

TEST REPORT

FCC Test for JET-R-FHD
Certification

APPLICANT
WISEJET,INC.

REPORT NO.
HCT-RF-2004-FC059-R1

DATE OF ISSUE
May 14, 2020

HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 F ax. +82 31 645 6401



HCT CO., LTD.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 F ax. +82 31 645 6401

TEST REPORT

FCC Test for JET-R-FHD

REPORT NO.
HCT-RF-2004-FC059-R1
DATE OF ISSUE
14 May 2020
Additional Model
-

Applicant	WISEJET, INC. 401-ho, 35, Techno 9-ro, Yuseong-gu, Daejeon, 34027, Republic of Korea
EUT Type Model Name	V-JETn JET-R-FHD
FCC ID	2ALI9V-JETRFHD
Date of Test	March 23, 2020 ~ April 23, 2020
FCC Rule Part(s)	CFR 47 Part 15, Subpart C

The result shown in this test report refer only to the sample(s) tested unless otherwise stated. This test results were applied only to the test methods required by the standard.

Tested by
Kyung Soo Kang

(signature)

Technical Manager
Jong Seok Lee

(signature)

(signature)
HCT CO., LTD.
Soo Chan Lee
SooChan Lee / CEO

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	April 27, 2020	Initial Release
1	May 14, 2020	Revised the power supply in section 1.2.

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

CONTENTS

1. GENERAL INFORMATION	5
1.1. APPLICANT INFORMATION	5
1.2. PRODUCT INFORMATION	5
1.3. TEST INFORMATION	5
2. FACILITIES AND ACCREDITATIONS	6
2.1. FACILITIES	6
2.2. EQUIPMENT	6
3. ANTENNA REQUIREMENTS	6
4. TEST SPECIFICATIONS	7
4.1. STANDARDS	7
4.2. ADDITIONAL DESCRIPTIONS ABOUT TEST	8
4.3. MEASUREMENT UNCERTAINTY	10
4.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS	10
4.5. Description of Test Modes	10
5. TEST EQUIPMENTS	11
6. TEST RESULT	12
6.1. 6 dB BANDWIDTH	12
6.2. Output Power	17
6.3. Radiated Emission Measurement	20
6.4. FREQUENCY STABILITY	28
6.5. AC POWER-LINE CONDUCTED EMISSIONS	30
7. Annex A_EUT AND TEST SETUP PHOTO	35

1. GENERAL INFORMATION

1.1. APPLICANT INFORMATION

Company Name	WISEJET,INC.
Company Address	401-ho, 35, Techno 9-ro, Yuseong-gu, Daejeon, 34027, Republic of Korea

1.2. PRODUCT INFORMATION

EUT Type	V-JETn		
EUT Serial Number	B1908JR01746		
Power Supply	DC 3.3V / 1A		
Frequency Range	LRP: 60.16 GHz ~ 62.96 GHz		
Modulation Type	BPSK		
Transfer Rate	LRP-BPSK (20.337 Mb/s)		
Tx Output Power	Min.	Typ.	Max.
	18.0 dBm	21.0 dBm	31.0 dBm
Antenna Specification	Type: Patch Array Antenna Peak Gain: 18.0 dBi		

1.3. TEST INFORMATION

FCC Rule Parts	CFR 47 Part 15, Subpart C
Measurement Standards	ANSI C63.10-2013
Test Location	HCT CO., LTD. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

2. FACILITIES AND ACCREDITATIONS

2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.

The site is constructed in conformance with the requirements of ANSI C63.4 (Version: 2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

3. ANTENNA REQUIREMENTS

According to FCC 47 CFR § 15.203:

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

- (1) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of § 15.203

4. TEST SPECIFICATIONS

4.1. STANDARDS

Description	Reference	Results
6 dB Bandwidth	15.255(e)	Compliant
Output Power	15.255 (c) & (e)	Compliant
Spurious Emissions	15.255(d)	Compliant
Frequency Stability	15.255(f)	Compliant
AC Power Conducted Emission	15.207	Compliant

4.2. ADDITIONAL DESCRIPTIONS ABOUT TEST

All tests is performed by radiated measurement and applied below conditions:

$$- R_m = 2D^2 / \lambda$$

$$Wavelength = Speed\ of\ light / Measurement\ frequency = 0.3 / 62.96 = 0.0048$$

$$(2 \times (Max\ measured\ antenna\ dimension)^2) / Wavelength = (2 \times (0.01698)^2) / 0.0048 = 0.12\ m$$

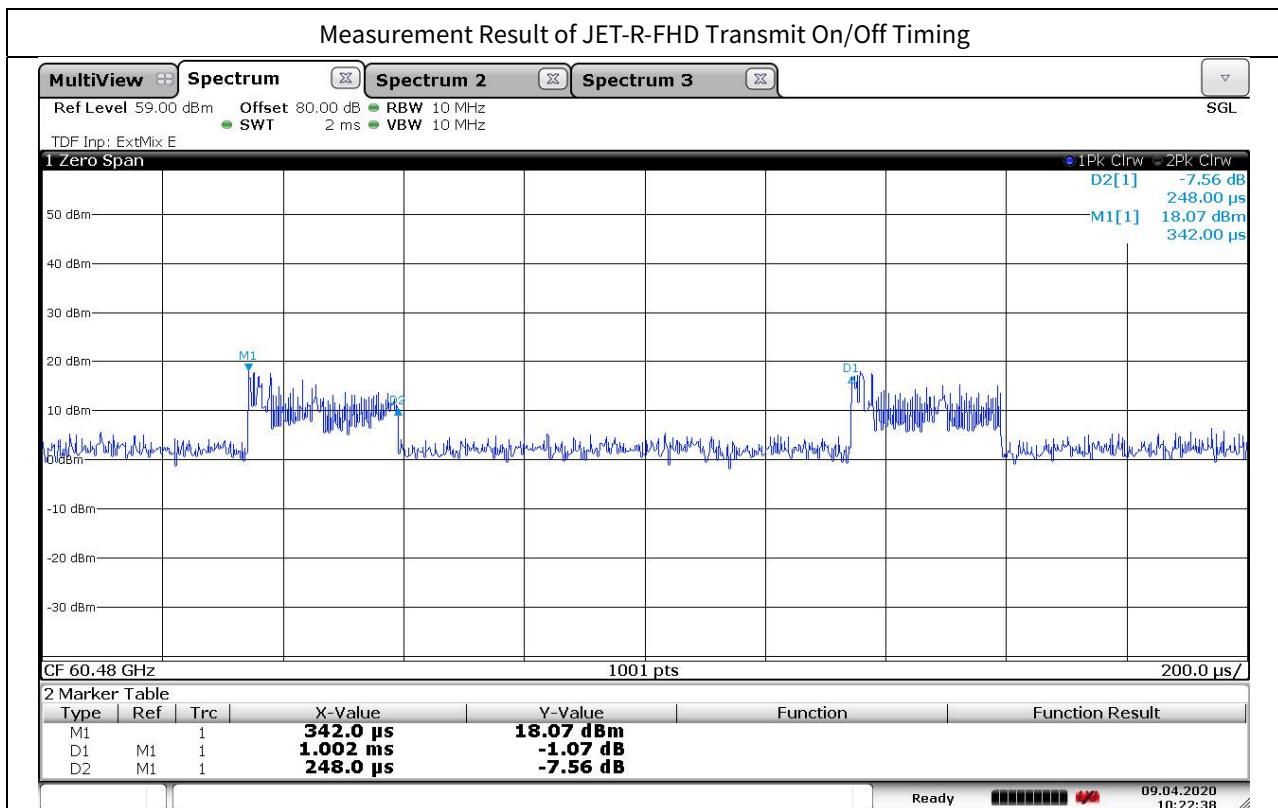
- For fundamental or out-of-band emissions the largest far-field distance of either the EUT antenna or measurement antenna shall be used. For spurious emissions the far-field distance will be based on the measurement antenna.
- In case of far-field distance for fundamental, we applied the measurement antenna dimension because the measured antenna is bigger than the antenna of EUT.

- Spurious emissions measurement distance is shown in table below (Reference : Measurement Antenna Dimension).

Frequency Range (GHz)	Wavelength (cm)	Far Field Distance (m)	Measurement Distance(m)
18 ~ 40	0.75	2.46	3.75
40 ~ 60	0.50	1.35	1.50
60 ~ 60.114	0.50	0.57	1.00
60.114 ~ 63.006	0.48	0.60	1.00
63.006 ~ 90	0.33	0.86	1.00
90 ~ 140	0.21	0.57	1.00
140 ~ 200	0.15	0.33	0.50

- Unwanted radiated emissions test was performed on state of all EUT antenna path is operated with a maximum output power level.

- EUT cannot be configured to transmit continuously and measurement instrument cannot be configured to measure only during active transmissions. So we perform the measurement using duty cycle method.



- The EUT duty cycle is

$$\text{Duty Cycle} = \text{On-time} / \text{Transmitter period} = 0.248 \text{ ms} / 1.002 \text{ ms} = 0.248$$

$$\text{Duty Correction} = 10 \log (1/\text{duty cycle}) = 10 \log (1/0.248) = 6.06 \text{ dB}$$

4.3. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty ($\pm$ dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05
Radiated Disturbance (40 GHz ~ 200 GHz)	4.59

4.4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature	+15 °C to +35 °C
Relative humidity	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

4.5. Description of Test Modes

LRP Mode							
Frequency Band	Channel Plan	Channel	Frequency	Channel	Frequency	Channel	Frequency
60.16 GHz – 60.80 GHz	A	1	60.16 GHz	2	60.48 GHz	3	60.80 GHz
62.32 GHz – 62.96 GHz	B	1	62.32 GHz	2	62.64 GHz	3	62.96 GHz

