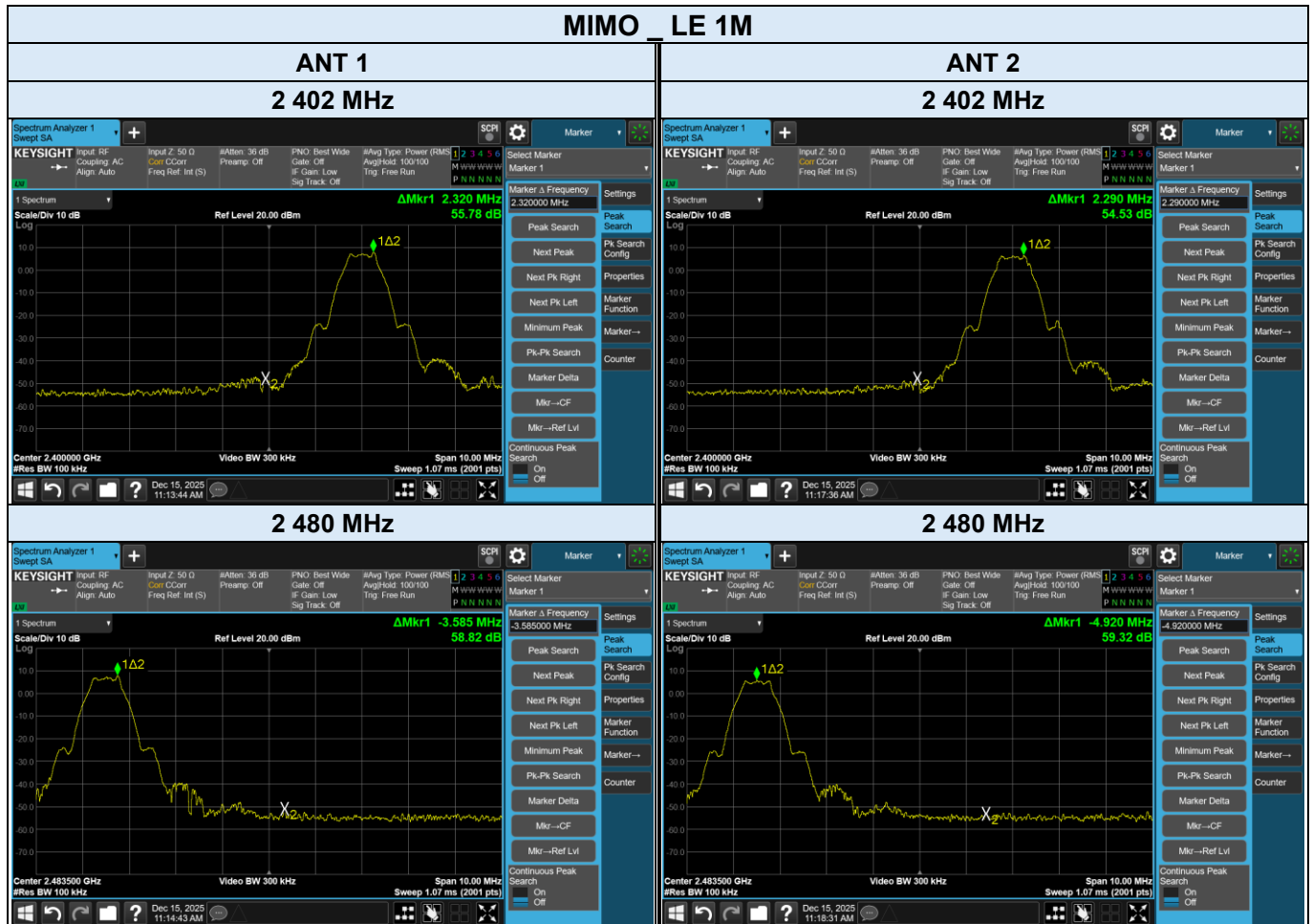
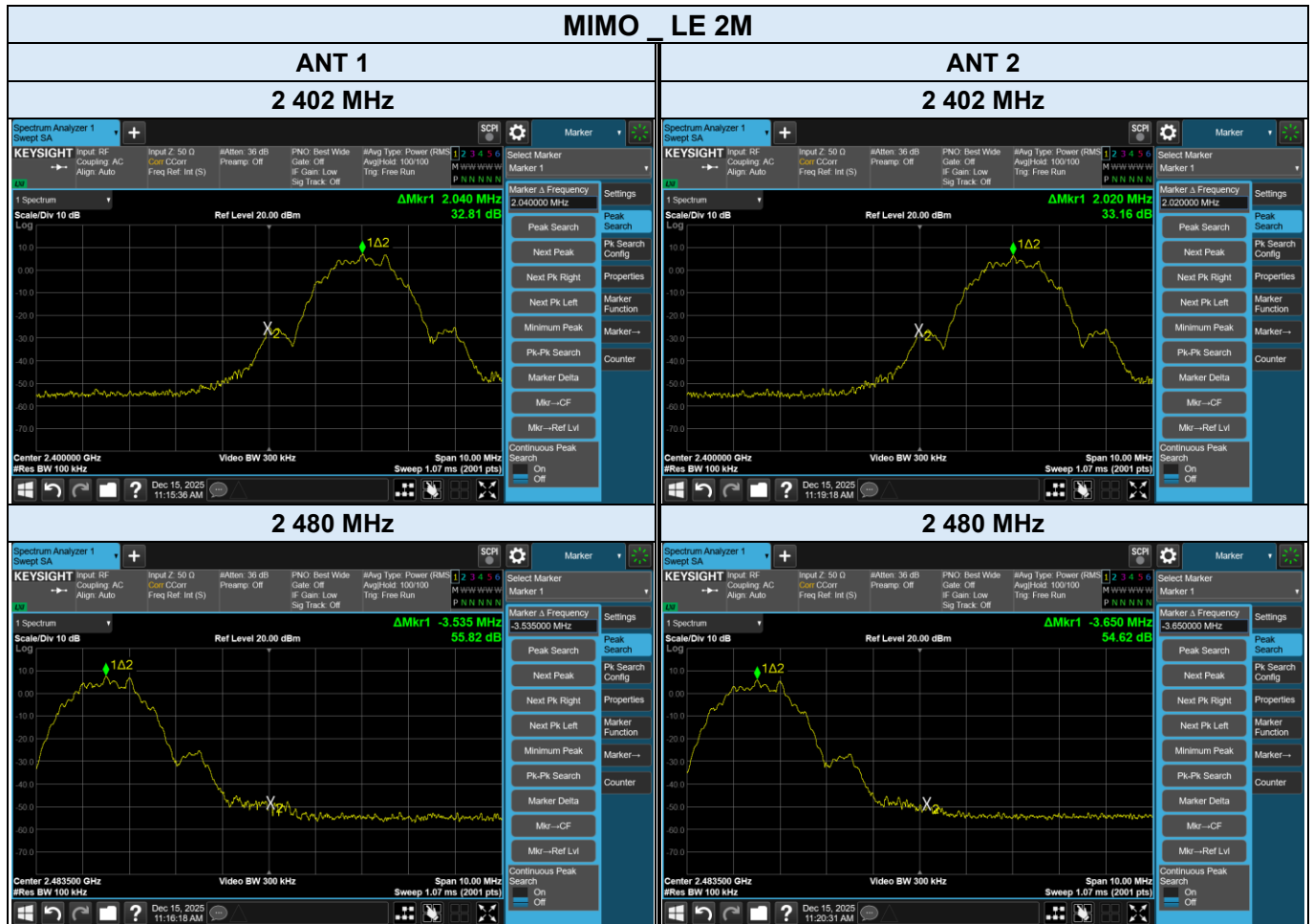
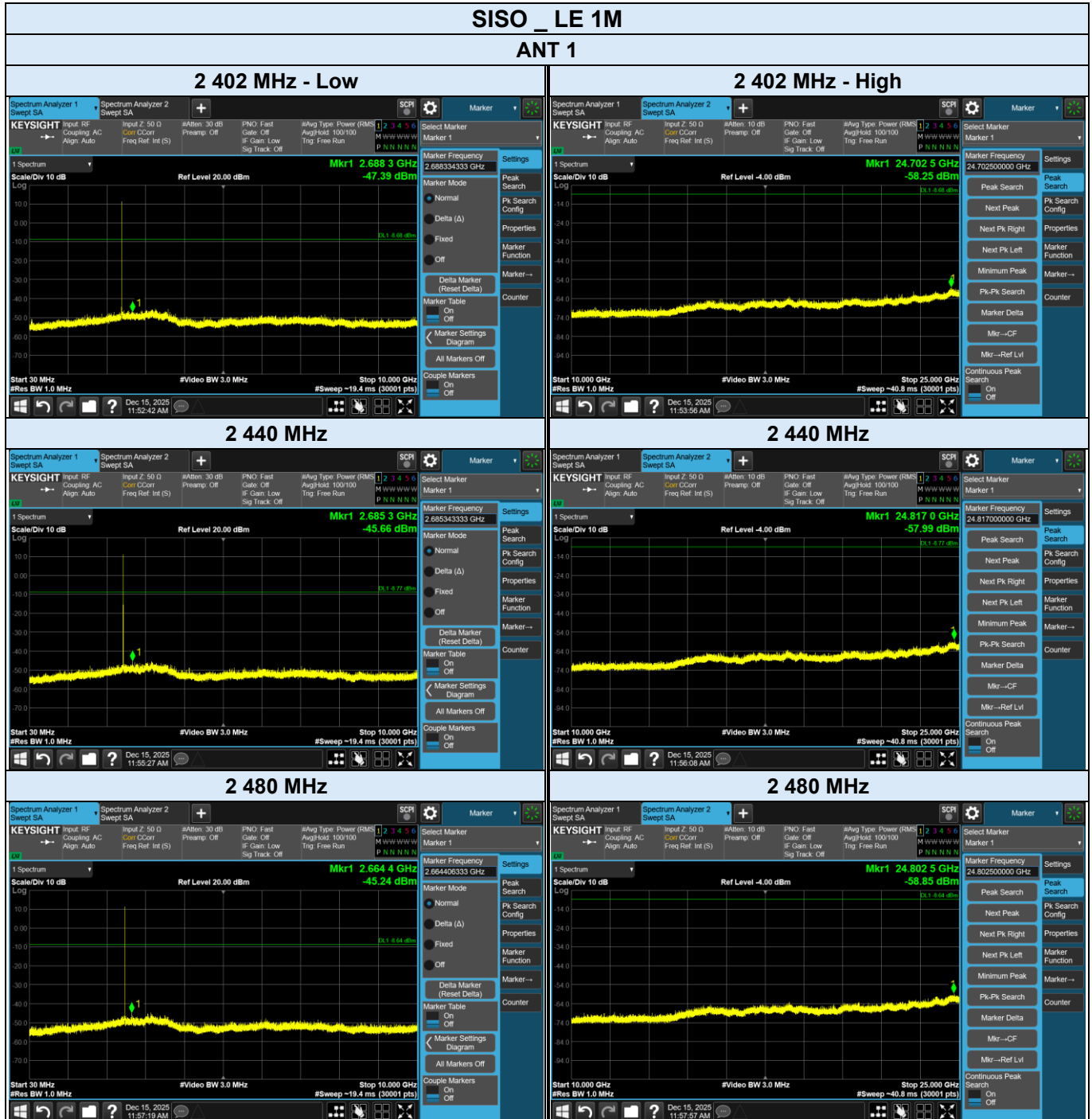








