EMC TEST REPORT

Applicant	Asiatelco Technologies Co.
FCC ID	XYO-AT16
Product	GPS tracker
Brand	Atel
Model	AT16
Report No.	R2205A0431-E1V1
Issue Date	June 28, 2022

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2021)/ ANSI C63.4-2014**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Wei Liu

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Guangchang Fan

Approved by: Guangchang Fan

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Version	Revision description	Issue Date
Rev.0	Initial issue of report.	June 14, 2022
Rev.1	Update information in Page 6.	June 28, 2022
Note: This revised report (Report No. R2205A0431-E1V1) supersedes and replaces the previously issued report (Report No. R2205A0431-E1). Please discard or destroy the previously issued report and dispose of it accordingly.		

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Summary of measurement results

Number	Test Case	Clause in FCC Rules	Conclusion
1	Radiated Emission	FCC Part15.109, ANSI C63.4-2014	PASS
2	Conducted Emission	FCC Part15.107, ANSI C63.4-2014	PASS
Date of Testing: May 31, 2022 ~ June 14, 2022 Date of Sample Received: May 19, 2022			
Note: All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

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1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City:	Shanghai
Post code:	201201
Country:	P. R. China
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2 General Description of Equipment under Test

2.1 Applicant and Manufacturer Information

Applicant	Asiatelco Technologies Co.
Applicant address	289 Bisheng Road, Building 8, 3F, Zhangjiang Hi-Tech Park, Pudong, Shanghai 201204 China
Manufacturer	Asiatelco Technologies Co.
Manufacturer address	289 Bisheng Road, Building 8, 3F, Zhangjiang Hi-Tech Park, Pudong, Shanghai 201204 China

2.2 General information

EUT Description			
Device Type	Fixed Device		
Model	AT16		
Lab internal SN:	R2205A0431/S01		
HW Version	AT16 P3		
SW Version	3.16		
Power Rating	DC 3.7V from battery.		
Connecting I/O Port(s)	Please refer to the User's Manual.		
Antenna Type	Internal Antenna		
Frequency	Band	Tx (MHz)	Rx (MHz)
	LTE Band 2	1850 ~ 1910	1930 ~ 1990
	LTE Band 4	1710 ~ 1755	2110 ~ 2155
	LTE Band 5	824 ~ 849	869 ~ 894
	LTE Band 12	699 ~ 716	729 ~ 746
	LTE Band 13	777 ~ 787	746 ~ 756
	Bluetooth	2400 ~ 2483.5	2400 ~ 2483.5
EUT Accessory			
Battery	Manufacturer: BPI Model: PL 401522 DC 3.7V, 80mAh		
Auxiliary test equipment			
DC Power Source	Manufacturer: APC Model: ADC-2400033-15 (SN : D215110016)		
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.			

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2.3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards
FCC Code CFR47 Part15B (2021)
ANSI C63.4-2014

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2.4 Test Mode

Test Mode	
Mode 1	External Power Supply + EUT + Bluetooth/eMTC Receiver
Mode 2	External Power Supply + EUT + Bluetooth/eMTC Traffic

During the test, the preliminary test was performed in all modes with all batteries, mode 1 is selected as the worst condition. The test data of the worst-case condition was recorded in this report.

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3 Test Case Results

3.1 Radiated Emission

Ambient condition

Temperature	Relative humidity	Pressure
15°C~35°C	30%~60%	101.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated signal level.
The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.
Set the spectrum analyzer in the following:

Below 1GHz:
RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK Detector: RBW=1MHz / VBW=3MHz/ Sweep=AUTO
(b) AVERAGE Detector: RBW=1MHz / VBW=3MHz / Sweep=AUTO

