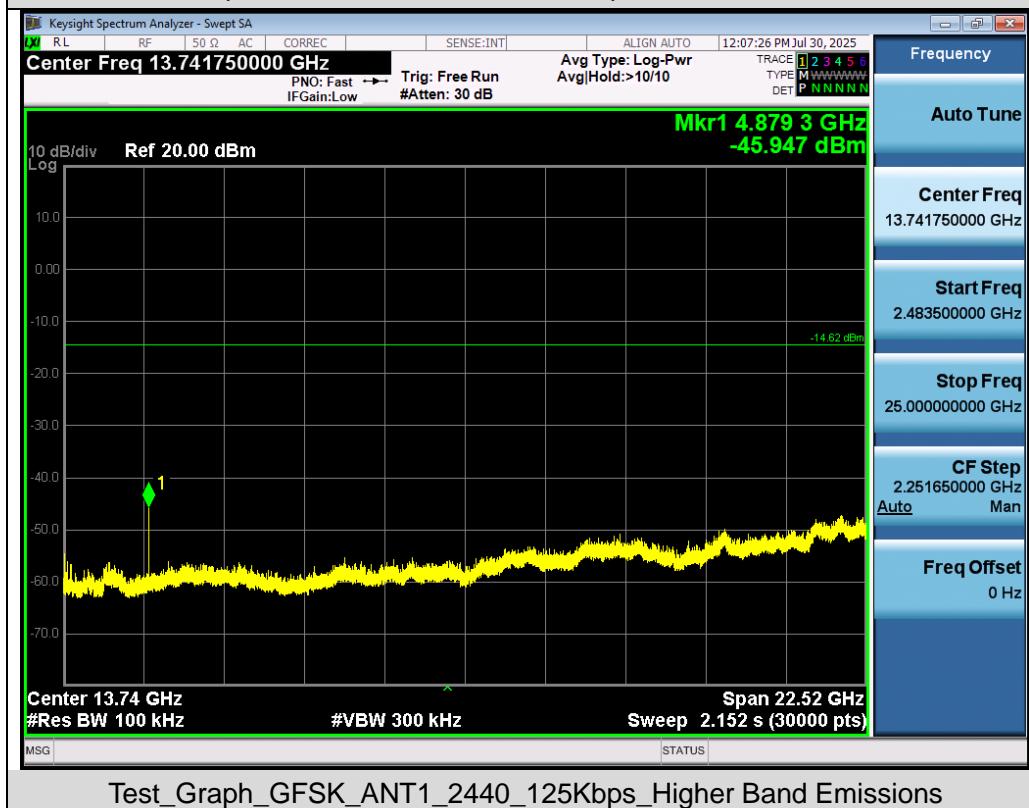


Test\_Graph\_GFSK\_ANT1\_2440\_125Kbps\_Lower Band Emissions



Test\_Graph\_GFSK\_ANT1\_2440\_125Kbps\_Higher Band Emissions

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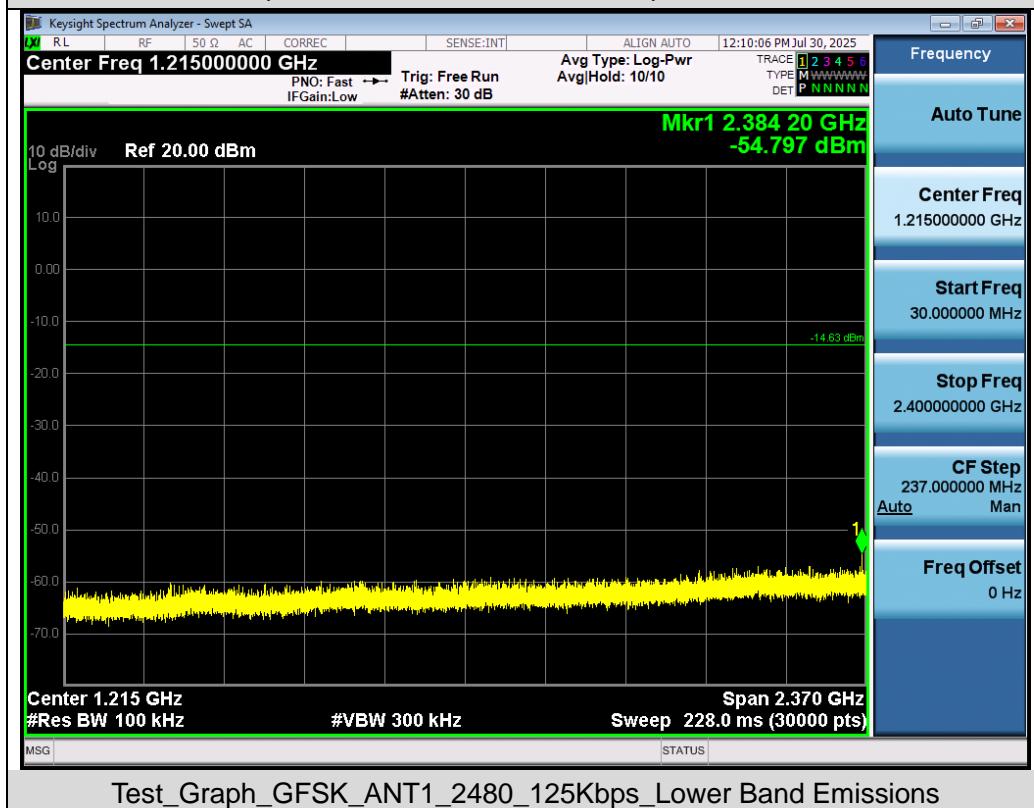
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Test\_Graph\_GFSK\_ANT1\_2480\_125Kbps\_Reference Level



