Electromagnetic Compatibility
Test Report

Test Report No: MOB 301215 Rev.2
Issued on: February 07, 2018

Product Name
MCU-30

Tested According to
FCC 47 CFR, Part 15.247

Tests Performed for
MOBILICOM
HaMetzoda 31, Azor 58001, Israel
Tel: 0777 10 30 60

QualiTech EMC Laboratory
30 Hasivim Street,P.O.Box 7500
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Certificate 1633.01
Electrical Testing

Test Personnel

Tests Performed By: ----------

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Report Prepared By: ----------

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Report Approved By: ----------

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EMC Lab. Manager
QualiTech EMC Laboratory

Test Report details:

Test commencement date: 16.12.2015
Test completion date: 28.12.2015
Customer's representative: Haim Zak
Issued on: 04.02.2018

Revision details:

Version	Date	Details/Reasons
Rev. 1	30.12.2015	
Rev. 2	04.02.2018	Test report updated according to TCB's comments

Assessment information:

This report contains an assessment of the EUT against Electromagnetic Compatibility based upon tests carried out on the samples submitted. The results contained in this report relate only to the items tested. Manufactured products will not necessarily give identical results due to production and measurement tolerances. QualiTech, EMC Lab does not assume responsibility for any conclusion and generalization drawn from the test results with regards to other specimens or samples of type of the equipment represented by test item.

The EUT was set up and exercised using the configuration, modes of operation and arrangements defined in this report only.

Modifications:

Modifications made to the EUT

None

Modifications made to the Test Standard

None

Summary of Compliance Status

Test Spec. Clause	Test Case	Remarks
47 CFR §15.247 (a) (2)	DTS Bandwidth	Comply
47 CFR §15.247 (b) (3) (4)	Fundamental Emission Output Power	Comply
47 CFR §15.247 (e)	Maximum Power Spectral Density Level in the Fundamental Emission	Comply
47 CFR §15.247 (d)	Emissions in Non-Restricted Frequency Bands	Comply
47 CFR §15.247 (d), & §15.205, & §15.209(a)	Emissions in Restricted Frequency Bands	Comply
47 CFR §15.247 (d)	Band-edge Measurements	Comply
47 CFR §15.203	Antenna Connector Requirements	Comply

Table of Contents

1. General Description

Description of the EUT system/test Item:

Product name: MCU-30

FCC ID: Q88-MCU-30

Description:

Communication unit used for security, robotics & surveillance

Frequency range: 2403 – 2478 MHz for 4.2 MHz bandwidth

2405 – 2475 MHz for BW = 8.4 MHz bandwidth

Type of Modulation: QPSK

Antenna Gain: 2.0 dBi

Voltage operation: 12VDC Battery operation.

Max Current: 1.2A

Recommended AH: 10AH (for 8 hours operation)

1.1. Worst Case Results:

In order to determine the worst-case emissions for all modes/data rates/tests and EUT's position(three axis- x,y,z), all modes/data rates and position were investigated for each required test to determine which produces the worst- case data and then full testing was performed in that mode/data rate and position,

2. Test Facility & Uncertainty of Measurement

2.1. Accreditation/ Registration reference:

- *A2LA Certificate Number: 1633.01*

2.2. Test Facility description

The tests were performed at the EMC Laboratory, QualiTech Division, ECI Telecom Group

Address: 30, Hasivim St., Petah Tikva, Israel.
Tel: 972-3-926-8443

Semi Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	9.5m x 6.5m x 5.2m
Antenna height	1 - 4m
Shielding Effectiveness	Magnetic field ≥80dB at 15 kHz ≥90dB at 100 kHz Electric field >120dB from 1MHz to 1GHz >110dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Emerson & Cuming hybrid absorbing material in selected positions on the walls
Normalized Site Attenuation measured at 5 positions	±3.49dB, 30MHz to 1GHz
Transmission Loss measured at 5 positions, at 1.5m height	±3dB, 1GHz to 18GHz

2.3. Uncertainty of Measurement:

Test Name	Test Method & Range	Uncertainty	
		Combined std. Uc(y)	Expanded U
Radiated Emission	30MHz÷230MHz, Horiz. polar. 30MHz÷230MHz, Ver. polar. 230MHz÷1000MHz, Horiz. polar. 230MHz÷1000MHz, Vert. polar.	[dB] 1.8 1.967 1.487 1.499	[dB] 3.6 3.934 2.973 2.998
Conducted Emission	9 kHz÷150 kHz 150 kHz÷30MHz	[dB] 1.378 1.095	[dB] 2.756 2.190
Radio frequency	Up to 18 GHz	$\pm 1*10^{-6}$	$< \pm 1*10^{-5}$
Total Conducted RF Power	Up to 18 GHz	±1.378 dB	< ±1.5dB
Conducted Power density	Up to 18 GHz	±1.378 dB	< ±3dB
Temperature	23.6 °C	±0.6°C	< ±2°C
Humidity	54.9%	±3.1%	< ±5%
DC Voltage	0-60 VDC	±0.3%	< ±3%

3. Report of Measurements and Examinations

3.1. 6dB DTS Bandwidth

Reference document:	**47 CFR §15.247 (a)(2)**		
Test Requirements:	Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725–5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz for systems with antenna gain not exceed 6dBi.		
Method of testing:	KDB 558074 D01 v03r03, Sec.8.2 Conducted	**Pass**	
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 100 kHz, VBW: 3 MHz		
Environment conditions:	Ambient Temperature: 21°C	Relative Humidity:48 %	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 3.1.1 – Plot 3.1.12	

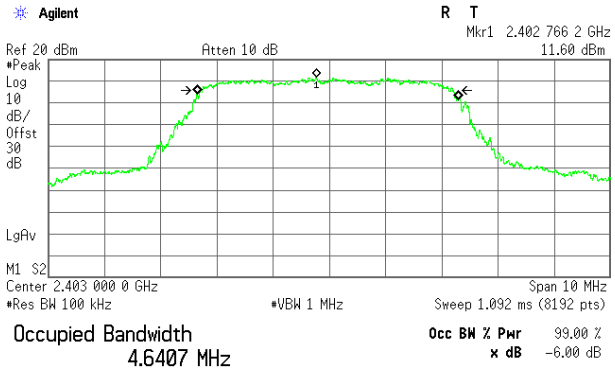
Test results for RF1 output:

Fundamental Frequency, [MHz]	6 dB DTS Bandwidth, [kHz]	Minimum Bandwidth, [kHz]	Pass/Fail
BW = 4.2 MHz, Bit Rate = 1.6 Mbps, continuous transmission			
2403	4640.7	500	Pass
2442	4586.0	500	Pass
2478	4613.4	500	Pass
BW = 4.2 MHz, Bit Rate = 4.0 Mbps, continuous transmission			
2403	4626.6	500	Pass
2442	4643.0	500	Pass
2478	4683.0	500	Pass
BW = 8.4 MHz, Bit Rate = 6.4 Mbps, continuous transmission			
2405	8693.0	500	Pass
2440	8725.2	500	Pass
2475	8719.1	500	Pass
BW = 8.4 MHz, Bit Rate = 8.0 Mbps, continuous transmission			
2405	8661.2	500	Pass
2440	8712.2	500	Pass
2475	8719.4	500	Pass

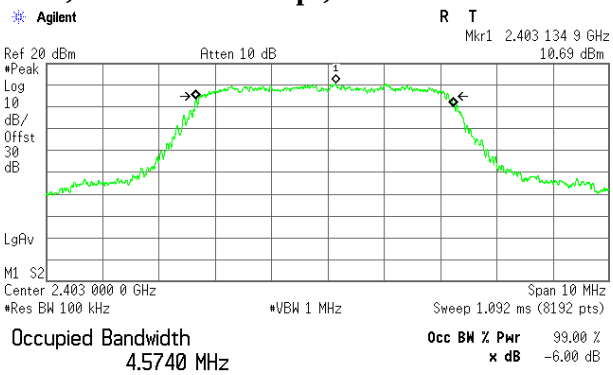
Test results for RF2 output:

Fundamental Frequency, [MHz]	6 dB DTS Bandwidth, [kHz]	Minimum Bandwidth, [kHz]	Pass/Fail
BW = 4.2 MHz, Bit Rate = 1.6 Mbps, continuous transmission			
2403	4574.0	500	Pass
2442	4647.7	500	Pass
2478	4623.5	500	Pass
BW = 4.2 MHz, Bit Rate = 4.0 Mbps, continuous transmission			
2403	4630.6	500	Pass
2442	4626.7	500	Pass
2478	4613.8	500	Pass
BW = 8.4 MHz, Bit Rate = 6.4 Mbps, continuous transmission			
2405	8714.7	500	Pass
2440	8672.3	500	Pass
2475	8717.9	500	Pass
BW = 8.4 MHz, Bit Rate = 8.0 Mbps, continuous transmission			
2405	8665.5	500	Pass
2440	8700.8	500	Pass
2475	8718.2	500	Pass

Plot 3.1.1 6 dB DTS Bandwidth, BW = 4.2 MHz, Bit rate = 1.6 Mbps, Fc = 2403MHz

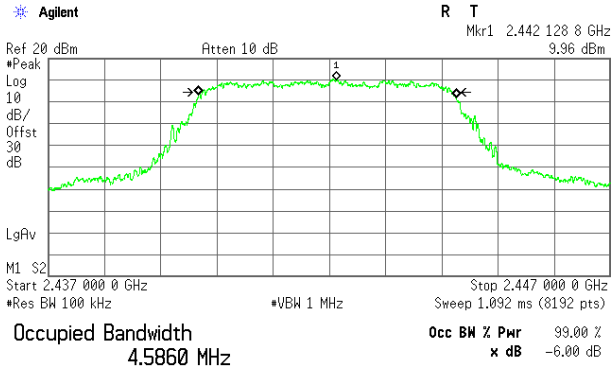


RF1

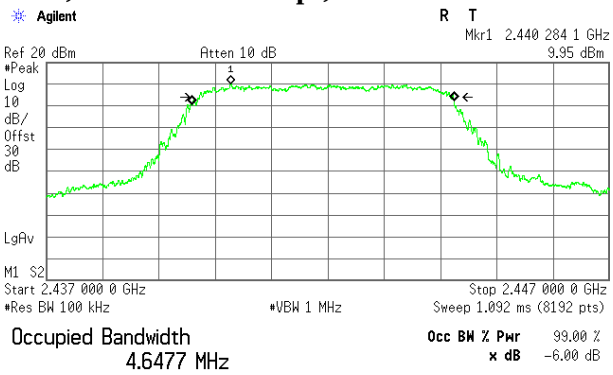


RF2

Plot 3.1.2 6 dB DTS Bandwidth, BW = 4.2 MHz, Bit rate = 1.6 Mbps, Fc = 2442MHz

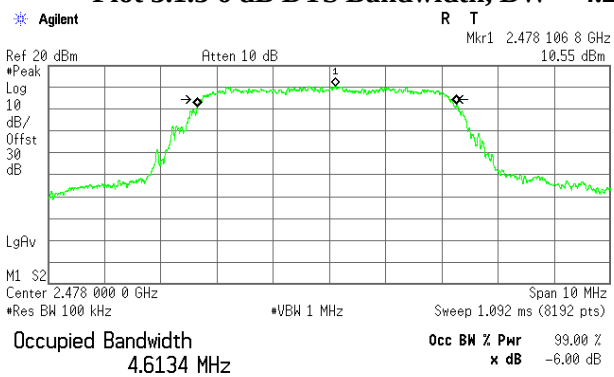


RF1

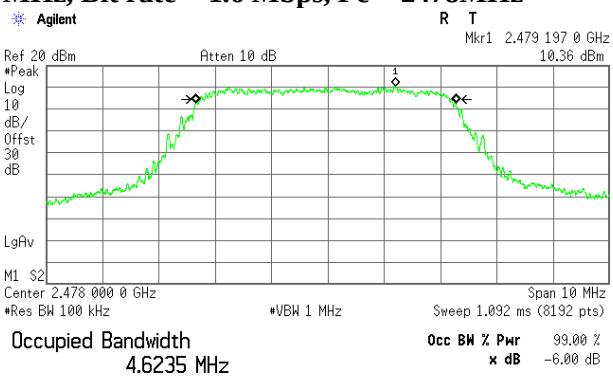


RF2

Plot 3.1.3 6 dB DTS Bandwidth, BW = 4.2 MHz, Bit rate = 1.6 Mbps, Fc = 2478MHz

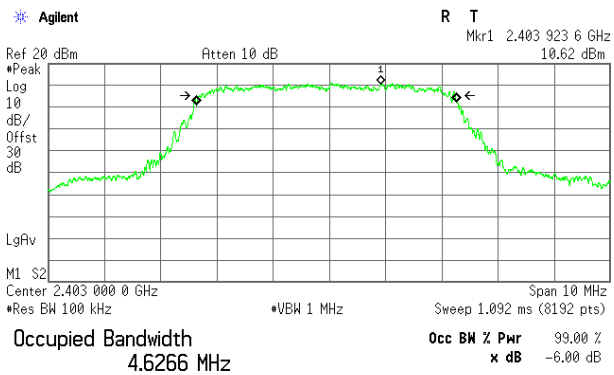


RF1

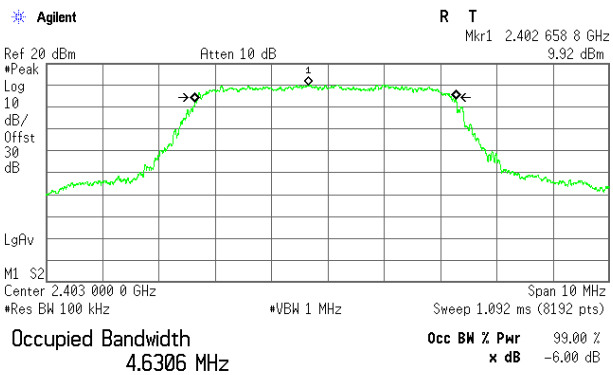


RF2

Plot 3.1.4 6 dB DTS Bandwidth, BW = 4.2 MHz, Bit rate = 4.0 Mbps, Fc = 2403MHz

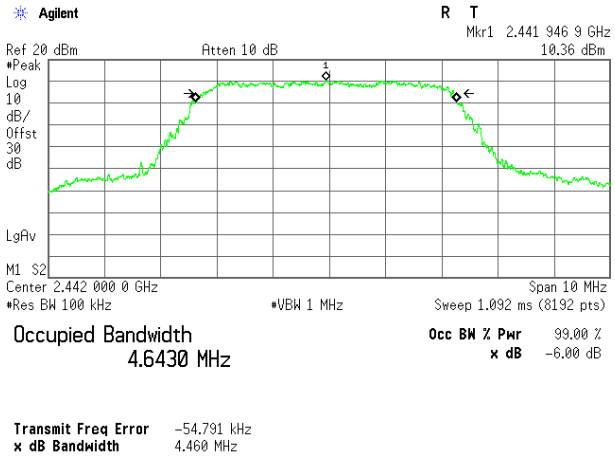


RF1

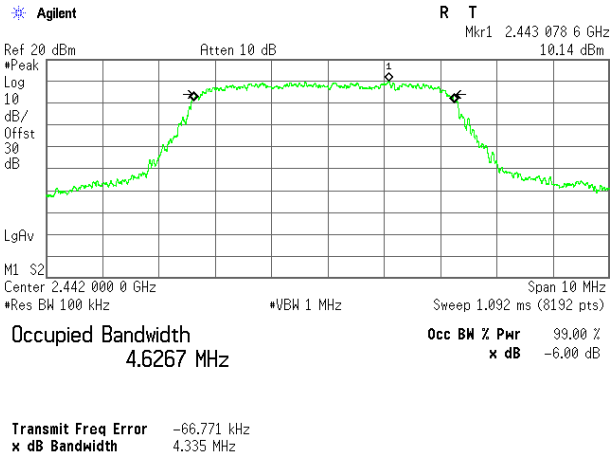


RF2

Plot 3.1.5 6 dB DTS Bandwidth, BW = 4.2 MHz, Bit rate = 4.0 Mbps, Fc = 2442

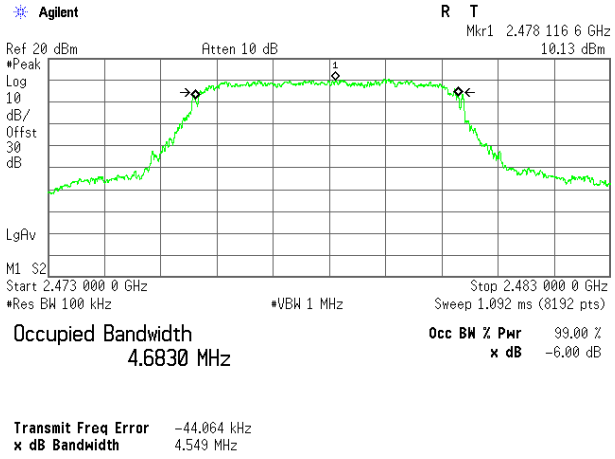


RF1

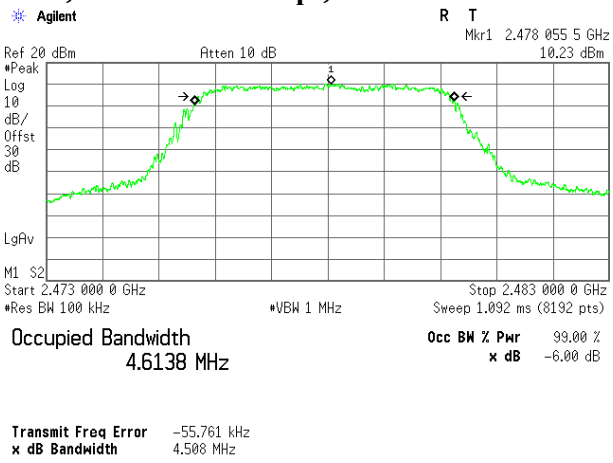


RF2

Plot 3.1.6 6 dB DTS Bandwidth, BW = 4.2 MHz, Bit rate = 4.0 Mbps, Fc = 2478MHz

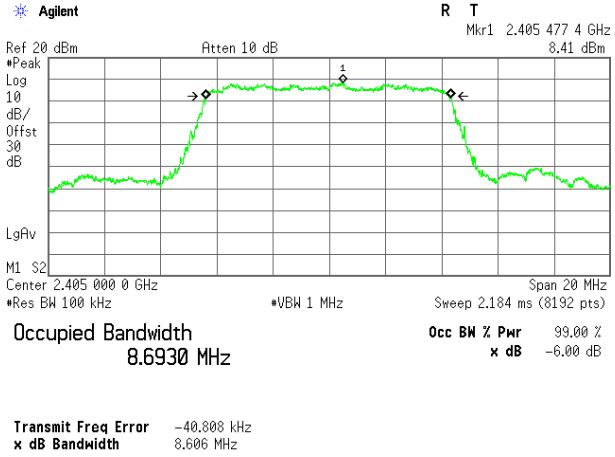


RF1

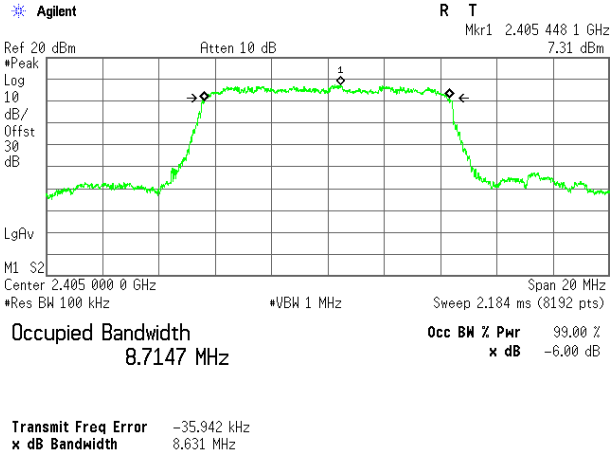


RF2

Plot 3.1.7 6 dB DTS Bandwidth, BW = 8.4 MHz, Bit rate = 6.4 Mbps, Fc = 2405 MHz

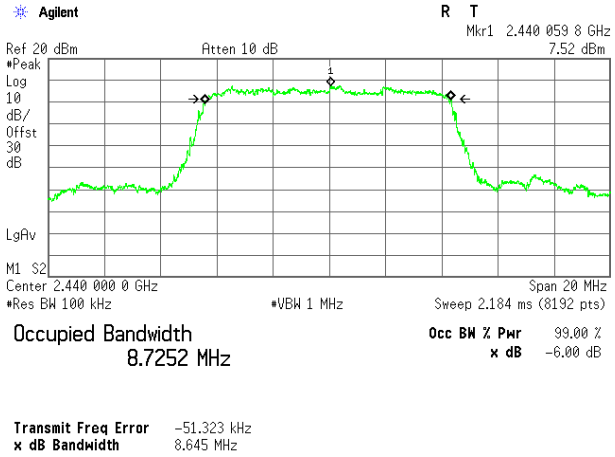


RF1

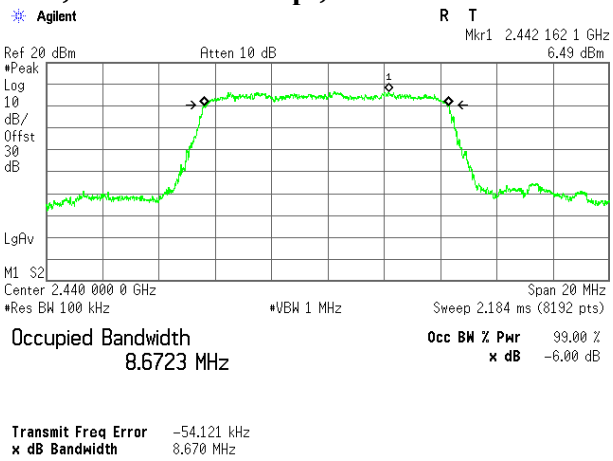


RF2

Plot 3.1.8 6 dB DTS Bandwidth, BW = 8.4 MHz, Bit rate = 6.4 Mbps, Fc = 2440 MHz

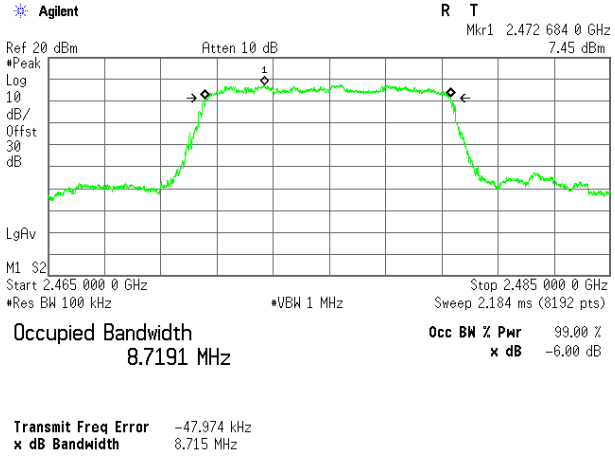


RF1

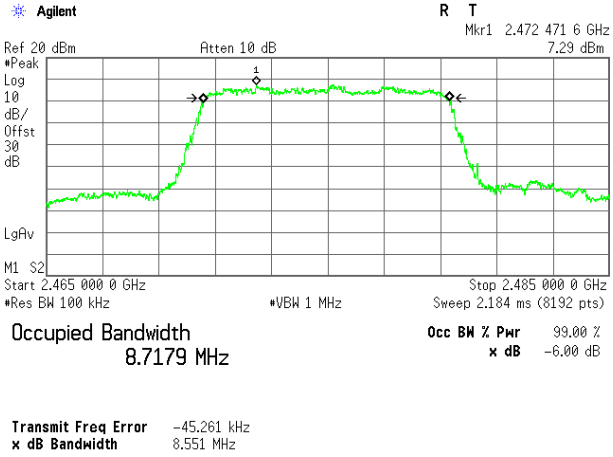


RF2

Plot 3.1.9 6 dB DTS Bandwidth, RF1 output, BW = 8.4 MHz, Bit rate = 6.4 Mbps, Fc = 2475 MHz

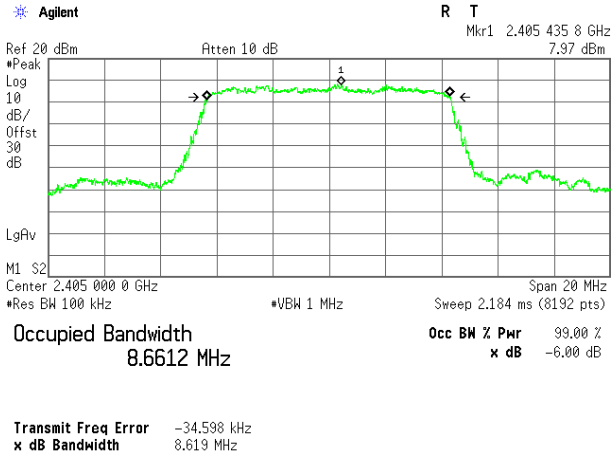


RF1

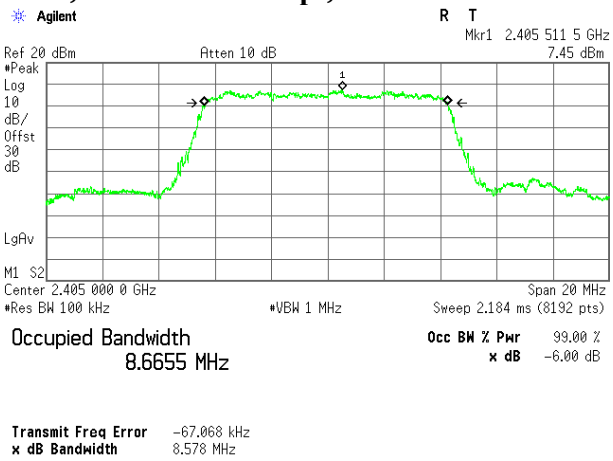


RF2

Plot 3.1.10 6 dB DTS Bandwidth, BW = 8.4 MHz, Bit rate = 8.0 Mbps, Fc = 2405 MHz

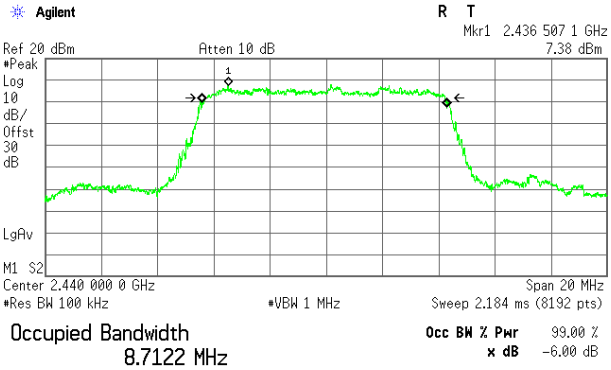


RF1

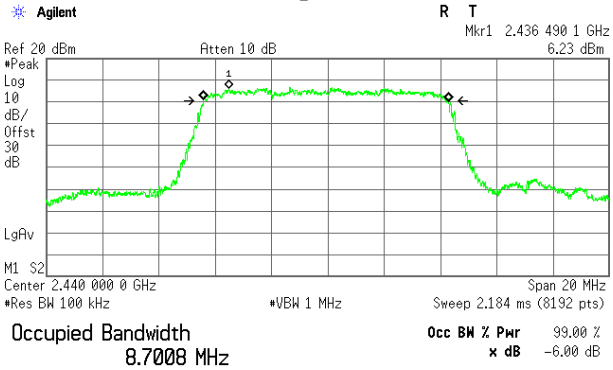


RF2

Plot 3.1.11 6 dB DTS Bandwidth, BW = 8.4 MHz, Bit rate = 8.0 Mbps, Fc = 2440 MHz

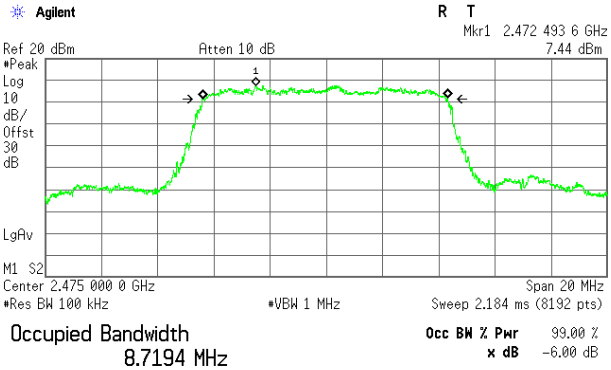


RF1

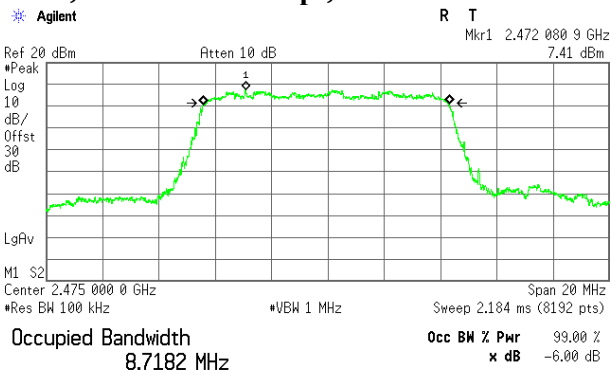


RF2

Plot 3.1.12 6 dB DTS Bandwidth, BW = 8.4 MHz, Bit rate = 8.0 Mbps, Fc = 2475 MHz



RF1



RF2

3.2. Fundamental Emission Output Power

Reference document:	**47 CFR §15.247 (b)(3)(4)**		
Test Requirements:	The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands shall not exceed 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted (average) output power. The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.		
Method of testing:	KDB 558074 D01 v03r03, Sec.9.1.2, Conducted PKPM1	**Pass**	
Operating conditions:	Under normal test conditions		
Settings:	Triggered/signal-gated broadband power meter		
Environment conditions:	Ambient Temperature: 21°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	--	

Test Results:

Fundamental Frequency, [MHz]	Transmitter Output	Emission Output Power, [mW]		Limit,	Margin, [mW]	Pass/Fail
		Fundamental	Total	[mW]		
BW = 4.2 MHz, Bit Rate = 1.6 Mbps, continuous transmission						
2403	RF1	500	943	1000	-57	Pass
	RF2	443				
2442	RF1	403	775	1000	-225	Pass
	RF2	372				
2478	RF1	444	854	1000	-146	Pass
	RF2	410				
BW = 4.2 MHz, Bit Rate = 4.0 Mbps, continuous transmission						
2403	RF1	500	948	1000	-52	Pass
	RF2	448				
2442	RF1	404	775	1000	-225	Pass
	RF2	381				
2478	RF1	450	871	1000	-129	Pass
	RF2	421				
BW = 8.4 MHz, Bit Rate = 6.4 Mbps, continuous transmission						
2405	RF1	300	560	1000	-440	Pass
	RF2	260				
2440	RF1	237	465	1000	-535	Pass
	RF2	228				
2475	RF1	262	498	1000	-502	Pass
	RF2	236				
BW = 8.4 MHz, Bit Rate = 8.0 Mbps, continuous transmission						
2405	RF1	311	580	1000	-420	Pass
	RF2	269				
2440	RF1	247	486	1000	-514	Pass
	RF2	239				
2475	RF1	268	514	1000	-486	Pass
	RF2	246				

***Note:** a) Limit (Pout) = 30 – (Gtx – 6), where Gtx is the maximum transmitting antenna directional gain in dBi;

b) Per KDB 662911 D01 v02r01, directional gain of N transmit antennas in case of correlated transmit signals is computed as follows:

Gtx = Gant + 10 log(N) dBi = 2+10Log(2) = 5 dBi, Gant = 2 dBi per customer's declaration.

c) Hence, Pout = 30 dBm = 1Watt

3.3. Maximum Power Spectral Density Level in the Fundamental Emissions

Reference document:	**47 CFR §15.247 (e)**		
Test Requirements:	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.		
Method of testing:	KDB 558074 D01 v03r03, Sec.10.2 Conducted, PKPSD method	**Pass**	
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 3 kHz, VBW: 3 MHz		
Environment conditions:	Ambient Temperature: 21°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 3.3.1 - Plot 3.3.12	

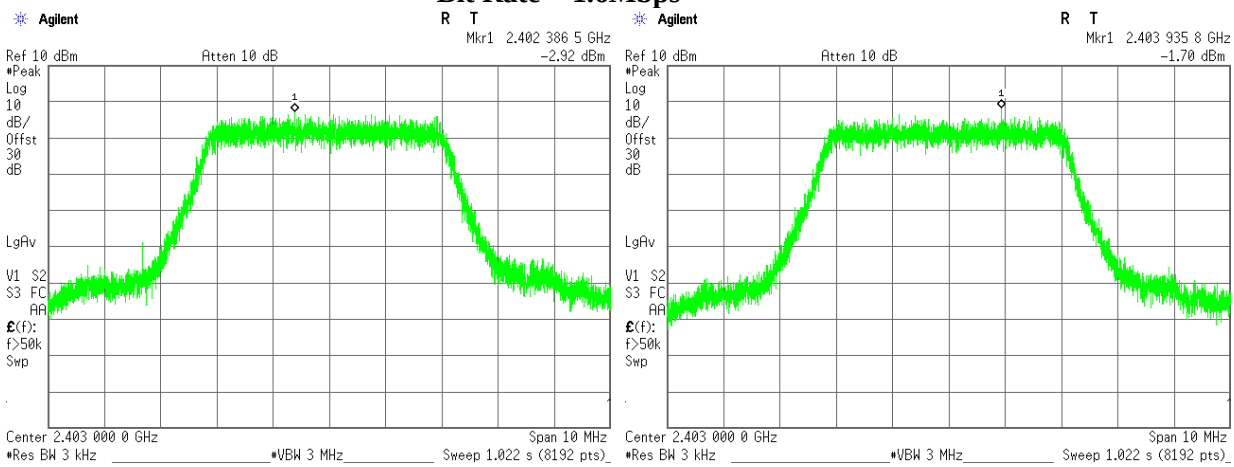
Test Results:

Fundamental Frequency, [MHz]	RF Output	PSD Measured, [dBm/3kHz]	Correction for 2 outputs*	Duty Cycle Correction Factor	PSD Corrected [dBm/3kHz]**	PSD Limit, [dBm/3kHz]	Margin, [dB]	Pass/ Fail
BW = 4.2 MHz, Bit Rate = 1.6 Mbps, continuous transmission								
2403	RF1	-2.9	3	NA	0.1	8.0	-7.9	Pass
	RF2	-1.7			1.3		-6.7	
2442	RF1	-4.3			-1.3	8.0	-9.3	Pass
	RF2	-3.8			-0.8		-8.8	
2478	RF1	-3.2			-0.2	8.0	-8.2	Pass
	RF2	-3.6			-0.6		-8.6	
BW = 4.2 MHz, Bit Rate = 4.0 Mbps, continuous transmission								
2403	RF1	-2.94	3	NA	0.1	8.0	-7.9	Pass
	RF2	-4.14			-1.1		-9.1	
2442	RF1	-4.20			-1.2	8.0	-9.2	Pass
	RF2	-5.47			-2.5		-10.5	
2478	RF1	-3.77			-0.8	8.0	-8.8	Pass
	RF2	-4.58			-1.6		-9.6	
BW = 8.4 MHz, Bit Rate = 6.4 Mbps, continuous transmission								
2405	RF1	-6.7	3	NA	-3.7	8.0	-11.7	Pass
	RF2	-7.1			-4.1		-12.1	
2440	RF1	-7.5			-4.5	8.0	-12.5	Pass
	RF2	-8.4			-5.4		-13.4	
2475	RF1	-7.0			-4.0	8.0	-12.0	Pass
	RF2	-7.4			-4.4		-12.4	
BW = 8.4 MHz, Bit Rate = 8.0 Mbps, continuous transmission								
2405	RF1	-6.4	3	NA	-3.4	8.0	-11.4	Pass
	RF2	-6.9			-3.9		-11.9	
2440	RF1	-7.9			-4.9	8.0	-12.9	Pass
	RF2	-8.3			-5.3		-13.3	
2475	RF1	-6.6			-3.6	8.0	-11.6	Pass
	RF2	-7.7			-4.7		-12.7	

*Correction for N outputs = 10log(Nant), where Nant is the number of outputs

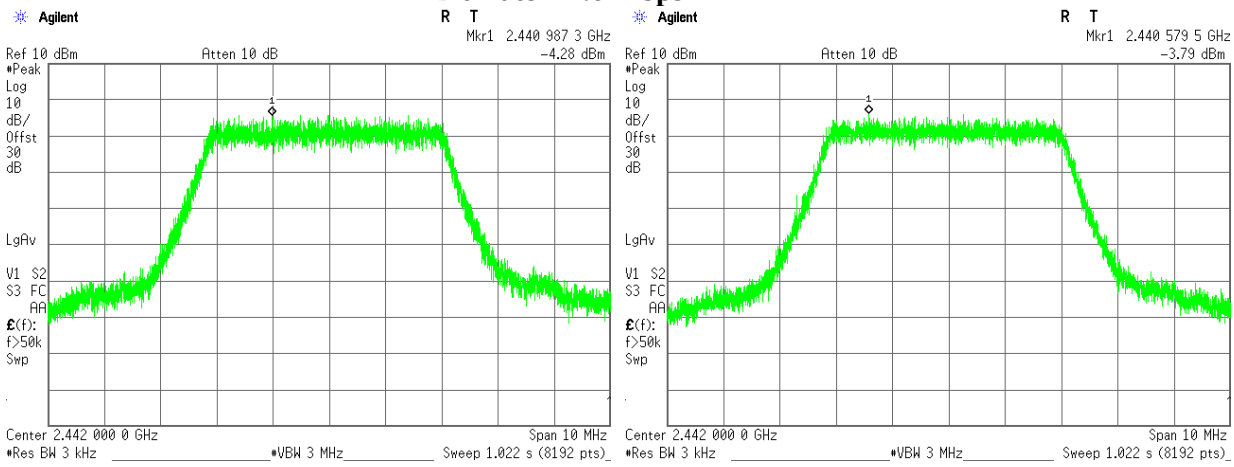
**PSD Corrected = PSD Measured + Correction for N outputs + Duty Cycle Correction Factor

Plot 3.3.1 Maximum Power Spectral Density test results, Fc = 2403MHz, BW = 4.2 MHz, Bit Rate = 1.6Mbps



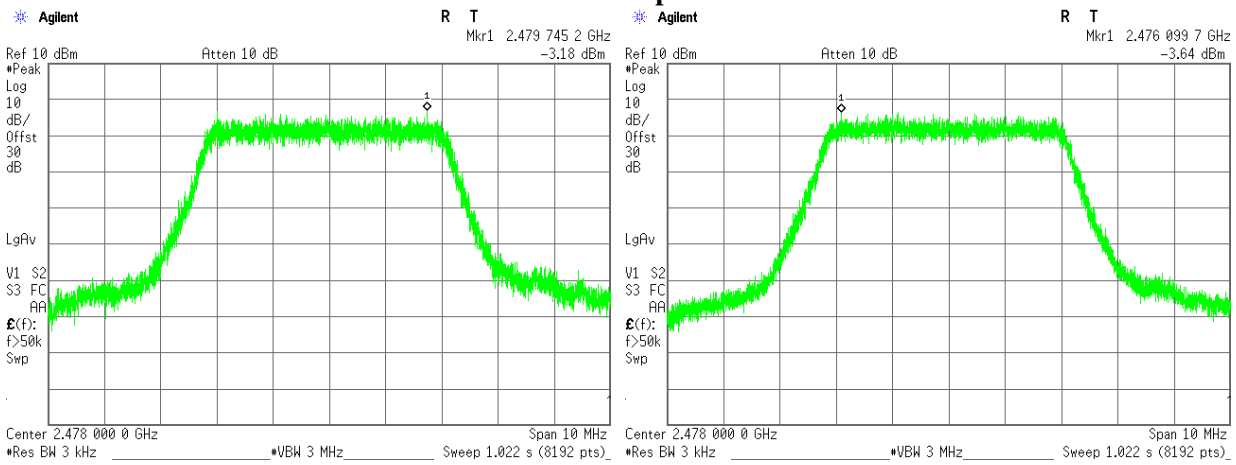
RF1 RF2

Plot 3.3.2 Maximum Power Spectral Density test results, Fc = 2442MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



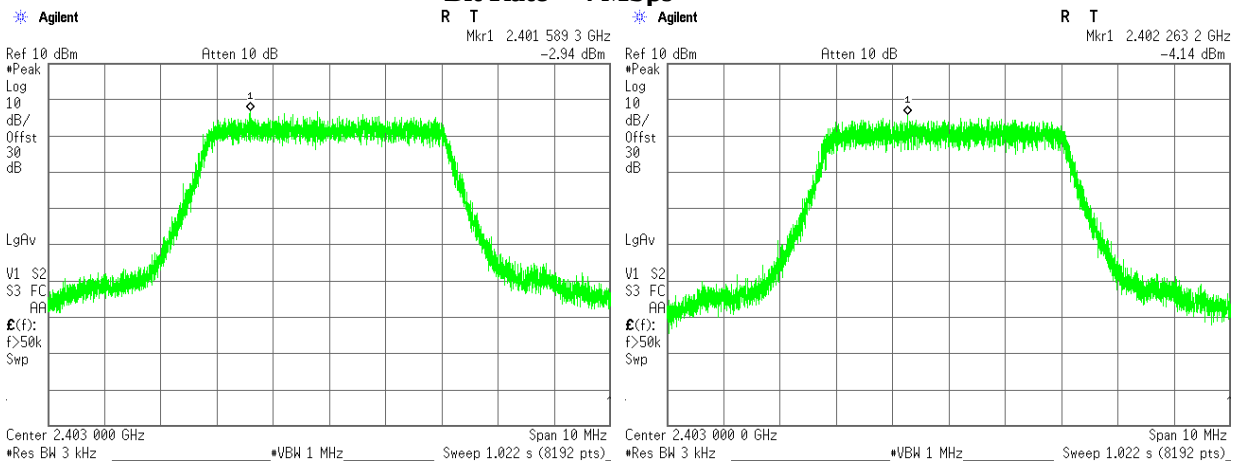
RF1 RF2

Plot 3.3.3 Maximum Power Spectral Density test results, Fc = 2478MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



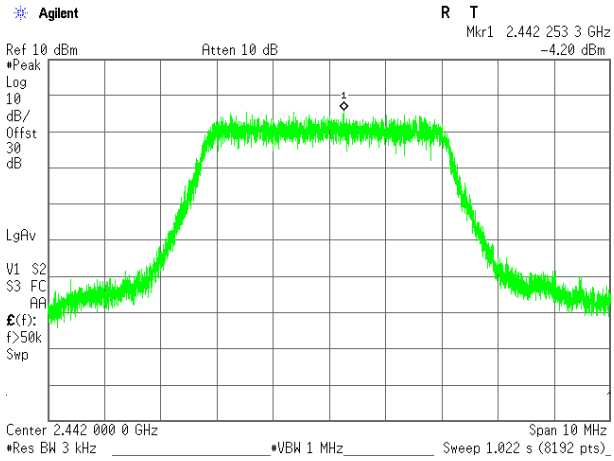
RF1 RF2

Plot 3.3.4 Maximum Power Spectral Density test results, Fc = 2403MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

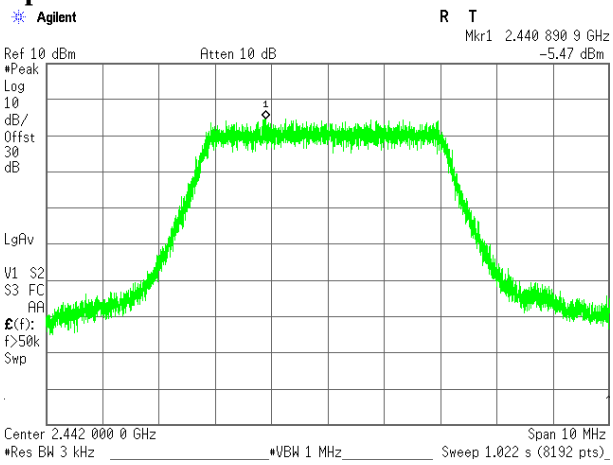


RF1 RF2

Plot 3.3.5 Maximum Power Spectral Density test results, Fc = 2442MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

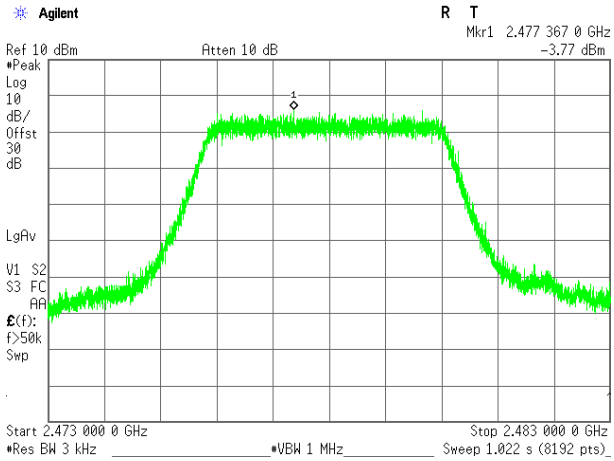


RF1

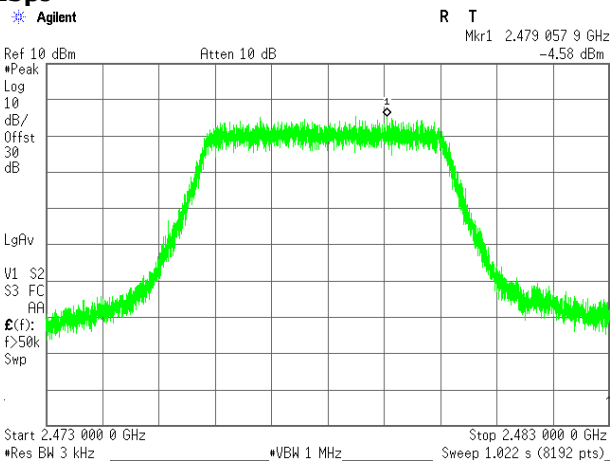


RF2

Plot 3.3.6 Maximum Power Spectral Density test results, Fc = 2478MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

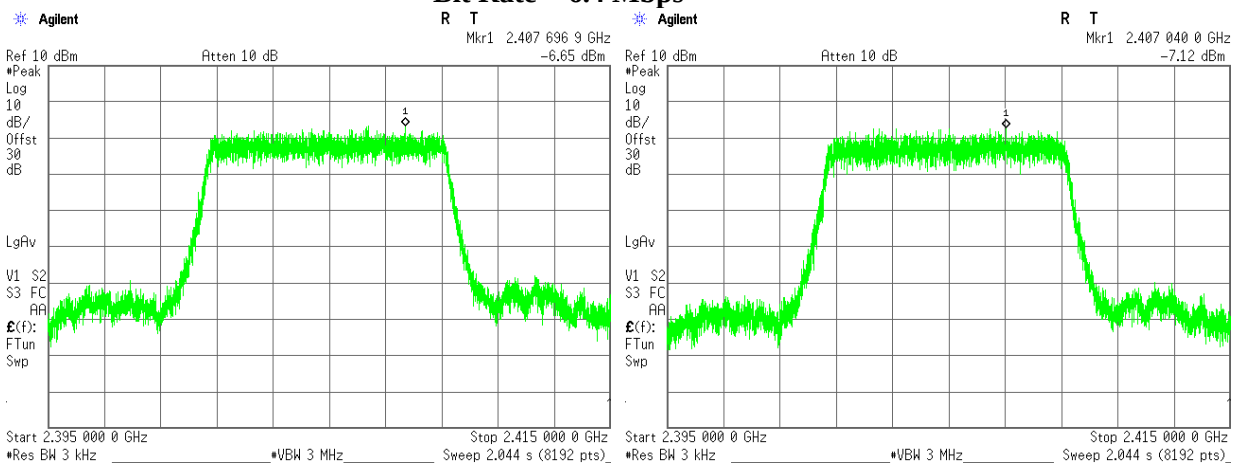


RF1



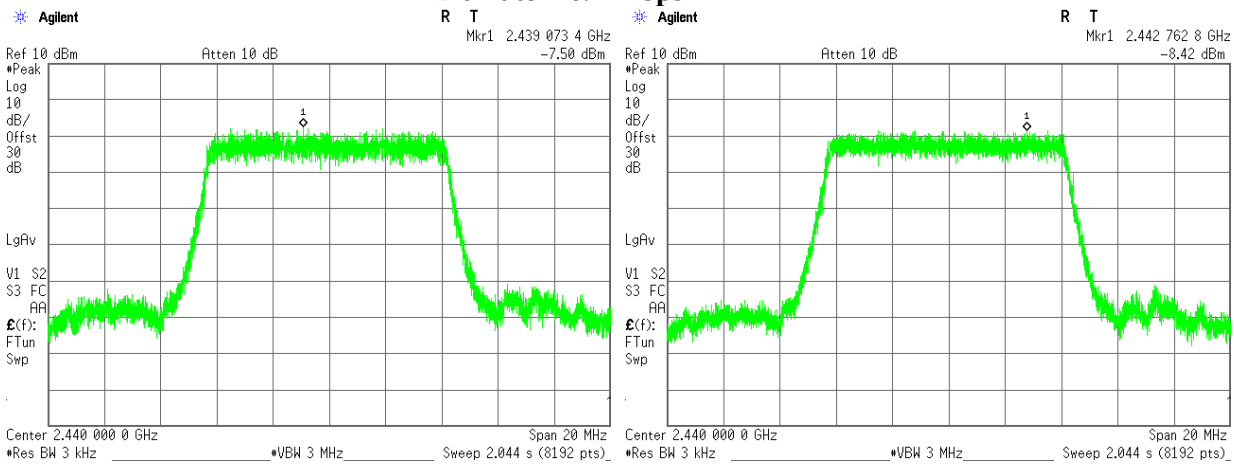
RF2

Plot 3.3.7 Maximum Power Spectral Density test results, Fc = 2405MHz, BW = 8.4 MHz, Bit Rate = 6.4 Mbps



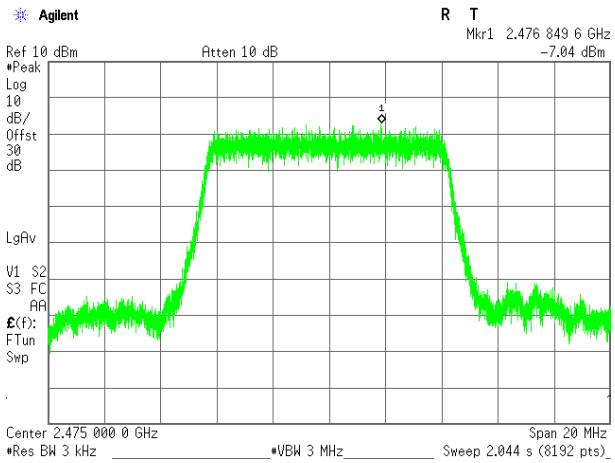
RF1 RF2

Plot 3.3.8 Maximum Power Spectral Density test results, Fc = 2440MHz, BW = 8.4 MHz, Bit Rate = 6.4 Mbps

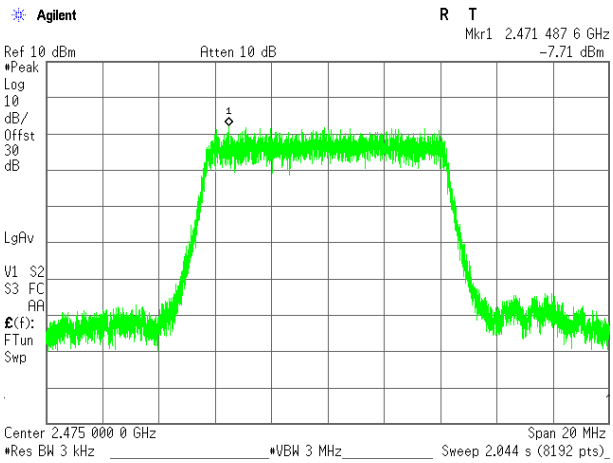


RF1 RF2

Plot 4.3.9 Maximum Power Spectral Density test results, Fc = 2475MHz, BW = 8.4 MHz, Bit Rate = 6.4 Mbps

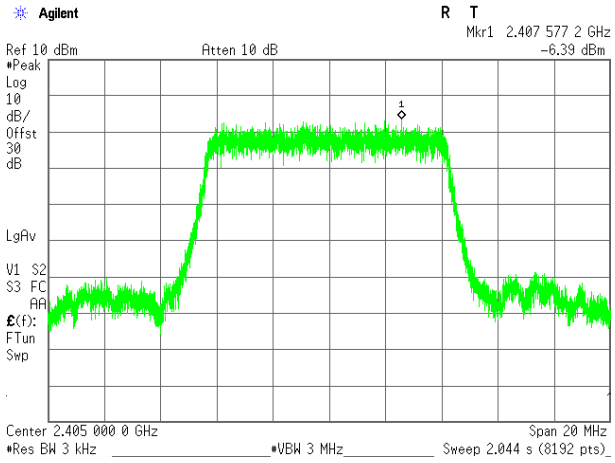


RF1

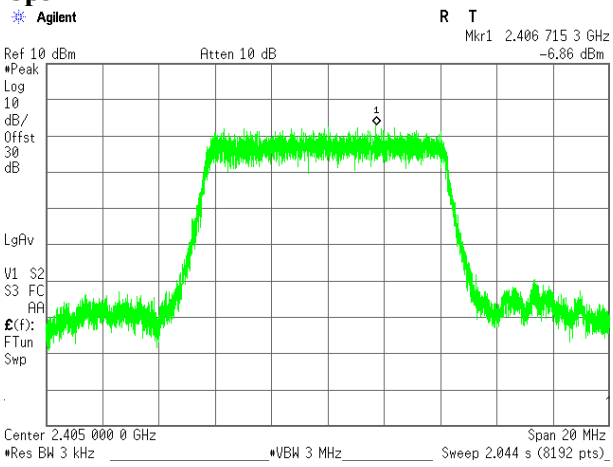


RF2

Plot 3.3.10 Maximum Power Spectral Density test results, Fc = 2405MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

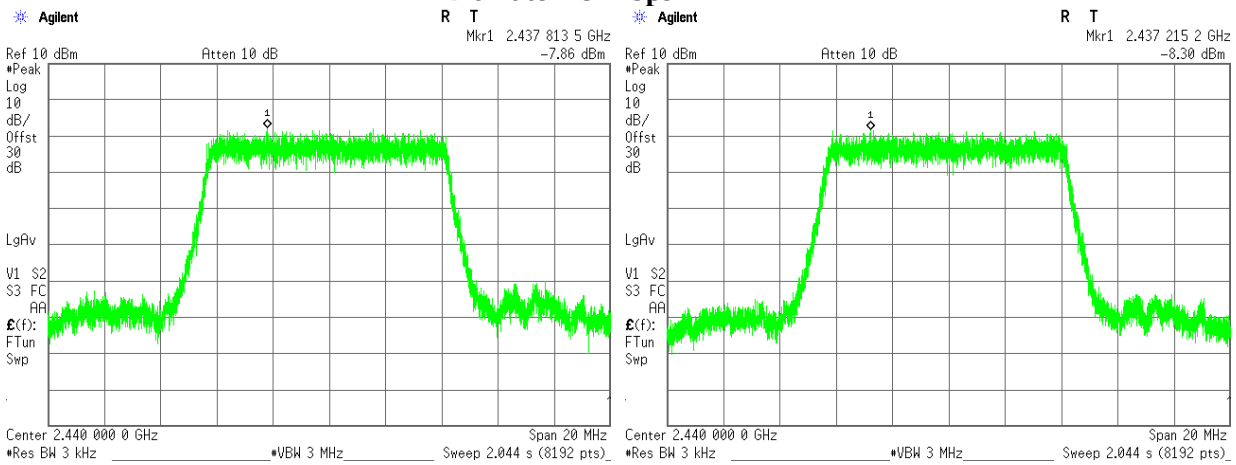


RF1



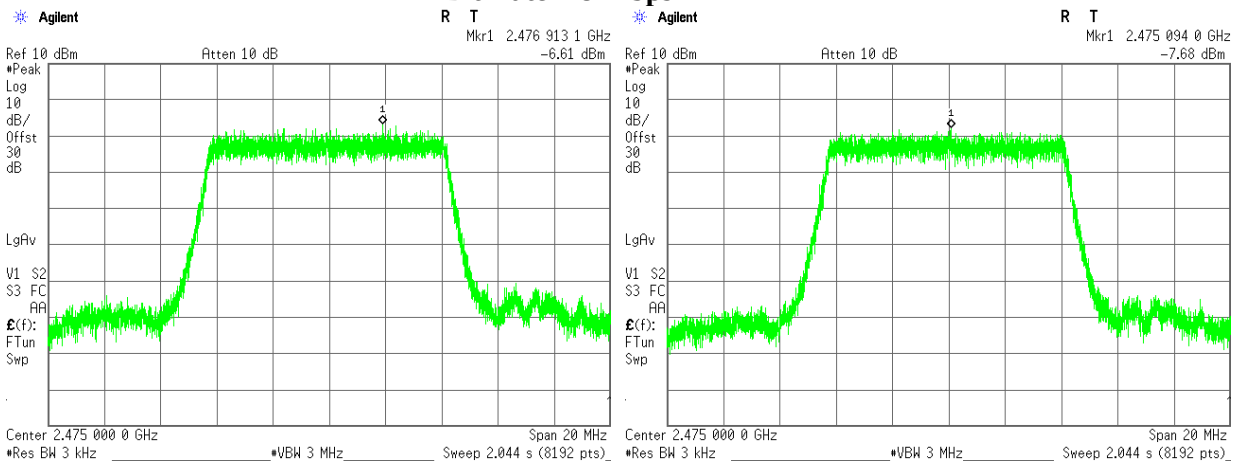
RF2

Plot 3.3.11 Maximum Power Spectral Density test results, Fc = 2440MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



RF1 RF2

Plot 3.3.12 Maximum Power Spectral Density test results, Fc = 2475MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



RF1 RF2

3.4. Emissions in Non-Restricted Frequency Bands

Reference document:	**47 CFR §15.247 (d)**		
Test Requirements:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (See §15.205(c)).		
Method of testing:	KDB 558074 D01 v03r03 Sec.11.1, a) Conducted	**Pass**	
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 100 kHz, VBW:3 MHz		
Environment conditions:	Ambient Temperature: 21°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 3.4.1- Plot 3.4.18	

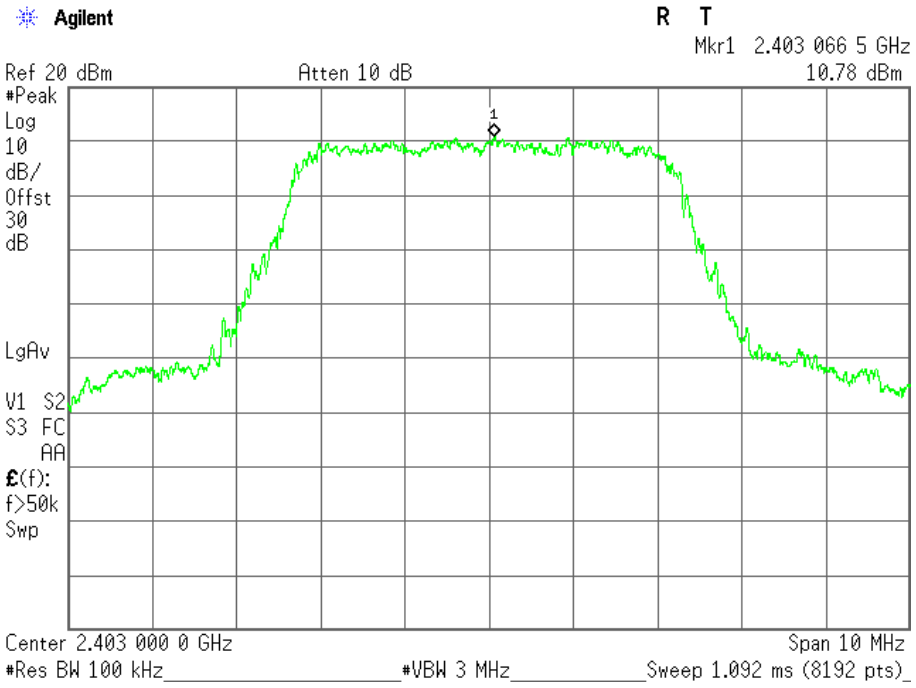
Test results:

Unwanted Emissions Measurements:

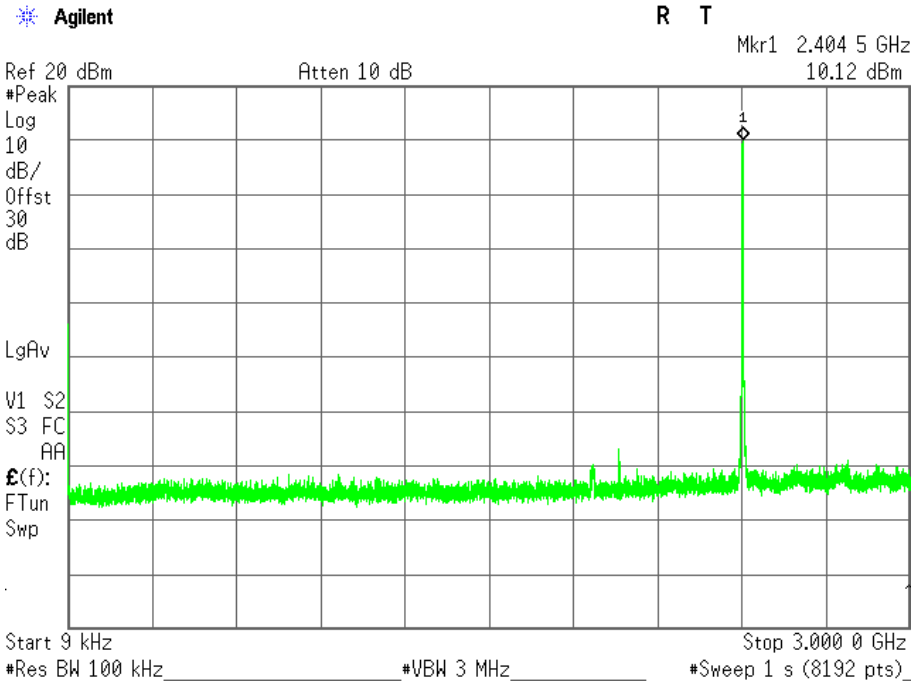
Fundamental Frequency, [MHz]	Fundamental Emission Reference Level, [dBm]	Unwanted Emissions Frequency, [MHz]	Unwanted Emissions Level, [dBm]	Correction factor for 2 outputs	Corrected Unwanted Emissions Level, [dBm]	Attenuation Below Fundamental [dB]	Minimum Attenuation Below Fundamental [dB]	Margin, [dB]	Pass/Fail
BW = 4.2 MHz, Bit Rate = 4 Mbps RF1 output(as a worst case in power test)									
2403	10.8	2399.700	All emissions were at least 20 dB the limit				30.0	NA	Pass
2442	10.3	2398.600	All emissions were at least 20 dB the limit				30.0	NA	Pass
2478	10.2	2483.200	All emissions were at least 20 dB the limit				30.0	NA	Pass
BW = 8.4 MHz, Bit Rate = 8 Mbps RF1 output (as a worst case in power test)									
2405	7.4	2399.700	All emissions were at least 20 dB the limit				30.0	NA	Pass
2440	6.3	2483.100	All emissions were at least 20 dB the limit				30.0	NA	Pass
2475	6.3	2484.300	All emissions were at least 20 dB the limit				30.0	NA	Pass

*Correction for N outputs = 10log(Nant), where Nant is the number of outputs

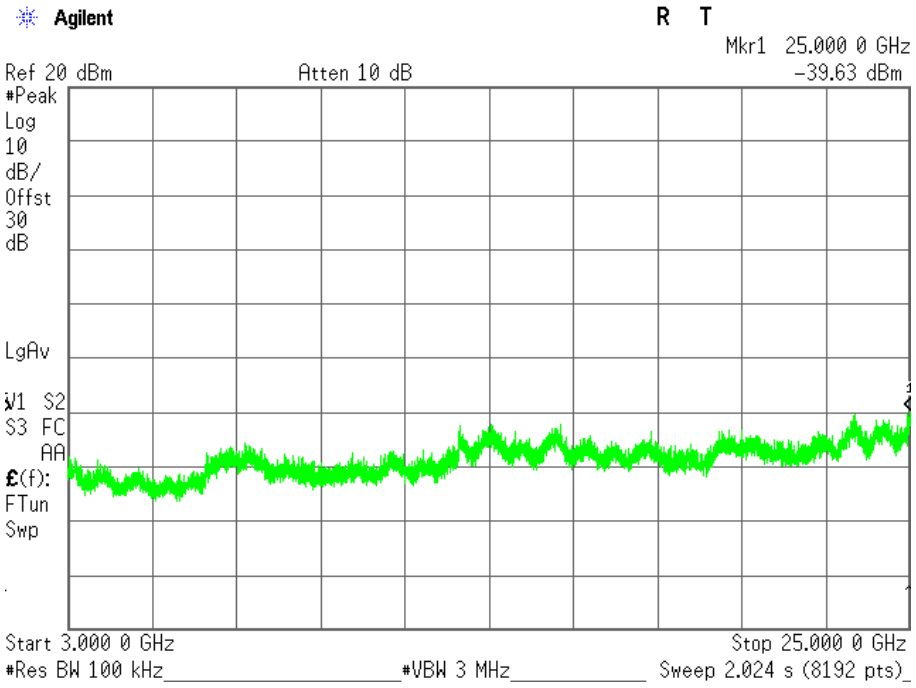
Plot 3.4.1 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz



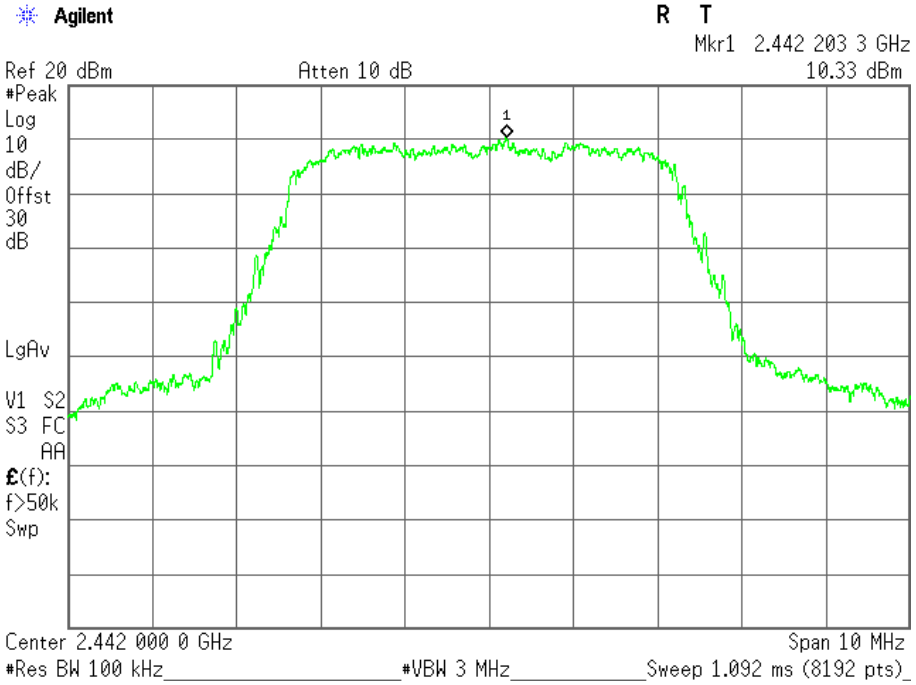
Plot 3.4.2 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in kHz – 3 GHz frequency range, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz 9