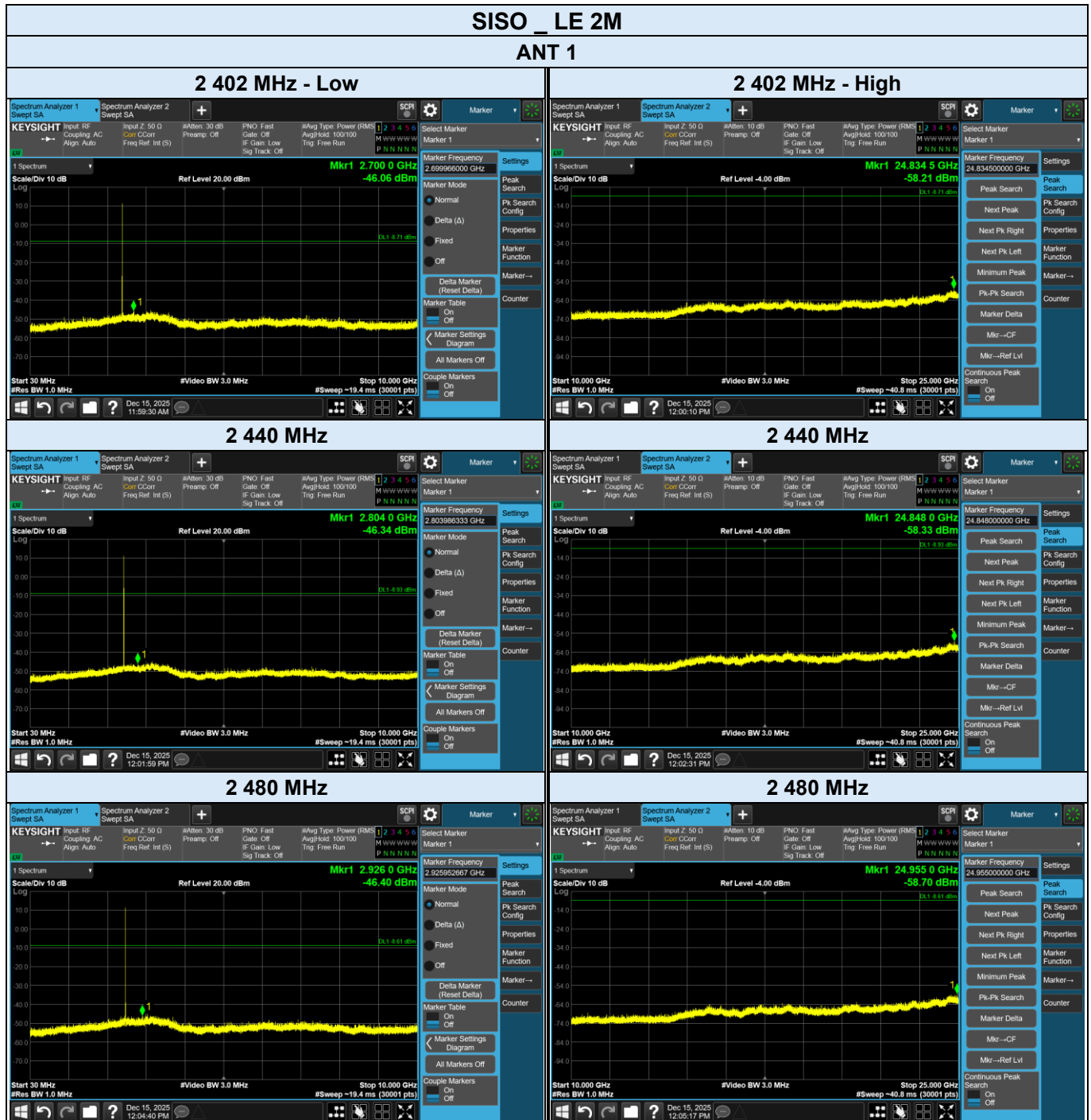
[Test Plot of Spurious Emission]