5. TEST EQUIPMENTS

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller (Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Ets	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	FSP (9 kHz ~ 40 GHz) / Spectrum Analyzer	07/16/2019	Annual	100843
Rohde&Schwarz	FSW / Spectrum Analyzer	07/18/2019	Annual	101256
Agilent	N9030B / PXA Signal Analyzer	03/27/2020	Annual	MY55480167
Rohde & Schwarz	Loop Antenna	01/18/2019	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	1300
Schwarzbeck	BBHA 9170 / Horn Antenna (15 GHz ~ 40 GHz)	04/29/2019	Biennial	BBHA9170342
TNM system	FBSM-01B / Amp & Filter Bank Switch Controller	N/A	N/A	N/A
TNM system	FBSM-05B / LNA1(1 ~ 18 GHz)	01/21/2020	Annual	25540
TESTEK	TK-PA1840H / LNA (18 ~ 40 GHz)	03/03/2020	Annual	170033-L
OML INC.	WR-19 Horn Antenna / Horn Antenna	04/23/2018	Biennial	18042301
OML INC.	WR-19 Horn Antenna / Horn Antenna	04/23/2018	Biennial	18042302
OML INC.	WR-12 Horn Antenna / Horn Antenna	04/23/2018	Biennial	18042301
OML INC.	WR-12 Horn Antenna / Horn Antenna	04/23/2018	Biennial	18042302
OML INC.	WR-08 Horn Antenna / Horn Antenna	05/01/2018	Biennial	18050101
OML INC.	WR-08 Horn Antenna / Horn Antenna	05/01/2018	Biennial	18050102
OML INC.	WR-05 Horn Antenna / Horn Antenna	05/01/2018	Biennial	18050101
OML INC.	WR-05 Horn Antenna / Horn Antenna	05/01/2018	Biennial	18050102
OML INC.	OML WR19 / Harmonic Mixer	09/09/2019	Annual	M19HWD
OML INC.	OML WR12 / Harmonic Mixer	09/09/2019	Annual	M12HWD
OML INC.	OML WR08 / Harmonic Mixer	09/09/2019	Annual	M08HWD
OML INC.	OML WR05 / Harmonic Mixer	09/09/2019	Annual	M05HWD
OML INC.	WR-19 / Source Module	11/19/2019	Annual	S19MS-A-160516-1
OML INC.	WR-12 / Source Module	09/09/2019	Annual	S12MS-A-160419-1
OML INC.	WR-08 / Source Module	09/09/2019	Annual	S08MS-A-160419-1
OML INC.	WR-05 / Source Module	07/22/2019	Annual	S05MS-A-160419-1
NANGYEUL CO., LTD.	NY-THR18750 / Temperature and Humidity Chamber	12/16/2019	Annual	NY-2009012201A
Rohde & Schwarz	ENV216 / LISN	09/11/2019	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/18/2019	Annual	100584

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

6. TEST RESULT

6.1. 6 dB BANDWIDTH

Test Requirement:

FCC Rules

§ 15.255 Operation within the band 57-71 GHz.

- (e) (1) For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g., for frequency hopping devices).

Test Procedure

Measurements were in accordance with the test methods section 9.3 in ANSI 63.10-2013.

The emission bandwidth (EBW) is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least the specified amount below the maximum level of the modulated carrier.

The following procedure shall be used for measurement of the bandwidth for millimeter-wave devices:

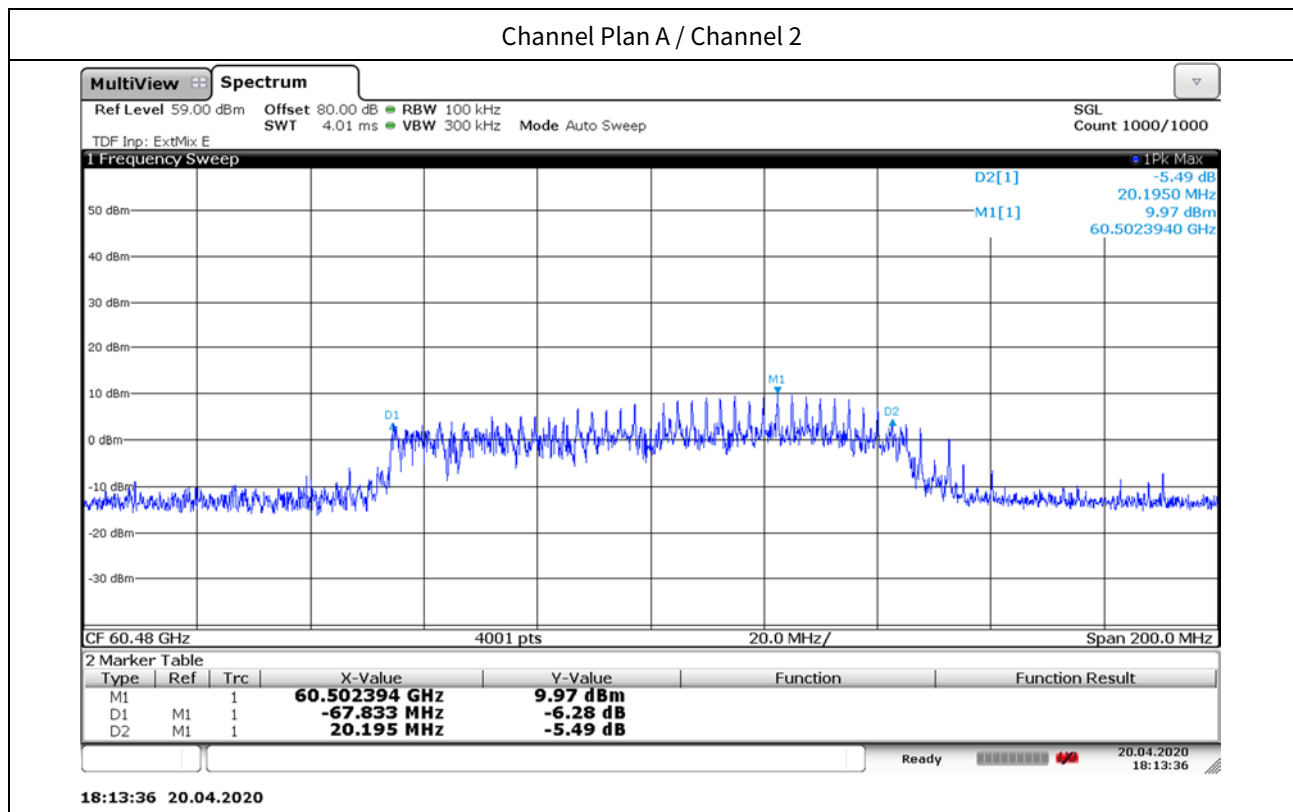
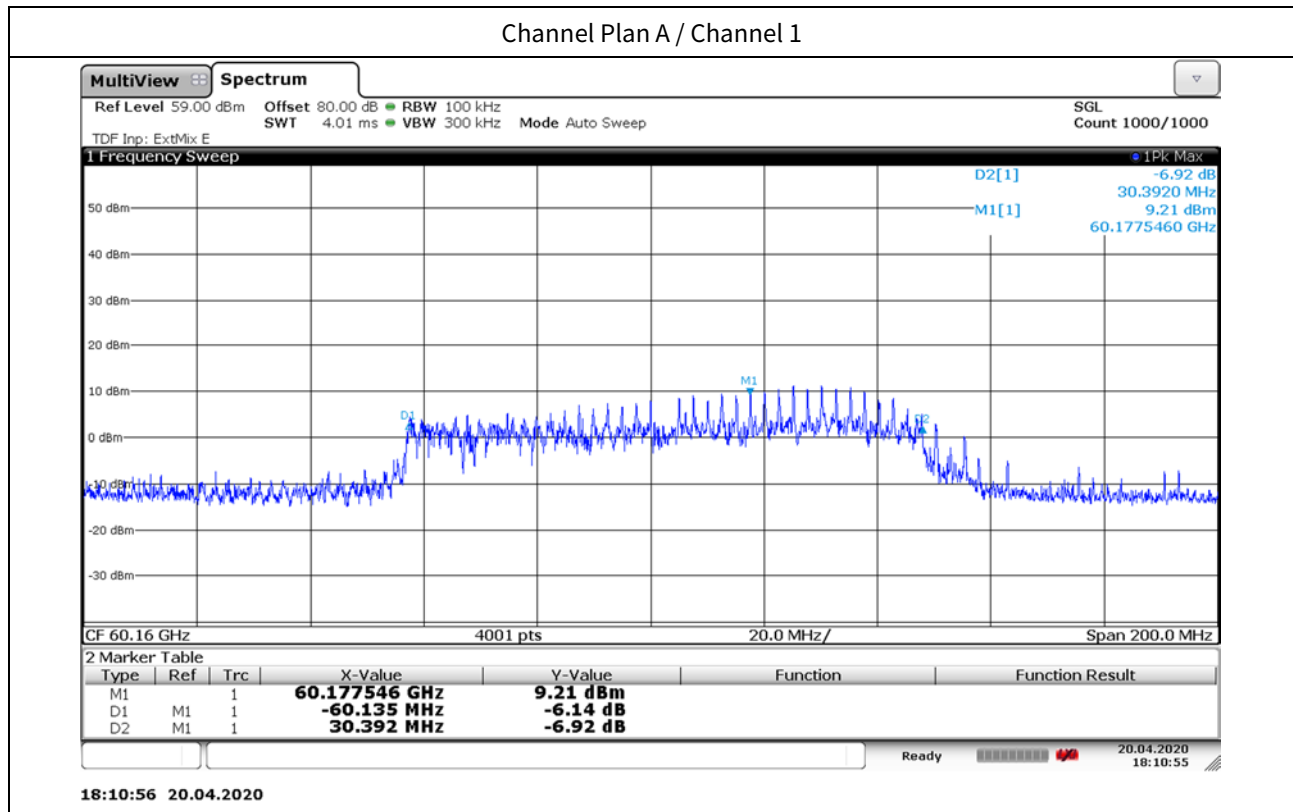
- a) Use the following spectrum analyzer settings:
 - 1) Span equal to approximately two times to three times the EBW, centered on the carrier frequency.
 - 2) RBW, as specified in the requirement. (RBW = 100 kHz)
 - 3) VBW, as specified in the requirement, or $VBW \geq RBW$ if not specified.
 - 4) Sweep = auto.
 - 5) Detector function = peak.
 - 6) Trace = max hold.
- b) The EUT shall be transmitting at its maximum data rate. Allow the trace to stabilize.
- c) Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure the specified dB down one side of the emission.
- d) Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.
- e) If this value varies with different modes of operation (data rate, modulation format, etc.), then repeat this test for each variation.

