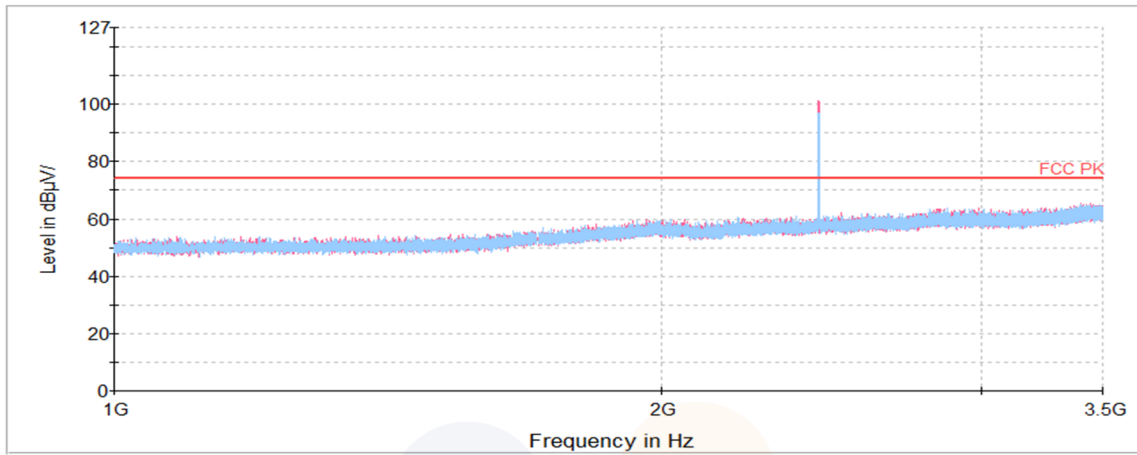
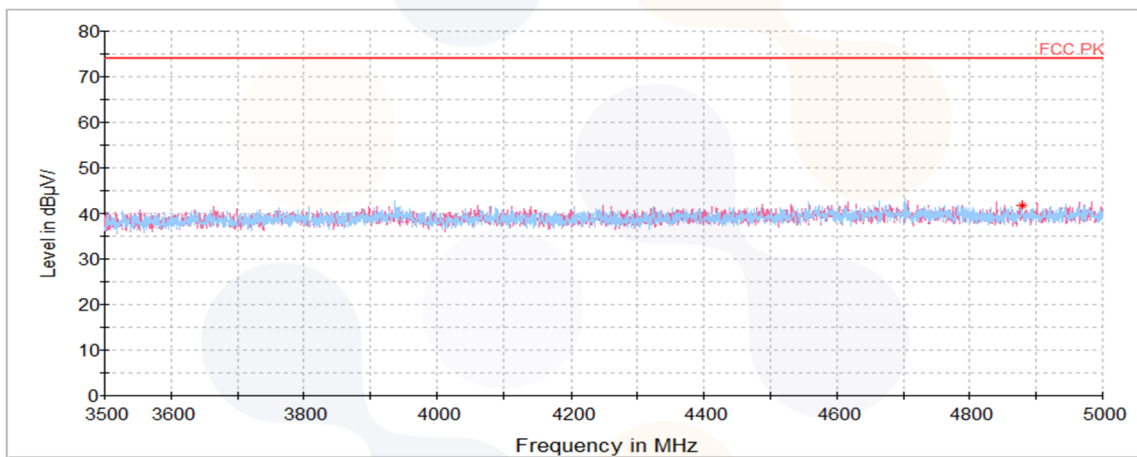


