MHz)
 Test Date : 2021/03/11

Horizontal



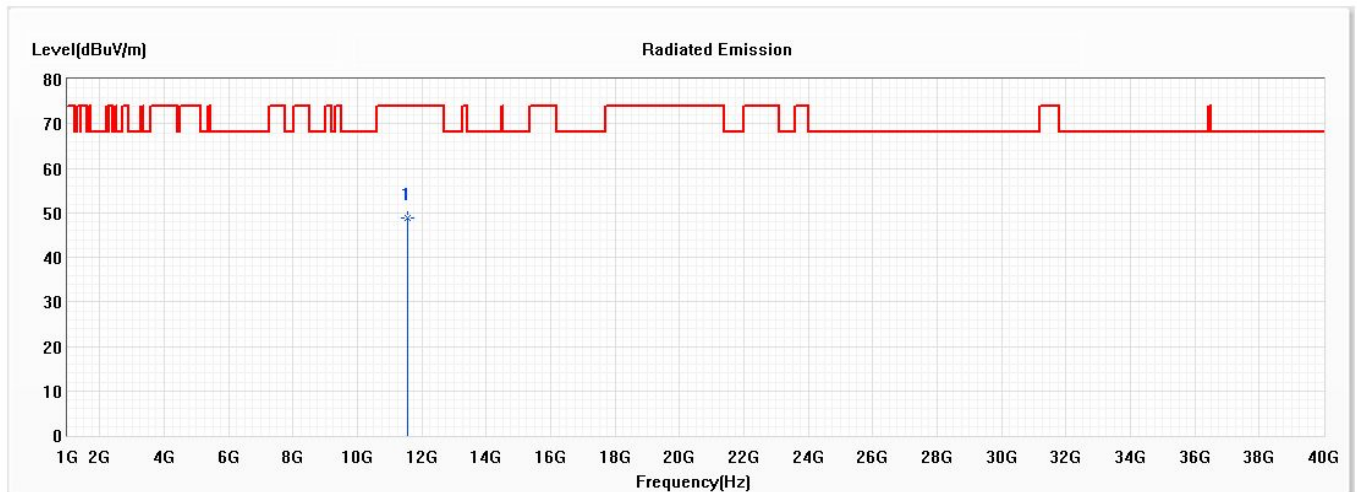
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11550.000	48.28	74.00	-25.72	42.15	6.13	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : Harmonic Radiated Emission Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5775MHz)
 Test Date : 2021/03/11

Vertical



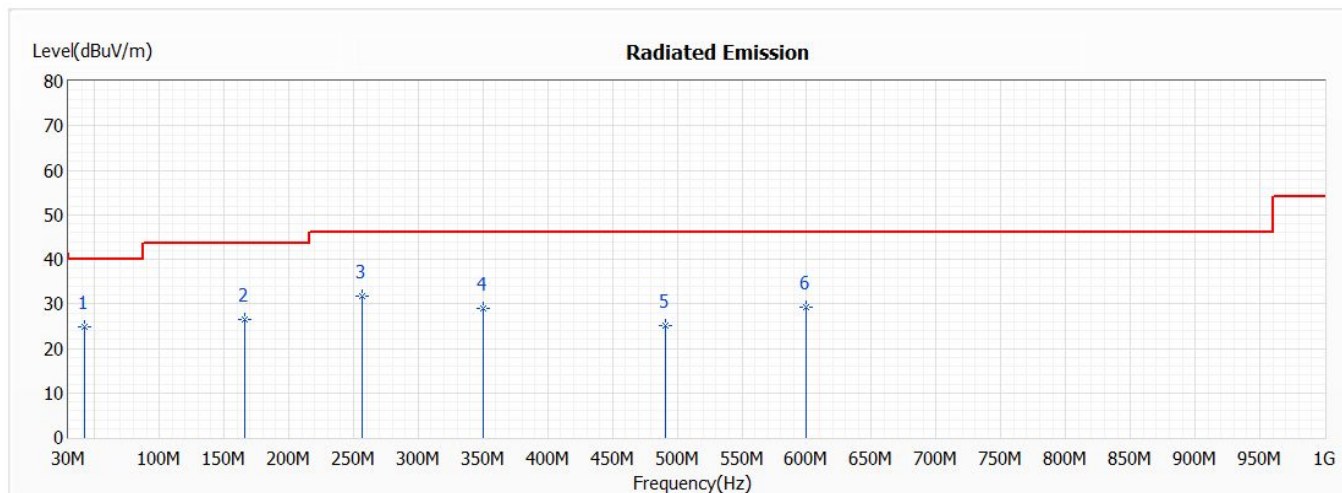
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	11550.000	48.75	74.00	-25.25	42.62	6.13	PK

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : KENWOOD Motorsports CAM
 Test Item : General Radiated Emission
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5775MHz)
 Test Date : 2021/03/24

Horizontal



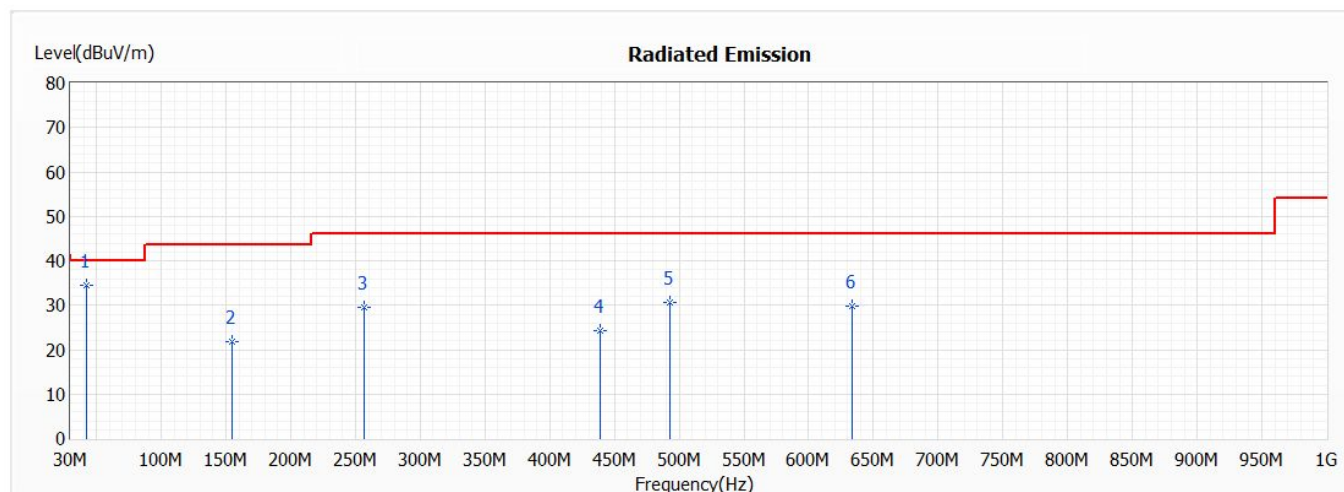
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	42.652	24.81	40.00	-15.19	35.27	-10.46	QP
2	166.362	26.49	43.50	-17.01	36.82	-10.33	QP
* 3	256.333	31.74	46.00	-14.26	42.98	-11.24	QP
4	350.522	28.97	46.00	-17.03	37.48	-8.51	QP
5	491.101	25.23	46.00	-20.77	30.83	-5.60	QP
6	599.348	29.28	46.00	-16.72	32.47	-3.19	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

Product : KENWOOD Motorsports CAM
 Test Item : General Radiated Emission
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5775MHz)
 Test Date : 2021/03/24

Vertical



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	42.652	34.49	40.00	-5.51	44.95	-10.46	QP
2	155.116	21.87	43.50	-21.63	32.37	-10.50	QP
3	256.333	29.39	46.00	-16.61	40.63	-11.24	QP
4	439.087	24.30	46.00	-21.70	30.68	-6.38	QP
5	492.507	30.65	46.00	-15.35	36.22	-5.57	QP
6	633.087	29.86	46.00	-16.14	32.75	-2.89	QP

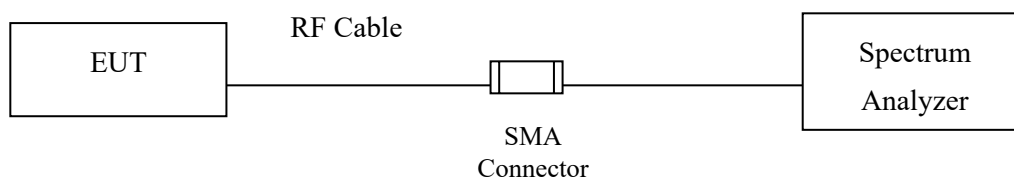
Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.
3. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. No emission found between lowest internal used/generated frequency to 30MHz.

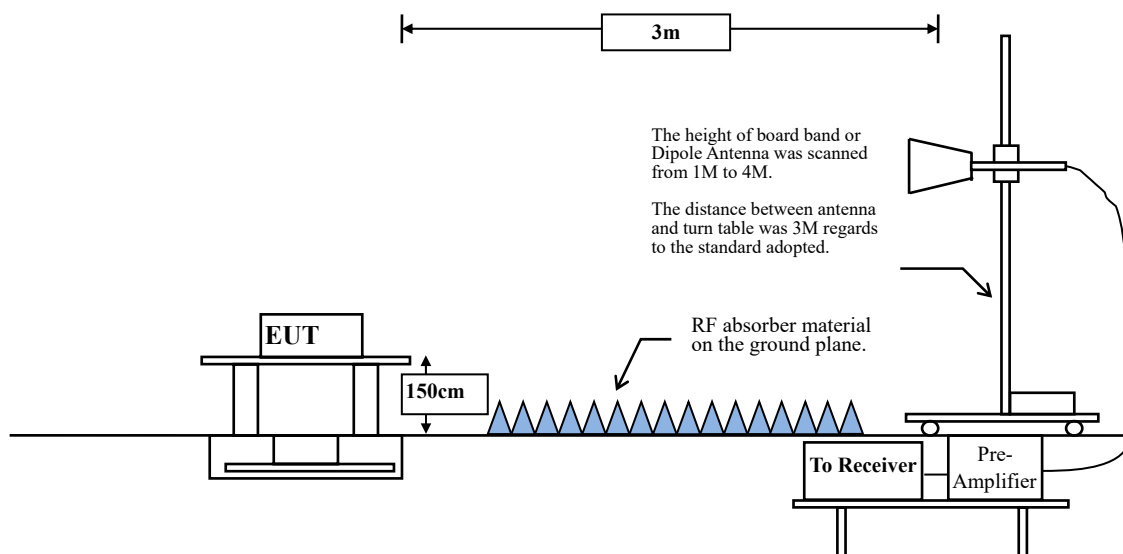
6. Band Edge

6.1. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



6.2. Limits

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBμV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks :

1. RF Voltage (dBμV) = 20 log RF Voltage (uV)
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

6.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

RBW and VBW Parameter setting:

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions
Measurements above 1000 MHz.

