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FCC BT LE REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
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Date of Issue:
July 29, 2022

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

Report No.: HCT-RF-2207-FC037

FCC ID:	**A3LSMA047F**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

Model:	SM-A047F/DS
Additional Model:	SM-A047F
EUT Type:	Mobile Phone
Average Output Power:	7.73 dBm (5.92 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 : Chang Hee Hwang
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
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)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2207-FC037	July 29, 2022	- First Approval Report

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1. EUT DESCRIPTION

Model	SM-A047F/DS		
Additional Model	SM-A047F		
EUT Type	Mobile Phone		
Power Supply	DC 3.85 V		
Frequency Range	2 402 MHz ~ 2 480 MHz		
Max. RF Output Power	Peak (For information only)	1M Bit/s : 2M Bit/s : 125k Bit/s : 500k Bit/s :	8.052 dBm (6.39 mW) 8.150 dBm (6.53 mW) 7.976 dBm (6.27 mW) 8.065 dBm (6.40 mW)
	Average	1M Bit/s : 2M Bit/s : 125k Bit/s : 500k Bit/s :	7.73 dBm (5.92 mW) 7.73 dBm (5.92 mW) 7.67 dBm (5.84 mW) 7.68 dBm (5.87 mW)
Modulation Type	GFSK		
Bluetooth Version	5.0		
Number of Channels	40 Channels		
Date(s) of Tests	July 20, 2022 ~ July 29, 2022		
Serial number	Radiated : R38T500CFMX Conducted : R38T500CEEK		

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 30 MHz 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 1 GHz. Above 1 GHz with 1.5 m 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.

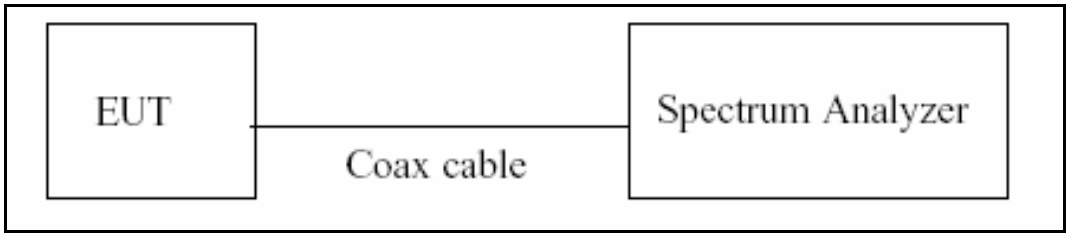
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	2.00 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.48 (Confidence level about 95 %, k=2)

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*.

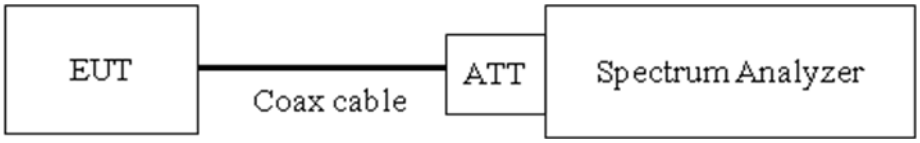
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

7.2. 6 dB 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.

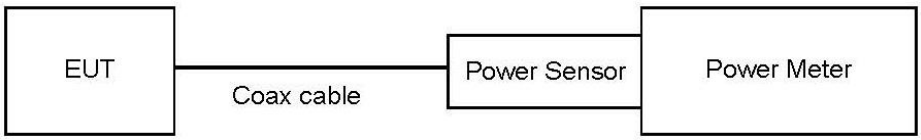
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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) = Measured Value + ATT loss + Cable loss

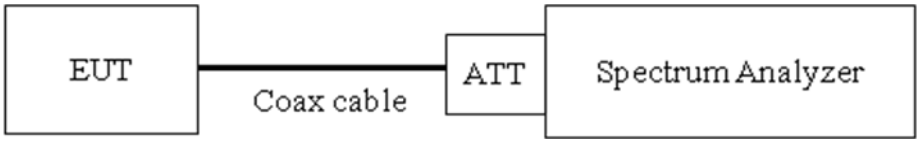
▪ Conducted Output Power(Average) = Measured Value + ATT loss + Cable loss + Duty Cycle Factor

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 = Measured Value + ATT loss + Cable loss

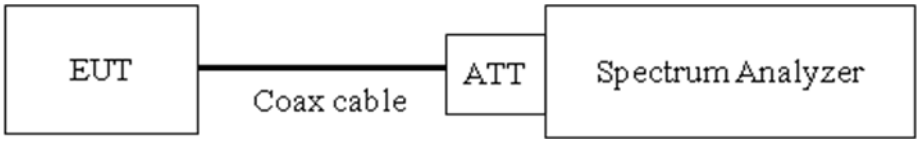
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

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	10.43
2500	**10.45**
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

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

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

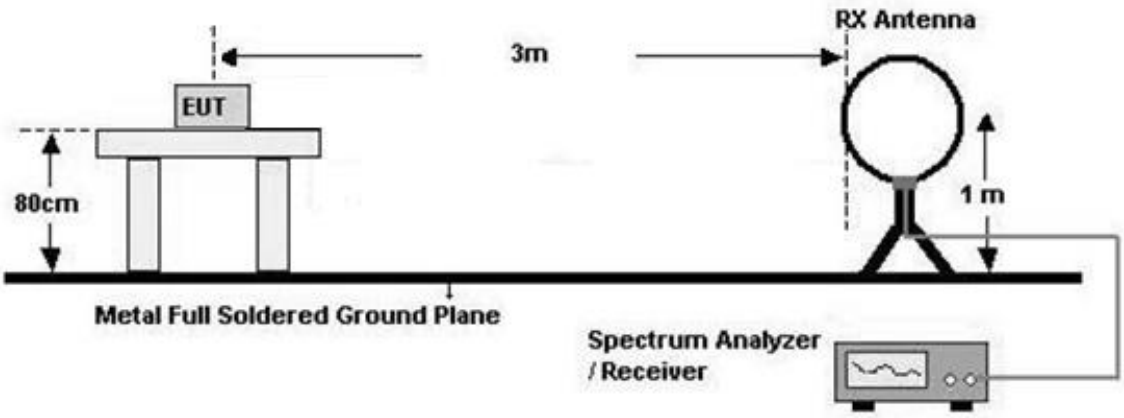
7.6. Radiated Test

Limit

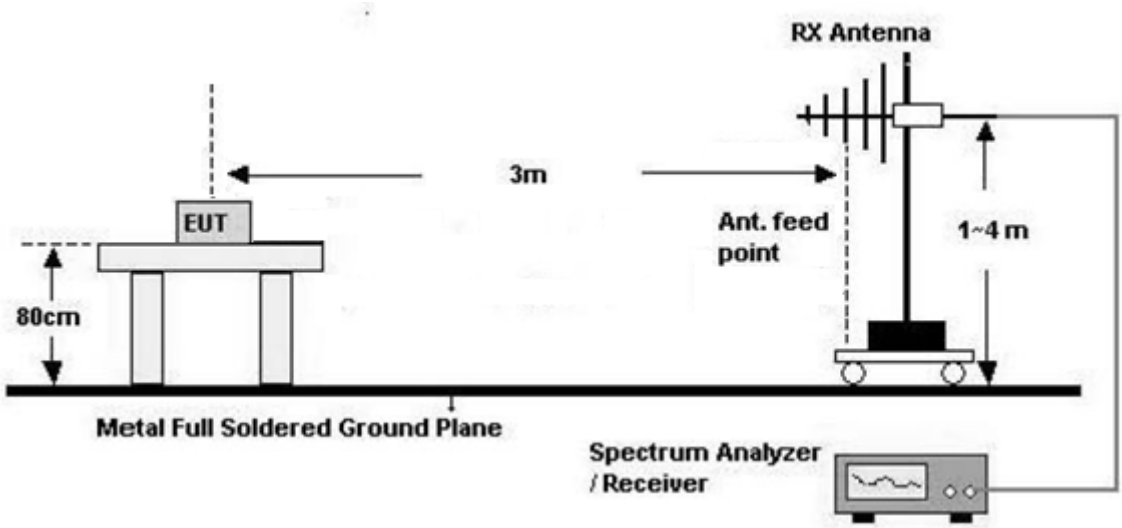
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

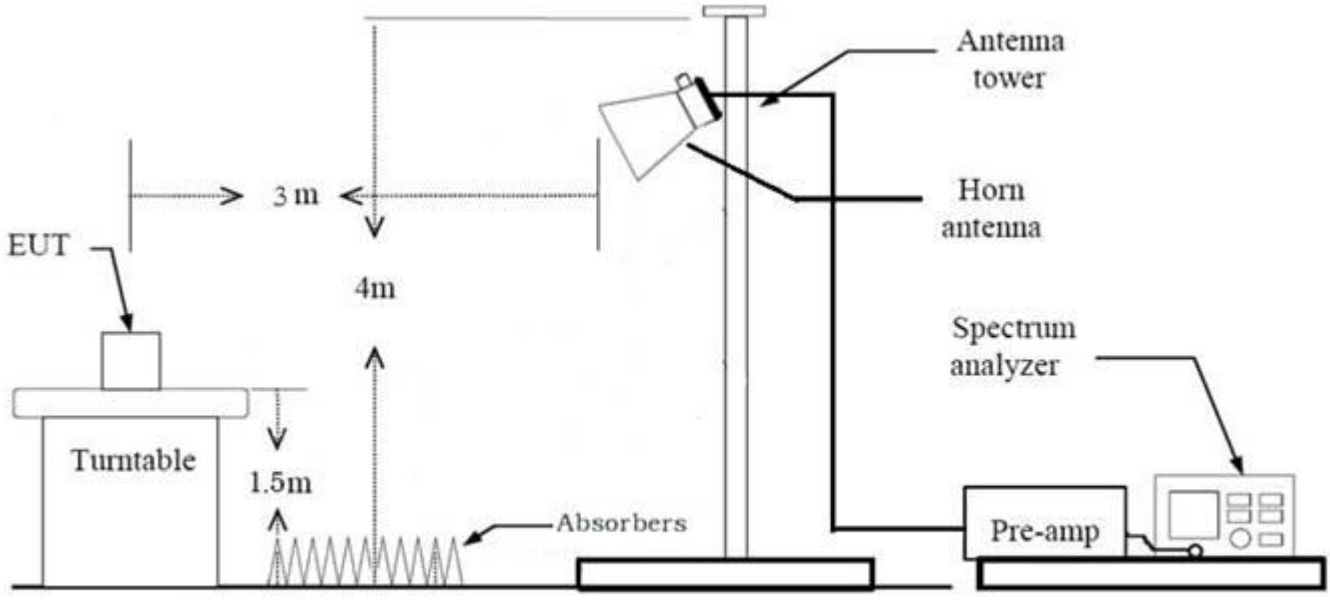
Below 30 MHz



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 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m 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 = Measured 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 1 GHz)

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 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1m to 4 m 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 = Measured 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 1 m to 4 m 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 Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

Total (Measurement Type : Average)

= Average Measured 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 1 m to 4 m 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 Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

Total(Measurement Type : Average)

= Average Measured 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) = Measured 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 : Y
   - Radiated Restricted Band Edge : X
3. All packet length of operation were investigated and the test results are worst case in lowest packet length.
   (Worst case :1M Bit/s 37 Byte, 2M Bit/s 37 Byte)
   (125k, 500k, 1M Bit/s all have the same 1MHz Band width and only Worst result is attached.)
4. All datarate of operation were investigated and the worst case configuration results are reported.
   - Worst case : 1 M, 2 M
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-A047F/DS, SM-A047F were tested and the worst case results are reported.

(Worst case : SM-A047F/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-A047F/DS, SM-A047F were tested and the worst case results are reported.

(Worst case : SM-A047F/DS)

Conducted test

1. The EUT was configured with packet length of highest power.
   - ALL supported mode tested.
   - Worst Results refer to Notes for each test item
2. SM-A047F/DS, SM-A047F were tested and the worst case results are reported.

(Worst case : SM-A047F/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

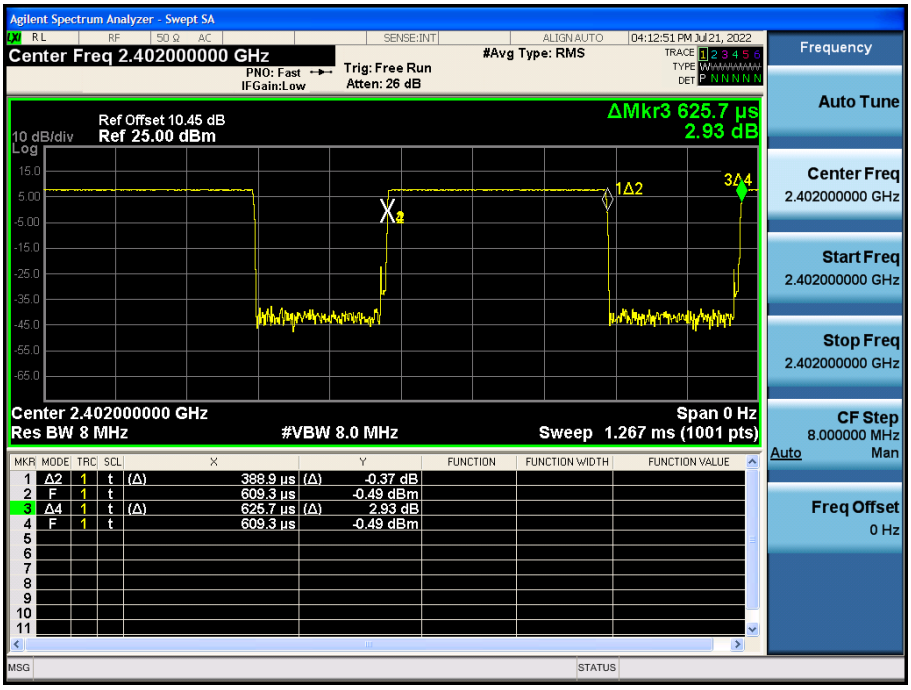
9. TEST RESULT

9.1 DUTY CYCLE

Data rate (Bit/s)	Packet length (Byte)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
1M	37	0.389	0.626	0.6215	2.07
	255	2.130	2.500	0.8520	0.70
2M	37	0.203	0.626	0.3239	4.90
	255	1.074	1.877	0.5723	2.42
125k	37	3.100	3.750	0.8267	0.83
	255	17.03	17.50	0.9733	0.12
500k	37	1.067	1.877	0.5684	2.45
	255	4.550	5.000	0.9100	0.41

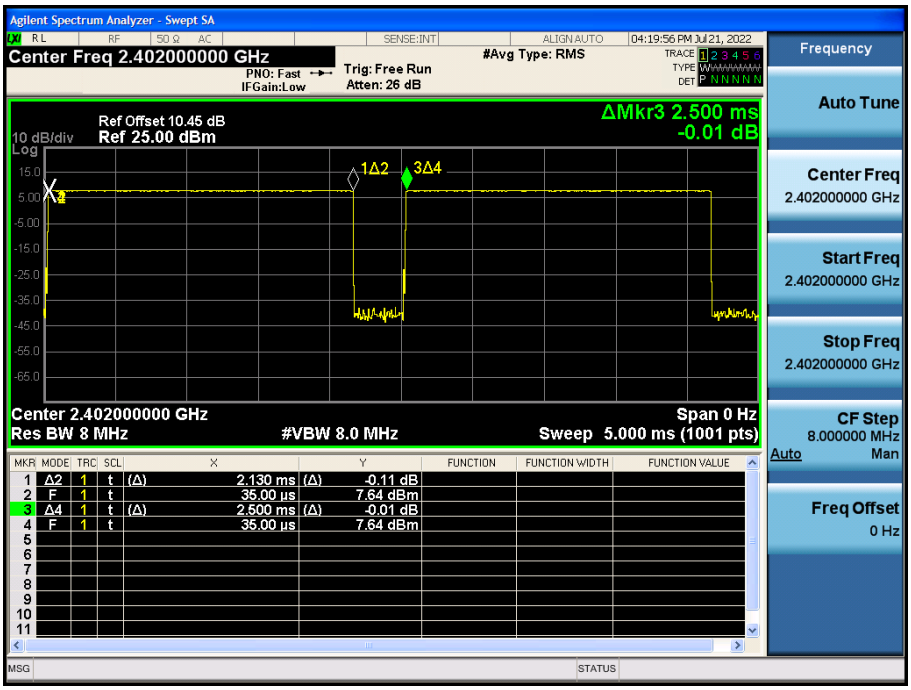
▣ 1M Bit/s (37 Byte) Test Plots

Duty Cycle (Low-CH 0)



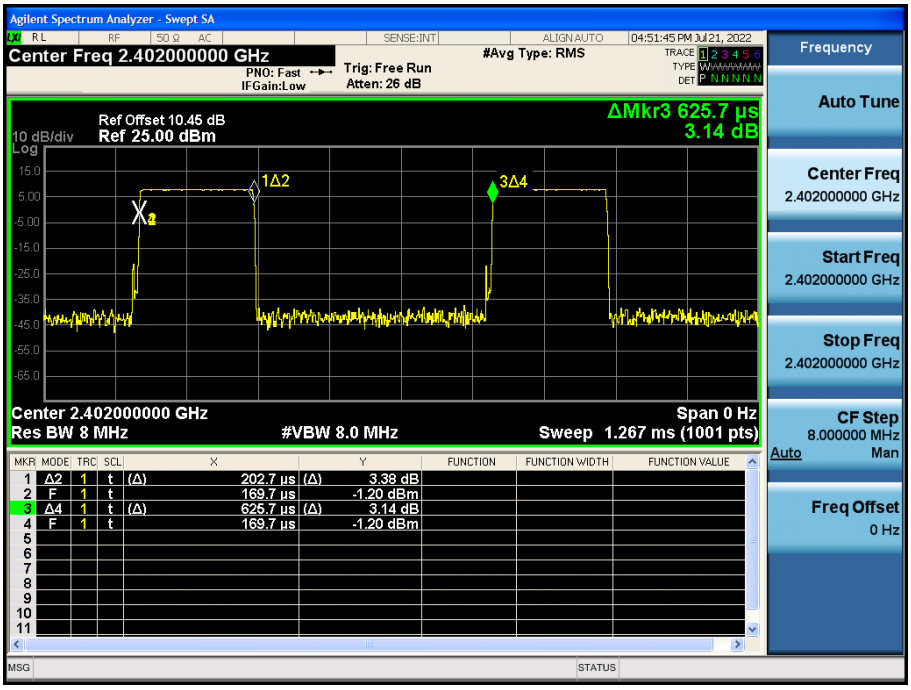
▣ 1M Bit/s (255 Byte) Test Plots

Duty Cycle (Low-CH 0)



