

Duty cycle

Regarding to KDB 789033 D02 v01r04, the maximum duty cycles of all modes were investigated and set the spectrum analyzer as below.

Set RBW \geq OBW if possible; otherwise, set RBW to the largest available value. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100.

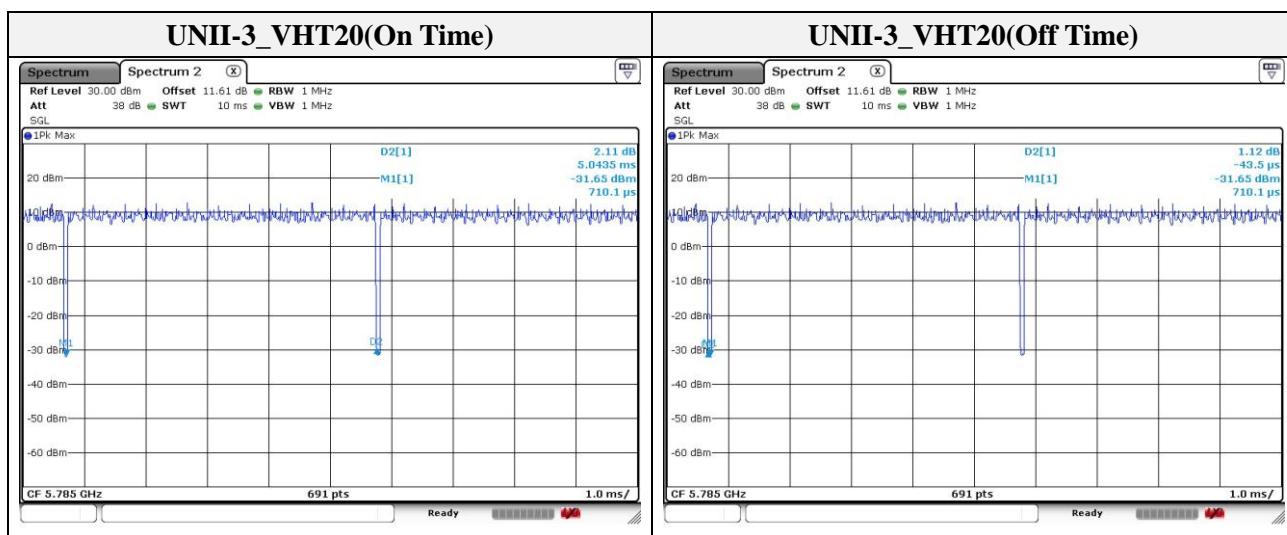
For the band 5.725-5.850 GHz

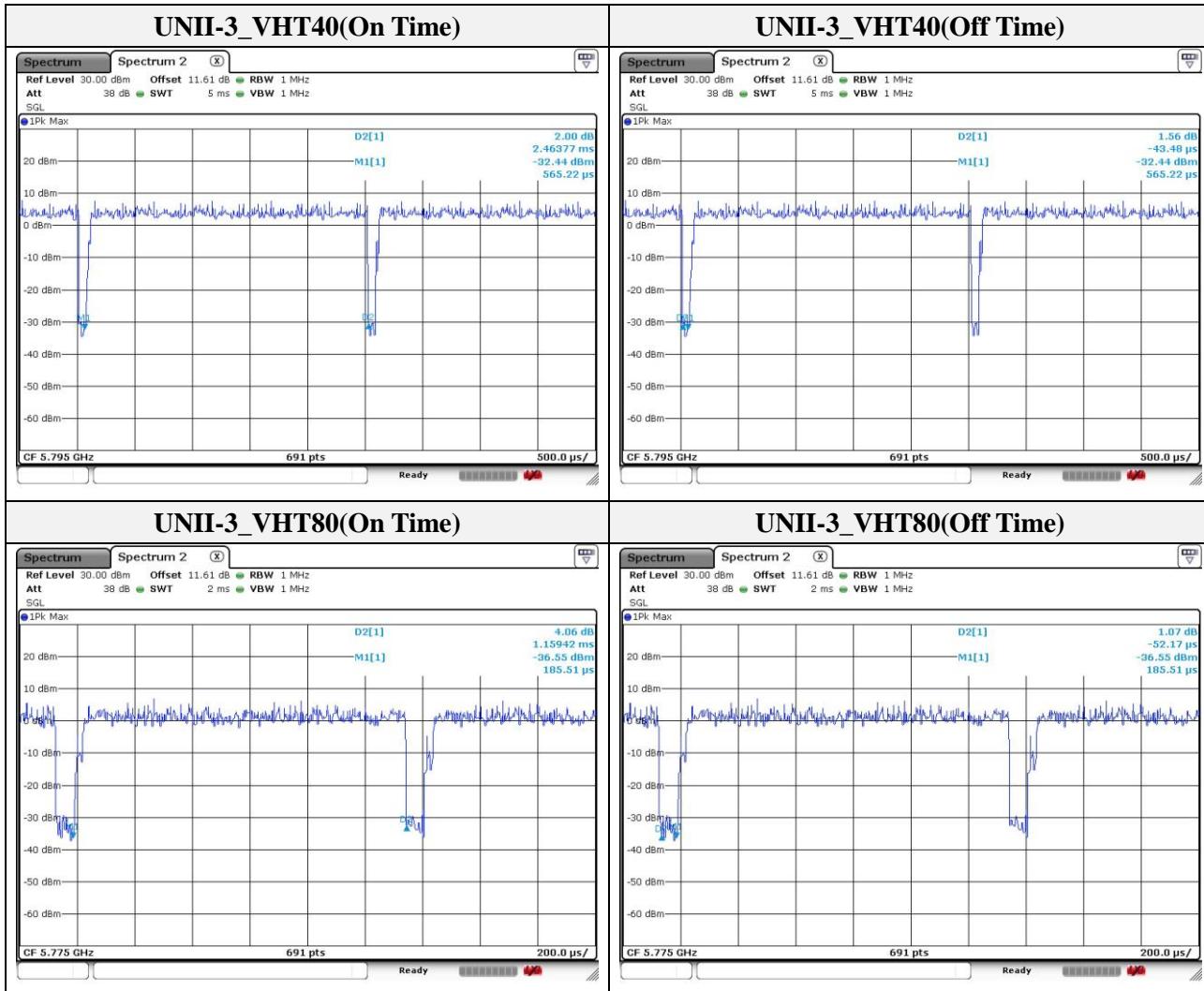
Test mode	T _{on} time (ms)	Period (ms)	Duty cycle (Linear)	Duty cycle (%)	Duty cycle correction factor(dB)
802.11n_VHT20	5.0435	0.043	0.99	99%	-
802.11n_VHT40	2.4638	0.043	0.98	98%	-
802.11n_VHT80	1.1594	0.052	0.96	96%	0.18

Note:

Duty cycle (Linear) = T_{on} time/Period

DCF(Duty cycle correction factor (dB)) = 10log(1/duty cycle)





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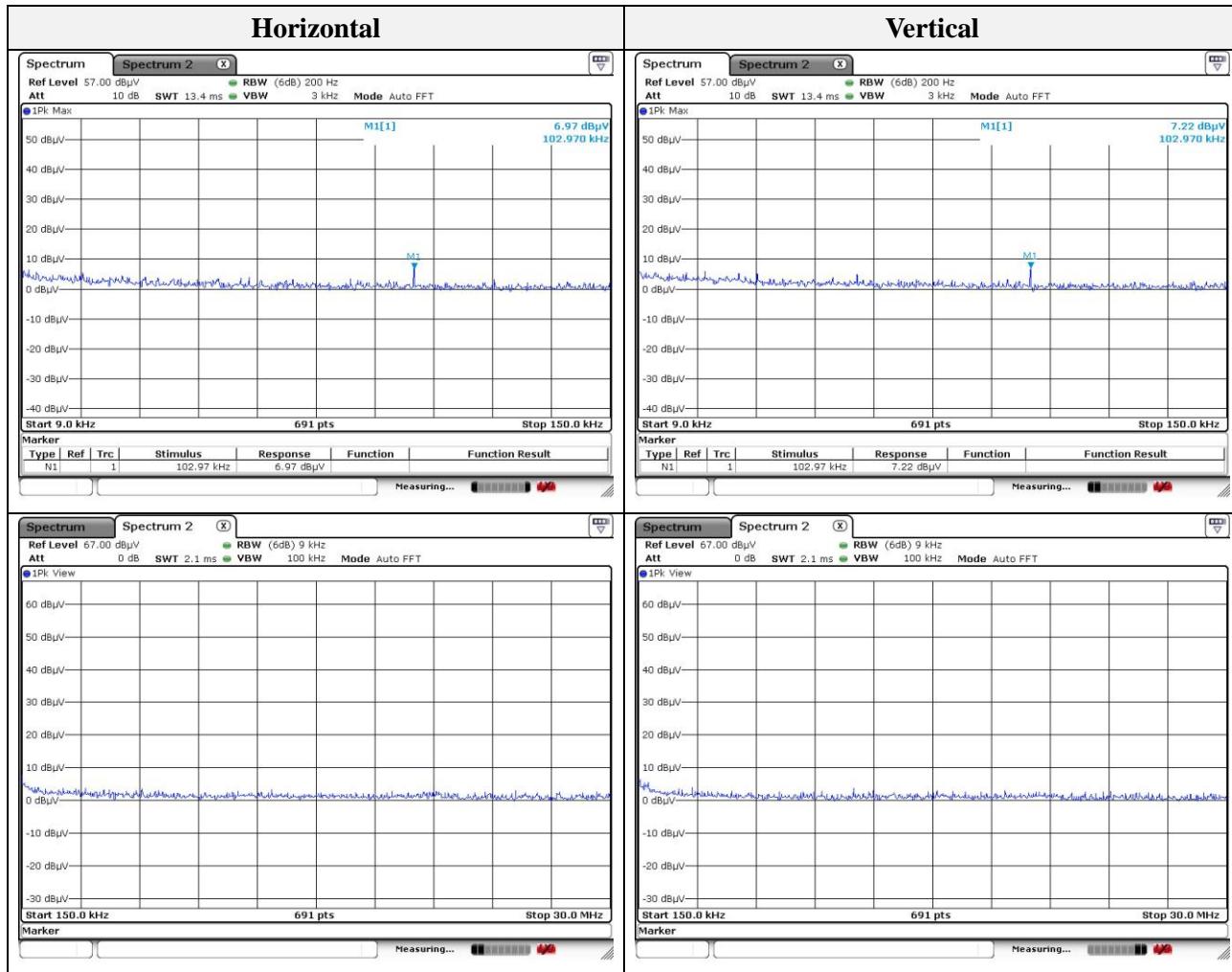
Test results (Below 30 MHz) – Worst case (Module 1)

Mode: UNII-3

Distance of measurement: 3 meter

Channel: 151

Frequency (MHz)	Level (dB μ V)	Ant. Pol. (H/V)	CF (dB)	F _d (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emissions were detected within 20 dB of the limit							



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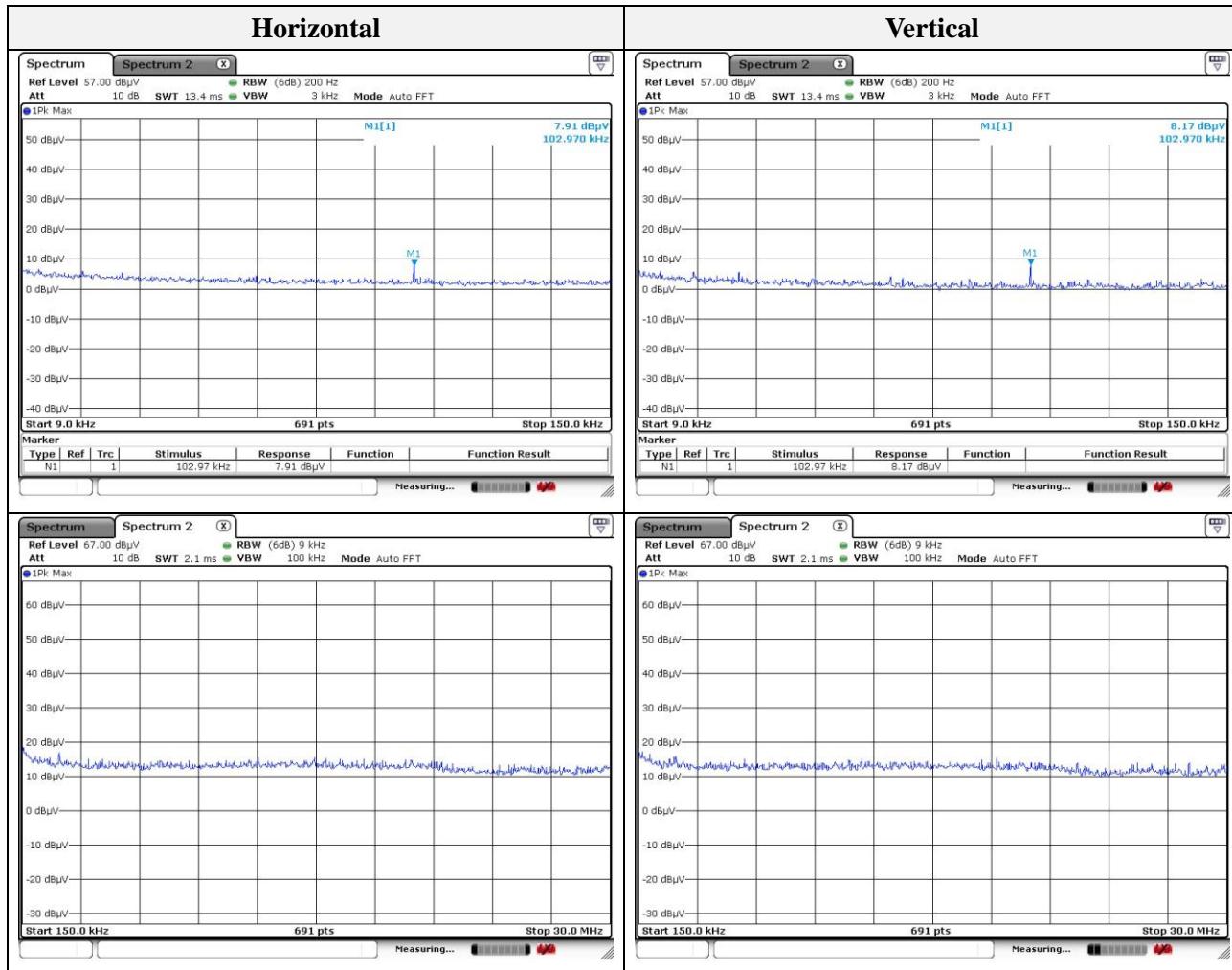
Test results (Below 30 MHz) – Worst case (Module 2)

Mode: UNII-3

Distance of measurement: 3 meter

Channel: 157

Frequency (MHz)	Level (dB μ V)	Ant. Pol. (H/V)	CF (dB)	F _d (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
No spurious emissions were detected within 20 dB of the limit							

