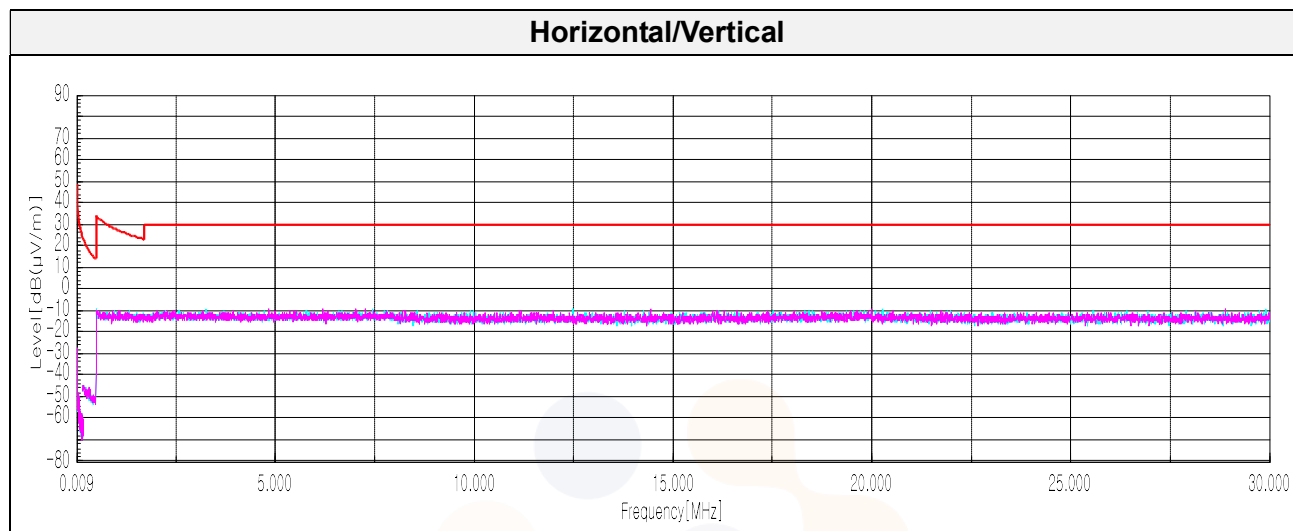


Test results (Below 30 MHz) –Worst case: 2 Mbits/s(37 Bytes)_2 440 MHz

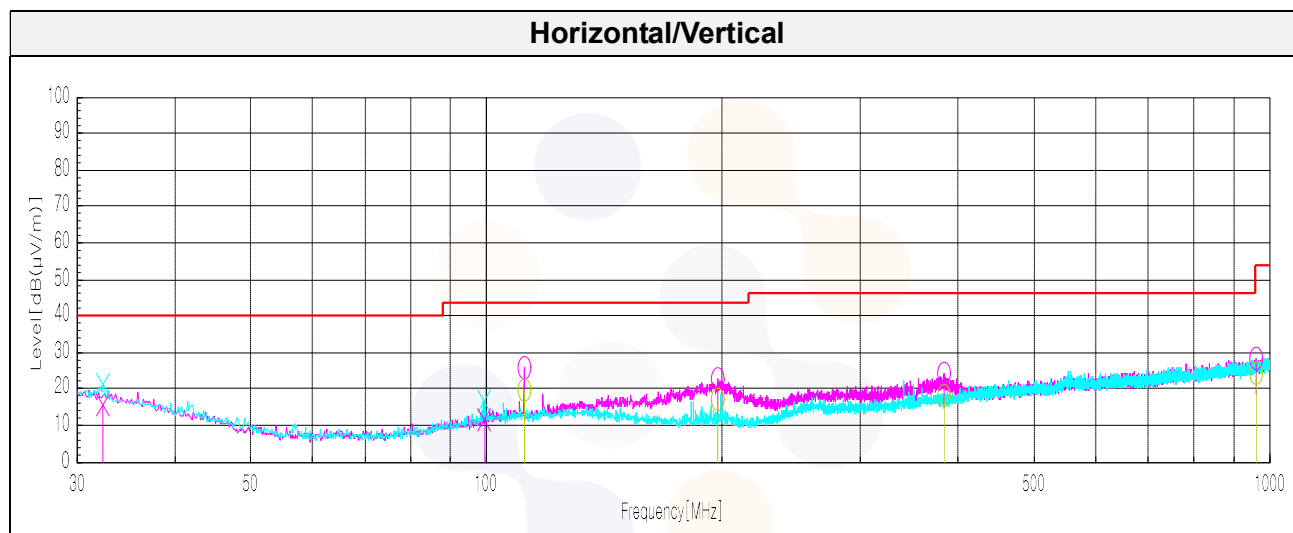
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	Distance Factor	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
No spurious emissions were detected within 20 dB of the limit.									



Note. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X KHz resulted in a level of Y dBuV/m, which is equivalent to $Y-51.5 = Z$ dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.

Test results (Below 1 000 MHz) –Worst case: 2 Mbits/s(37 Bytes)_2 440 MHz

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μV/m))	(dB(μV/m))	(dB)
Quasi-peak data								
32.43	V	22.10	23.49	-30.07	-	15.52	40.00	24.48
99.36	V	24.00	16.31	-28.66	-	11.65	43.50	31.85
111.72 ¹⁾	H	30.20	17.68	-28.53	-	19.35	43.50	24.15
197.33	H	28.90	15.27	-27.30	-	16.87	43.50	26.63
383.44	H	22.10	20.94	-25.10	-	17.94	46.00	28.06
962.05 ¹⁾	H	16.40	26.96	-19.27	-	24.09	54.00	29.91

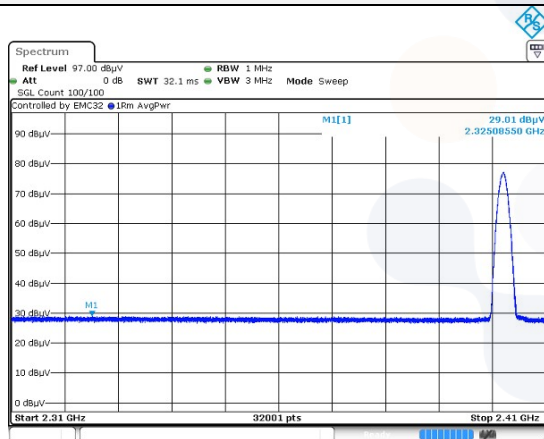


Test results (Above 1 000 MHz)_1 Mbits/s(37 Bytes)

2 402 MHz

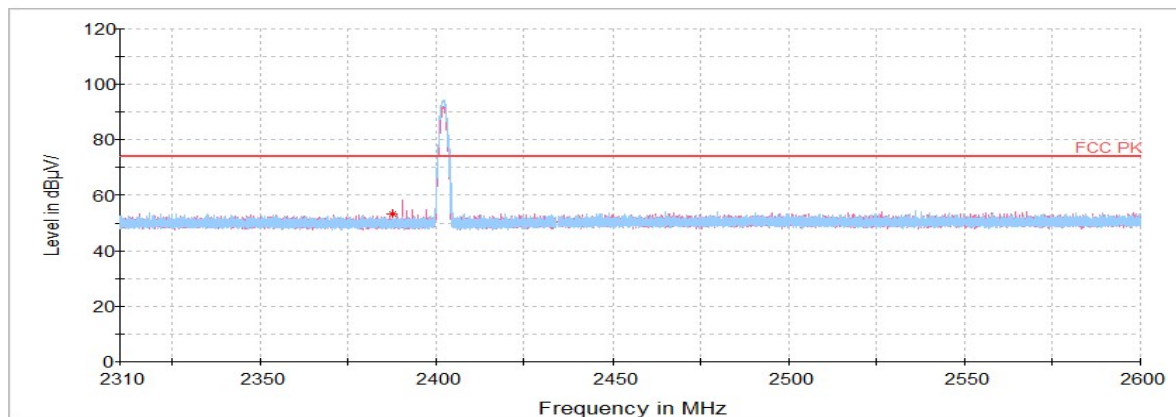
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
2 390.63	V	41.48	32.16	-18.17	-	55.47	74.00	18.53
2 325.09 ¹⁾	H	39.78	32.02	-18.16	-	53.64	74.00	20.36
4 453.38	H	66.60	33.69	-55.71	-	44.58	74.00	29.42
4 802.73 ¹⁾	H	68.22	33.70	-55.16	-	46.76	74.00	27.24
5 999.44	V	69.73	35.20	-53.61	-	51.32	74.00	22.68
7 217.44	V	61.75	35.14	-51.55	-	45.34	74.00	28.66
Average Data								
2 325.09 ¹⁾	H	29.01	32.02	-18.16	1.90	44.77	54.00	9.23

