

TEST REPORT

FCC BT LE Test for T8

APPLICANT

VC Inc.

REPORT NO.

HCT-RF-2101-FC067

DATE OF ISSUE

January 18, 2021

Tested by
Sang Hoon Lee



Technical Manager
Jong Seok Lee



HCT CO., LTD.

Soo Chan Lee
SooChan Lee / CEO

HCT CO., LTD.

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

TEST REPORT FCC BT LE Test for T8	REPORT NO. HCT-RF-2101-FC067
	DATE OF ISSUE January 18, 2021
	Additional Model -

Applicant	VC Inc. 3F-4F, Hwawon Building, 417, Nonhyeon-ro, Gangnam-gu, Seoul, Republic of Korea
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Eut Type Model Name	Voice Caddie GPS Golf Watch T8
FCC ID	2ABTKT8
Max. RF Output Power	3.355 dBm (2.165 mW)
Modulation type	GFSK
FCC Classification	Digital Transmission System(DTS)
FCC Rule Part(s)	Part 15.247

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.

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	January 18, 2021	Initial Release

Engineering Statement:

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.

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1. EUT DESCRIPTION

Model	T8	
Additional Model	-	
EUT Type	Voice Caddie GPS Golf Watch	
Power Supply	DC 3.7 V	
Frequency Range	2402 MHz - 2480 MHz	
Max. RF Output Power	Peak	1M Bit/s - 37 byte : 3.244 dBm (2.111 mW) - 255 byte : 3.185 dBm (2.082 mW) 2M Bit/s - 37 byte: 3.355 dBm (2.165 mW) - 255 byte : 3.274 dBm (2.125 mW)
	Average	1M Bit/s - 37 byte: 3.16 dBm (2.070 mW) - 255 byte: 3.15 dBm (2.065 mW) 2M Bit/s - 37 byte: 3.20 dBm (2.089 mW) - 255 bytes: 3.15 dBm (2.065 mW)
Modulation Type	GFSK	
Bluetooth Version	5.0	
Number of Channels	40 Channels	
Antenna type	Dielectric Chip Antenna	
Antenna Peak Gain	1.8 dBi	
Date(s) of Tests	January 04, 2021 ~ January 08, 2021	
Serial number	Radiated: VCT8B2000102	
	Conducted: VCT8B2000055	

2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 entitled “guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

3. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

4. FACILITIES AND ACCREDITATIONS

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).

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.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. 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."

5. 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

6. 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.

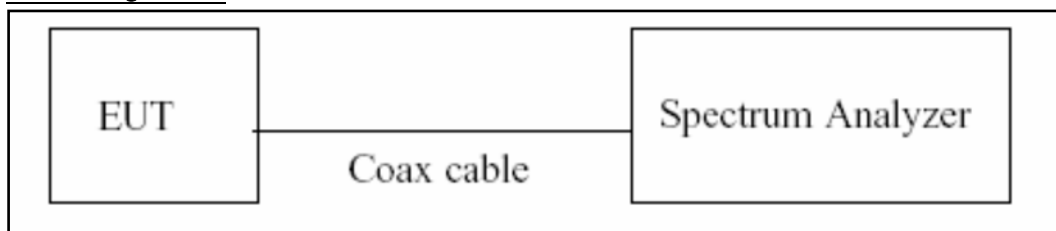
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (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

7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method, 6.0)b) in KDB 558074 v05r02.

The largest available value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

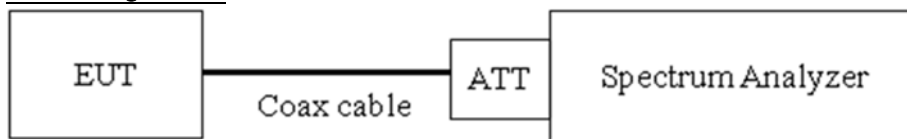
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (\geq RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/T_{total} and Duty Cycle Factor = $10\log(1/Duty\ Cycle)$

7.2. 6dB Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 8.2 in KDB 558074 v05r02, Procedure 11.8.1 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW \geq 3 x RBW
- 3) Detector = Peak
- 4) Trace mode = max hold
- 5) Sweep = auto couple
- 6) Allow the trace to stabilize
- 7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

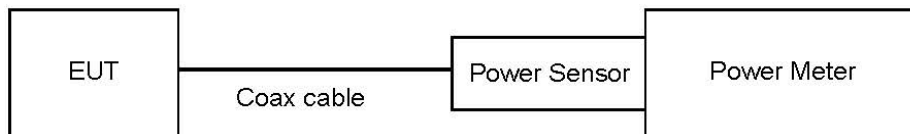
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)
: Measure the peak power of the transmitter.

- Average Power (Procedure 8.3.2.3 in KDB 558074 v05r02, Procedure 11.9.2.3 in ANSI 63.10-2013)
 - 1) Measure the duty cycle.
 - 2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
 - 3) Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

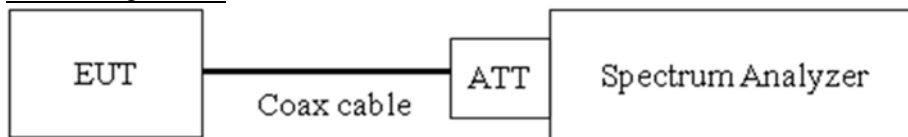
- Conducted Output Power(Peak) = Reading Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3 kHz BW.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Set span to at least 1.5 times the OBW.
- 3) $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$.
- 4) $VBW \geq 3 \times RBW$.
- 5) Sweep = auto couple
- 6) Detector = Peak
- 7) Trace mode = max hold
- 8) Allow trace to fully stabilize.
- 9) Use the peak marker function to determine the maximum amplitude level.
- 10) Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Sample Calculation

- Power Spectral Density = Reading Value + ATT loss + Cable loss

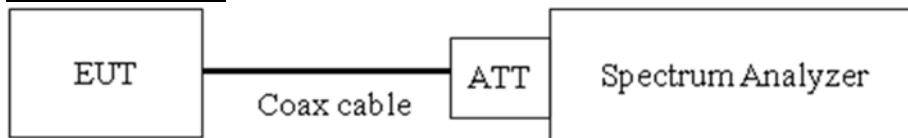
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (peak) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30dBc relative to the maximum in-band peak PSD level in 100 kHz.

[Conducted > 30dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 8.5 in KDB 558074 v05r02, Procedure 11.11 in ANSI 63.10-2013)

- 1) RBW = 100 kHz
- 2) VBW \geq 3 x RBW
- 3) Set span to encompass the spectrum to be examined
- 4) Detector = Peak
- 5) Trace Mode = max hold
- 6) Sweep time = auto couple
- 7) Ensure that the number of measurement points \geq 2 x Span/VBW
- 8) Allow trace to fully stabilize.
- 9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.

Factors for frequency

Freq(MHz)	Factor(dB)
30	10.29
100	10.32
200	10.37
300	10.42
400	10.45
500	10.46
600	10.46
700	10.48
800	10.49
900	10.51
1000	10.52
2000	10.66
2400	10.70
2480	10.72
2500	10.72
3000	10.77
4000	10.85
5000	10.96
5150	10.96
5850	10.98
6000	10.98
7000	11.05
8000	11.10
9000	11.16
10000	11.22
11000	11.27
12000	11.35
13000	11.44
14000	11.41
15000	11.46
16000	11.47
17000	11.50
18000	11.55
19000	11.57
20000	11.61
21000	11.73
22000	11.80
23000	11.80
24000	11.84
25000	11.93
26000	11.94

Note : 1. 2 400 ~ 2 500 MHz is fundamental frequency range.

2. Factor = Attenuator loss + Cable loss + EUT Cable loss

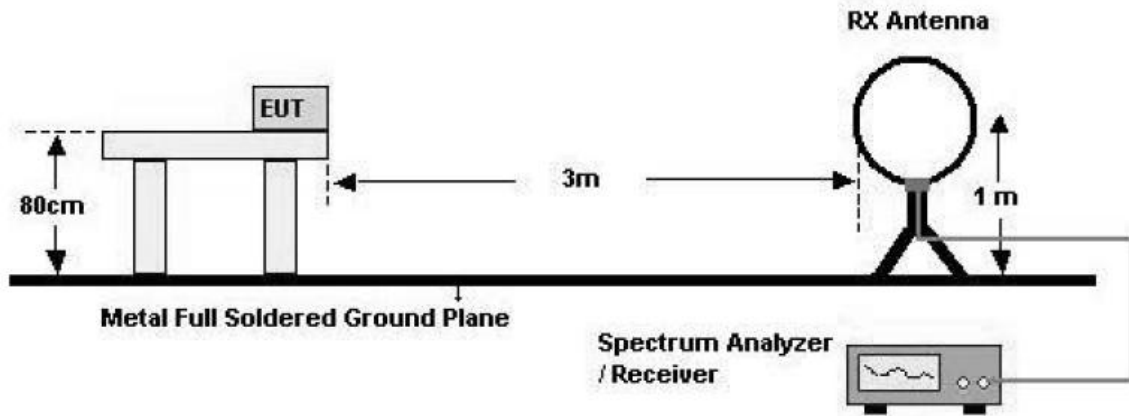
7.6. Radiated Test

Limit

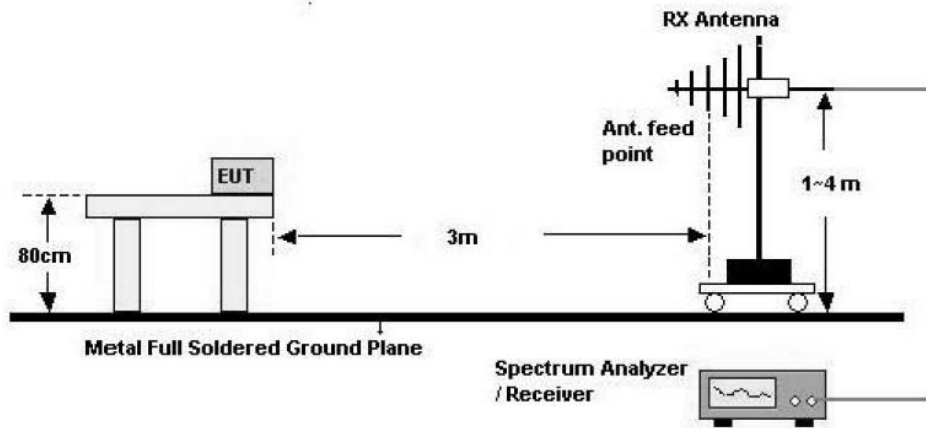
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

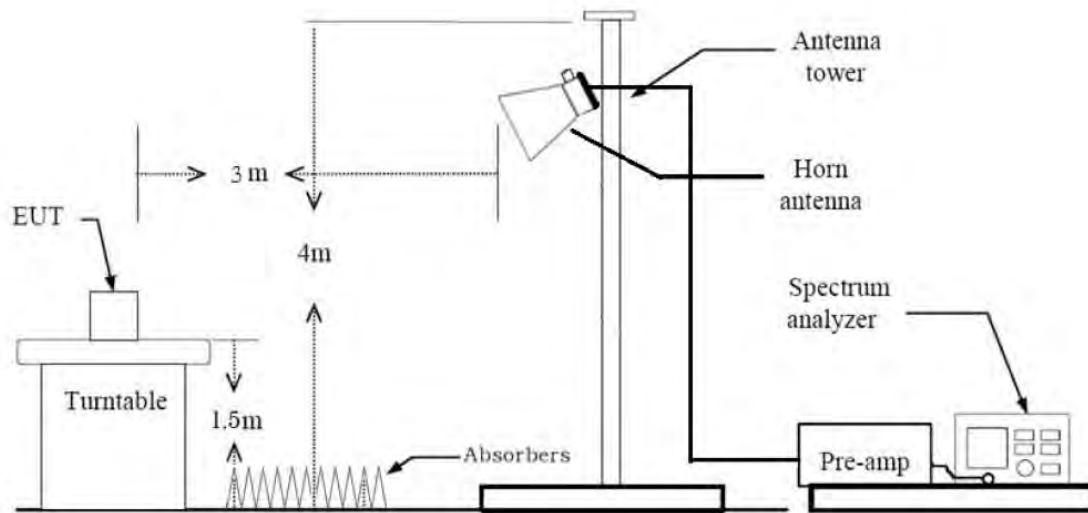
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = $40\log(3\text{ m}/300\text{ m}) = -80\text{ dB}$
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$
Measurement Distance : 3 m
8. Spectrum Setting
 - Frequency Range = 9 kHz ~ 30 MHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 9 kHz
 - VBW $\geq 3 \times$ RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered

that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

6. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 100 kHz
- VBW \geq 3 x RBW

(2) Measurement Type(Quasi-peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Quasi-Peak
- RBW = 120 kHz

In general, (1) is used mainly

7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, Procedure 11.12 in ANSI 63.10-2013)
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 1 GHz – 25 GHz
 - Detector = Peak
 - Trace = Max hold
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Average):
 - Duty cycle < 98%, duty cycle variations are less than $\pm 2\%$
 - Measured Frequency Range : 1 GHz – 25 GHz
 - Detector = RMS
 - Averaging type = power (*i.e.*, RMS)
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - Sweep time = auto.
 - Trace mode = average (at least 100 traces).
 - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
 - Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1
9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
10. Distance extrapolation factor = $20\log(\text{test distance} / \text{specific distance})$ (dB)

11. Total (Measurement Type : Peak)

= Peak Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance

Factor(D.F)

Total (Measurement Type : Average)

= Average Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G)

+ Distance Factor(D.F) + Duty Cycle Factor

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
 - Detector = Peak
 - Trace = Max hold
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Average):
 - Duty cycle < 98%, duty cycle variations are less than $\pm 2\%$
 - Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
 - Detector = RMS
 - Averaging type = power (*i.e.*, RMS)
 - RBW = 1 MHz
 - VBW \geq 3 x RBW
 - Sweep time = auto.
 - Trace mode = average (at least 100 traces).
 - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
 - Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.
9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
10. Distance extrapolation factor = $20\log(\text{test distance} / \text{specific distance})$ (dB)

11. Total(Measurement Type : Peak)

= Peak Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

Total(Measurement Type : Average)

= Average Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

+ Duty Cycle Factor

7.7. AC Power line Conducted Emissions

Limit

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).

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

^(a)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 Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

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

7.8. Worst case configuration and mode

Radiated Test

1. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone, Stand alone+ Travel adaptor + charge cable
- Worstcase : Stand alone

2. EUT Axis:

- Radiated Spurious Emissions : Z
- Radiated Restricted Band Edge : Y

3. All packet length of operation were investigated and the test results are worst case in lowest packet length.

- Worst case : 1M 37Bytes (LE Data Packet Length Extension : Not Supported)

4. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.

- Position : Horizontal, Vertical, Parallel to the ground plane

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.