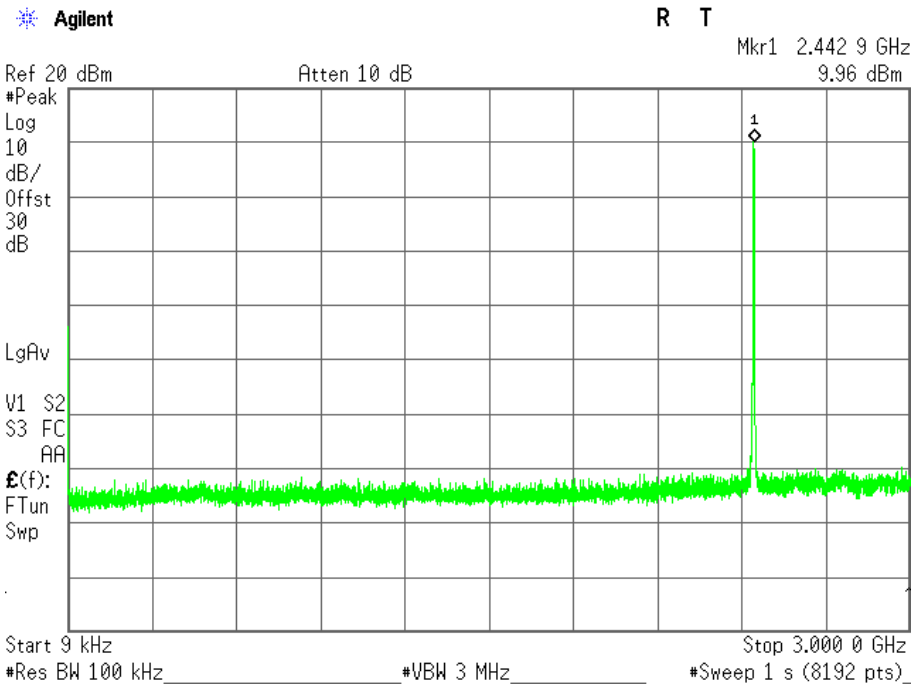
Plot 3.4.3 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in GHz – 25 GHz frequency range, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz **3**



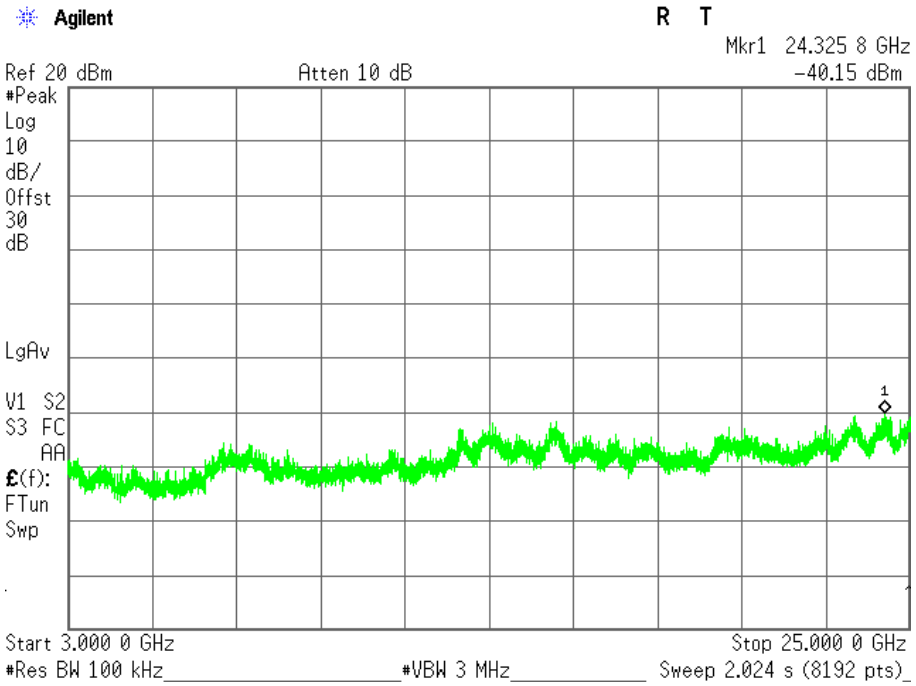
Plot 3.4.4 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz



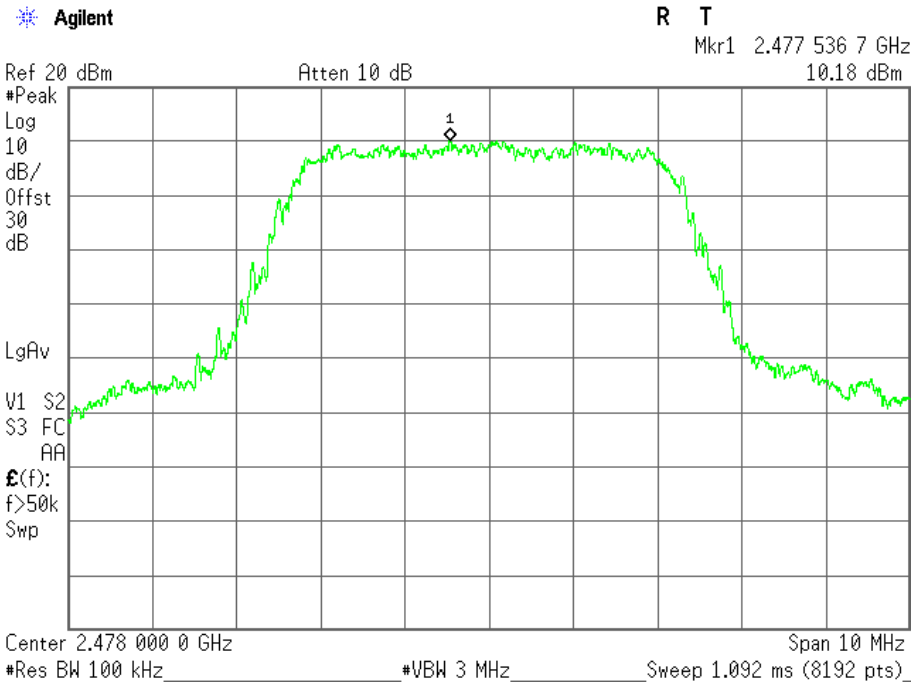
Plot 3.4.5 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 3 GHz frequency range, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz



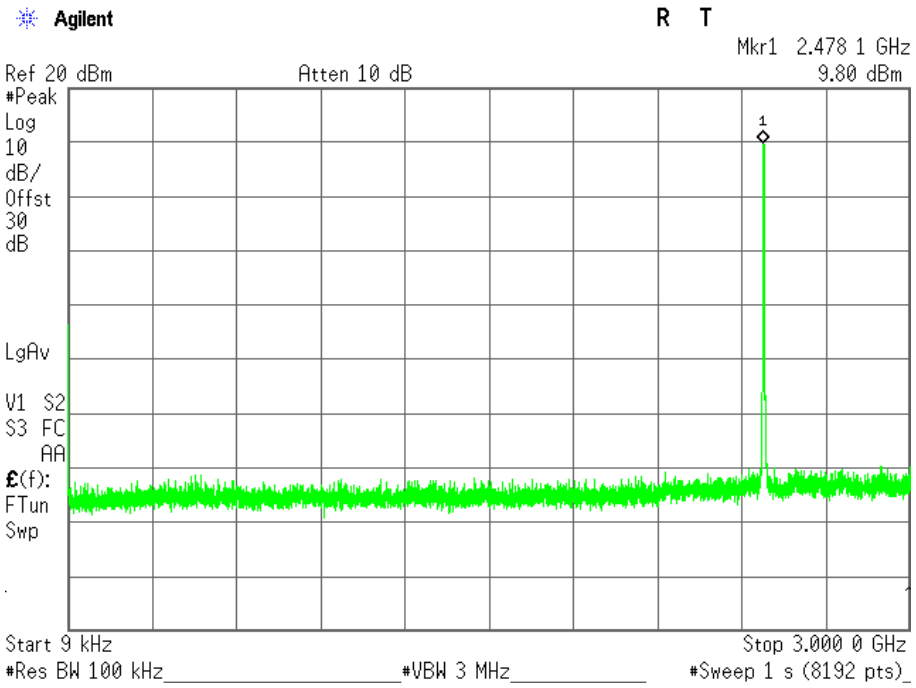
Plot 3.4.6 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 3 GHz – 25 GHz frequency range, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz



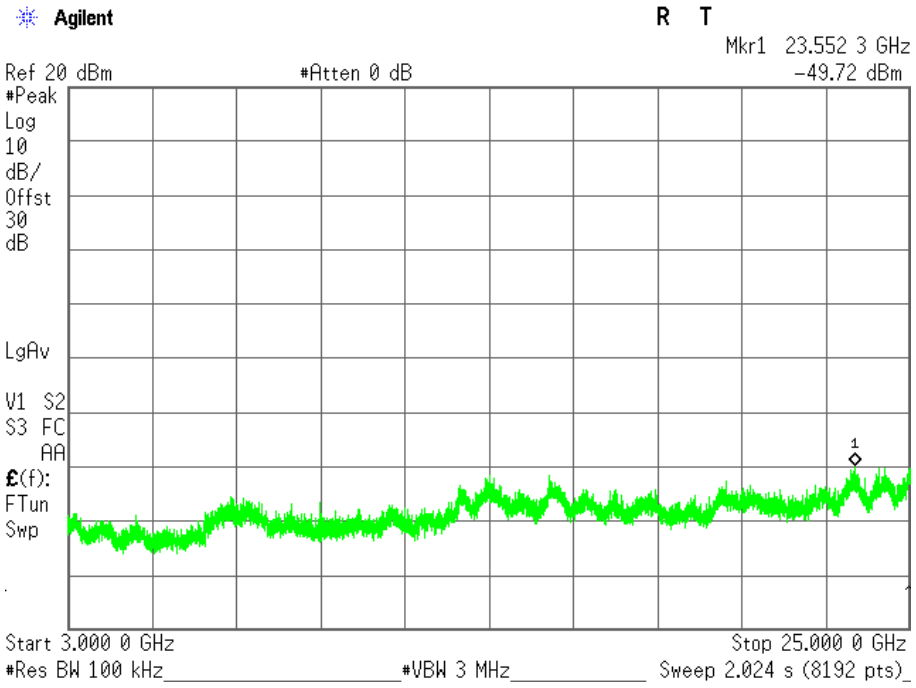
Plot 3.4.7 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz



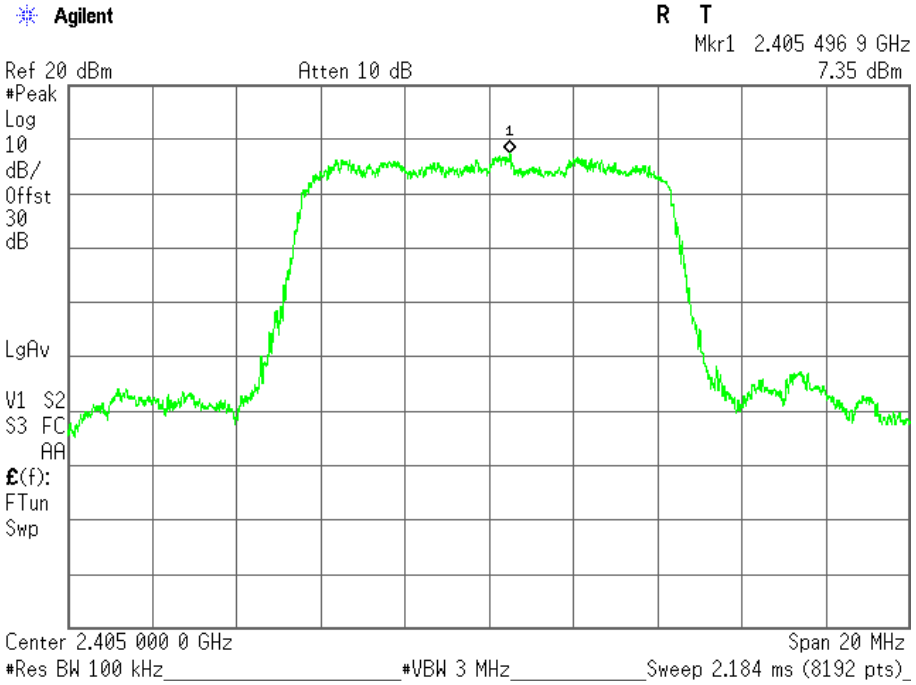
Plot 3.4.8 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 3 GHz frequency range, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz



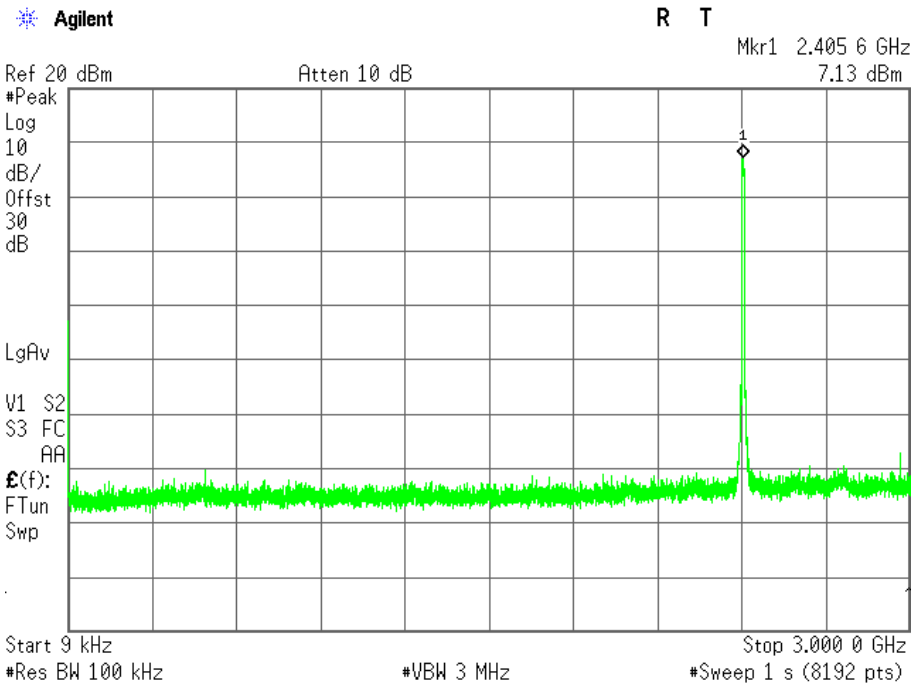
Plot 3.4.9 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 3 GHz – 25 GHz frequency range, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 MHz



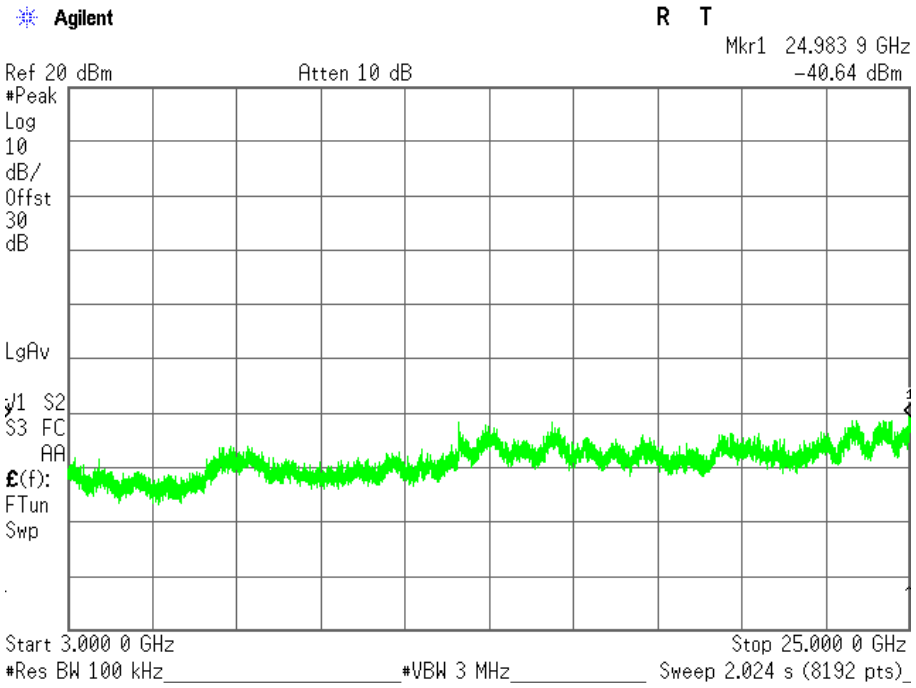
Plot 3.4.10 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



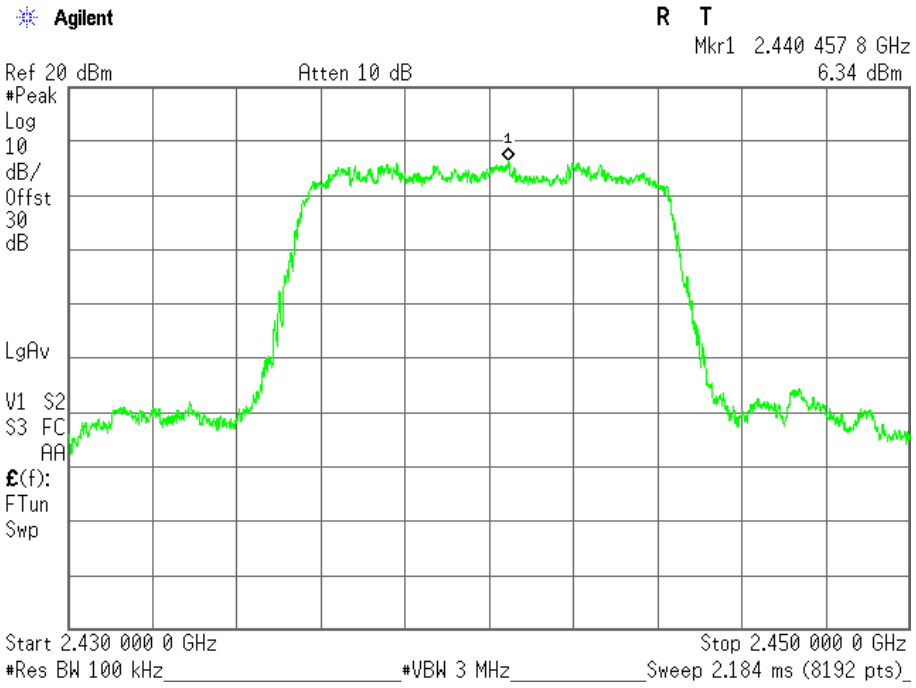
Plot 3.4.11 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 3 GHz frequency range, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



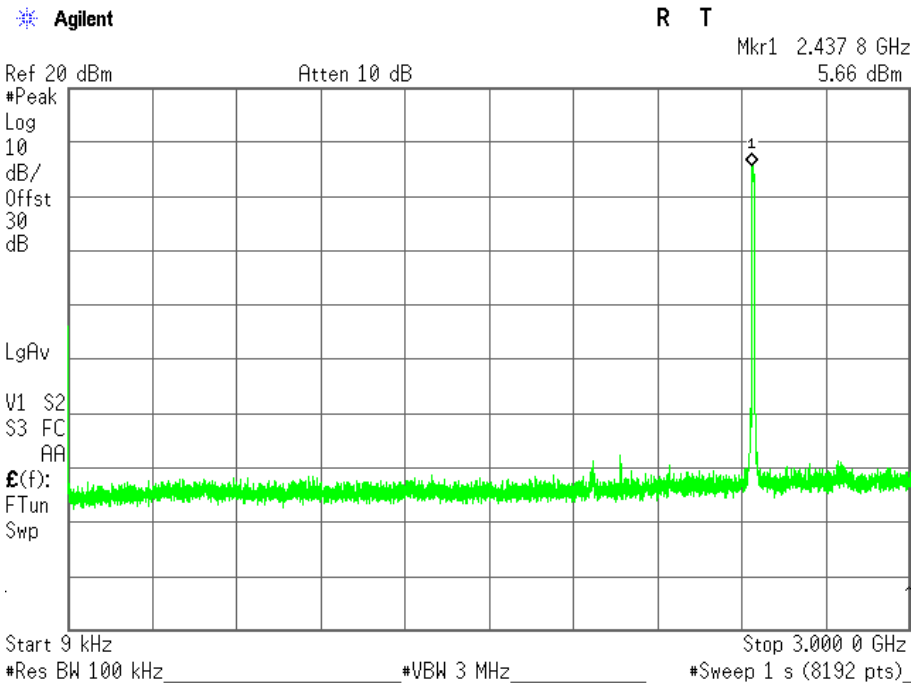
Plot 3.4.12 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 3 GHz – 25 GHz frequency range, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



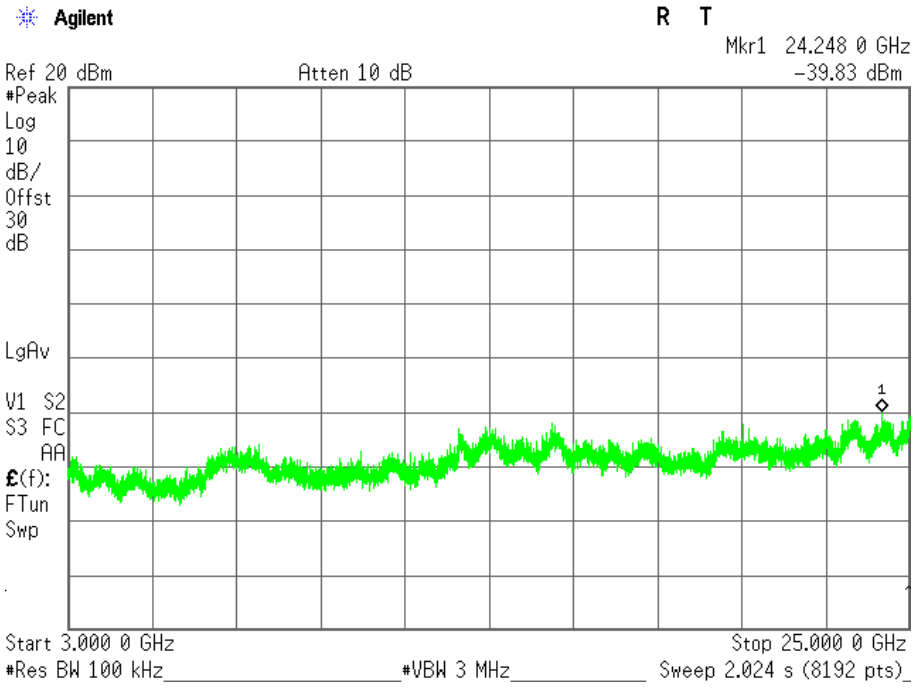
Plot 3.4.13 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



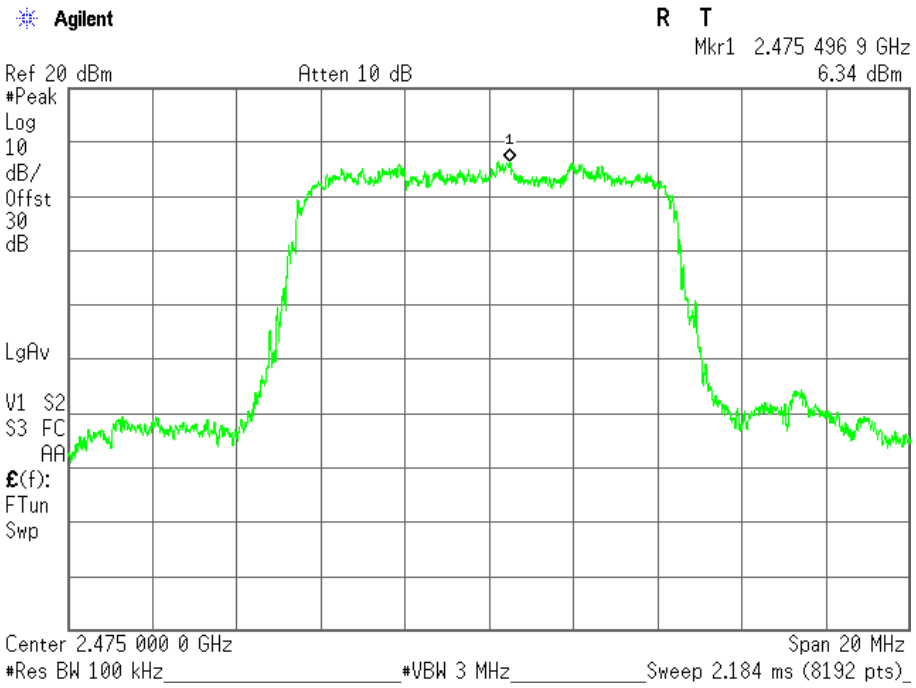
Plot 3.4.14 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 3 GHz frequency range, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



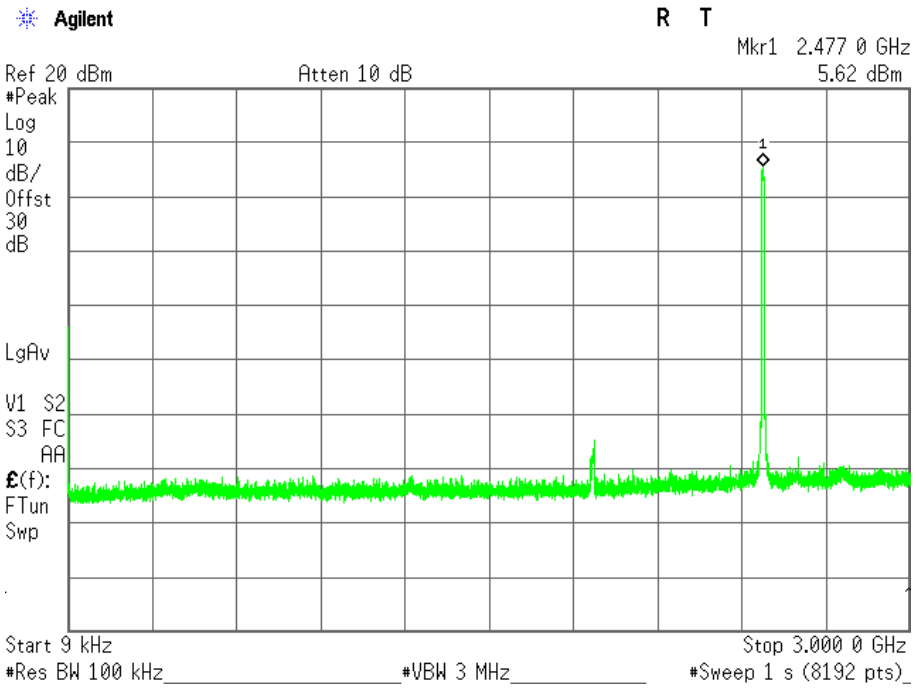
Plot 3.4.15 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 3 GHz – 25 GHz frequency range, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



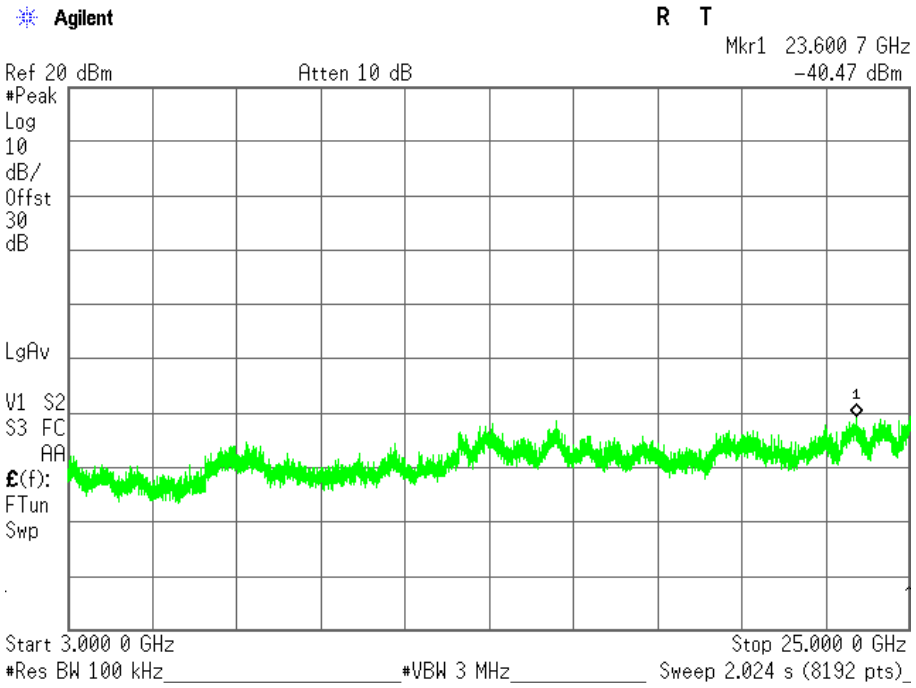
Plot 3.4.16 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results, Fundamental Emission Reference Level, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



Plot 3.4.17 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 9 kHz – 3 GHz frequency range, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



Plot 3.4.18 Unwanted Conducted Emissions into Non-Restricted Frequency Bands test results in 3 GHz – 25 GHz frequency range, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 MHz



3.5. Emissions in restricted frequency bands

Reference document:	**47 CFR §15.247 (d), & §15.205, & §15.209(a)**		
Test Requirements:	Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must comply with the radiated emissions limits specified in §15.209(a) (see §15.205(c)).		
Method of testing:	KDB 558074 D01 v03r03, Sec.12.2.1-12.2.5 Conducted & 12.2.7 Radiated for cabinet/case spurious emissions	**Pass**	
Operating conditions:	Under normal test conditions		
S.A. Settings:	According to KDB 558074 D01 v03r03		
Environment conditions:	Ambient Temperature: 21°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 3.5.1 - Plot 3.5.78	

Limits:

30MHz to 1GHz frequency range:

Frequency [MHz]	QP Limit [dBµV /m] Class A	QP Limit [dBµV /m] Class B
30÷88	49.5	40.0
88÷216	54.0	43.5
216÷960	57.0	46.0
960÷1000	60.0	54.0

Above 1GHz frequency range:

Frequency [GHz]	AVR Limit [dBµV m] Class A	AVR Limit [dBµV /m] Class B
Above 1GHz	74	54

Test results below 1GHz for BW = 4.2 MHz, Bit Rate = 4 Mbps* (Radiated Spurious emissions from cabinet/case):

All measurements were done in horizontal and vertical polarizations; the results show the worst case.

