



Certificate #4312.01

TEST REPORT

Product Name: IP Phone
Trade Mark: GRANDSTREAM
Model No. / HVIN: GRP2670
Report Number: 210821025EMC-1
Test Standards: FCC 47 CFR Part 15 Subpart B
ICES-003 Issue 7
FCC ID: YZZGRP2670
IC: 11964A-GRP2670
Test Result: PASS
Date of Issue: October 18, 2021

Prepared for:

Grandstream Networks, Inc.
126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

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
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Technical Director

Date:

October 18, 2021

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Version

Version No.	Date	Description
V1.0	October 18, 2021	Original

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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Grandstream Networks, Inc.
Address of Applicant:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA
Manufacturer:	Grandstream Networks, Inc.
Address of Manufacturer:	126 Brookline Ave., 3rd Floor Boston, MA 02215, USA

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	IP Phone
Model No. / HVIN:	GRP2670
Trade Mark:	GRANDSTREAM
DUT Stage:	Identical Prototype
Rated Voltage:	☒ 100-240V~50/60Hz ☒ Powered by POE port
Classification of digital devices:	Class B
Highest Internal Frequency:	5825 MHz
Sample Received Date:	August 21, 2021
Sample Tested Date:	August 27, 2021 to August 29, 2021

1.2.2 Description of Accessories

Adapter(1)	
Model No.:	GQ12-120100-AU
Input:	100-240 V~50/60 Hz 0.4A Max
Output:	12 V $\Rightarrow$ 1.0 A
DC Cable:	2.5 Meter, Unshielded without ferrite

Adapter(2)	
Model No.:	DSA-12PFU-12 FUS 120100
Input:	100-240 V~50/60 Hz 0.5A
Output:	12 V $\Rightarrow$ 1.0 A 12.0W
DC Cable:	2.5 Meter, Unshielded without ferrite

Adapter(3)	
Model No.:	F12US1200100A
Input:	100-240 V~50/60 Hz 0.5A max
Output:	12 V $\Rightarrow$ 1.0 A
DC Cable:	2.5 Meter, Unshielded without ferrite

Cable(1)	
Connector:	Ethernet Cable
Cable Type:	Unshielded without ferrite
Length:	1.5 Meter

Cable(2)	
Connector:	Phone Cord
Cable Type:	Unshielded without ferrite
Length:	3.5 Meter

Others	
1x Handset, 1x Phone Stand	

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	Lenovo	B40-80	MP12NEQ6	UnionTrust
USB disk	Kingston	DTSE9	N/A	UnionTrust
Mouse	DELL	MS111	CN-011D3V-738	UnionTrust
Headset	YEY	VE120-MV	N/A	UnionTrust
Standard POE Power supply	TP-LINK	TL-POE160S	N/A	UnionTrust
IP Phone	GRANDSTREAM	GRP2615	N/A	Applicant
Expansion Module	GRANDSTREAM	GBX20	N/A	Applicant

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Ethernet Cable	RJ45	1.5 Unshielded without ferrite	UnionTrust
2	Ethernet Cable	RJ45	2.0 Unshielded without ferrite	UnionTrust
3	Ethernet Cable	RJ45	5.0 Unshielded without ferrite	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

Telephone: +86 (0) 755 2823 0888

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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

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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 ICES-003 Issue 7 Section 3.2.1	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109 ICES-003 Issue 7 Section 3.2.2	ANSI C63.4-2014	PASS

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	3m SAC	ETS-LINDGREN	3m	N/A	Jan. 22, 2021	Jan. 21, 2024
☒	Receiver	R&S	ESIB26	100114	Nov. 18, 2020	Nov. 17, 2021
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 14, 2020	Nov. 13, 2022
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	Nov. 14, 2020	Nov. 13, 2022
☒	Preamplifier	HP	8447F	2805A02960	Nov. 10, 2020	Nov. 09, 2021
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	Apr. 30, 2021	Apr. 29, 2023
☒	Pre-amplifier	ETS-Lindgren	00118385	00201874	Nov. 10, 2020	Nov. 9, 2021
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 14, 2020	Nov. 13, 2022
☒	Pre-amplifier	ETS-Lindgren	00118384	00202652	Nov. 17, 2020	Nov. 16, 2022
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	Receiver	R&S	ESR7	1316.3003K07-101181-K3	Nov. 18, 2020	Nov.17, 2021
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 18, 2020	Nov.17, 2021
☒	LISN	R&S	ESH2-Z5	860014/024	Nov. 18, 2020	Nov.17, 2021
☒	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 18, 2020	Nov.17, 2021
☒	Test Software	Audix	e3	Software Version: 9.160323		