RBW = 1MHz.

VBW $\geq$ 3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions
Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle $\geq$ 98 %

VBW $\geq$ 1/T, when duty cycle < 98 %

(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

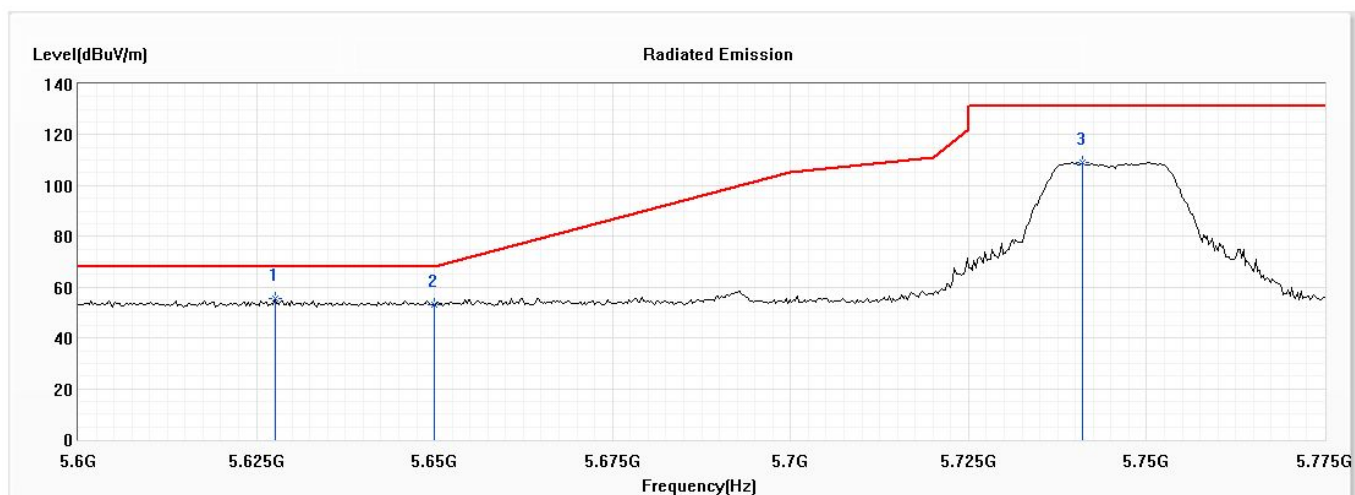
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	87.42	1.3594	736	1k
802.11n20	86.25	1.2725	786	1k
802.11n40	75.26	0.6348	1575	2k
802.11ac80	55.20	0.2464	4059	5k

Note: Duty Cycle Refer to Section 8

6.4. Test Result of Band Edge

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5745MHz)
 Test Date : 2021/03/11

Horizontal



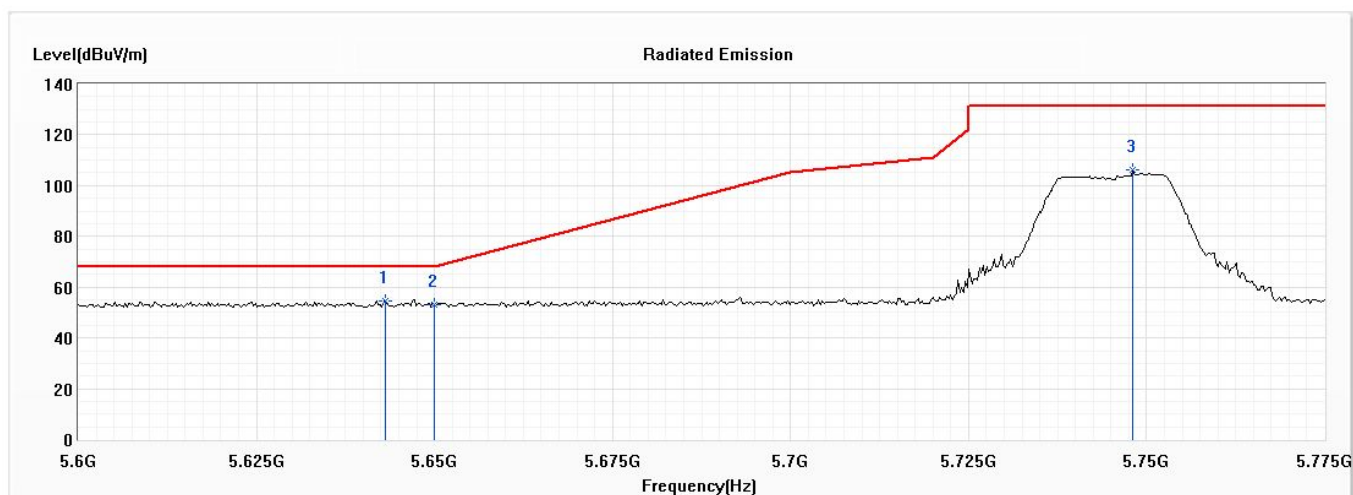
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	5627.645	55.50	68.22	-12.72	39.08	16.42	PK
2	5650.000	53.18	68.22	-15.04	36.74	16.44	PK
3	5741.014	109.21	131.20	-21.99	92.53	16.68	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5745MHz)
 Test Date : 2021/03/11

Vertical



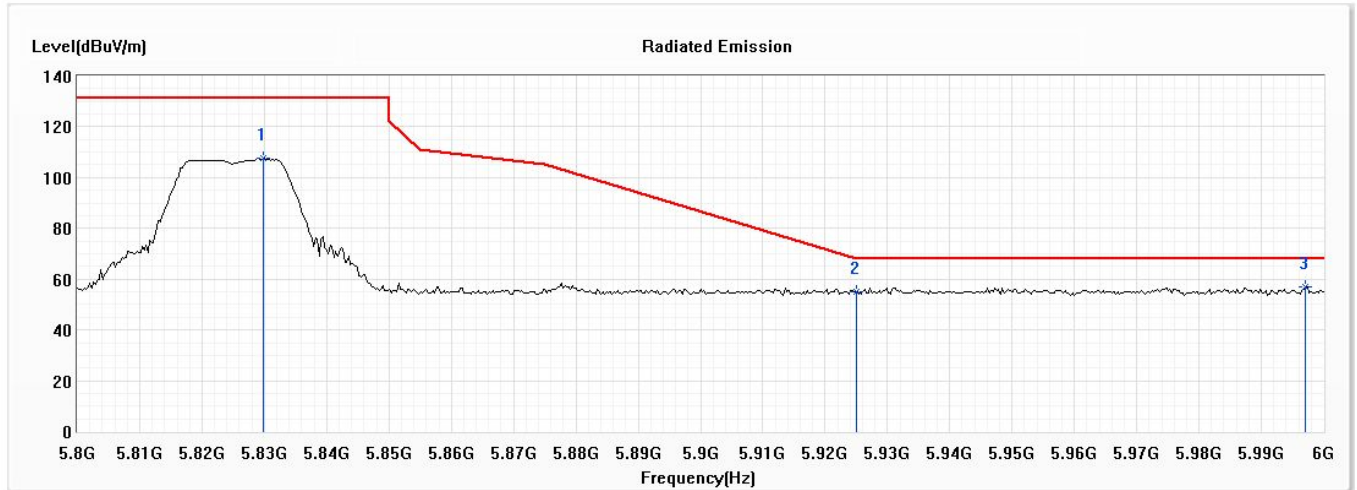
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	5643.116	54.50	68.22	-13.72	38.07	16.43	PK
2	5650.000	52.93	68.22	-15.29	36.49	16.44	PK
3	5748.116	106.15	131.20	-25.05	89.45	16.70	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5825MHz)
 Test Date : 2021/03/11

