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FCC BT LE REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
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Date of Issue:
June 14, 2021

Test Site/Location:
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2106-FC023

FCC ID:	**A3LSMG990B**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model:	SM-G990B/DS
Additional Model:	SM-G990B
EUT Type:	Mobile Phone
Average Output Power:	7.92 dBm (6.19 mW)
Frequency Range:	2 402 MHz ~ 2 480 MHz
Modulation type	GFSK
FCC Classification:	Digital Transmission System(DTS)
FCC Rule Part(s):	Part 15.247

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.

REVIEWED BY

Report prepared by : Woong Jin Kim
Engineer of Telecommunication Testing Center

Report approved by : Kwon Jeong
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2106-FC023	June 14, 2021	- First Approval Report

Table of Contents

1. EUT DESCRIPTION

Model	SM-G990B/DS	
Additional Model	SM-G990B	
EUT Type	Mobile Phone	
Power Supply	DC 4.20 V	
Frequency Range	2 402 MHz ~ 2 480 MHz	
Max. RF Output Power	Peak (For information only)	125k Bit/s : 8.375 dBm (6.88 mW) 500k Bit/s :8.280 dBm (6.73 mW) 1M Bit/s : 8.778 dBm (7.55 mW) 2M Bit/s : 8.701 dBm (7.41 mW)
	Average	125k Bit/s : 7.79 dBm (6.01 mW) 500k Bit/s :7.86 dBm (6.11 mW) 1M Bit/s : 7.92 dBm (6.19 mW) 2M Bit/s : 7.90 dBm (6.17 mW)
Modulation Type	GFSK	
Bluetooth Version	5.0	
Number of Channels	40 Channels	
Date(s) of Tests	April 24, 2021~ June 10, 2021	
Serial number	Radiated: 544a5f8570207ece Conducted: 524d0f145f1e7ece	

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.

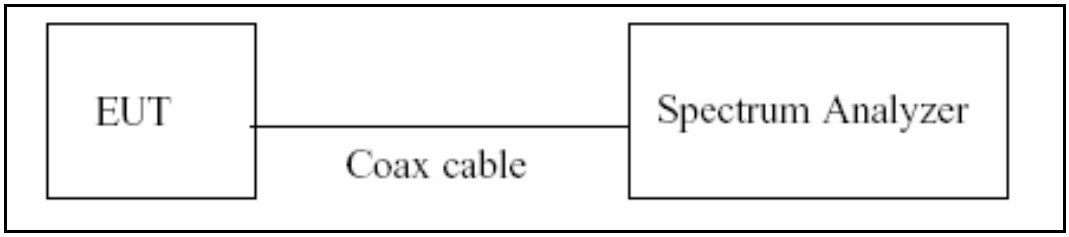
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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 ≤ 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*.

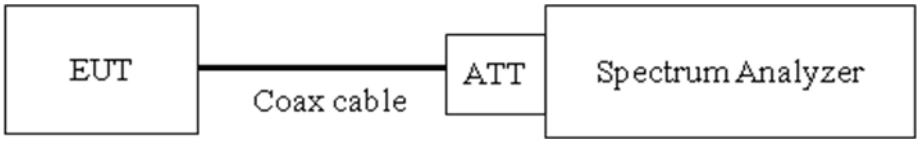
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

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 ≥ 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.

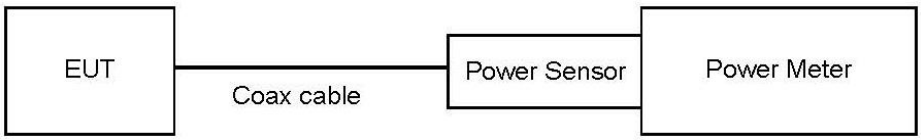
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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

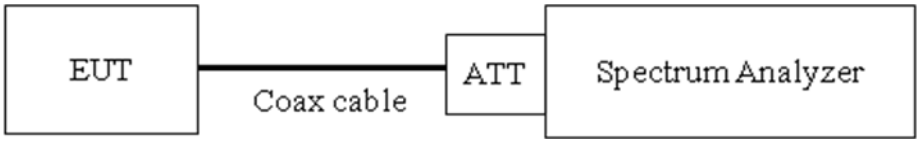
▪ Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8 dBm 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 kHz ≤ RBW ≤ 100 kHz.
4) VBW ≥ 3 x RBW.
5) Sweep = auto couple
6) Detector = power averaging (rms) or sample detector (when rms not available).
7) Ensure that the number of measurement points in the sweep ≥ [2 ×span / RBW].
8) Employ trace averaging (rms) mode over a minimum of 100 traces
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.
11) if then duty factor shall be added to adjust the result if the duty cycle is less than 98%

Sample Calculation

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

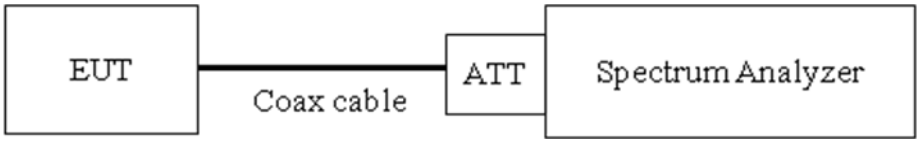
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (average) 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 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

[Conducted > 30 dBc]

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 ≥ 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 ≥ 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	10.04
100	10.07
200	10.12
300	10.17
400	10.20
500	10.21
600	10.21
700	10.23
800	10.24
900	10.26
1000	10.27
2000	10.41
2400	10.45
2500	10.47
3000	10.52
4000	10.60
5000	10.71
6000	10.73
7000	10.80
8000	10.85
9000	10.91
10000	10.97
11000	11.02
12000	11.10
13000	11.19
14000	11.16
15000	11.21
16000	11.22
17000	11.25
18000	11.30
19000	11.32
20000	11.36
21000	11.48
22000	11.55
23000	11.55
24000	11.59
25000	11.68
26000	11.69

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

2. Factor = Attenuator loss(10 dB) + Cable loss(1ea)

3. EUT Cable loss = 0.35 dB

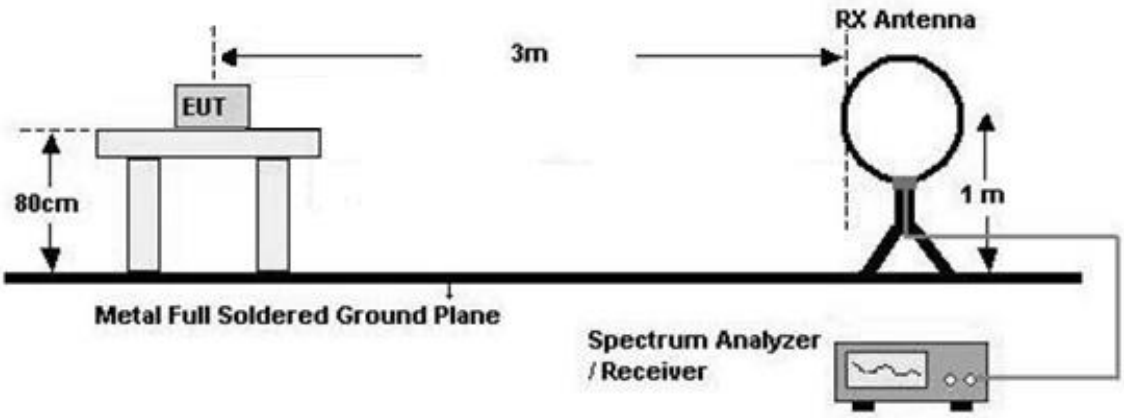
7.6. Radiated Test

Limit

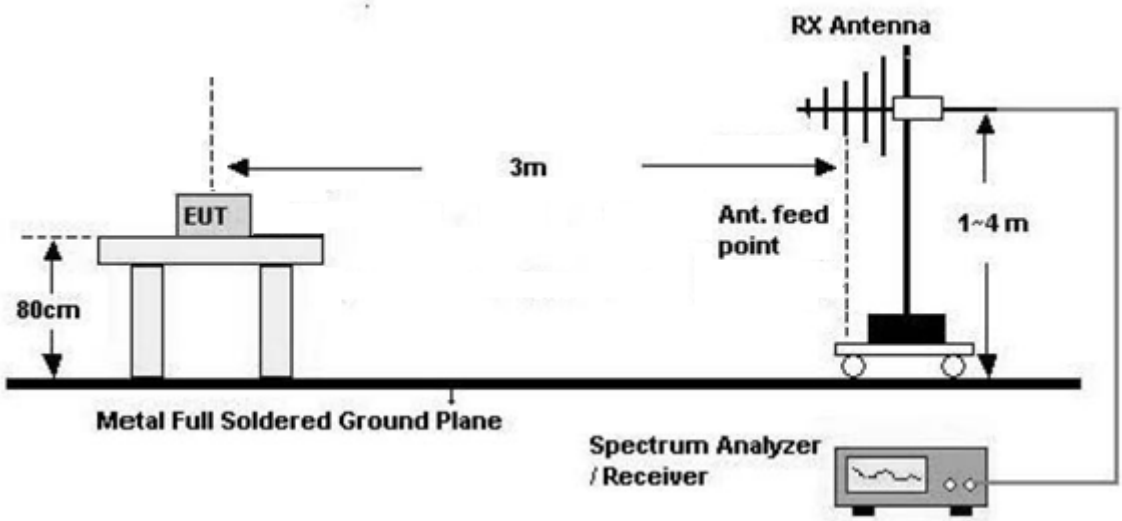
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

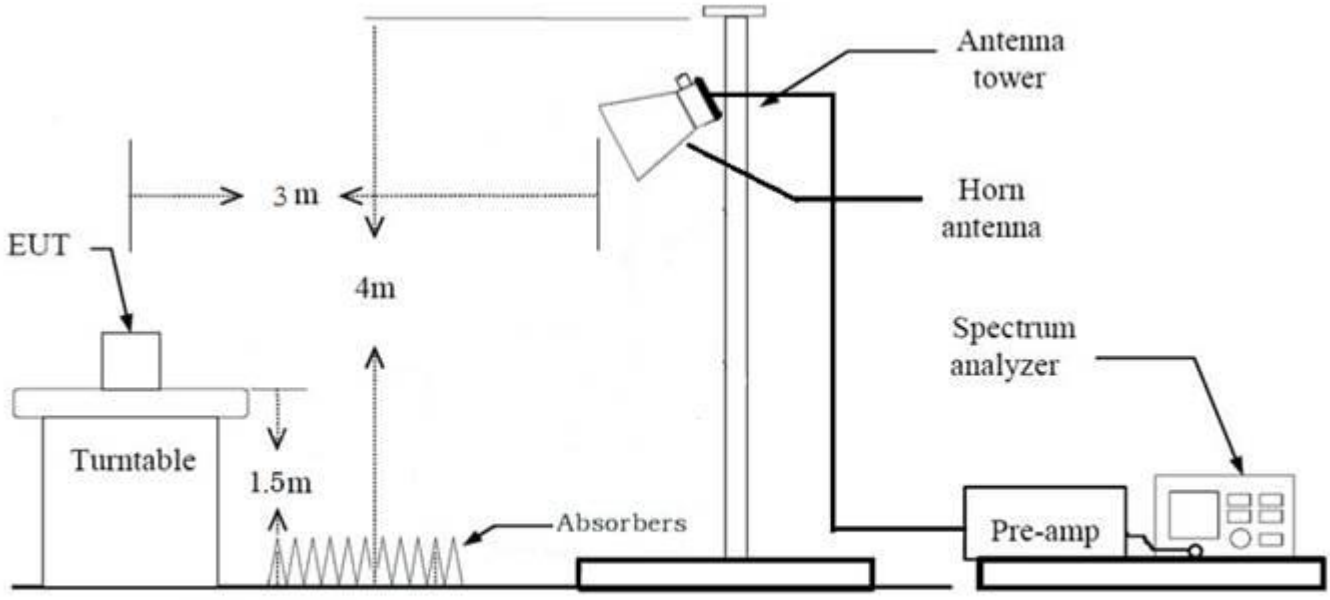
Below 30 MHz



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) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3 x 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 ≥ 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 ≥ 3 x RBW
   (2) Measurement Type(Average):
      - Duty cycle < 98%, duty cycle variations are less than ±2%
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = RMS
      - Averaging type = power (*i.e.*, RMS)
      - RBW = 1 MHz
      - VBW ≥ 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 = 20log (test distance / specific distance) (dB)
11. Total (Measurement Type : Peak)
    = Peak Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

Total (Measurement Type : Average)

= Average Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.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 ≥ 3 x RBW

   (2) Measurement Type(Average):
   - Duty cycle < 98%, duty cycle variations are less than ±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 ≥ 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 = 20log (test distance / 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 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	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 + External accessories(Earphone, etc)
   - Worstcase : Stand alone
2. EUT Axis:
   - Radiated Spurious Emissions : X
   - Radiated Restricted Band Edge : X, Z
3. All packet length of operation were investigated and the test results are worst case in lowest packet length.
   - Worst case : 37 Byte
4. All datarate of operation were investigated and the worst case configuration results are reported.
   - Worst case : 1M, 2M
5. 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
6. SM-G990B/DS, SM-G990B were tested and the worst case results are reported.
   (Worst case : SM-G990B/DS)

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + External accessories(Earphone, etc)+Travel Adapter, Stand alone + Travel Adapter
   - Worstcase : Stand alone + Travel Adapter
2. SM-G990B/DS, SM-G990B were tested and the worst case results are reported.
   (Worst case : SM-G990B/DS)

Conducted test

1. The EUT was configured with packet length of highest power.
   - Worst case : 37 Byte
2. SM-G990B/DS, SM-G990B were tested and the worst case results are reported.
   (Worst case : SM-G990B/DS)

8. SUMMARY TEST OF RESULTS

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

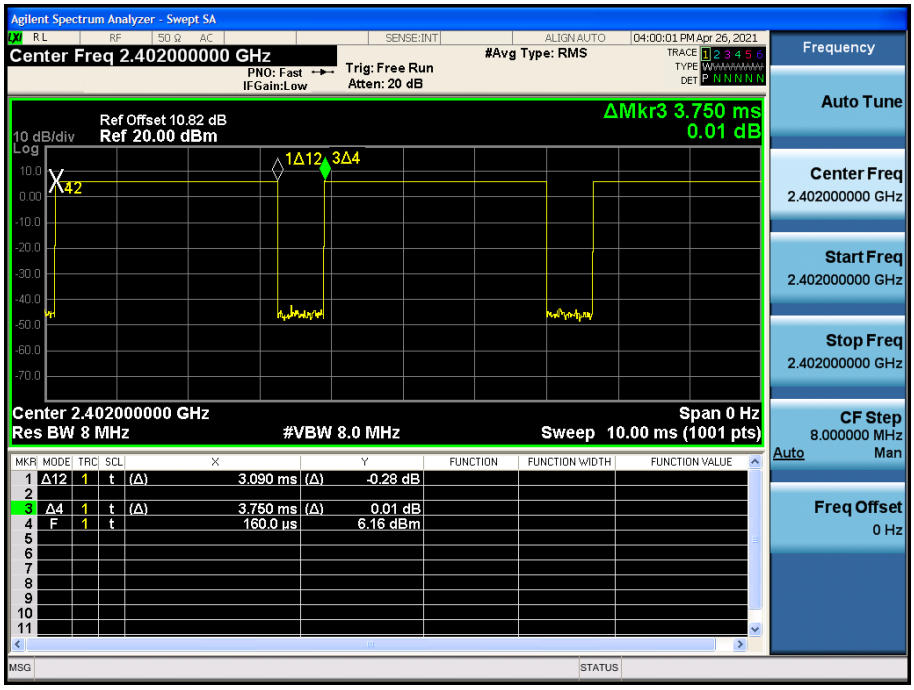
9. TEST RESULT

9.1 DUTY CYCLE

Data rate (Bit/s)	Packet length (Byte)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
125k	37	3.090	3.750	0.824	0.84
	255	17.067	17.500	0.975	0.11
500k	37	1.060	1.876	0.565	2.48
	255	4.550	5.000	0.910	0.41
1M	37	0.379	0.626	0.605	2.18
	255	2.120	2.500	0.848	0.72
2M	37	0.194	0.625	0.310	5.09
	255	1.064	1.872	0.568	2.45

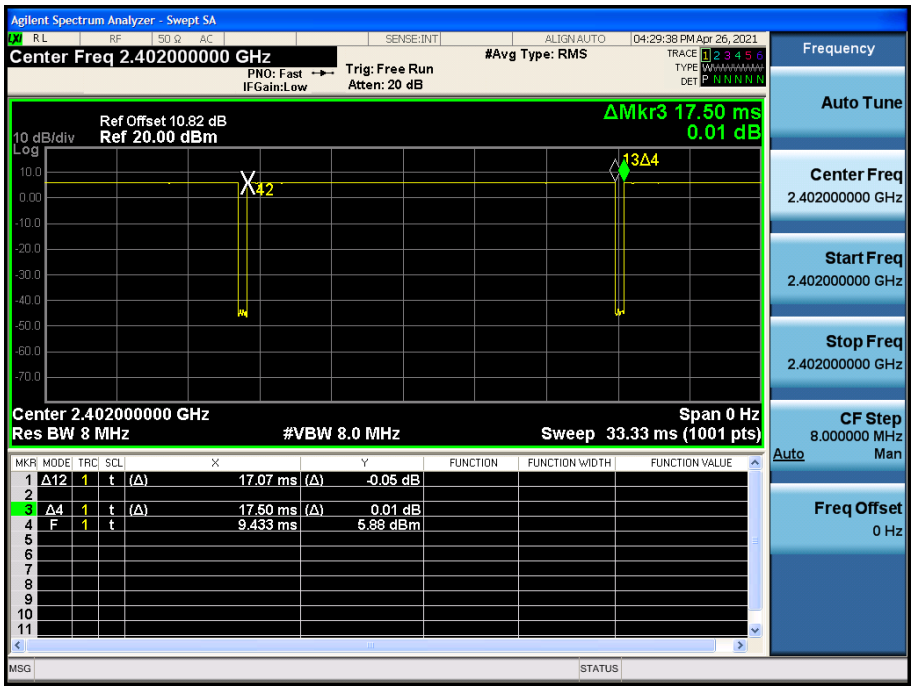
▣ 125k Bit/s(37 Byte) Test Plots

Duty Cycle (Low-CH 0)



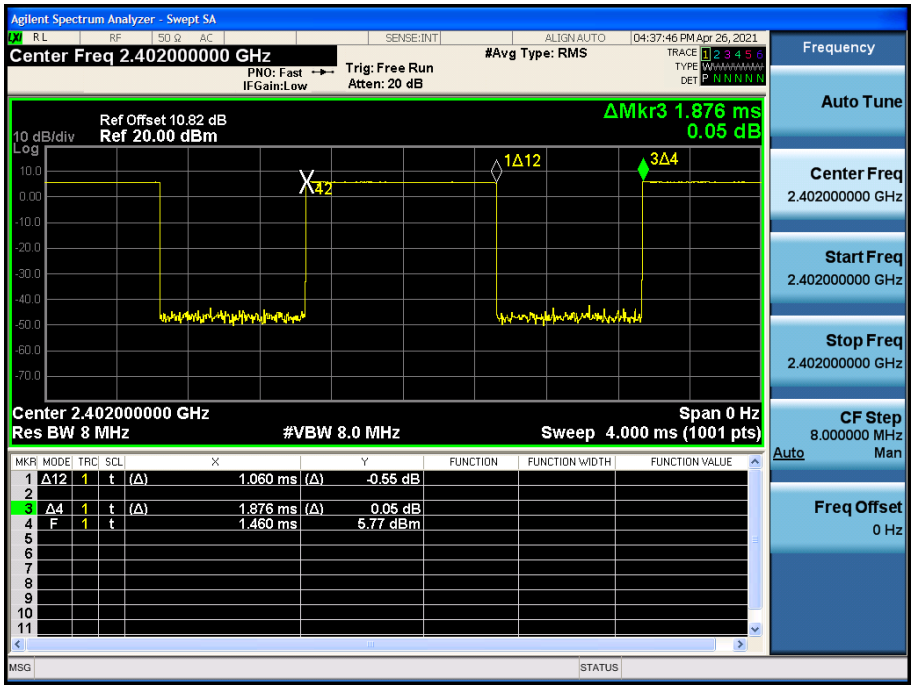
▣ 125k Bit/s(255 Byte) Test Plots

Duty Cycle (Low-CH 0)