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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	Powered by POE Port or Powered by DC 12V/1.0A	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Tested by
Conducted Emission	25.5	53	99.71	Niko Su
Radiated Emission	24.9	46	100.11	Asia Yan

4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	Test Mode1: AC120V/60Hz (Adaptor1) + Hands Free Test Mode 2: AC120V/60Hz (Adaptor1) + Ringing Test Mode 3: AC120V/60Hz (Adaptor1) + Handset Test Mode 4: AC120V/60Hz (Adaptor1) + Headset Test Mode 5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4 Test Mode 6: Worse from mode 1~5 (Adaptor2) Test Mode 7: Worse from mode 1~5 (Adaptor3) Test Mode 8: AC120V/60Hz (POE) +Worse from mode 1~4 Test Mode 9: Worse from mode 1~8 + Expansion Module
Conducted Emission	Test Mode1: AC120V/60Hz (Adaptor1) + Hands Free Test Mode 2: AC120V/60Hz (Adaptor1) + Ringing Test Mode 3: AC120V/60Hz (Adaptor1) + Handset Test Mode 4: AC120V/60Hz (Adaptor1) + Headset Test Mode 5: AC240V/50Hz (Adaptor1) + Worse from mode 1~4 Test Mode 6: Worse from mode 1~5 (Adaptor2) Test Mode 7: Worse from mode 1~5 (Adaptor3) Test Mode 8: AC120V/60Hz (POE) +Worse from mode 1~4 Test Mode 9: Worse from mode 1~8 + Expansion Module
Remark: The above test modes in boldface were the worst cases.	