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

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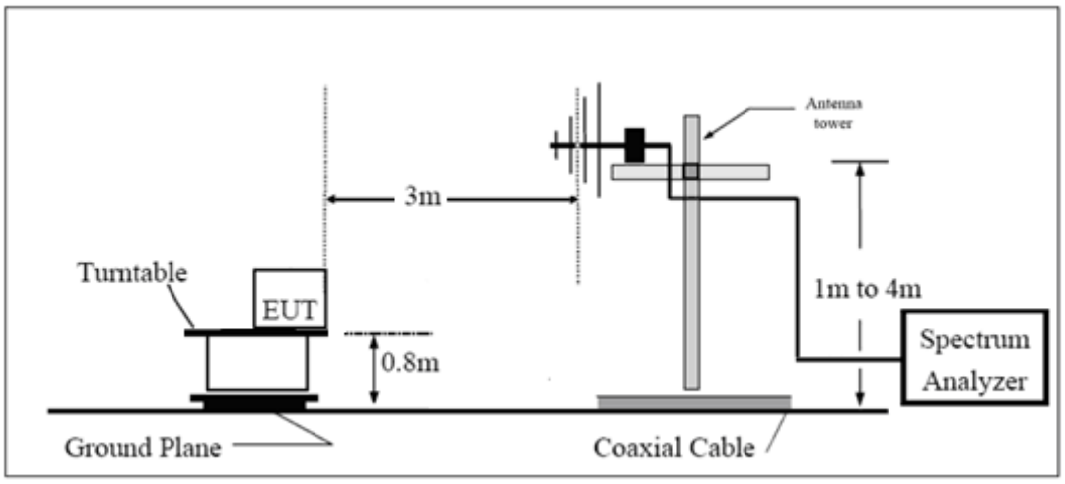
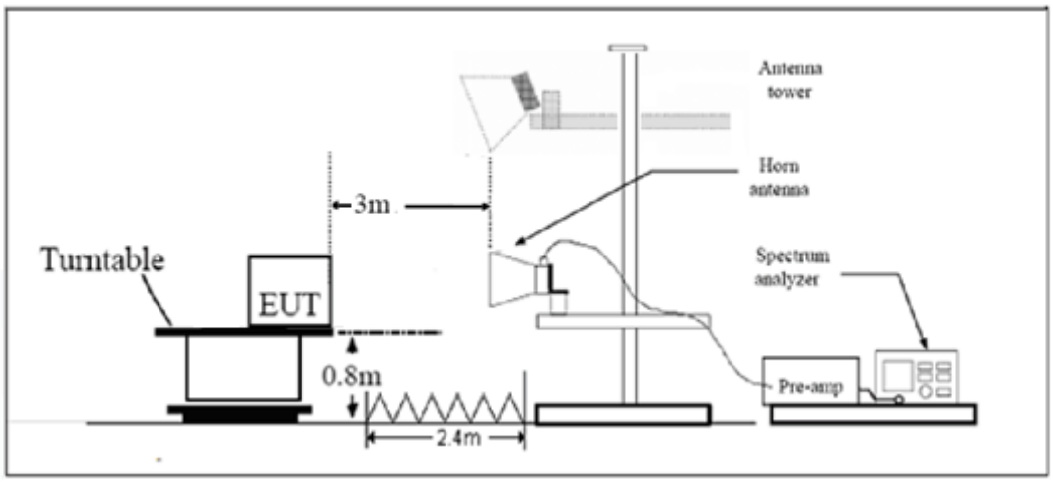
Test Setup

Below 1GHz



Above 1GHz



Note: Area side: 2.4mX3.6m

Antenna Tower meets ANSI C63.4 requirements for measurements above 1 GHz by keeping the antenna aimed at the EUT during the antenna's ascent/ descent along the antenna mast.

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Limits

Class B

Frequency (MHz)	Field Strength (dBμV/m)	Detector
30 -88	40.0	Quasi-peak
88-216	43.5	Quasi-peak
216 – 960	46.0	Quasi-peak
960-1000	54.0	Quasi-peak
1000-5th harmonic of the highest frequency or 40GHz, which is lower	54 74	Average Peak

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor *k* = 1.96.

Frequency	Uncertainty
30MHz~200MHz	4.17 dB
200MHz~1000MHz	4.84 dB
1GHz~18GHz	4.35 dB

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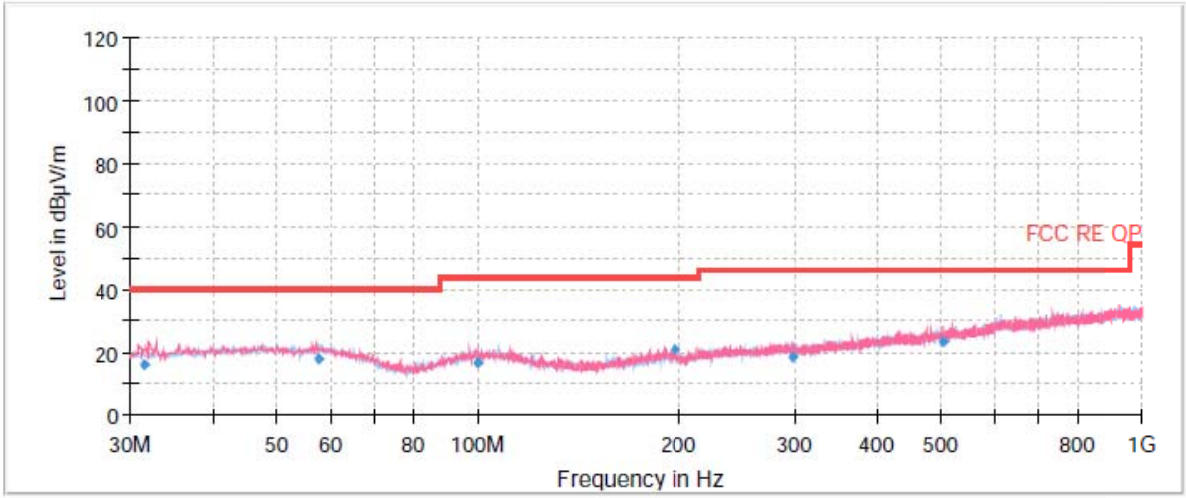
Test Results

Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier.

The following graphs display the maximum values of horizontal and vertical by software.
For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.



Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)
31.62	16.27	40.00	23.73	1000.00	118.0	V	18.00	12
57.44	18.09	40.00	21.91	1000.00	105.0	V	48.00	14
100.16	16.38	43.50	27.12	1000.00	118.0	V	1.00	13
198.01	20.91	43.50	22.59	1000.00	219.0	V	134.00	12
298.24	18.64	46.00	27.36	1000.00	118.0	V	306.00	15
502.44	23.30	46.00	22.70	1000.00	100.0	V	18.00	20

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss+ amplifier gain)
2. Margin = Limit – Quasi-Peak

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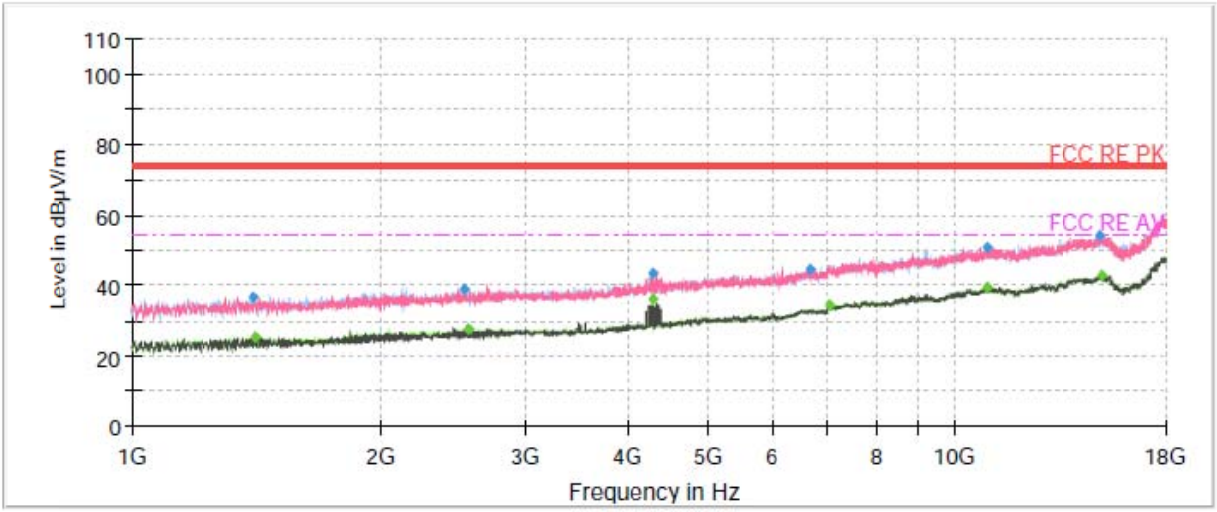

Radiated Emission from 1GHz to 18GHz

Frequency (MHz)	Peak (dBuV/m)	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)
1405.88	36.52	---	74.00	37.48	500.00	100.0	H	212.00	-17
1408.00	---	25.22	54.00	28.78	500.00	100.0	H	284.00	-17
2525.75	38.89	---	74.00	35.11	500.00	200.0	H	18.00	-14
2559.75	---	27.70	54.00	26.30	500.00	200.0	H	18.00	-14
4302.25	---	36.03	54.00	17.97	500.00	100.0	H	312.00	-11
4302.25	43.29	---	74.00	30.71	500.00	100.0	H	312.00	-11
6665.25	44.64	---	74.00	29.36	500.00	100.0	H	319.00	-4
7022.25	---	34.28	54.00	19.72	500.00	200.0	H	128.00	-3
10940.75	50.73	---	74.00	23.27	500.00	100.0	V	67.00	0
10942.88	---	39.32	54.00	14.68	500.00	100.0	H	312.00	0
14948.50	54.06	---	74.00	19.94	500.00	200.0	V	139.00	5
15059.00	---	43.11	54.00	10.89	500.00	200.0	V	95.00	5