Horizontal



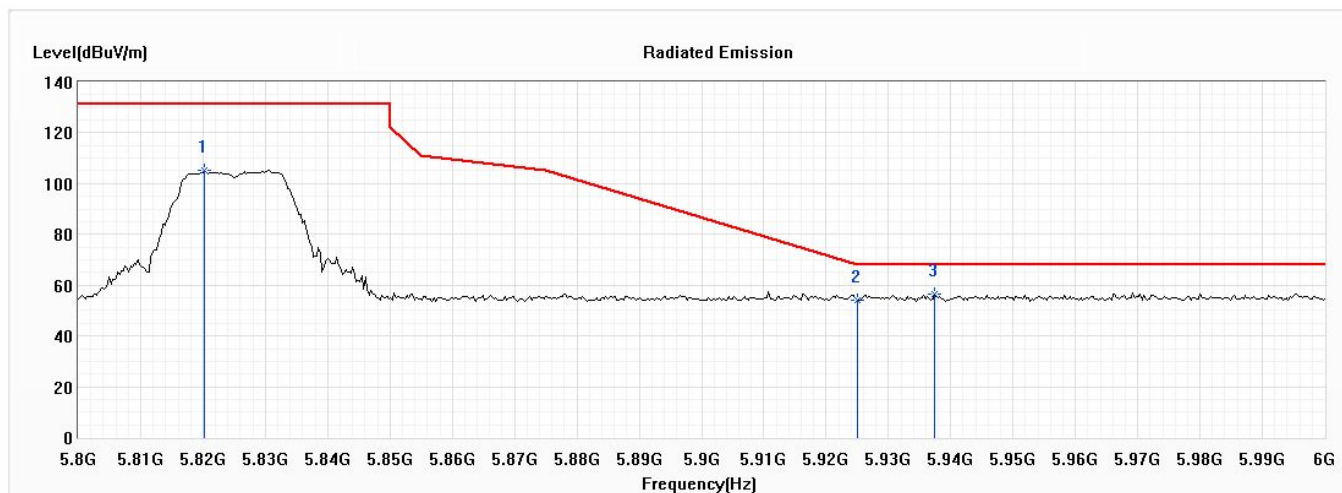
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5829.855	107.54	131.20	-23.66	90.48	17.06	PK
2	5925.000	55.20	68.22	-13.02	37.95	17.25	PK
* 3	5997.101	56.90	68.22	-11.32	39.46	17.44	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps) (5825MHz)
 Test Date : 2021/03/11

Vertical



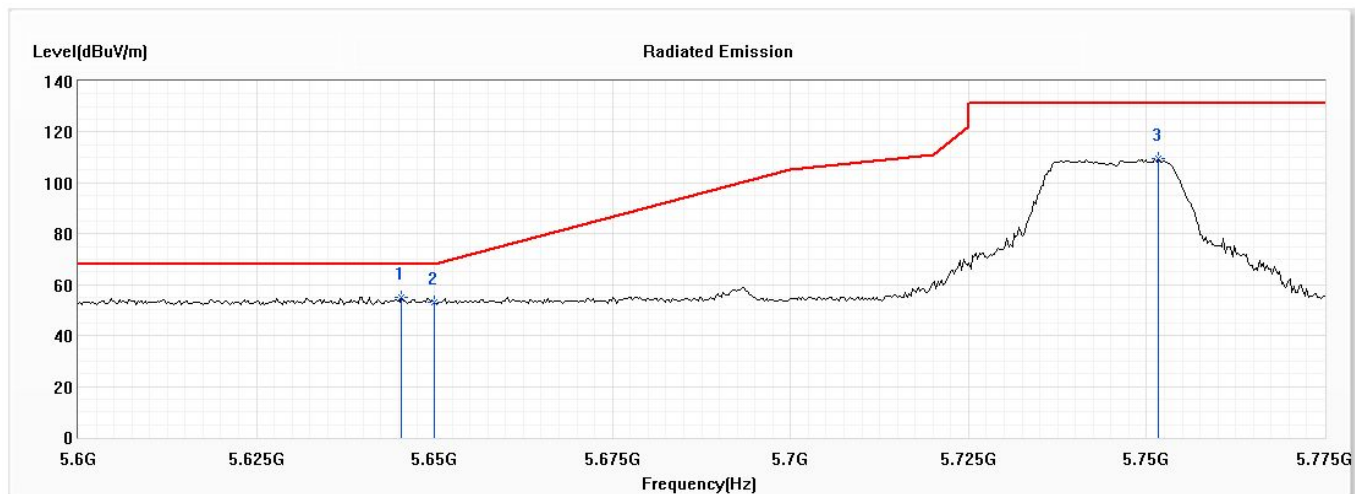
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5820.290	105.41	131.20	-25.79	88.42	16.99	PK
2	5925.000	54.04	68.22	-14.18	36.79	17.25	PK
* 3	5937.391	56.71	68.22	-11.51	39.53	17.18	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5745MHz)
 Test Date : 2021/03/11

Horizontal



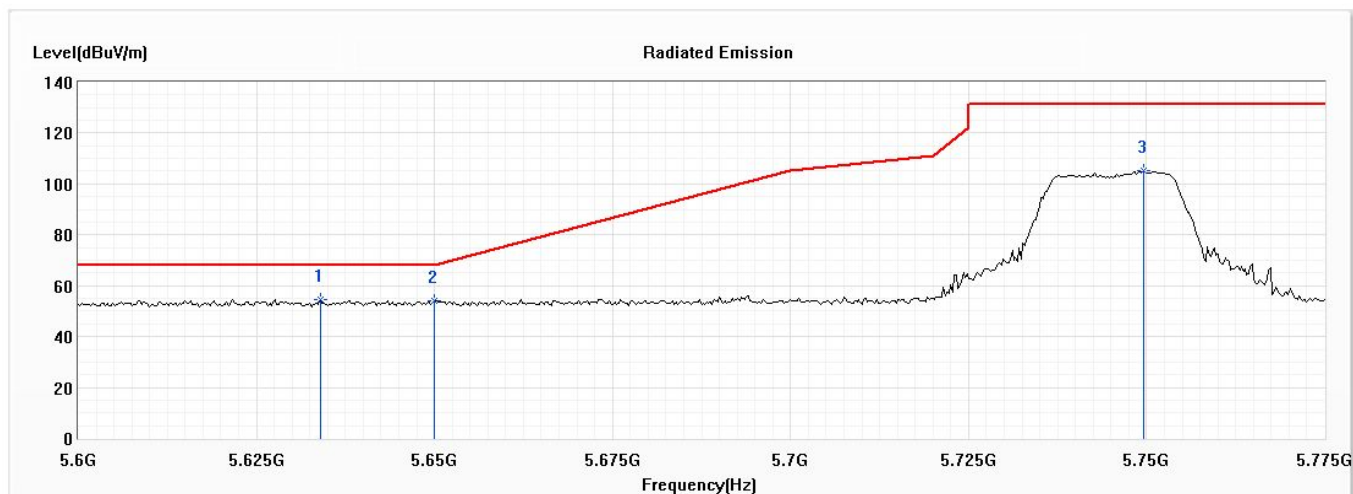
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	5645.399	55.13	68.22	-13.09	38.69	16.44	PK
2	5650.000	53.06	68.22	-15.16	36.62	16.44	PK
3	5751.667	109.66	131.20	-21.54	92.97	16.69	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5745MHz)
 Test Date : 2021/03/11

Vertical



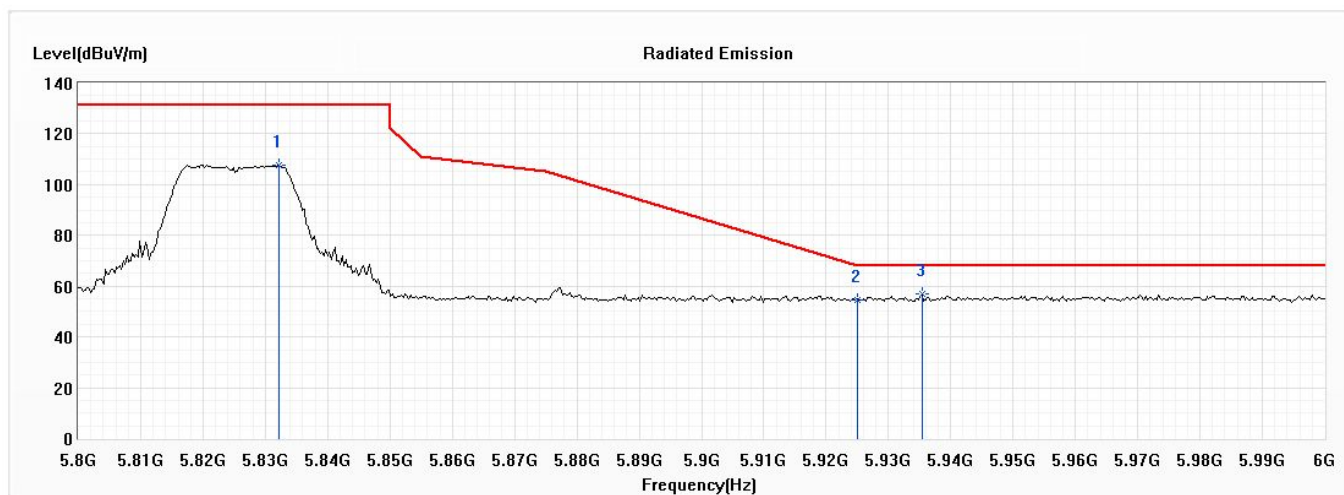
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	5633.986	54.59	68.22	-13.63	38.21	16.38	PK
2	5650.000	54.10	68.22	-14.12	37.66	16.44	PK
3	5749.638	105.23	131.20	-25.97	88.53	16.70	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5825MHz)
 Test Date : 2021/03/11

Horizontal



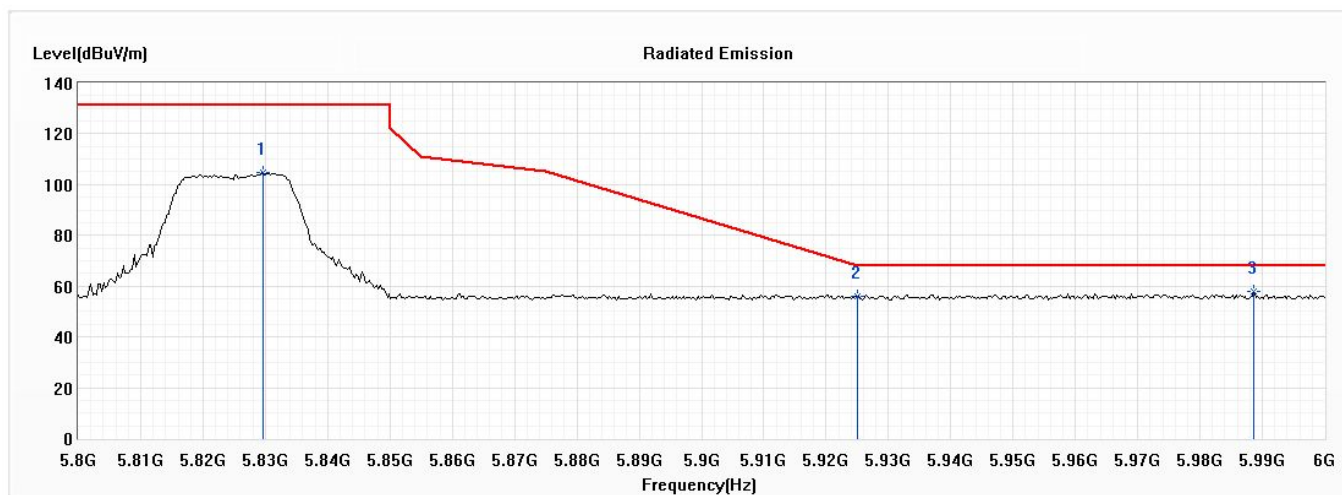
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5832.174	107.71	131.20	-23.49	90.65	17.06	PK
2	5925.000	54.79	68.22	-13.43	37.54	17.25	PK
* 3	5935.362	56.74	68.22	-11.48	39.55	17.19	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps) (5825MHz)
 Test Date : 2021/03/11

