FCC TEST REPORT

Product Name:	Detector HDR
Trade Mark:	N/A
Model No.:	Detector_HDR_XRL
Add. Model No.:	DH019C0—GG—1810, DH019C0—GG—1850
Report Number:	2308086385EMC-1
Test Standards:	FCC 47 CFR Part 15 Subpart B
FCC ID:	2AZIM-DET
Test Result:	PASS
Date of Issue:	January 8, 2024

Prepared for:

Defendec Ltd
Erika 14, C-entrance, 10416 Tallinn, Harjumaa, Estonia

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by:	David Chen	Reviewed by:	
	David Chen Senior Project Engineer		Henry Lu Team Leader
Approved by:	Kevin Liang Assistant Manager	Date:	January 8, 2024

UnionTrust Laboratories *Certified*

Version

Version No.	Date	Description
V1.0	January 8, 2024	Original

CONTENTS

1. GENERAL INFORMATION 4
   1.1 CLIENT INFORMATION 4
   1.2 EUT INFORMATION 4
      1.2.1 GENERAL DESCRIPTION OF EUT 4
      1.2.2 DESCRIPTION OF ACCESSORIES 4
   1.3 DESCRIPTION OF SUPPORT UNITS 4
   1.4 TEST LOCATION 5
   1.5 TEST FACILITY 5
   1.6 DEVIATION FROM STANDARDS 5
   1.7 ABNORMALITIES FROM STANDARD CONDITIONS 5
   1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER 5
   1.9 MEASUREMENT UNCERTAINTY 6
2. TEST SUMMARY 7
3. EQUIPMENT LIST 8
4. TEST CONFIGURATION 9
   4.1 ENVIRONMENTAL CONDITIONS FOR TESTING 9
      4.1.1 NORMAL OR EXTREME TEST CONDITIONS 9
      4.1.2 RECORD OF NORMAL ENVIRONMENT 9
   4.2 TEST MODES 9
   4.3 TEST SETUP 9
      4.3.1 FOR RADIATED EMISSIONS TEST SETUP 9
   4.4 SYSTEM TEST CONFIGURATION 10
5. REFERENCE DOCUMENTS FOR TESTING 11
6. EMC REQUIREMENTS SPECIFICATION 11
   6.1 RADIATED EMISSION 11
APPENDIX 1 PHOTOS OF TEST SETUP 16
APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS 16

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Defendec Ltd
Address of Applicant:	Erika 14, C-entrance, 10416 Tallinn, Harjumaa, Estonia
Manufacturer:	Defendec Ltd
Address of Manufacturer:	Erika 14, C-entrance, 10416 Tallinn, Harjumaa, Estonia

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Detector HDR
Model No.:	Detector_HDR_XRL
Add. Model No.:	DH019C0—GG—1810, DH019C0—GG—1850
Trade Mark:	N/A
DUT Stage:	Production Unit
Rated Voltage:	☒ Battery 3.7V
Classification of digital devices:	Class B
Highest Internal Frequency:	2480 MHz
Sample Received Date:	August 7, 2023
Sample Tested Date:	August 12, 2023 to August 12, 2023

1.2.2 Description of Accessories

Battery	
Model No.:	IXR19/66-3
Battery Type:	Lithium-ion Rechargeable Battery
Rated Voltage:	3.7 Vdc
Limited Charge Voltage:	4.2 Vdc
Rated Capacity:	10.2 Ah

1.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	DELL	Latitude 3400	N/A	UnionTrust
USB Serial port conversion board	N/A	BRN1948	N/A	Applicant

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	RF Cable	SMA	0.3 meter	UnionTrust

1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen,China 518109
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.5 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.9 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart B Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Conducted Emission	FCC 47 CFR Part 15.107	ANSI C63.4-2014	N/A (NOTE 1)
Radiated Emission	FCC 47 CFR Part 15.109	ANSI C63.4-2014	PASS

Note:
1) N/A: In this whole report not applicable.
2) The EUT is powered by a 3.7V battery.