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3.2 Conducted Emission

Ambient condition

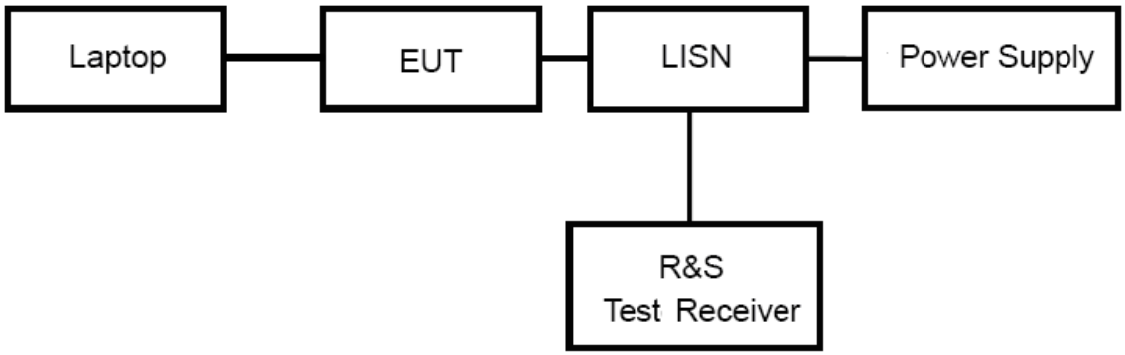
Temperature	Relative humidity	Pressure
15°C~35°C	30%~60%	101.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

Test Setup



Note: Power Supply is AC Power source and it is used to change the voltage 120V/60Hz.

Limits

Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50
*: Decreases with the logarithm of the frequency.		

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96. U= 2.57 dB.

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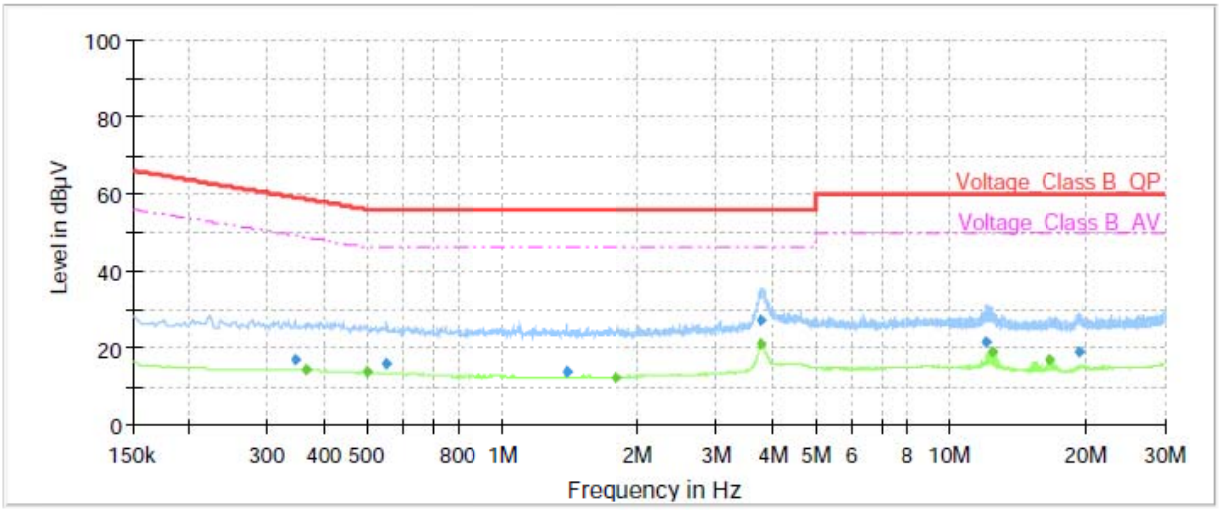
Test Results

Following plots, Blue trace uses the peak detection; Green trace uses the average detection.