Fundamental Frequency, MHz	Unwanted Emission Frequency, MHz	Antenna Polarization	QP Measured Emission, dBµV/m	Limit, dBµV/m	Delta, dB	Pass/Fail
2403	261.401	V	38.2	46.0	7.8	Pass

Test results above 1GHz for BW = 4.2 MHz, Bit Rate = 4 Mbps (Radiated Spurious emissions form cabinet/case):

Fundamental Frequency, MHz	Unwanted Emission Frequency, MHz	Antenna Polarization	Measured Emission, dBµV/m		Limit, dBµV/m		Delta, dB		Pass/ Fail
			Peak	AVG	Peak	AVG	Peak	AVG	
2403	17,930.4	H	60.3	49.76	74.0	54.0	13.7	4.24	Pass
2442	17,917.5	V	60.89	49.7	74.0	54.0	13.11	4.3	Pass
2478	17,920.1	H	60.52	50.13	74.0	54.0	13.48	3.87	Pass

Test results above 1GHz for BW = 8.4 MHz, Bit Rate = 8 Mbps (Radiated Spurious emissions form cabinet/case):

Fundamental Frequency, MHz	Unwanted Emission Frequency, MHz	Antenna Polarization	Measured Emission, dBµV/m		Limit, dBµV/m		Delta, dB		Pass/ Fail
			Peak	AVG	Peak	AVG	Peak	AVG	
2405	17,811.11	V	61.76	49.94	74.0	54.0	12.24	4.06	Pass
2440	17,914.9	H	61.41	51.56	74.0	54.0	12.59	2.44	Pass
2475	2.4836	V	67.69	52.35	74.0	54.0	6.31	1.65	Pass

Test results (Antenna-port conducted emission) in 2310-2390MHz and 2483.5-2500MHz frequency ranges:

Fundamental Frequency, MHz	Frequency Range, MHz	Measured Emission, dBm		Duty Cycle Correction Factor	Max Transmit Antenna Gain, dBi	MIMO Correction Factor	Equivalent EIRP, dBµV/m						Pass/ Fail
							Peak			Average			
		Peak	AVG (RMS)				Emission*	Limit	Delta	Emission*	Limit	Delta	
BW = 4.2 MHz, Bit Rate = 4 Mbps, RF1, continuous transmission													
2403	2310-2390	-43.4	-53.9	0.0	2	3	56.86	74	17.14	46.4	54.0	7.6	Pass
2478	2483.5-2500	-28.3	-46.8	0.0	2	3	71.96	74	2.04	53.5	54.0	0.5	Pass
BW = 4.2 MHz, Bit Rate = 4 Mbps, output RF 2, continuous transmission													
2403	2310-2390	-43.4	-54.7	0.0	2	3	56.86	74	17.14	45.6	54.0	8.4	Pass
2478	2483.5-2500	-29.4	-46.8	0.0	2	3	70.86	74	3.14	53.5	54.0	0.5	Pass
BW = 8.4 MHz, Bit Rate = 8 Mbps, RF1, continuous transmission													
2405	2310-2390	-37.4	-46.4	0.0	2	3	63.40	74	10.60	53.9	54.0	0.1	Pass
2475	2483.5-2500	-27.8	-46.6	0.0	2	3	73.00	74	1.00	53.7	54.0	0.3	Pass
BW = 8.4 MHz, Bit Rate = 8 Mbps, output RF 2, continuous transmission													
2405	2310-2390	-38.7	-47.9	0.0	2	3	62.10	74	11.90	52.4	54.0	1.6	Pass
2475	2483.5-2500	-29.2	-46.6	0.0	2	3	71.60	74	2.40	53.7	54.0	0.3	Pass

Note:

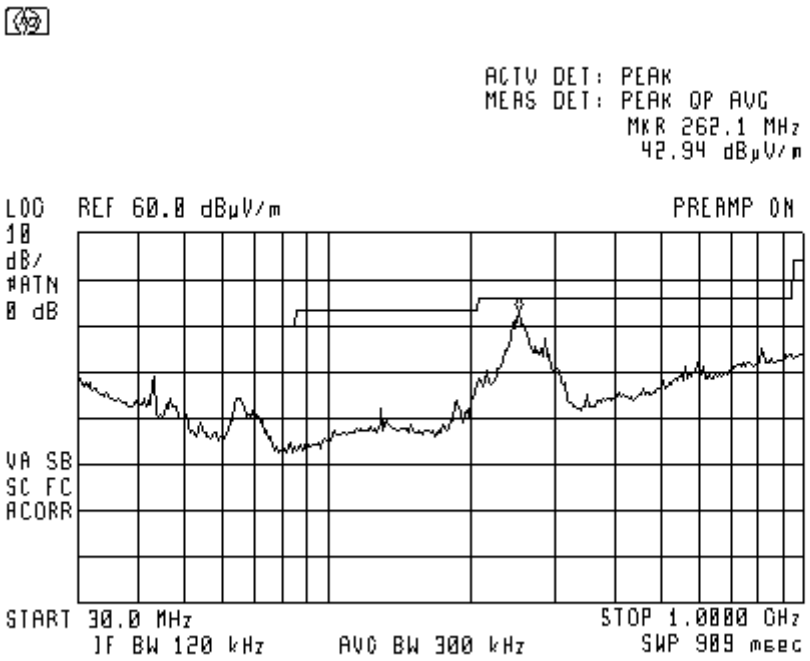
*E = EIRP – 20log D + 104.8

Duty Cycle Correction Factor for RMS measure = 10log(1/x), x is a duty cycle acc to KDB 662911 sec F)2)i)

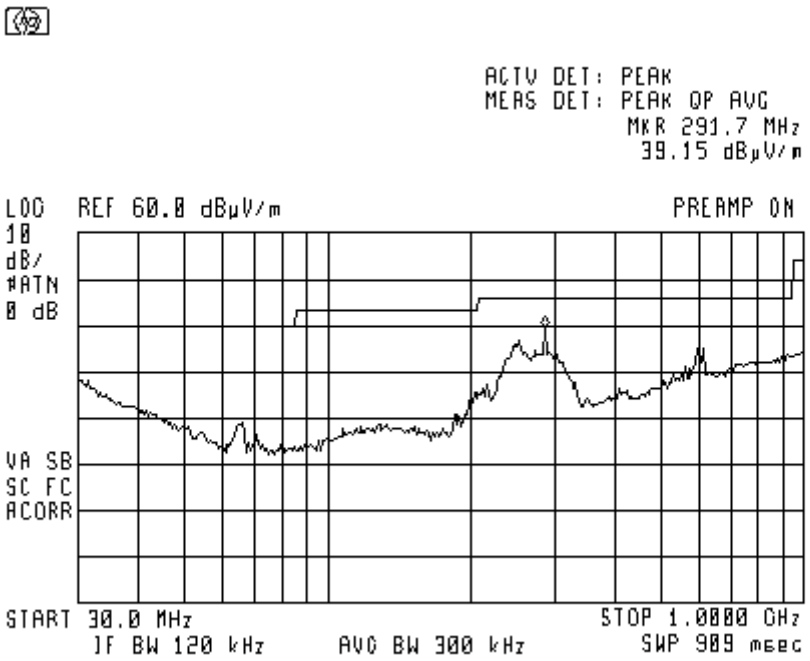
Max Transmit Antenna Gain acc to KDB558074 D01 v03r03 sec 12.2.6

For MIMO: Correction Factor = 10log(Nant) dBi acc to KDB 662911D01 v02r01

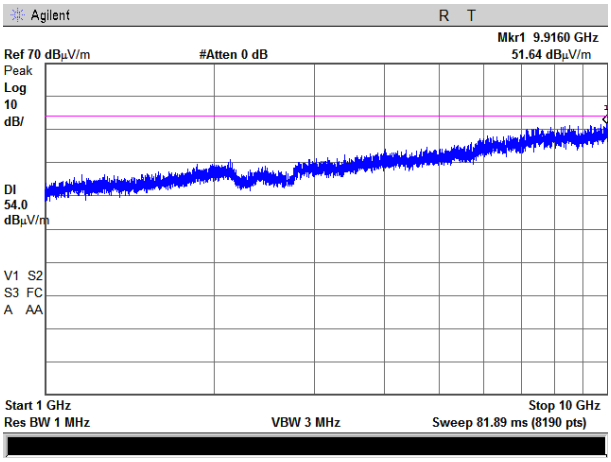
Plot 3.5.1 Emissions in restricted frequency bands test results, 30 MHz – 1 GHz range, Vertical polarization, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps (worst case for all modes)



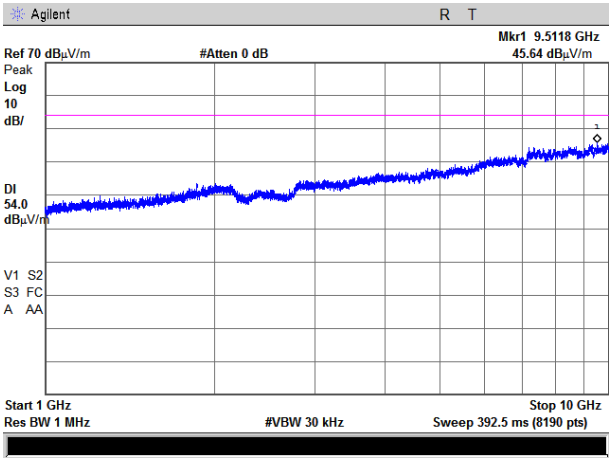
Plot 3.5.2 Emissions in restricted frequency bands test results, 30 MHz – 1 GHz range, Horizontal polarization, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps (worst case)



Plot 3.5.3 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

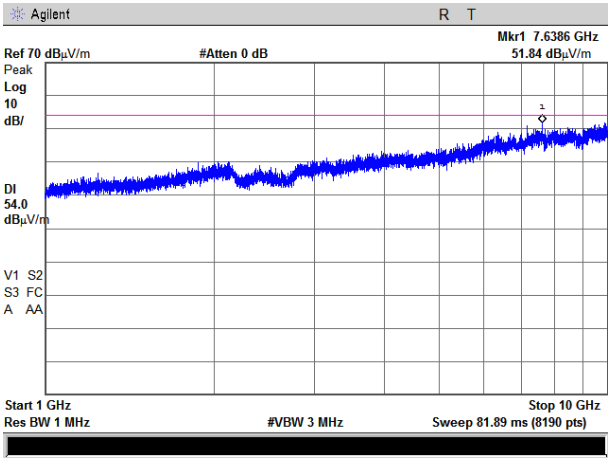


Peak

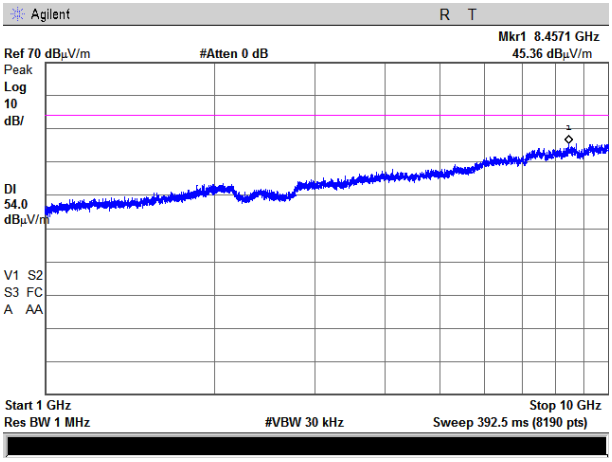


Average

Plot 3.5.4 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

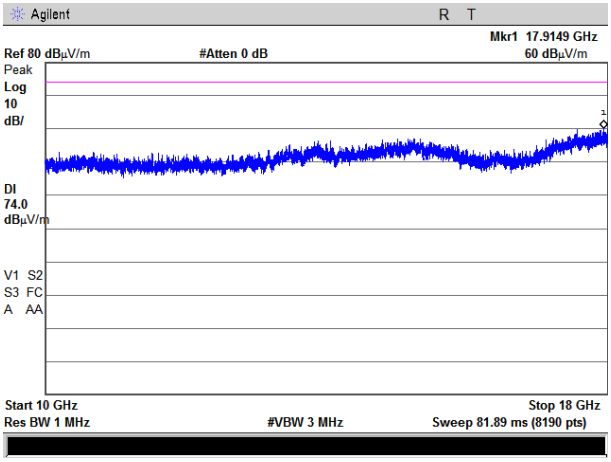


Peak

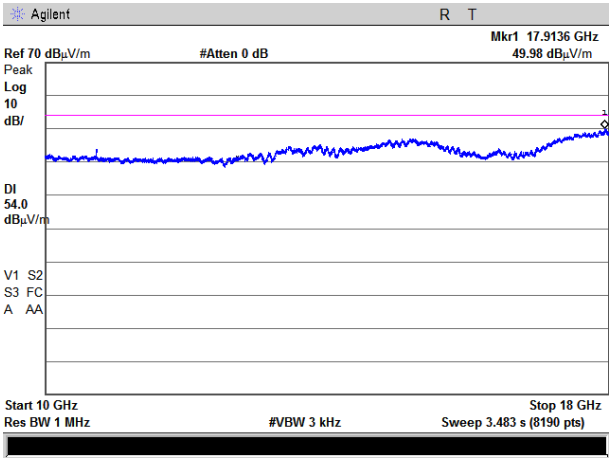


Average

Plot 3.5.5 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

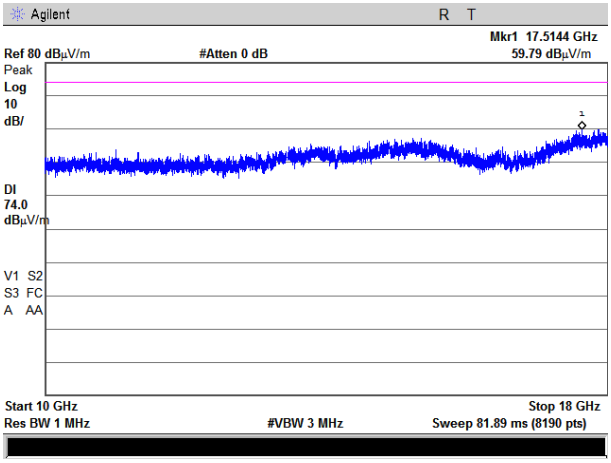


Peak

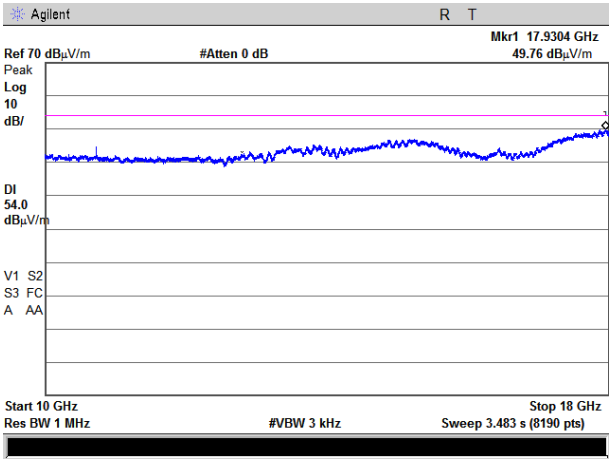


Average

Plot 3.5.6 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

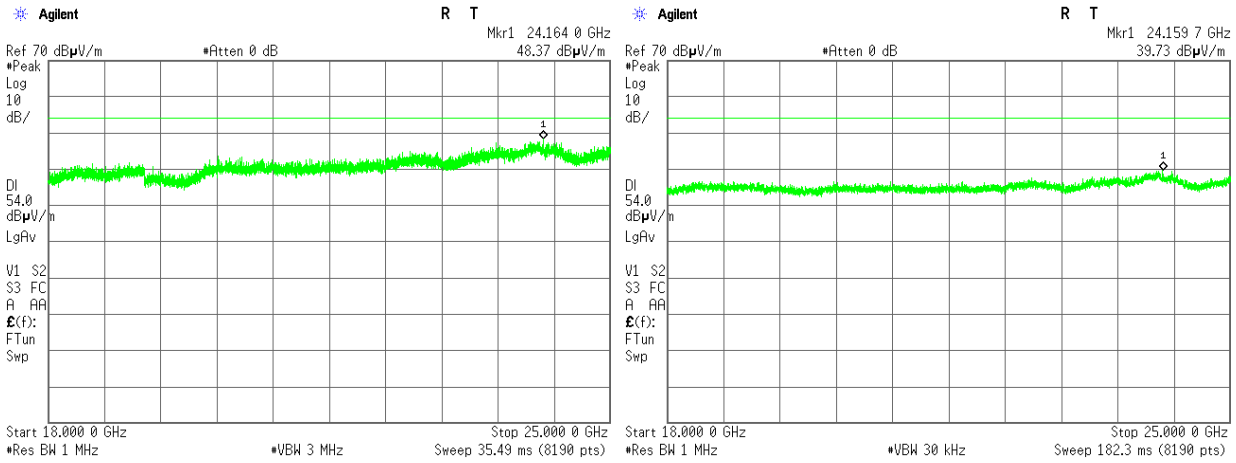


Peak



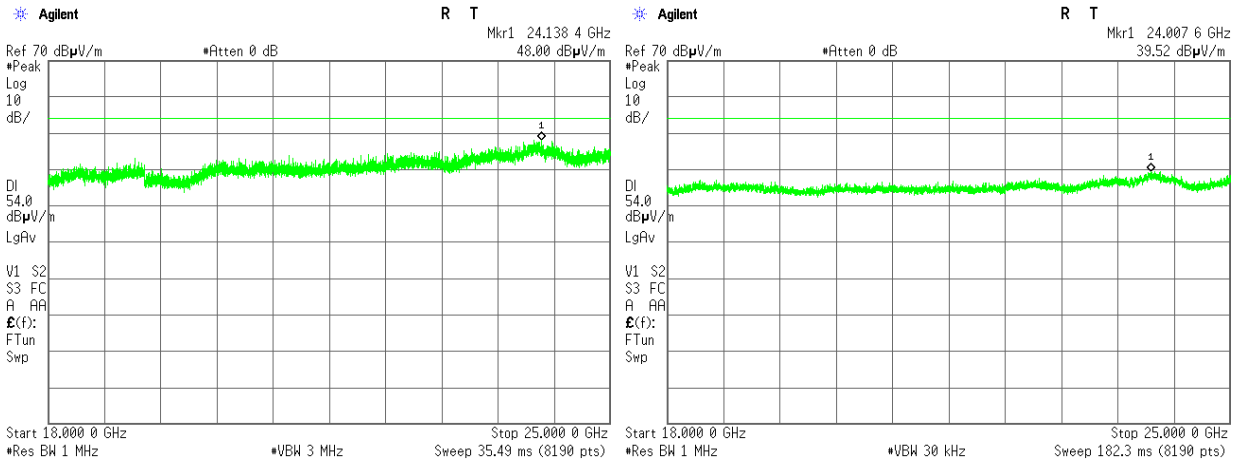
Average

Plot 3.5.7 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Vertical, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)



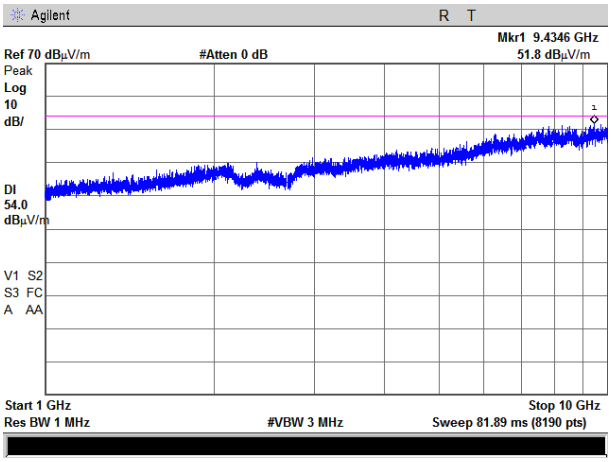
Peak Average

Plot 3.5.8 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Horizontal, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

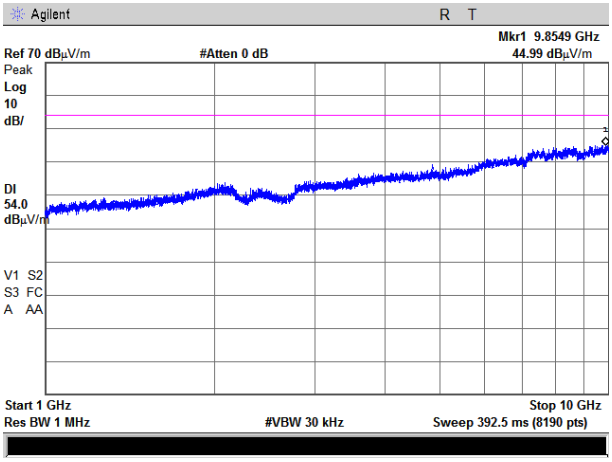


Peak Average

Plot 3.5.9 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

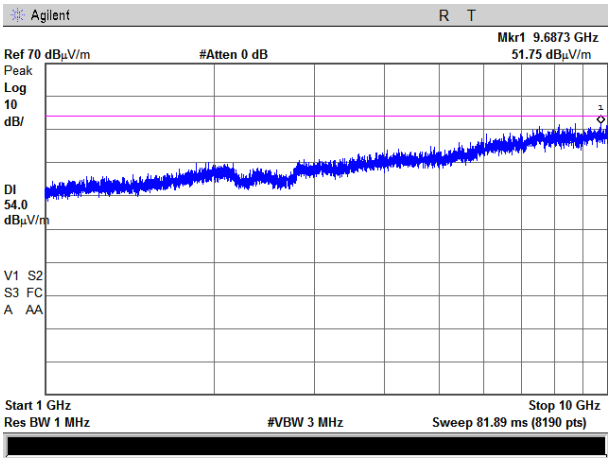


Peak

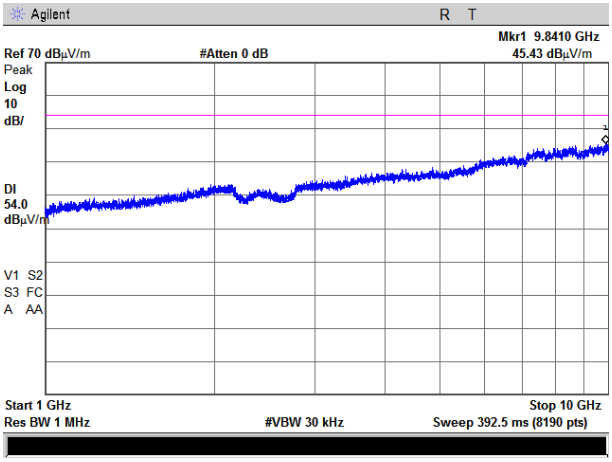


Average

Plot 3.5.10 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

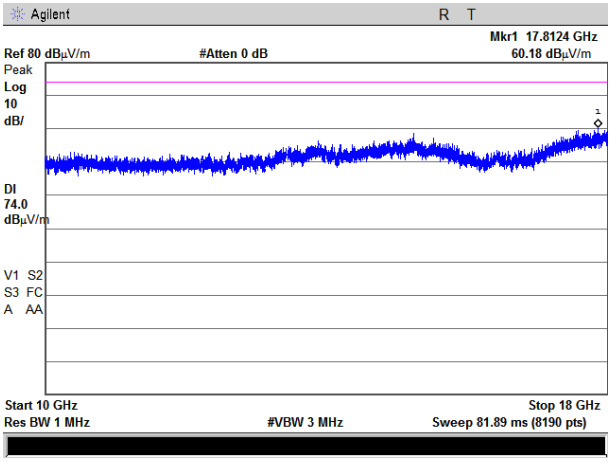


Peak

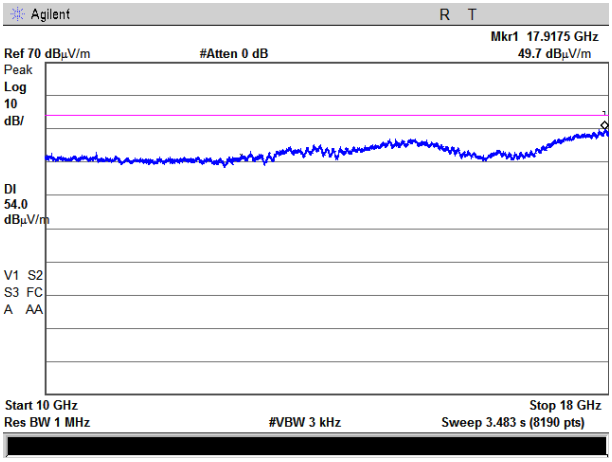


Average

Plot 3.5.11 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

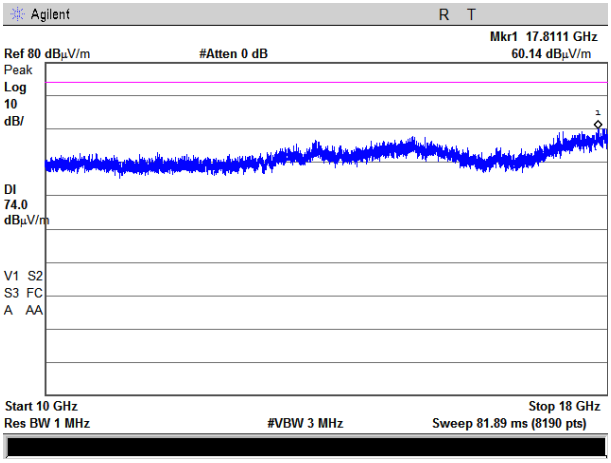


Peak

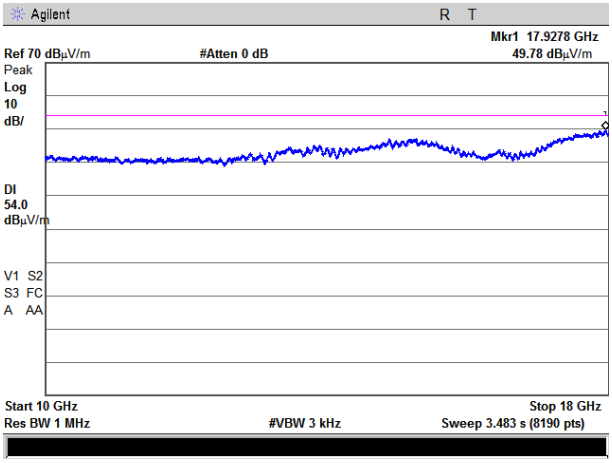


Average

Plot 3.5.12 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

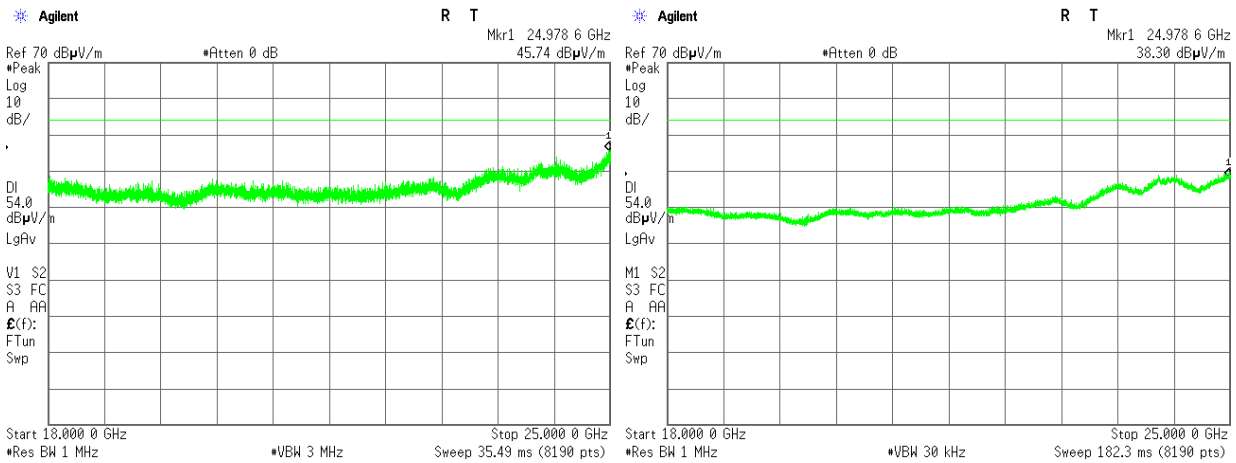


Peak



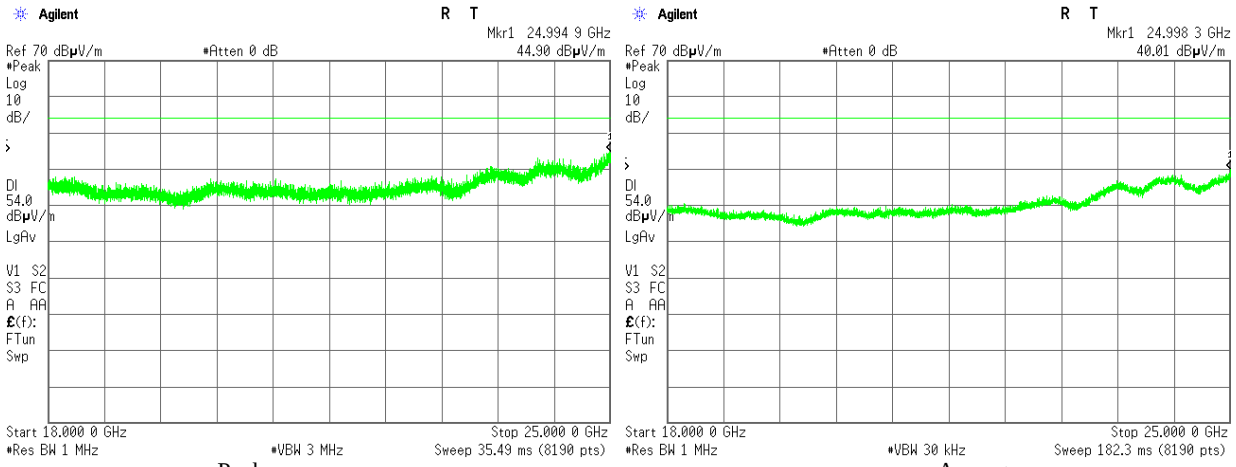
Average

Plot 3.5.13 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Vertical, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)



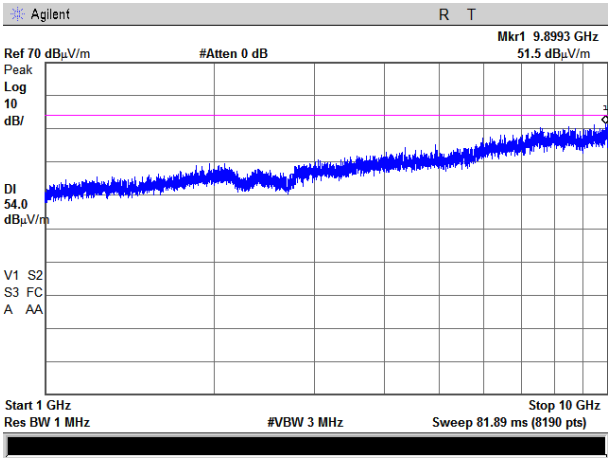
Peak Average

Plot 3.5.14 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Horizontal, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

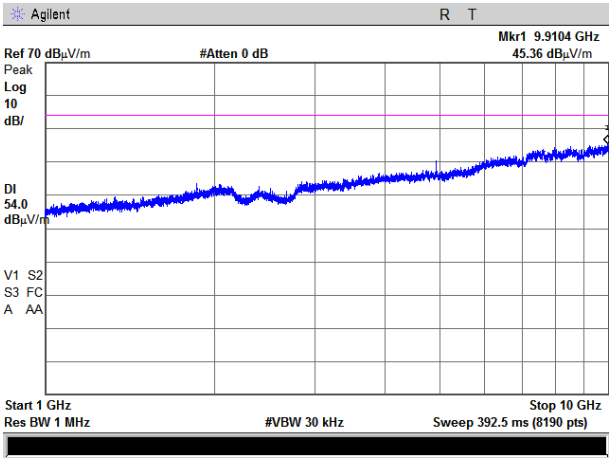


Peak Average

Plot 3.5.15 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

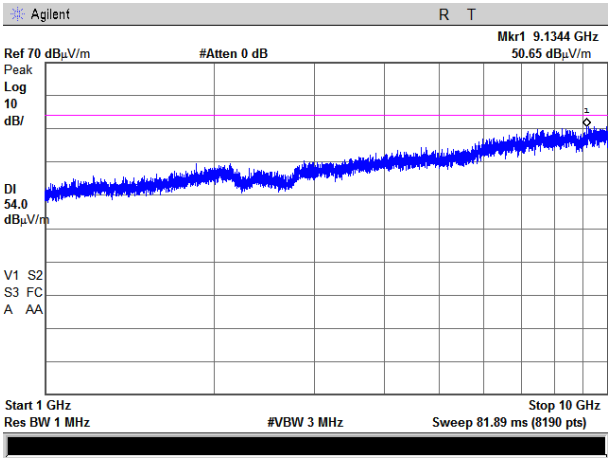


Peak

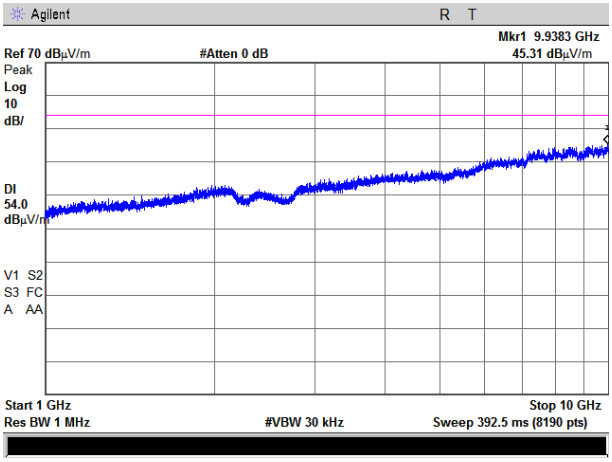


Average

Plot 3.5.16 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

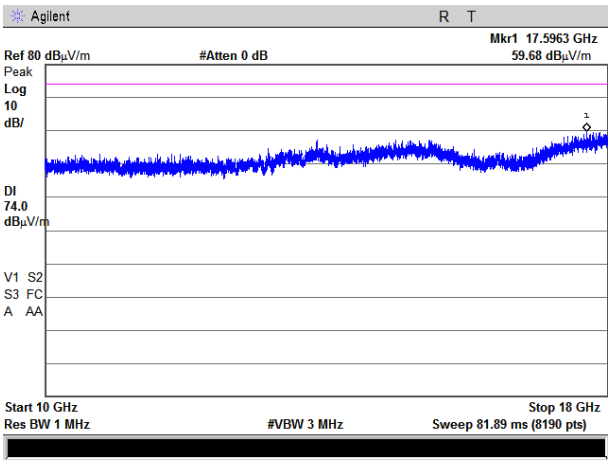


Peak

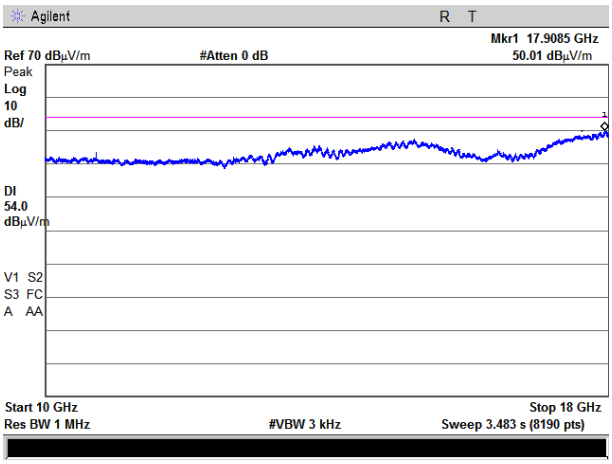


Average

Plot 3.5.17 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

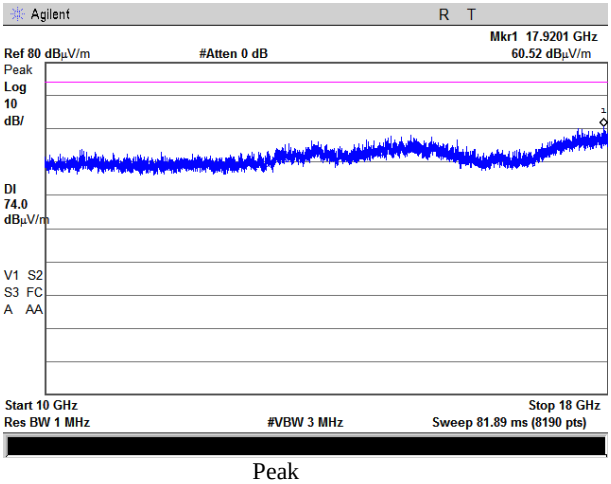


Peak

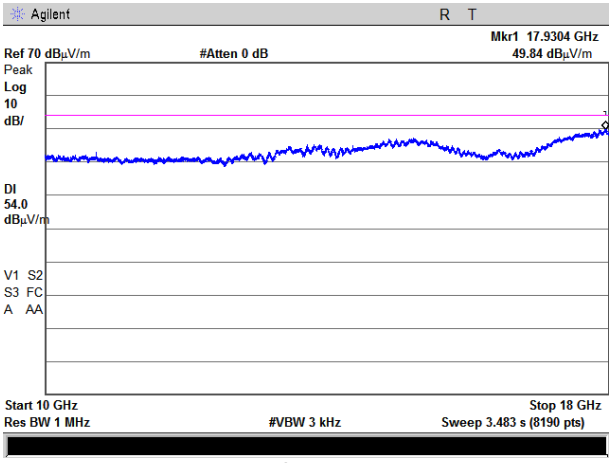


Average

Plot 3.5.18 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

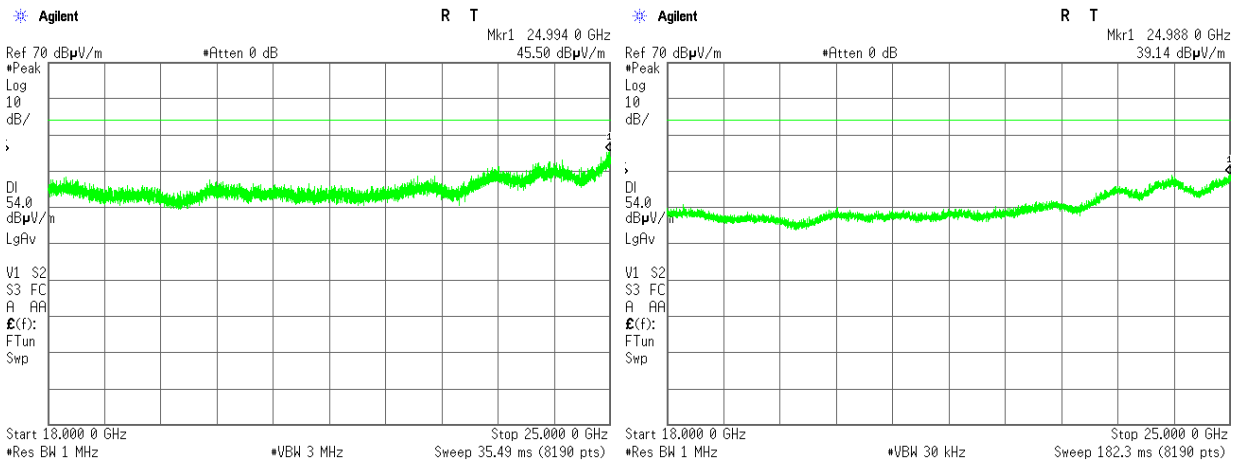


Peak



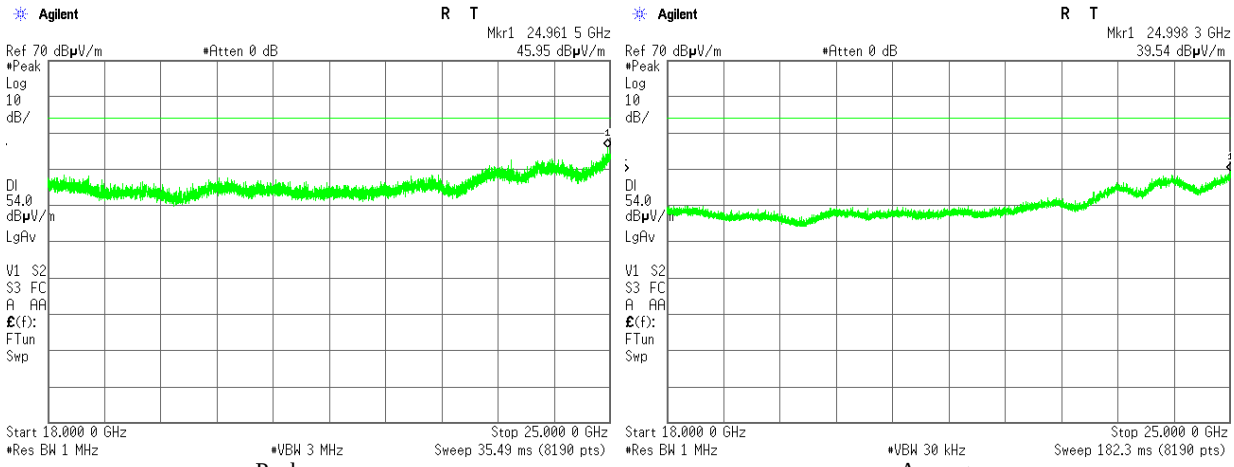
Average

Plot 3.5.19 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Vertical, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)



