

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)).		
Test setup:	See sec 2.2	Pass	
Method of testing:	KDB 558074 D01 v03r05, Sec.12.2.1-12.2.5 Conducted & 12.2.7 Radiated for cabinet/case spurious emissions		
Operating conditions:	Under normal test conditions		
S.A. Settings:	According to KDB 558074 D01 v03r05		
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 = 1.6 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
2403.000	145.600	H	Not in restricted band			
	168.000	H	34.54	43.50	8.96	Pass
	339.250	H	Not in restricted band			
	672.000	H	Not in restricted band			
	123.200	V	39.15	43.50	4.35	Pass

Test results above 1GHz for BW = 4.2 MHz, Bit Rate = 1.6 Mbps (Radiated Spurious emissions from 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	17,962.6	V	64.79	49.65	74.0	54.0	9.21	4.35	Pass
2442	17,954.8	H	64.68	49.72	74.0	54.0	9.32	4.28	Pass
2478	17,920.1	V	64.57	49.86	74.0	54.0	9.43	4.14	Pass

Test results above 1GHz for BW = 8.4 MHz, Bit Rate = 8 Mbps (Radiated Spurious emissions from 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	17,835.4	V	65.55	49.65	74.0	54.0	8.45	4.35	Pass
2440	17,836.7	H	64.86	49.95	74.0	54.0	9.14	4.05	Pass
2475	2.4836	V	65.75	49.97	74.0	54.0	8.25	4.03	Pass

Note: Spurious Emission [dBµV/m] = measured [dBµV] + Correction-factor [dB (1/m)]
Correction Factor = Antenna factor + Cable Loss

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, dBuV/m						Pass/Fail
		Peak	AVG (RMS)				Peak			Average			
							Emission*	Limit	Delta	Emission*	Limit	Delta	
BW = 4.2 MHz, Bit Rate = 1.6 Mbps, RF1, continuous transmission													
2403	2310-2390	-42.47	-52.84	0.0	2	3	57.79	74	16.21	47.42	54	6.58	Pass
2478	2483.5-2500	-30.19	-46.79	0.0	2	3	70.07	74	3.93	53.47	54	0.53	Pass
BW = 4.2 MHz, Bit Rate = 1.6 Mbps, output RF 2, continuous transmission													
2403	2310-2390	-42.98	-54.00	0.0	2	3	57.28	74	16.72	46.26	54	7.74	Pass
2478	2483.5-2500	-29.14	-46.62	0.0	2	3	71.12	74	2.88	53.64	54	0.36	Pass
BW = 8.4 MHz, Bit Rate = 8 Mbps, RF1, continuous transmission													
2405	2310-2390	-39.37	-48.64	0.0	2	3	63.40	74	10.60	51.62	54	2.38	Pass
2475	2483.5-2500	-30.10	-46.77	0.0	2	3	73.00	74	1.00	53.49	54	0.51	Pass
BW = 8.4 MHz, Bit Rate = 8 Mbps, output RF 2, continuous transmission													
2405	2310-2390	-39.7	-48.30	0.0	2	3	62.10	74	11.90	51.96	54	2.04	Pass
2475	2483.5-2500	-29.35	-47.05	0.0	2	3	71.60	74	2.40	53.21	54	0.79	Pass

Note:

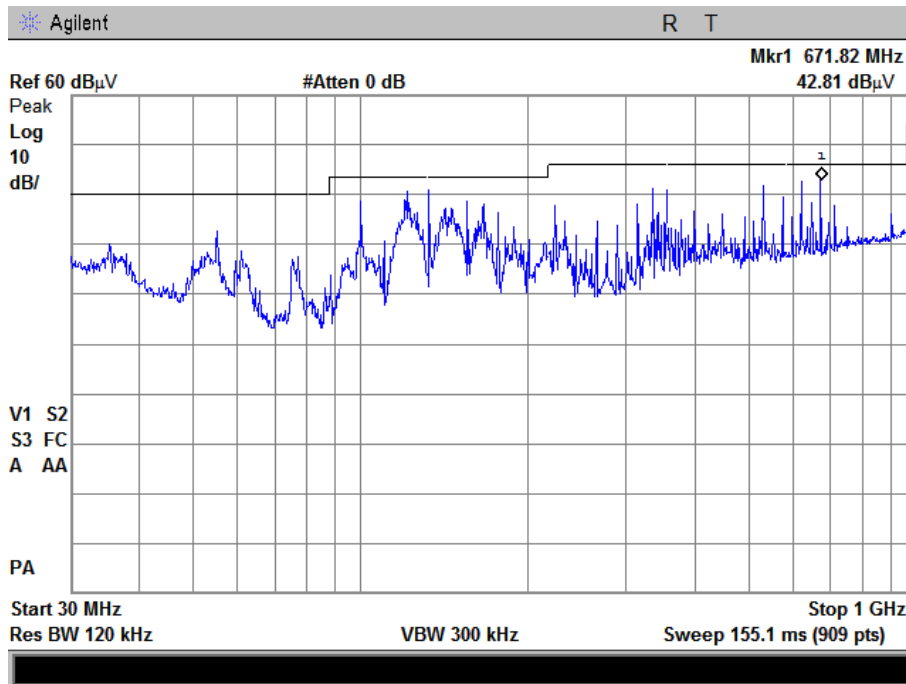
*E = EIRP – 20log D + 104.8

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

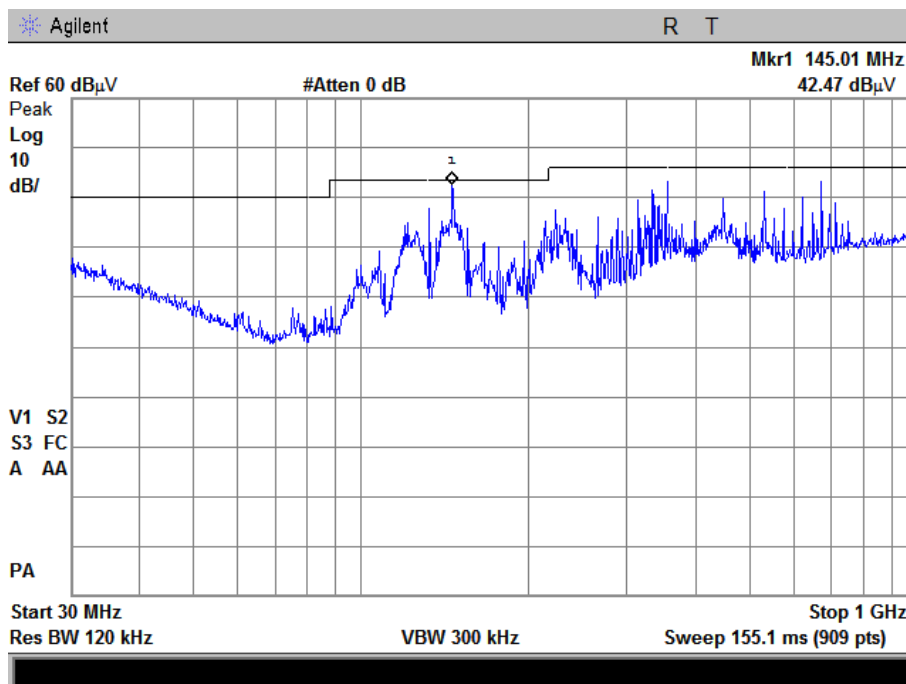
Max Transmit Antenna Gain acc to KDB558074 D01 v03r03 sec 12.2.6

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

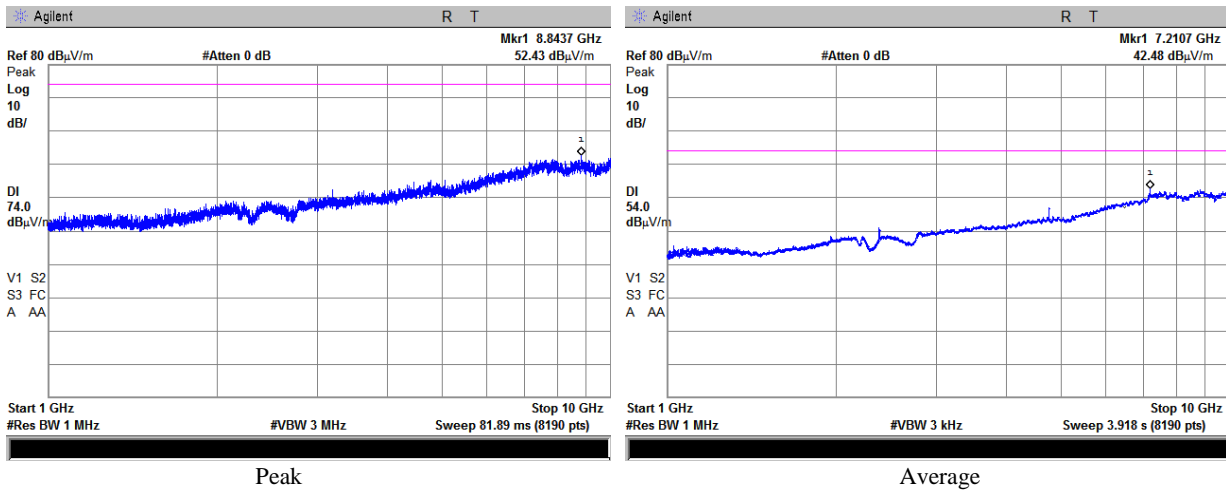
Plot 3.5.1 Emissions in restricted frequency bands test results, 30 MHz – 1 GHz range, Vertical polarization, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (worst case for all modes)



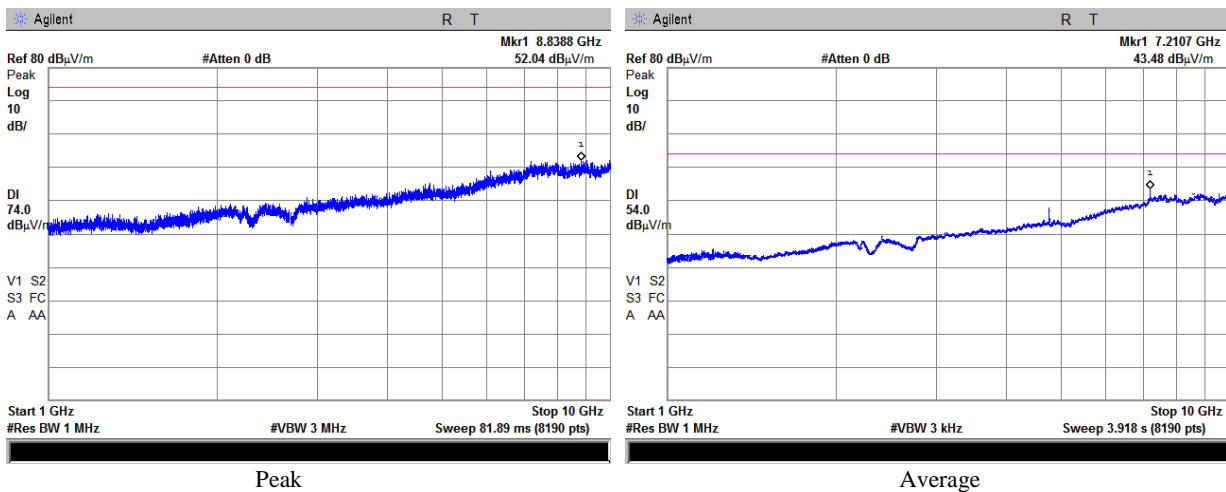
Plot 3.5.2 Emissions in restricted frequency bands test results, 30 MHz – 1 GHz range, Horizontal polarization, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (worst case)



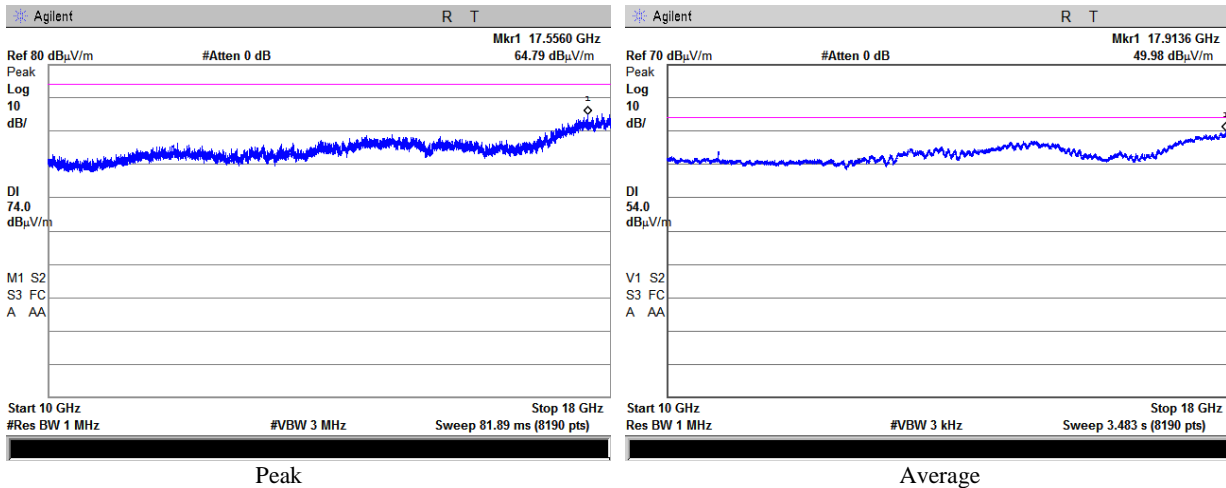
Plot 3.5.3 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



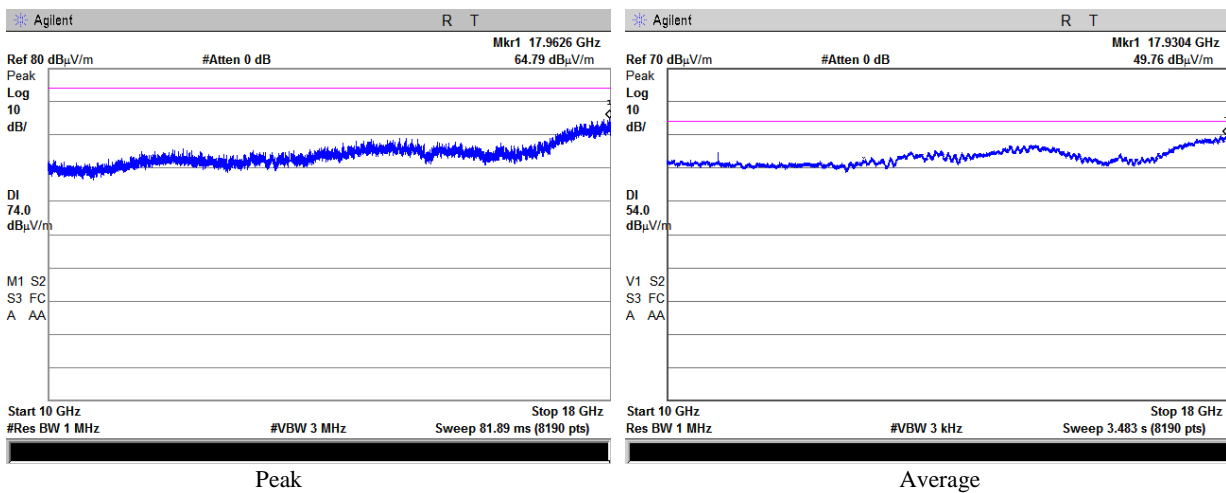
Plot 3.5.4 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



Plot 3.5.5 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, $F_c = 2403$ MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)

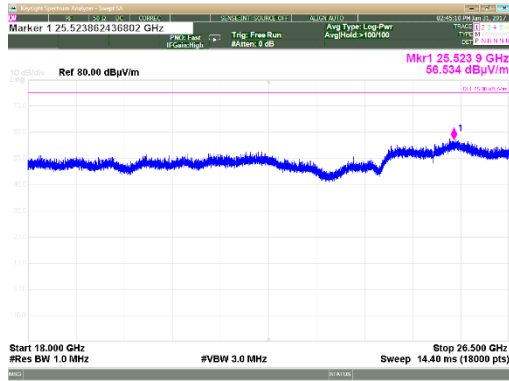


Plot 3.5.6 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, $F_c = 2403$ MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)

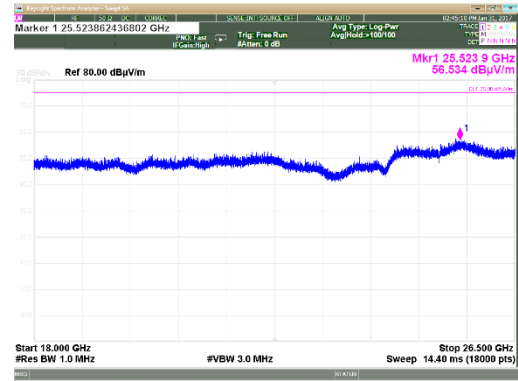


Plot 3.5.7 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Vertical, = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps(with notch filter)

