



# KES Co., Ltd.

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Report No.:

KES-RF-23T0015

Page ( 112 ) of ( 135 )

Mode: 802.11n\_HT40  
Band: UNII-2C  
Distance of measurement: 3 meter  
Channel: 134

## - Spurious

Frequency (MHz)	Level (dB $\mu$ N)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 062.74	43.84	Peak	V	-10.04	-	33.80	74.00	40.20
1 224.73	44.95	Peak	H	-9.05	-	35.90	74.00	38.10
3 477.50	43.15	Peak	V	-0.17	-	42.98	68.20	25.22
3 673.48	44.73	Peak	H	0.74	-	45.47	74.00	28.53

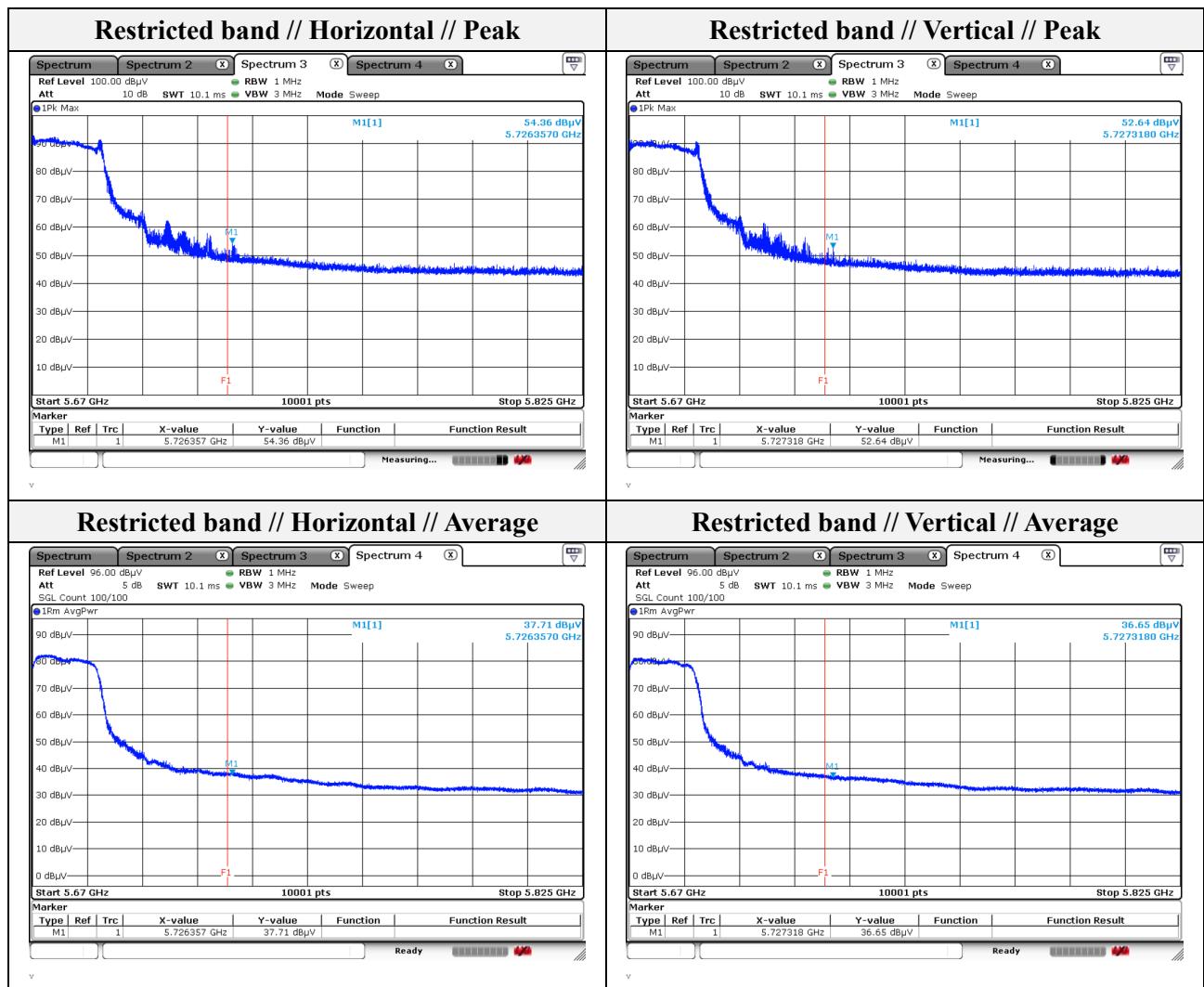
## - Band edge

Frequency (MHz)	Level (dB $\mu$ N)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
5 726.36	54.36	Peak	H	7.28	-	61.64	68.20	6.56
5 726.36	37.71	Average	H	7.28	0.27	45.26	48.20	2.94
5 727.32	52.64	Peak	V	7.29	-	60.6	68.20	7.60
5 727.32	36.65	Average	V	7.29	0.27	44.21	48.20	3.99

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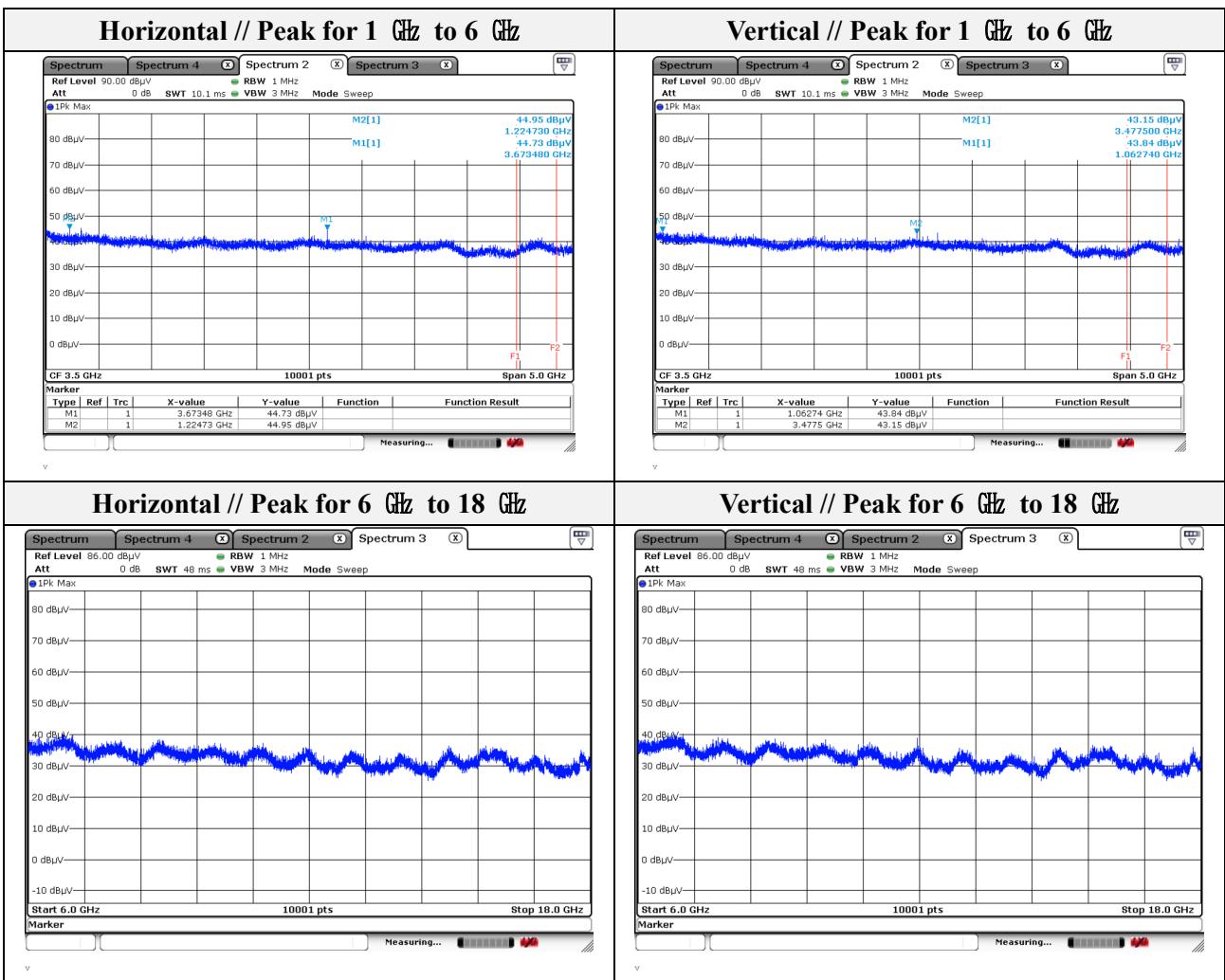
The authenticity of the test report, contact [kes@kes.co.kr](mailto:kes@kes.co.kr)