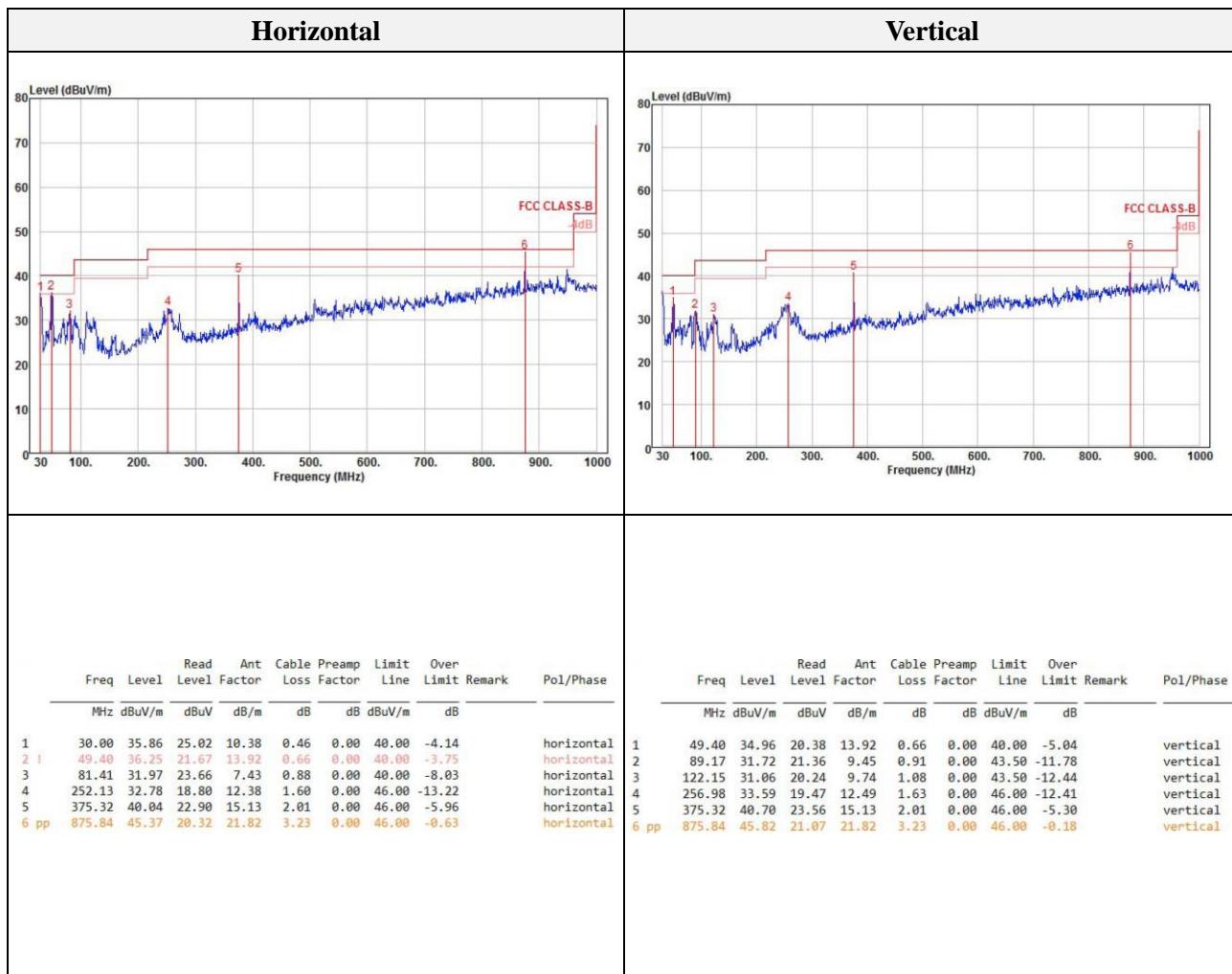


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Test results (Below 1 000 MHz) – Worst case (Module 1)

Mode: UNII-3

Distance of measurement: 3 meter

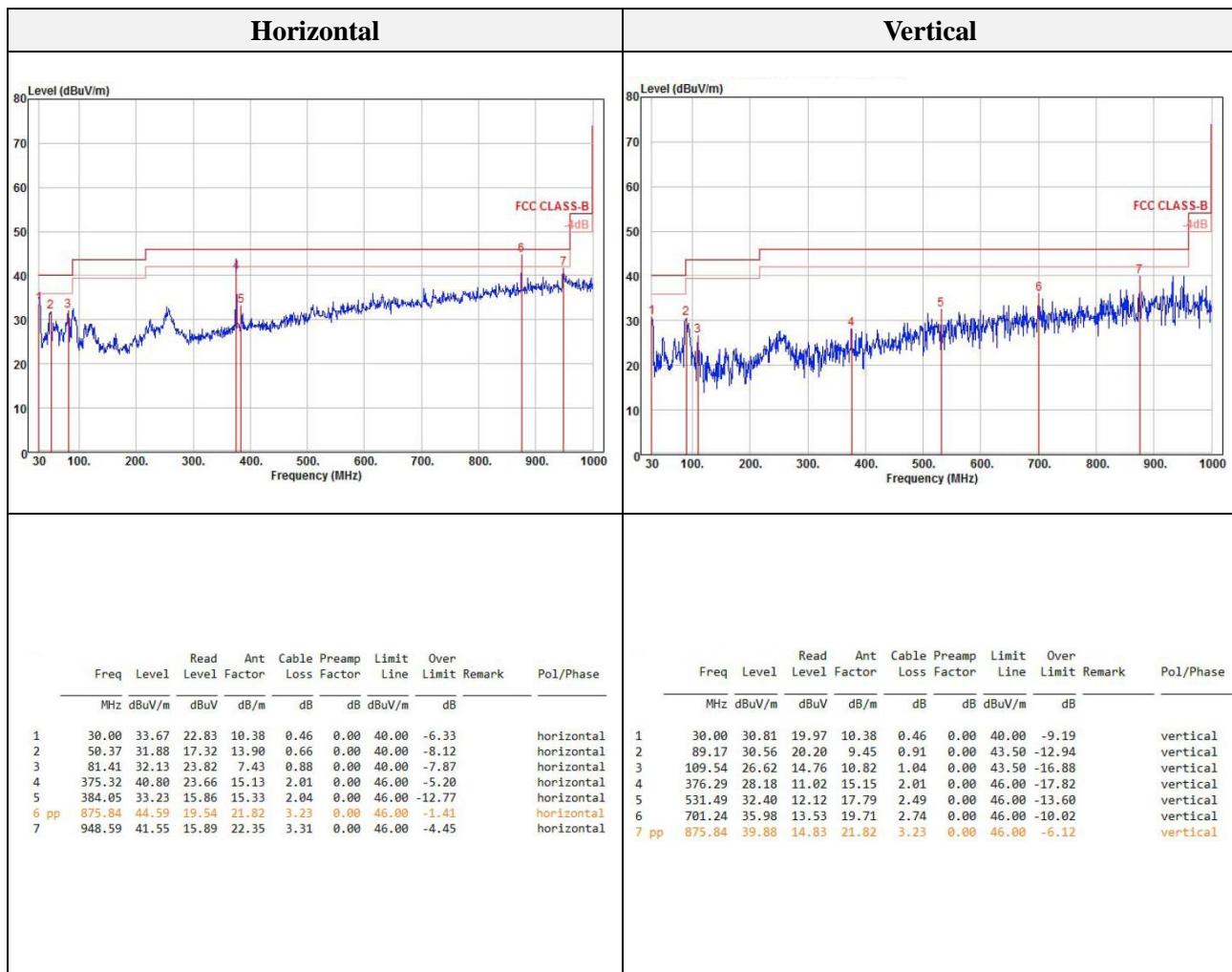
Channel: 149


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Test results (Below 1 000 MHz) – Worst case (Module 2)

 Mode: UNII-3

 Distance of measurement: 3 meter

 Channel: 149


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Mode: UNII-3(VHT20)_Module 1

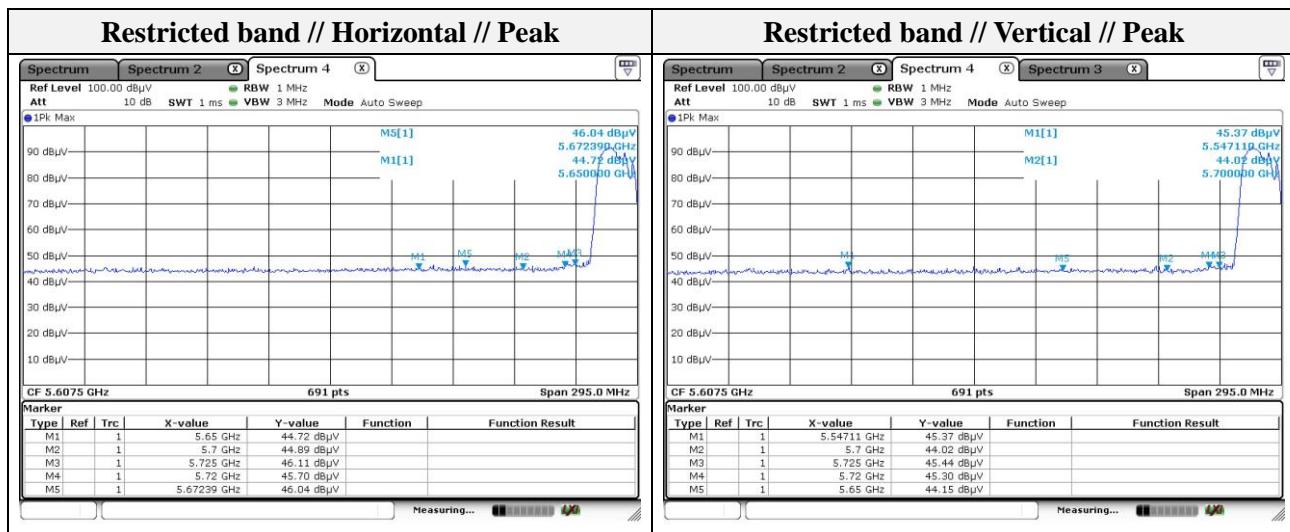
 Distance of measurement: 3 meter

 Channel: 149
- Spurious

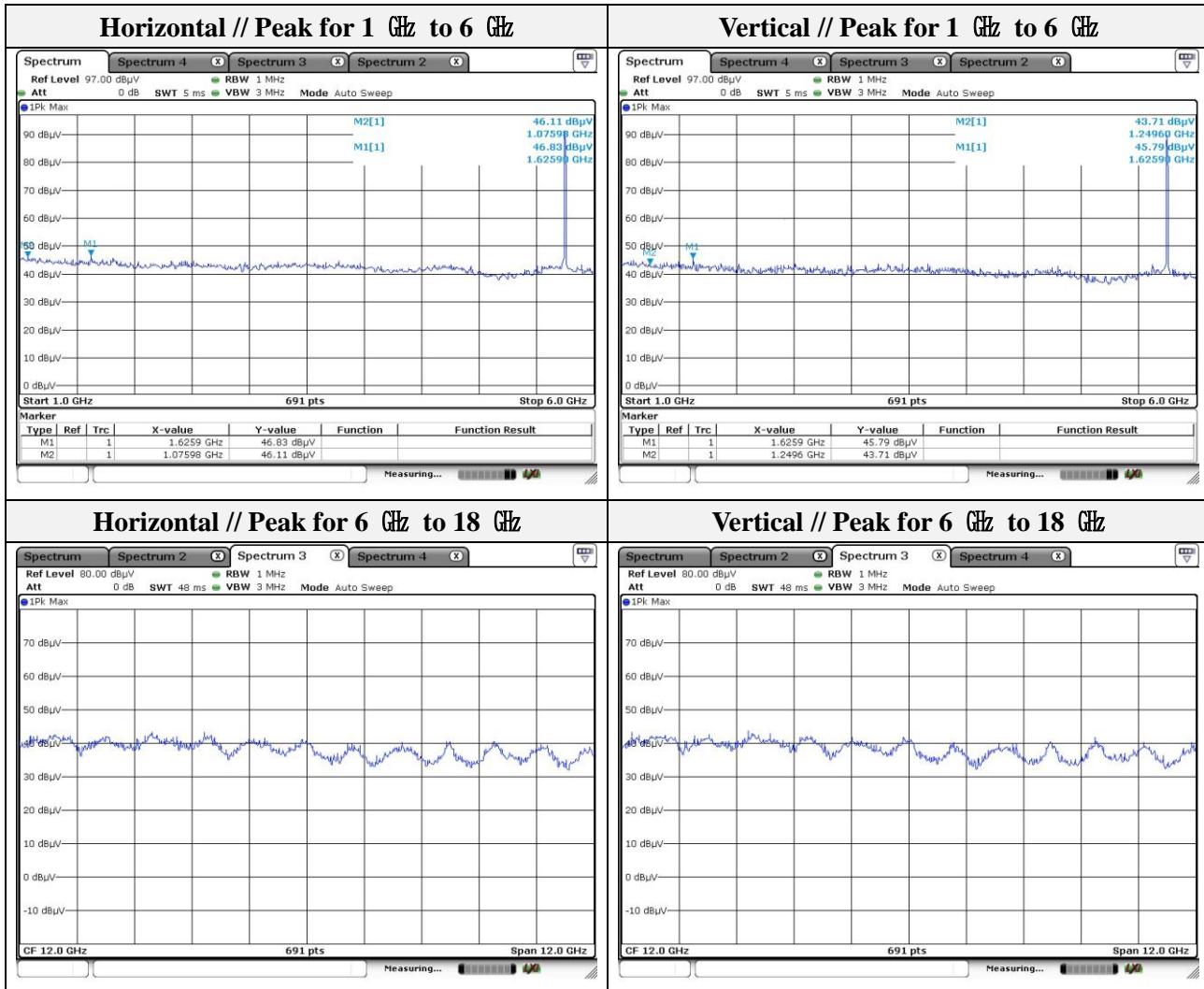
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1625.90	46.83	Peak	H	-4.74	-	42.09	74.00	31.91
1075.98	46.11	Peak	H	-8.65	-	37.46	74.00	36.54
1625.90	45.79	Peak	V	-4.74	-	41.05	74.00	32.95
1249.60	43.71	Peak	V	-7.54	-	36.17	74.00	37.83

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5725.00	46.11	Peak	H	10.87	-	56.98	122.20	65.22
5672.39	46.04	Peak	H	10.43	-	56.47	84.77	28.30
5725.00	45.44	Peak	V	10.87	-	56.31	122.20	65.89
5720.00	45.30	Peak	V	10.83	-	56.13	110.80	54.67