Fc



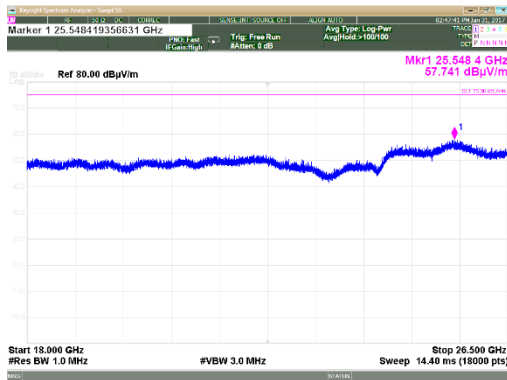
Peak



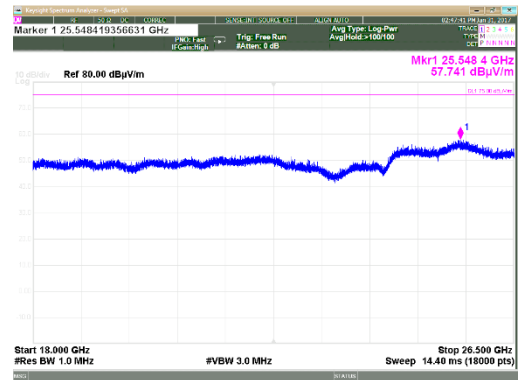
Average

Plot 3.5.8 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Horizontal, = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps(with notch filter)

Fc



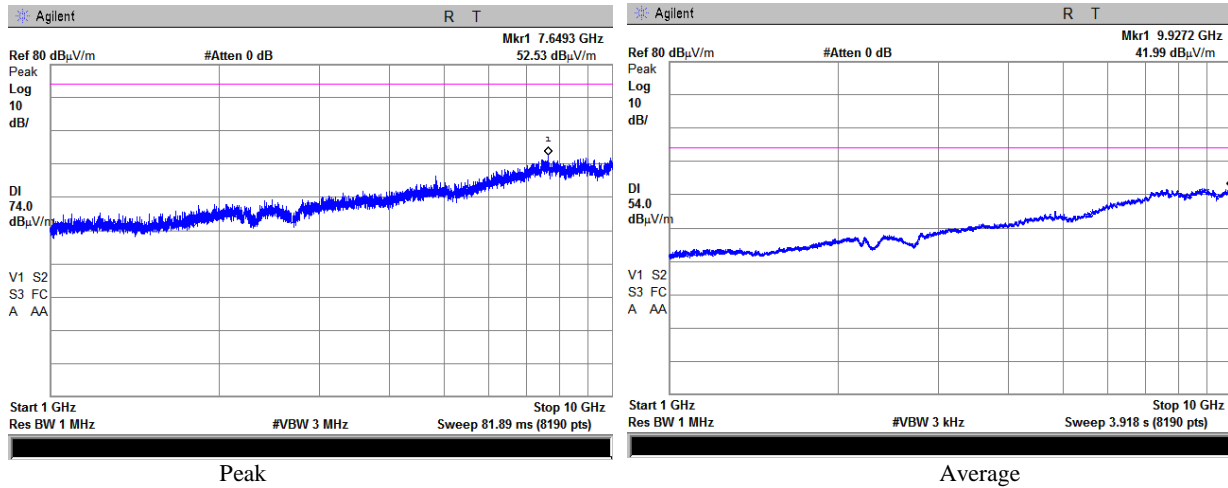
Peak



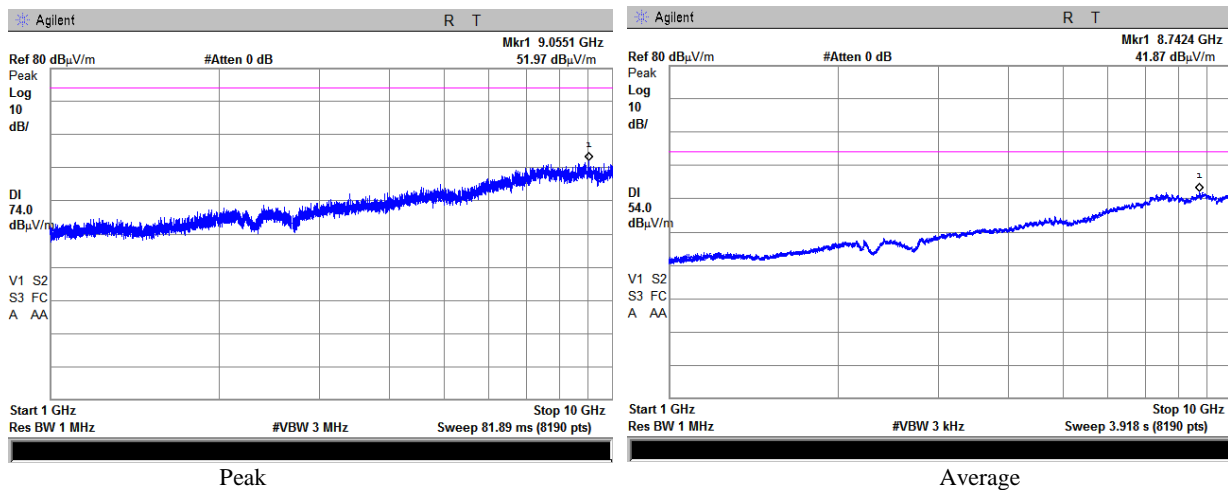
Average

Plot 3.5.9 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)

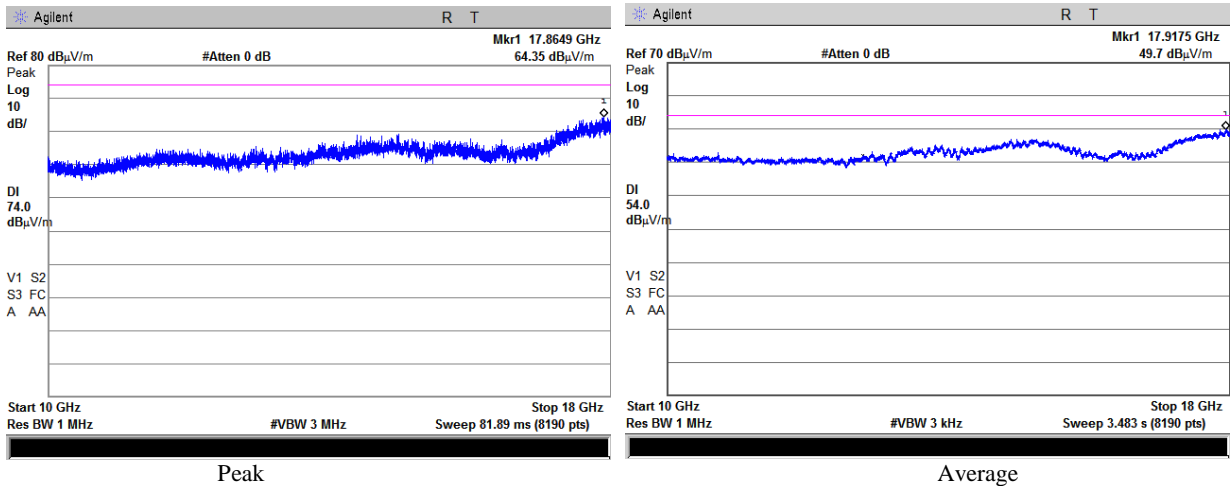
Fc



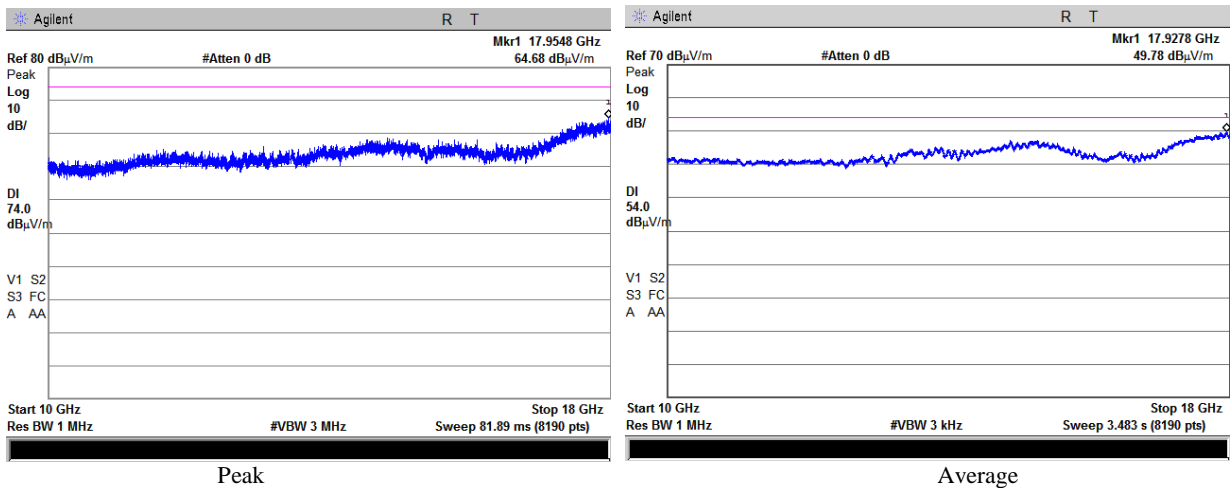
Plot 3.5.10 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



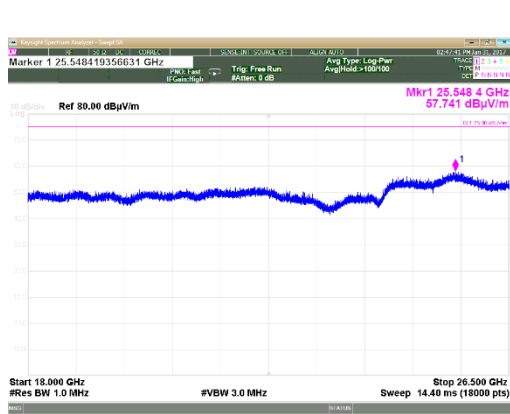
Plot 3.5.11 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



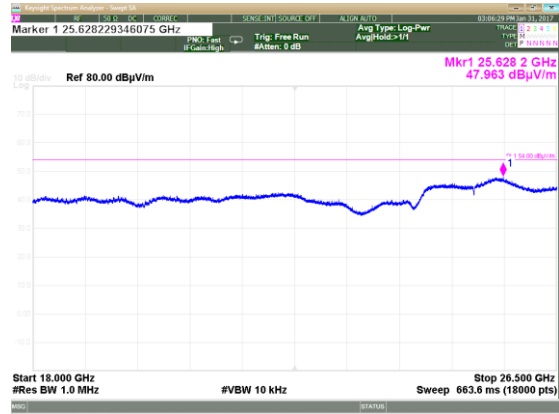
Plot 3.5.12 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



Plot 3.5.13 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Vertical, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps(with notch filter)

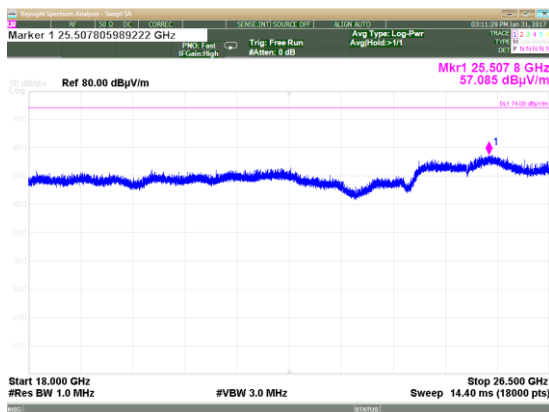


Peak

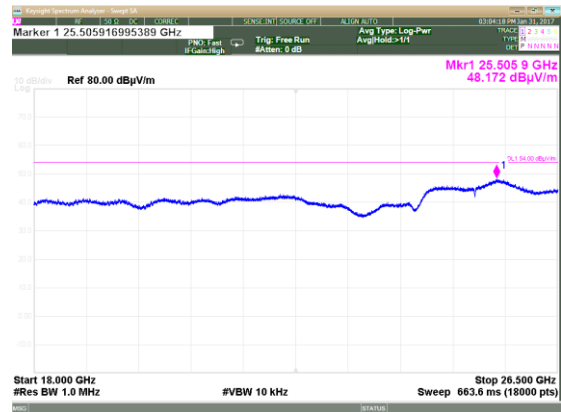


Average

Plot 3.5.14 Emissions in restricted frequency bands test results, 18 – 25 GHz range, Horizontal, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps(with notch filter)

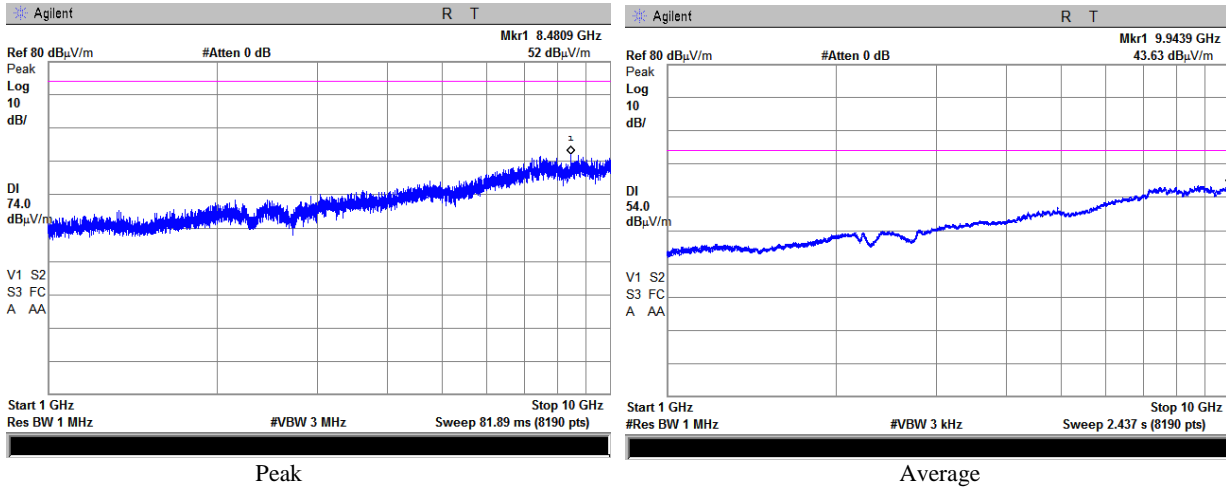


Peak

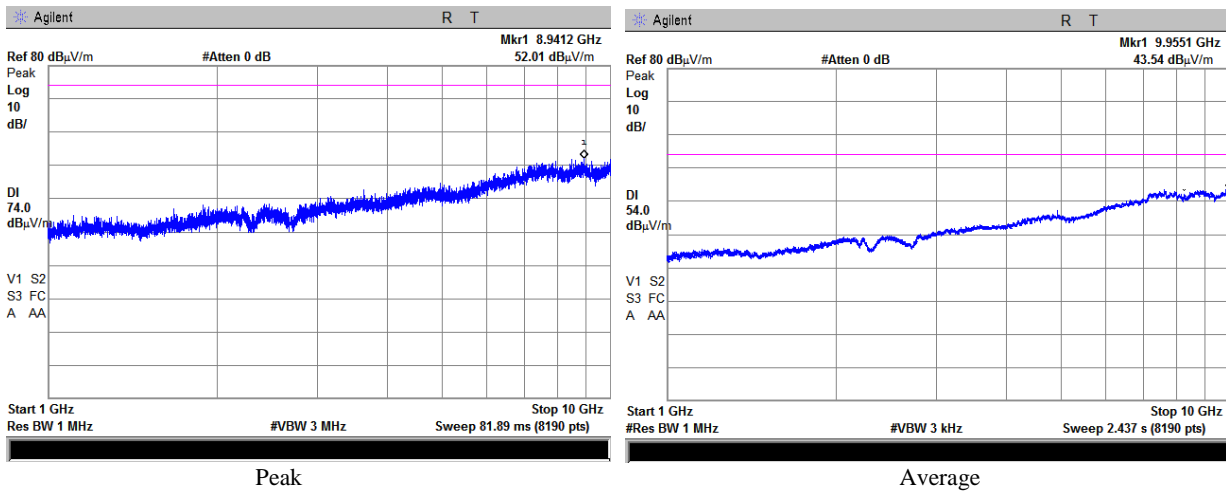


Average

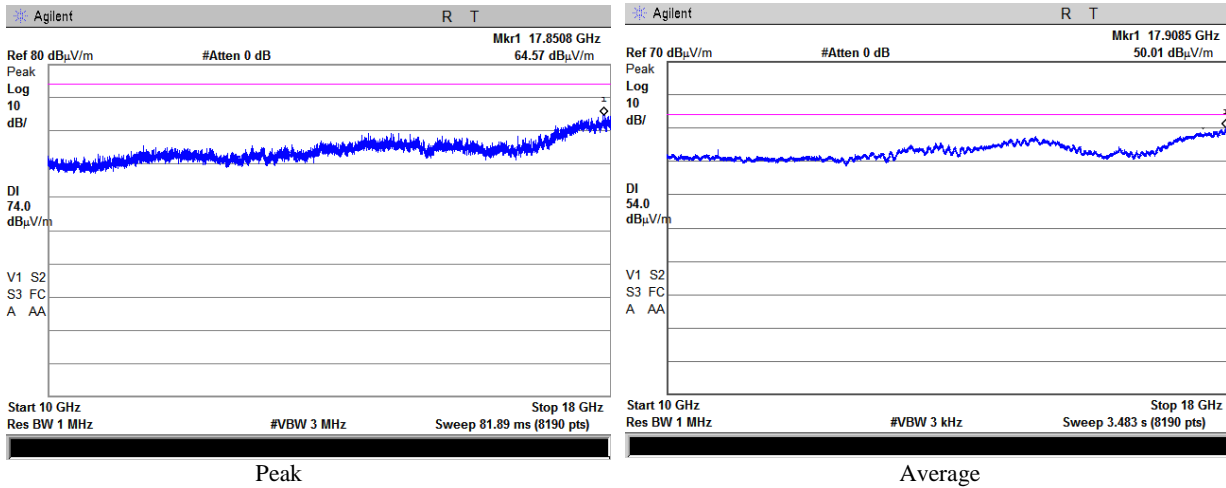
Plot 3.5.15 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