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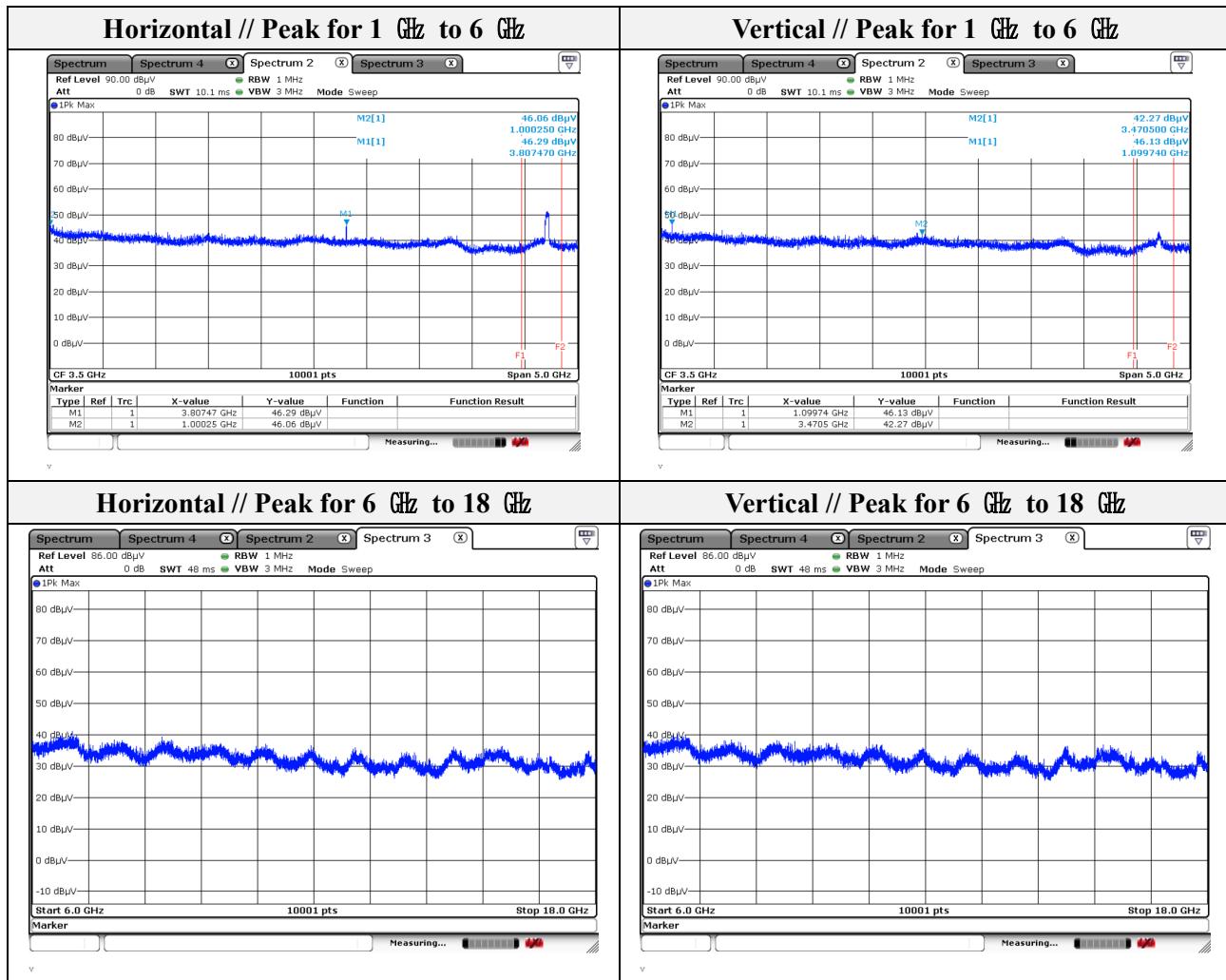
Note.

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  
 Band: UNII-2C  
 Distance of measurement: 3 meter  
 Channel: 142

**- Spurious**

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 000.25	46.06	Peak	H	-10.42	-	35.64	74.00	38.36
1 099.74	46.13	Peak	V	-9.81	-	36.32	74.00	37.68
3 470.50	42.27	Peak	V	-0.17	-	42.10	68.20	26.10
3 807.47	46.29	Peak	H	1.35	-	47.64	74.00	26.36



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.

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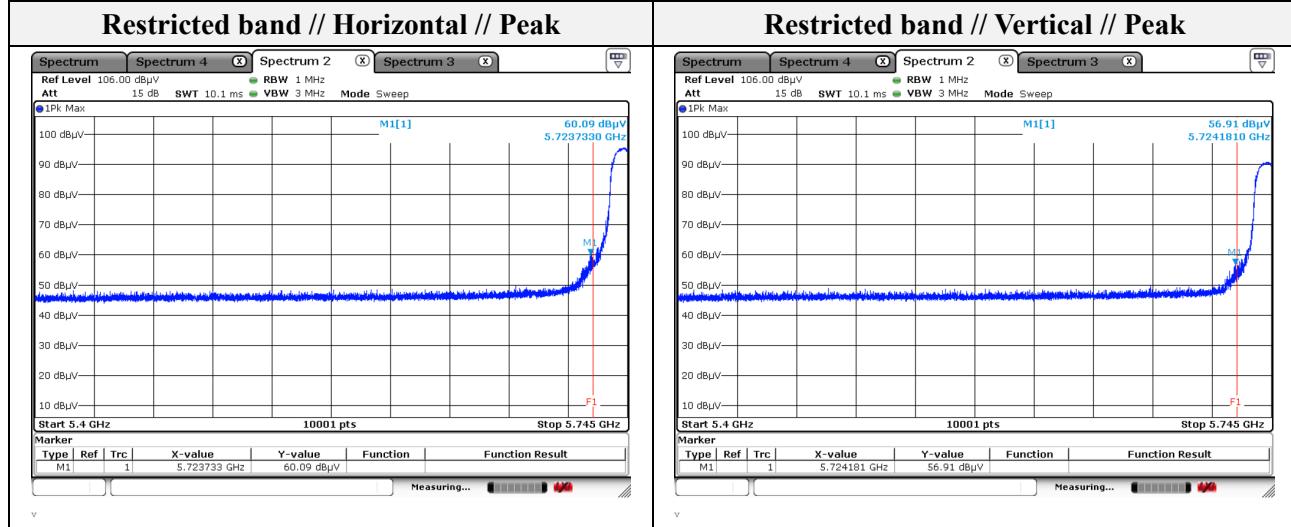
Mode: 802.11a  
 Band: UNII-3  
 Distance of measurement: 3 meter  
 Channel: 149

**- Spurious**

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 000.25	49.92	Peak	H	-10.42	-	39.50	74.00	34.50
1 201.23	44.53	Peak	V	-9.19	-	35.34	74.00	38.66
3 830.47	44.82	Peak	H	1.45	-	46.27	74.00	27.73
3 830.47	42.39	Peak	V	1.45	-	43.84	74.00	30.16

**- Band edge**

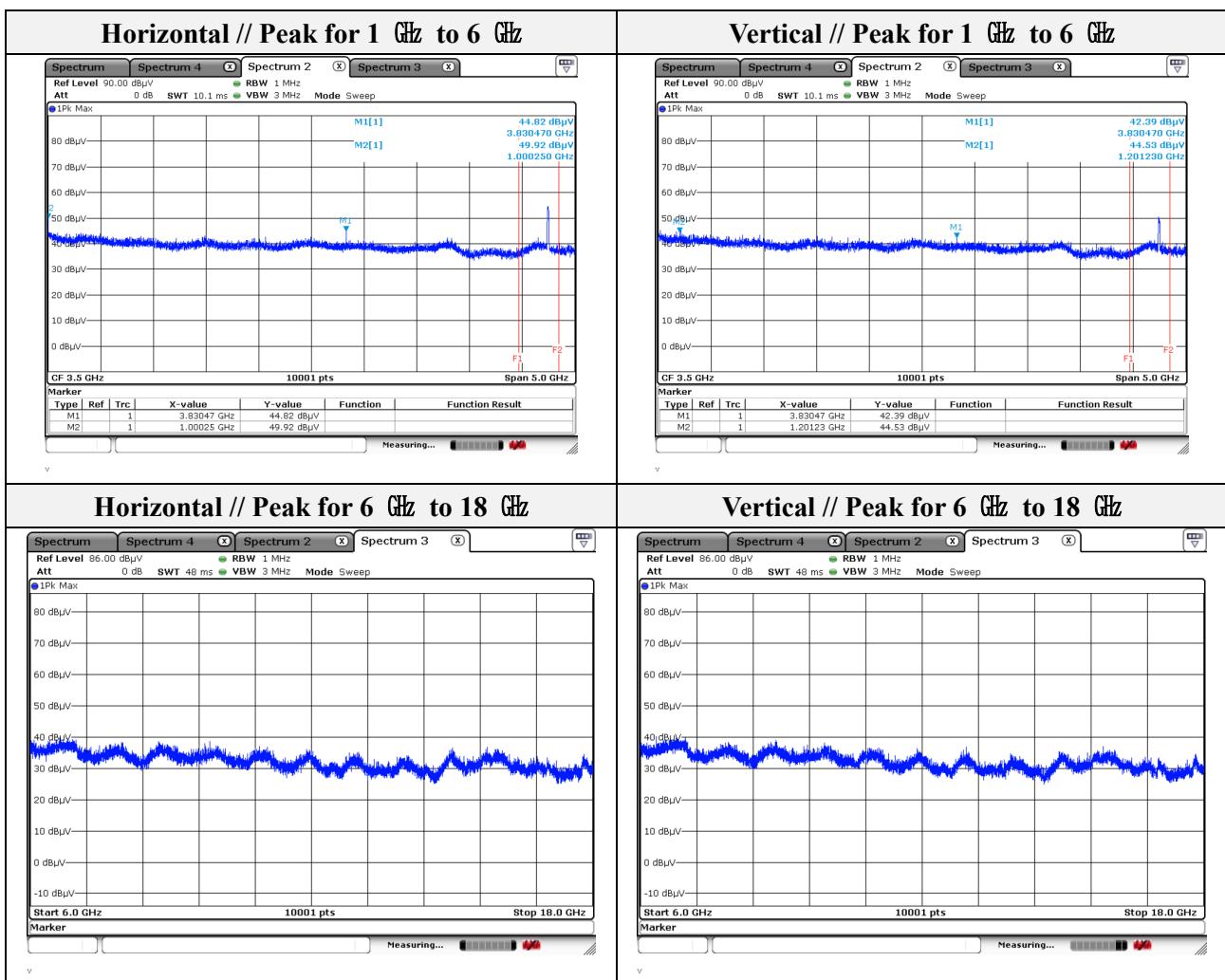
Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
5 723.73	60.09	Peak	H	7.27	-	67.36	119.33	51.97
5 724.18	56.91	Peak	V	7.27	-	64.18	120.36	56.18