- Mode : Stand alone + Travel adaptor + charge cable + Notebook
- Worst case : Stand alone + Travel adaptor + charge cable + Notebook

Conducted test

1. The EUT was configured with packet length of highest power.

- EUT supported All mode was tested.
- B.E & C.S.E (Worst case : 1M & 2M 37Bytes)

8. SUMMARY TEST OF RESULTS

FCC Part

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§ 15.247(a)(2)	> 500 kHz	Conducted	PASS
Conducted Maximum Output Power	§ 15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§ 15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§ 15.247(d)	Conducted > 30 dBc		PASS
AC Power line Conducted Emissions	§ 15.207	cf. Section 7.7		PASS
Radiated Spurious Emissions	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS
Radiated Restricted Band Edge	§ 15.247(d), 15.205, 15.209	cf. Section 7.6		PASS

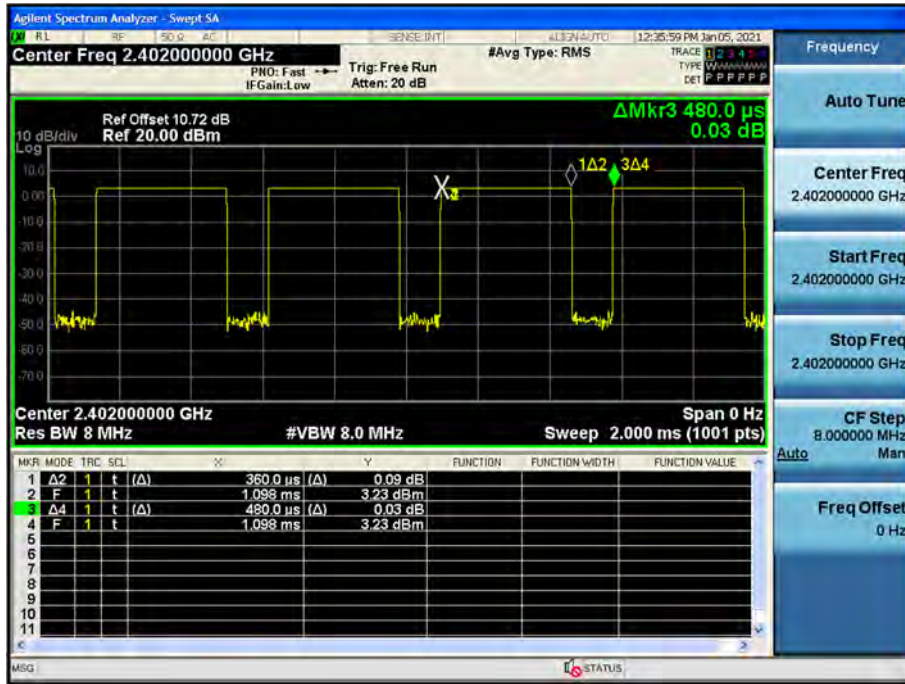
9. TEST RESULT

9.1 DUTY CYCLE

Data rate (Bit/s)	Packet length (Byte)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
1M	37	0.3600	0.4800	0.7500	1.25
	255	2.1000	2.2200	0.9459	0.24
2M	37	0.1850	0.3050	0.6066	2.17
	255	1.0590	1.1790	0.8982	0.47

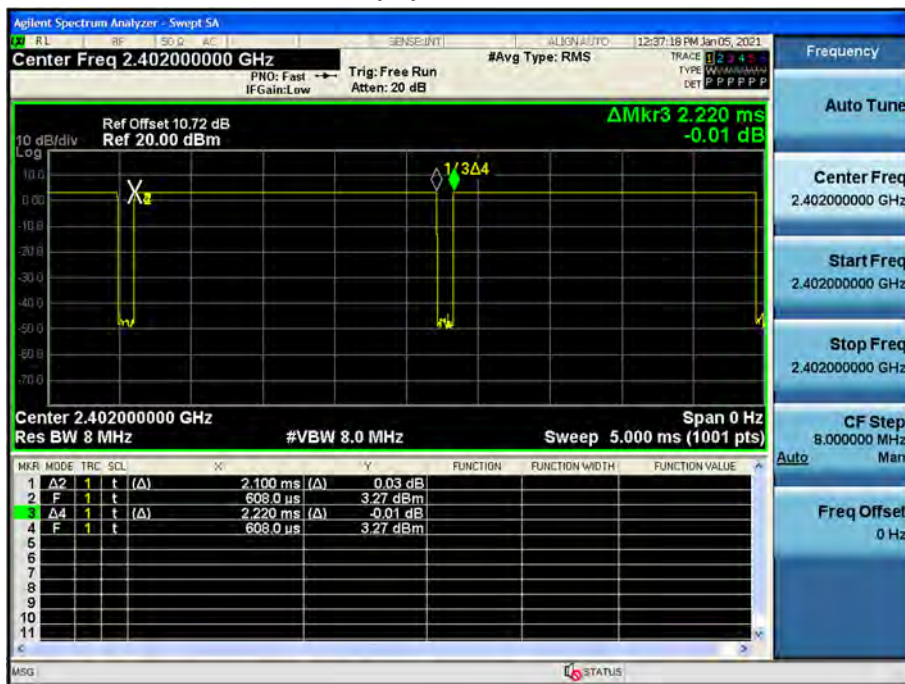
▣ 1M Bit/s(37 Byte) Test Plots

Duty Cycle (Low-CH 0)



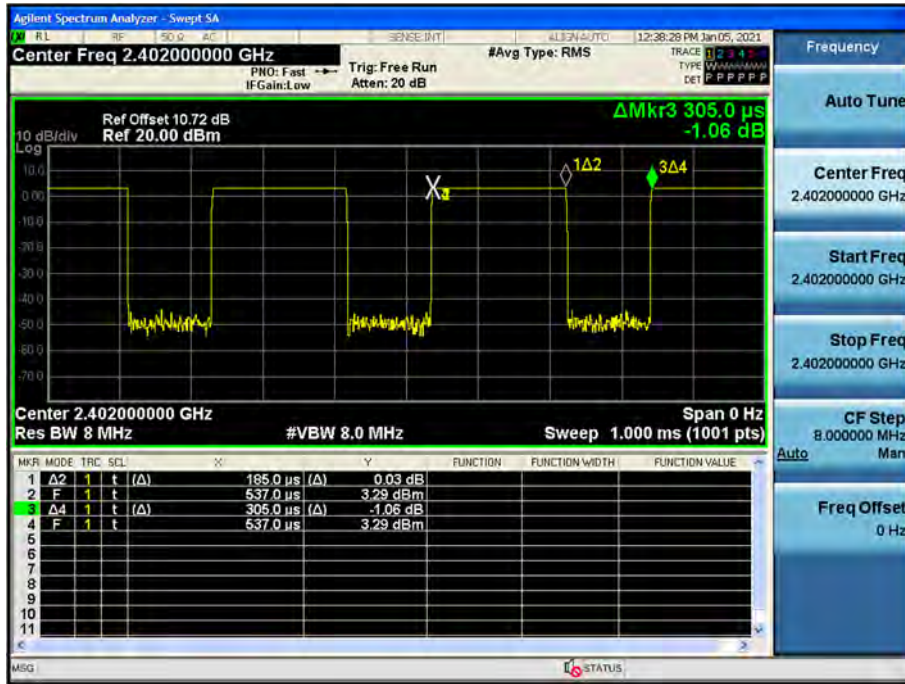
▣ 1M Bit/s(255 Byte) Test Plots

Duty Cycle (Low-CH 0)



▣ 2M Bit/s(37 Byte) Test Plots

Duty Cycle (Low-CH 0)



▣ 2M Bit/s(255 Byte) Test Plots

Duty Cycle (Low-CH 0)

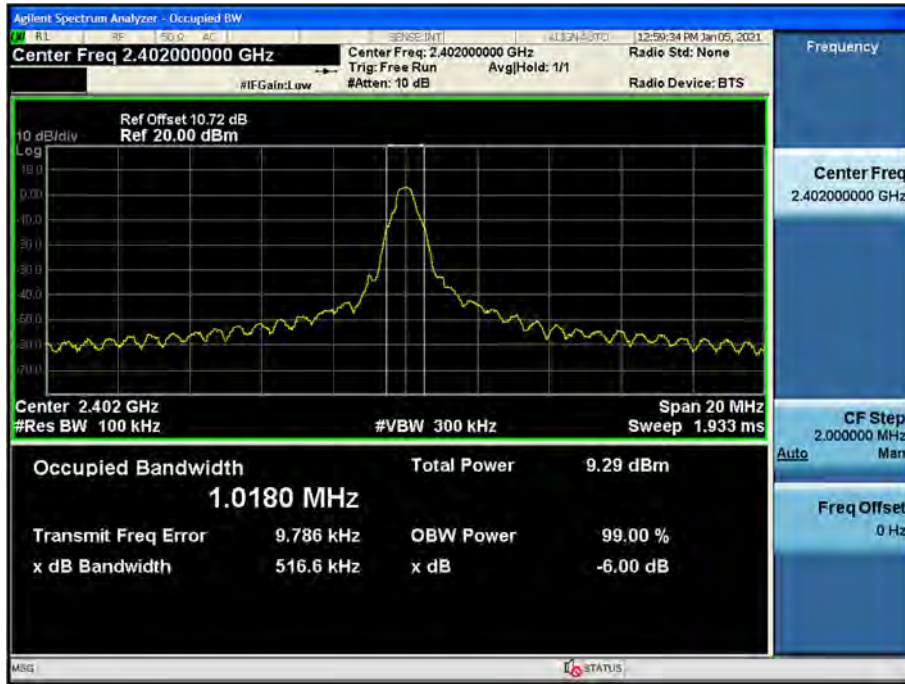


9.2 6dB BANDWIDTH

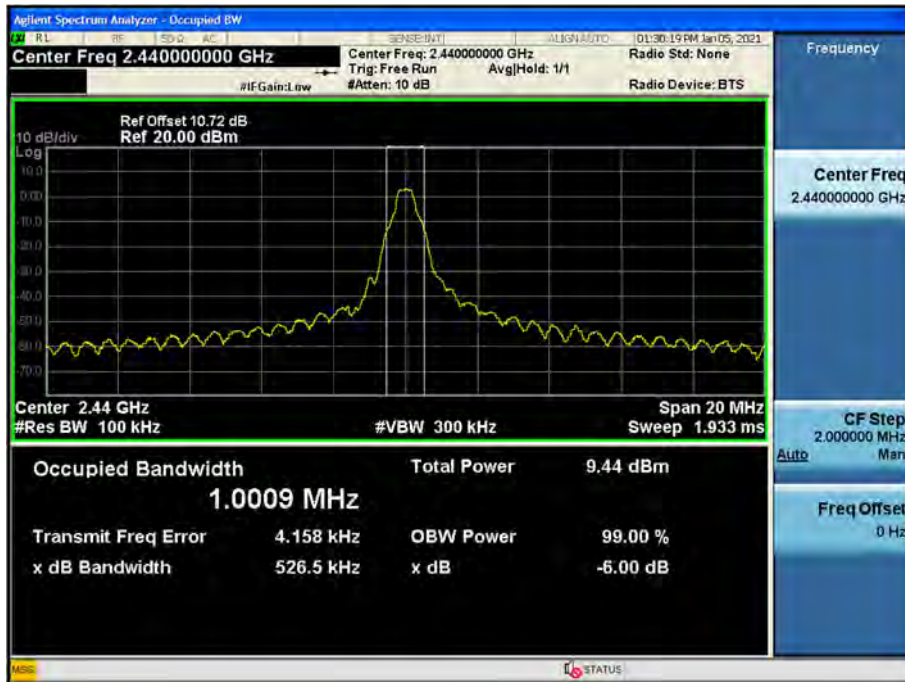
Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
1M 37Byte	0	516.6	> 500
	19	526.5	
	39	530.3	
1M 255Byte	0	527.4	> 500
	19	531.9	
	39	532.3	
2M 37Byte	0	648.4	> 500
	19	660.8	
	39	759.7	
2M 255Byte	0	833.4	> 500
	19	823.5	
	39	773.8	

▣ 1M Bit/s(37 Byte) Test Plots

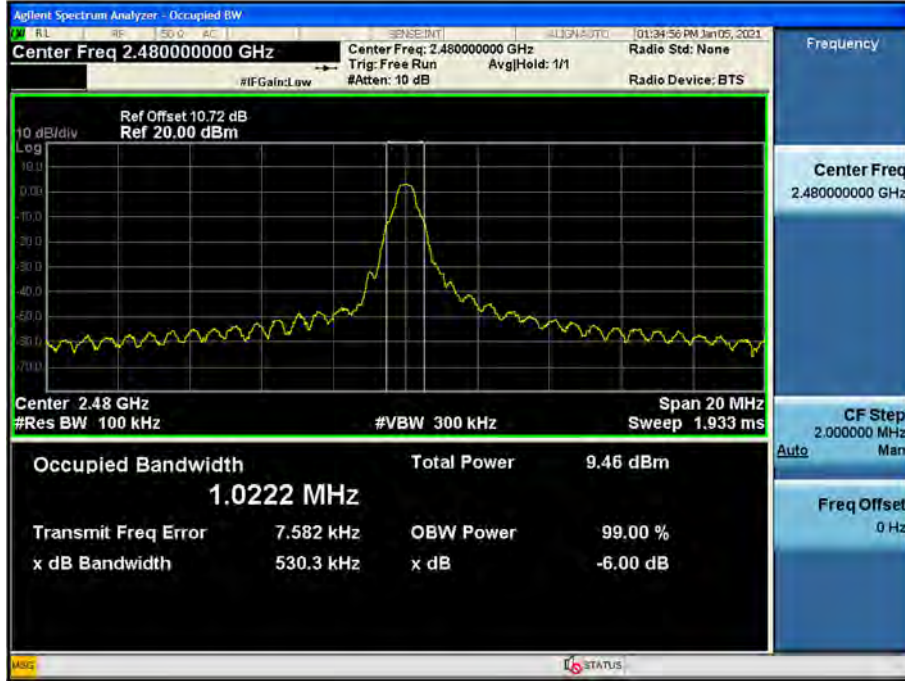
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

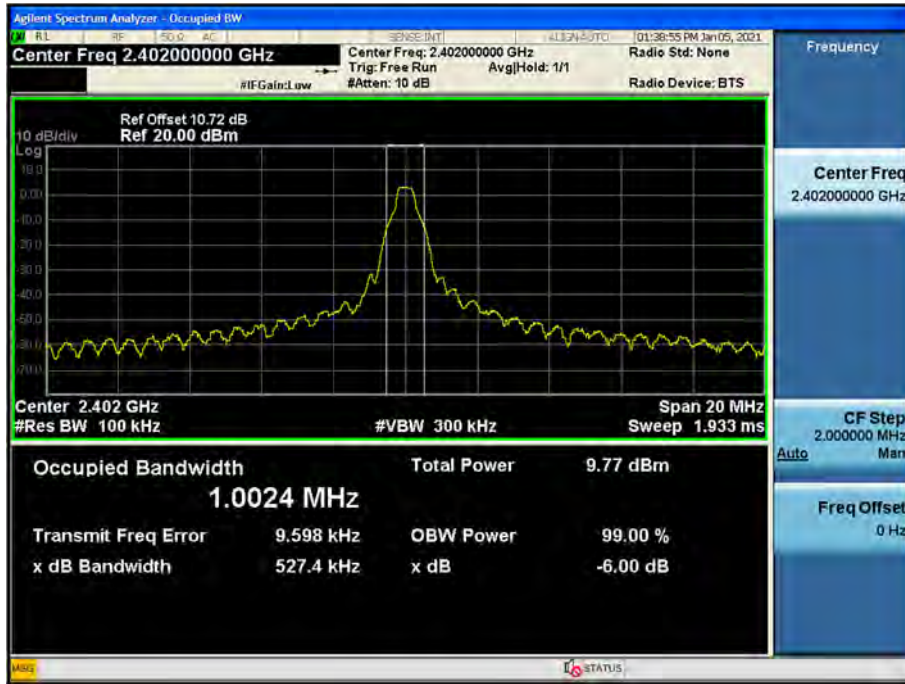


6 dB Bandwidth plot (High-CH 39)