4.3 TEST SETUP

4.3.1 For Radiated Emissions test setup

Figure 1. 30MHz to 1GHz

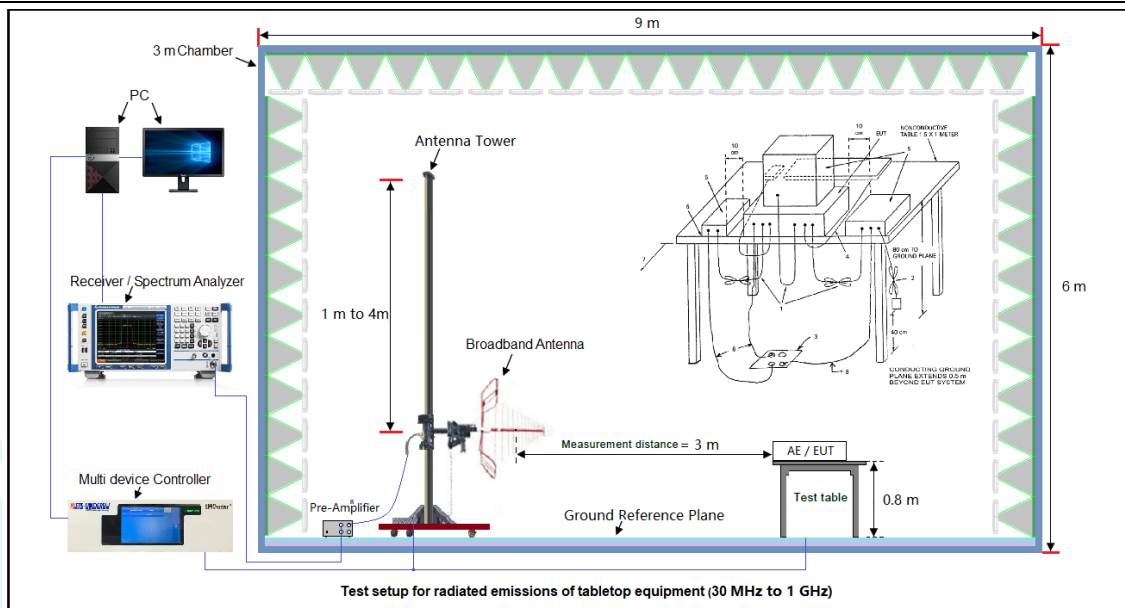
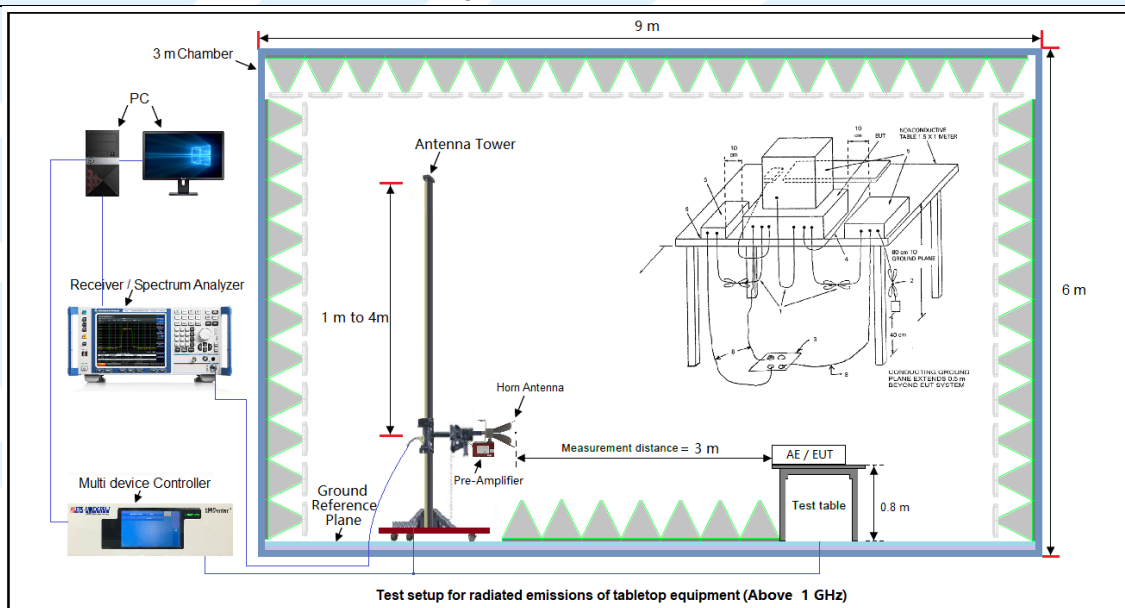
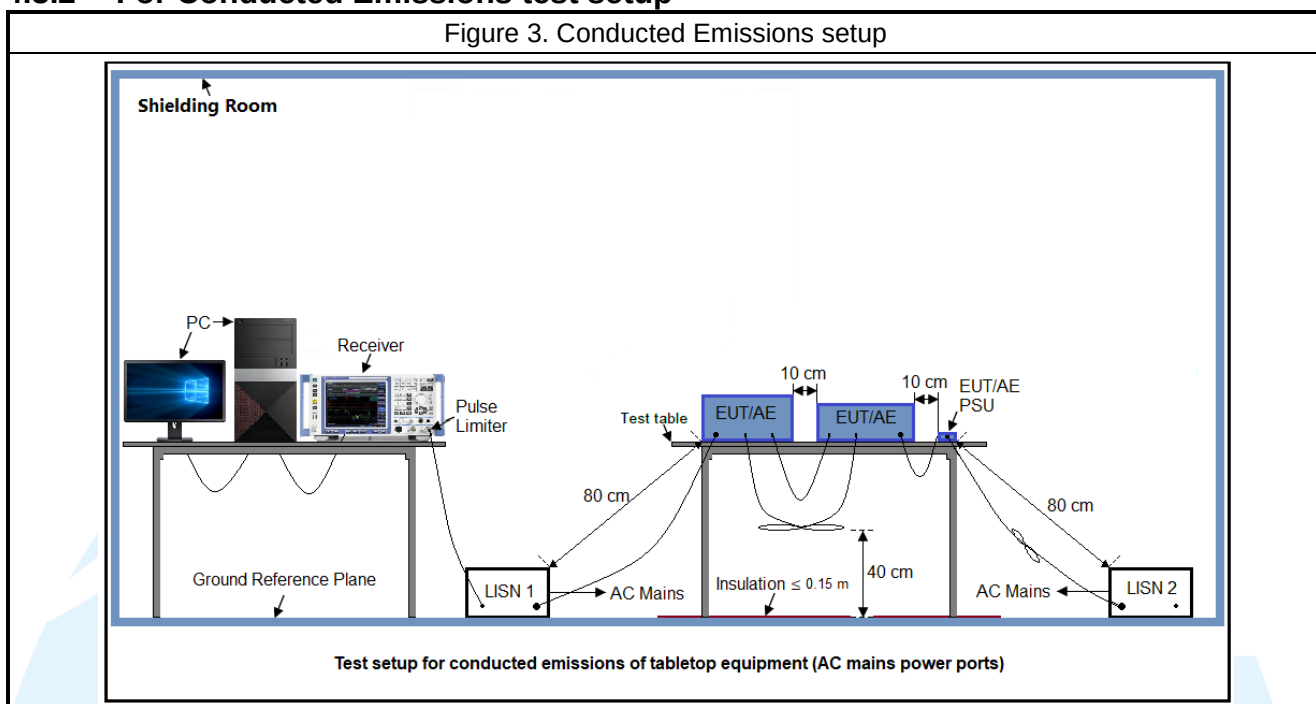