Note: We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

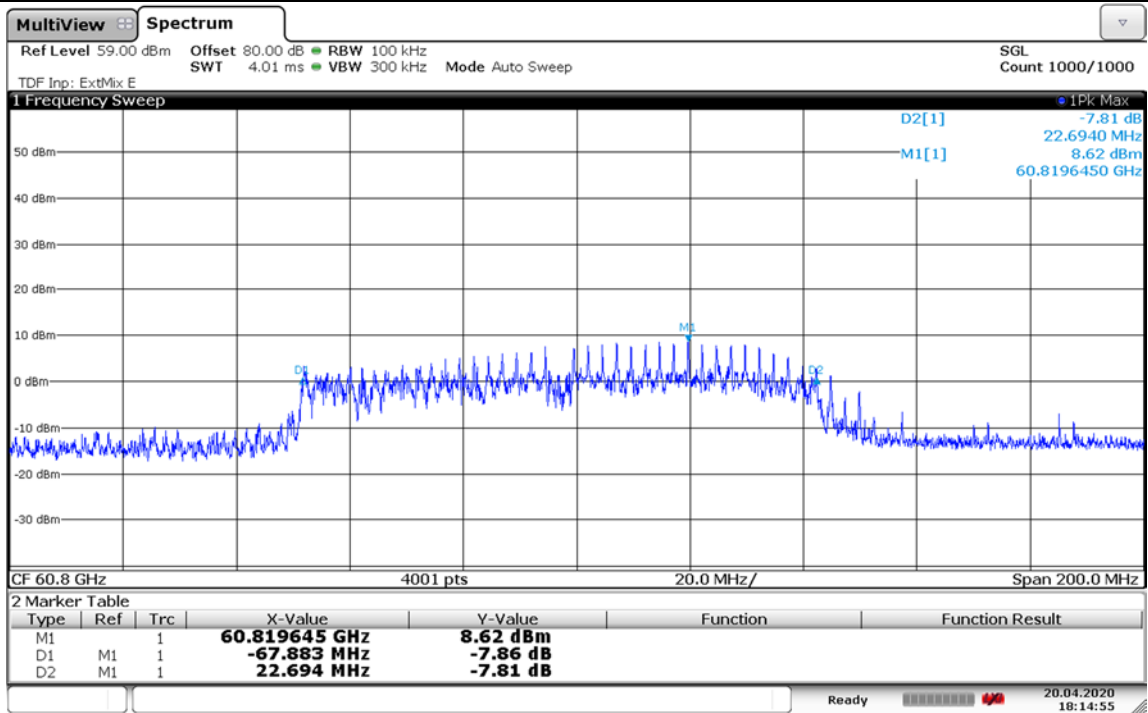
Test Results:

Channel Plan	Frequency Band	Channel	Frequency (GHz)	6 dB Bandwidth (MHz)
A	60.16 GHz – 60.80 GHz	1	60.16	90.527
		2	60.48	88.028
		3	60.80	90.577
B	62.32 GHz – 62.96 GHz	1	62.32	90.028
		2	62.64	90.377
		3	62.96	90.327

Plot data of 6 dB Bandwidth

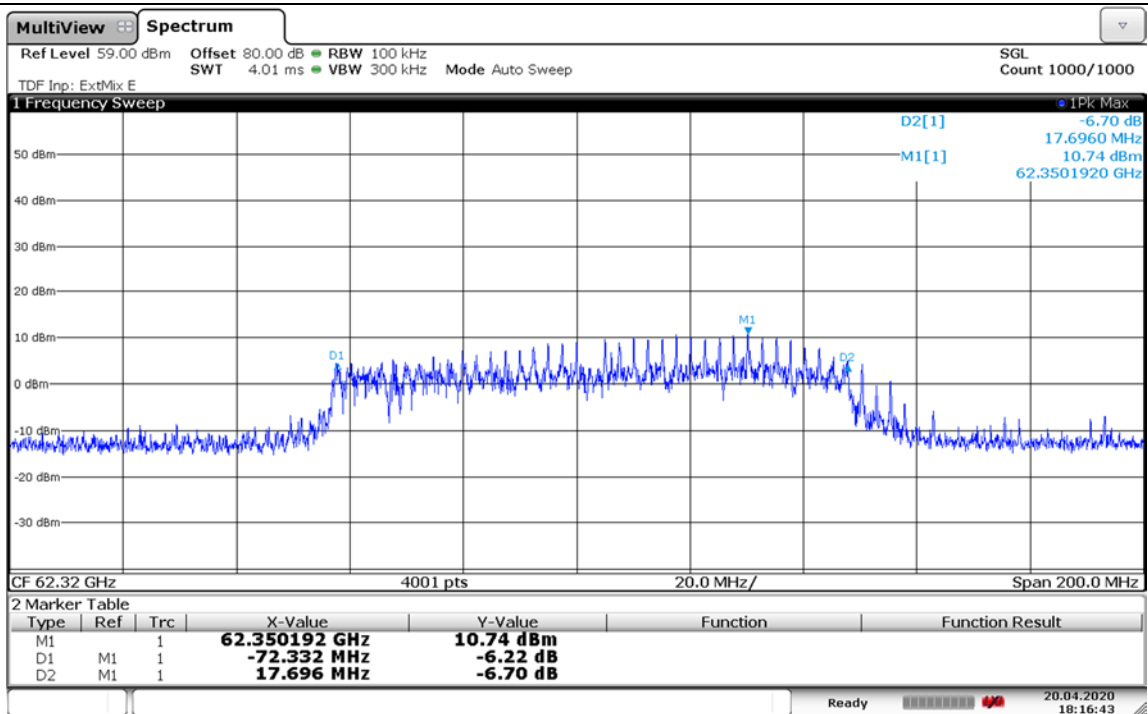


Channel Plan A / Channel 3



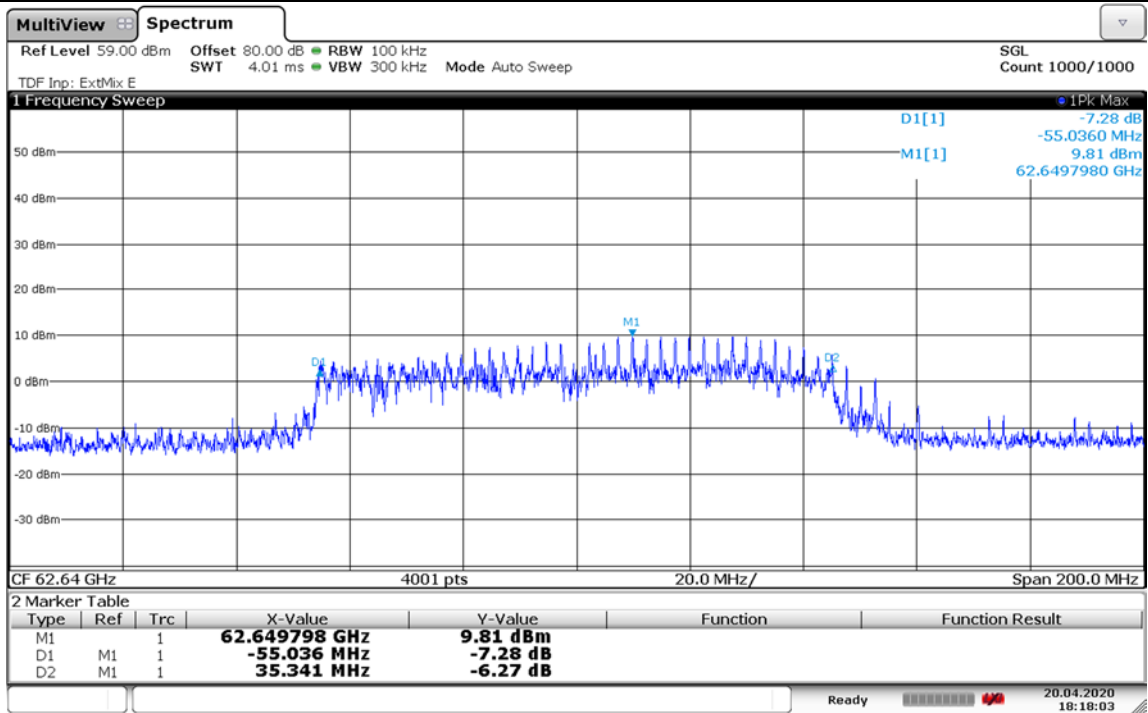
18:14:55 20.04.2020

Channel Plan B / Channel 1



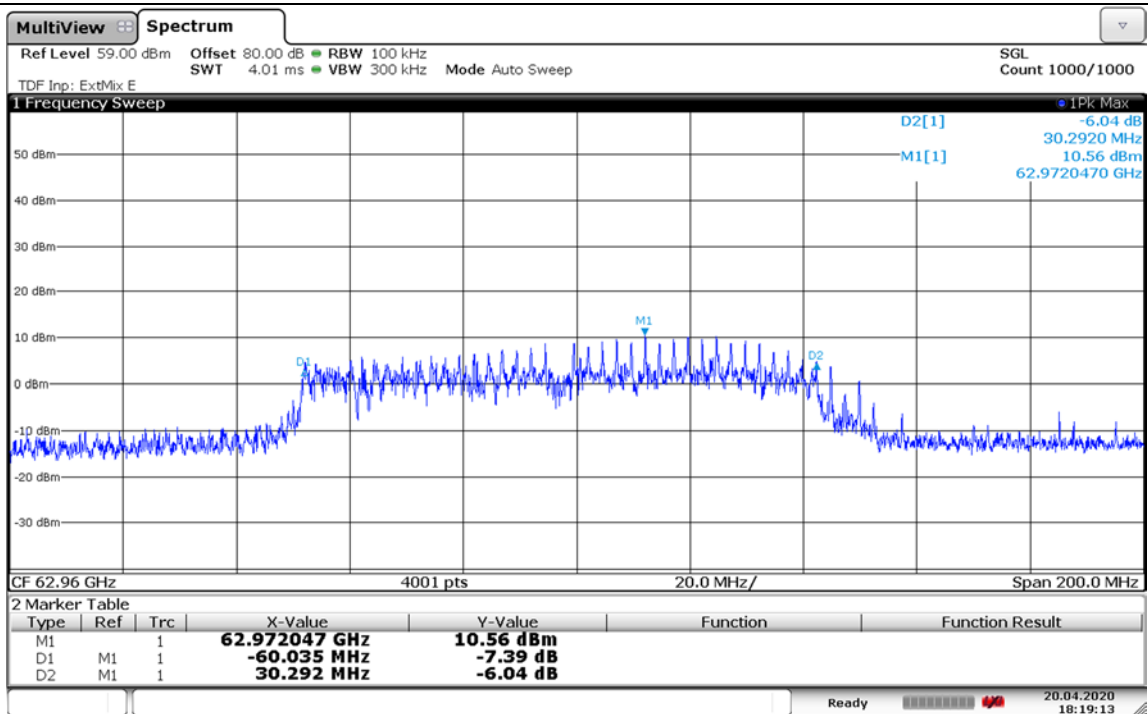
18:16:43 20.04.2020

Channel Plan B / Channel 2



18:18:03 20.04.2020

Channel Plan B / Channel 3



18:19:13 20.04.2020

6.2. Output Power

Test Requirement:

FCC Rules

§ 15.255 Operation within the band 57-71 GHz.