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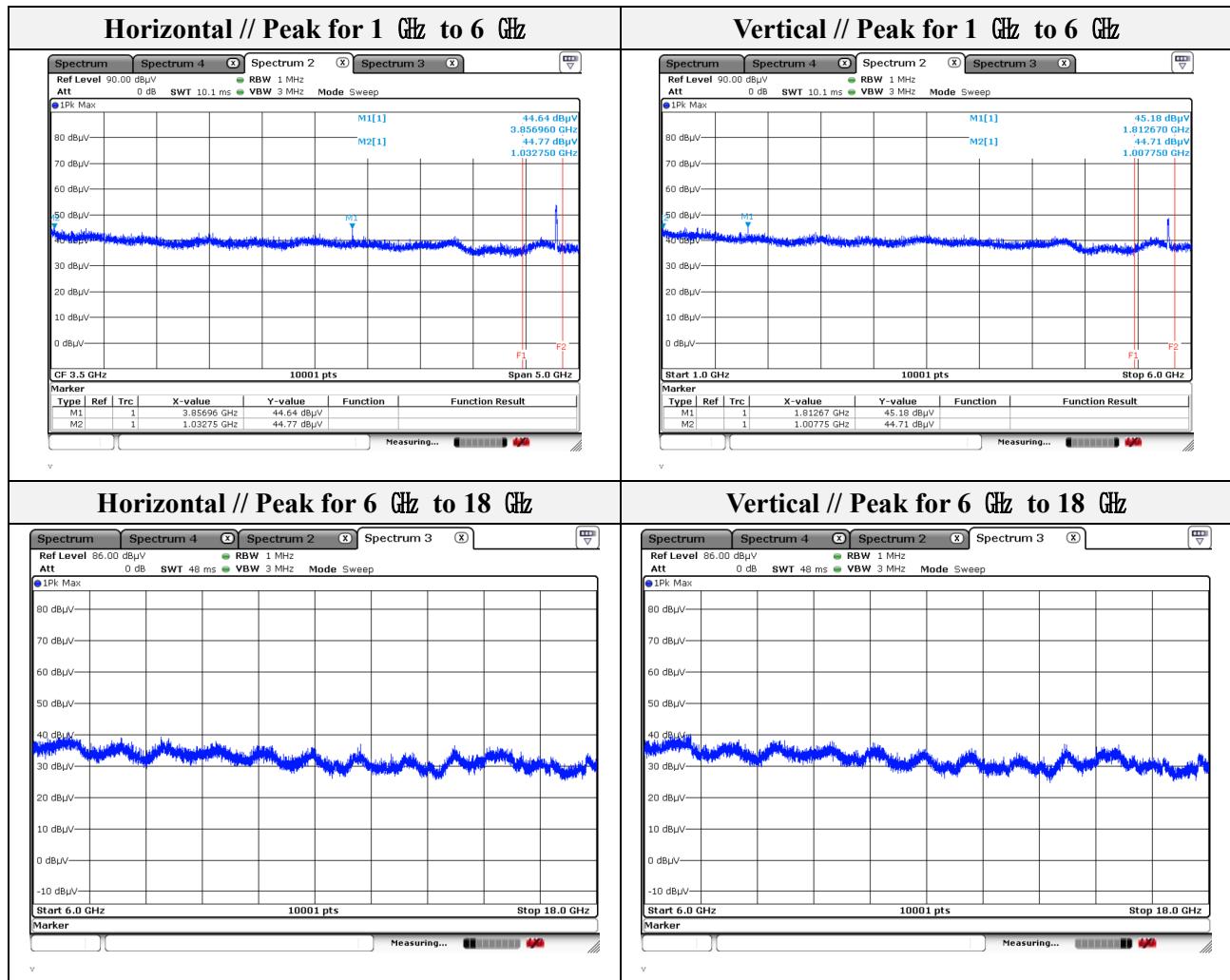
Note.

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: 802.11a  
 Band: UNII-3  
 Distance of measurement: 3 meter  
 Channel: 157

- Spurious

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 007.75	44.71	Peak	V	-10.37	-	34.34	74.00	39.66
1 032.75	44.77	Peak	H	-10.22	-	34.55	74.00	39.45
1 812.67	45.18	Peak	V	-3.97	-	41.21	68.20	26.99
3 856.96	44.64	Peak	H	1.58	-	46.22	74.00	27.78



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.

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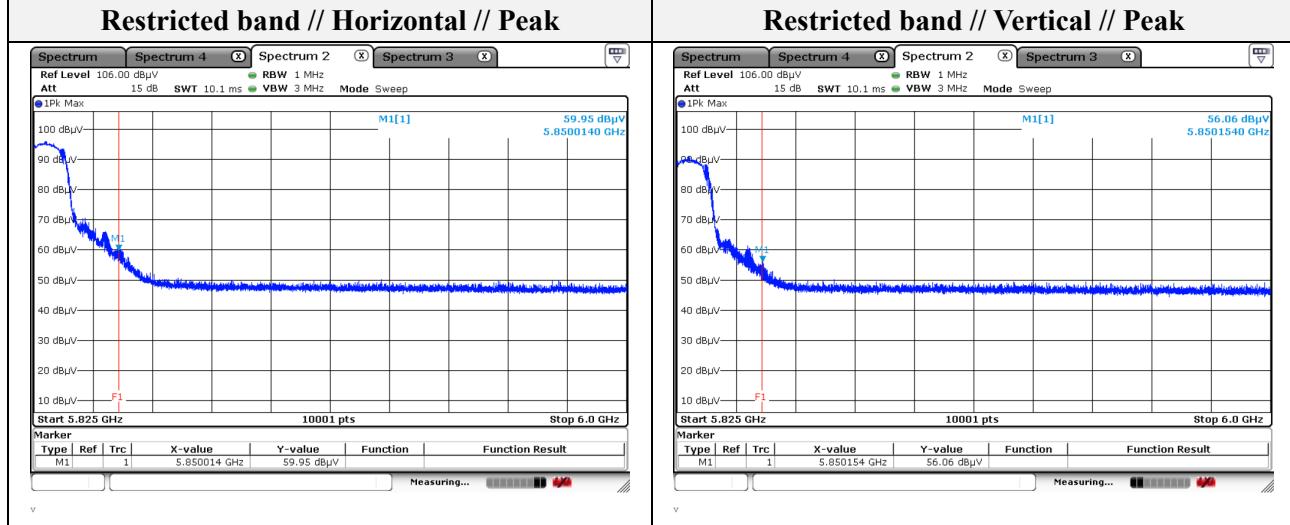
Mode: 802.11a  
 Band: UNII-3  
 Distance of measurement: 3 meter  
 Channel: 165

**- Spurious**

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 008.75	43.99	Peak	V	-10.37	-	33.62	74.00	40.38
1 056.24	44.77	Peak	H	-10.08	-	34.69	74.00	39.31
1 439.71	44.82	Peak	V	-7.76	-	37.06	74.00	36.94
3 883.46	44.87	Peak	H	1.70	-	46.57	74.00	27.43