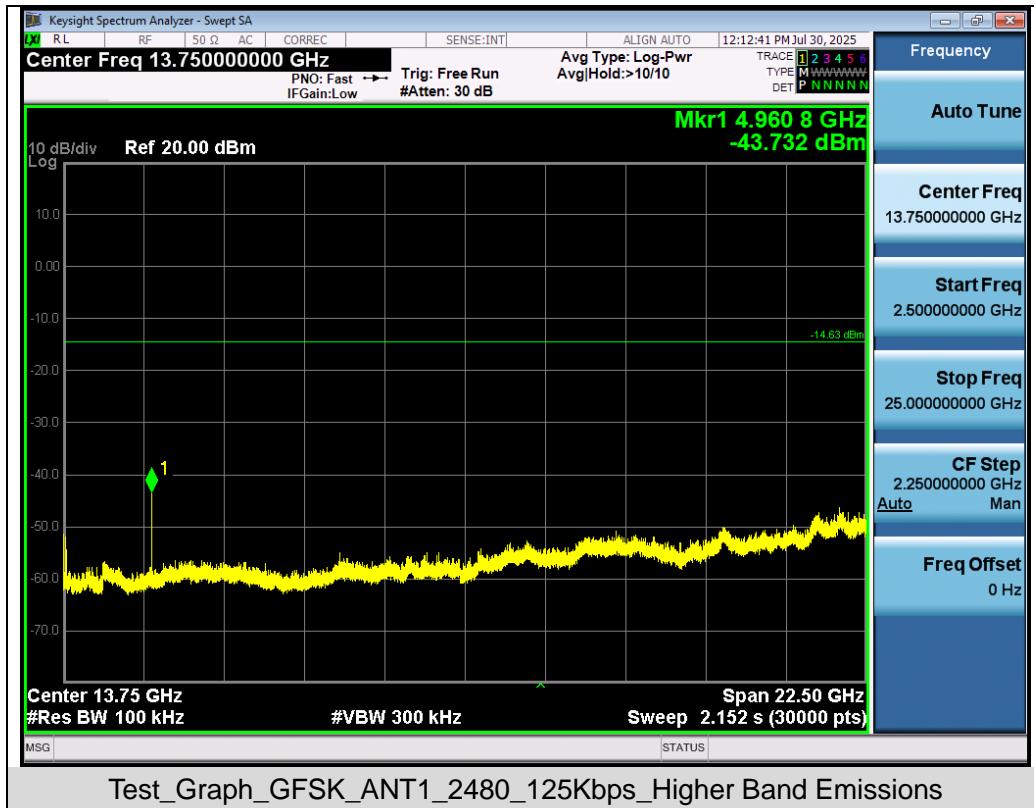
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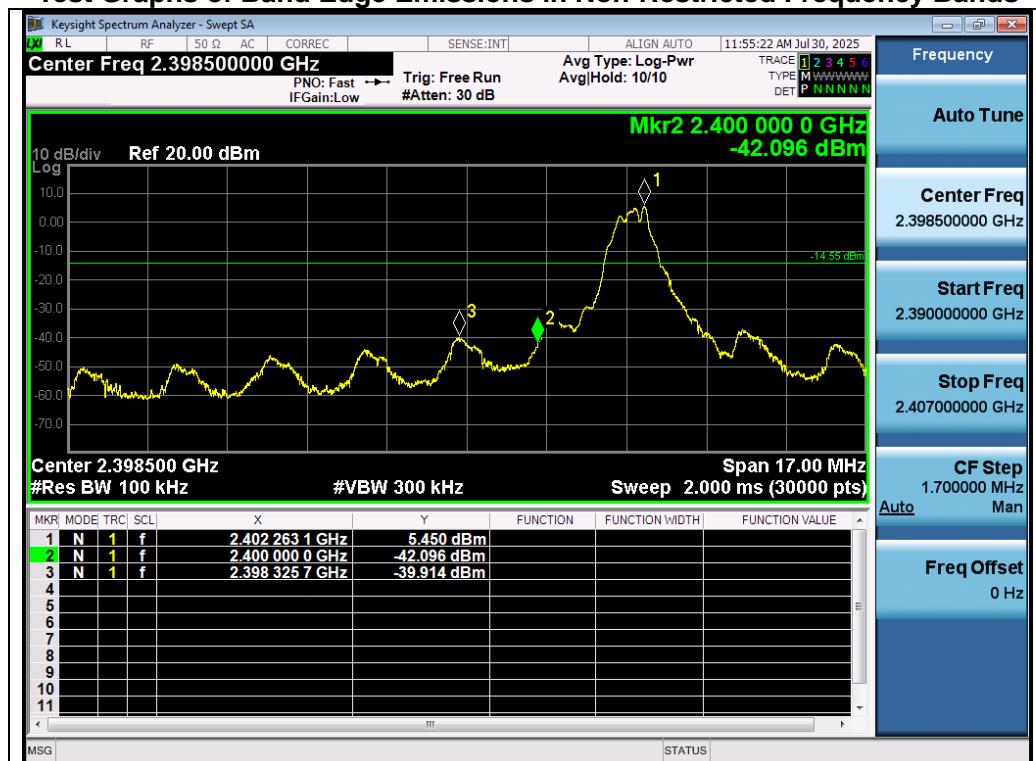
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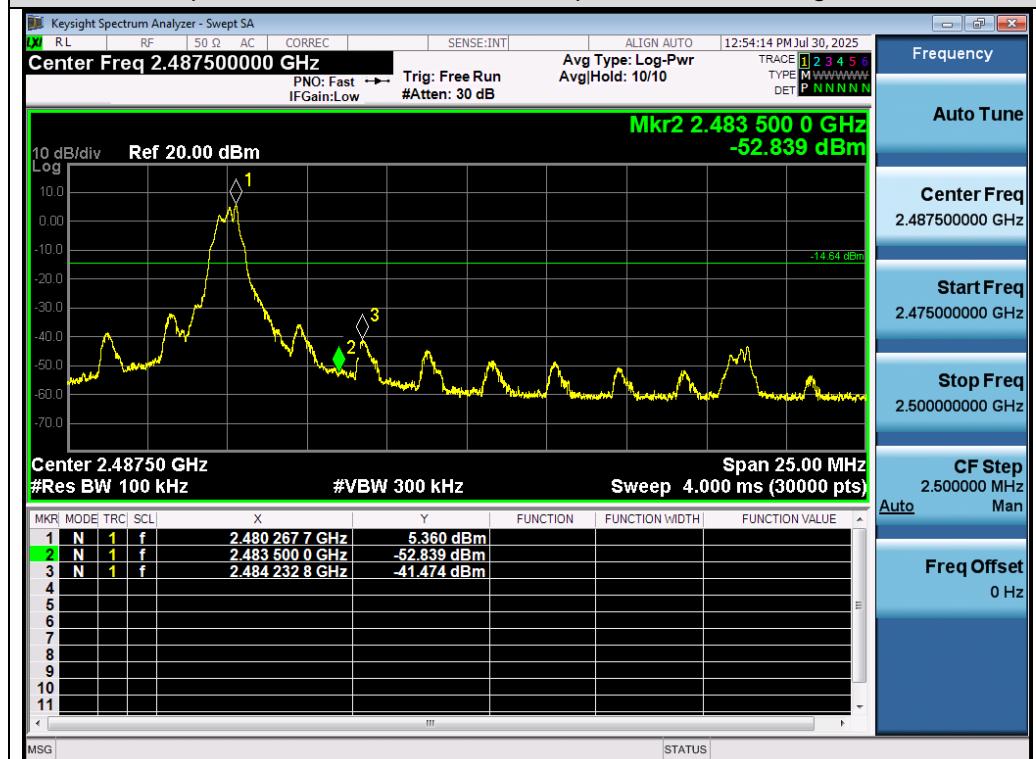
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### Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



### Test\_Graph\_GFSK\_ANT1\_2402\_125Kbps\_Lower Band Edge Emissions



### Test\_Graph\_GFSK\_ANT1\_2480\_125Kbps\_Higher Band Edge Emissions

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### Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

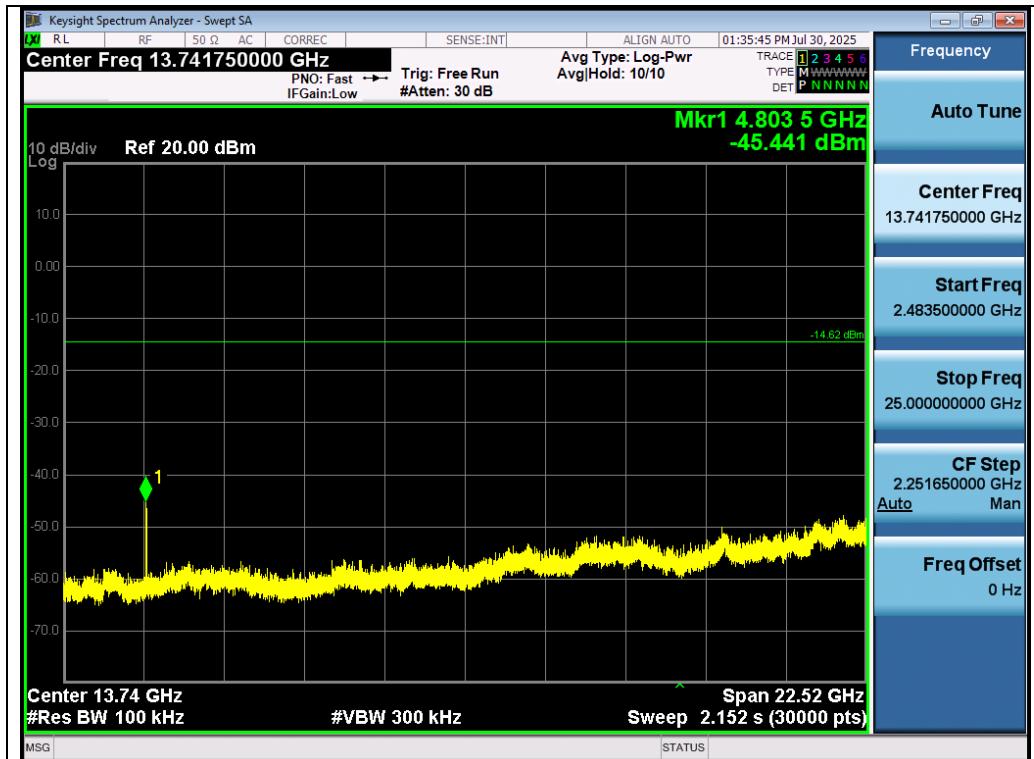


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Test\_Graph\_GFSK\_ANT1\_2402\_500Kbps\_Higher Band Emissions



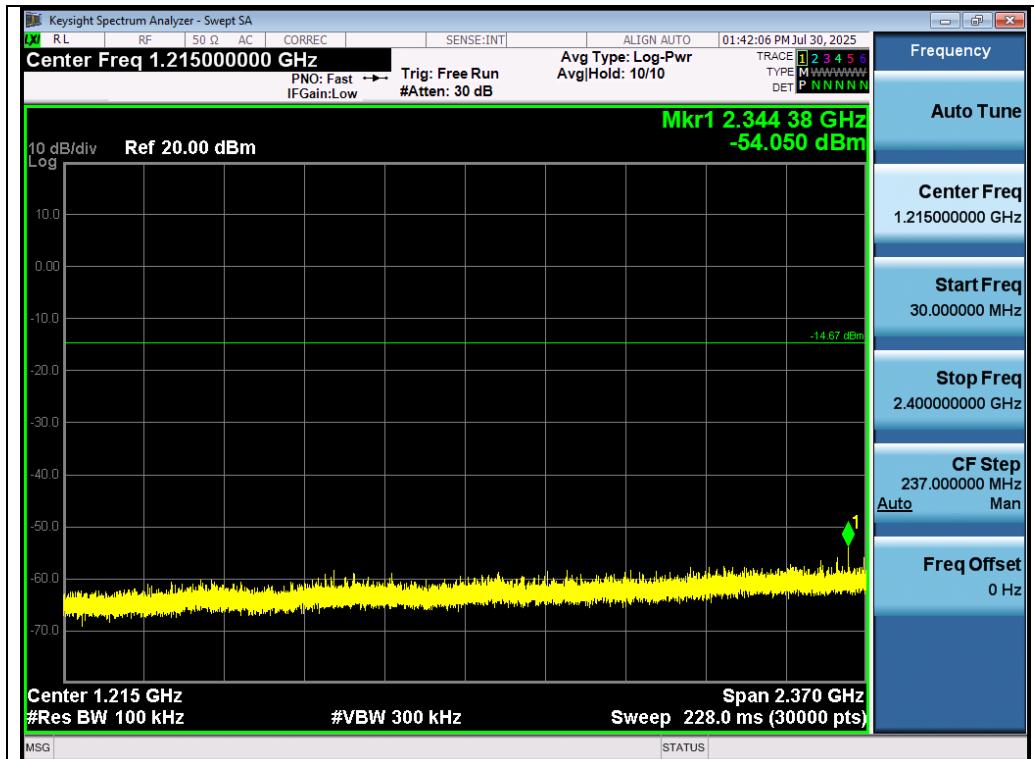
Test\_Graph\_GFSK\_ANT1\_2440\_500Kbps\_Reference Level