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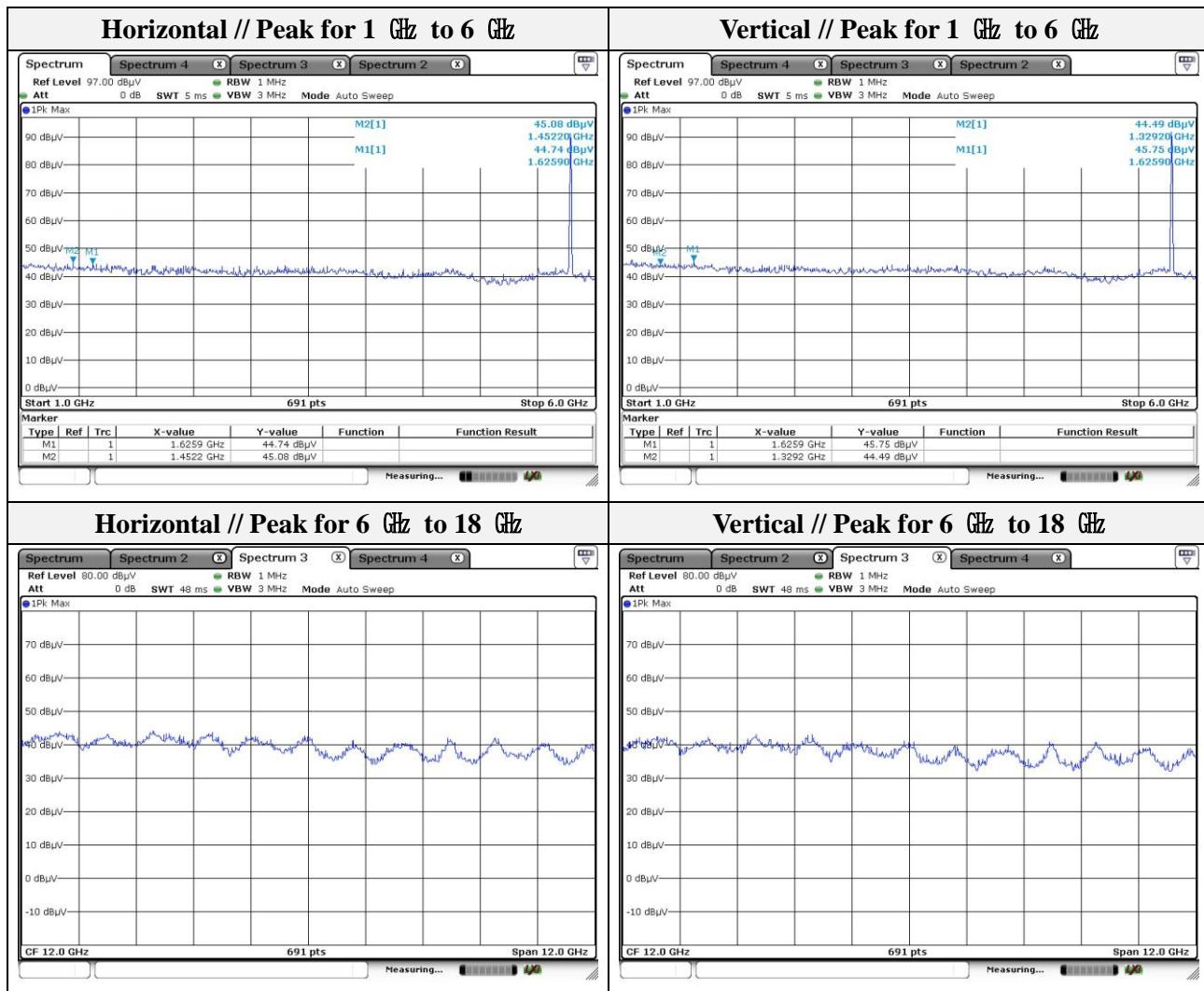
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Mode: UNII-3(VHT20)_Module 1

 Distance of measurement: 3 meter

 Channel: 157
- Spurious

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1625.90	44.74	Peak	H	-4.74	-	40.00	74.00	34.00
1452.20	45.08	Peak	H	-6.26	-	38.82	74.00	35.18
1625.90	45.75	Peak	V	-4.74	-	41.01	74.00	32.99
1329.20	44.49	Peak	V	-7.03	-	37.46	74.00	36.54



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Mode: UNII-3(VHT20) _Module 1

Distance of measurement: 3 meter

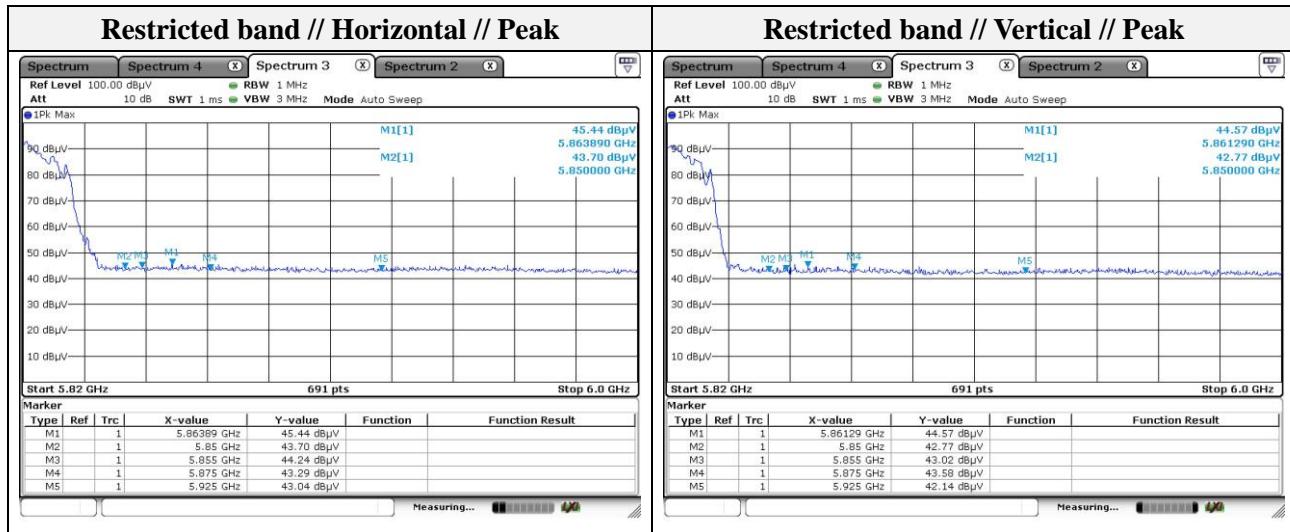
Channel: 165

- Spurious

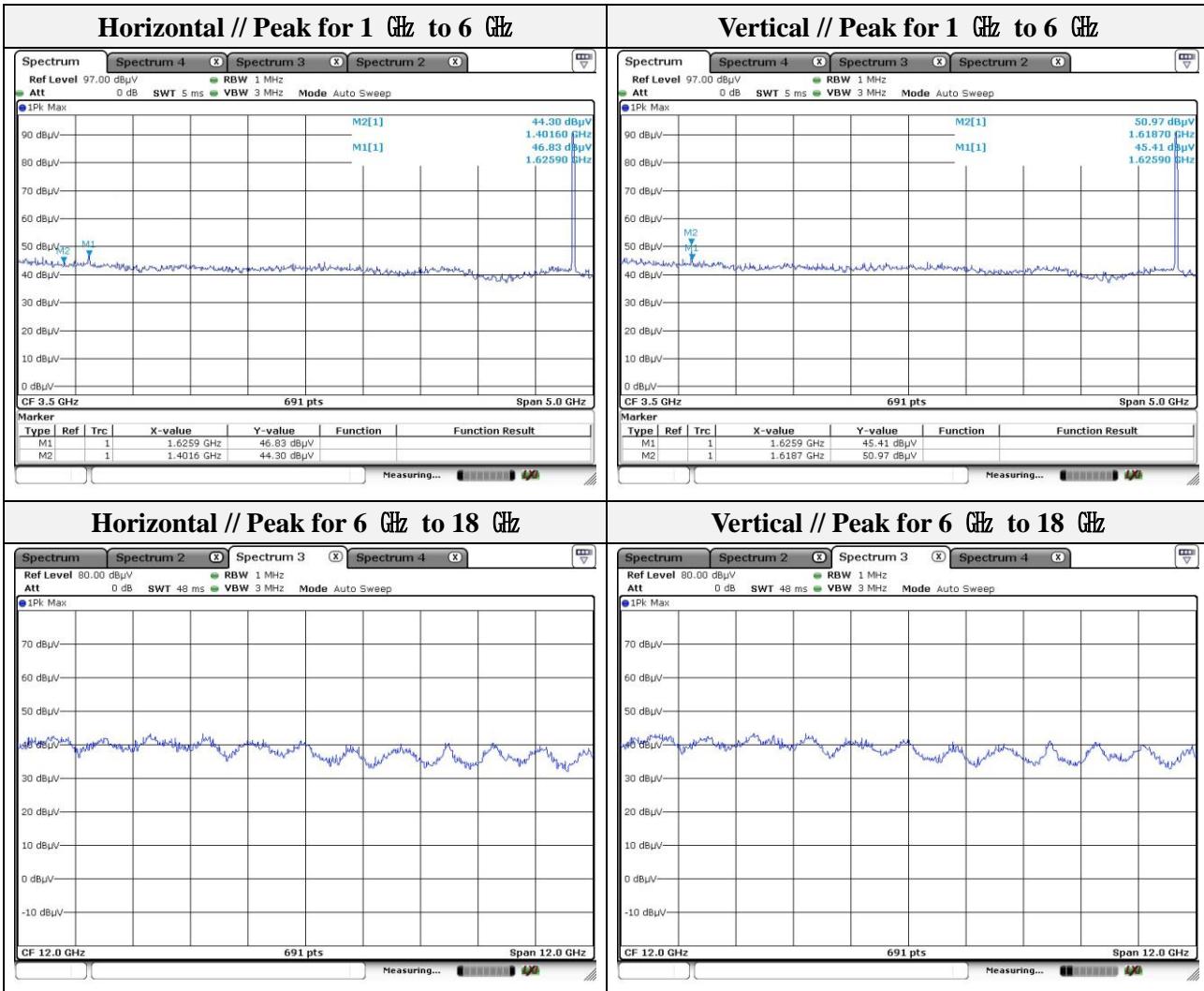
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1625.90	46.83	Peak	H	-4.74	-	42.09	74.00	31.91
1401.60	44.30	Peak	H	-6.57	-	37.73	74.00	36.27
1625.90	45.41	Peak	V	-4.74	-	40.67	74.00	33.33
1618.70	50.97	Peak	V	-4.81	-	46.16	74.00	27.84

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5863.89	45.44	Peak	H	11.85	-	57.29	108.31	51.02
5855.00	44.24	Peak	H	11.80	-	56.04	110.80	54.76
5861.29	44.57	Peak	V	11.84	-	56.41	109.04	52.63
5875.00	43.58	Peak	V	11.91	-	55.49	105.20	49.71



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Note.

1. No spurious emission were detected above 6 GHz.

Mode: UNII-3(VHT40) _Module 1

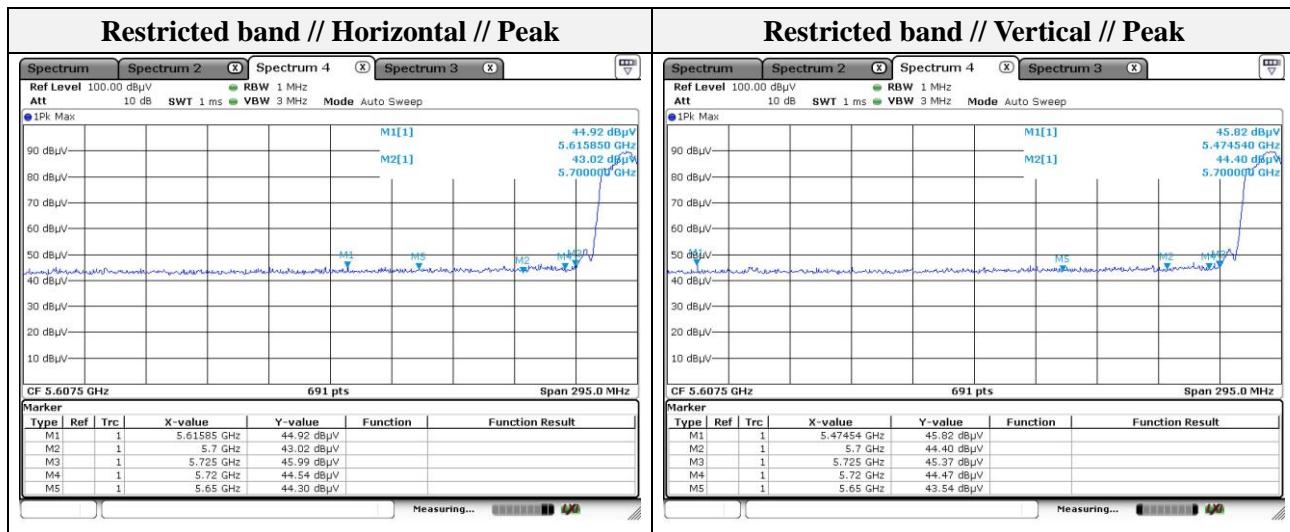
 Distance of measurement: 3 meter

 Channel: 151
- Spurious

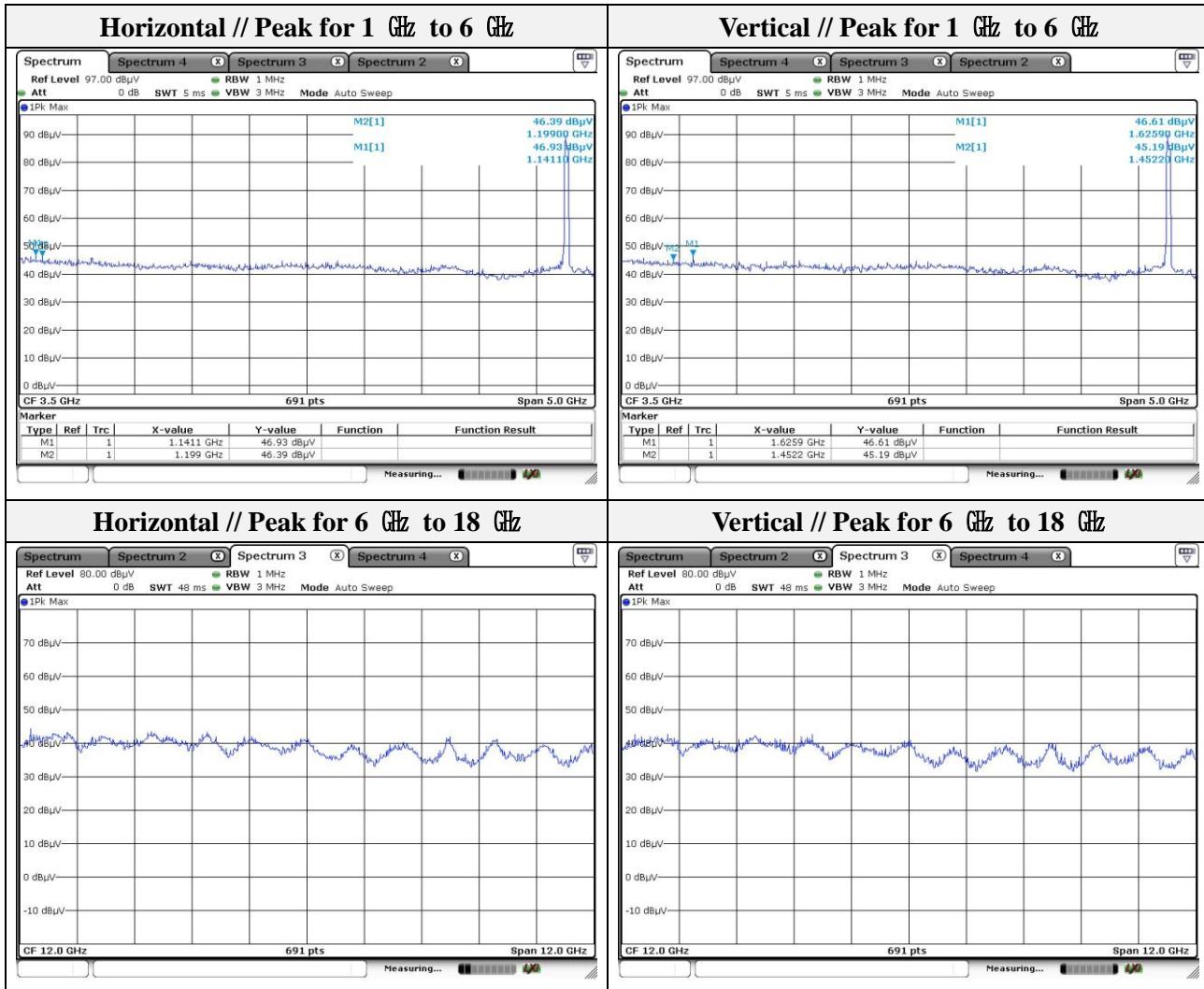
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1141.10	46.93	Peak	H	-8.24	-	38.69	74.00	35.31
1199.00	46.39	Peak	H	-7.86	-	38.53	74.00	35.47
1625.90	46.61	Peak	V	-4.74	-	41.87	74.00	32.13
1452.20	45.19	Peak	V	-6.26	-	38.93	74.00	35.07
1141.10	46.93	Peak	H	-8.24	-	38.69	74.00	35.31

