

Top Victory Electronics (Taiwan) Co. Ltd.

TEST REPORT

Model:

TAG1001R-04, TAG1001****

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Radio Spectrum TEST REPORT

Applicant:	Top Victory Electronics (Taiwan) Co. Ltd. 10F., No. 230, Liancheng Rd., Zhonghe Dist., New Taipei City 23553, Taiwan
Product:	Home Monitoring Platform
Model No.:	TAG1001R-04, TAG1001****
FCC ID:	ARS-TAG1001
Test Method/ Standard:	47 CFR FCC Part 15.249 & ANSI C63.10 2013
Test By:	Intertek Testing Services Taiwan Ltd., Hsinchu Laboratory No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li, Shiang-Shan District, Hsinchu City, Taiwan



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Revision History

Report No.	Issue Date	Revision Summary
221100108THC-001	Dec. 20, 2022	Original report

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Summary of Tests

Test	Reference	Results
20dB Bandwidth	15.215(c)	Pass
Radiated Emission test	15.249(c), 15.209	Pass
Emission on the Band Edge	15.249(d)	Pass
Conducted Emission of AC Power	15.207	N/A
Antenna Requirement	15.203	Pass

Note: Please note that the test results with statement of conformity, the decision rules which are based on: Safety Testing: the specification, standard or IEC Guide 115.

Other Testing: the specification, standard and not taking into account the measurement uncertainty.

1. General Information

1.1 Identification of the EUT

Product:	Home Monitoring Platform
Model No.:	TAG1001R-04
Operating Frequency:	915 MHz
Channel Number:	1 channel
Rated Power:	DC 3.3 V
Power Cord:	N/A
Sample receiving date:	2022/11/07
Sample condition:	Workable
Test Date(s):	2022/11/22 ~ 2022/12/07

1.2 Additional information about the EUT

The customer confirmed TAG1001**** is a series model to TAG1001R-04 (EUT), the different model numbers are served as marketing strategy.

Explanation of model designation TAG1001****:

The customer confirmed the "*" can be any alphanumeric character including blank, for marketing differences.

1.3 Antenna description

Antenna Type: Chip Antenna

Connector Type: Fixed

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

TX mode: EUT use 「SmartRF Studio 7 v2.27.0」 to transmit.

The signal is maximized through rotation and placement in the three orthogonal axes.



X axis

Y axis

Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at X axis. The final test data was executed under this configuration.

Mode	Frequency (MHz)	Signal on time(ms)	Signal on & off time(ms)	Duty cycle	Duty Cycle factor
GFSK	915	100	100	1.000	0.000

TEST REPORT**3. 20dB Bandwidth test****3.1 Operating environment**

Temperature:	21	°C
Relative Humidity:	58	%
Test date:	2022/12/07	

3.2 Test setup & procedure

Step 1: The 20dB bandwidth was measured using a 50 ohm spectrum analyzer

Step 2: The span range for the SA display shall be between two times and five times the OBW.

Step 3: The nominal IF filter bandwidth (3 dB RBW) should be approximately 1 % to 5 % of the OBW, unless otherwise specified, depending on the applicable requirement.

