

3.4 RADIATED EMISSION MEASUREMENT

3.4.1 Radiated Emission Limits (FCC 15.209)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
Frequency (MHz)	Limit (dBuV)	
30~88	40	3
88~216	43.5	3
216~960	46	3
960 -10000	54.00	3
*902 - 928	94.00	3

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).
- (3) *Note: This is the limit for the fundamental frequency.

LIMITS OF RADIATED EMISSION MEASUREMENT (FCC 15.249)

Frequency of Emission (MHz)	Field Strength of fundamental ((millivolts /meter)	Field Strength of Harmonics (microvolts/meter)
2400-2483.5	50	500

Notes:

- (1) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.4.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

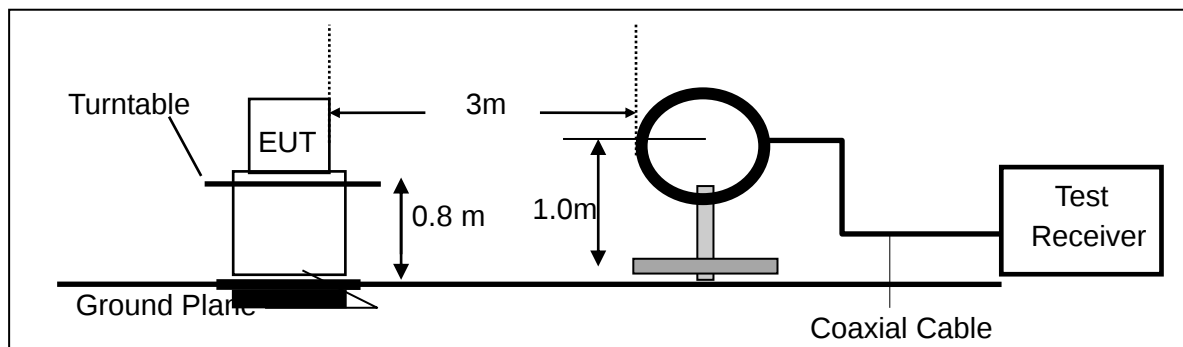
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.4.3 DEVIATION FROM TEST STANDARD

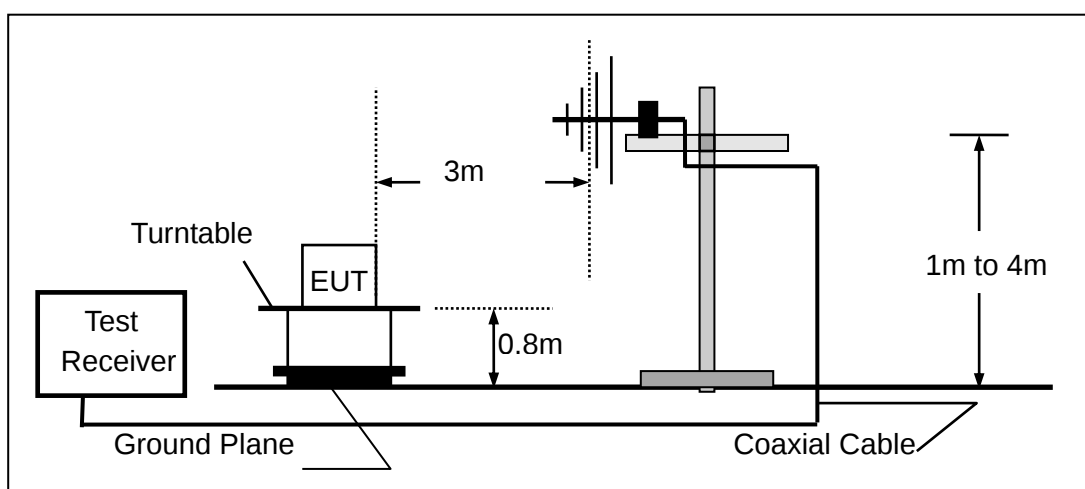
No deviation

(A) Radiated Emission Test-Up Frequency Below 30MHz

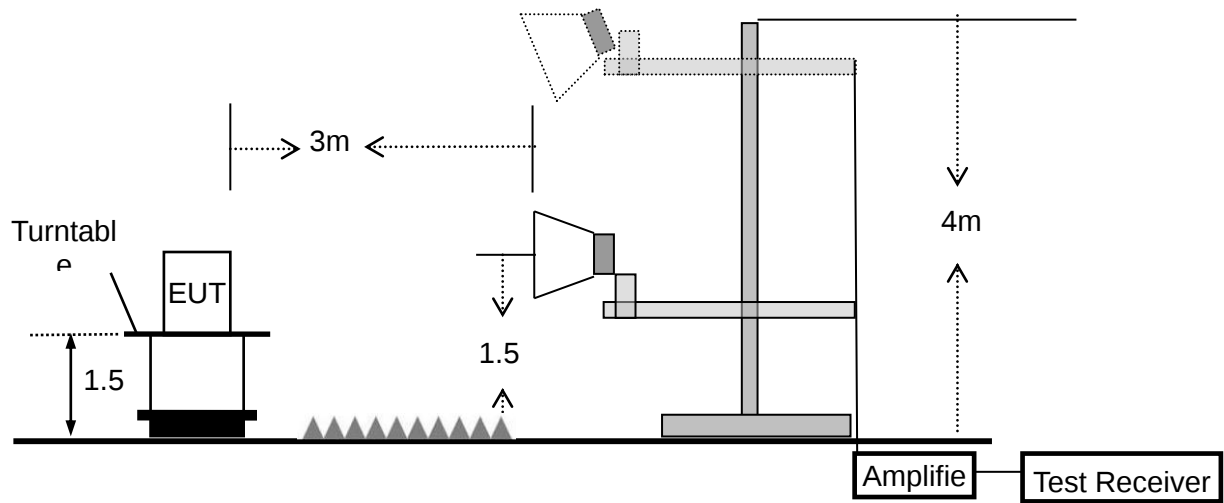
(a)



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



3.4.4 TEST RESULTS (BELOW 30MHz)

EUT :	Broncolor RFS 3	Model Name. :	RFS 3C
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Remark:1. Emission level in dBuV/m= $20 \log (\mu\text{V/m})$

2. Measurement was performed at an antenna to the closed point of EUT distance of meters.

3. For Frequency 9kHz~30MHz:

Distance extrapolation factor = $40\log(\text{Specific distance/ test distance})(\text{dB})$;

Limit line=Specific limits(dBuV) + distance extrapolation factor.

For Frequency above 30MHz:

Distance extrapolation factor = $20\log(\text{Specific distance/ test distance})(\text{dB})$;

Limit line=Specific limits(dBuV) + distance extrapolation factor.

