



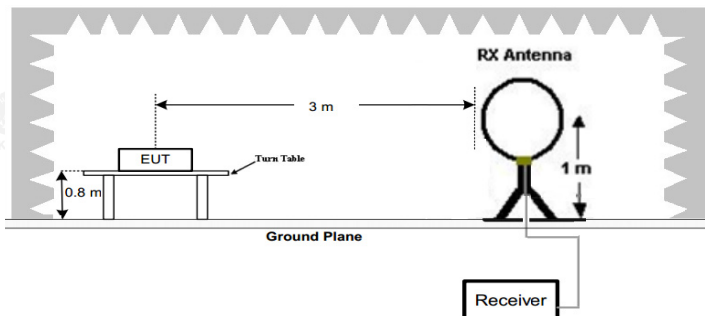
4.5 Spurious Emission

4.5.1 Test Specification

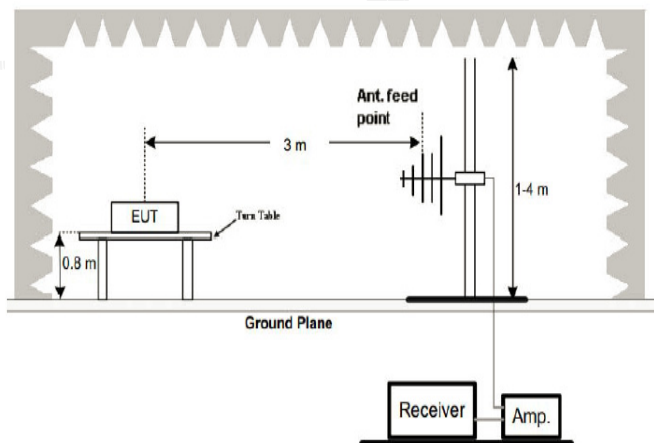
Test Requirement:	FCC CFR47 Part 15 Section 15.407				
Test Method:	KDB 789033 D02 v02r01				
Frequency Range:	9kHz to 40GHz				
Measurement Distance:	3 m				
Antenna Polarization:	Horizontal & Vertical				
Operation Mode:	Transmitting mode with modulation				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit:	(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz. (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. The limit of frequency below 1GHz and which fall in restricted bands should comply 15.209.				

Test Setup:

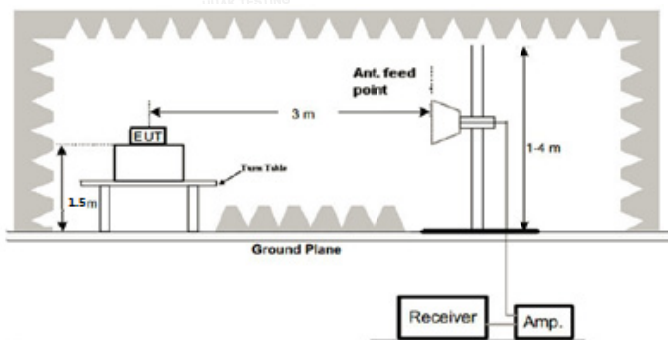
For radiated emissions below 30MHz



30MHz to 1GHz



Above 1GHz



Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test Results:	PASS

4.5.2 Test Instruments

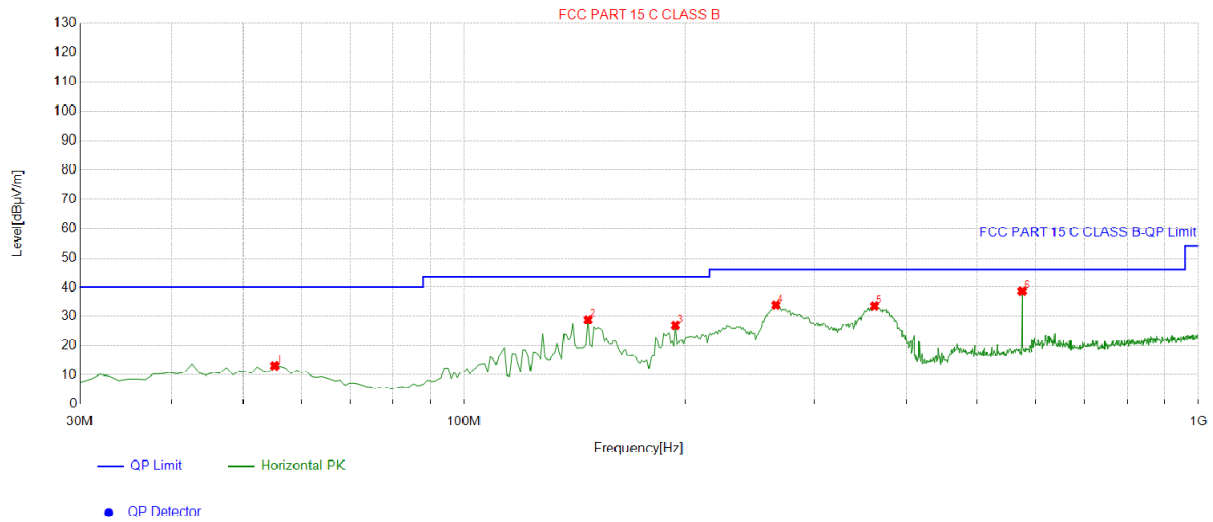
Radiated Emission Test Site (966)					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 06, 2026	Feb. 05, 2027
Spectrum analyzer	KEYSIGHT	N9020A	HKE-117	Feb. 06, 2026	Feb. 05, 2027
Spectrum analyzer	R&S	FSV3044	HKE-126	Feb. 06, 2026	Feb. 05, 2027
Preamplifier	Schwarzbeck	EMC051845SE	HKE-006	Feb. 04, 2026	Feb. 03, 2027
Preamplifier	Agilent	83051A	HKE-016	Feb. 04, 2026	Feb. 03, 2027
Preamplifier	QJD	QJD18-40-50	HKE-030	Feb. 05, 2026	Feb. 04, 2027
6dB Attenuator	Pasternack	6dB	HKE-007	Feb. 06, 2026	Feb. 05, 2027
EMI Test Receiver	R&S	ESR-7	HKE-010	Feb. 06, 2026	Feb. 05, 2027
Broadband Antenna	Schwarzbeck	VULB9168	HKE-167	Feb. 06, 2026	Feb. 05, 2028
Loop Antenna	COM-POWER	AL-130R	HKE-014	Feb. 06, 2026	Feb. 05, 2028
Horn Antenna	Schwarzbeck	9120D	HKE-013	Feb. 06, 2026	Feb. 05, 2028
Broadband Horn Antenna	A-INFO	LB-180400-KF	HKE-031	Feb. 06, 2026	Feb. 05, 2028
EMI Test Software	Tonscend	JS32-RE 5.0.0	HKE-082	/	/
RSE Test Software	Tonscend	JS36-RSE 5.0.0	HKE-184	/	/