Average Data

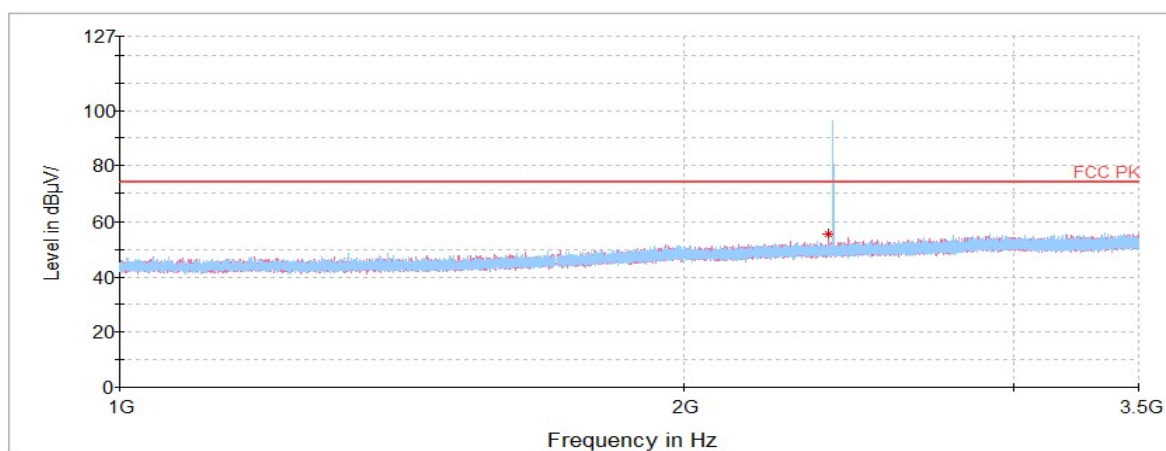


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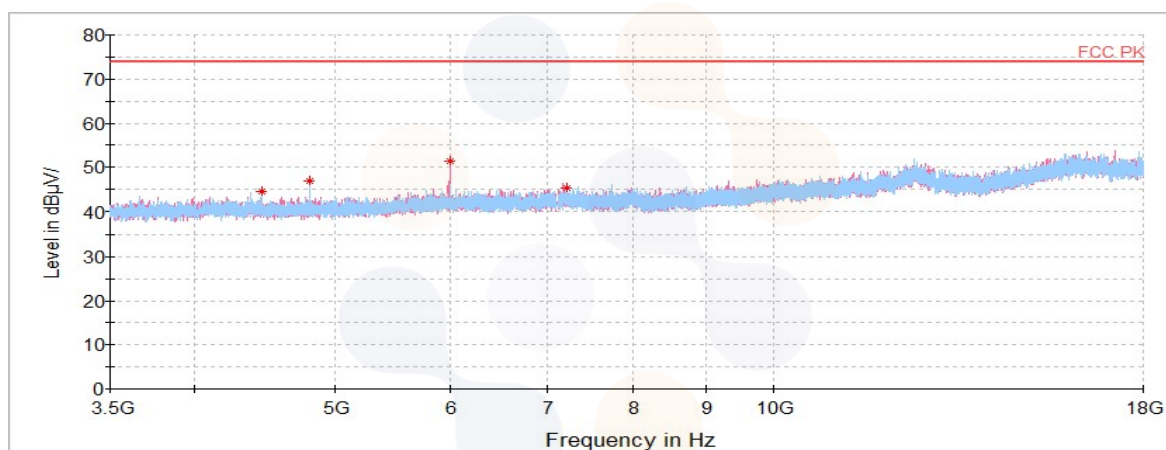
Horizontal/Vertical for Band-edge



Horizontal/Vertical for 1 GHz ~ 3.5 GHz



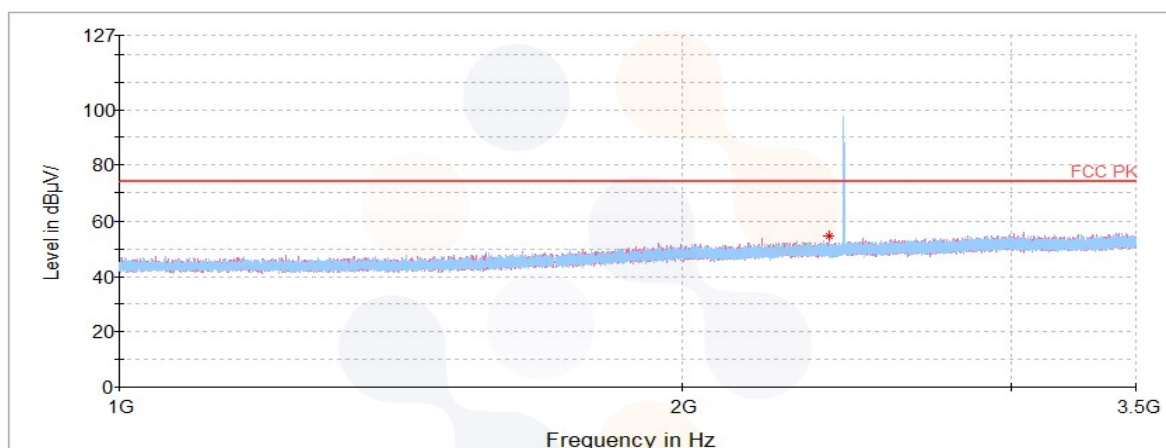
Horizontal/Vertical for 3.5 GHz ~ 18 GHz



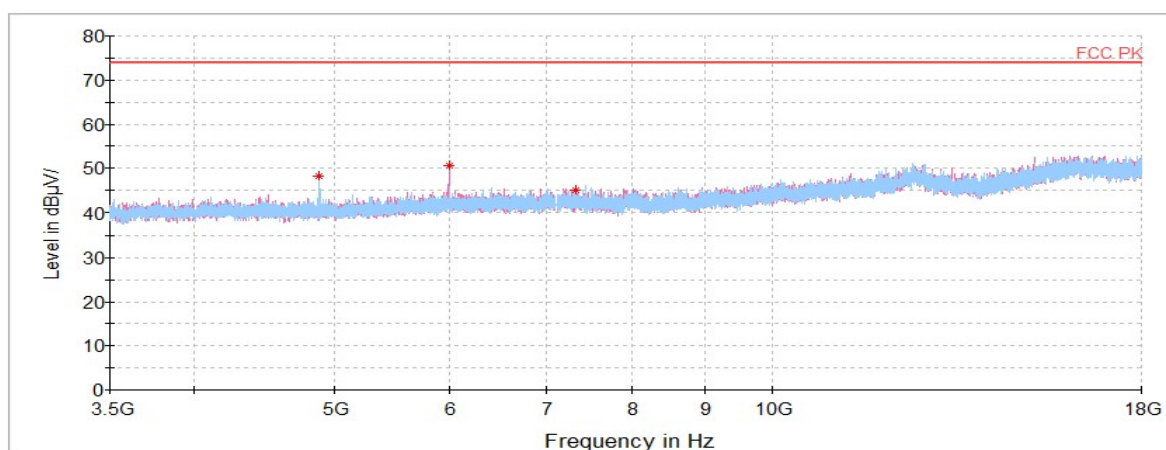
2 440 MHz

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
2 395.55	V	40.90	32.17	-18.17	-	54.90	74.00	19.10
4 879.77 ¹⁾	H	69.55	33.70	-55.09	-	48.16	74.00	25.84
6 000.34	V	68.94	35.20	-53.60	-	50.54	74.00	23.46
7 320.75 ¹⁾	H	61.43	35.16	-51.58	-	45.01	74.00	28.99
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 3.5 GHz