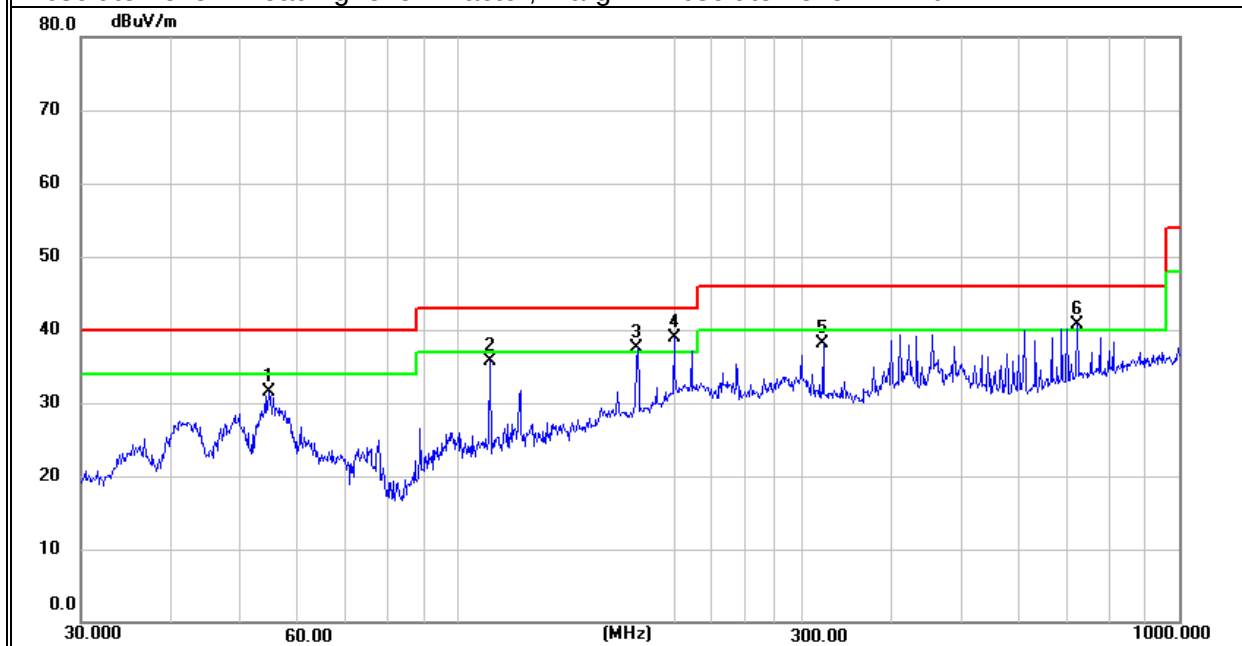
3.4.5 TEST RESULTS (BELOW 1000 MHz)

EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.1 °C	Relative Humidity :	52%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	Mode 1	Polarization :	Vertical

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	54.6428	11.94	19.51	31.45	40.00	-8.55	peak
V	110.5686	17.91	17.75	35.66	43.00	-7.34	peak
V	177.5089	21.54	15.91	37.45	43.00	-5.55	peak
V	199.2855	20.76	18.18	38.94	43.00	-4.06	peak
V	321.0605	17.20	20.91	38.11	46.00	-7.89	peak
V	721.7258	11.89	28.85	40.74	46.00	-5.26	peak

Remark:

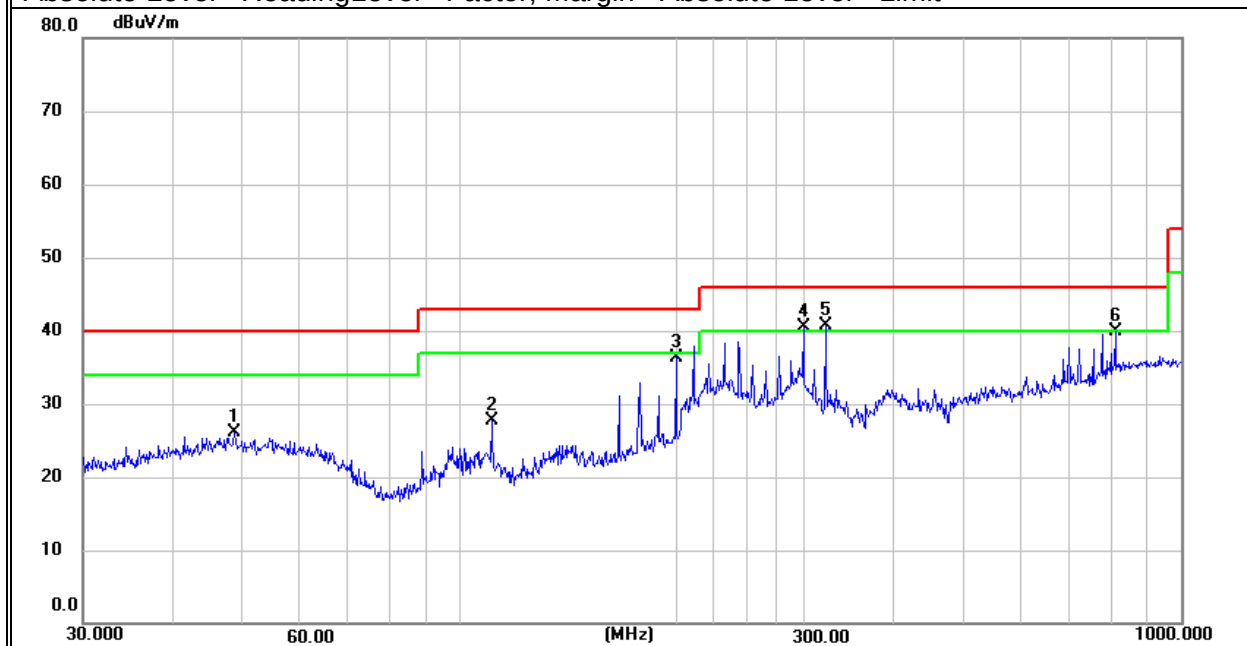
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	48.6720	6.40	19.74	26.14	40.00	-13.86	peak
H	110.5686	9.98	17.75	27.73	43.00	-15.27	peak
H	199.2855	18.04	18.18	36.22	43.00	-6.78	peak
H	299.3158	20.03	20.43	40.46	46.00	-5.54	peak
H	321.0607	19.86	20.91	40.77	46.00	-5.23	peak
H	810.2653	10.03	29.78	39.81	46.00	-6.19	peak

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Note: Only report the worst data, mode 1 is the worst, all other modes have been tested.