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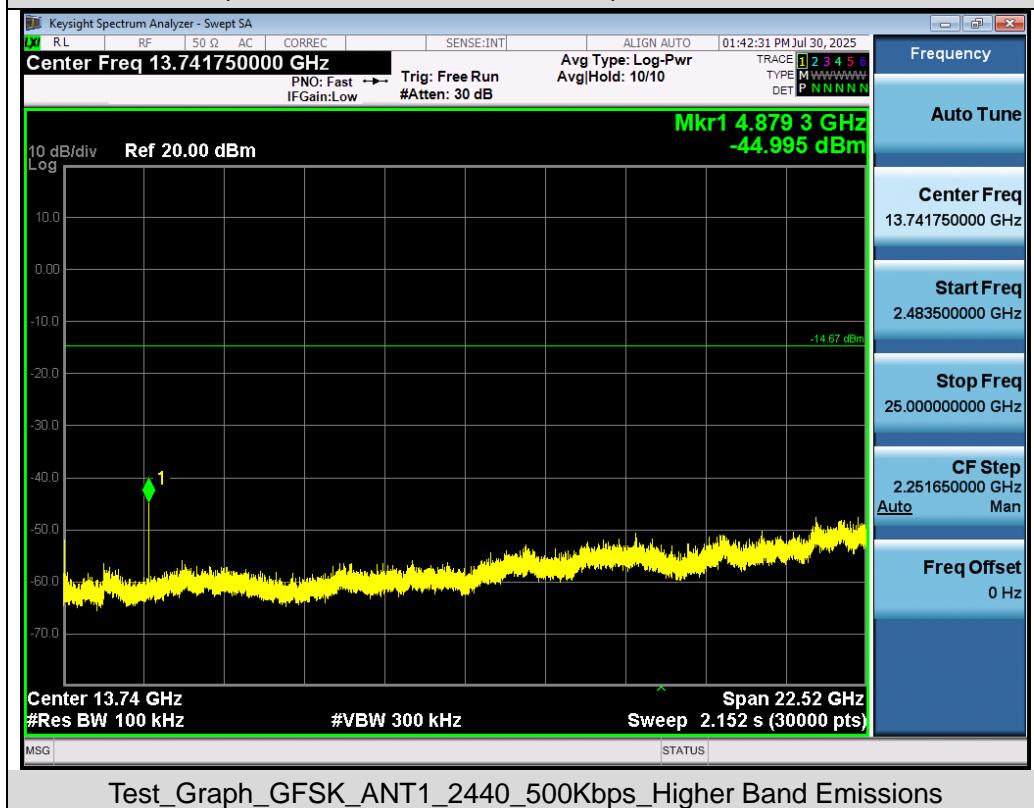
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Test\_Graph\_GFSK\_ANT1\_2440\_500Kbps\_Lower Band Emissions



Test\_Graph\_GFSK\_ANT1\_2440\_500Kbps\_Higher Band Emissions

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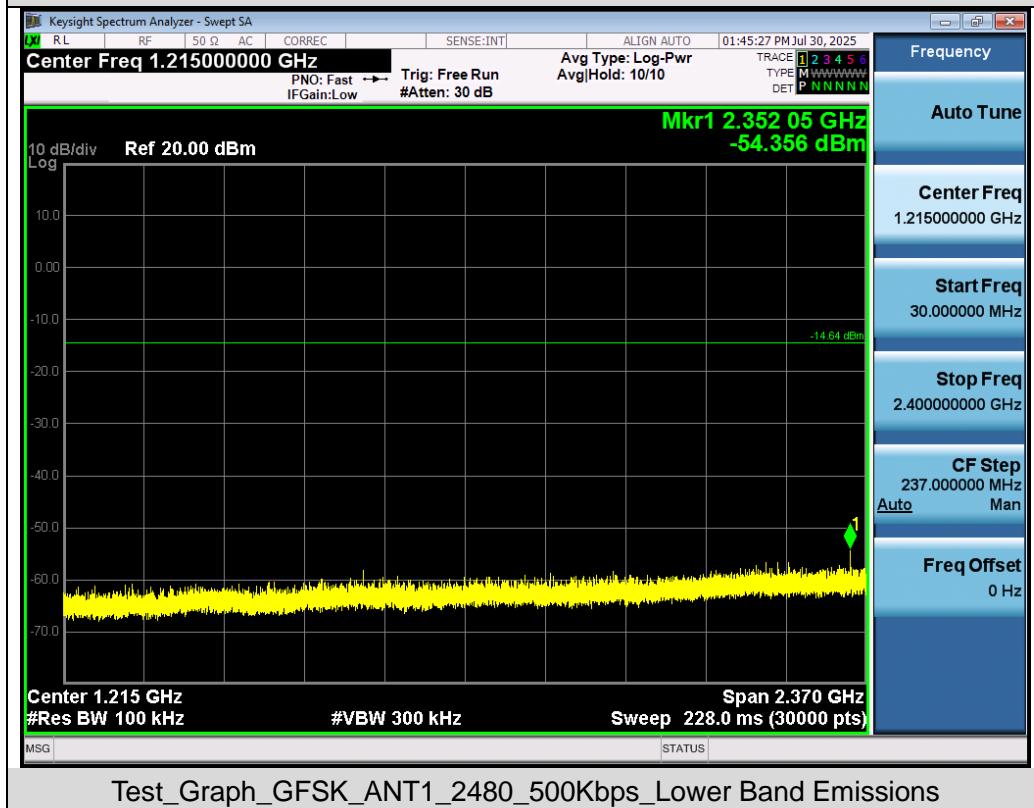
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Test\_Graph\_GFSK\_ANT1\_2480\_500Kbps\_Reference Level



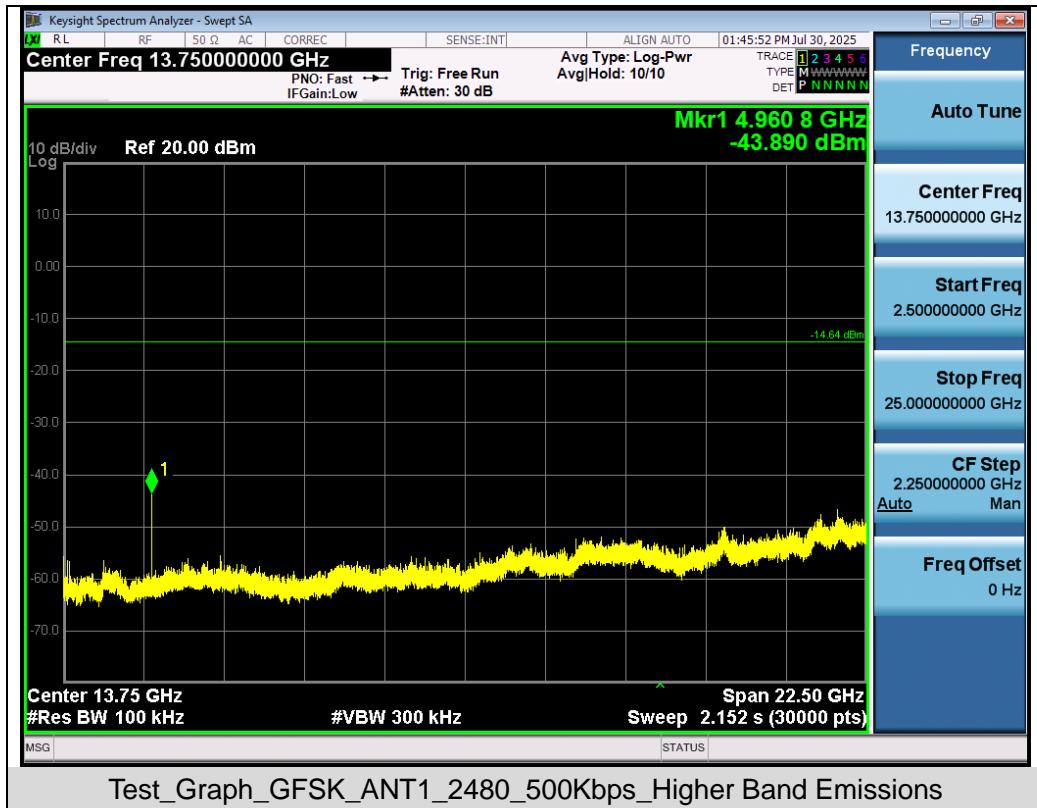
Test\_Graph\_GFSK\_ANT1\_2480\_500Kbps\_Lower Band Emissions