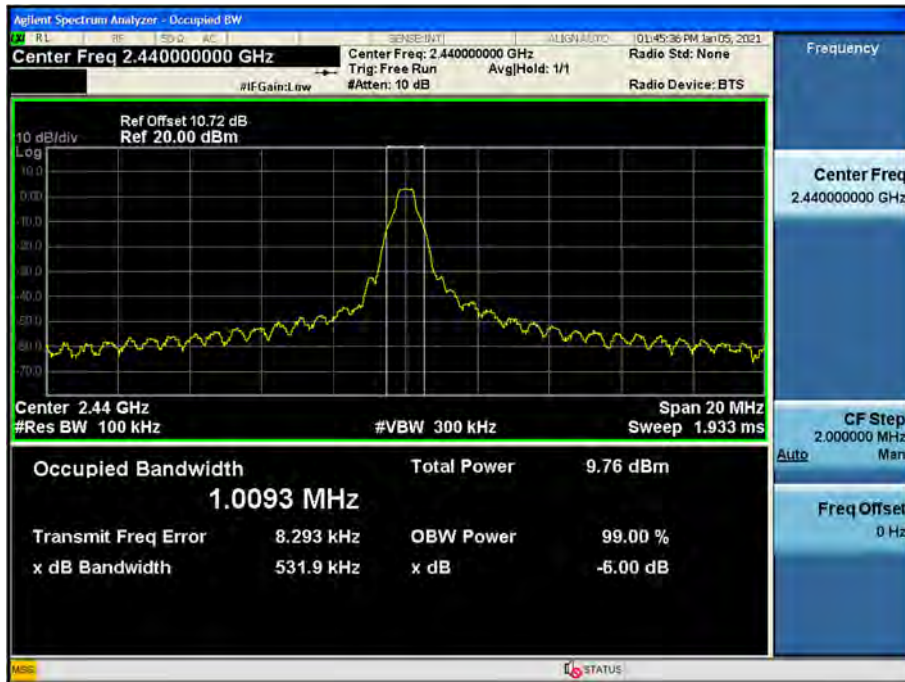


▣ 1M Bit/s(255 Byte) Test Plots

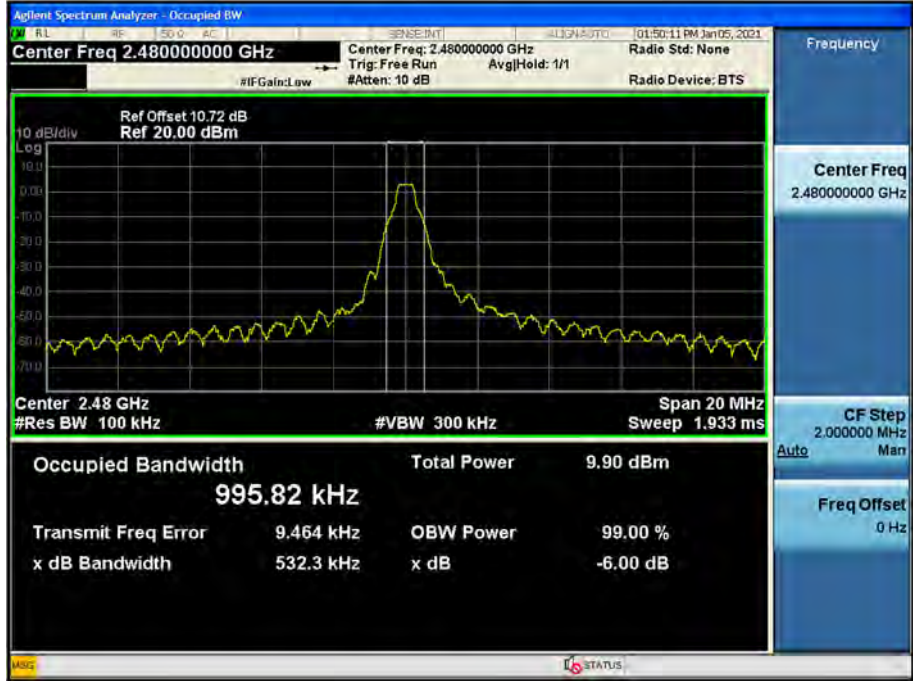
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)



6 dB Bandwidth plot (High-CH 39)



▣ 2M Bit/s(37 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)



6 dB Bandwidth plot (High-CH 39)



▣ 2M Bit/s(255 Byte) Test Plots

6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)



6 dB Bandwidth plot (High-CH 39)



9.3 OUTPUT POWER

Peak Power

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Measured Power(dBm)	Limit (dBm)
		Frequency [MHz]	Channel		
1M	37	2402	0	3.244	30
		2440	19	3.114	
		2480	39	3.180	
	255	2402	0	3.185	
		2440	19	3.142	
		2480	39	3.146	
2M	37	2402	0	3.355	
		2440	19	3.217	
		2480	39	3.255	
	255	2402	0	3.274	
		2440	19	3.264	
		2480	39	3.273	

Average Power

Data rate	Packet length	LE Mode		Measure d Power (dBm)	Duty Cycle Factor (dB)	Result (dBm)	Limit (dBm)
(Bit/s)	(Byte)	Frequency [MHz]	Channel				
1M	37	2402	0	1.91	1.25	3.16	30
		2440	19	1.82	1.25	3.07	
		2480	39	1.90	1.25	3.15	
	255	2402	0	2.91	0.24	3.15	
		2440	19	2.79	0.24	3.03	
		2480	39	2.79	0.24	3.03	
2M	37	2402	0	1.03	2.17	3.20	
		2440	19	0.92	2.17	3.10	
		2480	39	0.95	2.17	3.13	
	255	2402	0	2.68	0.47	3.15	
		2440	19	2.65	0.47	3.12	
		2480	39	2.66	0.47	3.13	

Note :

1. Power meter offset = Attenuator loss + Cable loss + EUT Cable Loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
So, 10.72 dB is offset for 2.4 GHz Band.

9.4 POWER SPECTRAL DENSITY

Frequency (MHz)	Channel No.	Mode (Bit/s)	Test Result	
			Measured Power(dBm)	Limit (dBm)
2402	0	1M 37 Byte	-8.471	8
2440	19		-9.028	
2480	39		-7.052	
2402	0	1M 255 Byte	-6.396	
2440	19		-7.605	
2480	39		-7.952	
2402	0	2M 37 Byte	-11.274	
2440	19		-10.983	
2480	39		-12.935	
2402	0	2M 255 Byte	-9.680	
2440	19		-10.330	
2480	39		-9.221	

Note :

1. Spectrum reading values are not plot data.
 The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss + EUT Cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
 So, 10.72 dB is offset for 2.4 GHz Band.

▣ 1M Bit/s (37 Byte) Test Plots

Power Spectral Density (Low-CH 0)



Power Spectral Density (Mid-CH 19)



Power Spectral Density (High-CH 39)



1M Bit/s (255 Byte) Test Plots

Power Spectral Density (Low-CH 0)



Power Spectral Density (Mid-CH 19)



Power Spectral Density (High-CH 39)



2M Bit/s (37 Byte) Test Plots

Power Spectral Density (Low-CH 0)



Power Spectral Density (Mid-CH 19)



Power Spectral Density (High-CH 39)



2M Bit/s (255 Byte) Test Plots

Power Spectral Density (Low-CH 0)



Power Spectral Density (Mid-CH 19)



Power Spectral Density (High-CH 39)



9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Result : please refer to the plot below.

In order to simplify the report, attached plots were only the worst case channel and data rate.

1M Bit/s (37 Byte) Test Plots -BandEdge

Low-CH 0



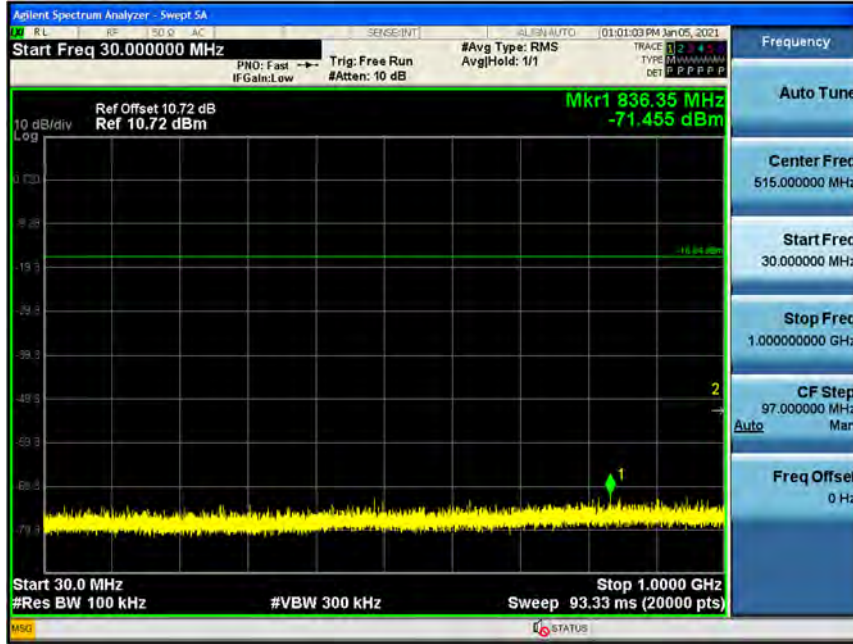
High-CH 39



☐ 1M Bit/s (37 Byte) Test Plots -Conducted Spurious Emission

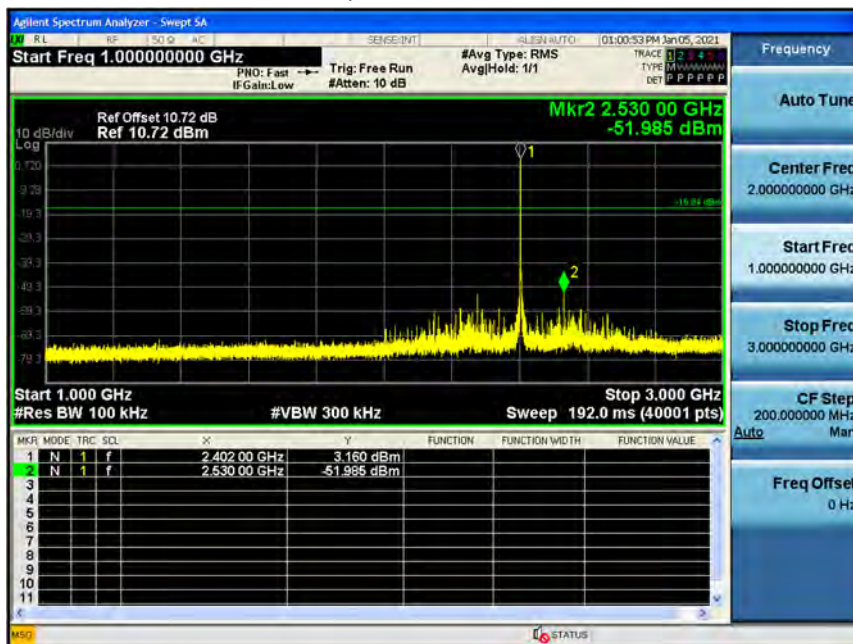
30 MHz ~ 1 GHz

Conducted Spurious Emission (Low-CH 0)



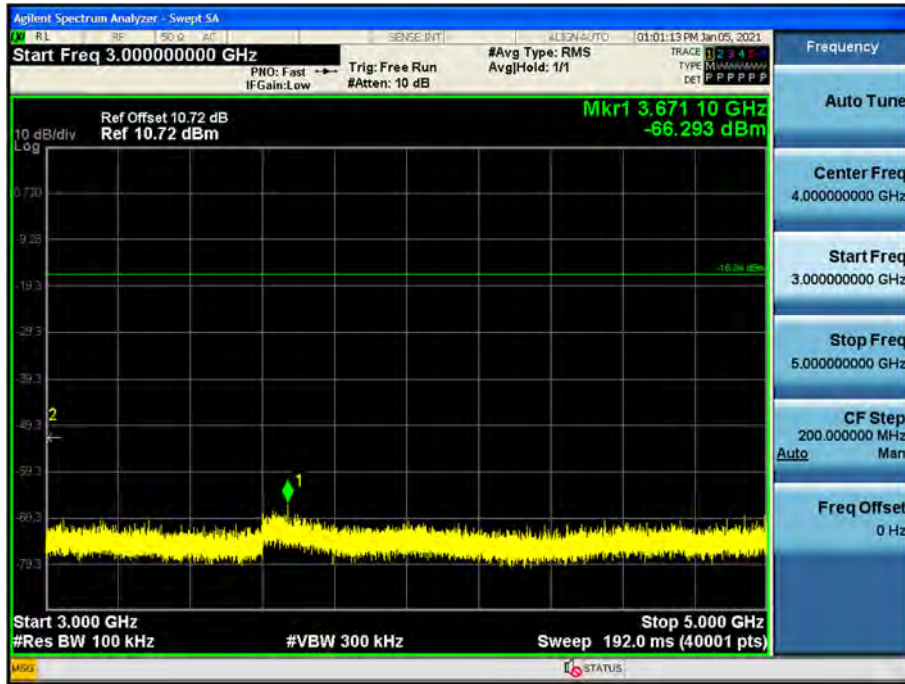
1 GHz ~ 3 GHz

Conducted Spurious Emission (Low-CH 0)



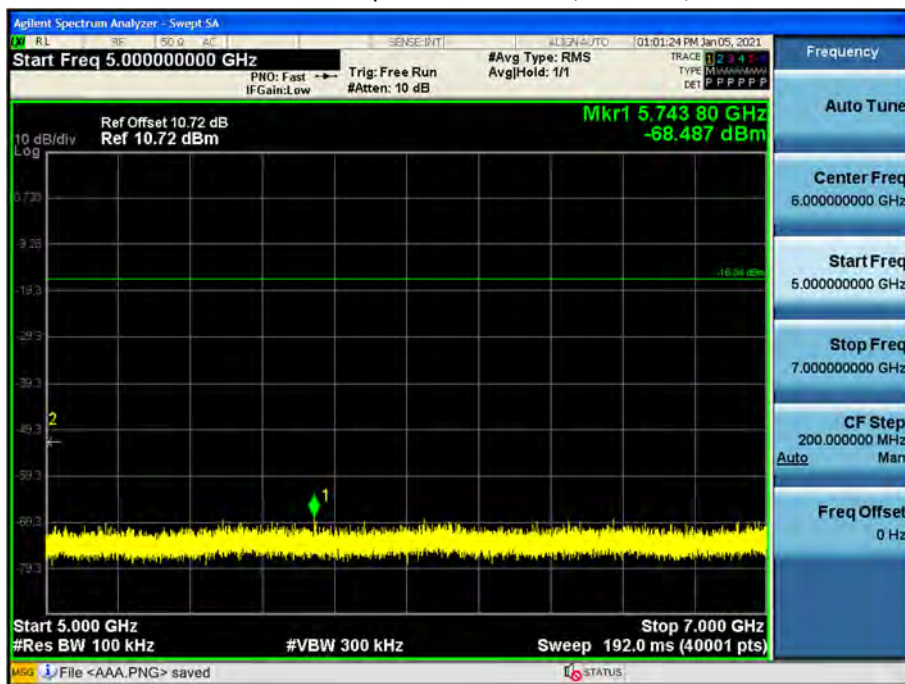
3 GHz ~ 5 GHz

Conducted Spurious Emission (Low-CH 0)