ANT 2



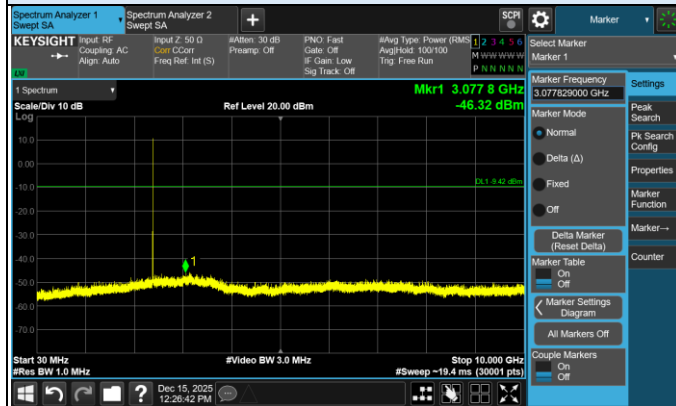




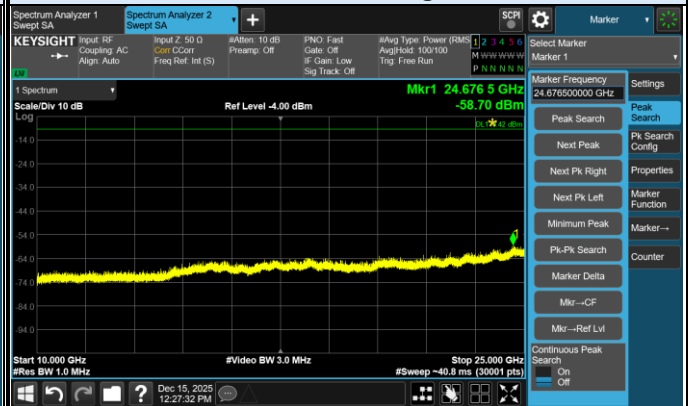
SISO_LE 2M

ANT 2

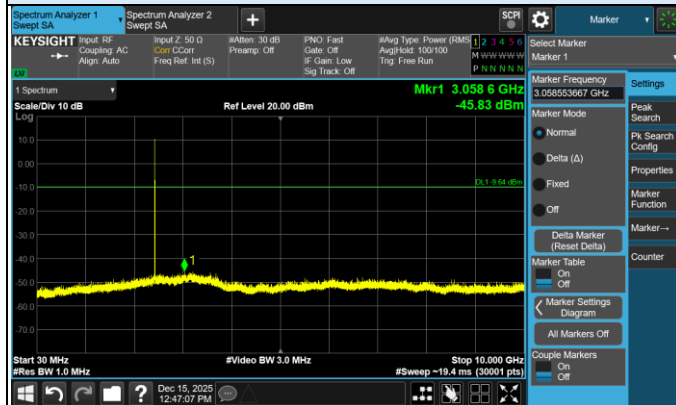
2 402 MHz - Low



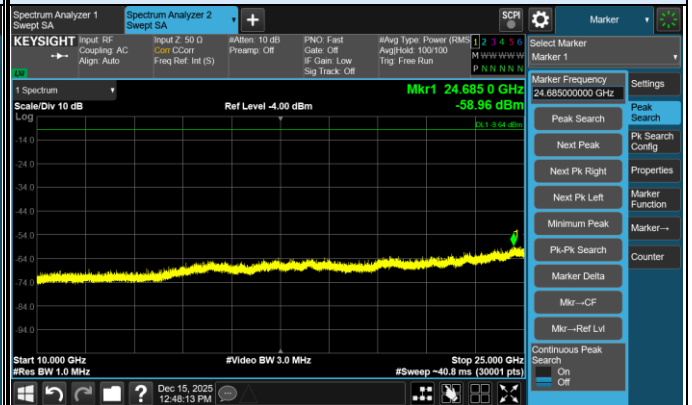
2 402 MHz - High



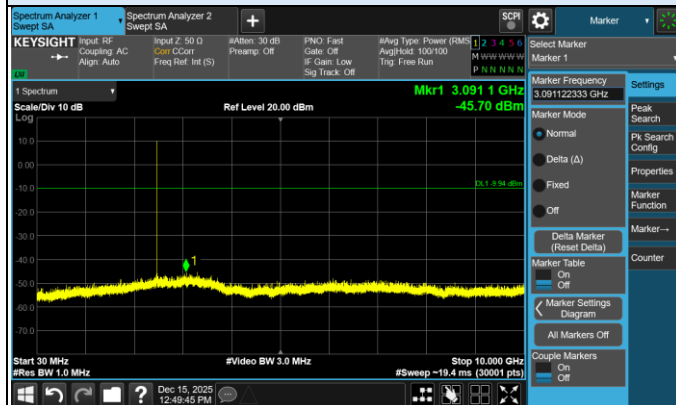
2 440 MHz



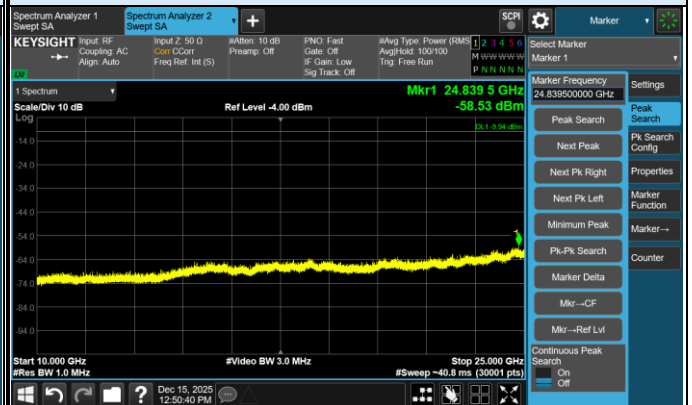
2 440 MHz



2 480 MHz



2 480 MHz

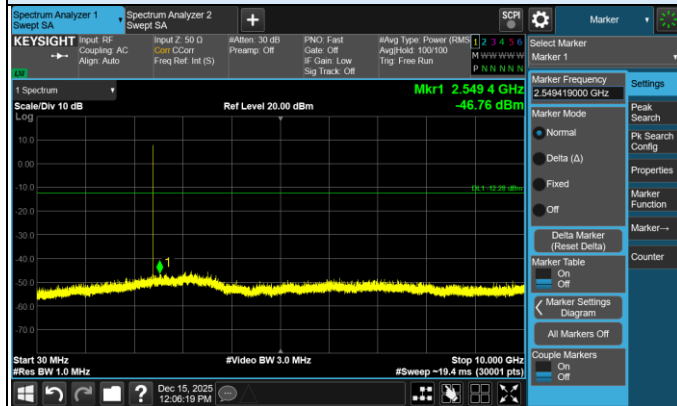




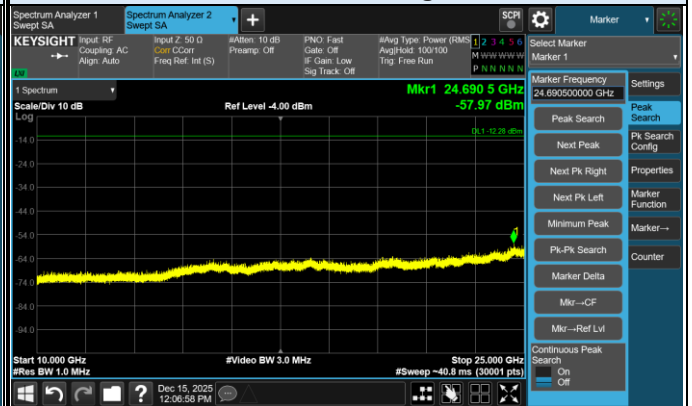
SISO_LE 125k

ANT 1

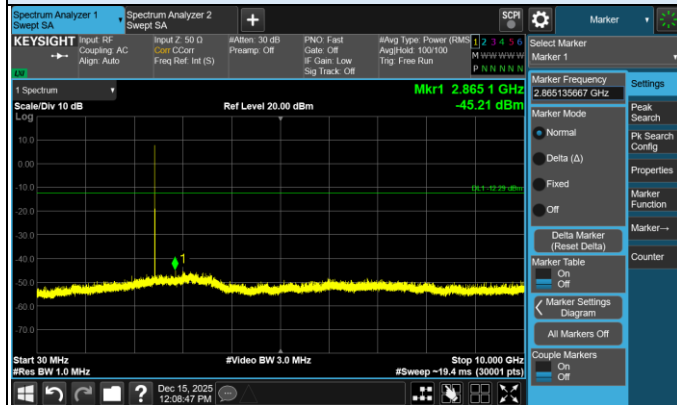
2 402 MHz - Low



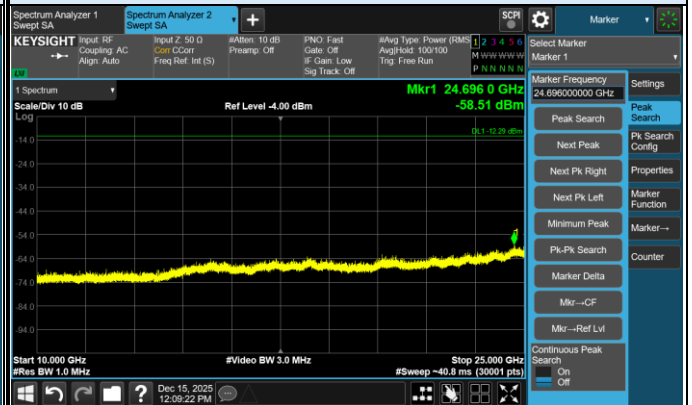
2 402 MHz - High



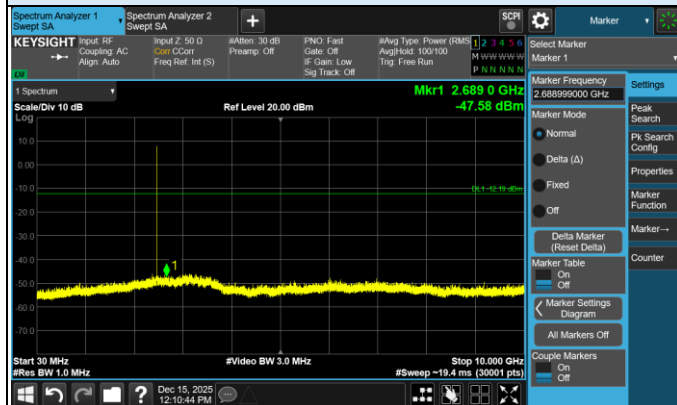
2 440 MHz



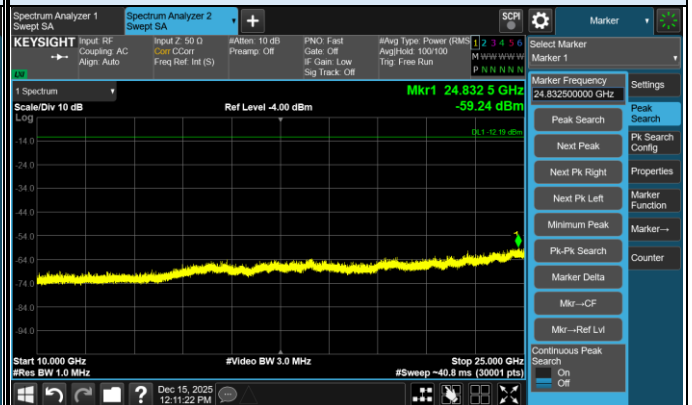
2 440 MHz



2 480 MHz



2 480 MHz

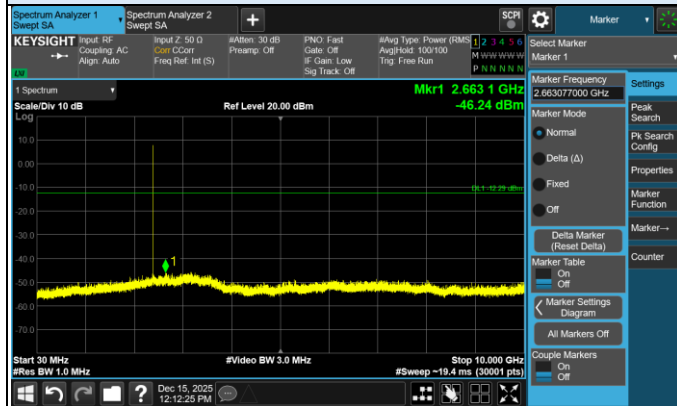




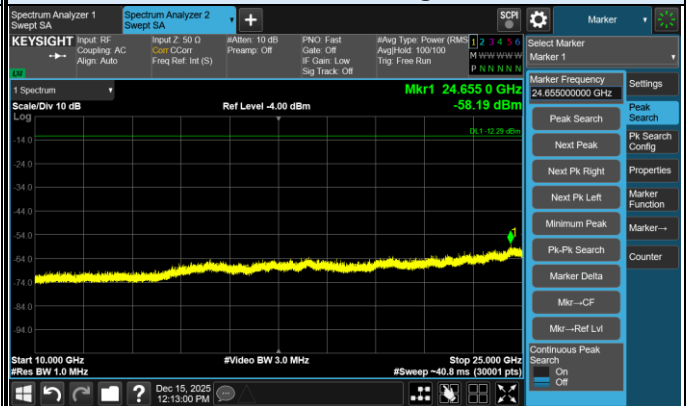
SISO_LE 500k

ANT 1

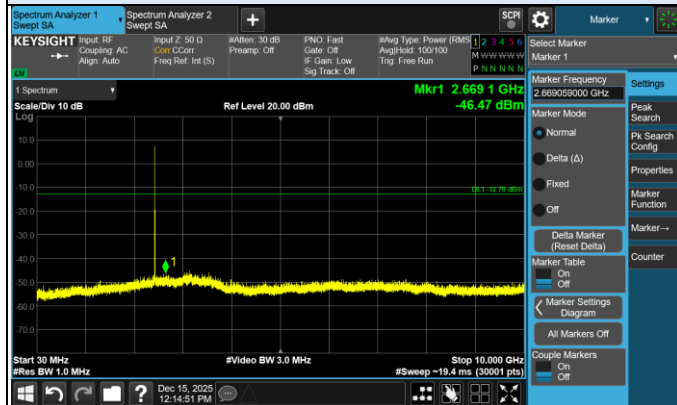
2 402 MHz - Low



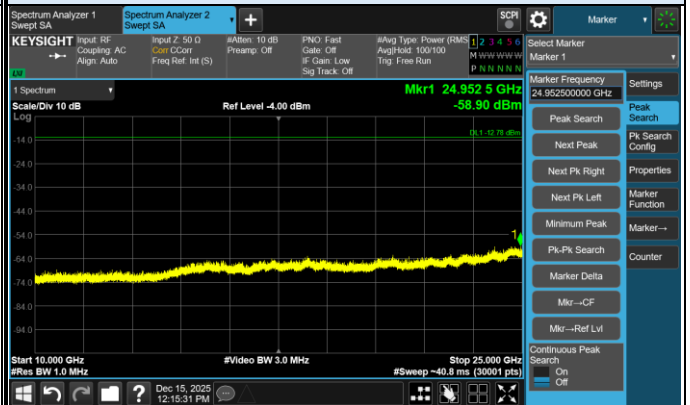
2 402 MHz - High



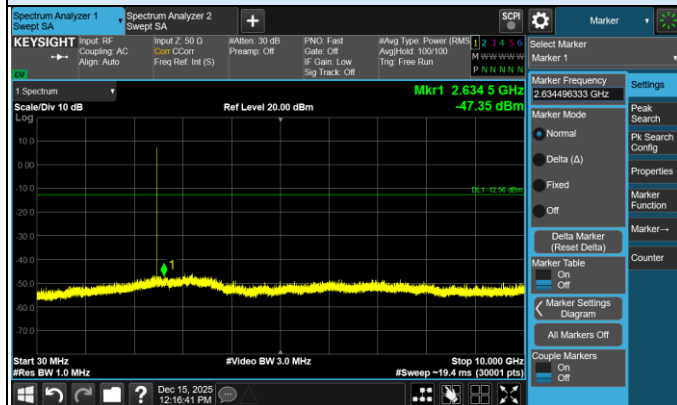
2 440 MHz



2 440 MHz



2 480 MHz



2 480 MHz



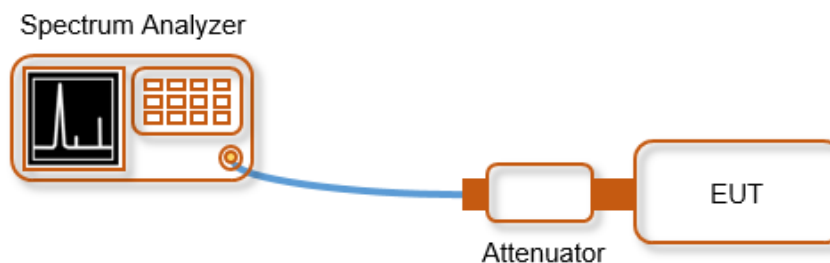
3.6 Duty Cycle

3.6.1 Test Procedure

Duty Cycle $[X = \text{On Time} / (\text{On} + \text{Off time})]$ is measured using Measurement Procedure of KDB789033 D02v02r01

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW $\geq$ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW $\geq$ RBW. Set detector = peak.
3. Note : The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$, where T is defined in section II.B.1.a), and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if $T \leq 16.7$ microseconds.) T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
(T = On time of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

3.6.2 Test Setup



3.6.3 Test Result

Test Mode	Pulse Width [ms]	Period [ms]	Duty Cycle [D]	DCCF [dB]
LE 1M	2.132	3.12	68.33	1.65
LE 2M	1.077	2.496	43.15	3.65
LE 125k	17.05	18.12	94.09	0.26
LE 500k	4.556	5.622	81.04	0.91



3.7 Spurious Emission, Band edge and Restricted Bands

3.7.1 Regulation

§15.209(a) : Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/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
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

§15.205(a) : Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

²Above 38.6



§15.205 (b) : Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

FCC Part 15.247 (d) : 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 30 dB instead of 20 dB. 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)).

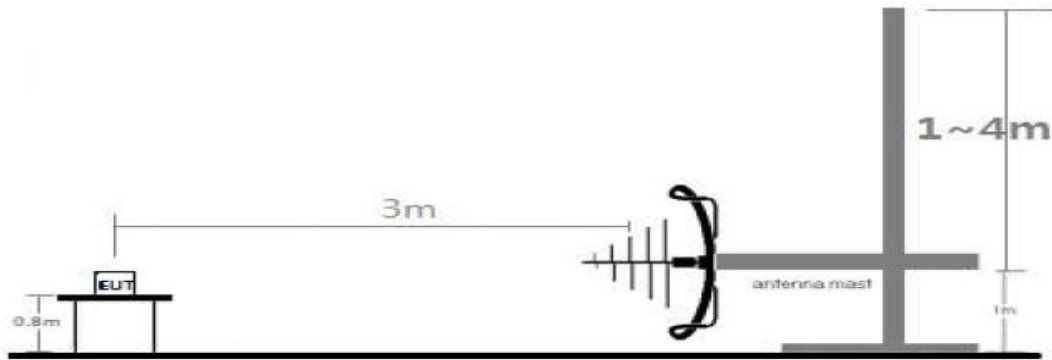
3.7.2 Test Procedure

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1m or 3 m away from the receiving antenna, which is varied from 1m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

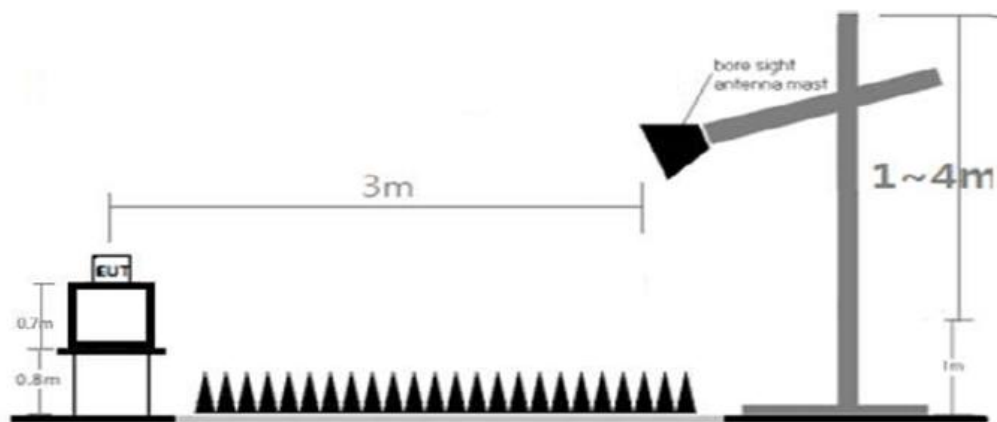
Radiated spurious emission measured using following Measurement Procedure of ANSI C63.10-2020



3.7.3 Test Setup



[Radiated Emission Test Setup Below 1 GHz]



[Radiated Emission Test Setup Above 1 GHz]

