



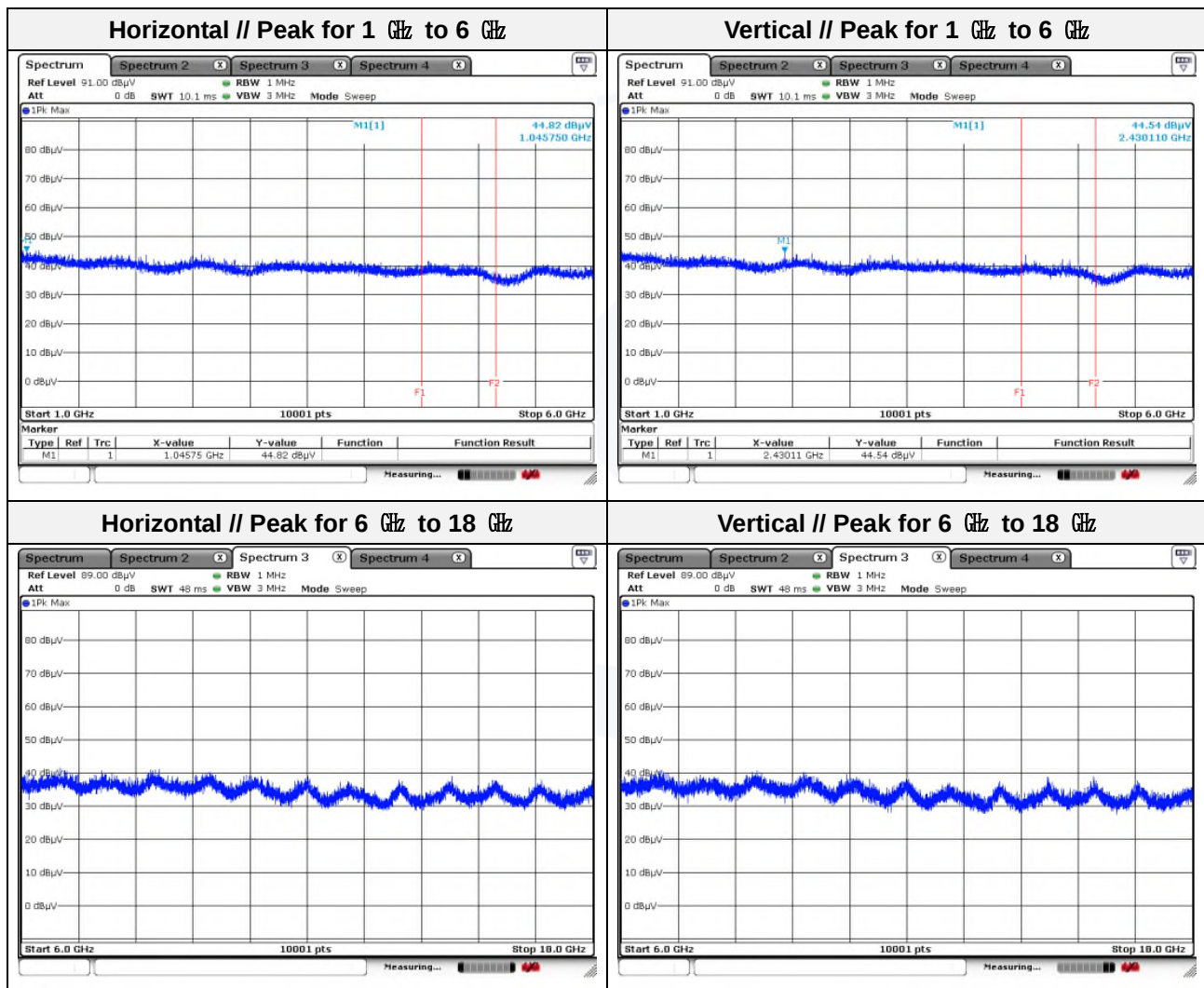
Mode: 802.11n_HT20_DC 24 V

Distance of measurement: 3 meter

Channel: 48

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 045.75	44.82	Peak	H	-9.11	-	35.71	74.00	38.29
2 430.11	44.54	Peak	V	-0.30	-	44.24	68.20	23.96



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Mode: 802.11ac_VHT20_DC 12 V

Distance of measurement: 3 meter

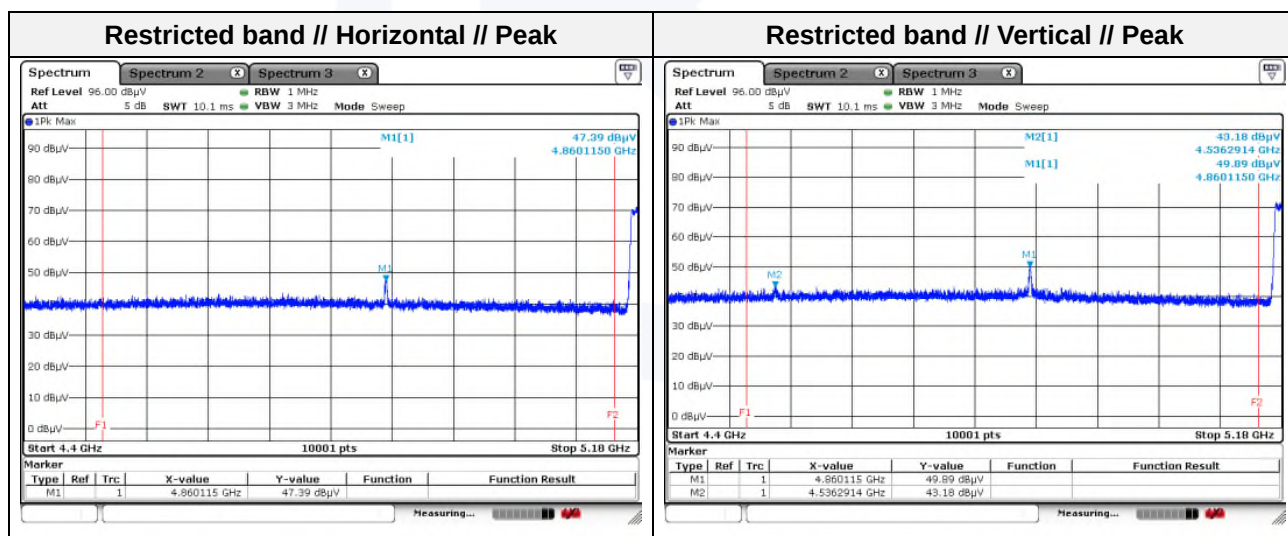
Channel: 36

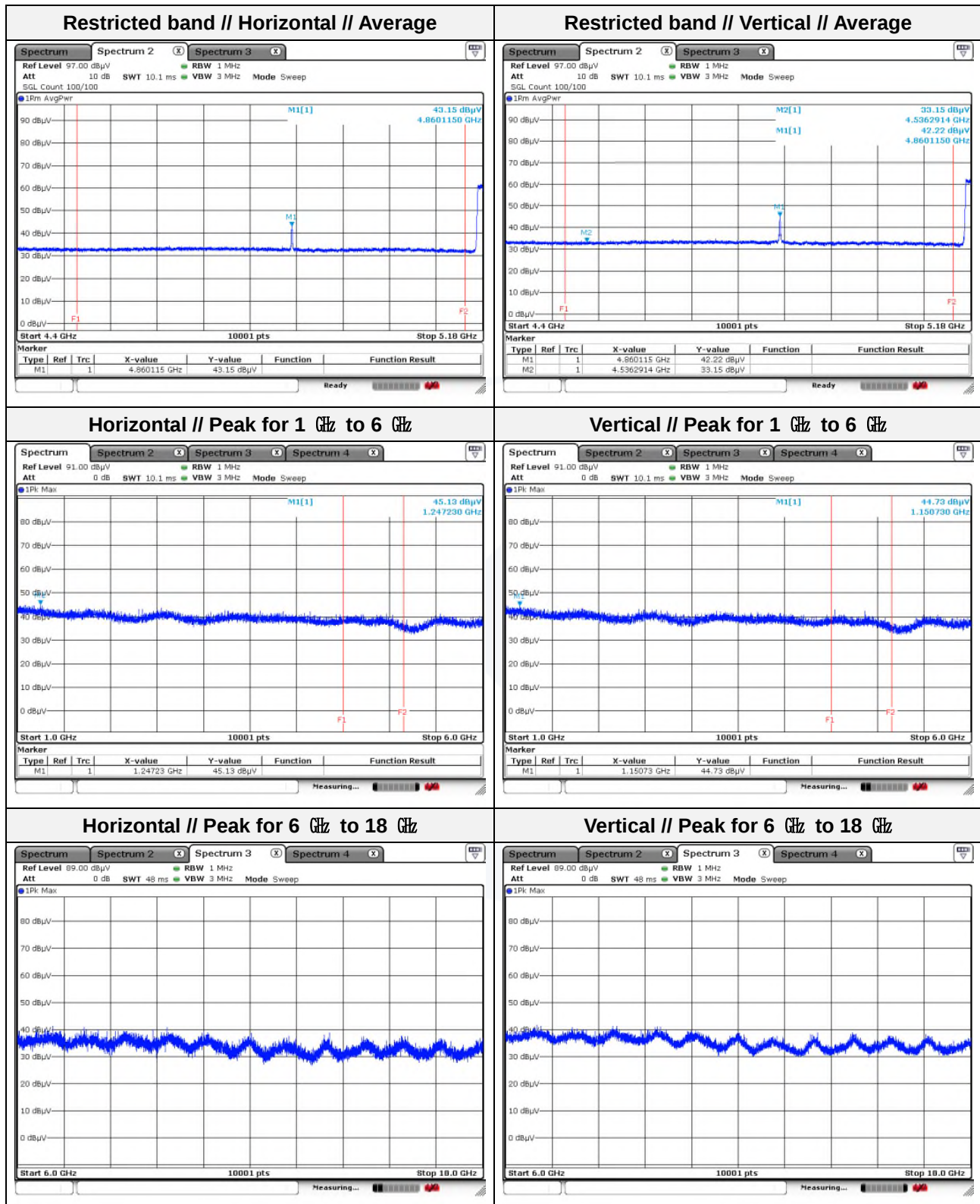
- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 150.73	44.73	Peak	V	-8.45	-	36.28	74.00	37.72
1 247.23	45.13	Peak	H	-7.85	-	37.28	68.20	30.92

- Band edge

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 536.29	43.18	Peak	V	4.70	-	47.88	74.00	26.12
4 536.29	33.15	Average	V	4.70	2.52	40.37	54.00	13.63
4 860.12	47.39	Peak	H	6.72	-	54.11	74.00	19.89
4 860.12	43.15	Average	H	6.72	2.52	52.39	54.00	1.61
4 860.12	49.89	Peak	V	6.72	-	56.61	74.00	17.39
4 860.12	42.22	Average	V	6.72	2.52	51.46	54.00	2.54





Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Report No. : KES-RF240420-R1