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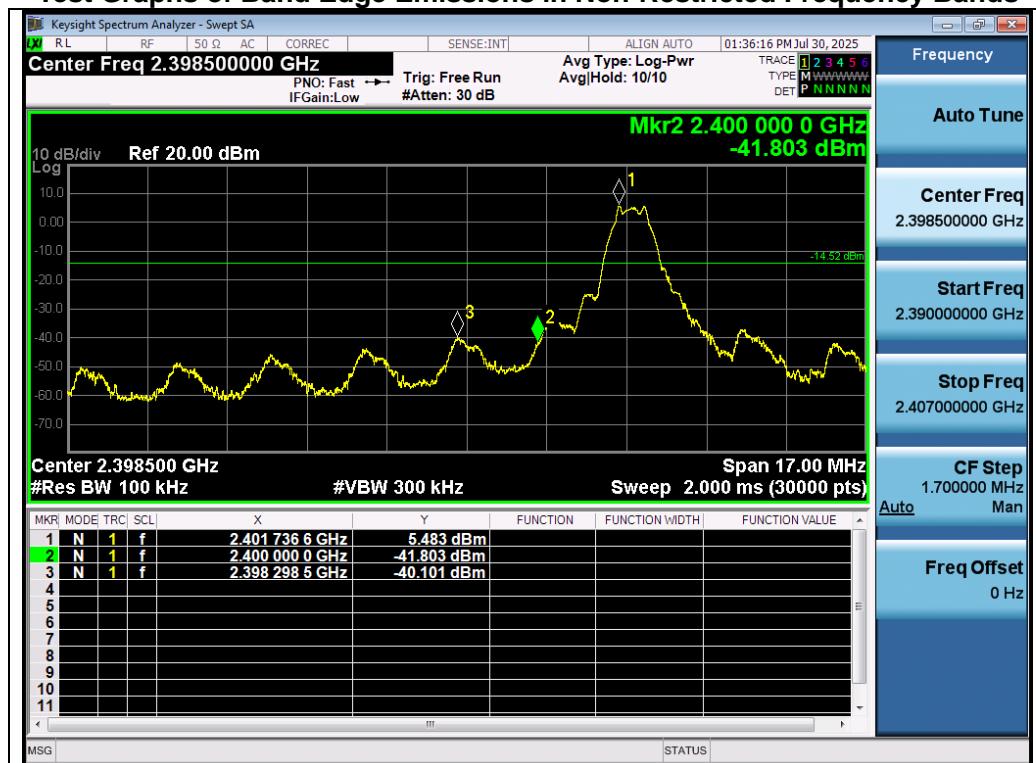
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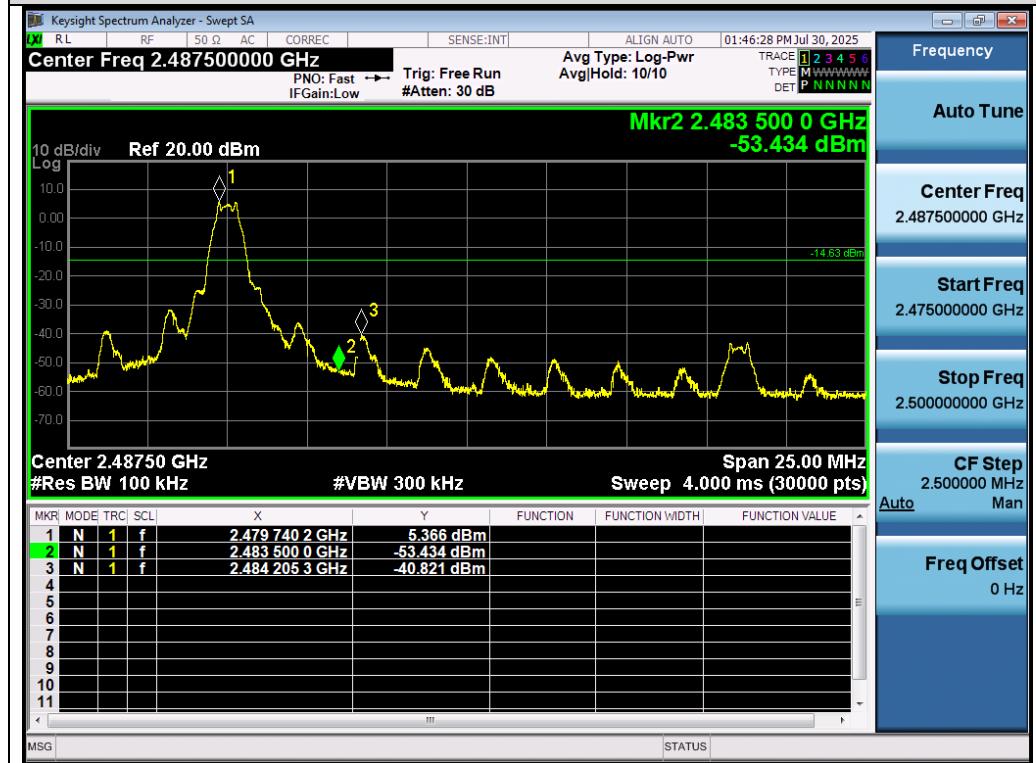
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### Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



### Test\_Graph\_GFSK\_ANT1\_2402\_500Kbps\_Lower Band Edge Emissions



### Test\_Graph\_GFSK\_ANT1\_2480\_500Kbps\_Higher Band Edge Emissions

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## 11. Radiated Spurious Emission

### 11.1 Measurement Limit

- FCC Part 15.209 Limit in the below table to be followed

Frequencies (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

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

### 11.2 Measurement Procedure

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

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7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.
8. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
9. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
10. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
11. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9kHz~150kHz/RB 200Hz for QP
Start ~Stop Frequency	150kHz~30MHz/RB 9kHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120kHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9kHz~150kHz/RB 200Hz for QP
Start ~Stop Frequency	150kHz~30MHz/RB 9kHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120kHz for QP

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- **Quasi-Peak Measurements below 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = as shown in the table above
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

- **Peak Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

- **Average Measurements above 1GHz**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW  $\geq [3 \times \text{RBW}]$
4. Detector = Power averaging (rms)
5. Averaging type = power (i.e., rms)
6. Sweep time = auto
7. Perform a trace average of at least 100 traces.
8. The applicable correction factor is  $[10^{\log (1 / D)}]$ , where D is the duty cycle. The factor had been edited in the "Input Correction" of the Spectrum Analyzer.