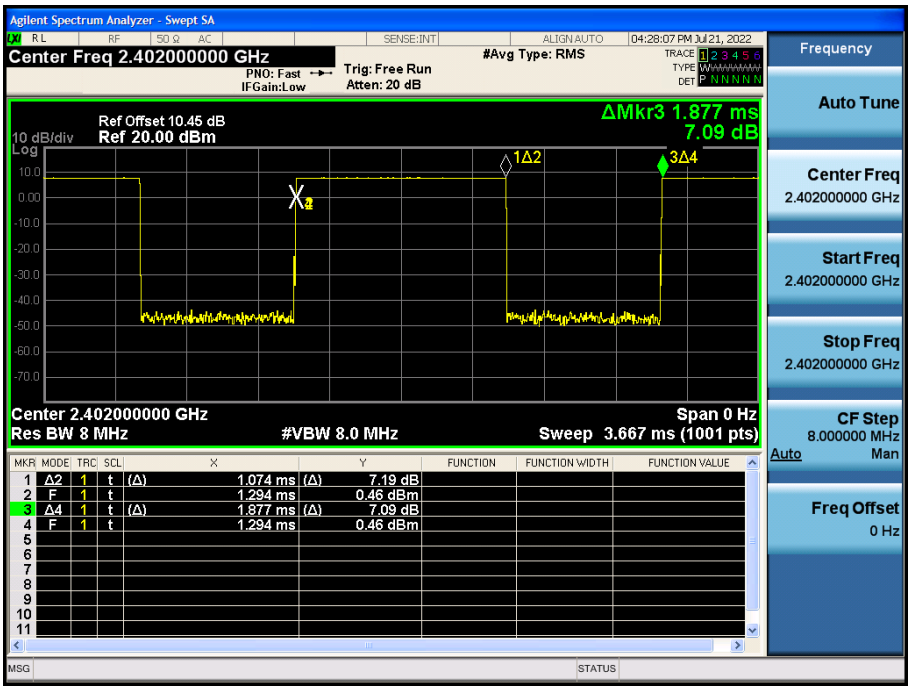
▣ 2M Bit/s (37 Byte) Test Plots

Duty Cycle (Low-CH 0)



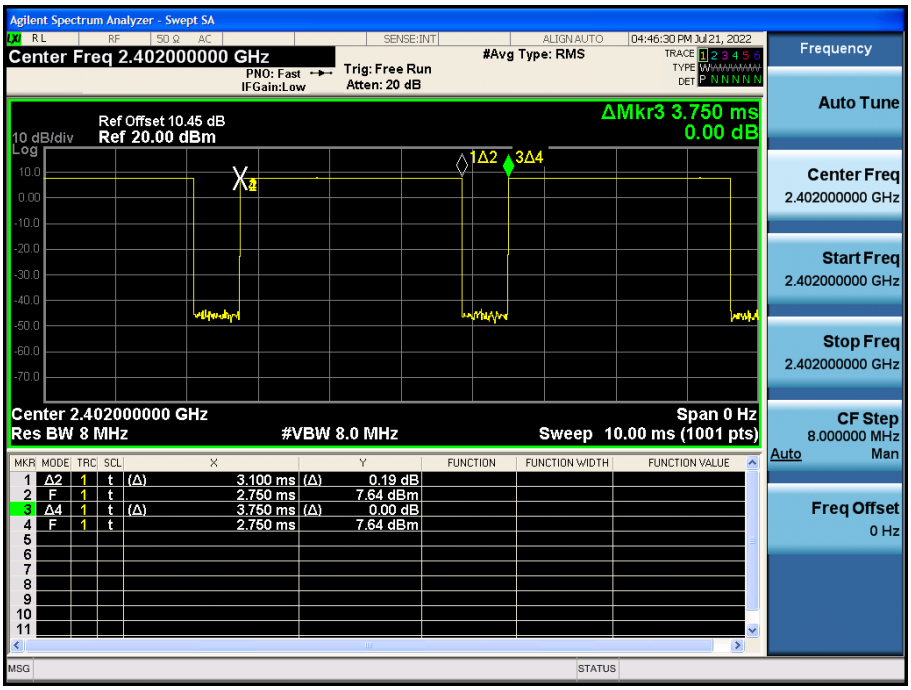
▣ 2M Bit/s (255 Byte) Test Plots

Duty Cycle (Low-CH 0)



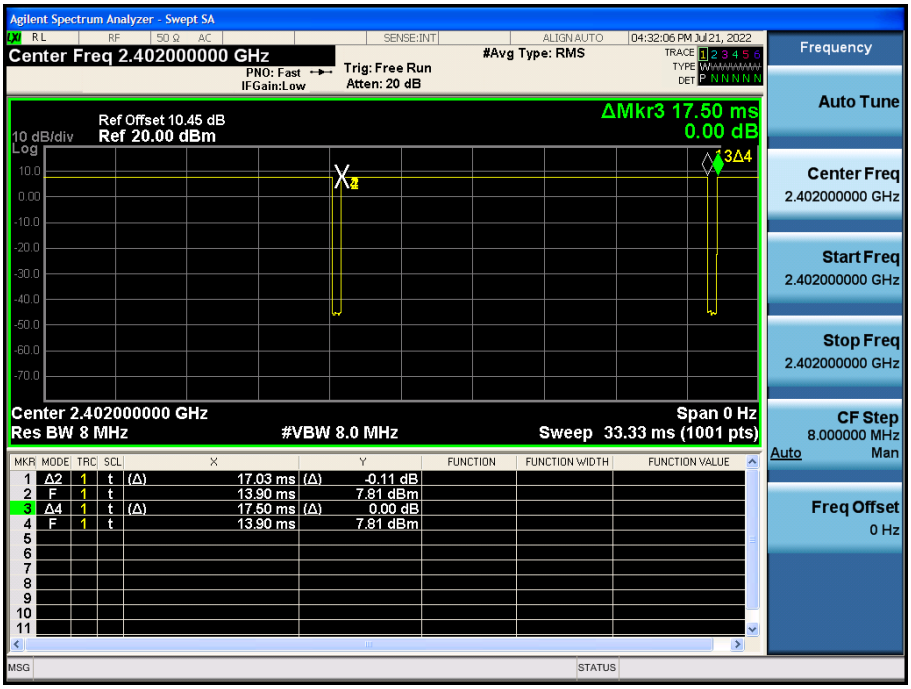
▣ 125k Bit/s(37 Byte) Test Plots

Duty Cycle (Low-CH 0)



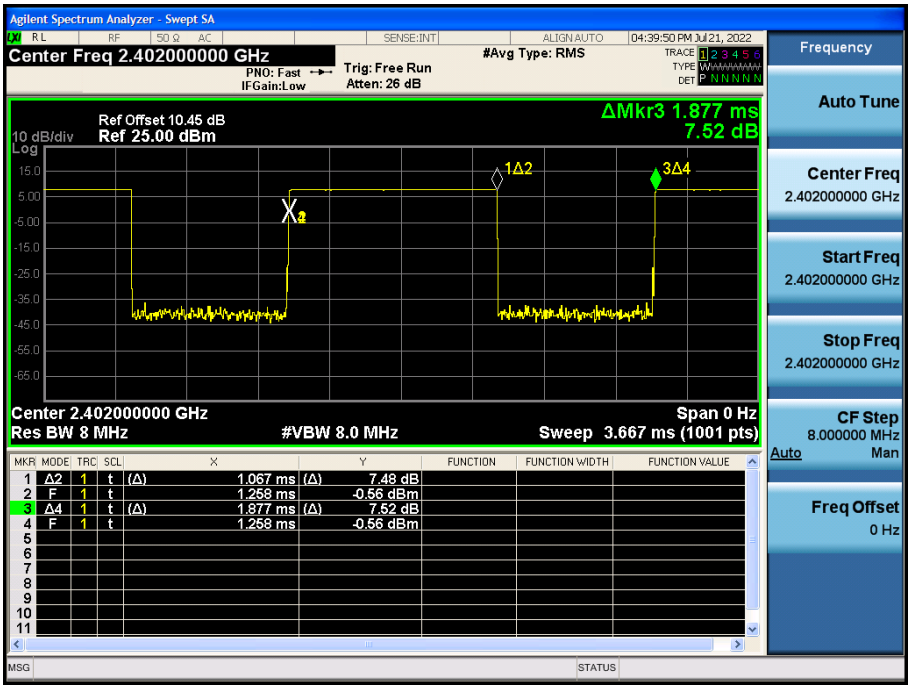
▣ 125k Bit/s(255 Byte) Test Plots

Duty Cycle (Low-CH 0)



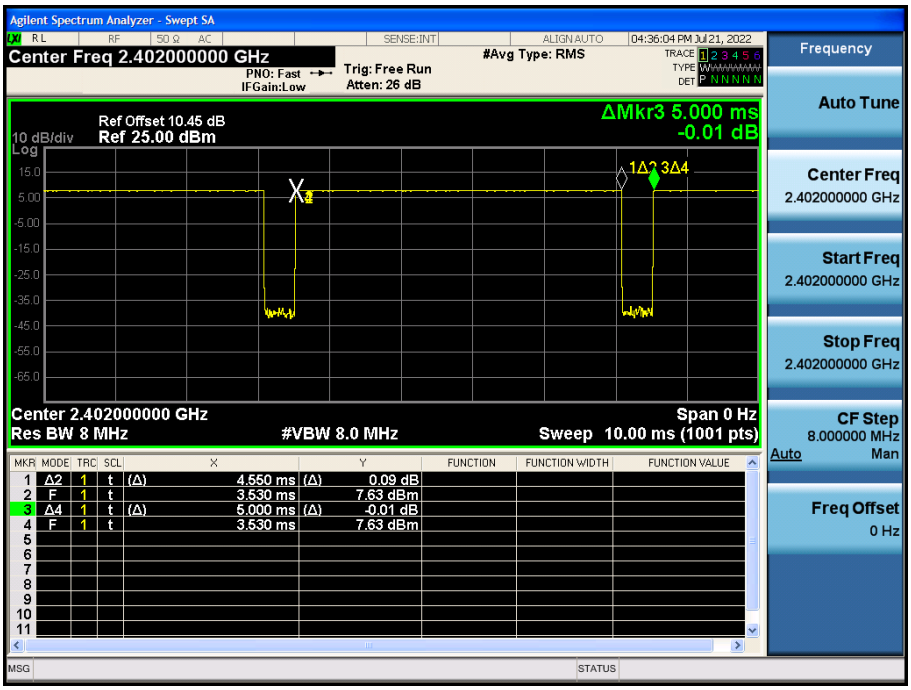
▣ 500k Bit/s(37 Byte) Test Plots

Duty Cycle (Low-CH 0)



▣ 500k Bit/s(255 Byte) Test Plots

Duty Cycle (Low-CH 0)



9.2 6 dB BANDWIDTH

Mode (Bit/s)	Channel	6 dB Bandwidth (kHz)	Limit (kHz)
1M(37)	0	726.6	> 500
	19	731.4	
	39	743.9	
1M(255)	**0**	**701.8**	> 500
	19	**703.0**	
	39	**714.1**	
2M(37)	0	1271	> 500
	19	1272	
	39	1280	
2M(255)	**0**	**1272**	> 500
	19	**1270**	
	39	**1281**	
125k(37)	**0**	**643.1**	> 500
	19	**641.9**	
	39	**663.1**	
125k(255)	0	643.1	> 500
	19	642.3	
	39	664.4	
500k(37)	0	715.4	> 500
	19	711.9	
	39	716.8	
500k(255)	**0**	**722.9**	> 500
	19	**711.2**	
	39	**709.7**	

Note:

Worst case test Plot Only

1M Bit/s: 255 Byte

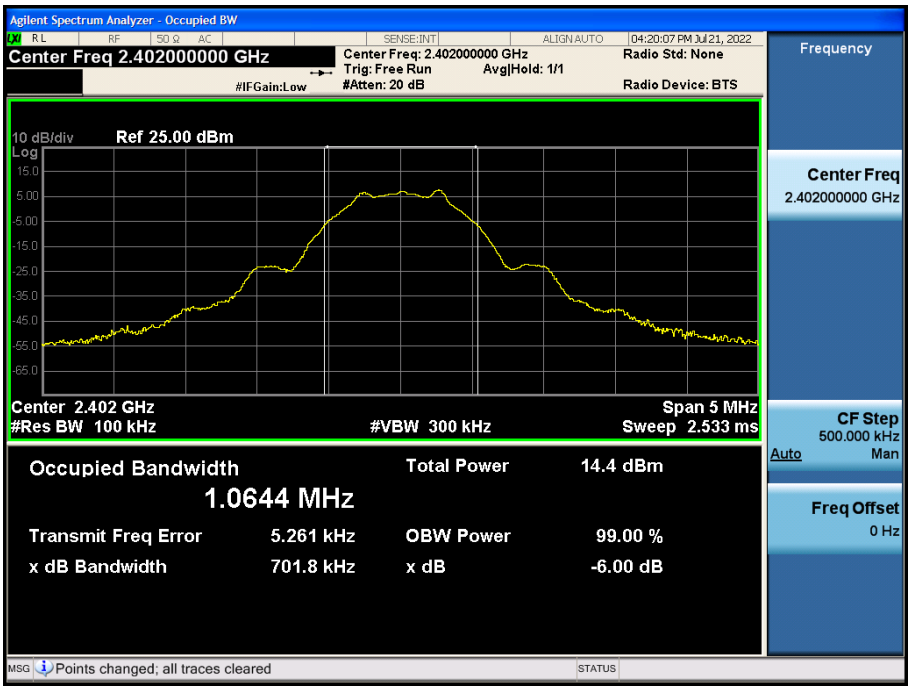
2M Bit/s: 255 Byte

125k Bit/s: 37 Byte

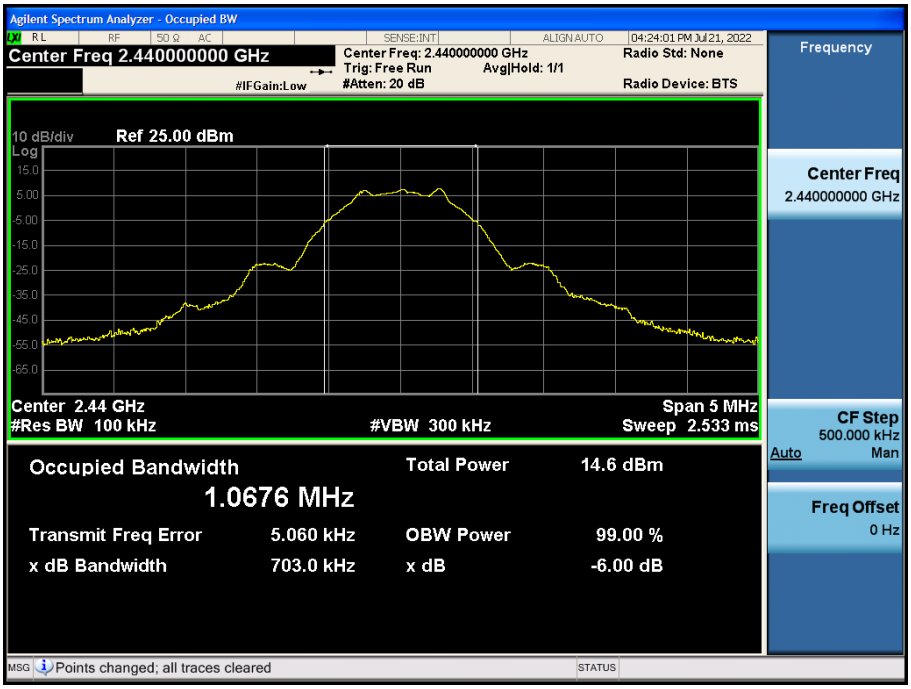
500k Bit/s: 255 Byte

▣ 1 MBit/s (255 Byte) Test Plots

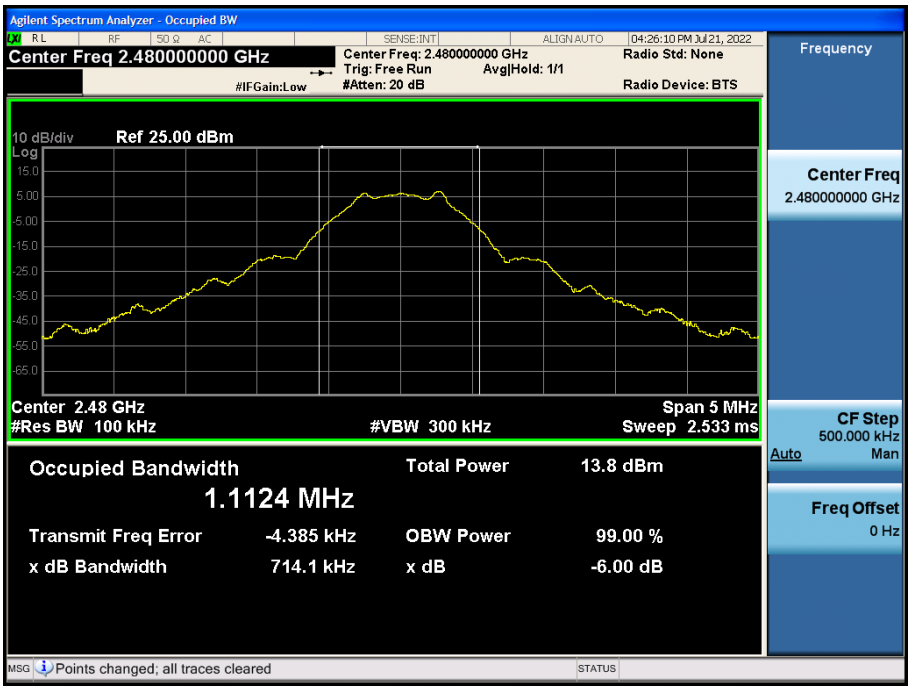
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

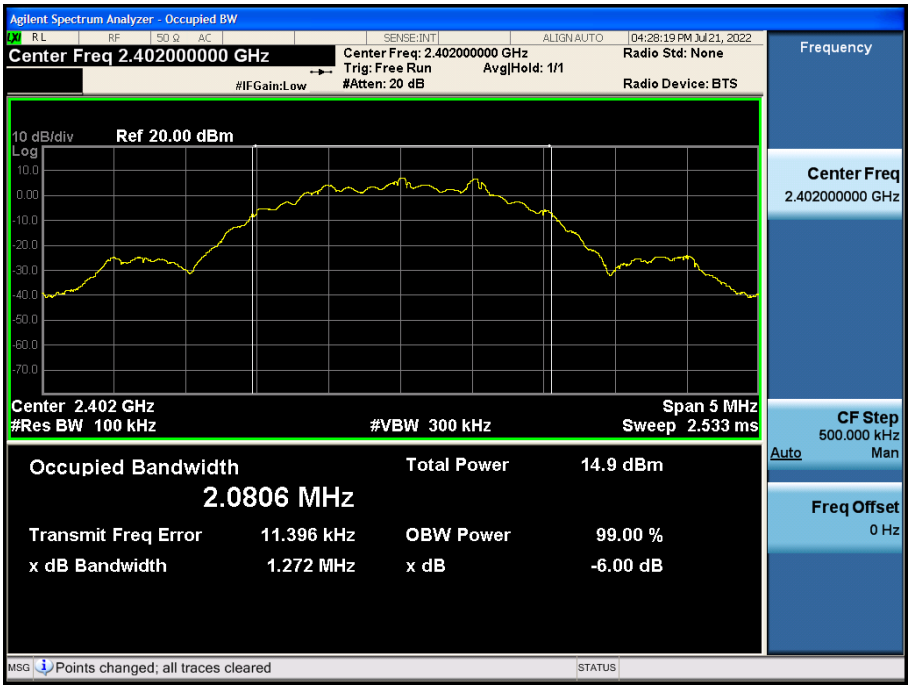


6 dB Bandwidth plot (High-CH 39)