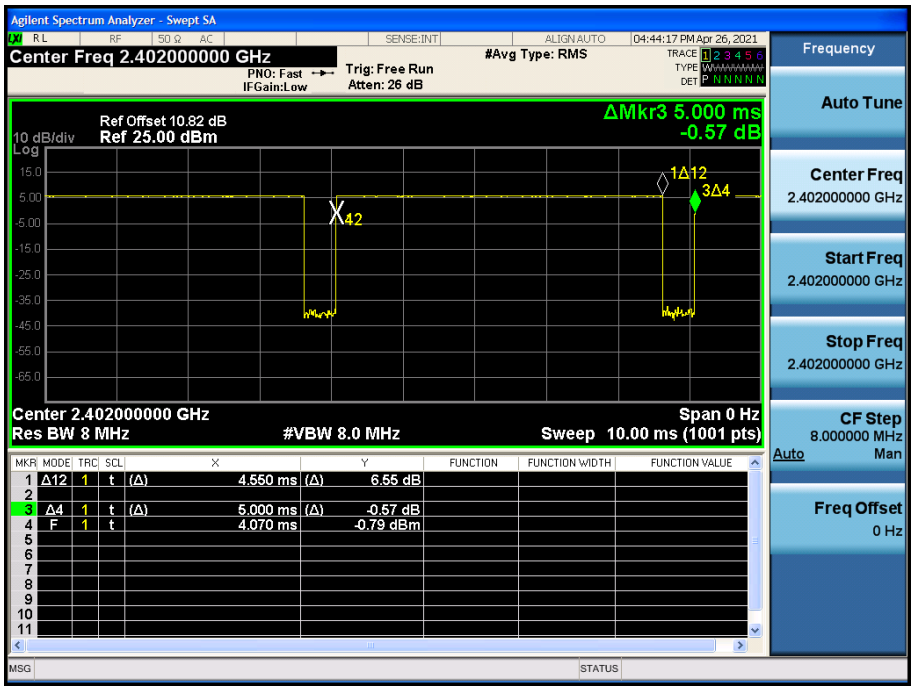
▣ 500k Bit/s(37 Byte) Test Plots

Duty Cycle (Low-CH 0)



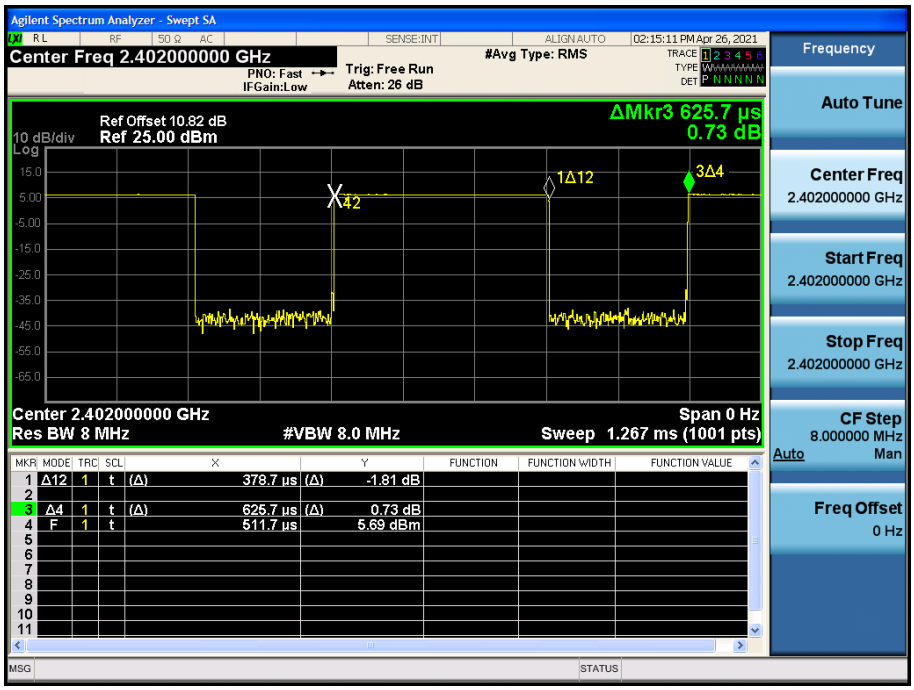
▣ 500k Bit/s(255 Byte) Test Plots

Duty Cycle (Low-CH 0)



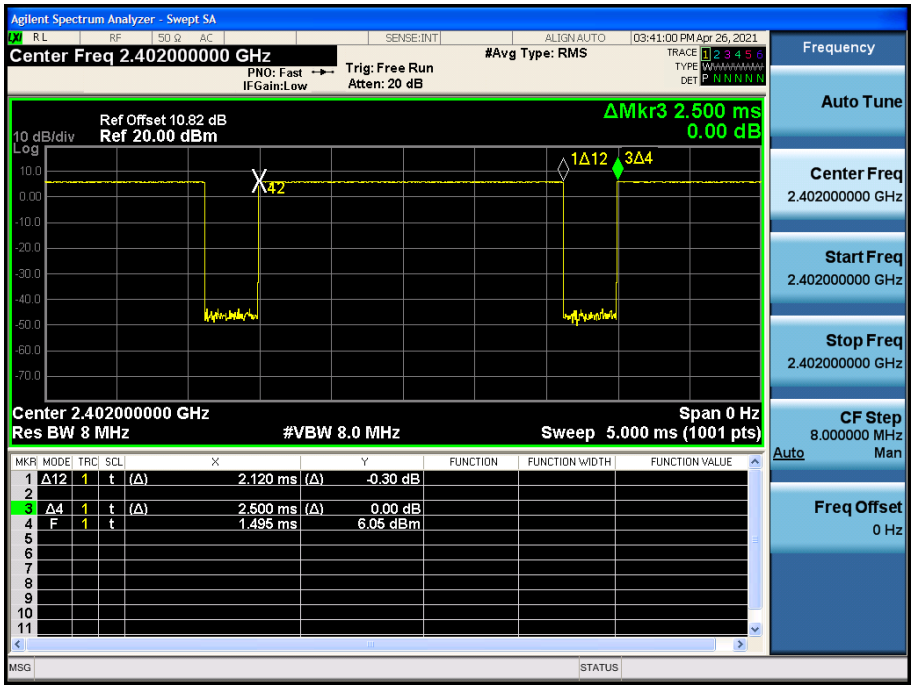
▣ 1M Bit/s (37 Byte) Test Plots

Duty Cycle (Low-CH 0)



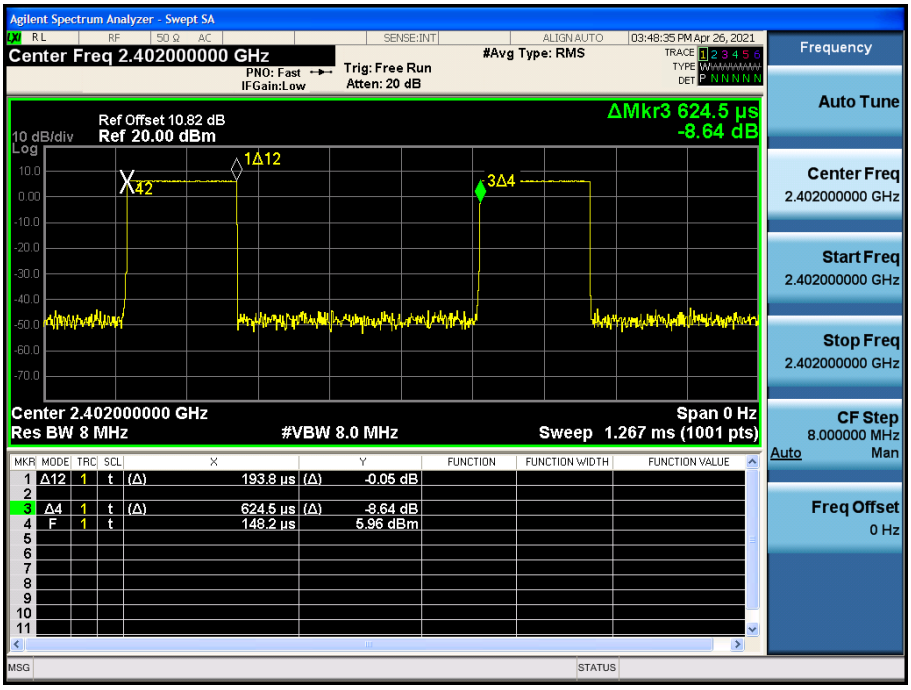
▣ 1M Bit/s (255 Byte) Test Plots

Duty Cycle (Low-CH 0)



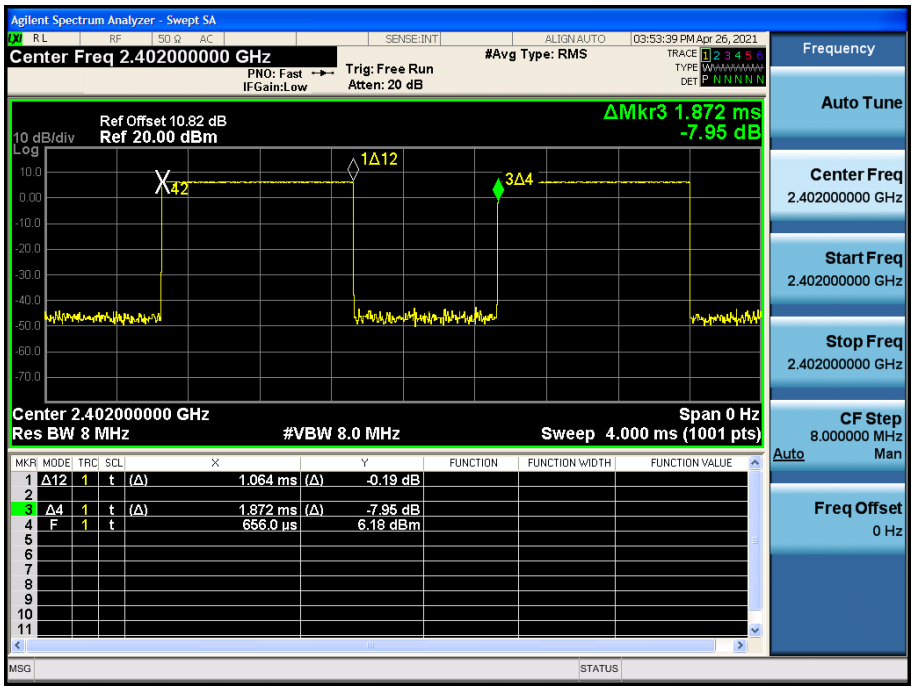
▣ 2M Bit/s (37 Byte) Test Plots

Duty Cycle (Low-CH 0)



▣ 2M Bit/s (255 Byte) Test Plots

Duty Cycle (Low-CH 0)



9.2 6dB BANDWIDTH

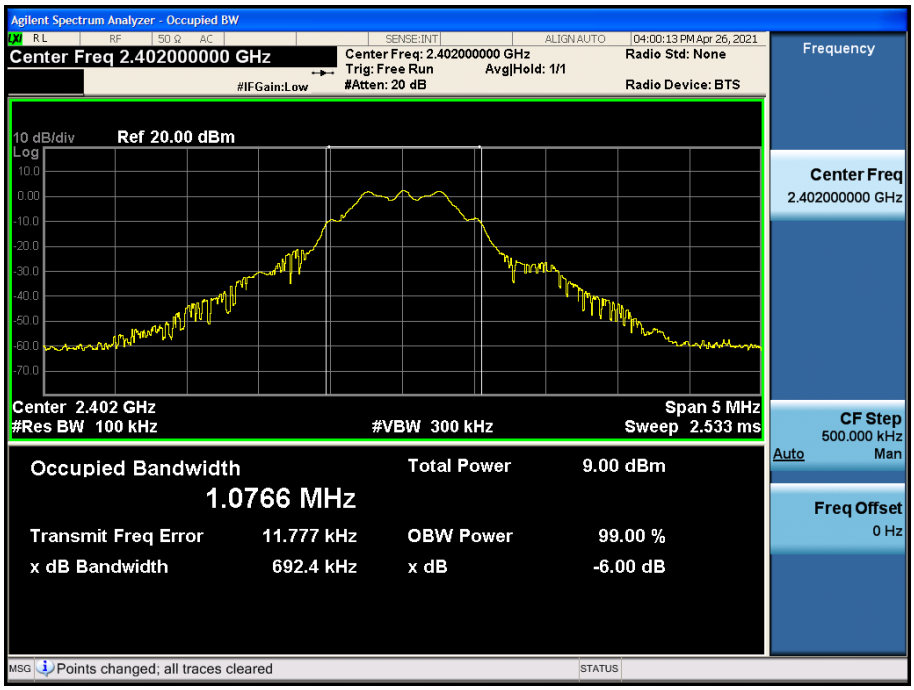
Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
125k(37)	0	692.4	> 500
	19	693.4	
	39	692.7	
125k(255)	0	693.2	> 500
	19	693.9	
	39	695.2	
500k(37)	0	673.8	> 500
	19	663.2	
	39	662.6	
500k(255)	0	671.8	> 500
	19	664.4	
	39	663.1	
1M(37)	0	710.2	> 500
	19	718.6	
	39	717.1	
1M(255)	0	665.7	> 500
	19	668.9	
	39	668.4	
2M(37)	0	1245	> 500
	19	1259	
	39	1255	
2M(255)	0	1185	> 500
	19	1247	
	39	1253	

Note:

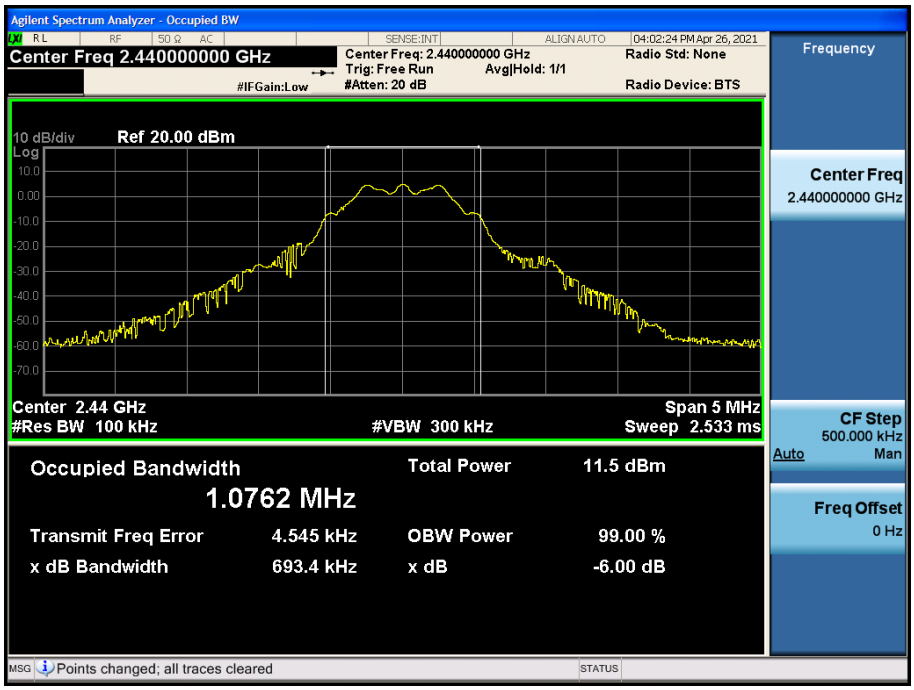
Worst case test Plot Only
125k Bit/s, 500k Bit/s: 37 Byte
1M Bit/s, 2M Bit/s: 255 Byte.