**- Band edge**

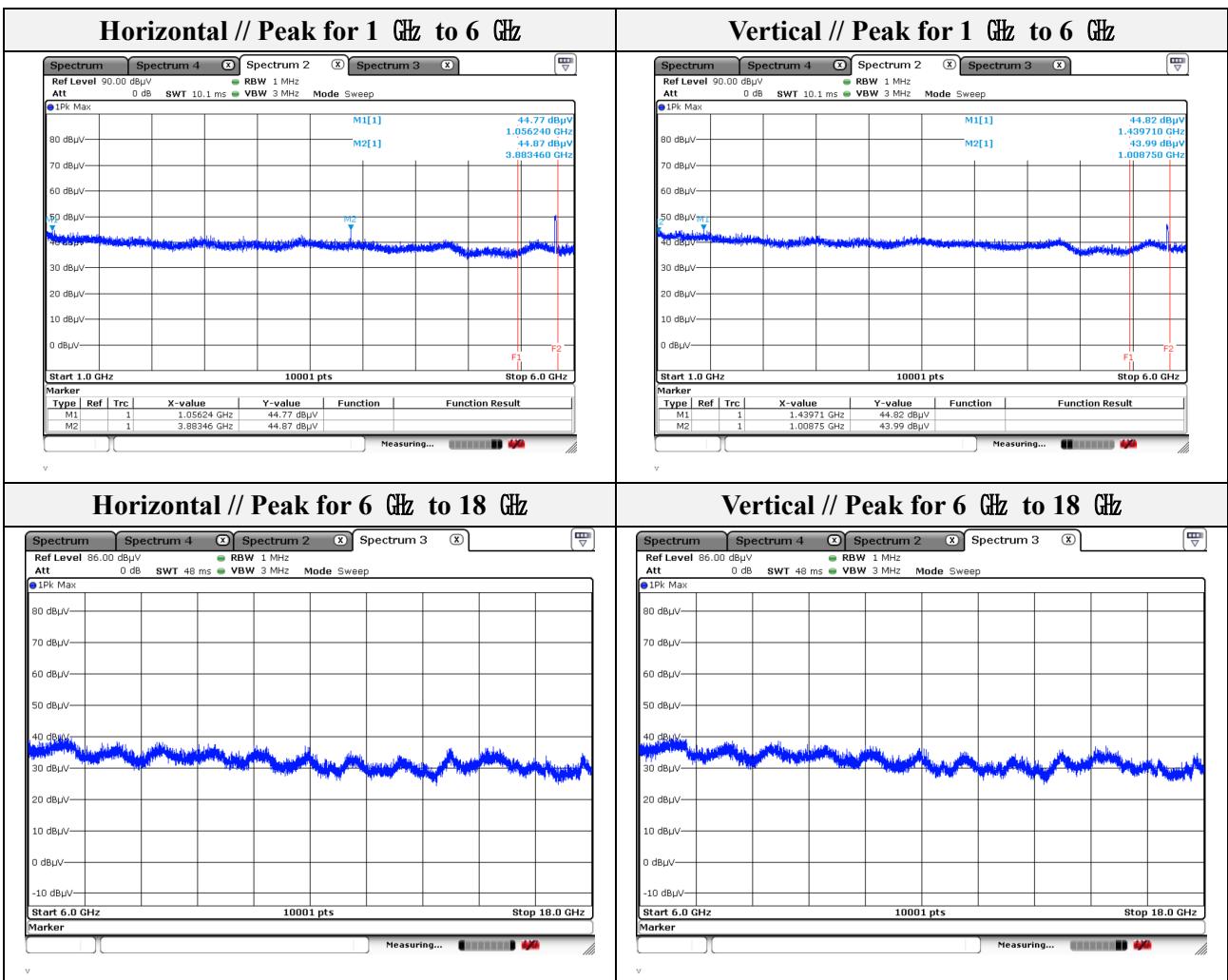
Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
5 850.01	59.95	Peak	V	7.80	-	67.75	122.21	54.46
5 850.15	56.06	Peak	V	7.80	-	63.86	121.89	58.03



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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.

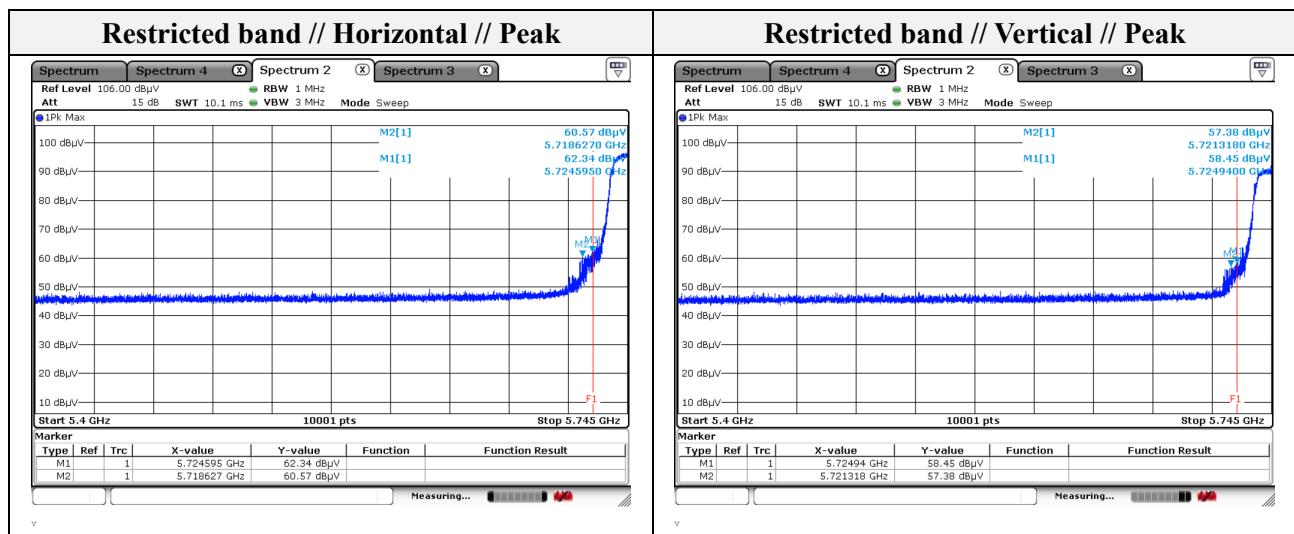
Mode: 802.11n\_HT20  
 Band: UNII-3  
 Distance of measurement: 3 meter  
 Channel: 149

**- Spurious**

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 008.75	45.45	Peak	H	-10.37	-	35.08	74.00	38.92
1 333.22	45.16	Peak	V	-8.38	-	36.78	74.00	37.22
3 395.01	43.16	Peak	V	-0.17	-	42.99	74.00	31.01
3 829.97	44.35	Peak	H	1.45	-	45.80	74.00	28.20

**- Band edge**

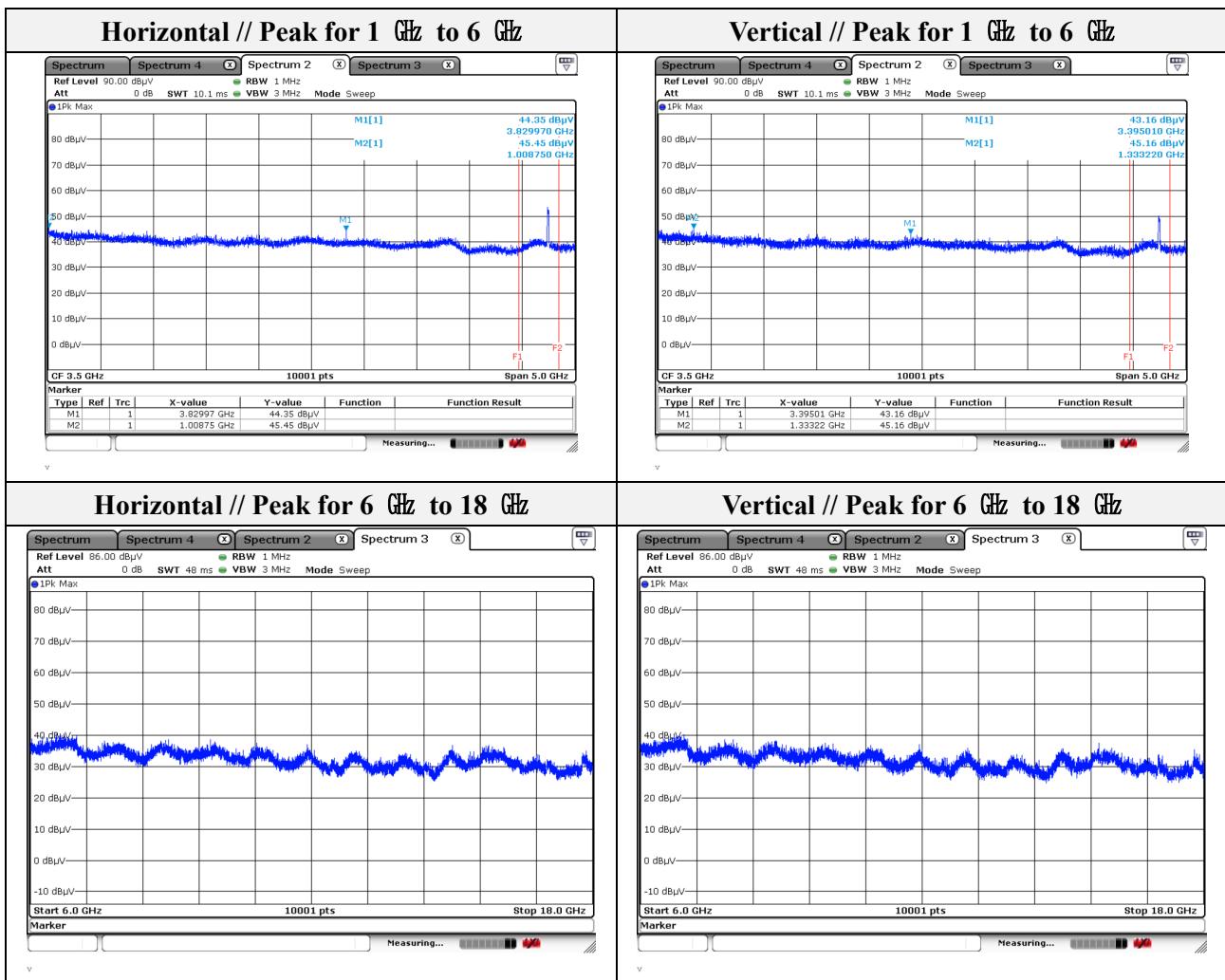
Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
5 718.63	60.57	Peak	H	7.24	-	67.81	110.45	42.64
5 721.32	57.38	Peak	V	7.25	-	64.63	113.84	49.21
5 724.60	62.34	Peak	H	7.27	-	69.61	121.32	51.71
5 724.94	58.45	Peak	V	7.27	-	65.72	122.09	56.37