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5615.85	44.92	Peak	H	9.96	-	54.88	68.20	13.32
5725.00	45.99	Peak	H	10.87	-	56.86	122.20	65.34
5474.54	45.82	Peak	V	9.10	-	54.92	68.20	13.28
5725.00	45.37	Peak	V	10.87	-	56.24	122.20	65.96



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Note.

1. No spurious emission were detected above 6 GHz.

Mode: UNII-3(VHT40) _Module 1

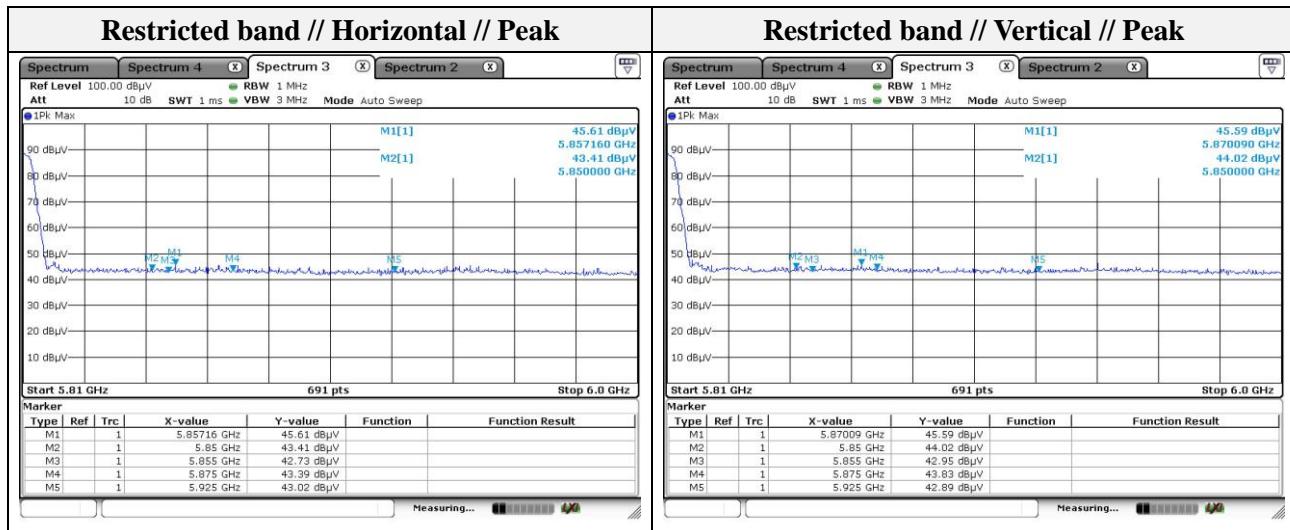
 Distance of measurement: 3 meter

 Channel: 159
- Spurious

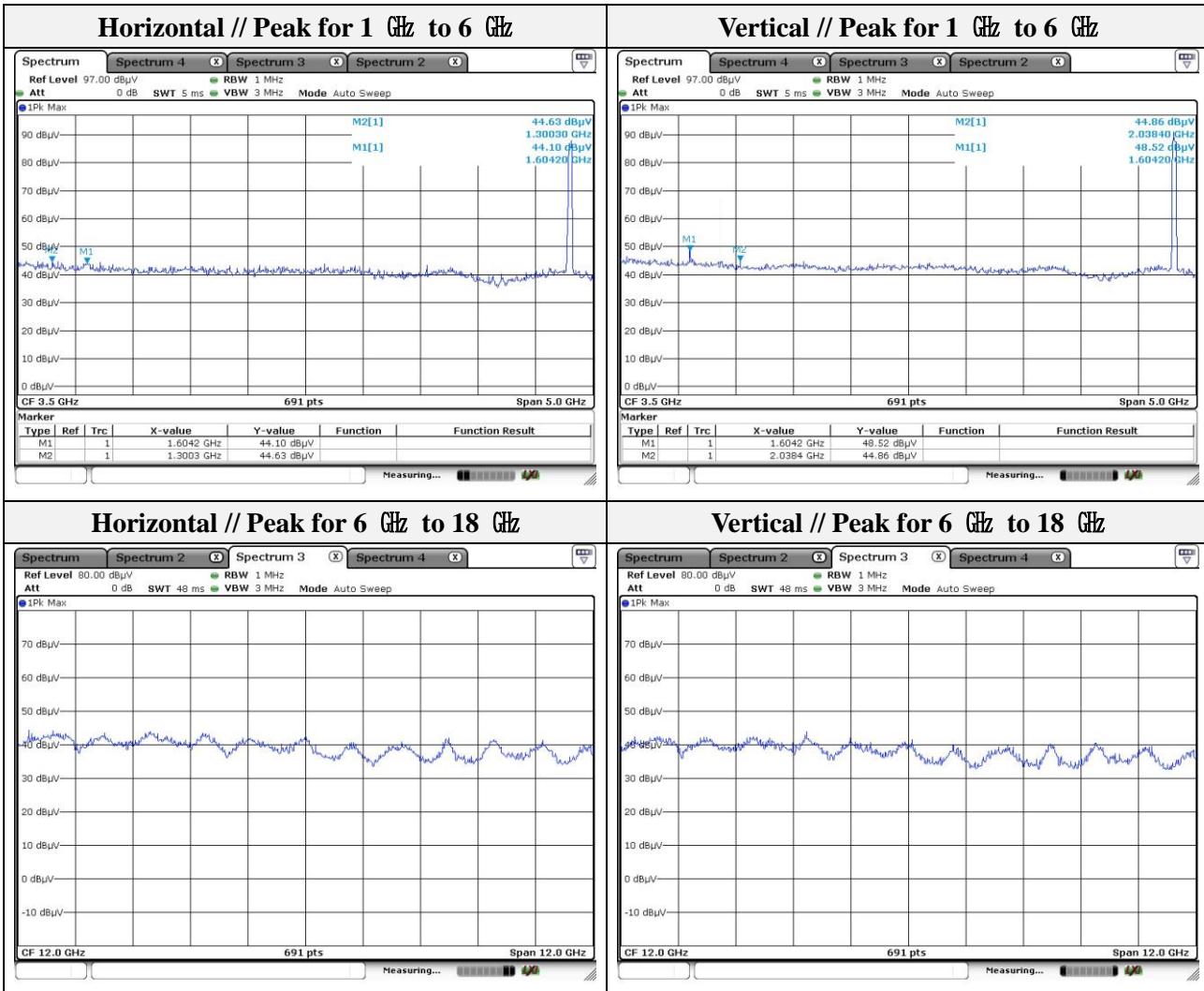
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1604.20	44.10	Peak	H	-4.95	-	39.15	74.00	34.85
1300.30	44.63	Peak	H	-7.22	-	37.41	74.00	36.59
1604.20	48.52	Peak	V	-4.95	-	43.57	74.00	30.43
2038.40	44.86	Peak	V	-0.89	-	43.97	74.00	30.03

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5857.16	45.61	Peak	H	11.81	-	57.42	110.20	52.78
5850.00	43.41	Peak	H	11.78	-	55.19	122.20	67.02
5870.09	45.59	Peak	V	11.89	-	57.48	106.57	49.09
5850.00	44.02	Peak	V	11.78	-	55.80	122.20	66.41



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Note.

1. No spurious emission were detected above 6 GHz.



KES Co., Ltd.

C-3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

Test report No.:
KES-RF-17T0053
Page (43) of (63)

Mode: UNII-3(VHT80) _Module 1

Distance of measurement: 3 meter

Channel: 155

- Spurious

Frequency (MHz)	Level (dB μ N)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1625.90	46.54	Peak	H	-4.74	0.18	41.98	74.00	32.38
2262.70	43.78	Peak	H	-0.46	0.18	43.50	74.00	30.86
1625.90	45.94	Peak	V	-4.74	0.18	41.38	74.00	32.98
1293.10	44.92	Peak	V	-7.26	0.18	41.98	74.00	32.38

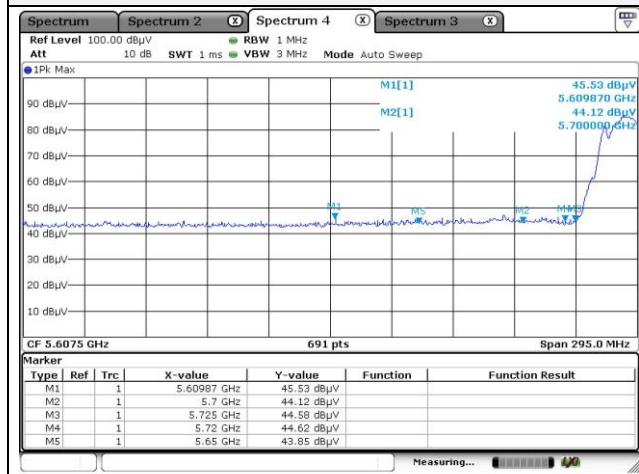
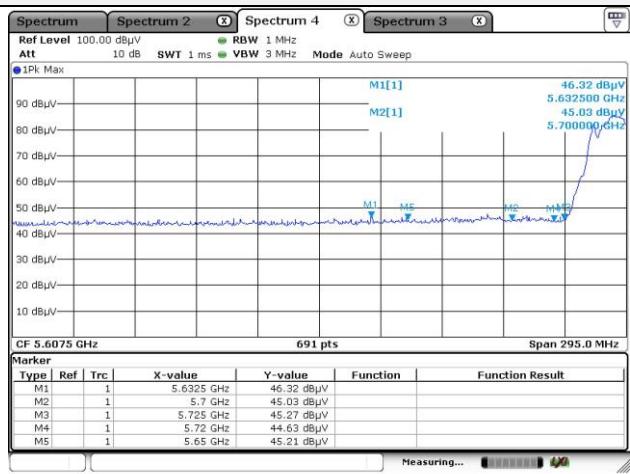
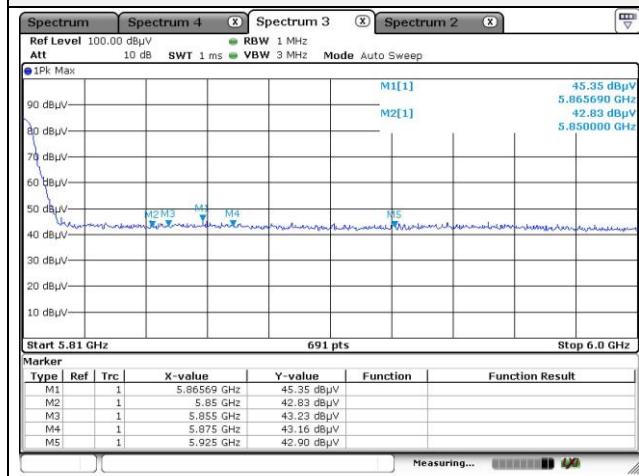
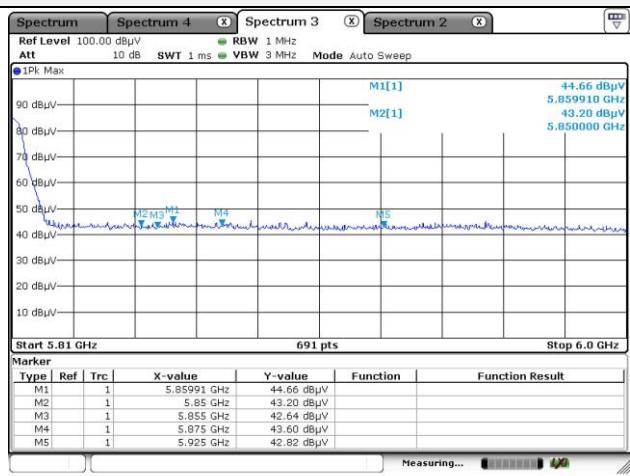
- Band edge // Below 5725 MHz

Frequency (MHz)	Level (dB μ N)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5609.87	45.53	Peak	H	9.91	0.18	55.62	68.20	12.58
5720.00	44.62	Peak	H	10.83	0.18	55.63	110.80	55.17
5632.50	46.32	Peak	V	10.10	0.18	56.60	68.20	11.60
5725.00	45.27	Peak	V	10.87	0.18	56.32	122.20	65.88