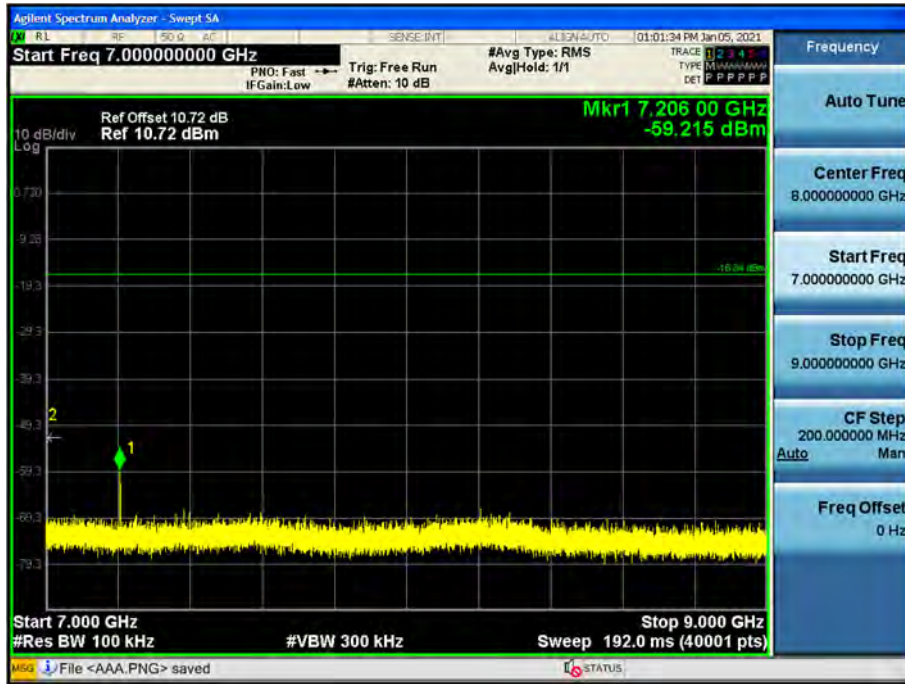
5 GHz ~ 7 GHz

Conducted Spurious Emission (Low-CH 0)



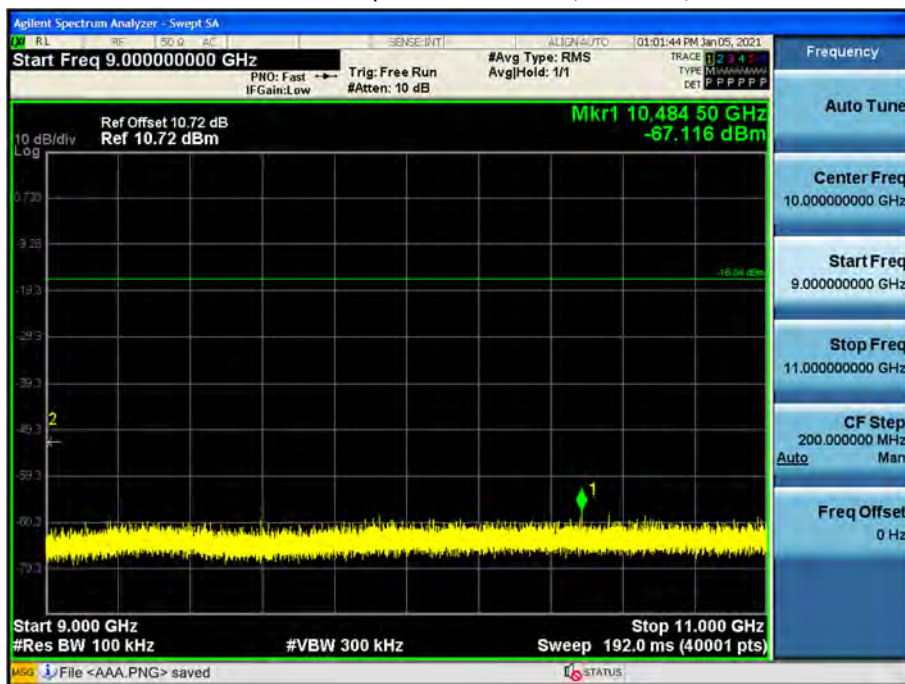
7 GHz ~ 9 GHz

Conducted Spurious Emission (Low-CH 0)



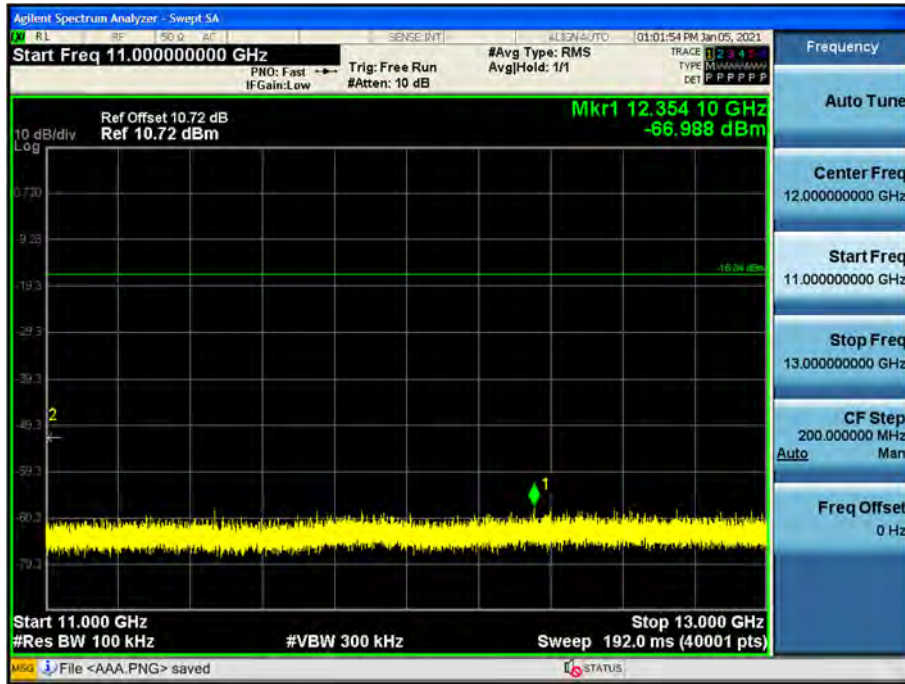
9 GHz ~ 11 GHz

Conducted Spurious Emission (Low-CH 0)



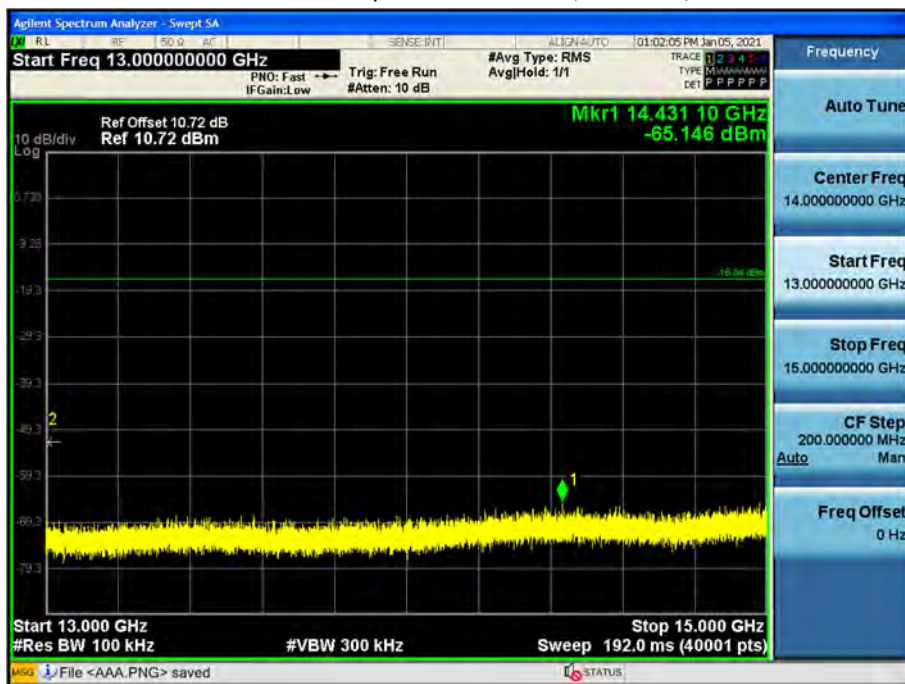
11 GHz ~ 13 GHz

Conducted Spurious Emission (Low-CH 0)



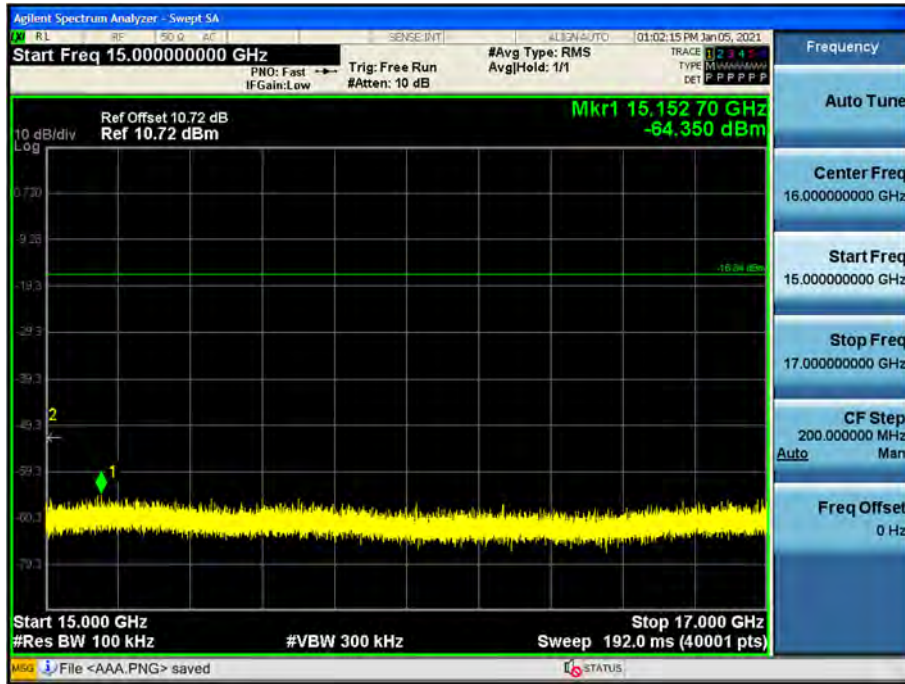
13 GHz ~ 15 GHz

Conducted Spurious Emission (Low-CH 0)



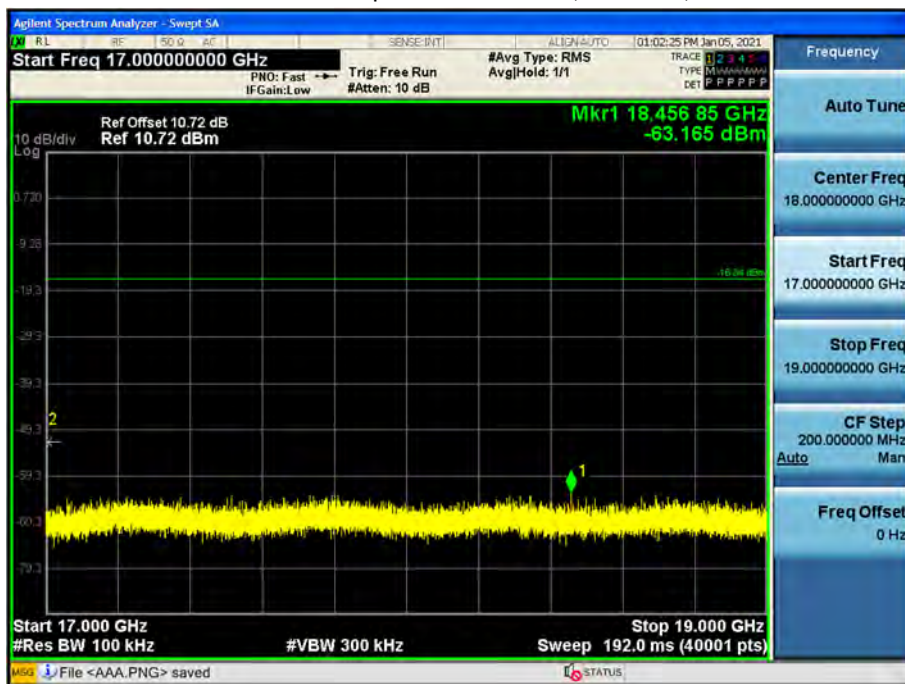
15 GHz ~ 17 GHz

Conducted Spurious Emission (Low-CH 0)



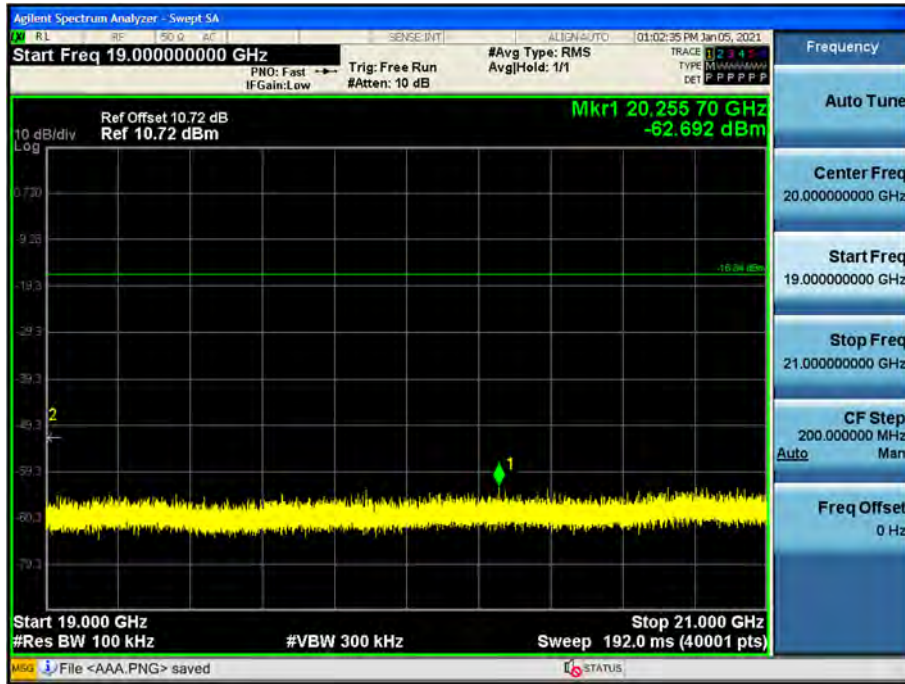
17 GHz ~ 19 GHz

Conducted Spurious Emission (Low-CH 0)