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.34	16.79	---	59.12	42.33	1000.00	9.000	L1	ON	21
0.36	---	14.32	48.69	34.37	1000.00	9.000	L1	ON	21
0.50	---	13.61	46.00	32.39	1000.00	9.000	L1	ON	20
0.55	15.66	---	56.00	40.34	1000.00	9.000	L1	ON	20
1.39	13.88	---	56.00	42.12	1000.00	9.000	L1	ON	20
1.79	---	12.49	46.00	33.51	1000.00	9.000	L1	ON	20
3.78	27.28	---	56.00	28.72	1000.00	9.000	L1	ON	19
3.78	---	21.23	46.00	24.77	1000.00	9.000	L1	ON	19
12.02	21.40	---	60.00	38.60	1000.00	9.000	L1	ON	20
12.40	---	19.14	50.00	30.86	1000.00	9.000	L1	ON	20
16.67	---	16.68	50.00	33.32	1000.00	9.000	L1	ON	20
19.36	19.03	---	60.00	40.97	1000.00	9.000	L1	ON	20

Remark: Correct factor=cable loss + LISN factor

L line

Conducted Emission from 150 KHz to 30 MHz

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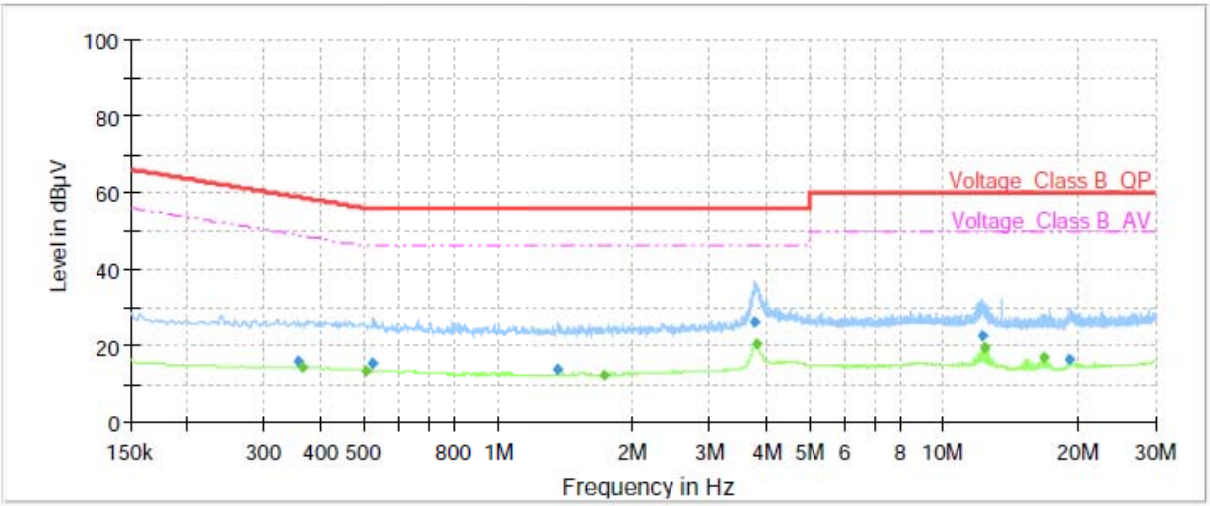

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.36	16.02	---	58.80	42.78	1000.00	9.000	N	ON	21
0.36	---	14.25	48.69	34.44	1000.00	9.000	N	ON	21
0.50	---	13.48	46.00	32.52	1000.00	9.000	N	ON	20
0.52	15.47	---	56.00	40.53	1000.00	9.000	N	ON	20
1.37	13.97	---	56.00	42.03	1000.00	9.000	N	ON	20
1.74	---	12.38	46.00	33.62	1000.00	9.000	N	ON	20
3.78	26.06	---	56.00	29.94	1000.00	9.000	N	ON	19
3.79	---	20.77	46.00	25.23	1000.00	9.000	N	ON	19
12.27	22.63	---	60.00	37.37	1000.00	9.000	N	ON	20
12.40	---	19.30	50.00	30.70	1000.00	9.000	N	ON	20
16.88	---	16.76	50.00	33.24	1000.00	9.000	N	ON	20
19.16	16.41	---	60.00	43.59	1000.00	9.000	N	ON	20

Remark: Correct factor=cable loss + LISN factor

N line

Conducted Emission from 150 KHz to 30 MHz

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4 Main Test Instruments

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Date	Expiration Time
Radiated Emission					
EMI Test Receiver	R&S	ESR	101667	2022-05-25	2023-05-24
Signal Analyzer	R&S	FSV40	101297	2021-12-12	2022-12-11
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9163	1023	2020-05-05	2023-05-04
Horn Antenna	Schwarzbeck	BBHA 9120D	430	2019-12-16	2022-12-15
Horn Antenna	ETS-Lindgren	3160-09	00102643	2021-10-10	2024-10-09
Software	R&S	EMC32	9.26.01	/	/
Conducted Emission					
Artificial main network	R&S	ENV216	102191	2020-12-13	2022-12-12
EMI Test Receiver	R&S	ESR	101667	2022-05-25	2023-05-24
Software	R&S	EMC32	10.35.10	/	/

********END OF REPORT ********

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ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

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ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.

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