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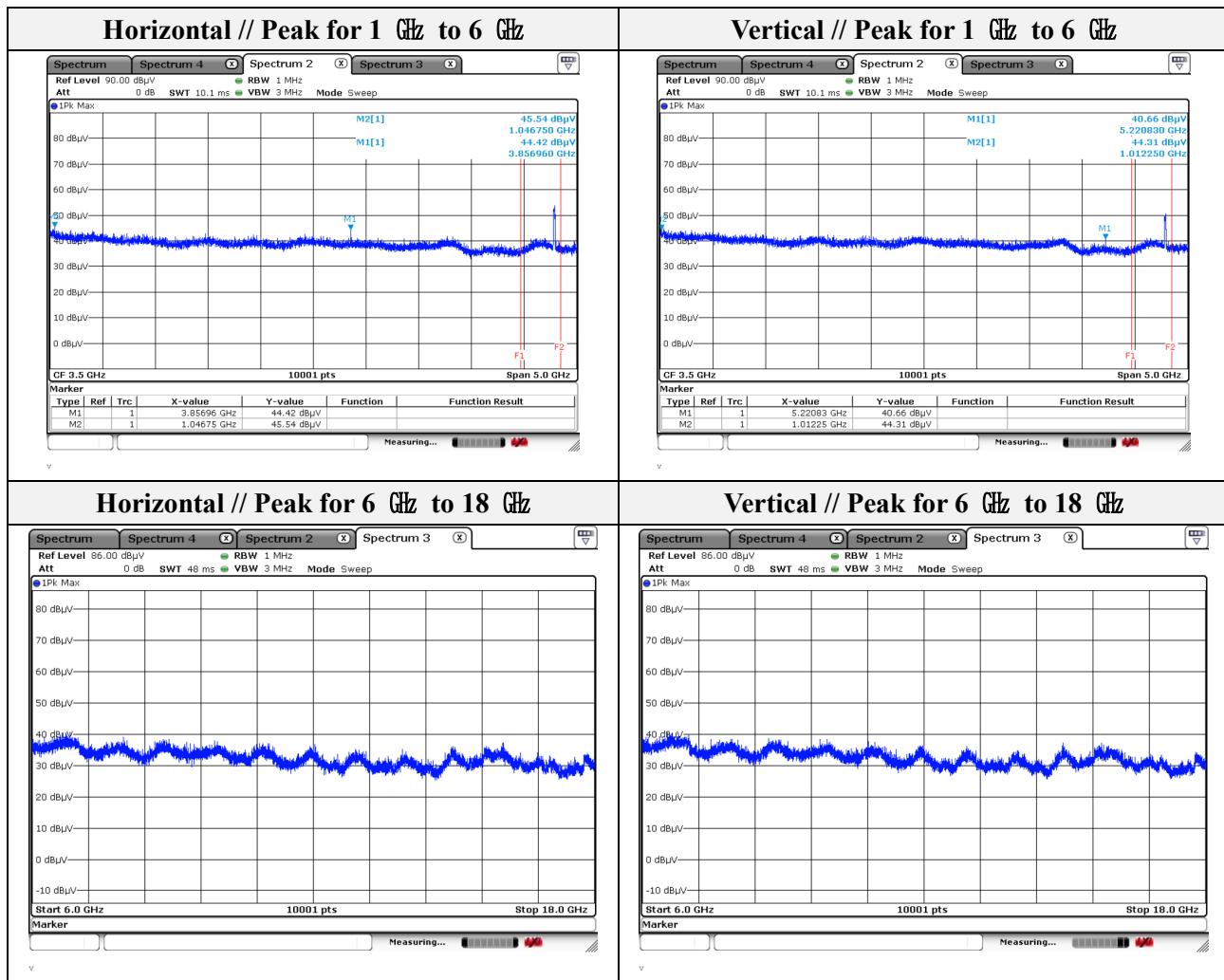
Note.

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\_HT20  
 Band: UNII-3  
 Distance of measurement: 3 meter  
 Channel: 157

- Spurious

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
1 012.25	44.31	Peak	V	-10.34	-	33.97	74.00	40.03
1 046.75	45.54	Peak	H	-10.13	-	35.41	74.00	38.59
3 856.96	44.42	Peak	H	1.58	-	46.00	68.20	22.20
5 220.83	40.66	Peak	V	6.01	-	46.67	74.00	27.33



Note.

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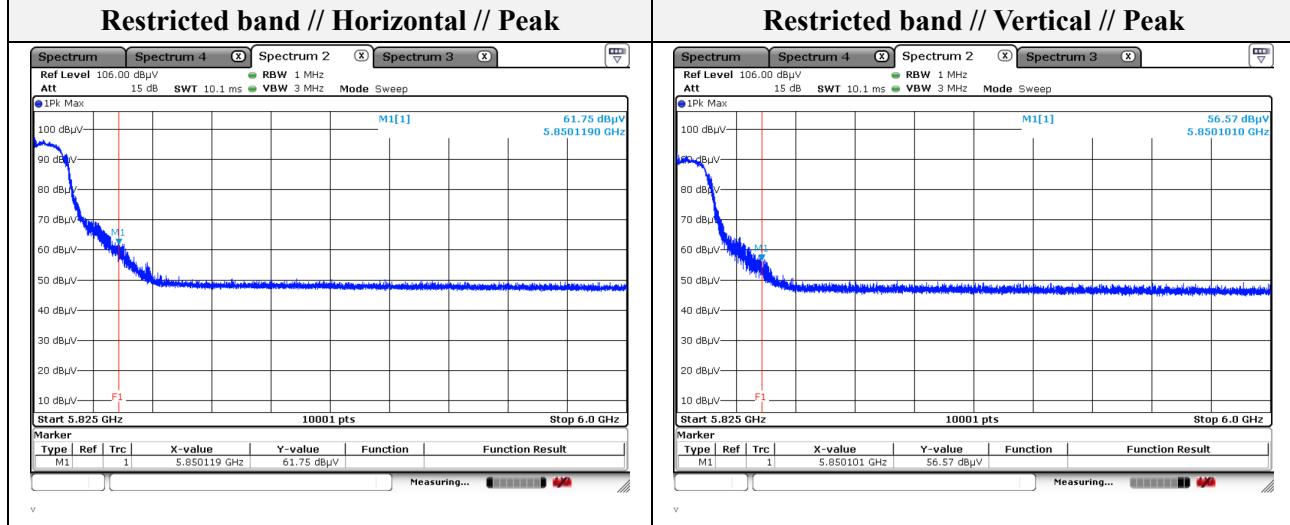
Mode: 802.11n\_HT20  
 Band: UNII-3  
 Distance of measurement: 3 meter  
 Channel: 165

**- Spurious**

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 008.25	44.91	Peak	H	-10.37	-	34.54	74.00	39.46
1 404.71	44.55	Peak	V	-7.94	-	36.61	74.00	37.39
1 530.70	44.59	Peak	V	-7.13	-	37.46	74.00	36.54
3 883.46	44.24	Peak	H	1.70	-	45.94	74.00	28.06