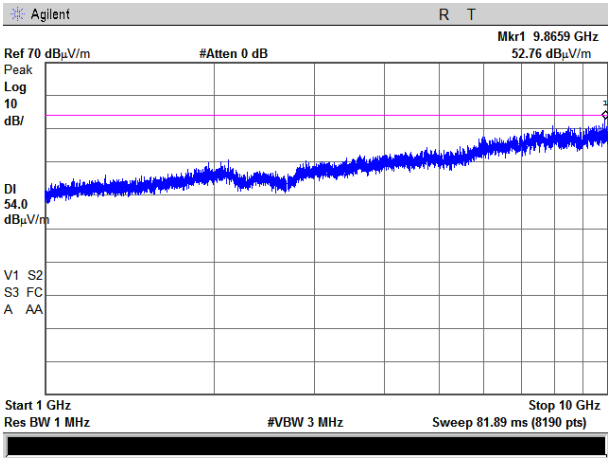
Peak Average

Plot 3.5.20 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Horizontal, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps(with notch filter)

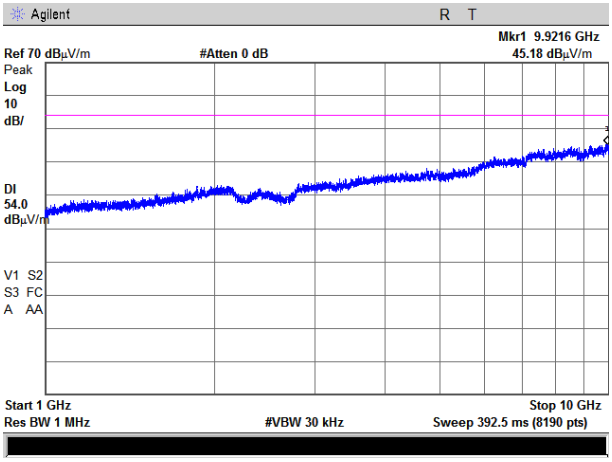


Peak Average

Plot 3.5.21 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

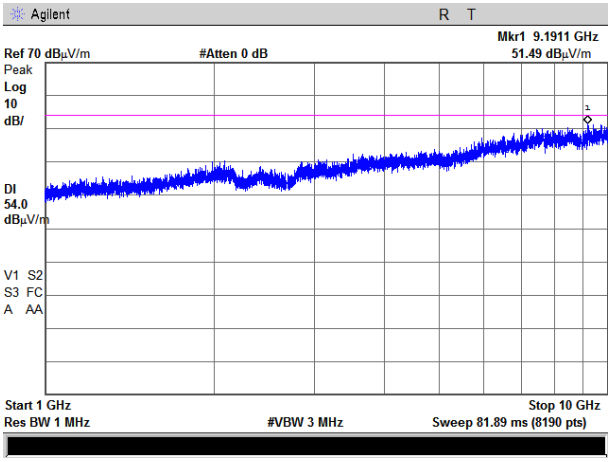


Peak

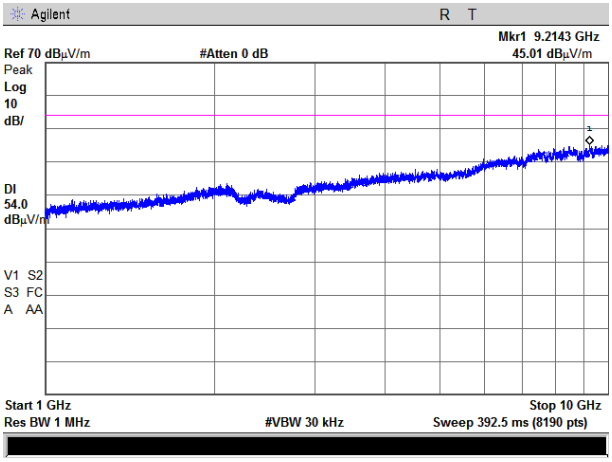


Average

Plot 3.5.22 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

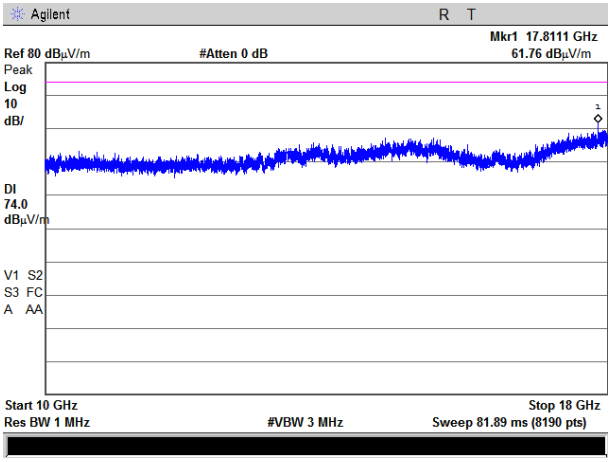


Peak

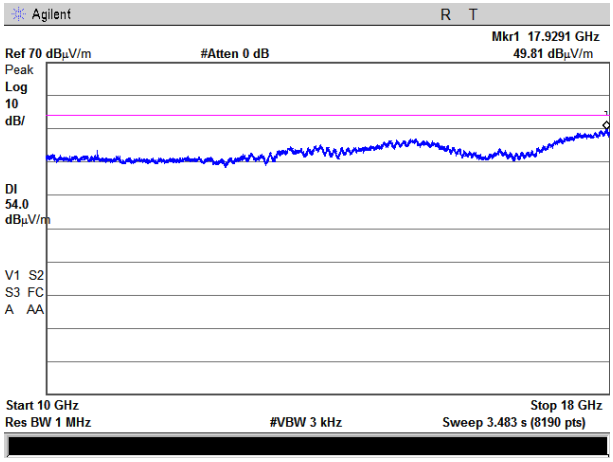


Average

Plot 3.5.23 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

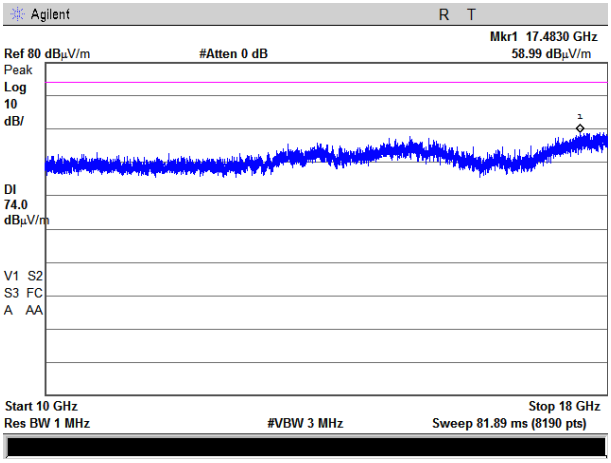


Peak

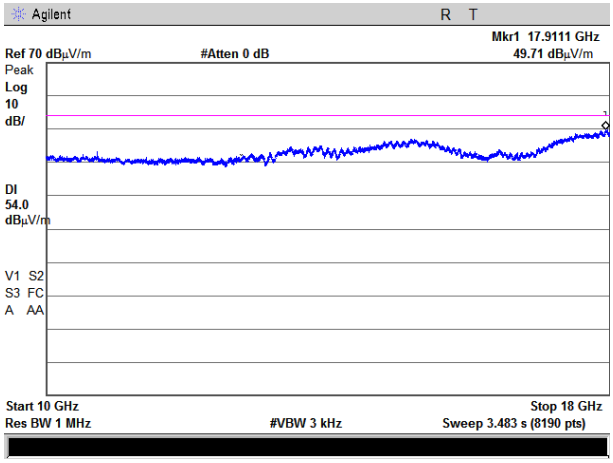


Average

Plot 3.5.24 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

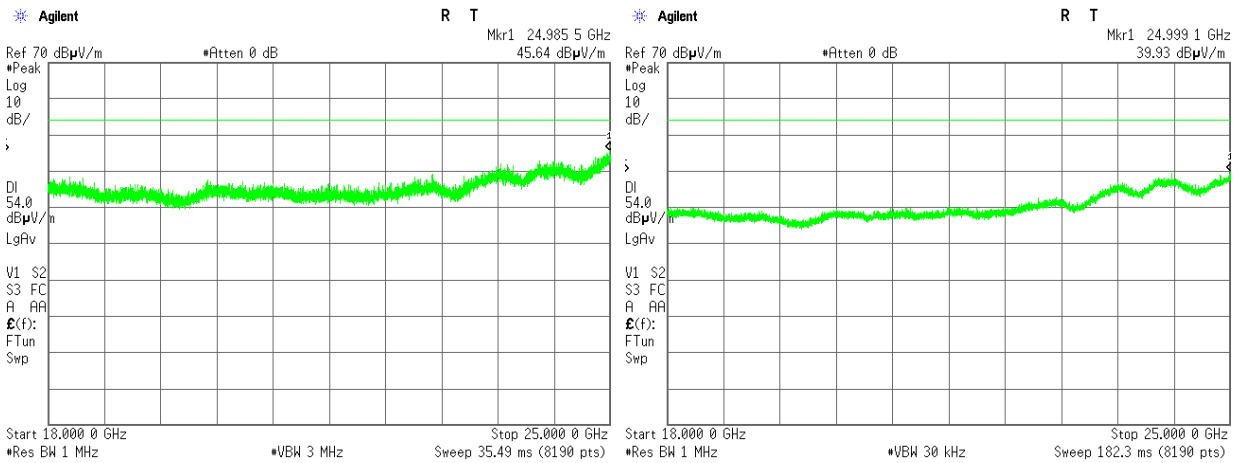


Peak



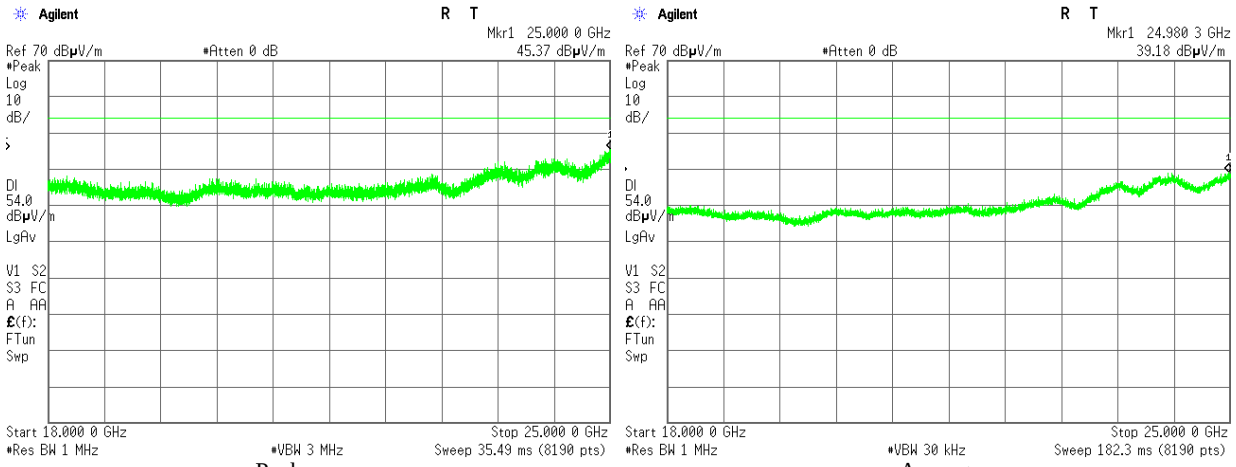
Average

Plot 3.5.25 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Vertical, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)



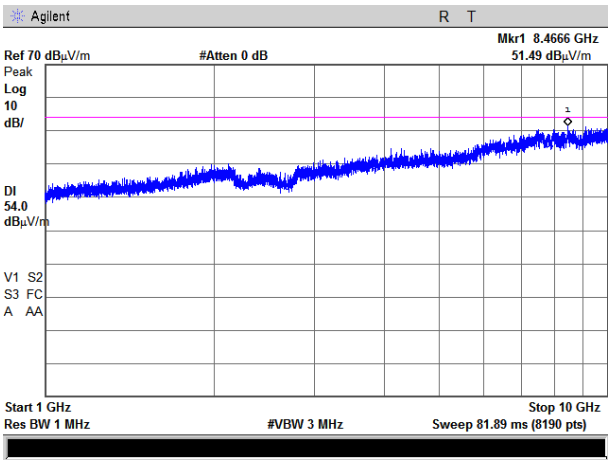
Peak Average

Plot 3.5.26 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Horizontal, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

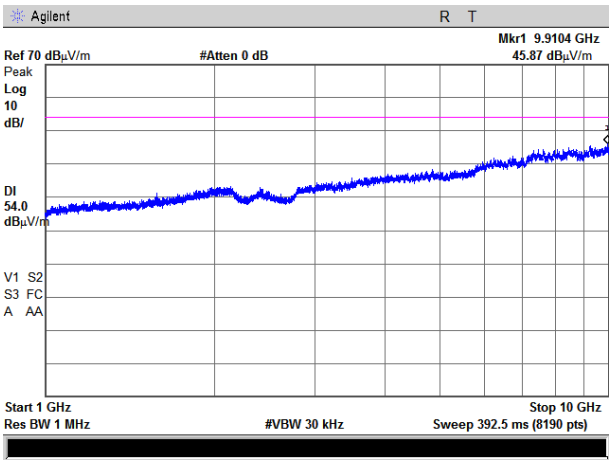


Peak Average

Plot 3.5.27 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

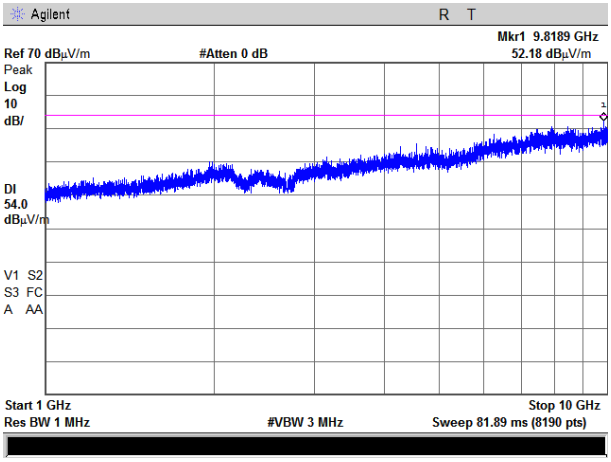


Peak

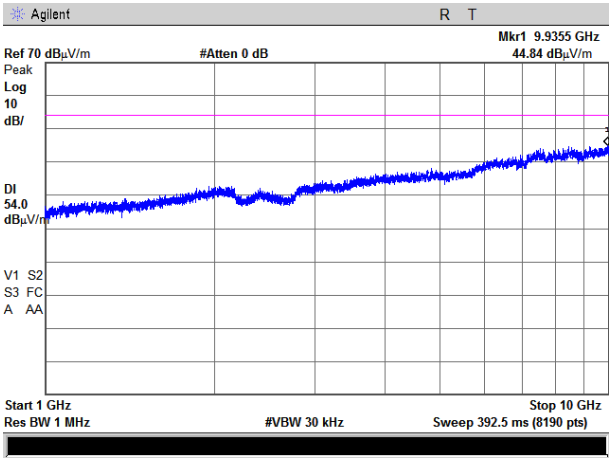


Average

Plot 3.5.28 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

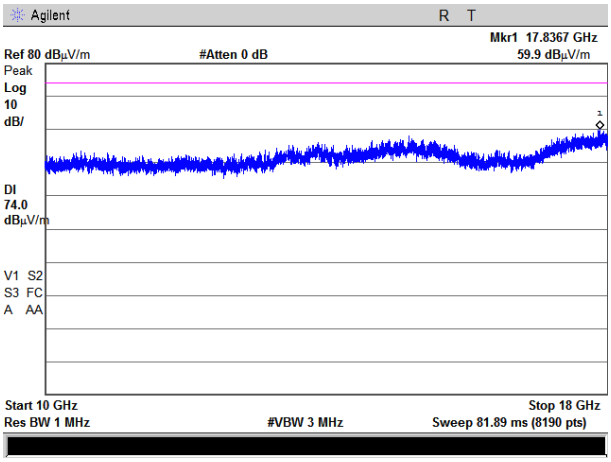


Peak

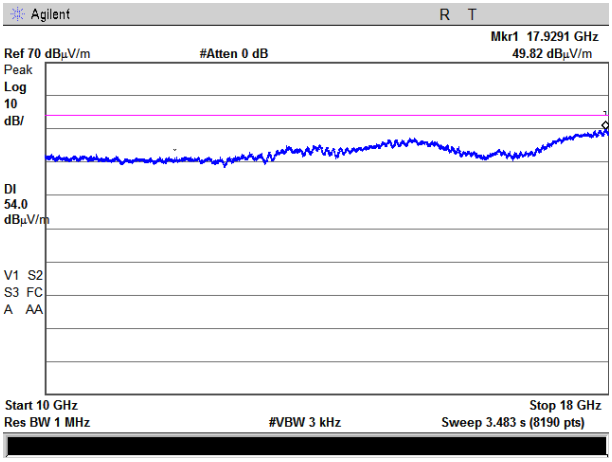


Average

Plot 3.5.29 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

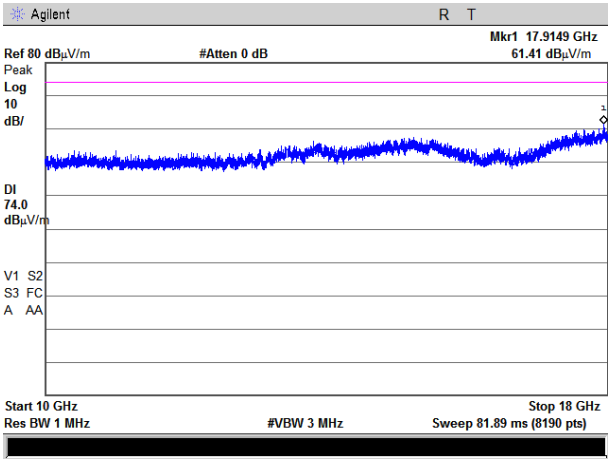


Peak

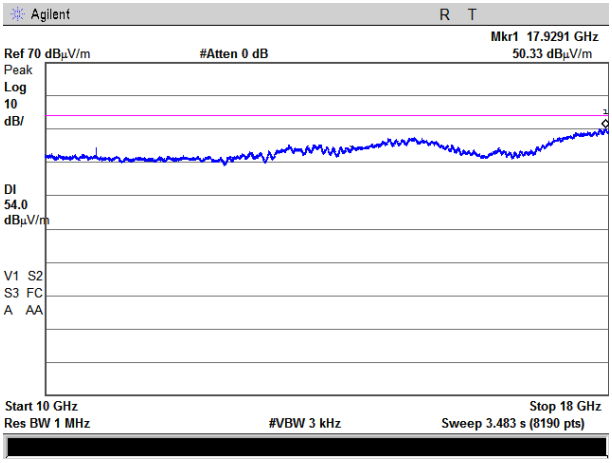


Average

Plot 3.5.30 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

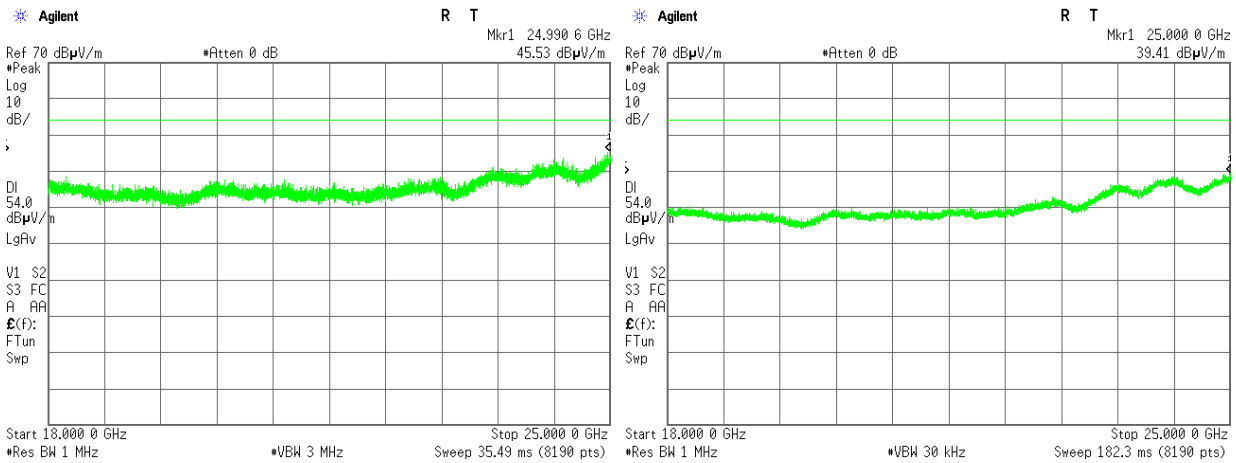


Peak



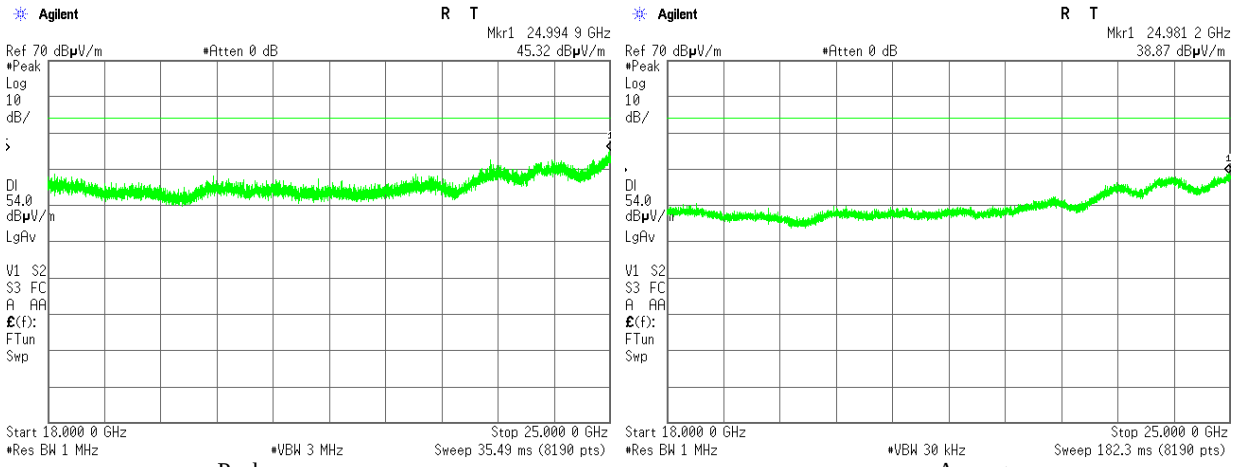
Average

Plot 3.5.31 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Vertical, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)



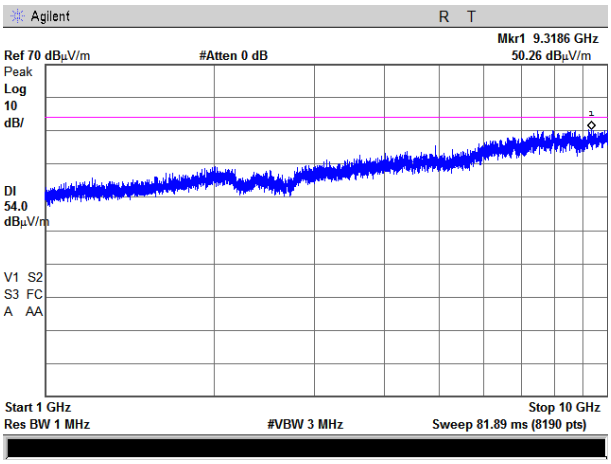
Peak Average

Plot 3.5.32 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Horizontal, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

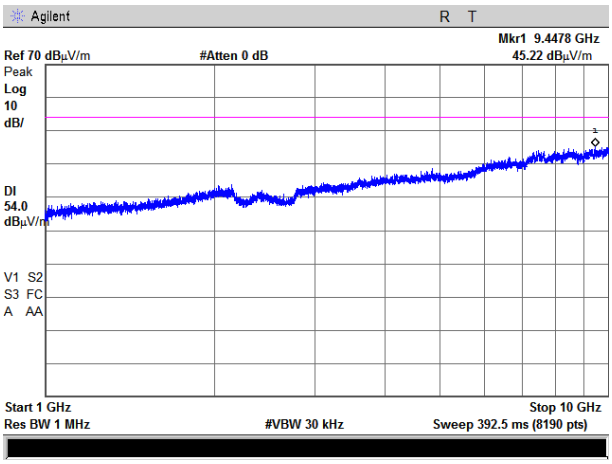


Peak Average

Plot 3.5.33 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

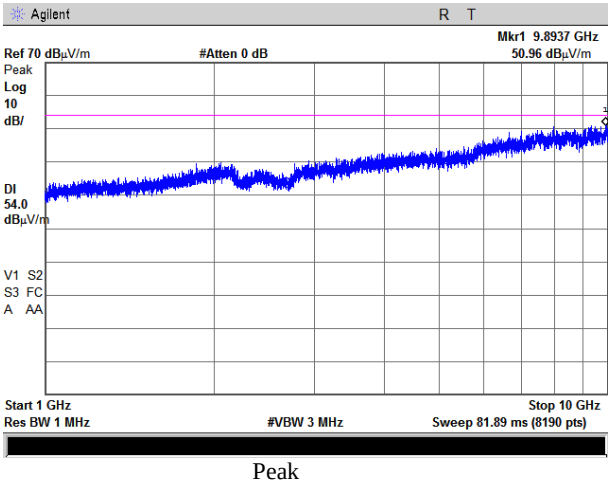


Peak

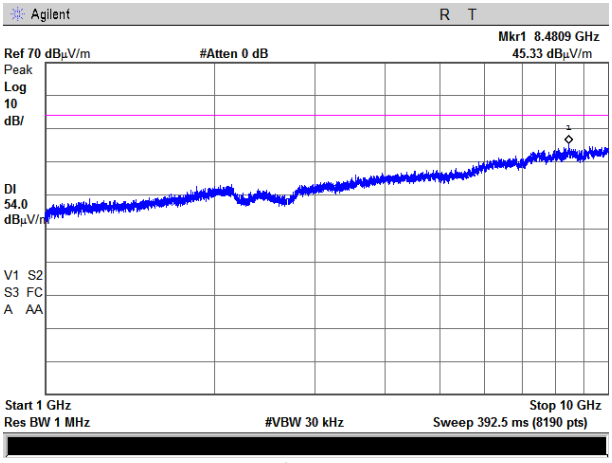


Average

Plot 3.5.34 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

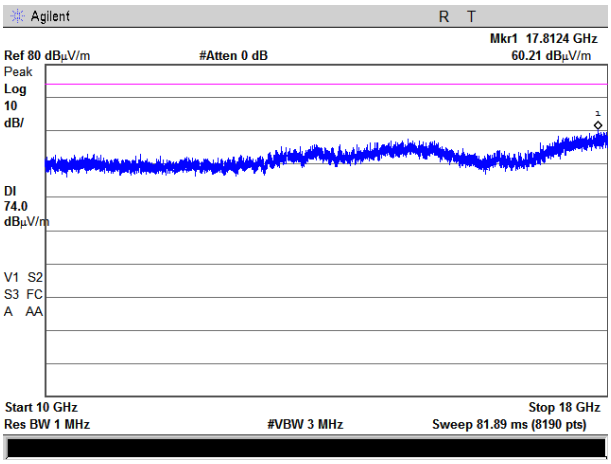


Peak

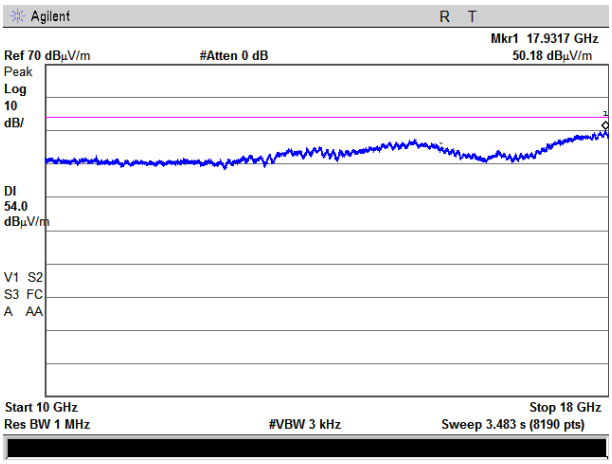


Average

Plot 3.5.35 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

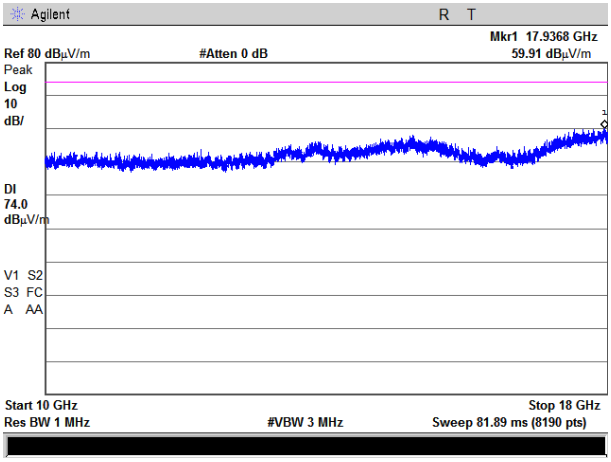


Peak

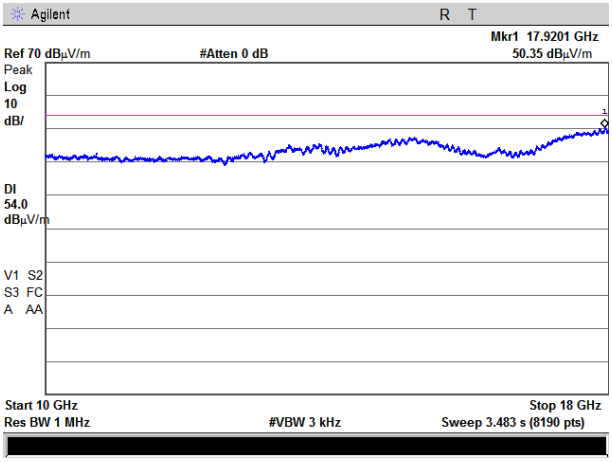


Average

Plot 3.5.36 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

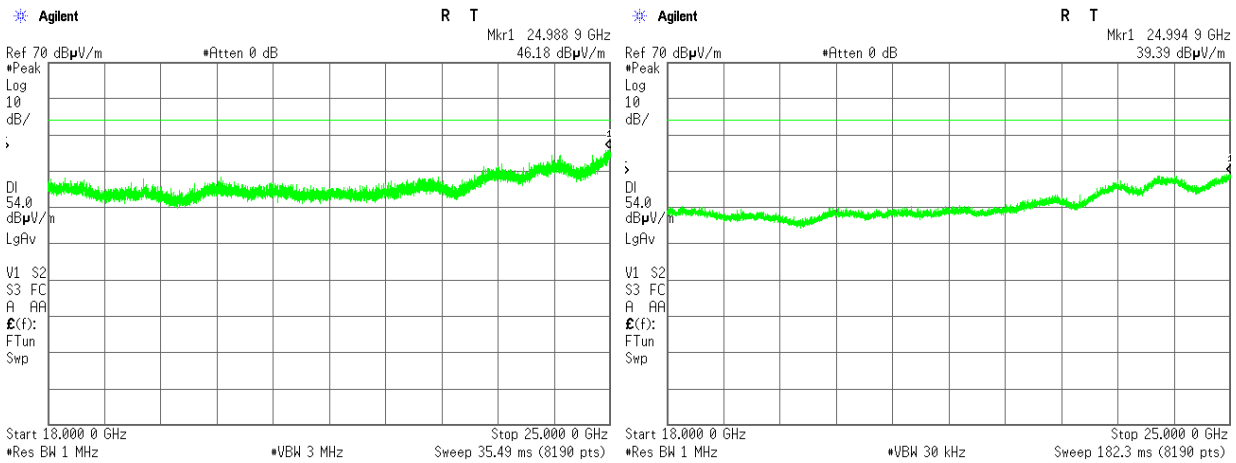


Peak



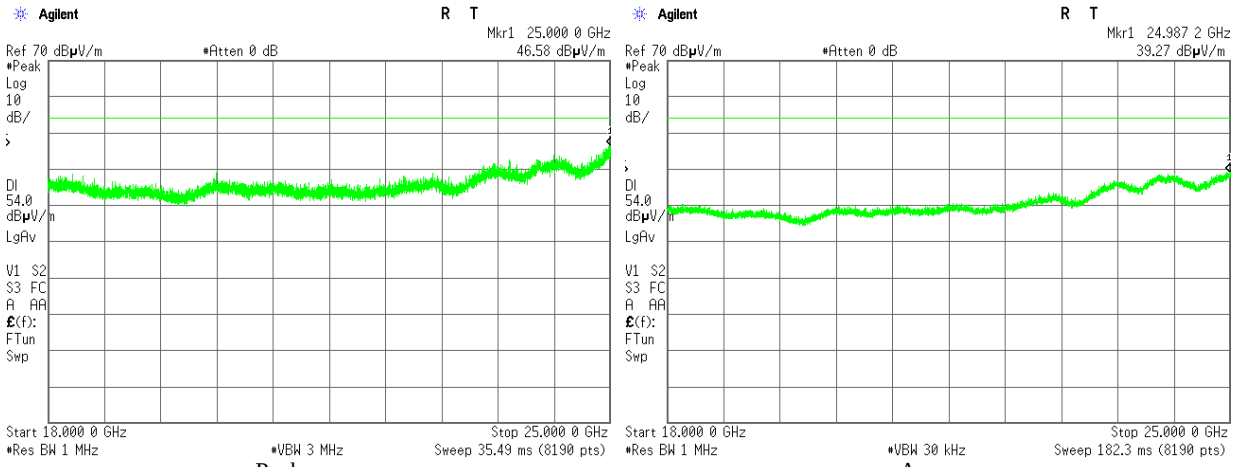
Average

Plot 3.5.37 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Vertical, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)