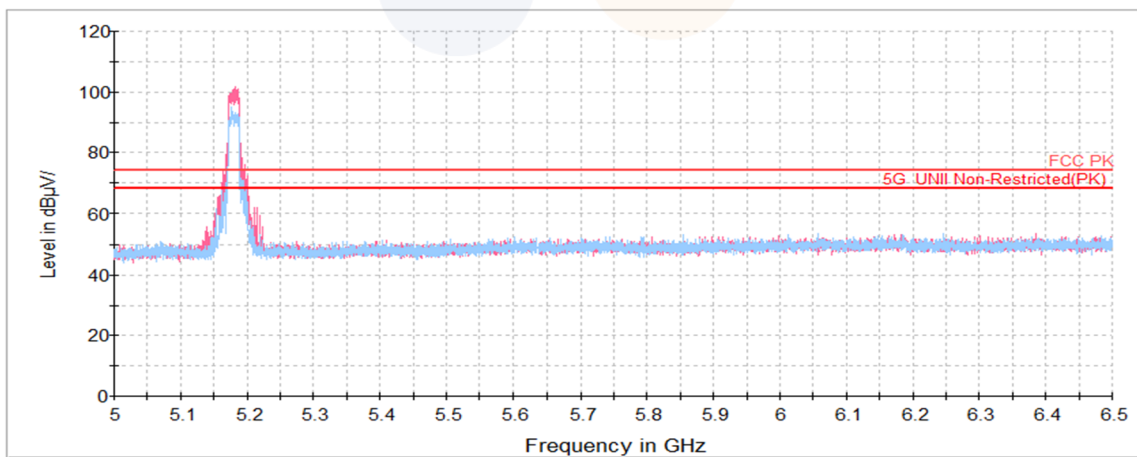
Horizontal/Vertical for 1 GHz ~ 3.5 GHz



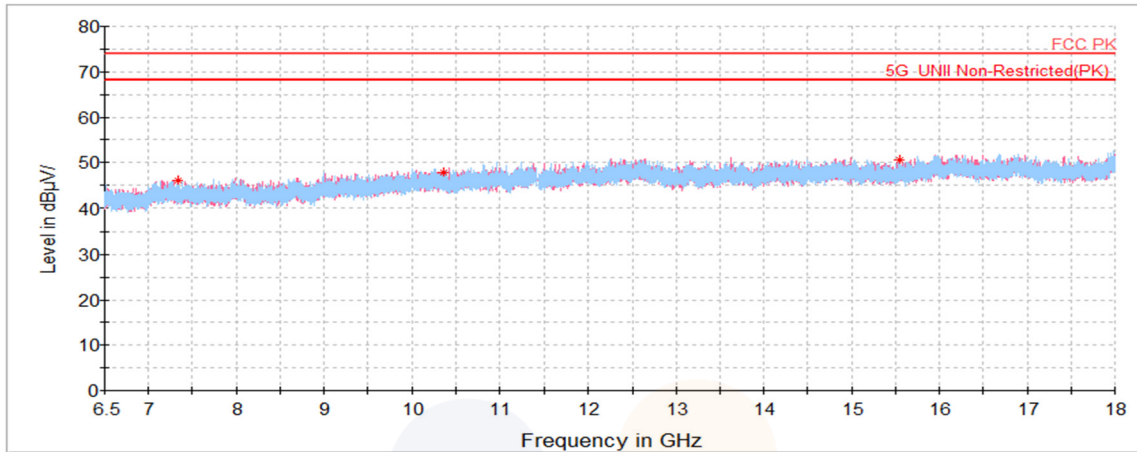
Horizontal/Vertical for 3.5 GHz ~ 5 GHz



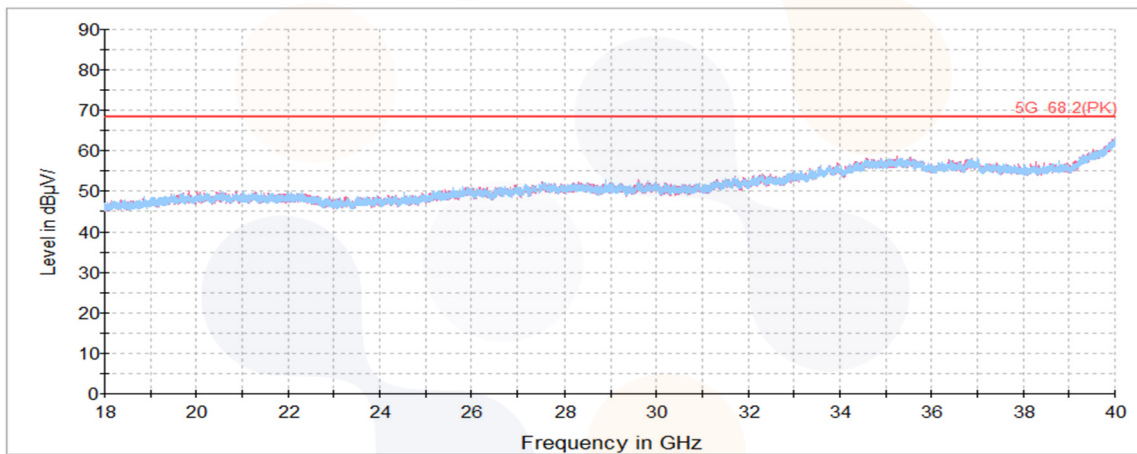
Horizontal/Vertical for 5 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz