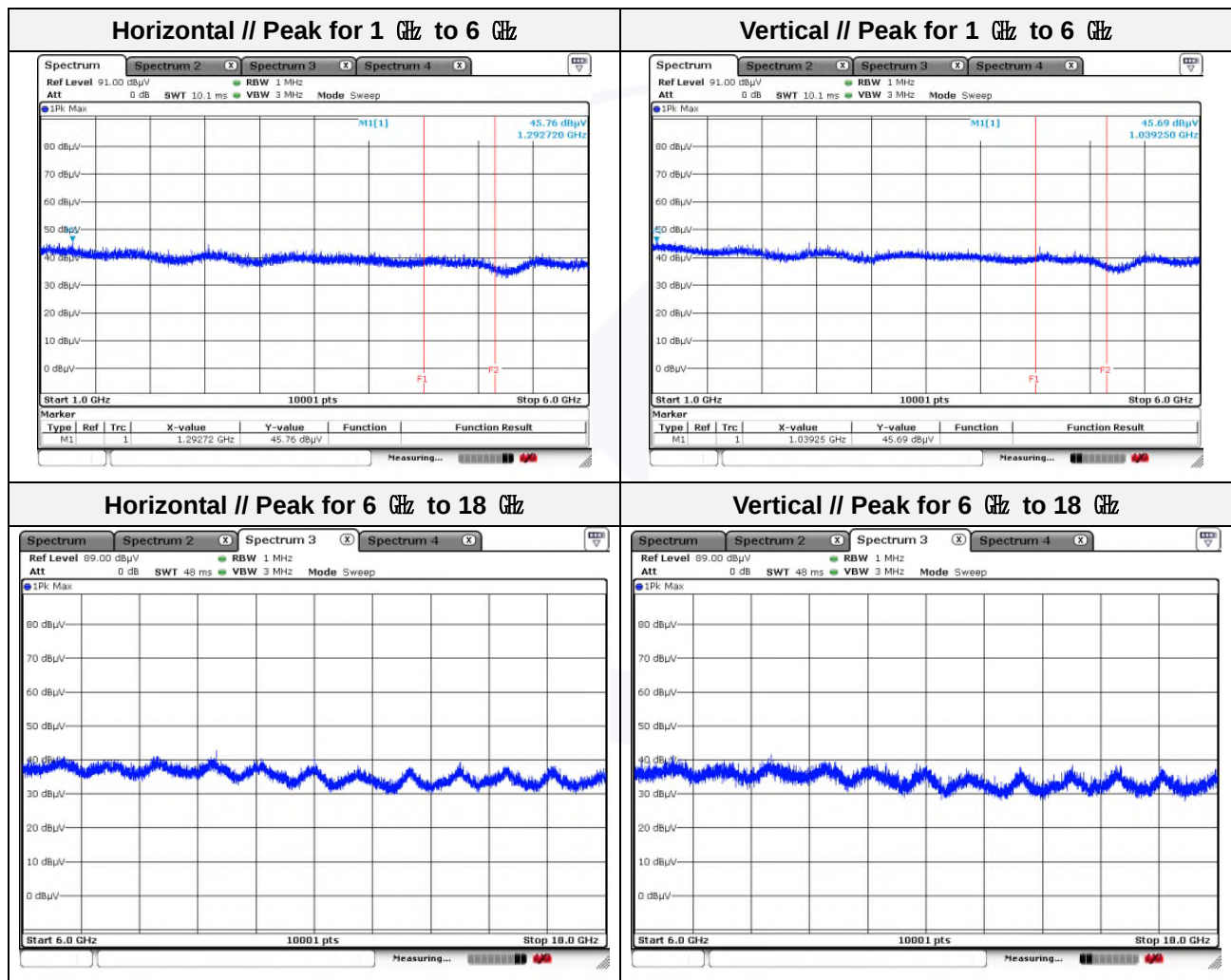
Mode: 802.11ac_VHT20_DC 12 V

Distance of measurement: 3 meter

Channel: 44

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 039.25	45.69	Peak	V	-9.15	-	36.54	74.00	37.46
1 292.72	45.76	Peak	H	-7.57	-	38.19	68.20	30.01



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Report No. : KES-RF240420-R1

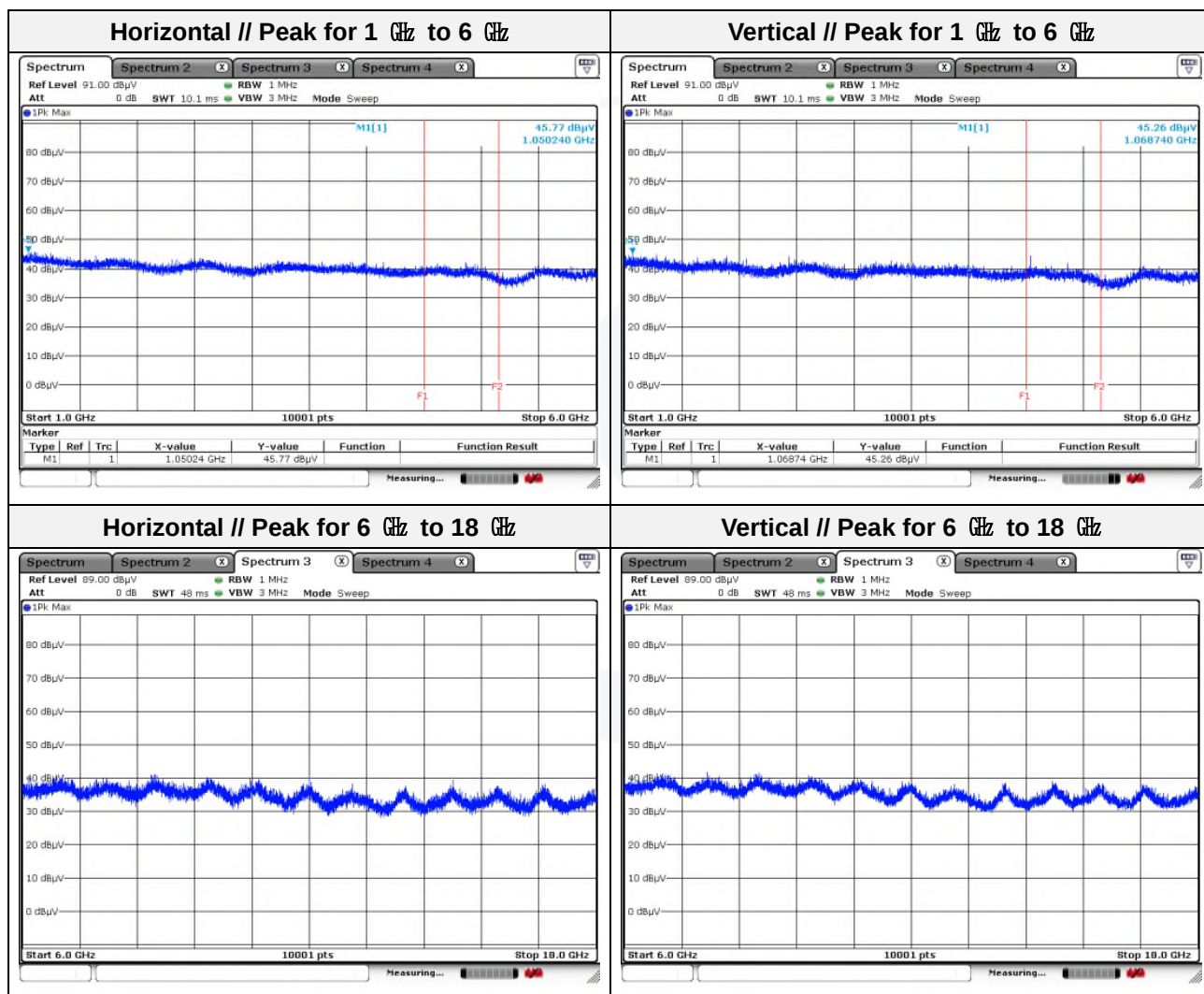
Mode: 802.11ac_VHT20_DC 12 V

Distance of measurement: 3 meter

Channel: 48

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 050.24	45.77	Peak	H	-9.09	-	36.68	74.00	37.32
1 068.74	45.26	Peak	V	-8.97	-	36.29	74.00	37.71



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Mode: 802.11ac_VHT20_DC 24 V

Distance of measurement: 3 meter

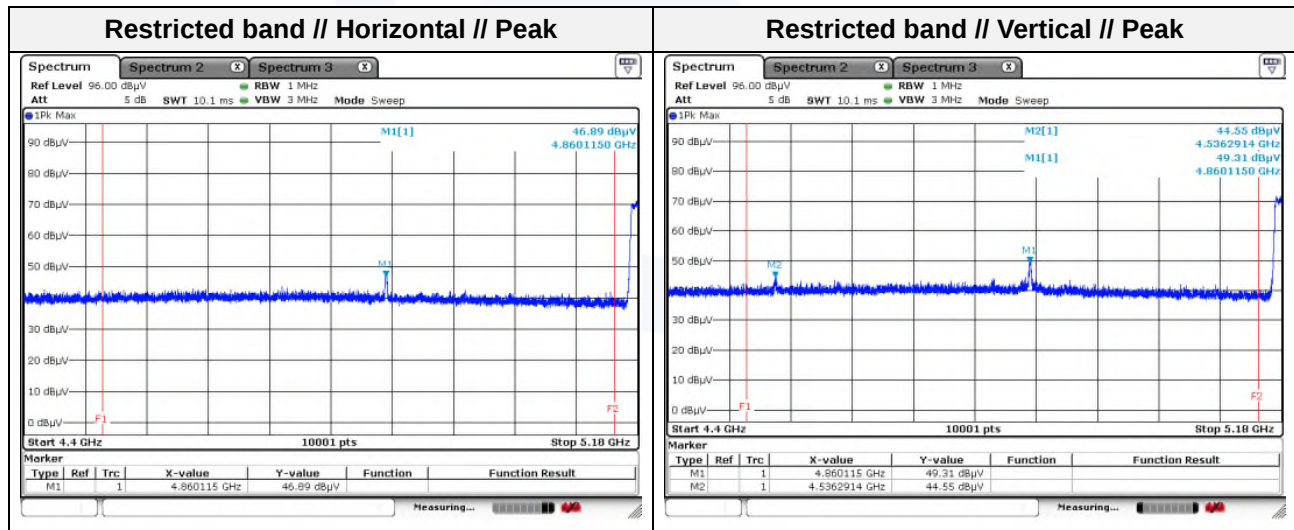
Channel: 36

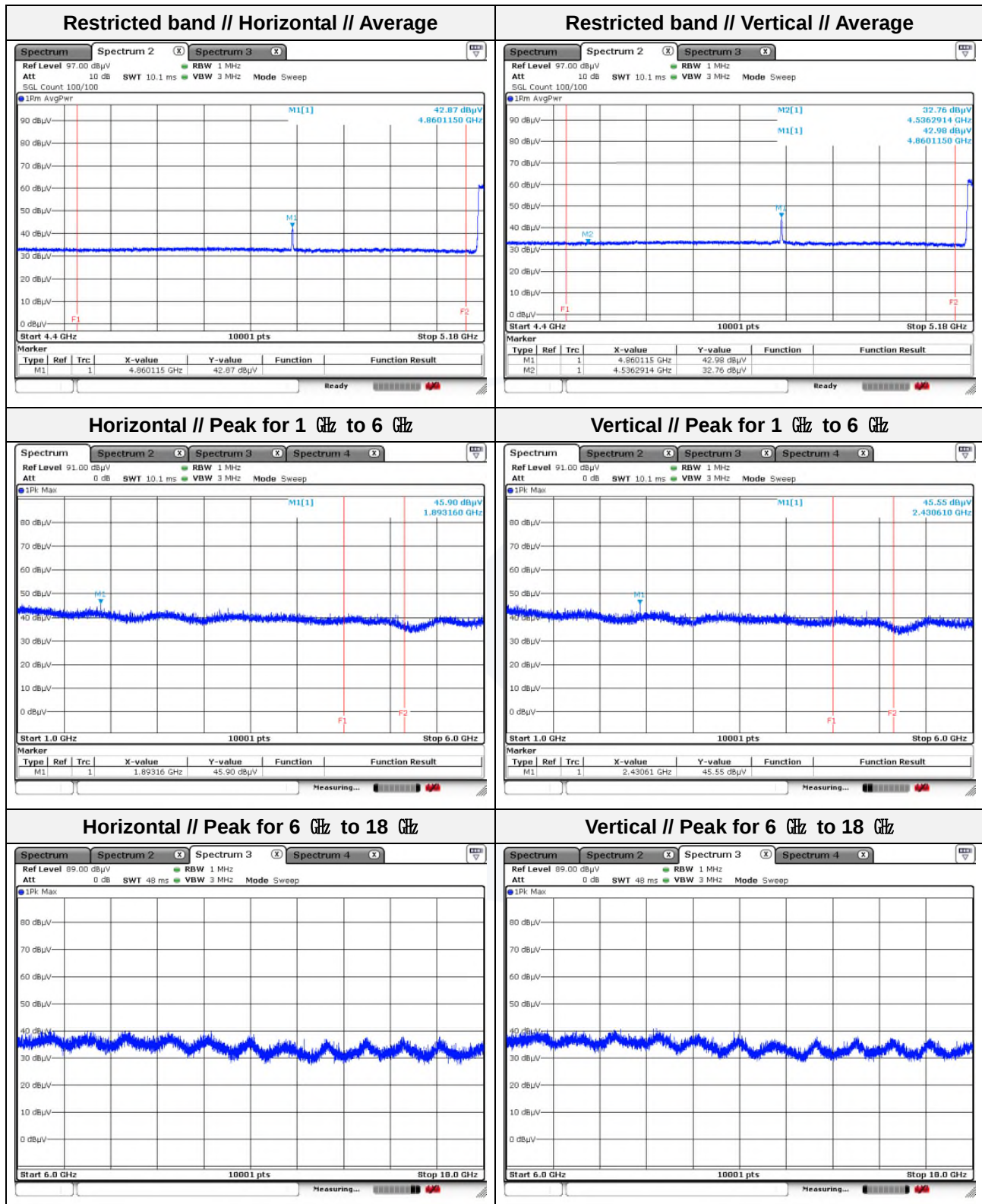
- Spurious

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1 893.16	45.90	Peak	H	-2.42	-	43.48	74.00	30.52
2 430.61	45.55	Peak	V	-0.30	-	45.25	68.20	22.95