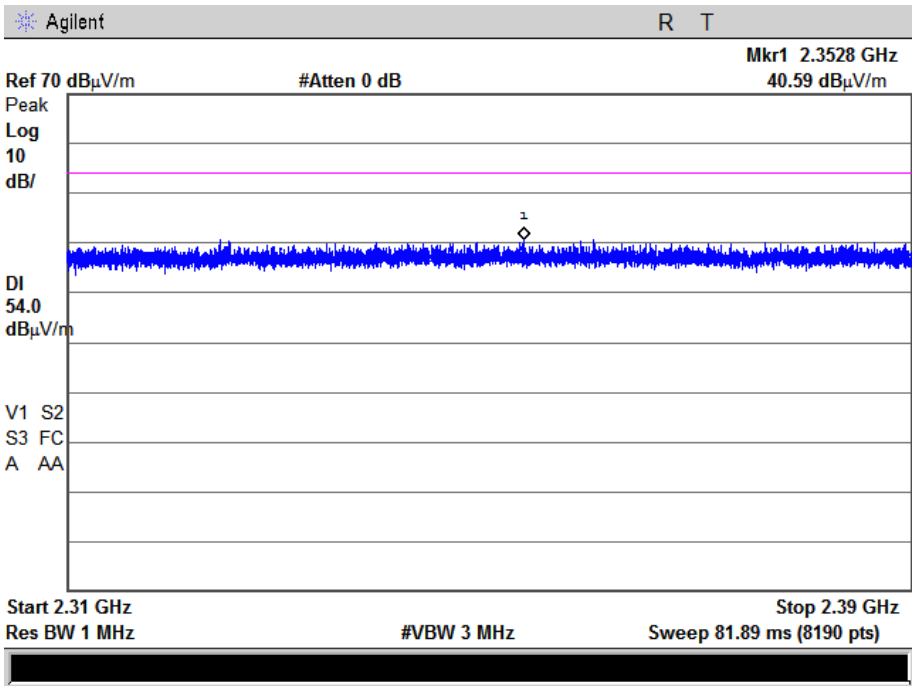
Peak Average

Plot 3.5.38 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Horizontal, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)

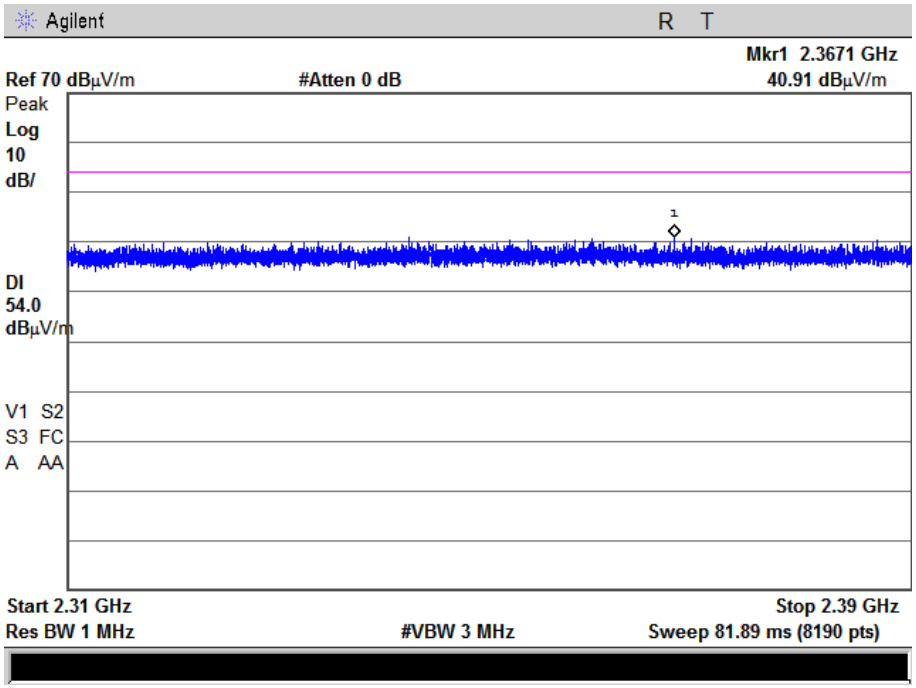


Peak Average

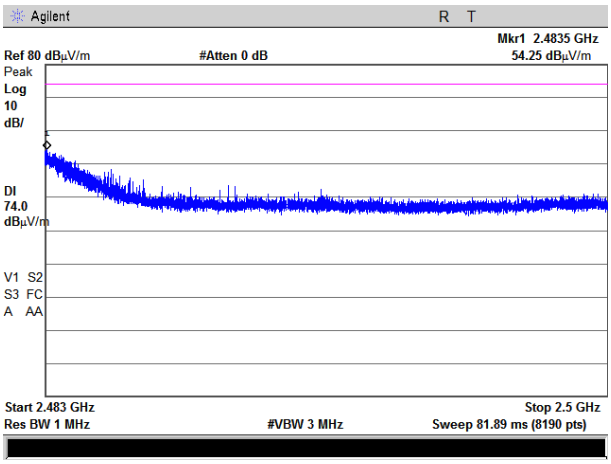
Plot 3.5.39 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Vertical polarization, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps



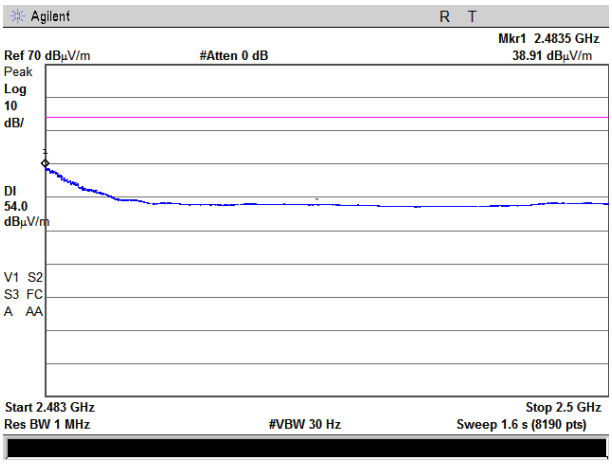
Plot 3.5.40 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Horizontal polarization, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps



Plot 3.5.41 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Vertical polarization, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

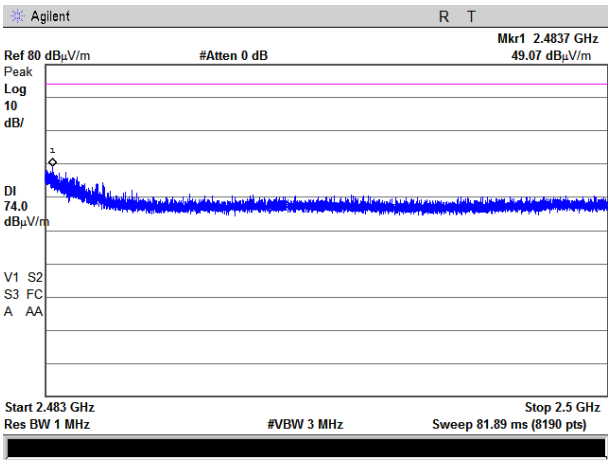


Peak

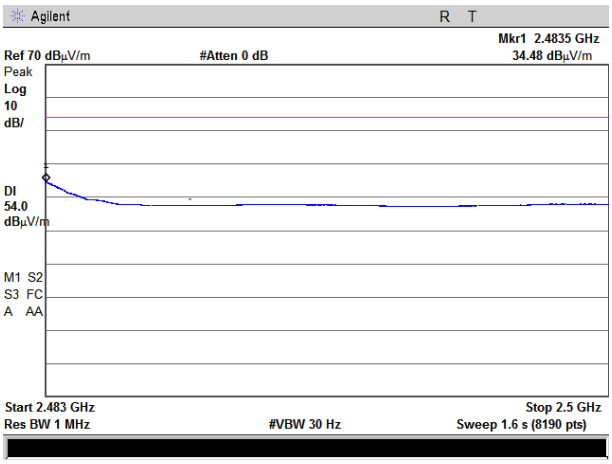


Average

Plot 3.5.42 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Horizontal polarization, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

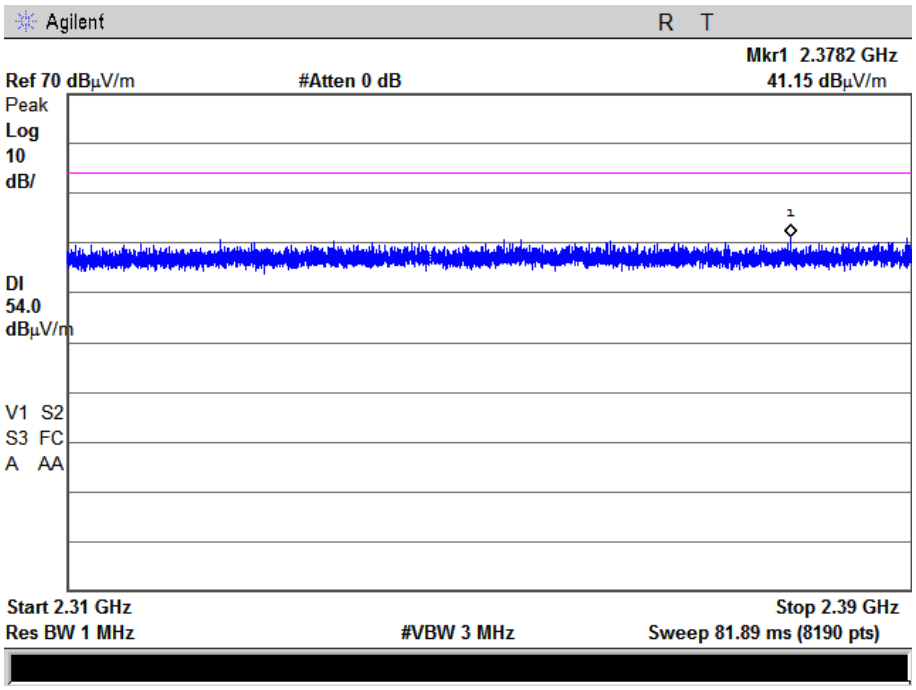


Peak

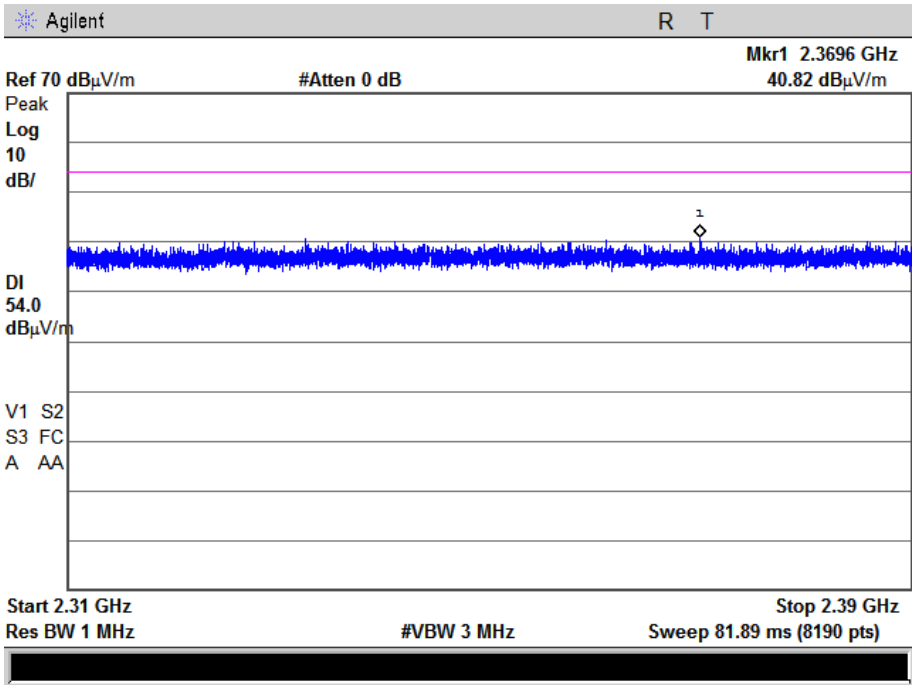


Average

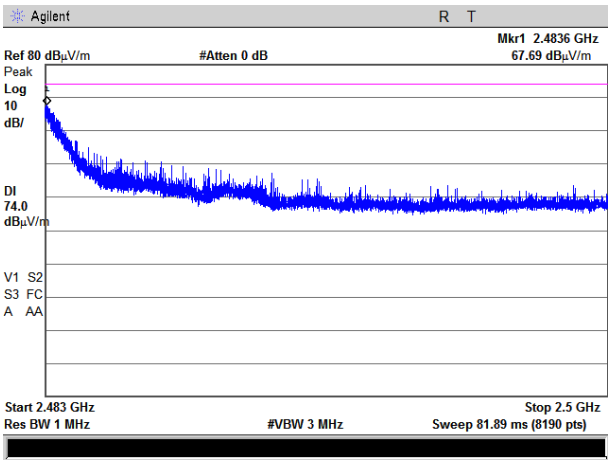
Plot 3.5.43 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Vertical polarization, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



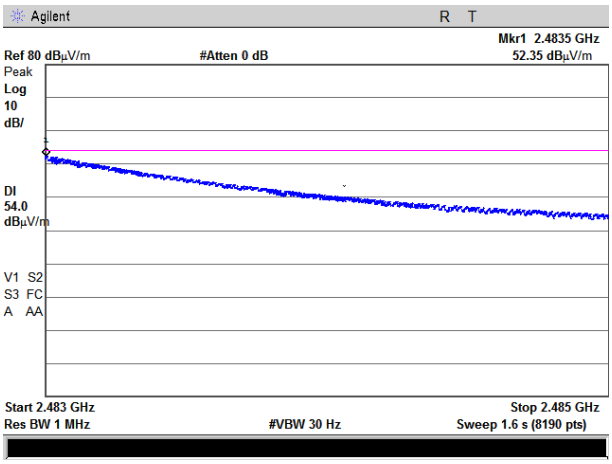
Plot 3.5.44 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Horizontal polarization, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



Plot 3.5.45 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Vertical polarization, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

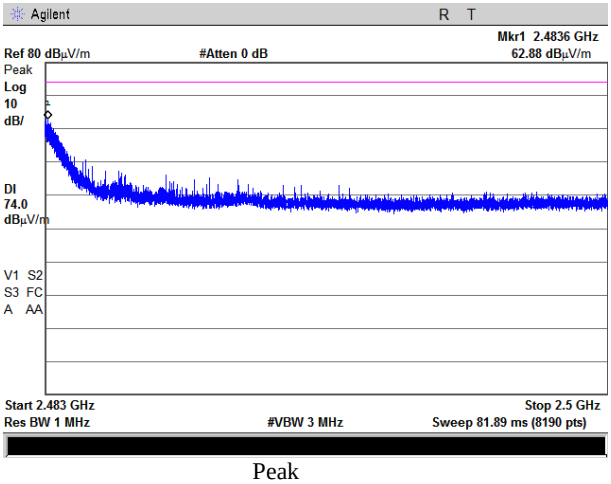


Peak

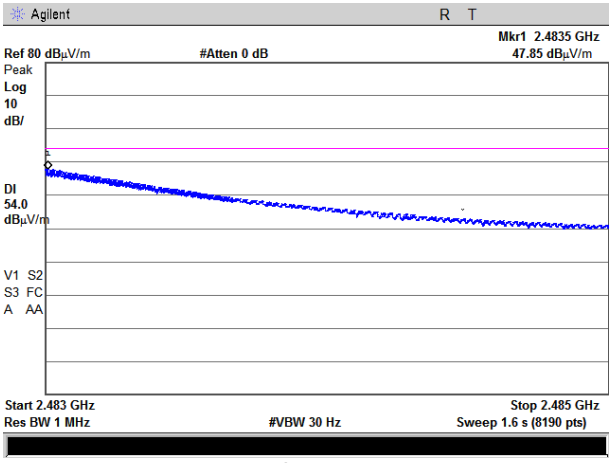


Average

Plot 3.5.46 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Horizontal polarization, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

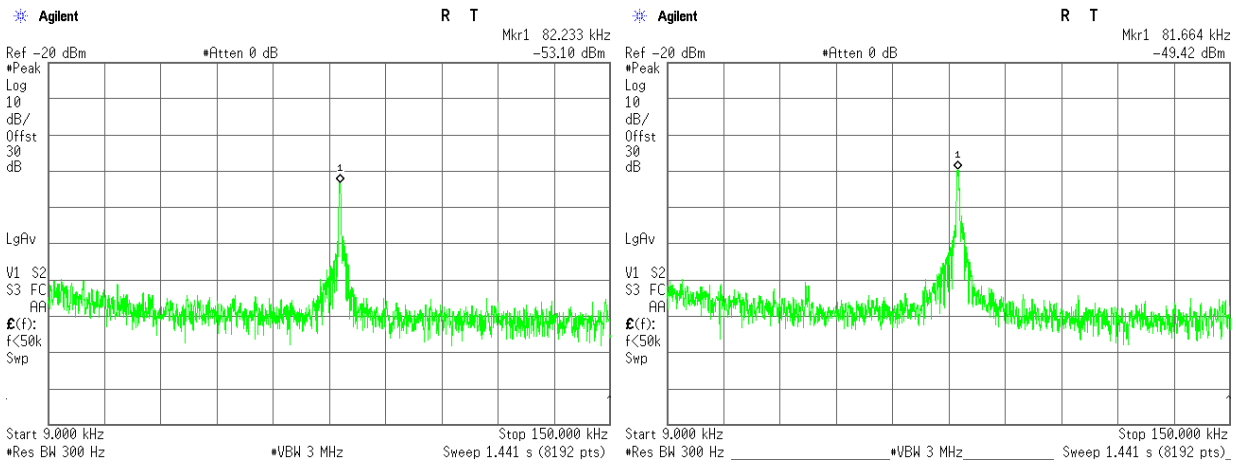


Peak



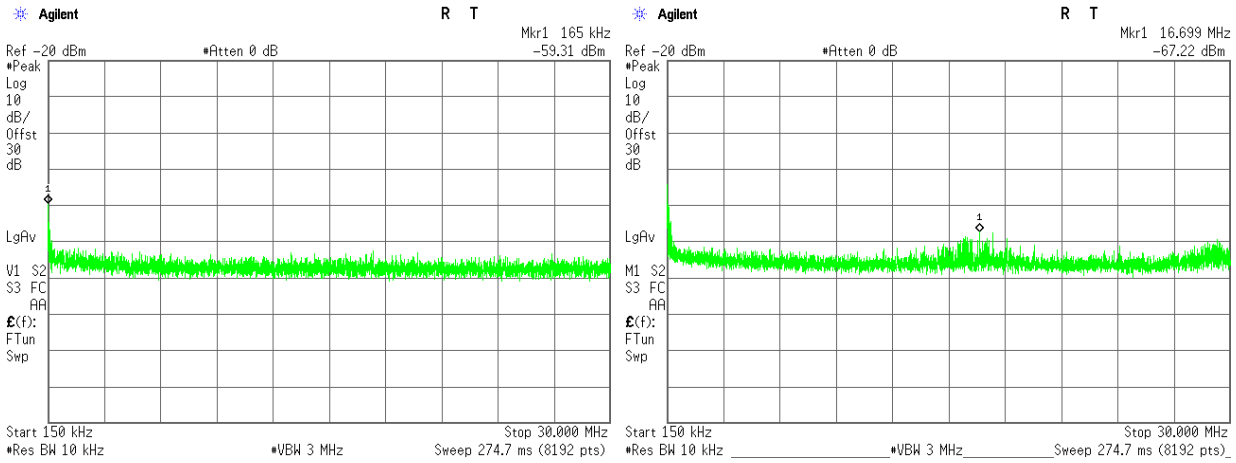
Average

Plot 3.5.47 Emissions in restricted frequency bands test results, Conducted measurements, 9 kHz – 150 kHz, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps



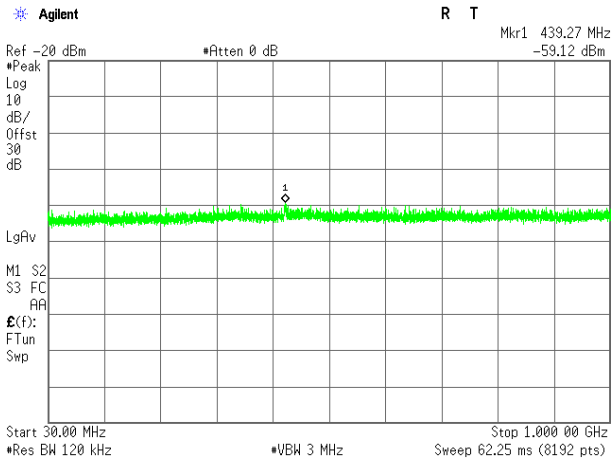
RF1 RF2

Plot 3.5.48 Emissions in restricted frequency bands test results, Conducted measurements, 150 kHz – 30 MHz, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

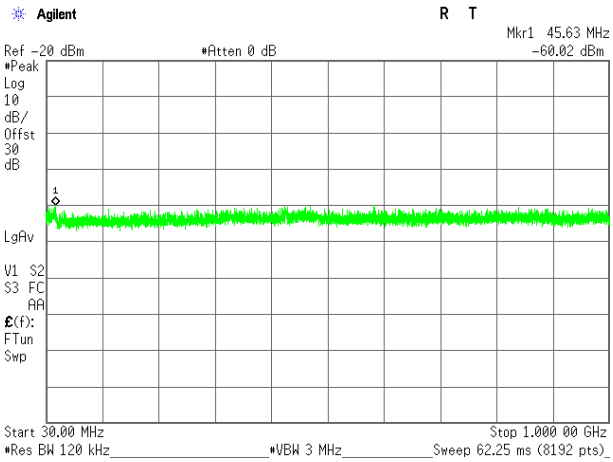


RF1 RF2

Plot 3.5.49 Emissions in restricted frequency bands test results, Conducted measurements, 30 MHz – 1000 MHz, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

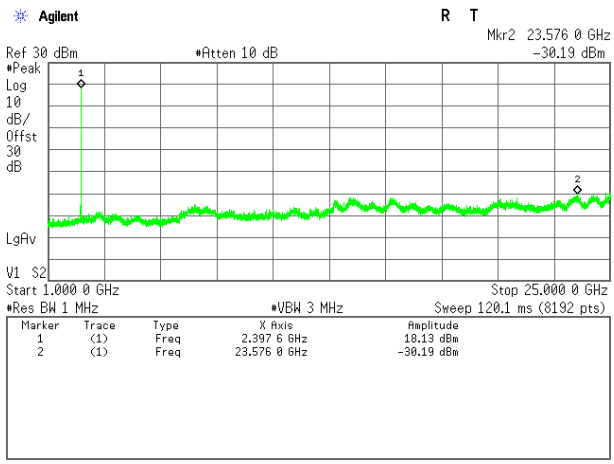


RF1

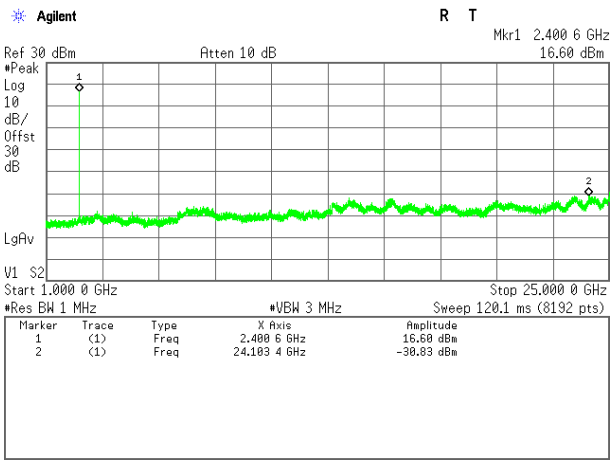


RF2

Plot 3.5.50 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 25 GHz, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

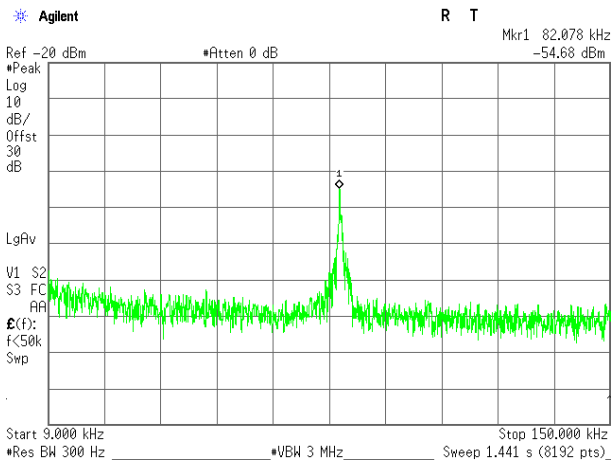


RF1

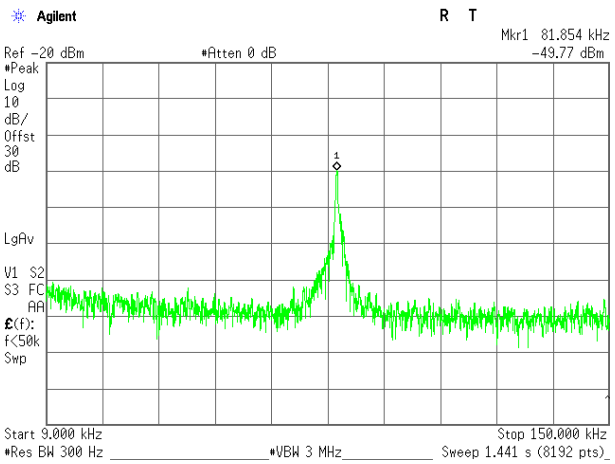


RF2

Plot 3.5.51 Emissions in restricted frequency bands test results, Conducted measurements, 9 kHz – 150 kHz, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

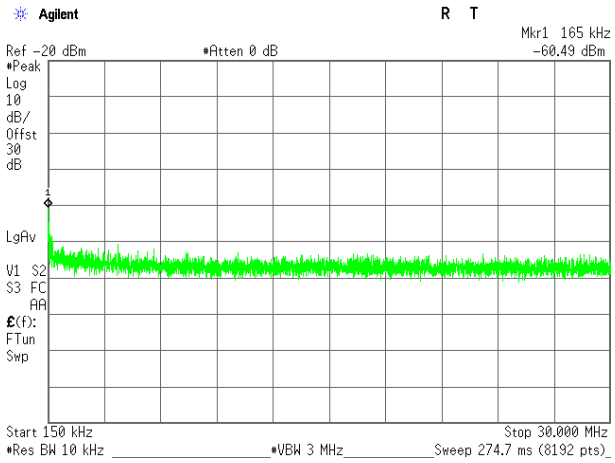


RF1

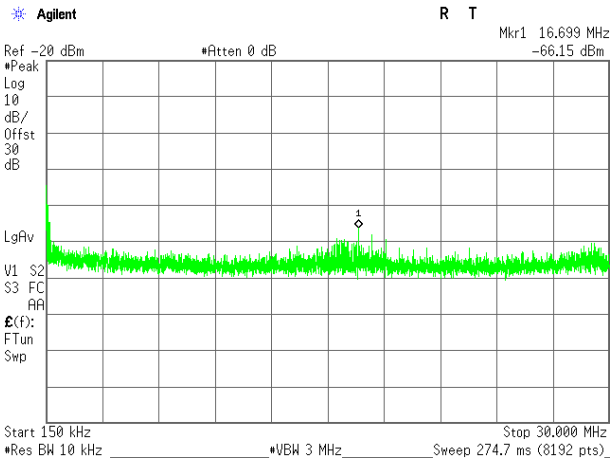


RF2

Plot 3.5.52 Emissions in restricted frequency bands test results, Conducted measurements, 150 kHz – 30 MHz, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

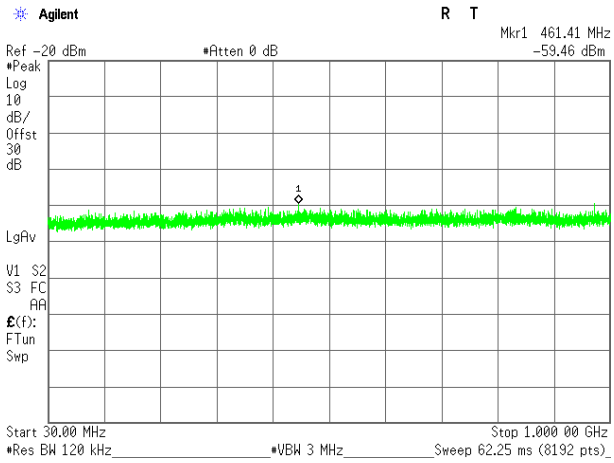


RF1

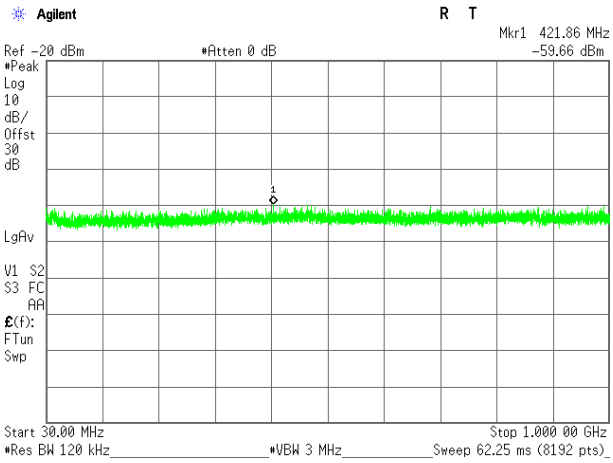


RF2

Plot 3.5.53 Emissions in restricted frequency bands test results, Conducted measurements, 30 MHz – 1000 MHz, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

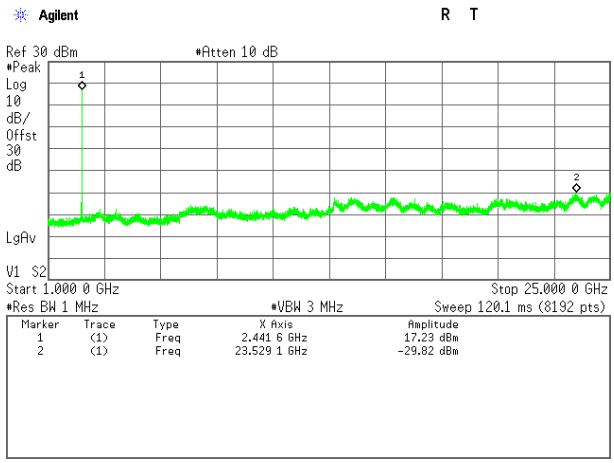


RF1

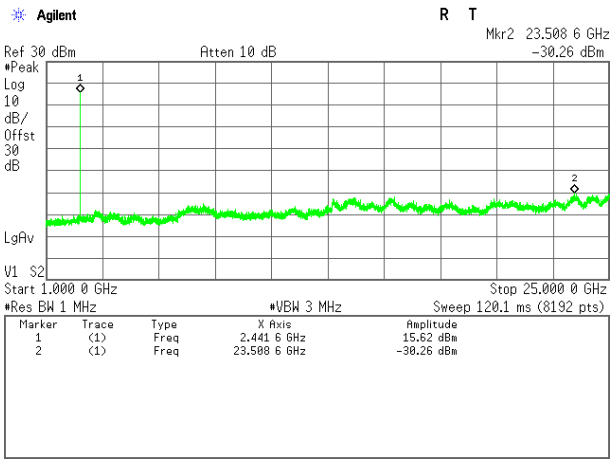


RF2

Plot 3.5.54 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 25 GHz, Fc = 2442 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