- (c) Within the 57-71 GHz band, emission levels shall not exceed the following equivalent isotropically radiated power (EIRP):
- (1) Products other than fixed field disturbance sensors and short-range devices for interactive motion sensing shall comply with one of the following emission limits, as measured during the transmit interval:
 - (i) The average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm; or
 - (ii) For fixed point-to-point transmitters located outdoors, the average power of any emission shall not exceed 82 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi. The peak power of any emission shall not exceed 85 dBm, and shall be reduced by 2 dB for every dB that the antenna gain is less than 51 dBi.
 - (A) The provisions in this paragraph (c) for reducing transmit power based on antenna gain shall not require that the power levels be reduced below the limits specified in paragraph (c)(1)(i) of this section.
 - (B) The provisions of § 15.204(c)(2) and (4) that permit the use of different antennas of the same type and of equal or less directional gain do not apply to intentional radiator systems operating under this provision. In lieu thereof, intentional radiator systems shall be certified using the specific antenna(s) with which the system will be marketed and operated. Compliance testing shall be performed using the highest gain and the lowest gain antennas for which certification is sought and with the intentional radiator operated at its maximum available output power level. The responsible party, as defined in § 2.909 of this chapter, shall supply a list of acceptable antennas with the application for certification.
 - (2) For fixed field disturbance sensors that occupy 500 MHz or less of bandwidth and that are contained wholly within the frequency band 61.0-61.5 GHz, the average power of any emission, measured during the transmit interval, shall not exceed 40 dBm, and the peak power of any emission shall not exceed 43 dBm. In addition, the average power of any emission outside of the 61.0-61.5 GHz band, measured during the transmit interval, but still within the 57-71 GHz band, shall not exceed 10 dBm, and the peak power of any emission shall not exceed 13 dBm.
 - (3) For fixed field disturbance sensors other than those operating under the provisions of paragraph (c)(2) of this section, and short-range devices for interactive motion sensing, the peak transmitter conducted output power shall not exceed –10 dBm and the peak EIRP level shall not exceed 10 dBm.
 - (4) The peak power shall be measured with an RF detector that has a detection bandwidth that encompasses the 57-71 GHz band and has a video bandwidth of at least 10 MHz. The average emission levels shall be measured over the actual time period during which transmission occurs.

- (e) Except as specified paragraph (e)(1) of this section, the peak transmitter conducted output power shall not exceed 500 mW. Depending on the gain of the antenna, it may be necessary to operate the intentional radiator using a lower peak transmitter output power in order to comply with the EIRP limits specified in paragraph (b) of this section.
- (1) Transmitters with an emission bandwidth of less than 100 MHz must limit their peak transmitter conducted output power to the product of 500 mW times their emission bandwidth divided by 100 MHz. For the purposes of this paragraph, emission bandwidth is defined as the instantaneous frequency range occupied by a steady state radiated signal with modulation, outside which the radiated power spectral density never exceeds 6 dB below the maximum radiated power spectral density in the band, as measured with a 100 kHz resolution bandwidth spectrum analyzer. The center frequency must be stationary during the measurement interval, even if not stationary during normal operation (e.g., for frequency hopping devices).
 - (2) Peak transmitter conducted output power shall be measured with an RF detector that has a detection bandwidth that encompasses the 57-71 GHz band and that has a video bandwidth of at least 10 MHz.
 - (3) For purposes of demonstrating compliance with this paragraph, corrections to the transmitter conducted output power may be made due to the antenna and circuit loss.

Test Procedure

Measurements were in accordance with the test methods section 9.11 in ANSI 63.10-2013.

Test Results:

Channel Plan	Ch.	Frequency (GHz)	Detector (Peak / Aver)	Measured Power (dBm)	Duty Cycle Factor (dB)	EIRP (dBm)	Limit (dBm)	Max. Ant. Gain. (dBi)	Conducted Output Power (dBm)	Conducted Output Power (mW)
A	1	60.16	Peak	29.42	-	29.42	43	18	11.42	13.87
			Average	12.18	6.06	18.24	40	-	-	
	2	60.48	Peak	28.11	-	28.11	43	18	10.11	10.26
			Average	11.26	6.06	17.32	40	-	-	
	3	60.80	Peak	27.41	-	27.41	43	18	9.41	8.73
			Average	10.85	6.06	16.91	40	-	-	
B	1	62.32	Peak	29.02	-	29.02	43	18	11.02	12.65
			Average	12.27	6.06	18.33	40	-	-	
	2	62.64	Peak	28.98	-	28.98	43	18	10.98	12.53
			Average	12.07	6.06	18.13	40	-	-	
	3	62.96	Peak	28.63	-	28.63	43	18	10.63	11.56
			Average	11.89	6.06	19.95	40	-	-	

Note:

1. Measured Power: Measured Value + Ant. Gain + Mixer Conversion Loss + Cable Loss
2. The 6 dB bandwidth is less than 100 MHz,
therefore maximum conducted power limit = 500 mW x (6dB bandwidth / 100)

6.3. Radiated Emission Measurement

Test Requirement:

FCC Rules

§ 15.255 Operation within the band 57-71 GHz.

(f) Limits on spurious emissions:

- A. The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.
- B. Radiated emissions below 40 GHz shall not exceed the general limits in § 15.209.
- C. Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm² at a distance of 3 meters.
- D. The levels of the spurious emissions shall not exceed the level of the fundamental emission.

§ 15.209 Radiated emission limits; general requirements.

- (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Procedures

Measurements were in accordance with the test methods section 6.3, 6.6 and 9.12 in ANSI 63.10-2013.

Test Results:

Tabular data of Radiated Emission Below 1GHz Data:

Frequency	Reading	Ant. Gain	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No emissions detected.							

Note: The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

Tabular data of Radiated Emission Above 1GHz Data:

Frequency	Reading	Combination Factor	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dB	(H/V)	dBuV/m	dBuV/m	dB
No emissions detected.						

Combination Factor: Ant. Gain + Cable Loss – Amp. Gain + Distance Factor

Note: The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

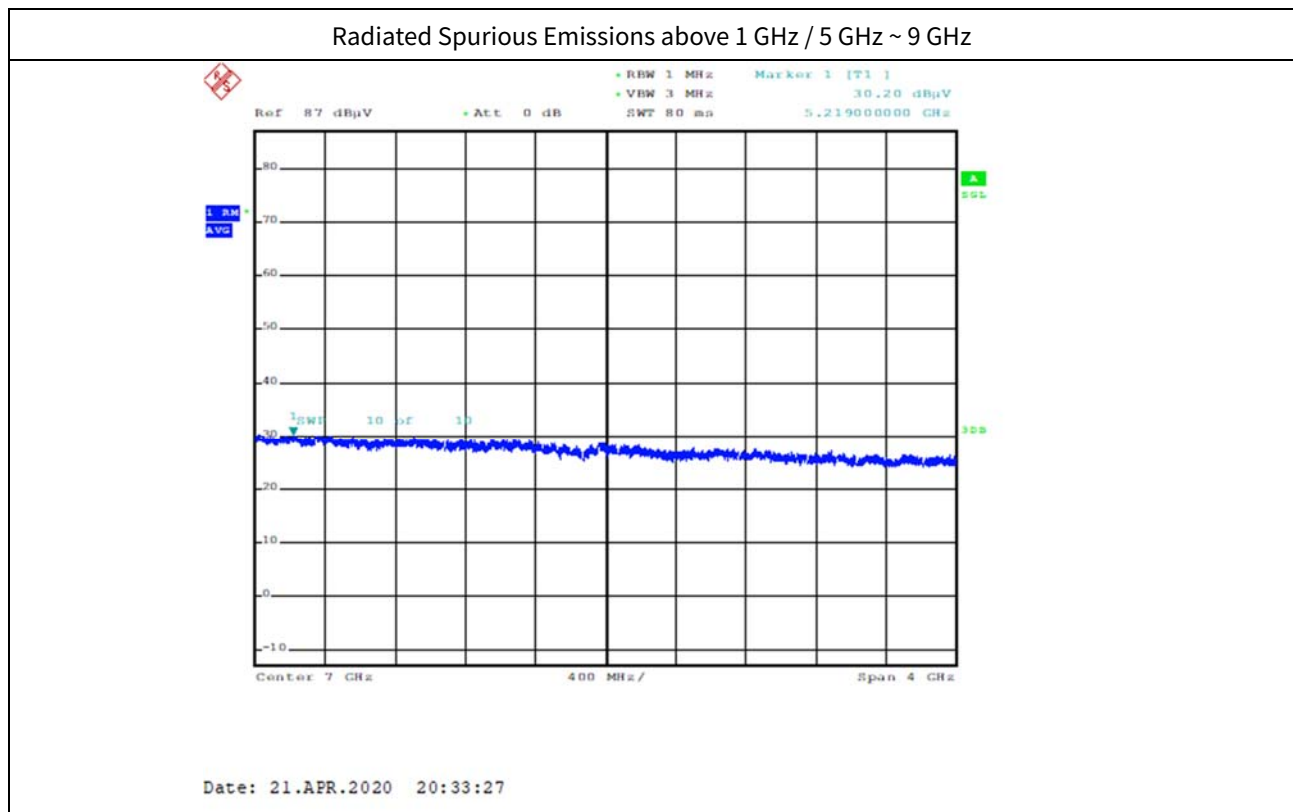
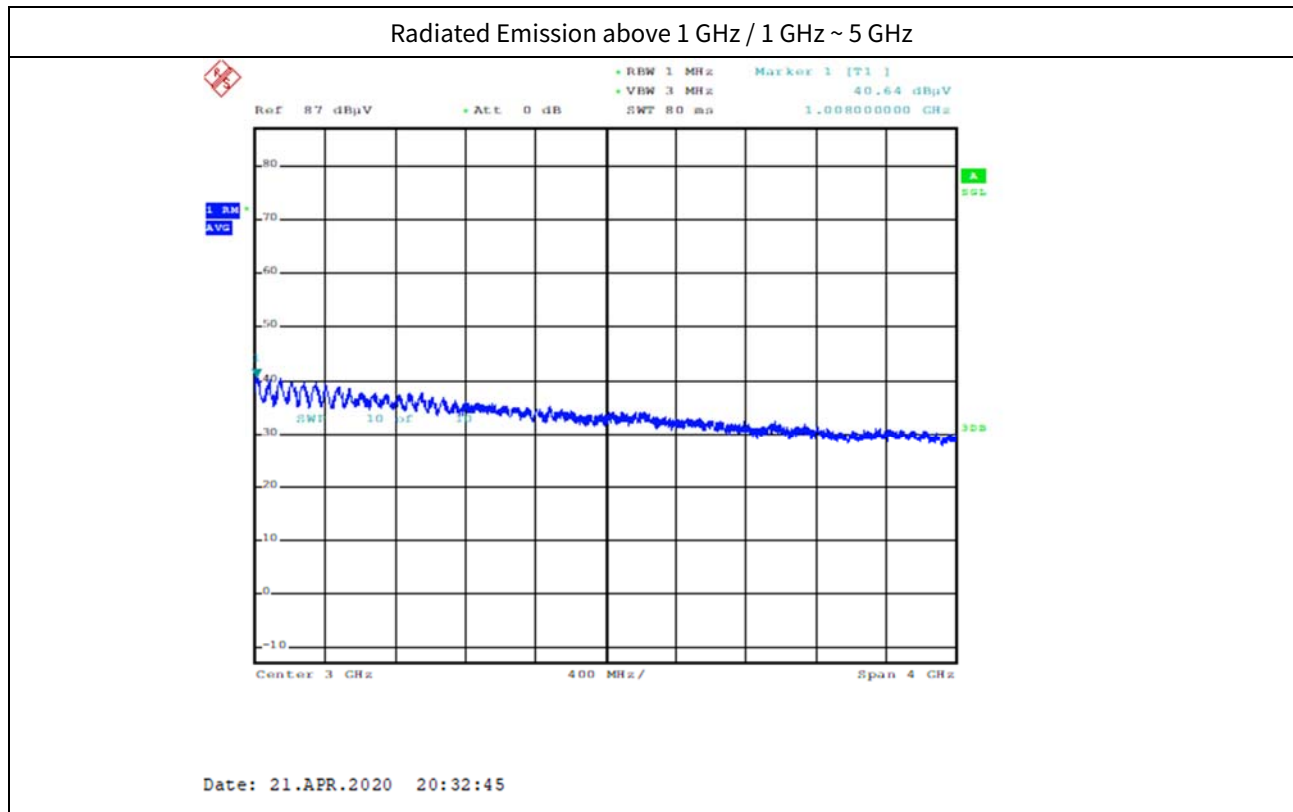
Tabular data of Radiated Emission Above 40GHz Data:

Frequency	Reading	Combination Factor	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dB	(H/V)	dBuV/m	dBuV/m	dB
No emissions detected.						

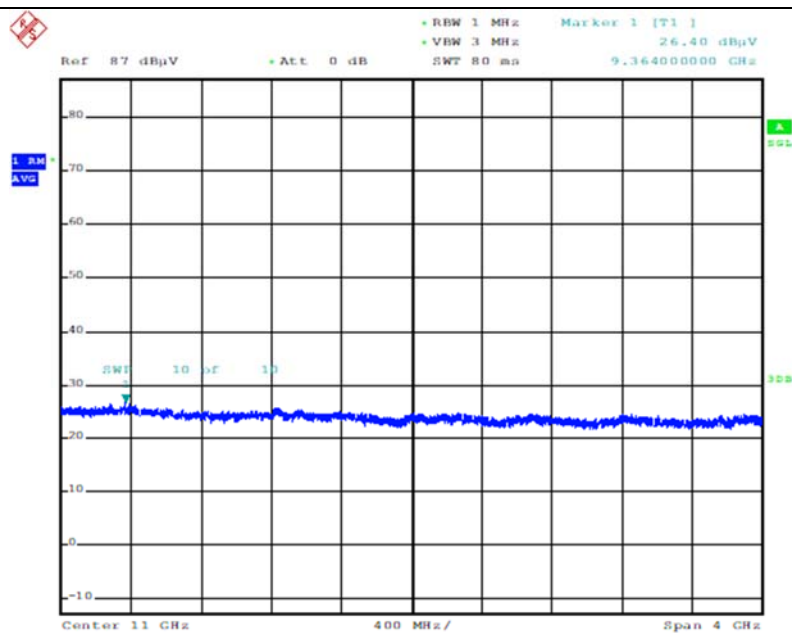
Combination Factor: Ant. Gain + Mixer Conversion Loss + Cable Loss - Amp. Gain + Distance Factor

Note: The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.