Vertical



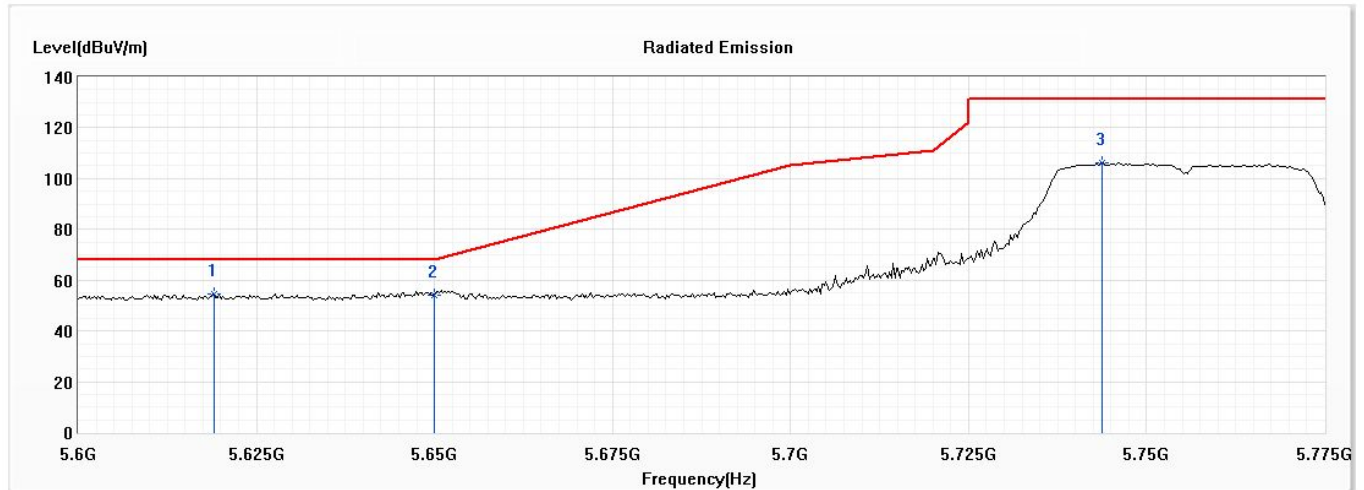
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5829.565	104.92	131.20	-26.28	87.86	17.06	PK
2	5925.000	56.07	68.22	-12.15	38.82	17.25	PK
* 3	5988.696	58.01	68.22	-10.21	40.61	17.40	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5755MHz)
 Test Date : 2021/03/11

Horizontal

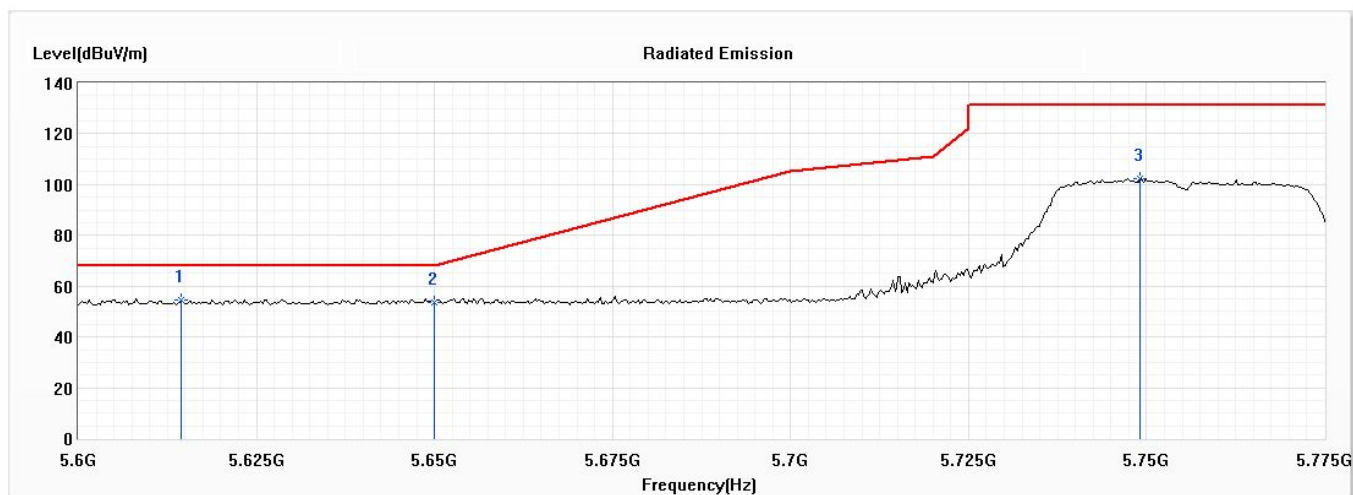


Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5755MHz)
 Test Date : 2021/03/11

Vertical



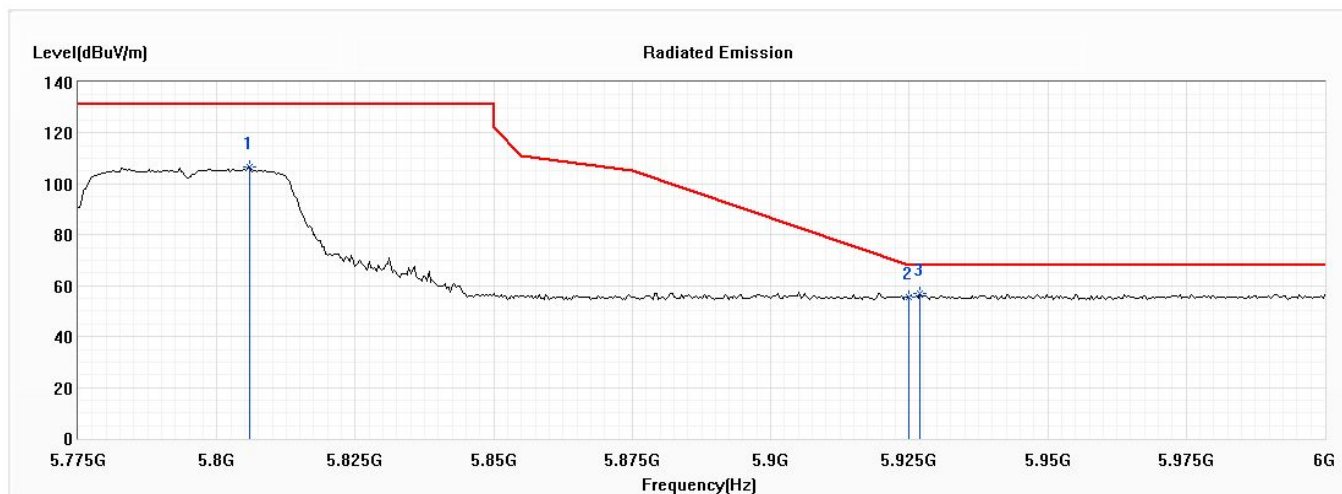
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	5614.457	54.56	68.22	-13.66	38.08	16.48	PK
2	5650.000	53.62	68.22	-14.60	37.18	16.44	PK
3	5749.130	102.47	131.20	-28.73	85.77	16.70	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
 Test Date : 2021/03/11

Horizontal



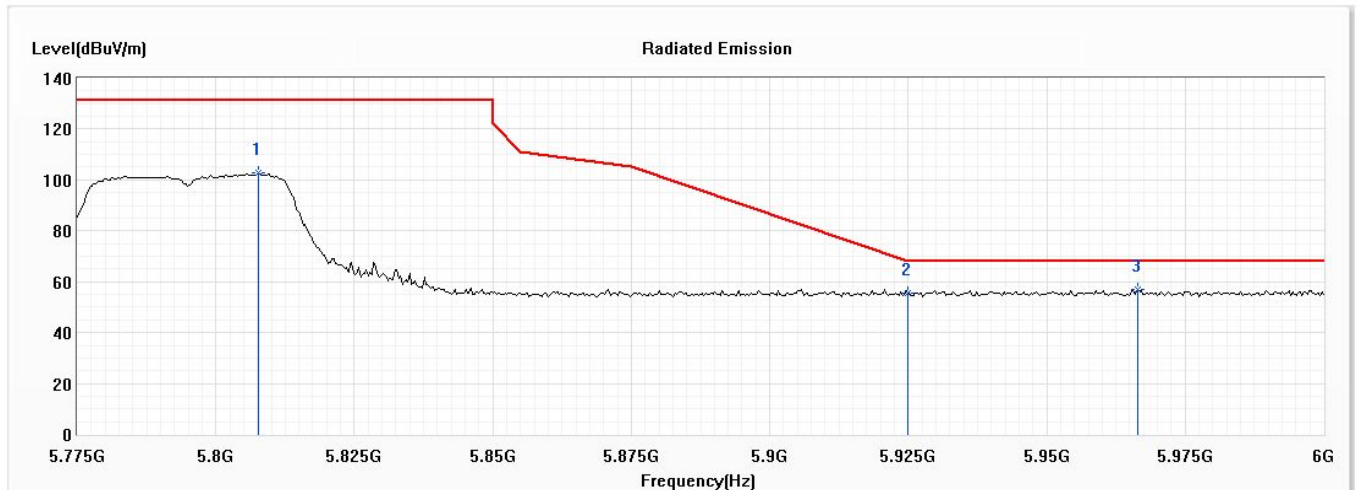
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5805.978	106.72	131.20	-24.48	89.75	16.97	PK
2	5925.000	55.66	68.22	-12.56	38.41	17.25	PK
* 3	5926.957	56.91	68.22	-11.31	39.66	17.25	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps) (5795MHz)
 Test Date : 2021/03/11