Figure 2. Above 1GHz



4.3.2 For Conducted Emissions test setup

Figure 3. Conducted Emissions setup



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	ICES-003 Issue 7	Information Technology Equipment (Including Digital Apparatus)
3	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 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
5	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
ICES-003 Issue 7 Clause 3.2.2

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f) (MHz)	Detector type	Measurement receiver bandwidth	
		RBW	VBW
$30 \leq f \leq 1\,000$	Quasi Peak	120 kHz	300 kHz
$f \geq 1000$	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

FCC 47 CFR Part 15 Subpart B

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

ICES-003 Issue 7

Frequency (MHz)	limits at 3m (dB μ V/m)		
	QP Detector	PK Detector	AV Detector
30 – 88	40.0	--	--
88 – 216	43.5	--	--

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216 – 230	46.0		
230 – 960	47.0	--	--
960 – 1000	54.0	--	--
Above 1000	--	74.0	54.0

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/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.

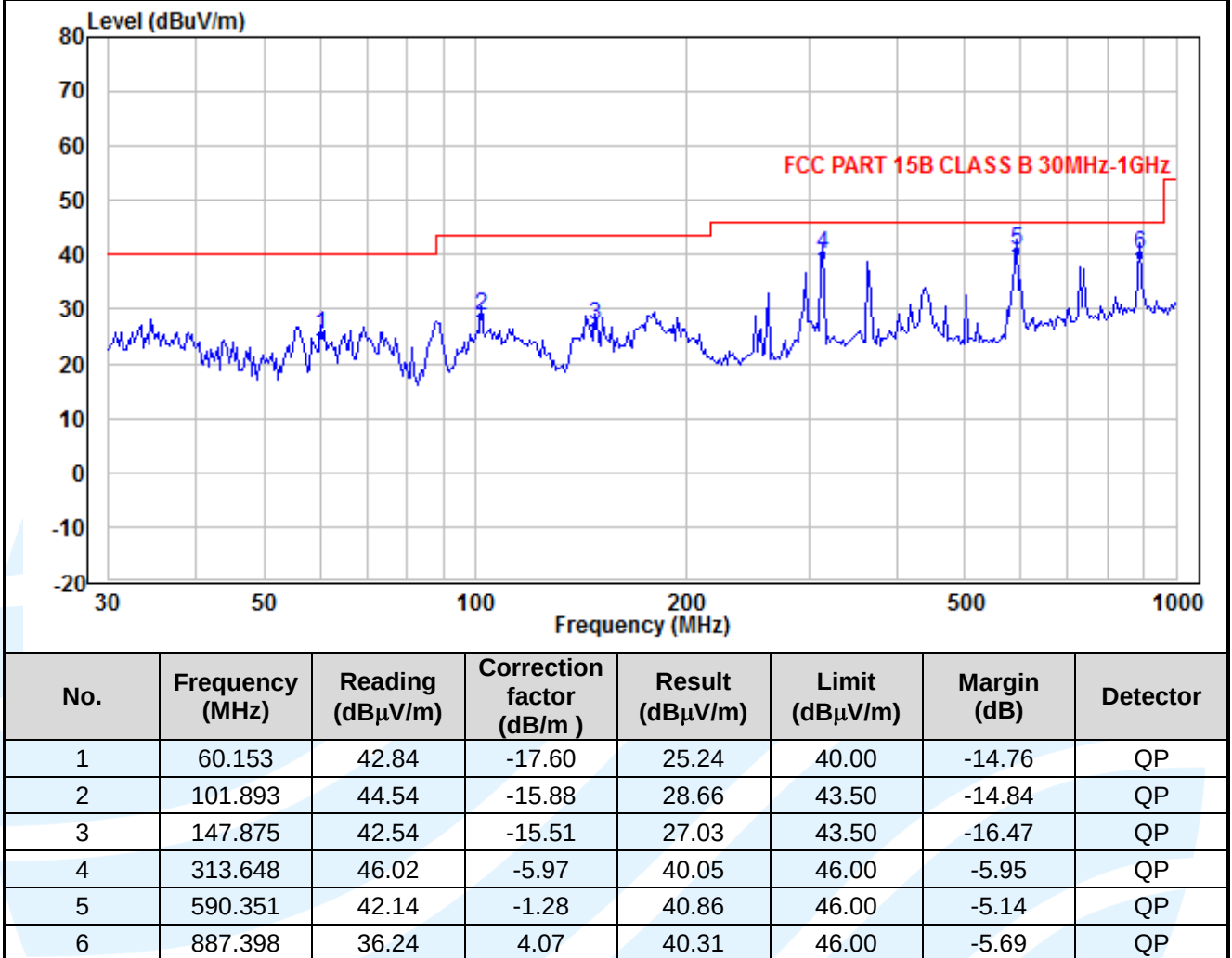
Test Result: Pass

The measurement data for FCC 47 CFR Part 15 Subpart B as follows:

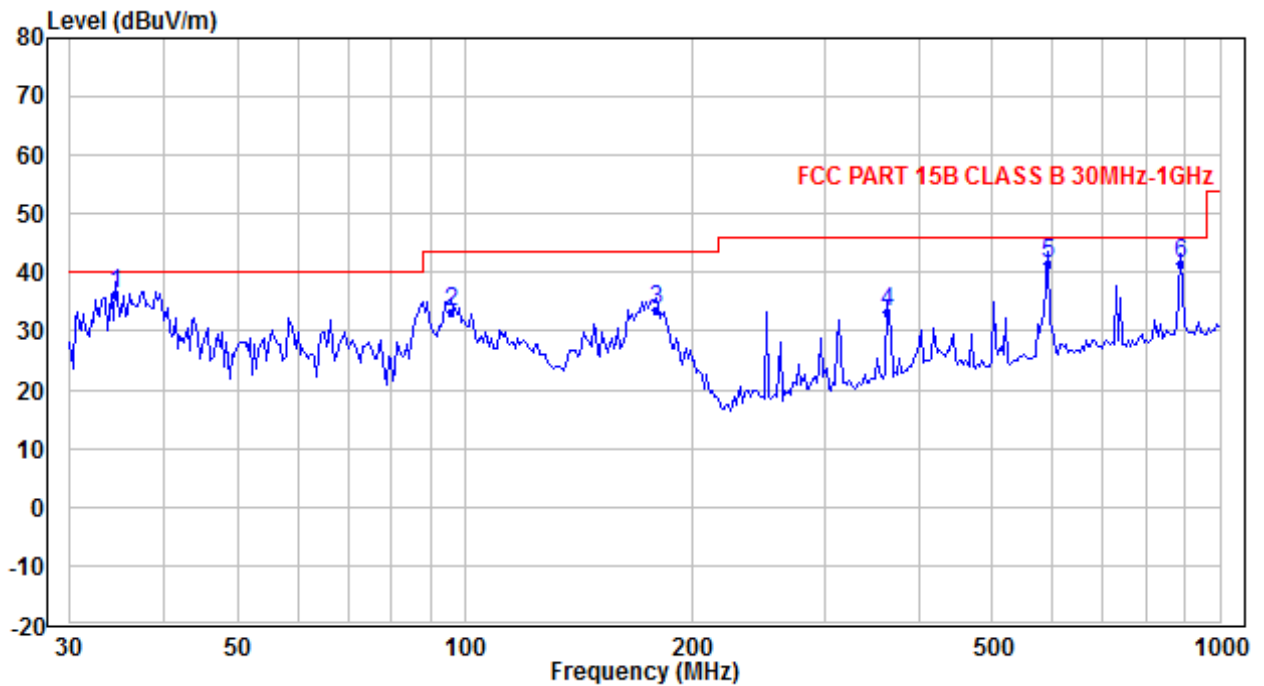
Below 1GHz(Quasi Peak):

Test Mode 1

Horizontal



Vertical



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	34.527	41.27	-4.98	36.29	40.00	-3.71	QP
2	95.649	49.09	-15.90	33.19	43.50	-10.31	QP
3	178.770	43.52	-9.91	33.61	43.50	-9.89	QP
4	363.523	38.64	-5.22	33.42	46.00	-12.58	QP
5	590.351	42.96	-1.28	41.68	46.00	-4.32	QP
6	887.398	37.33	4.07	41.40	46.00	-4.60	QP