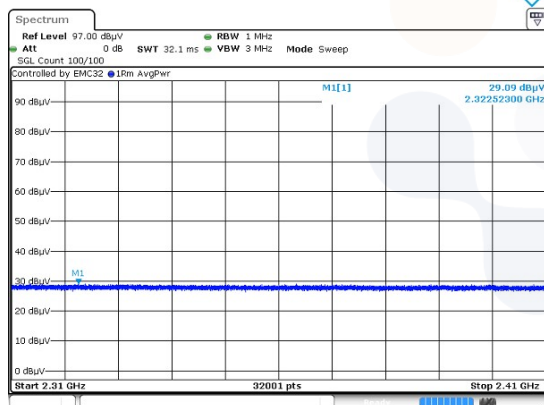
Horizontal/Vertical for 3.5 GHz ~ 18 GHz



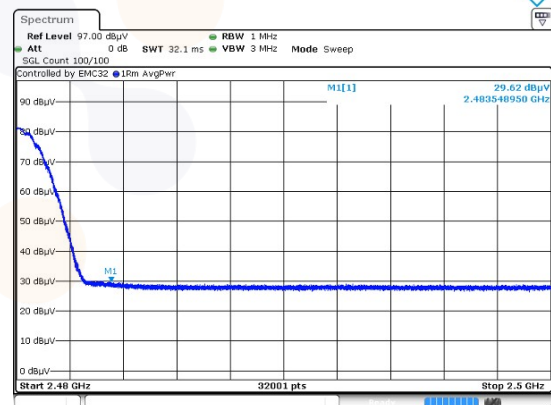
2 480 MHz

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
2 397.89	V	40.52	32.18	-18.17	-	54.53	74.00	19.47
2 322.52 ¹⁾	V	41.12	32.01	-18.16	-	54.97	74.00	19.03
2 483.55 ¹⁾	V	39.14	32.36	-17.89	-	53.61	74.00	20.39
3 798.16 ¹⁾	V	68.32	33.36	-56.23	-	45.45	74.00	28.55
4 959.97 ¹⁾	H	71.18	33.70	-54.98	-	49.90	74.00	24.10
5 999.44	V	69.99	35.20	-53.61	-	51.58	74.00	22.42
7 440.38 ¹⁾	H	62.38	35.19	-51.61	-	45.96	74.00	28.04
Average Data								
2 322.52 ¹⁾	V	29.09	32.01	-18.16	1.90	44.84	54.00	9.16
2 483.55 ¹⁾	V	29.62	32.36	-17.89	1.90	45.99	54.00	8.01

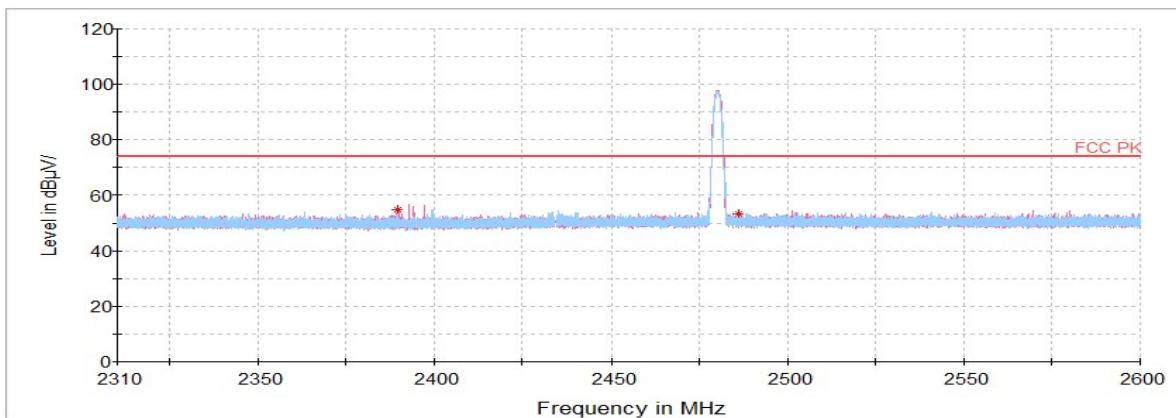
Average Data_Low

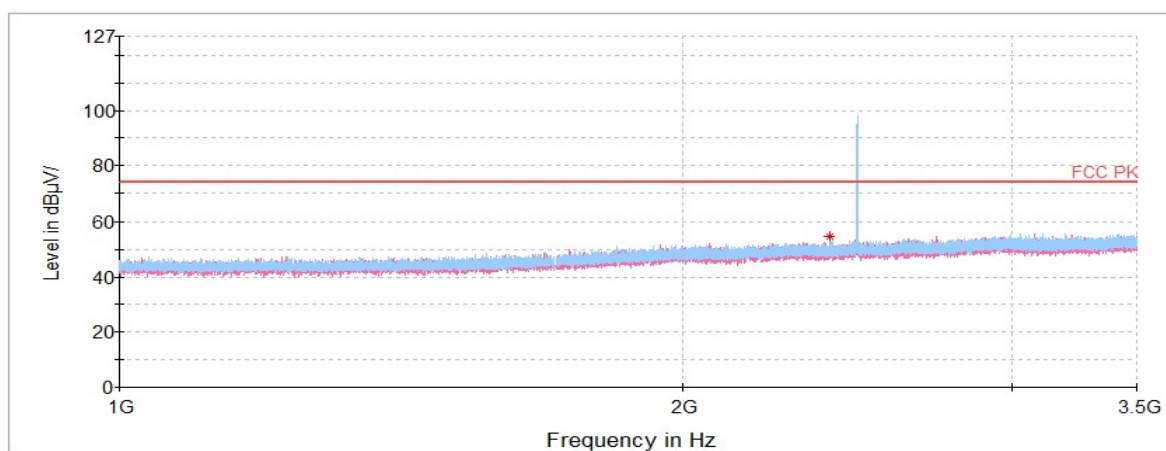
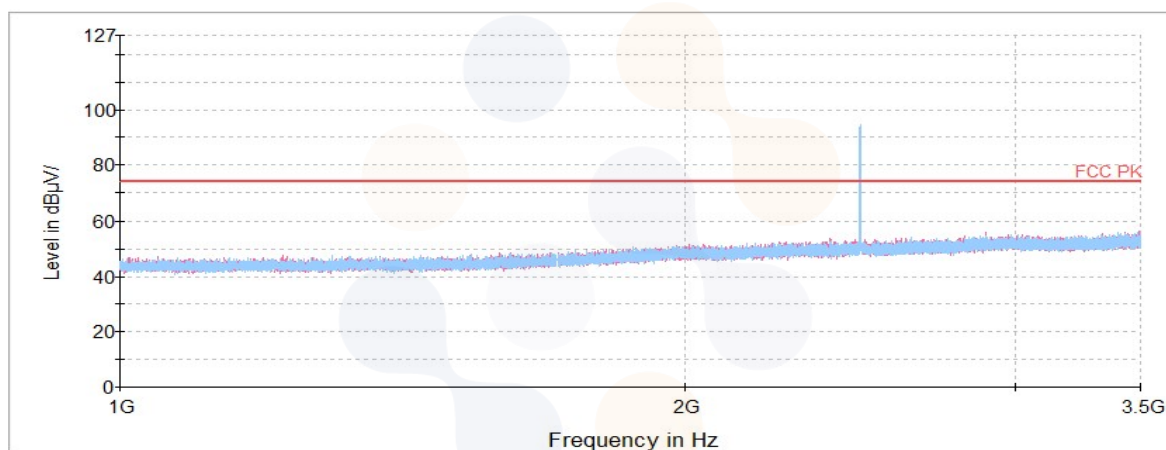