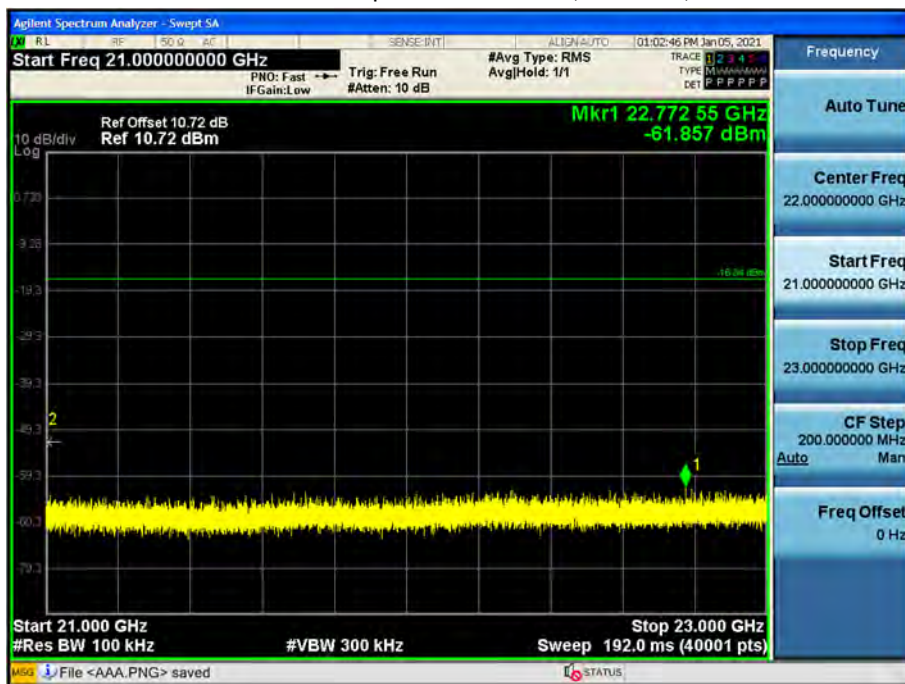
19 GHz ~ 21 GHz

Conducted Spurious Emission (Low-CH 0)



21 GHz ~ 23 GHz

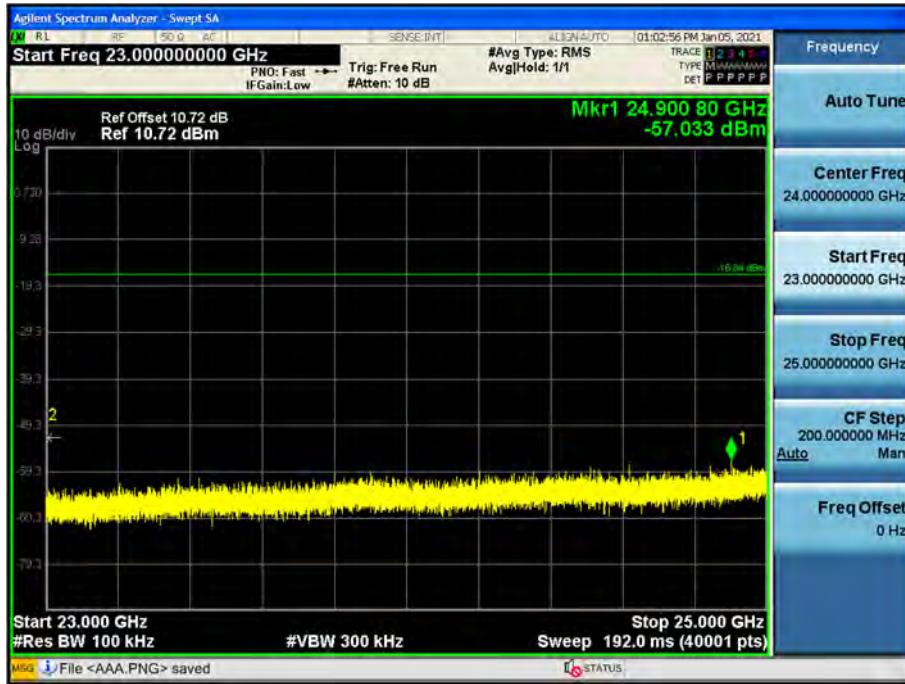
Conducted Spurious Emission (Low-CH 0)





23 GHz ~ 25 GHz

Conducted Spurious Emission (Low-CH 0)



2M Bit/s (37 Byte) Test Plots -BandEdge

Low-CH 0



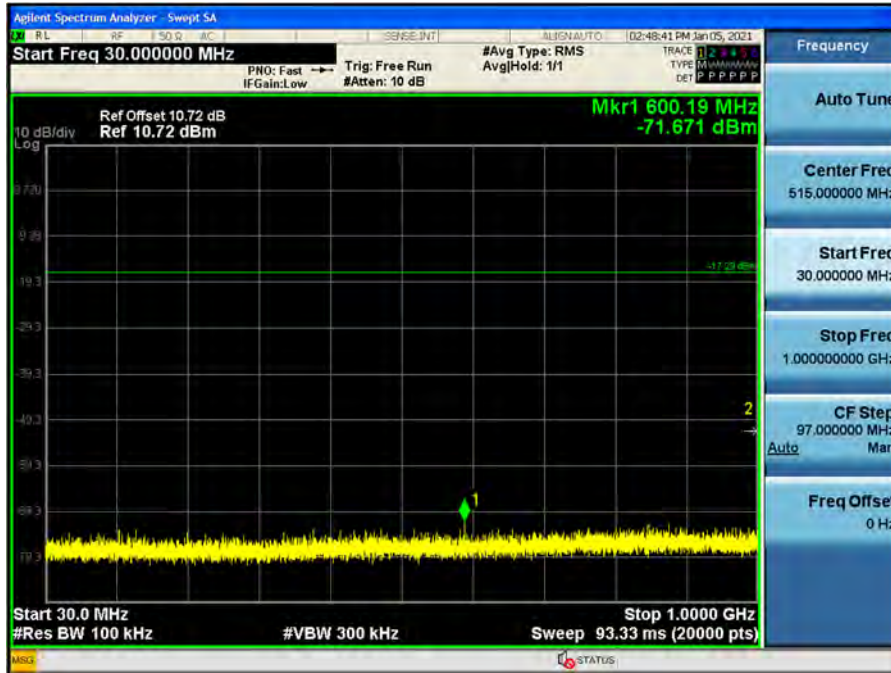
High-CH 39



☐ 2M Bit/s (37 Byte) Test Plots -Conducted Spurious Emission

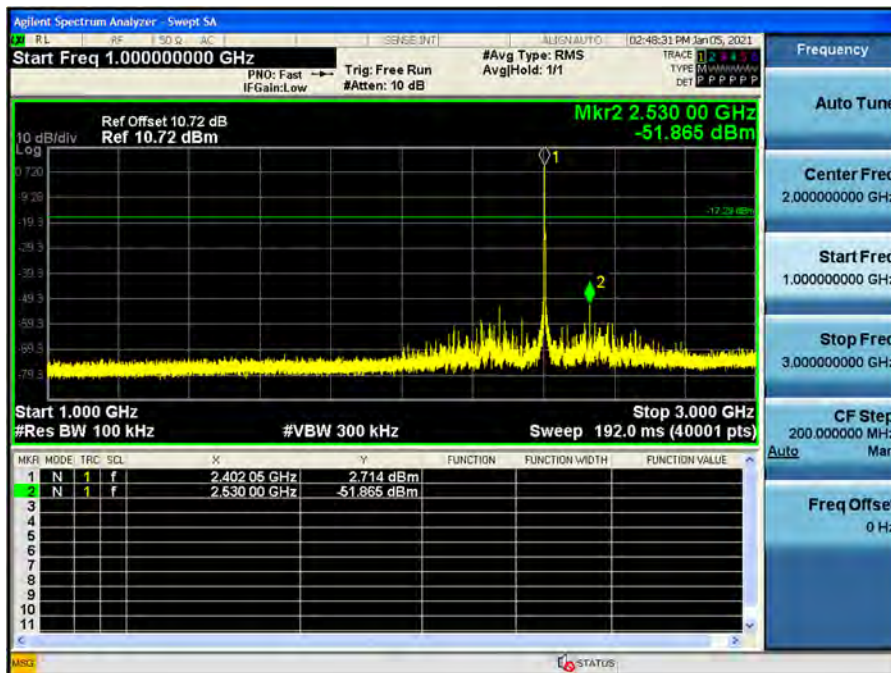
30 MHz ~ 1 GHz

Conducted Spurious Emission (Low-CH 0)



1 GHz ~ 3 GHz

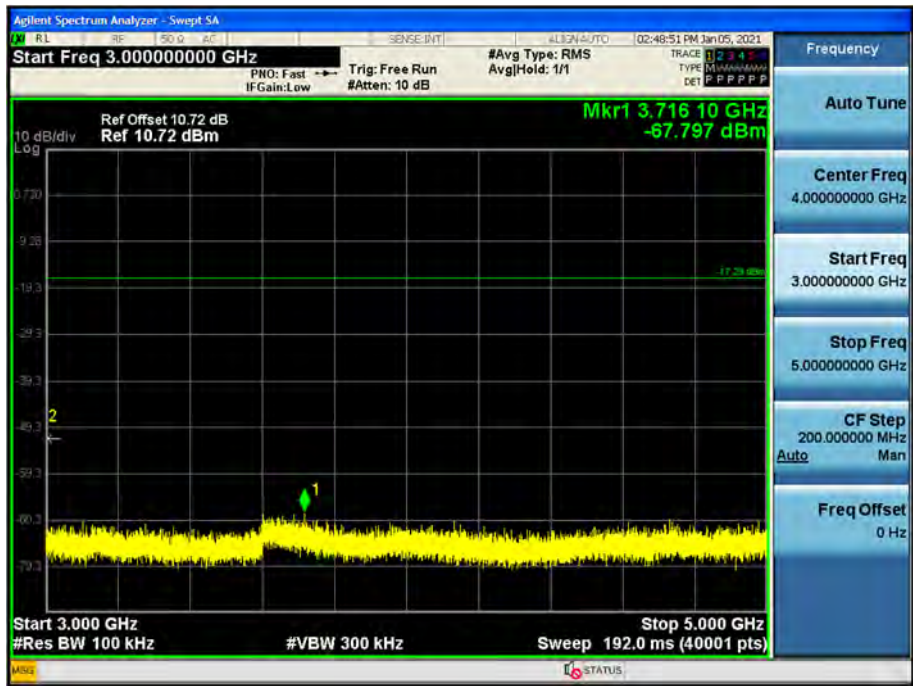
Conducted Spurious Emission (Low-CH 0)





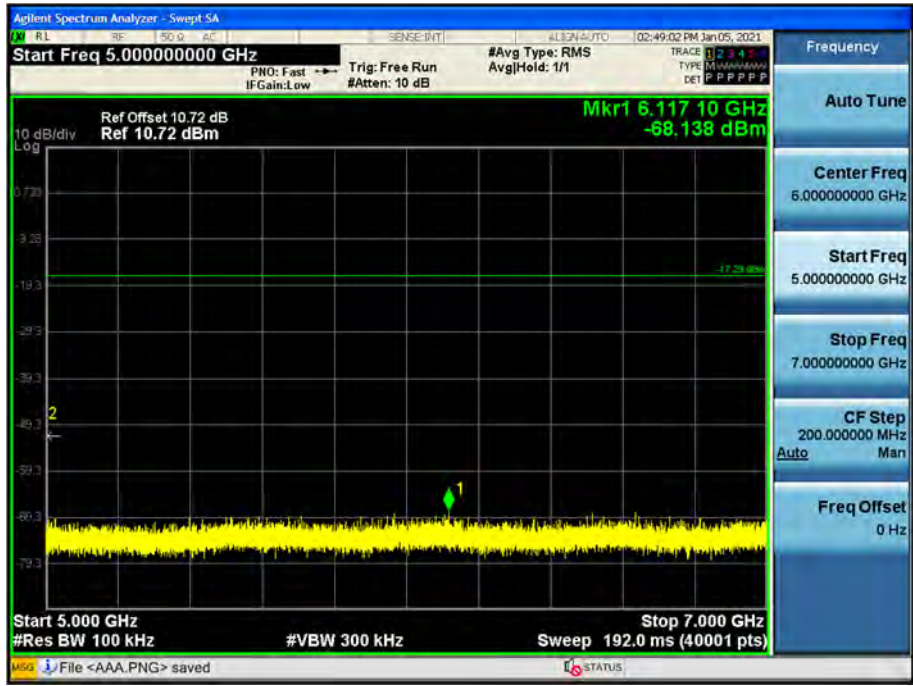
3 GHz ~ 5 GHz

Conducted Spurious Emission (Low-CH 0)



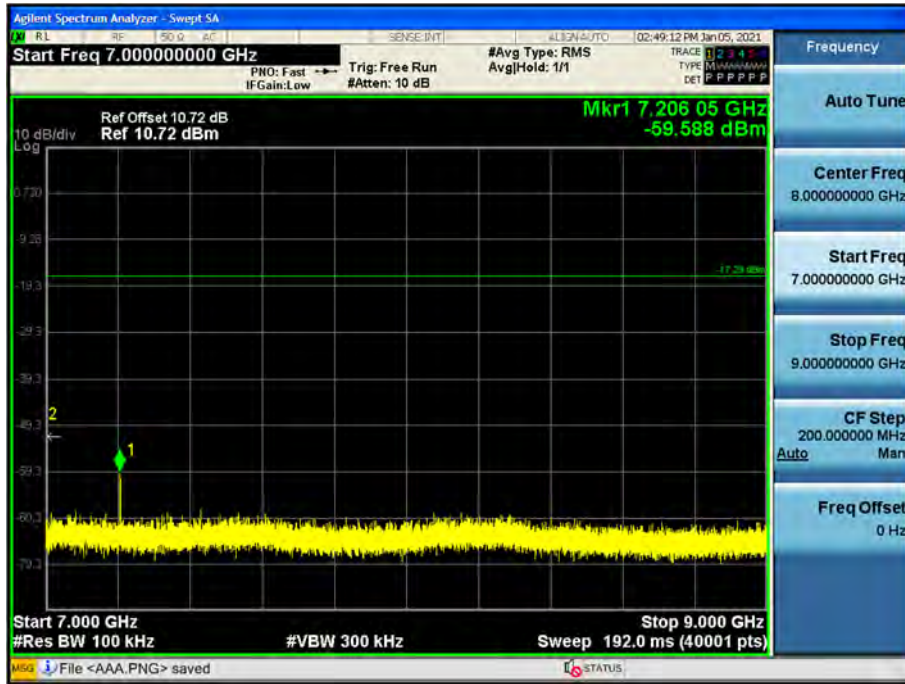
5 GHz ~ 7 GHz

Conducted Spurious Emission (Low-CH 0)



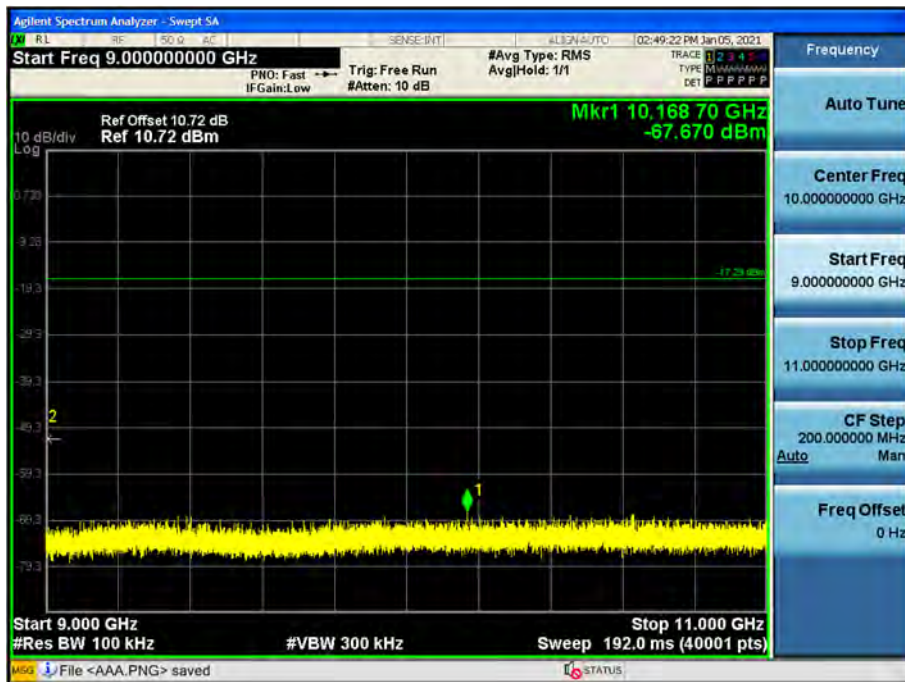
7 GHz ~ 9 GHz

Conducted Spurious Emission (Low-CH 0)