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4 536.29	44.55	Peak	V	4.70	-	49.25	74.00	24.75
4 536.29	32.76	Average	V	4.70	2.52	39.98	54.00	14.02
4 860.12	46.89	Peak	H	6.72	-	53.61	74.00	20.39
4 860.12	42.87	Average	H	6.72	2.52	52.11	54.00	1.89
4 860.12	49.31	Peak	V	6.72	-	56.03	74.00	17.97
4 860.12	42.98	Average	V	6.72	2.52	52.22	54.00	1.78





Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



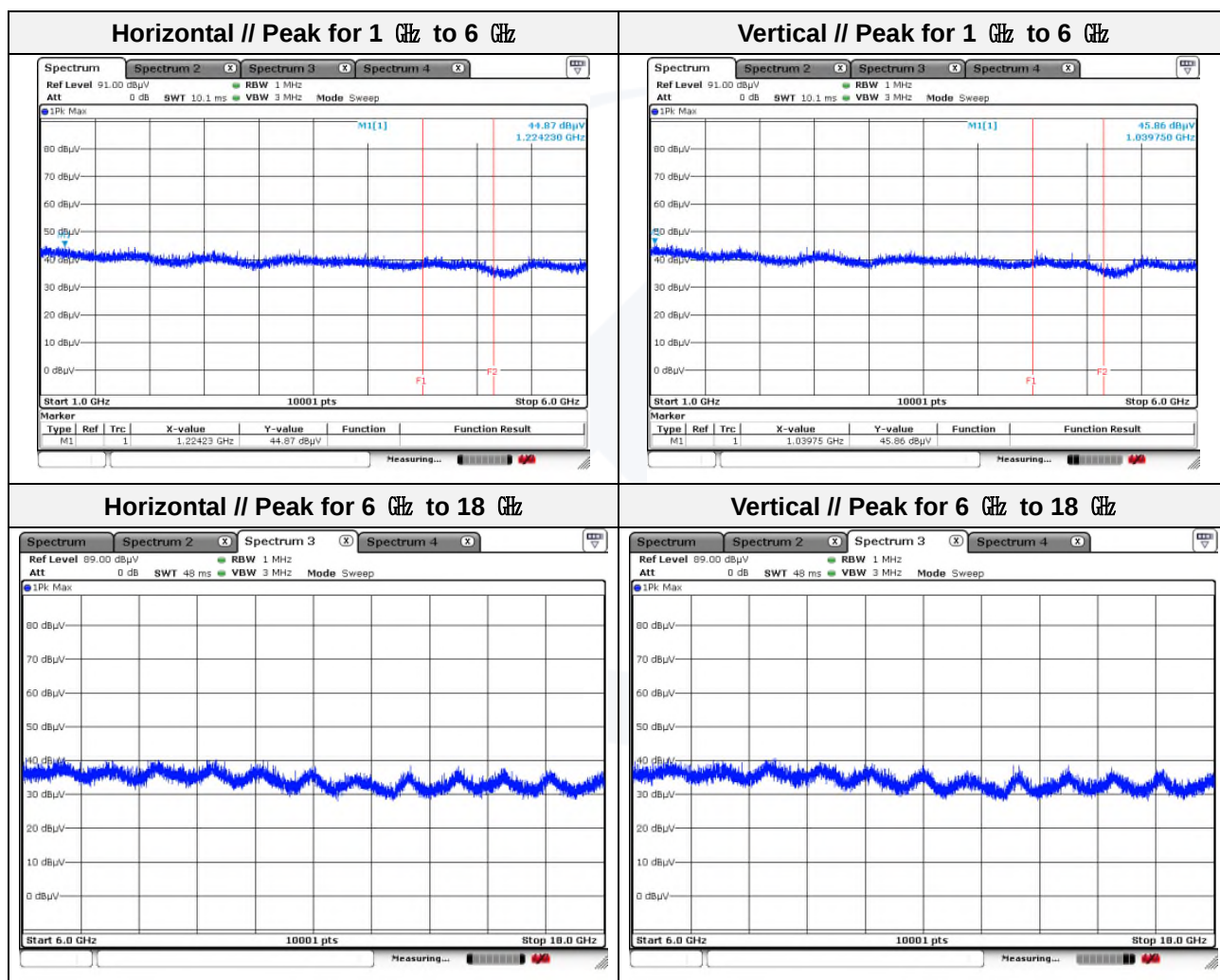
Mode: 802.11ac_VHT20_DC 24 V

Distance of measurement: 3 meter

Channel: 44

- Spurious

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1 039.75	45.86	Peak	V	-9.15	-	36.71	74.00	37.29
1 224.23	44.87	Peak	H	-7.99	-	36.88	74.00	37.12



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Report No. : KES-RF240420-R1

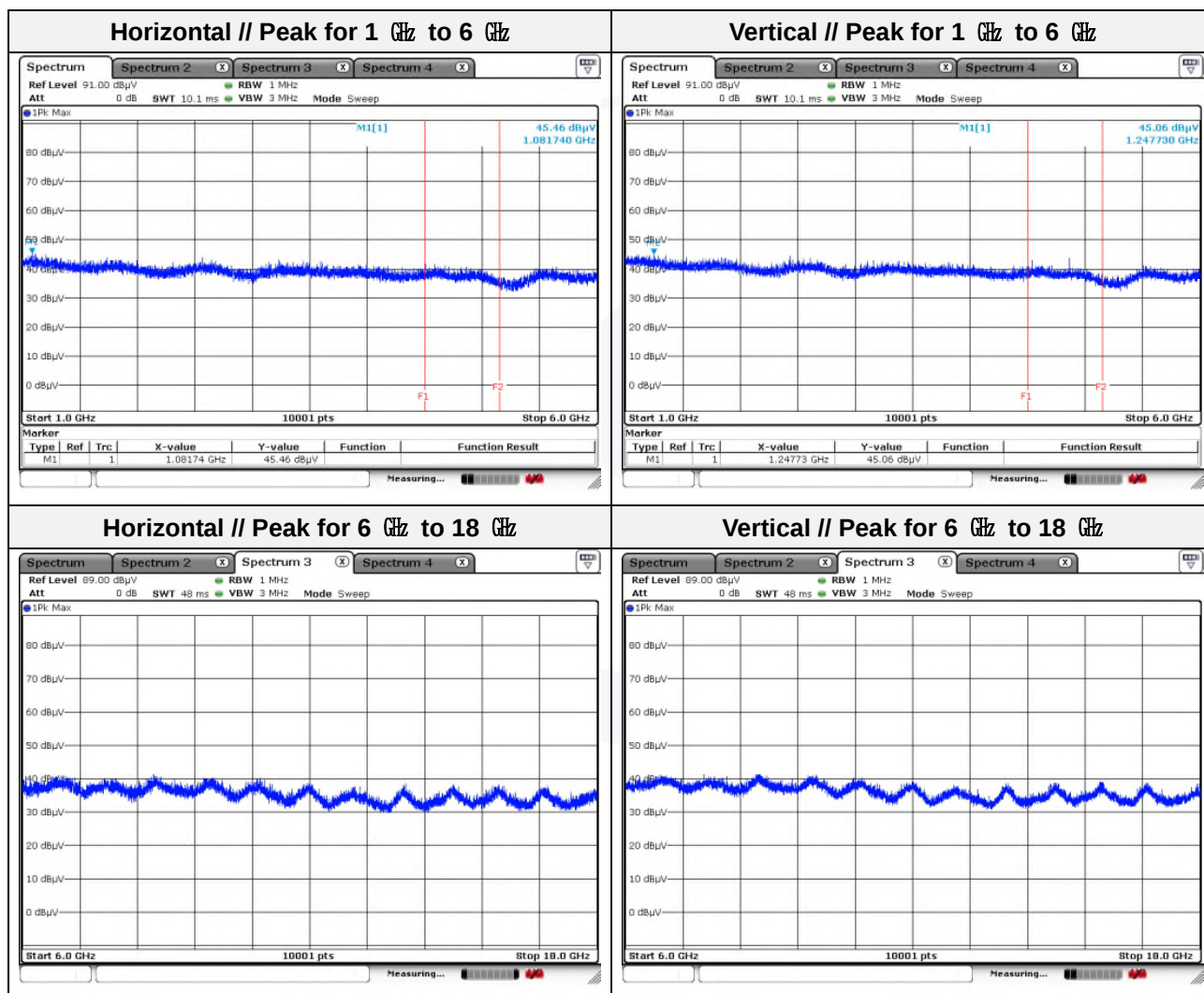
Mode: 802.11ac_VHT20_DC 24 V

Distance of measurement: 3 meter

Channel: 48

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 081.74	45.46	Peak	H	-8.89	-	36.57	74.00	37.43
1 247.74	45.06	Peak	V	-7.84	-	37.22	68.20	30.98



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



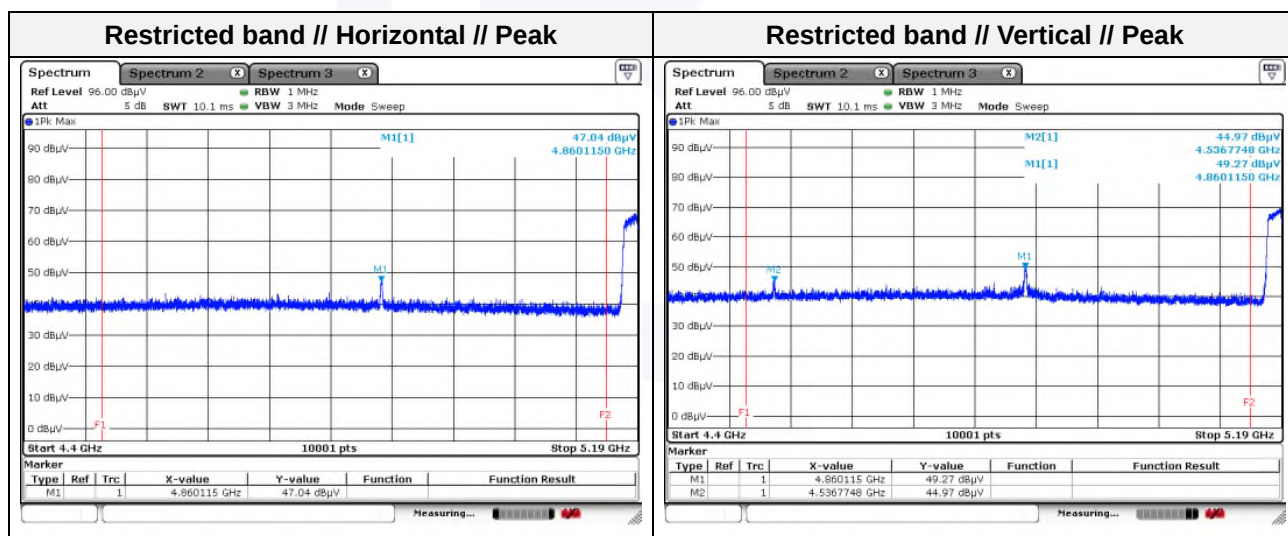
Mode: 802.11n_HT40_DC 12 V
Distance of measurement: 3 meter
Channel: 38

