

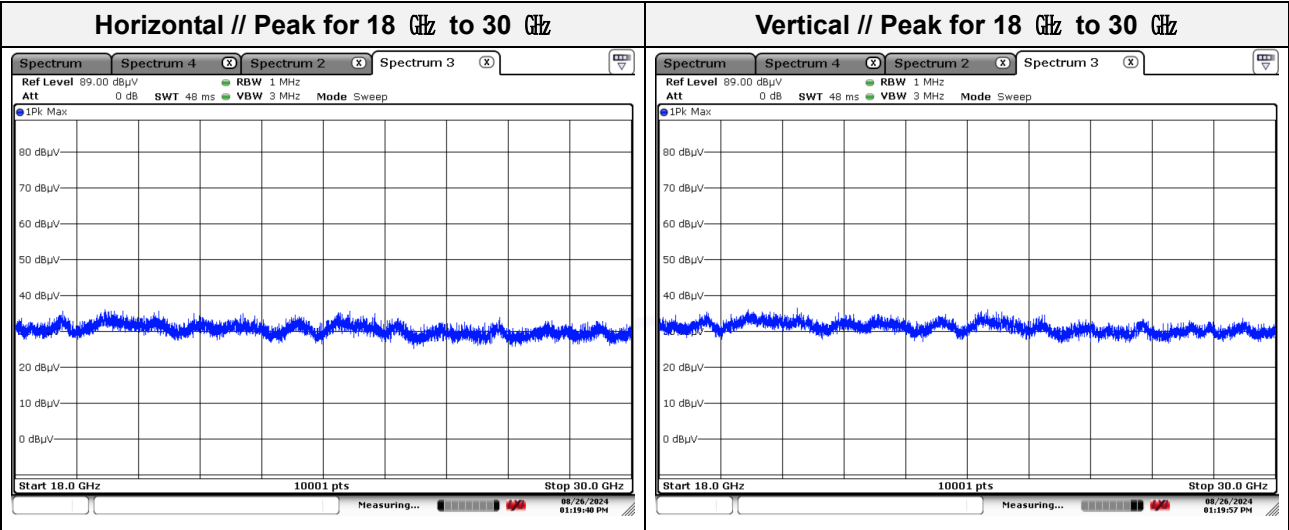


Report No. : KES-RF240529

Page 35 / 45

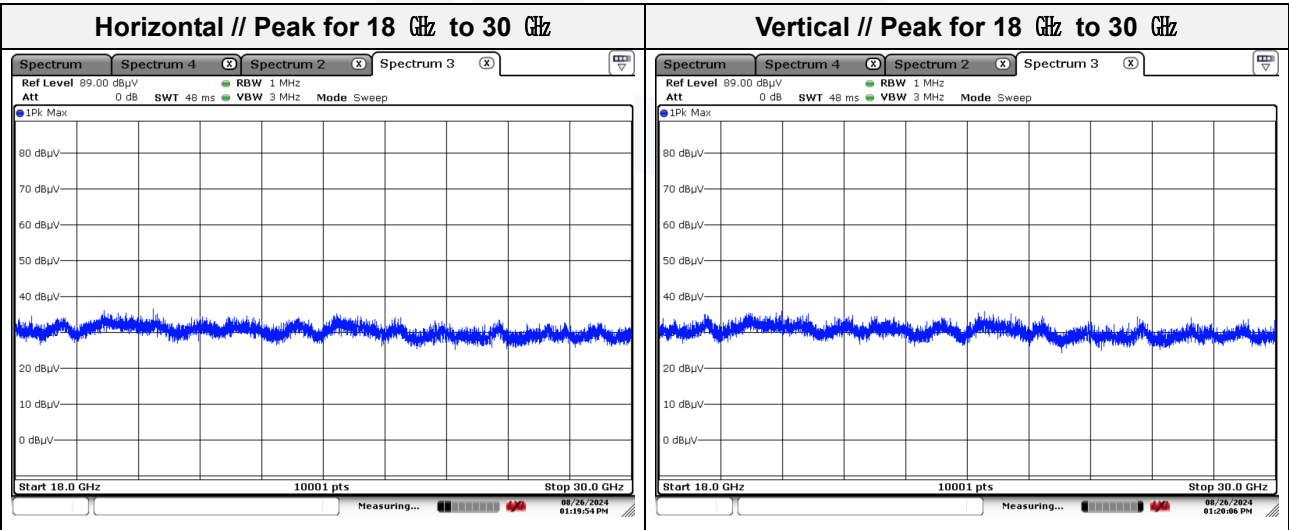
Test results (18 GHz to 30 GHz) – Worst case