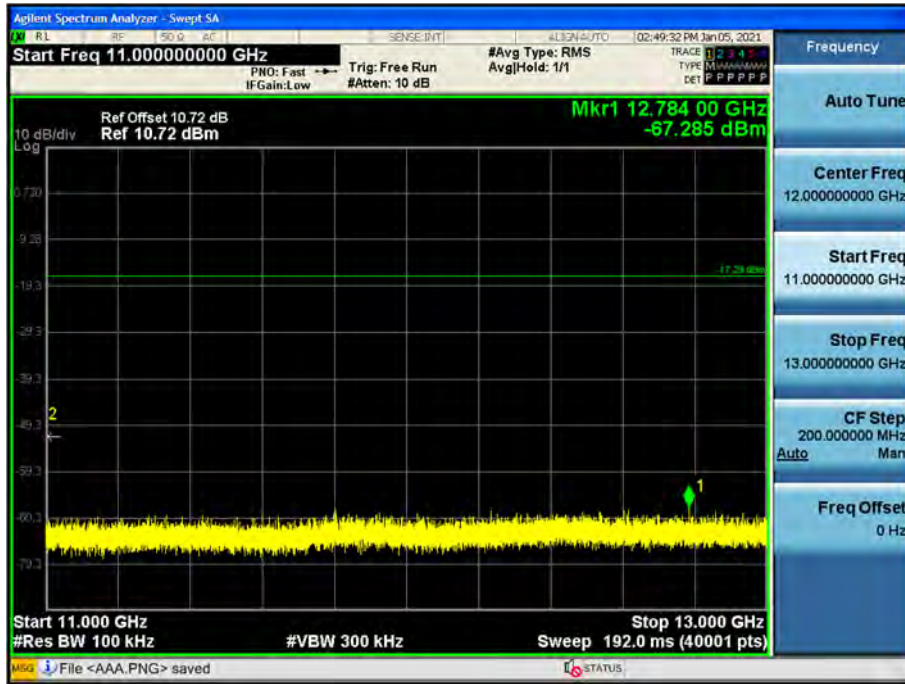
9 GHz ~ 11 GHz

Conducted Spurious Emission (Low-CH 0)



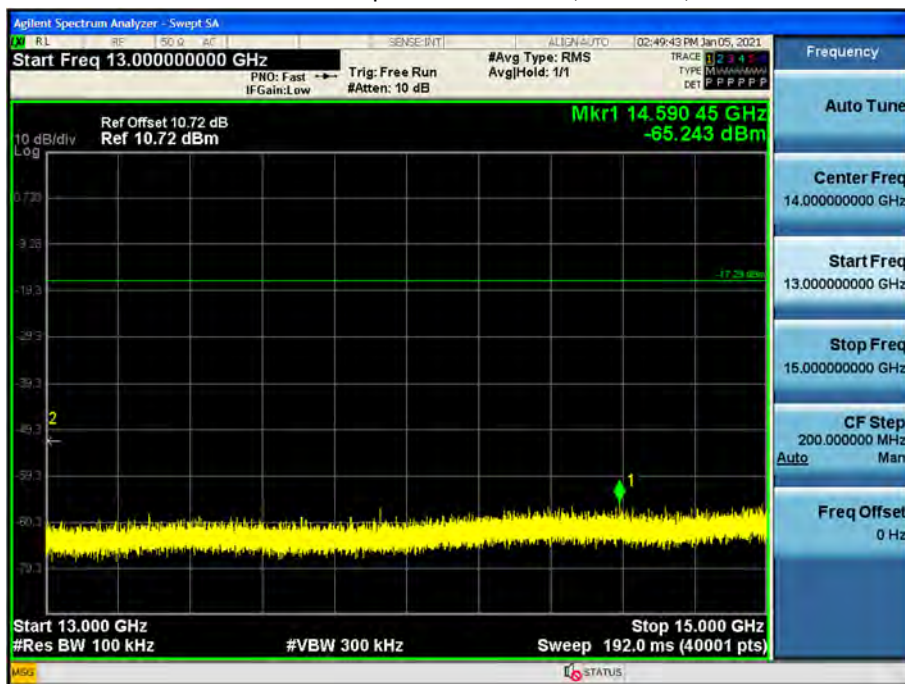
11 GHz ~ 13 GHz

Conducted Spurious Emission (Low-CH 0)



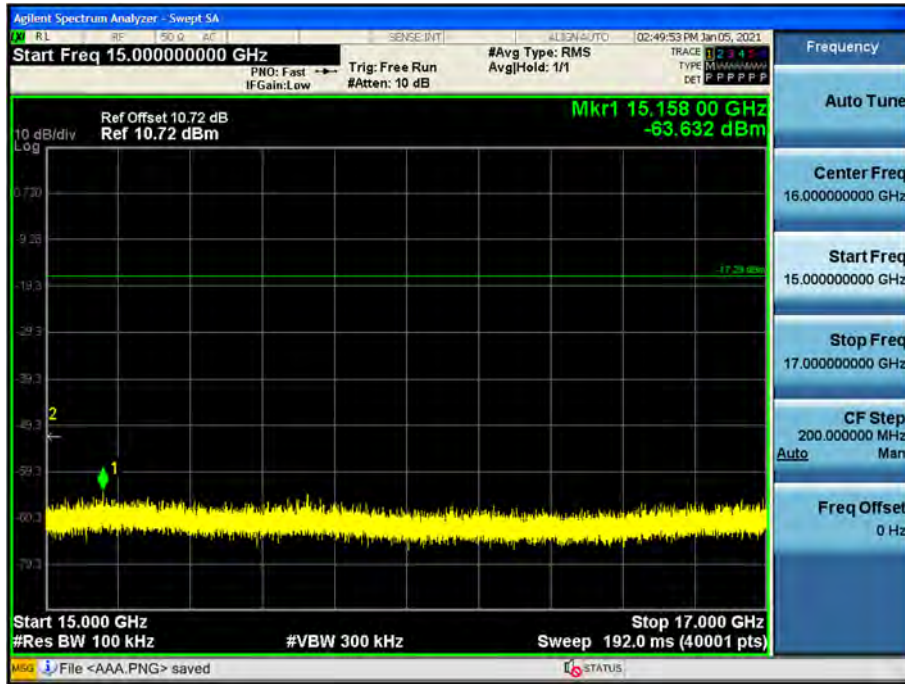
13 GHz ~ 15 GHz

Conducted Spurious Emission (Low-CH 0)



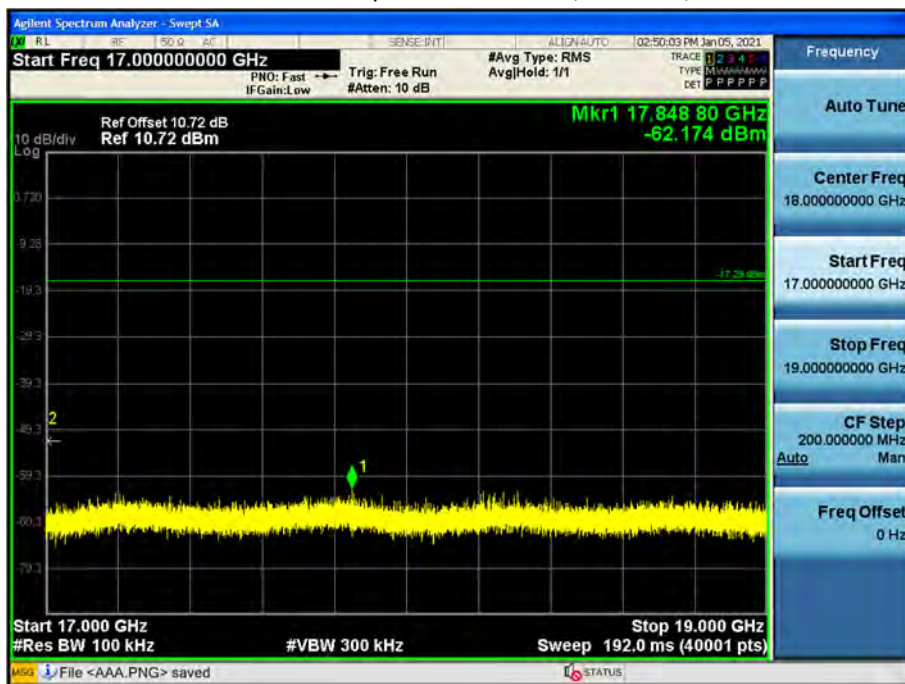
15 GHz ~ 17 GHz

Conducted Spurious Emission (Low-CH 0)



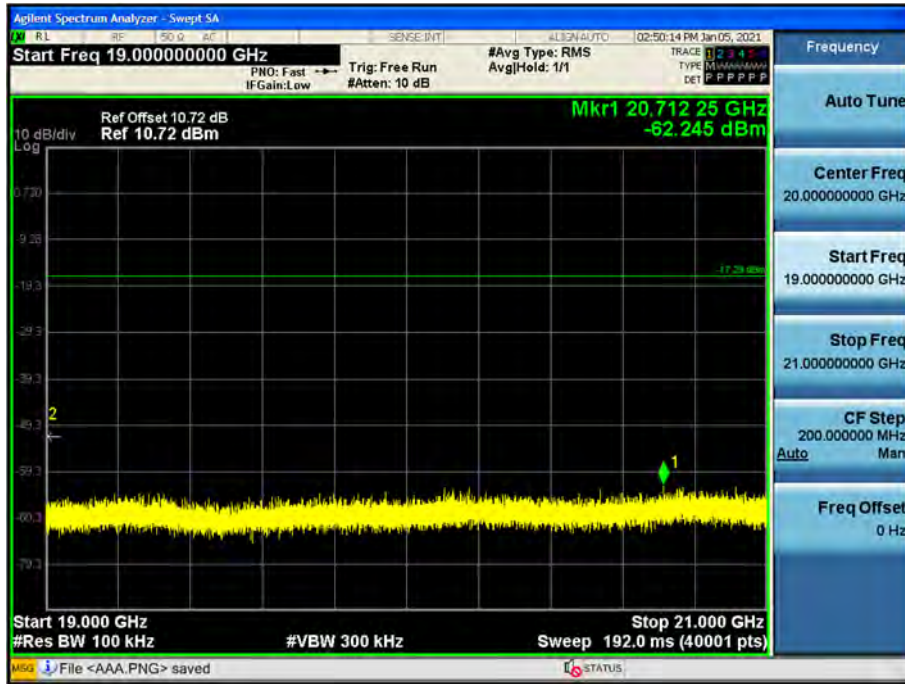
17 GHz ~ 19 GHz

Conducted Spurious Emission (Low-CH 0)



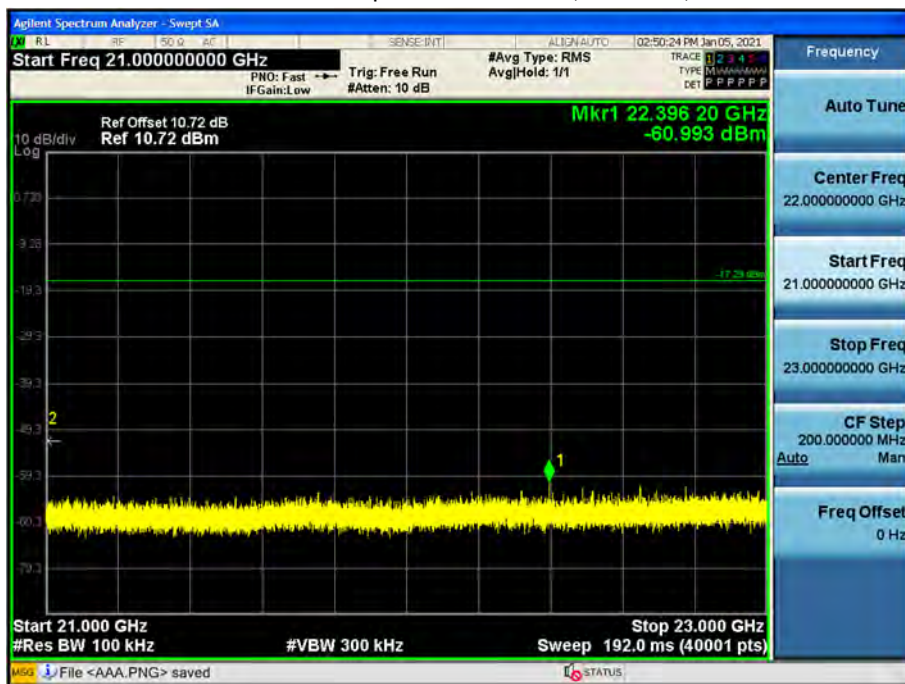
19 GHz ~ 21 GHz

Conducted Spurious Emission (Low-CH 0)



21 GHz ~ 23 GHz

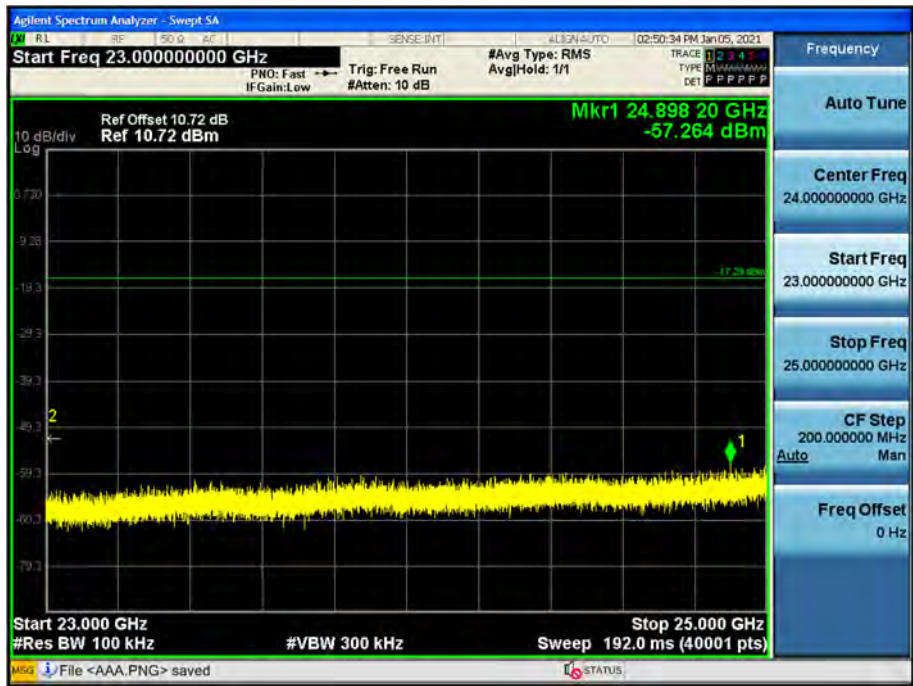
Conducted Spurious Emission (Low-CH 0)





23 GHz ~ 25 GHz

Conducted Spurious Emission (Low-CH 0)



9.6 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB

No Critical peaks found

Note:

1. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor = $40\log(\text{specific distance} / \text{test distance})$ (dB)
3. Limit line = specific Limits (dBuV) + Distance extrapolation factor
4. Radiated test is performed with hopping off.