Average Data_High



Horizontal/Vertical for Band-edge



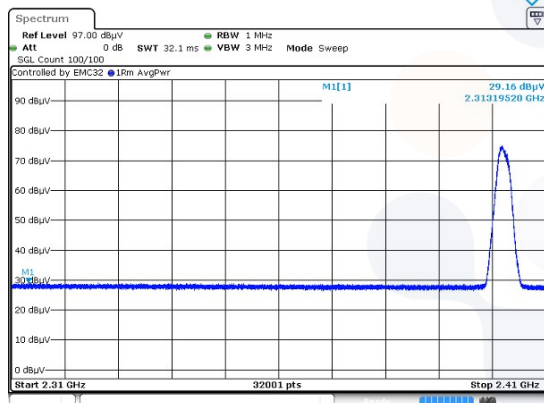
Horizontal/Vertical for 1 GHz ~ 3.5 GHz**Horizontal/Vertical for 3.5 GHz ~ 18 GHz**

Test results (Above 1 000 MHz)_2 Mbits/s(37 Bytes)

2 402 MHz

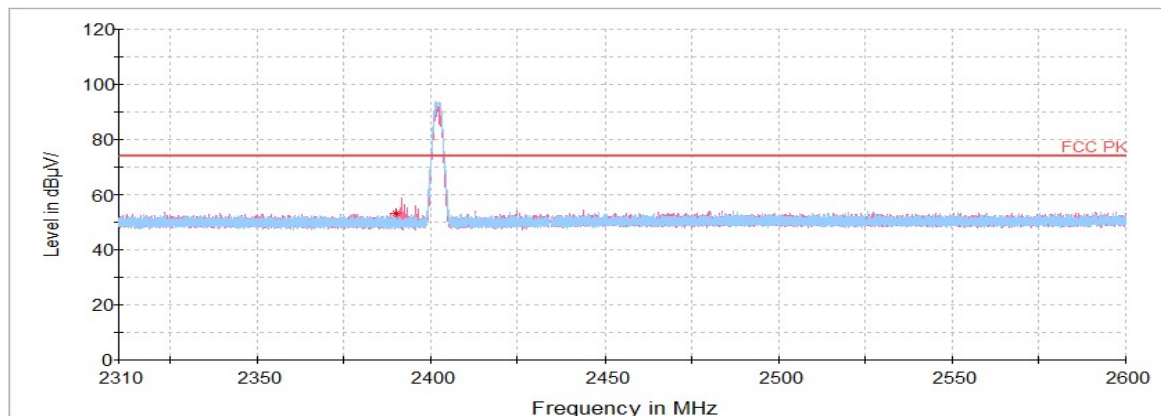
Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
2 313.20 ¹⁾	H	39.50	31.99	-18.16	-	53.33	74.00	20.67
3 999.34 ¹⁾	H	69.16	33.60	-56.33	-	46.43	74.00	27.57
4 803.64 ¹⁾	V	67.90	33.70	-55.16	-	46.44	74.00	27.56
5 999.44	V	68.73	35.20	-53.61	-	50.32	74.00	23.68
7 284.50 ¹⁾	V	61.97	35.16	-51.57	-	45.56	74.00	28.44
Average Data								
2 313.20 ¹⁾	H	29.16	31.99	-18.16	4.65	47.64	54.00	6.36

Average Data

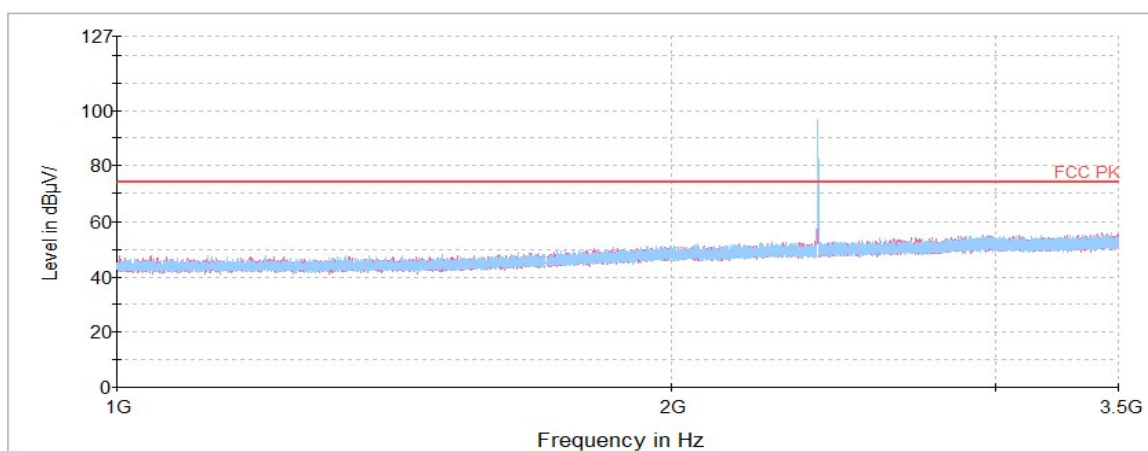


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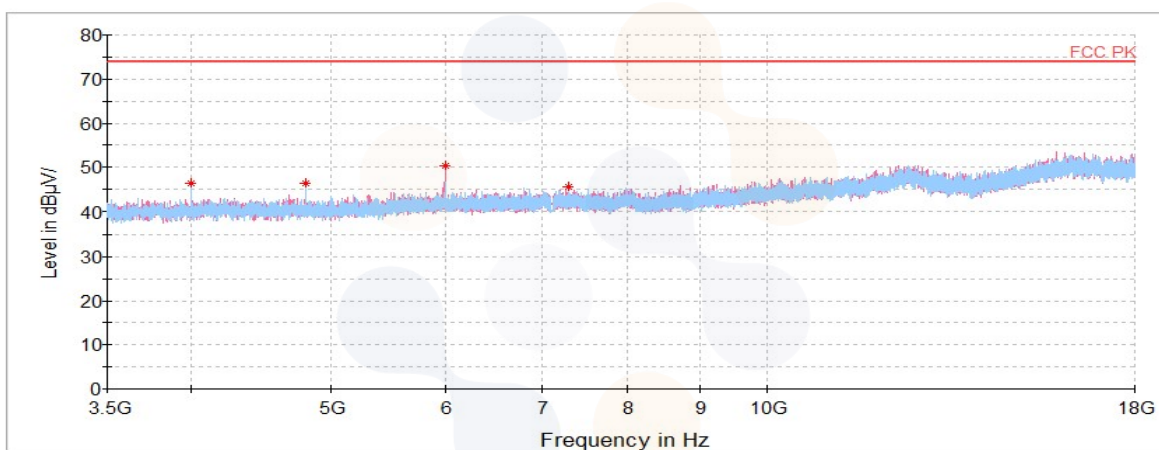
Horizontal/Vertical for Band-edge