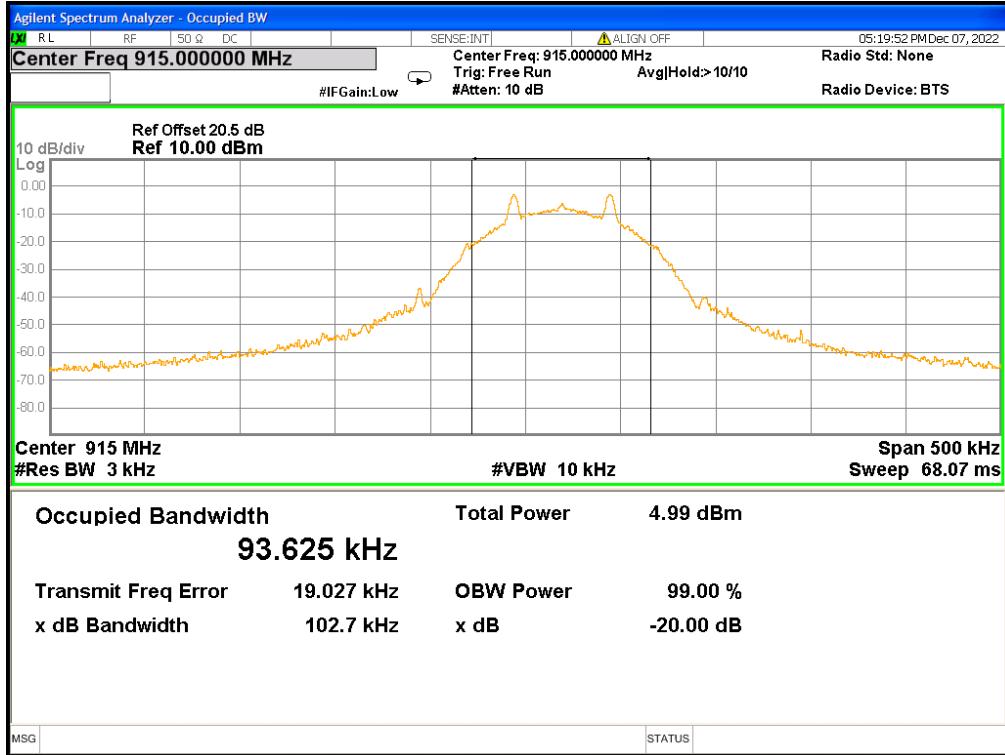
Step 4: The test was performed at 1 channel. The maximum 20dB modulation bandwidth is in the following Table.

3.3 Measured data of modulated bandwidth test results

Mode	Frequency (MHz)	20dB Occupied Bandwidth (MHz)
GFSK	915	0.1207

Please see the plot below.

20dB Bandwidth @ 915MHz



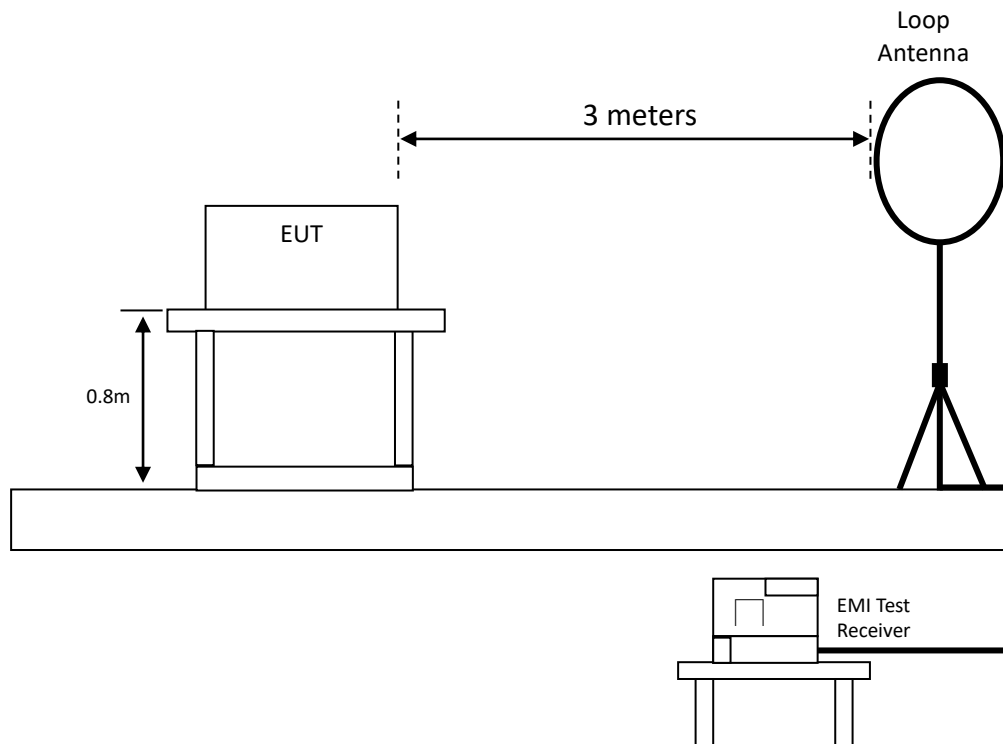
4. Radiated emission test FCC 15.249 (C)