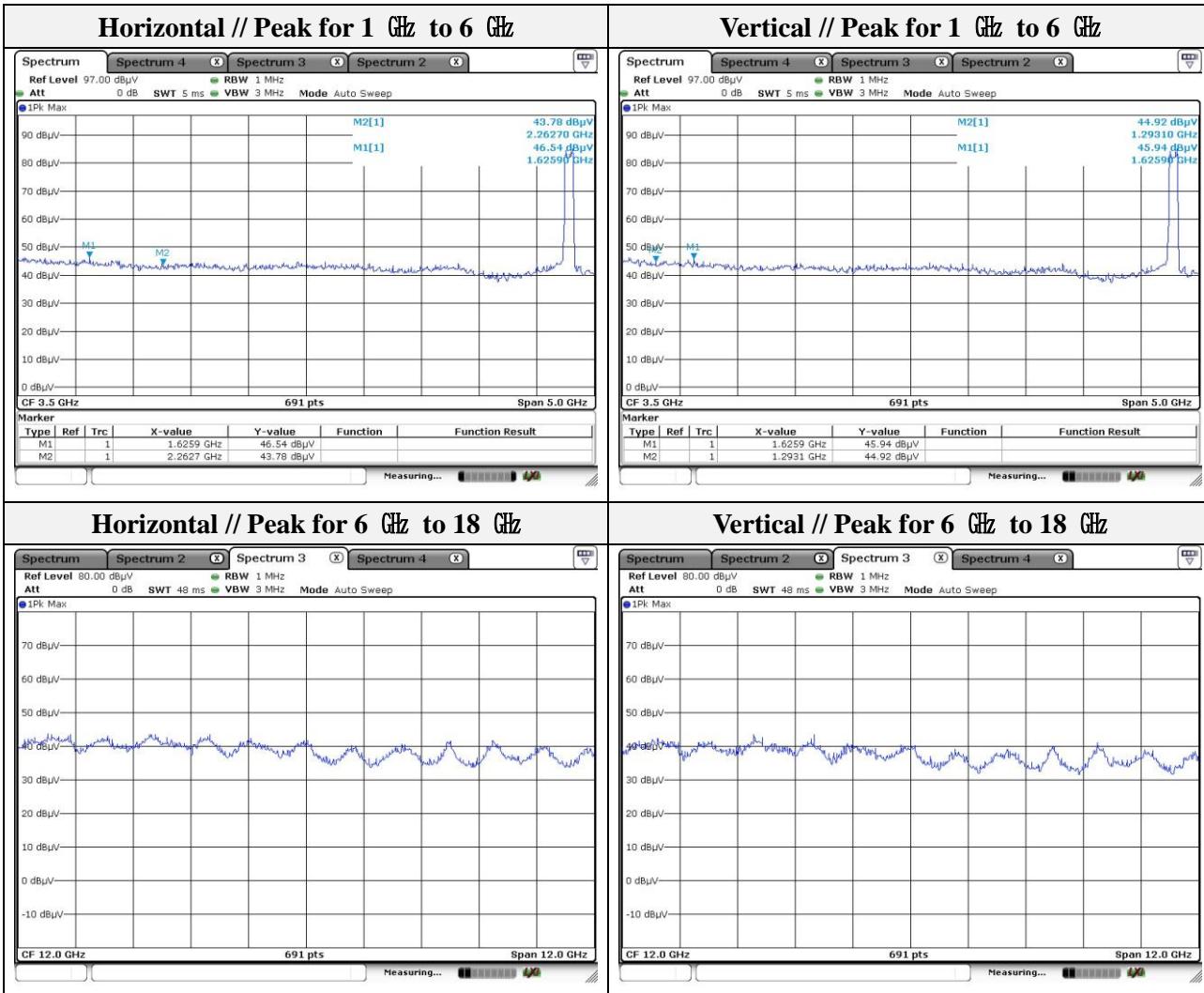
- Band edge // Above 5850 MHz

Frequency (MHz)	Level (dB μ N)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5865.69	45.35	Peak	H	11.86	0.18	57.39	107.81	50.42
5855.00	43.23	Peak	H	11.80	0.18	55.21	110.80	55.59
5859.91	44.66	Peak	V	11.83	0.18	56.67	109.43	52.76
5875.00	43.60	Peak	V	11.91	0.18	55.69	105.20	49.51

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Restricted band // Horizontal // Peak // Below 5725 MHz

Restricted band // Vertical // Peak // Below 5725 MHz

Restricted band // Horizontal // Peak // Below 5850 MHz

Restricted band // Vertical // Peak // Below 5850 MHz


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Note.

- No spurious emission were detected above 6 GHz.

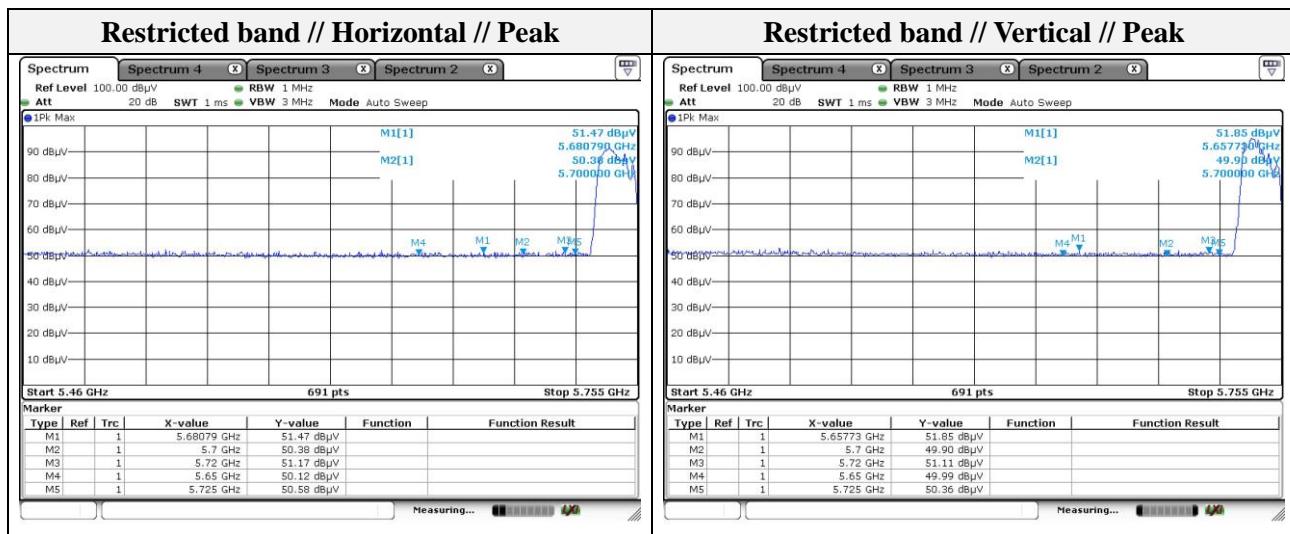
Mode: UNII-3(VHT20)_Module 2
 Distance of measurement: 3 meter
 Channel: 149

- Spurious

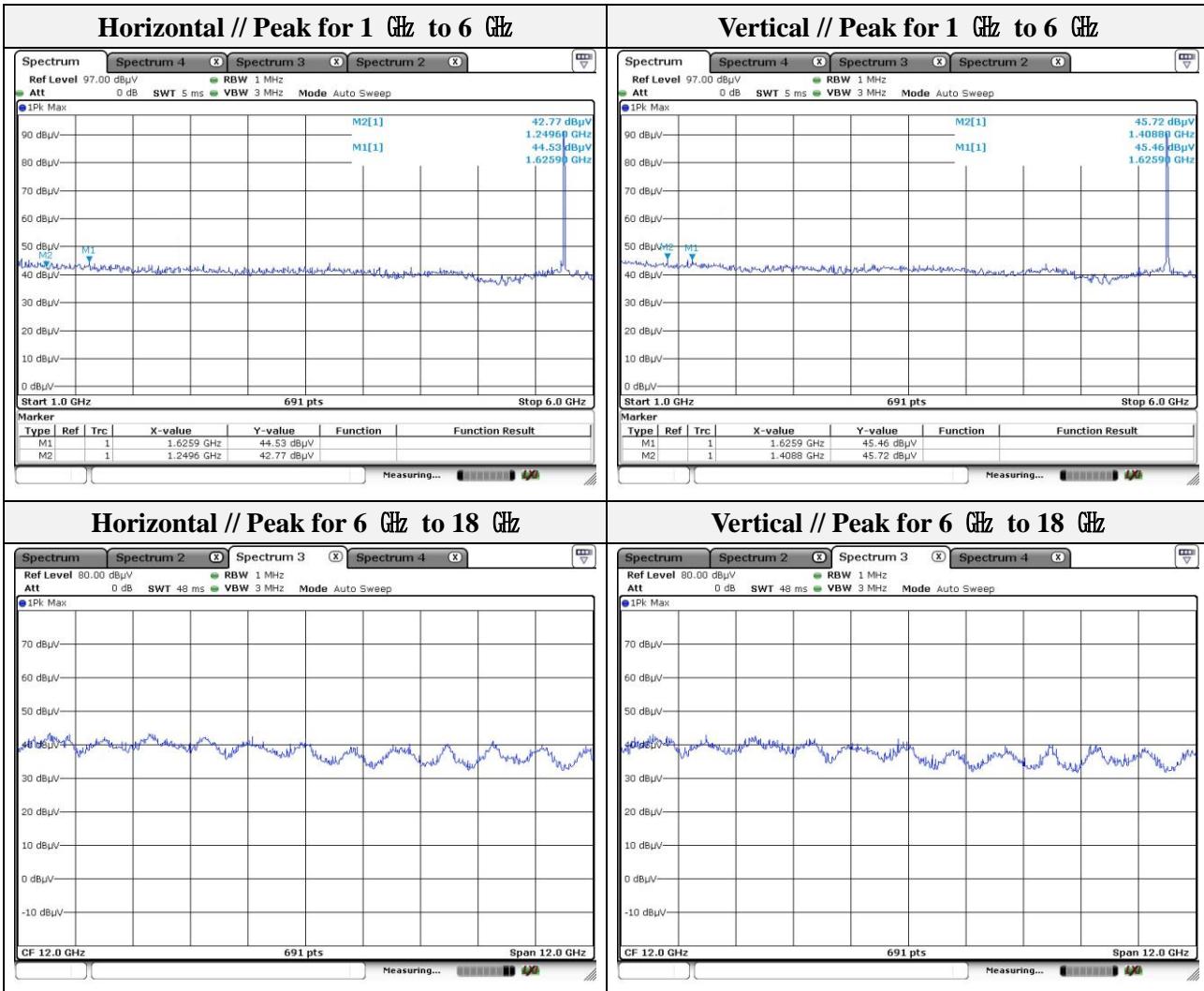
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1625.90	44.53	Peak	H	-4.74	-	39.79	74.00	34.21
1249.60	42.77	Peak	H	-7.54	-	35.23	74.00	38.77
1625.90	45.46	Peak	V	-4.74	-	40.72	74.00	33.28
1408.80	45.72	Peak	V	-6.52	-	39.20	74.00	34.80

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5680.79	51.47	Peak	H	10.50	-	61.97	90.98	29.01
5720.00	51.17	Peak	H	10.83	-	62.00	110.80	48.80
5657.73	51.85	Peak	V	10.31	-	62.16	73.92	11.76
5720.00	51.11	Peak	V	10.83	-	61.94	110.80	48.86



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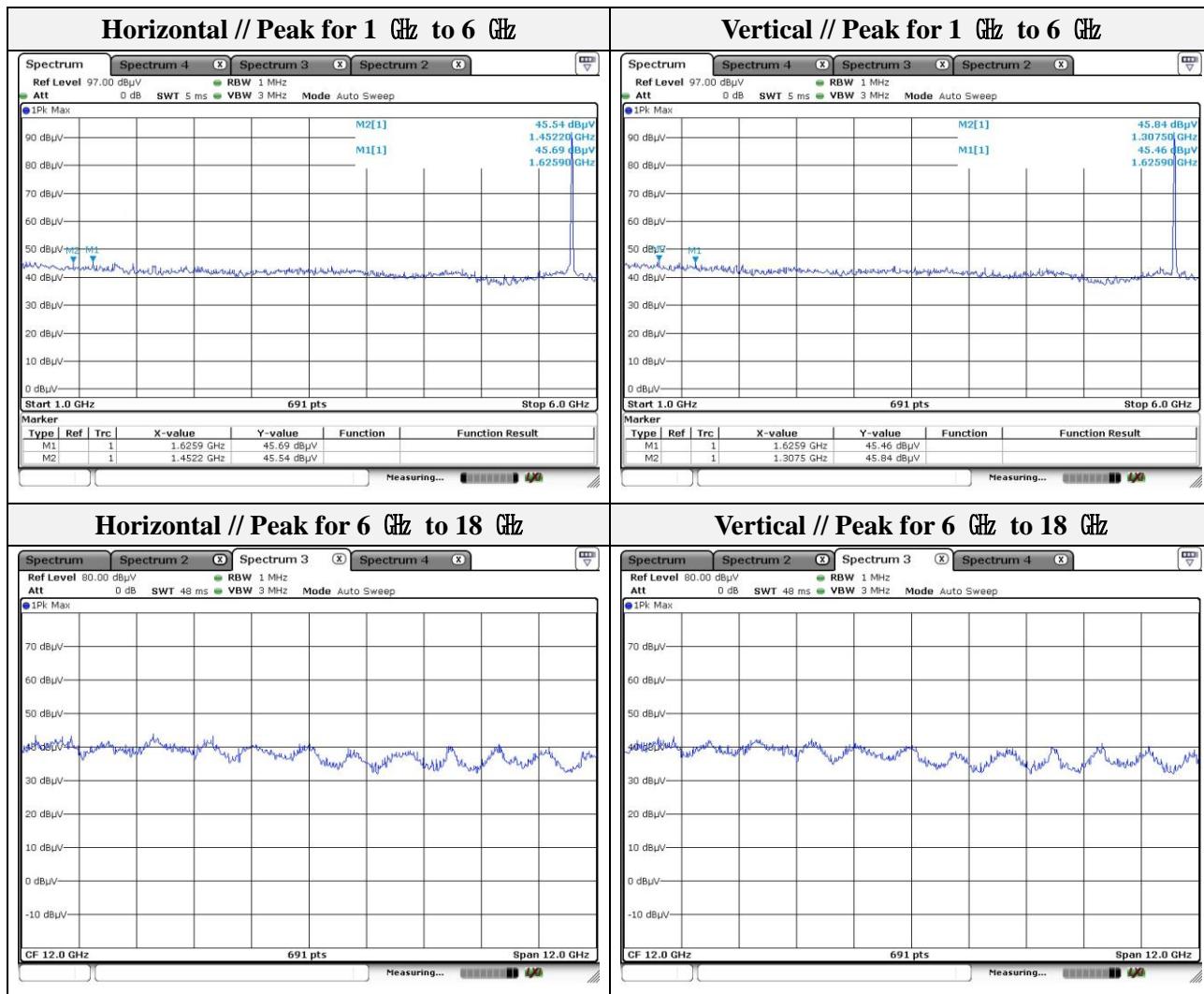
Note.

1. No spurious emission were detected above 6 GHz.
2. Average test was not performed because peak result is lower than the average limit.

Mode: UNII-3(VHT20)_Module 2
 Distance of measurement: 3 meter
 Channel: 157

- 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)
1625.90	45.69	Peak	H	-4.74	-	40.95	74.00	33.05
1452.20	45.54	Peak	H	-6.26	-	39.28	74.00	34.72
1625.90	45.46	Peak	V	-4.74	-	40.72	74.00	33.28
1307.50	45.84	Peak	V	-7.17	-	38.67	74.00	35.33


Note.