Vertical



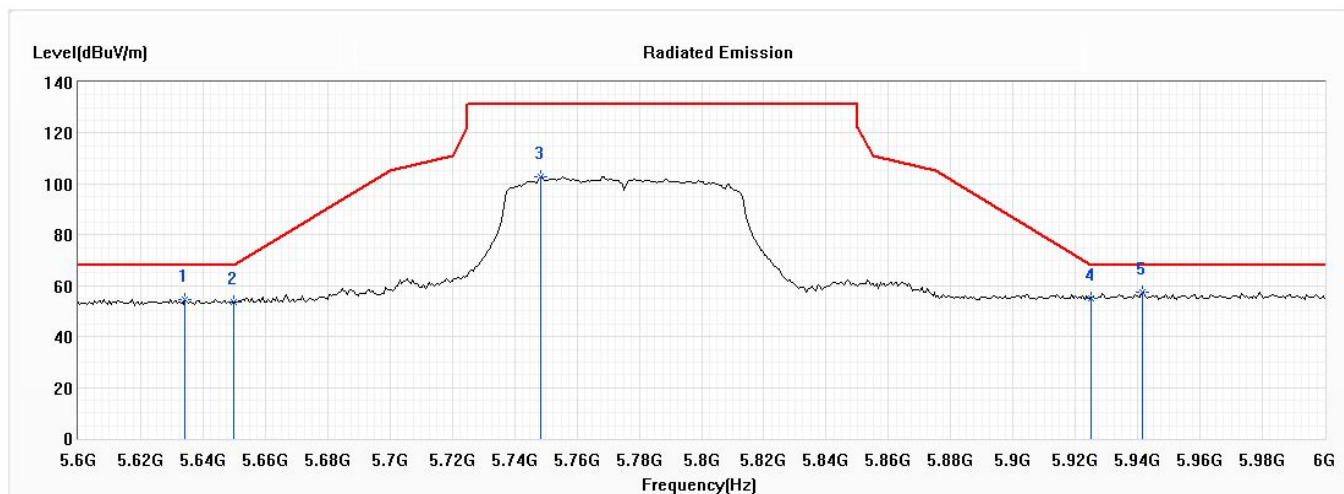
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5807.609	102.68	131.20	-28.52	85.73	16.95	PK
2	5925.000	55.54	68.22	-12.68	38.29	17.25	PK
* 3	5966.413	57.16	68.22	-11.06	39.84	17.32	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5775MHz)
 Test Date : 2021/03/11

Horizontal



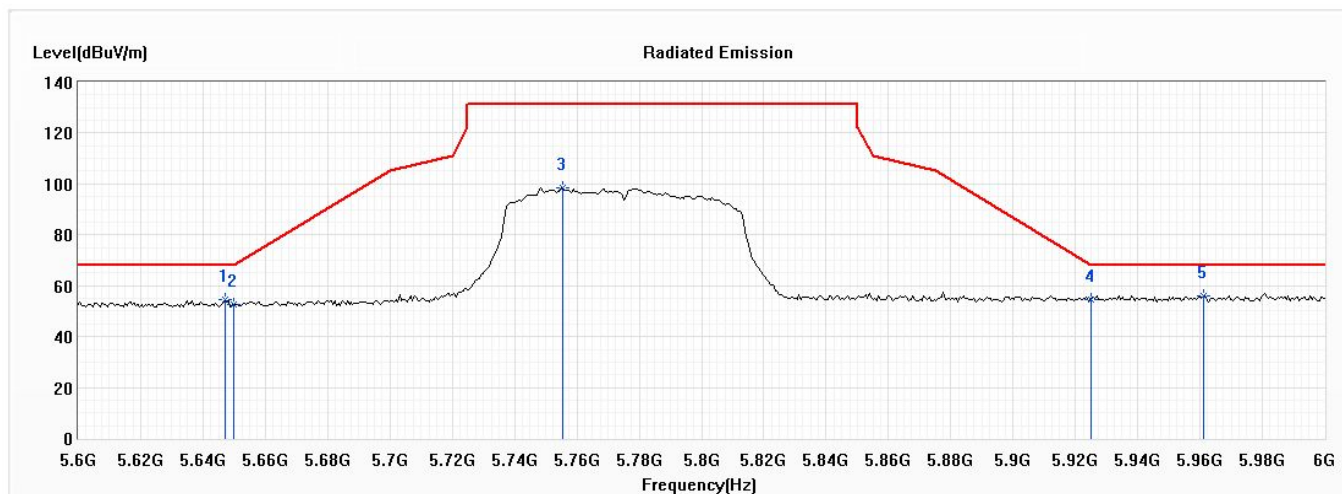
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5634.203	54.59	68.22	-13.63	38.21	16.38	PK
2	5650.000	53.43	68.22	-14.79	36.99	16.44	PK
3	5748.406	102.99	131.20	-28.21	86.29	16.70	PK
4	5925.000	55.21	68.22	-13.01	37.96	17.25	PK
* 5	5941.449	57.29	68.22	-10.93	40.08	17.21	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

Product : KENWOOD Motorsports CAM
 Test Item : Band Edge Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps) (5775MHz)
 Test Date : 2021/03/11

Vertical



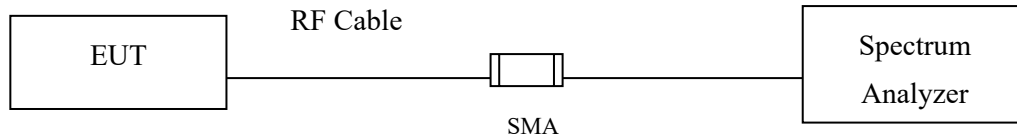
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	5646.957	54.51	68.22	-13.71	38.07	16.44	PK
2	5650.000	52.56	68.22	-15.66	36.12	16.44	PK
3	5755.362	98.28	131.20	-32.92	81.59	16.69	PK
4	5925.000	54.76	68.22	-13.46	37.51	17.25	PK
* 5	5961.159	55.90	68.22	-12.32	38.65	17.25	PK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Emission Level = Reading Level + Correct Factor.

7. Occupied Bandwidth

7.1. Test Setup



7.2. Limits

For the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

7.3. Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

7.4. Test Result of Occupied Bandwidth

Product : KENWOOD Motorsports CAM
 Test Item : Occupied Bandwidth Data
 Test Mode : Mode 1: Transmit (802.11a-6Mbps)
 Test Date : 2021/03/15

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	16450	>500	Pass
157	5785	16450	>500	Pass
165	5825	16450	>500	Pass

Figure Channel 149:

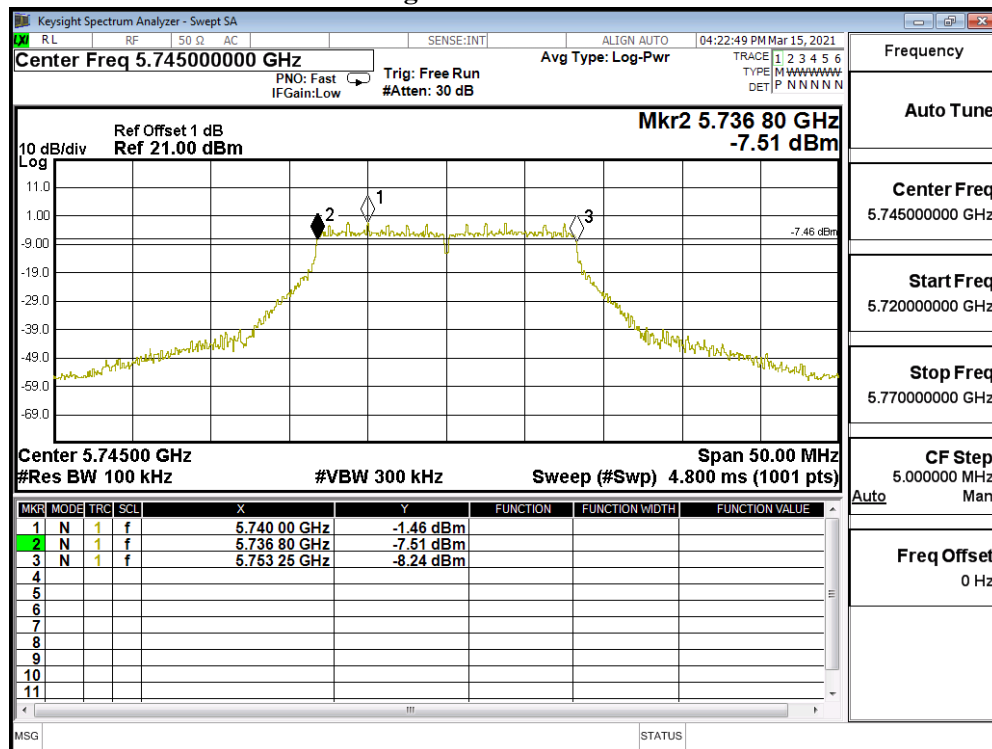


Figure Channel 157:

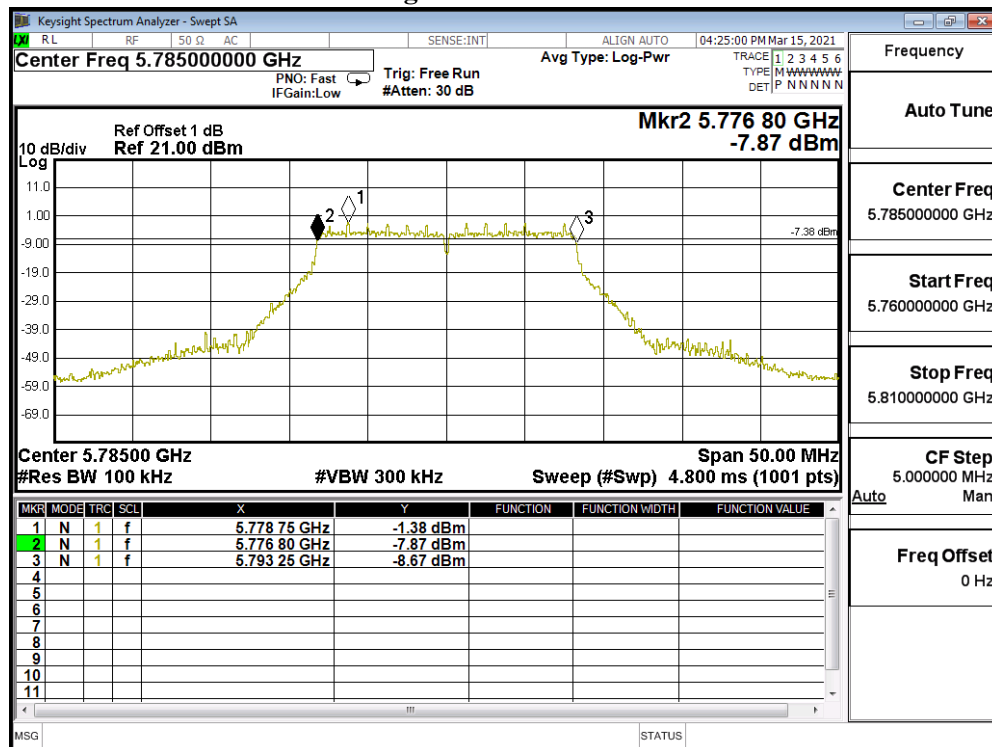
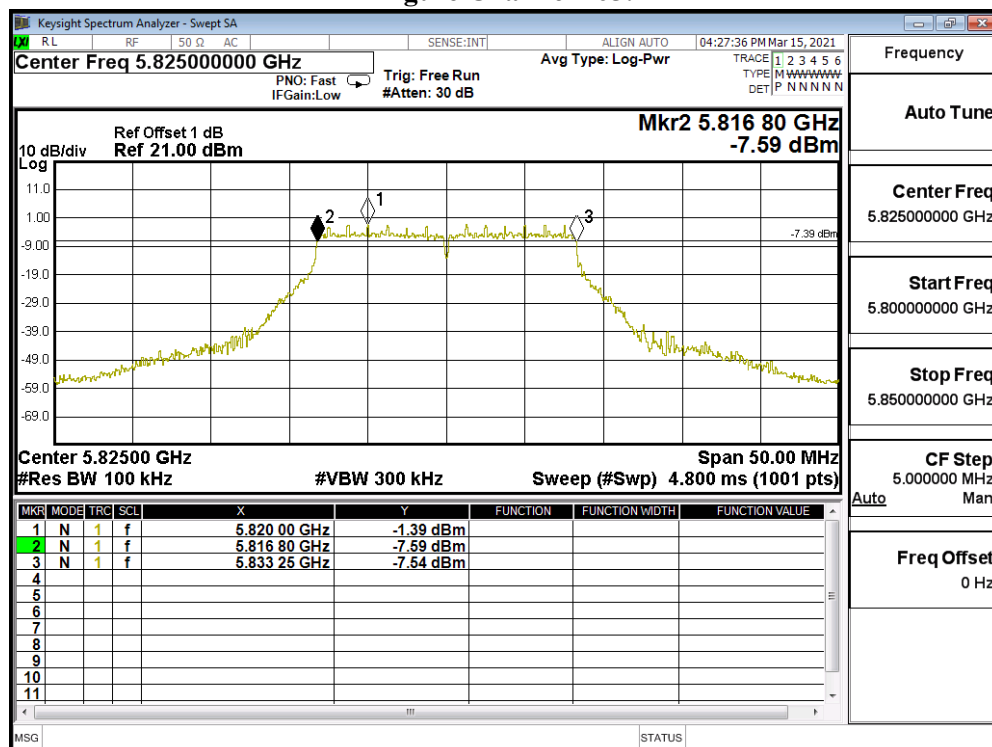


Figure Channel 165:



Product : KENWOOD Motorsports CAM
 Test Item : Occupied Bandwidth Data
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
 Test Date : 2021/03/15

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	17700	>500	Pass
157	5785	17700	>500	Pass
165	5825	17700	>500	Pass

Figure Channel 149:

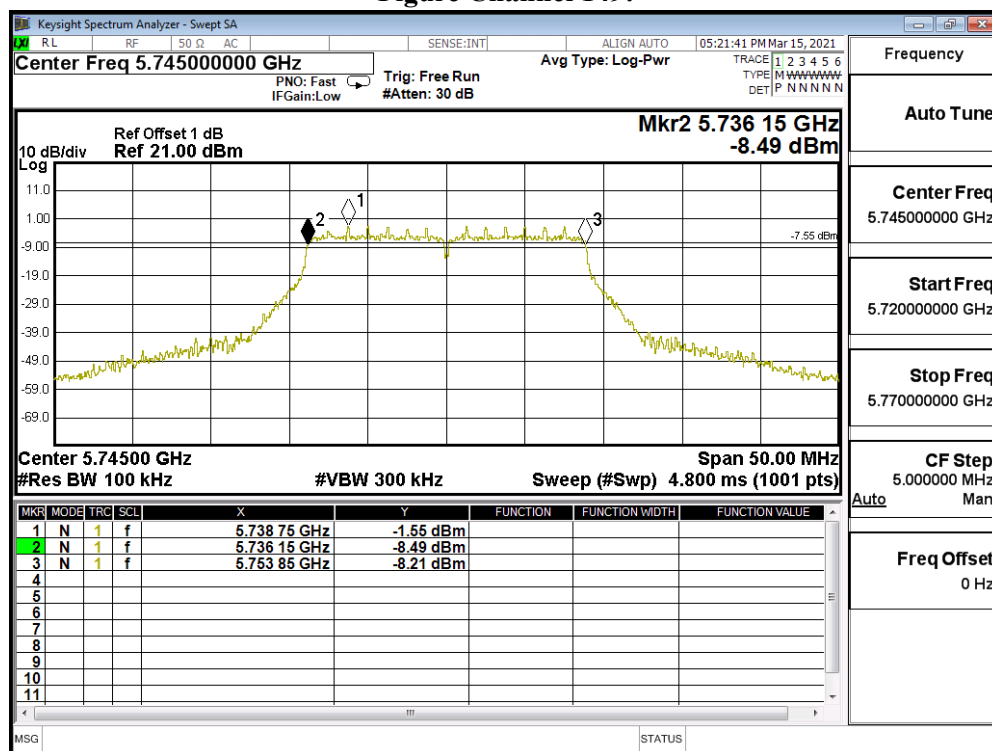


Figure Channel 157:

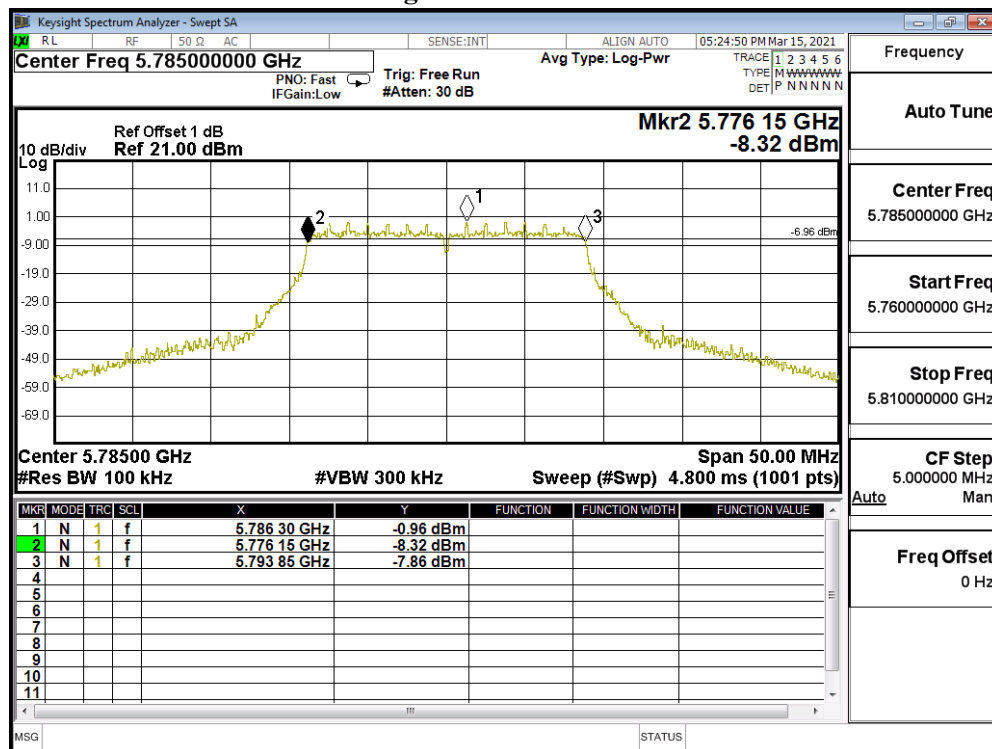
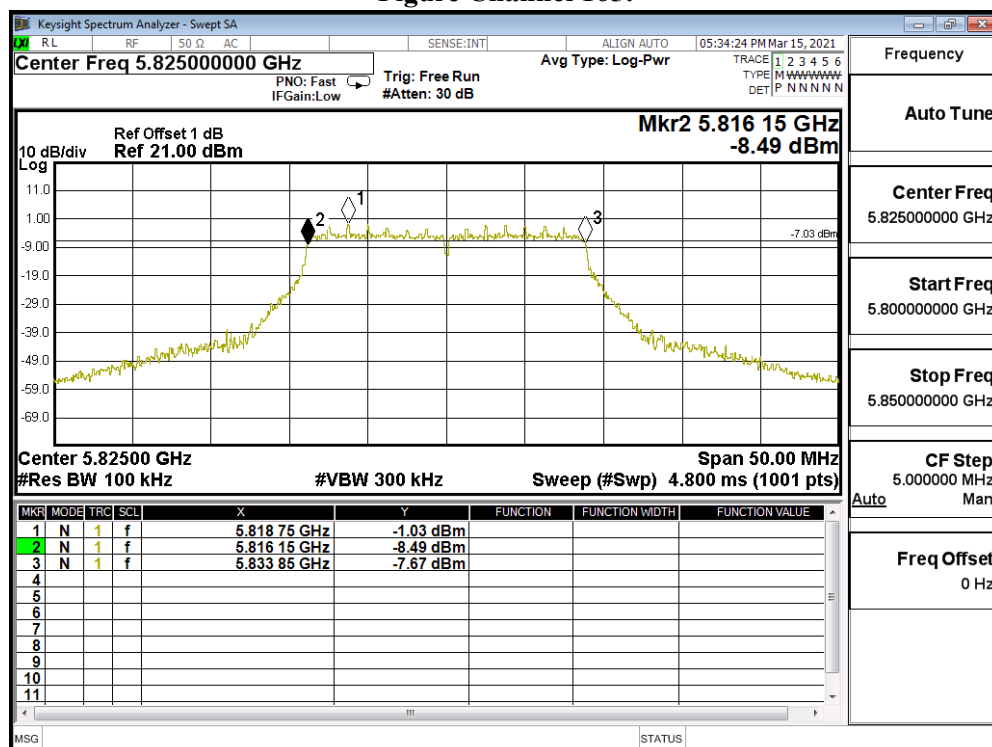