4.5.3 Test Data

Below 1GHz Test Results

All the test modes completed for test. Only the worst result was reported as below:

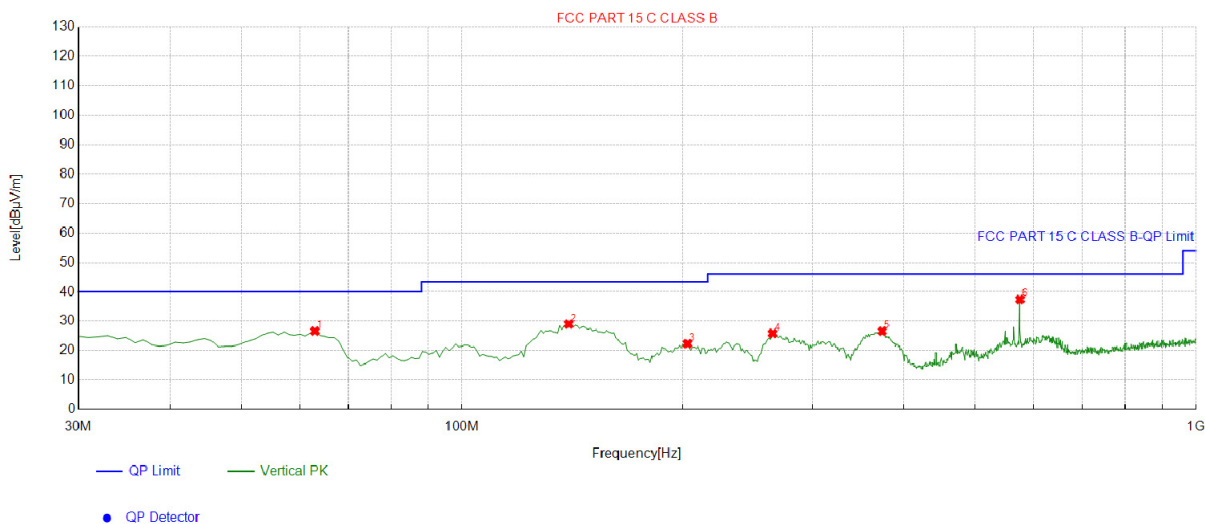
Antenna polarity: Horizontal



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	55.245	-13.35	26.55	13.20	40.00	26.80	100	235	Horizontal
2	147.487	-18.28	47.11	28.83	43.50	14.67	100	271	Horizontal
3	194.094	-15.02	41.97	26.95	43.50	16.55	100	289	Horizontal
4	265.946	-12.73	46.59	33.86	46.00	12.14	100	171	Horizontal
5	362.072	-10.51	44.07	33.56	46.00	12.44	100	167	Horizontal
6	575.686	-6.25	44.86	38.61	46.00	7.39	100	6	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

Antenna polarity: Vertical



Suspected List									
NO.	Freq. [MHz]	Factor [dB]	Reading [dBμV/m]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	63.013	-14.68	41.35	26.67	40.00	13.33	100	273	Vertical
2	139.720	-18.30	47.34	29.04	43.50	14.46	100	168	Vertical
3	202.833	-14.57	36.96	22.39	43.50	21.11	100	164	Vertical
4	264.975	-12.71	38.59	25.88	46.00	20.12	100	121	Vertical
5	373.724	-10.52	37.15	26.63	46.00	19.37	100	92	Vertical
6	575.686	-6.25	43.65	37.40	46.00	8.60	100	333	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

Harmonics and Spurious Emissions Frequency Range (9kHz-30MHz)

Frequency (MHz)	Level@3m (dBμV/m)	Limit@3m (dBμV/m)
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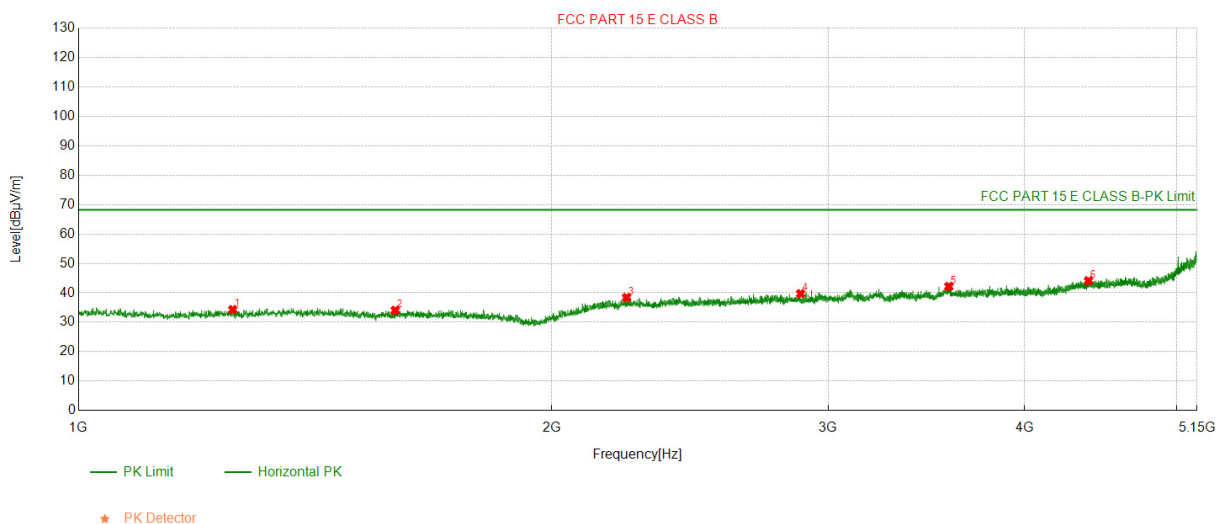
Note: 1. Emission Level=Reading+ Cable loss-Antenna factor-Amp factor.
2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement.