**- Band edge**

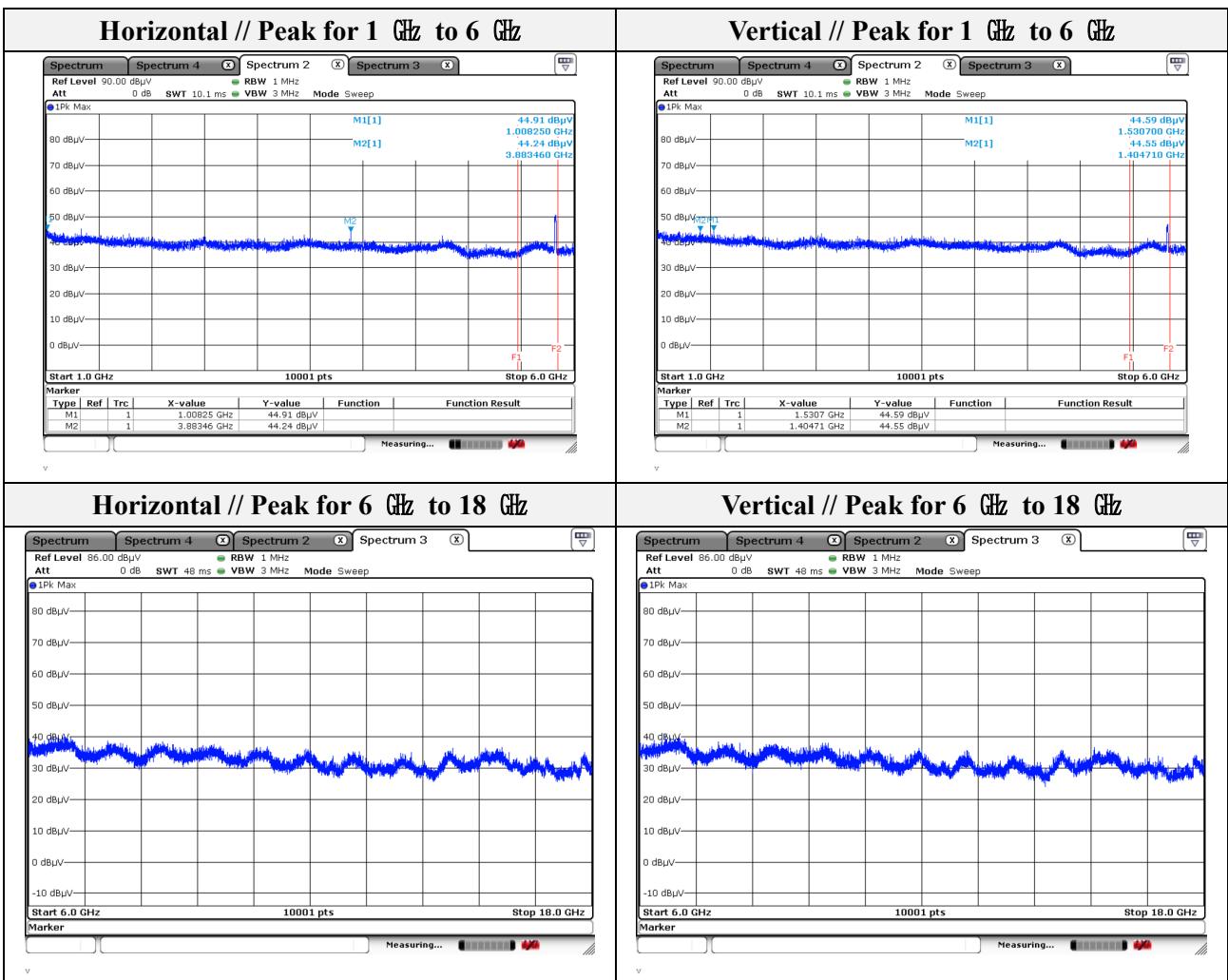
Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
5 850.10	56.57	Peak	V	7.80	-	64.37	122.00	57.63
5 850.12	61.75	Peak	H	7.80	-	69.55	121.96	52.41



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Note.

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2. Average test would be performed if the peak result were greater than the average limit.

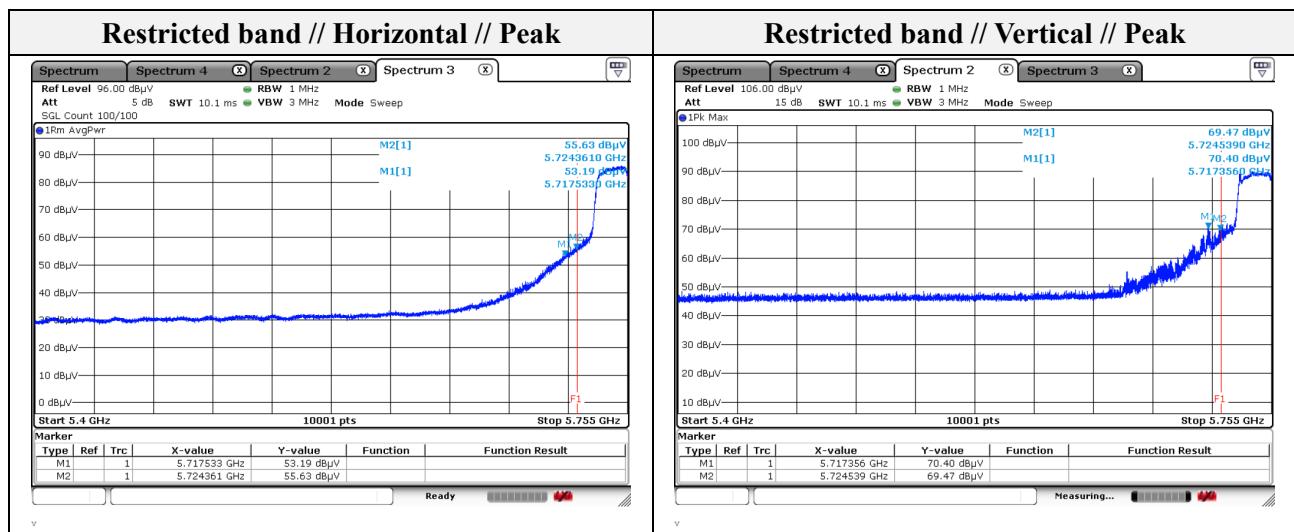
Mode: 802.11n\_HT40  
 Band: UNII-3  
 Distance of measurement: 3 meter  
 Channel: 151

**- Spurious**

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 007.25	44.72	Peak	H	-10.37	-	34.35	74.00	39.65
1 008.75	45.32	Peak	V	-10.37	-	34.95	74.00	39.05
2 435.61	44.22	Peak	V	-1.67	-	42.55	68.20	25.65
3 836.97	44.41	Peak	H	1.48	-	45.89	74.00	28.11