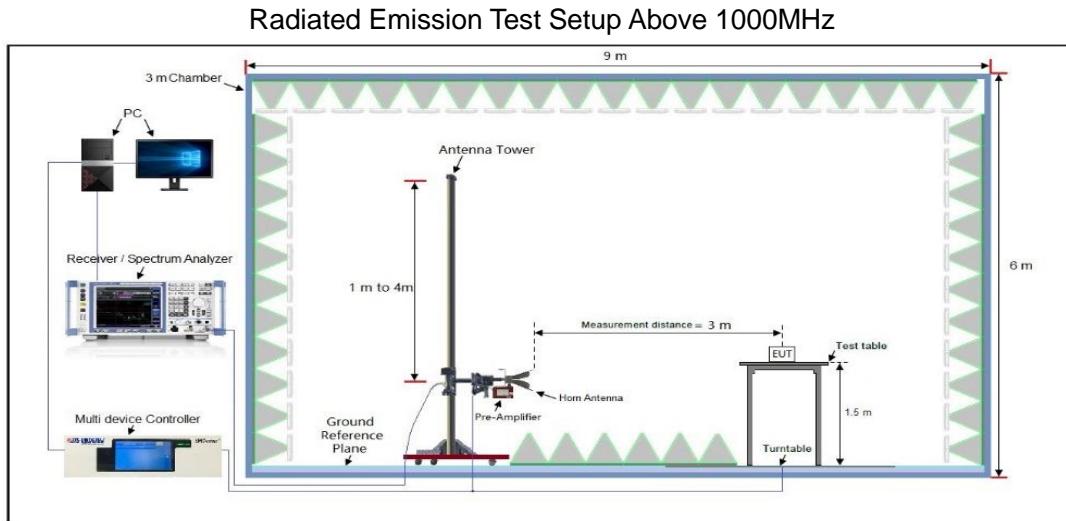
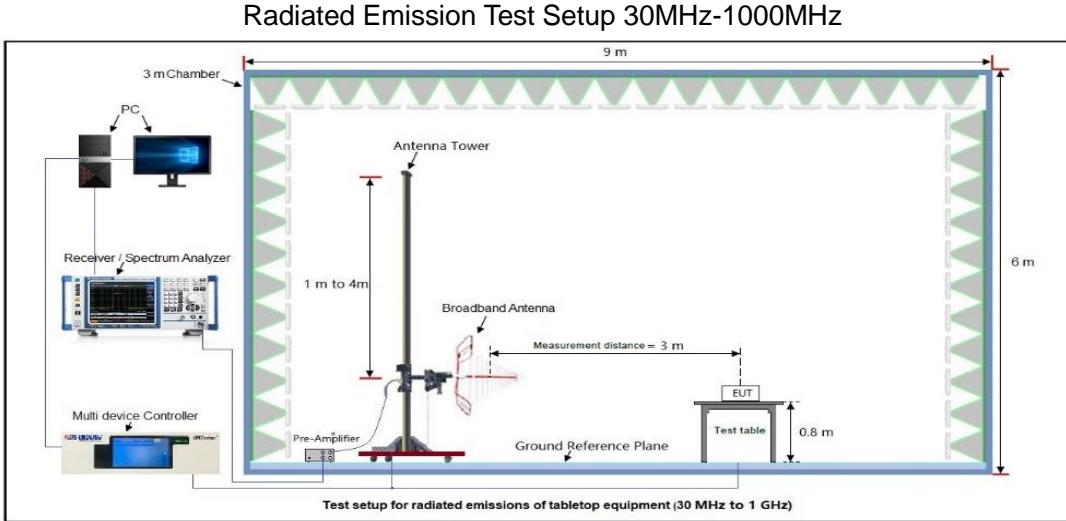
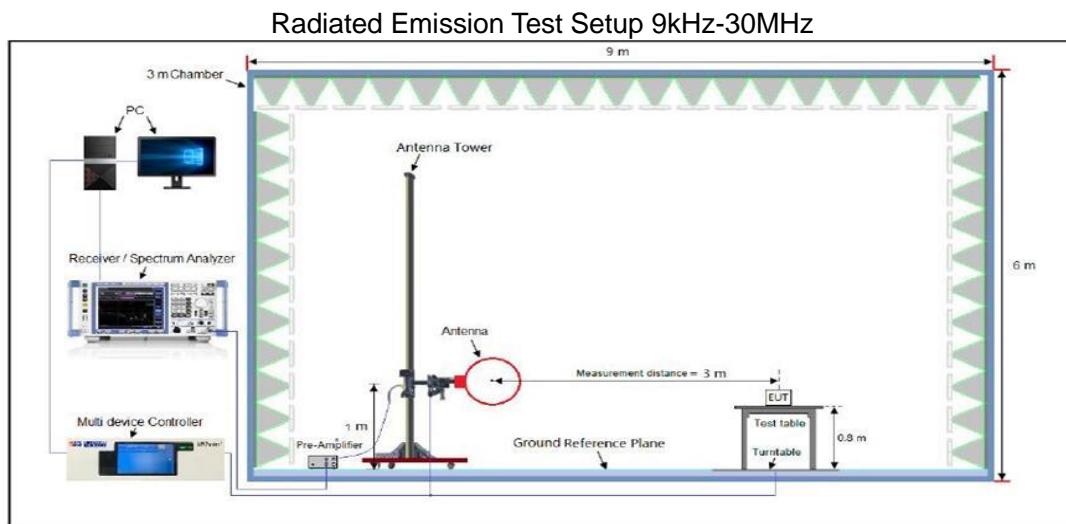
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### 11.3 Measurement Setup (Block Diagram of Configuration)



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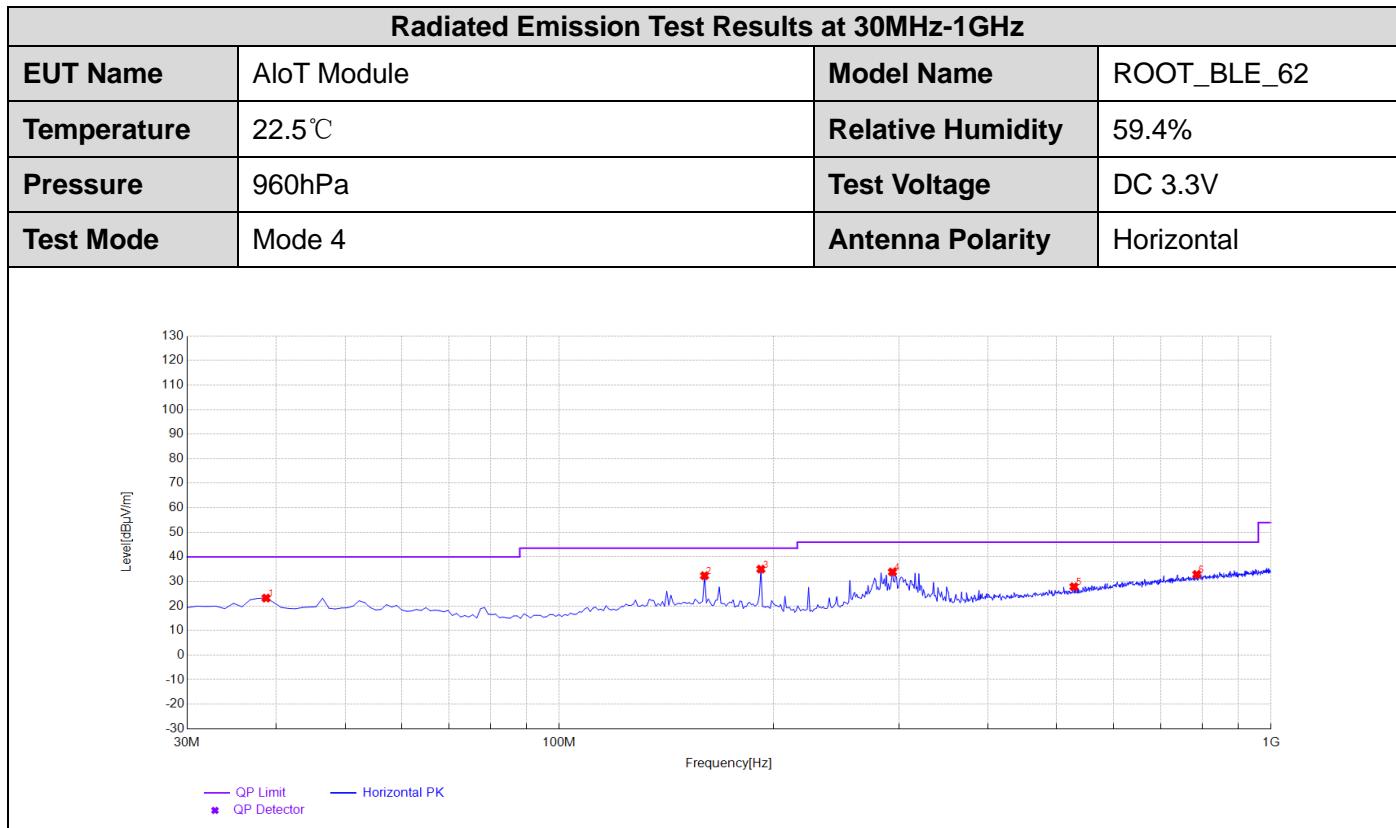
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## 11.4 Measurement Result

### Radiated Emission Below 30MHz

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.