1. Average test was not performed because peak result is lower than the average limit.

Mode: UNII-3(VHT20) _Module 2

Distance of measurement: 3 meter

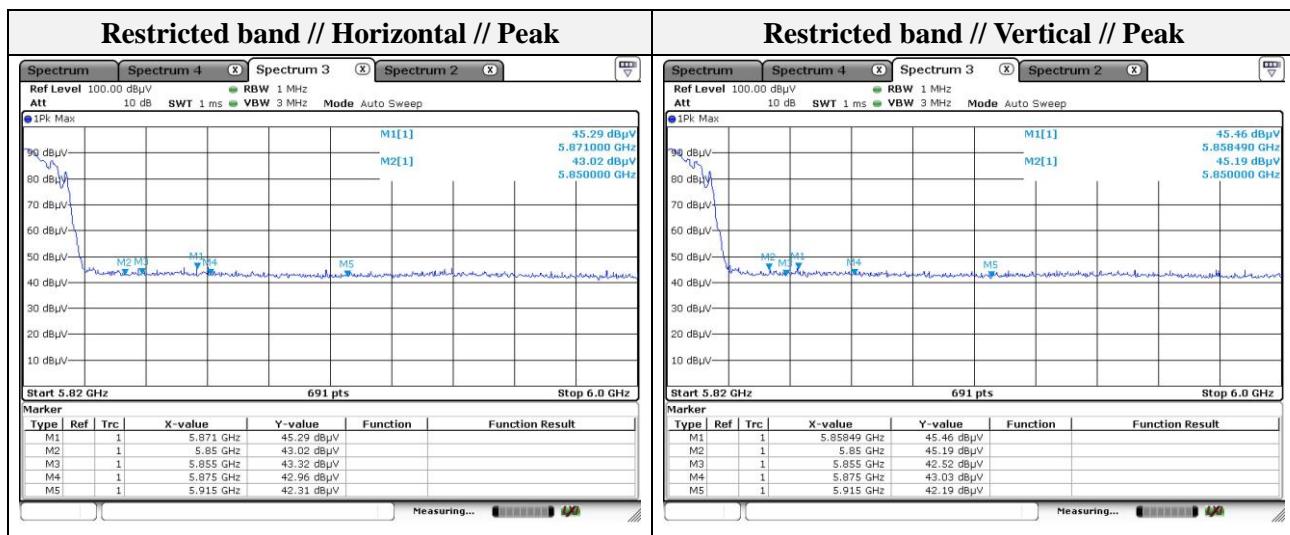
Channel: 165

- Spurious

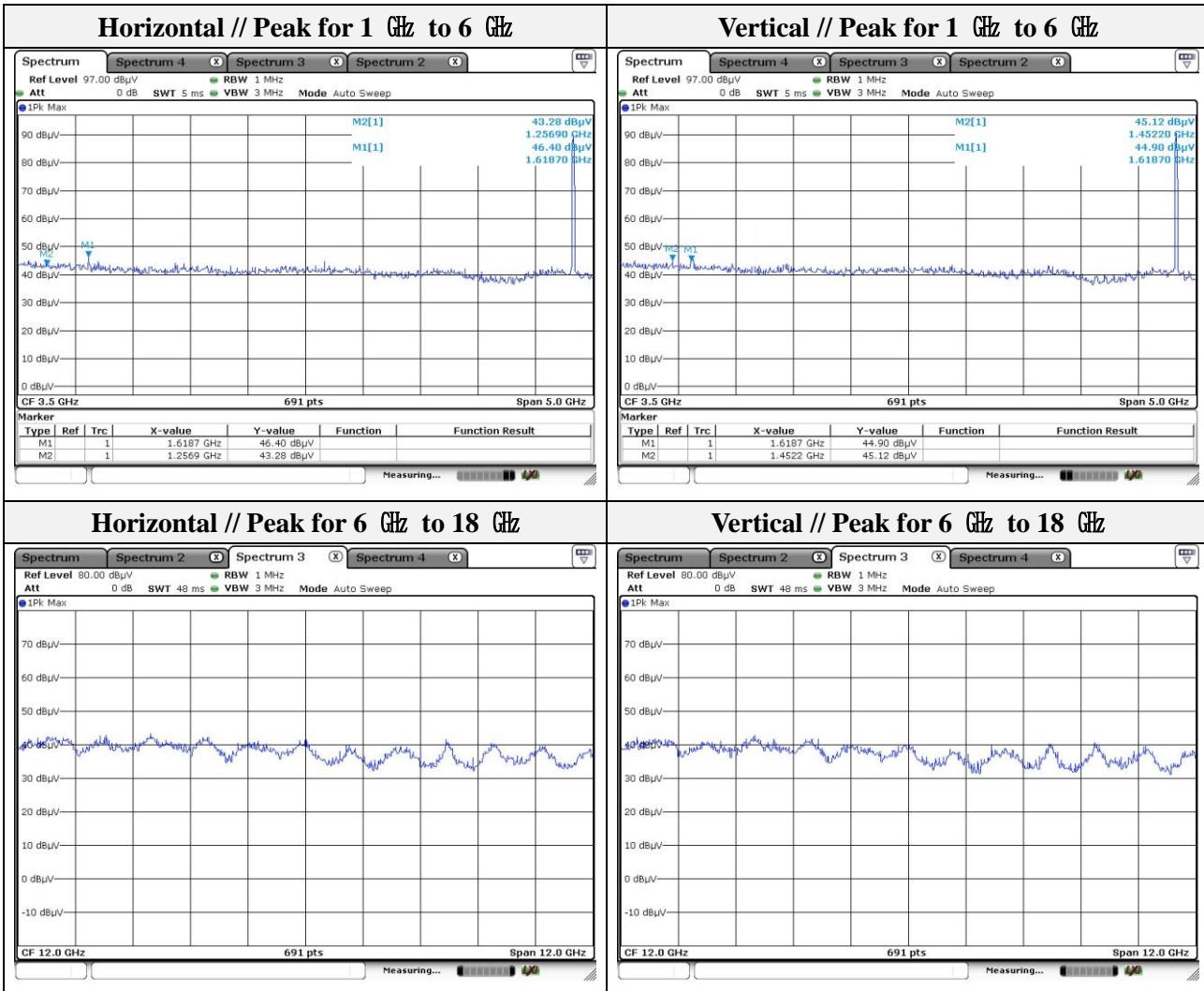
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1618.70	46.40	Peak	H	-4.81	-	41.59	74.00	32.41
1256.90	43.28	Peak	H	-7.49	-	35.79	74.00	38.21
1618.70	44.90	Peak	V	-4.81	-	40.09	74.00	33.91
1452.20	45.12	Peak	V	-6.26	-	38.86	74.00	35.14

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5871.00	45.29	Peak	H	11.89	-	57.18	106.32	49.14
5855.00	43.32	Peak	H	11.80	-	55.12	110.80	55.68
5858.49	45.46	Peak	V	11.82	-	57.28	109.82	52.54
5850.00	45.19	Peak	V	11.78	-	56.97	122.20	65.24



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Note.

1. No spurious emission were detected above 6 GHz.

Mode: UNII-3(VHT40) _Module 2

Distance of measurement: 3 meter

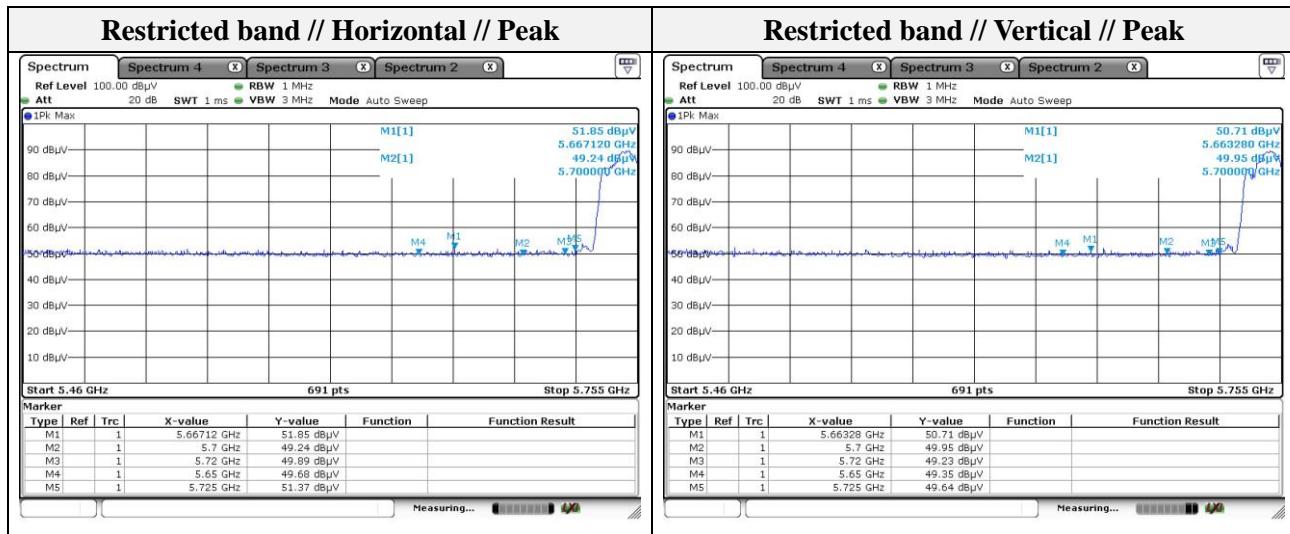
Channel: 151

- Spurious

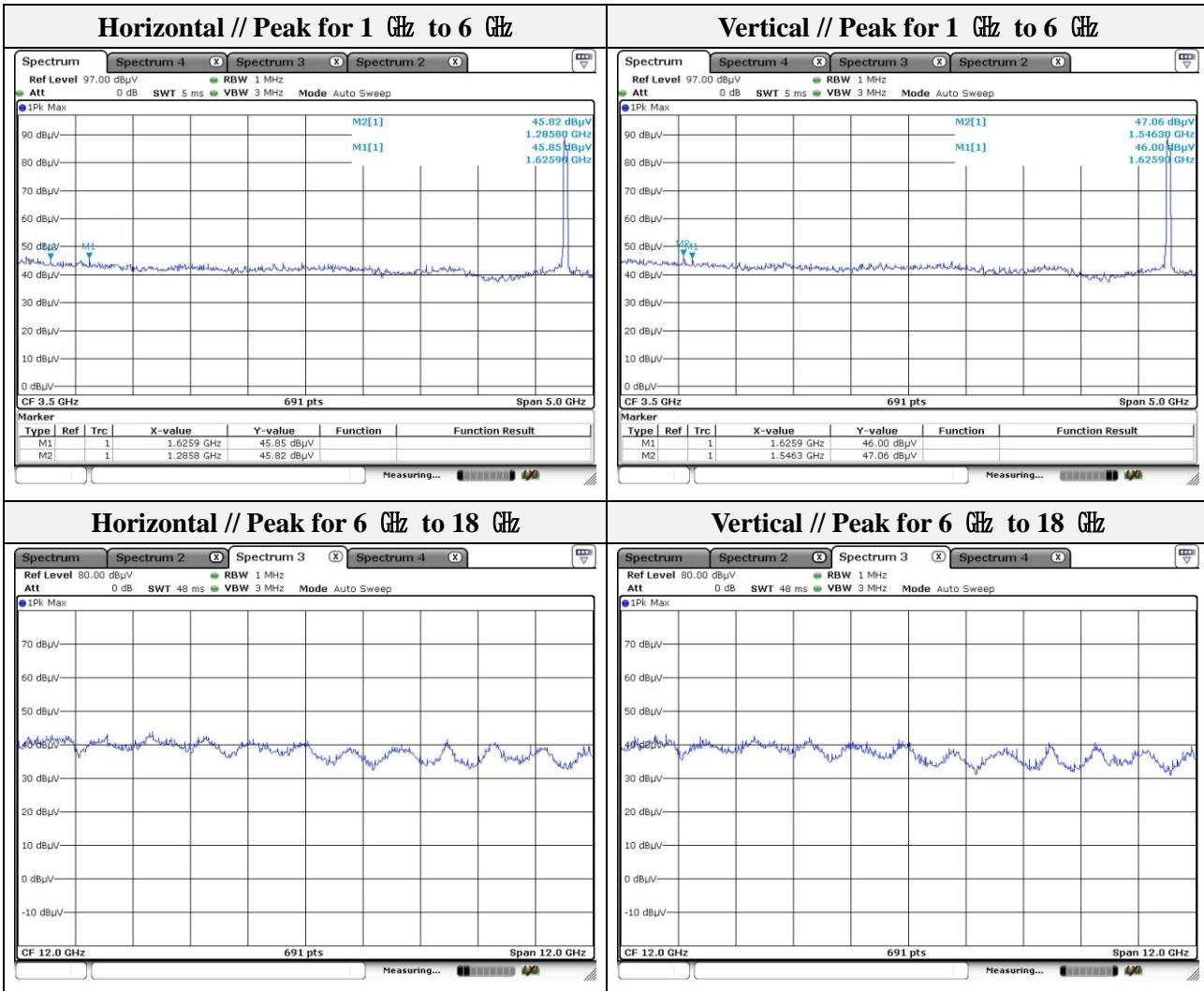
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1625.90	45.85	Peak	H	-4.74	-	41.11	74.00	32.89
1285.80	45.82	Peak	H	-7.31	-	38.51	74.00	35.49
1625.90	46.00	Peak	V	-4.74	-	41.26	74.00	32.74
1546.30	47.00	Peak	V	-5.52	-	41.48	74.00	32.52

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5667.12	51.85	Peak	H	10.39	-	62.24	80.87	18.63
5725.00	51.37	Peak	H	10.87	-	62.24	122.20	59.96
5662.38	50.71	Peak	V	10.35	-	61.06	77.36	16.30
5700.00	49.95	Peak	V	10.67	-	60.62	105.20	44.59



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Note.