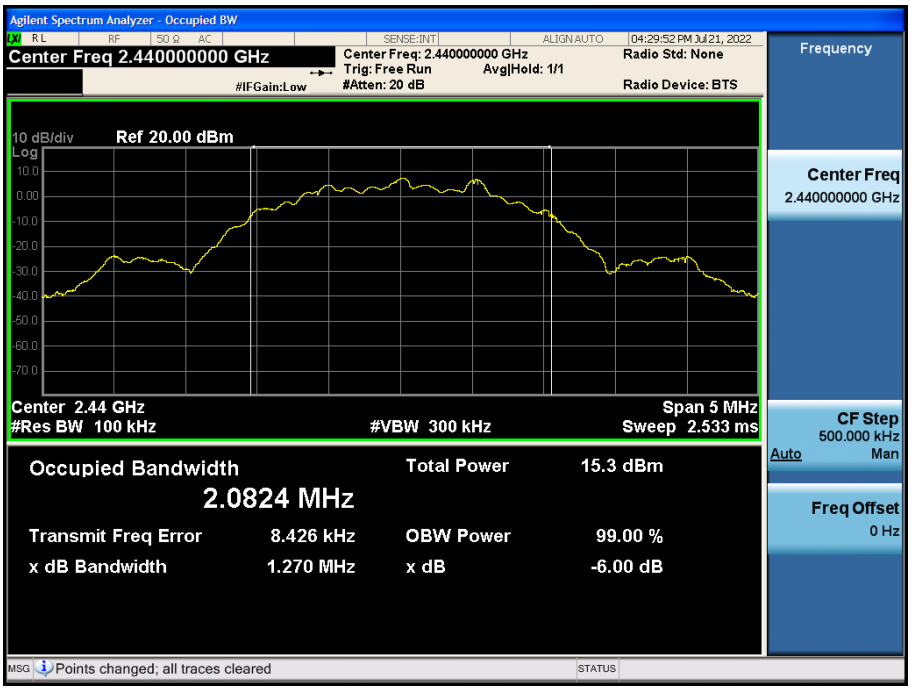


▣ 2 MBit/s (255 Byte) Test Plots

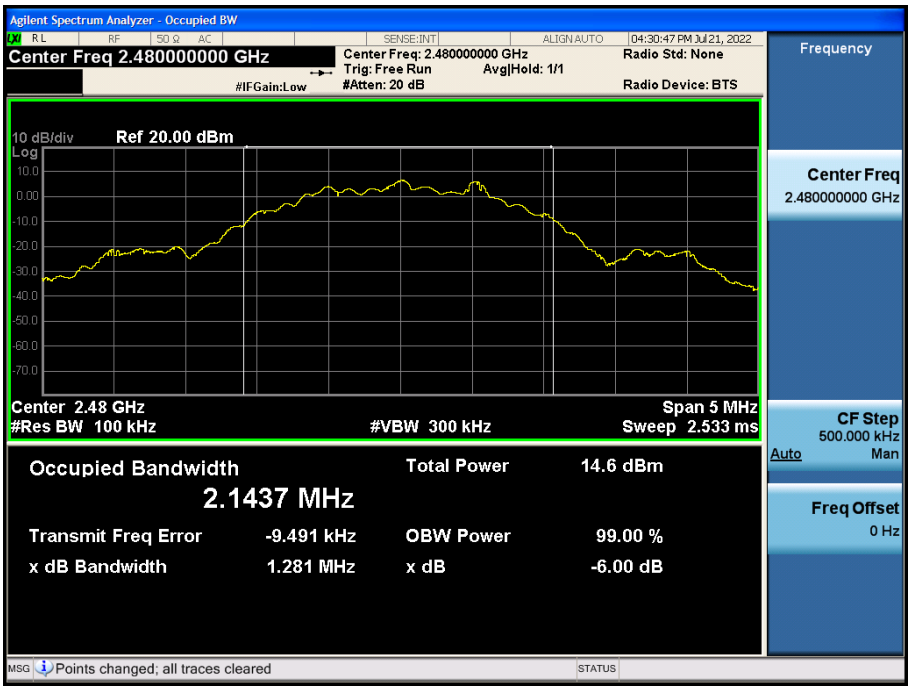
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

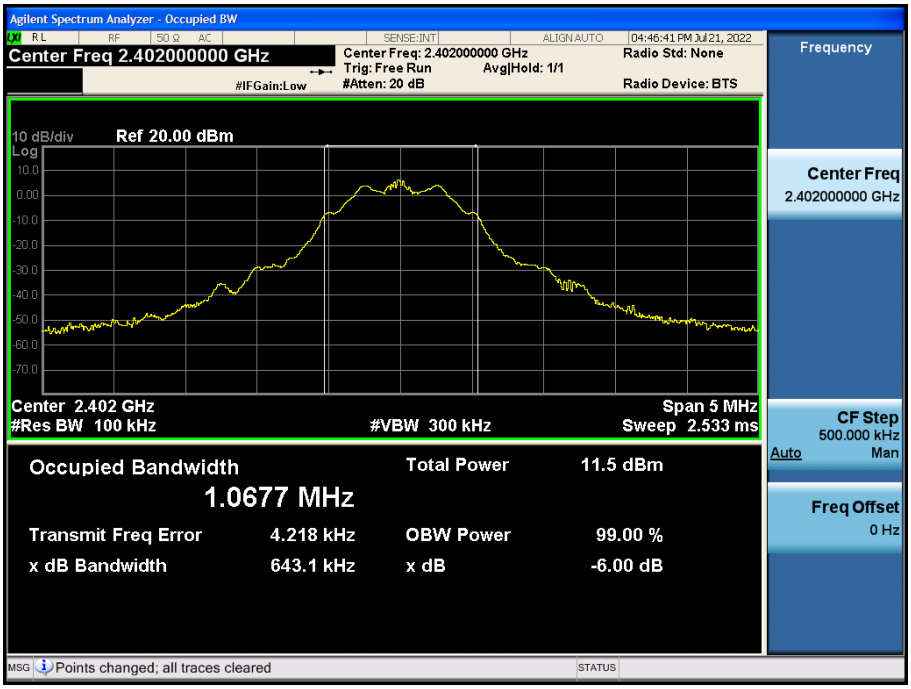


6 dB Bandwidth plot (High-CH 39)

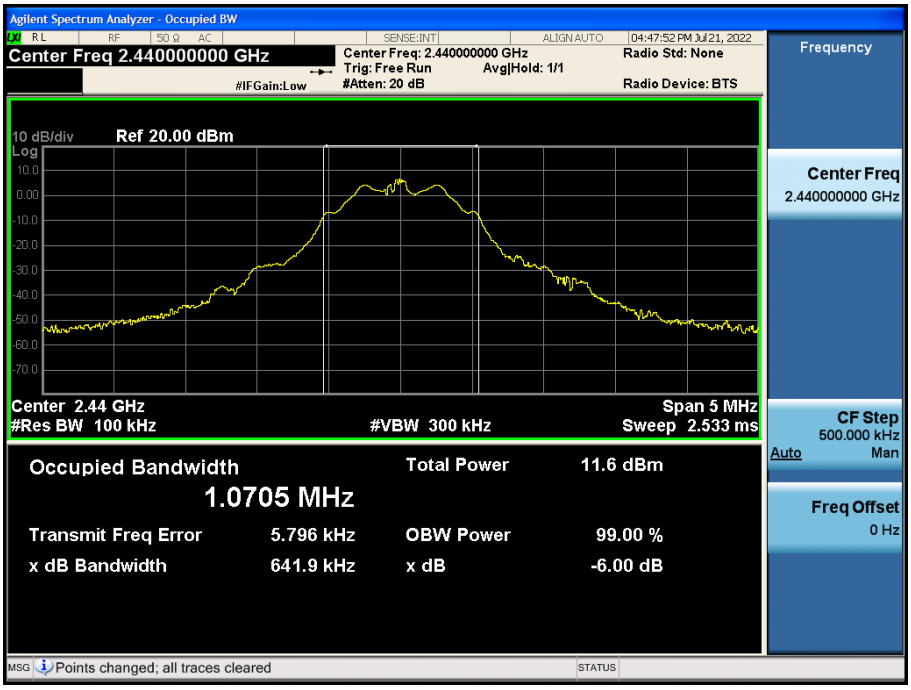


▣ 125k Bit/s(37 Byte) Test Plots

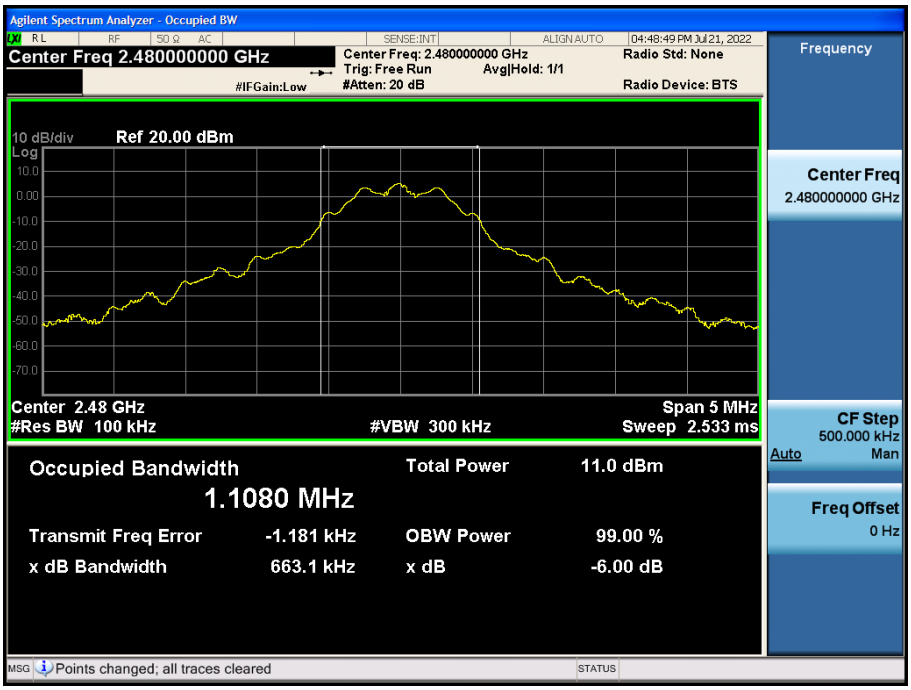
6 dB Bandwidth plot (Low-CH 0)



6 dB Bandwidth plot (Mid-CH 19)

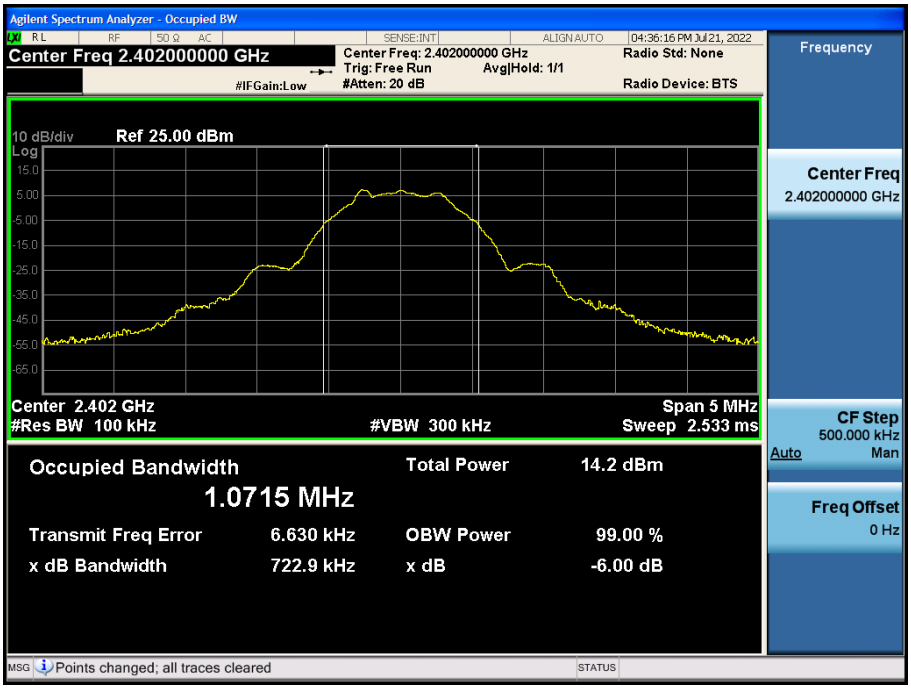


6 dB Bandwidth plot (High-CH 39)

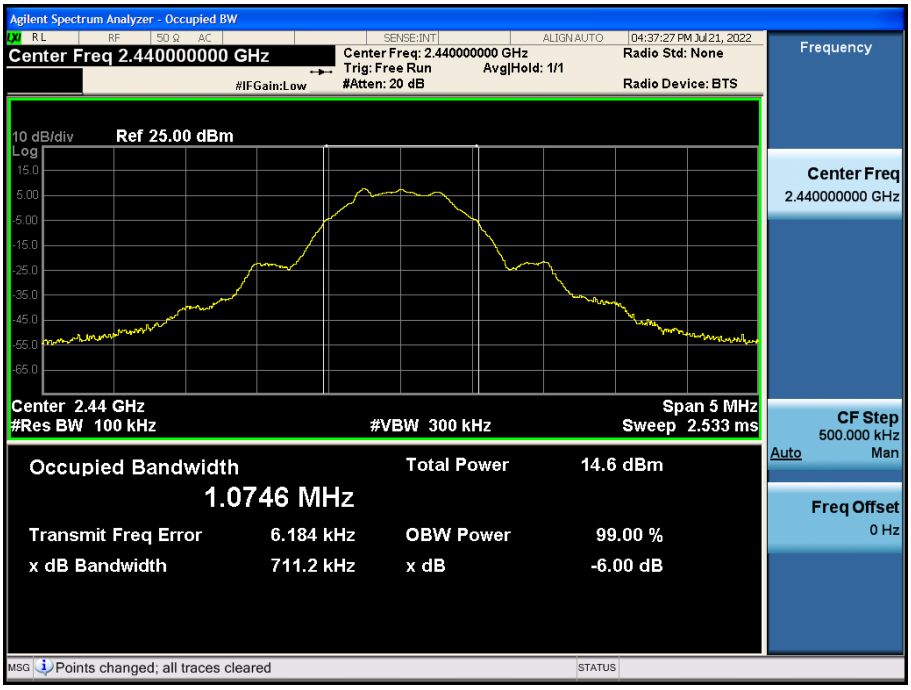


▣ 500k Bit/s(255 Byte) Test Plots

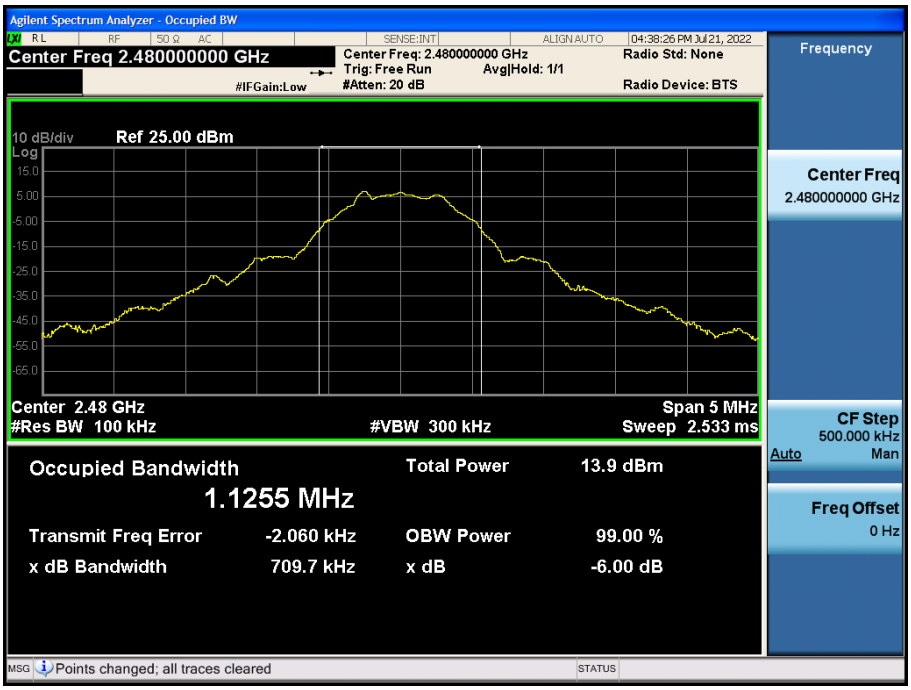
6 dB Bandwidth plot (Low-CH 0)



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	7.754	30
		2440	19	8.052	
		2480	39	7.600	
	255	2402	0	7.695	
		2440	19	7.973	
		2480	39	7.454	
2M	37	2402	0	7.838	
		2440	19	8.150	
		2480	39	7.704	
	255	2402	0	7.818	
		2440	19	8.104	
		2480	39	7.673	
125k	37	2402	0	7.710	
		2440	19	7.976	
		2480	39	7.480	
	255	2402	0	7.679	
		2440	19	7.956	
		2480	39	7.452	
500k	37	2402	0	7.757	
		2440	19	8.065	
		2480	39	7.551	
	255	2402	0	7.683	
		2440	19	7.982	
		2480	39	7.495	

Note :

1. Power meter offset = Attenuator loss + Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.45 dB is offset for 2.4 GHz Band.

Average Power

Data rate (Bit/s)	Packet length (Byte)	LE Mode		Measured Power (dBm)	Duty Cycle Factor (dB)	Result (dBm)	Limit (dBm)
		Frequency [MHz]	Channel				
1M	37	2402	0	5.35	2.07	7.42	30
		2440	19	5.66	2.07	7.73	
		2480	39	4.95	2.07	7.02	
	255	2402	0	6.74	0.70	7.44	
		2440	19	6.95	0.70	7.65	
		2480	39	6.17	0.70	6.87	
2M	37	2402	0	2.54	4.90	7.44	
		2440	19	2.83	4.90	7.73	
		2480	39	2.22	4.90	7.12	
	255	2402	0	4.95	2.42	7.37	
		2440	19	5.26	2.42	7.68	
		2480	39	4.33	2.42	6.75	
125k	37	2402	0	6.63	0.83	7.46	
		2440	19	6.84	0.83	7.67	
		2480	39	6.20	0.83	7.03	
	255	2402	0	7.31	0.12	7.43	
		2440	19	7.54	0.12	7.66	
		2480	39	6.87	0.12	6.99	
500k	37	2402	0	5.05	2.45	7.50	
		2440	19	5.23	2.45	7.68	
		2480	39	4.66	2.45	7.11	
	255	2402	0	7.05	0.41	7.46	
		2440	19	7.22	0.41	7.63	
		2480	39	6.54	0.41	6.95	

Note :

1. Power meter offset = Attenuator loss + Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.45 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	1 MBit/s 37 Byte	-0.991	2.07	1.075	8 dBm / 3 kHz
2440	19		-0.683	2.07	1.383	
2480	39		-1.616	2.07	0.450	
2402	0	1 MBit/s 255 Byte	0.212	0.70	0.908	
2440	19		0.253	0.70	0.949	
2480	39		-0.430	0.70	0.266	
2402	0	2 MBit/s 37 Byte	-4.919	4.90	-0.023	
2440	19		-4.445	4.90	0.451	
2480	39		-5.943	4.90	-1.047	
2402	0	2 MBit/s 255 Byte	-4.507	2.42	-2.083	
2440	19		-3.892	2.42	-1.468	
2480	39		-4.530	2.42	-2.106	
2402	0	125k 37 Byte	**0.810**	**0.83**	**1.637**	
2440	19		**1.196**	**0.83**	**2.023**	
2480	39		**0.375**	**0.83**	**1.202**	
2402	0	125k 255 Byte	1.546	0.12	1.663	
2440	19		1.753	0.12	1.870	
2480	39		1.001	0.12	1.118	
2402	0	500k 37 Byte	-2.037	2.45	0.417	
2440	19		-1.614	2.45	0.840	
2480	39		-2.447	2.45	0.007	
2402	0	500k 255 Byte	0.168	0.41	0.578	
2440	19		0.460	0.41	0.870	
2480	39		-0.166	0.41	0.244	

Note :

1. Spectrum measured Value 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
3. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 10.45 dB is offset for 2.4 GHz Band.
4. Worst case test Plot Only : 125k Bit/s (37 Byte)

▣ 125k 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.