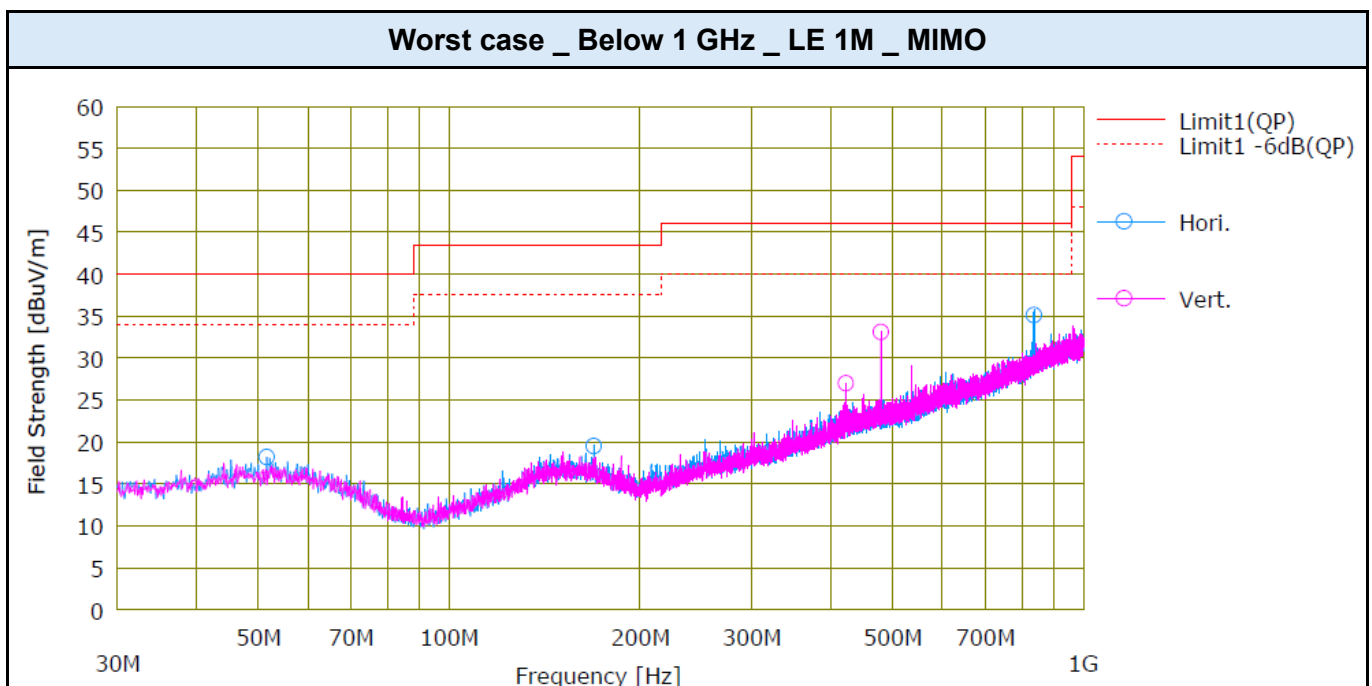
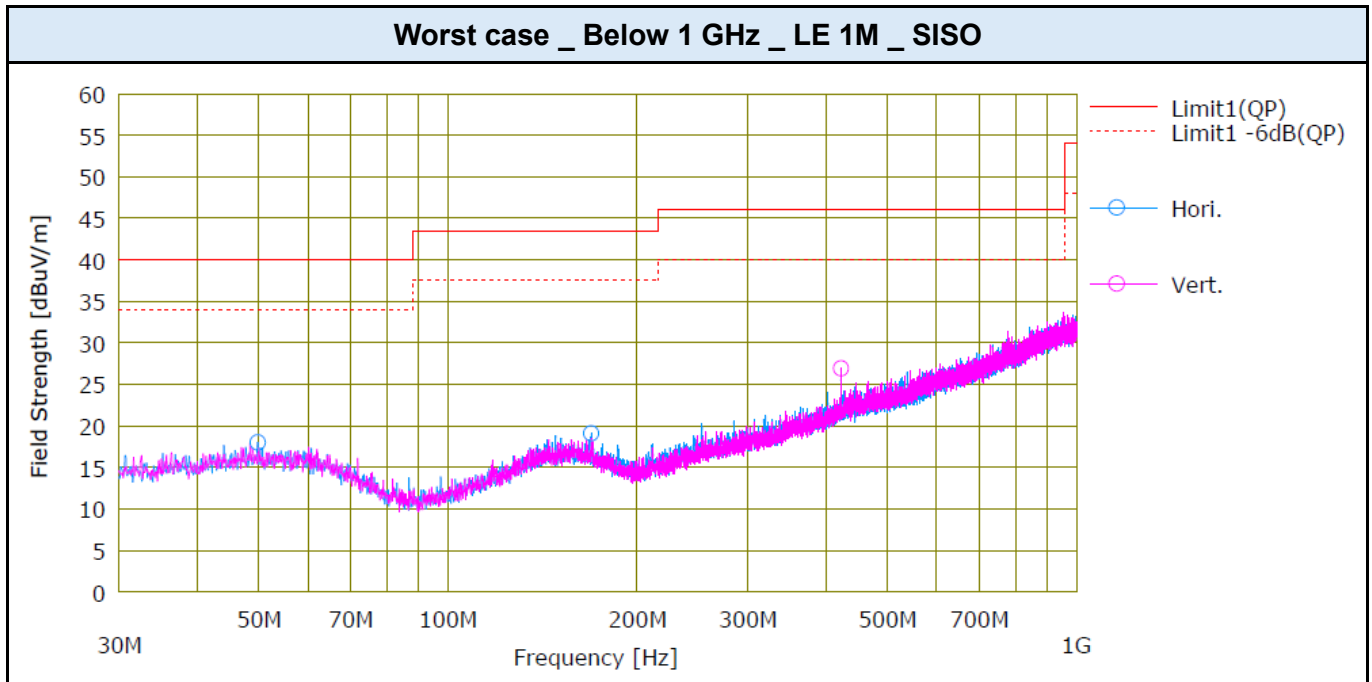


3.7.4 Test Result of Radiated Spurious Emission

Remarks

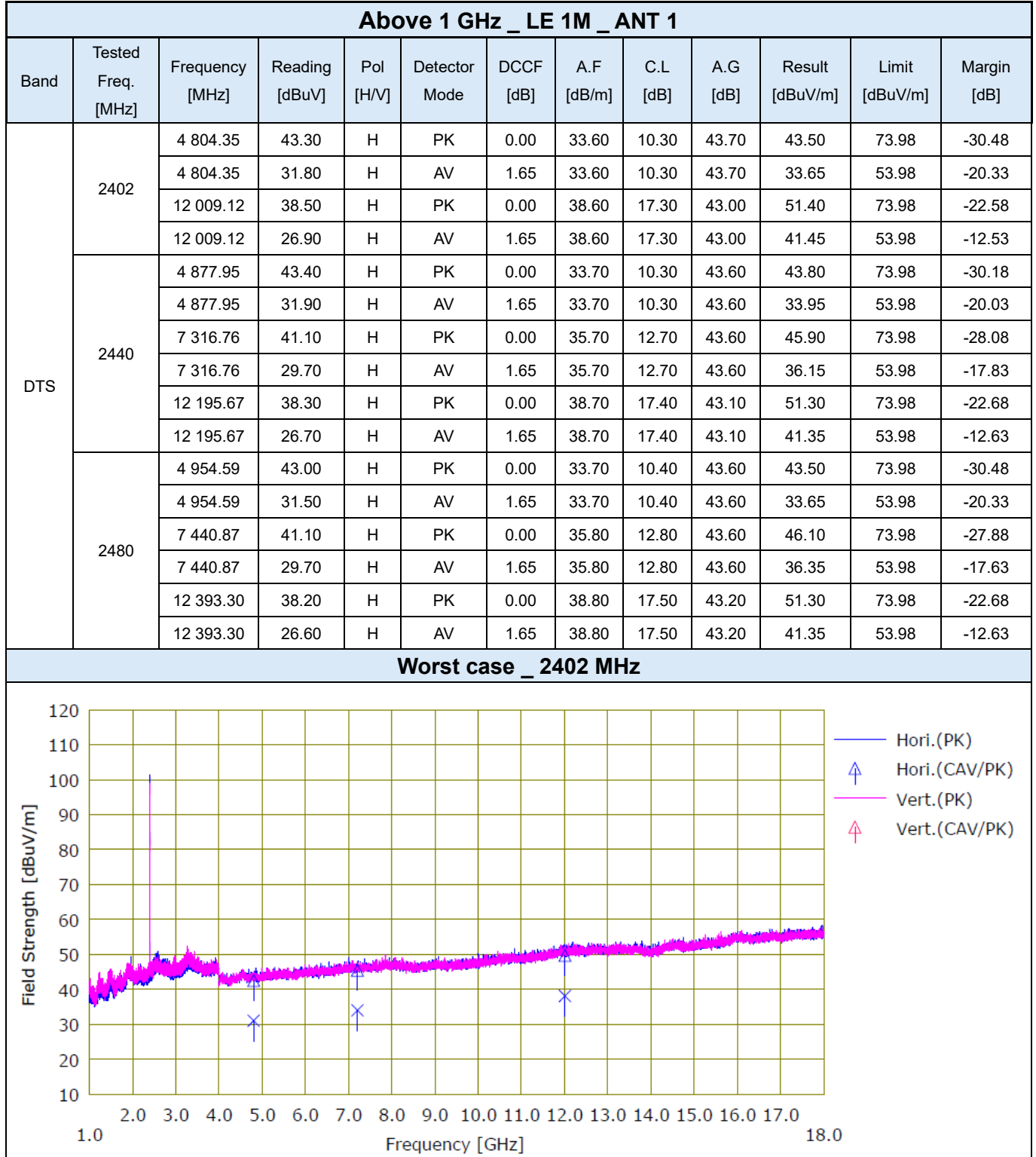
1. Result(dBμV/m) = Reading Value(dBμV) + A.F(dB/m) + C.L - A.G(dB) + DCCF(dB)
2. A.F = Antenna Factor(dB/m) / C.L = Cable Loss(dB) / A.G = Amplifier Gain(dB)
3. Margin(dB) = Result (dBμV/m) – Limit (dBμV/m)
4. Measurement Distance = 3 m.
6. DCCF = Duty Cycle Correction Factor.
7. No other spurious and harmonic emissions were found greater than listed emissions on above table
8. If the measured peak value satisfies the AVG LIMIT, the AVG value was not written.

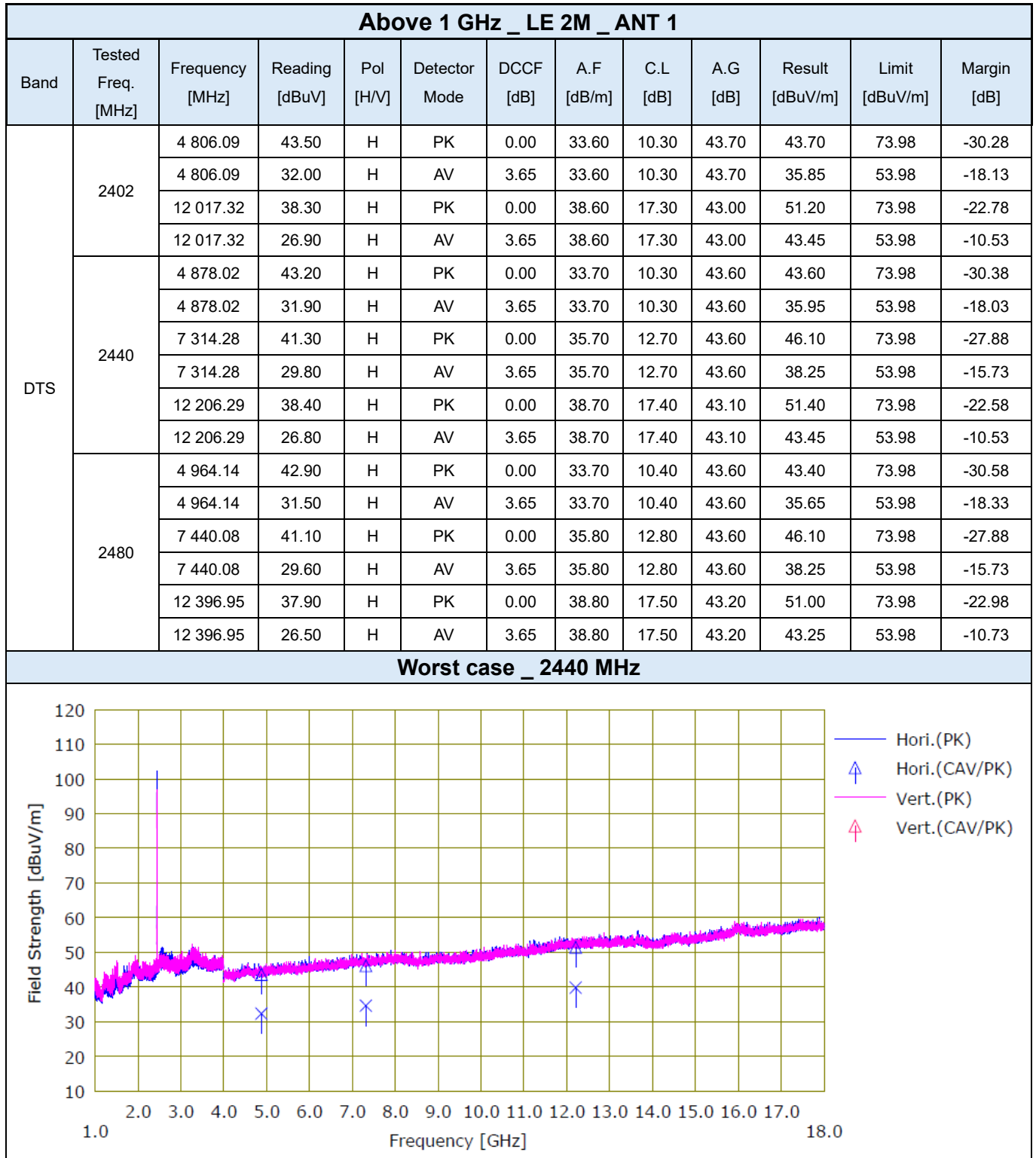
3.7.4.1 Radiated Emissions (Below 1 GHz)