3.4.6 TEST RESULTS (ABOVE 1000 MHZ)

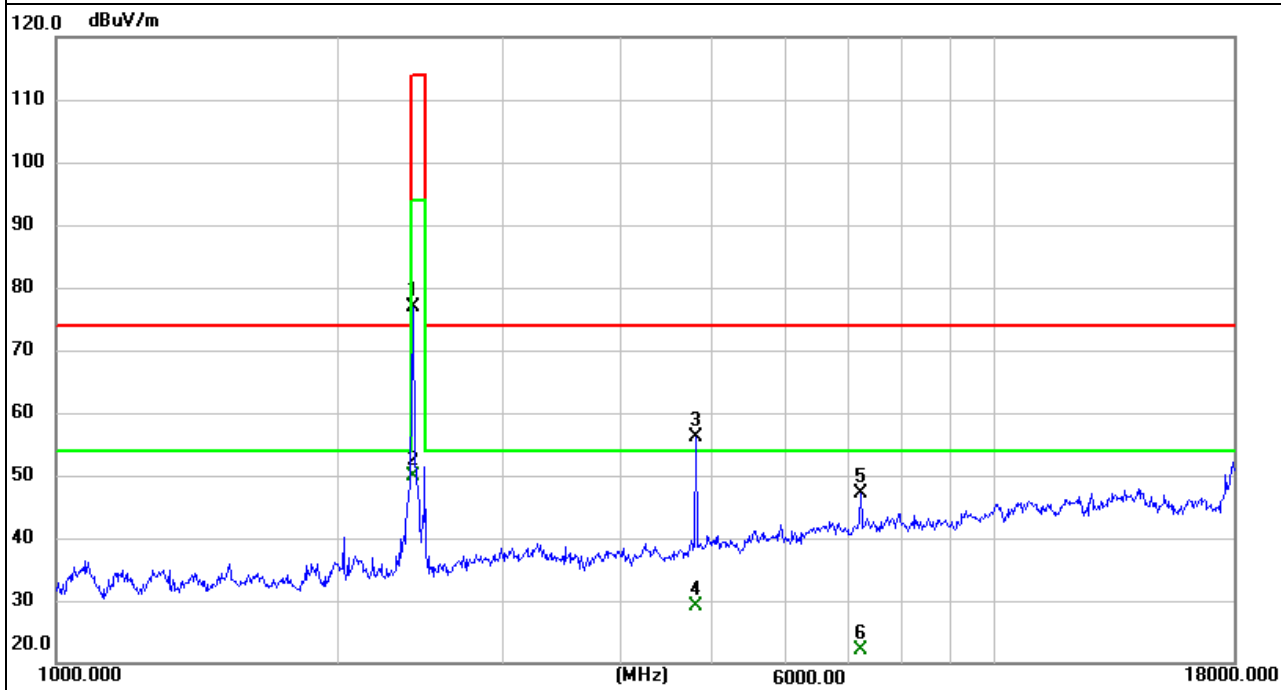
Note: For above 18GHz, the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX 2403MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2403.350	96.06	-19.19	76.87	114.00	-37.13	peak
2403.350	69.11	-19.19	49.92	94.00	-44.08	AVG
4805.875	69.15	-13.03	56.12	74.00	-17.88	peak
4805.875	42.13	-13.03	29.10	54.00	-24.90	AVG
7208.400	55.35	-8.11	47.24	74.00	-26.76	peak
7208.400	30.25	-8.11	22.14	54.00	-31.86	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



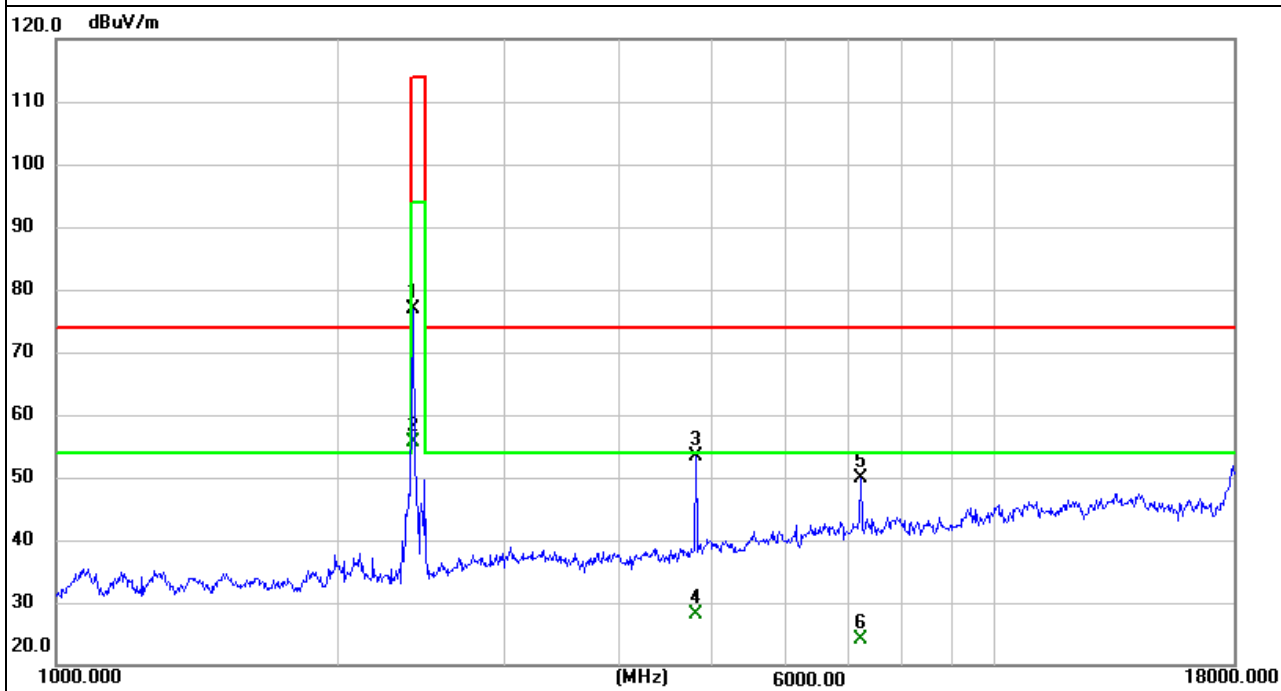
EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX 2403MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2403.350	94.58	-19.19	75.39	114	-38.61	peak
2403.350	74.94	-19.19	55.75	94.00	-38.25	AVG
4806.300	66.36	-13.02	53.34	74.00	-20.66	peak
4806.300	41.27	-13.02	28.25	54.00	-25.75	AVG
7209.675	58.00	-8.13	49.87	74.00	-24.13	peak
7209.675	32.26	-8.13	24.13	54.00	-29.87	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No emission above 18GHz.