Horizontal/Vertical for 1 GHz ~ 3.5 GHz



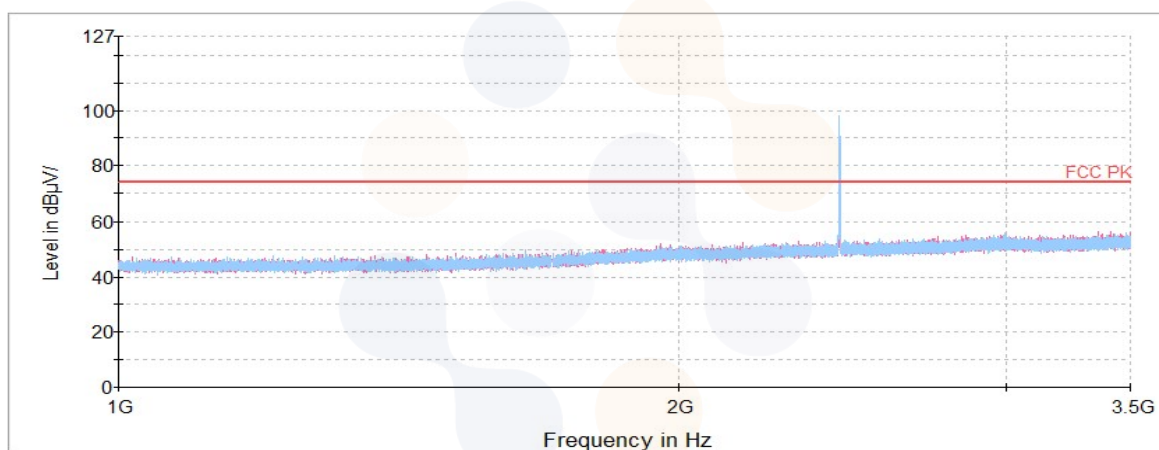
Horizontal/Vertical for 3.5 GHz ~ 18 GHz



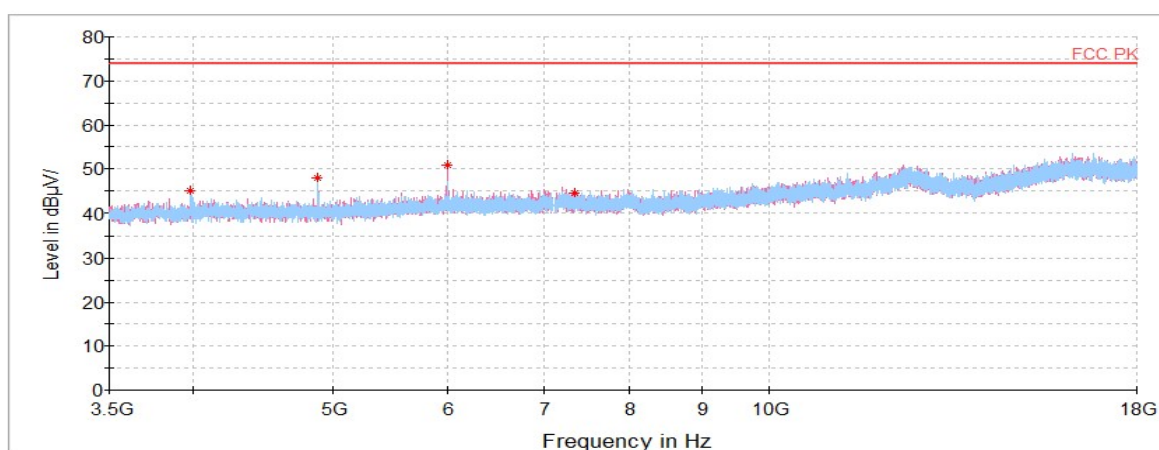
2 440 MHz

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
3 987.11 ¹⁾	H	67.81	33.58	-56.36	-	45.03	74.00	28.97
4 879.31 ¹⁾	H	69.39	33.70	-55.09	-	48.00	74.00	26.00
5 999.44	V	69.39	35.20	-53.61	-	50.98	74.00	23.02
7 342.05 ¹⁾	V	60.94	35.17	-51.59	-	44.52	74.00	29.48
Average Data								
No spurious emissions were detected within 20 dB of the limit.								

Horizontal/Vertical for 1 GHz ~ 3.5 GHz



Horizontal/Vertical for 3.5 GHz ~ 18 GHz



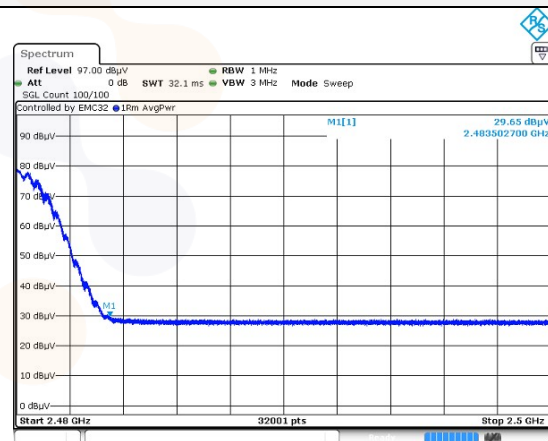
2 480 MHz

Frequency	Pol.	Reading	Antenna Factor	Amp. + Cable	DCF	Result	Limit	Margin
[MHz]	[V/H]	[dB(μV)]	[dB]	[dB]	[dB]	[dB(μV/m)]	[dB(μV/m)]	[dB]
Peak data								
2 339.06 ¹⁾	V	38.87	32.05	-18.16	-	52.76	74.00	21.24
2 483.50 ¹⁾	V	40.66	32.36	-17.89	-	55.13	74.00	18.87
3 987.11 ¹⁾	H	69.85	33.58	-56.36	-	47.07	74.00	26.93
4 959.97 ¹⁾	H	70.91	33.70	-54.98	-	49.63	74.00	24.37
6 000.34	V	69.97	35.20	-53.60	-	51.57	74.00	22.43
7 441.28 ¹⁾	H	63.42	35.19	-51.61	-	47.00	74.00	27.00
Average Data								
2 339.06 ¹⁾	V	29.03	32.05	-18.16	4.65	47.57	54.00	6.43
2 483.50 ¹⁾	V	29.65	32.36	-17.89	4.65	48.77	54.00	5.23