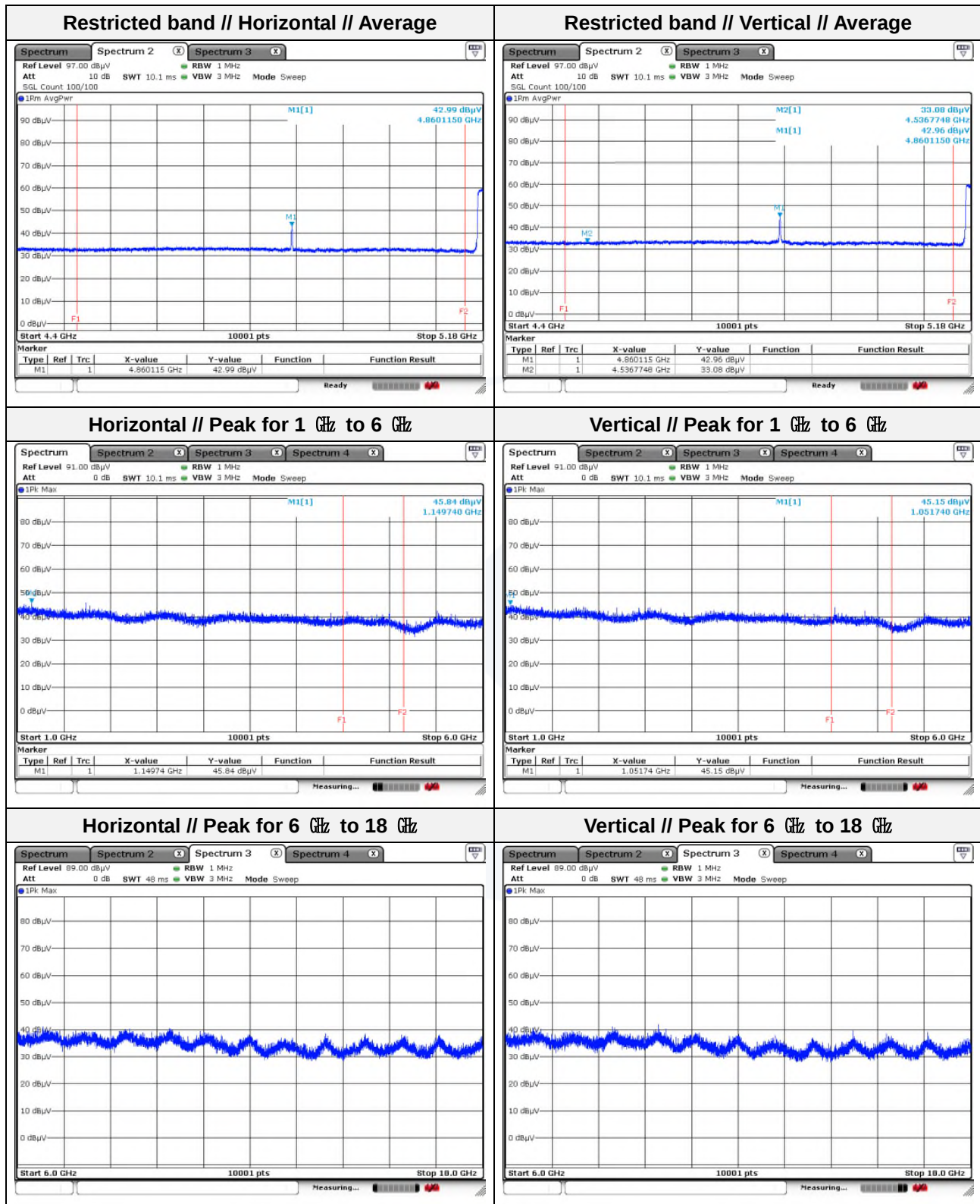
- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 051.74	45.15	Peak	V	-9.08	-	36.07	74.00	37.93
1 149.74	45.84	Peak	H	-8.46	-	37.38	74.00	36.62

- Band edge

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 536.77	44.97	Peak	V	4.70	-	49.67	74.00	24.33
4 536.77	33.08	Average	V	4.70	0.56	38.34	54.00	15.66
4 860.12	47.04	Peak	H	6.72	-	53.76	74.00	20.24
4 860.12	42.99	Average	H	6.72	0.56	50.27	54.00	3.73
4 860.12	49.27	Peak	V	6.72	-	55.99	74.00	18.01
4 860.12	42.96	Average	V	6.72	0.56	50.24	54.00	3.76





Note.

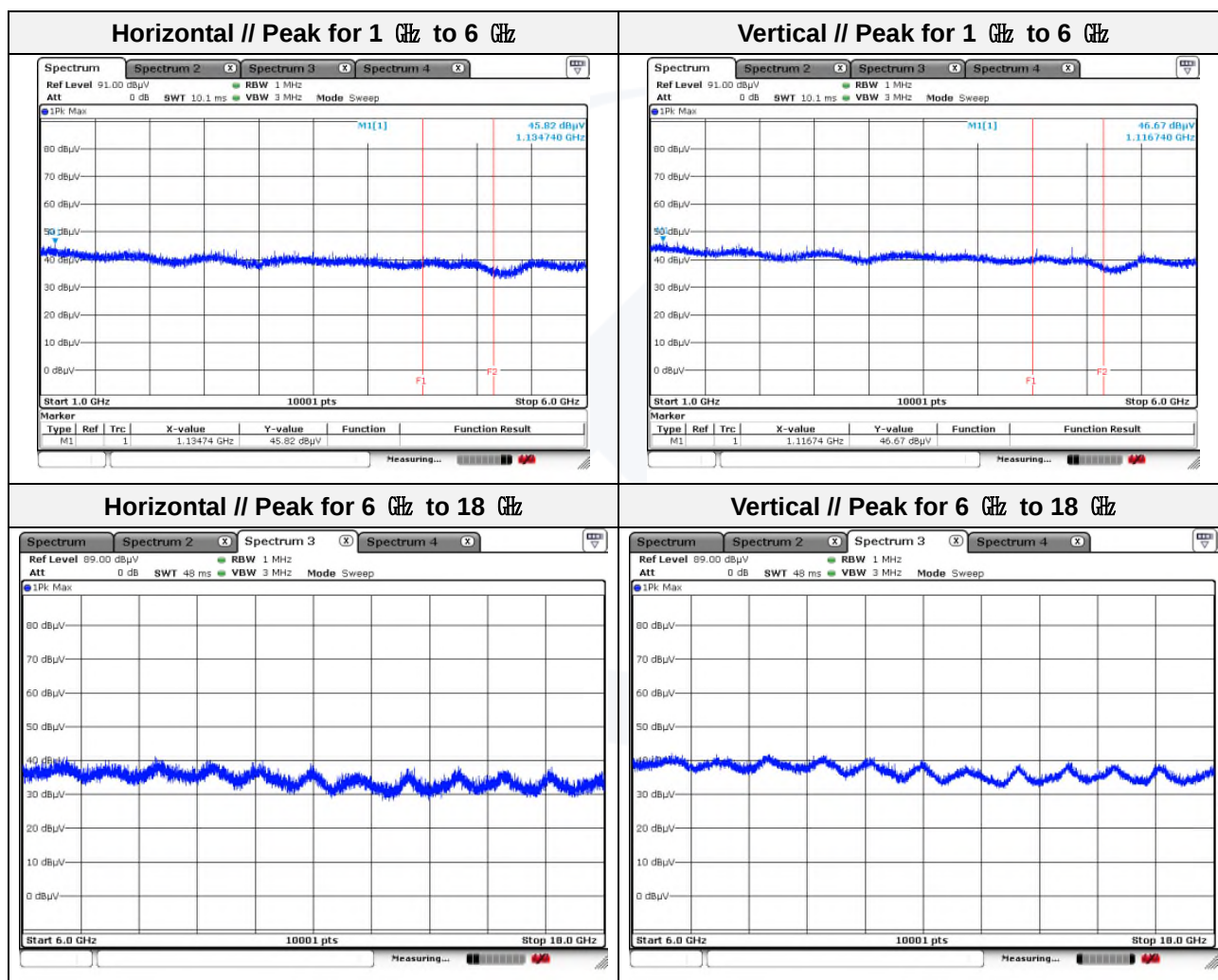
1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Mode: 802.11n_HT40_DC 12 V
Distance of measurement: 3 meter
Channel: 46

- Spurious

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1 116.74	46.67	Peak	V	-8.67	-	38.00	74.00	36.00
1 134.74	45.82	Peak	H	-8.55	-	37.27	74.00	36.73



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



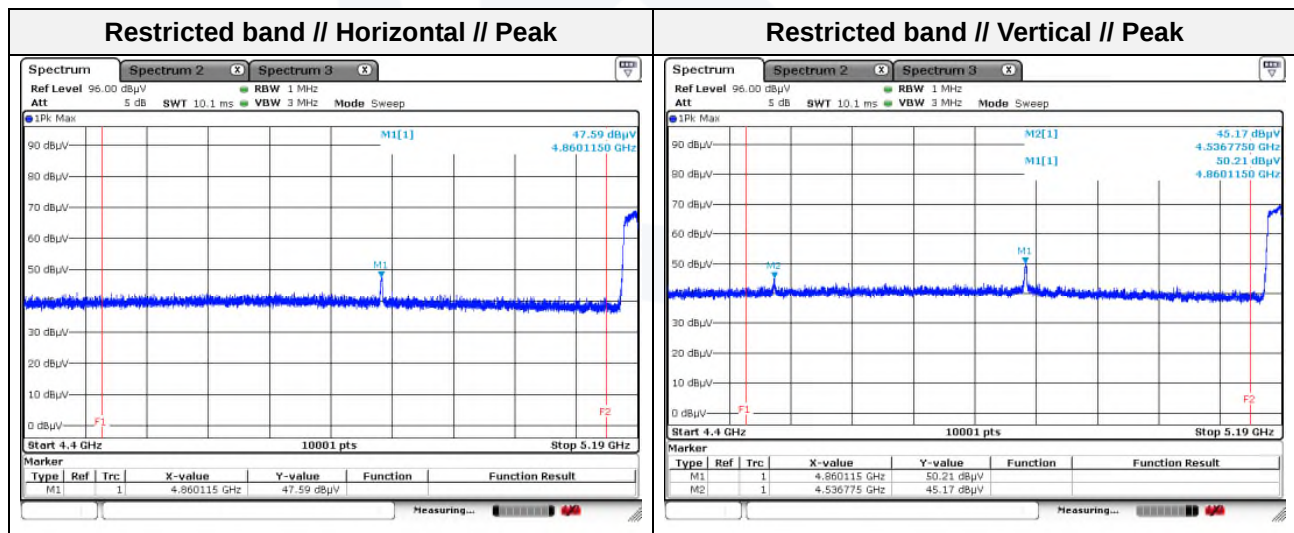
Mode: 802.11n_HT40_DC 24 V
Distance of measurement: 3 meter
Channel: 38