▣ 125k Bit/s(37 Byte) Test Plots

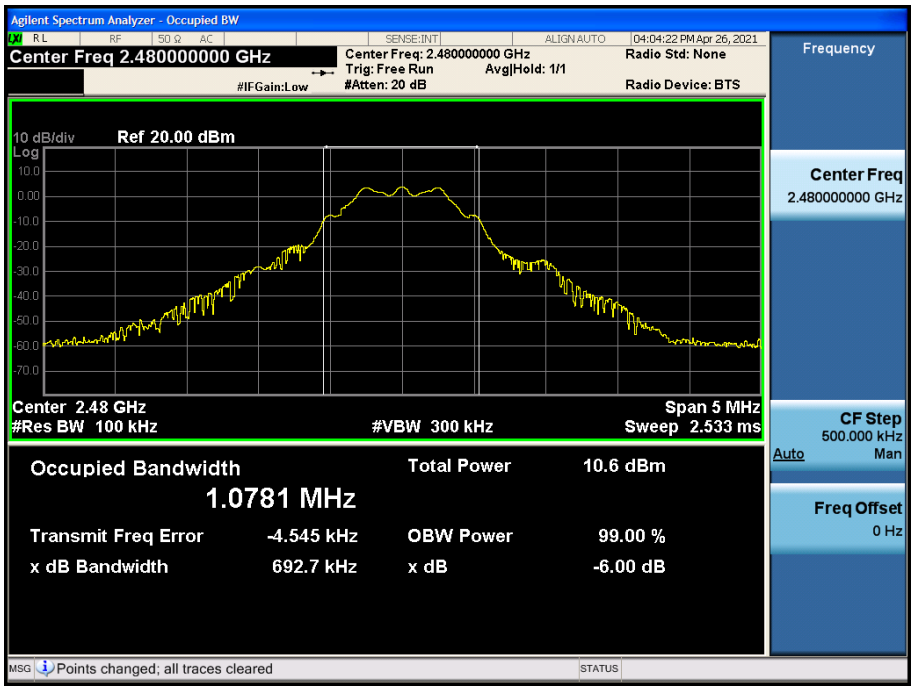
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

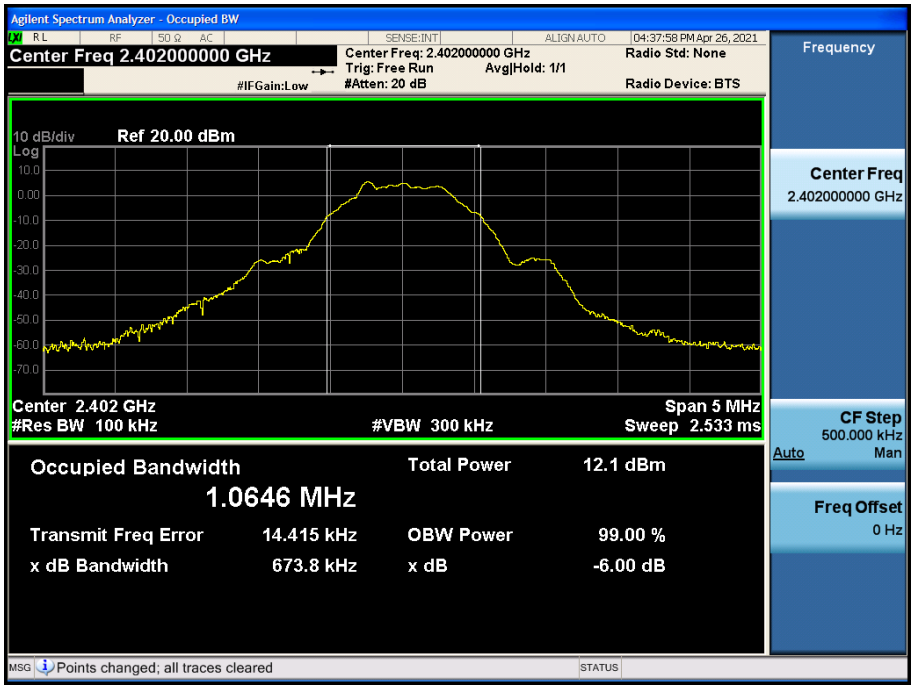


6 dB Bandwidth plot (High-CH 39)

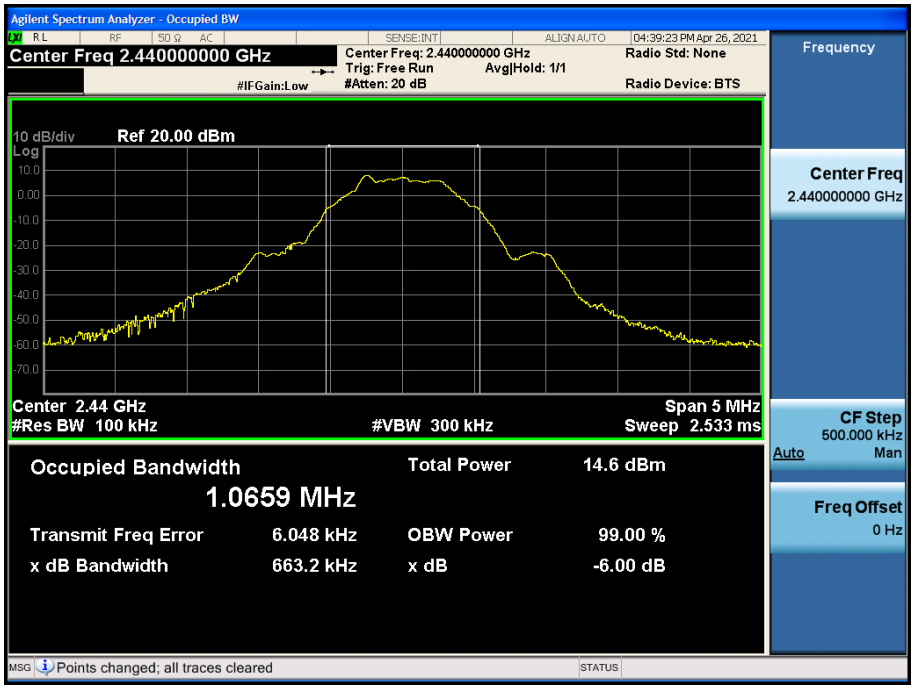


▣ 500k Bit/s(37 Byte) Test Plots

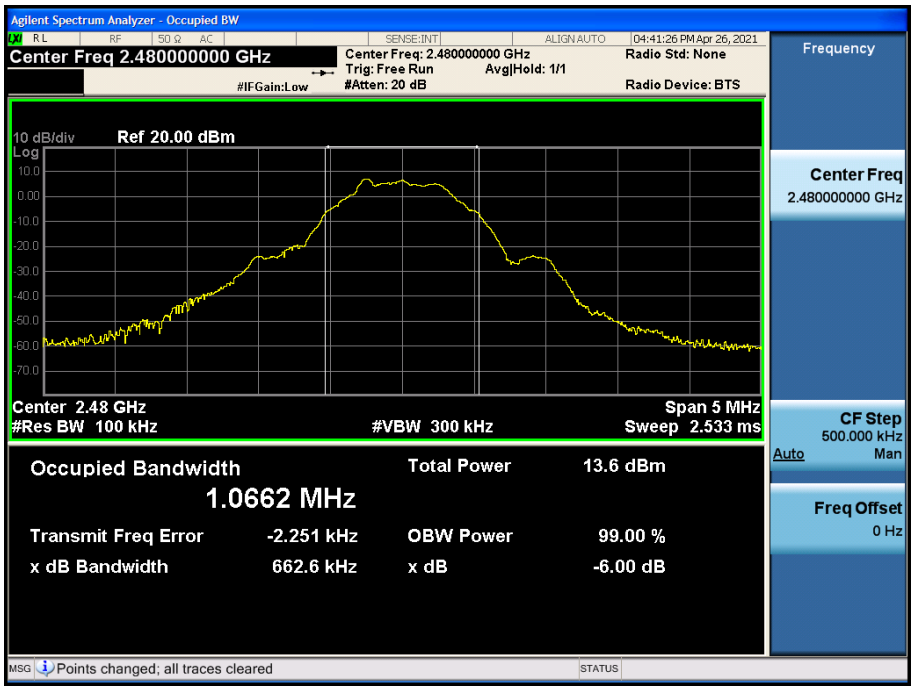
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

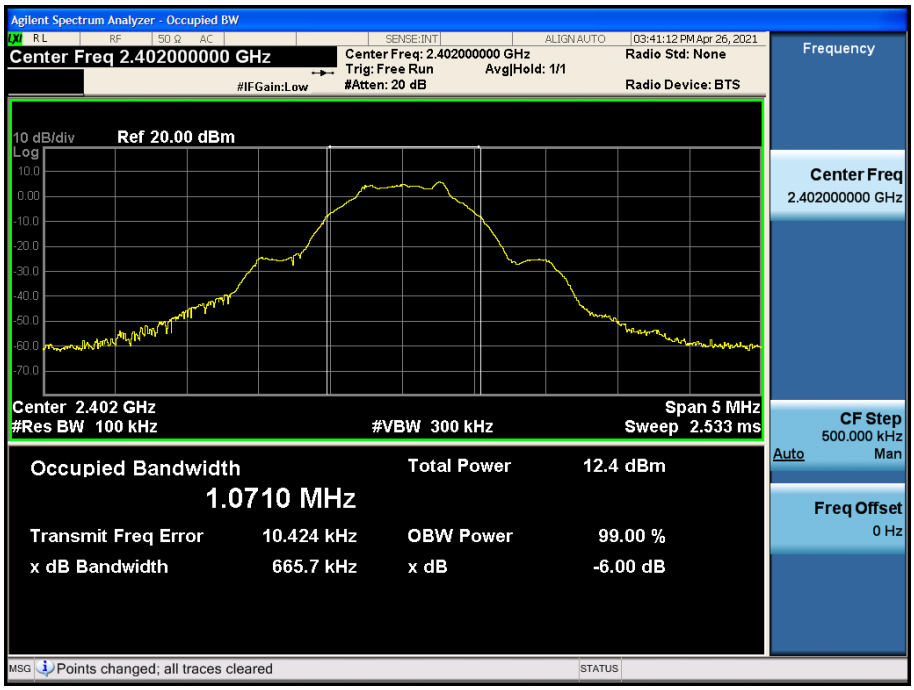


6 dB Bandwidth plot (High-CH 39)

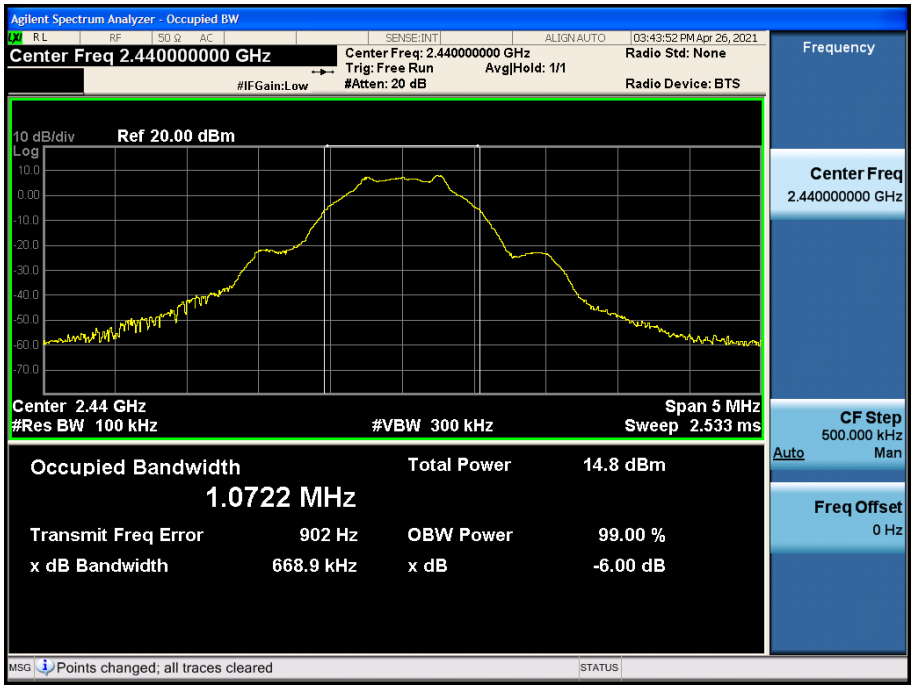


▣ 1M Bit/s (255 Byte) Test Plots

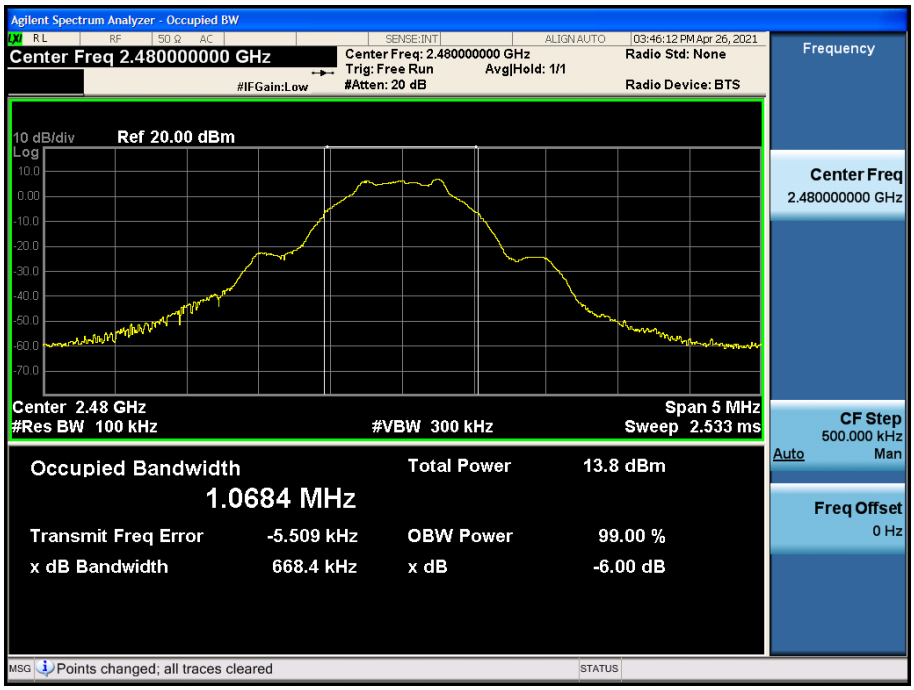
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

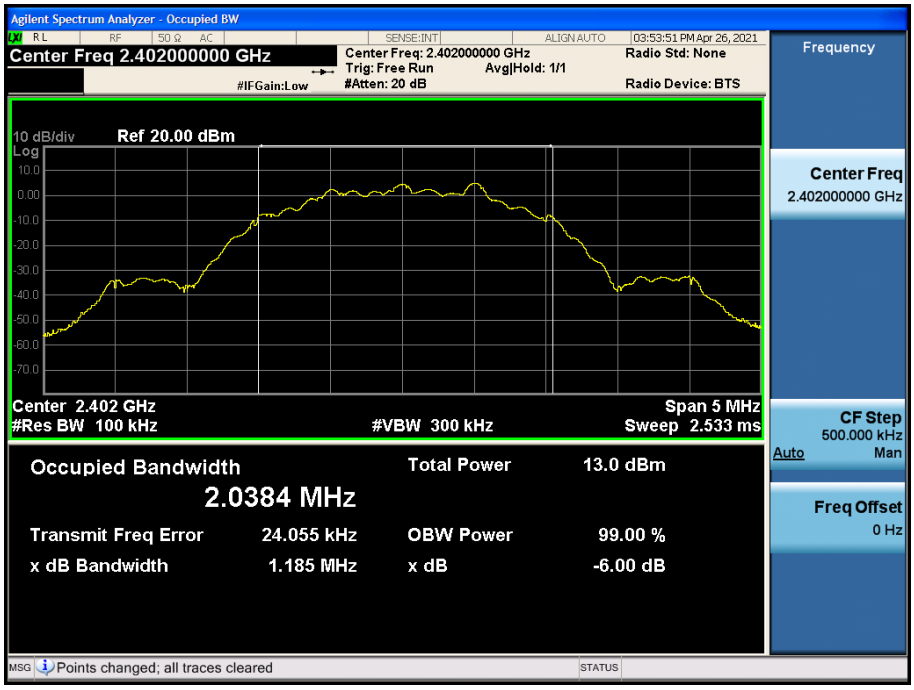


6 dB Bandwidth plot (High-CH 39)

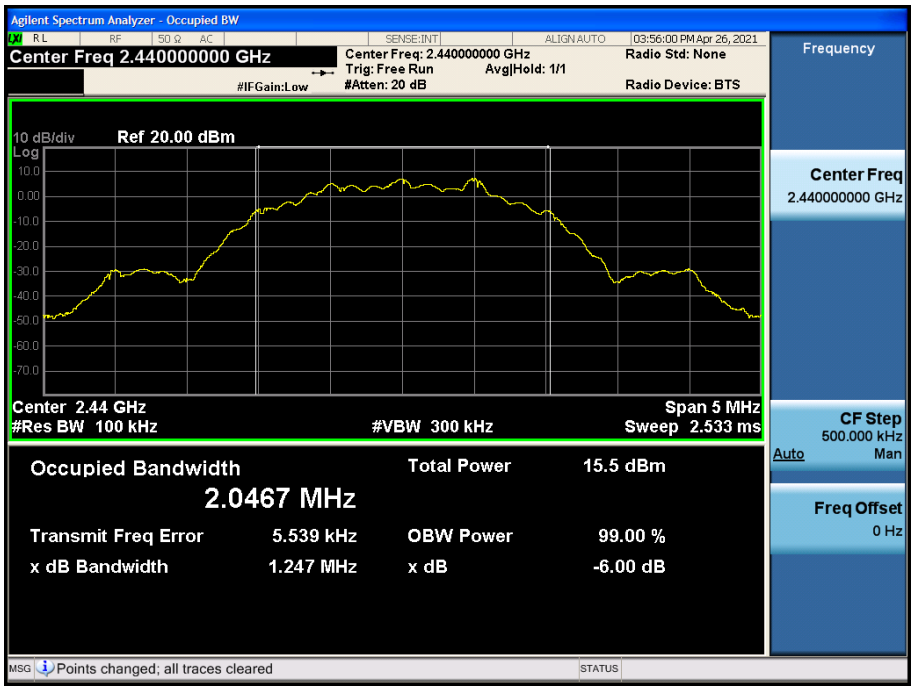


▣ 2M Bit/s (255 Byte) Test Plots

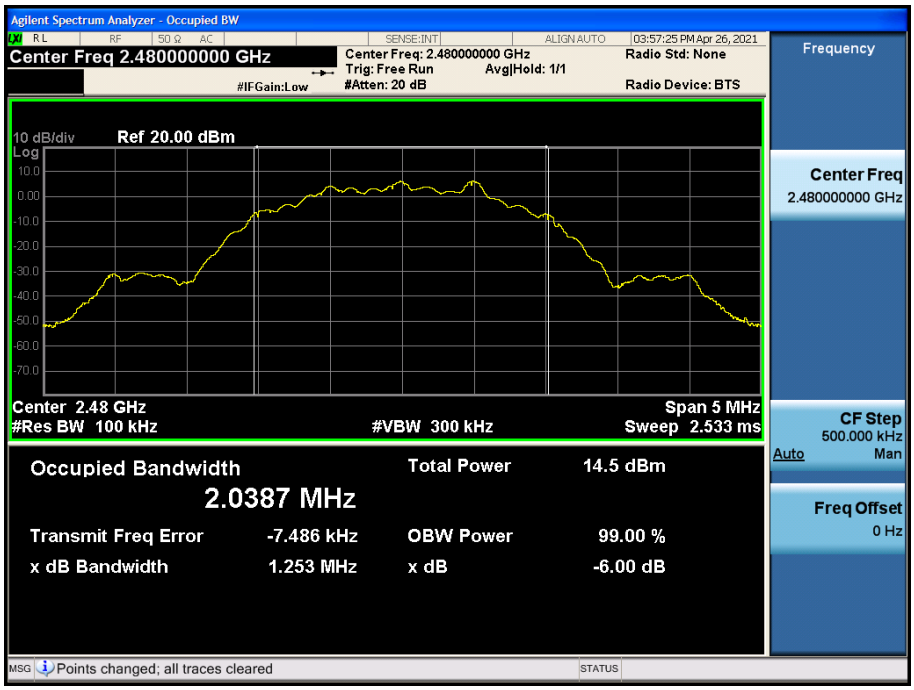
6 dB Bandwidth plot (Low-CH 0)



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		
125k	37	2402	0	6.095	30
		2440	19	8.375	
		2480	39	7.457	
	255	2402	0	5.994	
		2440	19	8.305	
		2480	39	7.238	
500k	37	2402	0	5.917	
		2440	19	8.275	
		2480	39	7.416	
	255	2402	0	5.886	
		2440	19	8.280	
		2480	39	7.442	
1M	37	2402	0	6.441	
		2440	19	8.778	
		2480	39	7.946	
	255	2402	0	5.959	
		2440	19	8.309	
		2480	39	7.332	
2M	37	2402	0	6.365	
		2440	19	8.701	
		2480	39	7.799	
	255	2402	0	6.311	
		2440	19	8.635	
		2480	39	7.788	

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, 10.82 dB is offset for 2.4 GHz Band.

Average Power

Data rate	Packet length	LE Mode		Measured Power (dBm)	Duty Cycle Factor	Result	Limit (dBm)
(Bit/s)	(Byte)	Frequency [MHz]	Channel		(dB)	(dBm)	
125k	37	2402	0	4.91	0.84	5.75	30
		2440	19	6.95	0.84	7.79	
		2480	39	6.03	0.84	6.87	
	255	2402	0	5.47	0.11	5.58	
		2440	19	7.63	0.11	7.74	
		2480	39	6.45	0.11	6.56	
500k	37	2402	0	3.20	2.48	5.68	
		2440	19	5.38	2.48	7.86	
		2480	39	4.28	2.48	6.76	
	255	2402	0	5.35	0.41	5.76	
		2440	19	7.39	0.41	7.80	
		2480	39	6.26	0.41	6.67	
1M	37	2402	0	3.45	2.18	5.63	
		2440	19	5.74	2.18	7.92	
		2480	39	4.84	2.18	7.02	
	255	2402	0	4.86	0.72	5.58	
		2440	19	7.01	0.72	7.73	
		2480	39	5.99	0.72	6.71	
2M	37	2402	0	0.49	5.09	5.58	
		2440	19	2.81	5.09	7.90	
		2480	39	1.72	5.09	6.81	
	255	2402	0	3.21	2.45	5.66	
		2440	19	5.33	2.45	7.78	
		2480	39	4.30	2.45	6.75	

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, 10.82 dB is offset for 2.4 GHz Band.