[BAND EDGE]

Frequency (MHz)	Mode	Channel No.	Position	Test Result	
				Measured Level (dB)	Limit (dBc)
2402	1M Bit/s 37 Byte	0	Lower	54.987	30
2480		39	Upper	57.916	30
2402	1M Bit/s 255 Byte	0	Lower	57.386	30
2480		39	Upper	59.312	30
2402	2M Bit/s 37 Byte	0	Lower	32.158	30
2480		39	Upper	50.335	30
2402	2M Bit/s 255 Byte	0	Lower	**31.960**	30
2480		39	Upper	**50.137**	30
2402	125k Bit/s 37 Byte	0	Lower	56.617	30
2480		39	Upper	60.299	30
2402	125k Bit/s 255 Byte	0	Lower	53.277	30
2480		39	Upper	60.022	30
2402	500k Bit/s 37 Byte	0	Lower	56.830	30
2480		39	Upper	60.019	30
2402	500k Bit/s 255 Byte	0	Lower	57.246	30
2480		39	Upper	60.484	30

Note :

1. Worst case test Plot
   (1) Lower 2M Bit/s (255 Byte)
   (2) Upper 2M Bit/s (255 Byte)

[CONDUCTED SPURIOUS EMISSIONS]

Note :

1. Worst case test Plot
   (1) 2M Bit/s (37 Byte)
   (2) 125 Bit/s (37 Byte)

▣ 2M Bit/s (255 Byte) Test Plots –Band Edge

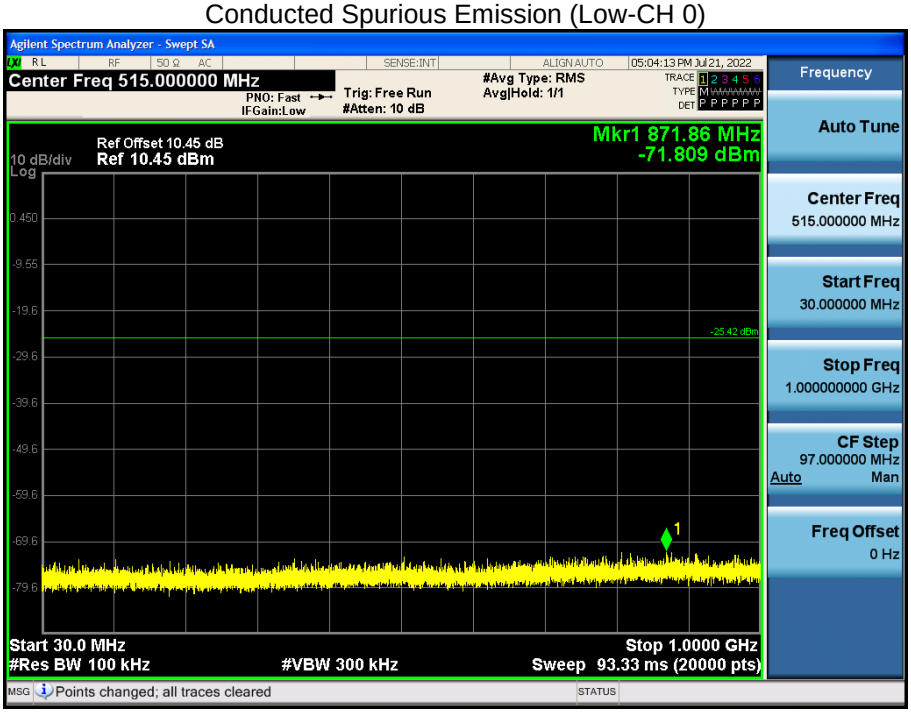
Low-CH 0

High-CH 39

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

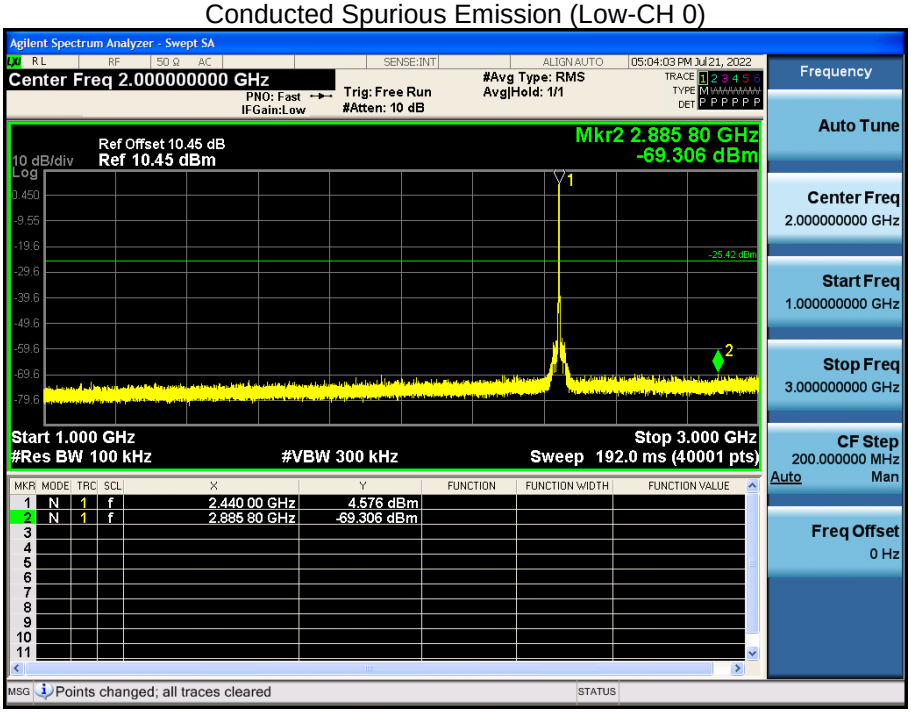
30 MHz ~ 1 GHz

Conducted Spurious Emission (Low-CH 0)



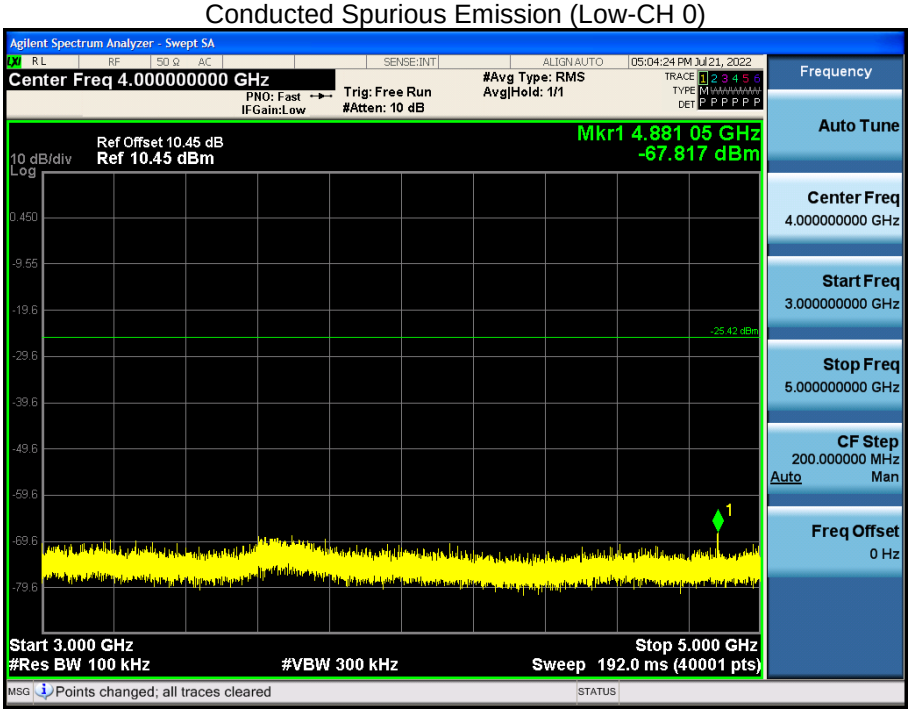
1 GHz ~ 3 GHz

Conducted Spurious Emission (Low-CH 0)



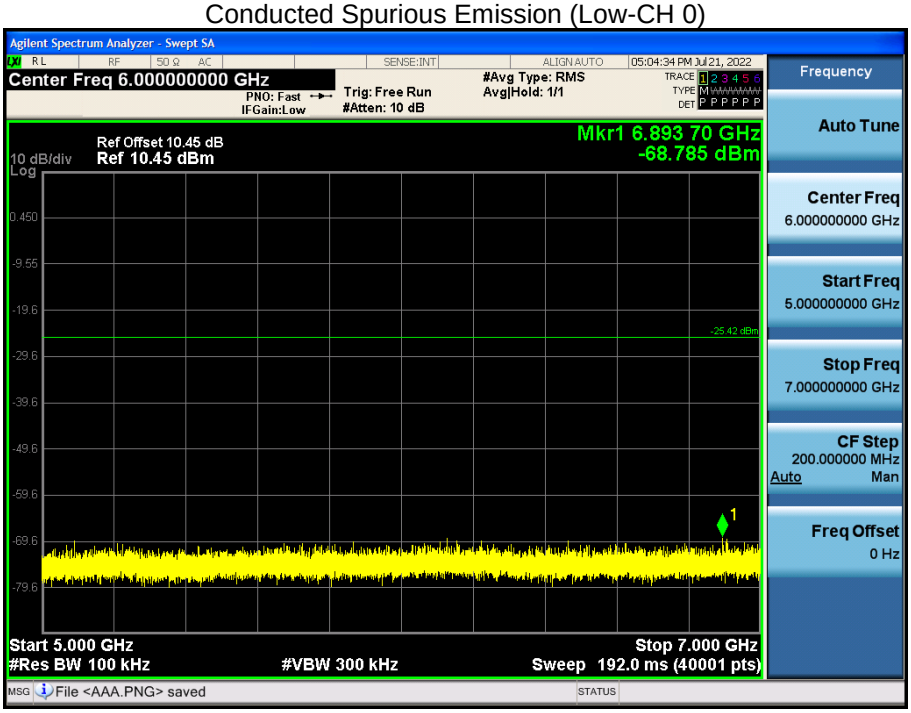
3 GHz ~ 5 GHz

Conducted Spurious Emission (Low-CH 0)



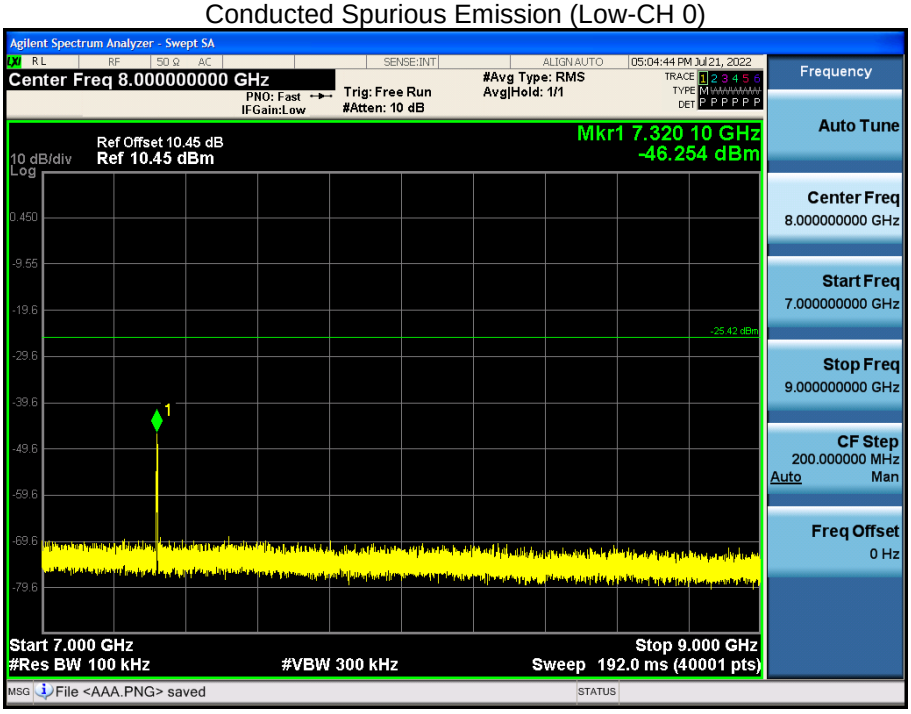
5 GHz ~ 7 GHz

Conducted Spurious Emission (Low-CH 0)



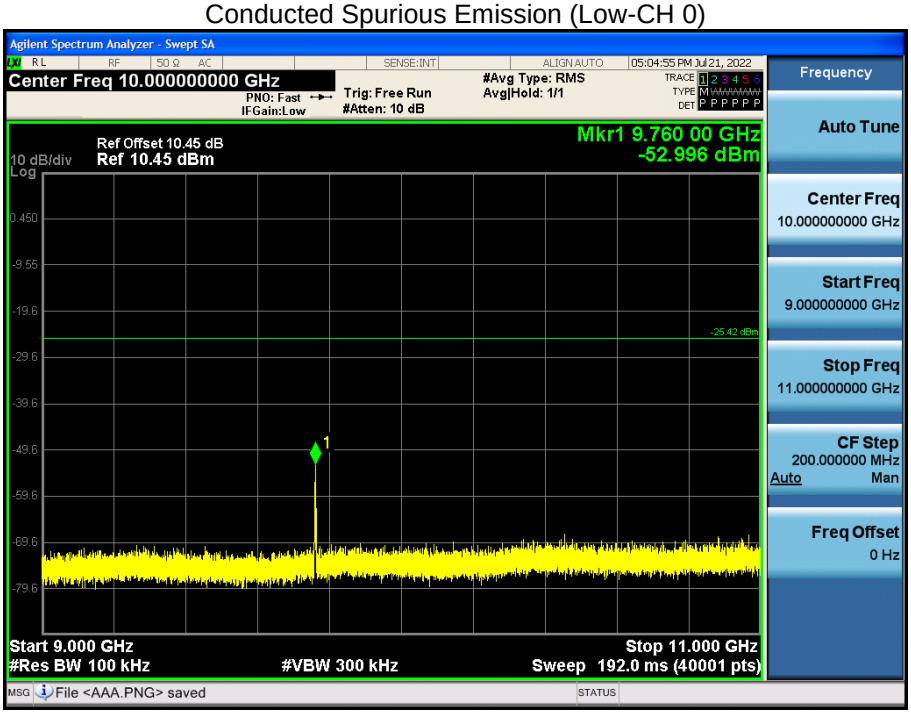
7 GHz ~ 9 GHz

Conducted Spurious Emission (Low-CH 0)



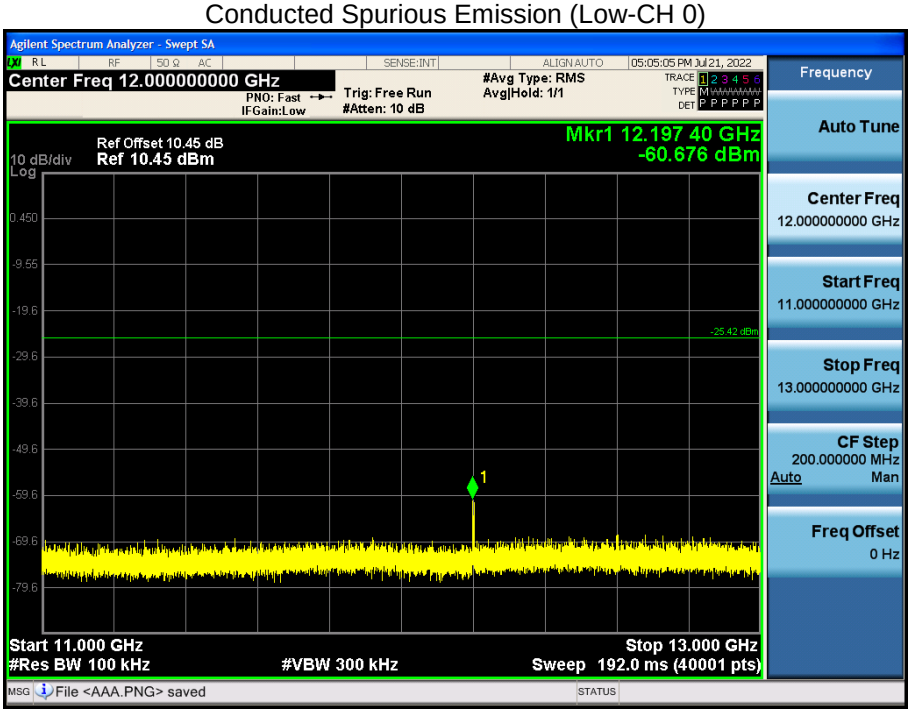
9 GHz ~ 11 GHz

Conducted Spurious Emission (Low-CH 0)



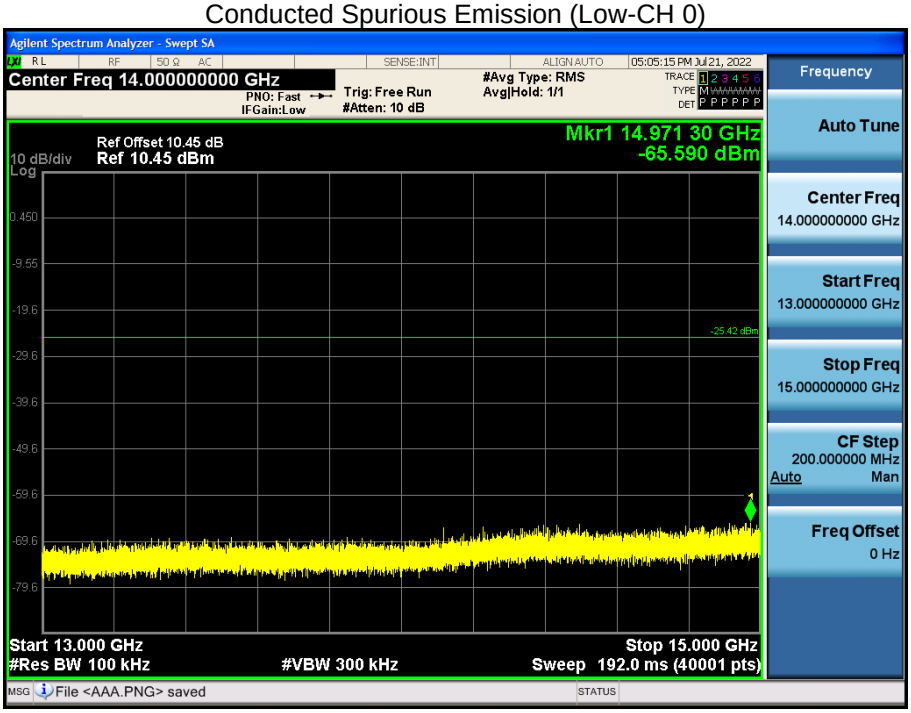
11 GHz ~ 13 GHz

Conducted Spurious Emission (Low-CH 0)