### Final Data List

NO.	Freq. [MHz]	Level [dB $\mu$ V/m]	Factor [dB]	Limit [dB $\mu$ V/m]	Margin [dB]	Detector	Angle [°]	Polarity
1	38.73	23.20	14.47	40.00	16.80	Peak	237	Horizontal
2	159.98	32.33	15.45	43.50	11.17	Peak	358	Horizontal
3	191.99	35.01	12.62	43.50	8.49	Peak	345	Horizontal
4	293.84	33.85	15.73	46.00	12.15	Peak	270	Horizontal
5	528.58	27.85	21.64	46.00	18.15	Peak	224	Horizontal
6	786.6	32.84	26.88	46.00	13.16	Peak	125	Horizontal

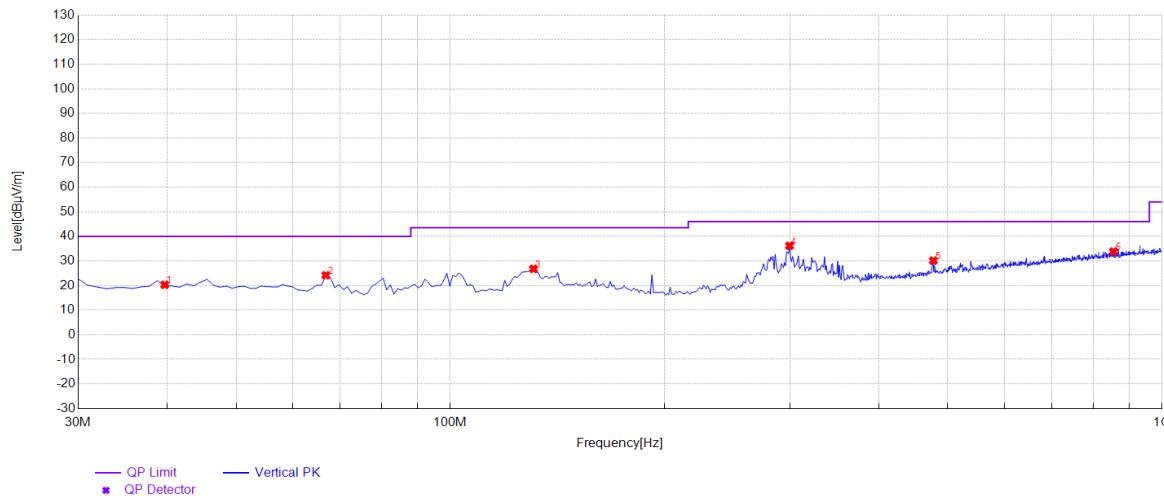
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Radiated Emission Test Results at 30MHz-1GHz			
EUT Name	AIoT Module	Model Name	ROOT_BLE_62
Temperature	22.5°C	Relative Humidity	59.4%
Pressure	960hPa	Test Voltage	DC 3.3V
Test Mode	Mode 4	Antenna Polarity	Vertical



#### Final Data List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Detector	Angle [°]	Polarity
1	39.7	20.30	14.52	40.00	19.70	Peak	360	Vertical
2	66.86	24.16	12.49	40.00	15.84	Peak	0	Vertical
3	130.88	26.78	14.43	43.50	16.72	Peak	353	Vertical
4	299.66	36.15	16.02	46.00	9.85	Peak	194	Vertical
5	477.17	30.13	20.49	46.00	15.87	Peak	359	Vertical
6	854.5	33.81	27.66	46.00	12.19	Peak	136	Vertical

#### RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss - Pre-amplifier, Margin= Limit-Level.

2. All test modes had been pre-tested. The mode 4 is the worst case and recorded in the report.

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 1	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4804.000	46.32	0.08	46.4	74	-27.6	peak
4804.000	37.94	0.08	38.02	54	-15.98	Avg
7206.000	42.58	2.21	44.79	74	-29.21	peak
7206.000	32.18	2.21	34.39	54	-19.61	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 1	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4804.000	48.51	0.08	48.59	74	-25.41	peak
4804.000	37.62	0.08	37.7	54	-16.3	Avg
7206.000	42.54	2.21	44.75	74	-29.25	peak
7206.000	32.38	2.21	34.59	54	-19.41	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## RESULT: PASS

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 2	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4880.000	46.84	0.14	46.98	74	-27.02	peak
4880.000	37.56	0.14	37.7	54	-16.3	Avg
7320.000	41.27	2.36	43.63	74	-30.37	peak
7320.000	32.65	2.36	35.01	54	-18.99	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 2	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4880.000	46.64	0.14	46.78	74	-27.22	peak
4880.000	37.28	0.14	37.42	54	-16.58	Avg
7320.000	42.41	2.36	44.77	74	-29.23	peak
7320.000	33.33	2.36	35.69	54	-18.31	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: Pass**

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 3	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960.000	46.47	0.22	46.69	74	-27.31	peak
4960.000	38.52	0.22	38.74	54	-15.26	Avg
7440.000	42.54	2.64	45.18	74	-28.82	peak
7440.000	33.68	2.64	36.32	54	-17.68	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 3	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960.000	45.32	0.22	45.54	74	-28.46	peak
4960.000	37.28	0.22	37.5	54	-16.5	Avg
7440.000	42.41	2.64	45.05	74	-28.95	peak
7440.000	32.61	2.64	35.25	54	-18.75	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 4	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4804.000	45.62	0.08	45.7	74	-28.3	peak
4804.000	38.74	0.08	38.82	54	-15.18	Avg
7206.000	42.45	2.21	44.66	74	-29.34	peak
7206.000	33.65	2.21	35.86	54	-18.14	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 4	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4804.000	47.81	0.08	47.89	74	-26.11	peak
4804.000	38.69	0.08	38.77	54	-15.23	Avg
7206.000	42.53	2.21	44.74	74	-29.26	peak
7206.000	33.84	2.21	36.05	54	-17.95	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## RESULT: PASS

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 5	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4880.000	46.93	0.14	47.07	74	-26.93	peak
4880.000	37.85	0.14	37.99	54	-16.01	Avg
7320.000	42.51	2.36	44.87	74	-29.13	peak
7320.000	33.46	2.36	35.82	54	-18.18	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 5	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4880.000	46.25	0.14	46.39	74	-27.61	peak
4880.000	37.84	0.14	37.98	54	-16.02	Avg
7320.000	42.36	2.36	44.72	74	-29.28	peak
7320.000	33.47	2.36	35.83	54	-18.17	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: Pass**

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 6	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960.000	46.58	0.22	46.8	74	-27.2	peak
4960.000	38.47	0.22	38.69	54	-15.31	Avg
7440.000	41.36	2.64	44	74	-30	peak
7440.000	32.15	2.64	34.79	54	-19.21	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 6	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960.000	46.69	0.22	46.91	74	-27.09	peak
4960.000	38.47	0.22	38.69	54	-15.31	Avg
7440.000	41.54	2.64	44.18	74	-29.82	peak
7440.000	31.74	2.64	34.38	54	-19.62	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 7	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4804.000	45.22	0.08	45.3	74	-28.7	peak
4804.000	38.41	0.08	38.49	54	-15.51	Avg
7206.000	41.48	2.21	43.69	74	-30.31	peak
7206.000	33.35	2.21	35.56	54	-18.44	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 7	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4804.000	47.3	0.08	47.38	74	-26.62	peak
4804.000	38.84	0.08	38.92	54	-15.08	Avg
7206.000	41.52	2.21	43.73	74	-30.27	peak
7206.000	31.69	2.21	33.9	54	-20.1	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## RESULT: PASS

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 8	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4880.000	46.25	0.14	46.39	74	-27.61	peak
4880.000	36.32	0.14	36.46	54	-17.54	Avg
7320.000	41.58	2.36	43.94	74	-30.06	peak
7320.000	32.46	2.36	34.82	54	-19.18	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 8	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4880.000	46.74	0.14	46.88	74	-27.12	peak
4880.000	37.51	0.14	37.65	54	-16.35	Avg
7320.000	42.36	2.36	44.72	74	-29.28	peak
7320.000	32.41	2.36	34.77	54	-19.23	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: Pass**

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 9	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960.000	45.85	0.22	46.07	74	-27.93	peak
4960.000	37.48	0.22	37.7	54	-16.3	Avg
7440.000	42.35	2.64	44.99	74	-29.01	peak
7440.000	33.65	2.64	36.29	54	-17.71	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 9	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960.000	47.25	0.22	47.47	74	-26.53	peak
4960.000	36.58	0.22	36.8	54	-17.2	Avg
7440.000	42.54	2.64	45.18	74	-28.82	peak
7440.000	32.81	2.64	35.45	54	-18.55	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 10	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4804.000	46.84	0.08	46.92	74	-27.08	peak
4804.000	38.52	0.08	38.6	54	-15.4	Avg
7206.000	42.12	2.21	44.33	74	-29.67	peak
7206.000	32.36	2.21	34.57	54	-19.43	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 10	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4804.000	47.84	0.08	47.92	74	-26.08	peak
4804.000	38.52	0.08	38.6	54	-15.4	Avg
7206.000	42.63	2.21	44.84	74	-29.16	peak
7206.000	32.21	2.21	34.42	54	-19.58	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## RESULT: PASS

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 11	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4880.000	45.84	0.14	45.98	74	-28.02	peak
4880.000	36.95	0.14	37.09	54	-16.91	Avg
7320.000	42.25	2.36	44.61	74	-29.39	peak
7320.000	32.41	2.36	34.77	54	-19.23	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 11	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4880.000	45.32	0.14	45.46	74	-28.54	peak
4880.000	36.95	0.14	37.09	54	-16.91	Avg
7320.000	41.52	2.36	43.88	74	-30.12	peak
7320.000	32.84	2.36	35.2	54	-18.8	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

**RESULT: Pass**

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## Radiated Emissions Test Results for Above 1GHz

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 12	<b>Antenna Polarity</b>	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960.000	46.25	0.22	46.47	74	-27.53	peak
4960.000	37.89	0.22	38.11	54	-15.89	Avg
7440.000	42.65	2.64	45.29	74	-28.71	peak
7440.000	31.42	2.64	34.06	54	-19.94	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

<b>EUT Name</b>	AIoT Module	<b>Model Name</b>	ROOT_BLE_62
<b>Temperature</b>	22.5°C	<b>Relative Humidity</b>	59.4%
<b>Pressure</b>	960hPa	<b>Test Voltage</b>	DC 3.3V
<b>Test Mode</b>	Mode 12	<b>Antenna Polarity</b>	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dB $\mu$ V)	(dB)	(dB $\mu$ V/m)	(dB $\mu$ V/m)	(dB)	
4960.000	44.28	0.22	44.5	74	-29.5	peak
4960.000	37.23	0.22	37.45	54	-16.55	Avg
7440.000	42.59	2.64	45.23	74	-28.77	peak
7440.000	32.61	2.64	35.25	54	-18.75	Avg

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

## RESULT: Pass

## Note:

1. The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.
2. Factor = Antenna Factor + Cable loss – Pre-amplifier gain, Margin =Emission Level-Limit.
3. The “Factor” value can be calculated automatically by software of measurement system.