Horizontal/Vertical for 18 GHz ~ 40 GHz

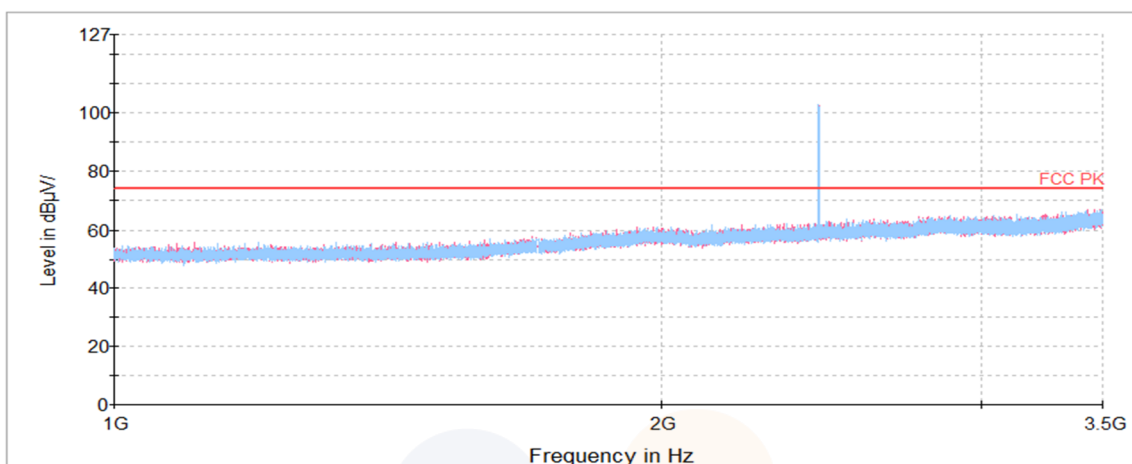


Case 5 : WLAN 5 GHz (MIMO)_802.11ac VHT80 (5 210 MHz) + BT (3DH-1)(2 441 MHz)

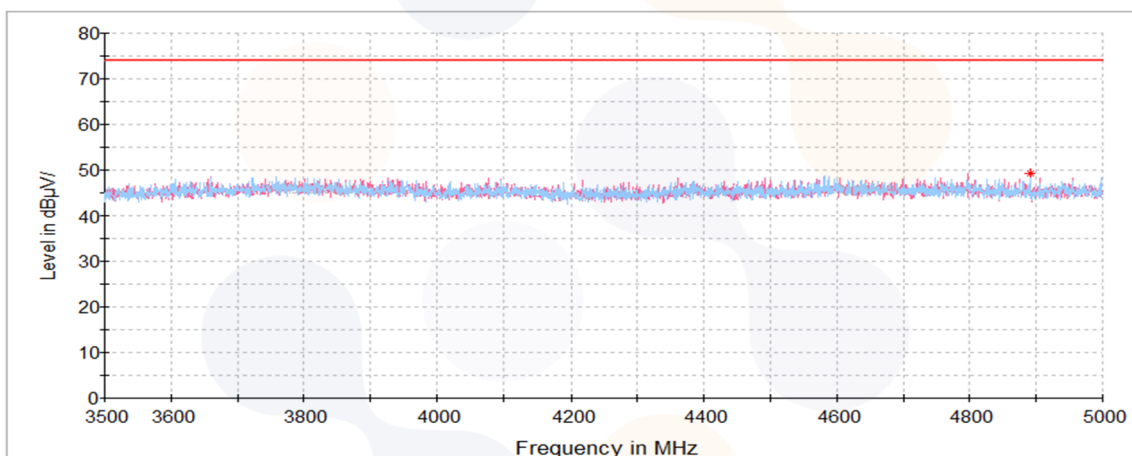
Frequency	Pol.	Reading	Ant. Factor	Amp. + Cable	DCCF	Result	Limit	Margin
(MHz)	(V/H)	(dB(μV))	(dB)	(dB)	(dB)	(dB(μW/m))	(dB(μW/m))	(dB)
Peak data								
4 890.55 ¹⁾	H	58.52	34.03	-43.51	-	49.04	74.00	24.96
7 337.58 ¹⁾	H	54.72	35.67	-41.34	-	49.05	74.00	24.95
10 427.25	H	51.12	37.54	-38.49	-	50.17	68.20	18.03
15 650.55 ¹⁾	H	48.84	39.80	-35.50	-	53.14	74.00	20.86
Average Data								
No spurious emissions were detected within 20 dB of the limit.								