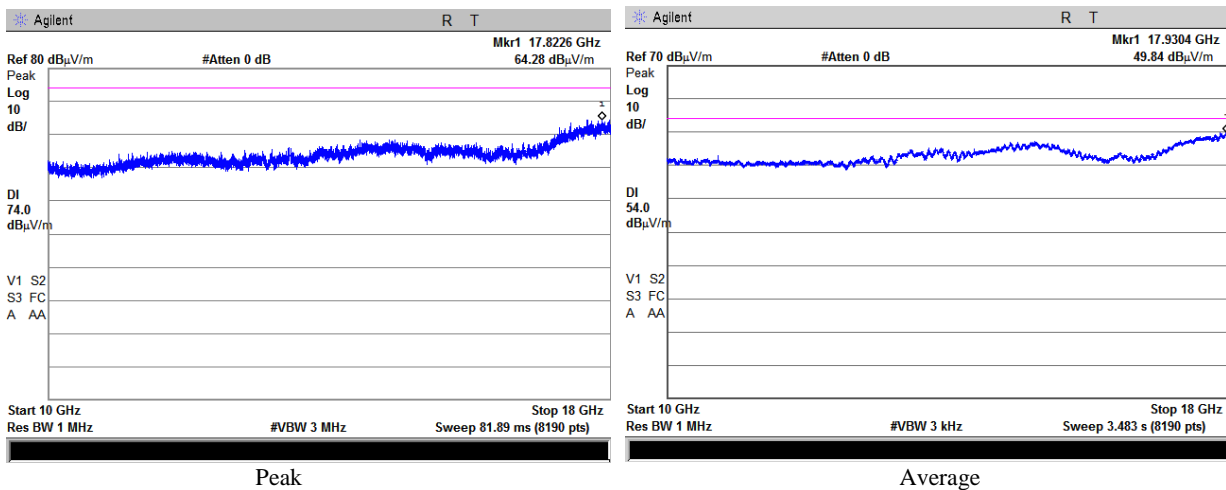
Plot 3.5.16 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



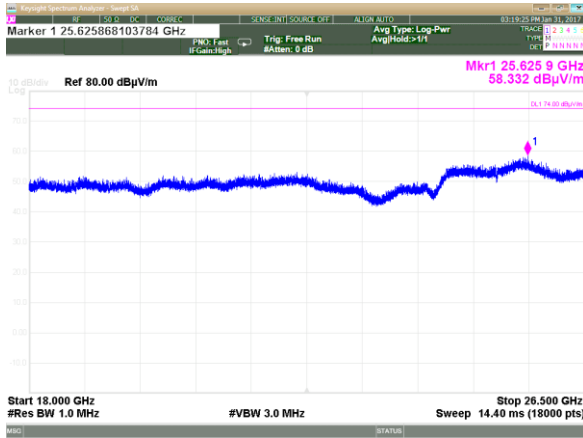
Plot 3.5.17 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



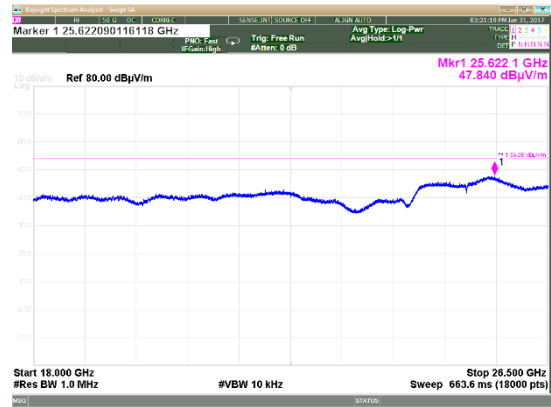
Plot 3.5.18 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps (with notch filter)



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 = 1.6 Mbps(with notch filter)

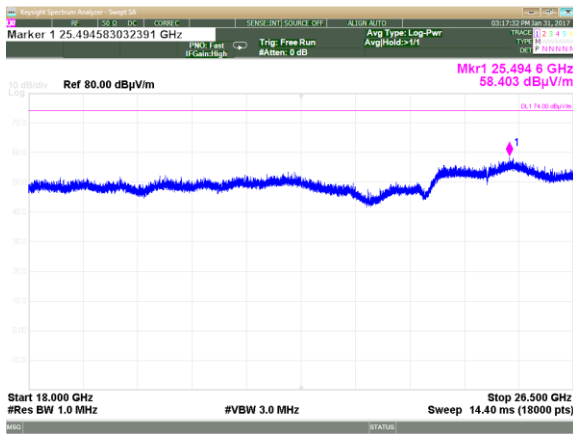


Peak

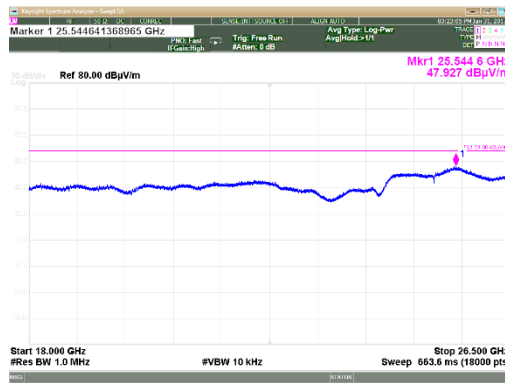


Average

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 = 1.6 Mbps(with notch filter)

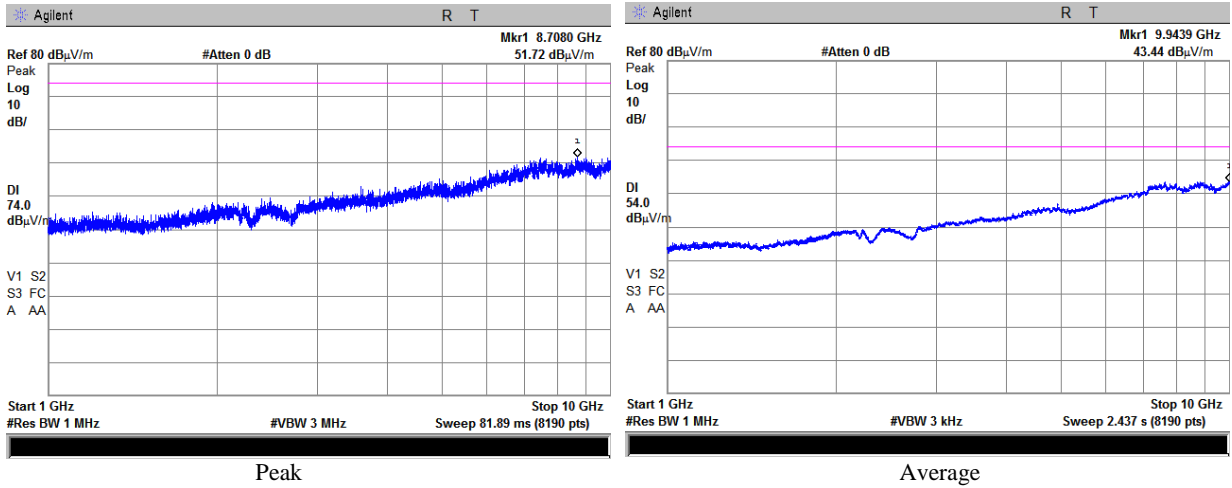


Peak

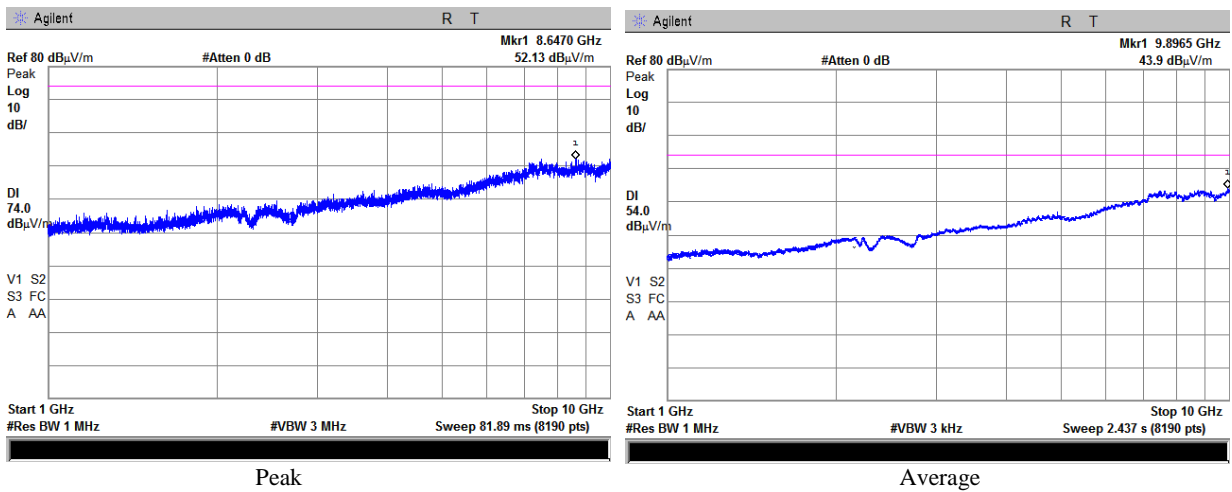


Average

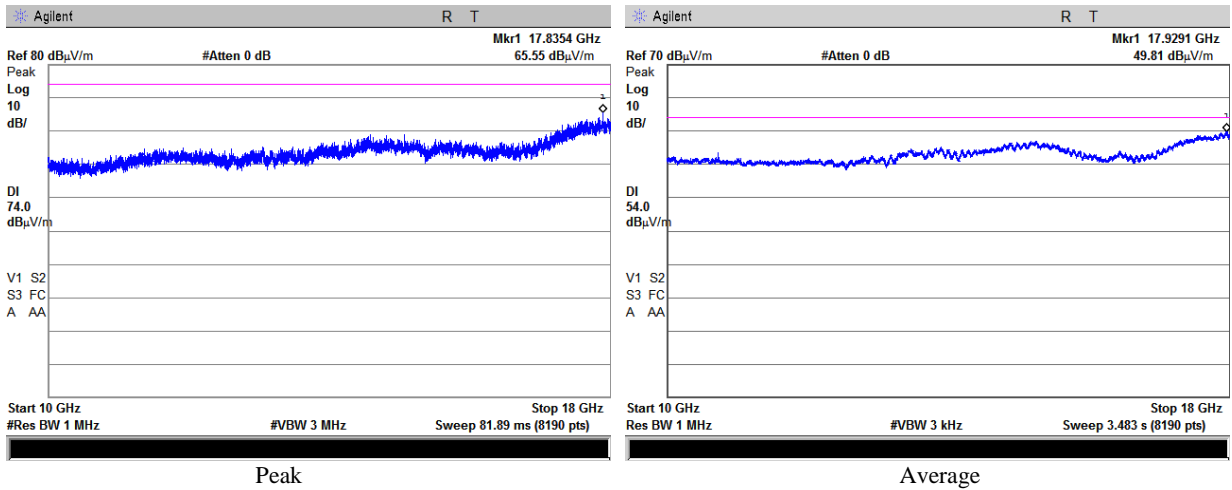
Plot 3.5.21 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



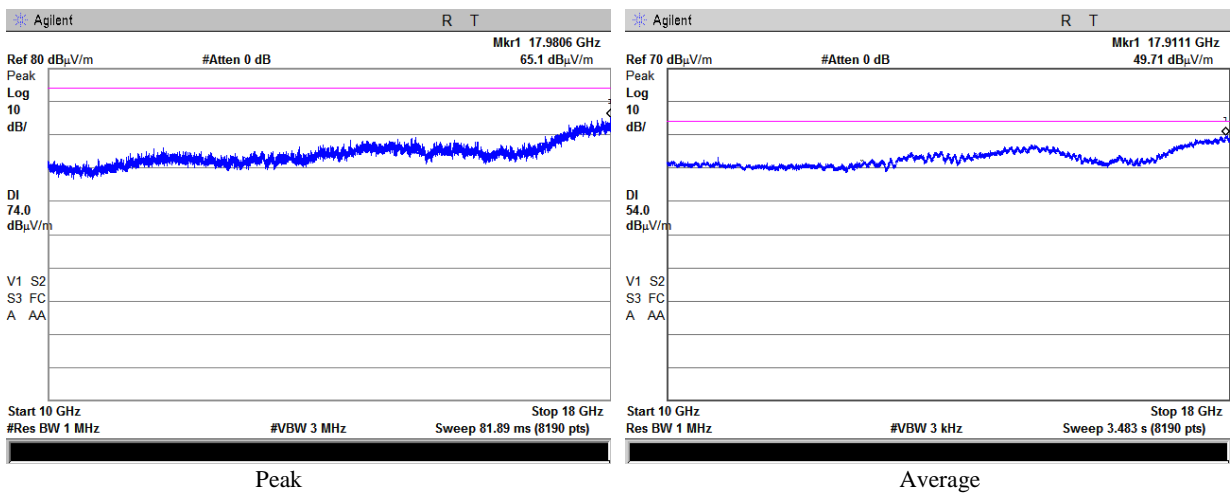
Plot 3.5.22 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



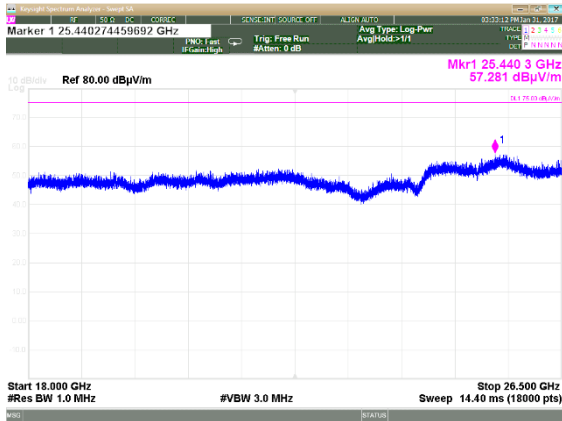
Plot 3.5.23 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



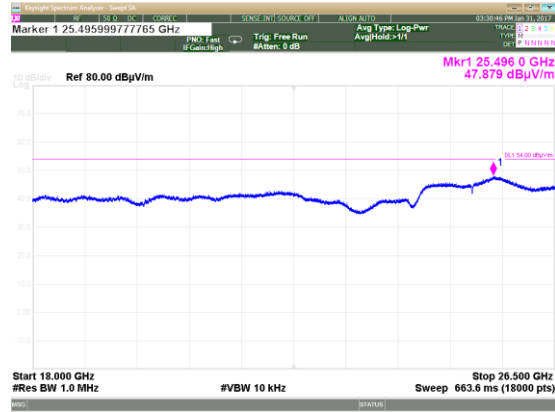
Plot 3.5.24 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



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)