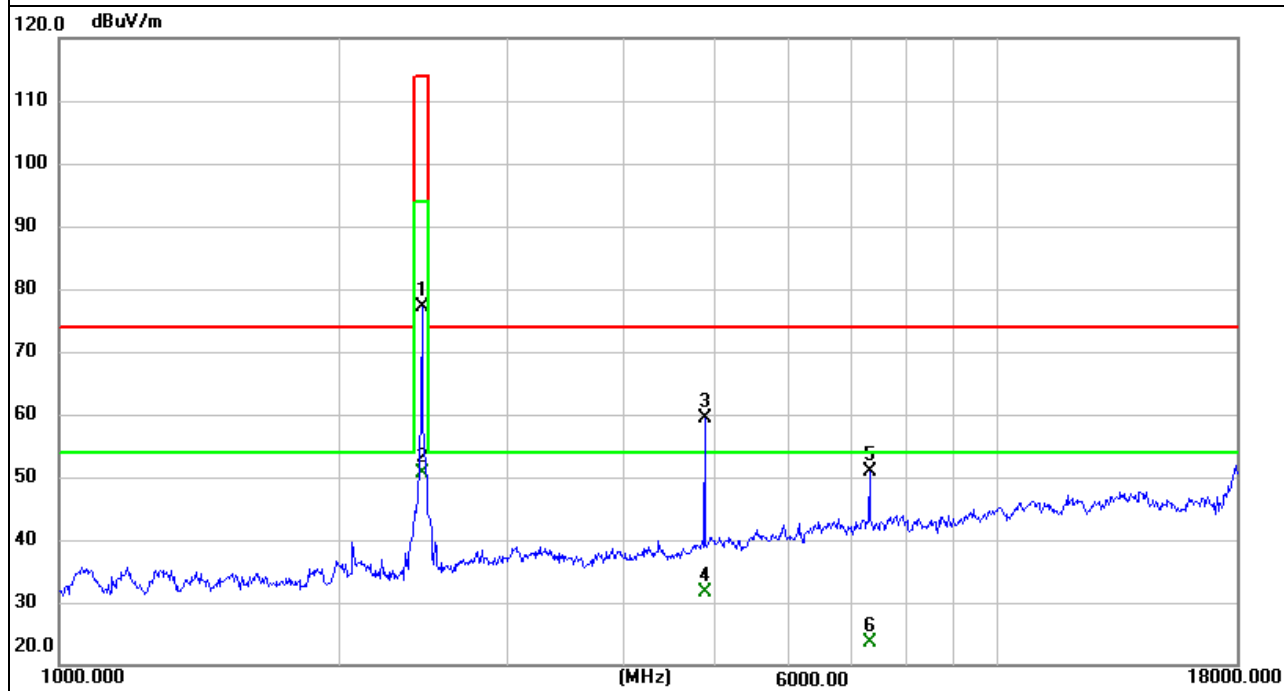


EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX 2441MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2441.175	96.15	-19.04	77.11	114.00	-36.89	peak
2441.175	69.78	-19.04	50.74	94.00	-43.26	AVG
4881.525	72.51	-13.25	59.26	74.00	-14.74	peak
4881.525	44.98	-13.25	31.73	54.00	-22.27	AVG
7323.150	59.04	-8.08	50.96	74.00	-23.04	peak
7323.150	31.59	-8.08	23.51	54.00	-30.49	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



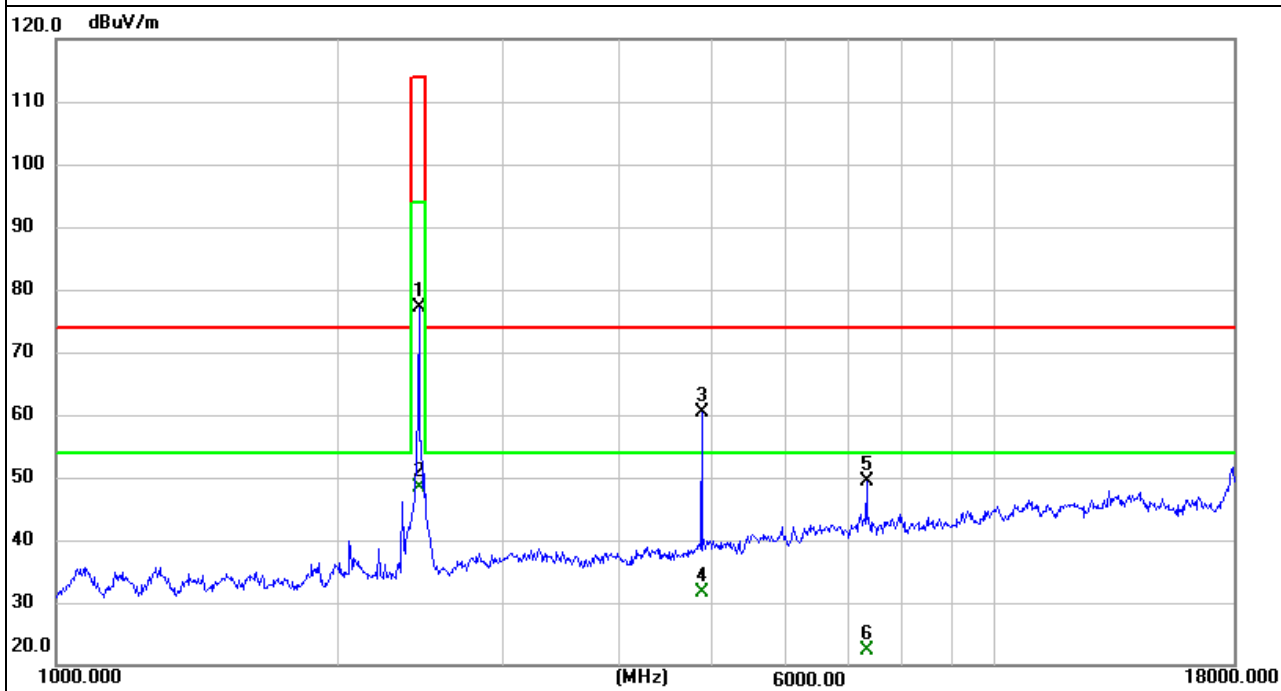
EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX 2441MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2441.175	95.68	-19.04	76.64	114	-37.36	peak
2441.175	67.53	-19.04	48.49	94.00	-45.51	AVG
4881.950	73.71	-13.24	60.47	74.00	-13.53	peak
4881.950	44.97	-13.24	31.73	54.00	-22.27	AVG
7323.575	57.52	-8.07	49.45	74.00	-24.55	peak
7323.575	30.47	-8.07	22.40	54.00	-31.60	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No emission above 18GHz.