3.7.4.2 Radiated Emissions (1 GHz to 18 GHz)



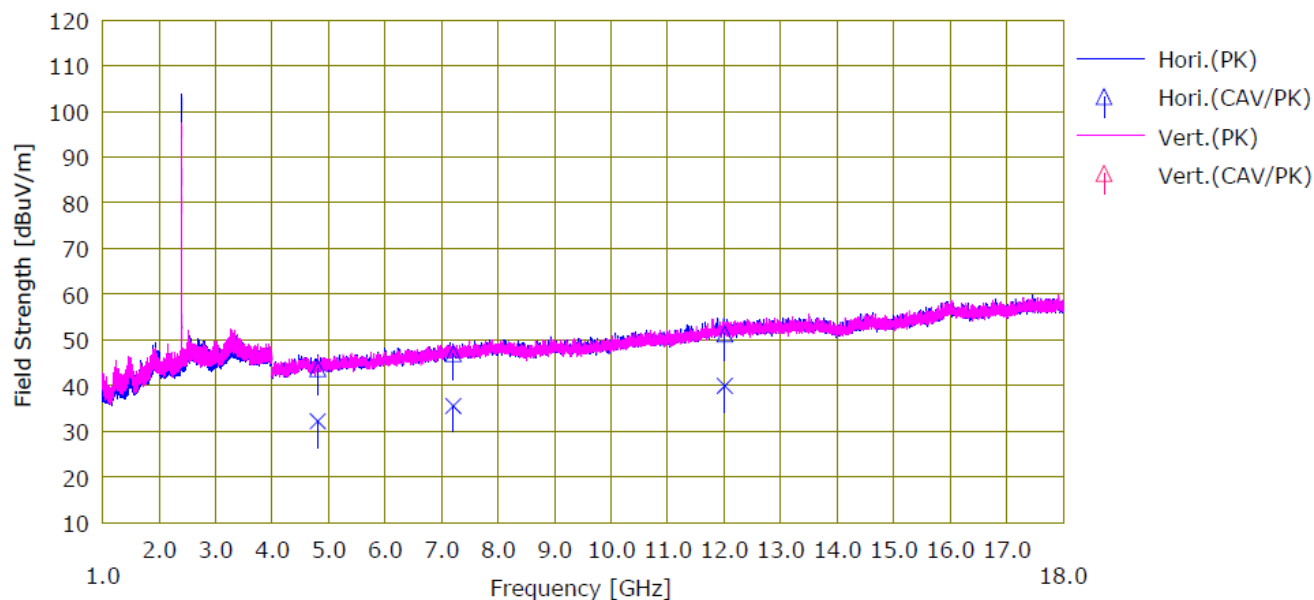




Above 1 GHz _ LE 1M _ ANT 2

Band	Tested Freq. [MHz]	Frequency [MHz]	Reading [dBuV]	Pol [H/V]	Detector Mode	DCCF [dB]	A.F [dB/m]	C.L [dB]	A.G [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
DTS	2402	4 807.96	43.40	H	PK	0.00	33.60	10.30	43.70	43.60	73.98	-30.38
		4 807.96	31.90	H	AV	1.65	33.60	10.30	43.70	33.75	53.98	-20.23
		12 013.91	38.40	H	PK	0.00	38.60	17.30	43.00	51.30	73.98	-22.68
		12 013.91	27.00	H	AV	1.65	38.60	17.30	43.00	41.55	53.98	-12.43
	2440	4 875.05	43.30	H	PK	0.00	33.70	10.30	43.60	43.70	73.98	-30.28
		4 875.05	31.80	H	AV	1.65	33.70	10.30	43.60	33.85	53.98	-20.13
		7 322.96	43.30	H	PK	0.00	35.70	12.70	43.60	48.10	73.98	-25.88
		7 322.96	29.80	H	AV	1.65	35.70	12.70	43.60	36.25	53.98	-17.73
		12 197.40	38.00	H	PK	0.00	38.70	17.40	43.10	51.00	73.98	-22.98
		12 197.40	26.60	H	AV	1.65	38.70	17.40	43.10	41.25	53.98	-12.73
	2480	4 960.46	43.40	H	PK	0.00	33.70	10.40	43.60	43.90	73.98	-30.08
		4 960.46	31.90	H	AV	1.65	33.70	10.40	43.60	34.05	53.98	-19.93
		7 444.24	41.50	H	PK	0.00	35.80	12.80	43.60	46.50	73.98	-27.48
		7 444.24	29.90	H	AV	1.65	35.80	12.80	43.60	36.55	53.98	-17.43
		12 399.73	37.80	H	PK	0.00	38.80	17.50	43.20	50.90	73.98	-23.08
		12 399.73	26.40	H	AV	1.65	38.80	17.50	43.20	41.15	53.98	-12.83