Frequency Range : Below 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB

No Critical peaks found

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

Frequency Range : Above 1 GHz

Mode : 1M Bit/s (37 Byte)

Operation Mode: CH Low

Frequency	Reading	Duty cycle Factor	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV /m]	[dBuV /m]	[dB]	
4804	52.41	0.00	4.21	V	56.62	73.98	17.36	PK
4804	43.93	1.25	4.21	V	49.39	53.98	4.59	AV
7206	42.61	0.00	12.24	V	54.85	73.98	19.13	PK
7206	34.52	1.25	12.24	V	48.01	53.98	5.97	AV
4804	54.17	0.00	4.21	H	58.38	73.98	15.60	PK
4804	45.39	1.25	4.21	H	50.85	53.98	3.13	AV
7206	44.27	0.00	12.24	H	56.51	73.98	17.47	PK
7206	37.27	1.25	12.24	H	50.76	53.98	3.22	AV

Operation Mode: CH Mid

Frequency	Reading	Duty cycle Factor	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV /m]	[dBuV /m]	[dB]	
4880	49.37	0.00	4.43	V	53.80	73.98	20.18	PK
4880	40.02	1.25	4.43	V	45.70	53.98	8.28	AV
7320	43.21	0.00	12.46	V	55.67	73.98	18.31	PK
7320	34.74	1.25	12.46	V	48.45	53.98	5.53	AV
4880	51.58	0.00	4.43	H	56.01	73.98	17.97	PK
4880	41.60	1.25	4.43	H	47.28	53.98	6.70	AV
7320	44.08	0.00	12.46	H	56.54	73.98	17.44	PK
7320	35.97	1.25	12.46	H	49.68	53.98	4.30	AV

Operation Mode: CH High

Frequency	Reading	Duty cycle Factor	A.F+C.L- A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV /m]	[dBuV /m]	[dB]	
4960	49.18	0.00	4.83	V	54.01	73.98	19.97	PK
4960	39.21	1.25	4.83	V	45.29	53.98	8.69	AV
7440	43.89	0.00	12.63	V	56.52	73.98	17.46	PK
7440	35.58	1.25	12.63	V	49.46	53.98	4.52	AV
4960	50.03	0.00	4.83	H	54.86	73.98	19.12	PK
4960	36.86	1.25	4.83	H	42.94	53.98	11.04	AV
7440	44.15	0.00	12.63	H	56.78	73.98	17.20	PK
7440	36.67	1.25	12.63	H	50.55	53.98	3.43	AV

Mode : 2M Bit/s (37 Byte)

Operation Mode: CH Low

Frequency	Reading	Duty cycle Factor	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV /m]	[dBuV /m]	[dB]	
4804	52.33	0.00	4.21	V	56.54	73.98	17.44	PK
4804	42.69	2.17	4.21	V	49.07	53.98	4.91	AV
7206	42.76	0.00	12.24	V	55.00	73.98	18.98	PK
7206	33.48	2.17	12.24	V	47.89	53.98	6.09	AV
4804	54.02	0.00	4.21	H	58.23	73.98	15.75	PK
4804	43.88	2.17	4.21	H	50.26	53.98	3.72	AV
7206	44.57	0.00	12.24	H	56.81	73.98	17.17	PK
7206	34.24	2.17	12.24	H	48.65	53.98	5.33	AV

Operation Mode: CH Mid

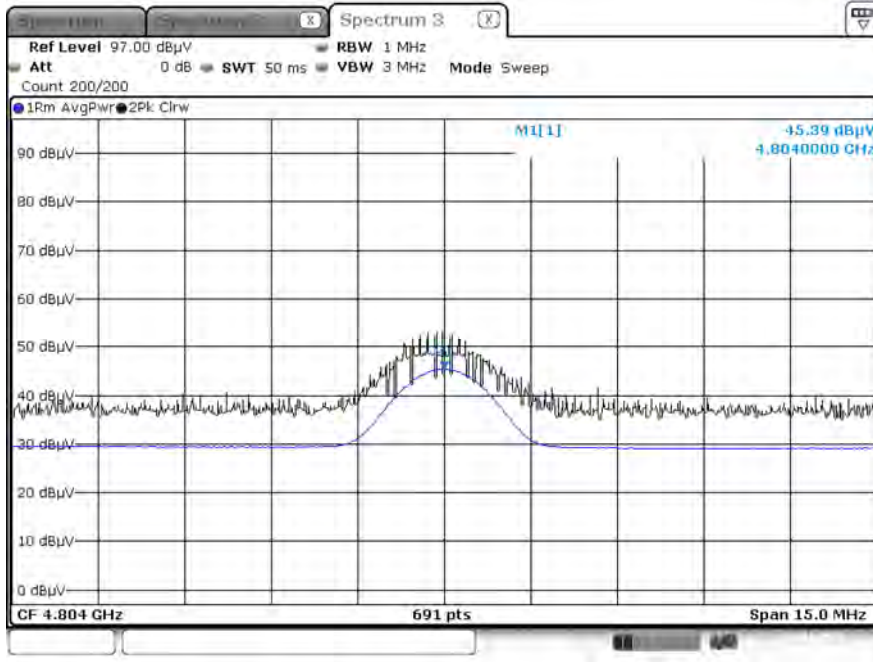
Frequency	Reading	Duty cycle Factor	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV /m]	[dBuV /m]	[dB]	
4880	49.86	0.00	4.43	V	54.29	73.98	19.69	PK
4880	38.23	2.17	4.43	V	44.83	53.98	9.15	AV
7320	42.56	0.00	12.46	V	55.02	73.98	18.96	PK
7320	32.13	2.17	12.46	V	46.76	53.98	7.22	AV
4880	51.44	0.00	4.43	H	55.87	73.98	18.11	PK
4880	39.55	2.17	4.43	H	46.15	53.98	7.83	AV
7320	43.74	0.00	12.46	H	56.20	73.98	17.78	PK
7320	33.44	2.17	12.46	H	48.07	53.98	5.91	AV

Operation Mode: CH High

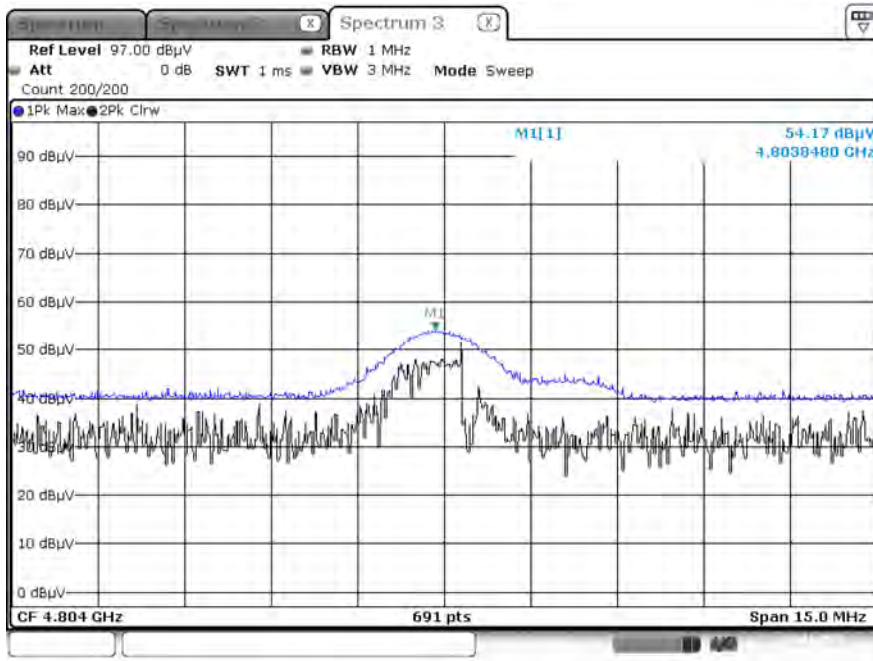
Frequency	Reading	Duty cycle Factor	A.F+C.L- A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV /m]	[dBuV /m]	[dB]	
4960	47.32	0.00	4.83	V	52.15	73.98	21.83	PK
4960	34.47	2.17	4.83	V	41.47	53.98	12.51	AV
7440	41.07	0.00	12.63	V	53.70	73.98	20.28	PK
7440	29.25	2.17	12.63	V	44.05	53.98	9.93	AV
4960	50.08	0.00	4.83	H	54.91	73.98	19.07	PK
4960	35.86	2.17	4.83	H	42.86	53.98	11.12	AV
7440	44.27	0.00	12.63	H	56.90	73.98	17.08	PK
7440	34.07	2.17	12.63	H	48.87	53.98	5.11	AV

▣ 1M Bit/s (37 Byte) Test Plots (Worst case : Z-H)

Radiated Spurious Emissions plot – Average Reading (Ch.0 2rd Harmonic)



Radiated Spurious Emissions plot – Peak Reading (Ch.0 2rd Harmonic)

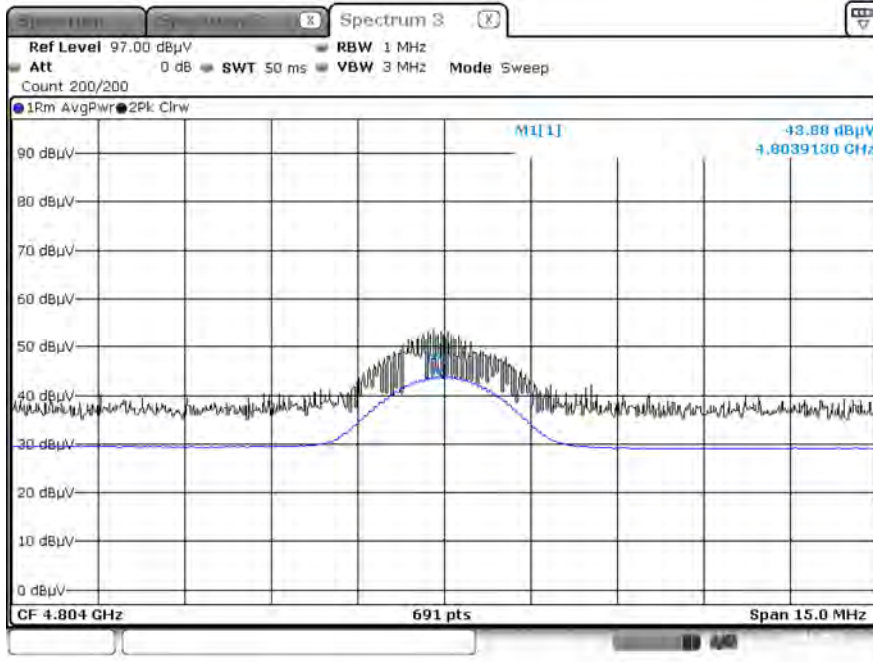


Note:

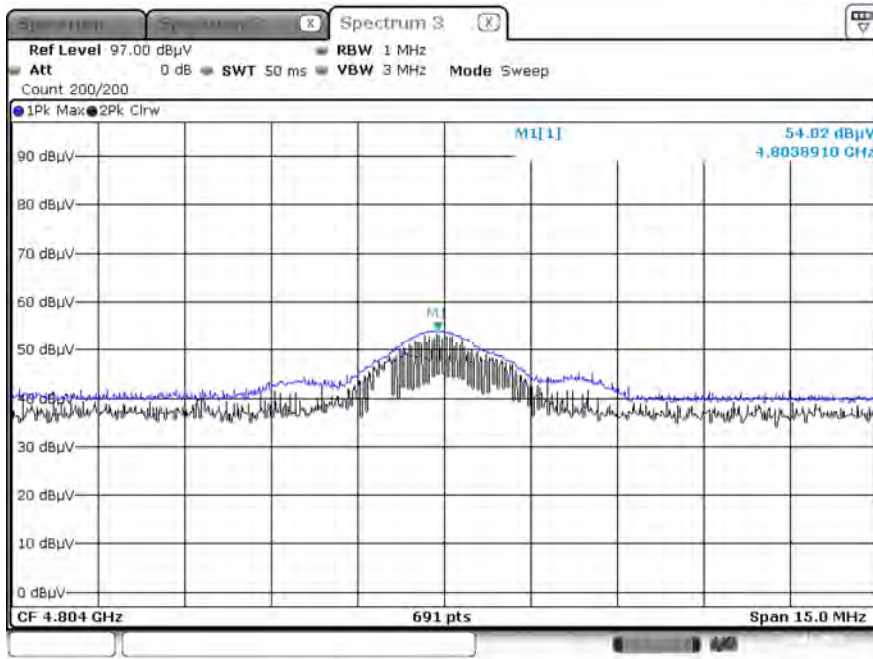
Plot of worst case are only reported.

▣ 2M Bit/s (37 Byte) Test Plots (Worst case : Z-H)

Radiated Spurious Emissions plot – Average Reading (Ch.0 2rd Harmonic)



Radiated Spurious Emissions plot – Peak Reading (Ch.0 2rd Harmonic)



Note:

Plot of worst case are only reported.

9.7 RADIATED RESTRICTED BAND EDGES

Mode : 1M Bit/s (37 Byte)

Operating Frequency 2402 MHz & 2480 MHz

Channel No. 0 & 39

Frequency	Reading	Duty Cycle Factor	A.F+C.L-A.G+D.F+ATT	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	48.56	0.00	2.61	H	51.17	73.98	22.81	PK
2390.0	36.09	1.25	2.61	H	39.95	53.98	14.03	AV
2390.0	47.89	0.00	2.61	V	50.50	73.98	23.48	PK
2390.0	35.92	1.25	2.61	V	39.78	53.98	14.20	AV
2483.5	51.79	0.00	3.13	H	54.92	73.98	19.06	PK
2483.5	35.72	1.25	3.13	H	40.10	53.98	13.88	AV
2483.5	51.01	0.00	3.13	V	54.14	73.98	19.84	PK
2483.5	35.43	1.25	3.13	V	39.81	53.98	14.17	AV

Mode : 1M Bit/s (255 Byte)

Operating Frequency 2402 MHz & 2480 MHz

Channel No. 0 & 39

Frequency	Reading	Duty Cycle Factor	A.F+C.L-A.G+D.F+ATT	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	48.55	0.00	2.61	H	51.16	73.98	22.82	PK
2390.0	36.25	0.24	2.61	H	39.10	53.98	14.88	AV
2390.0	47.95	0.00	2.61	V	50.56	73.98	23.42	PK
2390.0	35.98	0.24	2.61	V	38.83	53.98	15.15	AV
2483.5	51.59	0.00	3.13	H	54.72	73.98	19.26	PK
2483.5	35.80	0.24	3.13	H	39.17	53.98	14.81	AV
2483.5	50.84	0.00	3.13	V	53.97	73.98	20.01	PK
2483.5	35.51	0.24	3.13	V	38.88	53.98	15.10	AV

Mode : 2M Bit/s (37 Byte)

Operating Frequency 2402 MHz & 2480 MHz

Channel No. 0 & 39

Frequency	Reading	Duty Cycle Factor	A.F+C.L-A.G+D.F+ATT	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	47.97	0.00	2.61	H	50.58	73.98	23.40	PK
2390.0	35.94	2.17	2.61	H	40.72	53.98	13.26	AV
2390.0	47.62	0.00	2.61	V	50.23	73.98	23.75	PK
2390.0	35.55	2.17	2.61	V	40.33	53.98	13.65	AV
2483.5	51.88	0.00	3.13	H	55.01	73.98	18.97	PK
2483.5	36.20	2.17	3.13	H	41.50	53.98	12.48	AV
2483.5	51.19	0.00	3.13	V	54.32	73.98	19.66	PK
2483.5	36.04	2.17	3.13	V	41.34	53.98	12.64	AV