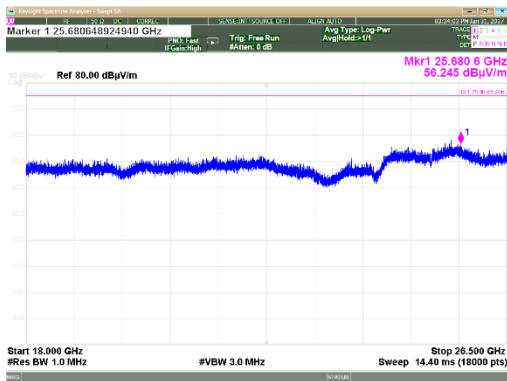


Peak

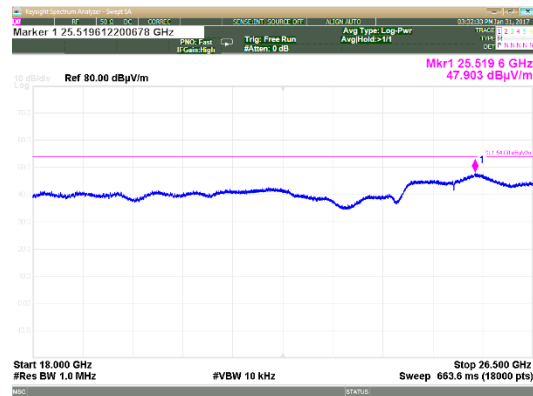


Average

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)

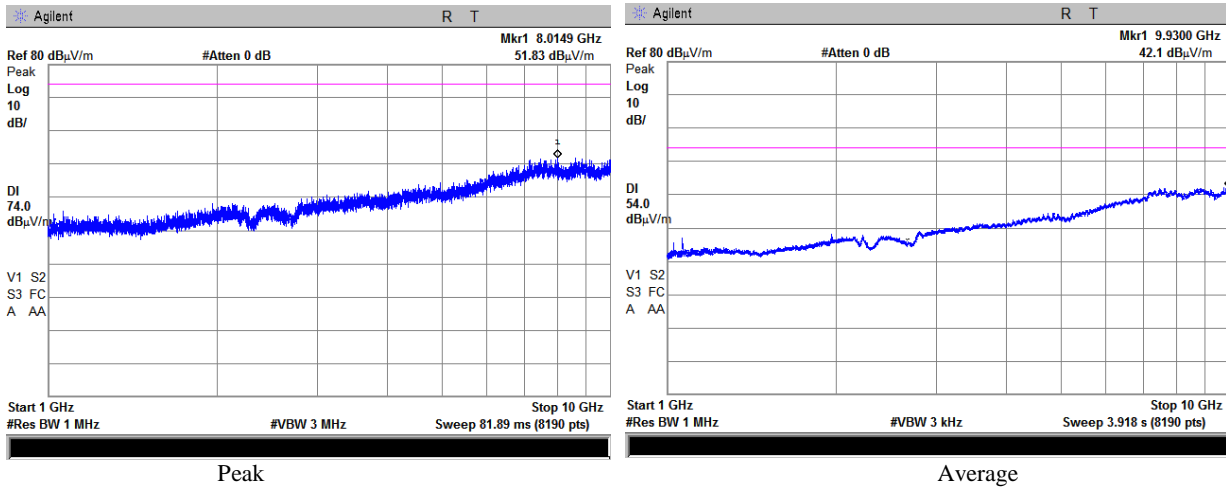


Peak

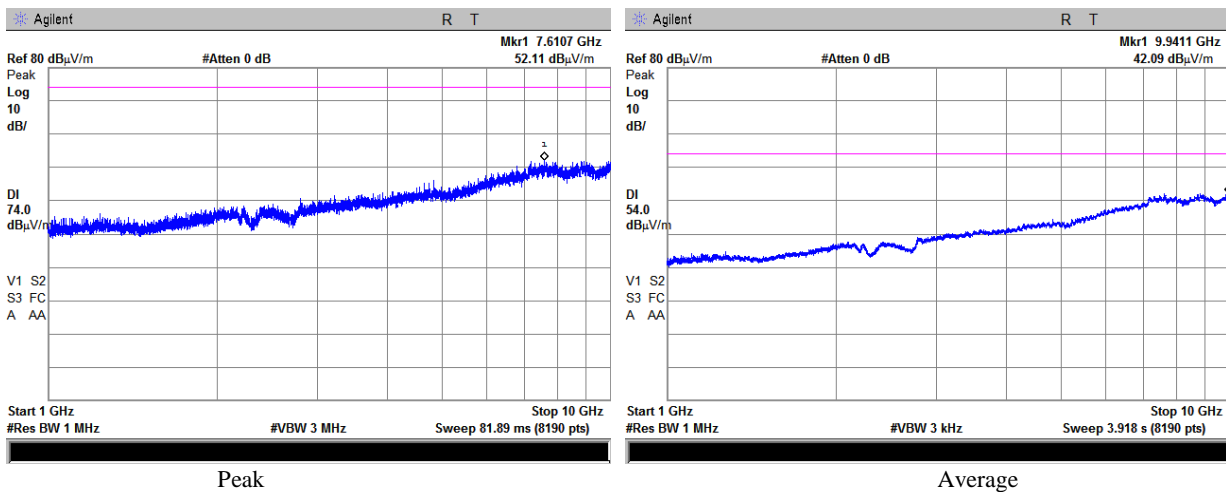


Average

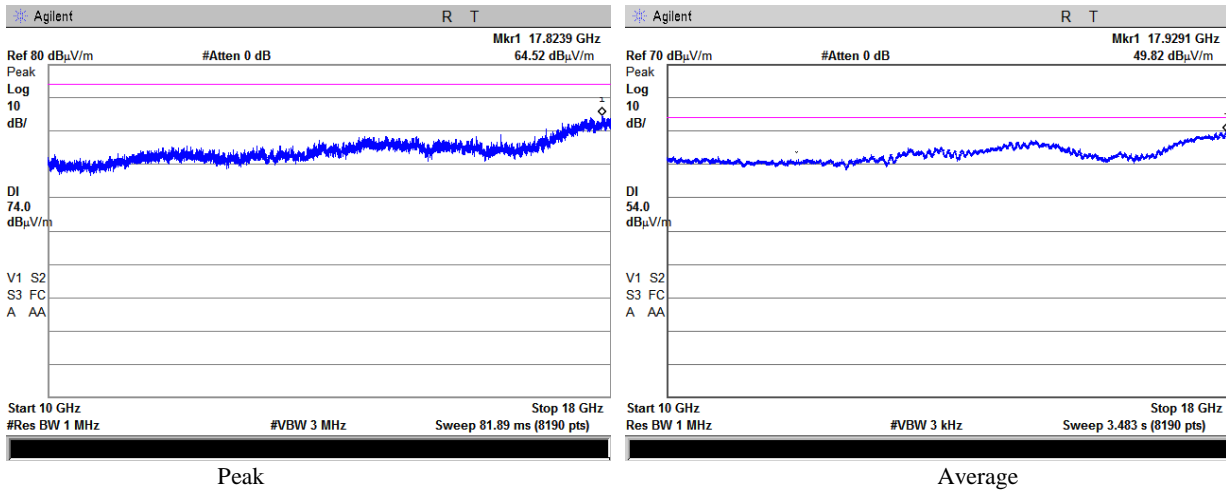
Plot 3.5.27 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



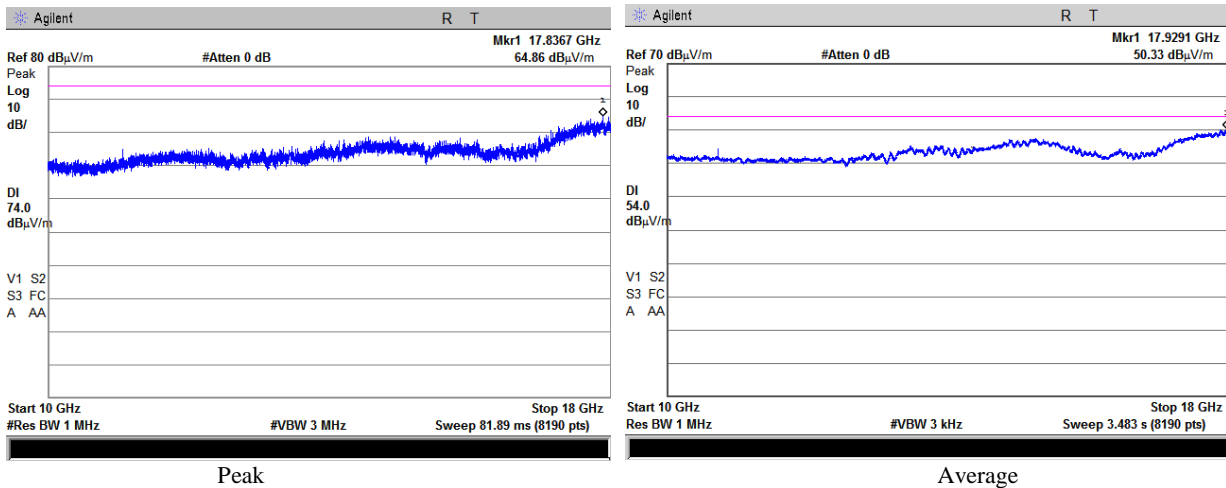
Plot 3.5.28 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



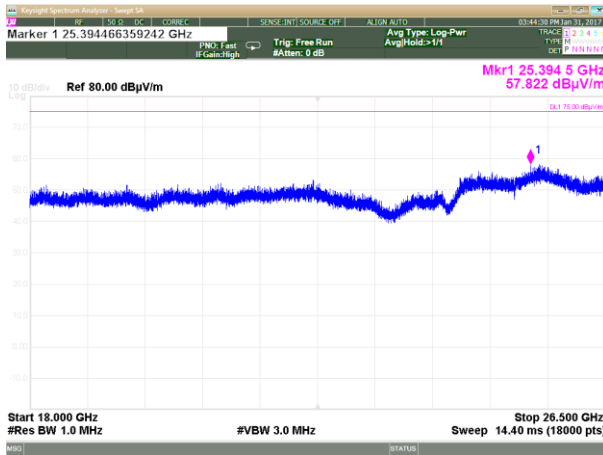
Plot 3.5.29 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2440 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps(with notch filter)



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)



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

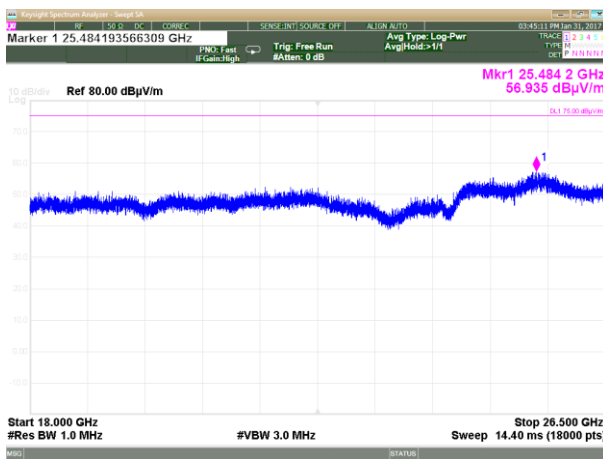


Peak

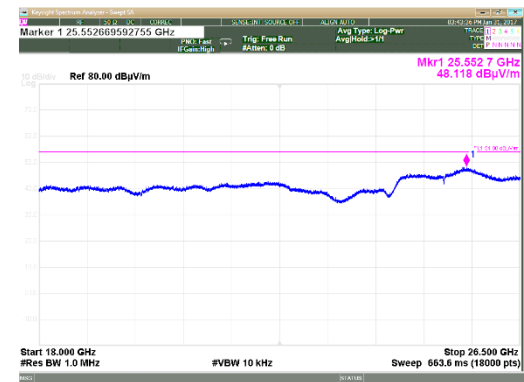


Average

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

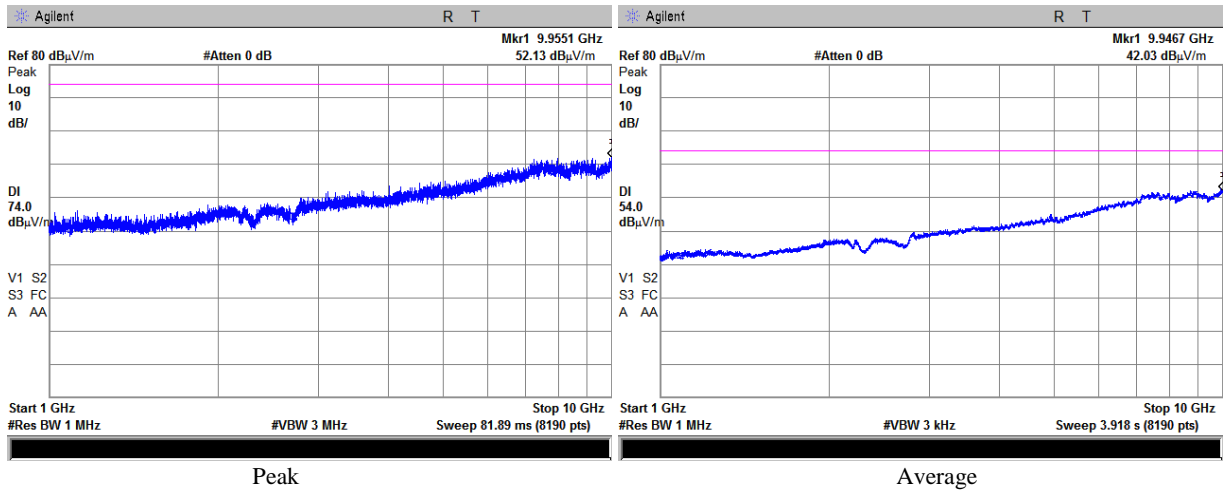


Peak

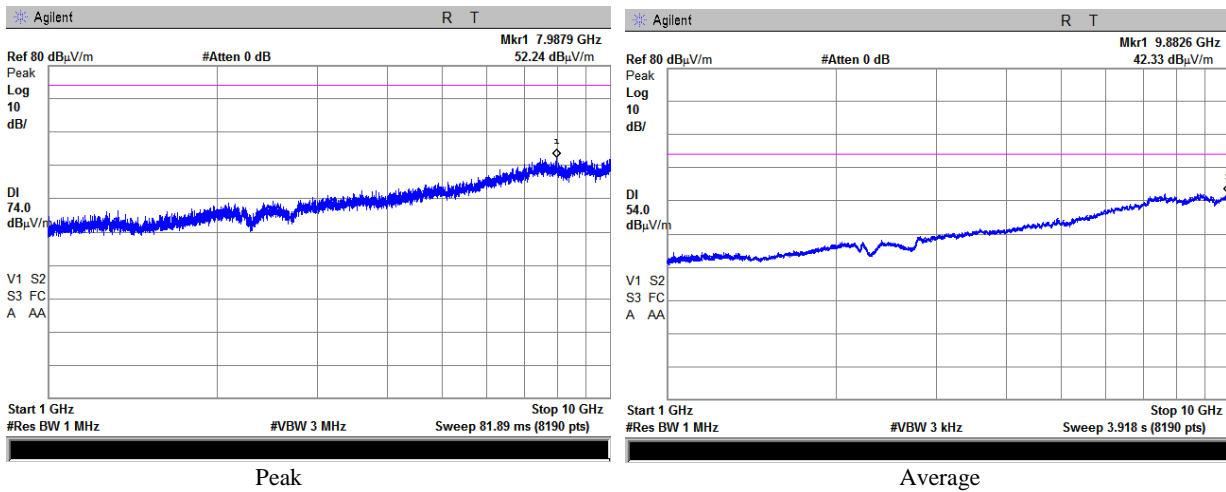


Average

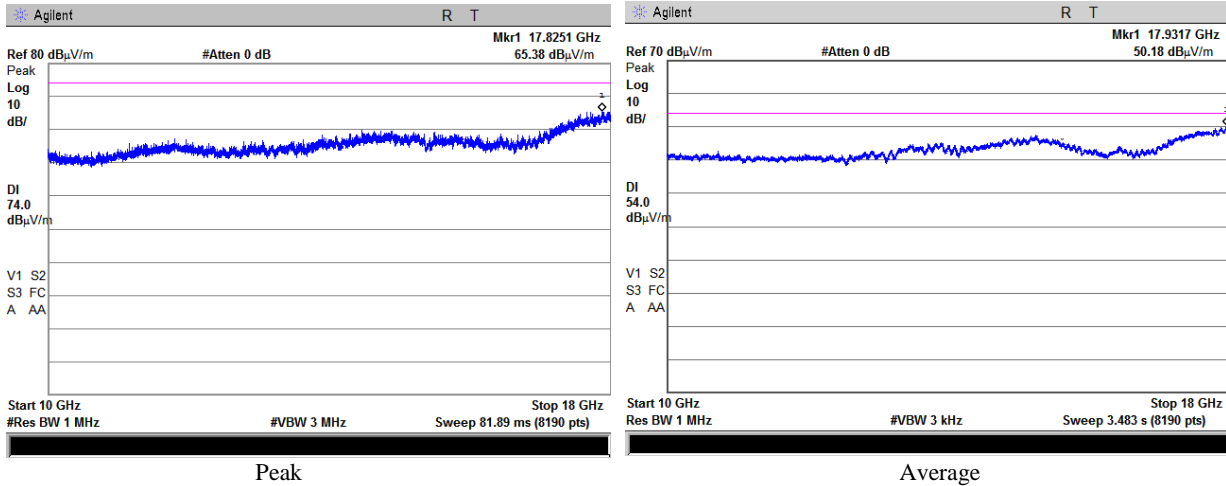
Plot 3.5.33 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Vertical, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