Above 1GHz Test Results

All the test modes completed for test. Only the worst result was reported as below:

For 1GHz to 5.15GHz

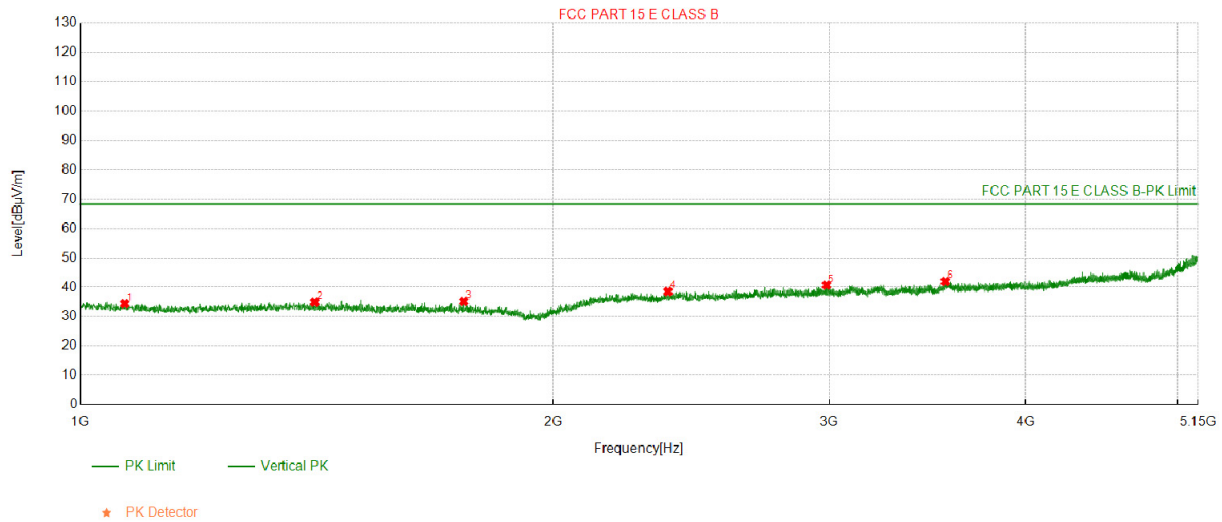
Antenna polarity: Horizontal



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1253.590	52.88	34.29	-18.59	68.20	33.91	150	239	Horizontal
2	1590.604	52.63	34.05	-18.58	68.20	34.15	150	325	Horizontal
3	2232.258	53.13	38.38	-14.75	68.20	29.82	150	184	Horizontal
4	2880.968	53.10	39.72	-13.38	68.20	28.48	150	12	Horizontal
5	3579.898	53.12	42.17	-10.95	68.20	26.03	150	198	Horizontal
6	4392.549	52.03	44.09	-7.94	68.20	24.11	150	212	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

Antenna polarity: Vertical



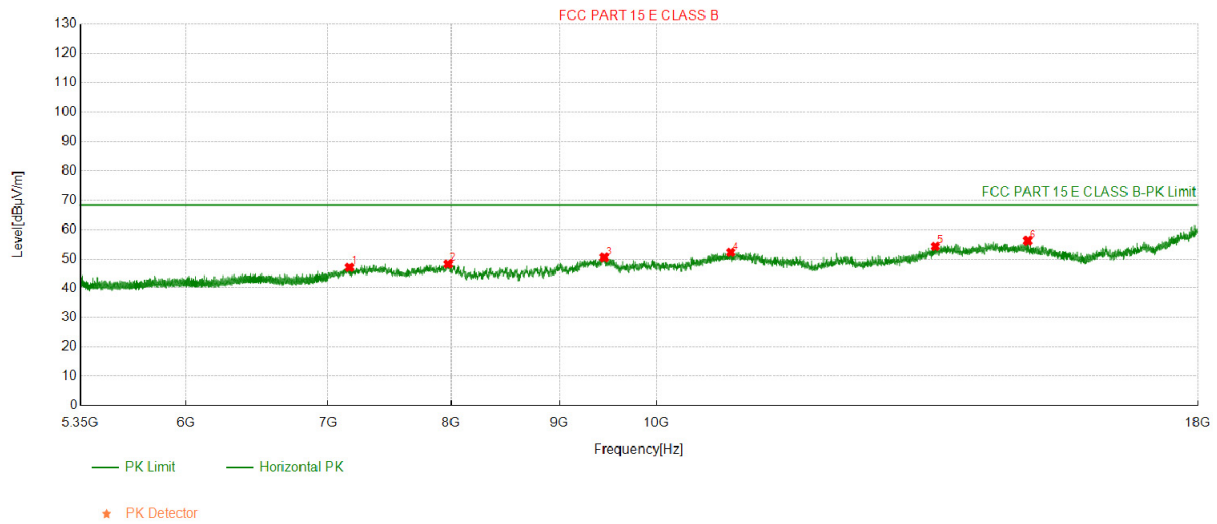
Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	1067.237	53.17	34.37	-18.80	68.20	33.83	150	121	Vertical
2	1410.061	52.96	34.90	-18.06	68.20	33.30	150	170	Vertical
3	1754.960	53.30	35.15	-18.15	68.20	33.05	150	0	Vertical
4	2367.562	53.09	38.53	-14.56	68.20	29.67	150	47	Vertical
5	2986.804	53.54	40.72	-12.82	68.20	27.48	150	52	Vertical
6	3555.411	53.22	41.97	-11.25	68.20	26.23	150	353	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