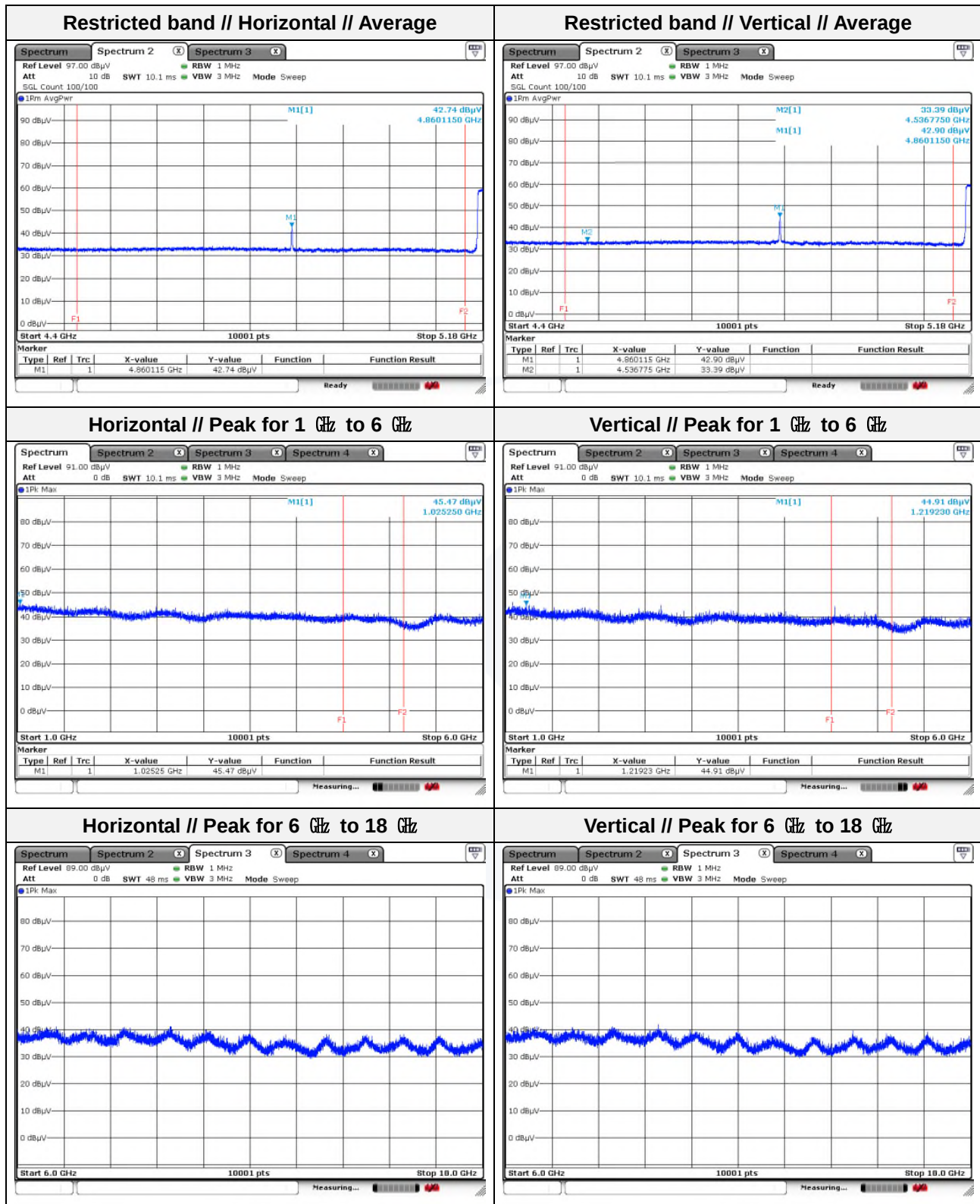
- Spurious

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1 025.25	45.47	Peak	H	-9.24	-	36.23	74.00	37.77
1 219.23	44.91	Peak	V	-8.02	-	36.89	74.00	37.11

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4 536.78	45.17	Peak	V	4.70	-	49.87	74.00	24.13
4 536.78	33.39	Average	V	4.70	0.56	38.65	54.00	15.35
4 860.12	47.59	Peak	H	6.72	-	54.31	74.00	19.69
4 860.12	42.74	Average	H	6.72	0.56	50.02	54.00	3.98
4 860.12	50.21	Peak	V	6.72	-	56.93	74.00	17.07
4 860.12	42.90	Average	V	6.72	0.56	50.18	54.00	3.82





Note.

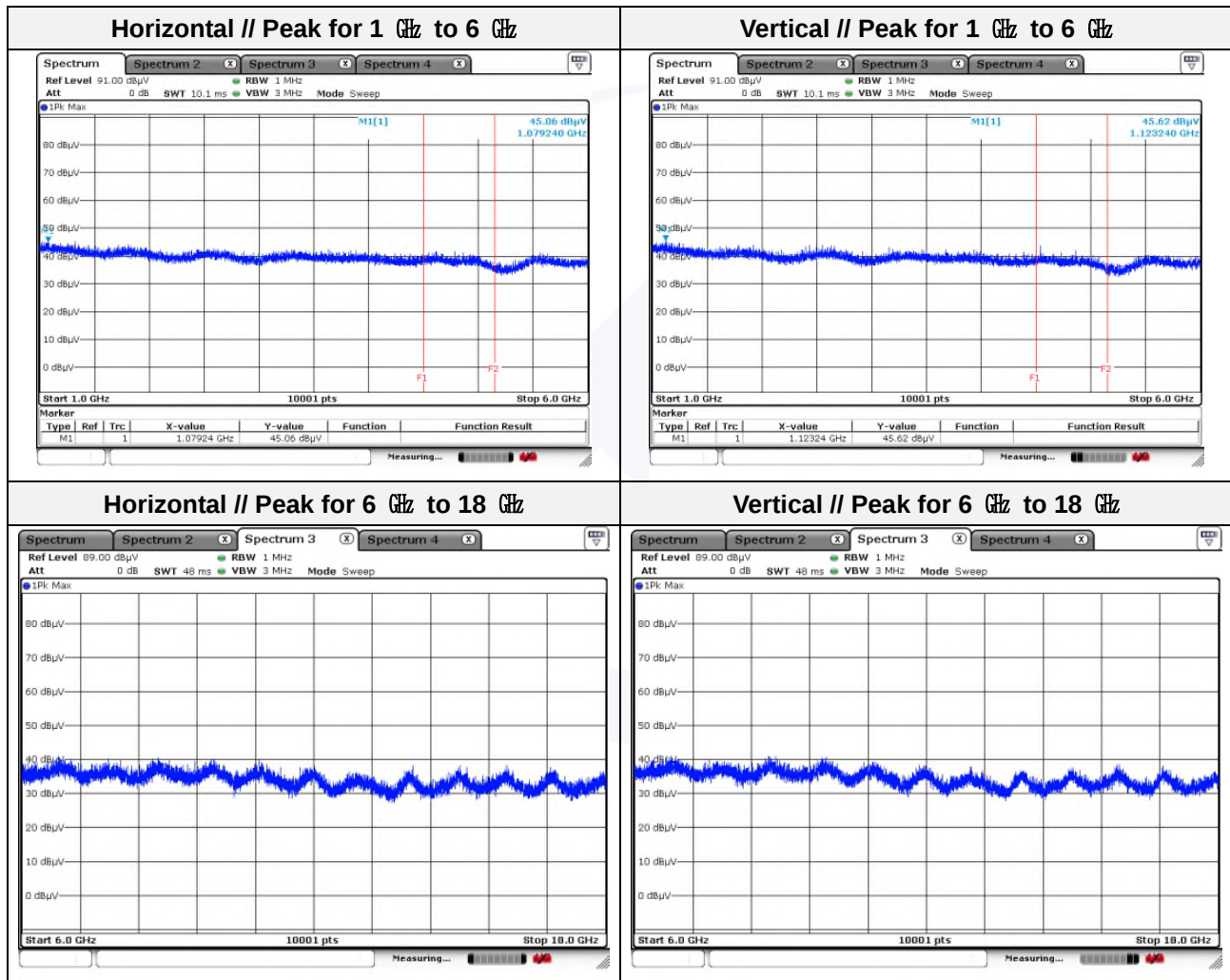
1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Mode: 802.11n_HT40_DC 24 V
Distance of measurement: 3 meter
Channel: 46

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 079.24	45.06	Peak	H	-8.90	-	36.16	74.00	37.84
1 123.24	45.62	Peak	V	-8.62	-	37.00	74.00	37.00



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



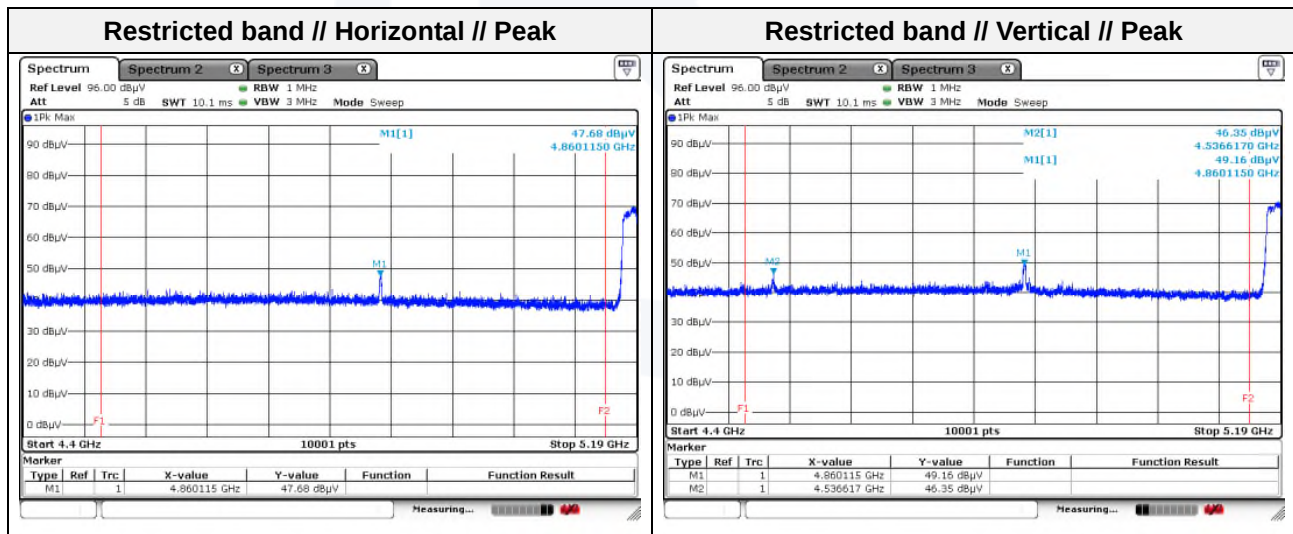
Mode: 802.11ac_VHT40_DC 12 V
Distance of measurement: 3 meter
Channel: 38

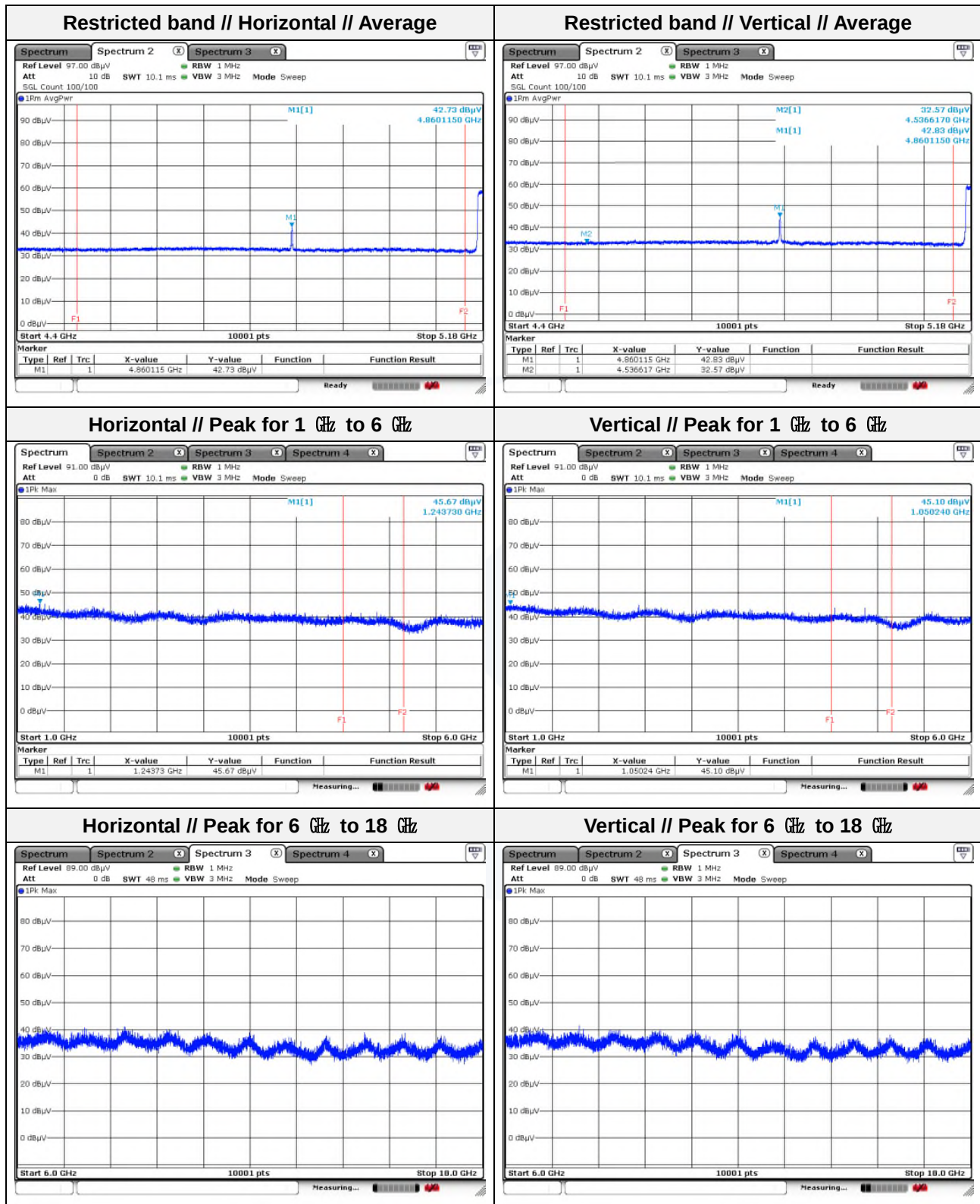
- Spurious

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1 050.24	45.10	Peak	V	-9.09	-	36.01	74.00	37.99
1 243.73	45.67	Peak	H	-7.87	-	37.80	68.20	30.40