4.1 Operating environment

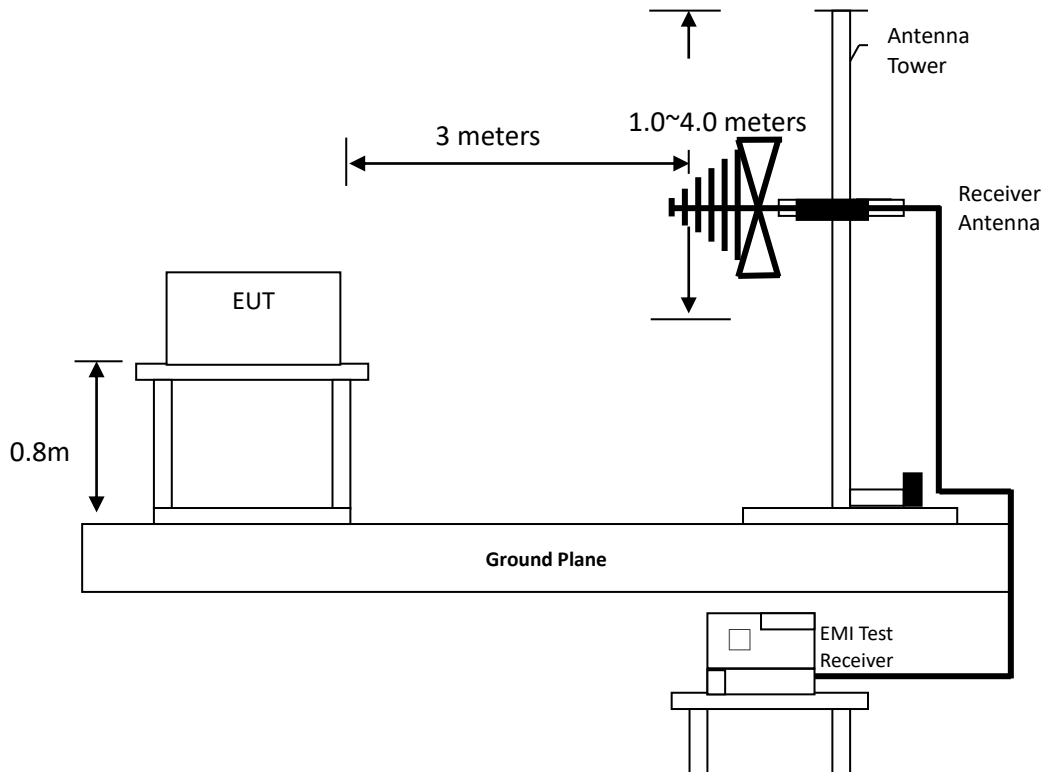
Temperature:	23	°C
Relative Humidity:	64	%
Atmospheric Pressure:	2022/11/22 ~ 2022/11/25	

4.2 Test setup & procedure

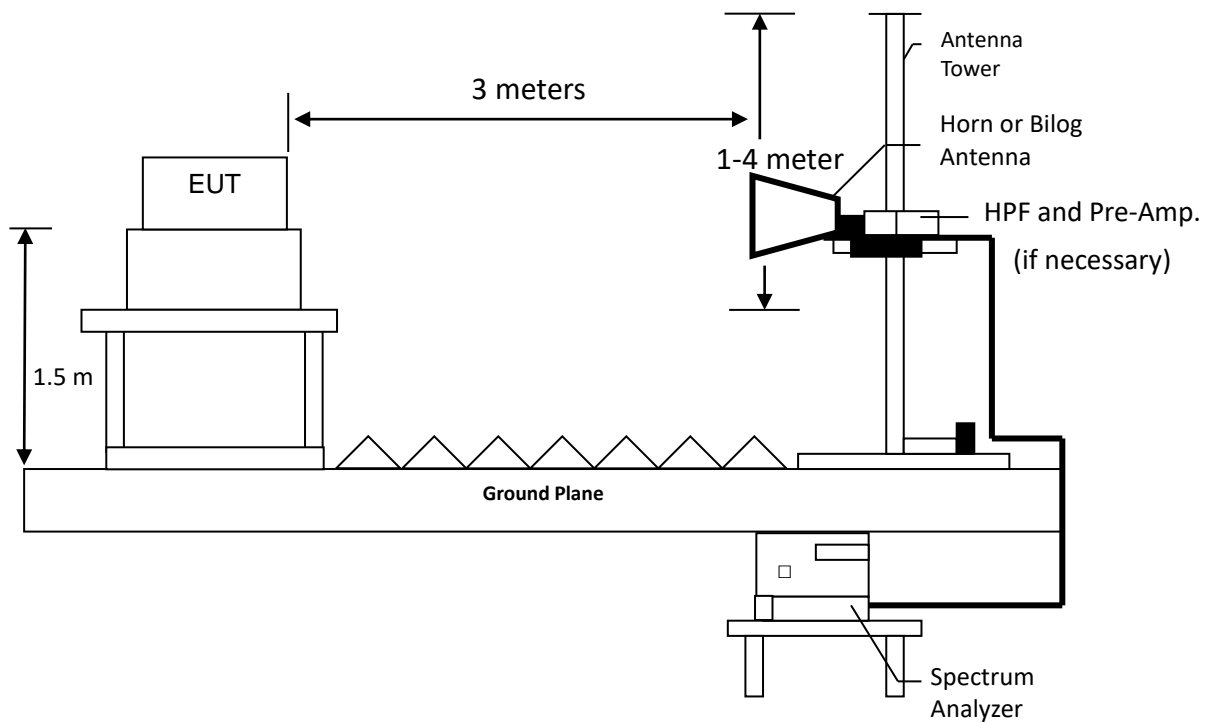
Radiated emission from 9kHz to 30MHz uses Loop Antenna:



Radiated emission below 1GHz using Bilog Antenna



Radiated emission above 1GHz using Horn Antenna



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Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report.

The EUT for testing is arranged on a turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

4.3 Emission limit

4.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
902-928	50	94	500	54

TEST REPORT**4.3.2 General radiated emission limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dBμV/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

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4.4 Radiated spurious emission test data

4.4.1 Measurement results: frequency range from 9 kHz to 30 MHz

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Perpendicular	0.399	AV	18.71	42.31	61.02	95.58	-34.56
Perpendicular	0.999	QP	19.10	33.20	52.30	67.61	-15.31
Perpendicular	1.958	QP	19.10	25.39	44.49	69.54	-25.05
Perpendicular	3.698	QP	19.27	18.81	38.08	69.54	-31.46
Perpendicular	5.197	QP	19.65	16.69	36.34	69.54	-33.20
Perpendicular	7.117	QP	20.20	12.22	32.42	69.54	-37.12

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Parallel	0.429	AV	18.74	39.07	57.81	94.96	-37.15
Parallel	2.918	QP	19.09	19.31	38.40	69.54	-31.14
Parallel	15.694	QP	21.33	13.41	34.74	69.54	-34.80
Parallel	23.462	QP	21.80	14.07	35.87	69.54	-33.67
Parallel	26.881	QP	22.05	16.89	38.94	69.54	-30.60
Parallel	27.661	QP	22.11	17.00	39.11	69.54	-30.43

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Ground-parallel	0.609	QP	18.86	32.75	51.61	71.91	-20.30
Ground-parallel	3.518	QP	19.22	14.62	33.84	69.54	-35.70
Ground-parallel	8.946	QP	20.72	10.97	31.69	69.54	-37.85
Ground-parallel	14.825	QP	21.28	10.98	32.26	69.54	-37.28
Ground-parallel	21.363	QP	21.65	9.71	31.36	69.54	-38.18
Ground-parallel	27.421	QP	22.09	9.00	31.09	69.54	-38.45

Remark: Corr. Factor = Antenna Factor + Cable Loss

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4.4.2 Measurement results: frequencies equal to or less than 1 GHz

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Horizontal	94.99	QP	18.04	21.72	39.76	43.50	-3.74
Horizontal	191.02	QP	17.37	13.06	30.43	43.50	-13.07
Horizontal	262.80	QP	20.79	8.22	29.01	46.00	-16.99
Horizontal	334.58	QP	23.04	8.65	31.69	46.00	-14.31
Horizontal	358.83	QP	23.31	7.23	30.54	46.00	-15.46
Horizontal	819.58	QP	31.20	5.68	36.88	46.00	-9.12