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## Band Edge Emission Test Results for Restricted Bands

EUT Name	AloT Module			Model Name			ROOT_BLE_62		
Temperature	24.5°C			Relative Humidity			57.0%		
Pressure	960hPa			Test Voltage			DC 3.3V		

Bluetooth Tx CH00_2402 MHz_1Mbps										
Item (Mark)	Freq. MHz	Reading dB $\mu$ V	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Pol.
1	2390.00	44.60	29.99	30.21	8.35	52.725	74	21.28	Peak	Horizontal
2	2390.00	25.80	29.99	30.21	8.35	33.926	54	20.07	AV	Horizontal
3	2390.00	41.68	29.99	30.21	8.35	49.812	74	24.19	Peak	Vertical
4	2390.00	24.39	29.99	30.21	8.35	32.516	54	21.48	AV	Vertical
Bluetooth Tx CH39_2480 MHz_1Mbps										
Item (Mark)	Freq. MHz	Reading dB $\mu$ V	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Pol.
1	2483.50	54.32	30.25	30.25	8.5	62.816	74	11.18	Peak	Horizontal
2	2483.50	34.05	30.25	30.25	8.5	42.553	54	11.45	AV	Horizontal
3	2483.50	52.67	30.25	30.25	8.5	61.171	74	12.83	Peak	Vertical
4	2483.50	32.19	30.25	30.25	8.5	40.686	54	13.31	AV	Vertical

Bluetooth Tx CH00_2402 MHz_2Mbps										
Item (Mark)	Freq. MHz	Reading dB $\mu$ V	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Pol.
1	2390.00	46.00	29.99	30.21	8.35	54.13	74	19.87	Peak	Horizontal
2	2390.00	26.00	29.99	30.21	8.35	34.129	54	19.87	AV	Horizontal
3	2390.00	43.27	29.99	30.21	8.35	51.403	74	22.60	Peak	Vertical
4	2390.00	24.42	29.99	30.21	8.35	32.553	54	21.45	AV	Vertical
Bluetooth Tx CH39_2480 MHz_2Mbps										
Item (Mark)	Freq. MHz	Reading dB $\mu$ V	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Pol.
1	2483.50	54.42	30.25	30.25	8.5	62.921	74	11.08	Peak	Horizontal
2	2483.50	34.00	30.25	30.25	8.5	42.502	54	11.50	AV	Horizontal
3	2483.50	50.85	30.25	30.25	8.5	59.346	74	14.65	Peak	Vertical
4	2483.50	29.98	30.25	30.25	8.5	38.484	54	15.52	AV	Vertical

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Bluetooth Tx CH00_2402 MHz_125Kbps										
Item (Mark)	Freq. MHz	Reading dB $\mu$ V	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Pol.
1	2390.00	44.29	29.99	30.21	8.35	52.419	74	21.58	Peak	Horizontal
2	2390.00	26.60	29.99	30.21	8.35	34.734	54	19.27	AV	Horizontal
3	2390.00	40.27	29.99	30.21	8.35	48.396	74	25.60	Peak	Vertical
4	2390.00	21.95	29.99	30.21	8.35	30.076	54	23.92	AV	Vertical
Bluetooth Tx CH39_2480 MHz_125Kbps										
Item (Mark)	Freq. MHz	Reading dB $\mu$ V	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Pol.
1	2483.50	54.41	30.25	30.25	8.5	62.908	74	11.09	Peak	Horizontal
2	2483.50	34.08	30.25	30.25	8.5	42.576	54	11.42	AV	Horizontal
3	2483.50	51.10	30.25	30.25	8.5	59.597	74	14.40	Peak	Vertical
4	2483.50	30.75	30.25	30.25	8.5	39.254	54	14.75	AV	Vertical

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EUT Name	AloT Module			Model Name			ROOT_BLE_62		
Temperature	24.6°C			Relative Humidity			51.0%		
Pressure	960hPa			Test Voltage			DC 3.3V		

Bluetooth Tx CH00_2402 MHz_500Kbps										
Item (Mark)	Freq. MHz	Reading dB $\mu$ V	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Pol.
1	2390.00	44.64	29.99	30.21	8.35	52.766	74	21.23	Peak	Horizontal
2	2390.00	26.36	29.99	30.21	8.35	34.488	54	19.51	AV	Horizontal
3	2390.00	40.17	29.99	30.21	8.35	48.304	74	25.70	Peak	Vertical
4	2390.00	22.92	29.99	30.21	8.35	31.048	54	22.95	AV	Vertical
Bluetooth Tx CH39_2480 MHz_500Kbps										
Item (Mark)	Freq. MHz	Reading dB $\mu$ V	Ant. Fac. dB/m	PRM Factor dB	Cable Loss dB	Level dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Pol.
1	2483.50	53.94	30.25	30.25	8.5	62.443	74	11.56	Peak	Horizontal
2	2483.50	32.83	30.25	30.25	8.5	41.333	54	12.67	AV	Horizontal
3	2483.50	51.52	30.25	30.25	8.5	60.021	74	13.98	Peak	Vertical
4	2483.50	30.52	30.25	30.25	8.5	39.020	54	14.98	AV	Vertical

**Remark:**

1. Result Level = Read Level + Antenna Factor + Cable loss - PRM Factor.
2. The other emission levels were very low against the limit.
3. Margin = Limit - Emission Level.
4. The average measurement was not performed when the peak measured data under the limit of average detection.
5. Detector AV is setting spectrum/receiver. RBW=1MHz/VBW=3MHz/Sweep time=Auto/Detector=Average.

**RESULT: Pass**

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## 12. AC Power Line Conducted Emission Test

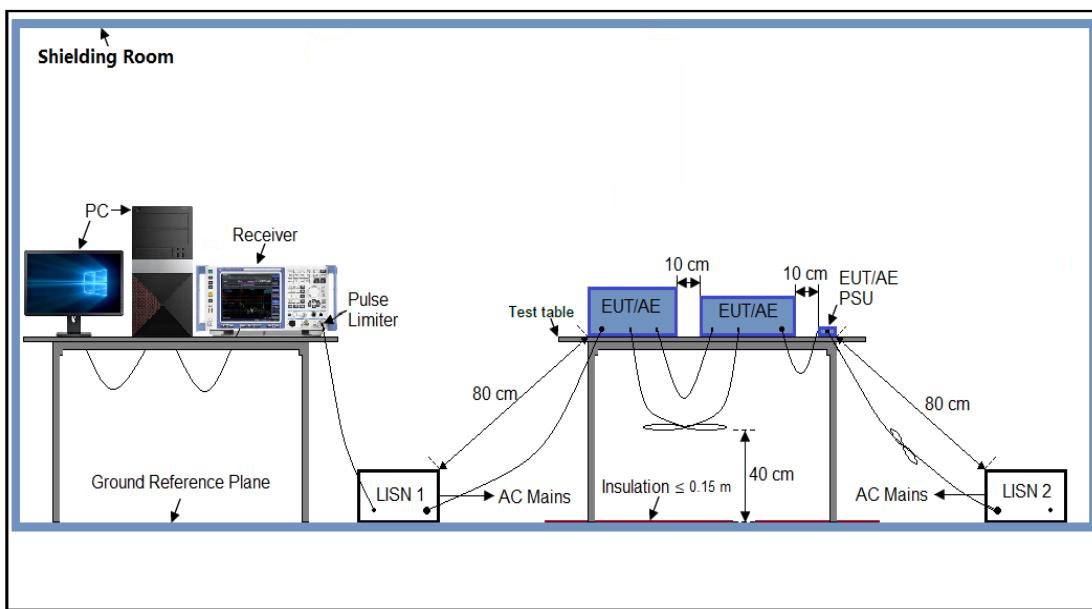
### 12.1 Measurement Limit

Frequency	Maximum RF Line Voltage	
	Q.P. (dB $\mu$ V)	Average (dB $\mu$ V)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