For 5.35GHz to 18GHz

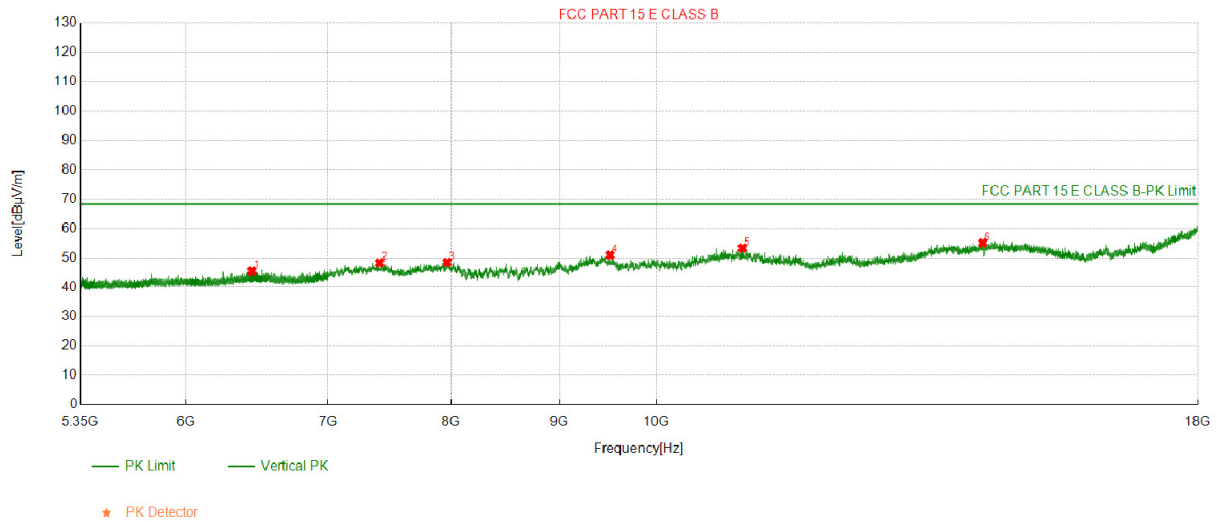
Antenna polarity: Horizontal



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	7165.017	50.46	47.15	-3.31	68.20	21.05	150	149	Horizontal
2	7974.697	50.27	48.29	-1.98	68.20	19.91	150	335	Horizontal
3	9447.745	50.30	50.51	0.21	68.20	17.69	150	116	Horizontal
4	10839.384	49.95	52.19	2.24	68.20	16.01	150	55	Horizontal
5	13536.854	48.77	54.29	5.52	68.20	13.91	150	294	Horizontal
6	14963.696	49.44	56.17	6.73	68.20	12.03	150	135	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

Antenna polarity: Vertical



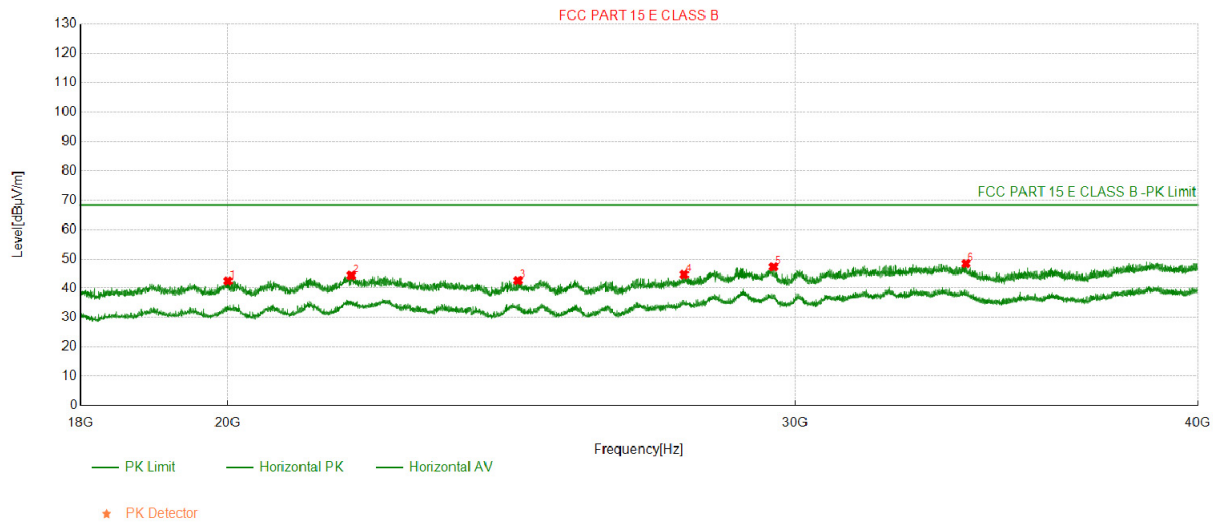
Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	6445.050	52.18	45.51	-6.67	68.20	22.69	150	12	Vertical
2	7403.740	51.34	48.28	-3.06	68.20	19.92	150	358	Vertical
3	7965.897	50.56	48.47	-2.09	68.20	19.73	150	84	Vertical
4	9507.151	50.51	50.95	0.44	68.20	17.25	150	34	Vertical
5	10976.898	50.59	53.32	2.73	68.20	14.88	150	115	Vertical
6	14248.625	47.96	55.08	7.12	68.20	13.12	150	307	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level



For 18GHz to 40GHz

Antenna polarity: Horizontal

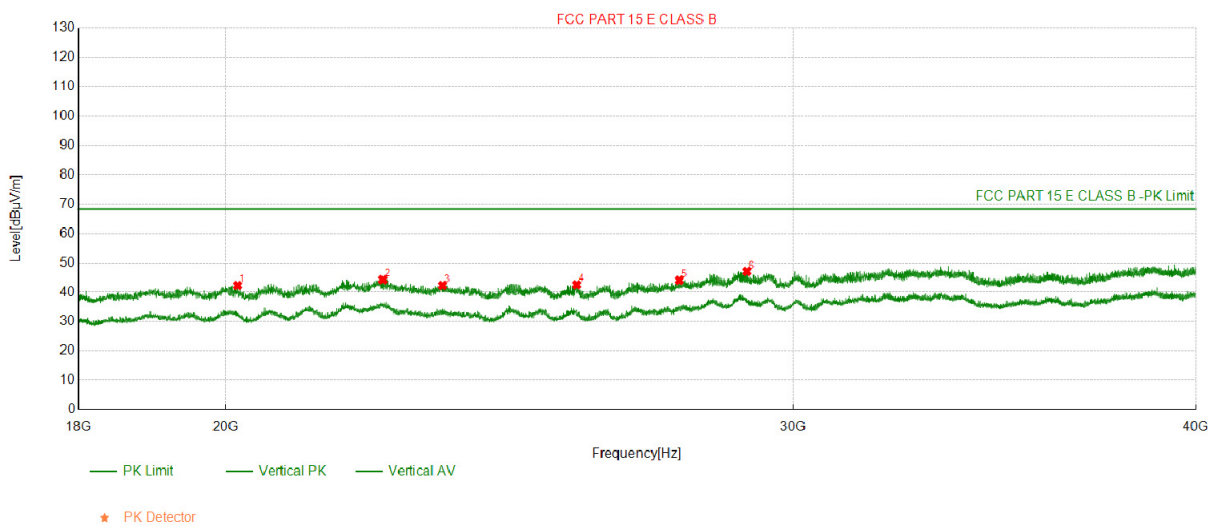


Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	20002.200	36.29	42.50	6.21	68.20	25.70	150	330	Horizontal
2	21843.784	38.75	44.35	5.60	68.20	23.85	150	150	Horizontal
3	24607.261	36.79	42.66	5.87	68.20	25.54	150	270	Horizontal
4	27709.571	36.30	44.68	8.38	68.20	23.52	150	130	Horizontal
5	29535.754	38.39	47.30	8.91	68.20	20.90	150	150	Horizontal
6	33889.989	37.44	48.43	10.99	68.20	19.77	150	290	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