Plot data of Radiated Emission Above 1GHz

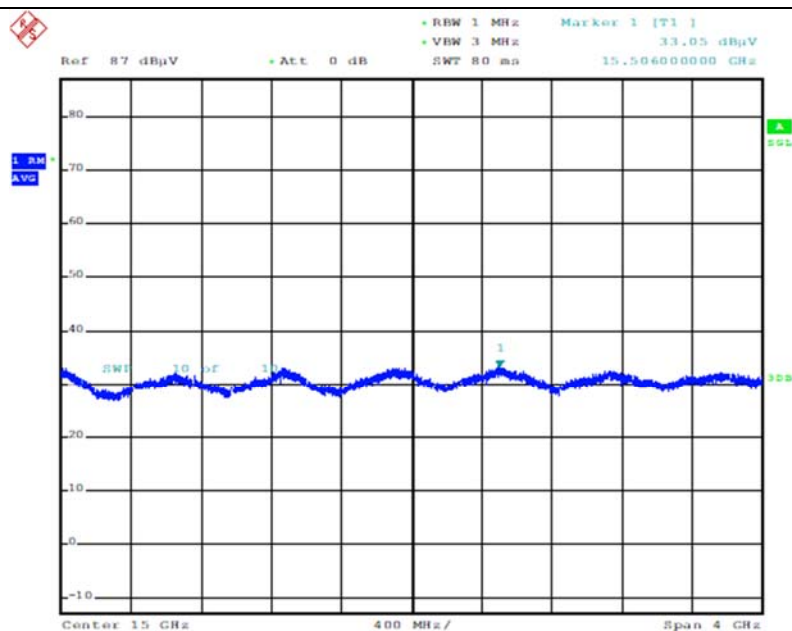


Radiated Spurious Emissions above 1 GHz / 9 GHz ~ 13 GHz



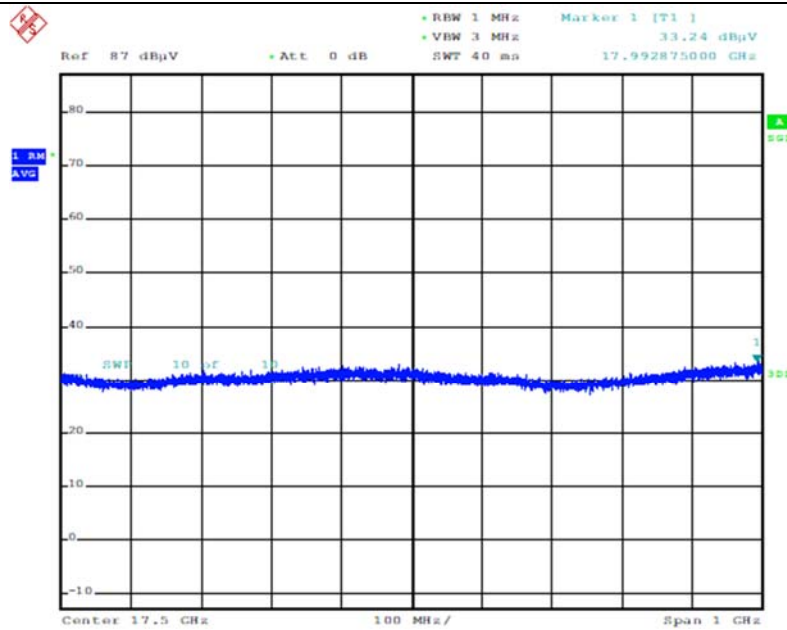
Date: 21.APR.2020 20:33:49

Radiated Spurious Emissions above 1 GHz / 13 GHz ~ 17 GHz



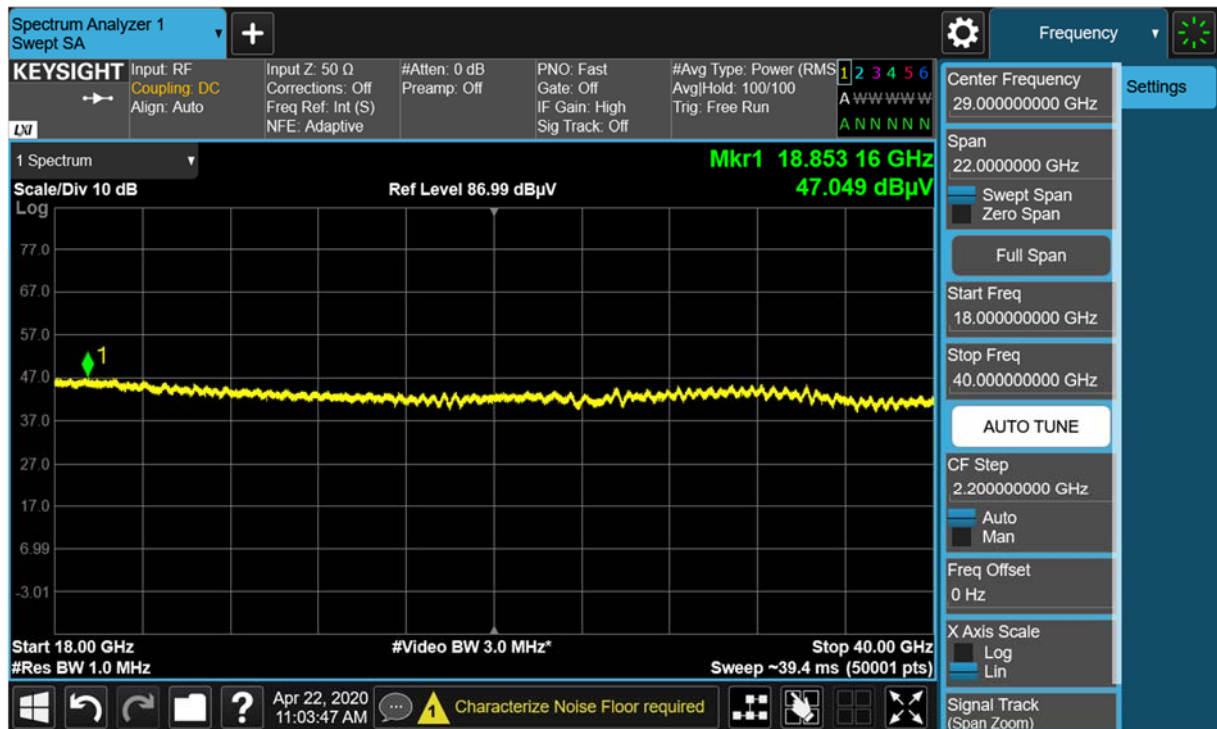
Date: 21.APR.2020 20:34:16

Radiated Spurious Emissions above 1 GHz / 17 GHz ~ 18 GHz

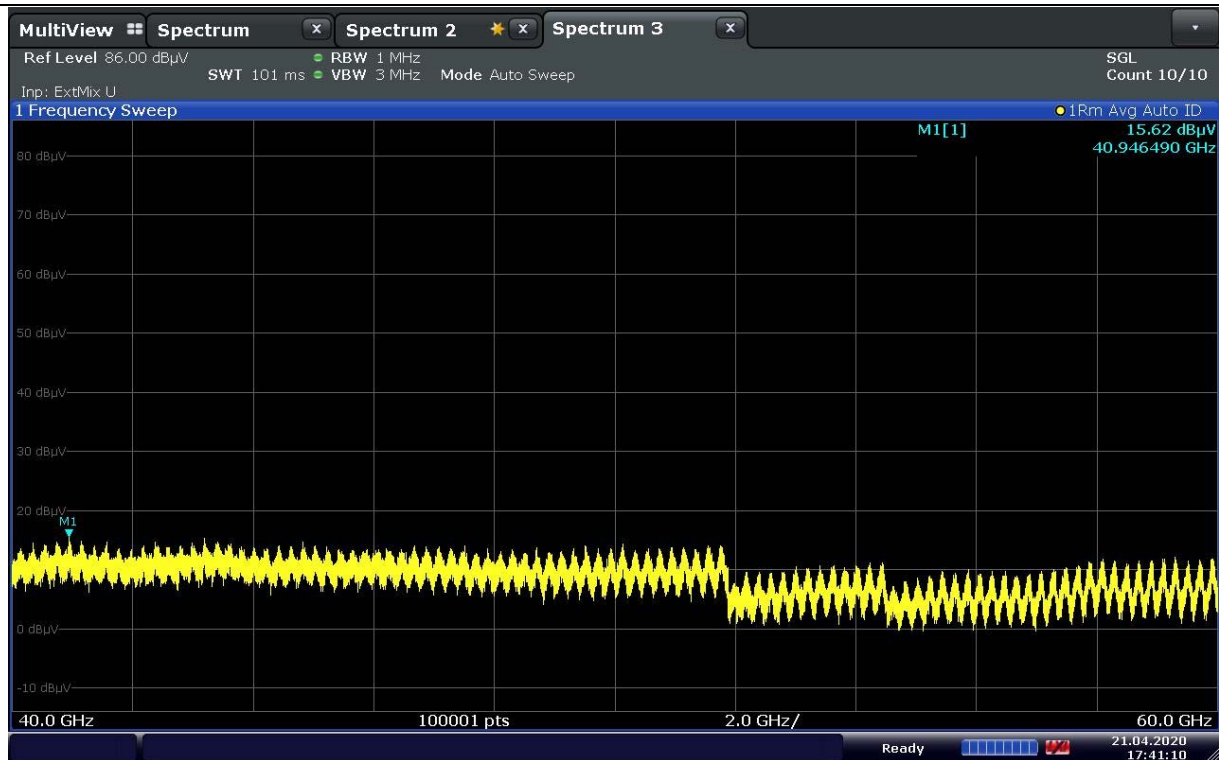


Date: 21.APR.2020 20:34:33

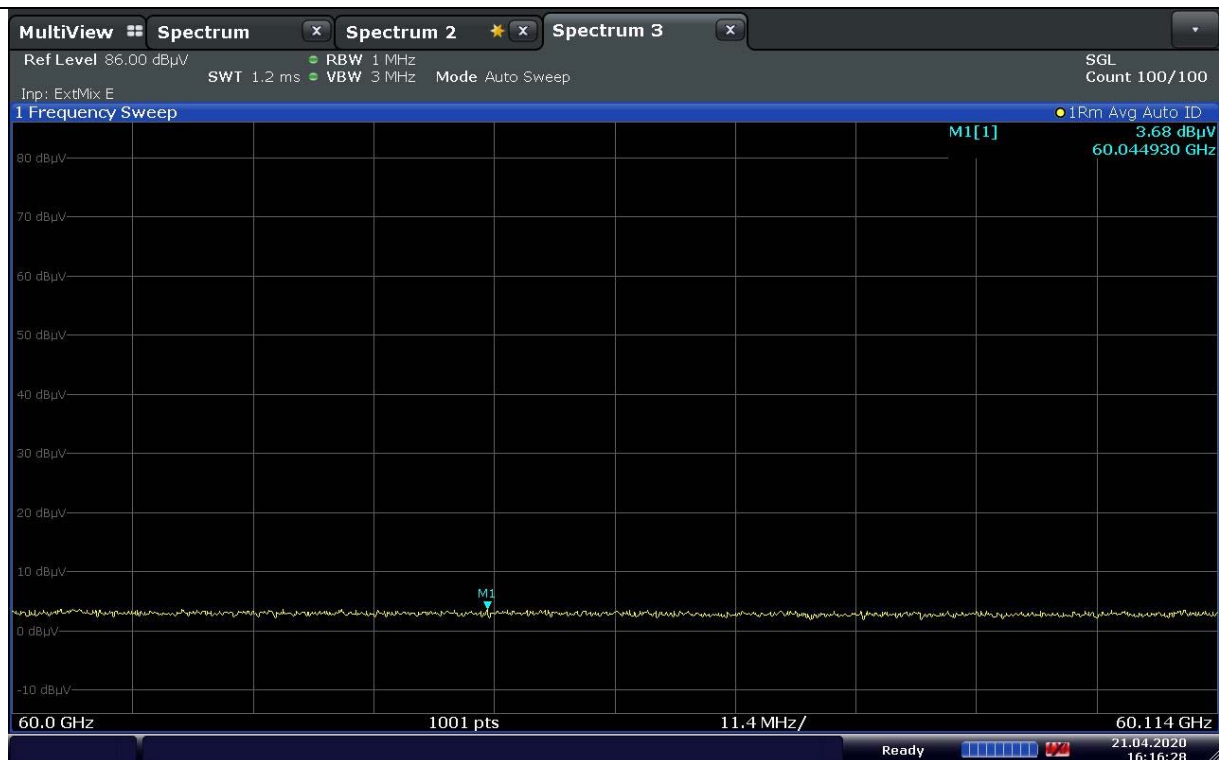
Radiated Spurious Emissions above 1 GHz / 18 GHz ~ 40 GHz



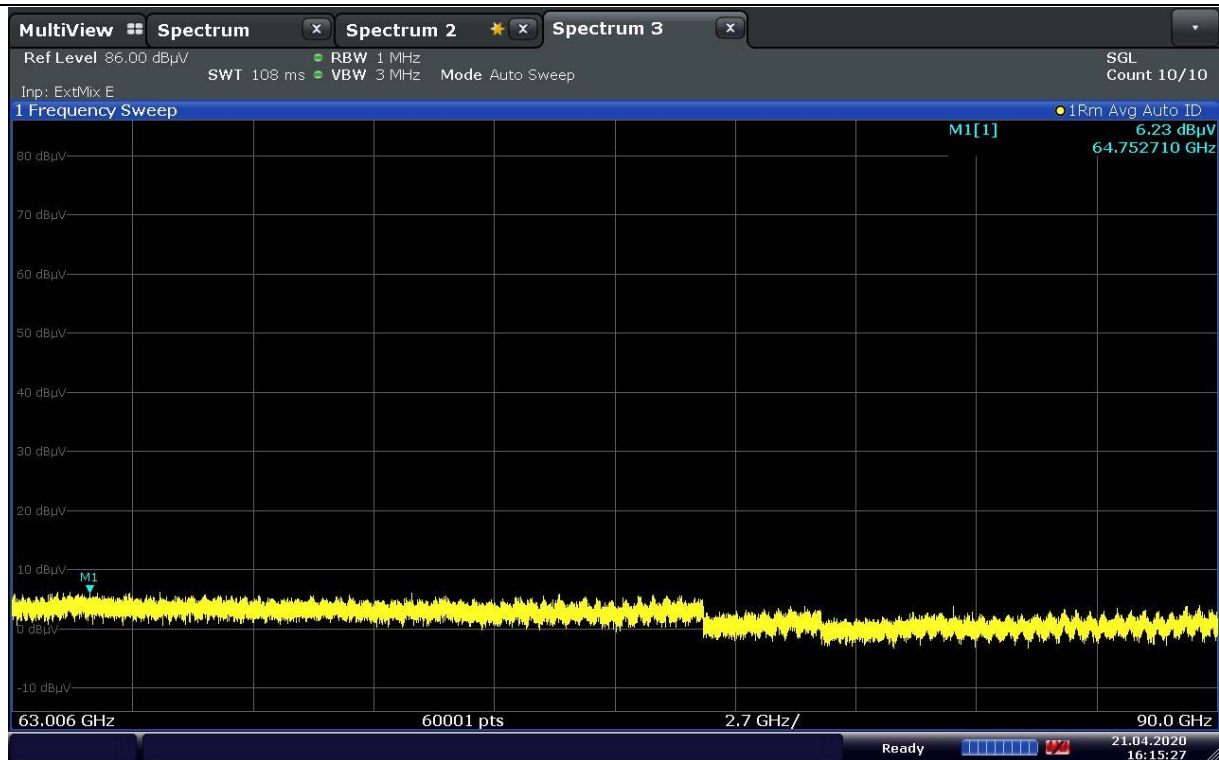
Radiated Spurious Emissions above 1 GHz / 40 GHz ~ 60 GHz



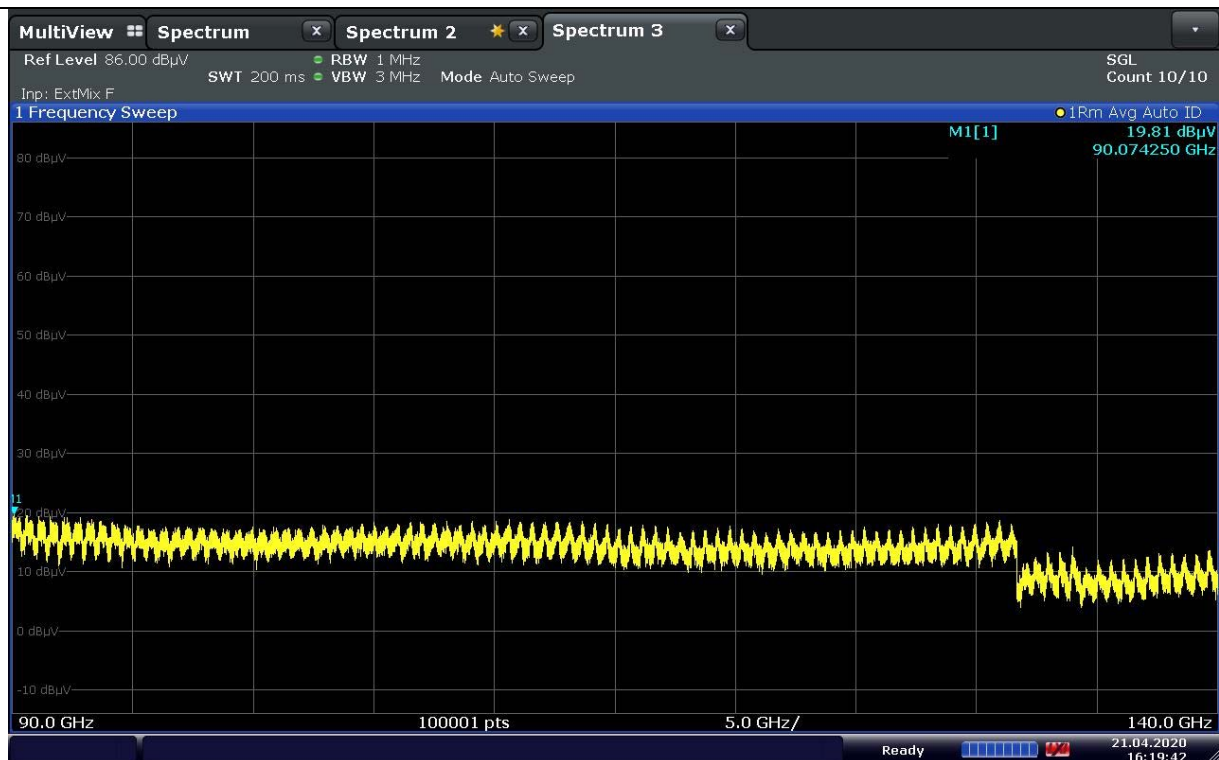
Radiated Spurious Emissions above 1 GHz / 60 GHz ~ 60.114 GHz