**- Band edge**

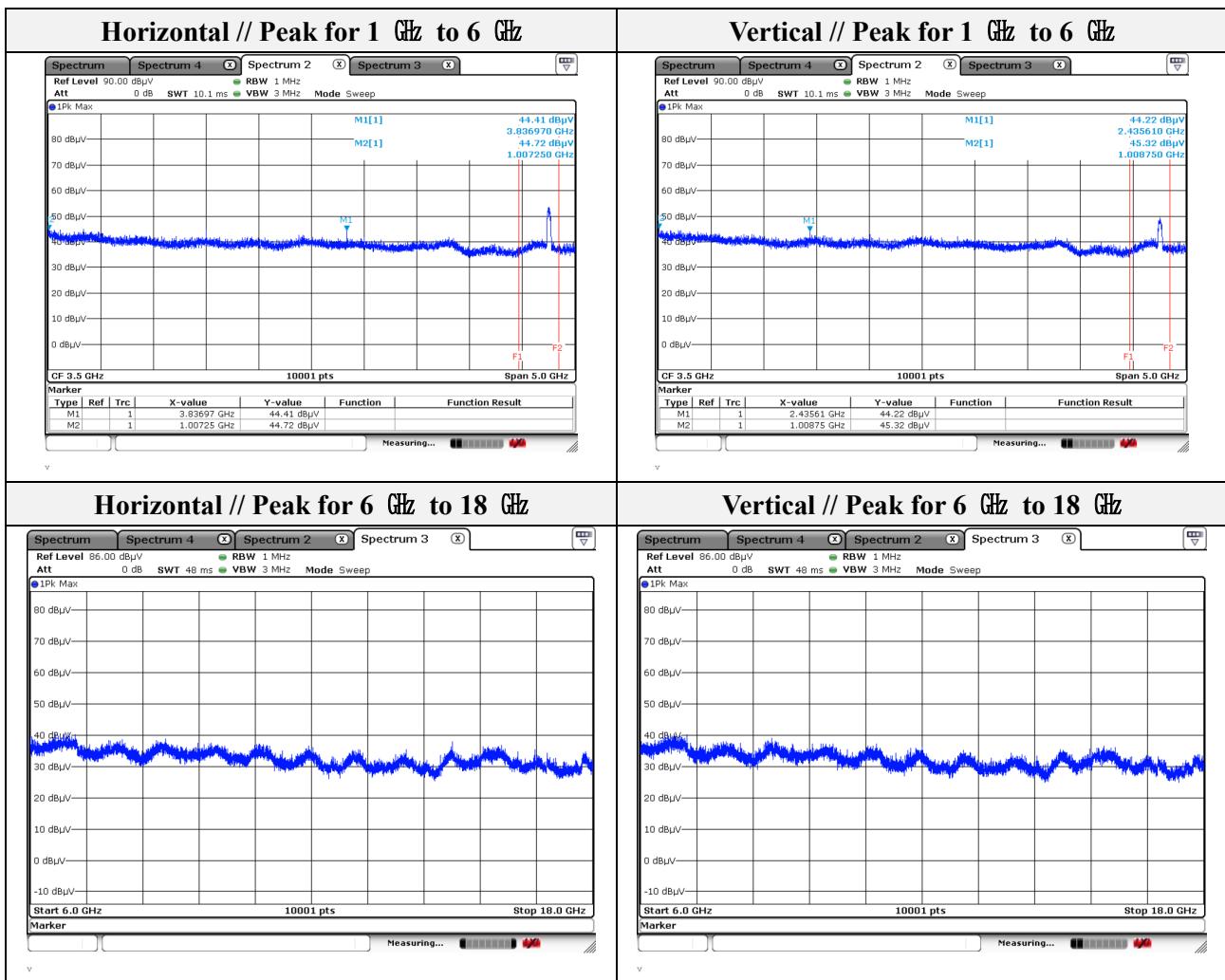
Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
5 717.36	70.40	Peak	V	7.23	-	77.63	110.09	32.46
5 717.53	74.76	Peak	H	7.23	-	81.99	110.14	28.15
5 724.36	73.95	Peak	H	7.27	-	81.22	120.77	39.55
5 724.54	69.47	Peak	V	7.27	-	76.74	121.18	44.44



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Note.

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2. Average test would be performed if the peak result were greater than the average limit.

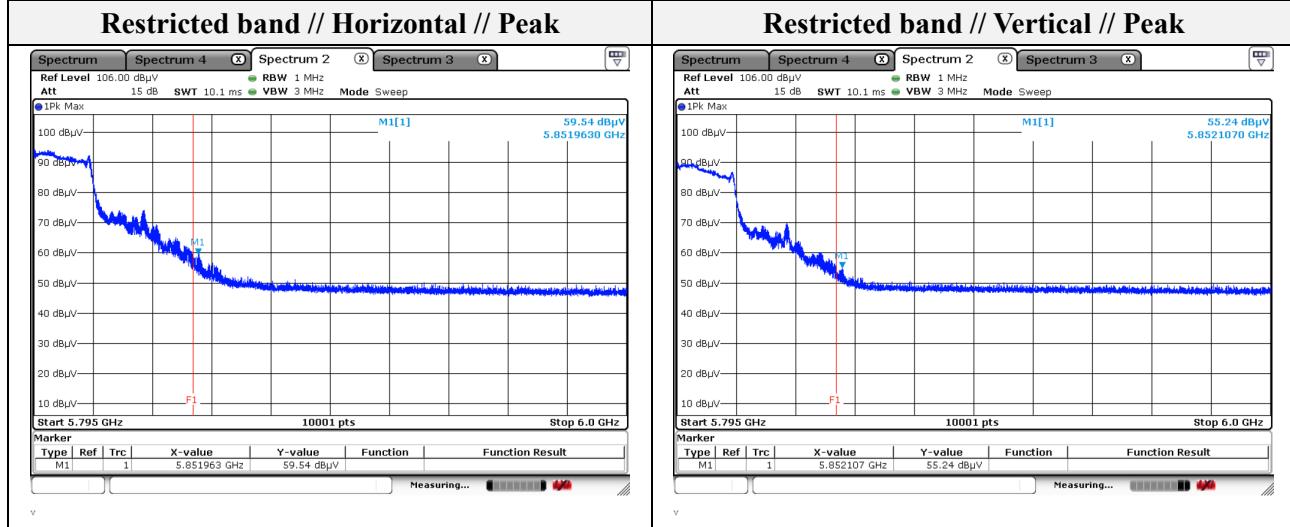
Mode: 802.11n\_HT40  
 Band: UNII-3  
 Distance of measurement: 3 meter  
 Channel: 159

**- Spurious**

Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
1 329.72	48.24	Peak	H	-8.40	-	39.84	74.00	34.16
1 524.70	44.39	Peak	V	-7.19	-	37.20	74.00	36.80
2 573.59	43.41	Peak	V	-1.45	-	41.96	68.20	26.24
3 863.96	47.40	Peak	H	1.61	-	49.01	74.00	24.99

**- Band edge**

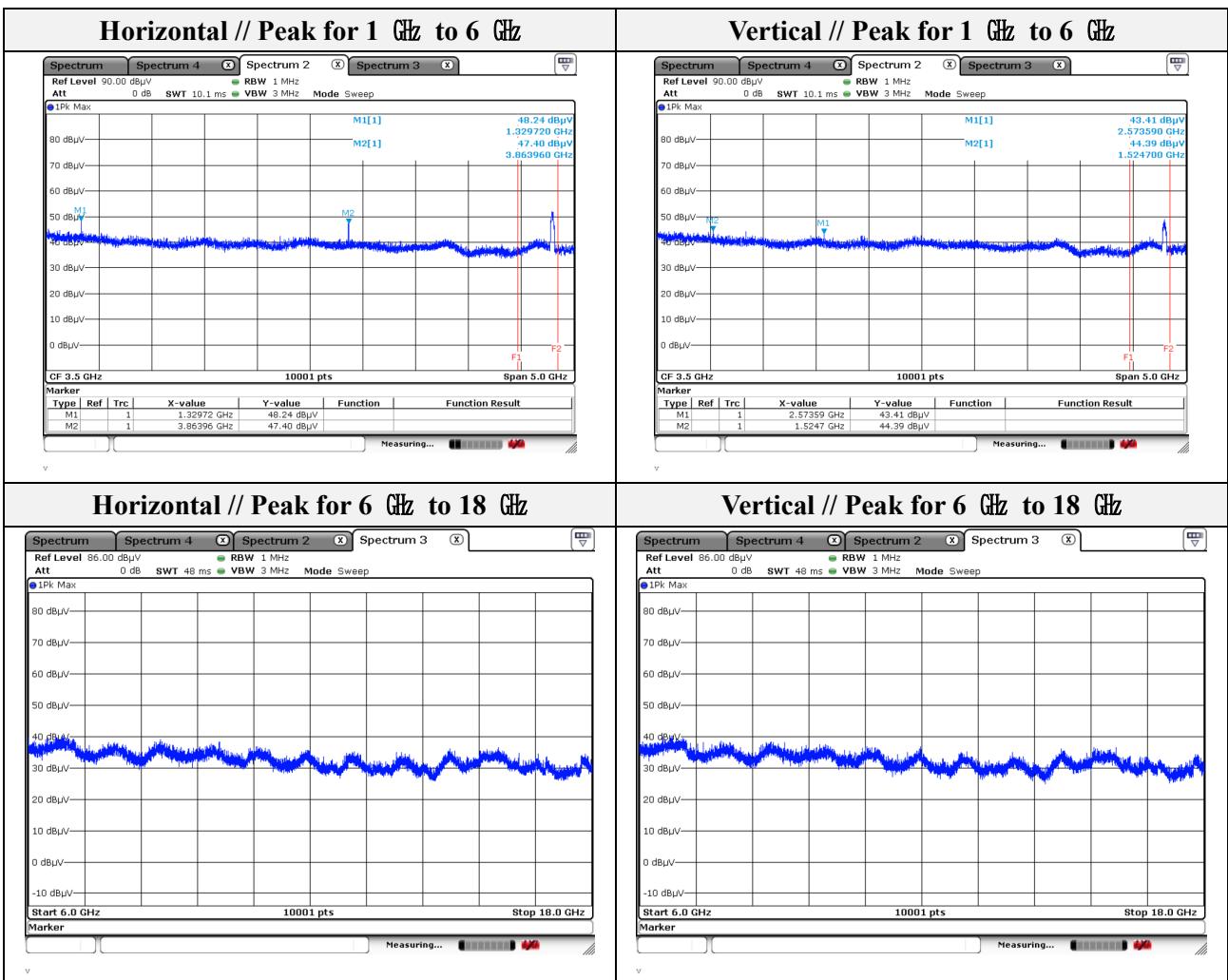
Frequency (MHz)	Level (dB $\mu$ V)	Detect mode	Ant. Pol. (H/V)	CF (dB)	DCF (dB)	Field strength (dB $\mu$ N/m)	Limit (dB $\mu$ N/m)	Margin (dB)
5 851.96	59.54	Peak	H	7.80	-	67.34	117.76	50.42
5 852.11	55.24	Peak	V	7.80	-	63.71	117.42	53.71



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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.