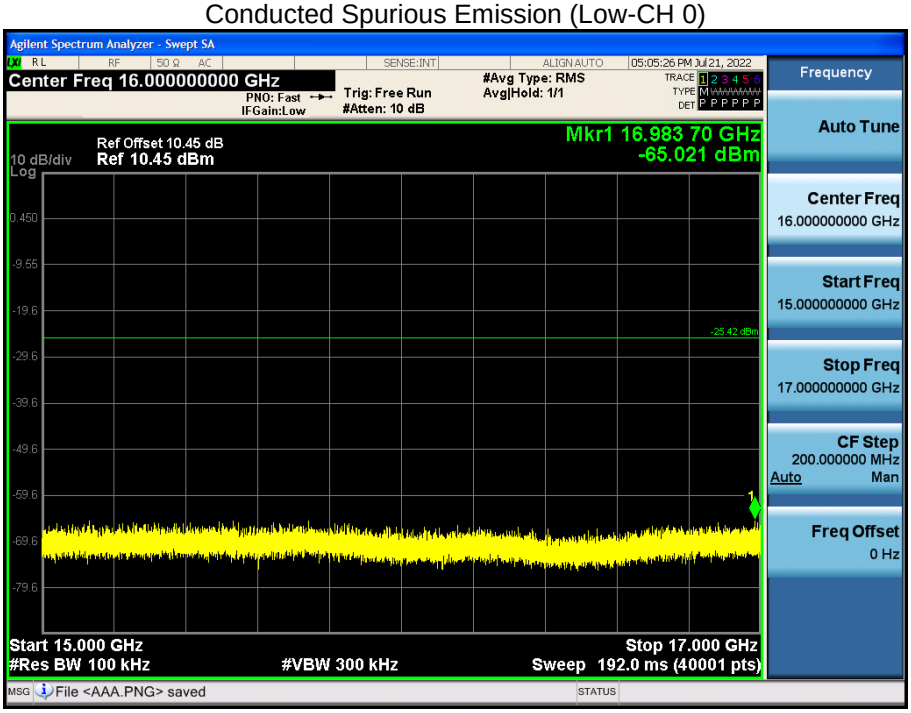
13 GHz ~ 15 GHz

Conducted Spurious Emission (Low-CH 0)



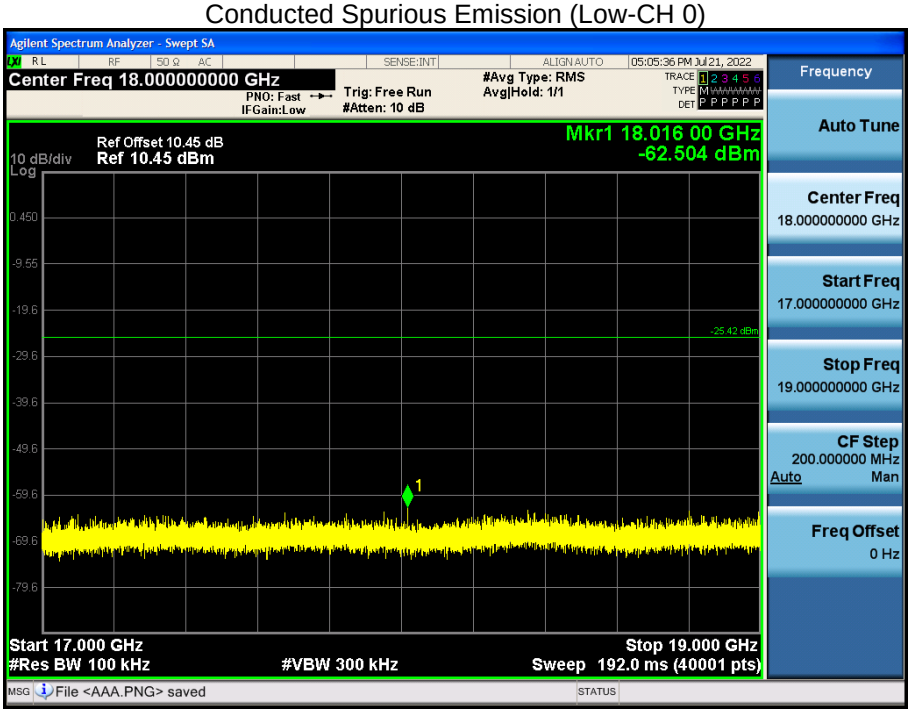
15 GHz ~ 17 GHz

Conducted Spurious Emission (Low-CH 0)



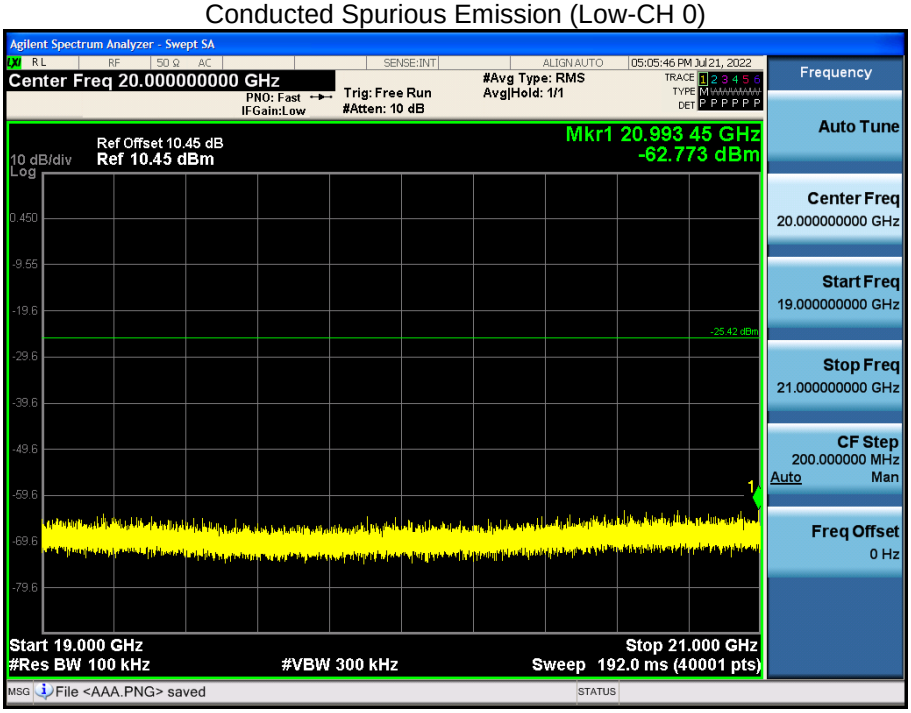
17 GHz ~ 19 GHz

Conducted Spurious Emission (Low-CH 0)



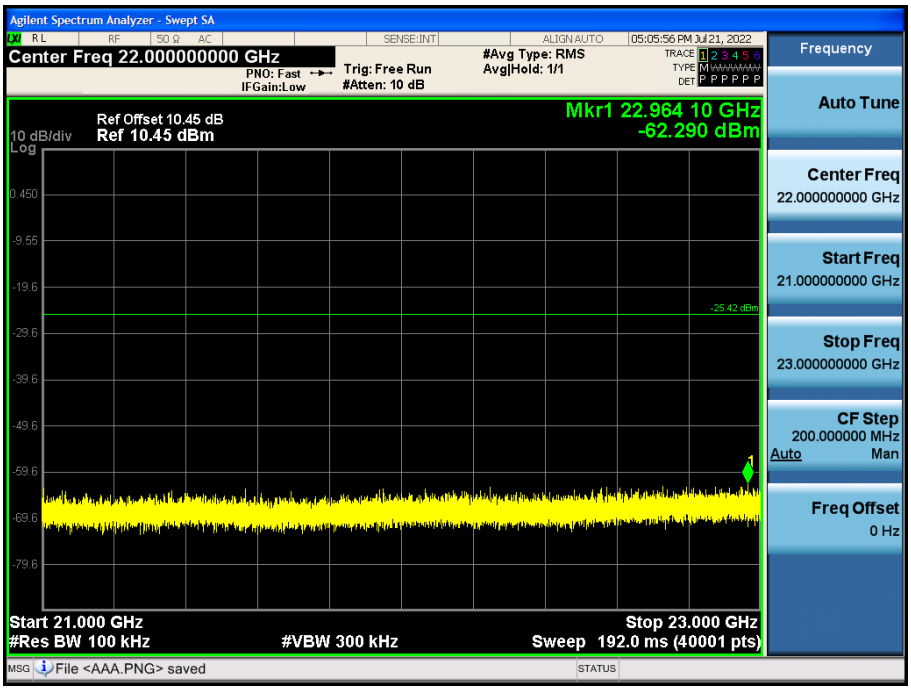
19 GHz ~ 21 GHz

Conducted Spurious Emission (Low-CH 0)



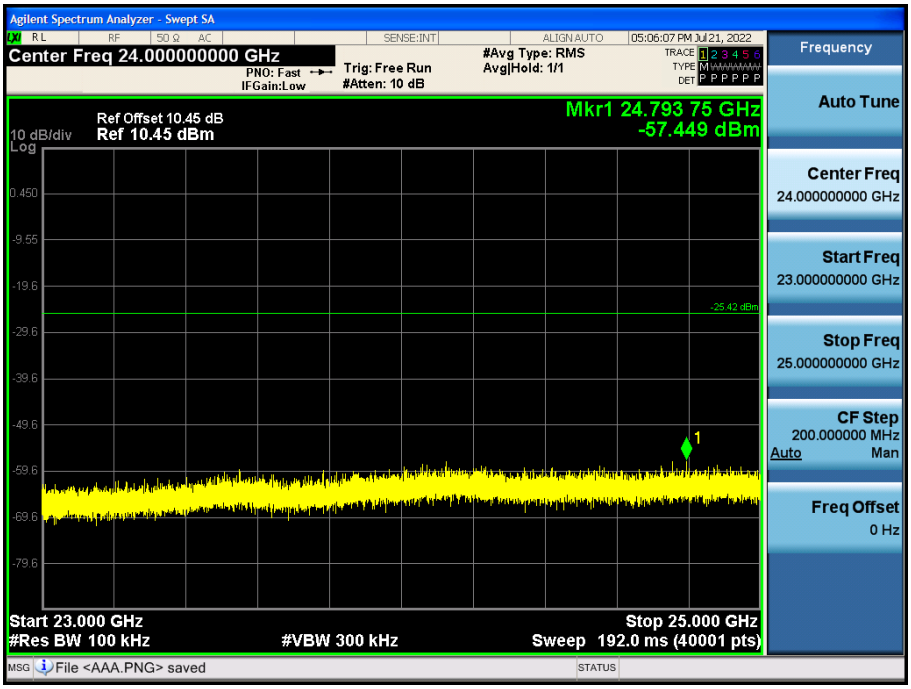
21 GHz ~ 23 GHz

Conducted Spurious Emission (Low-CH 0)



23 GHz ~ 25 GHz

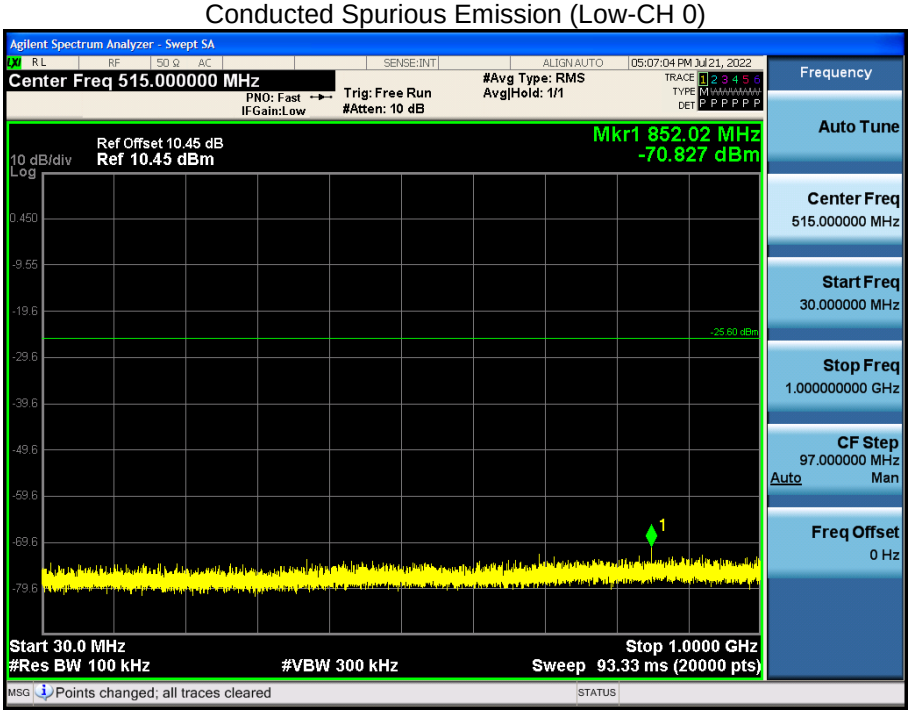
Conducted Spurious Emission (Low-CH 0)



▣ 125k Bit/s (37 Byte) Test Plots -Conducted Spurious Emission

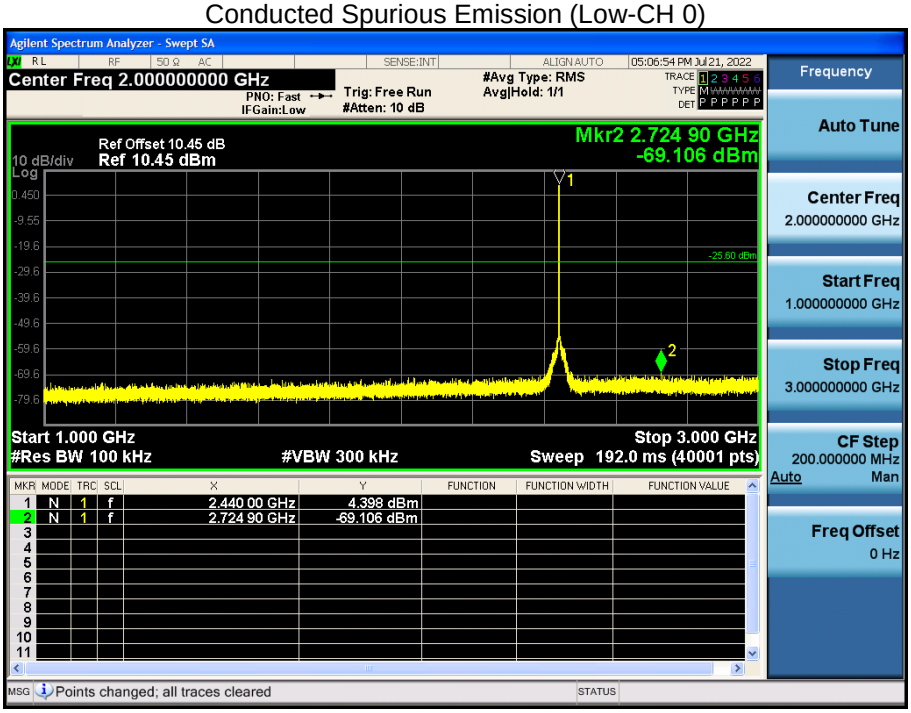
30 MHz ~ 1 GHz

Conducted Spurious Emission (Low-CH 0)



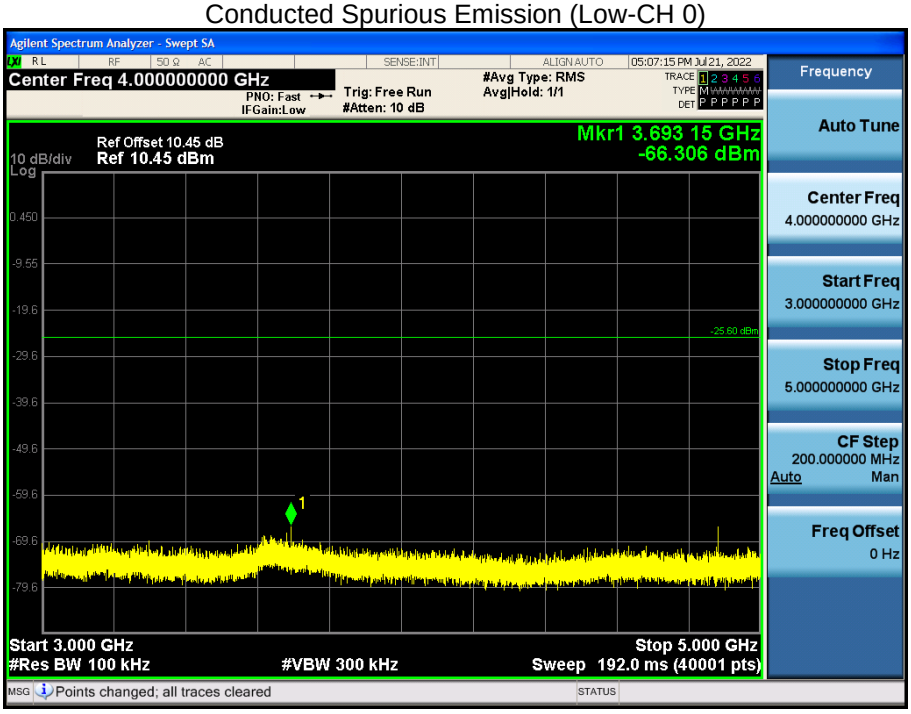
1 GHz ~ 3 GHz

Conducted Spurious Emission (Low-CH 0)



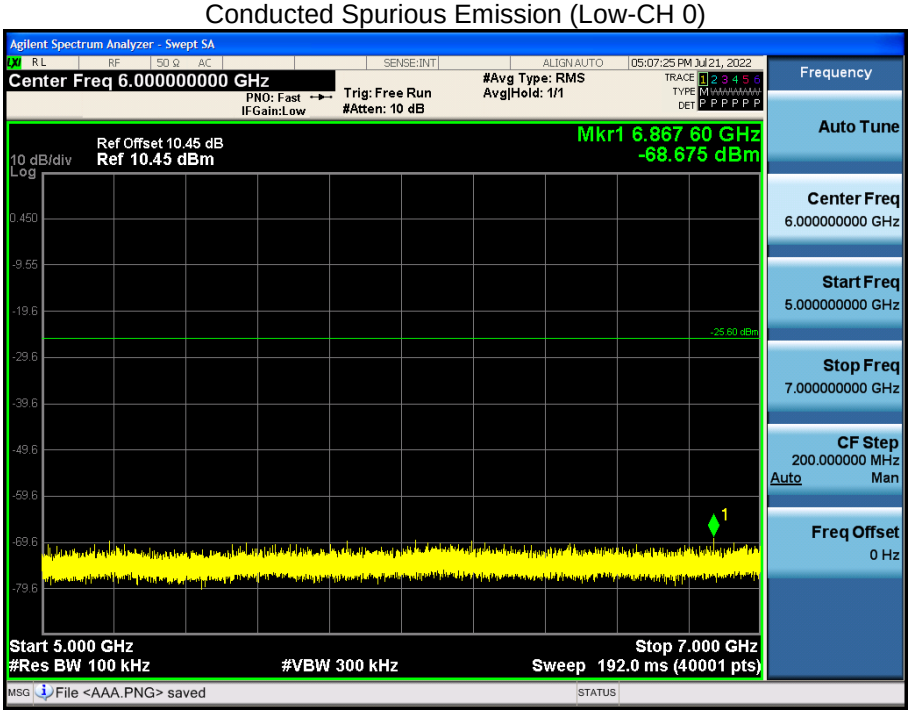
3 GHz ~ 5 GHz

Conducted Spurious Emission (Low-CH 0)