Mode: LE 1 Mbps
Distance of measurement: 3 meter
Channel: 00 (Worst case)



Note.
1. No spurious emission were detected above 18 GHz.

Mode: ANT+
Distance of measurement: 3 meter
Channel: 00 (Worst case)

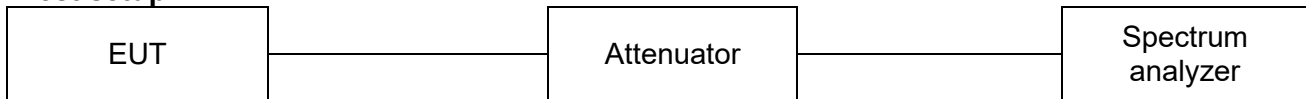


Note.
1. No spurious emission were detected above 18 GHz.



3.5. Conducted spurious emissions & band edge

Test setup



Test procedure

Band edge

ANSI C63.10-2013 - Section 11.11

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. Set the RBW = 100 kHz
4. Set the VBW = $[3 \times \text{RBW}]$.
5. Detector = Peak
6. Sweep time = auto
7. Trace mode = max hold
8. Allow trace to fully stabilize.

Out of band emissions

ANSI C63.10-2013 - Section 11.11

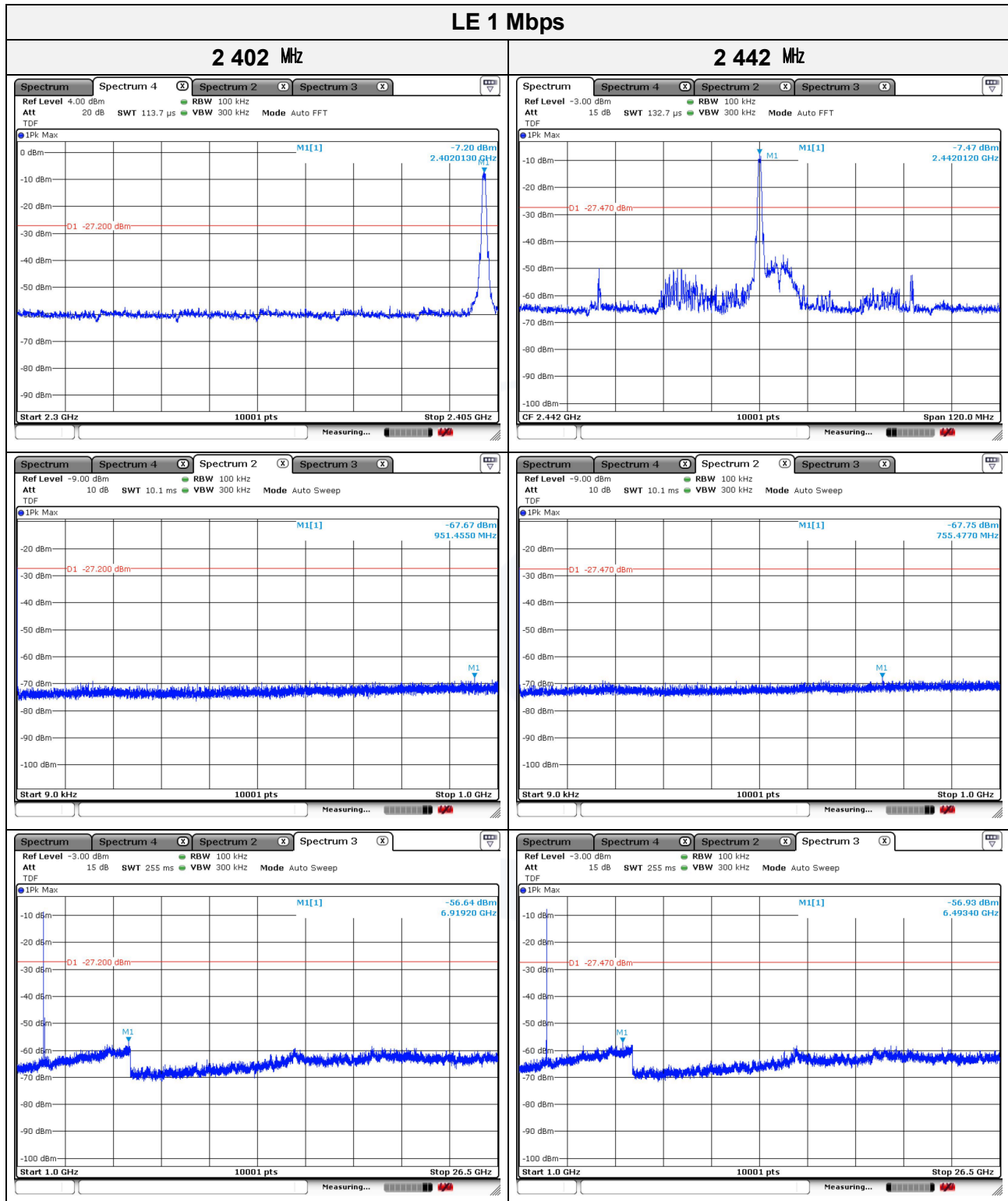
1. Start frequency was set to 30 MHz and stop frequency was set to 25 GHz for 2.4 GHz frequencies and 40 GHz for 5 GHz frequencies
2. Set the RBW = 100 kHz
3. Set the VBW = $[3 \times \text{RBW}]$.
4. Detector = Peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow trace to fully stabilize.