1. No spurious emission were detected above 6 GHz.

Mode: UNII-3(VHT40) _Module 2

Distance of measurement: 3 meter

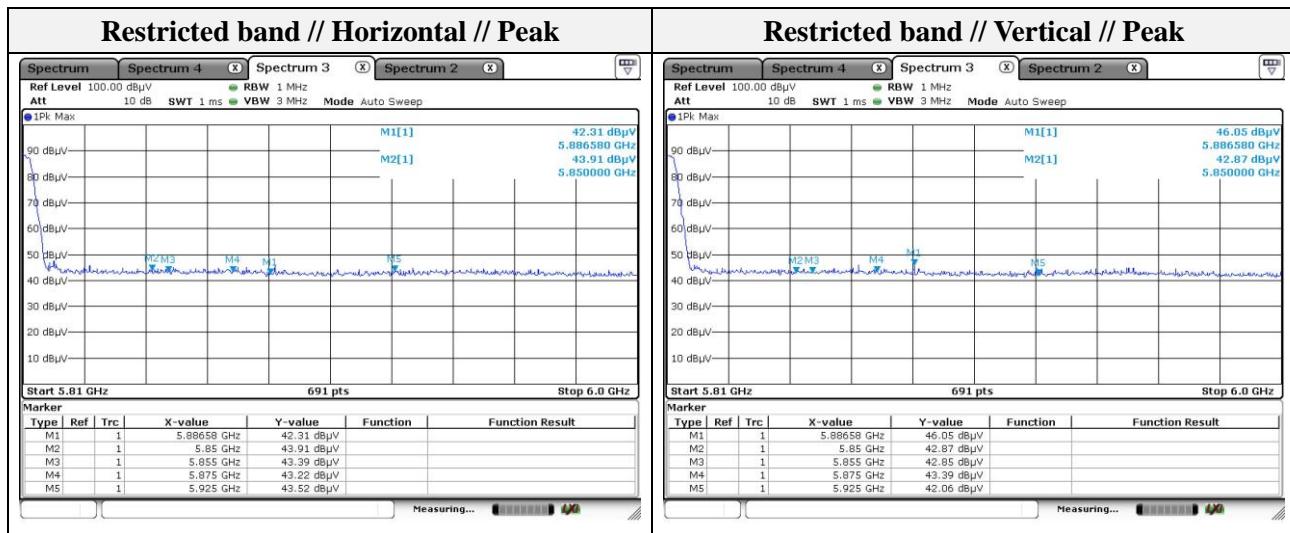
Channel: 159

- Spurious

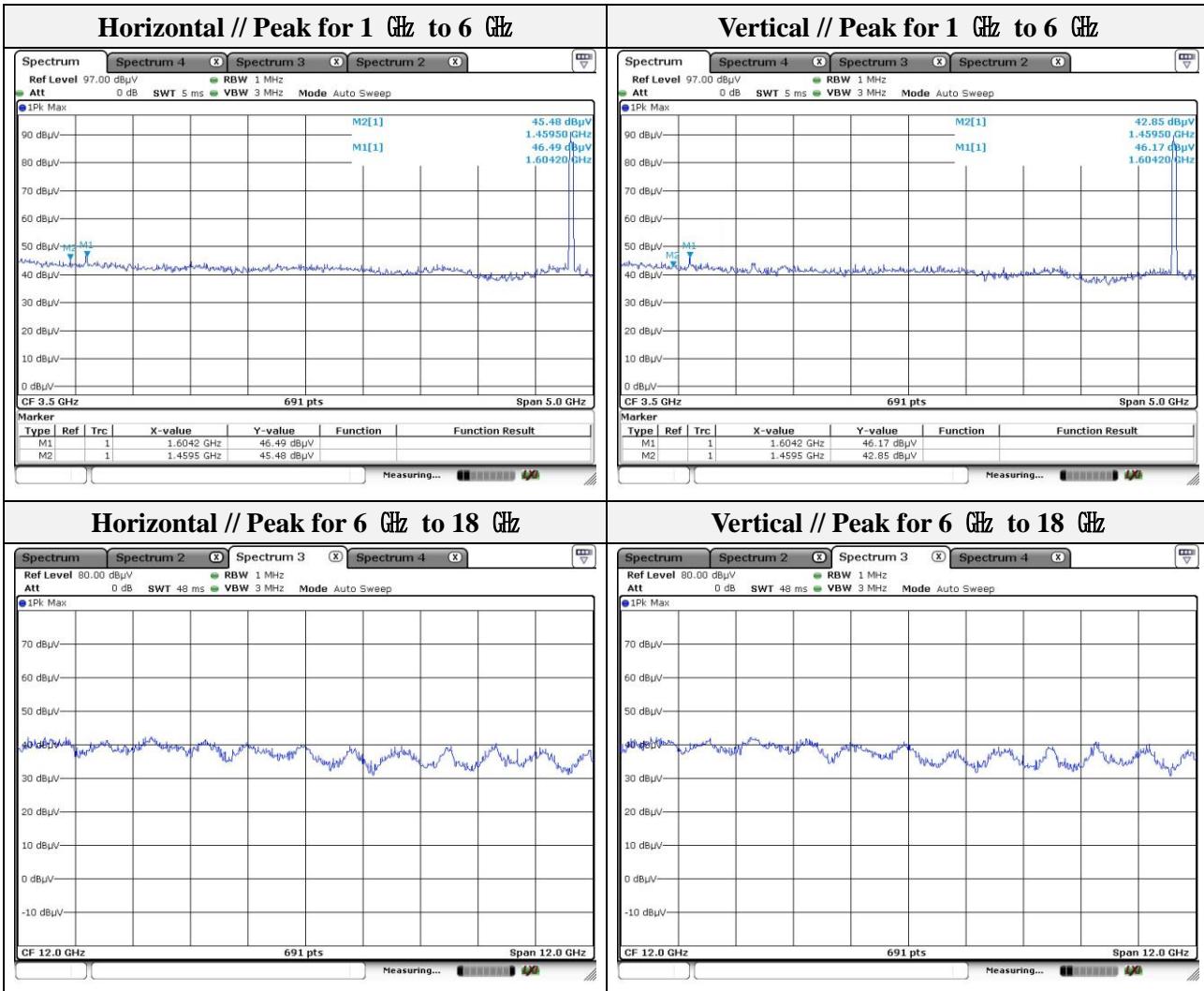
Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1604.20	46.49	Peak	H	-4.95	-	41.54	74.00	32.46
1459.50	45.48	Peak	H	-6.22	-	39.26	74.00	34.74
1604.20	46.17	Peak	V	-4.95	-	41.22	74.00	32.78
1459.50	42.85	Peak	V	-6.22	-	41.54	74.00	32.46

- Band edge

Frequency (MHz)	Level (dB μ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5850.00	43.91	Peak	H	11.78	-	55.69	122.20	66.52
5925.00	43.52	Peak	H	12.19	-	55.71	68.20	12.49
5886.58	46.05	Peak	V	11.98	-	58.03	95.68	37.65
5875.00	43.39	Peak	V	11.91	-	55.30	105.20	49.90



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Note.

- No spurious emission were detected above 6 GHz.



KES Co., Ltd.

C-3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

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Mode: UNII-3(VHT80) _Module 1

Distance of measurement: 3 meter

Channel: 155

- Spurious

Frequency (MHz)	Level (dB μ N)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
1625.90	46.51	Peak	H	-4.74	0.18	46.69	74.00	27.67
3666.40	44.68	Peak	H	2.49	0.18	44.86	74.00	29.50
1625.90	46.51	Peak	V	-4.74	0.18	46.69	74.00	27.67
2617.20	44.39	Peak	V	0.41	0.18	44.57	74.00	29.79

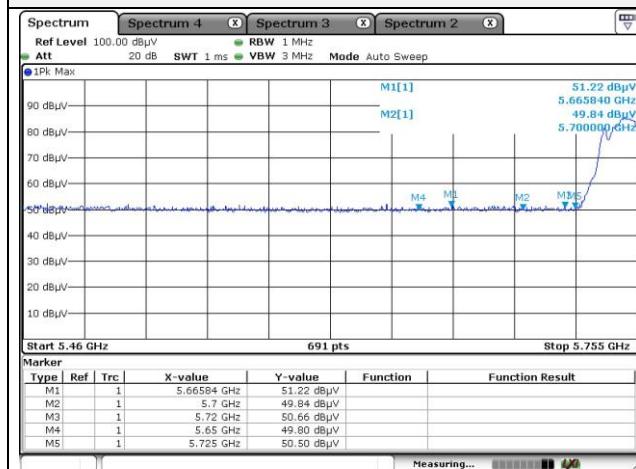
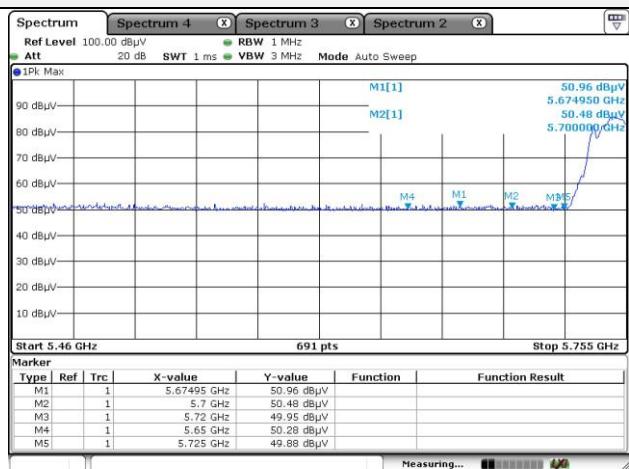
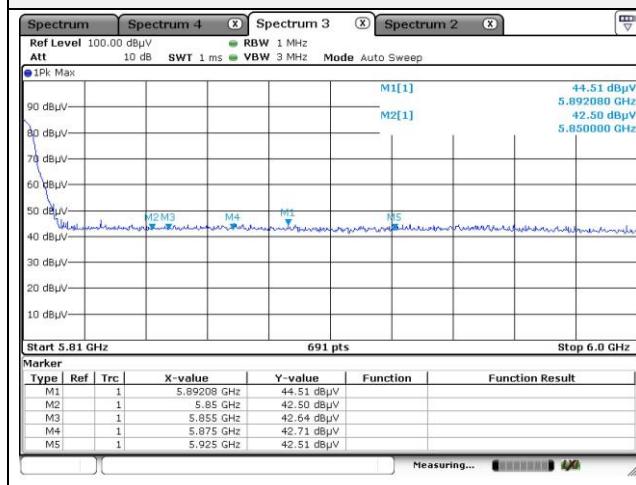
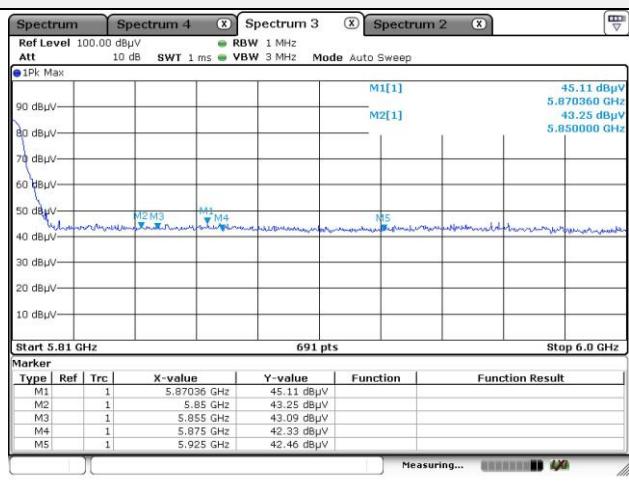
- Band edge // Below 5725 MHz

Frequency (MHz)	Level (dB μ N)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5665.84	51.22	Peak	H	10.38	0.18	61.78	79.92	18.14
5725.00	50.50	Peak	H	10.87	0.18	61.55	122.20	60.65
5674.95	50.96	Peak	V	10.46	0.18	61.60	86.66	25.06
5700.00	50.48	Peak	V	10.67	0.18	61.33	105.20	43.88

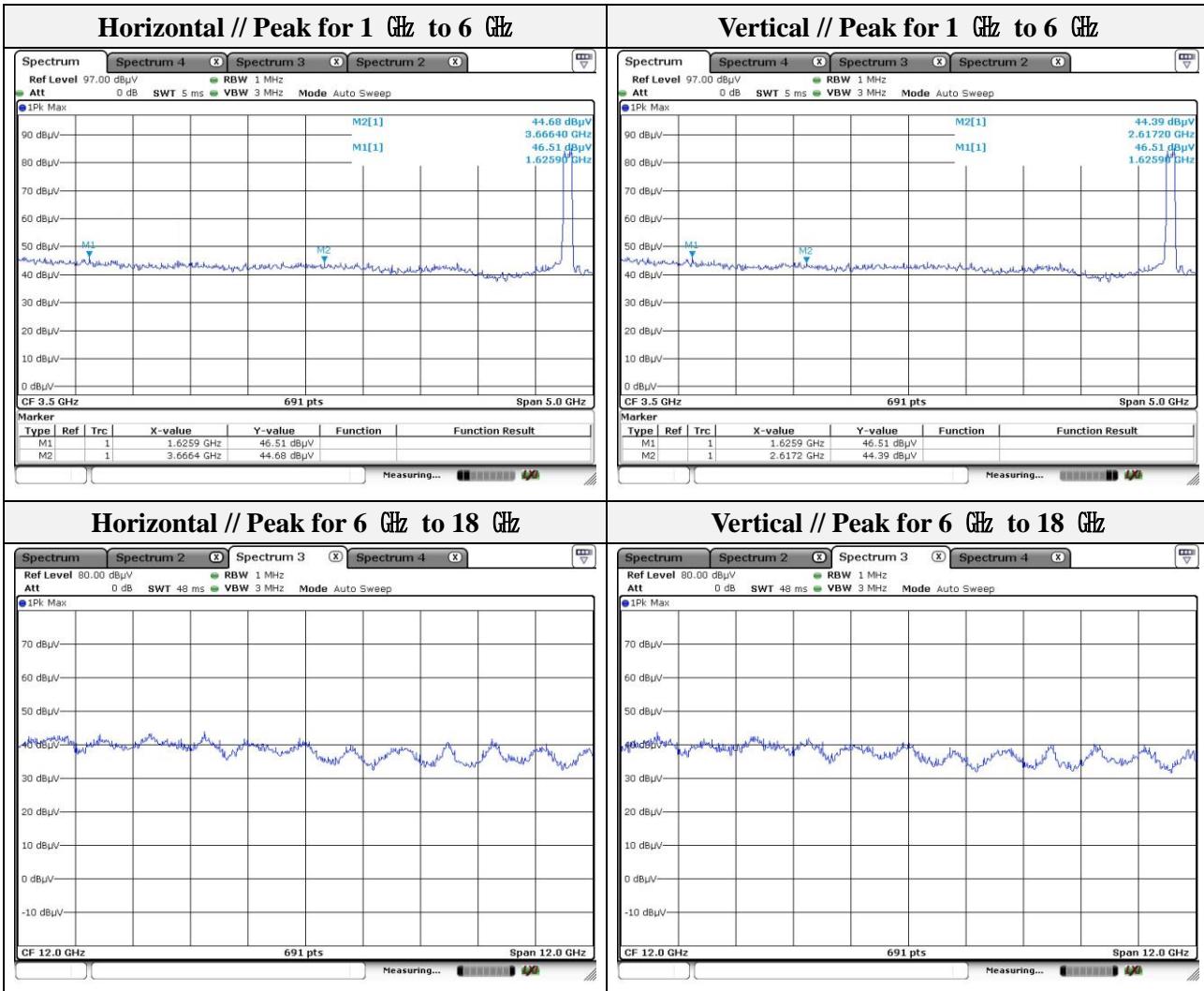
- Band edge // Above 5850 MHz

Frequency (MHz)	Level (dB μ N)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
5892.08	44.51	Peak	H	12.01	0.18	56.70	91.16	34.46
5875.00	42.71	Peak	H	11.91	0.18	54.80	105.20	50.40
5870.36	45.11	Peak	V	11.89	0.18	57.18	106.50	49.32
5850.00	43.25	Peak	V	11.78	0.18	55.21	122.20	67.00