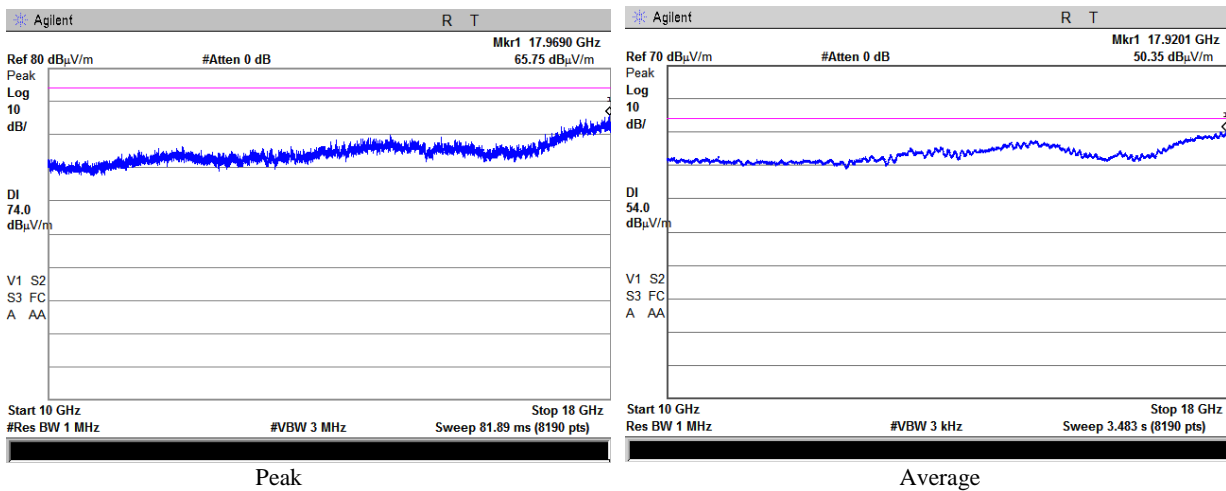
Plot 3.5.34 Emissions in restricted frequency bands test results, 1 – 10 GHz range, Horizontal, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



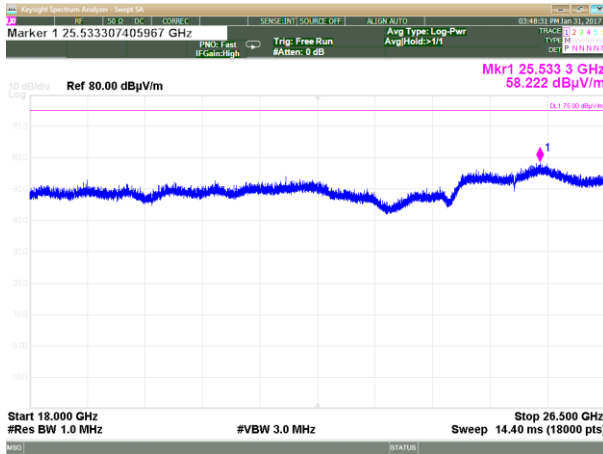
Plot 3.5.35 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Vertical, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



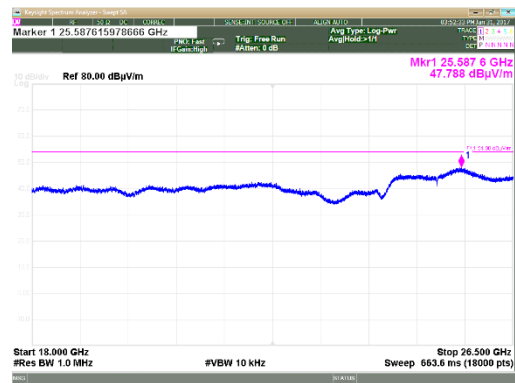
Plot 3.5.36 Emissions in restricted frequency bands test results, 10 – 18 GHz range, Horizontal, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps (with notch filter)



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)

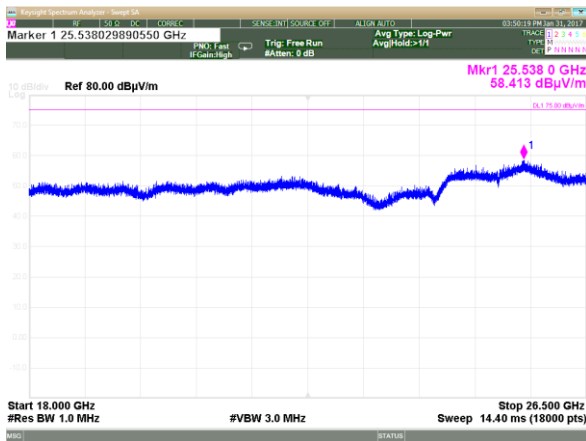


Peak

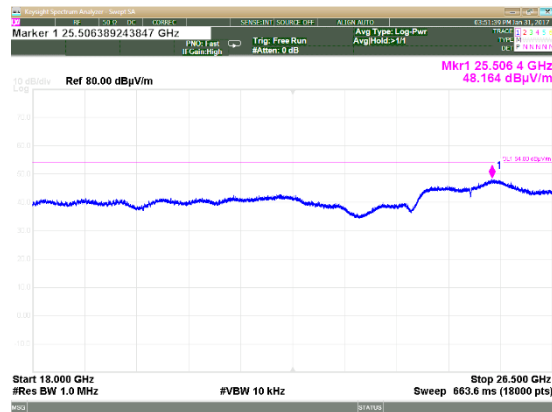


Average

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)

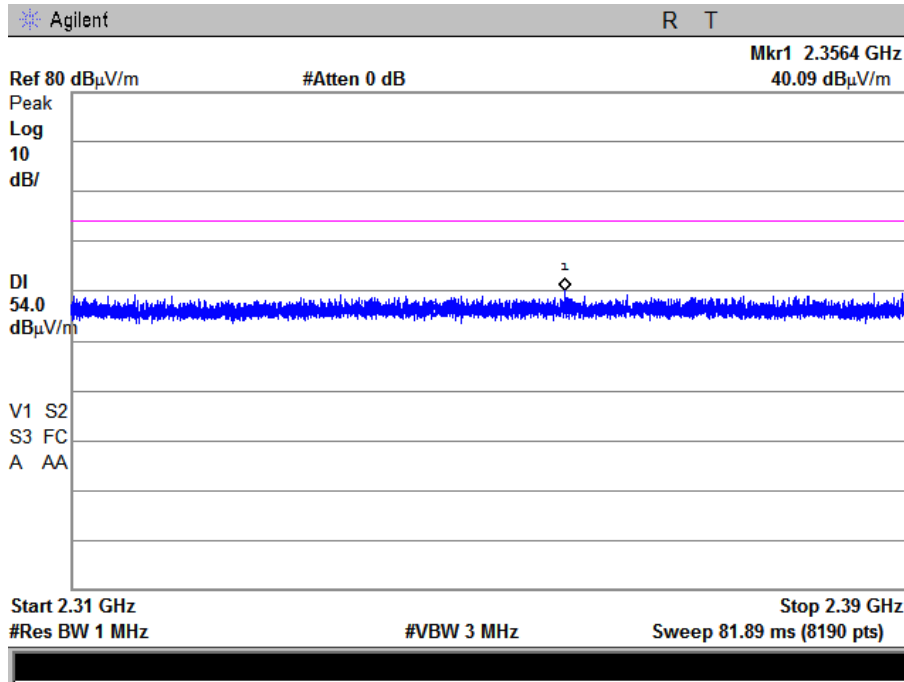


Peak

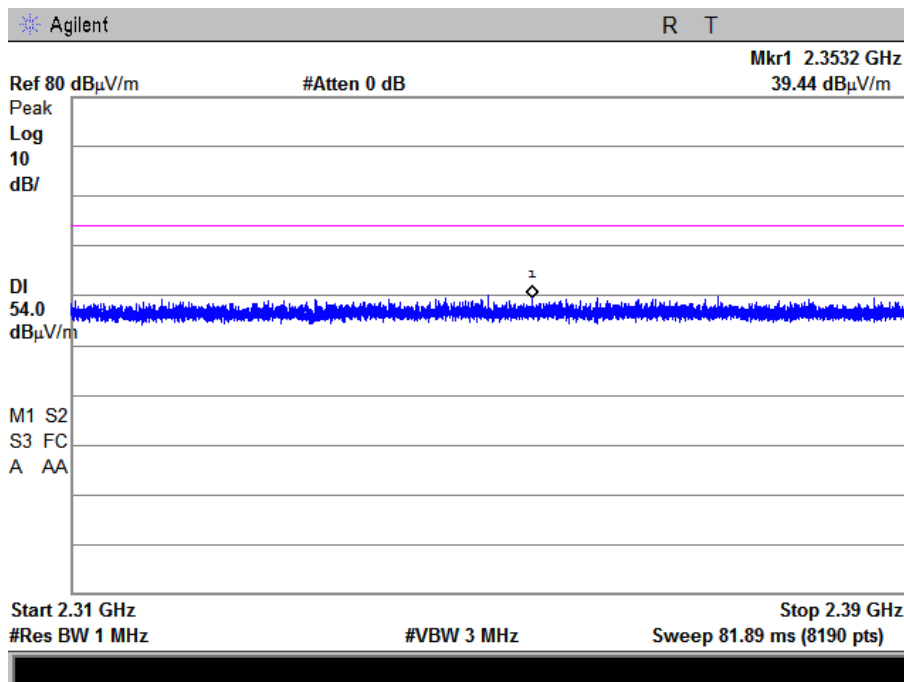


Average

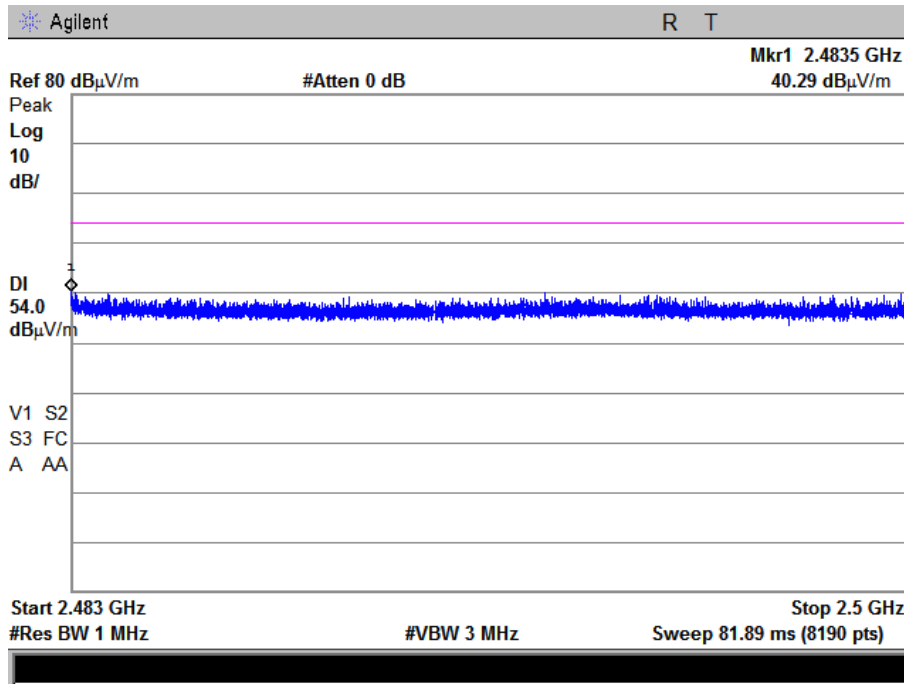
Plot 3.5.39 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Vertical polarization, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate =1.6 Mbps



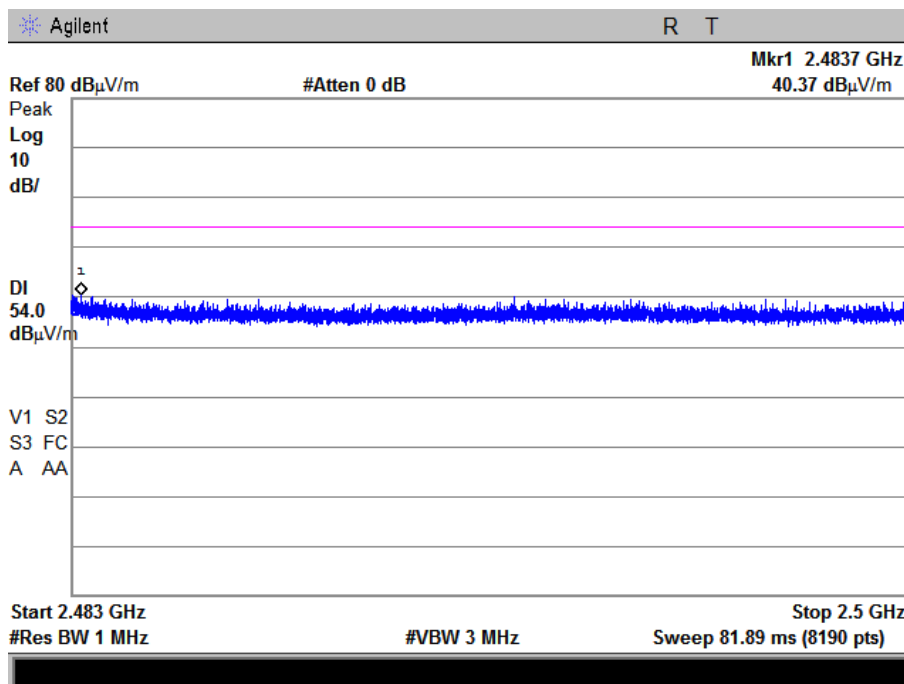
Plot 3.5.40 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Horizontal polarization, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



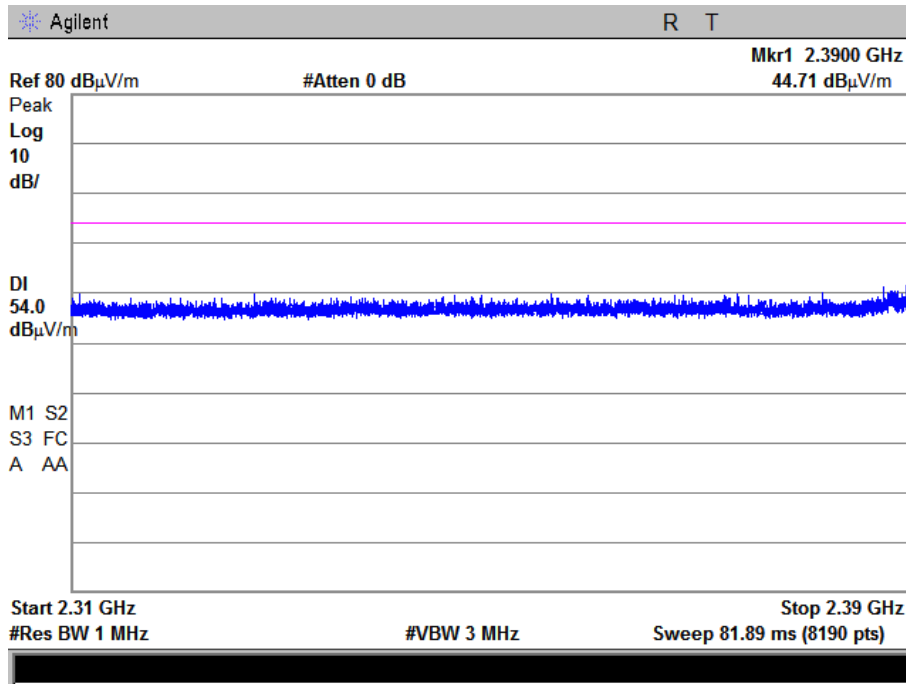
Plot 3.5.41 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Vertical polarization, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