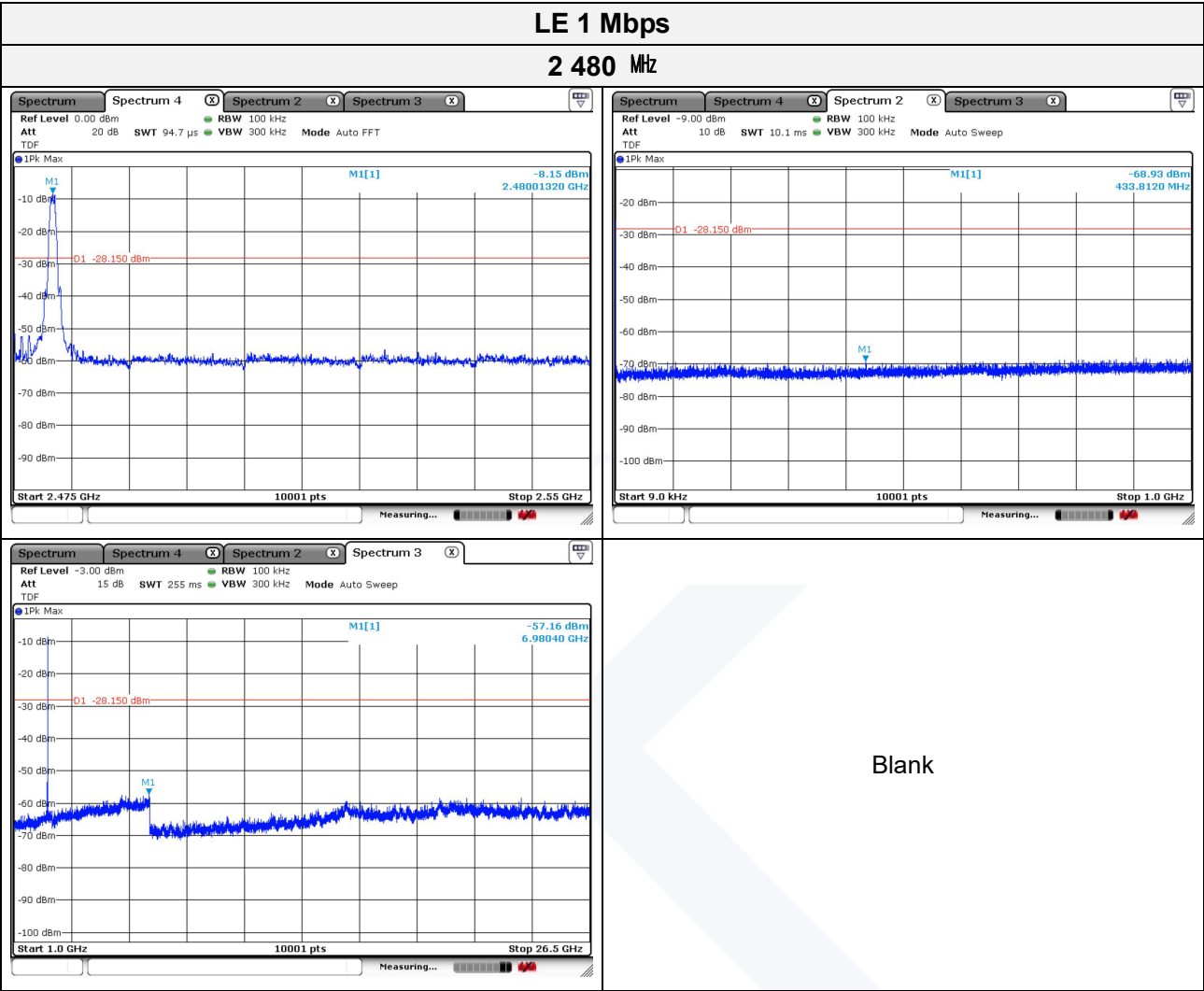
Limit

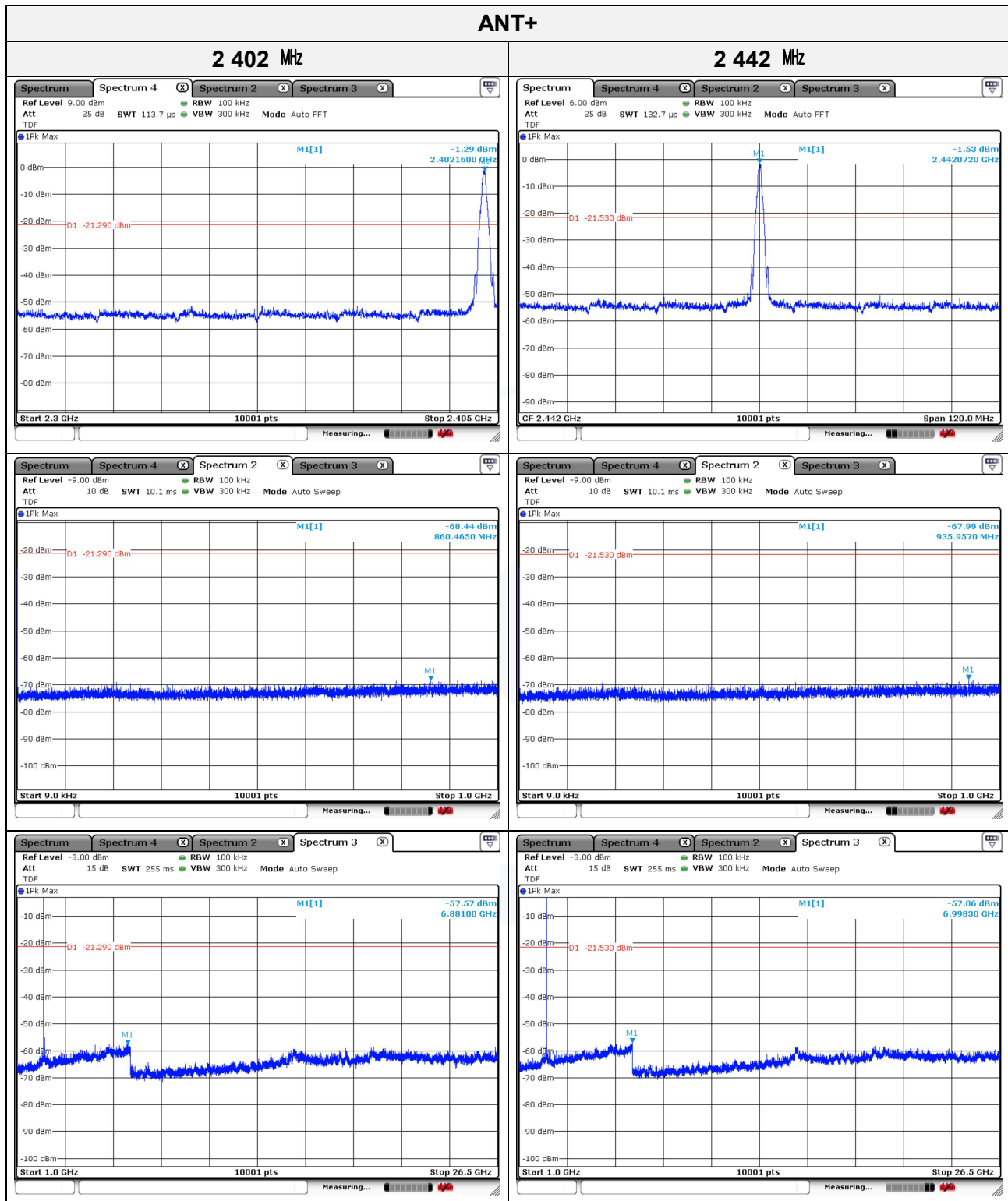
According to 15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within 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 section 15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section 15.205(a), must also comply the radiated emission limits specified in section 15.209(a) (see section 15.205(c))