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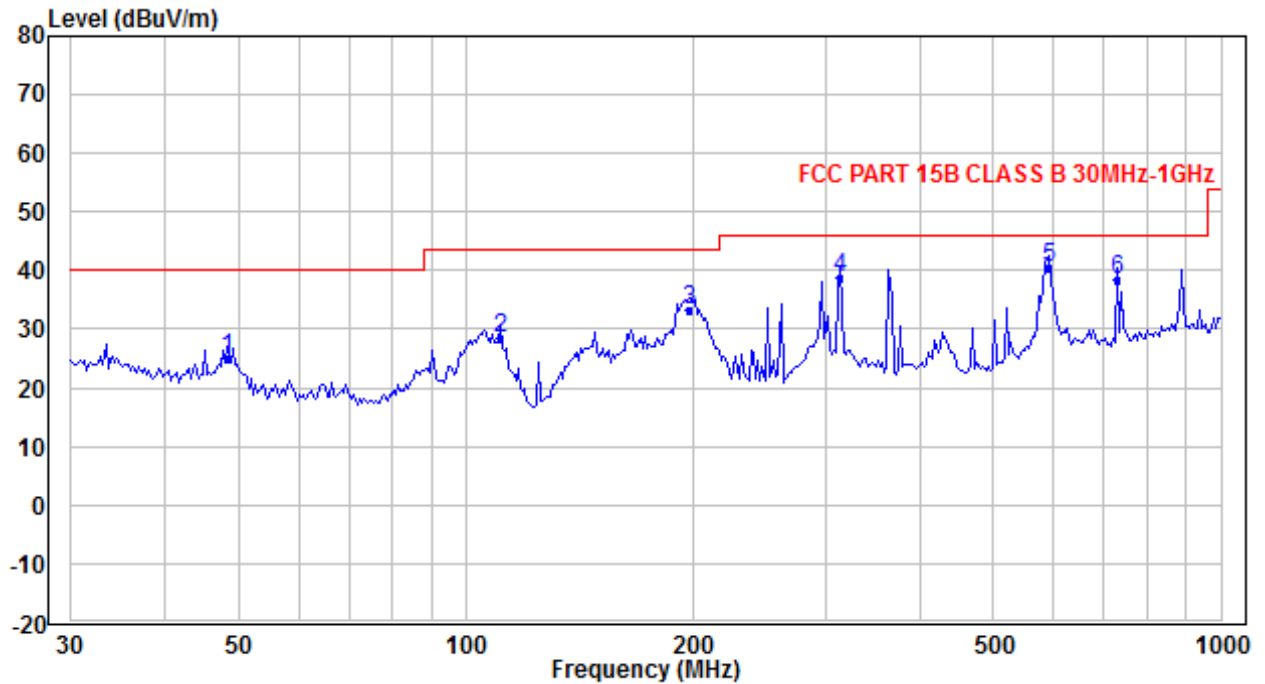
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Below 1GHz(Quasi Peak):
Test Mode 6
Horizontal



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	48.378	38.64	-13.71	24.93	40.00	-15.07	QP
2	110.858	44.28	-15.85	28.43	43.50	-15.07	QP
3	197.251	43.95	-10.64	33.31	43.50	-10.19	QP
4	313.648	44.64	-5.97	38.67	46.00	-7.33	QP
5	590.351	41.81	-1.28	40.53	46.00	-5.47	QP
6	728.897	36.78	1.63	38.41	46.00	-7.59	QP