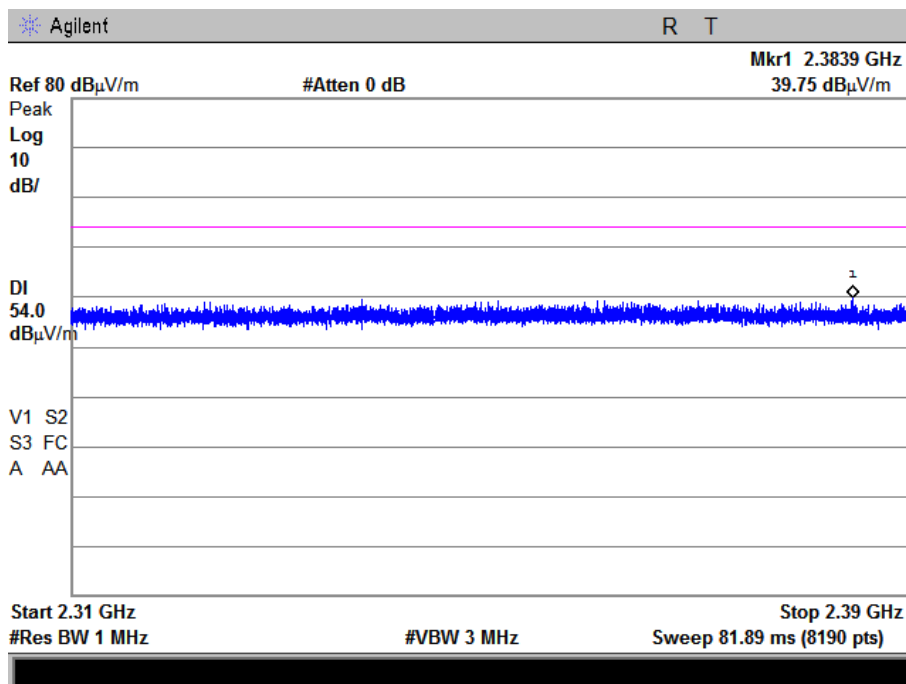
Plot 3.5.42 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Horizontal polarization, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



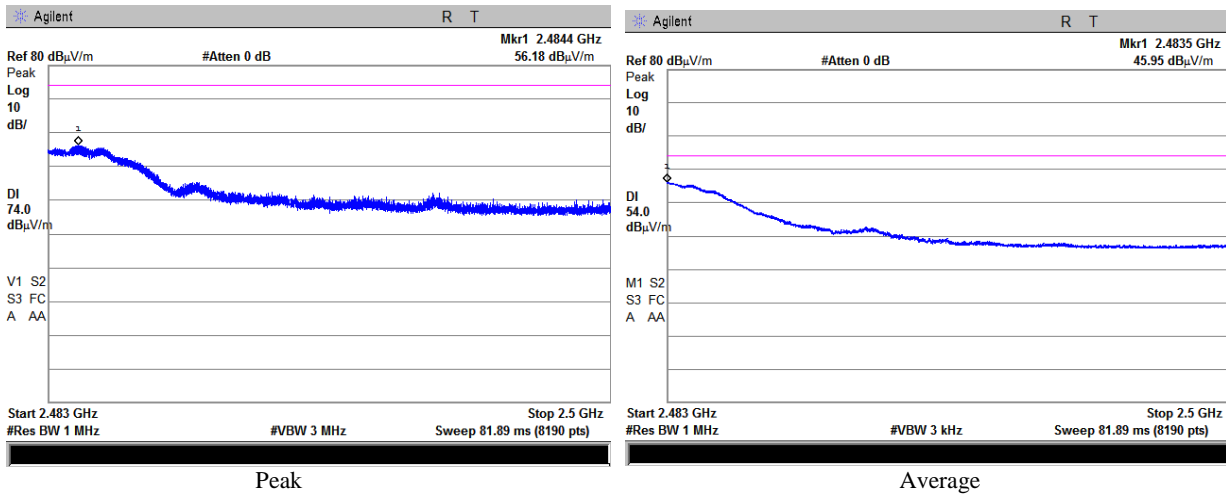
Plot 3.5.43 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Vertical polarization, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



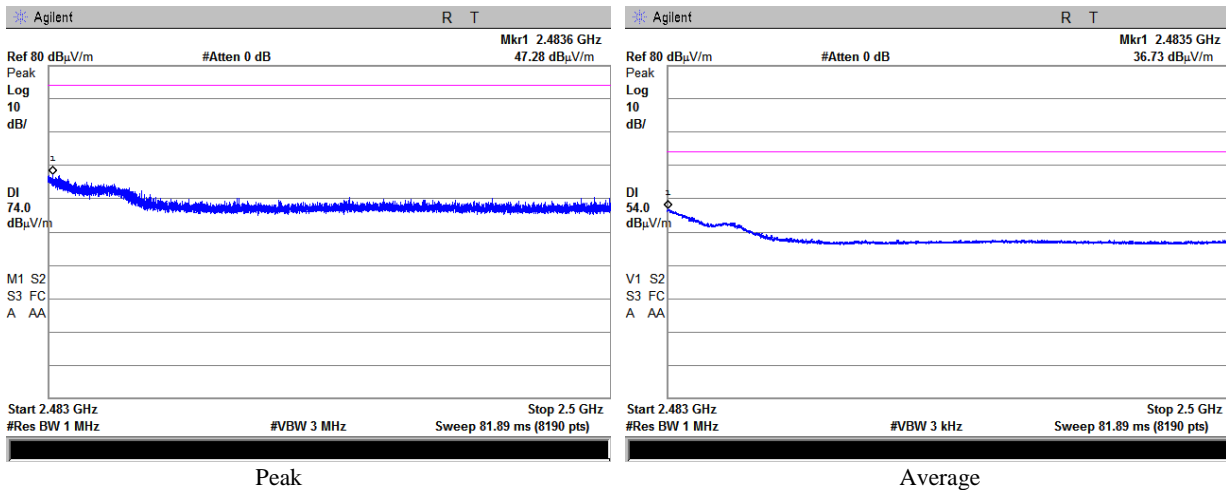
Plot 3.5.44 Emissions in restricted frequency bands test results, 2310 – 2390 MHz band, Horizontal polarization, Fc = 2405 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



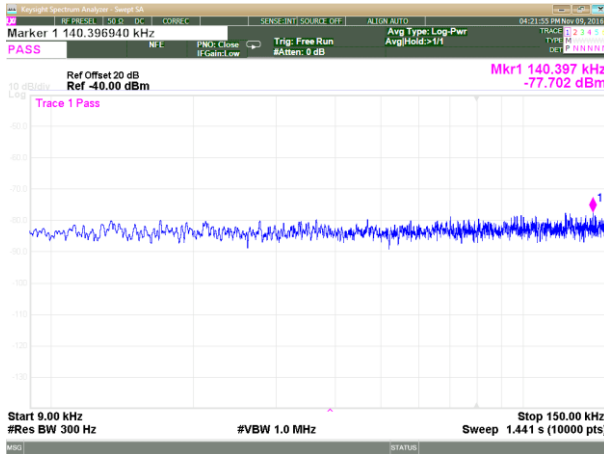
Plot 3.5.45 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Vertical polarization, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



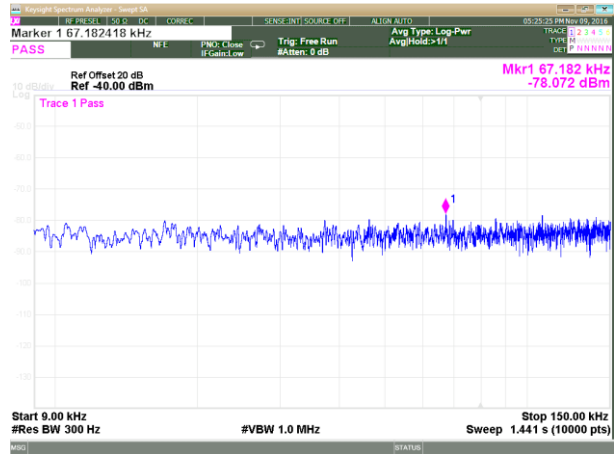
Plot 3.5.46 Emissions in restricted frequency bands test results, 2483.5 – 2500 MHz band, Horizontal polarization, Fc = 2475 MHz, BW = 8.4 MHz, Bit Rate = 8 Mbps



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 = 1.6 Mbps

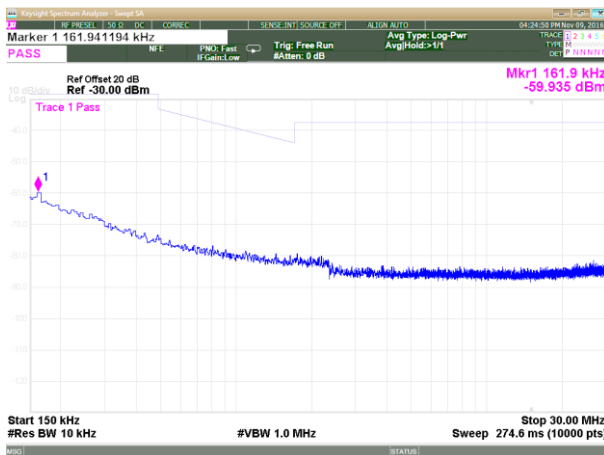


RF1

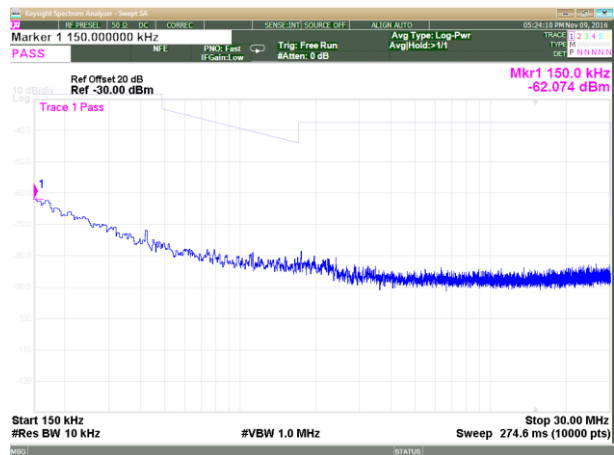


RF2

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 = 1.6 Mbps

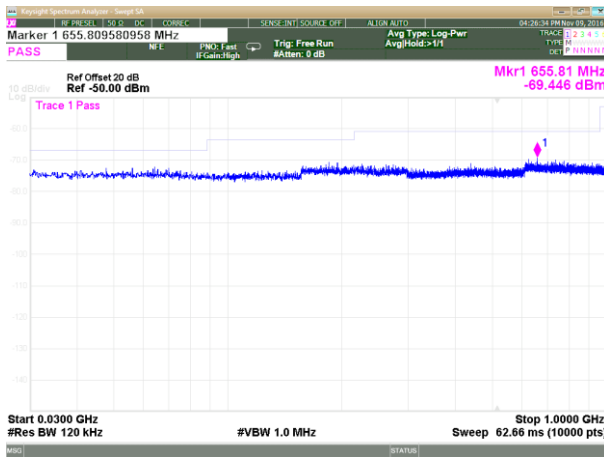


RF1

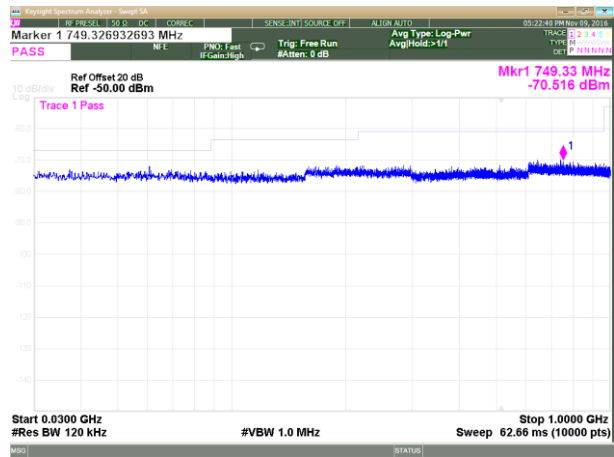


RF2

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 = 1.6 Mbps

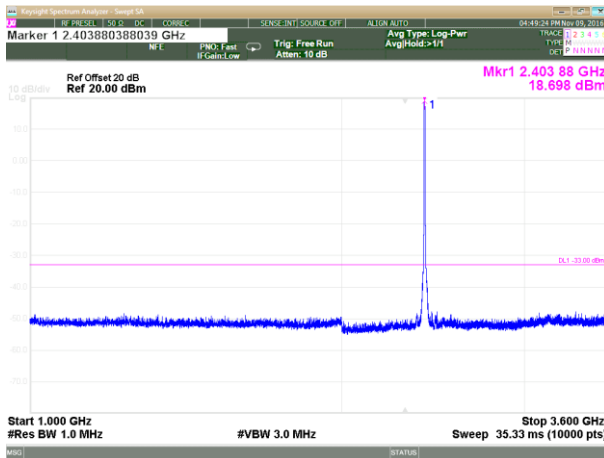


RF1

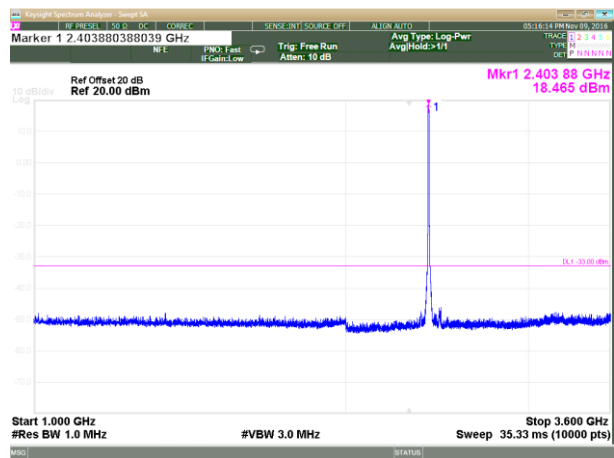


RF2

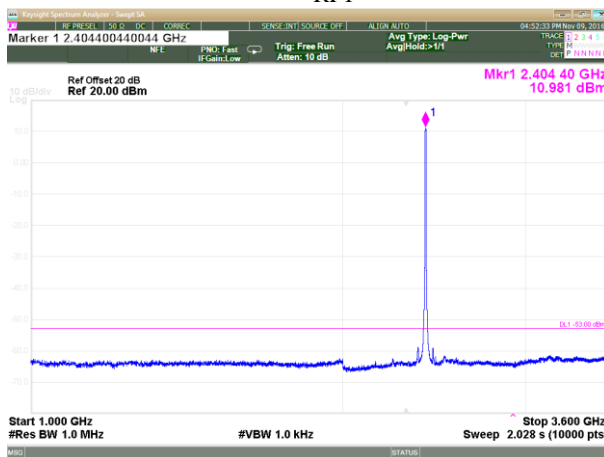
Plot 3.5.50 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 3.6 GHz, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



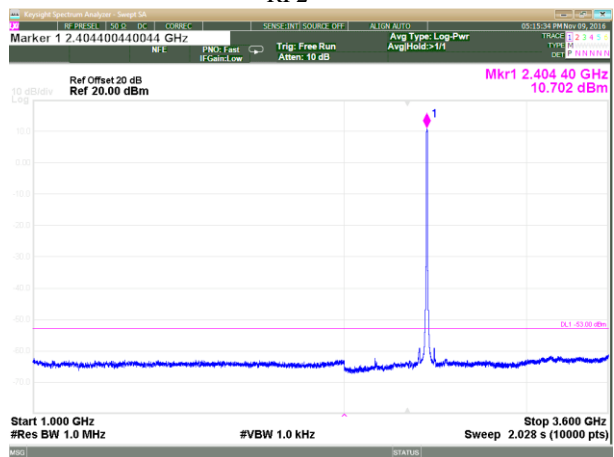
RF1



RF2

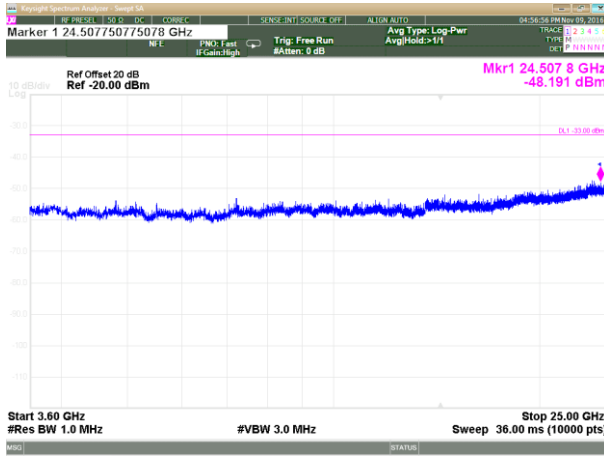


RF1

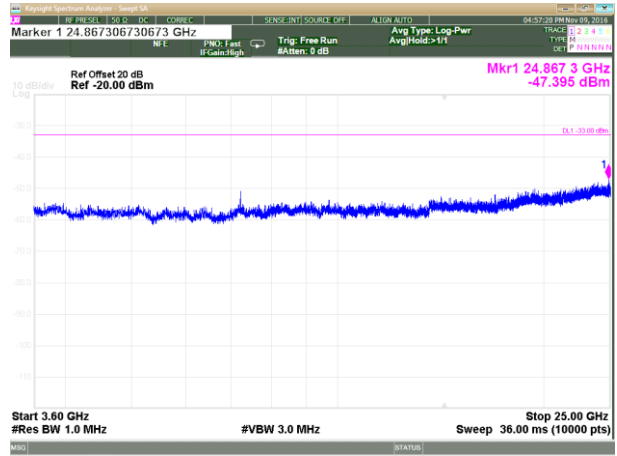


RF2

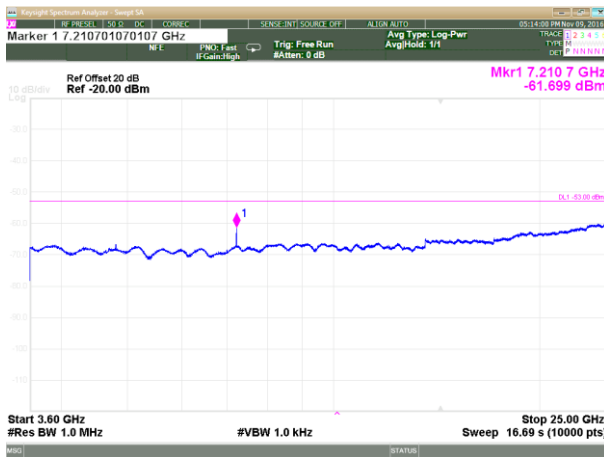
Plot 3.5.50 Emissions in restricted frequency bands test results, Conducted measurements, 3.6 GHz – 25 GHz, Fc = 2403 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