Antenna polarity: Vertical

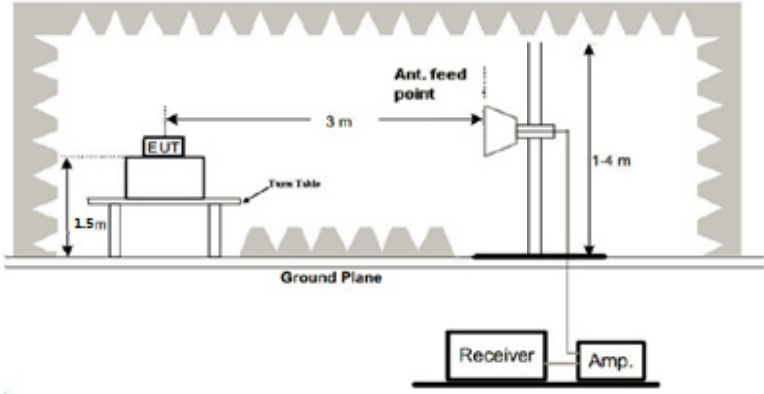


Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	20167.217	36.22	42.32	6.10	68.20	25.88	150	230	Vertical
2	22374.037	38.60	44.29	5.69	68.20	23.91	150	170	Vertical
3	23348.735	36.65	42.32	5.67	68.20	25.88	150	70	Vertical
4	25698.570	36.35	42.56	6.21	68.20	25.64	150	100	Vertical
5	27654.565	35.76	44.09	8.33	68.20	24.11	150	170	Vertical
6	29023.102	38.06	47.08	9.02	68.20	21.12	150	340	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

4.6 Band Edge

4.6.1 Test Specification

Test Requirement:	FCC CFR47 Part 15E Section 15.407
Test Method:	ANSI C63.10: 2020
Limit:	For band I&II&III: $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 68.2 \text{ dB}\mu\text{V}/\text{m}$, for $\text{EIRP}(\text{dBm}) = -27\text{dBm}$ For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of $-27 \text{ dBm}/\text{MHz}$ at 75 MHz or more above or below the band edge increasing linearly to $10 \text{ dBm}/\text{MHz}$ at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of $15.6 \text{ dBm}/\text{MHz}$ at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of $27 \text{ dBm}/\text{MHz}$ at the band edge. For band IV(5715-5725MHz&5850-5860MHz): $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 78.2 \text{ dB}\mu\text{V}/\text{m}$, for $\text{EIRP}(\text{dBm}) = -27\text{dBm}$; For band IV(other un-restricted band): $E[\text{dB}\mu\text{V}/\text{m}] = \text{EIRP}[\text{dBm}] + 95.2 = 68.2 \text{ dB}\mu\text{V}/\text{m}$, for $\text{EIRP}(\text{dBm}) = -27\text{dBm}$
Test Setup:	 The diagram illustrates the test setup. An Equipment Under Test (EUT) is placed on a turn table at a height of 1.5m. An antenna feed point is positioned 3m away from the EUT. The antenna is mounted on a vertical stand with a height of 1-4m. The entire setup is on a ground plane. A receiver and an amplifier are connected to the antenna feed point.
Test Mode:	Transmitting mode with modulation

Test Procedure:	1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi peak or average method as specified and then reported in a data sheet.
Test Result:	PASS

4.6.2 Test Instruments

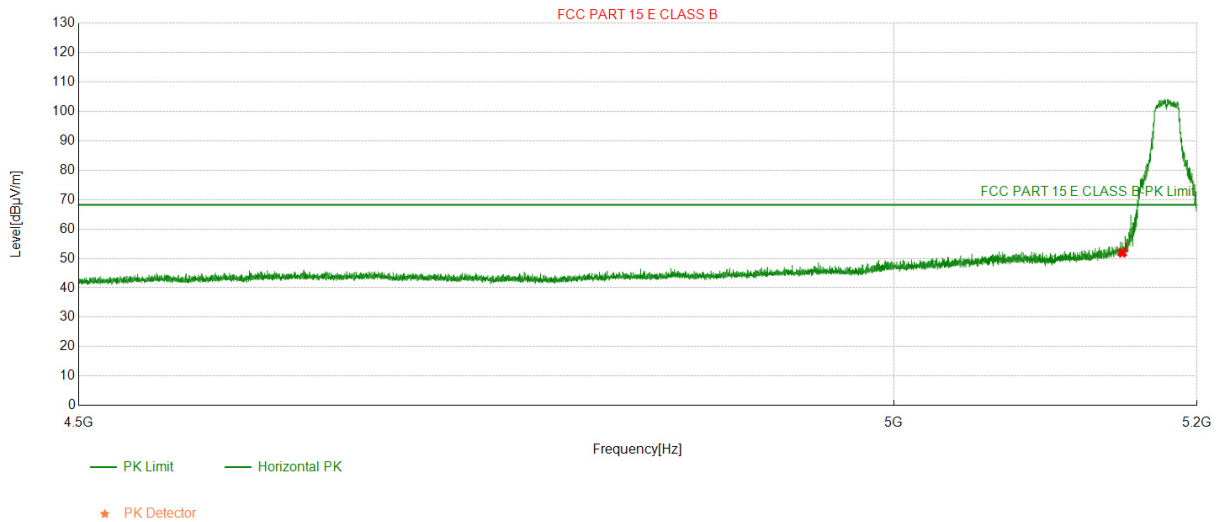
Radiated Emission Test Site (966)					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 06, 2026	Feb. 05, 2027
Spectrum analyzer	KEYSIGHT	N9020A	HKE-117	Feb. 06, 2026	Feb. 05, 2027
Spectrum analyzer	R&S	FSV3044	HKE-126	Feb. 06, 2026	Feb. 05, 2027
Preamplifier	Schwarzbeck	EMC051845SE	HKE-006	Feb. 04, 2026	Feb. 03, 2027
Preamplifier	Agilent	83051A	HKE-016	Feb. 04, 2026	Feb. 03, 2027
Preamplifier	QJD	QJD18-40-50	HKE-030	Feb. 05, 2026	Feb. 04, 2027
6dB Attenuator	Pasternack	6dB	HKE-007	Feb. 06, 2026	Feb. 05, 2027
EMI Test Receiver	R&S	ESR-7	HKE-010	Feb. 06, 2026	Feb. 05, 2027
Broadband Antenna	Schwarzbeck	VULB9168	HKE-167	Feb. 06, 2026	Feb. 05, 2028
Loop Antenna	COM-POWER	AL-130R	HKE-014	Feb. 06, 2026	Feb. 05, 2028
Horn Antenna	Schwarzbeck	9120D	HKE-013	Feb. 06, 2026	Feb. 05, 2028
Broadband Horn Antenna	A-INFO	LB-180400-KF	HKE-031	Feb. 06, 2026	Feb. 05, 2028
EMI Test Software	Tonscend	JS32-RE 5.0.0	HKE-082	/	/
RSE Test Software	Tonscend	JS36-RSE 5.0.0	HKE-184	/	/