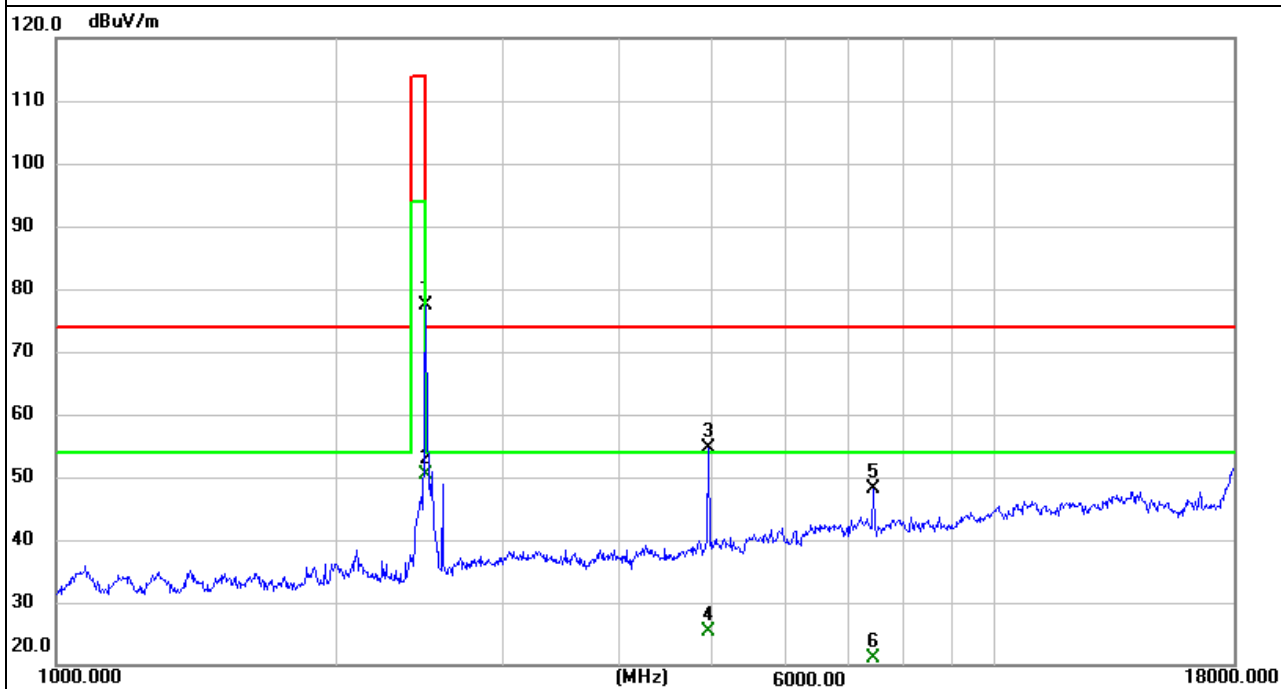


EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX 2481MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2481.125	95.90	-18.42	77.48	114.00	-36.52	peak
2481.125	68.74	-18.42	50.32	94.00	-43.68	AVG
4962.275	66.62	-12.10	54.52	74.00	-19.48	peak
4962.275	37.47	-12.10	25.37	54.00	-28.63	AVG
7443.425	56.56	-8.51	48.05	74.00	-25.95	peak
7443.425	29.56	-8.51	21.05	54.00	-32.95	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



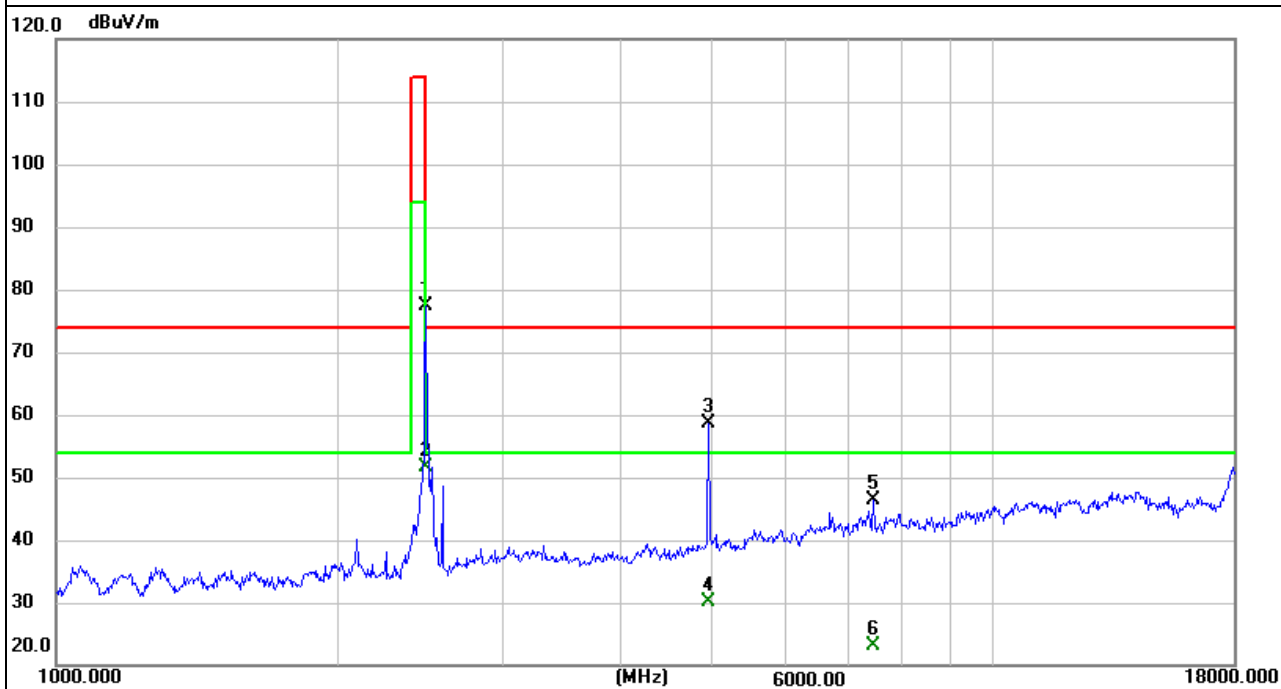
EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX 2481MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2481.125	94.55	-18.42	76.13	114	-37.87	peak
2481.125	70.14	-18.42	51.72	94.00	-42.28	AVG
4962.275	70.81	-12.10	58.71	74.00	-15.29	peak
4962.275	42.18	-12.10	30.08	54.00	-23.92	AVG
7443.000	54.92	-8.51	46.41	74.00	-27.59	peak
7443.000	31.67	-8.51	23.16	54.00	-30.84	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No emission above 18GHz.



Note: EUT Pre-scan X/Y/Z orientation, only worst case is presented in the report(X orientation),
Only report the worst data, mode 1/2/3 is the worst, all other modes have been tested.