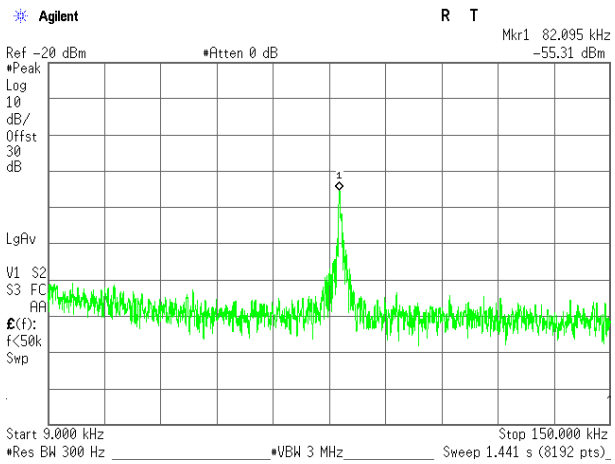


RF1

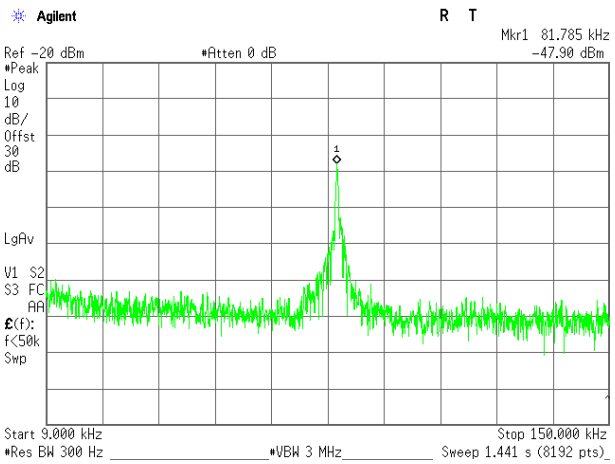


RF2

Plot 3.5.55 Emissions in restricted frequency bands test results, Conducted measurements, 9 kHz – 150 kHz, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

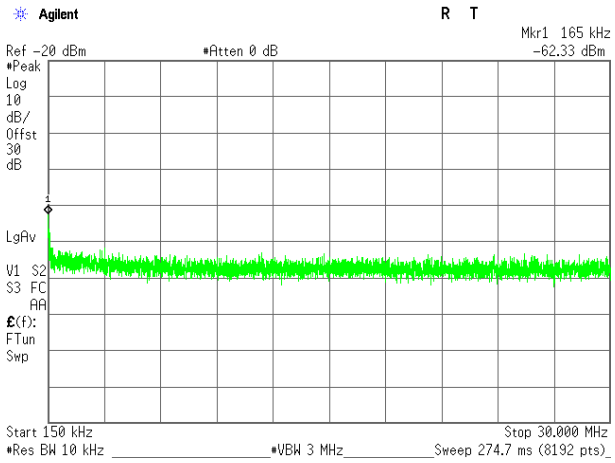


RF1

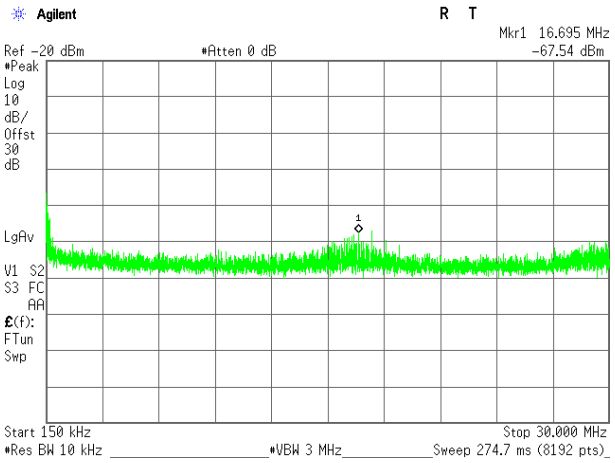


RF2

Plot 3.5.56 Emissions in restricted frequency bands test results, Conducted measurements, 150 kHz – 30 MHz, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

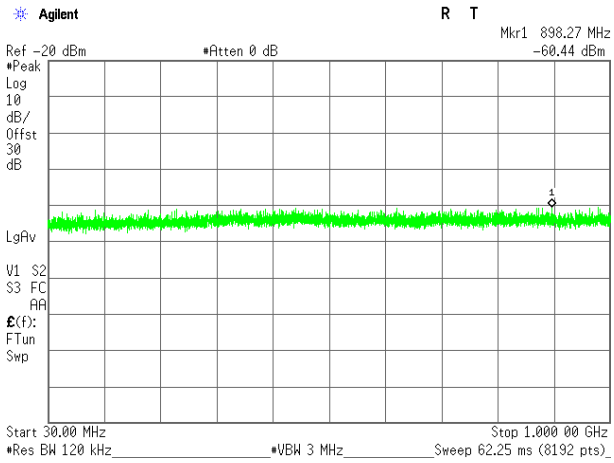


RF1

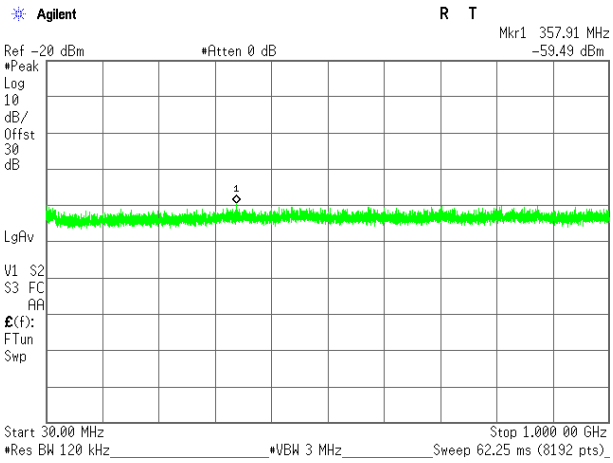


RF2

Plot 3.5.57 Emissions in restricted frequency bands test results, Conducted measurements, 30 MHz – 1000 MHz, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

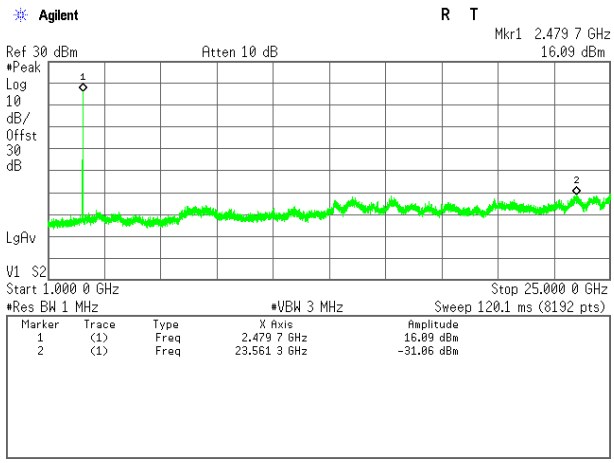


RF1

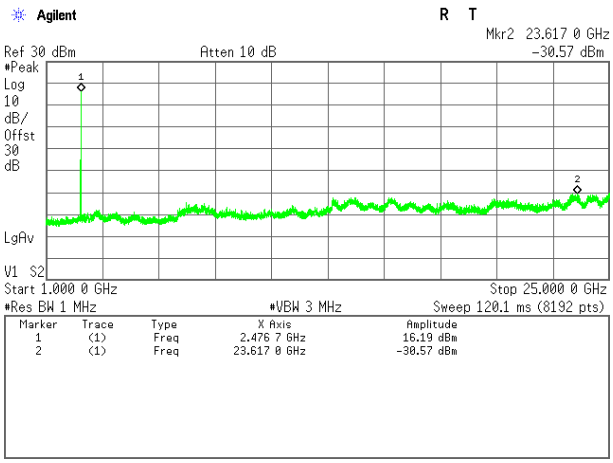


RF2

Plot 3.5.58 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 25 GHz, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps

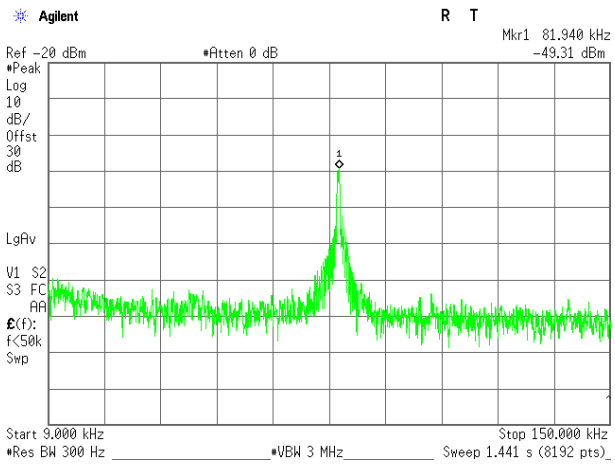


RF1

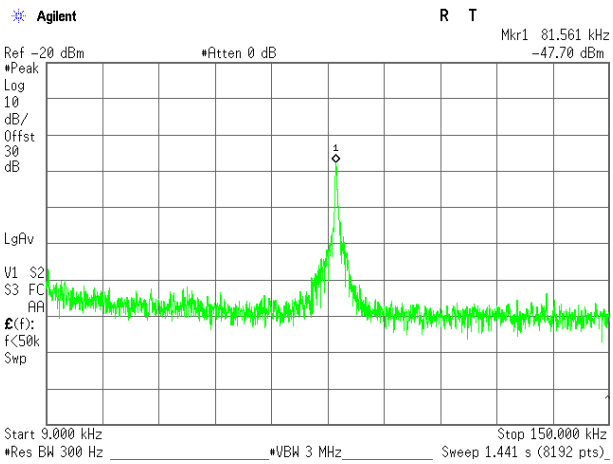


RF2

Plot 3.5.59 Emissions in restricted frequency bands test results, Conducted measurements, 9 kHz – 150 kHz, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

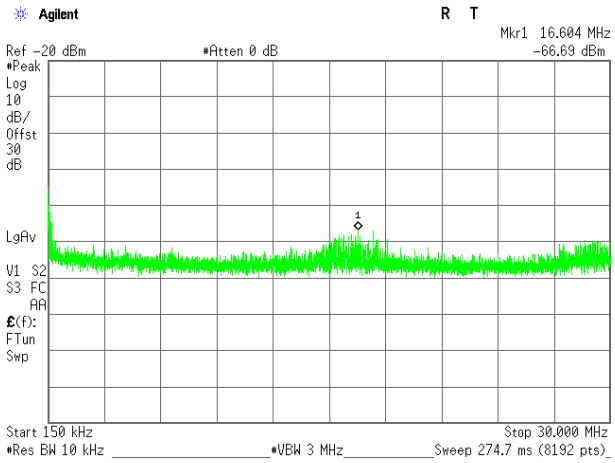


RF1

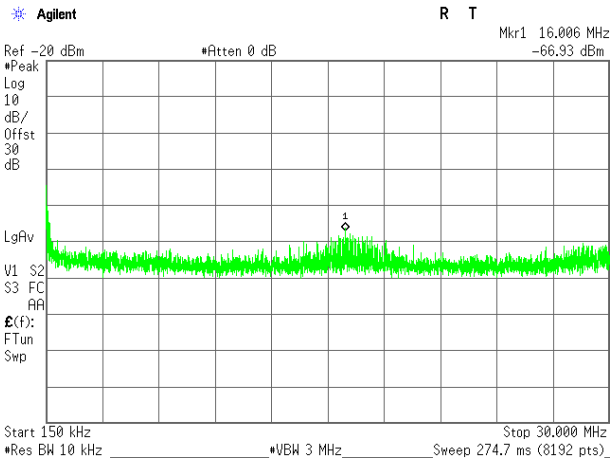


RF2

Plot 3.5.60 Emissions in restricted frequency bands test results, Conducted measurements, 150 kHz – 30 MHz, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

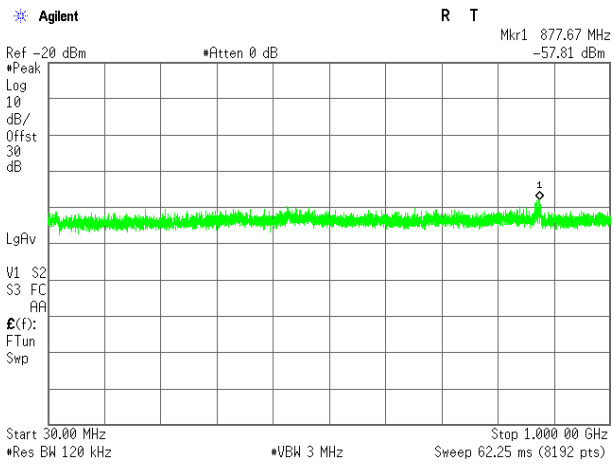


RF1

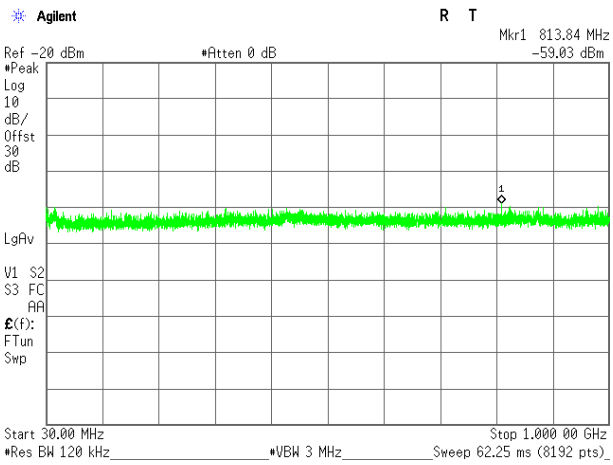


RF2

Plot 3.5.61 Emissions in restricted frequency bands test results, Conducted measurements, 30 MHz – 1000 MHz, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

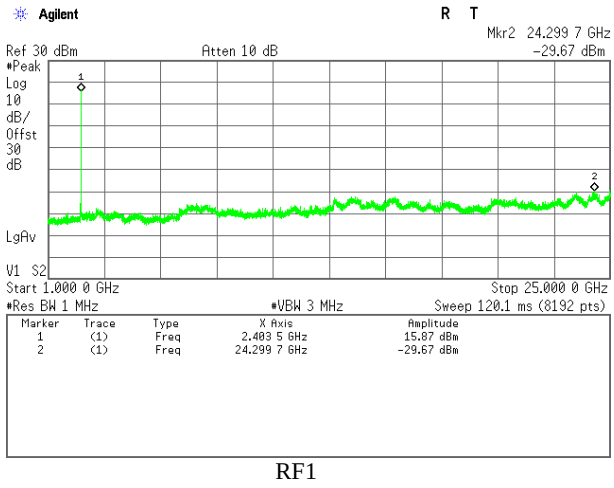


RF1

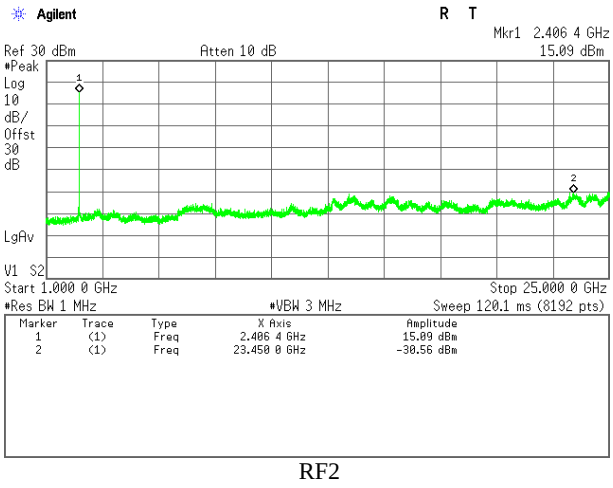


RF2

Plot 3.5.62 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 25 GHz, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

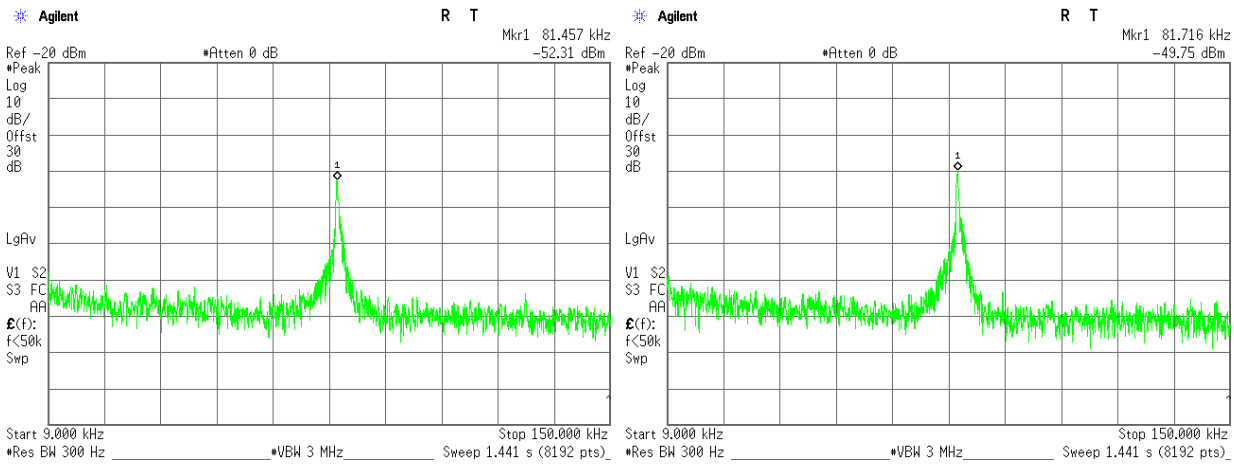


RF1



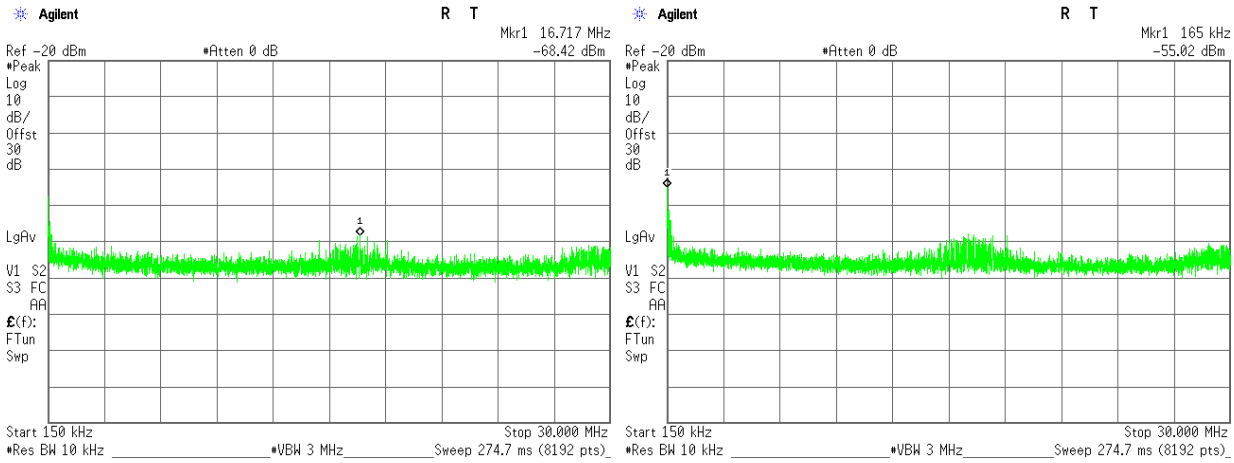
RF2

Plot 3.5.63 Emissions in restricted frequency bands test results, Conducted measurements, 9 kHz – 150 kHz, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



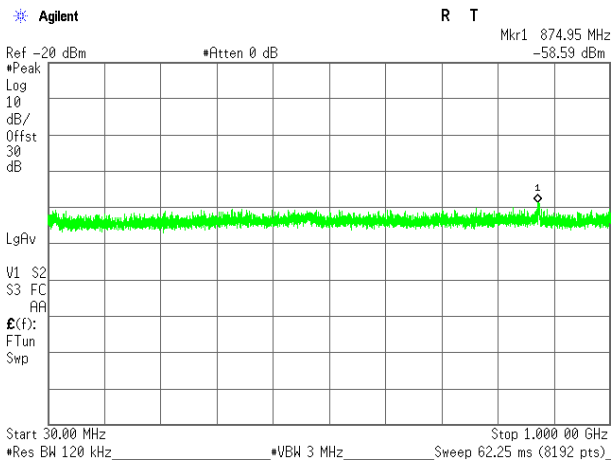
RF1 RF2

Plot 3.5.64 Emissions in restricted frequency bands test results, Conducted measurements, 150 kHz – 30 MHz, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

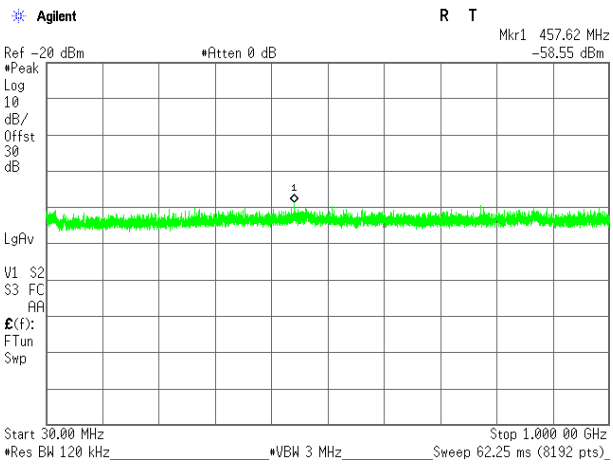


RF1 RF2

Plot 3.5.65 Emissions in restricted frequency bands test results, Conducted measurements, 30 MHz – 1000 MHz, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

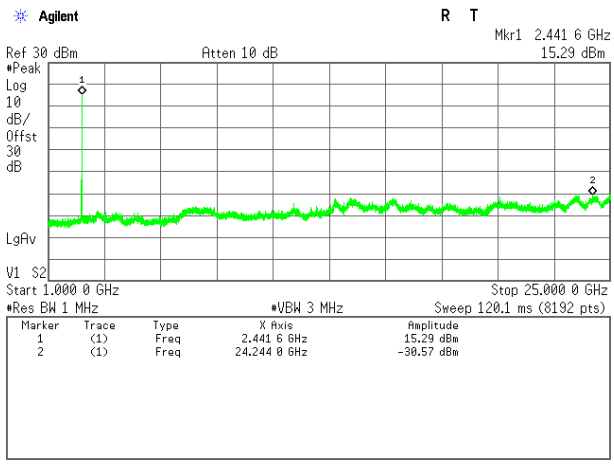


RF1

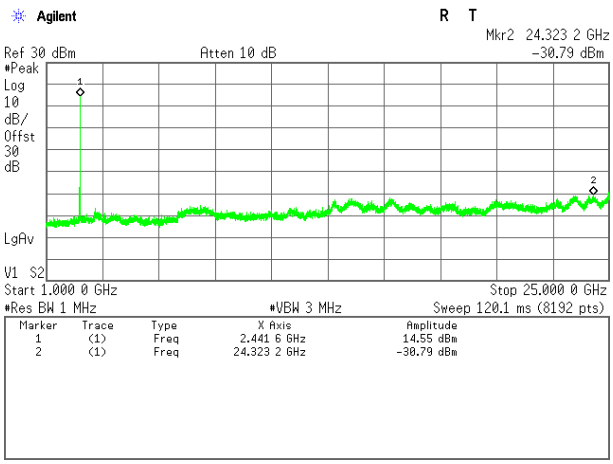


RF2

Plot 3.5.66 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 25 GHz, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

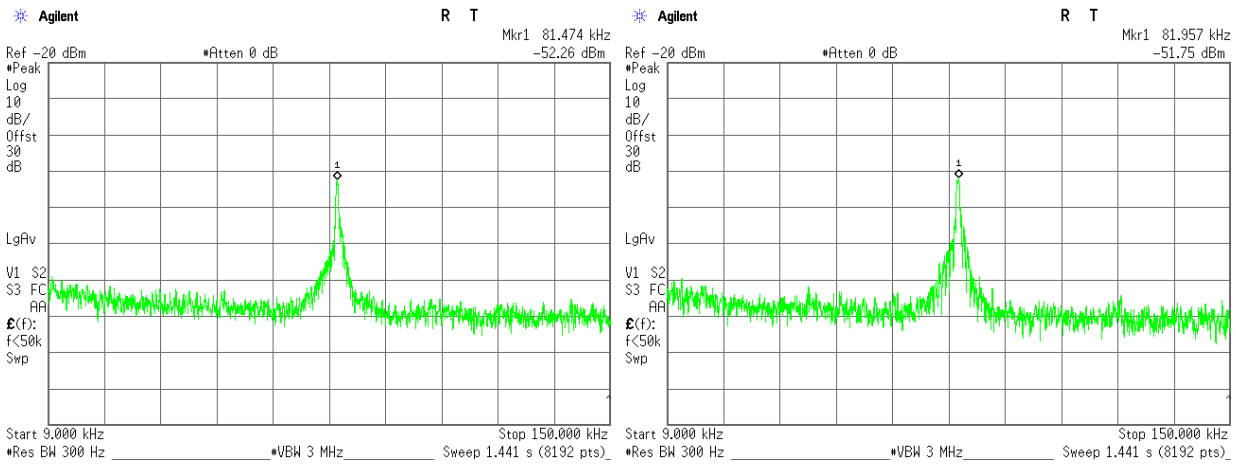


RF1



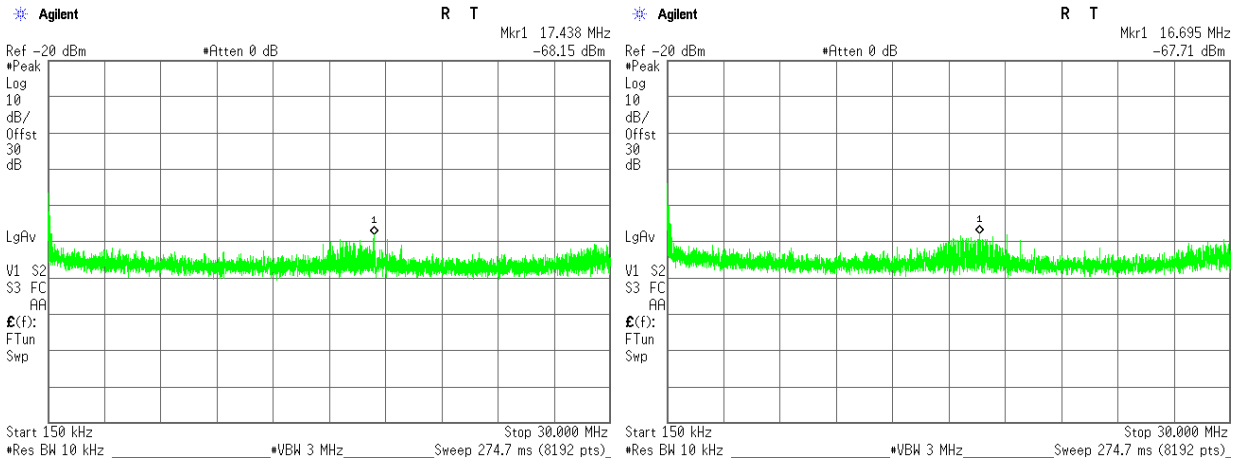
RF2

Plot 3.5.67 Emissions in restricted frequency bands test results, Conducted measurements, 9 kHz – 150 kHz, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



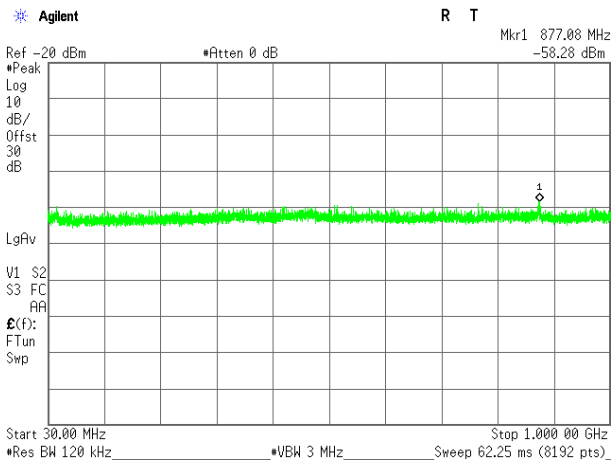
RF1 RF2

Plot 3.5.68 Emissions in restricted frequency bands test results, Conducted measurements, 150 kHz – 30 MHz, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

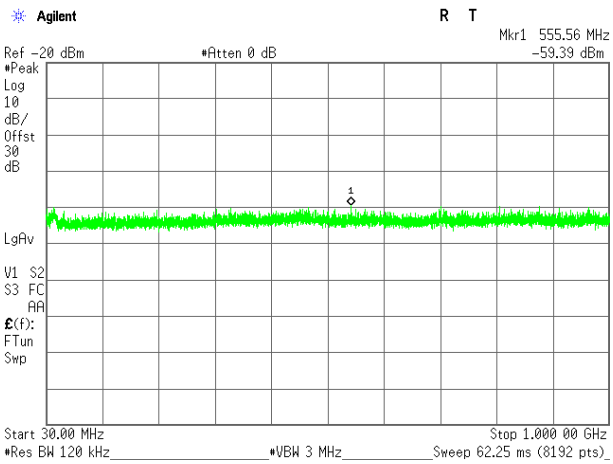


RF1 RF2

Plot 3.5.69 Emissions in restricted frequency bands test results, Conducted measurements, 30 MHz – 1000 MHz, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

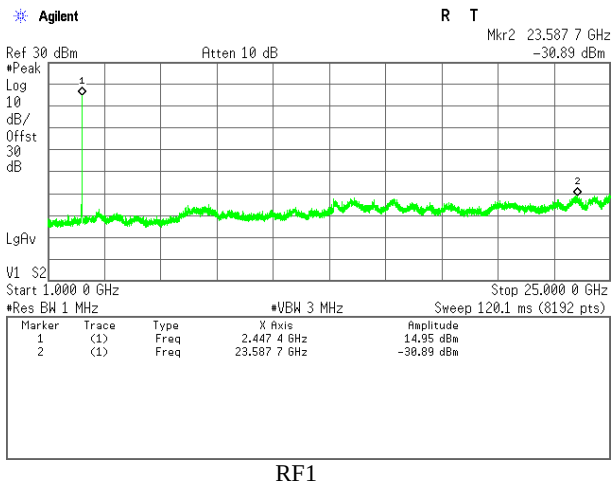


RF1

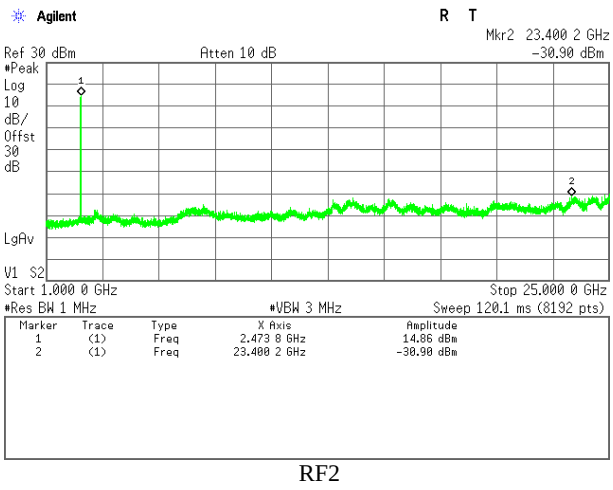


RF2

Plot 3.5.70 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 25 GHz, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps

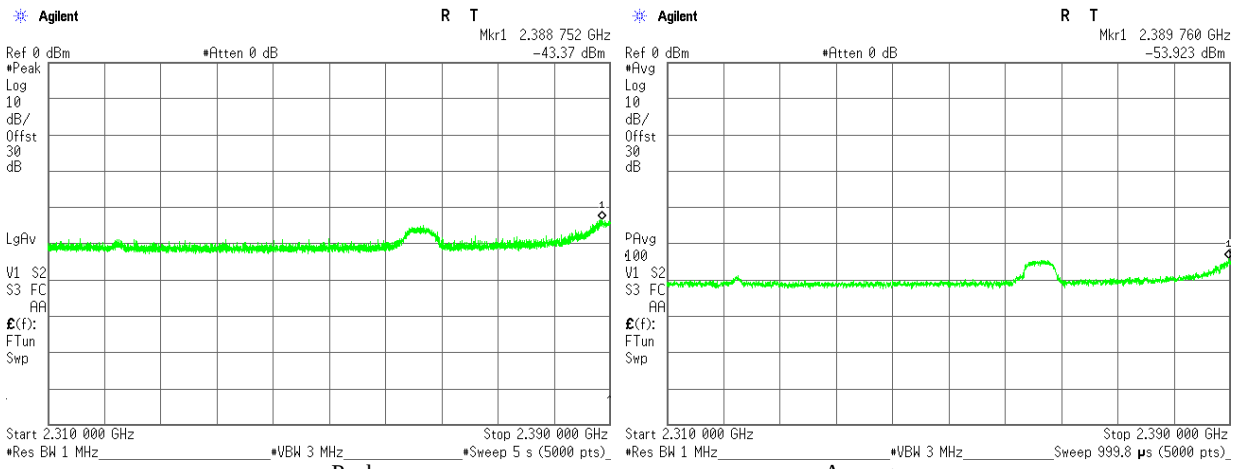


RF1



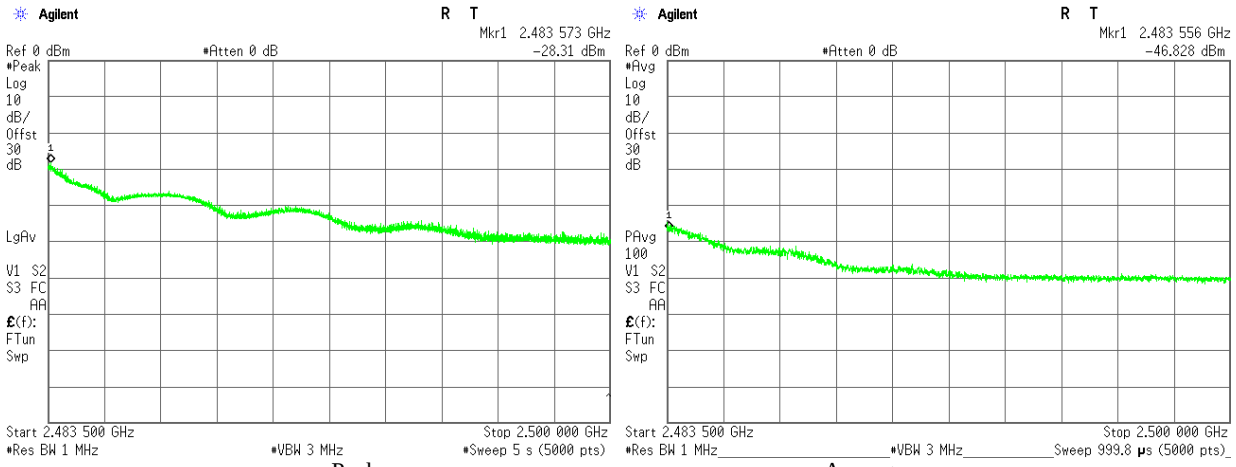
RF2

Plot 3.5.71 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Conducted measurements, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps, output RF 1