Worst case _ 2402 MHz

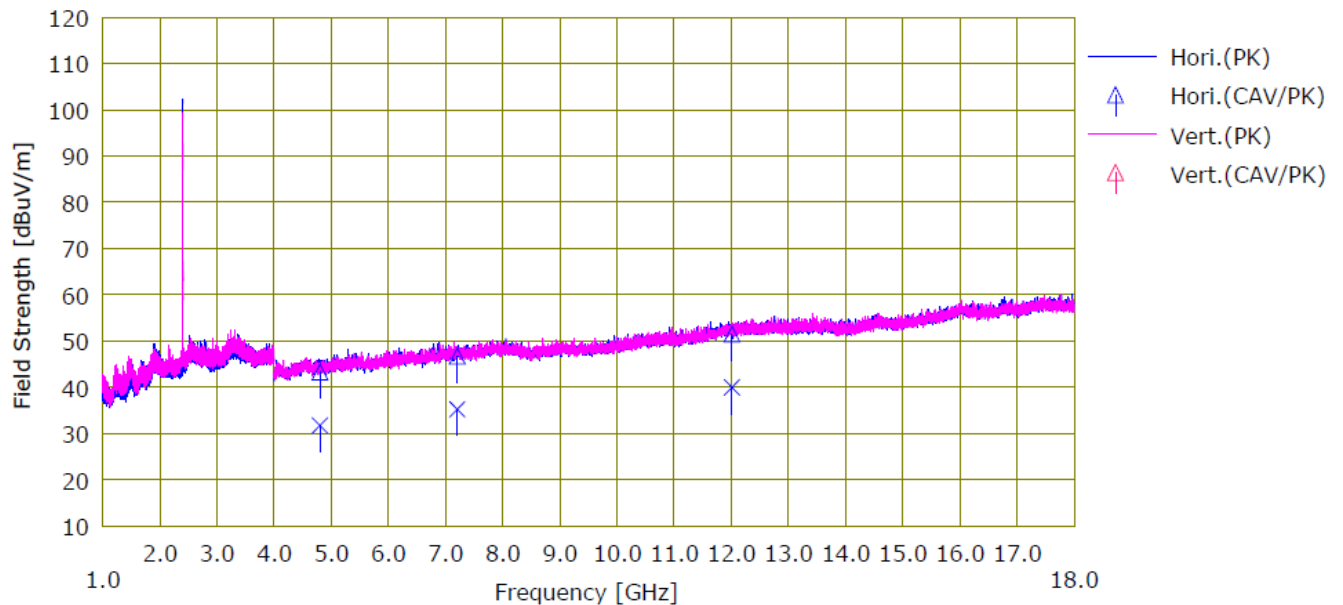


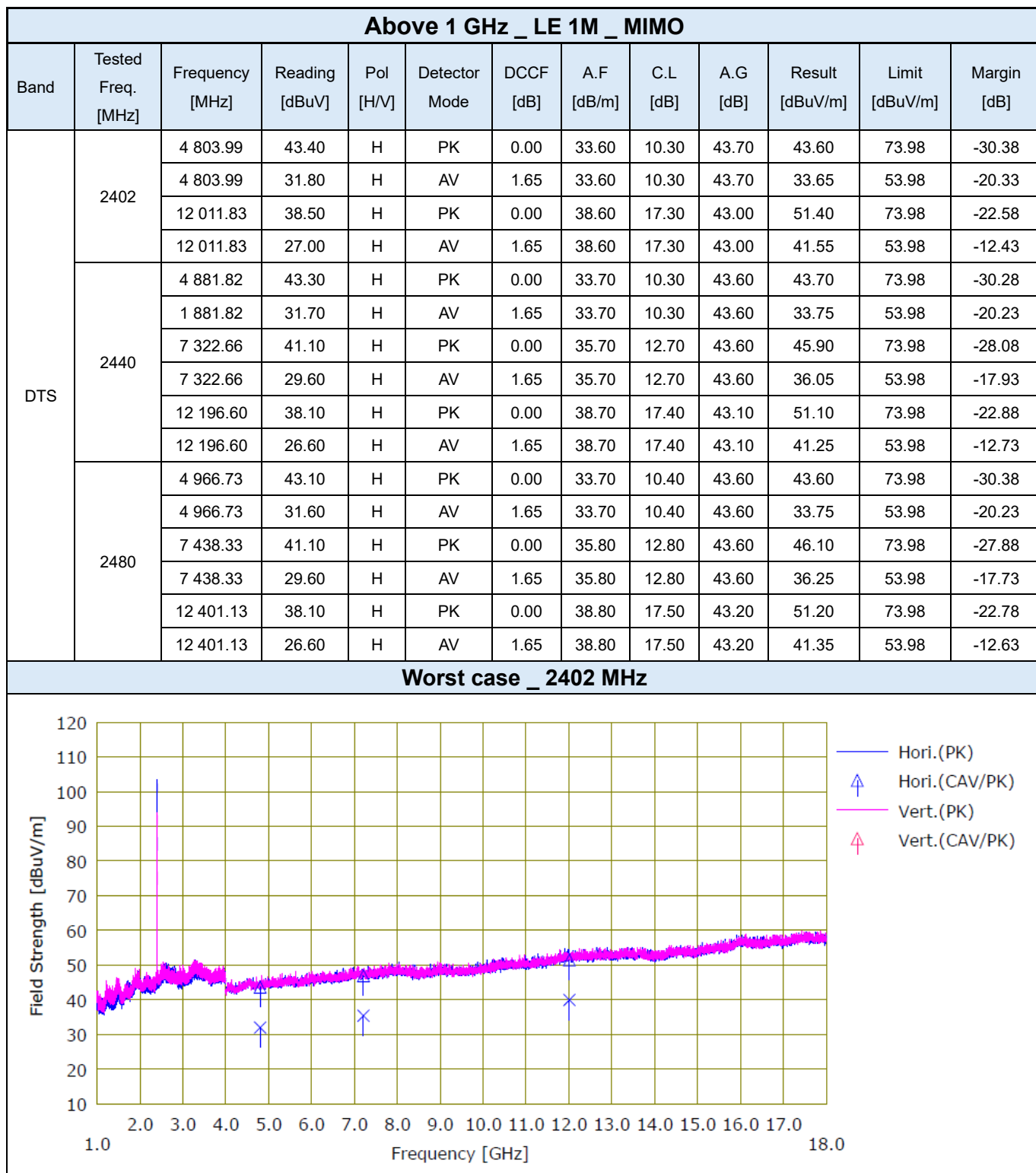


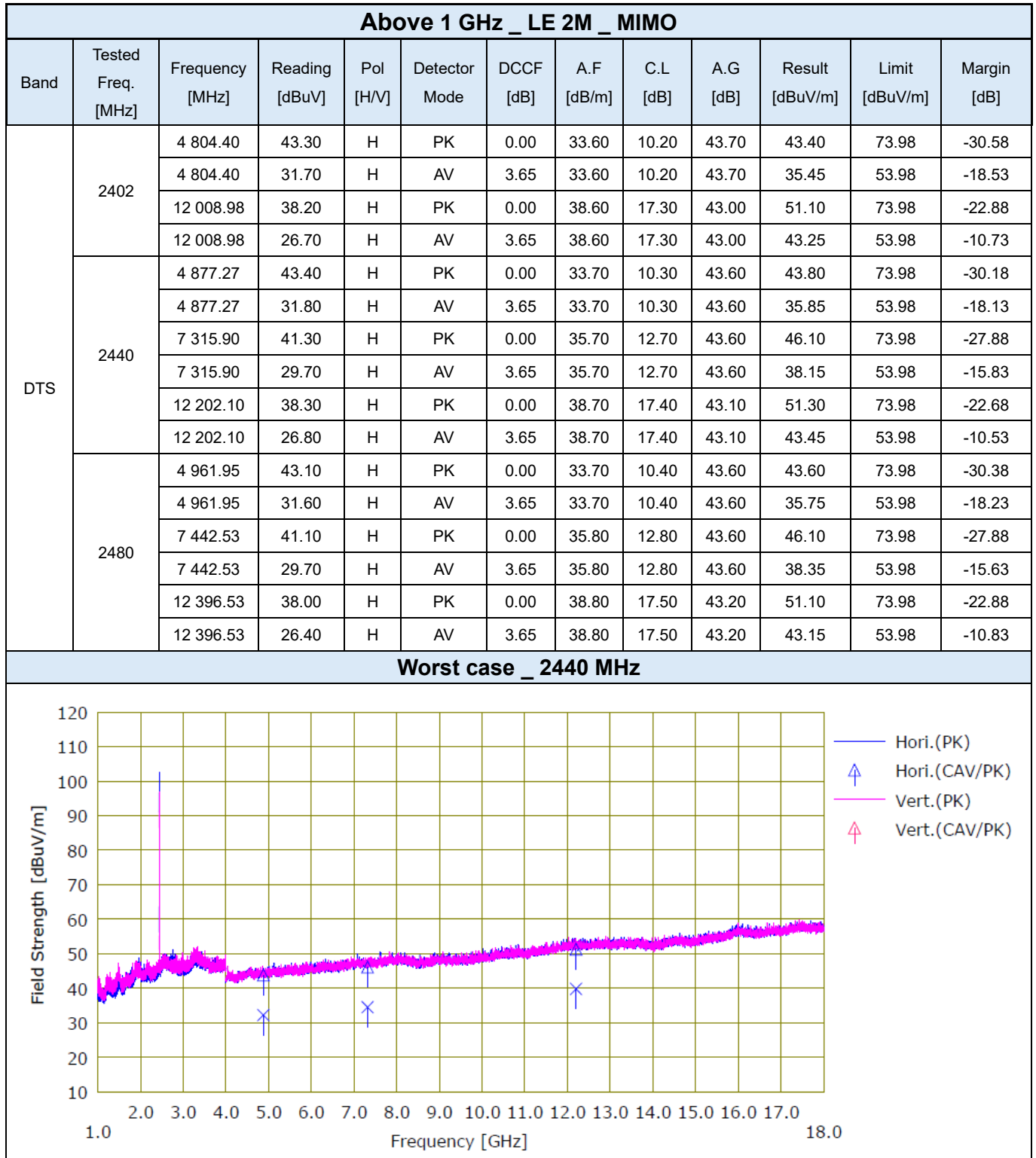
Above 1 GHz _ LE 2M _ ANT 2

Band	Tested Freq. [MHz]	Frequency [MHz]	Reading [dBuV]	Pol [H/V]	Detector Mode	DCCF [dB]	A.F [dB/m]	C.L [dB]	A.G [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
DTS	2402	4 802.70	43.20	H	PK	0.00	33.60	10.20	43.70	43.30	73.98	-30.68
		4 802.70	31.60	H	AV	3.65	33.60	10.20	43.70	35.35	53.98	-18.63
		12 011.60	38.60	H	PK	0.00	38.60	17.30	43.00	51.50	73.98	-22.48
		12 011.60	27.10	H	AV	3.65	38.60	17.30	43.00	43.65	53.98	-10.33
	2440	4 879.09	43.30	H	PK	0.00	33.70	10.30	43.60	43.70	73.98	-30.28
		4 879.09	31.80	H	AV	3.65	33.70	10.30	43.60	35.85	53.98	-18.13
		7 321.01	41.20	H	PK	0.00	35.70	12.70	43.60	46.00	73.98	-27.98
		7 321.01	29.70	H	AV	3.65	35.70	12.70	43.60	38.15	53.98	-15.83
		12 203.13	38.50	H	PK	0.00	38.70	17.40	43.10	51.50	73.98	-22.48
		12 203.13	26.80	H	AV	3.65	38.70	17.40	43.10	43.45	53.98	-10.53
	2480	4 962.11	43.10	H	PK	0.00	33.70	10.40	43.60	43.60	73.98	-30.38
		4 962.11	31.70	H	AV	3.65	33.70	10.40	43.60	35.85	53.98	-18.13
		7 439.08	41.10	H	PK	0.00	35.80	12.80	43.60	46.10	73.98	-27.88
		7 439.08	29.60	H	AV	3.65	35.80	12.80	43.60	38.25	53.98	-15.73
		12 402.16	38.20	H	PK	0.00	38.80	17.50	43.20	51.30	73.98	-22.68
		12 402.16	26.70	H	AV	3.65	38.80	17.50	43.20	43.45	53.98	-10.53