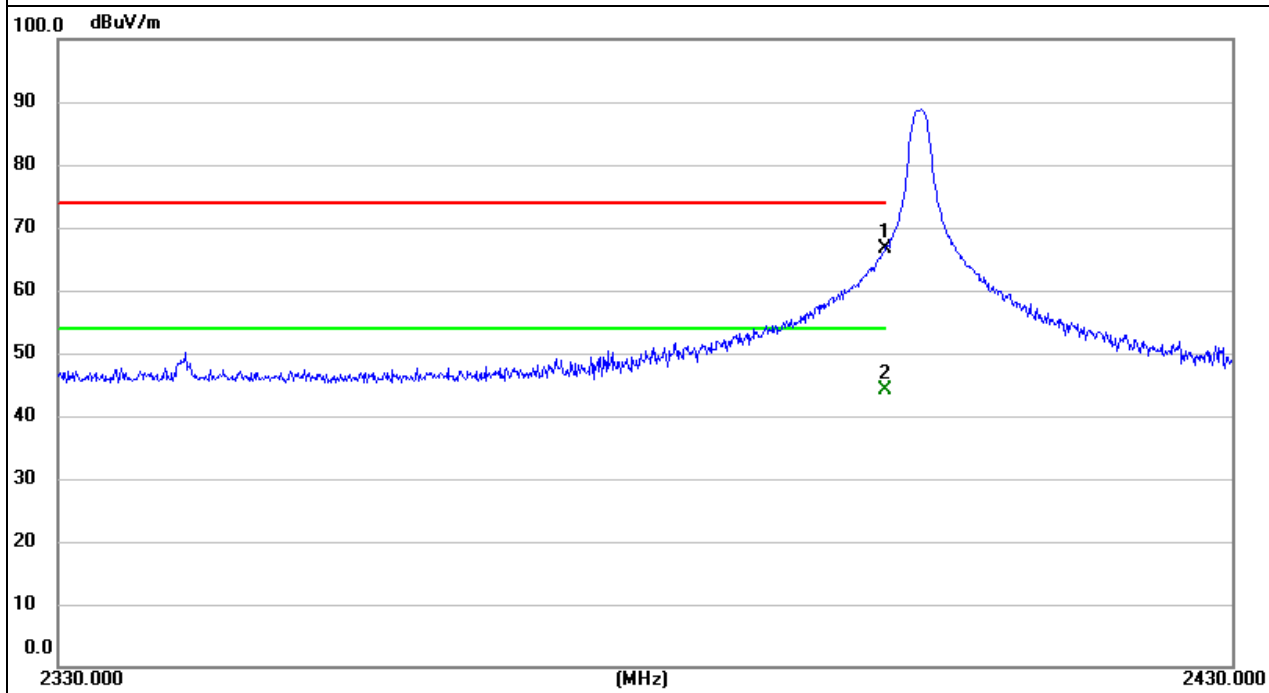
3.4.7 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX 2403MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2400.000	73.91	-7.21	66.70	74.00	-7.30	peak
2400.000	51.39	-7.21	44.18	54.00	-9.82	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

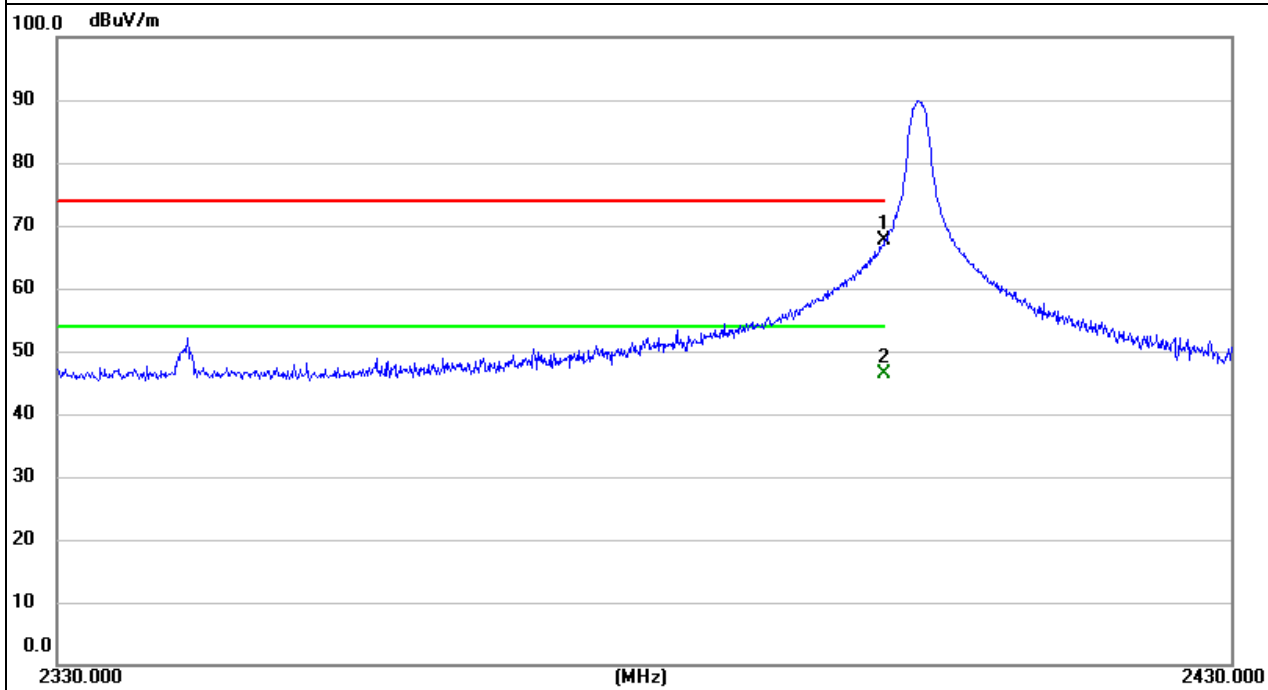


EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3V
Test Mode :	TX 2403MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2400.000	74.75	-7.21	67.54	74.00	-6.46	peak
2400.000	53.69	-7.21	46.48	54.00	-7.52	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