Mode : 2M Bit/s (255 Byte)

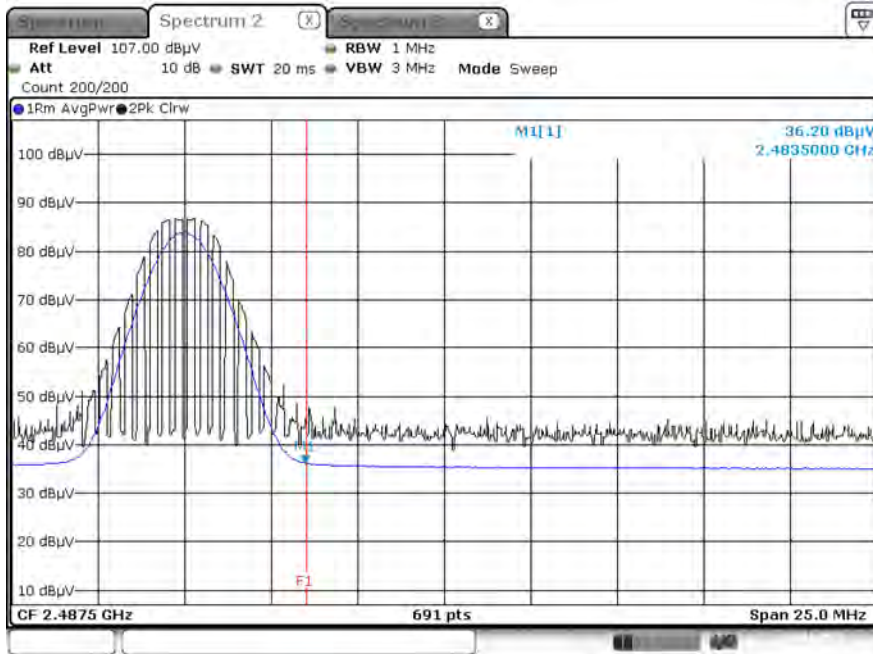
Operating Frequency 2402 MHz & 2480 MHz

Channel No. 0 & 39

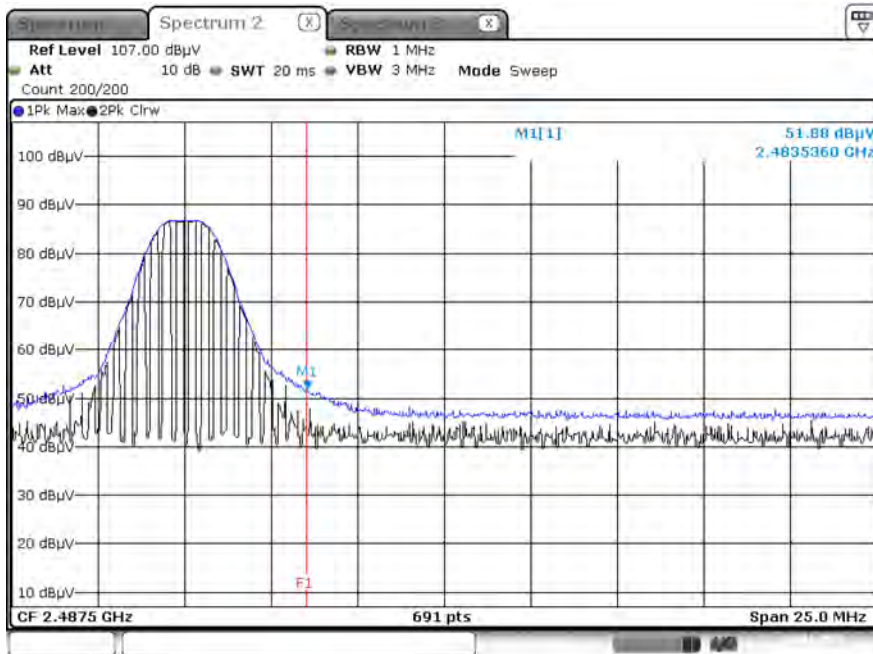
Frequency	Reading	Duty Cycle Factor	A.F+C.L-A.G+D.F+ATT	Ant. Pol.	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV/m]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	48.00	0.00	2.61	H	50.61	73.98	23.37	PK
2390.0	36.16	0.47	2.61	H	39.24	53.98	14.74	AV
2390.0	47.77	0.00	2.61	V	50.38	73.98	23.60	PK
2390.0	36.07	0.47	2.61	V	39.15	53.98	14.83	AV
2483.5	51.86	0.00	3.13	H	54.99	73.98	18.99	PK
2483.5	36.47	0.47	3.13	H	40.07	53.98	13.91	AV
2483.5	51.08	0.00	3.13	V	54.21	73.98	19.77	PK
2483.5	36.12	0.47	3.13	V	39.72	53.98	14.26	AV

Mode : 2M Bit/s (37 Byte) Test Plots

Radiated Restricted Band Edges plot – Average Reading (Ch.39, Y-H)



Radiated Restricted Band Edges plot – Peak Reading (Ch.39, Y-H)



Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

Test

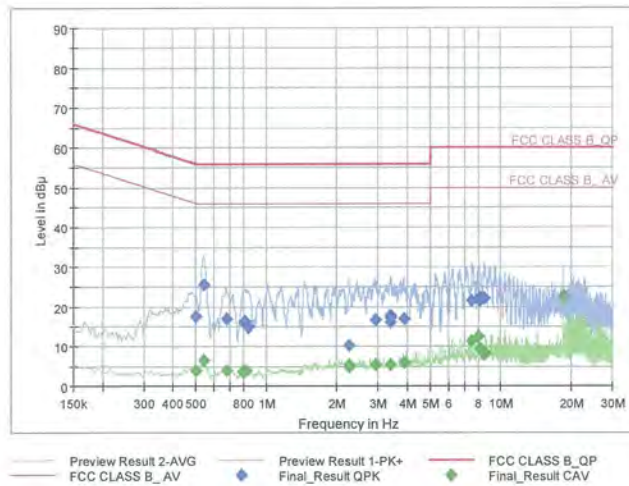
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Test Report

Common Information

EUT :	VC-T8
Manufacturer :	VOICE CADDIE
Test Site:	SHIELD ROOM
Operating Conditions :	BTLE MODE_N
Operator Name:	
Comment:	

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak	Limit	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.500000	17.63	56.00	38.37	9.000	N	OFF	9.6
0.540500	25.59	56.00	30.41	9.000	N	OFF	9.6
0.675500	16.90	56.00	39.10	9.000	N	OFF	9.6
0.801500	16.06	56.00	39.94	9.000	N	OFF	9.6
0.815000	16.34	56.00	39.66	9.000	N	OFF	9.6
0.837500	14.99	56.00	41.01	9.000	N	OFF	9.6
2.257250	10.31	56.00	45.69	9.000	N	OFF	9.7
2.932250	16.79	56.00	39.21	9.000	N	OFF	9.8
3.373250	16.20	56.00	39.80	9.000	N	OFF	9.8
3.386750	17.22	56.00	38.78	9.000	N	OFF	9.8
3.400250	17.79	56.00	38.21	9.000	N	OFF	9.8
3.859250	16.88	56.00	39.12	9.000	N	OFF	9.8
7.522250	21.61	60.00	38.40	9.000	N	OFF	10.0
8.057750	21.88	60.00	38.12	9.000	N	OFF	10.0
8.093750	21.52	60.00	38.48	9.000	N	OFF	10.0
8.111750	22.42	60.00	37.58	9.000	N	OFF	10.0
8.116250	22.52	60.00	37.48	9.000	N	OFF	10.0
8.503250	22.07	60.00	37.93	9.000	N	OFF	10.0

Final_Result_CAV

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Test

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Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.500000	4.06	46.00	41.94	9.000	N	OFF	9.6
0.540500	6.77	46.00	39.23	9.000	N	OFF	9.6
0.675500	4.14	46.00	41.86	9.000	N	OFF	9.6
0.797000	3.66	46.00	42.34	9.000	N	OFF	9.6
0.803750	3.71	46.00	42.29	9.000	N	OFF	9.6
0.821750	3.91	46.00	42.10	9.000	N	OFF	9.6
2.255000	4.92	46.00	41.08	9.000	N	OFF	9.7
2.259500	5.50	46.00	40.50	9.000	N	OFF	9.7
2.936750	5.43	46.00	40.57	9.000	N	OFF	9.8
3.371000	5.57	46.00	40.43	9.000	N	OFF	9.8
3.852500	6.04	46.00	39.96	9.000	N	OFF	9.8
3.859250	5.97	46.00	40.03	9.000	N	OFF	9.8
7.524500	11.53	50.00	38.47	9.000	N	OFF	10.0
8.053250	12.64	50.00	37.36	9.000	N	OFF	10.0
8.118500	9.52	50.00	40.48	9.000	N	OFF	10.0
8.496500	8.05	50.00	41.96	9.000	N	OFF	10.0
8.613500	8.30	50.00	41.70	9.000	N	OFF	10.0
18.432500	22.91	50.00	27.09	9.000	N	OFF	10.5

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Conducted Emissions (Line 2)

Test

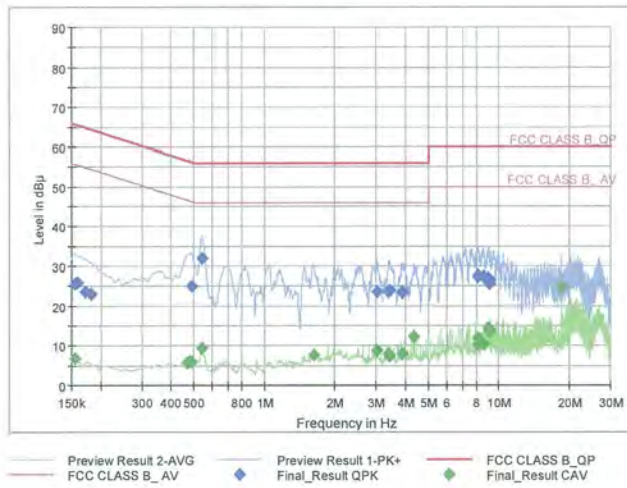
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Test Report

Common Information

EUT :	VC-T8
Manufacturer :	VOICE CADDIE
Test Site:	SHIELD ROOM
Operating Conditions :	BTLE MODE_L1
Operator Name:	
Comment:	

Full Spectrum



Final Result QPK

Frequency (MHz)	QuasiPeak	Limit (dEμV)	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.154500	25.68	65.75	40.07	9.000	L1	OFF	9.6
0.159000	26.02	65.52	39.50	9.000	L1	OFF	9.6
0.172500	23.77	64.84	41.07	9.000	L1	OFF	9.6
0.181500	23.16	64.42	41.26	9.000	L1	OFF	9.6
0.487500	25.16	56.21	31.05	9.000	L1	OFF	9.6
0.542750	32.13	56.00	23.87	9.000	L1	OFF	9.6
3.035750	23.57	56.00	32.43	9.000	L1	OFF	9.8
3.389000	23.58	56.00	32.42	9.000	L1	OFF	9.8
3.411500	23.89	56.00	32.11	9.000	L1	OFF	9.8
3.859250	23.44	56.00	32.56	9.000	L1	OFF	9.8
3.866000	23.60	56.00	32.40	9.000	L1	OFF	9.8
3.870500	23.67	56.00	32.33	9.000	L1	OFF	9.8
8.118500	27.74	60.00	32.26	9.000	L1	OFF	10.0
8.136500	27.48	60.00	32.52	9.000	L1	OFF	10.0
8.627000	27.34	60.00	32.66	9.000	L1	OFF	10.0
8.975750	27.24	60.00	32.76	9.000	L1	OFF	10.0
9.083750	26.58	60.00	33.42	9.000	L1	OFF	10.0
9.117500	25.60	60.00	34.40	9.000	L1	OFF	10.0

Final Result CAV

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Test

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Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154500	6.86	55.75	48.89	9.000	L1	OFF	9.6
0.467250	5.81	46.56	40.75	9.000	L1	OFF	9.6
0.476250	5.98	46.40	40.42	9.000	L1	OFF	9.6
0.489750	6.09	46.17	40.08	9.000	L1	OFF	9.6
0.542750	9.56	46.00	36.44	9.000	L1	OFF	9.6
1.620500	7.75	46.00	38.25	9.000	L1	OFF	9.7
3.038000	9.03	46.00	36.97	9.000	L1	OFF	9.8
3.398000	8.02	46.00	37.98	9.000	L1	OFF	9.8
3.422750	7.61	46.00	38.39	9.000	L1	OFF	9.8
3.861500	8.05	46.00	37.95	9.000	L1	OFF	9.8
4.356500	12.40	46.00	33.60	9.000	L1	OFF	9.8
8.136500	10.35	50.00	39.65	9.000	L1	OFF	10.0
8.159000	12.21	50.00	37.79	9.000	L1	OFF	10.0
8.631500	10.66	50.00	39.34	9.000	L1	OFF	10.0
8.978000	14.30	50.00	35.70	9.000	L1	OFF	10.0
9.079250	14.00	50.00	36.00	9.000	L1	OFF	10.0
9.119750	13.52	50.00	36.48	9.000	L1	OFF	10.0
18.432500	24.92	50.00	25.08	9.000	L1	OFF	10.3

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10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESR / EMI Test Receiver	09/16/2020	Annual	101910
ESPEC	SU-642 / Temperature Chamber	07/30/2020	Annual	0093000718
Agilent	N9030A / Signal Analyzer	03/23/2020	Annual	MY49432108
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Agilent	N1921A / Power Sensor	06/08/2020	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/10/2020	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	02/14/2020	Annual	10545
HP	E3632A / DC Power Supply	09/16/2020	Annual	MY40004427
HP	8493C / Attenuator(10 dB)(DC-26.5 GHz)	06/26/2020	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A
Rohde & Schwarz	CBT / Bluetooth Tester	03/02/2020	Annual	100808

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.

Radiated Test

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
Audix	Turn Table	N/A	N/A	N/A
TNM system	FBSM-01B / Amp & Filter Bank Switch Controller	N/A	N/A	N/A
Schwarzbeck	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/29/2019	Biennial	BBHA9170342
Rohde & Schwarz	FSP(10 Hz ~ 40 GHz) / Spectrum Analyzer	05/13/2020	Annual	101055
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/21/2020	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/10/2020	Annual	1
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	03/18/2020	Annual	3000C000276
TNM system	FBSM-05B / HPF(3~18GHz) + LNA1(1~18GHz)	01/21/2020	Annual	F6
TNM system	FBSM-05B / ATT(10dB) + LNA1(1~18GHz)	01/21/2020	Annual	None
TNM system	FBSM-05B / ATT(3dB) + LNA1(1~18GHz)	01/21/2020	Annual	None
TNM system	FBSM-05B / LNA1(1~18GHz)	01/21/2020	Annual	25540
TNM system	FBSM-05B / HPF(7~18GHz) + LNA2(6~18GHz)	01/21/2020	Annual	28550
TNM system	FBSM-05B / Thru(30MHz ~ 18GHz)	01/21/2020	Annual	None
Weinschel	2-3 / Attenuator (3 dB)	10/07/2020	Annual	BR0617
H+S	5910-N-50-010 / Attenuator(10 dB)	10/28/2020	Annual	None
Rohde & Schwarz	ESCI / Test Receiver	06/10/2020	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.

3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017)..

11. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2101-FC067-P