3. EQUIPMENT LIST

Radiated Emission Test - 3M Chamber						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☒	3m Chamber & Accessory Equipment	ETS-Lindgren	3m	Euroshiedpn-CT 001270-1317	22-Jan-2021	21-Jan-2024
☒	Broadband Antenna	ETS-Lindgren	3142E	00201566	13-Dec-2022	12-Dec-2023
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	13-Dec-2022	12-Dec-2023
☒	Pre-amplifier	HP	8447F	2805A02960	1-Nov-2022	31-Oct-2023
☒	Receiver	ROHDE & SCHWARZ	ESIB26	100114	3-Nov-2022	2-Nov-2023
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	16- Apr-2022	15- Apr-2024
☒	Pre-amplifier	ETS-Lindgren	00118385	00201874	1-Nov-2022	31-Oct-2023
☒	Multi device Controller	ETS-Lindgren	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35	3.7	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temp. (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
Radiated Emission	24.5	57	98.8	S202308071951-ZJA01/2	Lucas Ouyang

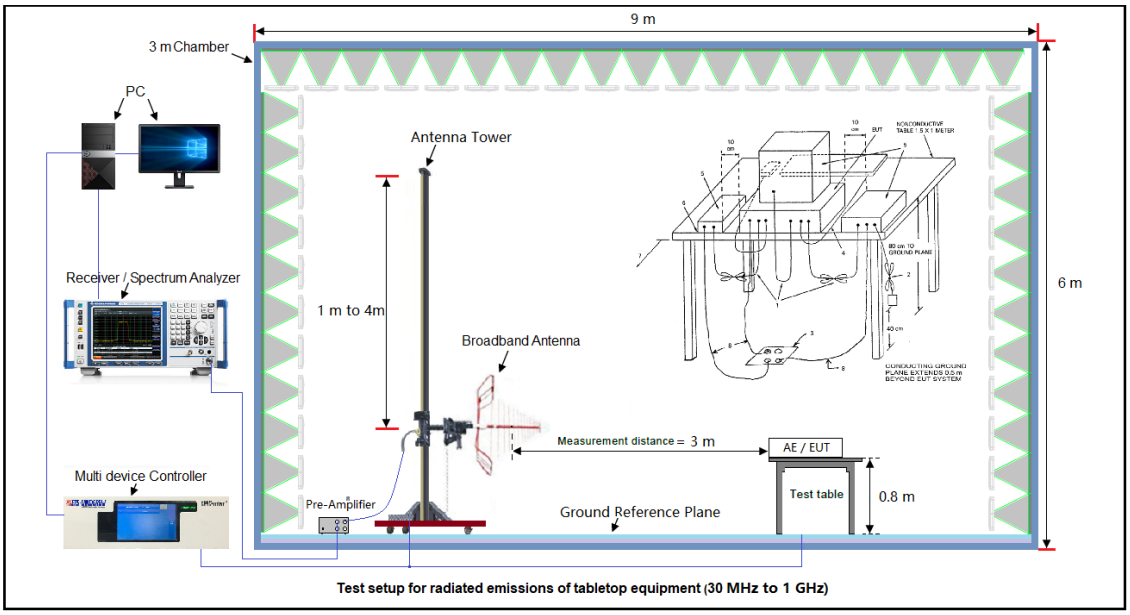
4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	Test Mode 1: Normal working + Camera

4.3 TEST SETUP

4.3.1 For Radiated Emissions test setup

Figure 1. 30MHz to 1GHz



4.4 SYSTEM TEST CONFIGURATION

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic (according to KDB 896810 D02 SDoC FAQ v01r01) of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part15 Subpart B	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
4	KDB 896810 D02 SDoC FAQ v01r02	Supplier's Declaration of Conformity frequency asked questions

6. EMC REQUIREMENTS SPECIFICATION

6.1 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15.109

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f) (MHz)	Detector type	Measurement receiver bandwidth	
		RBW	VBW
30 ≤ f ≤ 1 000	Quasi Peak	120 kHz	300 kHz
f ≥1000	Peak	1 MHz	3 MHz
	Average	1 MHz	3 MHz

Measured frequency range

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Limits:

Limits for Class B devices

Frequency (MHz)	limits at 3m (dBμV/m)		
	QP Detector	PK Detector	AV Detector
30-88	40.0	--	--
88-216	43.5	--	--
216-960	46.0	--	--
960 to 1000	54.0	--	--
Above 1000	--	74.0	54.0

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.3.1 for details.

Test Procedures:

1. From 30 MHz to 1GHz test procedure as below:

1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.