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4 536.62	46.35	Peak	V	4.70	-	51.05	74.00	22.95
4 536.62	32.57	Average	V	4.70	2.60	39.87	54.00	14.13
4 860.12	47.68	Peak	H	6.72	-	54.40	74.00	19.60
4 860.12	42.73	Average	H	6.72	2.60	52.05	54.00	1.95
4 860.12	49.16	Peak	V	6.72	-	55.88	74.00	18.12
4 860.12	42.83	Average	V	6.72	2.60	52.15	54.00	1.85





Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.

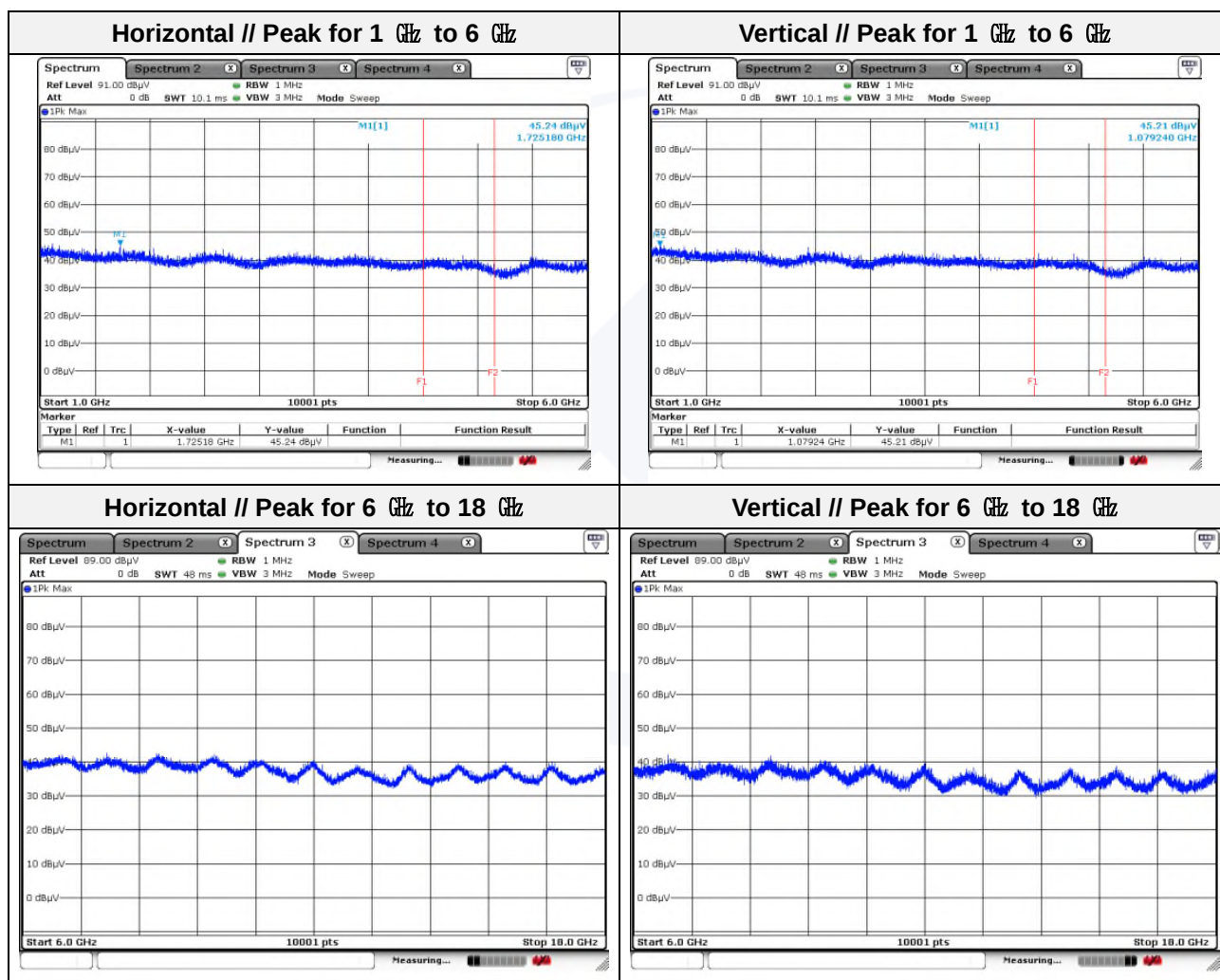


Report No. : KES-RF240420-R1

Mode: 802.11ac_VHT40_DC 24 V
Distance of measurement: 3 meter
Channel: 46

- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 079.24	45.21	Peak	V	-8.90	-	36.31	74.00	37.69
1 725.18	45.24	Peak	H	-4.14	-	41.10	68.20	27.10



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



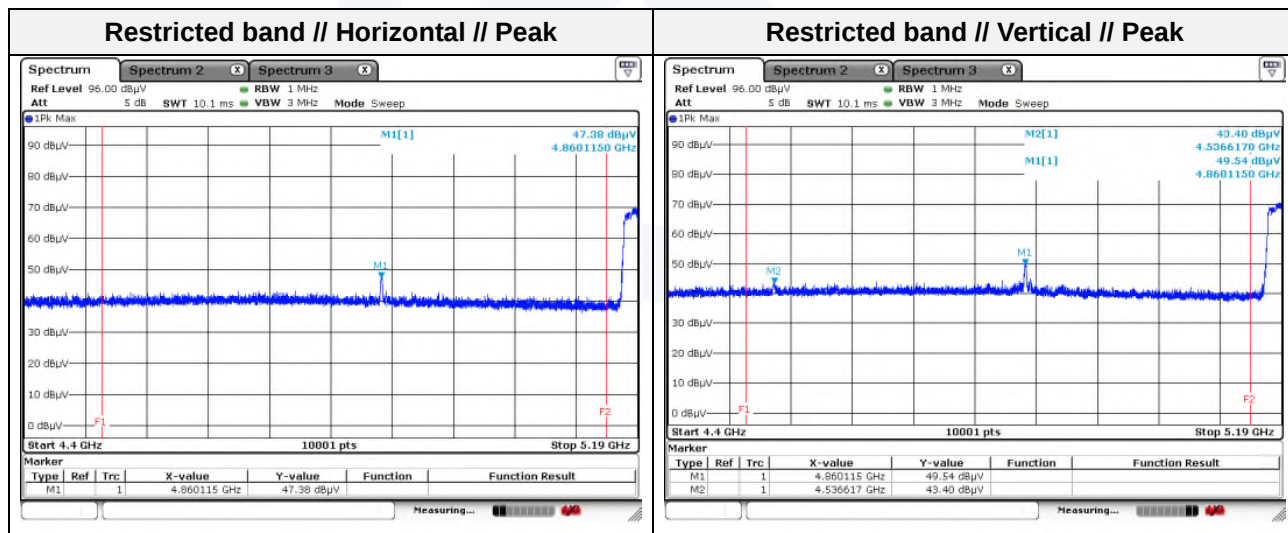
Mode: 802.11ac_VHT40_DC 24 V
Distance of measurement: 3 meter
Channel: 38

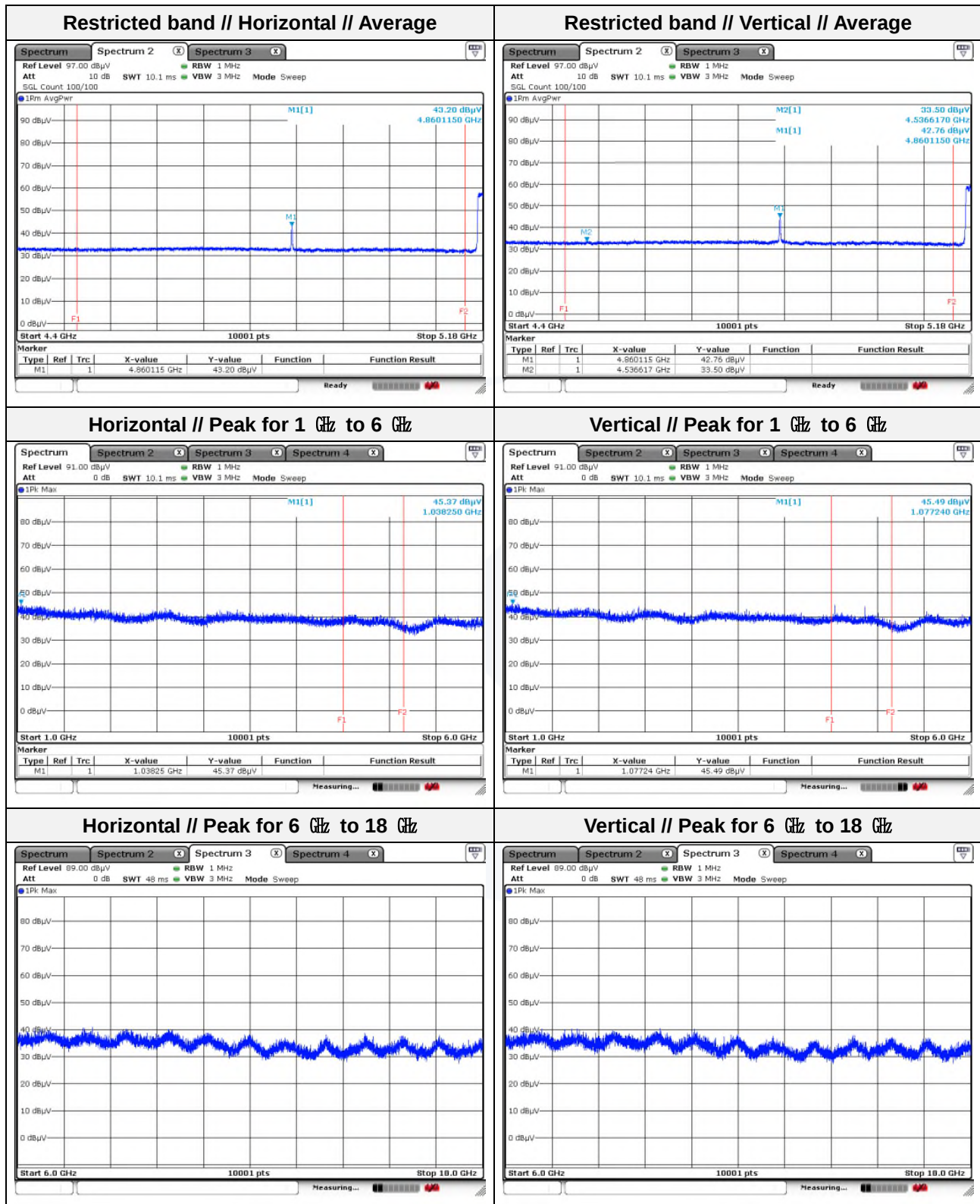
- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 038.25	45.37	Peak	H	-9.16	-	36.21	74.00	37.79
1 077.24	45.49	Peak	V	-8.92	-	36.57	74.00	37.43

- Band edge

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 536.62	43.40	Peak	V	4.70	-	48.10	74.00	25.90
4 536.62	33.50	Average	V	4.70	2.60	40.80	54.00	13.20
4 860.12	47.38	Peak	H	6.72	-	54.10	74.00	19.90
4 860.12	43.20	Average	H	6.72	2.60	52.52	54.00	1.48
4 860.12	49.54	Peak	V	6.72	-	56.26	74.00	17.74
4 860.12	42.76	Average	V	6.72	2.60	52.08	54.00	1.92





Note.