Worst case _ 2402 MHz

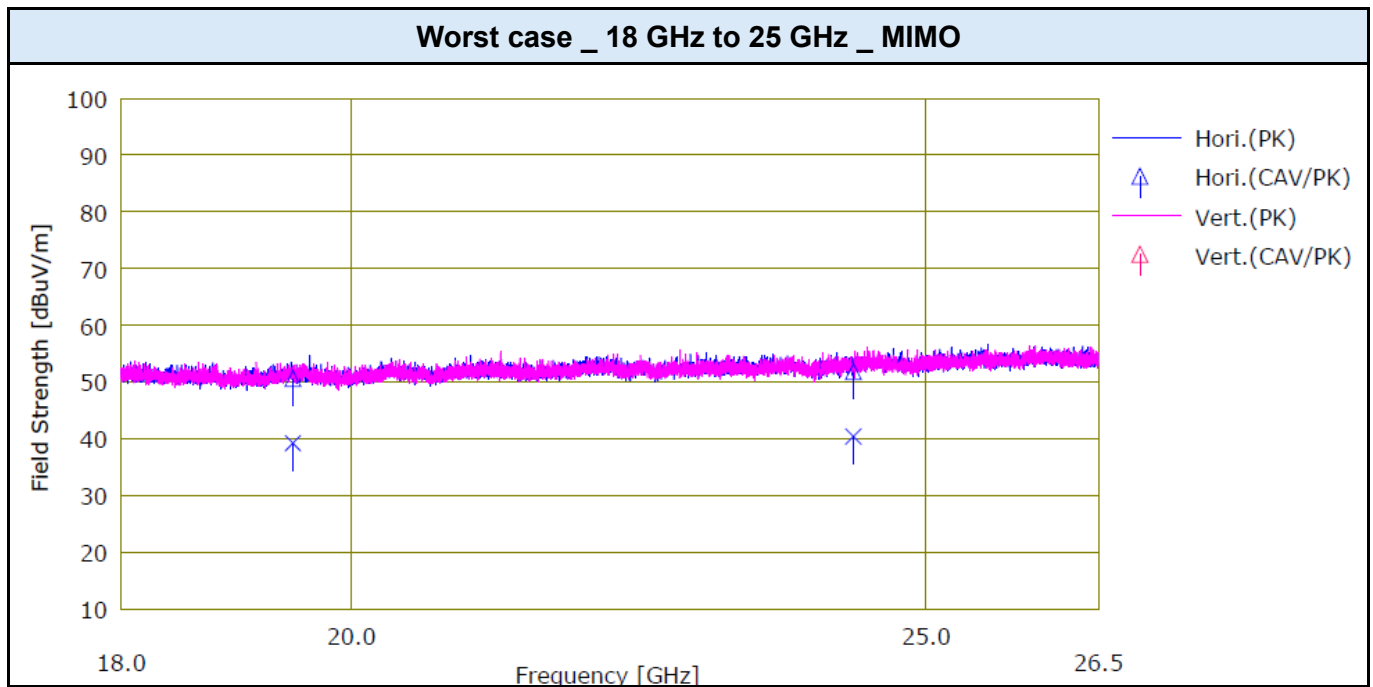








3.7.4.3 Radiated Emissions (18 GHz to 25 GHz).

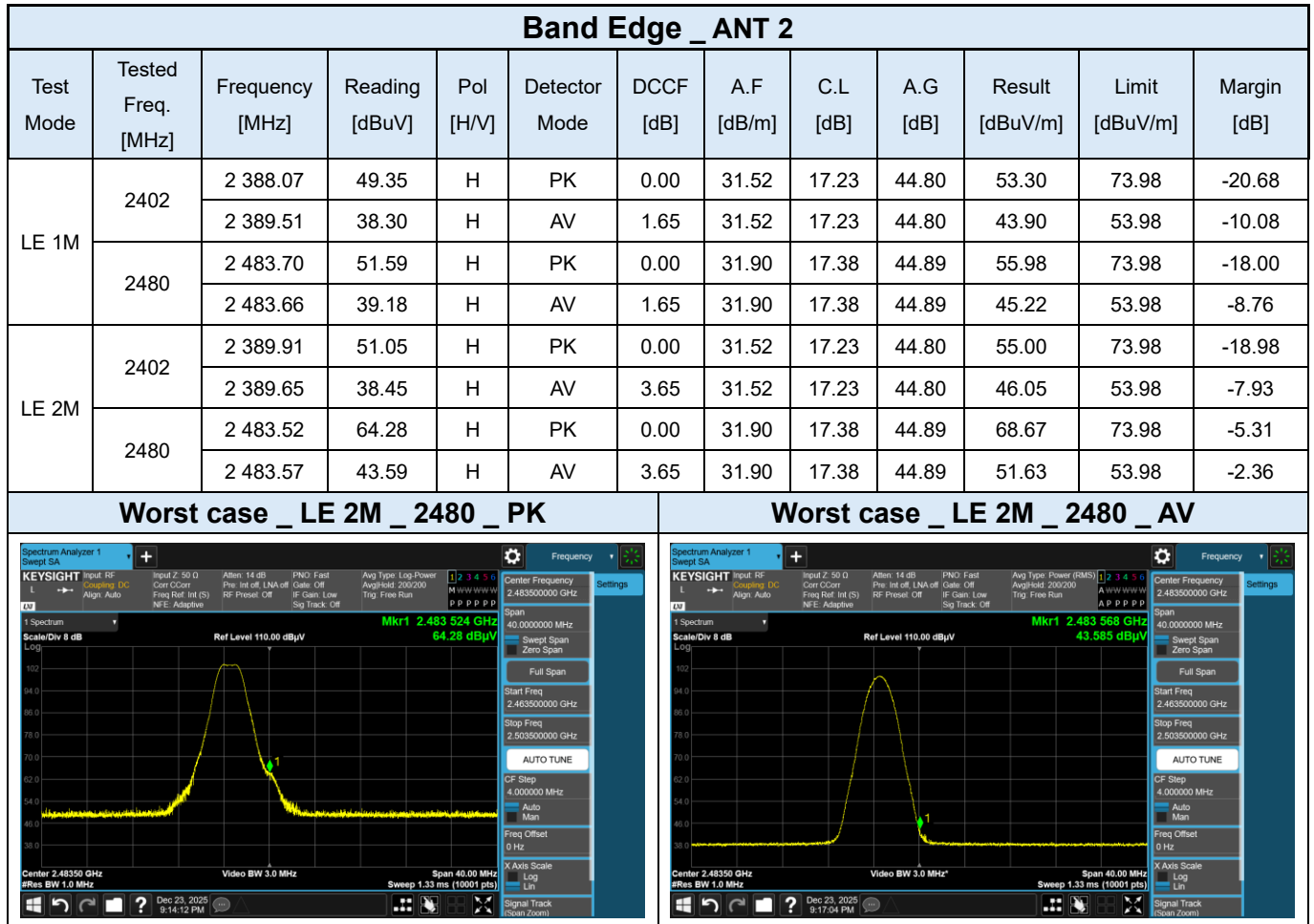


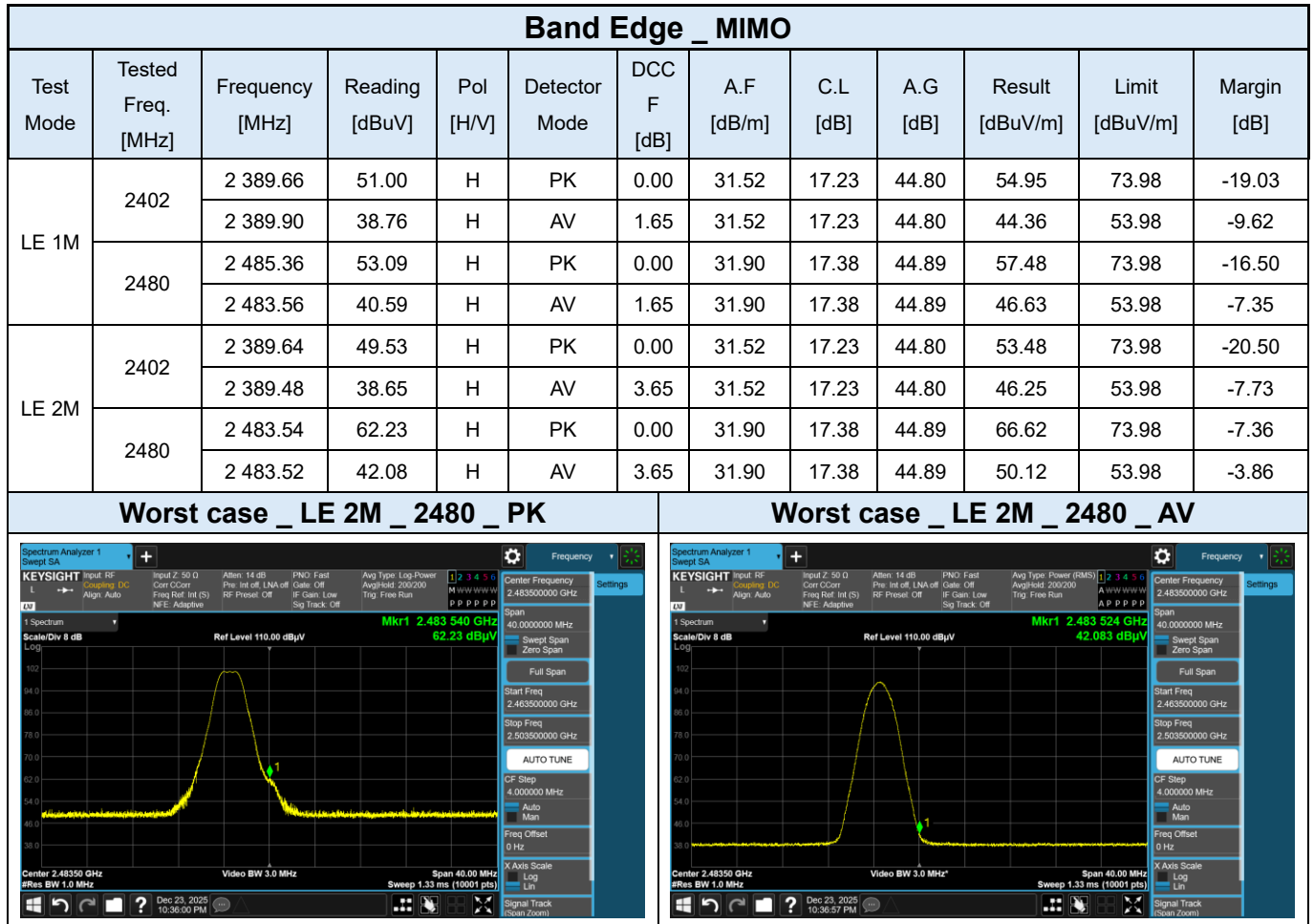


3.7.4.4 Band Edge

Band Edge _ ANT 1												
Test Mode	Tested Freq. [MHz]	Frequency [MHz]	Reading [dBuV]	Pol [H/V]	Detector Mode	DCCF [dB]	A.F [dB/m]	C.L [dB]	A.G [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
LE 1M	2402	2 389.55	49.61	H	PK	0.00	31.52	17.23	44.80	53.56	73.98	-20.42
		2 389.57	38.81	H	AV	1.65	31.52	17.23	44.80	44.41	53.98	-9.58
	2480	2 483.58	53.32	H	PK	0.00	31.90	17.38	44.89	57.71	73.98	-16.27
		2 483.58	39.65	H	AV	1.65	31.90	17.38	44.89	45.69	53.98	-8.29
LE 2M	2402	2 389.60	50.24	H	PK	0.00	31.52	17.23	44.80	54.19	73.98	-19.79
		2 389.05	38.97	H	AV	3.65	31.52	17.23	44.80	46.57	53.98	-7.41
	2480	2 483.54	61.00	H	PK	0.00	31.90	17.38	44.89	65.39	73.98	-8.59
		2 483.52	42.04	H	AV	3.65	31.90	17.38	44.89	50.08	53.98	-3.90

Worst case _ LE 2M _ 2480 _ PK						Worst case _ LE 2M _ 2480 _ AV						





3.8 AC Conducted Emissions (150 kHz to 30 MHz)

3.8.1 Regulation

§15.207(a) : Except as shown in paragraphs (b) and (c) of this section, 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 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

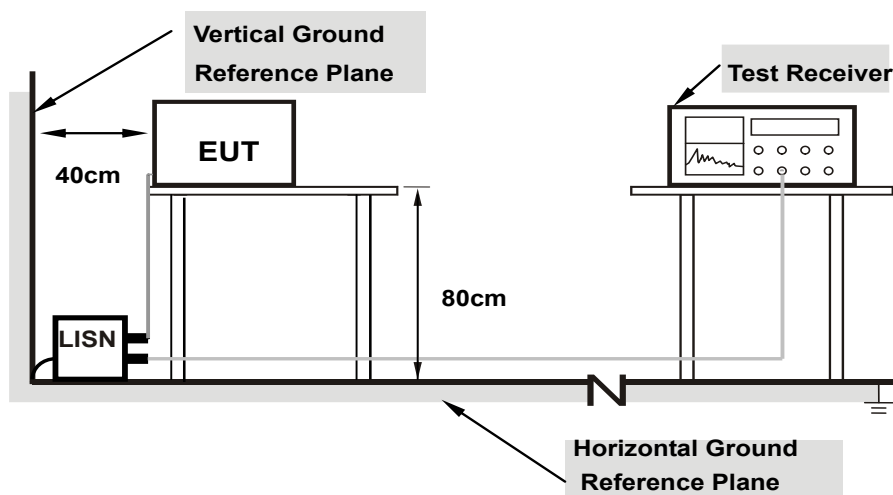
* Decreases with the logarithm of the frequency.

3.8.2 Test Procedure

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm / 50 μ H of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

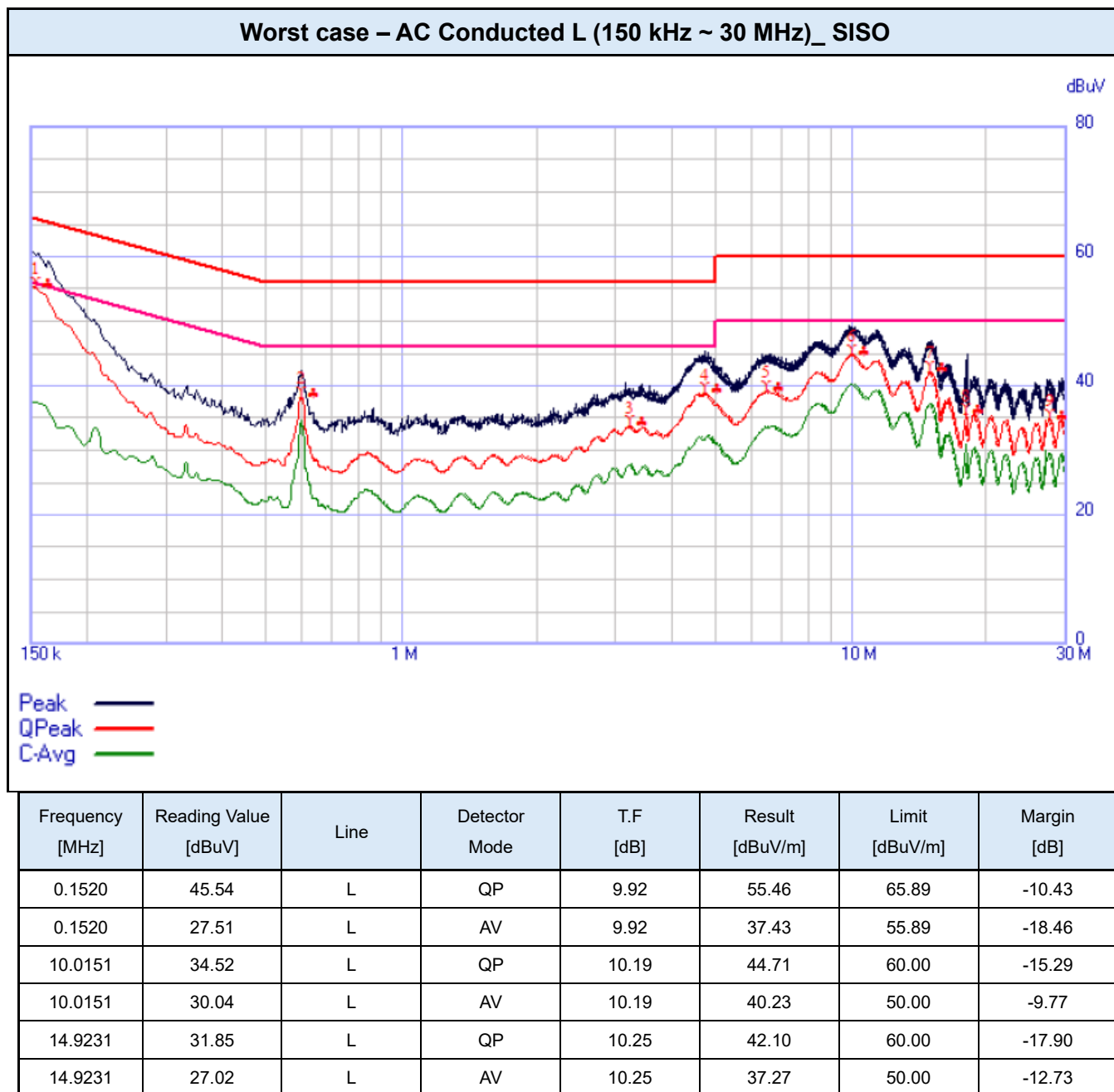
Remark : The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