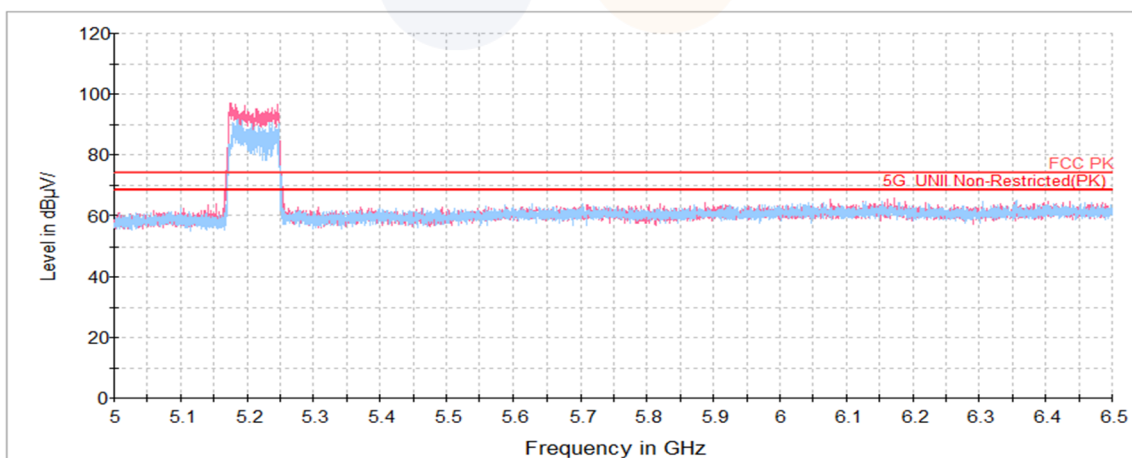
Horizontal/Vertical for 1 GHz ~ 3.5 GHz



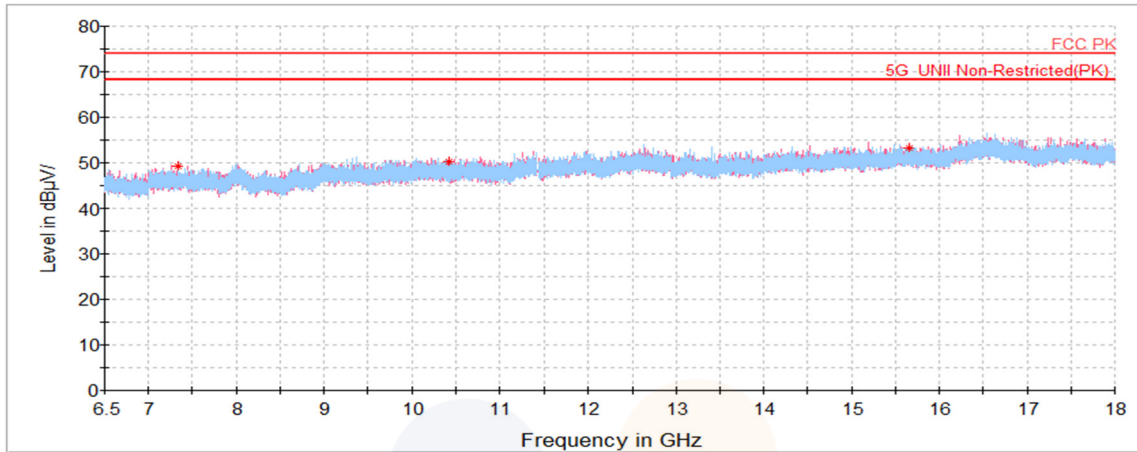
Horizontal/Vertical for 3.5 GHz ~ 5 GHz



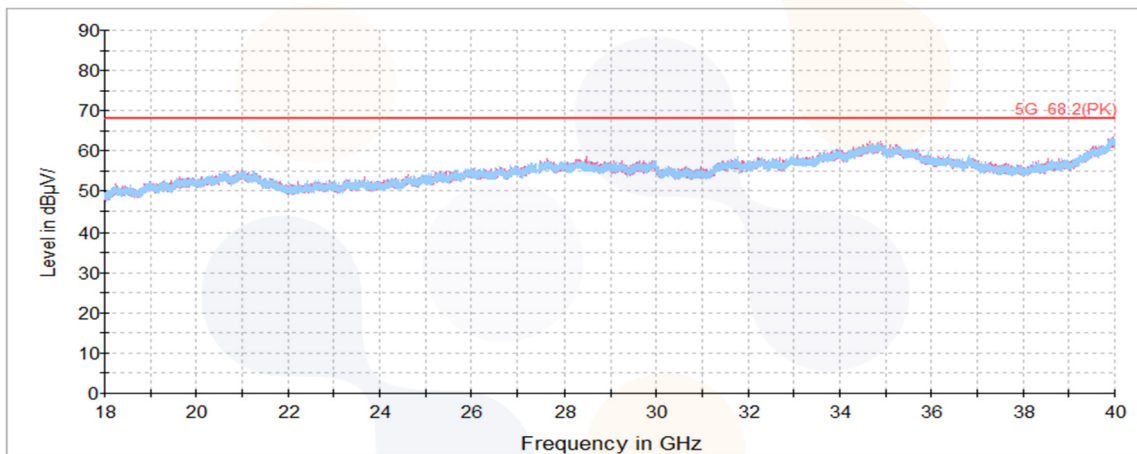
Horizontal/Vertical for 5 GHz ~ 6.5 GHz



Horizontal/Vertical for 6.5 GHz ~ 18 GHz

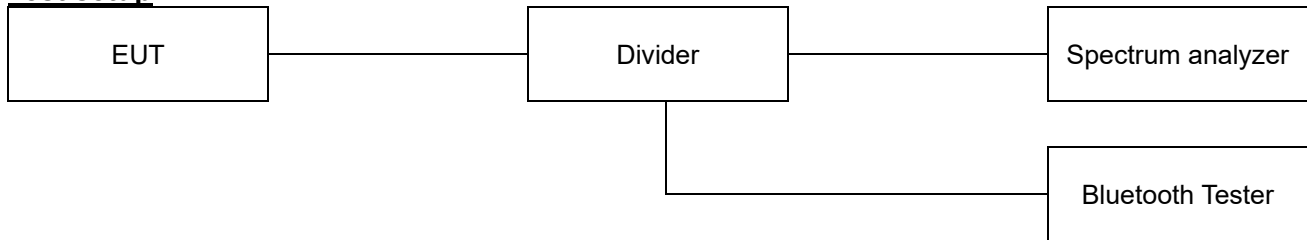


Horizontal/Vertical for 18 GHz ~ 40 GHz



7.7. Conducted Spurious Emission

Test setup



Limit

According to §15.247(d),

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 C63.10-2020 - Section 6.10.4, 7.8.7