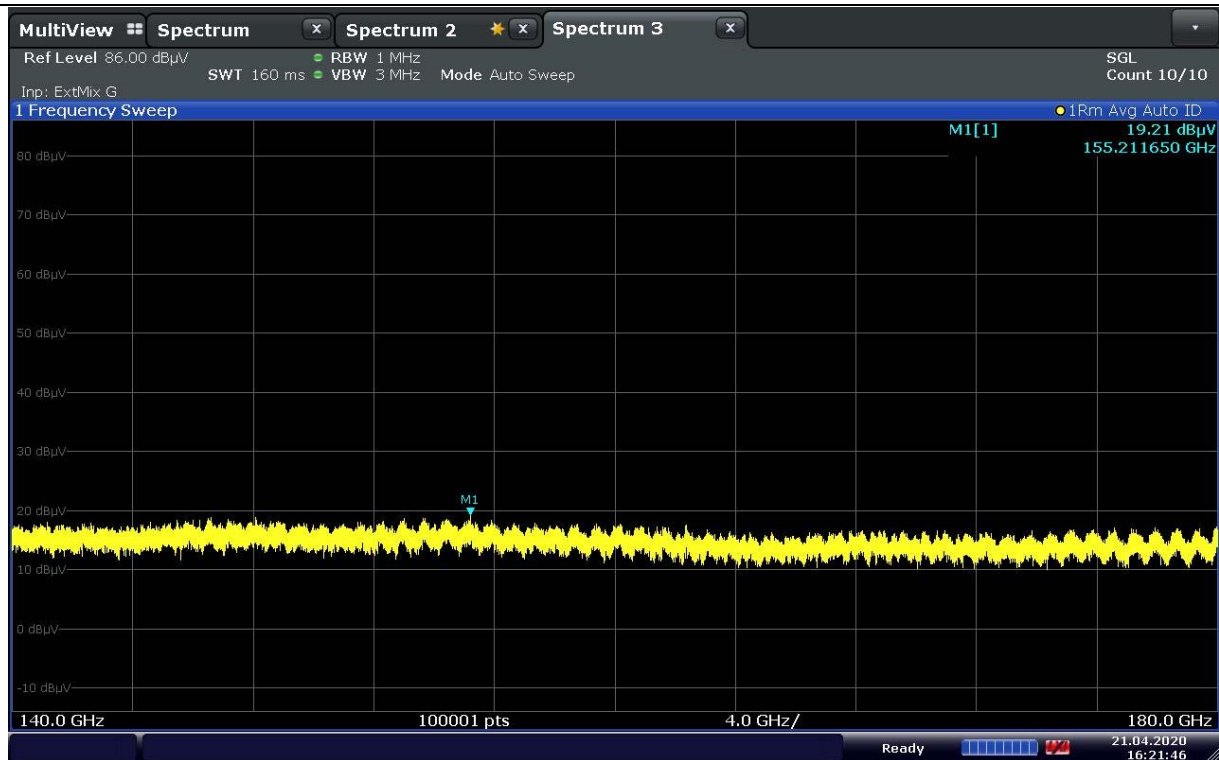
Radiated Spurious Emissions above 1 GHz / 60.006 GHz ~ 90 GHz



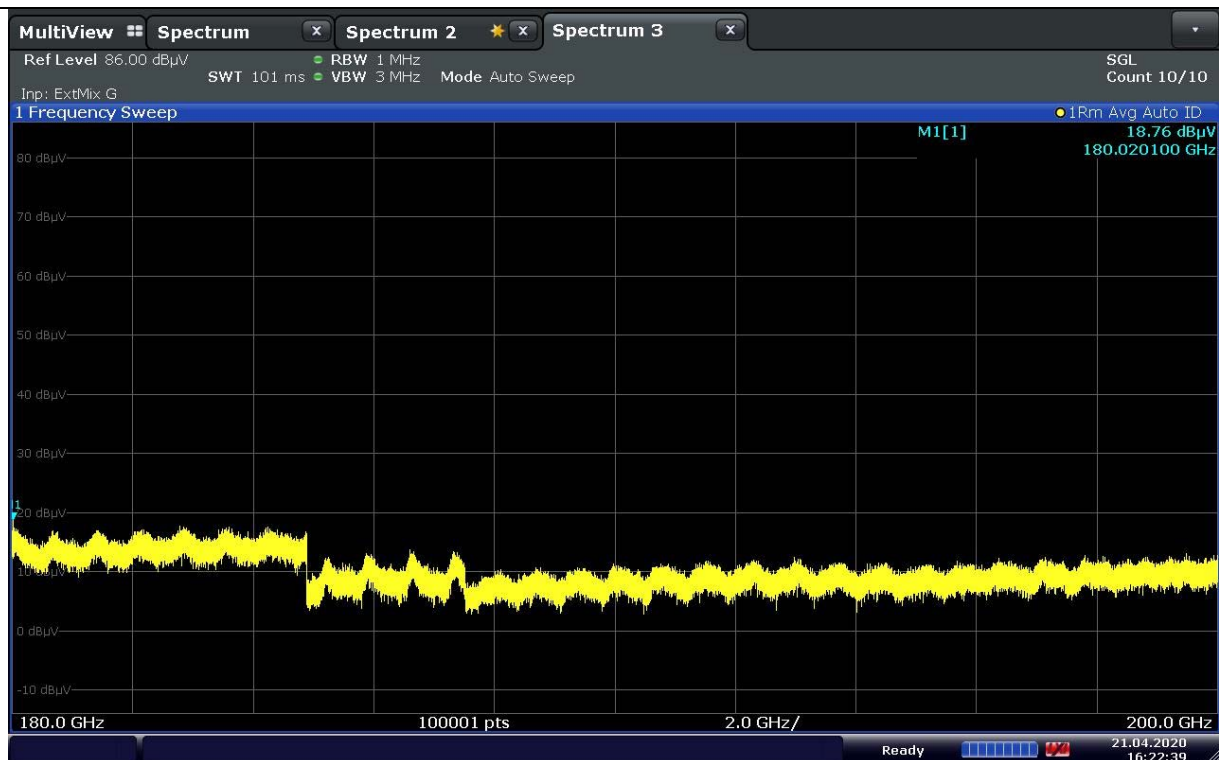
Radiated Spurious Emissions above 1 GHz / 90 GHz ~ 140 GHz



Radiated Spurious Emissions above 1 GHz / 140 GHz ~ 180 GHz



Radiated Spurious Emissions above 1 GHz / 180 GHz ~ 200 GHz



Note : Only the worst case plots for Radiated Spurious Emissions.

6.4. FREQUENCY STABILITY

Test Requirements:

§ 15.255 Operation within the band 57-71 GHz.

- (f) Frequency stability. Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to $+50$ degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

Test Procedures:

Measurements were in accordance with the test methods section 9.14 in ANSI 63.10-2013.

The following procedure shall be used for determining frequency stability of millimeter-wave systems:

- Arrange EUT and test equipment as shown in Figure 21. Some temperature chambers have a window or other opening that permits locating the receive antenna outside the chamber.
- With the EUT at ambient temperature (approximately 25°C) and voltage source set to the EUT nominal operating voltage (100%), record the spectrum mask of the EUT emission on the spectrum analyzer.
- Vary EUT power supply between 85% and 115% of nominal, and record the frequency excursion of the EUT emission mask.
- Set the power supply to 100% nominal setting, and raise EUT operating temperature to 50°C .
- Record the frequency excursion of the EUT emission mask.
- Repeat step d) at each 10°C increment down to -20°C .

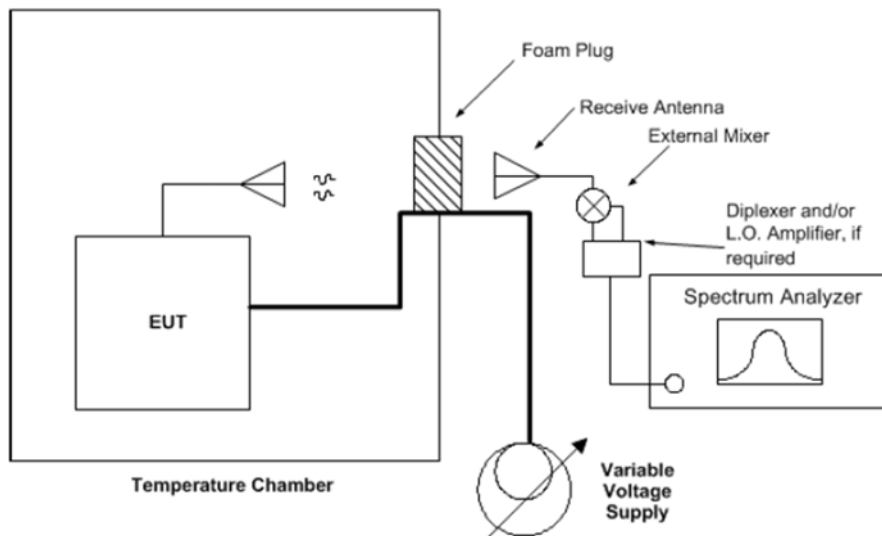


Figure 21 —Frequency stability setup configuration

Note: The results of the frequency stability test shown above the frequency deviation measured values are very small and similar trend for each path, so we are attached only the worst case data.