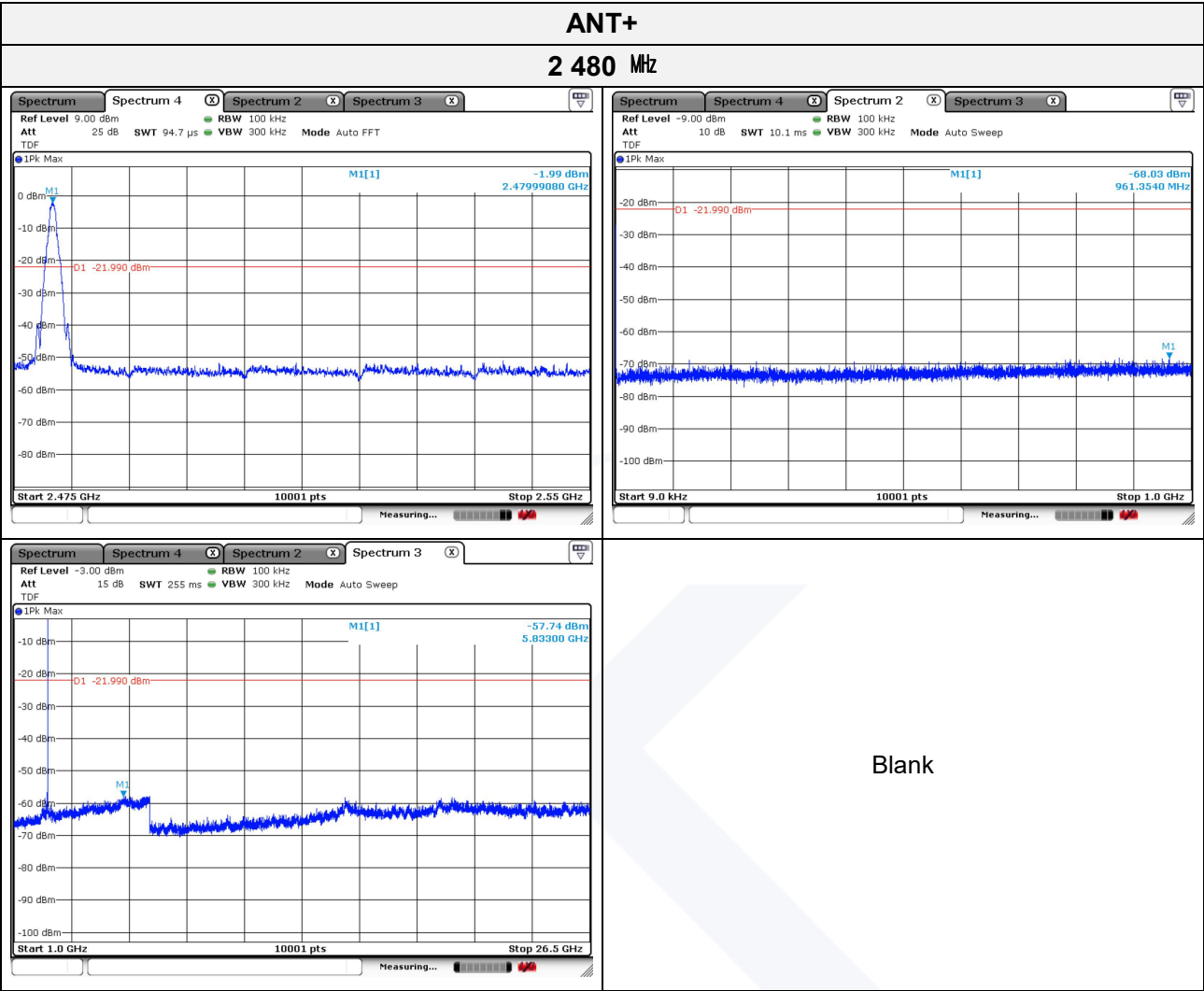


Test results











3.6. AC conducted emissions

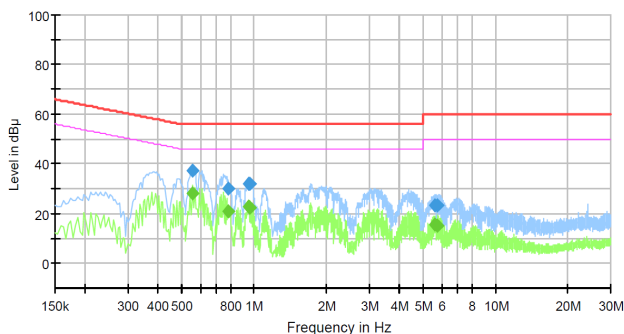
Limit

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.

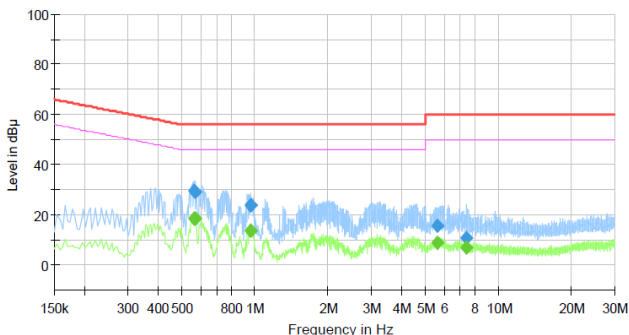
Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

**Test results**

Mode: LE 1 Mbps
Transfer rate: 1 Mbps
Channel: 00 (Worst case)