2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

2. Above 1GHz test procedure as below:

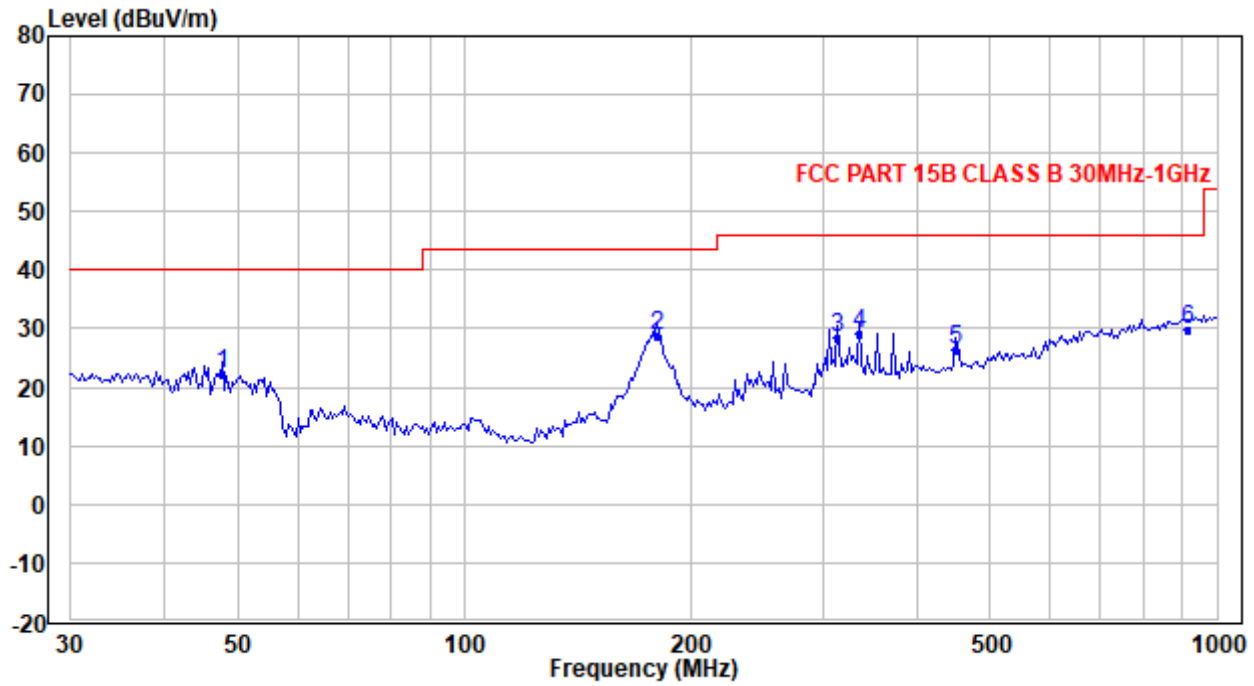
1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

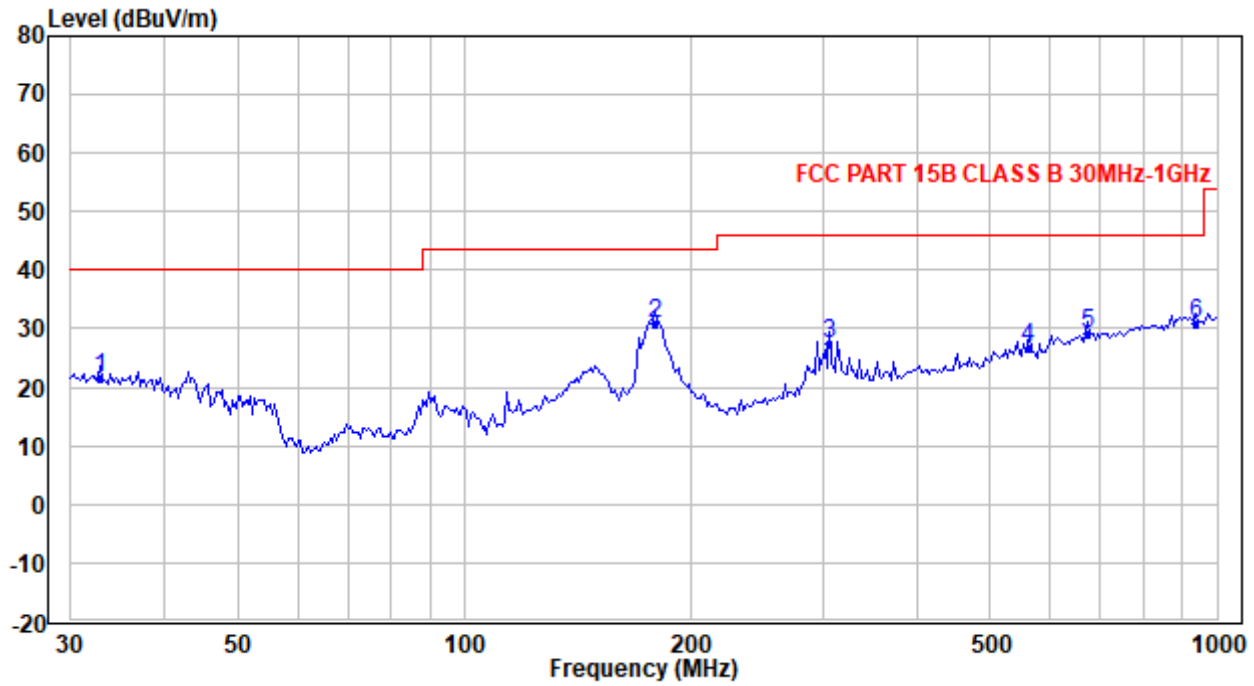
The measurement data as follows:

Below 1GHz (Quasi Peak):
Test Mode 1
Horizontal



No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	47.703	35.66	-13.26	22.40	40.00	-17.60	QP
2	180.030	39.05	-10.31	28.74	43.50	-14.76	QP
3	313.648	34.10	-5.71	28.39	46.00	-17.61	QP
4	334.126	34.25	-4.96	29.29	46.00	-16.71	QP
5	448.836	29.76	-3.39	26.37	46.00	-19.63	QP
6	912.695	24.88	4.80	29.68	46.00	-16.32	QP

Vertical

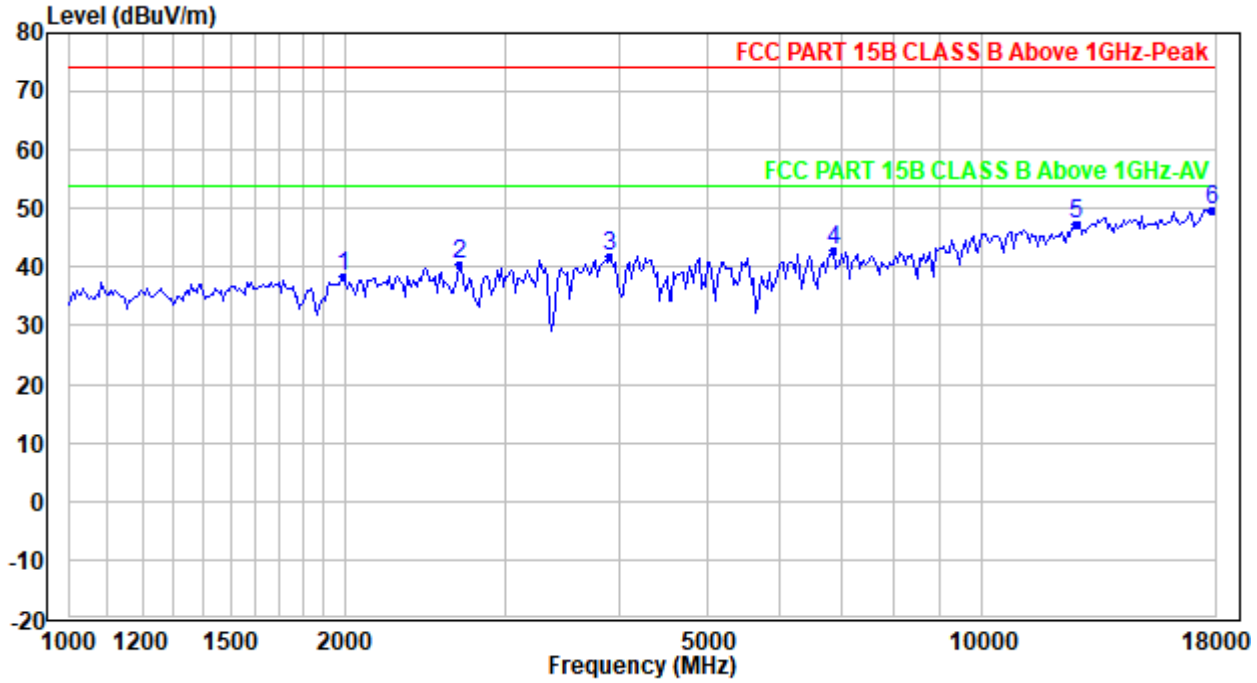


No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	32.870	26.96	-5.23	21.73	40.00	-18.27	QP
2	178.770	40.75	-9.88	30.87	43.50	-12.63	QP
3	304.955	33.48	-6.09	27.39	46.00	-18.61	QP
4	562.014	28.08	-1.26	26.82	46.00	-19.18	QP
5	674.677	27.66	1.51	29.17	46.00	-16.83	QP
6	938.714	25.62	5.12	30.74	46.00	-15.26	QP