9.4 POWER SPECTRAL DENSITY

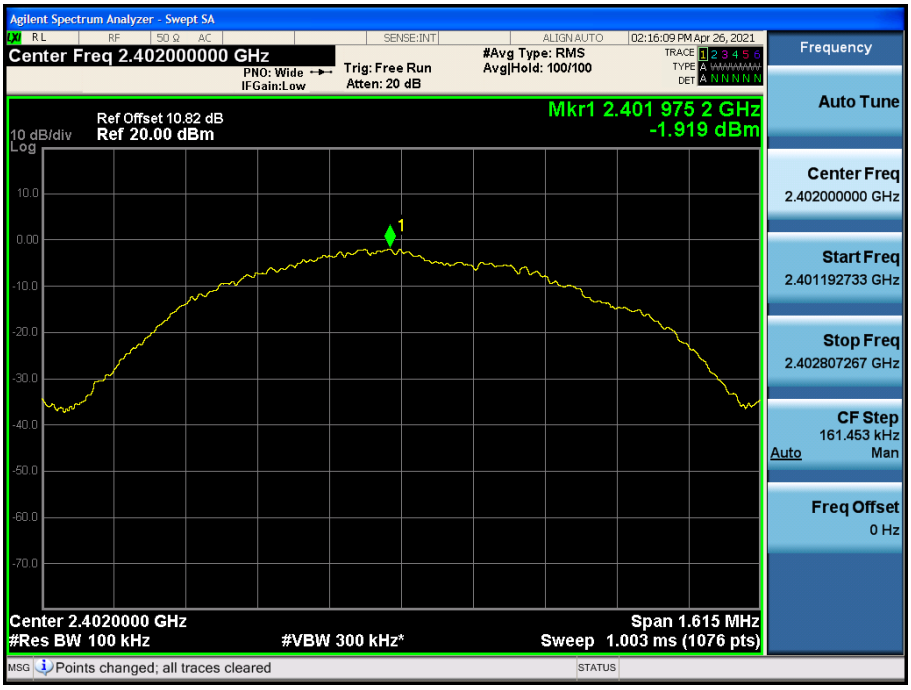
Frequency (MHz)	Channel No.	Mode	Test Result			
			Measured Power(dBm)	Duty Cycle Factor(dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
2402	0	125k Bit/s 37 Byte	-0.800	0.84	0.041	8 dBm / 3 kHz
2440	19		1.561	0.84	2.402	
2480	39		0.578	0.84	1.419	
2402	0	125k Bit/s 255 Byte	-0.243	0.11	-0.134	
2440	19		2.090	0.11	2.199	
2480	39		1.192	0.11	1.301	
2402	0	500k Bit/s 37 Byte	-4.088	2.48	-1.609	
2440	19		-1.419	2.48	1.060	
2480	39		-2.446	2.48	0.033	
2402	0	500k Bit/s 255 Byte	-1.534	0.41	-1.124	
2440	19		1.177	0.41	1.587	
2480	39		-0.311	0.41	0.099	
2402	0	1M Bit/s 37 Byte	-1.919	2.18	0.262	
2440	19		0.444	2.18	2.625	
2480	39		-0.257	2.18	1.924	
2402	0	1M Bit/s 255 Byte	-1.777	0.72	-1.061	
2440	19		0.977	0.72	1.693	
2480	39		-0.236	0.72	0.480	
2402	0	2M Bit/s 37 Byte	-7.423	5.09	-2.338	
2440	19		-5.167	5.09	-0.082	
2480	39		-5.427	5.09	-0.342	
2402	0	2M Bit/s 255 Byte	-6.258	2.45	-3.804	
2440	19		-3.635	2.45	-1.181	
2480	39		-4.676	2.45	-2.222	

Note :

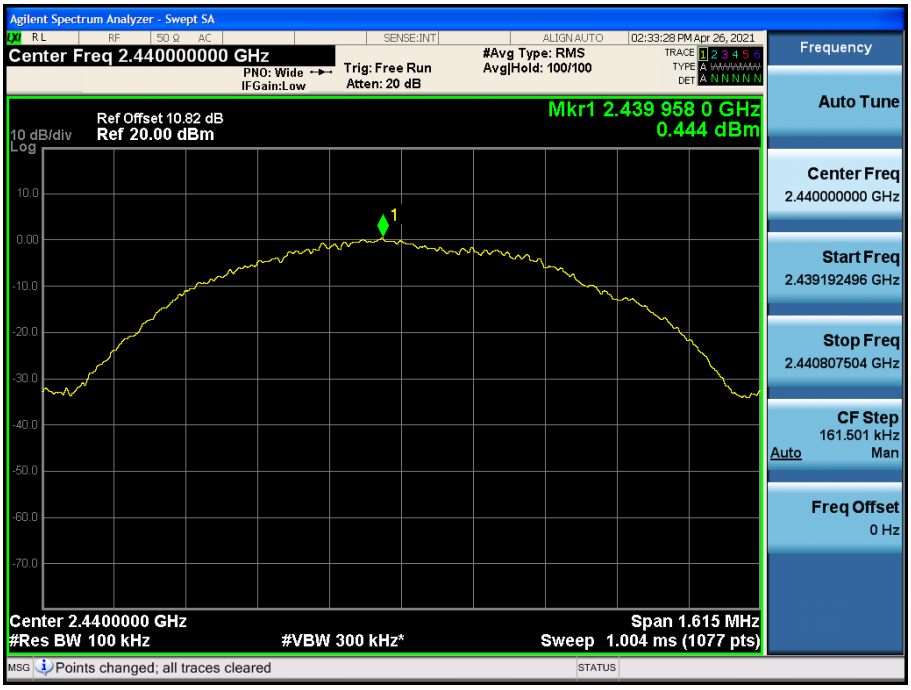
1. Spectrum reading values are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss + EUT cable loss
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.82 dB is offset for 2.4 GHz Band.
4. Worst case test Plot Only : 1M Bit/s (37 Byte)

▣ 1M Bit/s (37 Byte) Test Plots

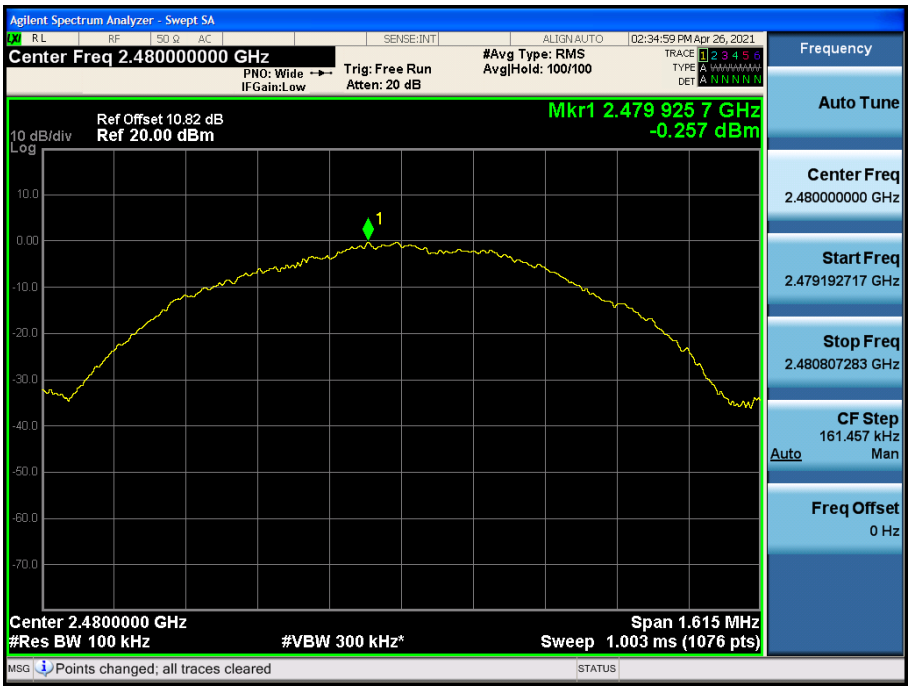
Power Spectral Density (Low-CH 0)



Power Spectral Density (Mid-CH 19)



Power Spectral Density (High-CH 39)

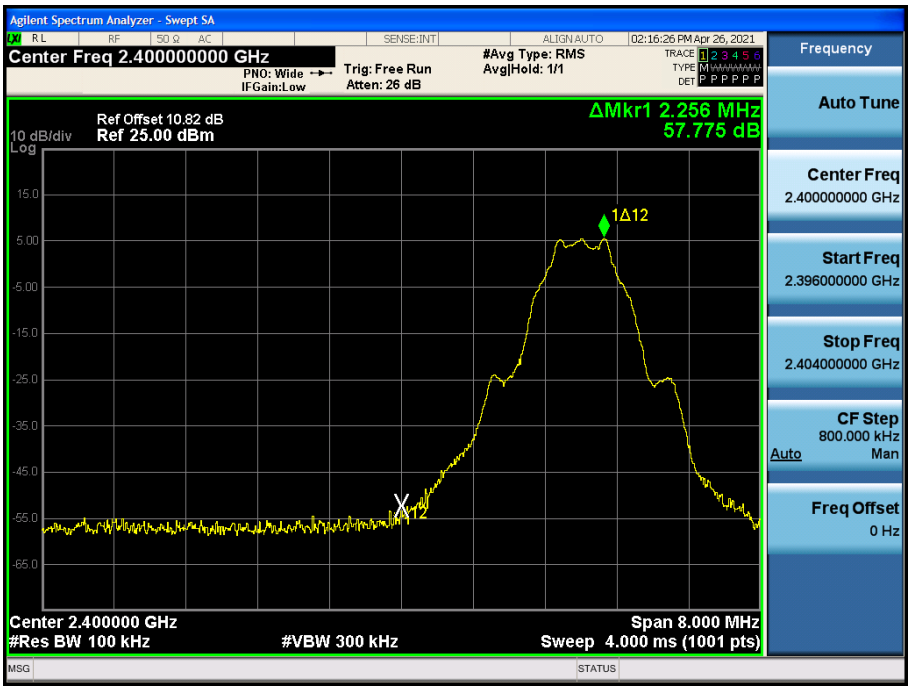


9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

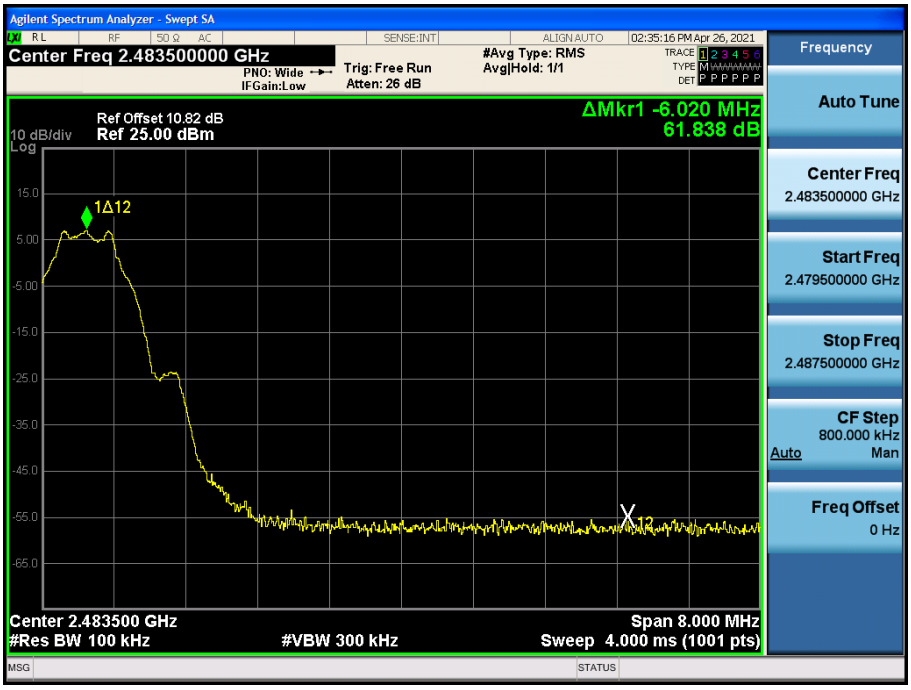
Test Result : please refer to the plot below.
In order to simplify the report, attached plots were only the worst case channel and data rate.

▣ 1M Bit/s (37 Byte) Test Plots –Band Edge

Low-CH 0



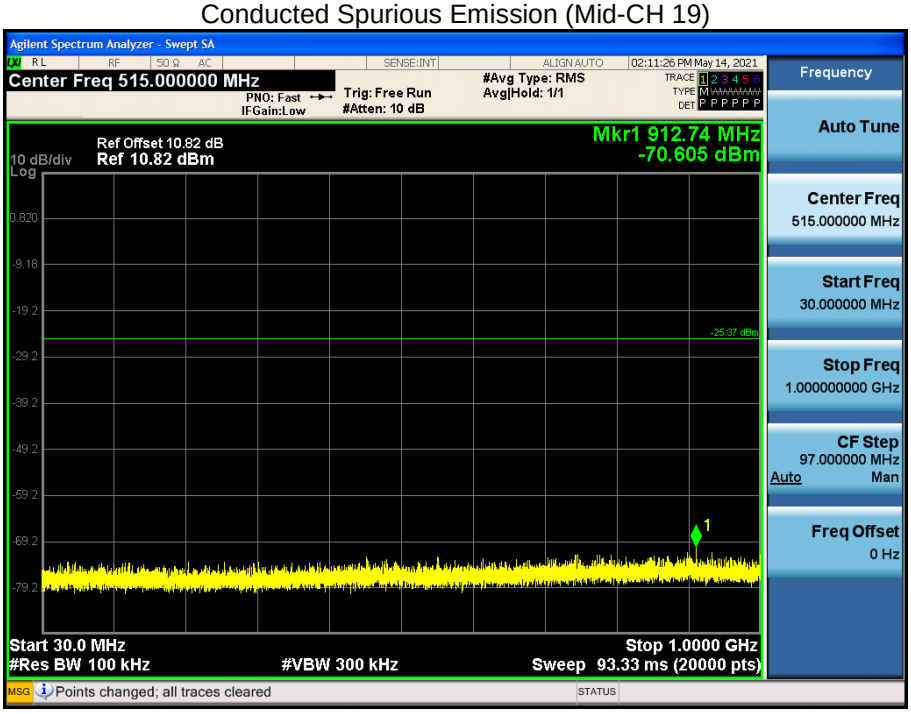
High-CH 39



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

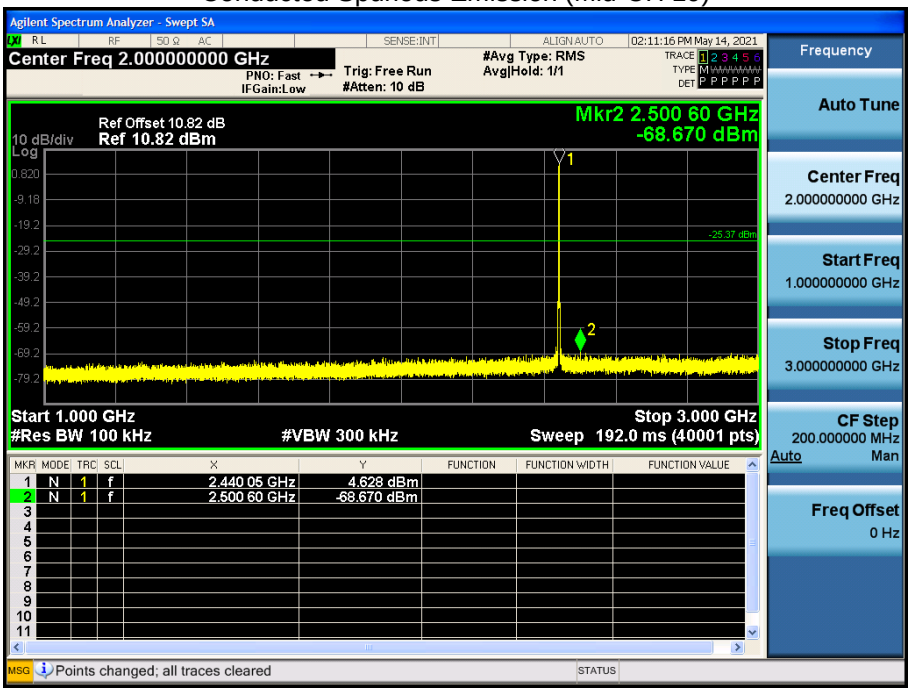
30 MHz ~ 1 GHz

Conducted Spurious Emission (Mid-CH 19)



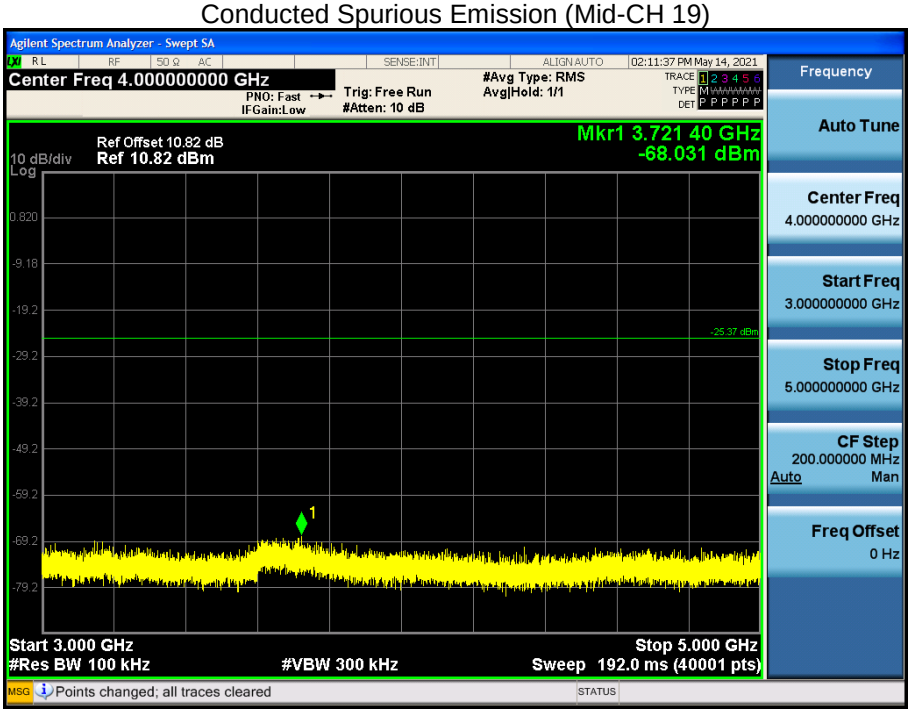
1 GHz ~ 3 GHz

Conducted Spurious Emission (Mid-CH 19)