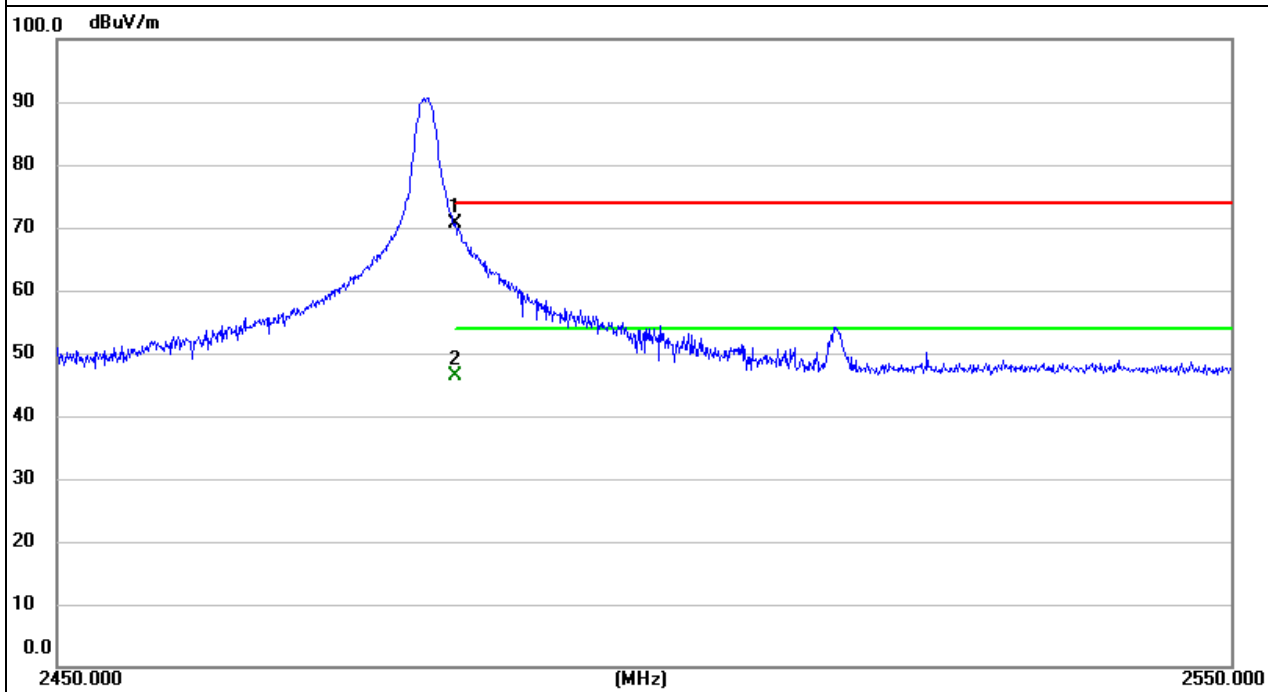


EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3.7V
Test Mode :	TX 2481MHz	Polarization :	Horizontal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.500	77.00	-6.38	70.62	74.00	-3.38	peak
2483.500	52.86	-6.38	46.48	54.00	-7.52	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

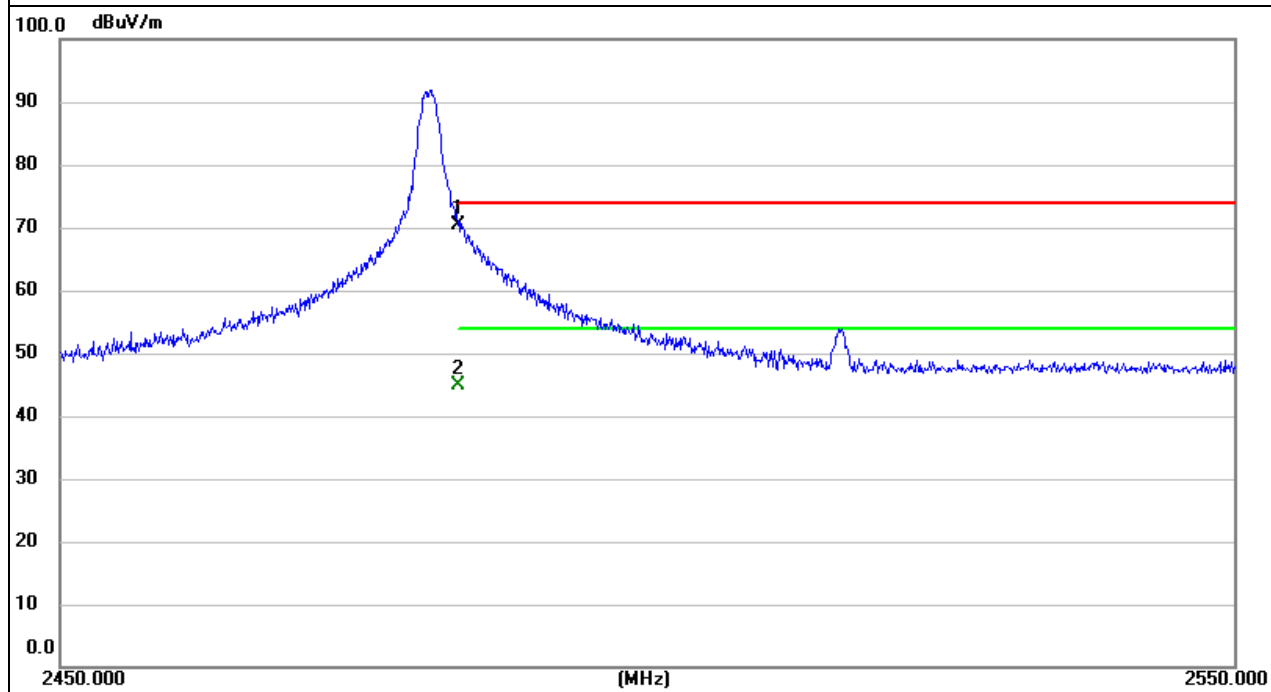


EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	24.2 °C	Relative Humidity :	50%
Pressure :	1010 hPa	Test Voltage :	DC 3V
Test Mode :	TX 2481MHz	Polarization :	Vertical

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
2483.500	76.88	-6.38	70.50	74.00	-3.50	peak
2483.500	51.26	-6.38	44.88	54.00	-9.12	AVG

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Note: Only report the worst data, mode 1/3 is the worst, all other modes have been tested.

4. BANDWIDTH TEST

4.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW $\geq$ RBW, Sweep time = Auto.

4.2 DEVIATION FROM STANDARD

No deviation.