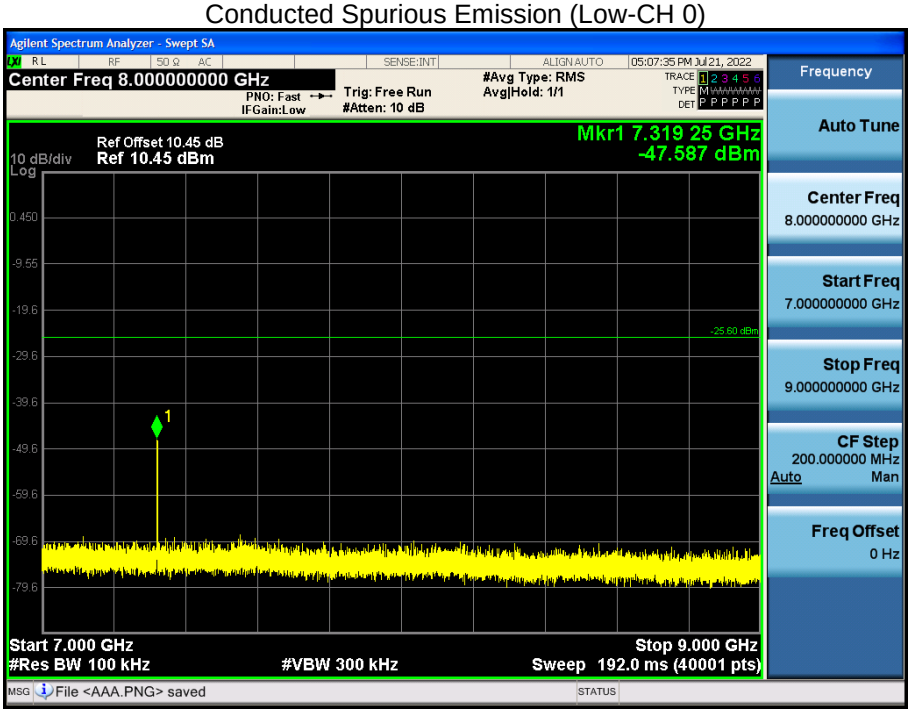
5 GHz ~ 7 GHz

Conducted Spurious Emission (Low-CH 0)



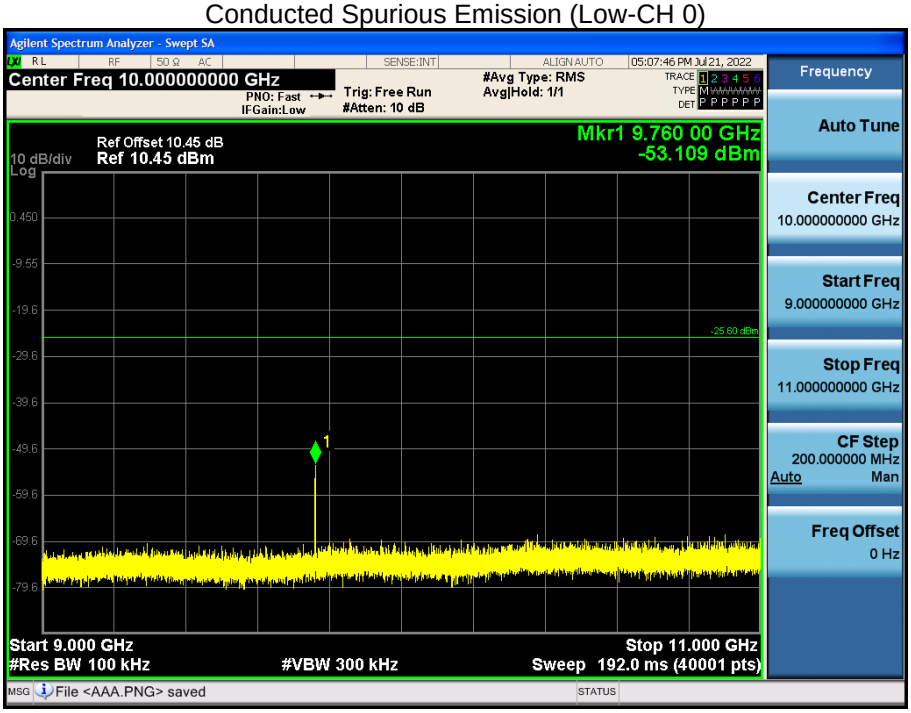
7 GHz ~ 9 GHz

Conducted Spurious Emission (Low-CH 0)



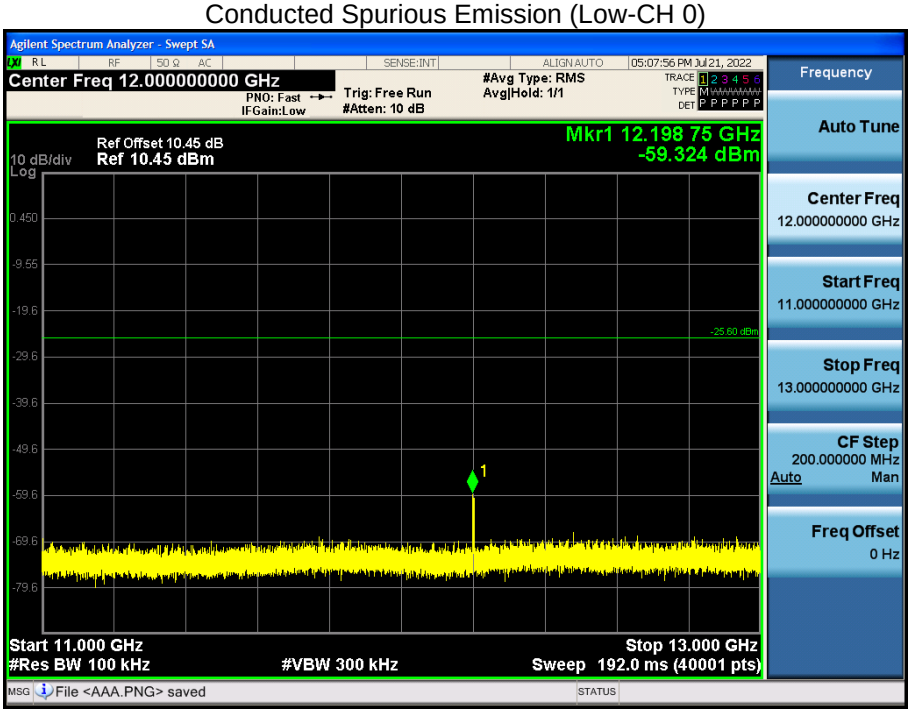
9 GHz ~ 11 GHz

Conducted Spurious Emission (Low-CH 0)



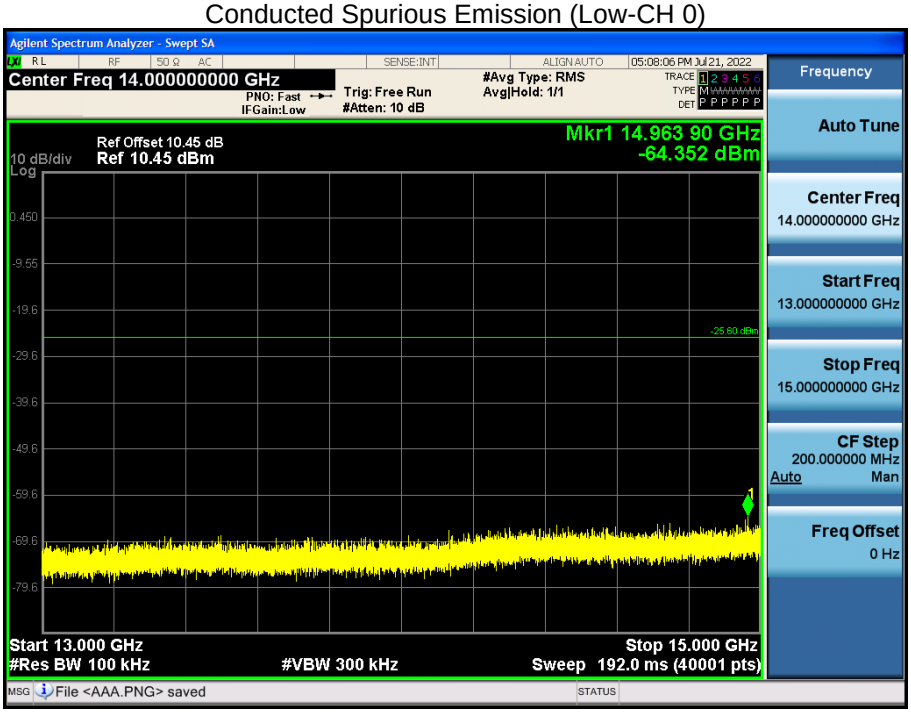
11 GHz ~ 13 GHz

Conducted Spurious Emission (Low-CH 0)



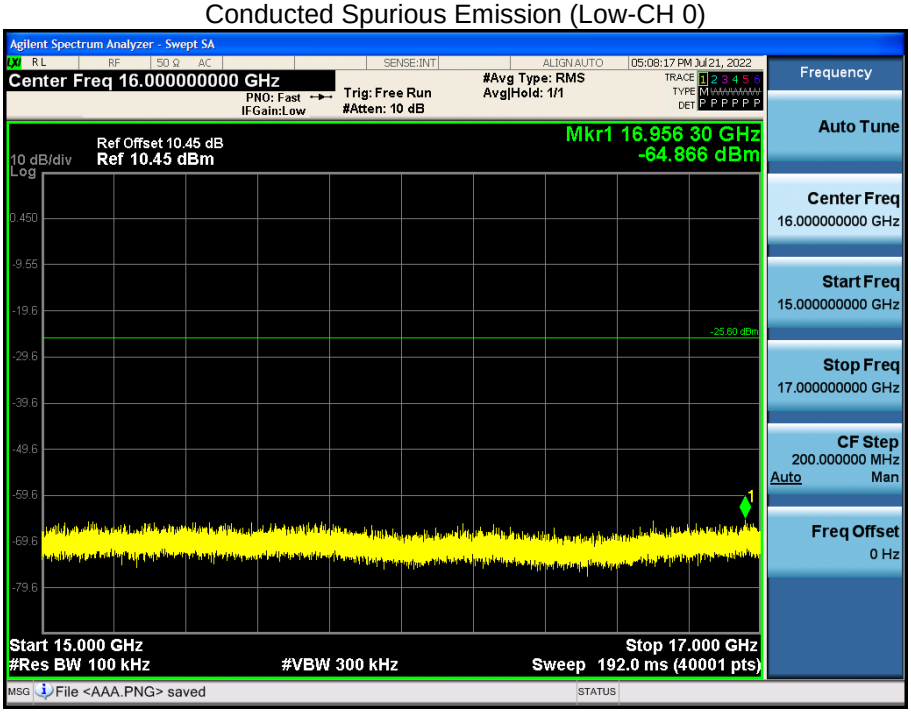
13 GHz ~ 15 GHz

Conducted Spurious Emission (Low-CH 0)



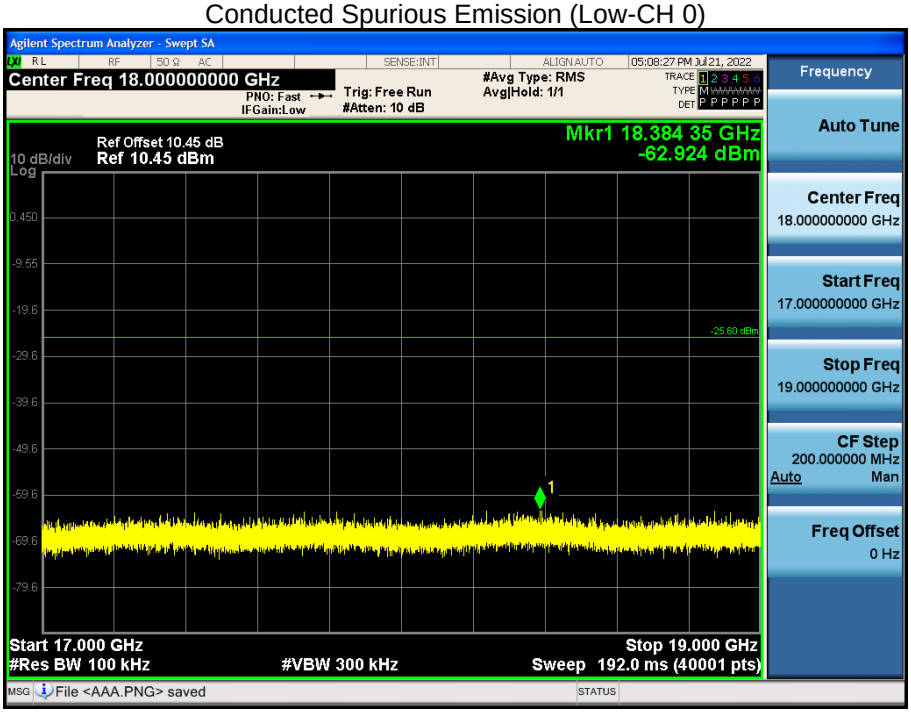
15 GHz ~ 17 GHz

Conducted Spurious Emission (Low-CH 0)



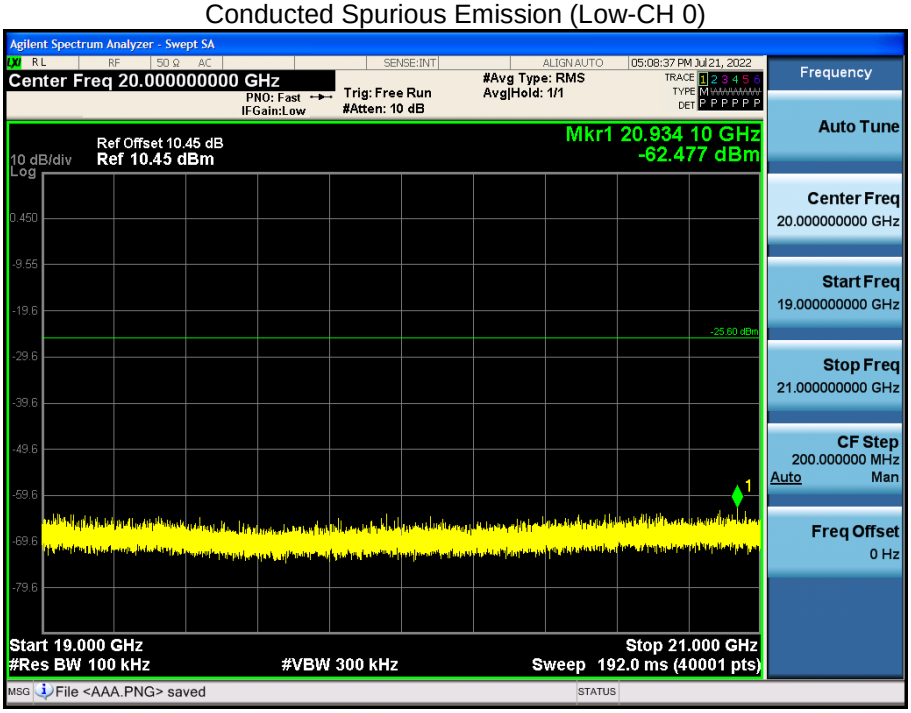
17 GHz ~ 19 GHz

Conducted Spurious Emission (Low-CH 0)



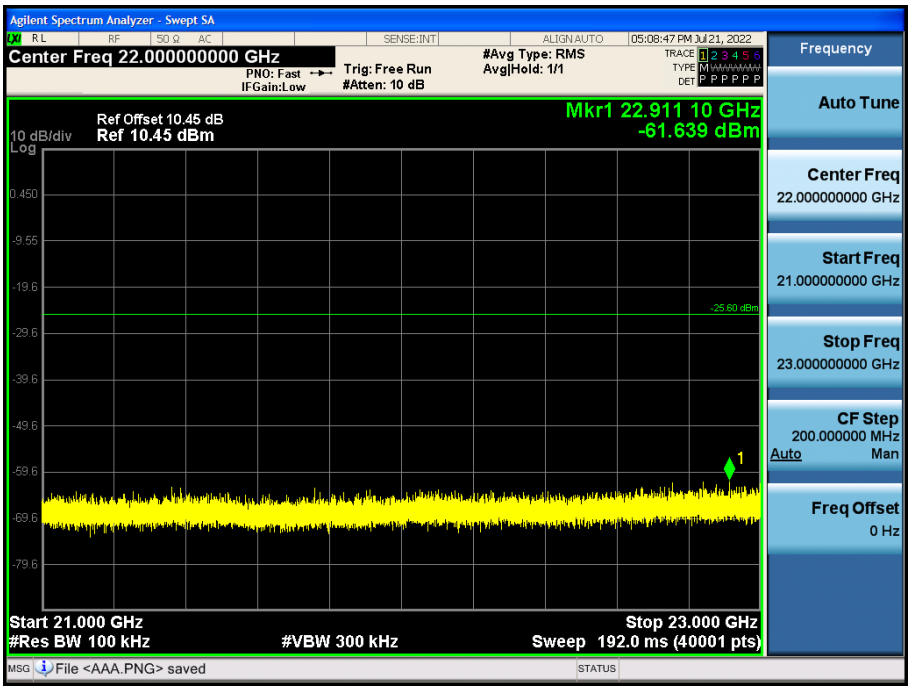
19 GHz ~ 21 GHz

Conducted Spurious Emission (Low-CH 0)



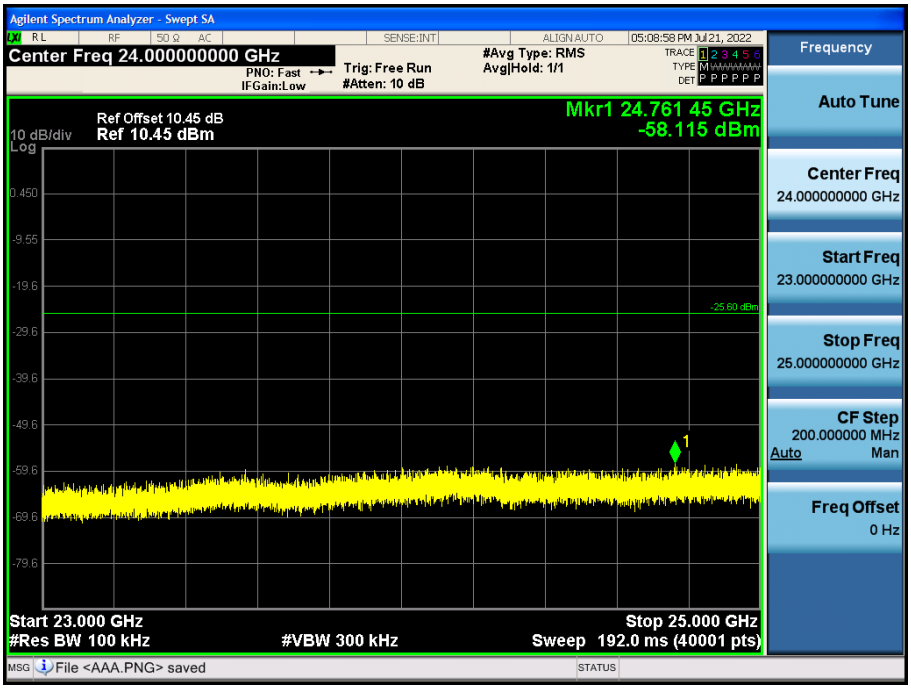
21 GHz ~ 23 GHz

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 – 30 MHz

Frequency	Measured Value	A.F+C.L+D.F	POL	Total	Limit	Margin
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]
No Critical peaks found						

Note:

1. The Measured 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 (dBμV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

Frequency	Measured Value	A.F+C.L	POL	Total	Limit	Margin
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/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 : 1 MBit/s (37 Byte)

Operation Mode: CH Low

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4804	42.11	0.00	3.98	V	46.09	73.98	27.89	PK
4804	31.08	2.07	3.98	V	37.13	53.98	16.85	AV
7206	43.49	0.00	12.53	V	56.02	73.98	17.97	PK
7206	33.53	2.07	12.53	V	48.13	53.98	5.86	AV
4804	42.83	0.00	3.98	H	46.81	73.98	27.17	PK
4804	31.27	2.07	3.98	H	37.32	53.98	16.66	AV
7206	44.89	0.00	12.53	H	57.42	73.98	16.57	PK
7206	34.47	2.07	12.53	H	49.07	53.98	4.92	AV