Hot Line**Final Result**

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.558000	37.13	---	56.00	18.87	1000.0	9.000	L1	19.7
0.559000	---	28.05	46.00	17.95	1000.0	9.000	L1	19.7
0.786000	---	20.94	46.00	25.06	1000.0	9.000	L1	19.8
0.786000	30.16	---	56.00	25.84	1000.0	9.000	L1	19.8
0.954000	---	22.92	46.00	23.08	1000.0	9.000	L1	19.8
0.954000	32.17	---	56.00	23.83	1000.0	9.000	L1	19.8
0.966000	---	22.48	46.00	23.52	1000.0	9.000	L1	19.8
0.966000	31.76	---	56.00	24.24	1000.0	9.000	L1	19.8
5.642000	---	15.54	50.00	34.46	1000.0	9.000	L1	20.2
5.642000	23.52	---	60.00	36.48	1000.0	9.000	L1	20.2
5.746000	---	15.07	50.00	34.93	1000.0	9.000	L1	20.3
5.746000	23.27	---	60.00	36.73	1000.0	9.000	L1	20.3

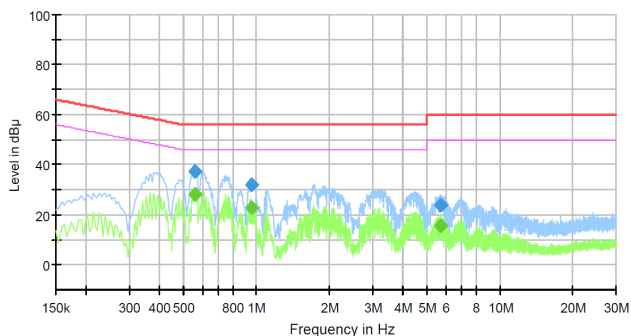
Neutral Line**Final Result**

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.562000	---	18.44	46.00	27.56	1000.0	9.000	N	19.8
0.562000	29.33	---	56.00	26.67	1000.0	9.000	N	19.8
0.566000	---	18.42	46.00	27.58	1000.0	9.000	N	19.8
0.566000	29.13	---	56.00	26.87	1000.0	9.000	N	19.8
0.958000	---	13.49	46.00	32.51	1000.0	9.000	N	19.8
0.958000	23.95	---	56.00	32.05	1000.0	9.000	N	19.8
0.962000	---	13.44	46.00	32.56	1000.0	9.000	N	19.8
0.962000	23.82	---	56.00	32.18	1000.0	9.000	N	19.8
5.594000	---	8.85	50.00	41.15	1000.0	9.000	N	20.3
5.594000	15.68	---	60.00	44.32	1000.0	9.000	N	20.3
7.426000	---	6.88	50.00	43.12	1000.0	9.000	N	20.4
7.426000	10.92	---	60.00	49.08	1000.0	9.000	N	20.4



Mode: ANT+
Transfer rate: 1 Mbps
Channel: 00 (Worst case)