3.8.3 Test Setup



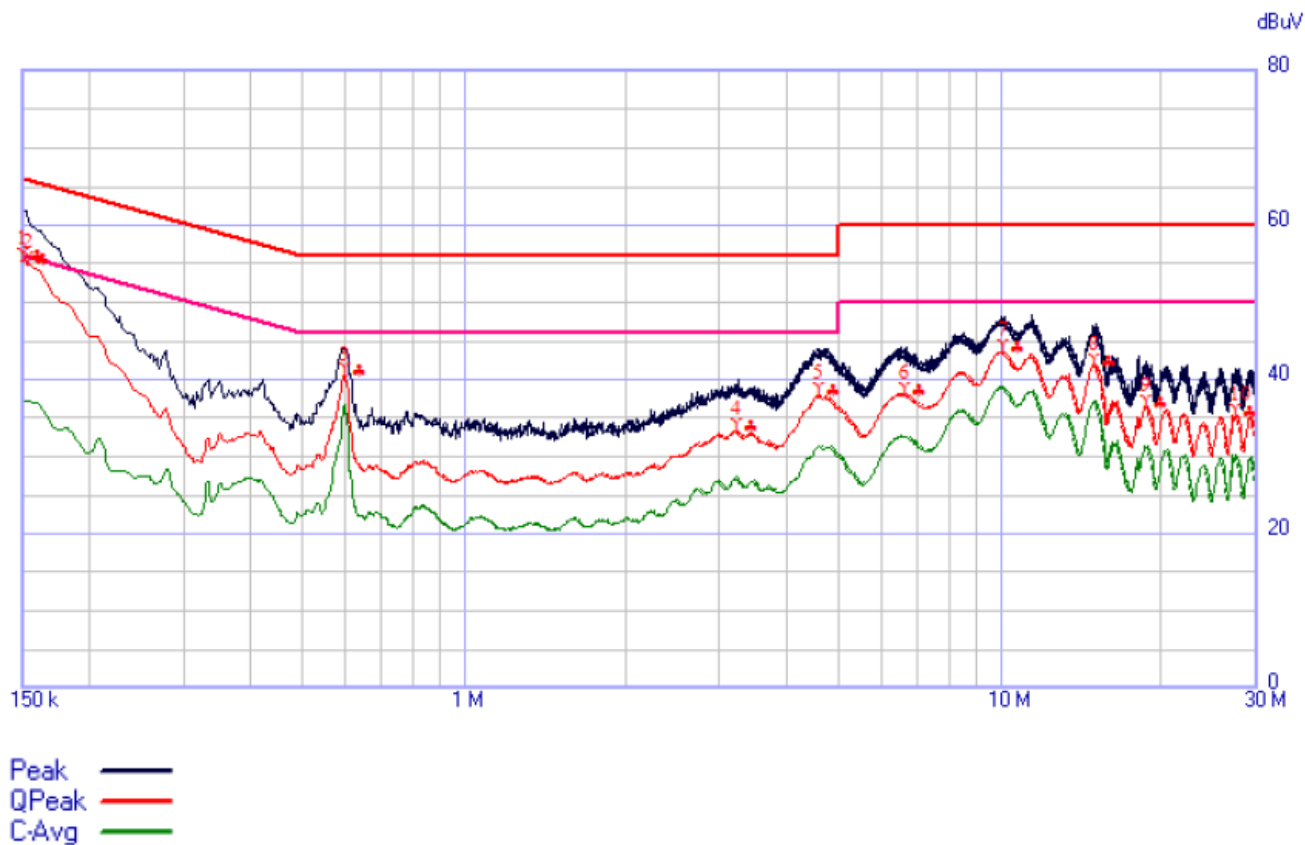


3.8.4 Test Result





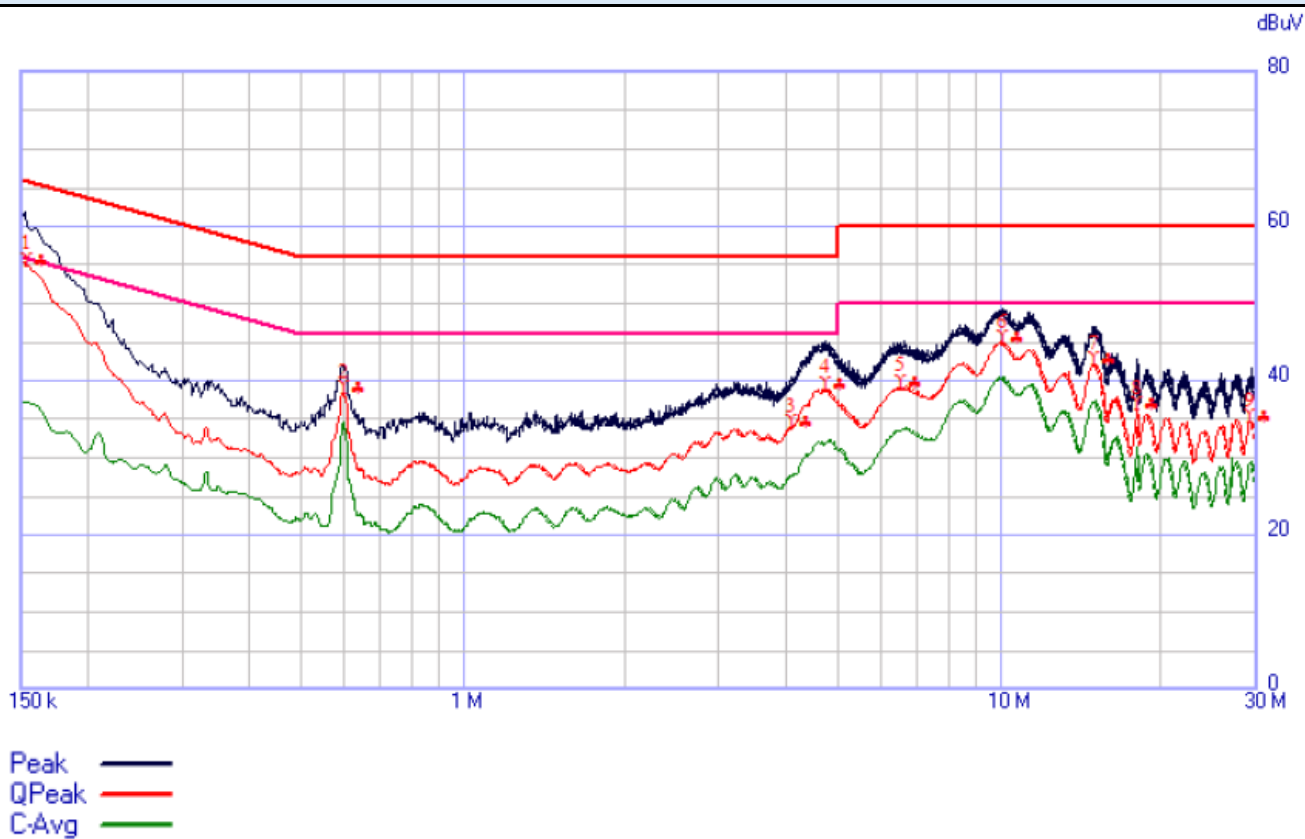
Worst case – AC Conducted N (150 kHz ~ 30 MHz)_ SISO



Frequency [MHz]	Reading Value [dBuV]	Line	Detector Mode	T.F [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
0.5979	30.48	N	QP	9.94	40.42	56.00	-15.58
0.5979	26.85	N	AV	9.94	36.79	46.00	-9.21
10.0601	33.33	N	QP	10.19	43.52	60.00	-16.48
10.0601	28.75	N	AV	10.19	38.94	50.00	-11.06
14.9333	31.55	N	QP	10.25	41.80	60.00	-18.20
14.9333	26.79	N	AV	10.25	37.04	50.00	-12.96



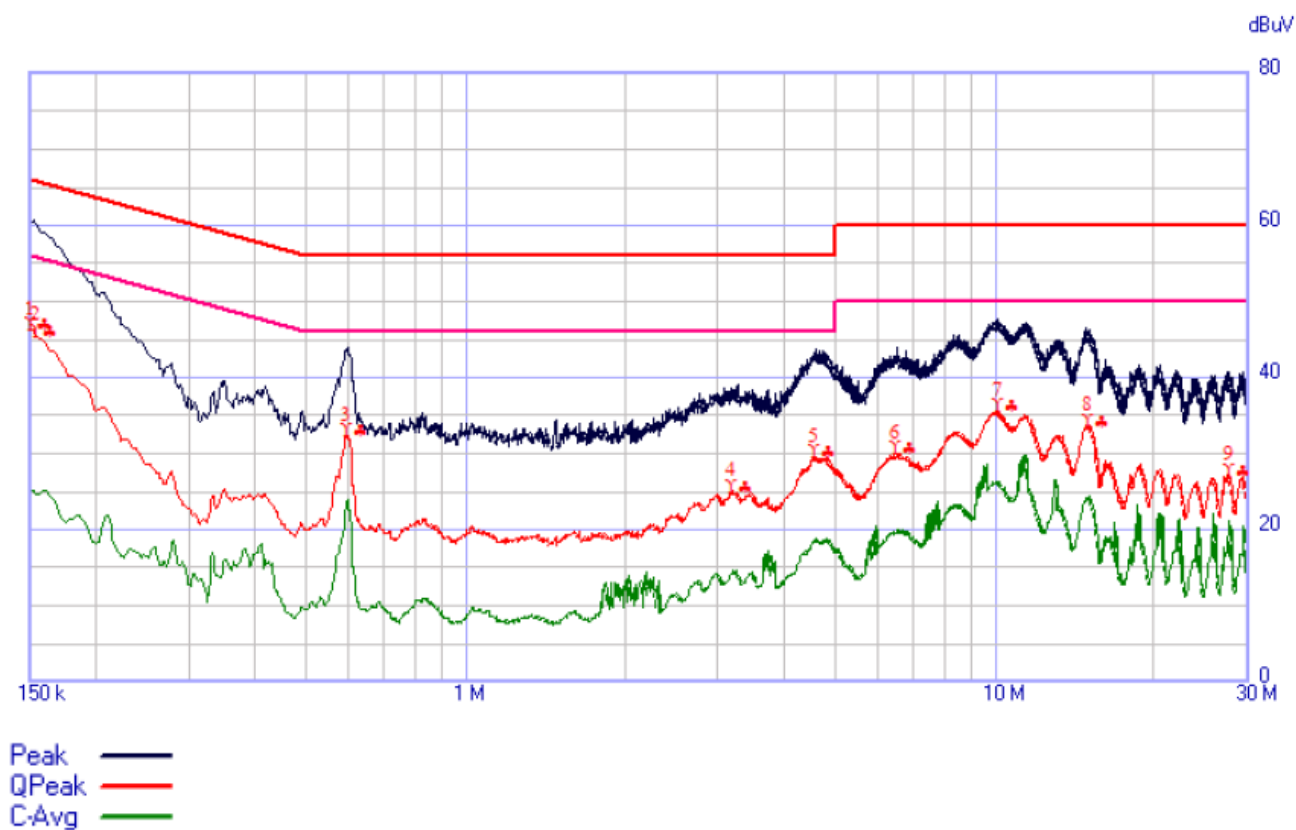
Worst case – AC Conducted L (150 kHz ~ 30 MHz)_ MIMO



Frequency [MHz]	Reading Value [dBuV]	Line	Detector Mode	T.F [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
0.5979	28.39	L	QP	9.94	38.33	56.00	-17.67
0.5979	24.75	L	AV	9.94	34.69	46.00	-11.31
4.7185	28.81	L	QP	10.09	38.90	56.00	-17.10
4.7185	21.81	L	AV	10.09	31.90	46.00	-14.10
10.0989	34.74	L	QP	10.19	44.93	60.00	-15.07
10.0989	30.19	L	AV	10.19	40.38	50.00	-9.62



Worst case – AC Conducted N (150 kHz ~ 30 MHz)_ MIMO



Frequency [MHz]	Reading Value [dBuV]	Line	Detector Mode	T.F [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
3.1807	15.00	N	QP	10.05	25.05	56.00	-30.95
3.1807	4.35	N	AV	10.05	14.40	46.00	-31.60
8.4691	22.56	N	QP	10.15	32.71	60.00	-27.29
8.4691	12.91	N	AV	10.15	23.06	50.00	-26.94
10.0683	25.35	N	QP	10.19	35.54	60.00	-24.46
10.0683	15.99	N	AV	10.19	26.18	50.00	-23.82

- End of report -