4.6.3 Test Data

All the test modes completed for test. Only the worst result was reported as below:

802.11n(HT20)-5180

Antenna polarity: Horizontal

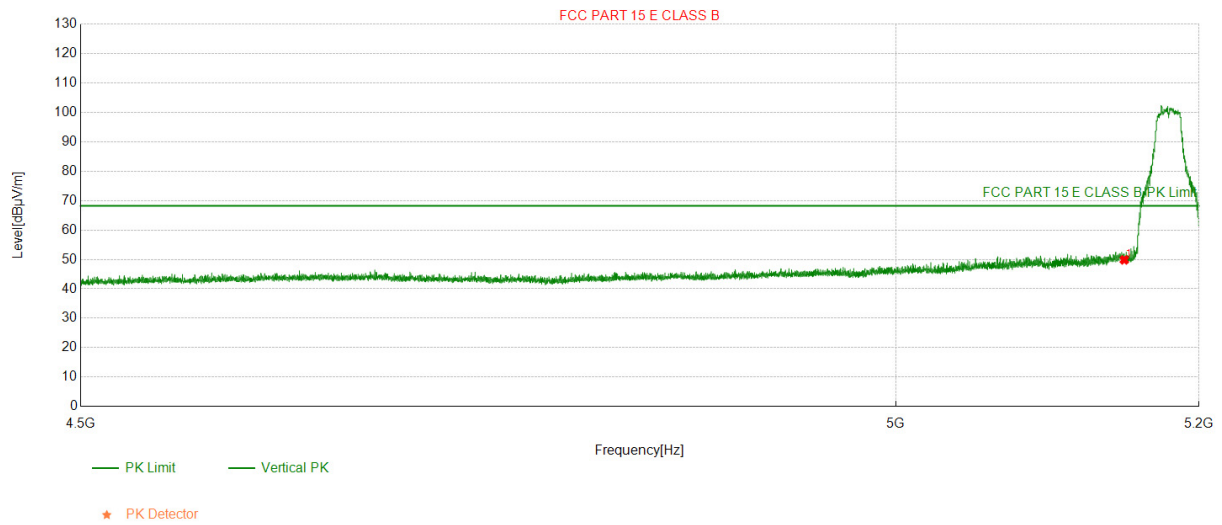


Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5150.000	56.20	51.92	-4.28	68.20	16.28	150	264	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

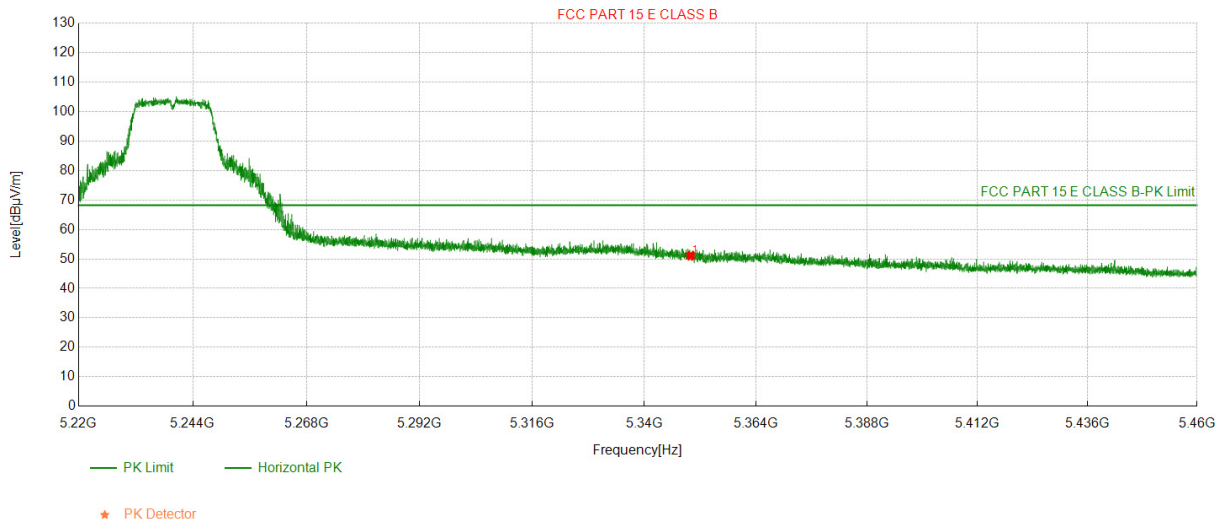
Antenna polarity: Vertical



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5150.000	54.13	49.85	-4.28	68.20	18.35	150	26	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

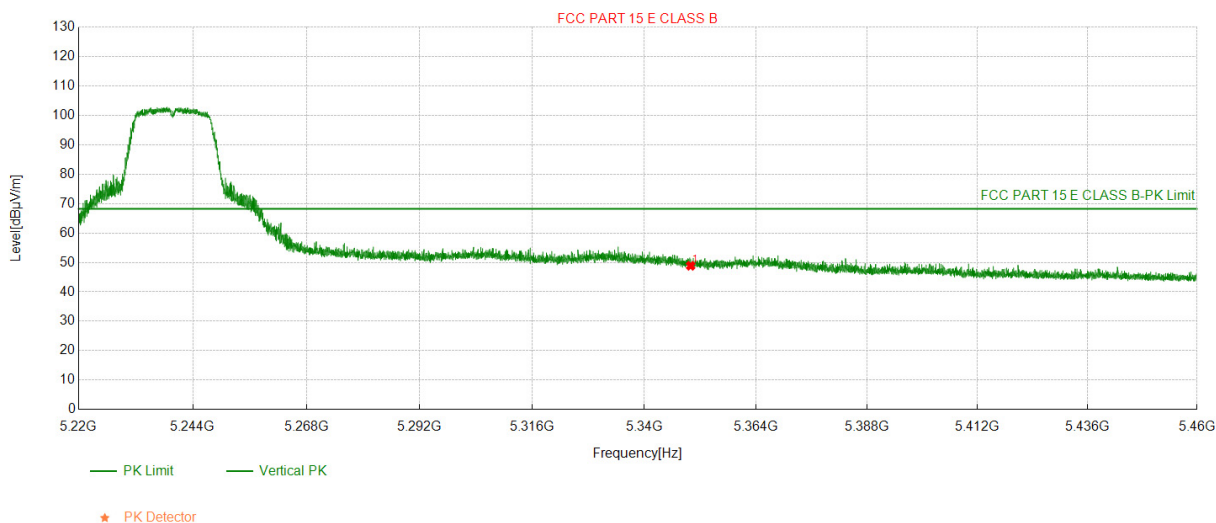
802.11n(HT20)-5240
Antenna polarity: Horizontal