### 12.2 Measurement Setup (Block Diagram of Configuration)



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### 12.3 Preliminary Procedure of Line Conducted Emission Test

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received DC 3.3V power from PC which received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side).
7. Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
8. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
9. During the above scans, the emissions were maximized by cable manipulation.
10. The test mode(s) were scanned during the preliminary test.
11. Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

### 12.4 Final Procedure of Line Conducted Emission Test

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit.
3. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
4. The test data of the worst case condition(s) was reported on the Summary Data page.
5. A conducted emission is calculated by the following equation:
  - Measurement Level (dB $\mu$ V) = Receiver reading (dB $\mu$ V) + Transd (dB)
  - Transd (dB)= AMN Factor(dB)+Cable Loss(dB)+Attenuation(dB)
  - Margin= Limit-Level

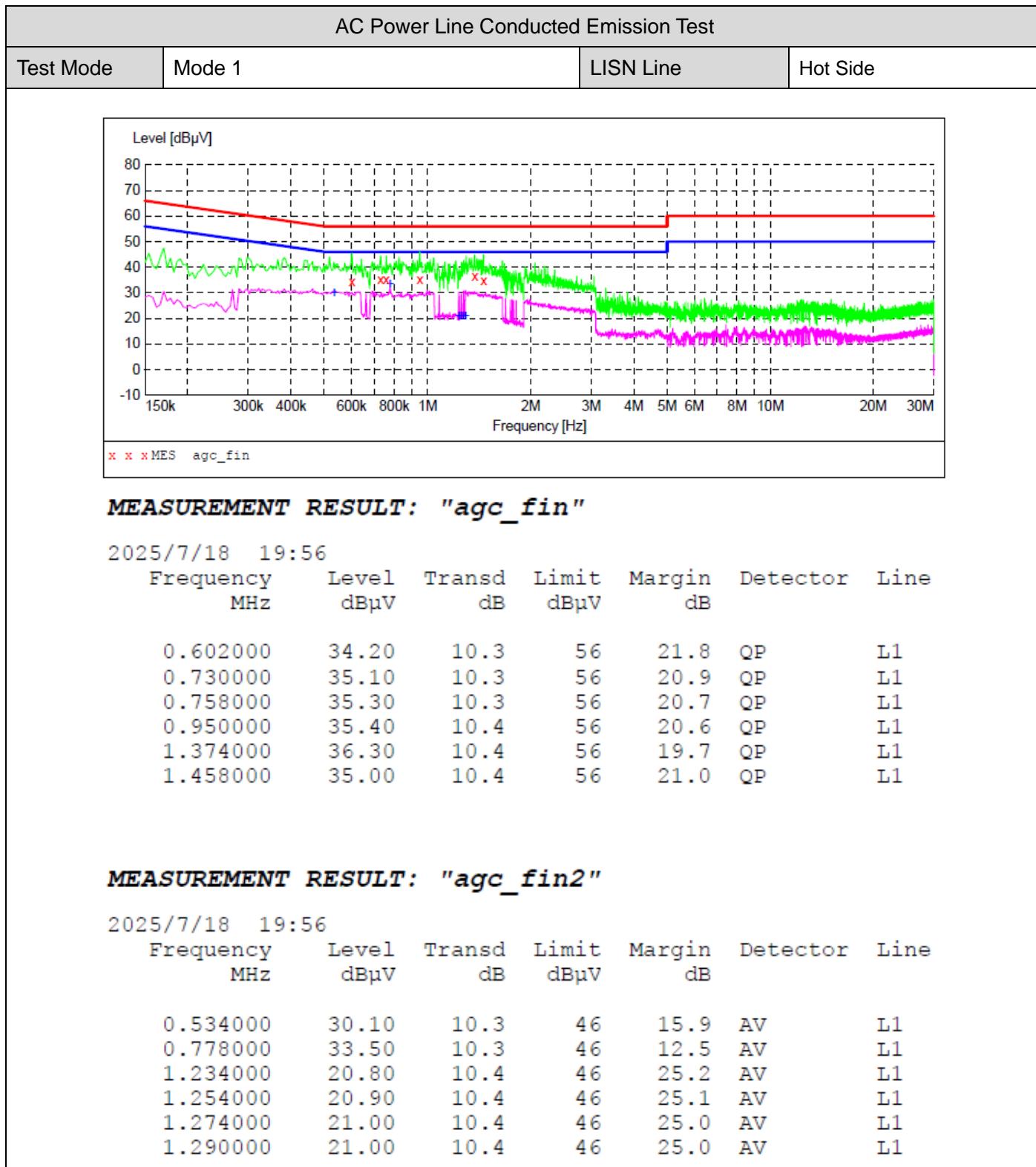
### 12.5 Measurement Result

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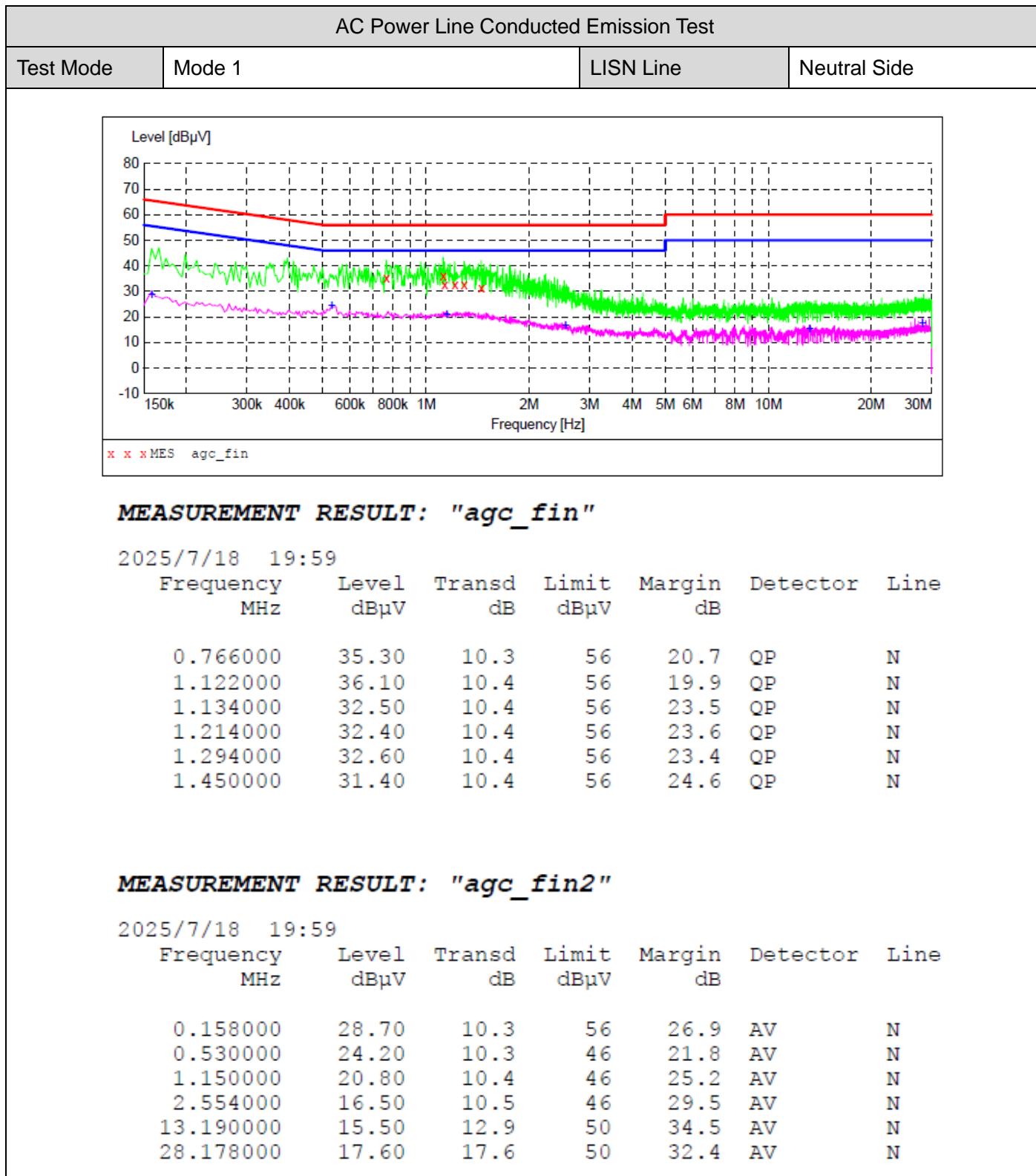
**RESULT: PASS**

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**RESULT: PASS**

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**Appendix I: Photographs of Test Setup**

Refer to the Report No.: AGC16786250701AP01

**Appendix II: Photographs of Test EUT**

Refer to the Report No.: AGC16786250701AP02

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2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
7. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract or warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

-----End of Report-----

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