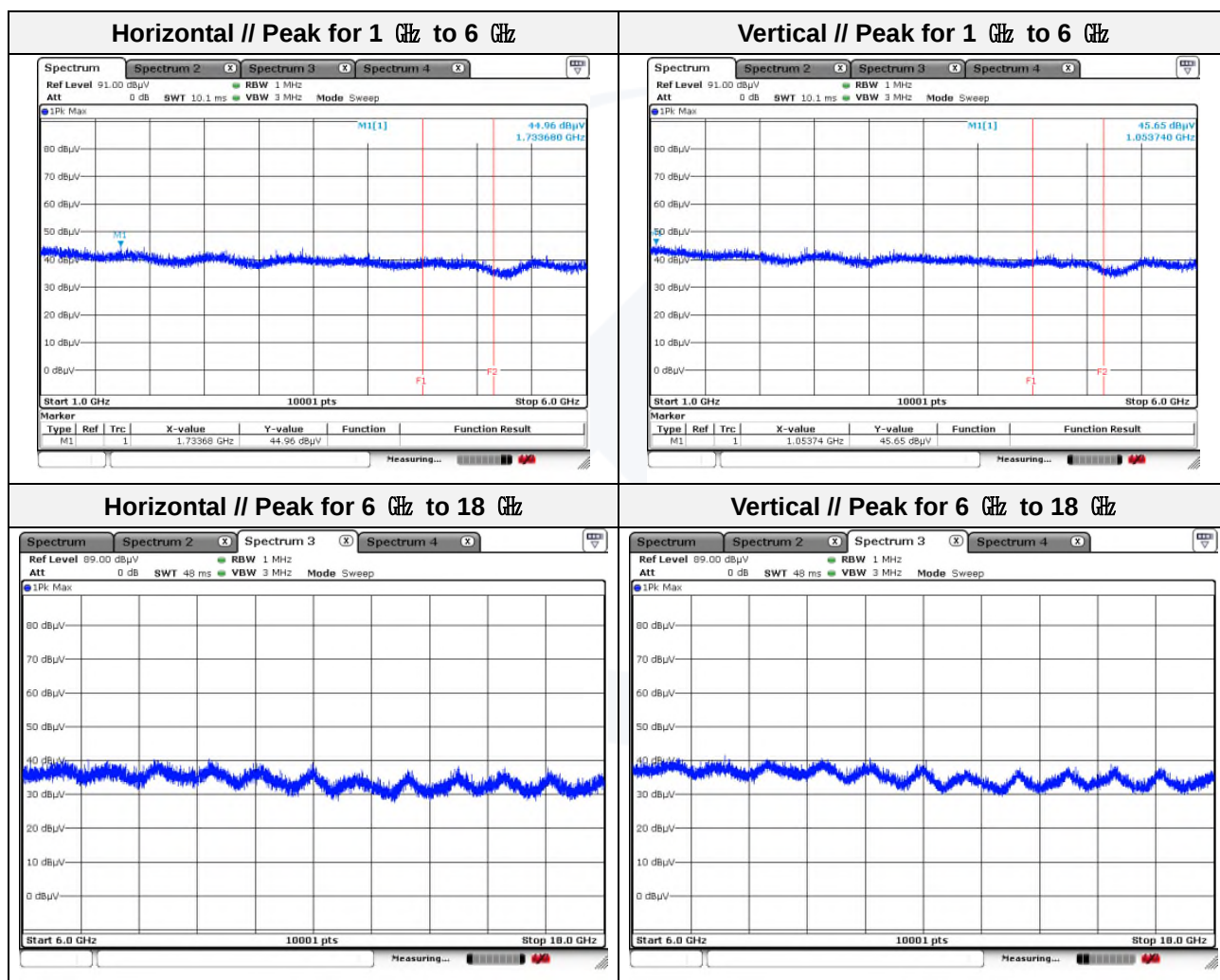
1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Mode: 802.11ac_VHT40_DC 24 V
Distance of measurement: 3 meter
Channel: 46

- Spurious

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1 053.74	45.65	Peak	V	-9.06	-	36.59	74.00	37.41
1 733.68	44.96	Peak	H	-4.06	-	40.90	68.20	27.30



Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



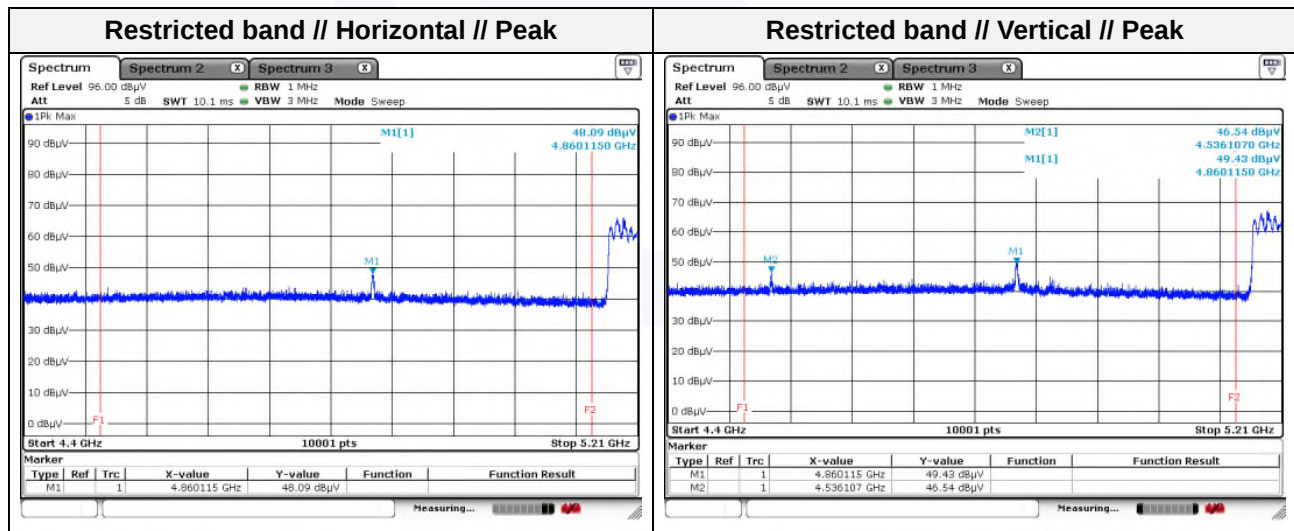
Mode: 802.11ac_VHT80_DC 12 V
Distance of measurement: 3 meter
Channel: 42

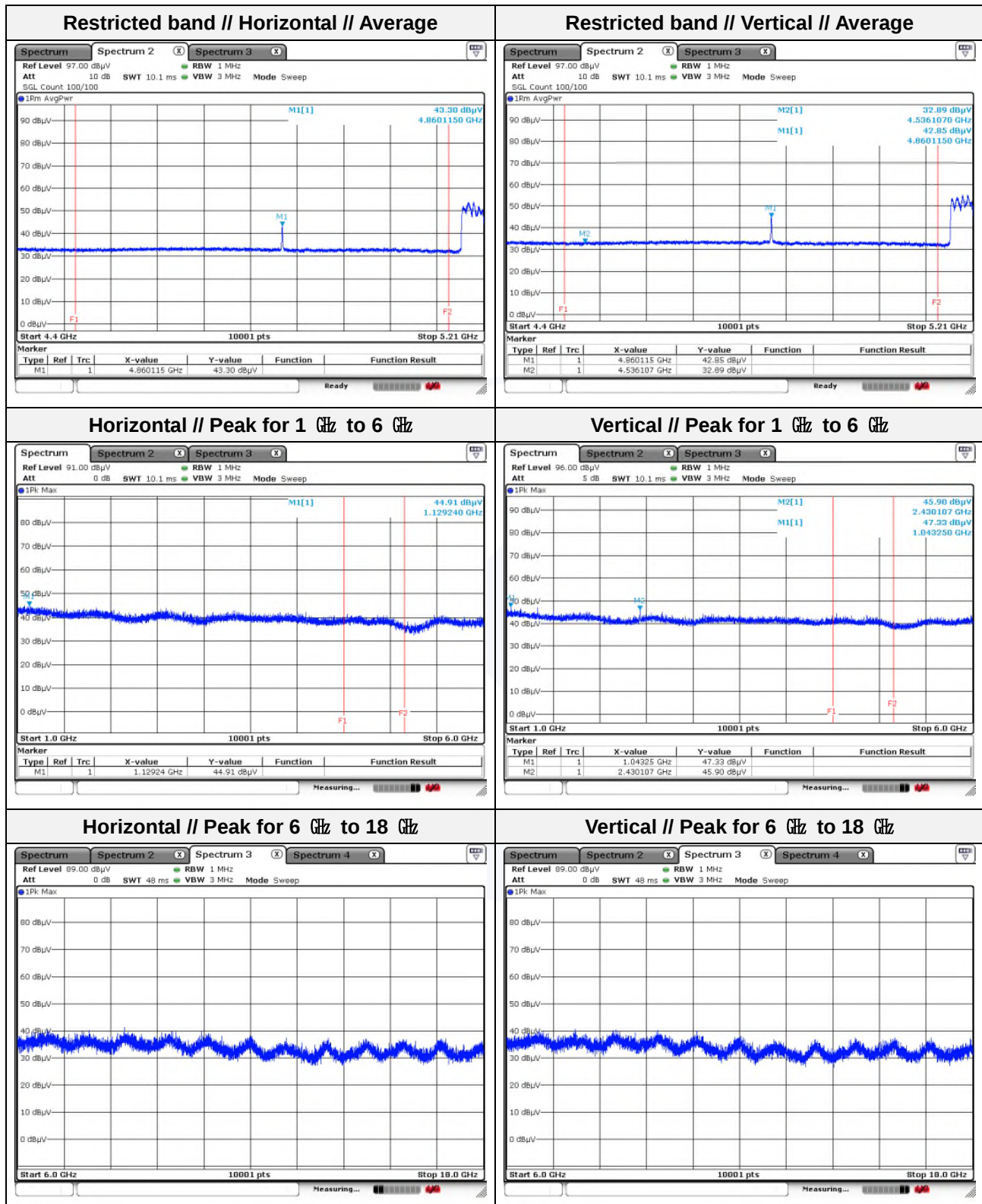
- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 043.25	47.33	Peak	V	-9.13	-	38.20	74.00	35.80
1 129.24	44.91	Peak	H	-8.59	-	36.32	74.00	37.68
2 430.11	45.90	Peak	V	-0.30	-	45.60	68.20	22.60

- Band edge

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 536.11	46.54	Peak	V	4.70	-	51.24	74.00	22.76
4 536.11	32.89	Average	V	4.70	3.37	40.96	54.00	13.04
4 860.12	48.09	Peak	H	6.72	-	54.81	74.00	19.19
4 860.12	43.30	Average	H	6.72	3.37	53.39	54.00	0.61
4 860.12	49.43	Peak	V	6.72	-	56.15	74.00	17.85
4 860.12	42.85	Average	V	6.72	3.37	52.94	54.00	1.06





Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



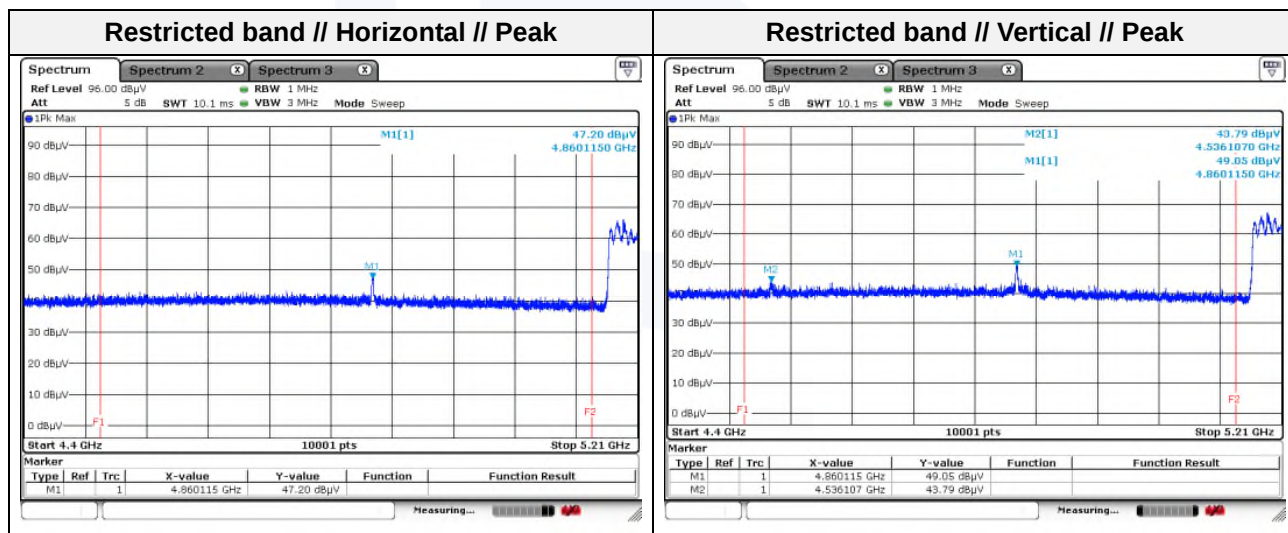
Mode: 802.11ac_VHT80_DC 24 V
Distance of measurement: 3 meter
Channel: 42

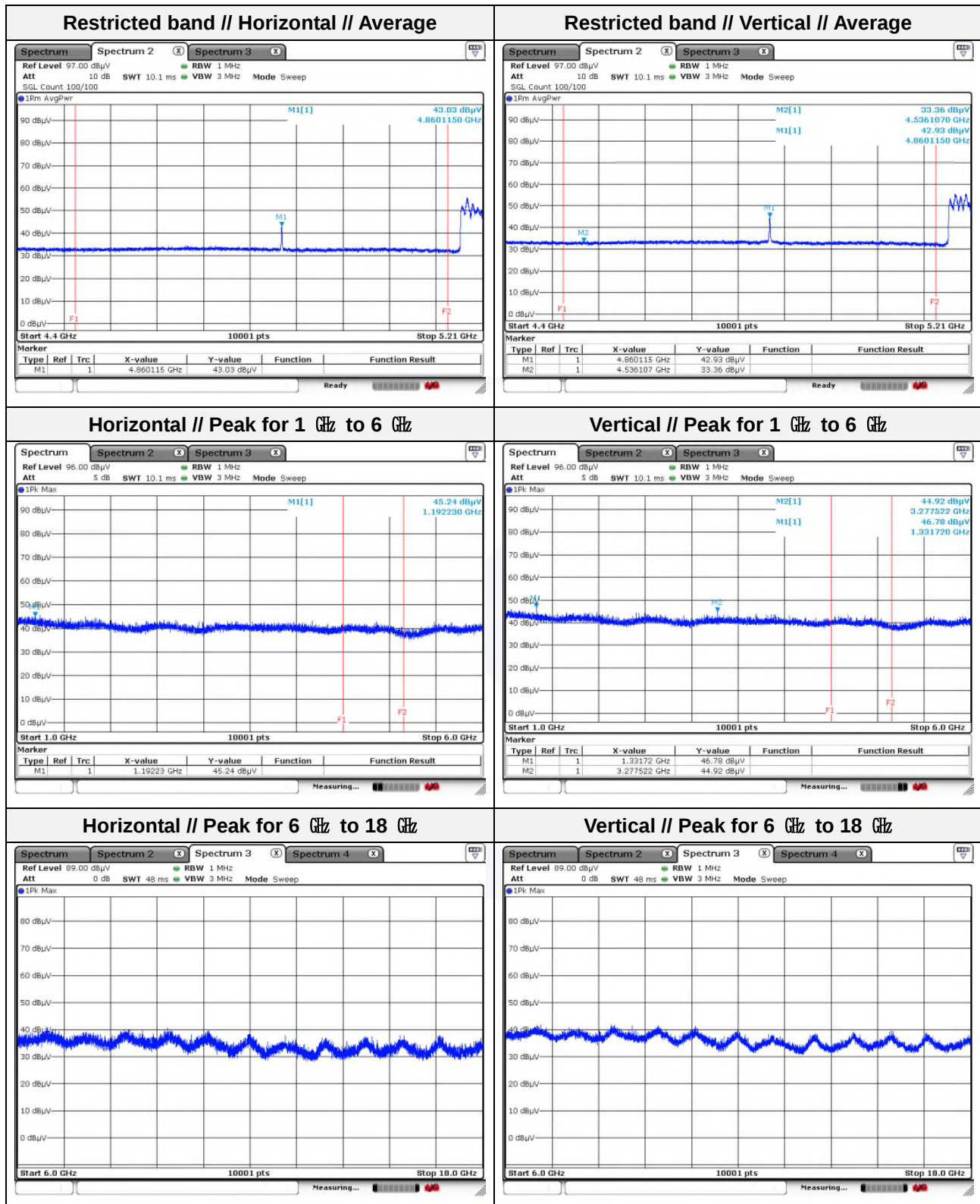
- Spurious

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1 192.23	45.24	Peak	H	-8.19	-	37.05	74.00	36.95
1 331.72	46.78	Peak	V	-7.32	-	39.46	74.00	34.54
3 277.52	44.92	Peak	V	1.12	-	46.04	68.20	22.16

- Band edge

Frequency (MHz)	Level (dBμV)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4 536.11	43.79	Peak	V	4.70	-	48.49	74.00	25.51
4 536.11	33.36	Average	V	4.70	3.37	41.43	54.00	12.57
4 860.12	47.20	Peak	H	6.72	-	53.92	74.00	20.08
4 860.12	43.03	Average	H	6.72	3.37	53.12	54.00	0.88
4 860.12	49.05	Peak	V	6.72	-	55.77	74.00	18.23
4 860.12	42.93	Average	V	6.72	3.37	53.02	54.00	0.98





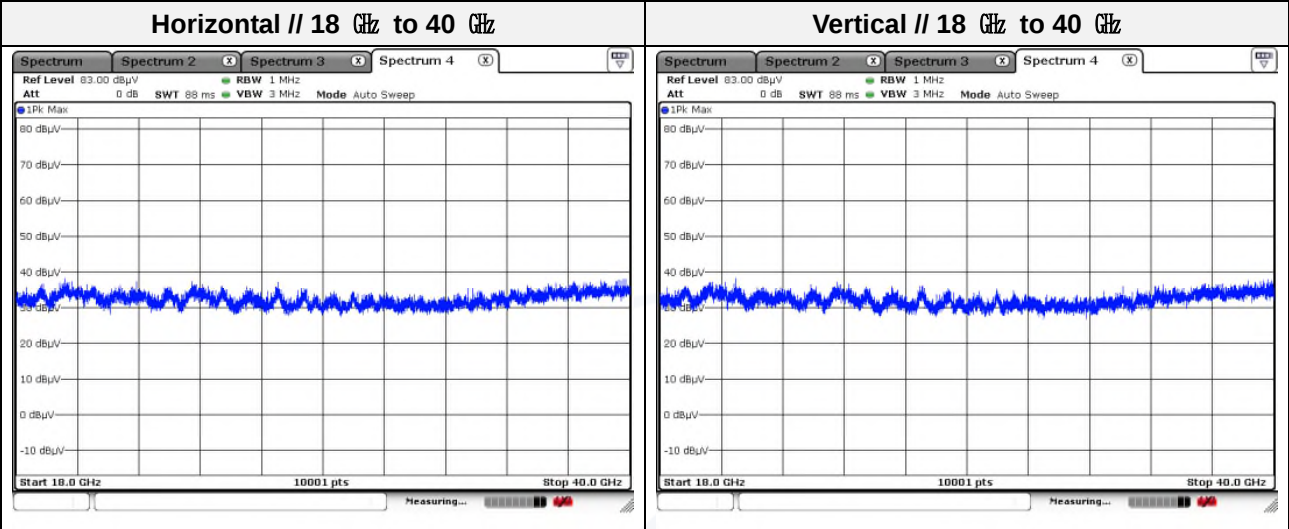
Note.

1. No spurious emission were detected above 6 GHz.
2. Average test would be performed if the peak result were greater than the average limit.



Test results (18 GHz to 40 GHz)

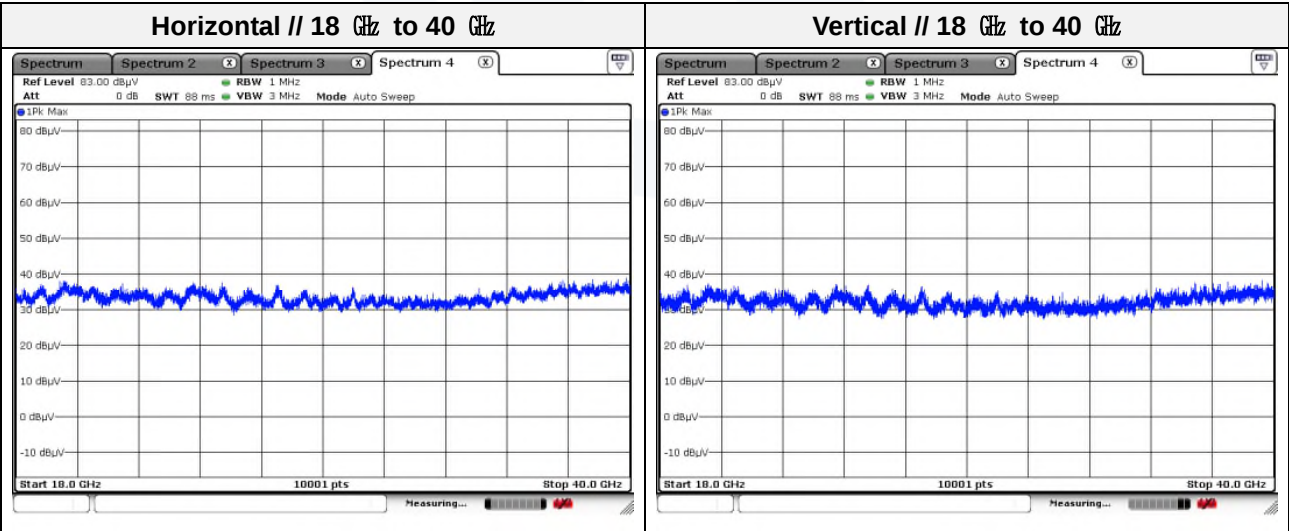
Band 802.11ac_VHT20 (Worst Case)_DC 12 V
Distance of measurement: 3 meter
Channel 48 (Worst Case)



Note.

1. No spurious emission were detected above 18 GHz.

Band 802.11ac_VHT20 (Worst Case)_DC 24 V
Distance of measurement: 3 meter
Channel 48 (Worst Case)



Note.

1. No spurious emission were detected above 18 GHz.



3.6. 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
BAND REJECT FILTER	MICRO-TRONICS	BRM50716	G199	1 year	2025.01.12
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	SORENSEN	DCS40-75E	1408A02745	1 year	2025.01.12
EMI Test Receiver	R&S	ESU26	100552	1 year	2025.02.13

* 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.