Remark:

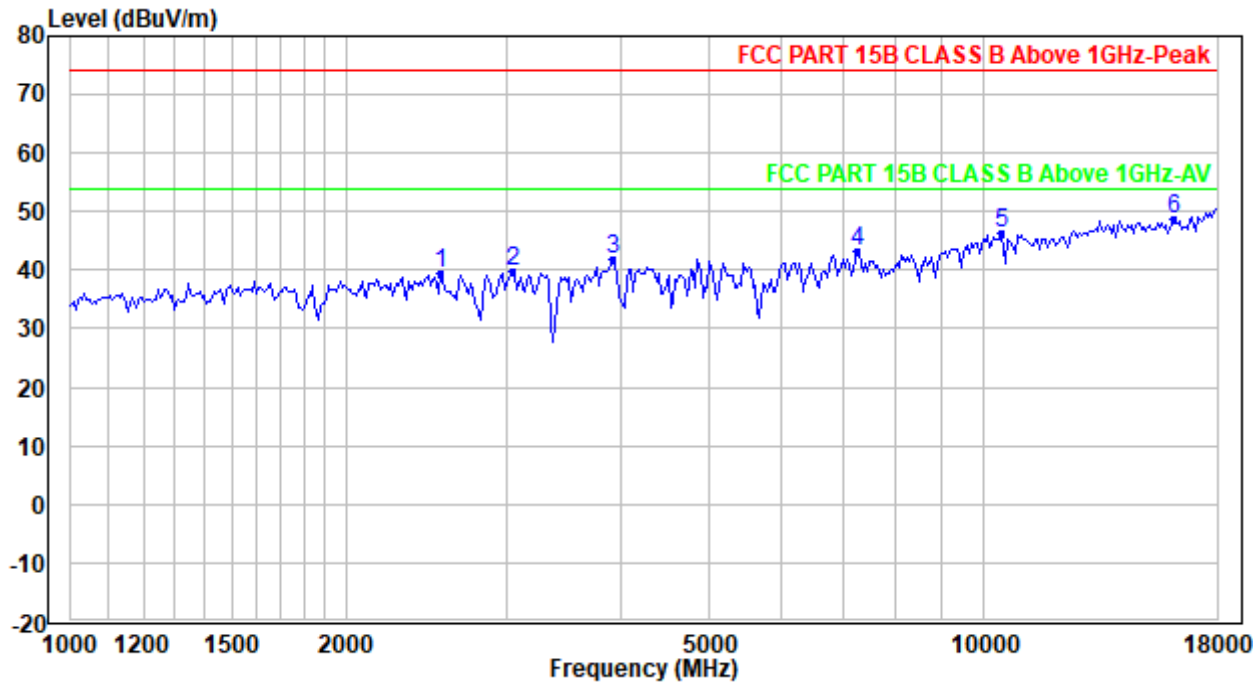
1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit

Above 1GHz (Peak & Average)
Test Mode 1
Horizontal



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	1992.295	48.64	-10.37	38.27	74.00	-35.73	Peak
2	2676.997	47.79	-7.29	40.50	74.00	-33.50	Peak
3	3900.860	44.43	-2.57	41.86	74.00	-32.14	Peak
4	6881.560	40.71	2.02	42.73	74.00	-31.27	Peak
5	12642.190	37.63	9.79	47.42	74.00	-26.58	Peak
6	17896.040	33.86	15.99	49.85	74.00	-24.15	Peak

Vertical



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	2541.018	46.81	-7.49	39.32	74.00	-34.68	Peak
2	3040.819	46.13	-6.37	39.76	74.00	-34.24	Peak
3	3923.521	44.45	-2.52	41.93	74.00	-32.07	Peak
4	7249.817	40.96	2.29	43.25	74.00	-30.75	Peak
5	10442.590	39.09	7.23	46.32	74.00	-27.68	Peak
6	16124.140	36.55	12.22	48.77	74.00	-25.23	Peak

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit
4. All possible modes of operation were investigated, only the worst case emissions reported.
5. For Radiated Emission above 18GHz, there was not any unwanted emission detected.
6. As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

********** End of Report **********

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.