Suspected Data List									
NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5350.000	56.23	51.09	-5.14	68.20	17.11	150	294	Horizontal

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

Antenna polarity: Vertical



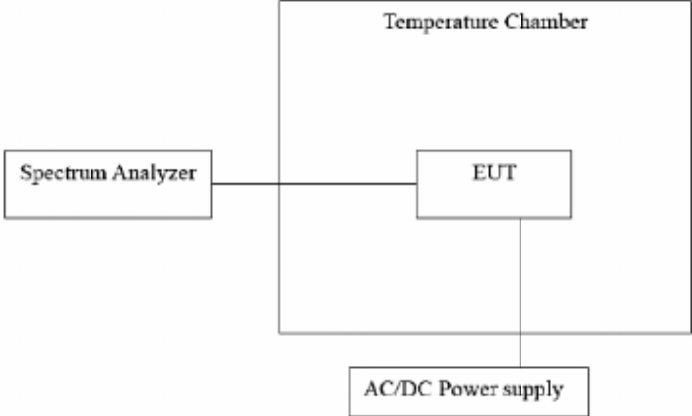
Suspected Data List

NO.	Freq. [MHz]	Reading [dBμV/m]	PK Level [dBμV/m]	Factor [dB]	PK Limit [dBμV/m]	PK Margin [dB]	Height [cm]	Angle [°]	Polarity
1	5350.000	54.00	48.86	-5.14	68.20	19.34	150	358	Vertical

Remark: Factor = Cable loss + Antenna factor + Attenuator – Preamplifier; Level = Reading + Factor; Margin = Limit – Level

4.7 Frequency Stability Measurement

4.7.1 Test Specification

Test Requirement:	FCC Part15 Section 15.407(g)
Test Method:	ANSI C63.10: 2020
Limit:	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 35 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.
Test Setup:	 <pre> graph LR SA[Spectrum Analyzer] --- EUT[EUT] subgraph TC [Temperature Chamber] EUT end EUT --- P[AC/DC Power supply] </pre>
Test Procedure:	a. The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
Test Result:	PASS
Remark:	N/A

4.7.2 Test Instruments

RF Test Room

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Spectrum analyzer	Agilent	N9020A	HKE-025	Feb. 06, 2026	Feb. 05, 2027
Spectrum analyzer	KEYSIGHT	N9020A	HKE-117	Feb. 06, 2026	Feb. 05, 2027
Power meter	KEYSIGHT	E4419B	HKE-144	Feb. 06, 2026	Feb. 05, 2027
Power Sensor	Agilent	E9304A H18	HKE-165	Feb. 06, 2026	Feb. 05, 2027
RF cable	Times	1-40G	N/A	Feb. 06, 2026	Feb. 05, 2027
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Feb. 06, 2026	Feb. 05, 2027
RF Test Software	Tonscend	JS1120-3 Version 3.5.39	HKE-083	/	/

Note: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).

4.7.3 Test Result

Mode	Voltage (V)	FHL (5180MHz)	Deviation (KHz)	FHH (5240MHz)	Deviation (KHz)
5.2G Band	12.75	5179.997	-3	5179.978	-22
	15.00	5179.986	-14	5180.029	29
	17.25	5179.989	-11	5179.973	-27

Mode	Temperature (°C)	FHL (5180MHz)	Deviation (KHz)	FHH (5240MHz)	Deviation (KHz)
5.2G Band	-30	5179.982	-18	5240.002	2
	-20	5179.995	-5	5239.971	-29
	-10	5179.998	-2	5239.984	-16
	0	5180.036	36	5239.969	-31
	10	5179.969	-31	5239.965	-35
	20	5179.998	-2	5240.023	23
	30	5180.019	19	5239.979	-21
	40	5179.971	-29	5239.982	-18
	50	5179.989	-11	5240.027	27

4.8 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, 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.

Refer to statement below for compliance.