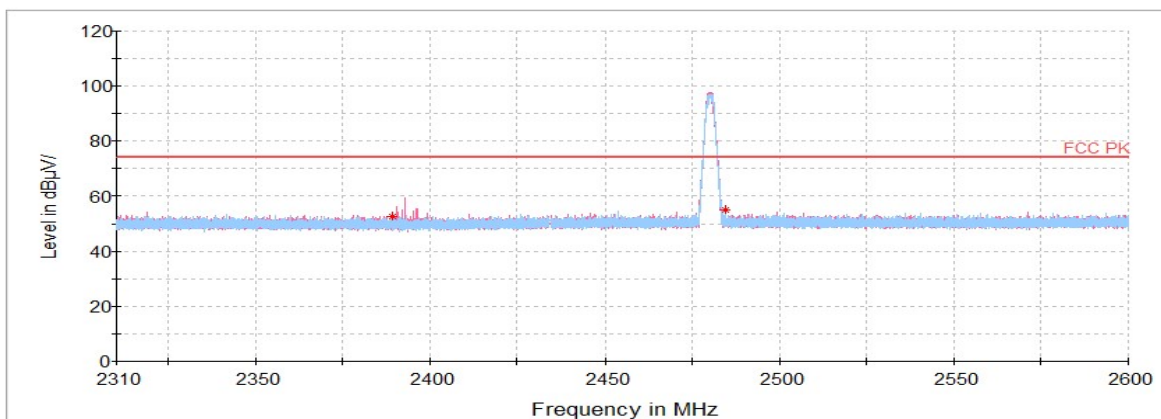
Average Data_Low



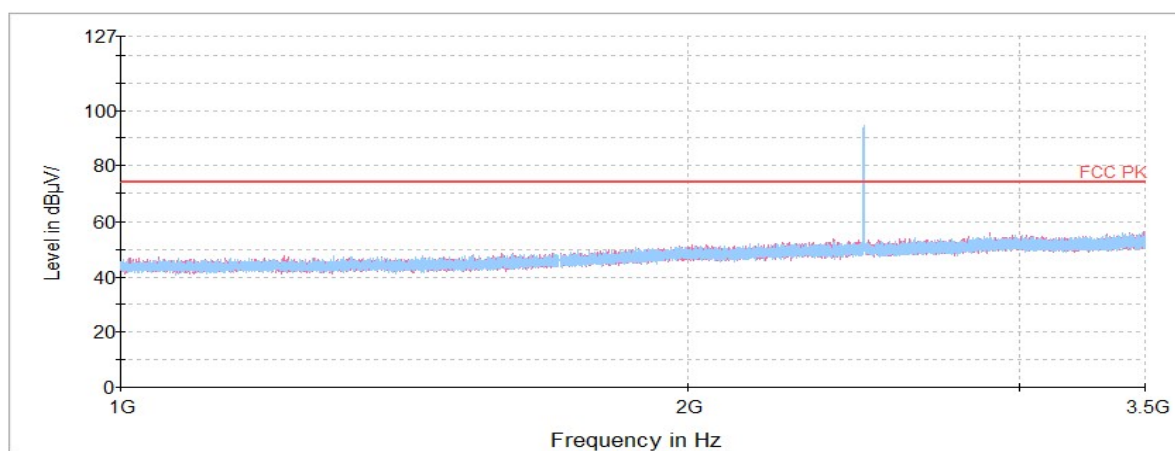
Average Data_High



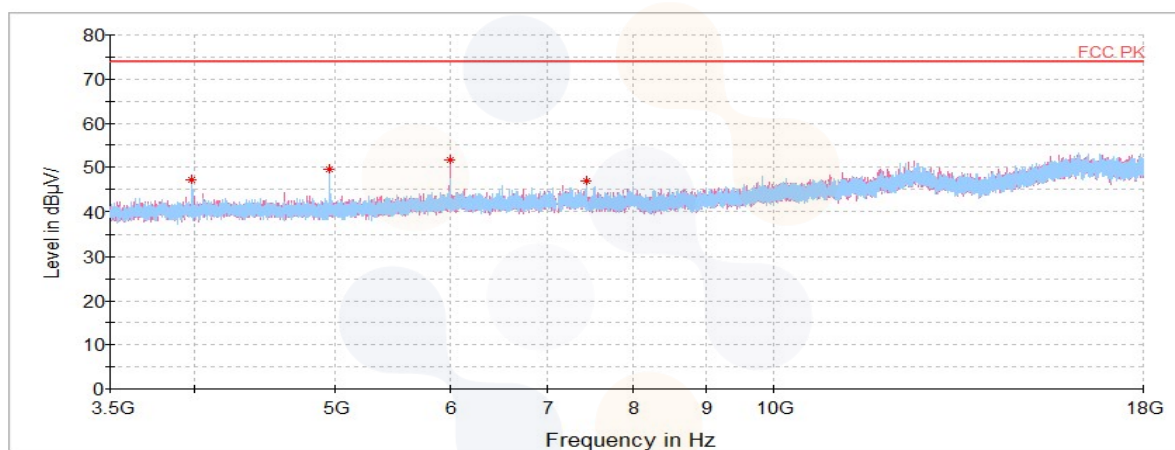
Horizontal/Vertical for Band-edge



Horizontal/Vertical for 1 GHz ~ 3.5 GHz

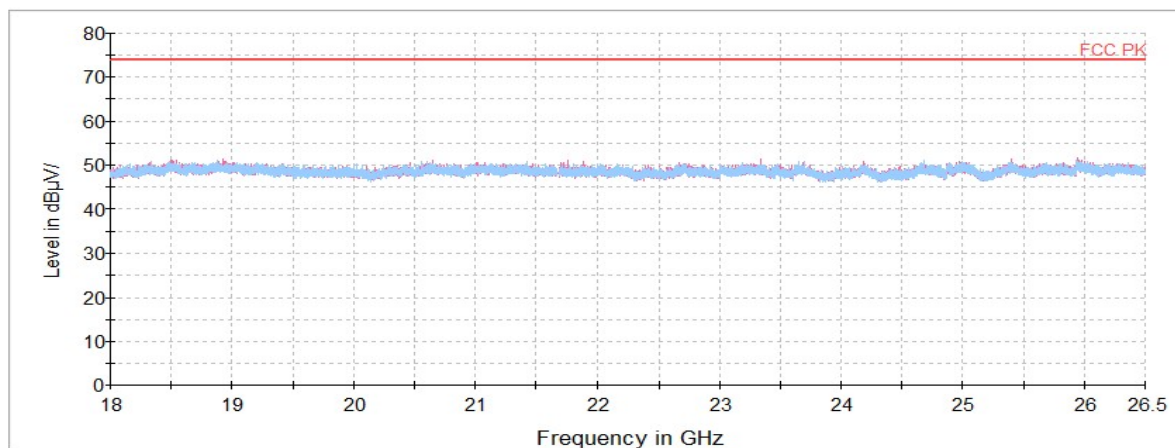


Horizontal/Vertical for 3.5 GHz ~ 18 GHz



Test results (Above 18 GHz) – Worst case: 2 MBits/s(37 Bytes)_2 480 MHz

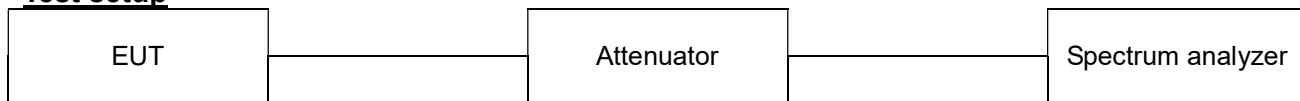
Horizontal/Vertical for 18 GHz ~ 40 GHz



Note: The Worst case was based on the lowest margin condition considering Harmonic and Spurious Emission.

7.5. Conducted Spurious Emission

Test setup



Limit

According to §15.247(d) and RSS-247(5.5), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operation, 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 averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation specified in §15.209(a) is not required. In addition, radiated emission limits specified in §15.209(a) (see §15.205(c)).