Test settings

▪ Band-edge

- 1) Span : Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation
- 2) Reference level : As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log(\text{OBW}/\text{RBW})]$ below the reference level.
- 3) Attenuation: Auto (at least 10 dB preferred)
- 4) Sweep time = No faster than coupled (auto) time
- 5) RBW : 100 kHz
- 6) VBW : 300 kHz
- 7) Detector : Peak
- 8) Trace : Max hold

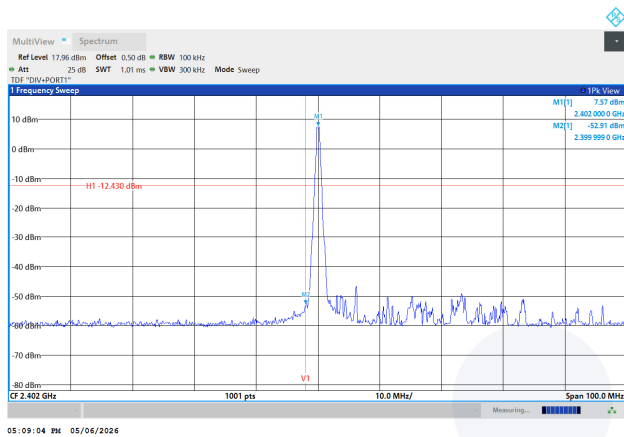
▪ Spurious emissions

- 1) Span : 30 MHz to 10 times the operating frequency in GHz
- 2) RBW : 100 kHz
- 3) VBW : 300 kHz
- 4) Sweep time : Coupled
- 5) Detector : Peak

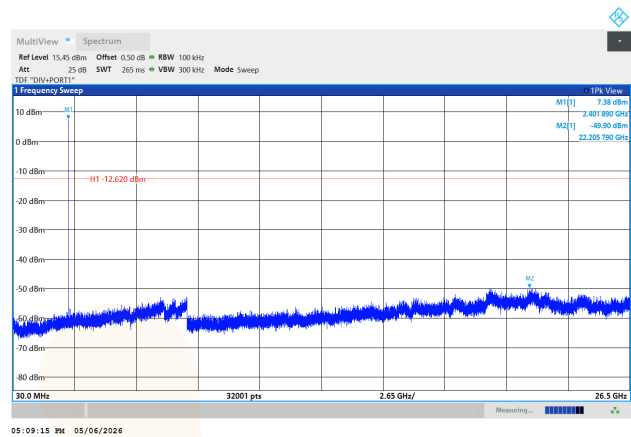
Test results

GFSK

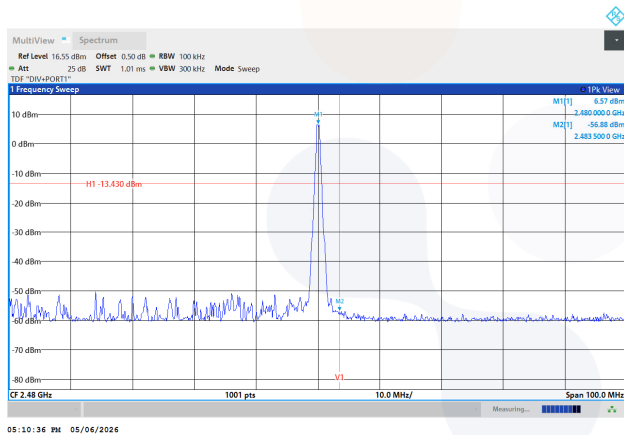
Conducted band-edge / Low ch



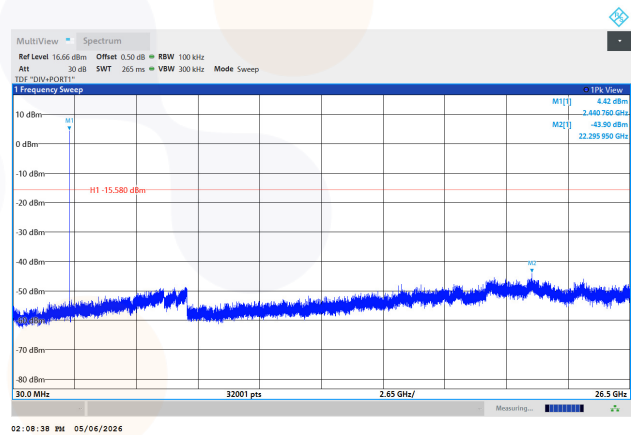
Conducted spurious / Low ch.