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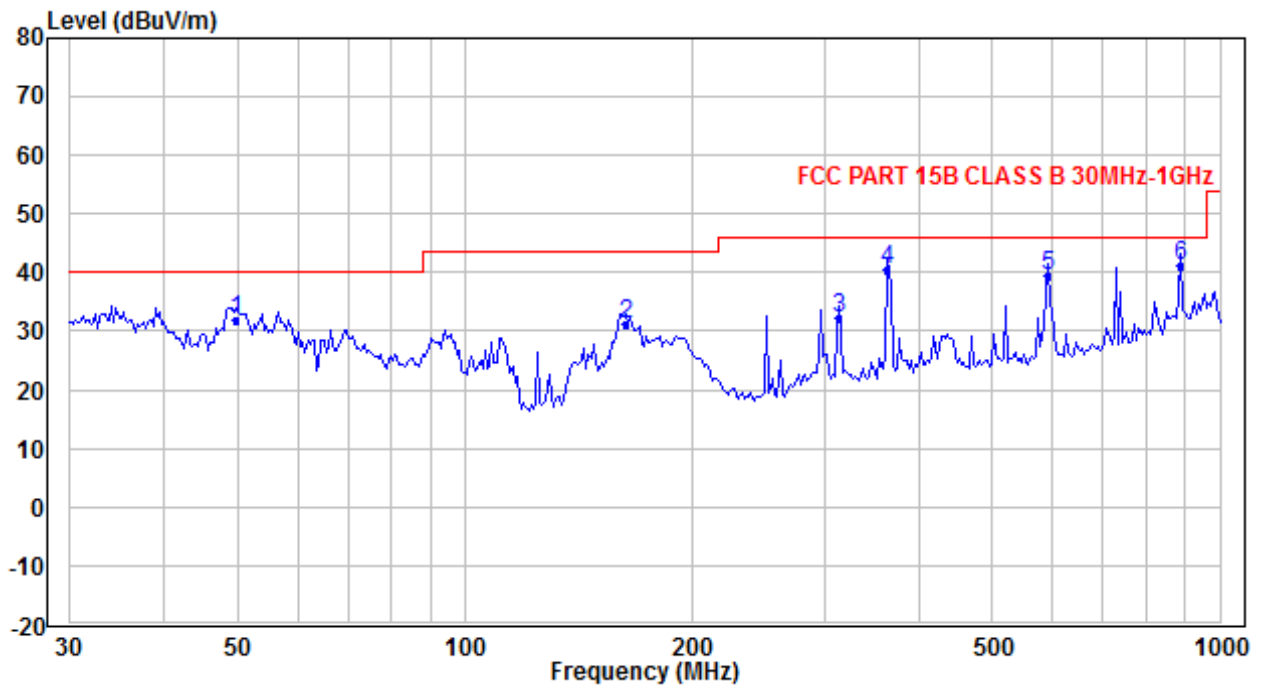
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Vertical



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	49.757	46.58	-14.62	31.96	40.00	-8.04	QP
2	163.162	43.68	-12.62	31.06	43.50	-12.44	QP
3	313.648	38.33	-5.97	32.36	46.00	-13.64	QP
4	363.523	45.63	-5.22	40.41	46.00	-5.59	QP
5	590.351	40.85	-1.28	39.57	46.00	-6.43	QP
6	887.398	37.04	4.07	41.11	46.00	-4.89	QP

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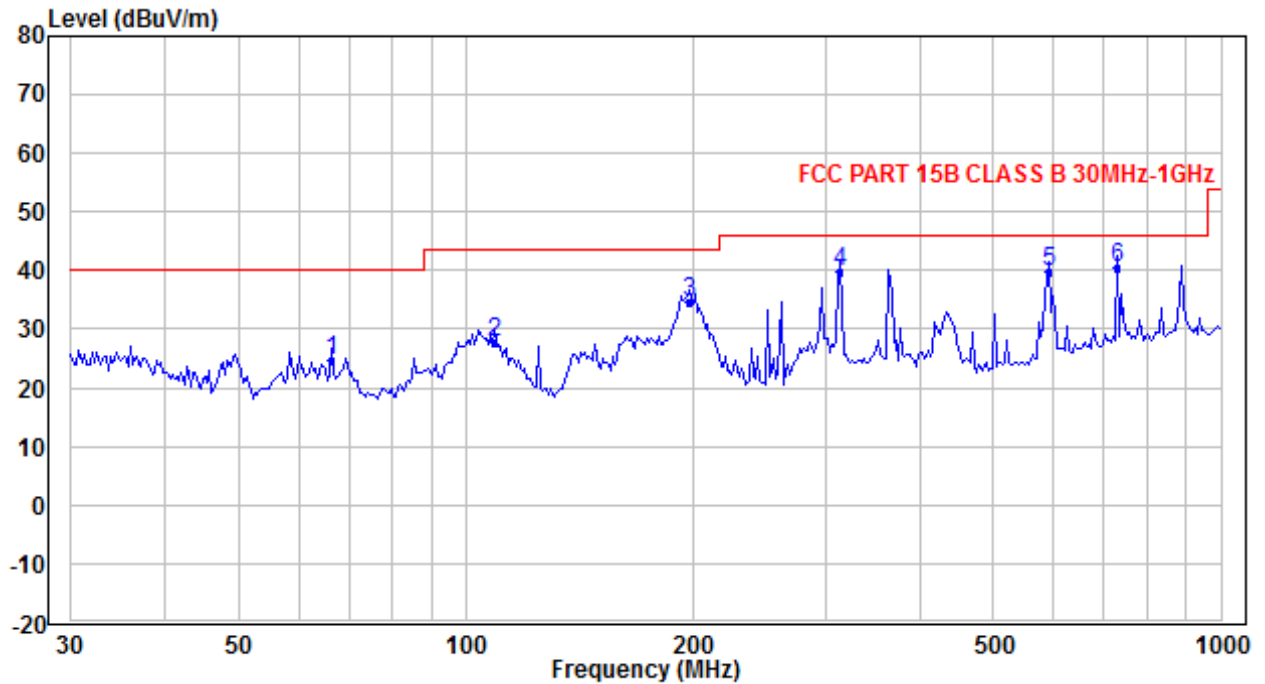
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Below 1GHz(Quasi Peak):
Test Mode 7
Horizontal