4.3 TEST SETUP

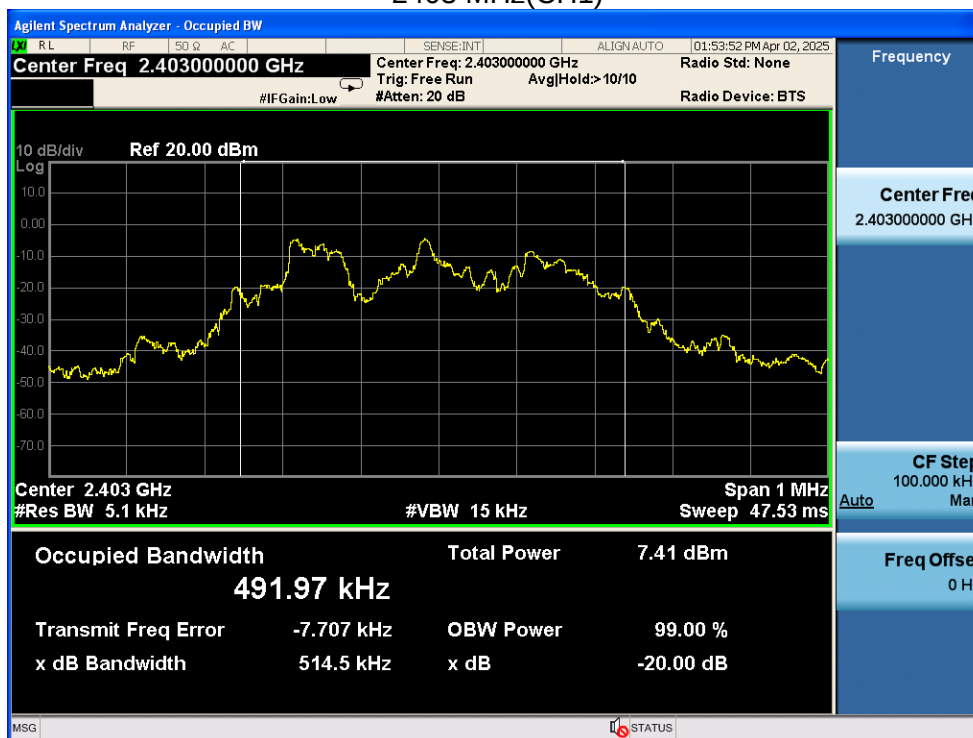


5. TEST RESULTS

EUT :	Broncolor RFS 3	Model Name :	RFS 3C
Temperature :	26 °C	Relative Humidity :	53%
Pressure :	1020 hPa	Test Power :	DC 3.7V
Test Mode :	Mode 1/2/3/4/5/6/7/8/9		

Test Frequency (MHz)	20 dBc Bandwidth (MHz)
2403(CH1)	0.5145
2441(CH18)	0.5229
2481(CH40)	0.5234
2403(CH41)	0.5208
2441(CH58)	0.5211
2481(CH80)	0.5201
2403(CH81)	0.5148
2439(CH93)	0.5355
2471(CH95)	0.5326

2403 MHz(CH1)



2441 MHz(CH18)



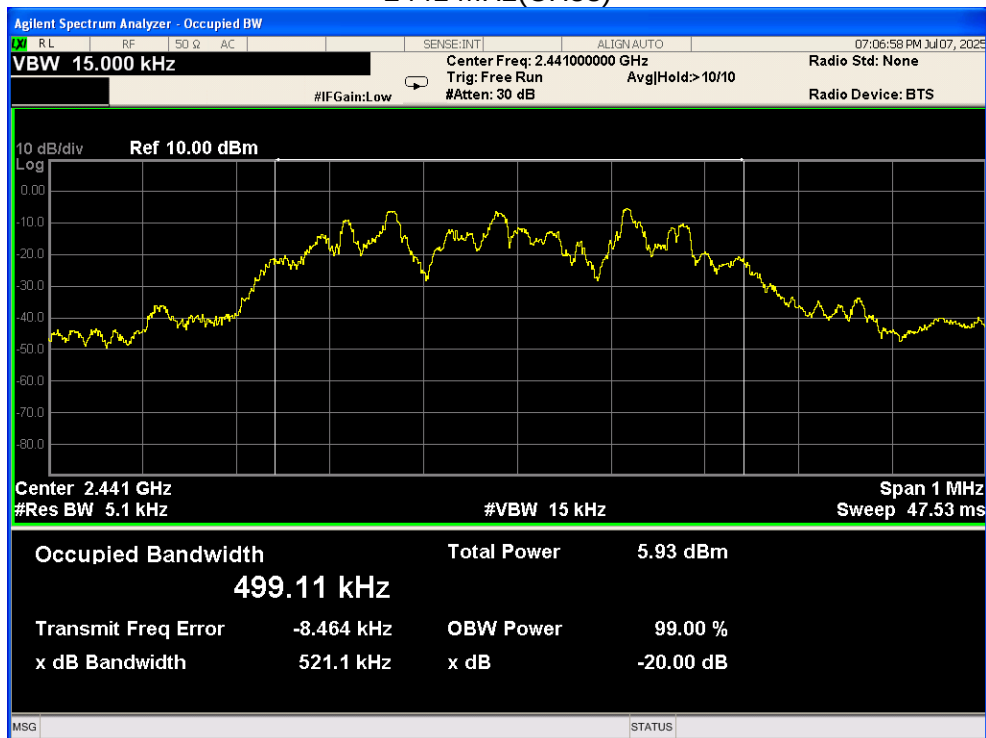
2481 MHz(CH40)



2403 MHz(CH41)



2441 MHz(CH58)



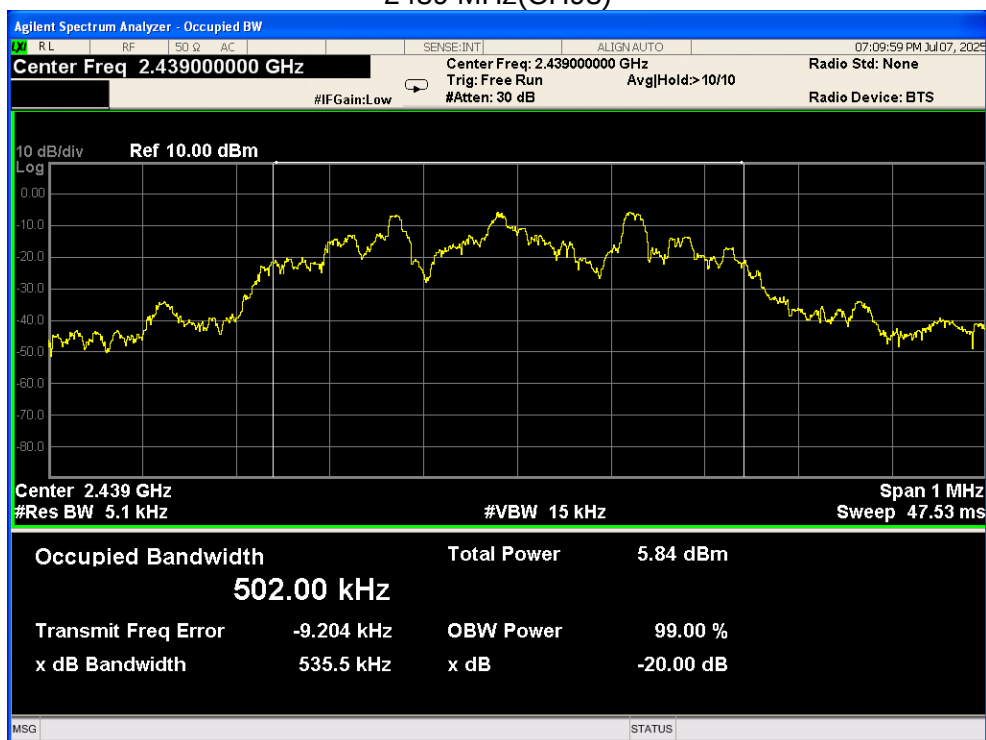
2481 MHz(CH80)



2403 MHz(CH81)



2439 MHz(CH93)



2471 MHz(CH95)



END OF REPORT