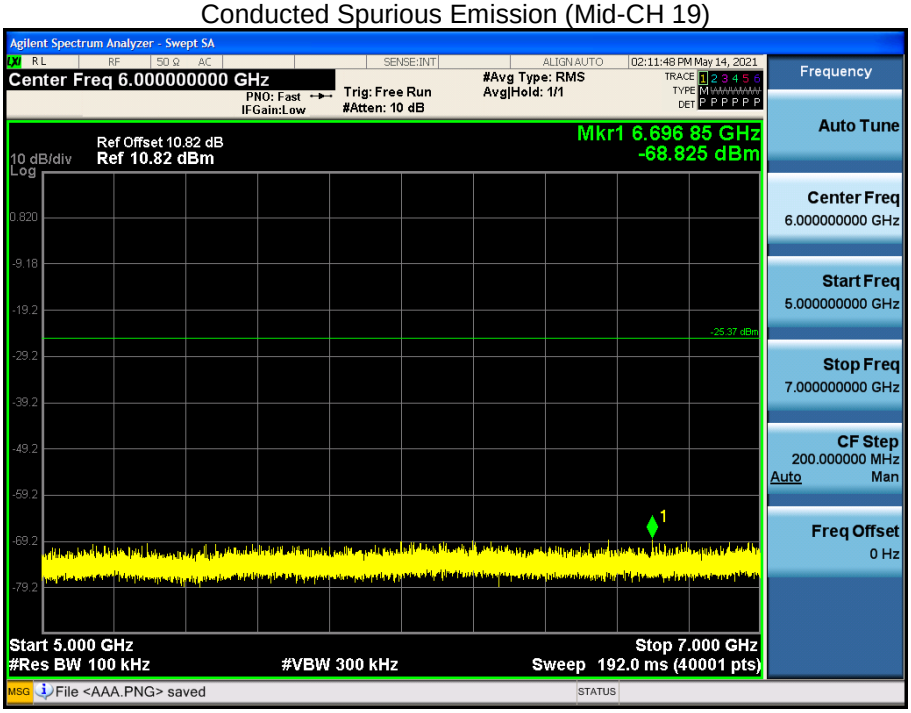
3 GHz ~ 5 GHz

Conducted Spurious Emission (Mid-CH 19)



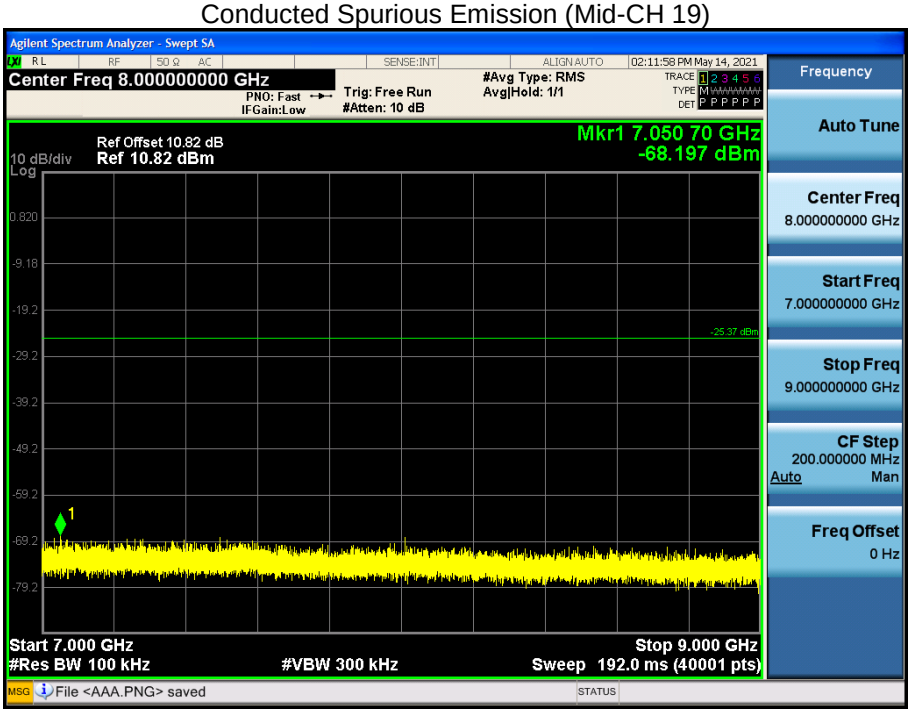
5 GHz ~ 7 GHz

Conducted Spurious Emission (Mid-CH 19)



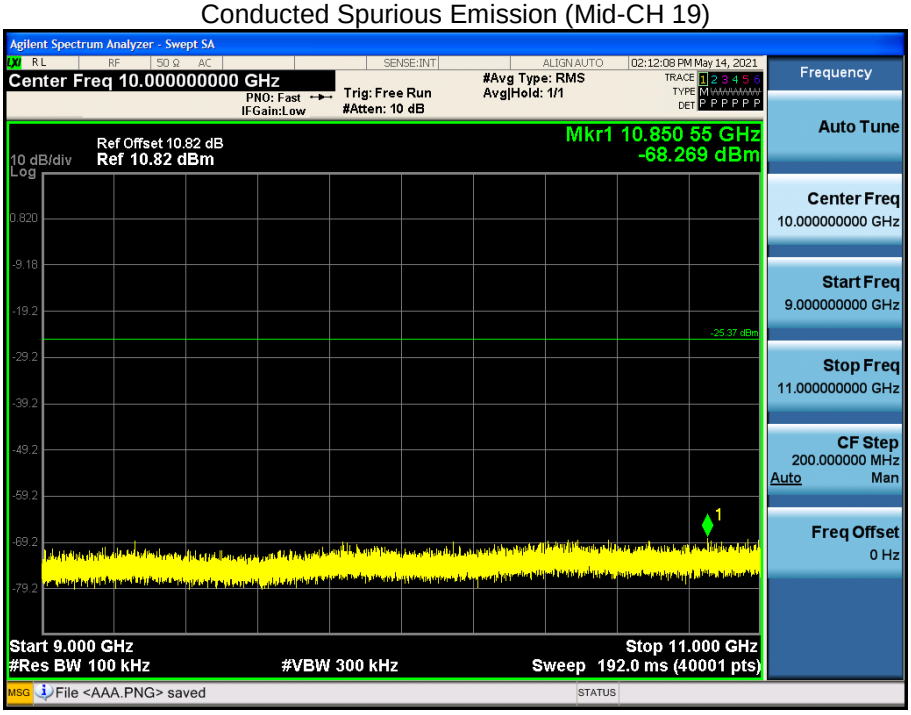
7 GHz ~ 9 GHz

Conducted Spurious Emission (Mid-CH 19)



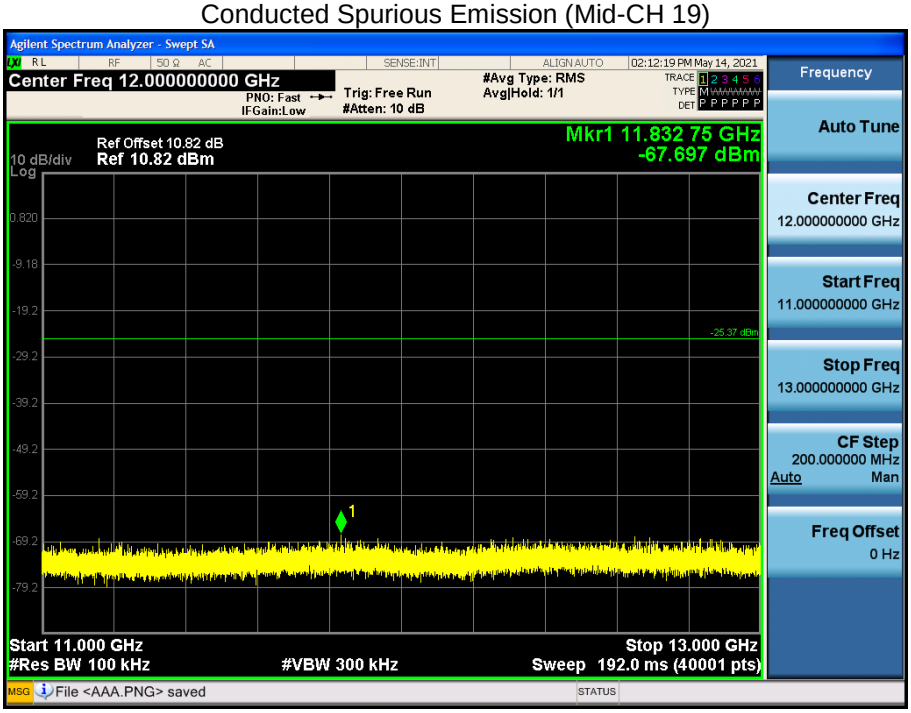
9 GHz ~ 11 GHz

Conducted Spurious Emission (Mid-CH 19)



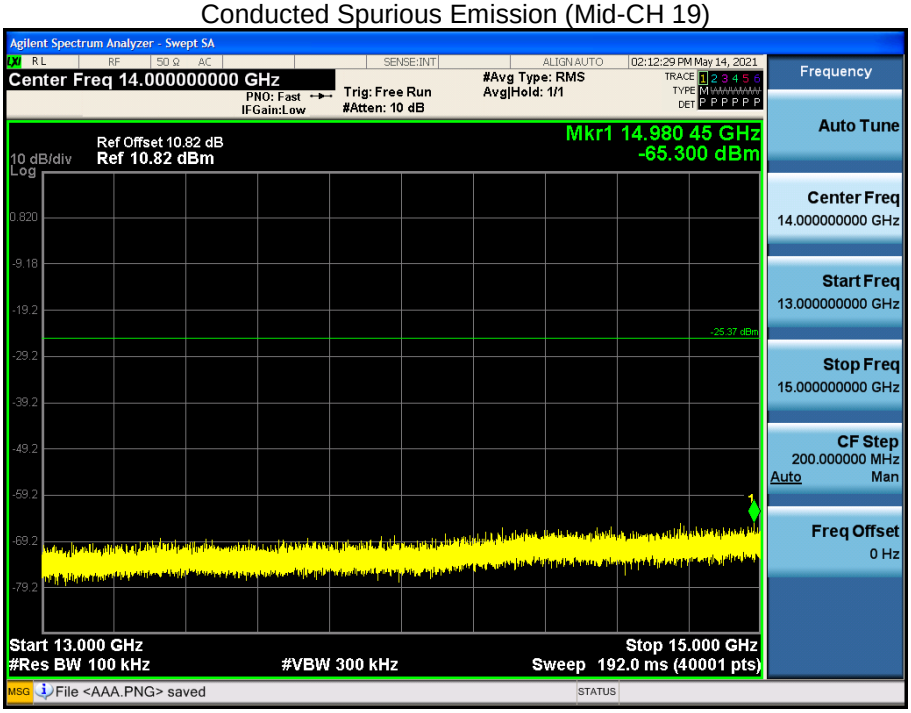
11 GHz ~ 13 GHz

Conducted Spurious Emission (Mid-CH 19)



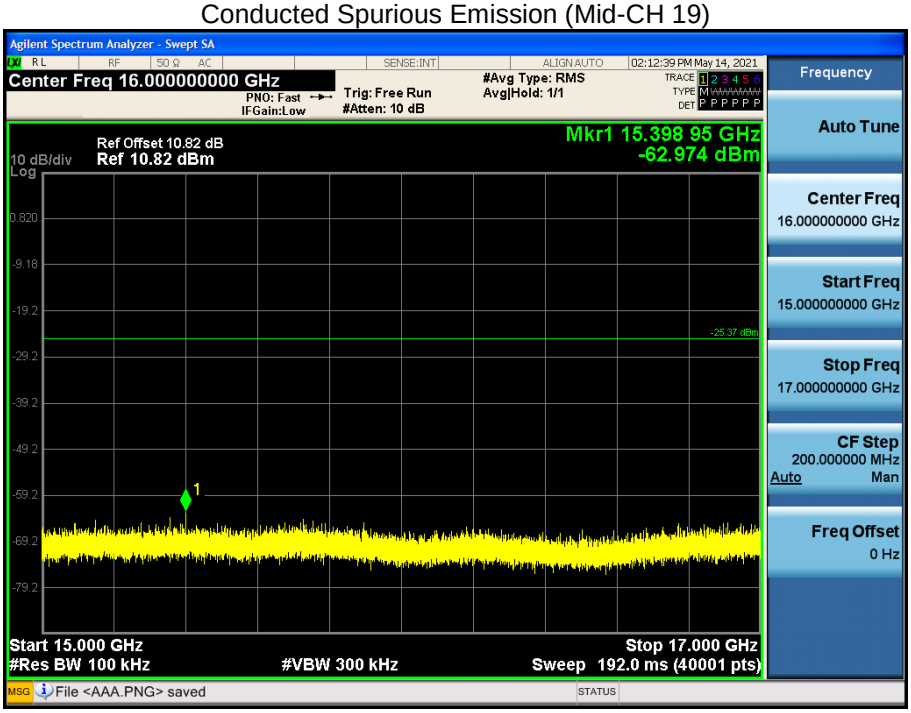
13 GHz ~ 15 GHz

Conducted Spurious Emission (Mid-CH 19)



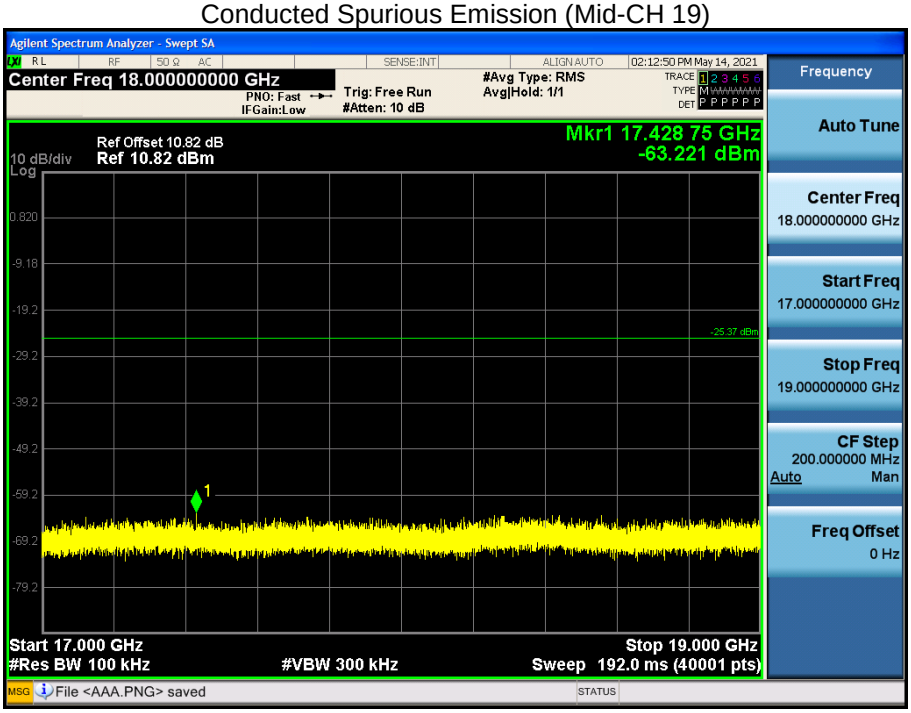
15 GHz ~ 17 GHz

Conducted Spurious Emission (Mid-CH 19)



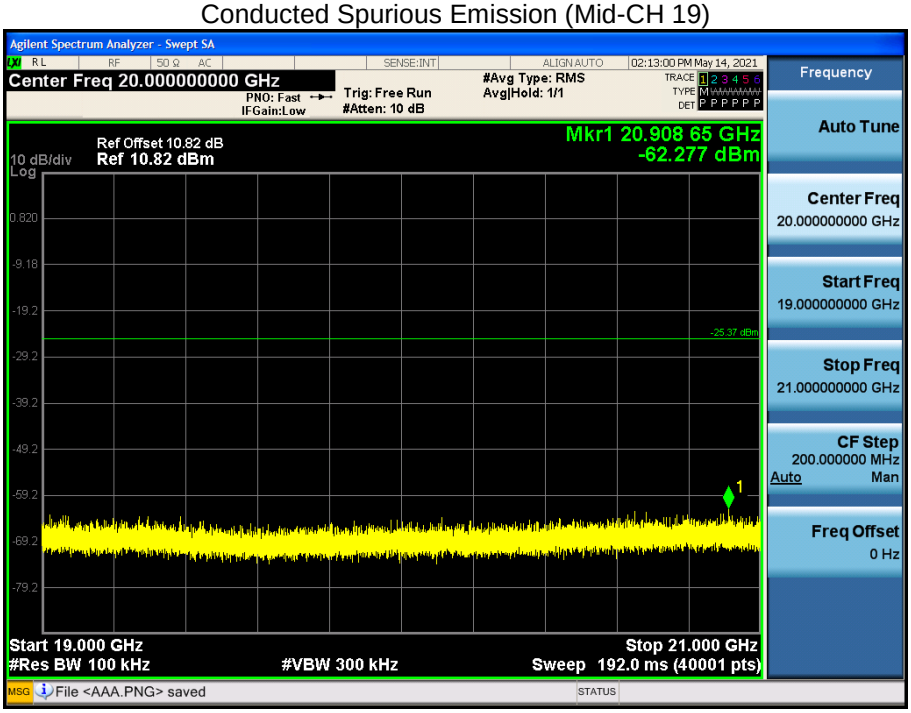
17 GHz ~ 19 GHz

Conducted Spurious Emission (Mid-CH 19)



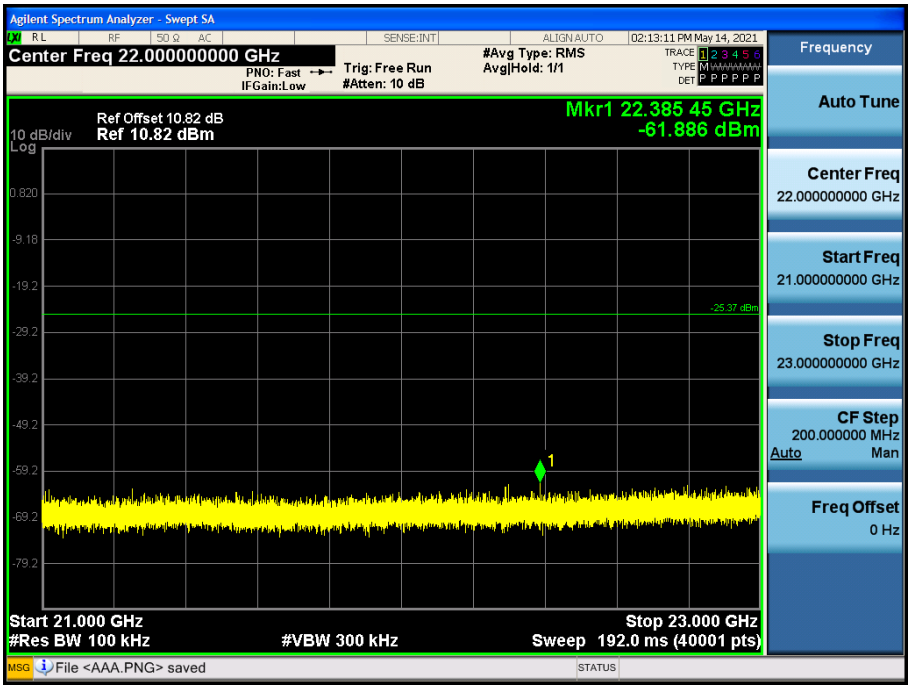
19 GHz ~ 21 GHz

Conducted Spurious Emission (Mid-CH 19)