Operation Mode: CH Mid

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4880	41.52	0.00	4.07	V	45.59	73.98	28.39	PK
4880	30.56	2.07	4.07	V	36.70	53.98	17.28	AV
7320	44.13	0.00	11.58	V	55.71	73.98	18.28	PK
7320	35.44	2.07	11.58	V	49.09	53.98	4.90	AV
4880	42.99	0.00	4.07	H	47.06	73.98	26.92	PK
4880	31.42	2.07	4.07	H	37.56	53.98	16.42	AV
7320	45.78	0.00	11.58	H	57.36	73.98	16.63	PK
7320	36.79	2.07	11.58	H	50.44	53.98	3.54	AV

Operation Mode: CH High

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4960	41.92	0.00	4.77	V	46.69	73.98	27.29	PK
4960	30.05	2.07	4.77	V	36.89	53.98	17.09	AV
7440	44.21	0.00	11.99	V	56.20	73.98	17.78	PK
7440	35.12	2.07	11.99	V	49.18	53.98	4.80	AV
4960	43.44	0.00	4.77	H	48.21	73.98	25.77	PK
4960	30.51	2.07	4.77	H	37.35	53.98	16.63	AV
7440	**46.35**	**0.00**	**11.99**	**H**	**58.34**	**73.98**	**15.64**	**PK**
7440	**36.44**	**2.07**	**11.99**	**H**	**50.50**	**53.98**	**3.48**	**AV**

Mode : 2 MBit/s (37 Byte)

Operation Mode: CH Low

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4804	41.98	0.00	3.98	V	45.96	73.98	28.02	PK
4804	30.26	4.90	3.98	V	39.14	53.98	14.84	AV
7206	43.38	0.00	12.53	V	55.91	73.98	18.08	PK
7206	30.26	4.90	12.53	V	47.69	53.98	6.29	AV
4804	42.42	0.00	3.98	H	46.40	73.98	27.58	PK
4804	30.62	4.90	3.98	H	39.50	53.98	14.48	AV
7206	44.59	0.00	12.53	H	57.12	73.98	16.87	PK
7206	31.47	4.90	12.53	H	48.90	53.98	5.09	AV

Operation Mode: CH Mid

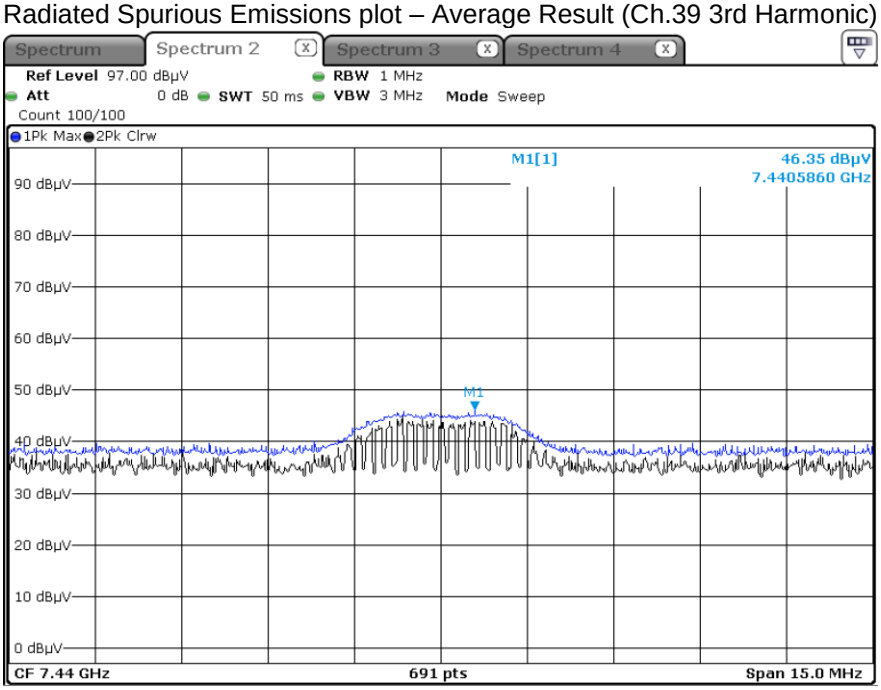
Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4880	41.48	0.00	4.07	V	45.55	73.98	28.43	PK
4880	30.46	4.90	4.07	V	39.43	53.98	14.55	AV
7320	44.02	0.00	11.58	V	55.60	73.98	18.39	PK
7320	32.07	4.90	11.58	V	48.55	53.98	5.44	AV
4880	42.69	0.00	4.07	H	46.76	73.98	27.22	PK
4880	31.45	4.90	4.07	H	40.42	53.98	13.56	AV
7320	45.17	0.00	11.58	H	56.75	73.98	17.24	PK
7320	33.15	4.90	11.58	H	49.63	53.98	4.36	AV

Operation Mode: CH High

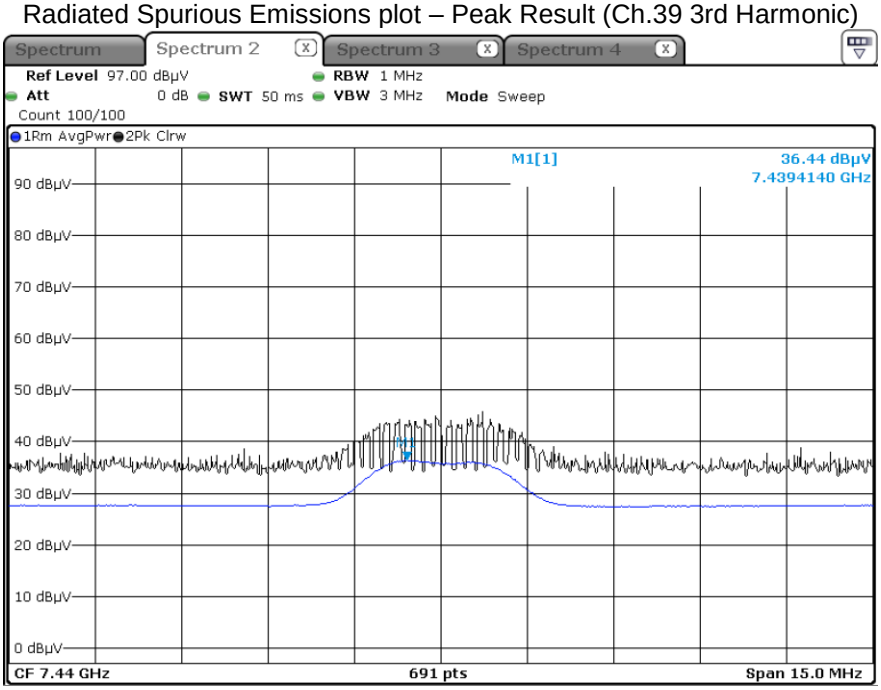
Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F + C.L - A.G + D.F [dB/m]	Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
4960	41.52	0.00	4.77	V	46.29	73.98	27.69	PK
4960	30.12	4.90	4.77	V	39.79	53.98	14.19	AV
7440	44.28	0.00	11.99	V	56.27	73.98	17.71	PK
7440	32.64	4.90	11.99	V	49.53	53.98	4.45	AV
4960	42.80	0.00	4.77	H	47.57	73.98	26.41	PK
4960	30.54	4.90	4.77	H	40.21	53.98	13.77	AV
7440	**45.92**	**0.00**	**11.99**	**H**	**57.91**	**73.98**	**16.07**	**PK**
7440	**33.57**	**4.90**	**11.99**	**H**	**50.46**	**53.98**	**3.52**	**AV**

▣ 1 MBit/s 37 Byte Test Plots (Worst case : Y-H)

Radiated Spurious Emissions plot – Average Result (Ch.39 3rd Harmonic)

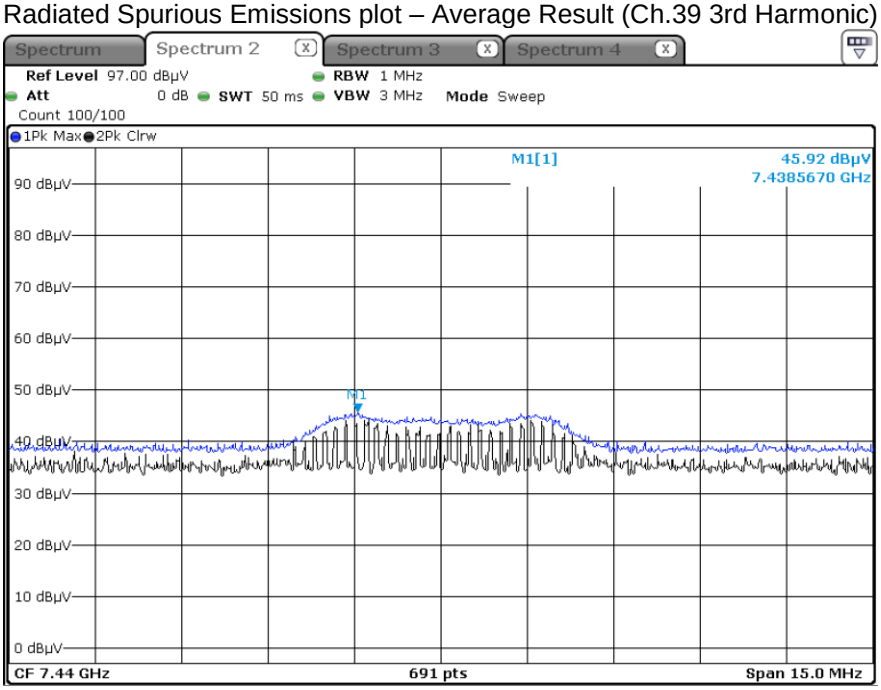


Radiated Spurious Emissions plot – Peak Result (Ch.39 3rd Harmonic)

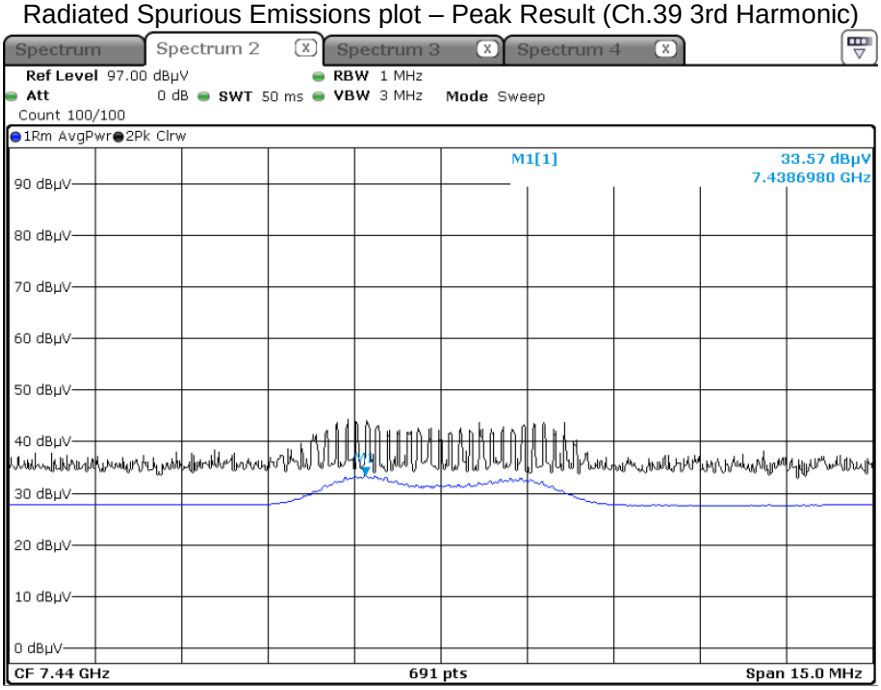


▣ 2 MBit/s 37 Byte Test Plots (Worst case : Y-H)

Radiated Spurious Emissions plot – Average Result (Ch.39 3rd Harmonic)



Radiated Spurious Emissions plot – Peak Result (Ch.39 3rd Harmonic)



Note:

Plot of worst case are only reported.

9.7 RADIATED RESTRICTED BAND EDGES

Mode : 1 MBit/s (37 Byte)

Operating Frequency 2402 MHz, 2480 MHz

Channel No. 0 CH, 39 CH

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F.+C.L+D.F [dB/m]	Ant. Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
2390.0	**37.31**	**0.00**	**34.50**	**H**	**71.81**	**73.98**	**2.17**	**PK**
2390.0	11.32	2.07	34.50	H	47.89	53.98	6.09	AV
2390.0	36.58	0.00	34.50	V	71.08	73.98	2.90	PK
2390.0	10.73	2.07	34.50	V	47.31	53.98	6.67	AV
#2484	29.43	0.00	34.87	H	64.30	73.98	9.68	PK
#2485	28.82	0.00	34.87	H	63.69	73.98	10.29	PK
2485.5~2500	36.78	0.00	34.87	H	71.66	73.98	2.32	PK
2483.5~2500	12.13	2.07	34.87	H	49.07	53.98	4.91	AV

Note : integration method Used (ANSI C63.10 Section11.13.3)

Mode : 2 MBit/s (37 Byte)

Operating Frequency 2402 MHz, 2480 MHz

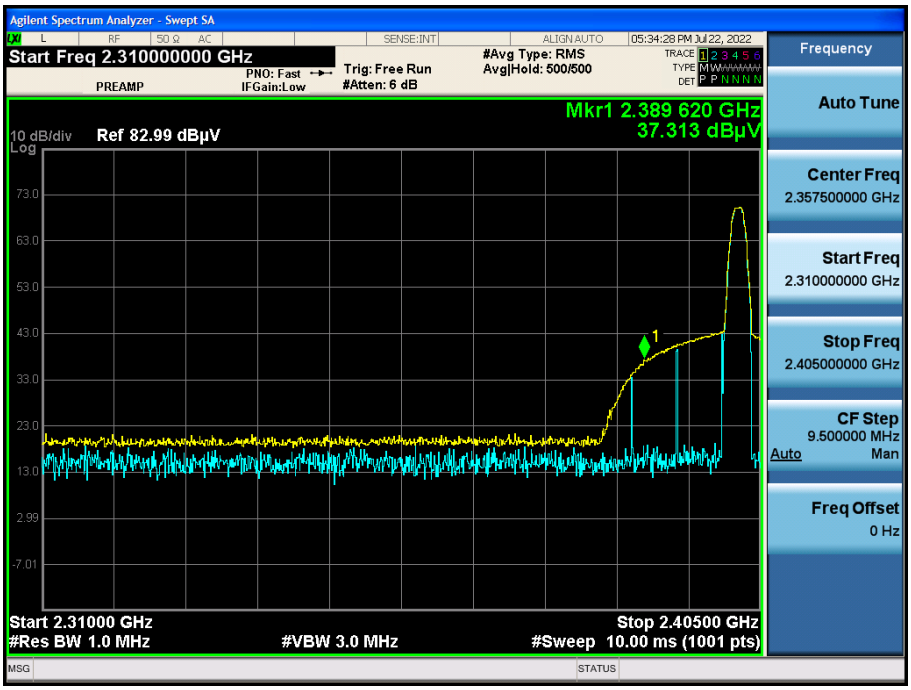
Channel No. 0 CH, 39 CH

Frequency [MHz]	Measured Value [dBµV]	Duty Cycle Factor [dB]	A.F.+C.L+D.F [dB/m]	Ant. Pol. [H/V]	Total [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Measurement Type
2390.0	37.25	0.00	34.50	H	71.76	73.98	2.22	PK
2390.0	11.38	4.90	34.50	H	50.78	53.98	3.20	AV
2390.0	36.42	0.00	34.50	V	70.92	73.98	3.06	PK
2390.0	10.68	4.90	34.50	V	50.08	53.98	3.90	AV
#2484	**29.77**	**0.00**	**34.87**	**H**	**64.64**	**73.98**	**9.34**	**PK**
#2484	**12.17**	**4.90**	**34.87**	**H**	**51.94**	**53.98**	**2.04**	**AV**
#2485	**28.79**	**0.00**	**34.87**	**H**	**63.66**	**73.98**	**10.32**	**PK**
#2485	**8.63**	**4.90**	**34.87**	**H**	**48.40**	**53.98**	**5.58**	**AV**
2485.5~2500	**36.87**	**0.00**	**34.87**	**H**	**71.75**	**73.98**	**2.23**	**PK**
2483.5~2500	**11.77**	**4.90**	**34.87**	**H**	**51.54**	**53.98**	**2.44**	**AV**

Note : integration method Used (ANSI C63.10 Section11.13.3)

▣ Mode : 1 MBit/s (37 Byte) Test Plots

Radiated Restricted Band Edges plot – Peak Result (Ch.0, Y-H)



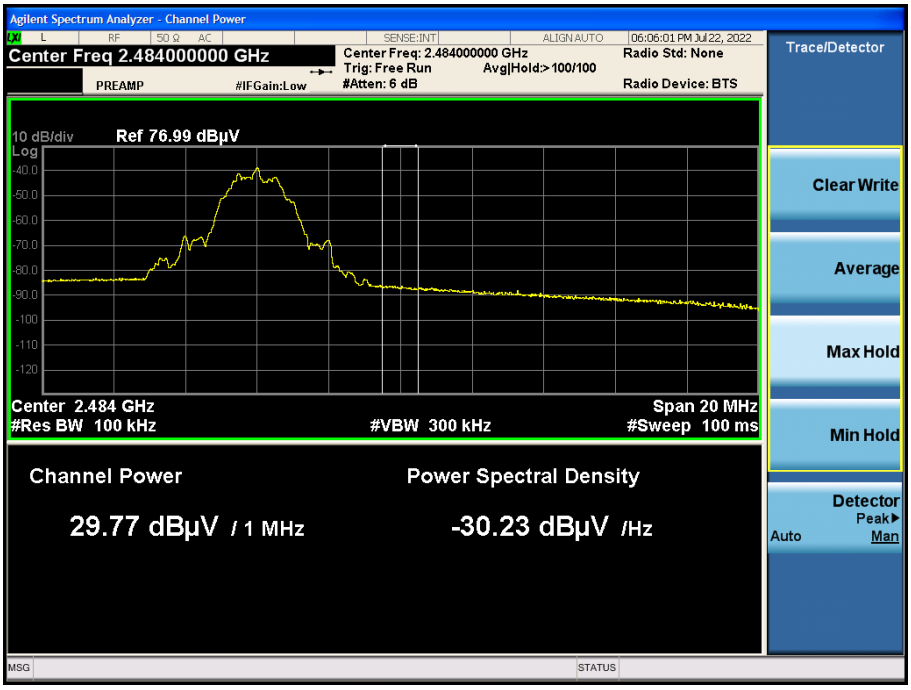
Note:

Plot of worst case are only reported.