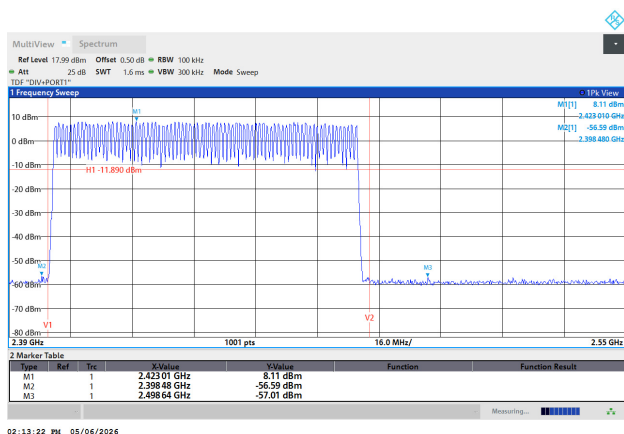
Conducted band-edge / High ch.



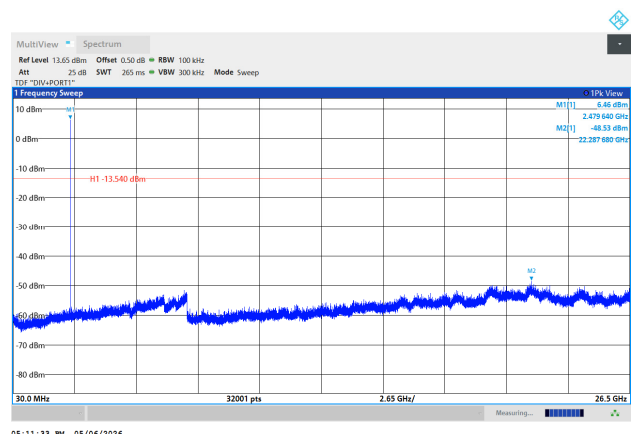
Conducted spurious / Mid ch.



Conducted band-edge / Hopping ch.

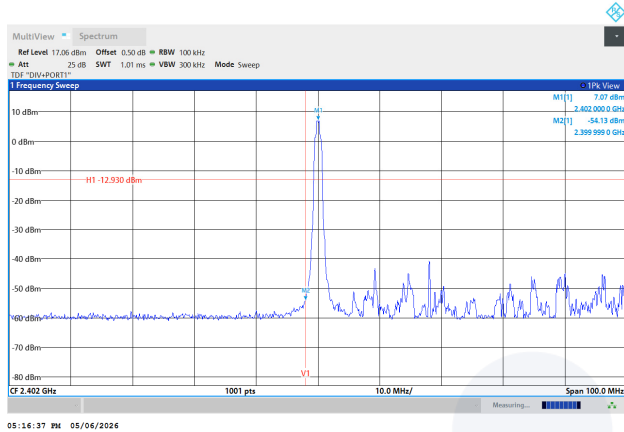


Conducted spurious / High ch.