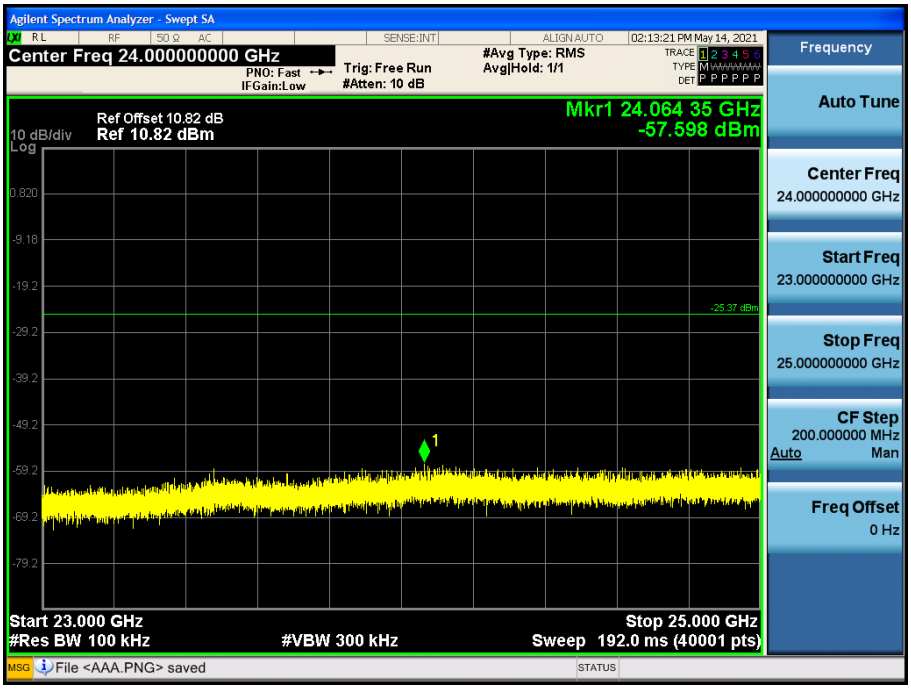
21 GHz ~ 23 GHz

Conducted Spurious Emission (Mid-CH 19)



23 GHz ~ 25 GHz

Conducted Spurious Emission (Mid-CH 19)



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

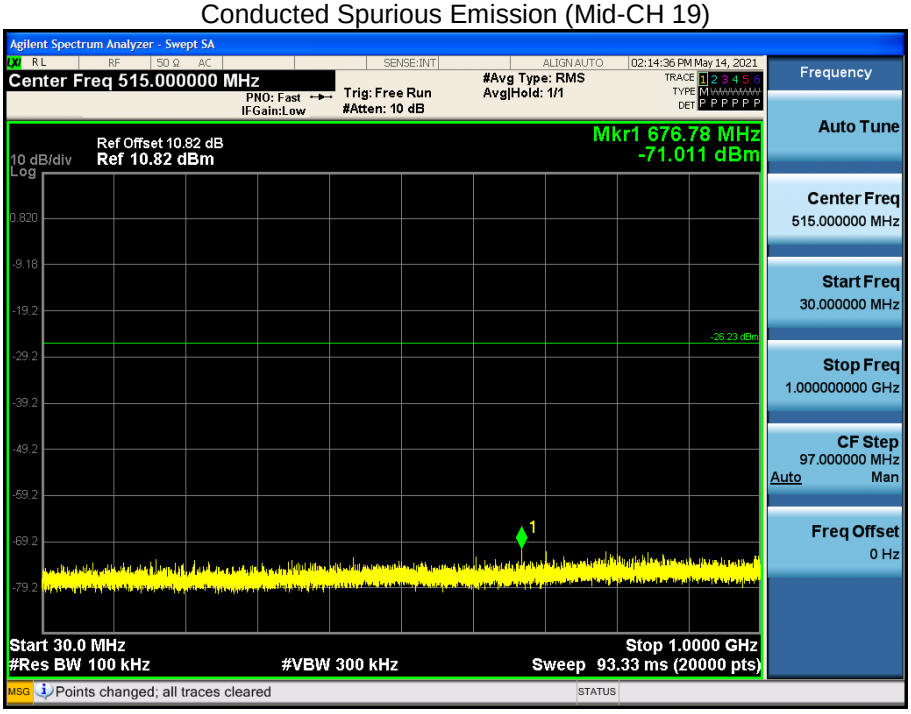
Low-CH 0

High-CH 39

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

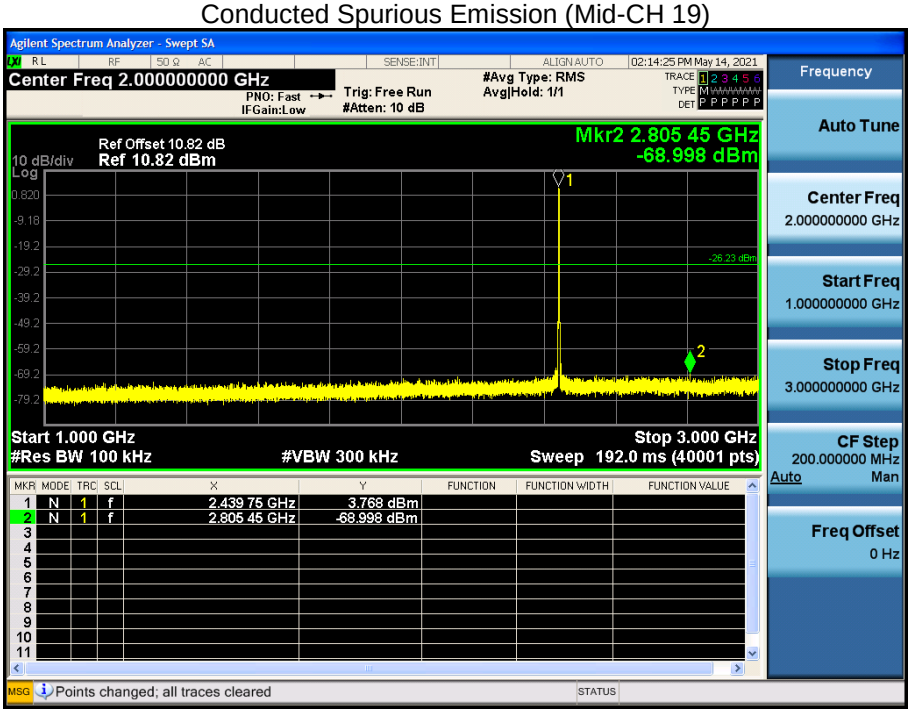
30 MHz ~ 1 GHz

Conducted Spurious Emission (Mid-CH 19)



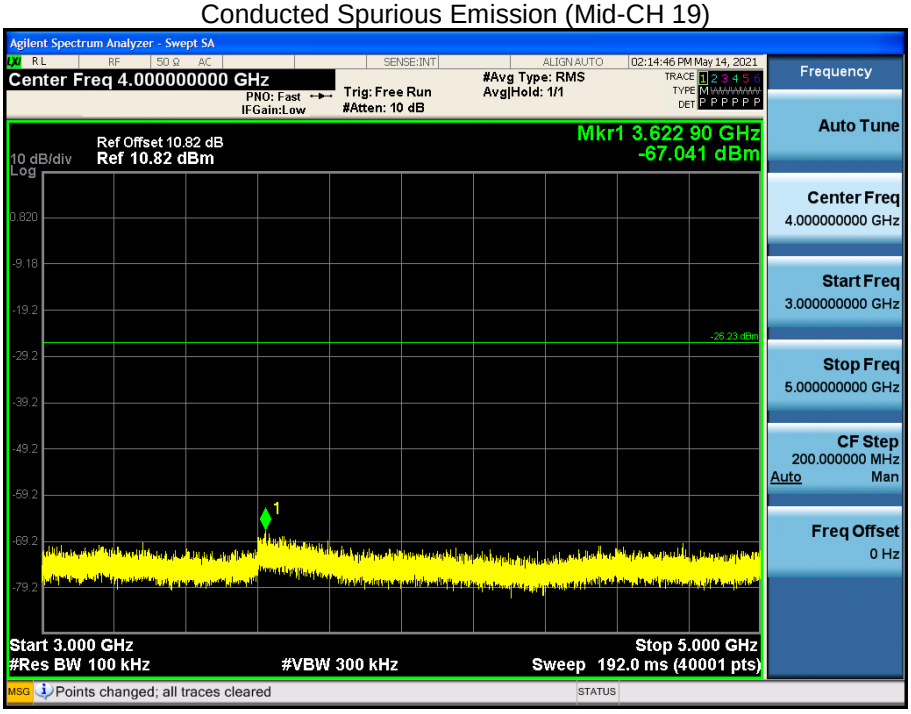
1 GHz ~ 3 GHz

Conducted Spurious Emission (Mid-CH 19)



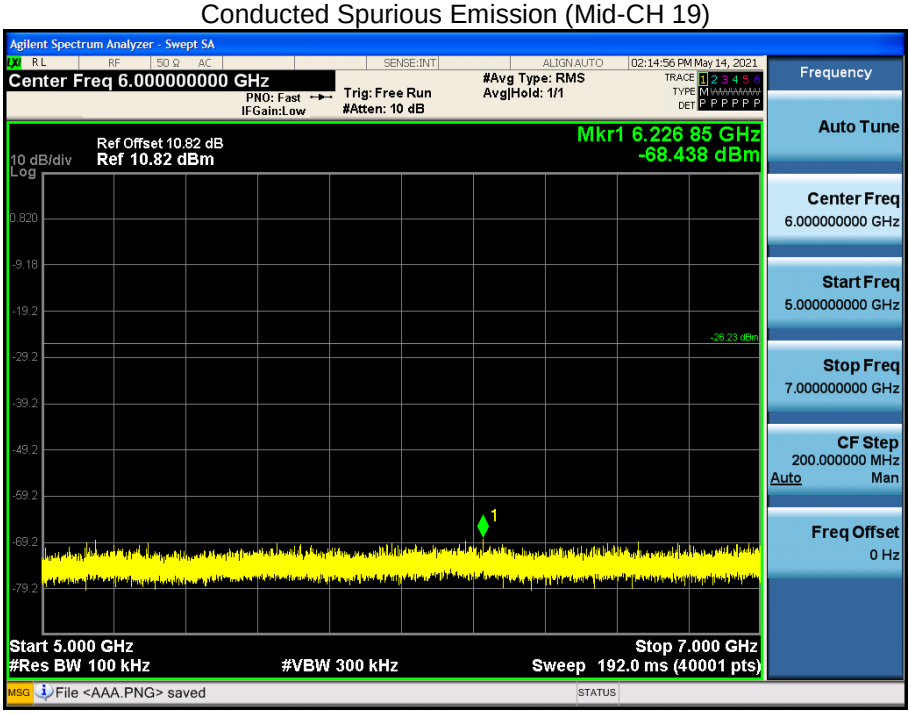
3 GHz ~ 5 GHz

Conducted Spurious Emission (Mid-CH 19)



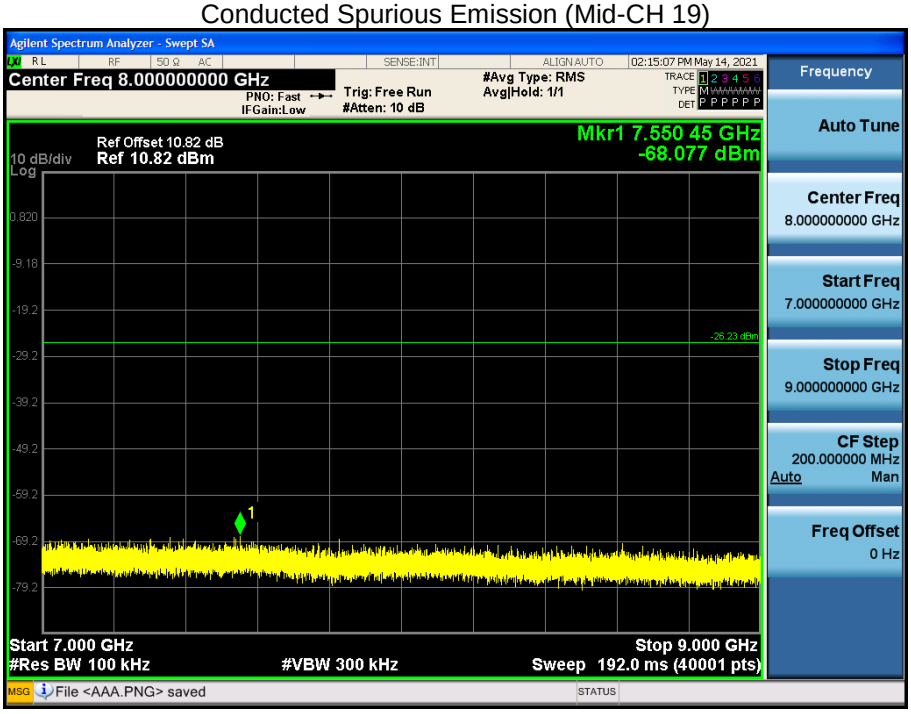
5 GHz ~ 7 GHz

Conducted Spurious Emission (Mid-CH 19)



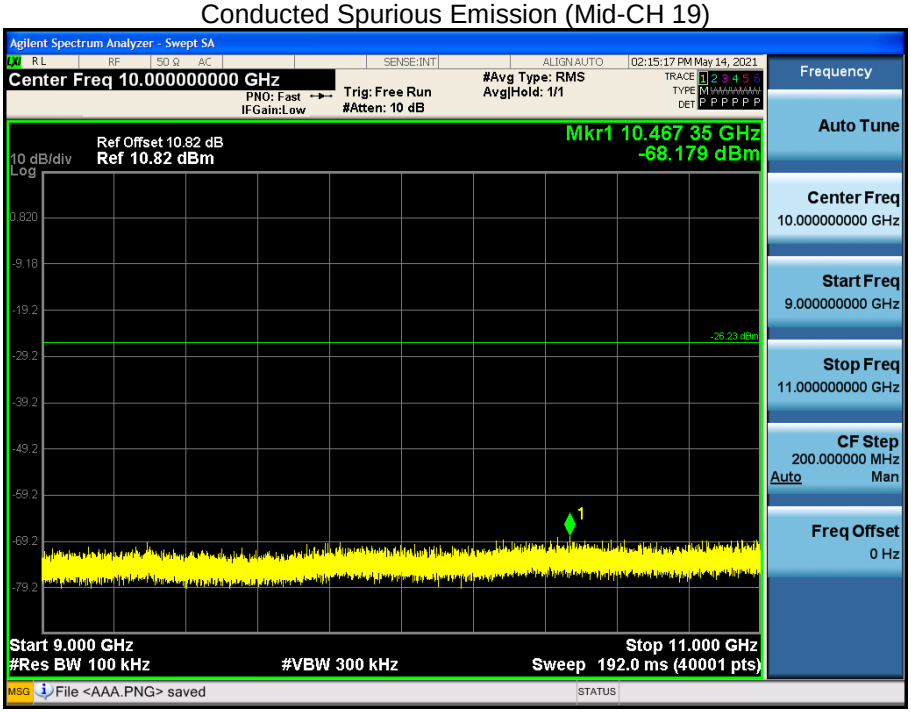
7 GHz ~ 9 GHz

Conducted Spurious Emission (Mid-CH 19)



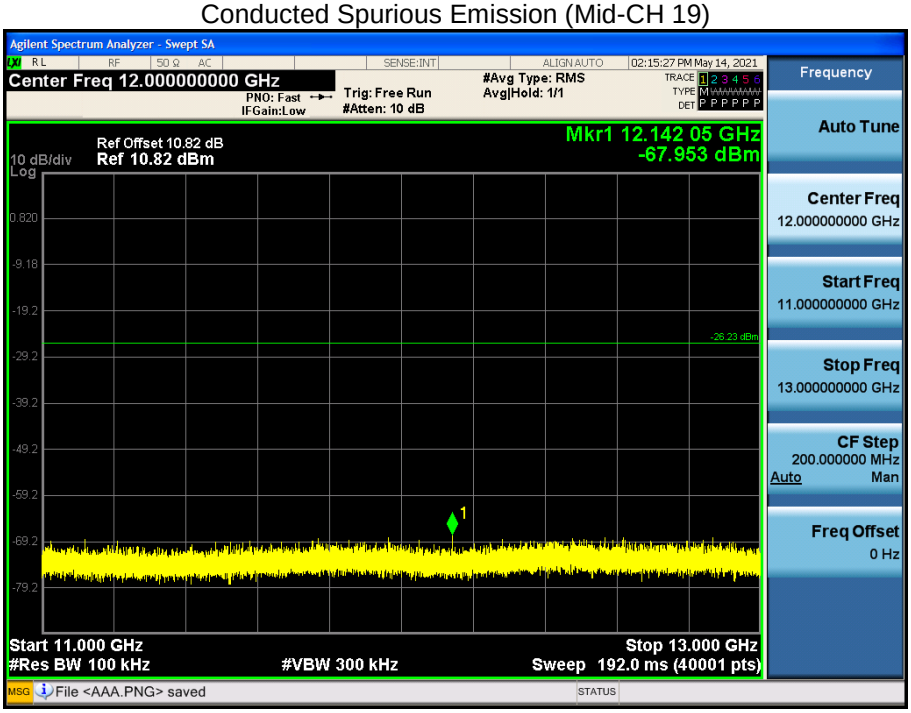
9 GHz ~ 11 GHz

Conducted Spurious Emission (Mid-CH 19)



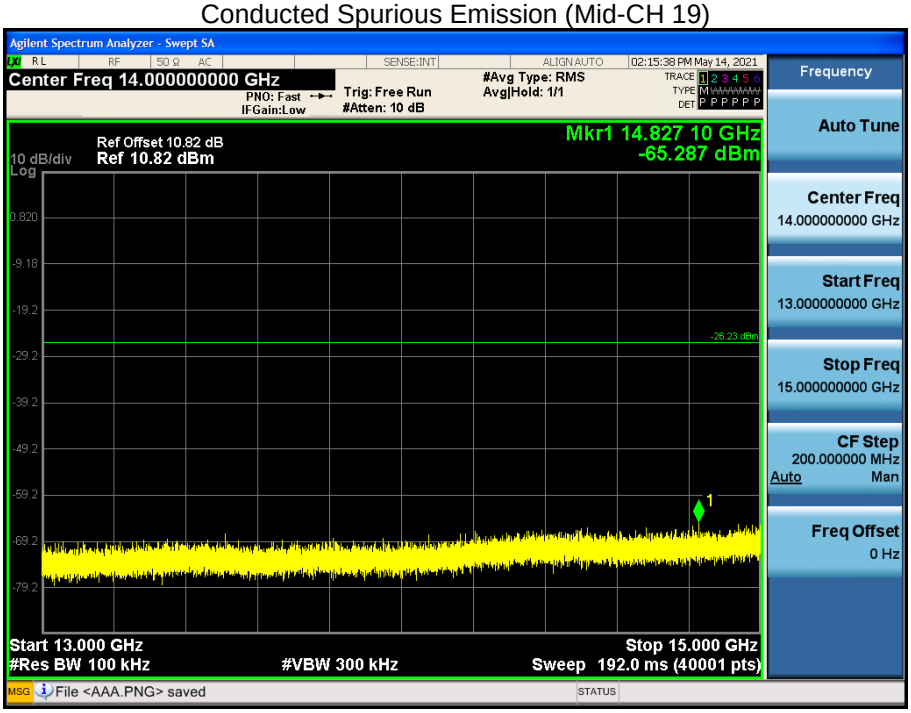
11 GHz ~ 13 GHz

Conducted Spurious Emission (Mid-CH 19)