Remark: Corr. Factor = Antenna Factor + Cable Loss

Antenna Polarity	Frequency (MHz)	Spectrum Analyzer Detector	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
Vertical	94.99	QP	18.04	13.44	31.48	43.50	-12.02
Vertical	191.02	QP	17.37	6.32	23.69	43.50	-19.81
Vertical	262.80	QP	20.79	2.62	23.41	46.00	-22.59
Vertical	438.37	QP	25.72	0.79	26.51	46.00	-19.49
Vertical	644.01	QP	29.56	2.38	31.94	46.00	-14.06
Vertical	819.58	QP	31.20	1.56	32.76	46.00	-13.24

Remark: Corr. Factor = Antenna Factor + Cable Loss

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4.4.3 Measurement results: frequency above 1GHz

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
GFSK	1830	PK	H	-20.32	68.00	47.68	74	-26.32
	2134	PK	H	-17.61	63.99	46.38	74	-27.62
	2745	PK	H	-15.30	61.00	45.70	74	-28.30
	3979	PK	H	-10.26	53.09	42.83	74	-31.17
	1830	PK	V	-20.32	66.00	45.68	74	-28.32
	2071	PK	V	-18.51	66.50	47.99	74	-26.01
	2745	PK	V	-15.30	64.00	48.70	74	-25.30
	3997	PK	V	-10.14	59.28	49.14	74	-24.86
	4258	PK	V	-9.36	62.30	52.94	74	-21.06

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

4.4.4 Measurement results: Fundamental

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polarity (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
GFSK	915	PK	H	32.80	61.00	93.80	114.00	-20.20
	915	AV	H	32.80	60.50	93.30	94.00	-0.70
	915	PK	V	32.80	54.99	87.79	114.00	-26.21

Remark: Correction Factor = Antenna Factor + Cable Loss

5. Conducted emission test FCC 15.207

Since the EUT is not connected to AC source, therefore, the test can be waived.

Appendix A: Test equipment list

Test Equipment/ Test site	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESR7	101822	2022/08/09	2023/08/08
Signal Analyzer	Agilent	N9030A	MY51380492	2022/08/09	2023/08/08
Active Loop Antenna	SCHWARZBECK MESS-ELEKTRONIC	FMZB1519	1519-067	2022/04/13	2023/04/12
Bilog Hybrid Antenna	ETC	MCTD 2786B	BLB17J04019 & JB-5-019	2022/10/04	2023/10/03
Pre-amplifier (18~40GHz)	SGH	SGH184	20201124-1	2022/11/11	2023/11/10
Horn Antenna	SHWARZBECK	BBHA 9120 D	9120D-456	2022/01/21	2023/01/20
Broadband Amplifier	SGH	SGH118(45dB)	20220105-1	2022/01/07	2023/01/06
Power Meter	Anritsu	ML2495A	0844001	2022/07/04	2023/07/03
Power Sensor	Anritsu	MA2491A	031543	2022/03/07	2023/03/06
966-2(A) Cable	SUHNER	SMA / EX 100	N/A	2022/03/04	2023/03/03
966-2(B) Cable	SUHNER	SUCOFLEX 104P	CB0005	2022/03/04	2023/03/03
966-2 Cable	SUHNER	SUCOFLEX 104P	9403/4P	2022/11/25	2023/11/24
966-2_3m Semi-Anechoic Chamber	966_2	CEM-966_2	N/A	2022/01/14	2023/01/13
20dB Attenuator	Mini-Circuits	BW-S20W5+	N/A	2022/05/25	2023/05/24
Test software	Audix	e3	V9	NCR	NCR

Note: No Calibration Required (NCR).

Appendix B: Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

Item	Uncertainty
Vertically polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.16 dB
Horizontally polarized radiated disturbances from 30MHz~1GHz in a semi-anechoic chamber at a distance of 3m	5.02 dB
Radiated disturbances from 1GHz~18GHz in a semi-anechoic chamber at a distance of 3m	5.17 dB
Vertically polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.39 dB
Horizontally polarized Radiated disturbances from 18GHz~26.5GHz in a semi-anechoic chamber at a distance of 1m	2.39 dB
Radiated disturbances from 9kHz~30MHz in a semi-anechoic chamber at a distance of 3m	3.70 dB
Emission on the Band Edge Test	4.32 dB
Occupied Bandwidth	7.78 %
AC Power Line Conducted Emission	3.08 dB