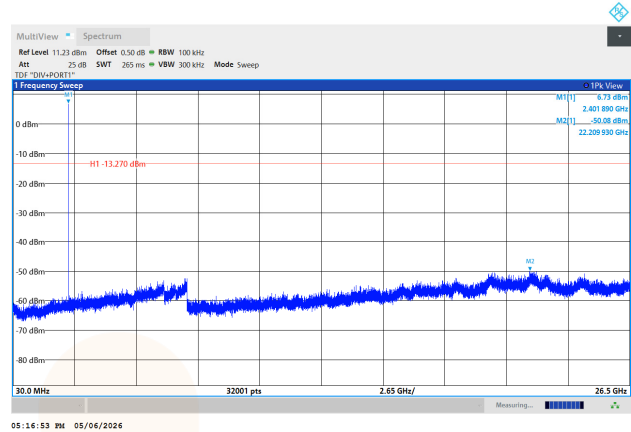


8DPSK

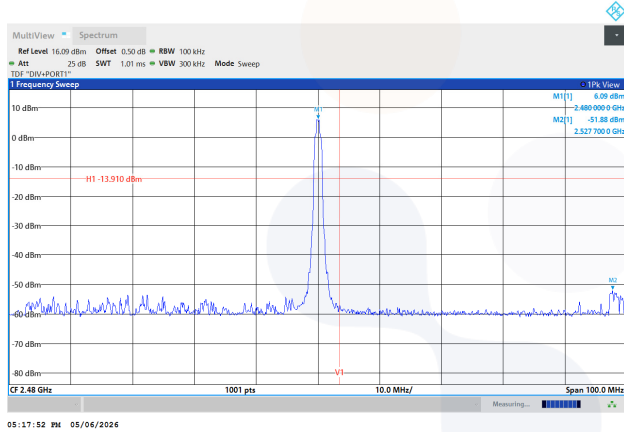
Conducted band-edge / Low ch



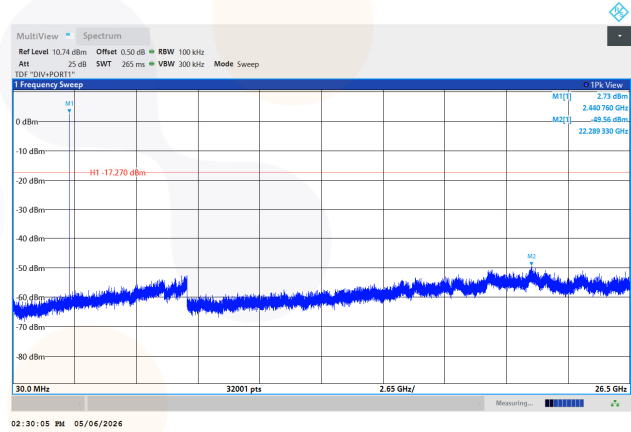
Conducted spurious / Low ch.



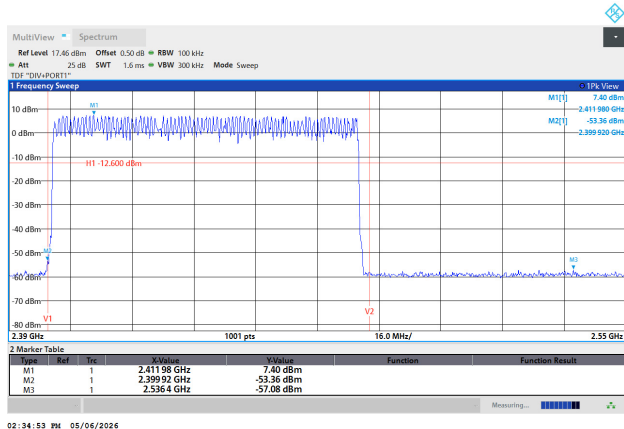
Conducted band-edge / High ch.



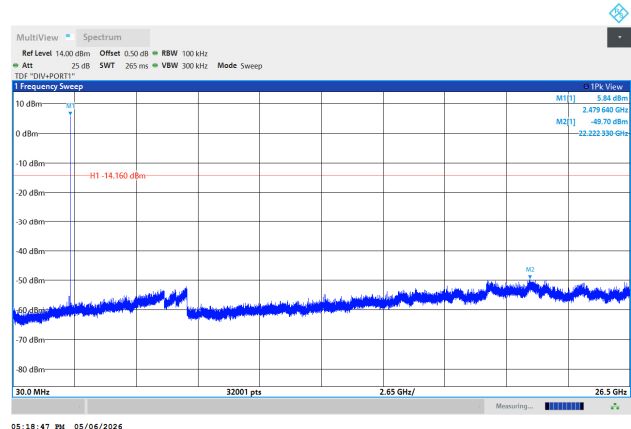
Conducted spurious / Mid ch.



Conducted band-edge / Hopping ch.

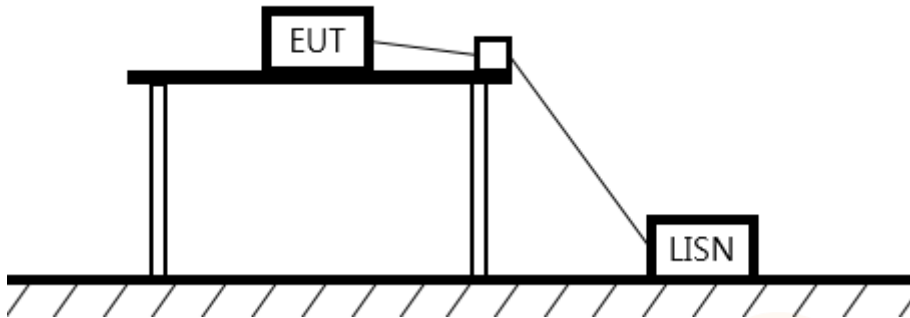


Conducted spurious / High ch.