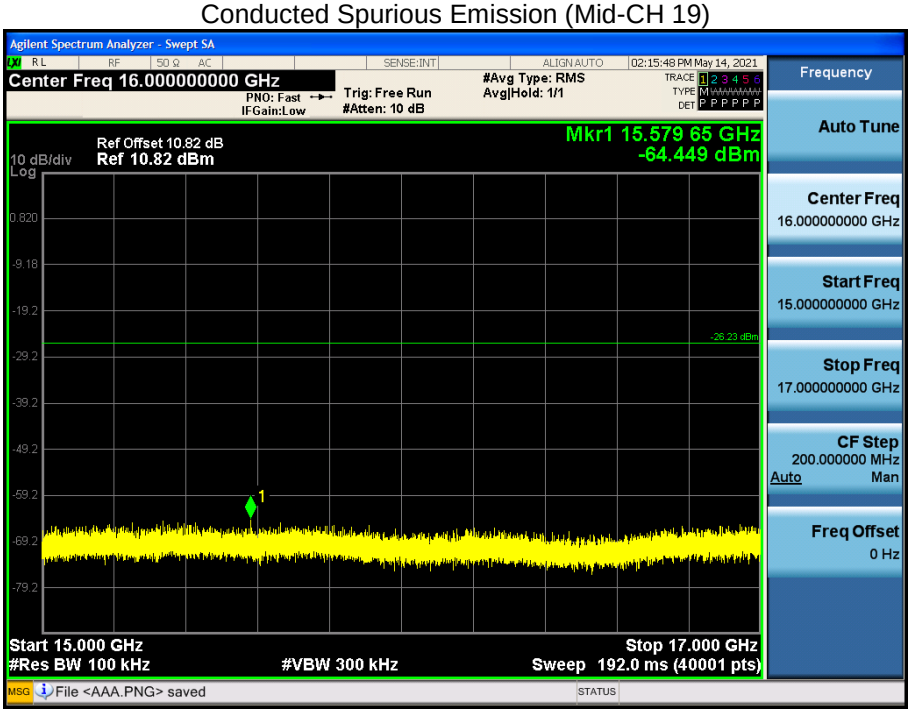
13 GHz ~ 15 GHz

Conducted Spurious Emission (Mid-CH 19)



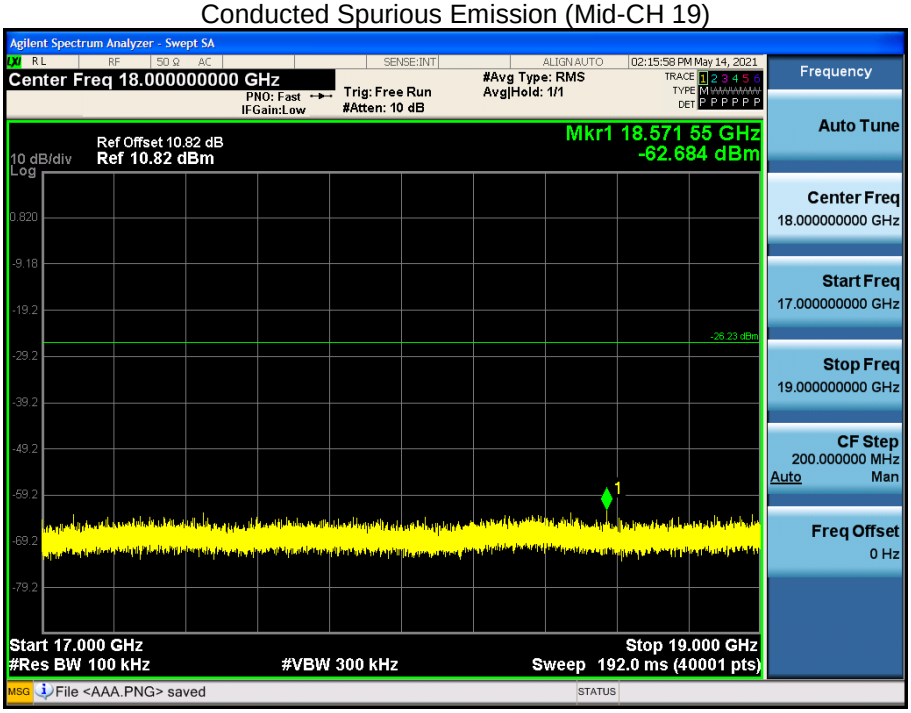
15 GHz ~ 17 GHz

Conducted Spurious Emission (Mid-CH 19)



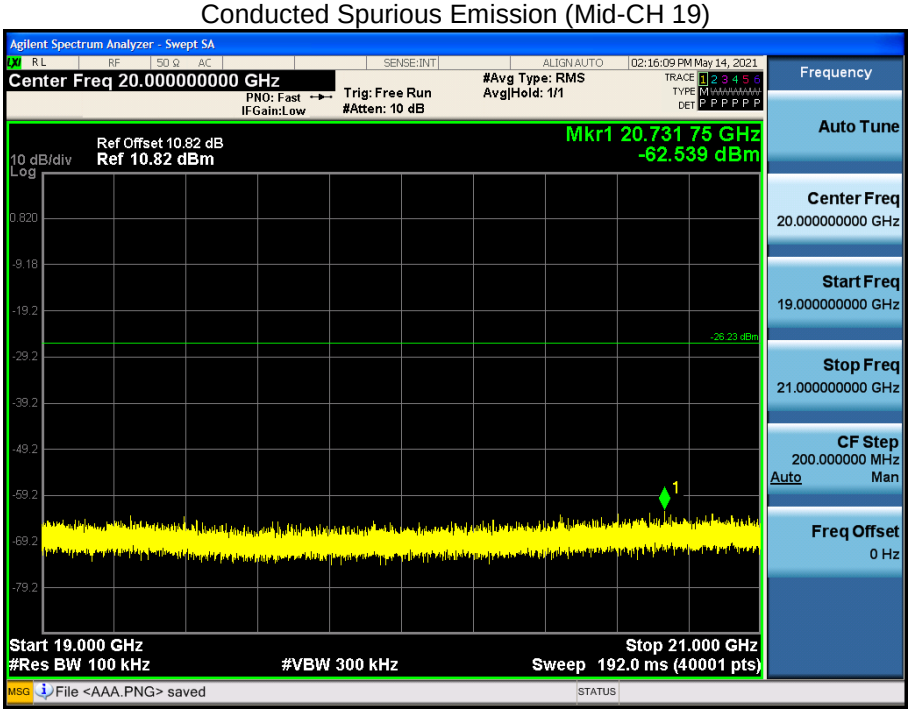
17 GHz ~ 19 GHz

Conducted Spurious Emission (Mid-CH 19)



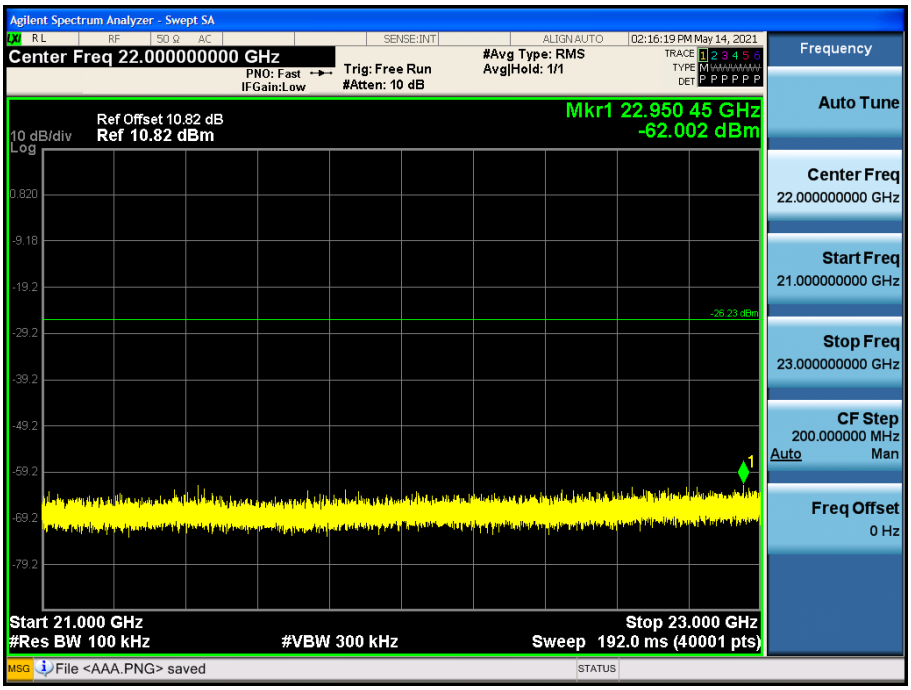
19 GHz ~ 21 GHz

Conducted Spurious Emission (Mid-CH 19)



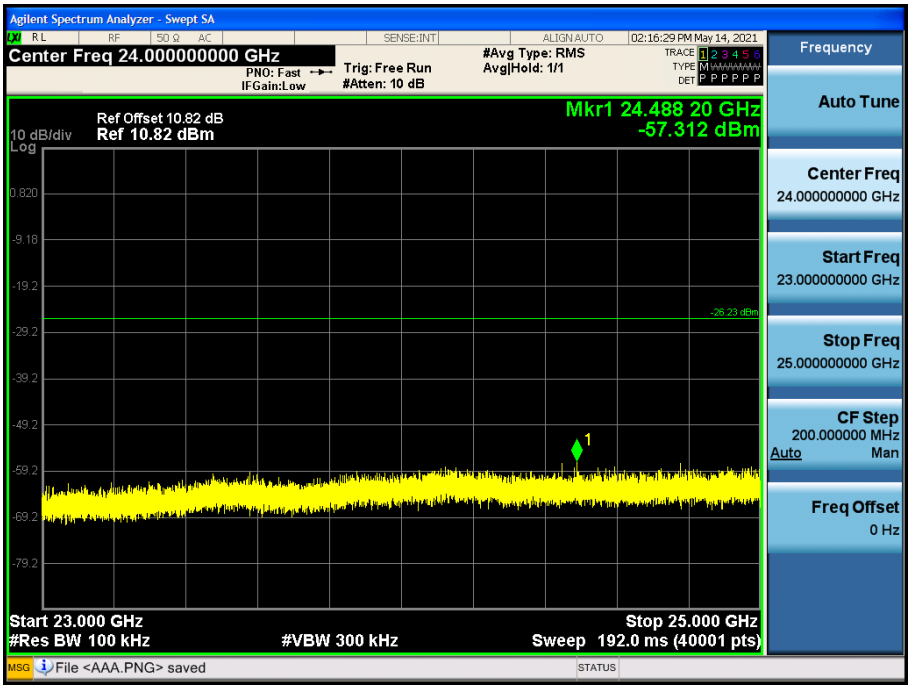
21 GHz ~ 23 GHz

Conducted Spurious Emission (Mid-CH 19)



23 GHz ~ 25 GHz

Conducted Spurious Emission (Mid-CH 19)



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 = 40log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBuV) + Distance extrapolation factor

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 [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4804	40.89	0.00	3.75	V	44.64	73.98	29.34	PK
4804	29.25	2.18	3.75	V	35.18	53.98	18.80	AV
7206	38.09	0.00	12.70	V	50.79	73.98	23.19	PK
7206	25.77	2.18	12.70	V	40.65	53.98	13.33	AV
4804	41.97	0.00	3.75	H	45.72	73.98	28.26	PK
4804	30.03	2.18	3.75	H	35.96	53.98	18.02	AV
7206	38.20	0.00	12.70	H	50.90	73.98	23.08	PK
7206	25.99	2.18	12.70	H	40.87	53.98	13.11	AV

Operation Mode: CH Mid

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4880	42.40	0.00	3.71	V	46.11	73.98	27.87	PK
4880	30.52	2.18	3.71	V	36.41	53.98	17.57	AV
7320	38.78	0.00	11.70	V	50.48	73.98	23.50	PK
7320	26.45	2.18	11.70	V	40.33	53.98	13.65	AV
4880	43.57	0.00	3.71	H	47.28	73.98	26.70	PK
4880	31.90	2.18	3.71	H	37.79	53.98	16.19	AV
7320	39.02	0.00	11.70	H	50.72	73.98	23.26	PK
7320	26.62	2.18	11.70	H	40.50	53.98	13.48	AV

Operation Mode: CH High

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4960	42.77	0.00	4.49	V	47.26	73.98	26.72	PK
4960	30.11	2.18	4.49	V	36.78	53.98	17.20	AV
7440	27.75	0.00	12.08	V	39.83	73.98	34.15	PK
7440	25.45	2.18	12.08	V	39.71	53.98	14.27	AV
4960	43.85	0.00	4.49	H	48.34	73.98	25.64	PK
4960	31.03	2.18	4.49	H	37.70	53.98	16.28	AV
7440	37.92	0.00	12.08	H	50.00	73.98	23.98	PK
7440	25.59	2.18	12.08	H	39.85	53.98	14.13	AV

Mode : 2M Bit/s (37 Byte)

Operation Mode: CH Low

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4804	41.52	0.00	3.75	V	45.27	73.98	28.71	PK
4804	28.85	5.09	3.75	V	37.69	53.98	16.29	AV
7206	38.68	0.00	12.70	V	51.38	73.98	22.60	PK
7206	25.78	5.09	12.70	V	43.57	53.98	10.41	AV
4804	42.20	0.00	3.75	H	45.95	73.98	28.03	PK
4804	29.70	5.09	3.75	H	38.54	53.98	15.44	AV
7206	38.86	0.00	12.70	H	51.56	73.98	22.42	PK
7206	25.96	5.09	12.70	H	43.75	53.98	10.23	AV

Operation Mode: CH Mid

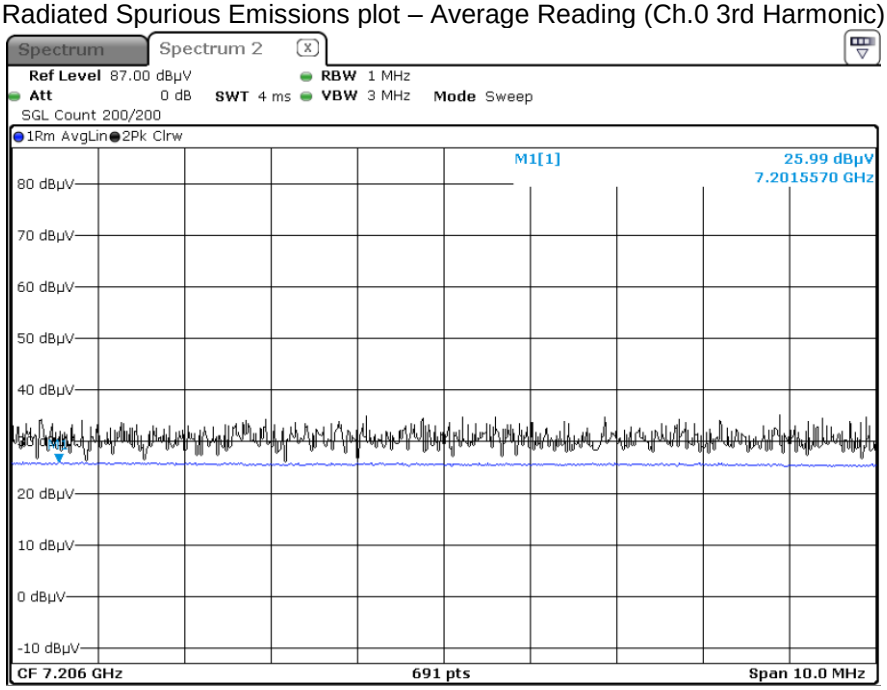
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4880	41.44	0.00	3.71	V	45.15	73.98	28.83	PK
4880	29.12	5.09	3.71	V	37.92	53.98	16.06	AV
7320	38.45	0.00	11.70	V	50.15	73.98	23.83	PK
7320	26.52	5.09	11.70	V	43.31	53.98	10.67	AV
4880	42.35	0.00	3.71	H	46.06	73.98	27.92	PK
4880	30.01	5.09	3.71	H	38.81	53.98	15.17	AV
7320	38.63	0.00	11.70	H	50.33	73.98	23.65	PK
7320	26.70	5.09	11.70	H	43.49	53.98	10.49	AV

Operation Mode: CH High

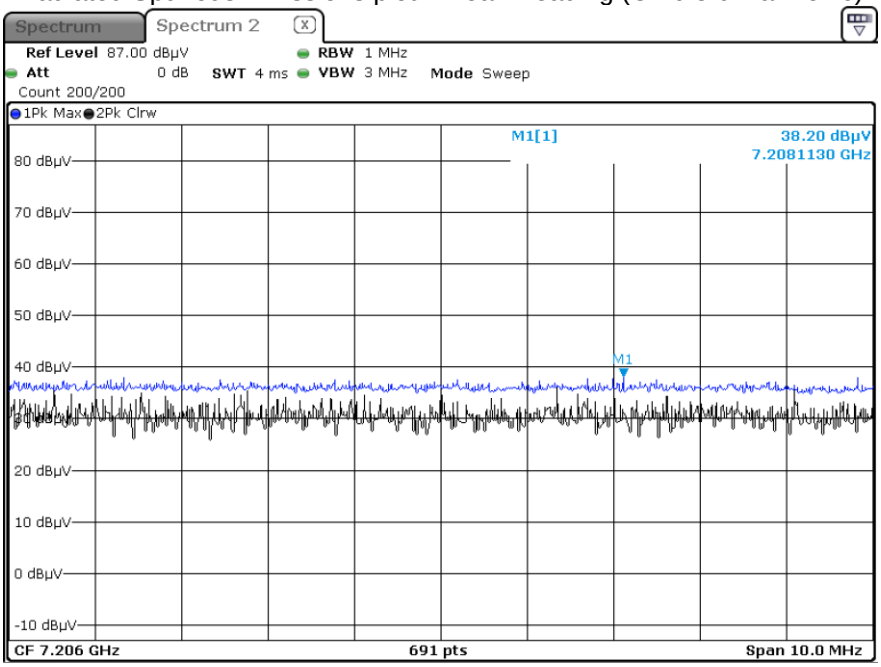
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4960	41.55	0.00	4.49	V	46.04	73.98	27.94	PK
4960	28.89	5.09	4.49	V	38.47	53.98	15.51	AV
7440	38.33	0.00	12.08	V	50.41	73.98	23.57	PK
7440	25.62	5.09	12.08	V	42.79	53.98	11.19	AV
4960	42.56	0.00	4.49	H	47.05	73.98	26.93	PK
4960	29.95	5.09	4.49	H	39.53	53.98	14.45	AV
7440	38.40	0.00	12.08	H	50.48	73.98	23.50	PK
7440	25.75	5.09	12.08	H	42.92	53.98	11.06	AV

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

Radiated Spurious Emissions plot – Average Reading (Ch.0 3rd Harmonic)