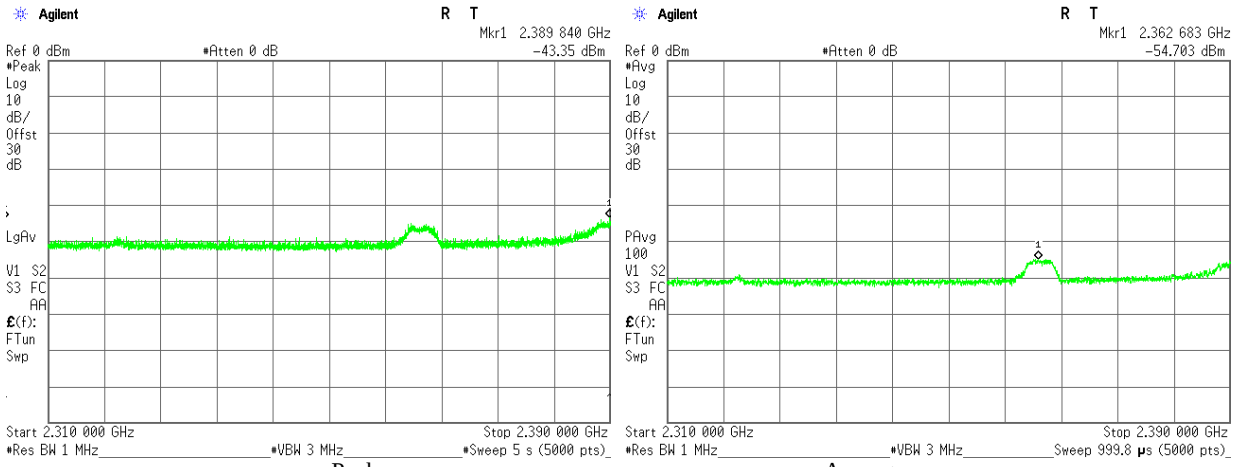
Peak Average

Plot 3.5.72 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Conducted measurements, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps, output RF 1



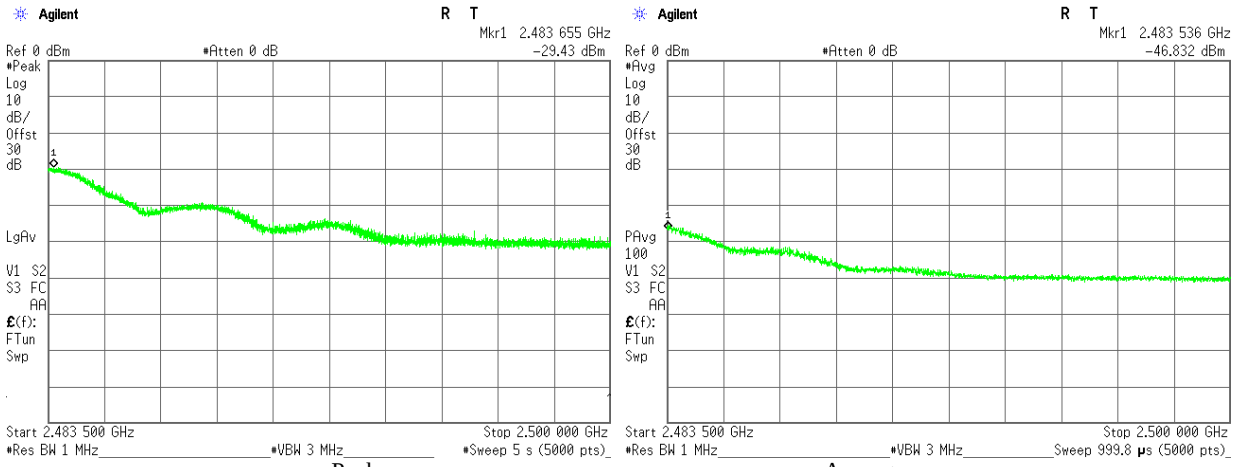
Peak Average

Plot 3.5.73 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Conducted measurements, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps, output RF 2



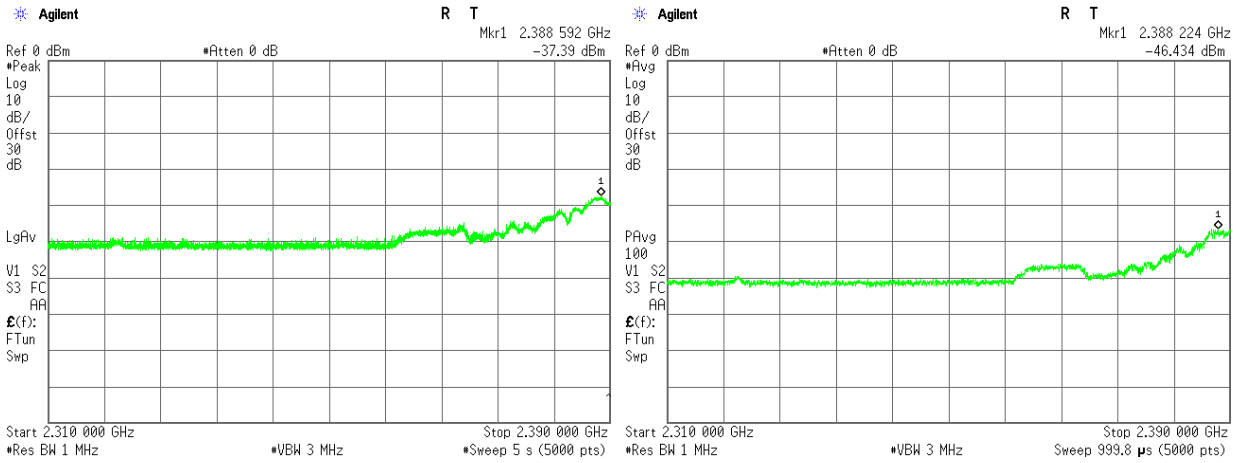
Peak Average

Plot 3.5.74 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Conducted measurements, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 4 Mbps, output RF 2

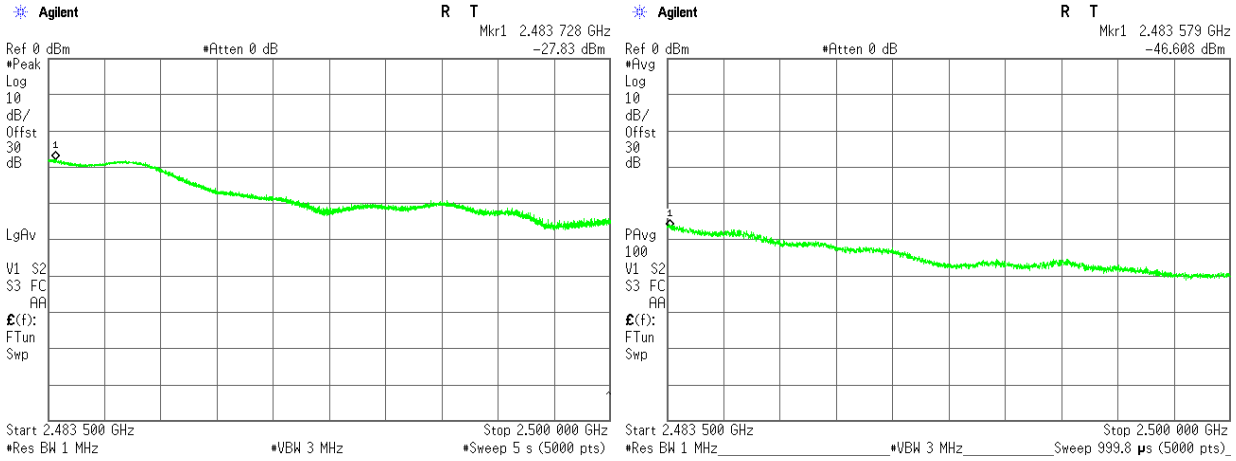


Peak Average

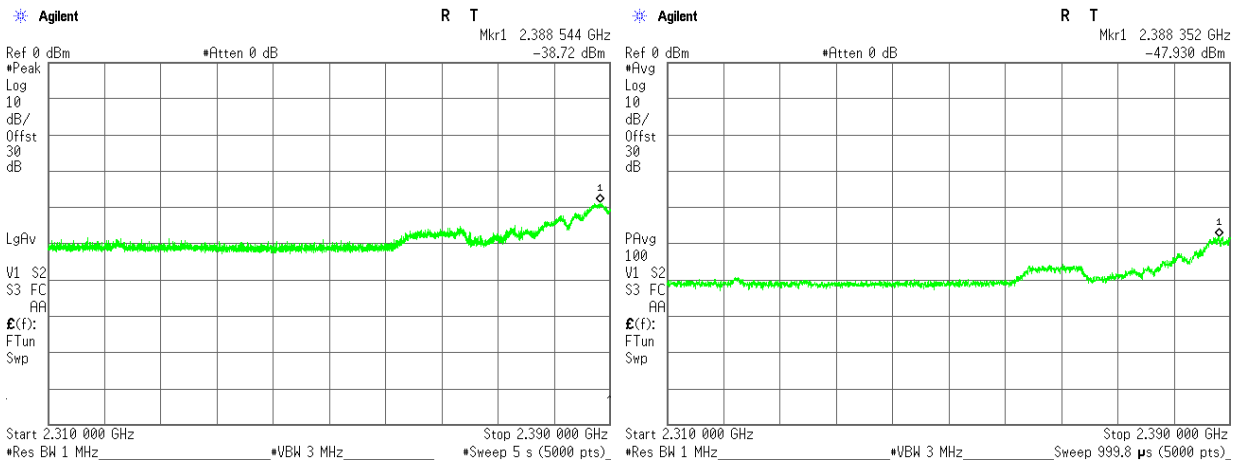
Plot 3.5.75 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Conducted measurements, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps, output RF 1



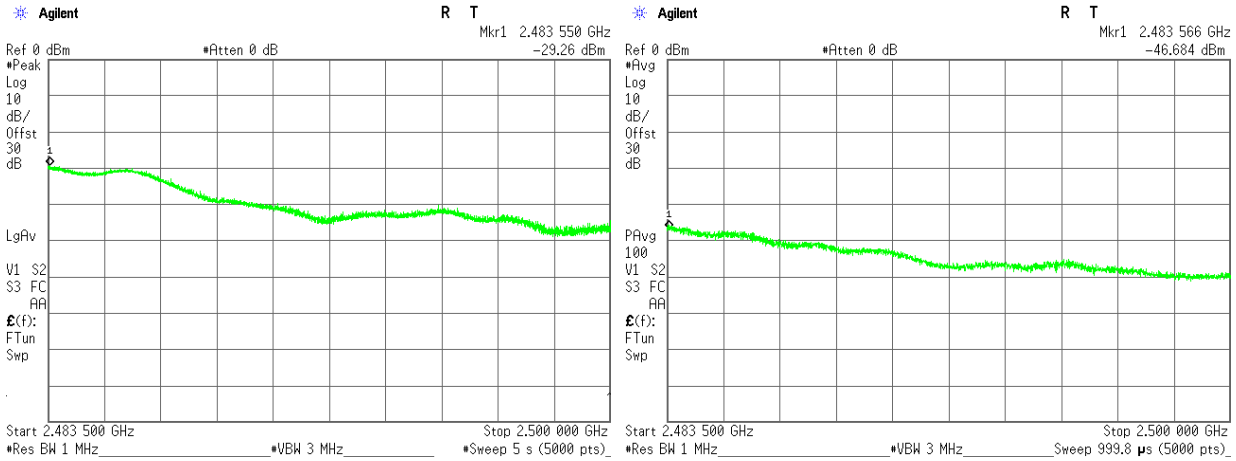
Plot 3.5.76 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Conducted measurements, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps, output RF 1



Plot 3.5.77 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Conducted measurements, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps, output RF 2



Plot 3.5.78 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Conducted measurements, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps, output RF 2



3.6. Band edge measurements

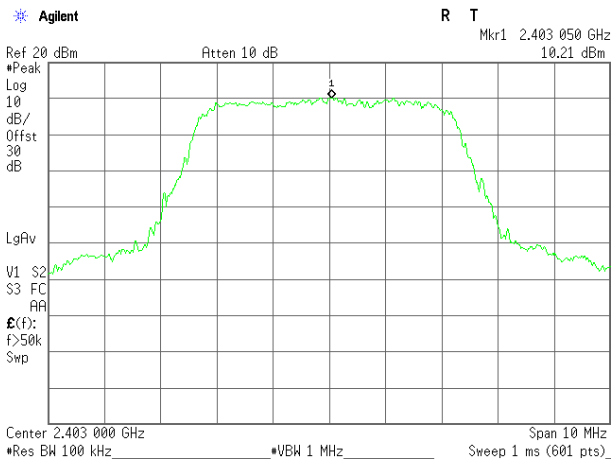
Reference document:	**47 CFR §15.247 (d)**		
Test Requirements:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (See §15.205(c)).		
Method of testing:	KDB 558074 D01 v03r03, Sec.13.3.1 Conducted	**Pass**	
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 100 kHz, VBW: ≥3×RBW		
Environment conditions:	Ambient Temperature: 48°C	Relative Humidity: 21%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 3.6.1 - Plot 3.6.9	

Test results:

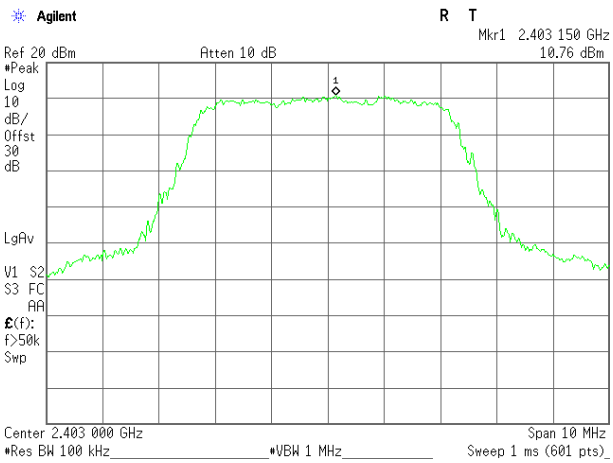
Fundamental Frequency, [MHz]	Fundamental Emission Reference Level, [dBm]	Measured Average Power, [dBm]	Duty Cycle Correction Factor	Calculated Average Power, [dBm]	Attenuation Below Fundamental, [dB]	Minimum Attenuation Below Fundamental, [dB]	Margin, [dB]	Pass/ Fail
RF1 output, BW = 4.2 MHz, Data rate = 4 Mbps, continuous transmission								
2403	10.2	-13.95	NA*	-13.95	24.15	20	4.15	Pass
2478	9.3	-38.9	NA*	-38.9	48.2	20	28.2	Pass
RF2 output, BW = 4.2 MHz, Data rate = 4 Mbps, continuous transmission								
2403	10.8	-13.76	NA*	-13.76	24.56	20	4.56	Pass
2478	10.9	-38.9	NA*	-38.9	49.8	20	29.8	Pass
RF1 output, BW = 8.4 MHz, Data rate = 8 Mbps, continuous transmission								
2405	8.7	-28.1	NA*	-28.1	36.8	20	16.8	Pass
2475	7.6	-35.0	NA*	-35	42.6	20	22.6	Pass
RF2 output, BW = 8.4 MHz, Data rate = 8 Mbps, continuous transmission								
2405	7.6	-30.0	NA*	-30	37.6	20	17.6	Pass
2475	7.6	-38.4	NA*	-38.4	46	20	26	Pass

*Duty Cycle Correction Factor = 10log(1/X) = 10log(1/1) = 0, X is transmit Duty Cycle [1/100%]

Plot 3.6.1 Band-Edge test results, Fundamental Emission Reference Level, BW = 4.2 MHz, Data rate = 4 Mbps, Fc = 2403 MHz

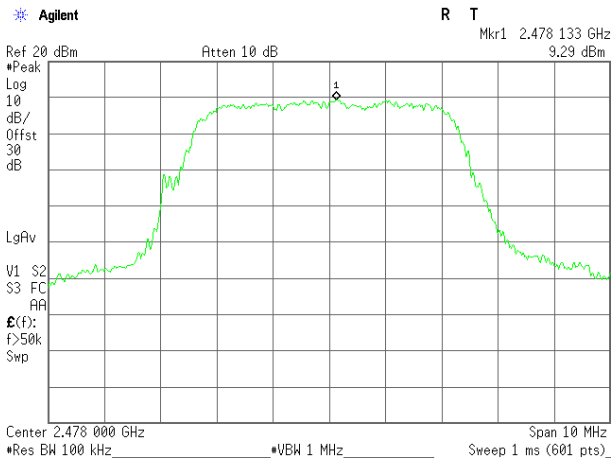


RF1

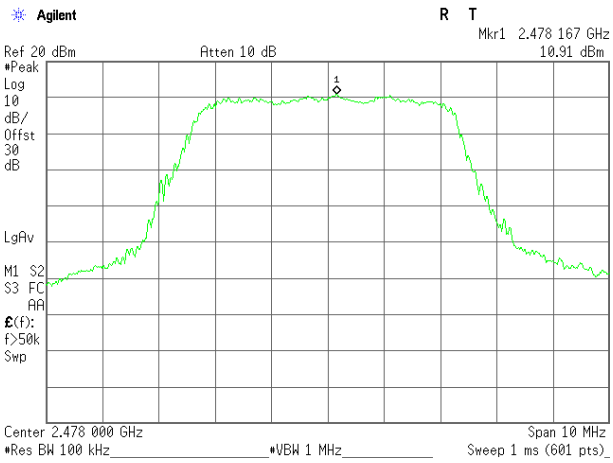


RF2

Plot 3.6.2 Band-Edge test results, Fundamental Emission Reference Level, BW = 4.2 MHz, Data rate = 4 Mbps, Fc = 2478 MHz

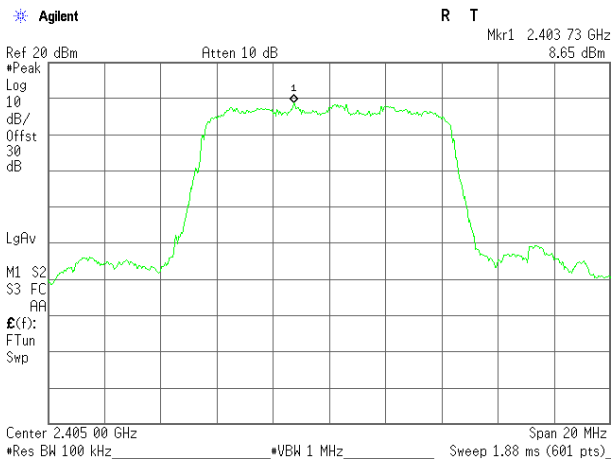


RF1

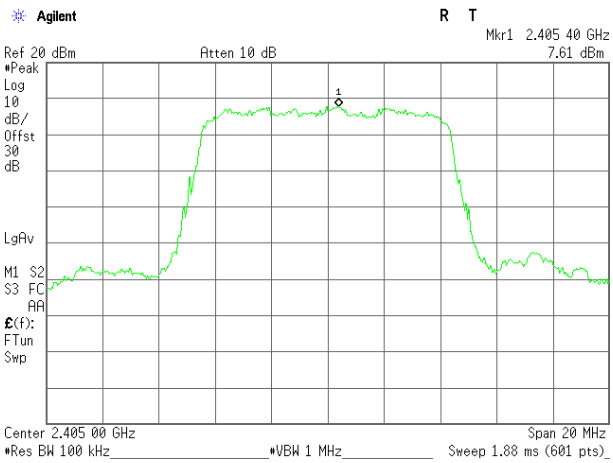


RF2

Plot 3.6.3 Band-Edge test results, Fundamental Emission Reference Level, BW = 8.4 MHz, Data rate = 8 Mbps, Fc = 2405 MHz

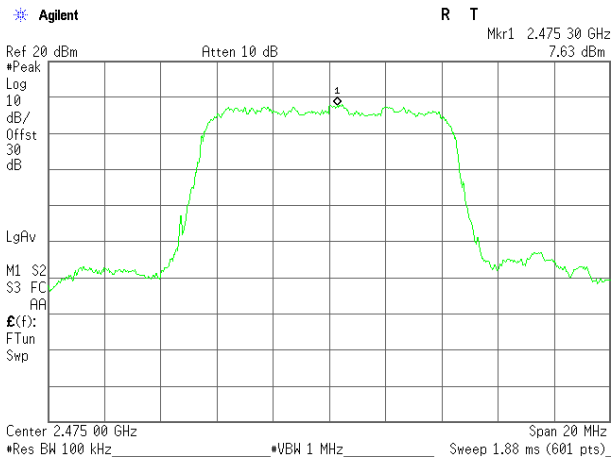


RF1

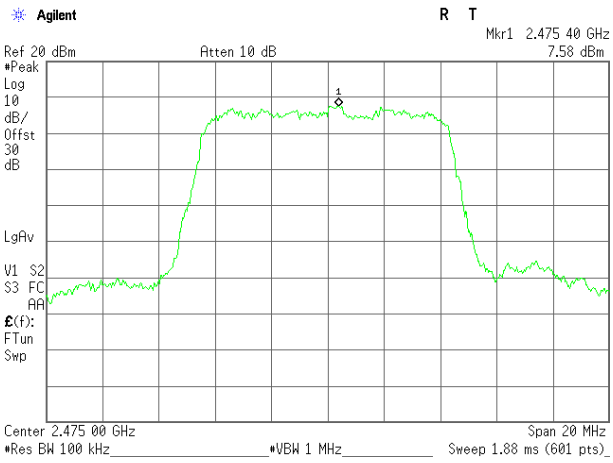


RF2

Plot 3.6.4 Band-Edge test results, Fundamental Emission Reference Level, BW = 8.4 MHz, Data rate = 8 Mbps, Fc = 2475 MHz

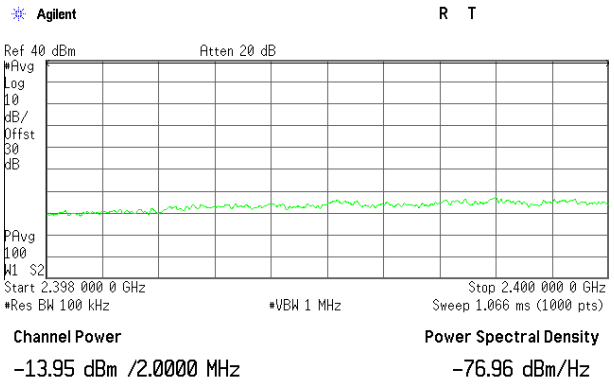


RF1

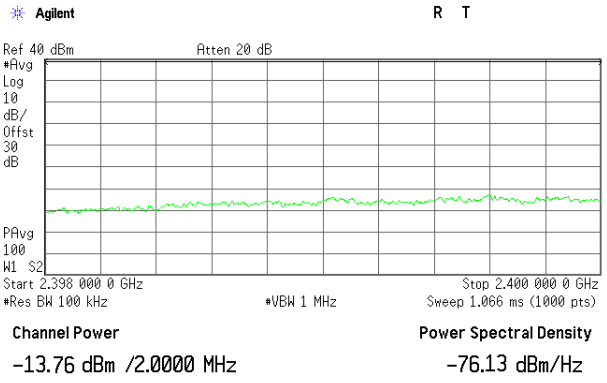


RF2

Plot 3.6.5 Band-Edge test results, BW = 4.2 MHz, Data rate = 4 Mbps, Fc = 2403 MHz

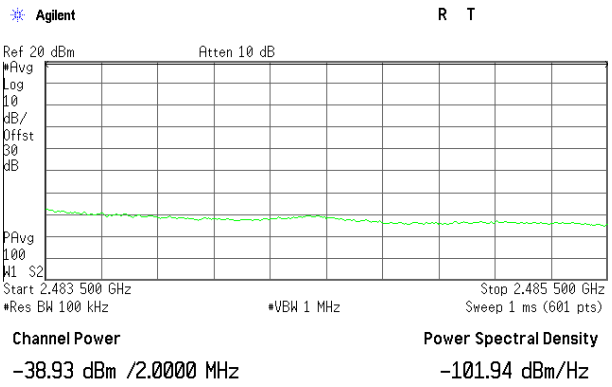


RF1

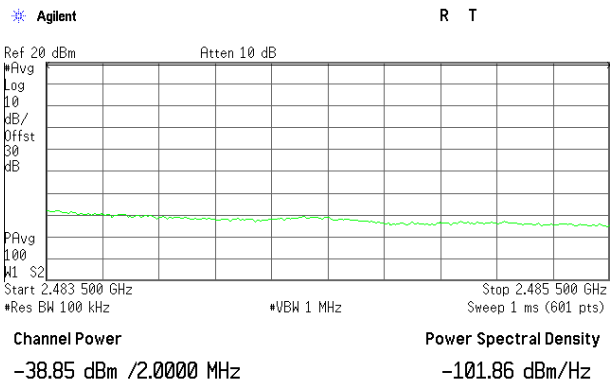


RF2

Plot 3.6.6 Band-Edge test results, BW = 4.2 MHz, Data rate = 4 Mbps, Fc = 2478 MHz

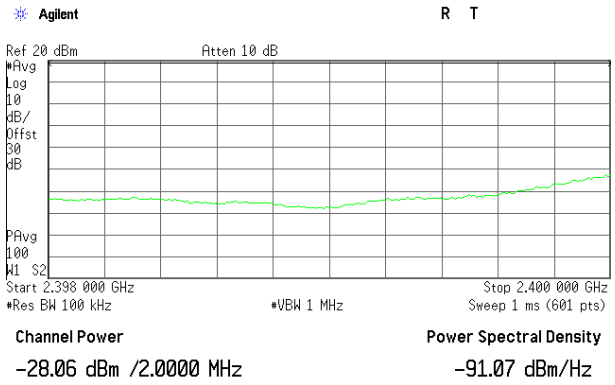


RF1

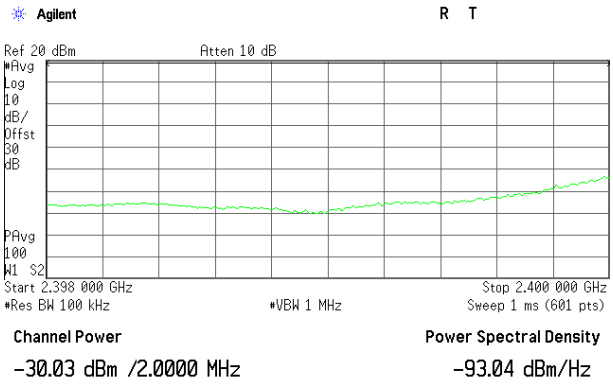


RF2

Plot 3.6.7 Band-Edge test results, BW = 8.4 MHz, Data rate = 8 Mbps, Fc = 2405 MHz

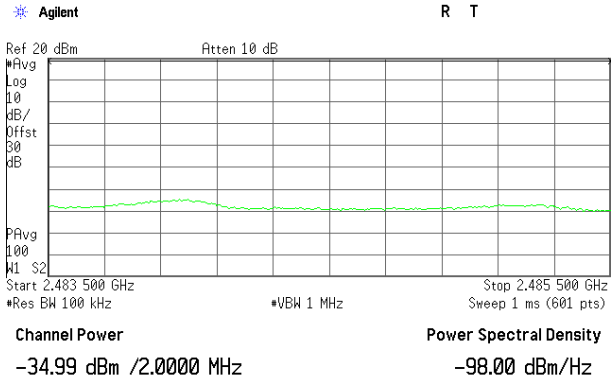


RF1

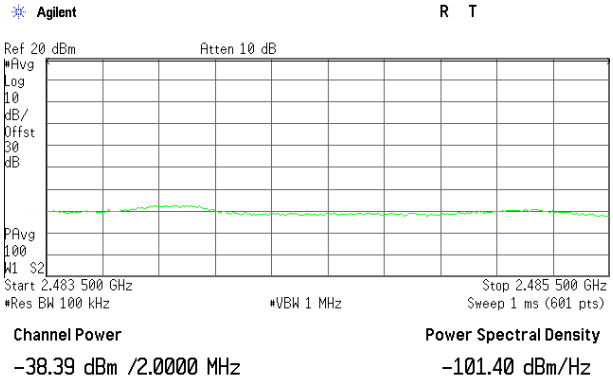


RF2

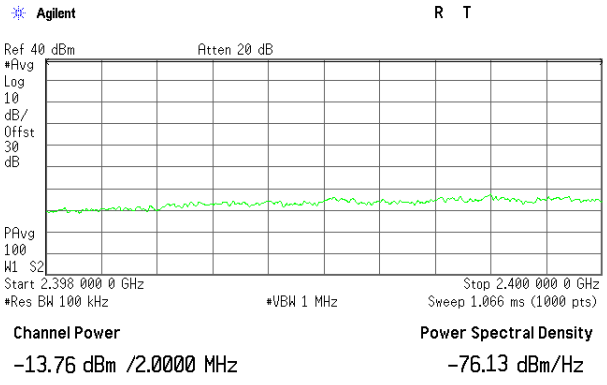
Plot 3.6.8 Band-Edge test results, BW = 8.4 MHz, Data rate = 8 Mbps, Fc = 2475 MHz

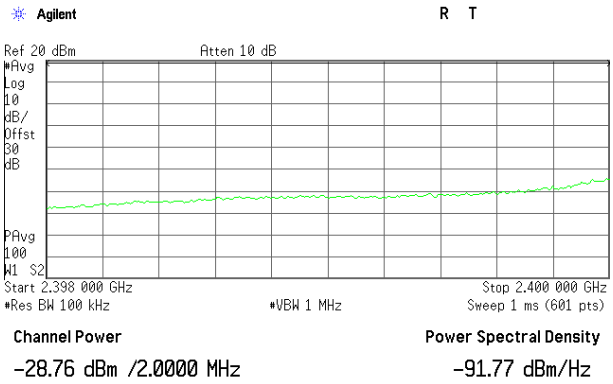


RF1



RF2





3.7. Antenna Connector Requirements

Reference document:	**47 CFR §15.203**	
Test Requirements:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall 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 provisions of this section.	
Test Result:	The EUT must be install as a professional installation equipment, see user manual.	

Appendix B: List of test equipment used

Equipment	Manufacturer	Model No.	Serial No.	Calibration Due Date
CISPR16 EMI Receiver	HP	8546A	3710A00392	14.03.2016
EMC Analyzer	HP	8593EM	3536A00131	10.04.2016
Billog Antenna	Teseq	CBL 6141B	34119	03.03.2016
Double Ridge Guide Horn antenna	A.R.A	DRG-118/A	17188	22.04.2016
LISN	Fischer	50/250-25-2	9705	26.04.2016
V-LISN	Schwarzbeck	NNBL 8226-2	120	14.03.2016
Transient Limiter	Agilent	11947A	3107A04121	14.04.2016
Current Probe	Fischer	F35A	44	25.03.2016
CDN	Fischer	T2	9953	31.03.2016
CDN	Fischer	T4	9817	31.04.2016
Universal Telecom	Fischer	ISN F-071115-1057-1	20616	31.04.2016
Discharge Simulator	Noiseken	ESS-2000	8000c03235	10.04.2016
RF Signal Generator	Marconi (IFR)	2025	202301/940	12.03.2016
Power Meter	Boonton	4230	26203	04.03.2016
Power Sensor	Boonton	51015	31821	04.04.2016
EFT Generator	EMtest	EFT 500 N8	V114911192	27.04.2016
Coupling/Decoupling network for burst and surge	EMTest	CNI 503 A18/ 32A	V0947105536	04.04.2016
Surge Generator combination wave,	EMTest	VCS 500 N10	V0824103874	04.03.2016
RF Signal Generator	Marconi	2024	1122681029	08.03.2016
Power Meter	Boonton	4235	26203	10.03.2016
Power Sensor	Boonton	51015	31821	10.04.2016
EM Injection Clamp	Fischer	F2031	348	31.04.2016
CDN	Fischer	C1	9815	31.03.2016
CDN	Fischer	M2	9824	31.04.2016
CDN	Fischer	M3	9840	31.03.2016
CDN	Fischer	T4	9817	02.04.2016
ESD Generator	Noiseken	ESS-2000	8000C03235	10.04.2016
ELF Magnetic Field Meter,	Holaday	HI-3624A	00034615	20.04.2016
Power Source & Analyzer	Pacific Power	140TMX	0233	10.04.2016
Harmonics & Flickers Analyzer,	EM Test	DPA 500	V0627101584	01.04.2016

Appendix C: Accreditation Certificate

American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

QUALITECH

Petach-Tikva, Israel

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 16th day of October 2014.

President & CEO
For the Accreditation Council
Certificate Number 1633.01
Valid to June 30, 2016

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

End of the Test Report