Limit : 20 dBc

Test procedure

ANSI C63.10-2013 - Section 11.11.3

KDB 558074 D01 v05 - Section 8.5

KDB 662911 D01 v02r01 – section (E)(3)(b)

Test settings

Establish an emission level by using the following procedure:

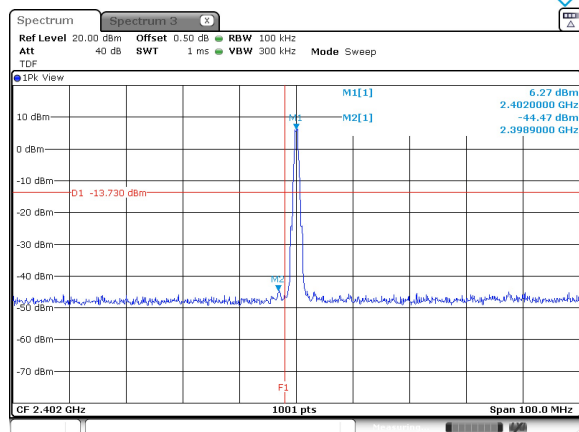
- 1) Set the center frequency and span to encompass frequency range to be measured.
- 2) Set the RBW = 100 kHz
- 3) Set the VBW $\geq [3 \times \text{RBW}]$
- 4) Detector = peak
- 5) Sweep time = auto couple
- 6) Trace mode = max hold
- 7) Allow trace to fully stabilize.
- 8) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

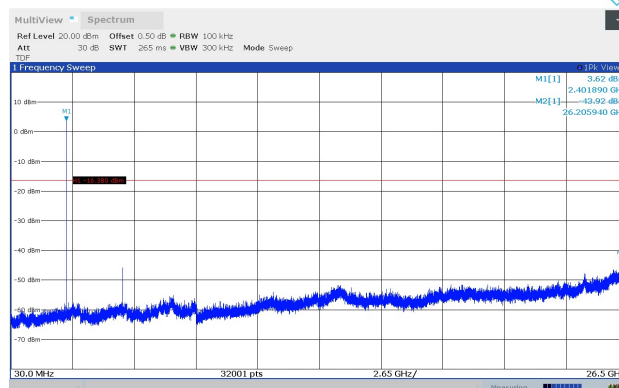
Test results

BLE_1 MBit/s(37 Bytes)

Conducted band-edge / 2 402 MHz



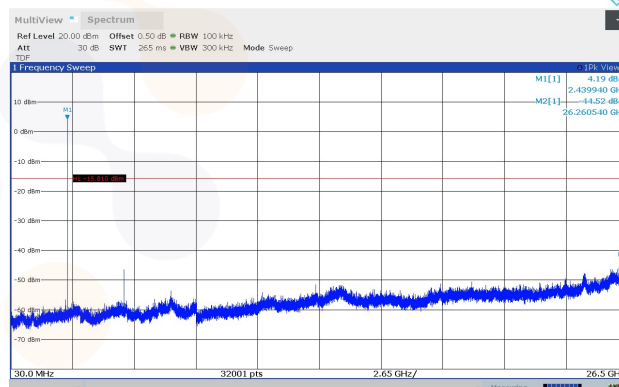
Conducted spurious / 2 402 MHz



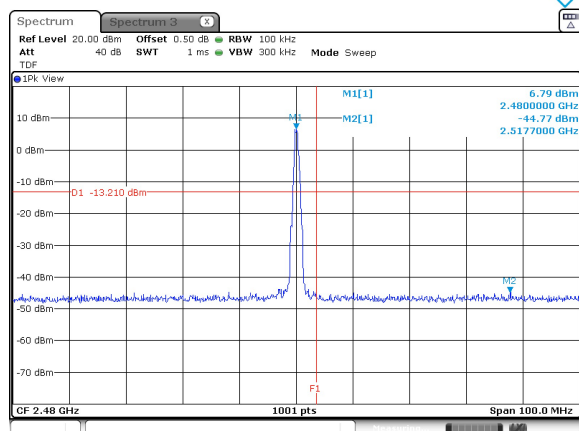
Conducted band-edge / 2 440 MHz

Blank

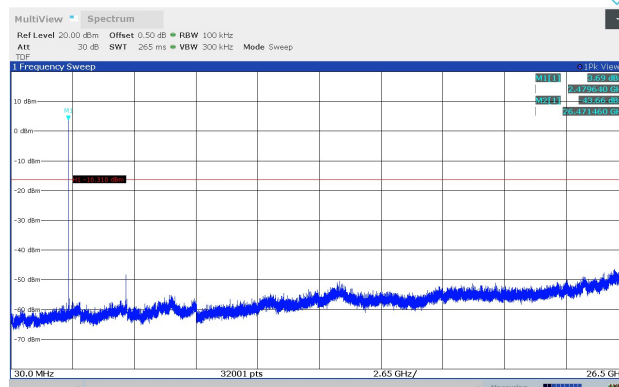
Conducted spurious / 2 440 MHz



Conducted band-edge / 2 480 MHz

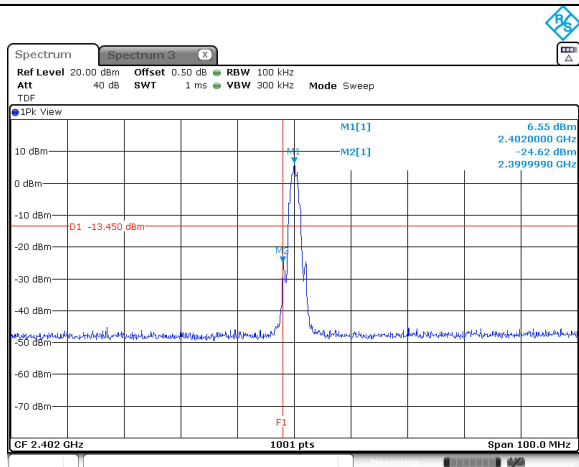


Conducted spurious / 2 480 MHz

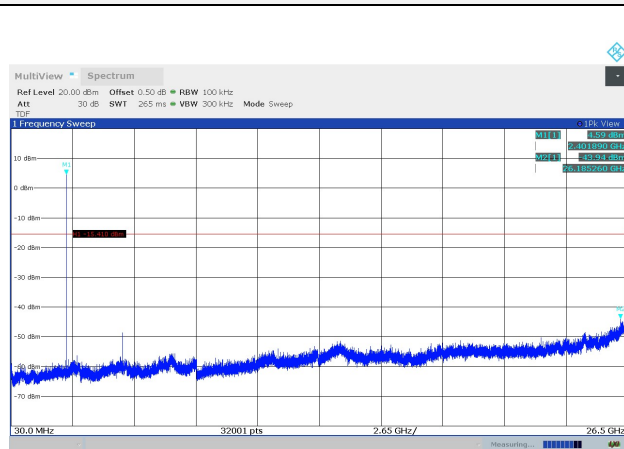


BLE_2 MBit/s(37 Bytes)