Figure Channel 165:



Product : KENWOOD Motorsports CAM
 Test Item : Occupied Bandwidth Data
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
 Test Date : 2021/03/15

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755	35400	>500	Pass
159	5795	35400	>500	Pass

Figure Channel 151:

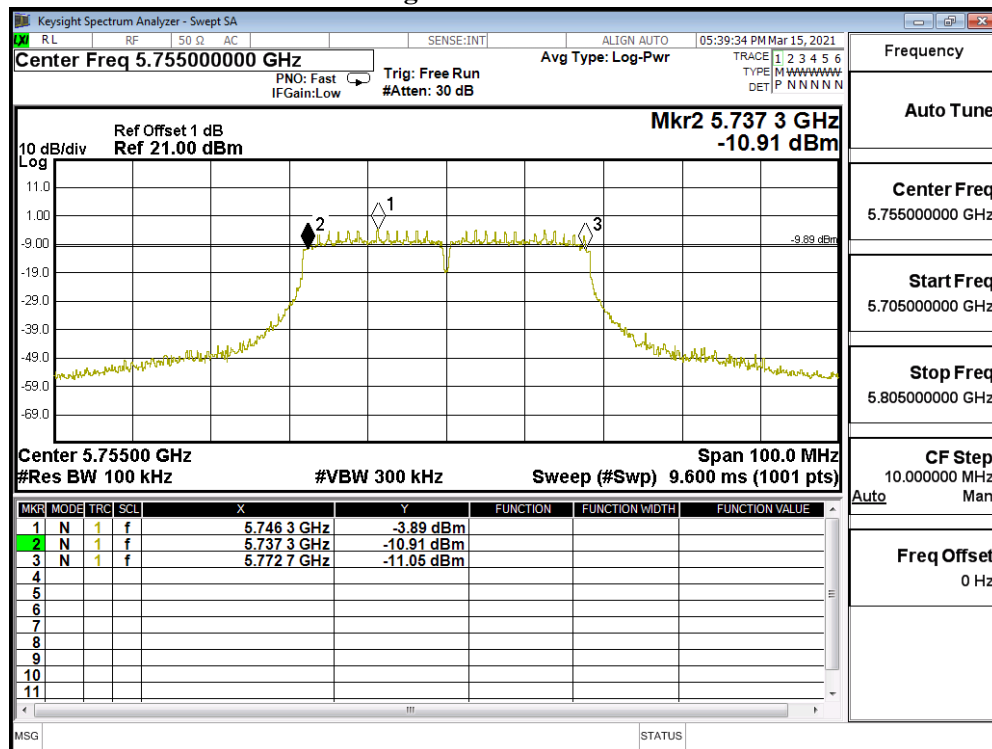
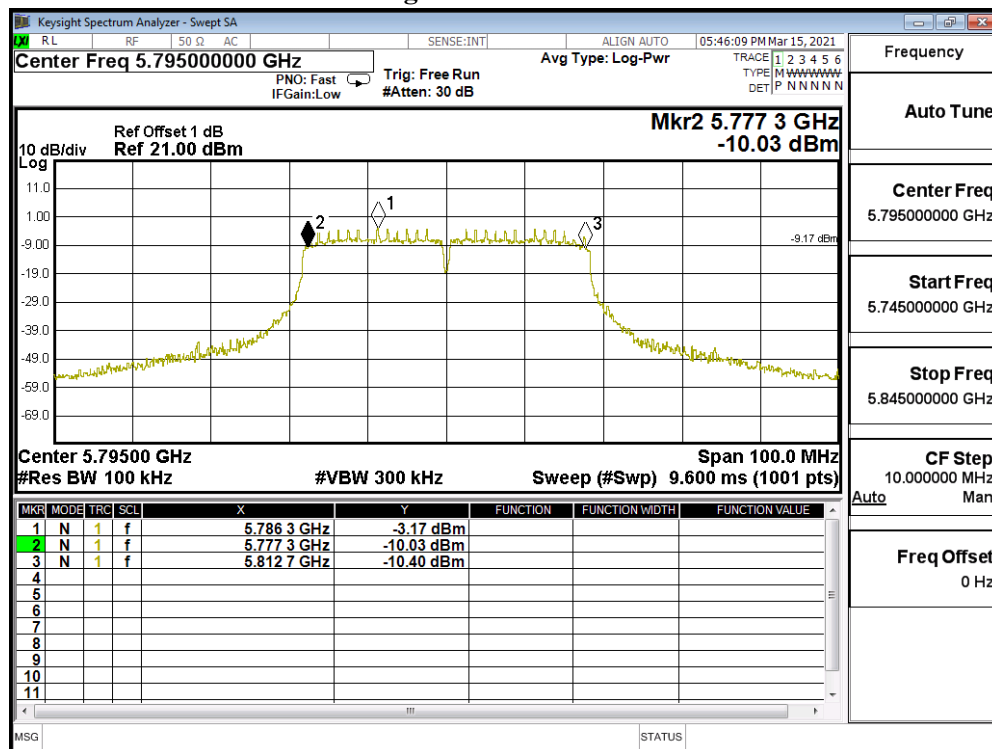


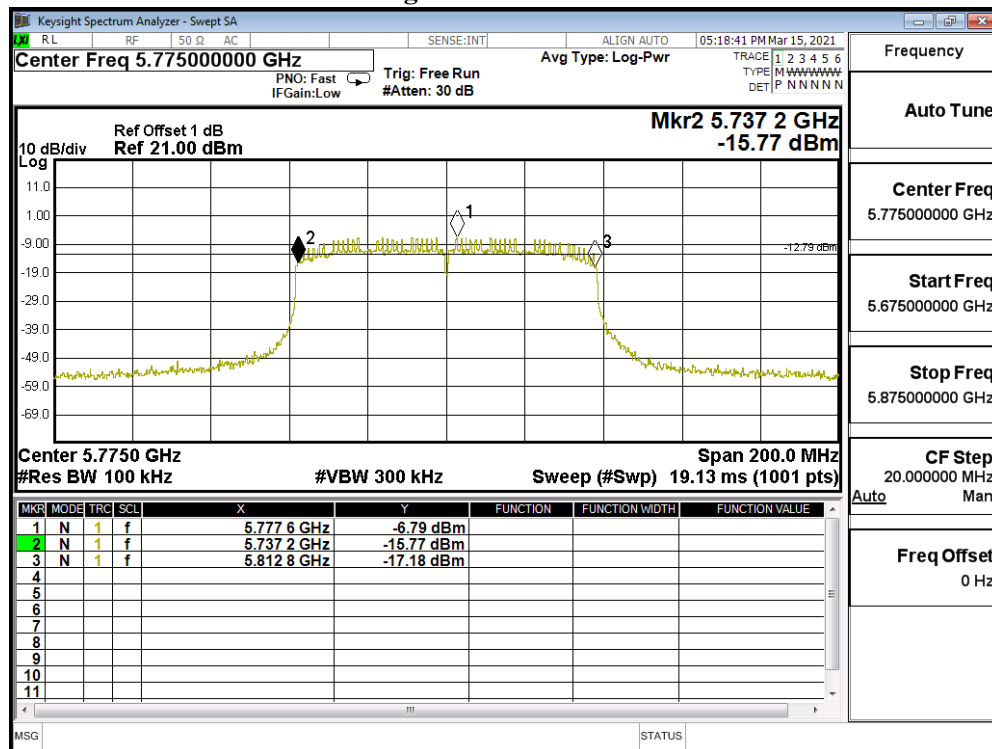
Figure Channel 159:



Product : KENWOOD Motorsports CAM
 Test Item : Occupied Bandwidth Data
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
 Test Date : 2021/03/15

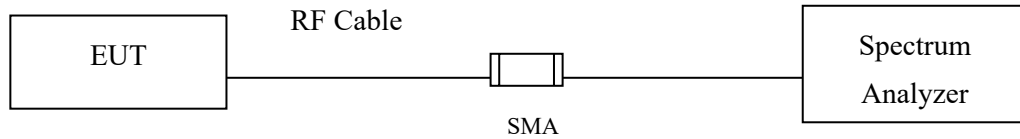
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	5775	75600	>500	Pass

Figure Channel 155:



8. Duty Cycle

8.1. Test Setup



8.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to U-NII test procedure of KDB789033 for compliance to FCC 47CFR 15.407 requirements.