Test Results:

Channel Plan A

Reference: Voltage = (100 ~ 240) VAC at 20°C, Frequency = 60.48 GHz

Voltage	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(°C)	(Hz)	(Hz)	(Hz)	
100%	+20(Ref)	60 480 000 000 003	3.244	0.000	0.00000
	-20	60 480 000 000 008	8.163	4.919	0.08133
	-10	60 480 000 000 000	0.283	-2.961	-0.04896
	0	60 480 000 000 006	6.235	2.991	0.04946
	+10	60 480 000 000 005	5.160	1.916	0.03169
	+30	60 480 000 000 001	0.906	-2.338	-0.03866
	+40	60 480 000 000 002	1.941	-1.303	-0.02154
	+50	60 480 000 000 008	7.955	4.711	0.07790
115%	+20	60 480 000 000 001	0.612	-2.632	-0.04352
85%	+20(Ref)	60 480 000 000 005	5.337	2.093	0.03461

Channel Plan B

Reference: Voltage = (100 ~ 240) VAC at 20°C, Frequency = 62.64 GHz

Voltage	Temp.	Frequency	Frequency Error	Deviation	ppm
(%)	(°C)	(Hz)	(Hz)	(Hz)	
100%	+20(Ref)	62 640 000 000 009	8.828	0.000	0.00000
	-20	62 640 000 000 002	2.339	-6.489	-0.10729
	-10	62 640 000 000 008	8.343	-0.485	-0.00802
	0	62 640 000 000 009	8.486	-0.342	-0.00566
	+10	62 640 000 000 000	0.146	-8.682	-0.14355
	+30	62 640 000 000 003	2.748	-6.080	-0.10053
	+40	62 640 000 000 006	5.501	-3.327	-0.05501
	+50	62 640 000 000 008	7.697	-1.131	-0.01870
115%	+20	62 640 000 000 009	9.249	0.421	0.00696
85%	+20(Ref)	62 640 000 000 009	9.115	0.287	0.00474

6.5. AC POWER-LINE CONDUCTED EMISSIONS

Test Requirement:

FCC Rules

§ 15.207 Conducted limits.

- (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges. strength levels specified in the following table:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

Test Results:

Conducted Emissions (Line 1)

60G_N

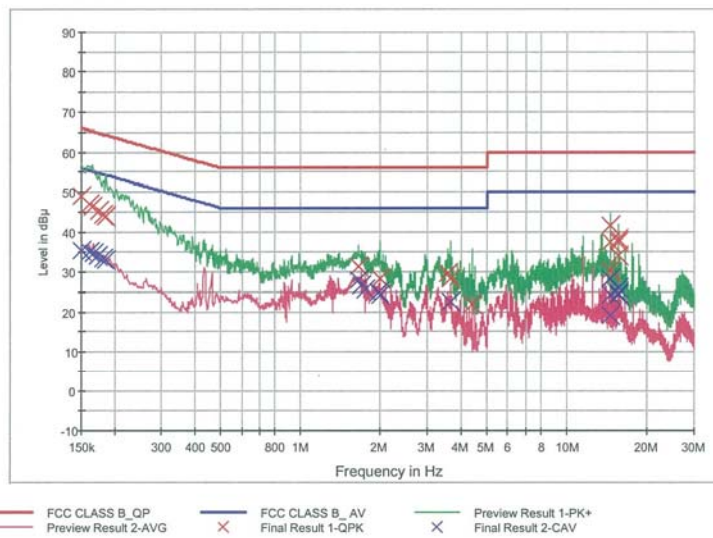
1 / 2

HCT TEST Report

Common Information

EUT: JET-R-FHD
 Manufacturer: WISEJET,INC.
 Test Site: SHIELD ROOM
 Operating Conditions: 60G_N

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	49.0	9.000	On	N	9.7	17.0	66.0
0.160000	47.1	9.000	On	N	9.7	18.4	65.5
0.164000	46.4	9.000	On	N	9.7	18.9	65.3
0.174000	45.3	9.000	On	N	9.7	19.5	64.8
0.180000	44.4	9.000	On	N	9.7	20.1	64.5
0.186000	43.8	9.000	On	N	9.7	20.4	64.2
1.656000	31.3	9.000	On	N	9.8	24.7	56.0
1.994000	28.3	9.000	On	N	9.8	27.7	56.0
3.578000	29.6	9.000	On	N	9.8	26.4	56.0
3.584000	29.6	9.000	On	N	9.8	26.4	56.0
3.644000	28.4	9.000	On	N	9.8	27.6	56.0
4.388000	21.9	9.000	On	N	9.8	34.1	56.0
14.538000	41.4	9.000	On	N	10.0	18.6	60.0
14.544000	37.5	9.000	On	N	10.0	22.5	60.0
14.548000	30.3	9.000	On	N	10.0	29.7	60.0
15.566000	34.2	9.000	On	N	10.0	25.8	60.0
15.572000	37.6	9.000	On	N	10.0	22.4	60.0
15.578000	38.1	9.000	On	N	10.0	21.9	60.0

2020-04-23

오후 7:07:55

60G_N

2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	35.4	9.000	On	N	9.7	20.6	56.0
0.160000	35.1	9.000	On	N	9.7	20.4	55.5
0.166000	34.8	9.000	On	N	9.7	20.4	55.2
0.172000	34.2	9.000	On	N	9.7	20.7	54.9
0.180000	33.5	9.000	On	N	9.7	21.0	54.5
0.186000	33.0	9.000	On	N	9.7	21.2	54.2
1.656000	27.9	9.000	On	N	9.8	18.1	46.0
1.692000	26.7	9.000	On	N	9.8	19.3	46.0
1.742000	25.5	9.000	On	N	9.8	20.5	46.0
1.974000	24.9	9.000	On	N	9.8	21.1	46.0
1.994000	24.2	9.000	On	N	9.8	21.8	46.0
3.642000	22.7	9.000	On	N	9.8	23.3	46.0
14.538000	28.3	9.000	On	N	10.0	21.7	50.0
14.544000	24.2	9.000	On	N	10.0	25.8	50.0
14.550000	19.2	9.000	On	N	10.0	30.8	50.0
15.566000	24.5	9.000	On	N	10.0	25.5	50.0
15.572000	24.4	9.000	On	N	10.0	25.6	50.0
15.578000	26.1	9.000	On	N	10.0	23.9	50.0

2020-04-23

오후 7:07:55

Conducted Emissions (Line 2)

60G_H

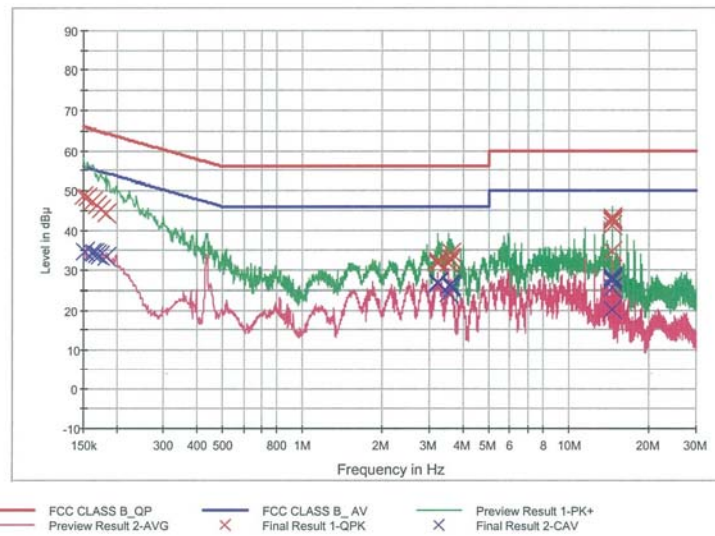
1 / 2

HCT TEST Report

Common Information

EUT: JET-R-FHD
 Manufacturer: WISEJET, INC.
 Test Site: SHIELD ROOM
 Operating Conditions: 60G_H

FCC CLASS B



Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	48.7	9.000	On	L1	9.7	17.3	66.0
0.156000	48.2	9.000	On	L1	9.7	17.5	65.7
0.162000	47.2	9.000	On	L1	9.7	18.2	65.4
0.168000	46.3	9.000	On	L1	9.7	18.8	65.1
0.174000	45.1	9.000	On	L1	9.7	19.6	64.8
0.182000	44.2	9.000	On	L1	9.7	20.2	64.4
3.218000	31.7	9.000	On	L1	9.8	24.3	56.0
3.224000	32.3	9.000	On	L1	9.8	23.7	56.0
3.522000	31.6	9.000	On	L1	9.8	24.4	56.0
3.562000	33.0	9.000	On	L1	9.8	23.0	56.0
3.592000	34.4	9.000	On	L1	9.8	21.6	56.0
3.620000	32.6	9.000	On	L1	9.8	23.4	56.0
14.530000	34.8	9.000	On	L1	10.0	25.2	60.0
14.536000	42.4	9.000	On	L1	10.0	17.6	60.0
14.544000	43.1	9.000	On	L1	10.0	16.9	60.0
14.550000	42.3	9.000	On	L1	10.0	17.7	60.0
14.554000	42.9	9.000	On	L1	10.0	17.1	60.0
14.560000	41.1	9.000	On	L1	10.0	18.9	60.0

2020-04-23

오후 7:21:28

60G_H



2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	34.7	9.000	On	L1	9.7	21.2	55.9
0.160000	34.4	9.000	On	L1	9.7	21.1	55.5
0.164000	34.3	9.000	On	L1	9.7	20.9	55.3
0.168000	34.1	9.000	On	L1	9.7	21.0	55.1
0.172000	33.7	9.000	On	L1	9.7	21.1	54.9
0.182000	33.3	9.000	On	L1	9.7	21.1	54.4
3.220000	26.7	9.000	On	L1	9.8	19.3	46.0
3.224000	26.9	9.000	On	L1	9.8	19.1	46.0
3.522000	24.3	9.000	On	L1	9.8	21.7	46.0
3.562000	26.4	9.000	On	L1	9.8	19.6	46.0
3.592000	26.3	9.000	On	L1	9.8	19.7	46.0
3.622000	25.5	9.000	On	L1	9.8	20.5	46.0
14.530000	20.1	9.000	On	L1	10.0	29.9	50.0
14.536000	25.5	9.000	On	L1	10.0	24.5	50.0
14.542000	28.2	9.000	On	L1	10.0	21.8	50.0
14.548000	28.0	9.000	On	L1	10.0	22.0	50.0
14.554000	27.8	9.000	On	L1	10.0	22.2	50.0
14.560000	27.4	9.000	On	L1	10.0	22.6	50.0

2020-04-23

오후 7:21:28

7. Annex A_EUT AND TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2004-FC059-P