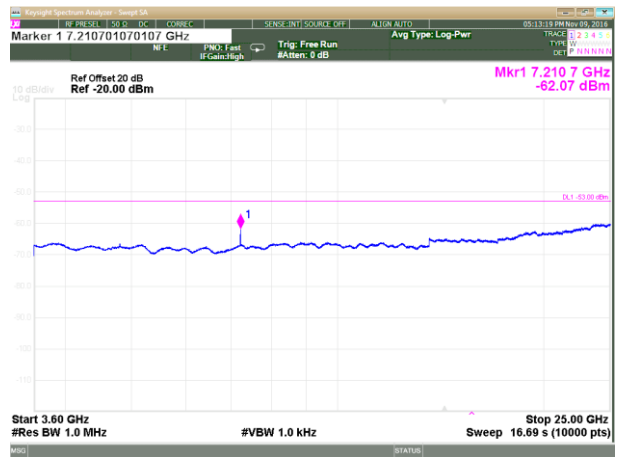
RF1



RF2

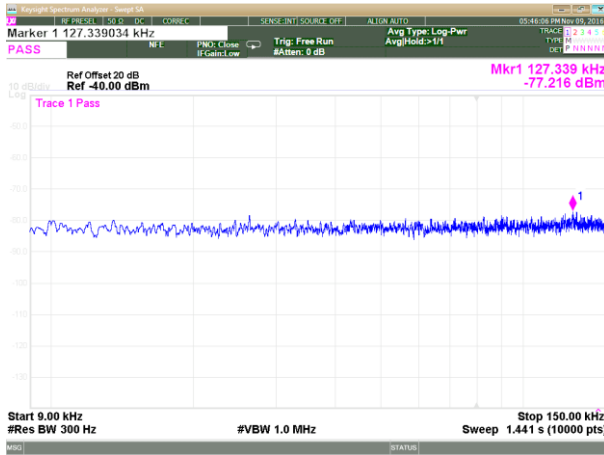


RF1

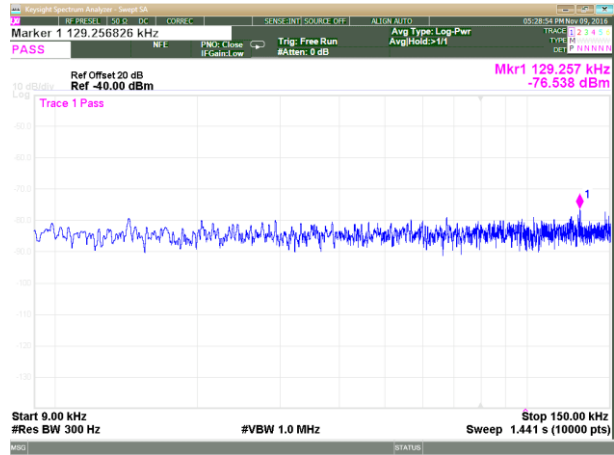


RF2

Plot 3.5.51 Emissions in restricted frequency bands test results, Conducted measurements, 9 kHz – 150 kHz, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps

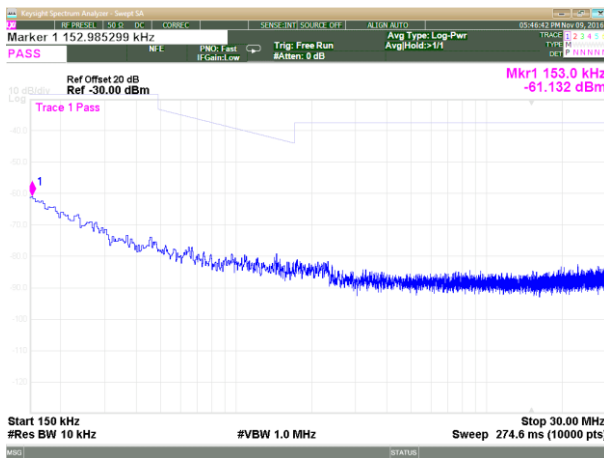


RF1

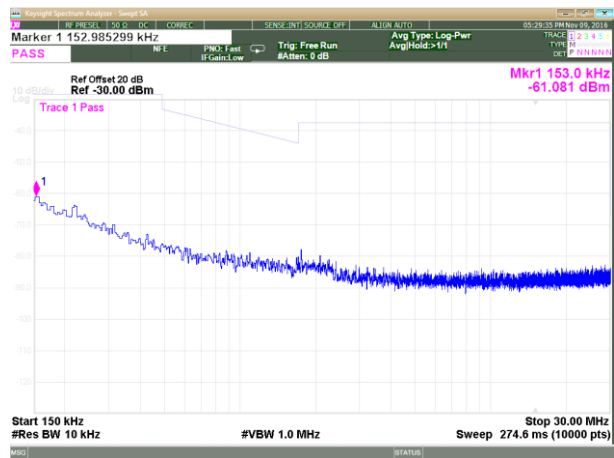


RF2

Plot 3.5.52 Emissions in restricted frequency bands test results, Conducted measurements, 150 kHz – 30 MHz, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps

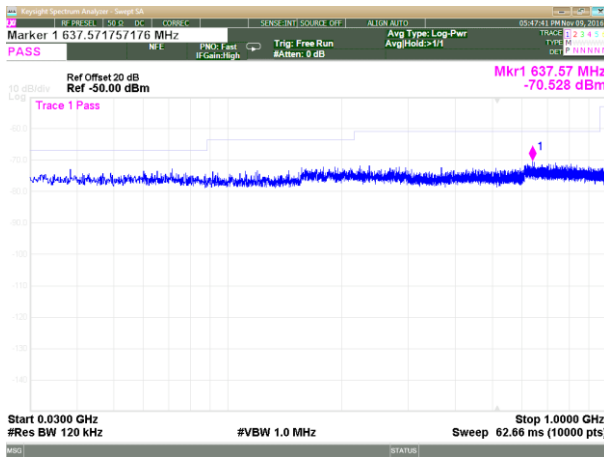


RF1

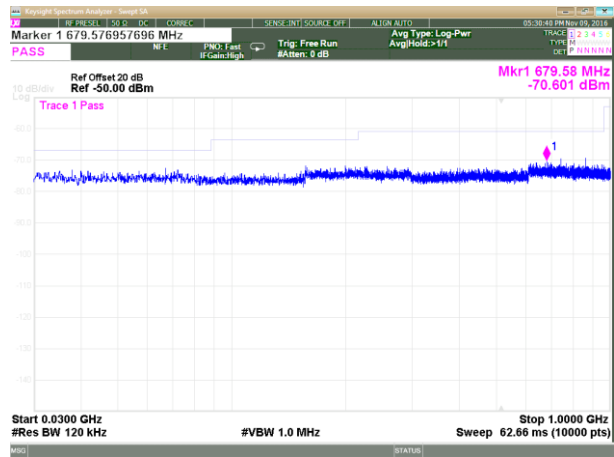


RF2

Plot 3.5.53 Emissions in restricted frequency bands test results, Conducted measurements, 30 MHz – 1000 MHz, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps

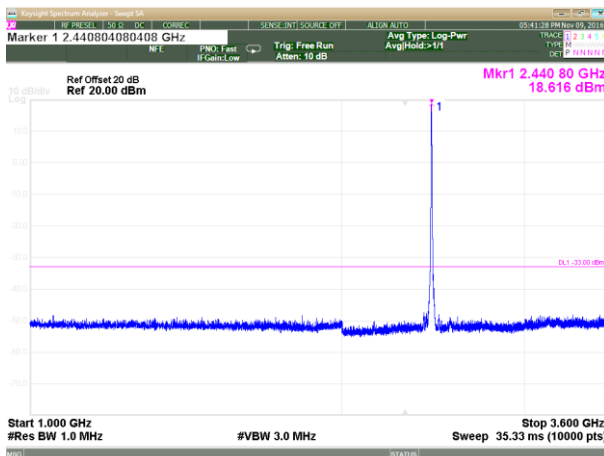


RF1

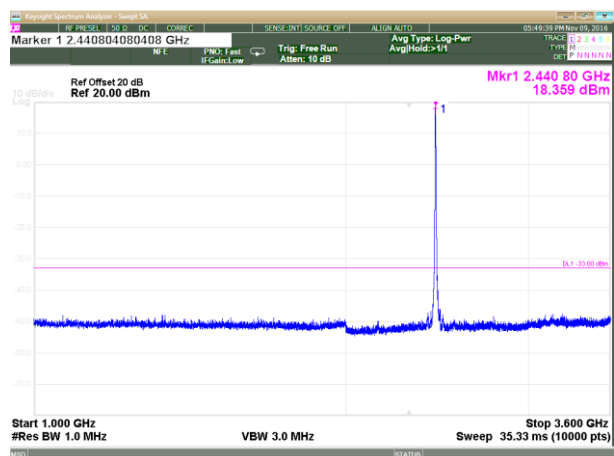


RF2

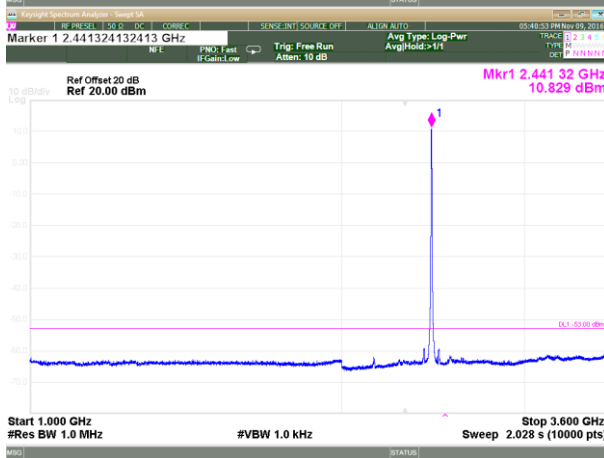
Plot 3.5.54 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 3.6 GHz, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



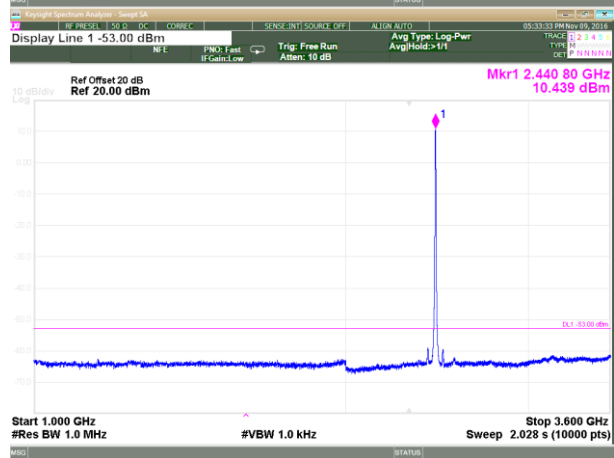
RF1



RF2

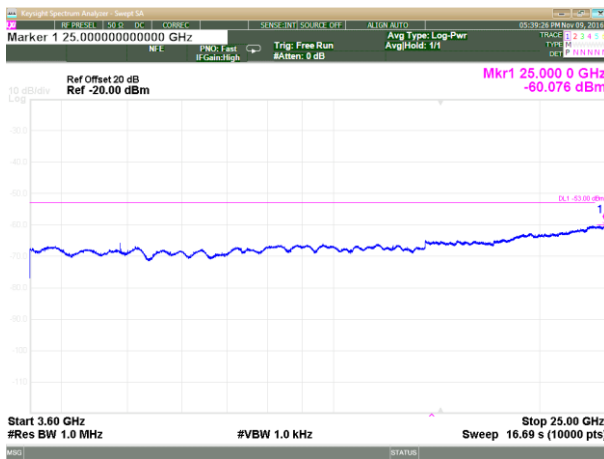
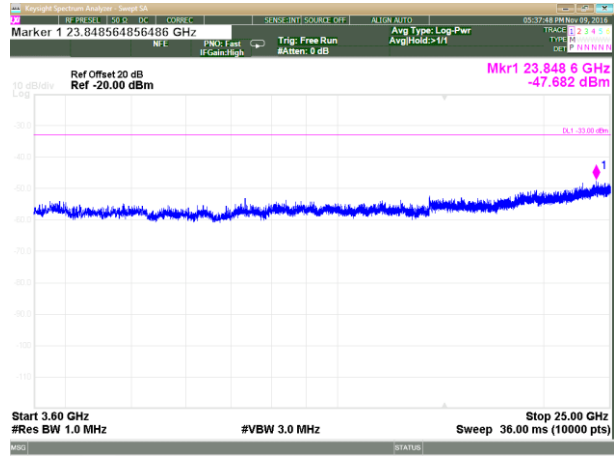
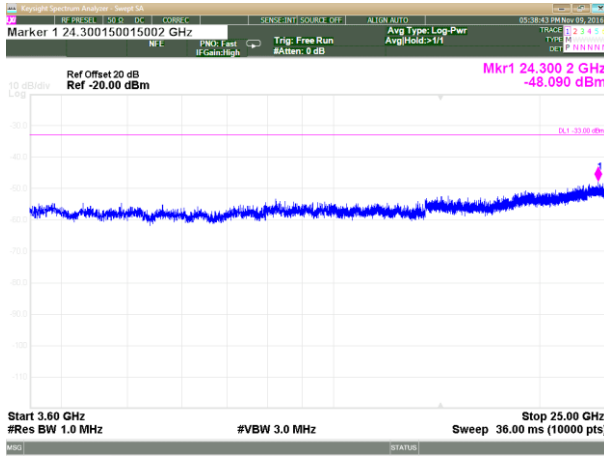


RF1

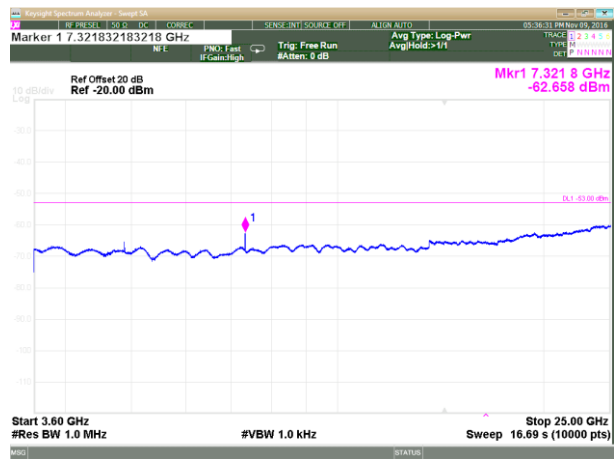


RF2

Plot 3.5.54 Emissions in restricted frequency bands test results, Conducted measurements, 3.6 GHz – 25 GHz, Fc = 2440 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps

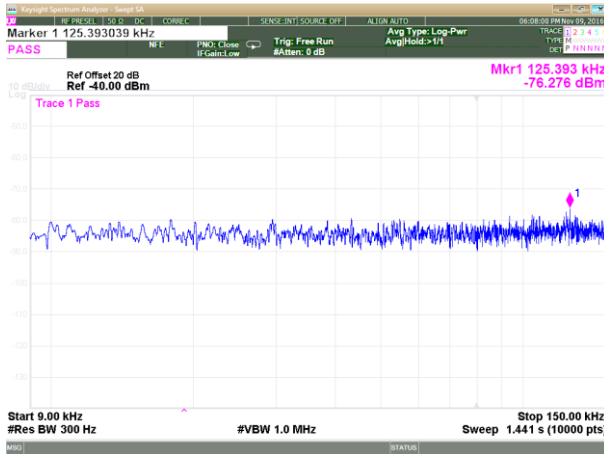


RF1

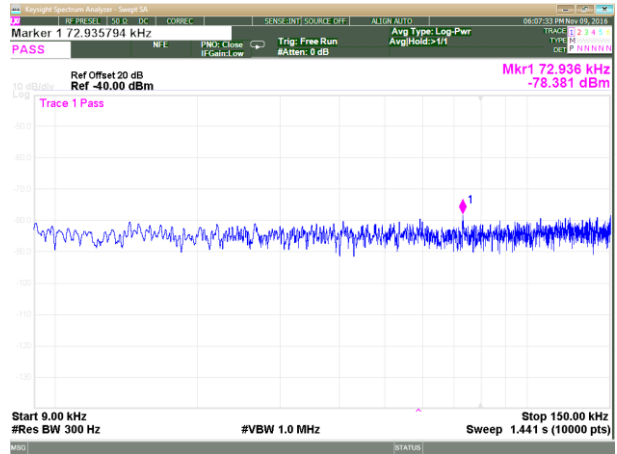


RF2

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 = 1.6 Mbps

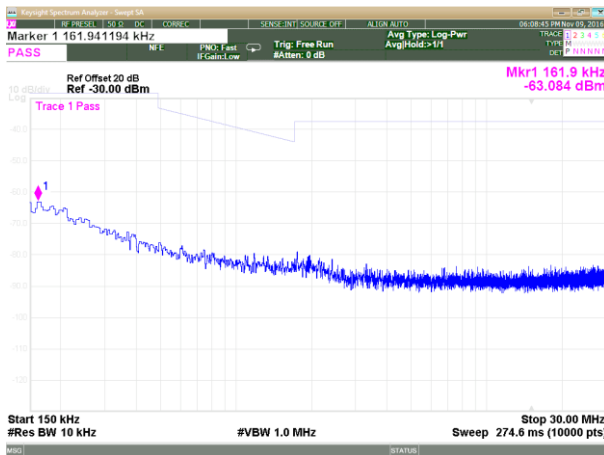


RF1

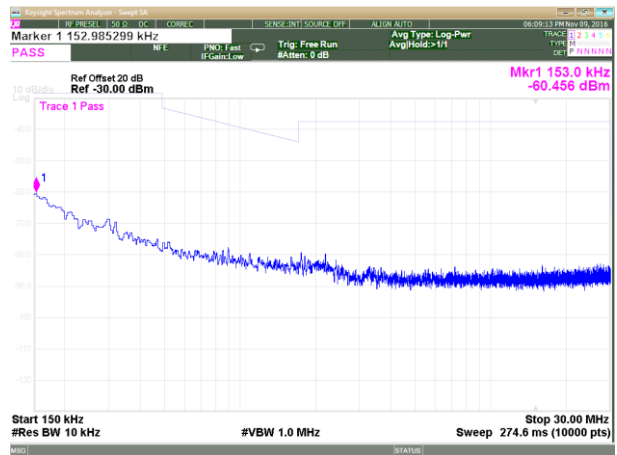


RF2

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 = 1.6 Mbps

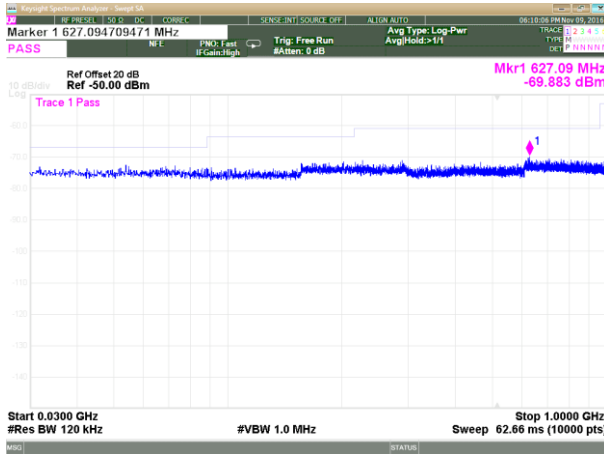


RF1

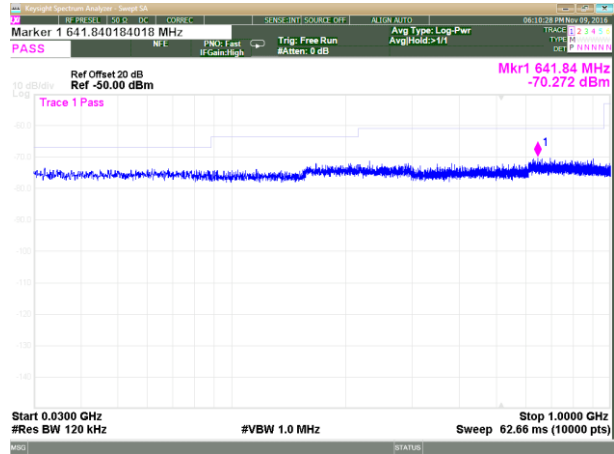


RF2

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 = 1.6 Mbps

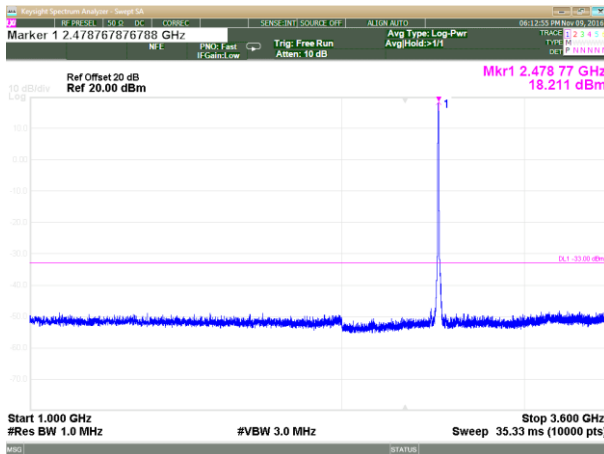


RF1

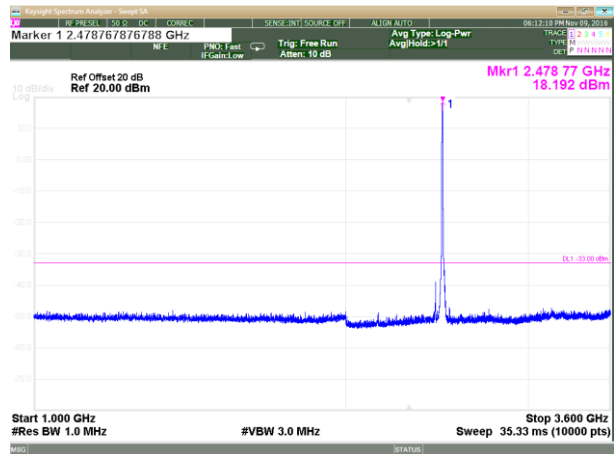


RF2

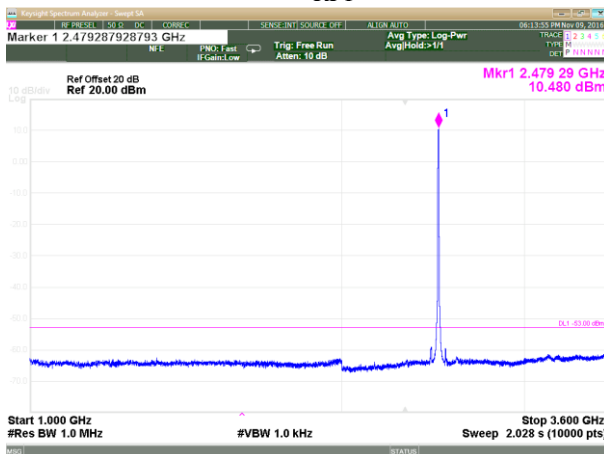
Plot 3.5.58 Emissions in restricted frequency bands test results, Conducted measurements, 1 GHz – 3.6 GHz, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



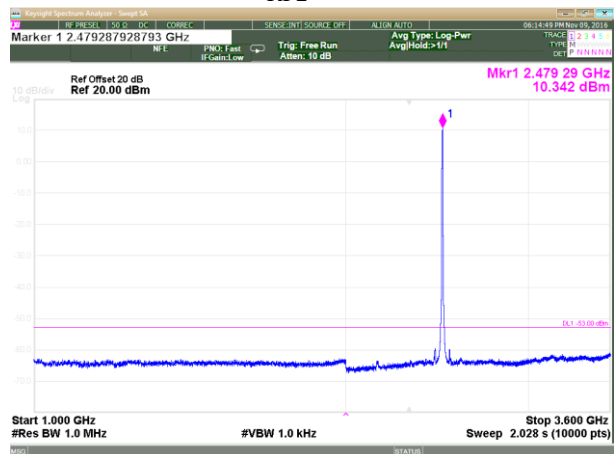
RF1



RF2

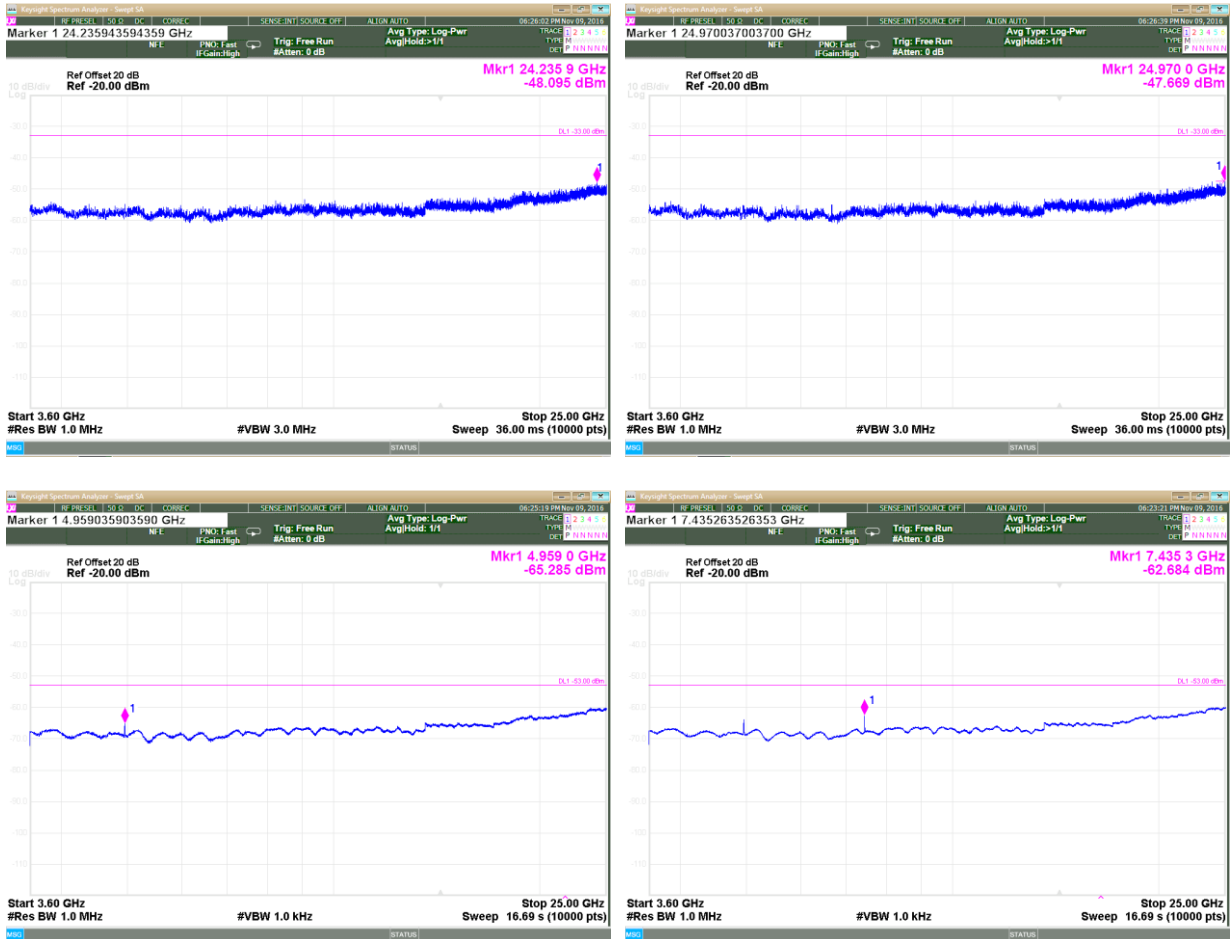


RF1

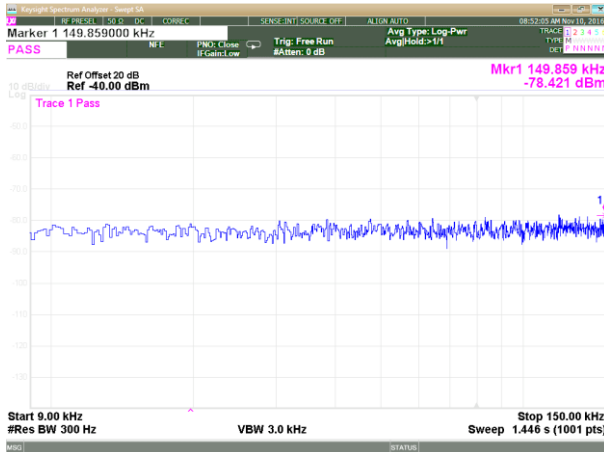


RF2

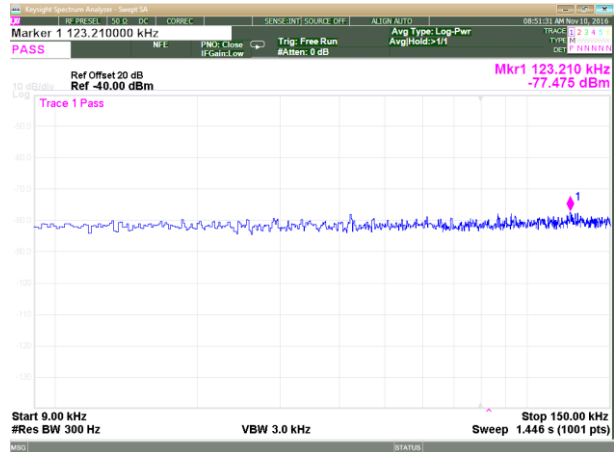
Plot 3.5.58 Emissions in restricted frequency bands test results, Conducted measurements, 3.6 GHz – 25 GHz, Fc = 2478 MHz, BW = 4.2 MHz, Bit Rate = 1.6 Mbps



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

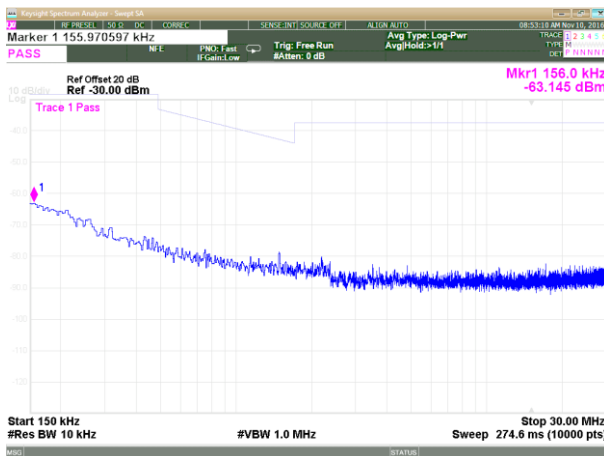


RF1

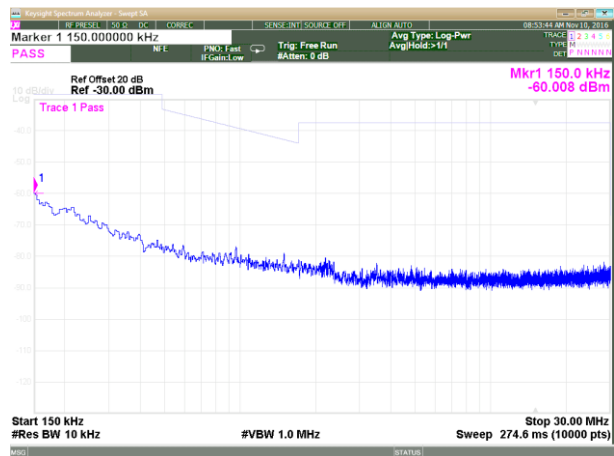


RF2

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