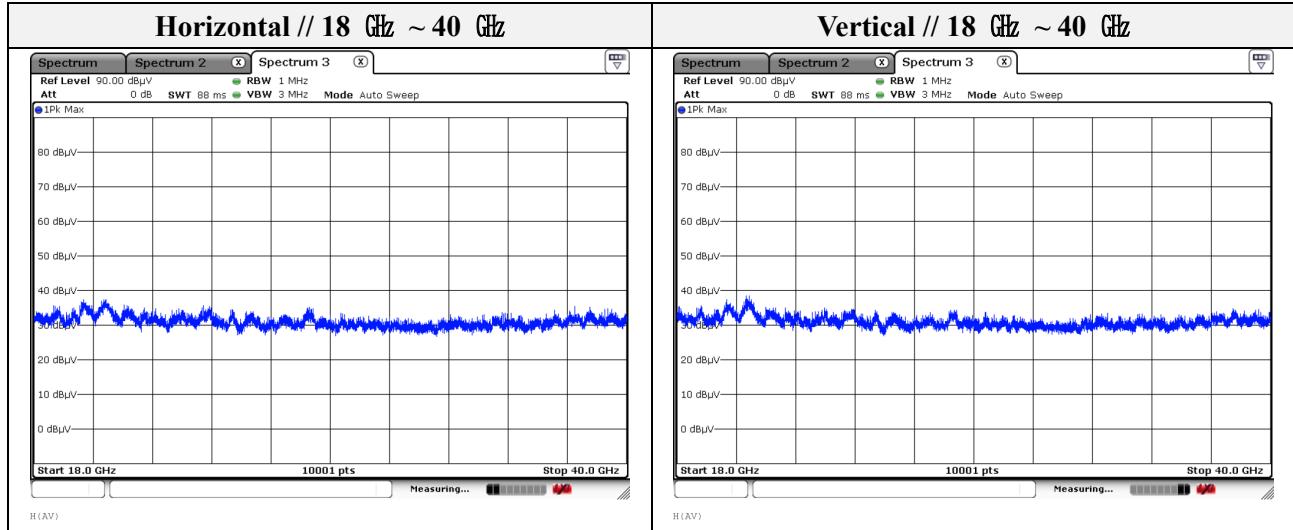
**Test results (18 GHz to 40 GHz)**

Mode: 802.11n\_HT40

Band: UNII-1

Channel: 46 (Worst Case)

Distance of measurement: 3 meter



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 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.

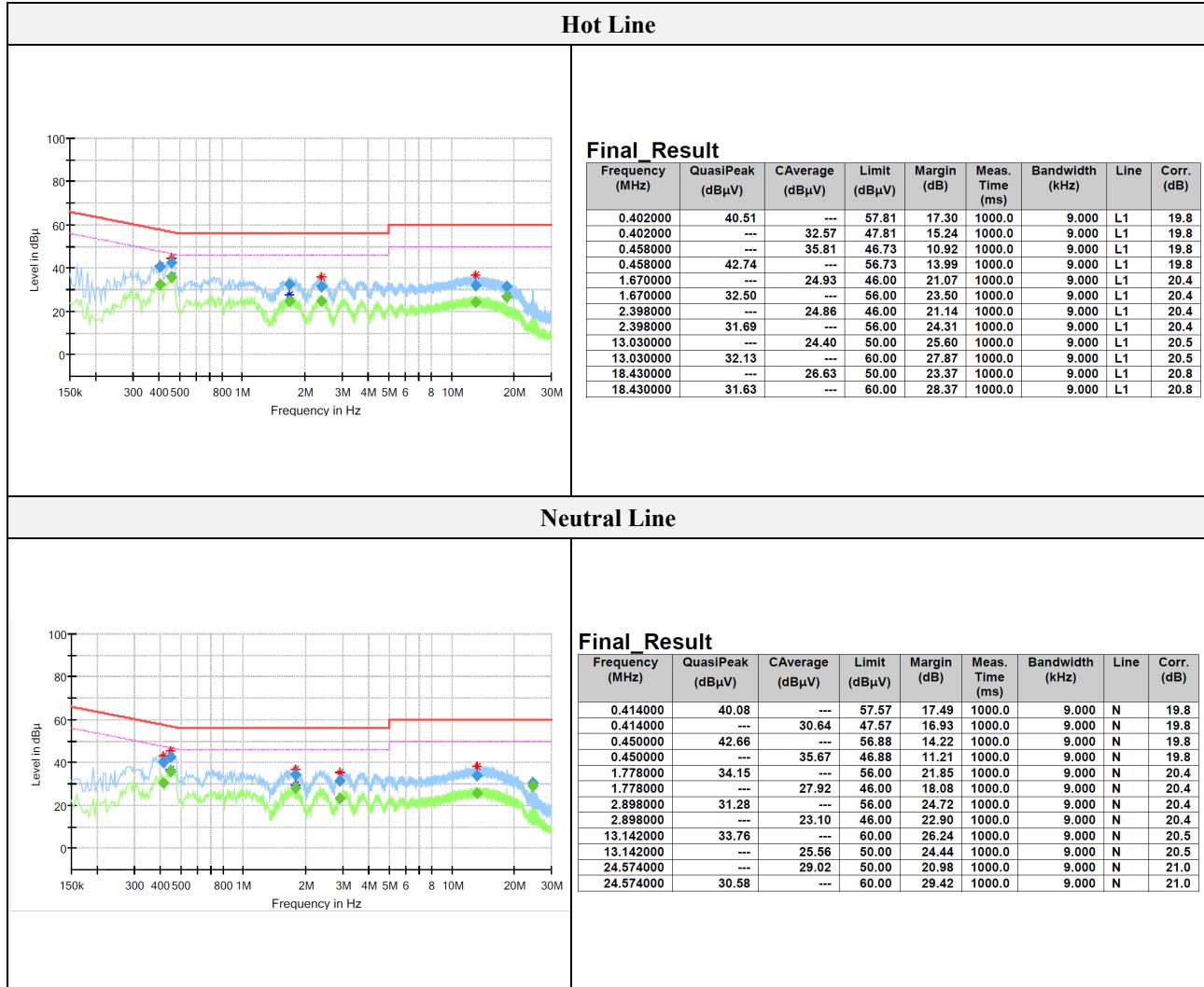
Frequency of Emission (MHz)	Conducted limit (dB $\mu$ N/m)	
	Quasi-peak	Average
0.15 – 0.50	66 - 56*	56 - 46*
0.50 – 5.00	56	46
5.00 – 30.0	60	50

According to RSS-Gen 8.8, For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Frequency of Emission (MHz)	Conducted limit (dB $\mu$ N/m)	
	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: 802.11n\_HT40  
 Band: UNII-1  
 Channel: 38 (Worst Case)



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### **3.8. 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	FSV3044	101272	1 year	2023.03.14
Spectrum analyzer	R&S	FSV40-N	102194	1 year	2023.08.11
SIGNAL GENERATOR	KEYSIGHT	N5182B	MY59100115	1 year	2023.04.27
SIGNAL GENERATOR	Anritsu	68369B	002118	1 year	2023.05.13
Power Meter	Anritsu	ML2495A	2010001	1 year	2023.04.27
Pulse Power Sensor	Anritsu	MA2411B	1911111	1 year	2023.04.27
Attenuator	Mini-Circuits	BW-S10-2W263+	3	1 year	2023.01.17
Loop Antenna	Schwarzbeck	FMZB1513	225	2 years	2023.01.18
TRILOG-BROADBAND ANTENNA	Schwarzbeck	VULB 9163	714	2 years	2024.04.19
Attenuator	HUBER+SHHNER	6806.17.A	NONE	1 year	2023.04.01
Horn Antenna	A.H	SAS-571	414	1 year	2023.01.18
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA 9170550	1 year	2023.01.18
Amplifier	SONOMA INSTRUMENT	310N	100517	1 year	2023.08.01
PREAMPLIFIER	HP	8449B	3008A00538	1 year	2023.06.02
BROADBAND AMPLIFIER	SCHWARZBECK	BBV9721	PS9721-003	1 year	2023.01.17
AC POWER SOURCE/ANALYZER	HP	6813A	3729A00754	1 year	2023.01.14
EMI Test Receiver	R&S	ESU26	100517	1 year	2023.08.01
EMI Test Receiver	R&S	ESR3	101783	1 year	2023.11.11
PULSE LIMITER	R&S	ESH2-Z2	101915	1 year	2023.11.10
BAND REJECT FILTER	MICRO-TRONICS	BRM50716	G199	1 year	2023.01.14
LISN	R&S	ENV216	101787	1 year	2023.11.10
Temp. & Humid. Chamber	ESPEC	SH642	93012658	1 year	2023.06.16

## Peripheral devices

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

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