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

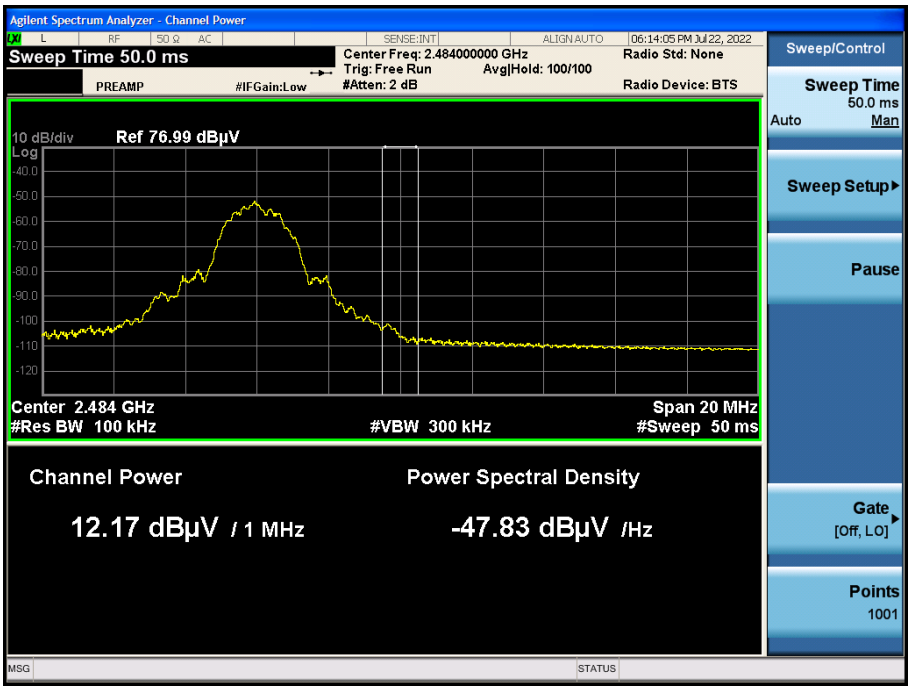
Radiated Restricted Band Edges plot – Peak Result (Ch.39, Y-H)

Integration method Used_ 2484 MHz



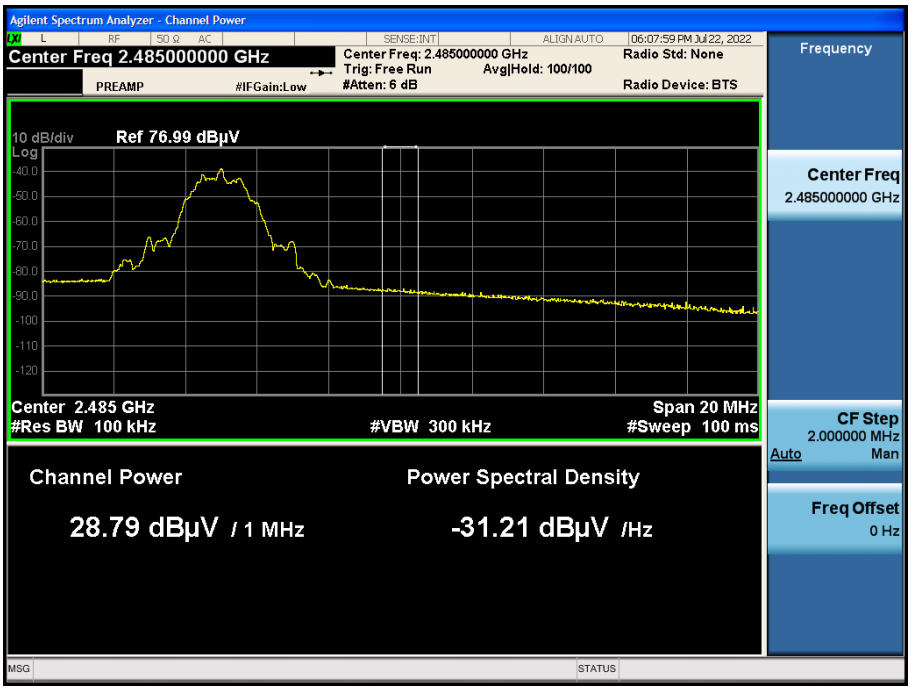
Radiated Restricted Band Edges plot – Average Result (Ch.39, Y-H)

Integration method Used_ 2484 MHz



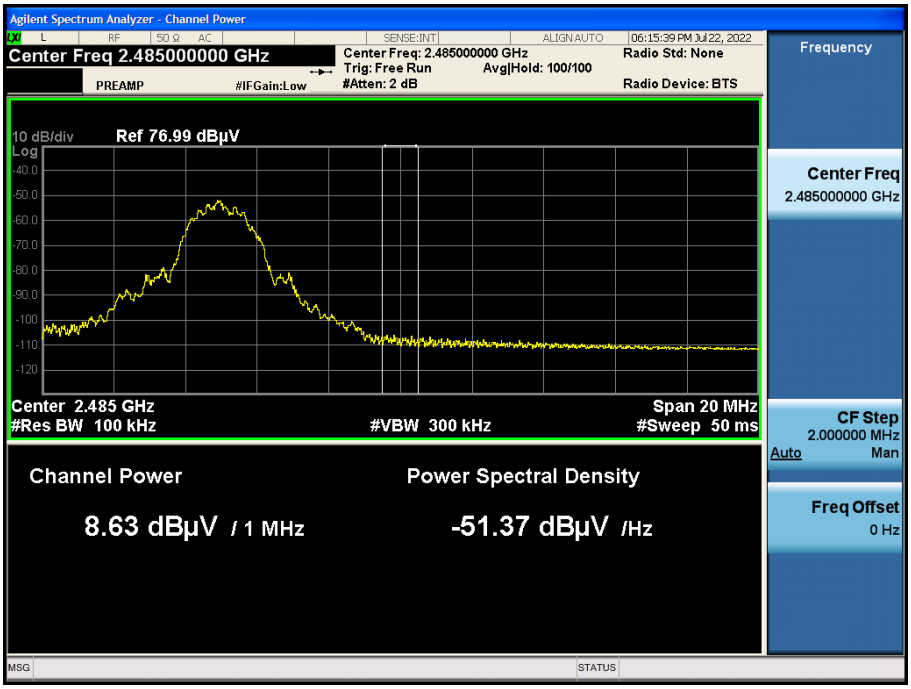
Radiated Restricted Band Edges plot – Peak Result (Ch.39, Y-H)

Integration method Used_ 2485 MHz

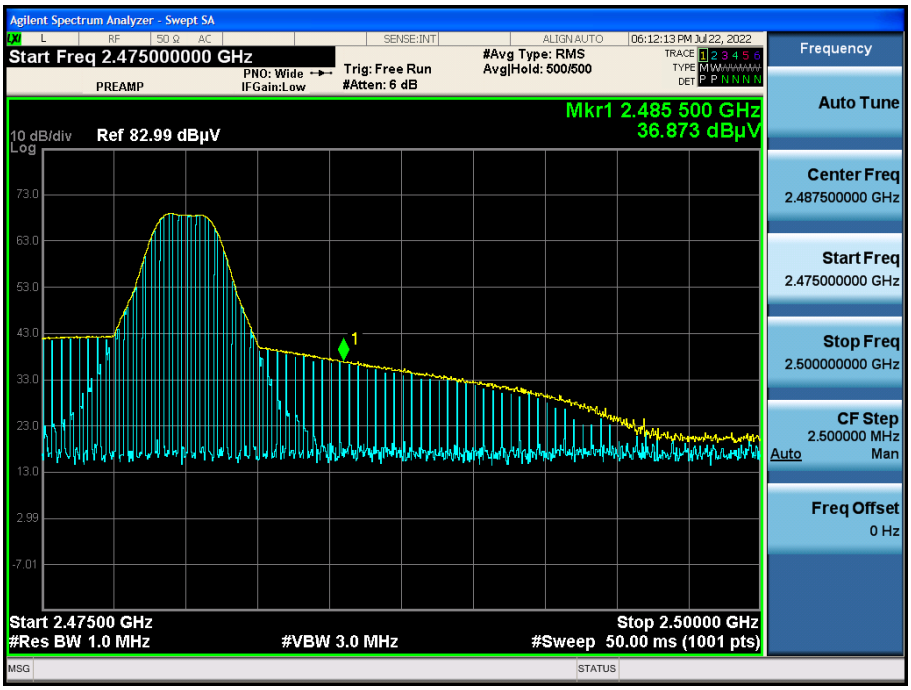


Radiated Restricted Band Edges plot – Average Result (Ch.39, Y-H)

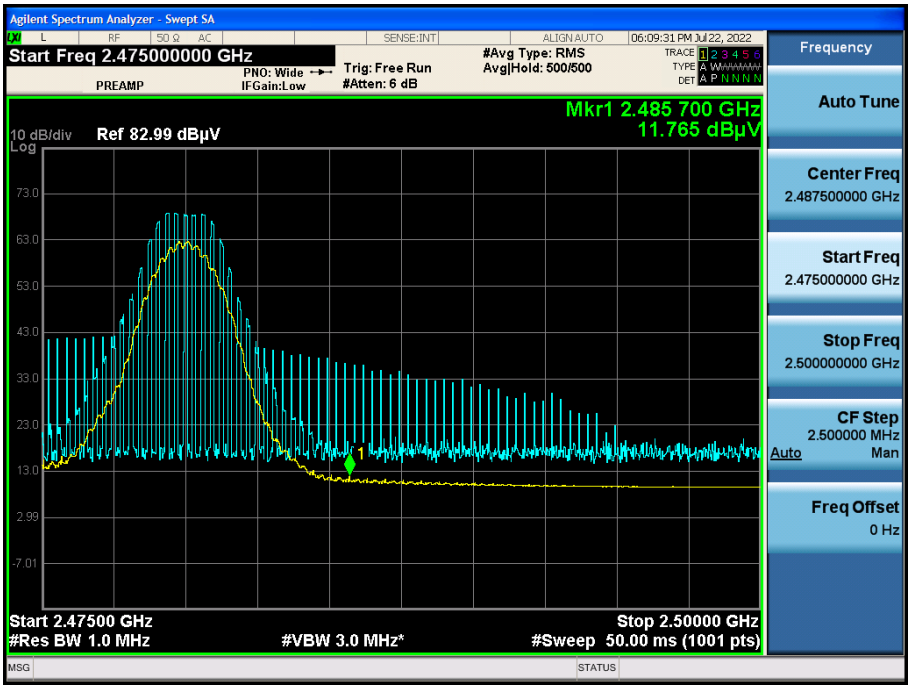
Integration method Used_ 2485 MHz



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



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



Note:

Plot of worst case are only reported.

9.8 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

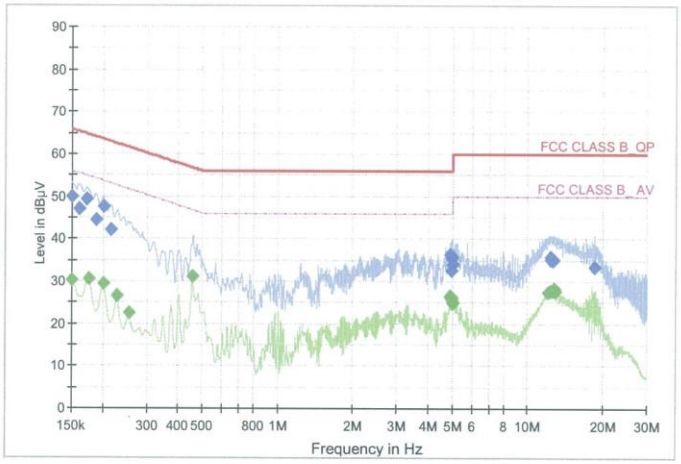
Test 1 / 2

Test Report

Common Information

EUT :	SM-A047F/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Comment:	BTLE L1 MODE

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	49.82	66.00	16.18	9.000	L1	OFF	9.6
0.1613	47.03	65.40	18.37	9.000	L1	OFF	9.6
0.1725	49.31	64.84	15.53	9.000	L1	OFF	9.6
0.1883	44.56	64.11	19.56	9.000	L1	OFF	9.6
0.2018	47.53	63.54	16.01	9.000	L1	OFF	9.6
0.2153	42.02	63.00	20.98	9.000	L1	OFF	9.6
4.9280	36.44	56.00	19.56	9.000	L1	OFF	9.8
4.9348	35.87	56.00	20.13	9.000	L1	OFF	9.8
4.9573	35.49	56.00	20.51	9.000	L1	OFF	9.8
4.9640	35.45	56.00	20.56	9.000	L1	OFF	9.8
4.9708	32.71	56.00	23.29	9.000	L1	OFF	9.8
4.9933	33.92	56.00	22.08	9.000	L1	OFF	9.8
12.2810	35.77	60.00	24.23	9.000	L1	OFF	10.1
12.3103	35.16	60.00	24.84	9.000	L1	OFF	10.1
12.3418	35.79	60.00	24.21	9.000	L1	OFF	10.1
12.5960	35.01	60.00	24.99	9.000	L1	OFF	10.1
12.6253	35.19	60.00	24.81	9.000	L1	OFF	10.1
18.5855	33.58	60.00	26.42	9.000	L1	OFF	10.3

Test 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	30.41	56.00	25.59	9.000	L1	OFF	9.6
0.1748	30.57	54.73	24.16	9.000	L1	OFF	9.6
0.2018	29.53	53.54	24.01	9.000	L1	OFF	9.6
0.2265	26.43	52.58	26.14	9.000	L1	OFF	9.6
0.2535	22.57	51.64	29.08	9.000	L1	OFF	9.6
0.4560	31.28	46.77	15.48	9.000	L1	OFF	9.7
4.9033	26.19	46.00	19.81	9.000	L1	OFF	9.8
4.9303	26.54	46.00	19.46	9.000	L1	OFF	9.8
4.9573	26.20	46.00	19.80	9.000	L1	OFF	9.8
4.9843	25.64	46.00	20.36	9.000	L1	OFF	9.8
5.0000	24.82	46.00	21.18	9.000	L1	OFF	9.9
5.0248	25.03	50.00	24.97	9.000	L1	OFF	9.9
12.0538	27.39	50.00	22.61	9.000	L1	OFF	10.1
12.3980	27.82	50.00	22.18	9.000	L1	OFF	10.1
12.6275	27.71	50.00	22.29	9.000	L1	OFF	10.1
12.6545	27.62	50.00	22.38	9.000	L1	OFF	10.1
12.8075	28.40	50.00	21.60	9.000	L1	OFF	10.1
12.8548	27.72	50.00	22.28	9.000	L1	OFF	10.1

Conducted Emissions (Line 2)

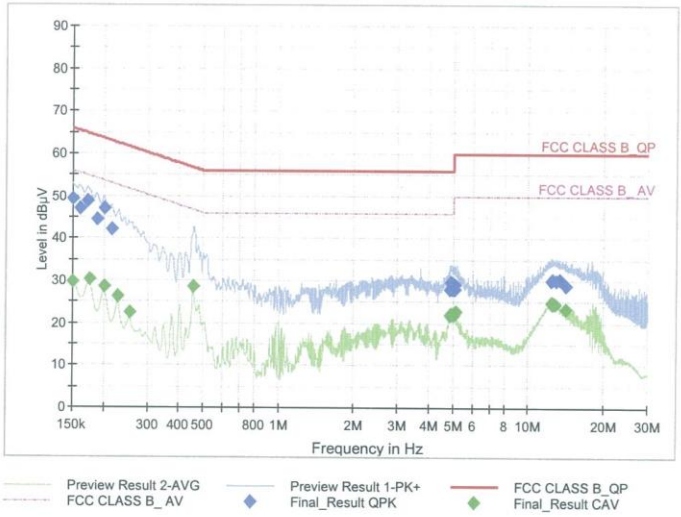
Test 1 / 2

Test Report

Common Information

EUT :	SM-A047F/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Comment:	BTLE N MODE

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	49.31	66.00	16.69	9.000	N	OFF	9.6
0.1613	46.91	65.40	18.49	9.000	N	OFF	9.6
0.1725	48.83	64.84	16.01	9.000	N	OFF	9.6
0.1883	44.54	64.11	19.57	9.000	N	OFF	9.6
0.2018	47.08	63.54	16.46	9.000	N	OFF	9.6
0.2153	41.98	63.00	21.02	9.000	N	OFF	9.6
4.8470	27.88	56.00	28.12	9.000	N	OFF	9.8
4.9010	29.69	56.00	26.31	9.000	N	OFF	9.8
4.9325	29.41	56.00	26.59	9.000	N	OFF	9.8
4.9370	27.95	56.00	28.05	9.000	N	OFF	9.8
5.0608	28.01	60.00	31.99	9.000	N	OFF	9.9
5.0945	29.07	60.00	30.93	9.000	N	OFF	9.9
12.3395	30.03	60.00	29.97	9.000	N	OFF	10.2
12.4835	30.19	60.00	29.81	9.000	N	OFF	10.2
12.9155	29.94	60.00	30.06	9.000	N	OFF	10.2
12.9560	29.99	60.00	30.01	9.000	N	OFF	10.2
13.4060	30.43	60.00	29.57	9.000	N	OFF	10.2
14.0833	28.83	60.00	31.17	9.000	N	OFF	10.2

Test 2 / 2

Final_Result_CAV

Frequency (MHz)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	29.79	56.00	26.21	9.000	N	OFF	9.6
0.1748	30.27	54.73	24.46	9.000	N	OFF	9.6
0.2018	28.48	53.54	25.06	9.000	N	OFF	9.6
0.2265	26.15	52.58	26.43	9.000	N	OFF	9.6
0.2535	22.63	51.64	29.01	9.000	N	OFF	9.6
0.4560	28.64	46.77	18.12	9.000	N	OFF	9.7
4.8718	21.91	46.00	24.09	9.000	N	OFF	9.8
4.8988	22.14	46.00	23.86	9.000	N	OFF	9.8
4.9280	21.91	46.00	24.09	9.000	N	OFF	9.8
4.9978	21.99	46.00	24.01	9.000	N	OFF	9.8
5.0248	22.31	50.00	27.69	9.000	N	OFF	9.9
5.1013	22.84	50.00	27.16	9.000	N	OFF	9.9
12.3710	24.69	50.00	25.31	9.000	N	OFF	10.2
12.4160	24.54	50.00	25.46	9.000	N	OFF	10.2
12.4498	24.78	50.00	25.22	9.000	N	OFF	10.2
12.4970	24.60	50.00	25.40	9.000	N	OFF	10.2
12.7018	24.55	50.00	25.45	9.000	N	OFF	10.2
14.0833	23.26	50.00	26.74	9.000	N	OFF	10.2

10. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/23/2022	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	06/07/2023	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	03/04/2023	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	01/11/2023	Annual
Power Measurement Set	OSP 120	Rohde & Schwarz	101231	06/14/2023	Annual
Power Meter	N1911A	Agilent	MY45100523	03/24/2023	Annual
Power Sensor	N1921A	Keysight	MY57820067	03/24/2023	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2022	Annual
Power Splitter	11667B	Hewlett Packard	05001	05/18/2023	Annual
DC Power Supply	E3646A	Agilent	MY40002937	12/14/2022	Annual
Attenuator(10 dB)	8493C	Hewlett Packard	07560	06/14/2023	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	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

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	EM1000	Audix	060520	N/A	N/A
Turn Table	N/A	Audix	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	760	02/22/2023	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	02299	03/24/2024	Biennial
Horn Antenna (15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170541	11/16/2023	Biennial
Spectrum Analyzer	FSV40-N	Rohde & Schwarz	102168	07/04/2023	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	01/11/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/13/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/13/2023	Annual
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/06/2023	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	02/072023	Annual
High Pass Filter	WHK3.0/18G-10EF	Wainwright Instruments	8	01/21/2023	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	25	01/21/2023	Annual
Attenuator (3 dB)	18B-03	Api tech.	1	01/21/2023	Annual
Attenuator(10 dB)	8493C-10	Agilent	08285	01/21/2023	Annual
Power Amplifier	CBLU1183540	CERNEX	22964	01/21/2023	Annual
Power Amplifier	CBL06185030	CERNEX	22965	01/21/2023	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/11/2023	Annual

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-2207-FC037-P