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Restricted band // Horizontal // Peak // Below 5725 MHz

Restricted band // Vertical // Peak // Below 5725 MHz

Restricted band // Horizontal // Peak // Below 5850 MHz

Restricted band // Vertical // Peak // Below 5850 MHz


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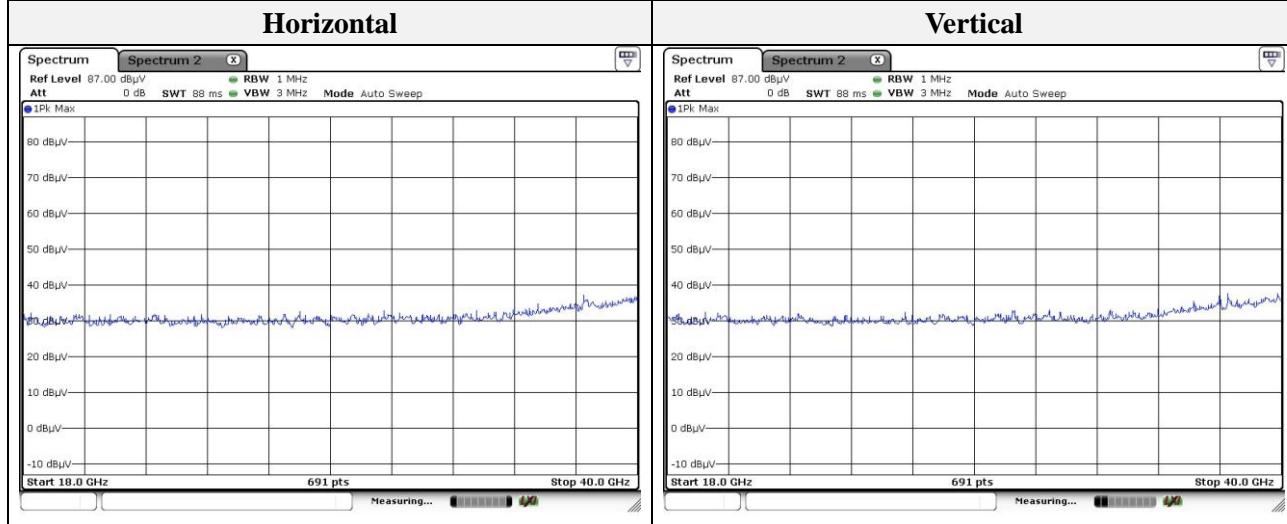


Note.

1. No spurious emission were detected above 6 GHz.

Test results (18 GHz to 40 GHz) – Worst case

Mode: UNII-3(VHT80) _Module 1
 Distance of measurement: 3 meter
 Channel: 157

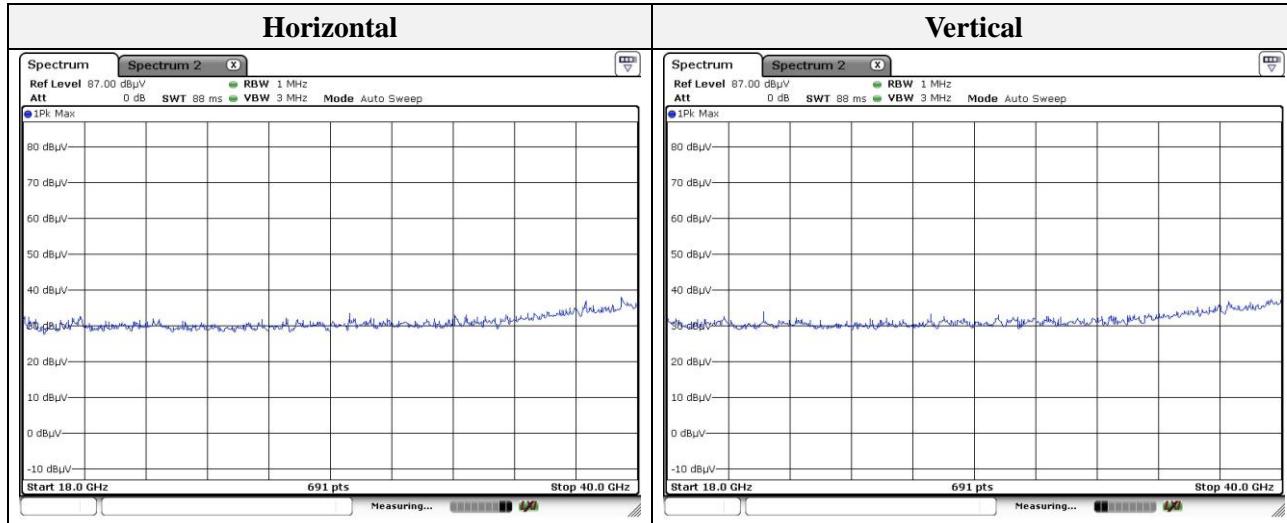


Note.

1. No spurious emission were detected above 18 GHz.

Test results (18 GHz to 40 GHz) – Worst case

Mode: UNII-3(VHT80) _Module 2
 Distance of measurement: 3 meter
 Channel: 157



Note.

1. No spurious emission were detected above 18 GHz.

3.7. AC conducted emissions

Limit

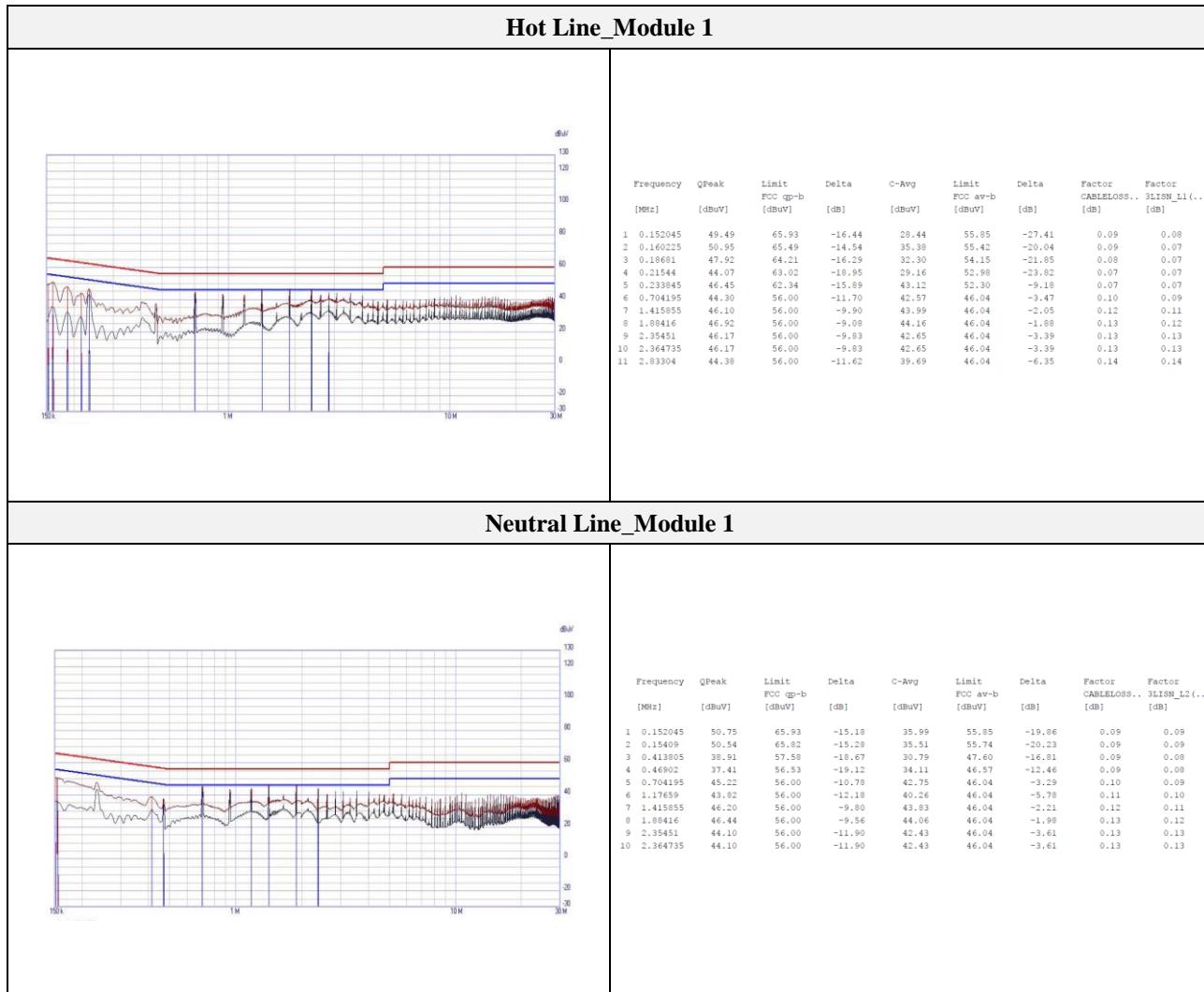
According to 15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall be 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 (dB μ V/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

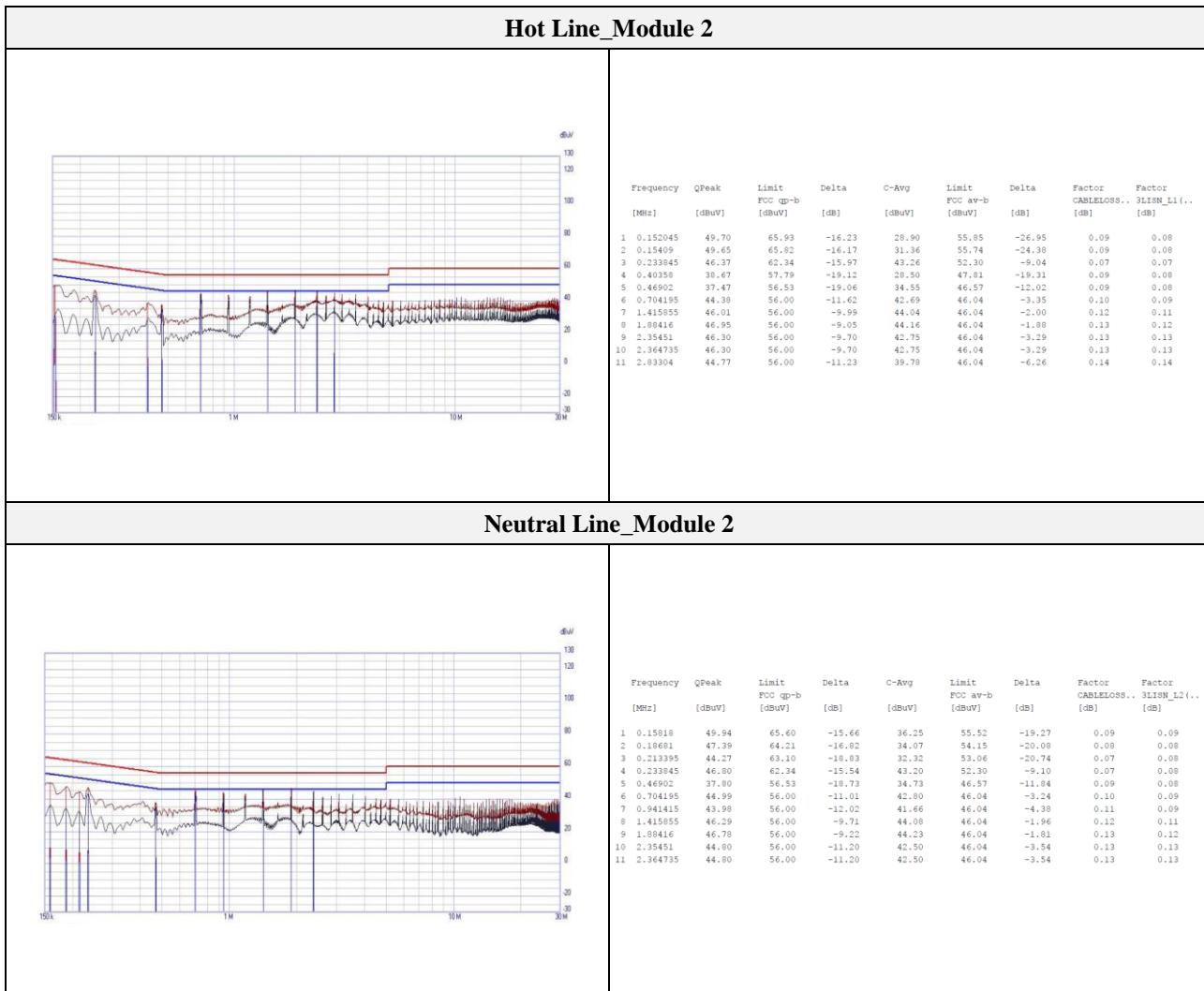
Note:

1. All AC line conducted spurious emission are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and the appropriate frequencies. All data rates and modes were investigated for conducted spurious emission. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.
3. Both Cable loss and LISN factor are included in measurement level(QP Level or AV Level).

Test results



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KES Co., Ltd.

C-3701, 40, Simin-daero 365beon-gil,
Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Tel: +82-31-425-6200 / Fax: +82-31-424-0450
www.kes.co.kr

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Appendix A. Measurement equipment

Equipment	Manufacturer	Model	Serial No.	Calibration interval	Calibration due.
Spectrum Analyzer	R&S	FSV40	101002	1 year	2017.07.06
Signal Generator	ANRITSU	68369B	992113	1 year	2018.02.20
Power Meter	Anritsu	ML2495A	1438001	1 year	2018.01.23
Pluse Power Sensor	Anritsu	MA2411B	1339205	1 year	2018.01.23
Loop antenna	SCHWARZBECK	FMZB1513	225	2 years	2019.05.10
Trilog-broadband antenna	SCHWARZBECK	VULB 9163	9168-714	2 years	2018.11.28
Horn Antenna	A.H	SAS-571	414	2 years	2019.02.15
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170550	2 years	2019.02.15
Preamplifier	SCHWARZBECK	BBV-9718	9718-246	1 year	2017.10.14
Preamplifier	HP	8449B	3008A00538	1 year	2017.07.05
Broadband Amplifier	SCHWARZBECK	BBV-9721	PS9721-003	1 year	2018.01.23
Low Pass Filter	Wainwright Instrument	WHNK6.0/26.5G-6SS	1	1 year	2017.07.05
High Pass Filter	WAINWRIGHT INSTRUMENT	WHJS3000-10TT	1	1 year	2017.07.04
Attenuator	Keysight	8493C	82506	1 year	2018.01.23
EMI Test Receiver	R&S	ESU26	100552	1 year	2018.04.19
Temperature & Humidity Chamber	Daehan Engineering	DH-1000	DH1000060628	1 year	2018.01.20
EMI Receiver	NARDA	9010F	020WW31006	1 year	2018.03.24
LISN	SCHWARZBECK	NSLK8126	8126157	1 year	2018.03.24

Peripheral devices

Device	Manufacturer	Model No.	Serial No.
Notebook Computer	Hewlett-Packard Company	15-B113TU	5CD242B016

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