The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

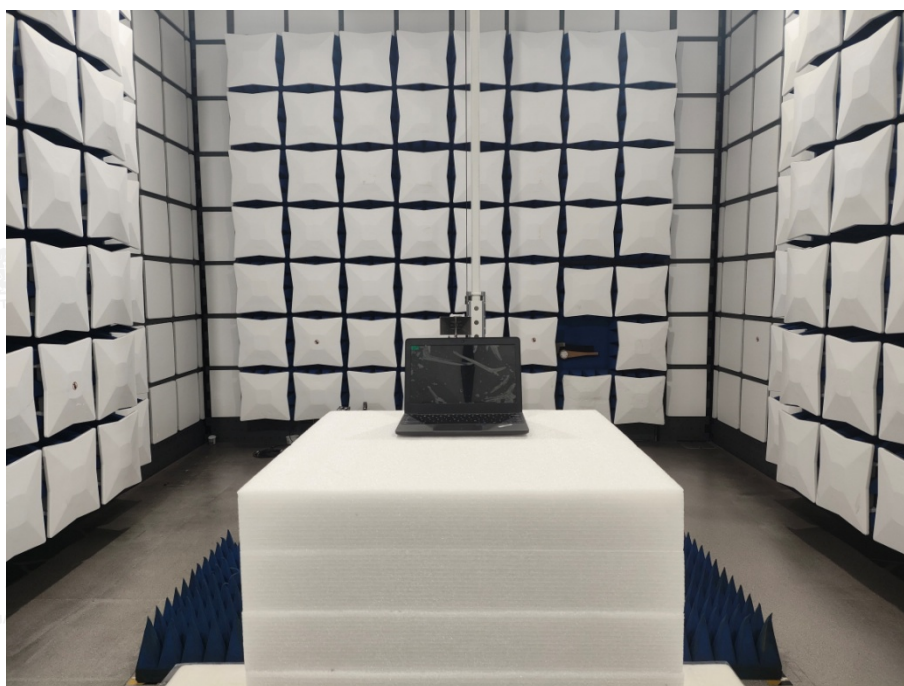
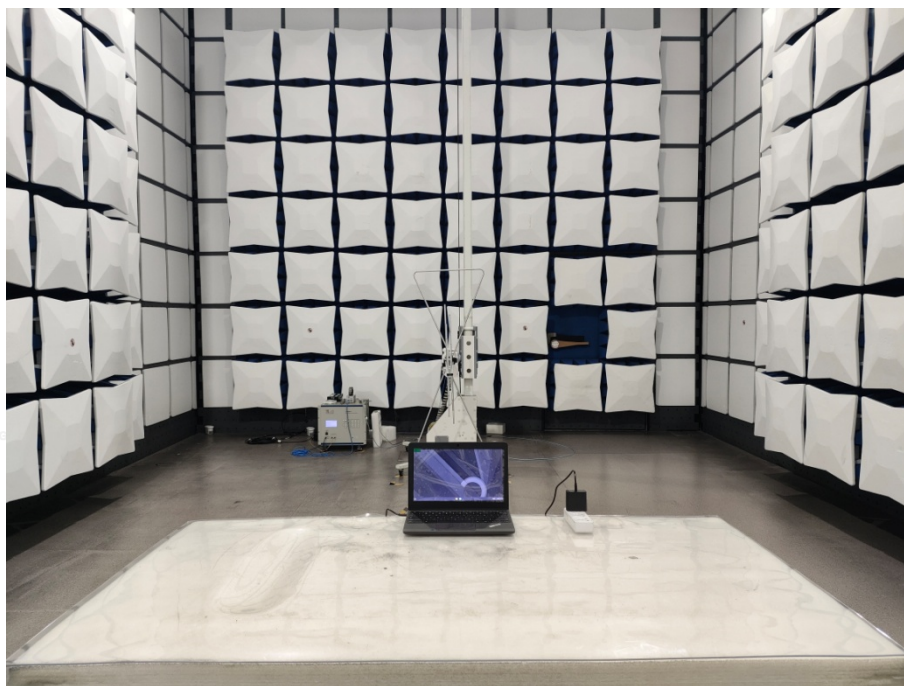
The antenna used in this product is a FPC antenna, need professional installation, not easy to remove. It conforms to the standard requirements. And the best case gain of the antenna is Antenna port 1: 1.11dBi and Antenna port 2: 1.55dBi.

WIFI Antenna



5. Test Setup Photos of the EUT

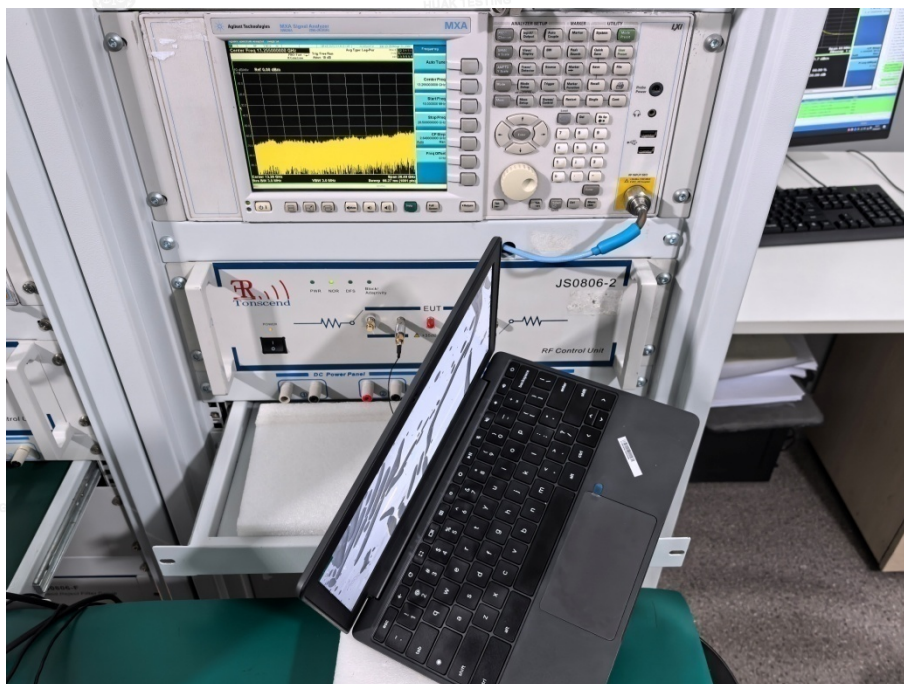
Radiated Emission



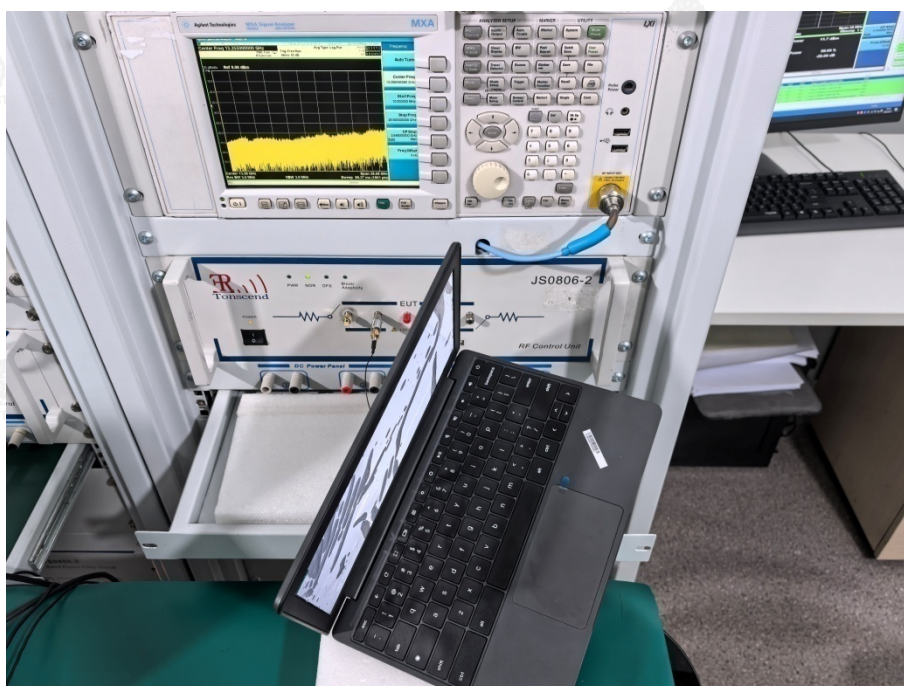
AC Conducted Emission



RF Conducted Emission ANT 1



ANT 2



6. Photos of the EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos

-----End of test report-----