8.3. Test Result of Duty Cycle

Product : KENWOOD Motorsports CAM
Test Item : Duty Cycle
Test Mode : Transmit

Duty Cycle Formula:

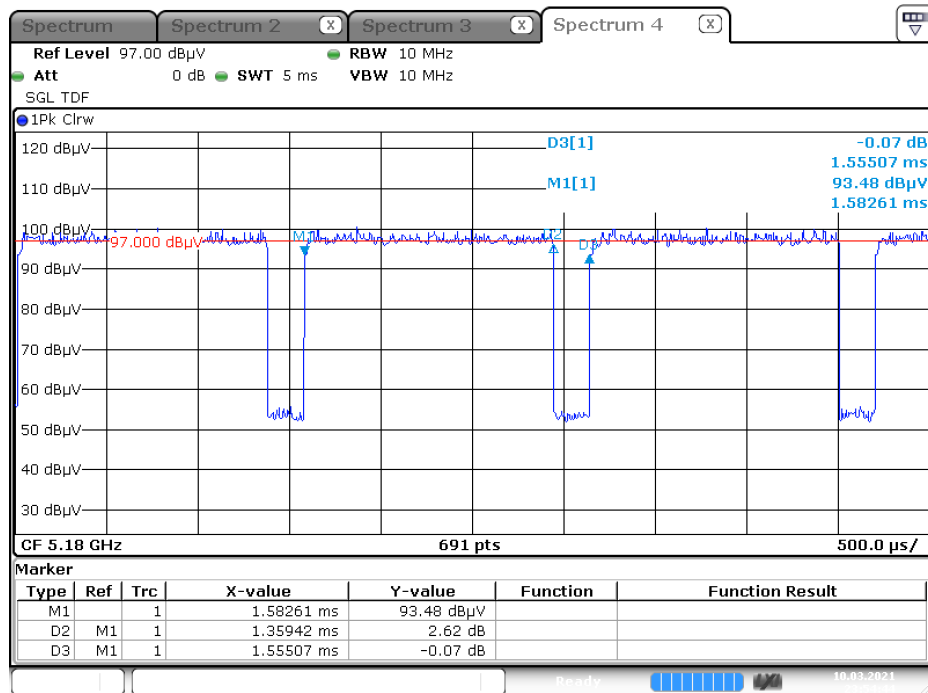
$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$

$\text{Duty Factor} = 10 \text{ Log } (1/\text{Duty Cycle})$

Results:

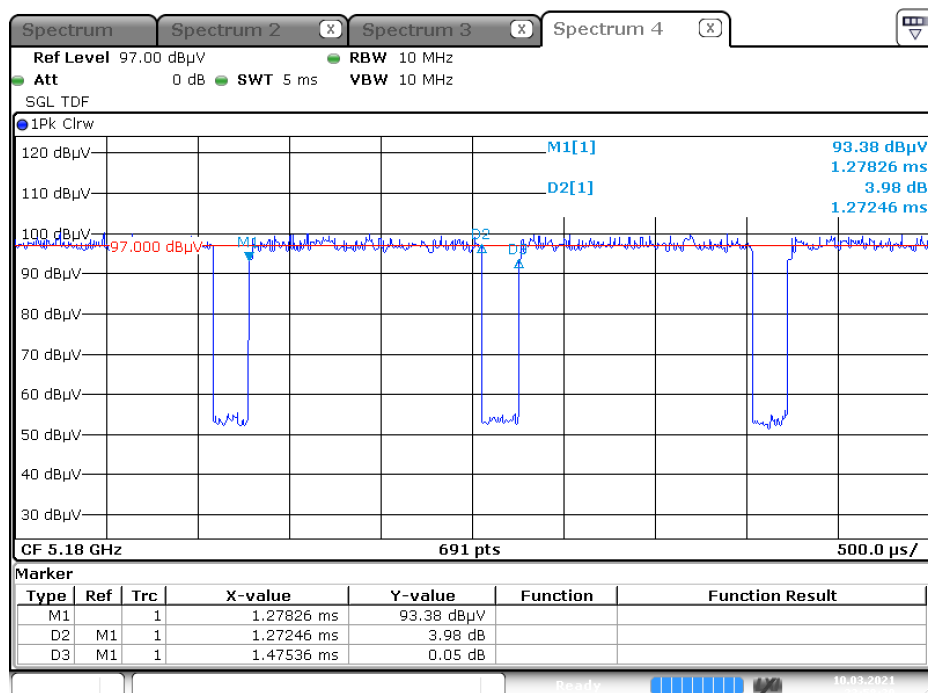
5GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	1.3594	1.5551	87.42	0.58
802.11n20	1.2725	1.4754	86.25	0.64
802.11n40	0.6348	0.8435	75.26	1.23
802.11ac80	0.2464	0.4464	55.20	2.58

802.11a



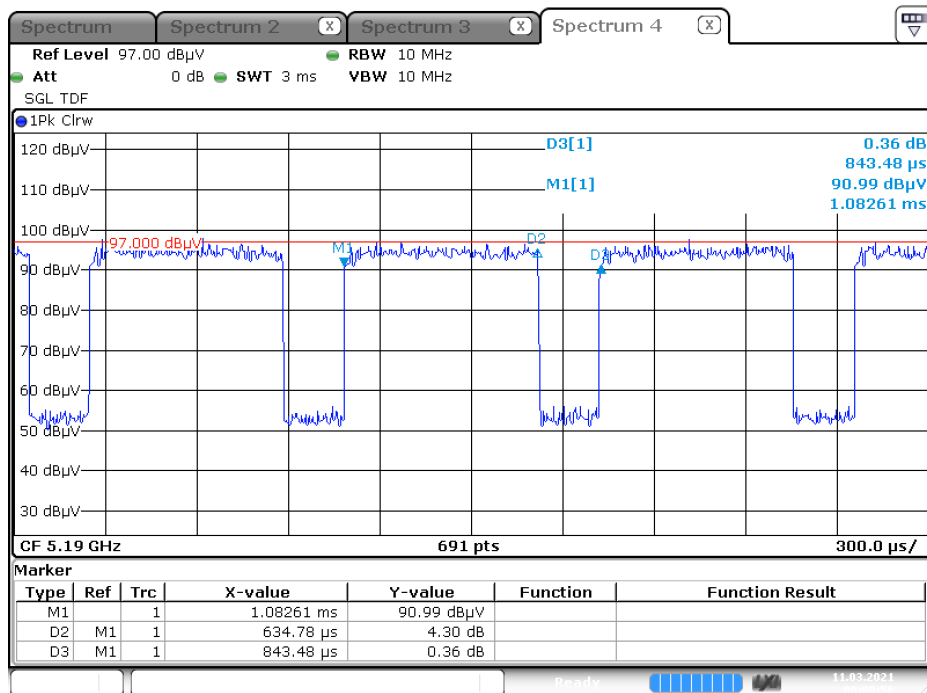
Date: 10.MAR.2021 23:54:44

802.11n20



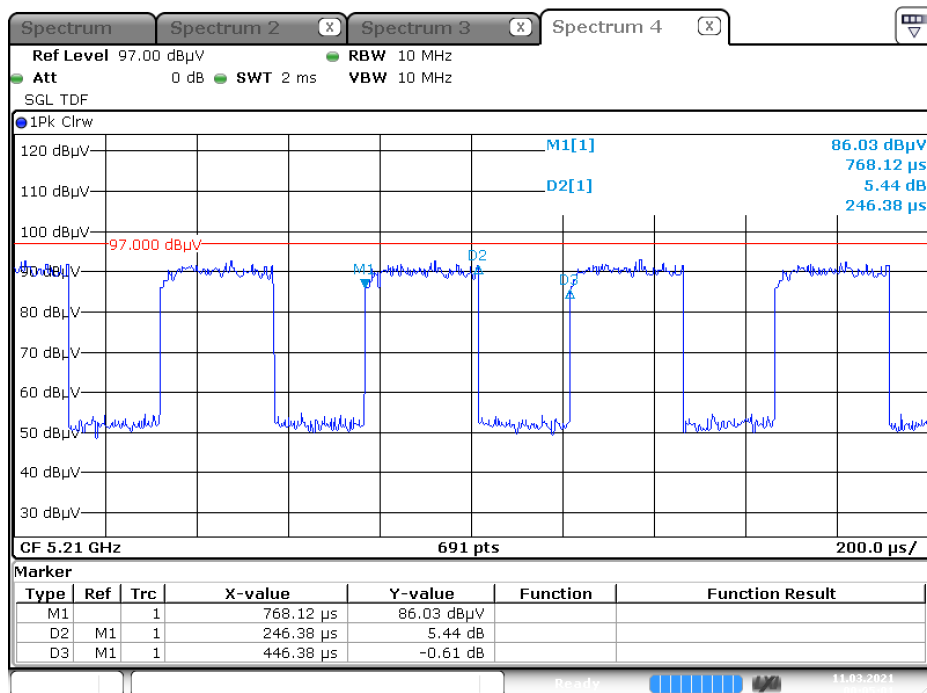
Date: 10.MAR.2021 23:58:20

802.11n40



Date: 11.MAR.2021 00:00:56

802.11ac80



Date: 11.MAR.2021 00:05:01

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.