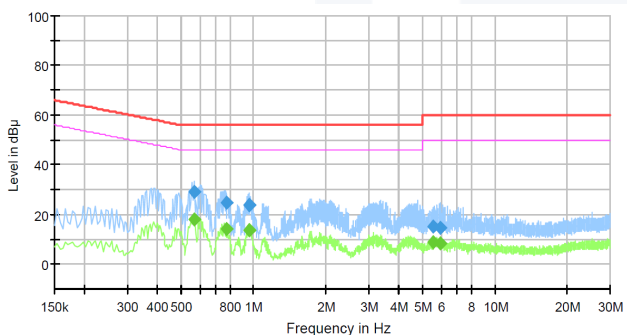
Hot Line



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.558000	---	28.03	46.00	17.97	1000.0	9.000	L1	19.7
0.558000	37.13	---	56.00	18.87	1000.0	9.000	L1	19.7
0.562000	---	28.31	46.00	17.69	1000.0	9.000	L1	19.7
0.562000	37.30	---	56.00	18.70	1000.0	9.000	L1	19.7
0.950000	---	22.81	46.00	23.19	1000.0	9.000	L1	19.8
0.950000	32.10	---	56.00	23.90	1000.0	9.000	L1	19.8
0.962000	---	22.70	46.00	23.30	1000.0	9.000	L1	19.8
0.962000	32.00	---	56.00	24.00	1000.0	9.000	L1	19.8
5.706000	---	15.52	50.00	34.48	1000.0	9.000	L1	20.3
5.706000	23.67	---	60.00	36.33	1000.0	9.000	L1	20.3
5.762000	---	15.55	50.00	34.45	1000.0	9.000	L1	20.3
5.762000	23.82	---	60.00	36.18	1000.0	9.000	L1	20.3

Neutral Line



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.566000	28.98	---	56.00	27.02	1000.0	9.000	N	19.8
0.566000	---	18.19	46.00	27.81	1000.0	9.000	N	19.8
0.770000	---	13.97	46.00	32.03	1000.0	9.000	N	19.8
0.770000	24.54	---	56.00	31.46	1000.0	9.000	N	19.8
0.958000	---	13.62	46.00	32.38	1000.0	9.000	N	19.8
0.958000	23.87	---	56.00	32.13	1000.0	9.000	N	19.8
0.962000	---	13.46	46.00	32.54	1000.0	9.000	N	19.8
0.962000	23.79	---	56.00	32.21	1000.0	9.000	N	19.8
5.570000	---	8.70	50.00	41.30	1000.0	9.000	N	20.3
5.570000	15.06	---	60.00	44.94	1000.0	9.000	N	20.3
5.946000	---	8.45	50.00	41.55	1000.0	9.000	N	20.3
5.946000	14.46	---	60.00	45.54	1000.0	9.000	N	20.3



3.7. Antenna Requirement

According to 15.207(a), An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

**Appendix A. Measurement equipment**

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum analyzer	R&S	FSV40	101725	1 year	2025.06.12
Spectrum analyzer	R&S	FSV3044	101272	1 year	2025.03.12
SIGNAL GENERATOR	KEYSIGHT	N5182B	MY59100115	1 year	2025.04.15
SIGNAL GENERATOR	Anritsu	68369B	002118	1 year	2025.04.15
Power Meter	Anritsu	ML2495A	2010001	1 year	2025.04.15
Pulse Power Sensor	Anritsu	MA2411B	1911111	1 year	2025.04.15
Attenuator	Mini-Circuits	BW-S10-2W263+	3	1 year	2025.01.15
ACTIVE LOOP ANTENNA	SCHWARZBECK	FMZB 1513	1513-257	2 years	2025.11.16
TRILOG-BROADBAND ANTENNA	Schwarzbeck	VULB 9163	714	2 years	2026.04.19
Attenuator	HUBER+SHHNER	6806.17.A	NONE	1 year	2025.02.13
Horn Antenna	A.H.	SAS-571	414	1 year	2025.01.16
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA 9170550	1 year	2025.01.16
Amplifier	SONOMA INSTRUMENT	310N	401123	1 year	2025.02.13
PREAMPLIFIER	HP	8449B	3008A00538	1 year	2025.04.30
BROADBAND AMPLIFIER	SCHWARZBECK	BBV9721	PS9721-003	1 year	2025.01.15
DC POWER SUPPLY	AGILENT	6632B	MY43004090	1 year	2025.06.17
EMI Test Receiver	R&S	ESU26	100552	1 year	2025.02.13
EMI Test Receiver	R&S	ESR3	101783	1 year	2024.11.08
PULSE LIMITER	R&S	ESH2-Z2	101915	1 year	2024.11.08
LISN	R&S	ENV216	101787	1 year	2024.11.08

* Statement of Traceability: KES Co., Ltd. attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Peripheral devices

Device	Manufacturer	Model No.	Serial No.
Notebook computer	LG Electronics Inc.,	LGS53	306QCZP560949
Test Jig Board	N/A	N/A	N/A

The end of test report.