7.8. AC Conducted Emission

Test setup



Limit

According to 15.207(a),

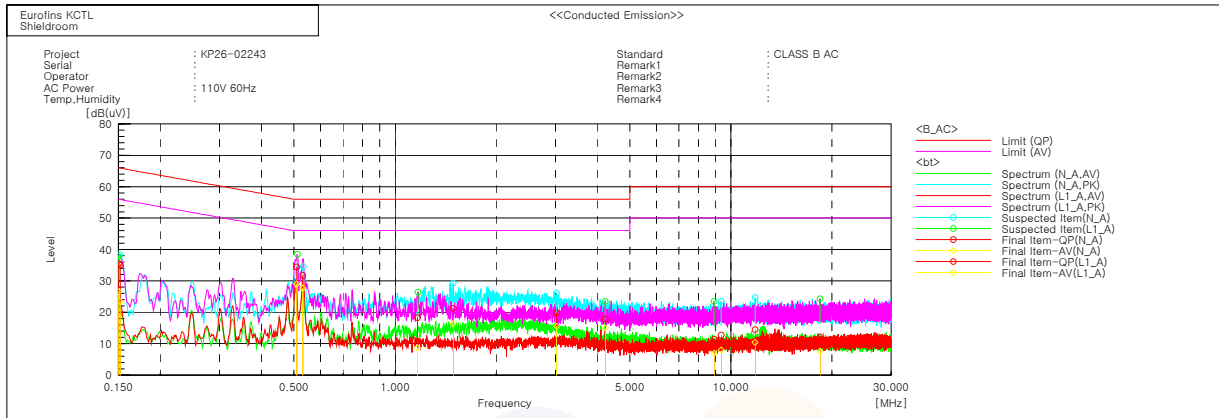
For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured 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: 8DPSK_2 480 MHz



Final Result

--- N_A Phase ---

No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]
1	0.15175	25.0	13.3	10.1	35.1	23.4	65.9	55.9	30.8	32.5
2	0.53092	21.6	17.5	10.2	31.8	27.7	56.0	46.0	24.2	18.3
3	1.4901	11.3	6.3	10.0	21.3	16.3	56.0	46.0	34.7	29.7
4	3.02761	9.9	5.6	9.9	19.8	15.5	56.0	46.0	36.2	30.5
5	9.35291	2.1	-2.6	10.6	12.7	8.0	60.0	50.0	47.3	42.0
6	11.80842	3.7	-0.4	10.8	14.5	10.4	60.0	50.0	45.5	39.6

--- L1_A Phase ---

No.	Frequency	Reading QP	Reading CAV	c.f	Result QP	Result CAV	Limit QP	Limit AV	Margin QP	Margin CAV
	[MHz]	[dB(uV)]	[dB(uV)]	[dB]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB(uV)]	[dB]	[dB]
1	0.15045	25.5	16.4	10.1	35.6	26.5	66.0	56.0	30.4	29.5
2	0.50923	24.3	18.8	10.2	34.5	29.0	56.0	46.0	21.5	17.0
3	1.16624	8.3	-1.3	10.0	18.3	8.7	56.0	46.0	37.7	37.3
4	4.22576	7.9	5.1	9.9	17.8	15.0	56.0	46.0	38.2	31.0
5	8.91012	1.0	-3.6	10.5	11.5	6.9	60.0	50.0	48.5	43.1
6	18.42493	1.0	-3.5	11.1	12.1	7.6	60.0	50.0	47.9	42.4

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Horn antenna	ETS.lindgren	3117	00251528	27.01.23
Amplifier	B&Z Technologies	BZR-0050400-551028-252525	27736	27.04.27
Amplifier	Narda-MITEQ	LNAS-55-01001800-22-10p	2265313	27.01.15
Attenuator	Pasternack	PE7090-10	1928	27.01.12
High pass Filter	WT	WT-A1699-HS	WT160411001	27.04.23
High pass Filter	WT	WT-A1699-HS	WT160411002	27.04.23
Spectrum Analyzer	R&S	FSV40	100989	26.09.29
Signal Generator	R&S	SMB100A	176206	27.01.15
Antenna Mast	Innco Systems	MA4640-XP-ET	MA4000/396/30810213/L	-
Controller	Innco Systems	CO3000	1175/45850319/P	-
TWO-LINE V - NETWORK	R&S	ENV216	101358	27.04.21
EMI TEST RECEIVER	R&S	ESCI3	100001	26.08.11
Bluetooth Tester	TESCOM	TC-3000C	3000C000270	27.04.24
Spectrum Analyzer	R&S	FSV3030	102317	26.11.25
DC Power Supply	AGILENT	E3632A	MY40008800	27.04.23
Attenuator	HUBER+SUHNER	6610_SK-50-1/199_NE	ATT11	26.07.07
Power Sensor	R&S	NRP-Z81	1137.9009.02-106223-bB	27.04.24
Bluetooth Tester	TESCOM	TC-3000B	3000B64005	27.01.15
Spectrum Analyzer	R&S	FSV40	100988	27.04.06
Amplifier	SONOMA INSTRUMENT	310N	421910	26.07.01
Bi-log Antenna	Teseq GmbH	CBL 6112D	61521	26.12.11
Loop Antenna	R&S	HFH2-Z2	100355	26.06.25
DC Power Supply	POWERCOM	DCP-50100A	20220610-01	27.01.16
Vector Signal Generator	R&S	SMBV100A	257566	26.07.01
AC/DC Power Supply	KIKUSUI	PCR2000W	GB001619	27.04.23
Controller	INNCO SYSTEMS	CO3000	1442/54370322/P	-
Antenna Mast	INNCO SYSTEMS	MA4640-XP-ET	AM002	-
Turn Device	INNCO SYSTEMS	DS1200-S-1t	0001	-

End of test report