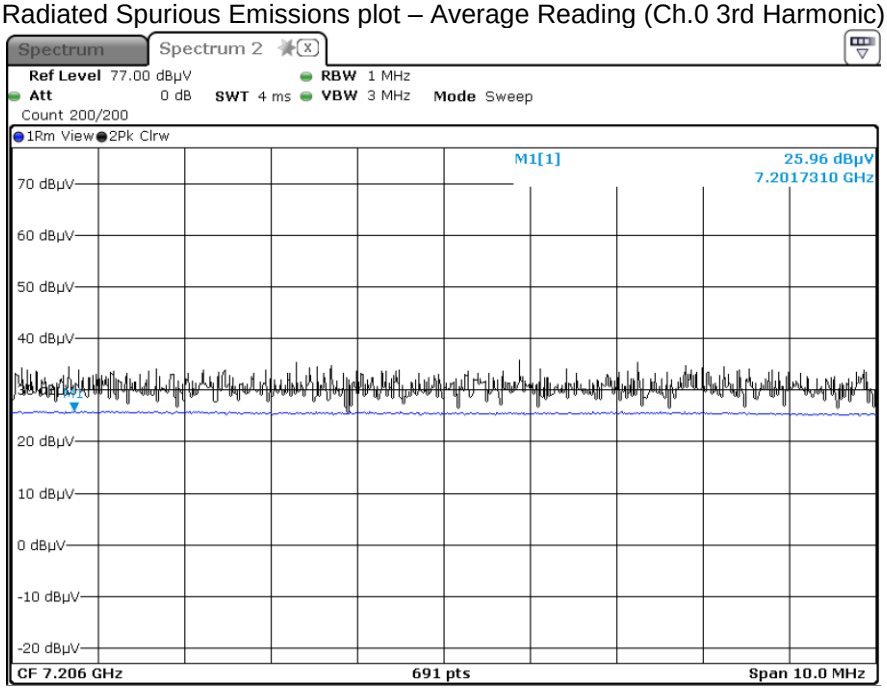


Radiated Spurious Emissions plot – Peak Reading (Ch.0 3rd Harmonic)

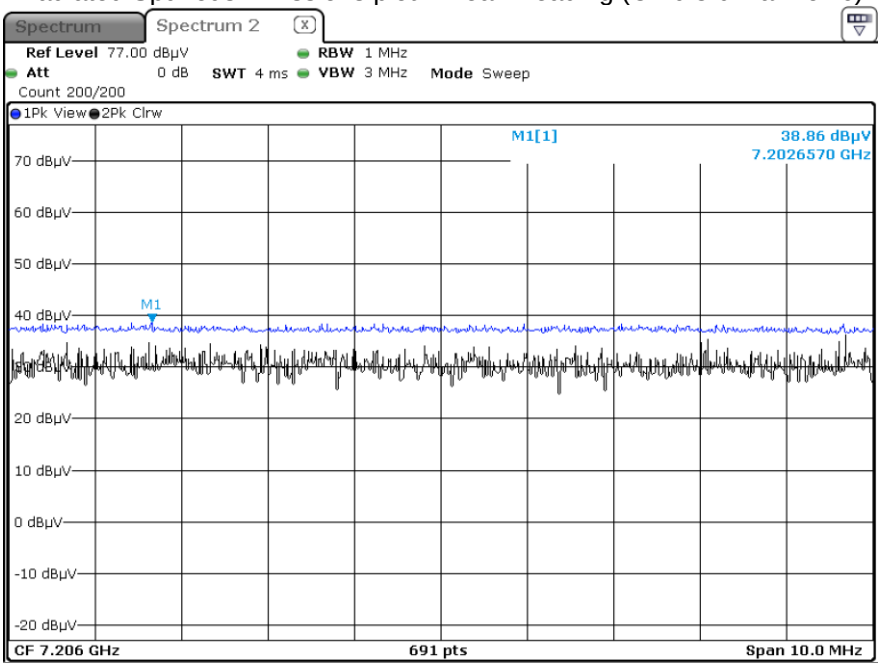


▣ 2M Bit/s 37 Byte Test Plots (Worst case : X-H)

Radiated Spurious Emissions plot – Average Reading (Ch.0 3rd Harmonic)



Radiated Spurious Emissions plot – Peak Reading (Ch.0 3rd 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 CH, 39 CH

Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F [dB]	Ant. Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	21.391	0.00	34.04	H	55.43	73.98	18.55	PK
2390.0	9.625	2.18	34.04	H	45.85	53.98	8.14	AV
2390.0	21.025	0.00	34.04	V	55.07	73.98	18.92	PK
2390.0	9.452	2.18	34.04	V	45.67	53.98	8.31	AV
2483.5	21.855	0.00	35.00	H	56.86	73.98	17.13	PK
2483.5	9.685	2.18	35.00	H	46.87	53.98	7.11	AV
2483.5	21.861	0.00	35.00	V	56.86	73.98	17.12	PK
2483.5	9.774	2.18	35.00	V	46.95	53.98	7.03	AV

Mode : 2M Bit/s (37 Byte)

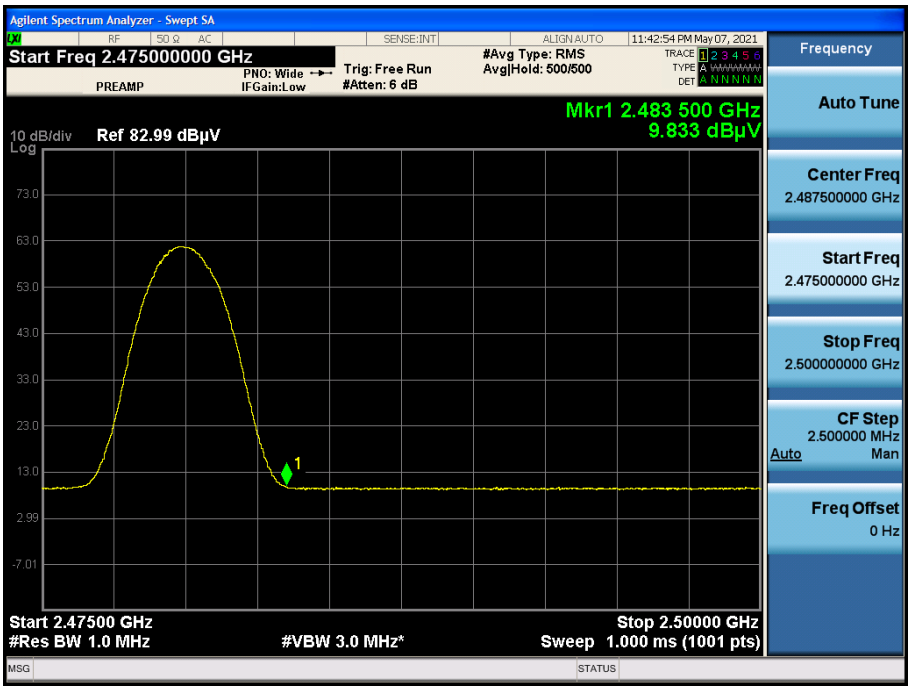
Operating Frequency 2402 MHz, 2480 MHz

Channel No. 0 CH, 39 CH

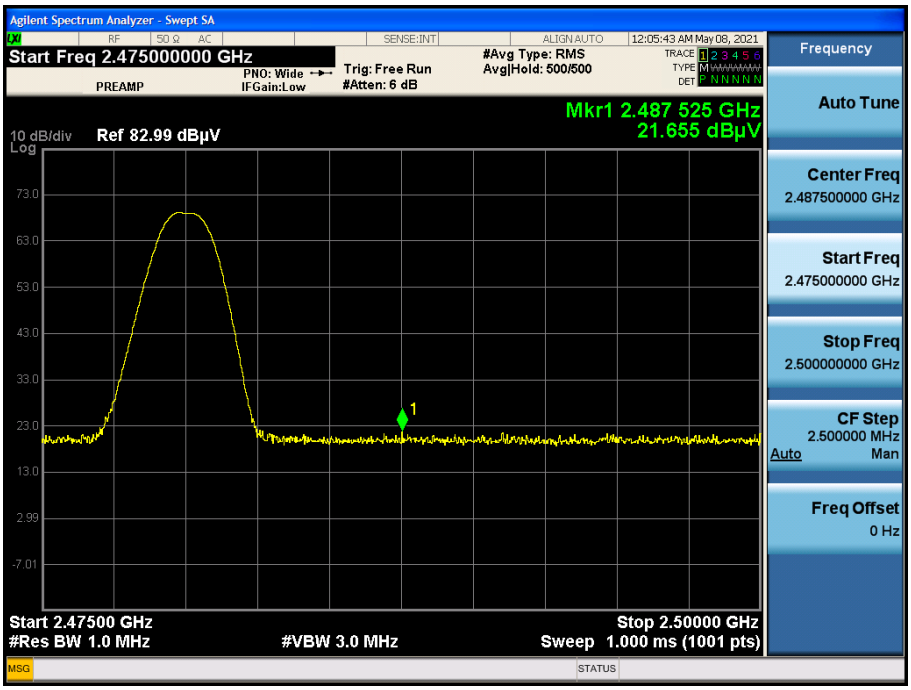
Frequency [MHz]	Reading [dBuV/m]	Duty Cycle Factor [dB]	A.F.+C.L.+D.F [dB]	Ant. Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	21.563	0.00	34.04	H	55.60	73.98	18.38	PK
2390.0	9.725	5.09	34.04	H	48.86	53.98	5.13	AV
2390.0	21.252	0.00	34.04	V	55.29	73.98	18.69	PK
2390.0	9.658	5.09	34.04	V	48.79	53.98	5.19	AV
2483.5	21.712	0.00	35.00	H	56.71	73.98	17.27	PK
2483.5	9.802	5.09	35.00	H	49.89	53.98	4.09	AV
2483.5	21.655	0.00	35.00	V	56.66	73.98	17.33	PK
2483.5	9.833	5.09	35.00	V	49.92	53.98	4.06	AV

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

Radiated Restricted Band Edges plot – Average Reading (Ch.39, Z-V)



Radiated Restricted Band Edges plot – Peak Reading (Ch.39, Z-V)



Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

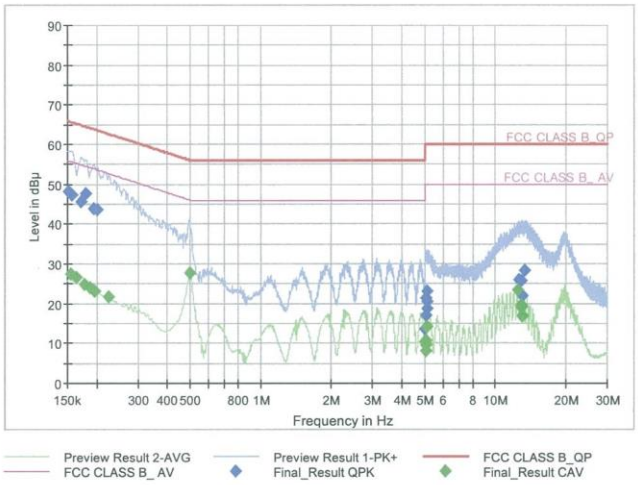
BT_LE L1 1 / 2

Test Report

Common Information

EUT :	SM-G990B/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	BT_LE L1 (25W)
Operator Name:	
Comment:	

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1523	48.15	65.88	17.73	9.000	L1	OFF	9.6
0.1568	47.17	65.63	18.46	9.000	L1	OFF	9.6
0.1725	45.45	64.84	19.39	9.000	L1	OFF	9.6
0.1793	47.47	64.52	17.05	9.000	L1	OFF	9.6
0.1950	43.81	63.82	20.01	9.000	L1	OFF	9.6
0.2018	43.53	63.54	20.01	9.000	L1	OFF	9.6
5.0000	13.54	56.00	42.46	9.000	L1	OFF	9.9
5.0675	21.47	60.00	38.53	9.000	L1	OFF	9.9
5.0900	17.09	60.00	42.91	9.000	L1	OFF	9.9
5.1125	18.70	60.00	41.30	9.000	L1	OFF	9.9
5.1193	20.44	60.00	39.56	9.000	L1	OFF	9.9
5.1418	23.14	60.00	36.86	9.000	L1	OFF	9.9
12.6680	25.96	60.00	34.04	9.000	L1	OFF	10.2
12.9178	25.67	60.00	34.33	9.000	L1	OFF	10.2
12.9380	25.75	60.00	34.25	9.000	L1	OFF	10.2
12.9898	21.94	60.00	38.06	9.000	L1	OFF	10.2
13.0123	21.84	60.00	38.16	9.000	L1	OFF	10.2
13.2913	28.26	60.00	31.74	9.000	L1	OFF	10.2

2021-05-15 오전 2:34:47

BT_LE L1 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	27.50	55.75	28.26	9.000	L1	OFF	9.6
0.1635	26.40	55.28	28.88	9.000	L1	OFF	9.6
0.1770	24.88	54.63	29.74	9.000	L1	OFF	9.6
0.1883	24.07	54.11	30.05	9.000	L1	OFF	9.6
0.1973	23.07	53.73	30.65	9.000	L1	OFF	9.6
0.2243	21.62	52.66	31.04	9.000	L1	OFF	9.6
0.5023	27.82	46.00	18.18	9.000	L1	OFF	9.6
5.0000	10.24	46.00	35.76	9.000	L1	OFF	9.9
5.0653	8.04	50.00	41.96	9.000	L1	OFF	9.9
5.0765	9.60	50.00	40.40	9.000	L1	OFF	9.9
5.0923	10.76	50.00	39.24	9.000	L1	OFF	9.9
5.1440	14.22	50.00	35.78	9.000	L1	OFF	9.9
12.4070	23.27	50.00	26.73	9.000	L1	OFF	10.1
12.9493	19.61	50.00	30.39	9.000	L1	OFF	10.2
12.9605	18.99	50.00	31.01	9.000	L1	OFF	10.2
12.9718	19.32	50.00	30.68	9.000	L1	OFF	10.2
13.0123	16.74	50.00	33.26	9.000	L1	OFF	10.2
13.0528	17.02	50.00	32.98	9.000	L1	OFF	10.2

2021-05-15 오전 2:34:47

Conducted Emissions (Line 2)

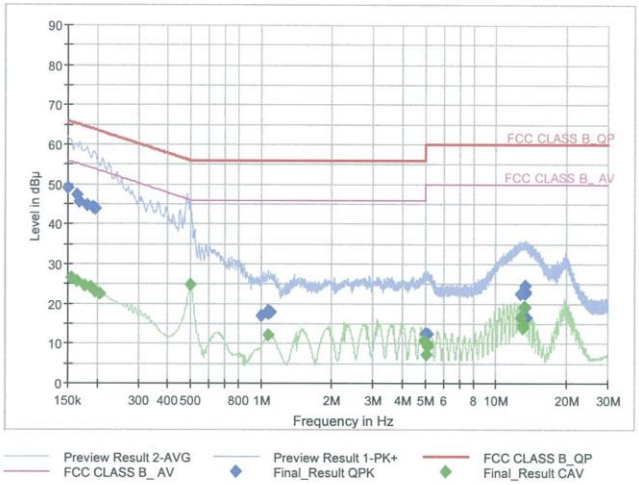
BT_LE N 1 / 2

Test Report

Common Information

EUT :	SM-G990B/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	BT_LE N (25W)
Operator Name:	
Comment:	

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	48.91	66.00	17.09	9.000	N	OFF	9.6
0.1635	47.20	65.28	18.09	9.000	N	OFF	9.6
0.1680	45.62	65.06	19.43	9.000	N	OFF	9.6
0.1815	44.68	64.42	19.73	9.000	N	OFF	9.6
0.1928	44.05	63.92	19.86	9.000	N	OFF	9.6
0.1973	43.95	63.73	19.77	9.000	N	OFF	9.6
1.0063	16.88	56.00	39.12	9.000	N	OFF	9.7
1.0715	17.61	56.00	38.39	9.000	N	OFF	9.7
1.0760	18.26	56.00	37.74	9.000	N	OFF	9.7
1.0985	17.75	56.00	38.25	9.000	N	OFF	9.7
5.0000	12.42	56.00	43.58	9.000	N	OFF	9.9
5.1260	12.36	60.00	47.64	9.000	N	OFF	9.9
12.7670	22.37	60.00	37.63	9.000	N	OFF	10.2
13.3205	23.07	60.00	36.93	9.000	N	OFF	10.3
13.3295	22.58	60.00	37.42	9.000	N	OFF	10.3
13.3430	22.91	60.00	37.09	9.000	N	OFF	10.3
13.3655	24.59	60.00	35.41	9.000	N	OFF	10.3
13.4825	16.49	60.00	43.51	9.000	N	OFF	10.3

2021-05-15 오전 2:28:47

BT_LE N 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1545	26.61	55.75	29.14	9.000	N	OFF	9.6
0.1635	25.79	55.28	29.49	9.000	N	OFF	9.6
0.1770	24.57	54.63	30.06	9.000	N	OFF	9.6
0.1883	24.12	54.11	29.99	9.000	N	OFF	9.6
0.1973	23.13	53.73	30.60	9.000	N	OFF	9.6
0.2063	22.58	53.36	30.77	9.000	N	OFF	9.6
0.5000	24.80	46.00	21.20	9.000	N	OFF	9.6
1.0738	12.19	46.00	33.81	9.000	N	OFF	9.7
4.9775	10.69	46.00	35.31	9.000	N	OFF	9.9
5.0540	7.10	50.00	42.90	9.000	N	OFF	9.9
5.1035	9.30	50.00	40.70	9.000	N	OFF	9.9
5.1260	9.95	50.00	40.05	9.000	N	OFF	9.9
12.7445	16.53	50.00	33.47	9.000	N	OFF	10.2
13.0640	14.11	50.00	35.89	9.000	N	OFF	10.3
13.1068	13.85	50.00	36.15	9.000	N	OFF	10.3
13.1158	14.66	50.00	35.34	9.000	N	OFF	10.3
13.2643	18.99	50.00	31.01	9.000	N	OFF	10.3
13.3228	19.17	50.00	30.83	9.000	N	OFF	10.3

2021-05-15 오전 2:28:47

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
ESPAC	SU-642 /Temperature Chamber	03/15/2021	Annual	0093008124
Agilent	N9030A / Signal Analyzer	01/11/2021	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/02/2021	Annual	101231
Agilent	N1911A / Power Meter	04/08/2021	Annual	MY45100523
Keysight	N1921A / Power Sensor	04/08/2021	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/10/2020	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/20/2021	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	02/16/2021	Annual	MY50360067
Hewlett Packard	8493C / Attenuator(10 dB)	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

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
Rohde & Schwarz	Loop Antenna	03/19/2020	Biennial	1513-333
Schwarzbeck	VULB 9168 / Hybrid Antenna	02/22/2021	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	05/19/2020	Biennial	02299
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	11/29/2019	Biennial	BBHA9170541
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	07/28/2020	Annual	102168
Agilent	N9030A / Signal Analyzer	01/11/2021	Annual	MY49431210
Wainwright Instruments	WRCJV12-4900-5100-5900-6100-50SS	06/24/2021	Annual	5
Wainwright Instruments	WRCJV12-4900-5100-5900-6100-50SS	06/24/2021	Annual	6
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/06/2021	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/08/2021	Annual	1
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	02/03/2021	Annual	8
Wainwright Instruments	WHKX8-6090-7000-18000-40SS/ High Pass Filter	02/03/2021	Annual	25
Api tech.	18B-03 / Attenuator (3 dB)	02/03/2021	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	02/03/2021	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	02/03/2021	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	02/03/2021	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2021	Annual	25956

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-2106-FC023-P