Conducted band-edge / 2 402 MHz



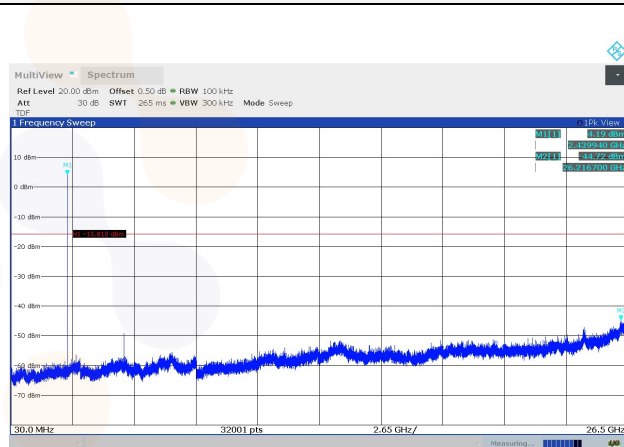
Conducted spurious / 2 402 MHz



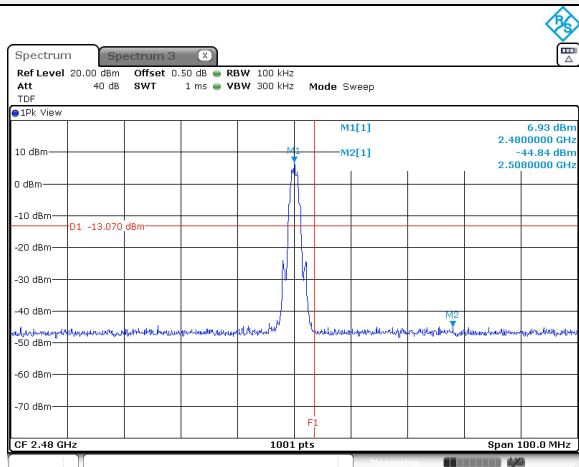
Conducted band-edge / 2 440 MHz

Blank

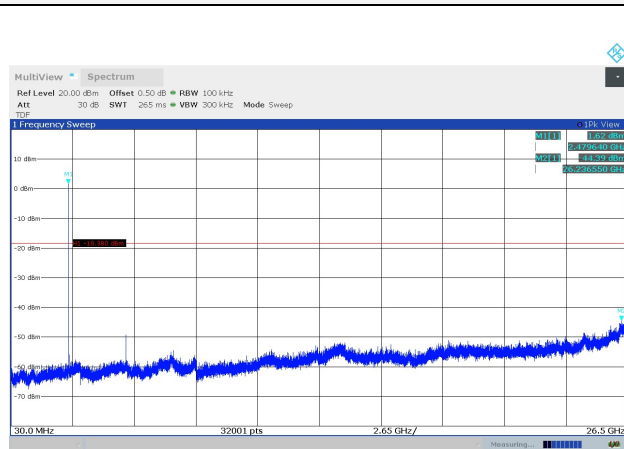
Conducted spurious / 2 440 MHz



Conducted band-edge / 2 480 MHz

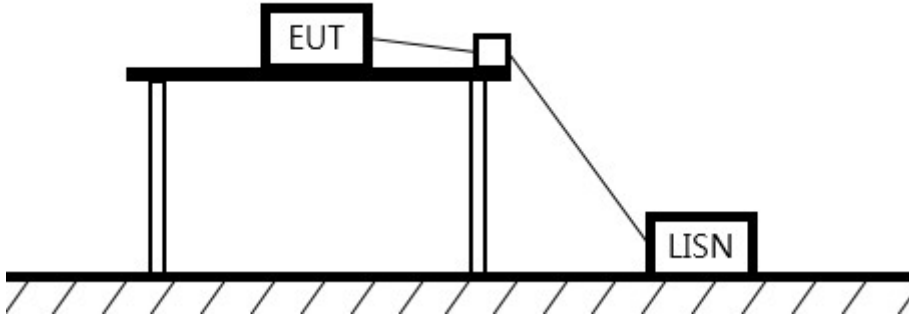


Conducted spurious / 2 480 MHz



7.6. AC Conducted emission

Test setup



Limit

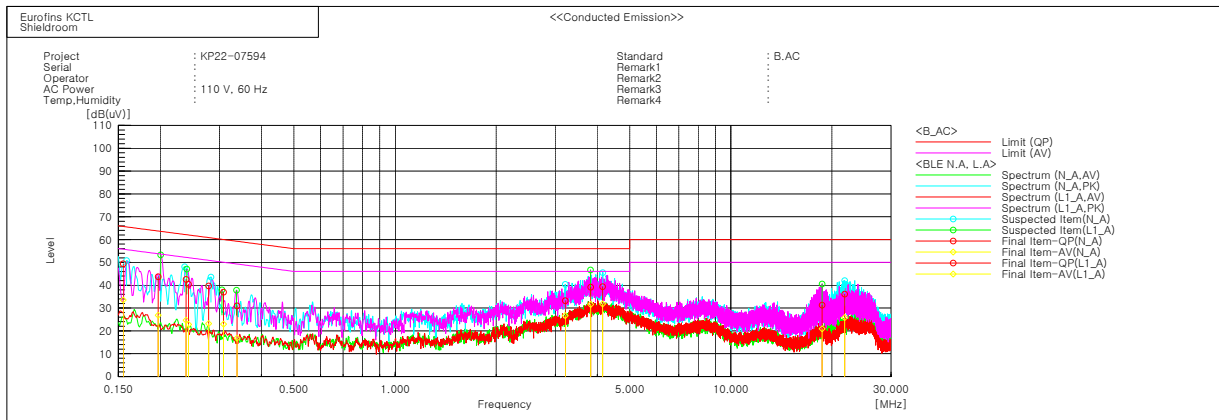
According to 15.207(a) and RSS-Gen(8.8), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted limit (dBμV/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

Measurement procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 kHz or to quasi-peak and average within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

Test results-Worst case: 2 MBits/s(37 Bytes) 2 480 MHz



Final Result

--- N_A Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.15497	39.5	23.6	9.9	49.4	33.5	65.7	55.7	16.3	22.2
2	0.23868	32.8	14.8	9.8	42.6	24.6	62.1	52.1	19.5	27.5
3	0.27844	29.9	13.4	9.8	39.7	23.2	60.9	50.9	21.2	27.7
4	3.21163	23.3	16.8	9.9	33.2	26.7	56.0	46.0	22.8	19.3
5	4.15088	29.4	21.9	9.9	39.3	31.8	56.0	46.0	16.7	14.2
6	21.83751	25.2	14.9	10.9	36.1	25.8	60.0	50.0	23.9	24.2

--- L1_A Phase ---

No.	Frequency [MHz]	Reading QP [dB(uV)]	Reading CAV [dB(uV)]	c.f [dB]	Result QP [dB(uV)]	Result CAV [dB(uV)]	Limit QP [dB(uV)]	Limit AV [dB(uV)]	Margin QP [dB]	Margin CAV [dB]
1	0.19703	33.8	16.9	10.0	43.8	26.9	63.7	53.7	19.9	26.8
2	0.2426	30.6	13.1	9.7	40.3	22.8	62.0	52.0	21.7	29.2
3	0.30641	27.2	13.2	9.8	37.0	23.0	60.0	50.0	23.0	27.0
4	0.33661	21.1	6.9	9.9	31.0	16.8	59.2	49.2	28.2	32.4
5	3.62402	29.3	21.7	9.9	39.2	31.6	56.0	46.0	16.8	14.4
6	18.69685	20.6	10.2	10.7	31.3	20.9	60.0	50.0	28.7	29.1

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40	100989	23.10.14
EMI TEST RECEIVER	R&S	ESCI7	100732	23.01.19
Bi-Log Antenna	TESEQ	CBL 6112D	62438	24.08.24
Amplifier	SONOMA INSTRUMENT	310N	284608	23.08.18
ATTENUATOR	KEYSIGHT	8491B-6dB	MY39271060	24.04.27
ISOLATION TRANSFORMER	ONETECH CO., LTD	OT-IT500VA	OTR1-16026	23.03.28
Horn antenna	ETS.lindgren	3117	155787	23.09.29
Horn antenna	ETS.lindgren	3116	00086635	23.05.04
Attenuator	API Inmet	40AH2W-10	12	23.05.03
AMPLIFIER	B&Z Technologies	BZRT-00504000-481055-382525	26299-27735	23.09.19
AMPLIFIER	B&Z Technologies	BZR-0050400-551028-252525	27736	23.09.19
LOOP Antenna	R&S	HFH2-Z2	100355	24.08.10
Antenna Mast	Innco Systems	MA4640-XP-ET	-	-
Turn Table	Innco Systems	CO3000	1175/45850319/P	-
Antenna Mast	Innco Systems	MA4000-EP	303	-
Turn Table	Innco Systems	CO3000	1175/45850319/P	-
Highpass Filter	WT	WT-A1698-HS	WT160411001	23.05.03
TWO-LINE V - NETWORK	R&S	ENV216	101358	23.09.29
EMI TEST RECEIVER	R&S	ESCI3	100001	23.08.18
Vector Signal Generator	R&S	SMBV100A	257566	23.07.04
Signal Generator	R&S	SMB100A	176206	23.01.19

End of test report