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	66.371	42.02	-17.30	24.72	40.00	-15.28	QP
2	109.311	43.96	-16.03	27.93	43.50	-15.57	QP
3	197.251	45.43	-10.64	34.79	43.50	-8.71	QP
4	313.648	45.65	-5.97	39.68	46.00	-6.32	QP
5	590.351	40.96	-1.28	39.68	46.00	-6.32	QP
6	728.897	38.99	1.63	40.62	46.00	-5.38	QP

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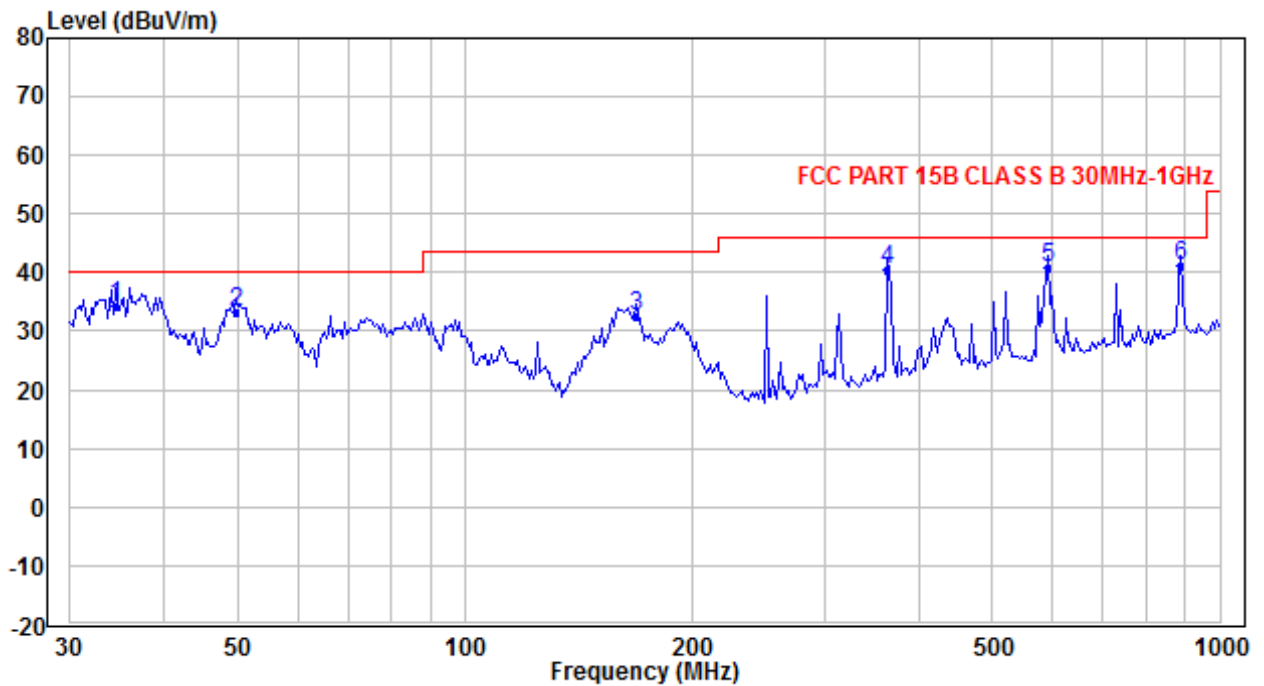
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Vertical



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	34.527	39.44	-4.98	34.46	40.00	-5.54	QP
2	49.757	47.85	-14.62	33.23	40.00	-6.77	QP
3	168.997	44.07	-11.55	32.52	43.50	-10.98	QP
4	363.523	45.81	-5.22	40.59	46.00	-5.41	QP
5	590.351	42.13	-1.28	40.85	46.00	-5.15	QP
6	887.398	36.93	4.07	41.00	46.00	-5.00	QP

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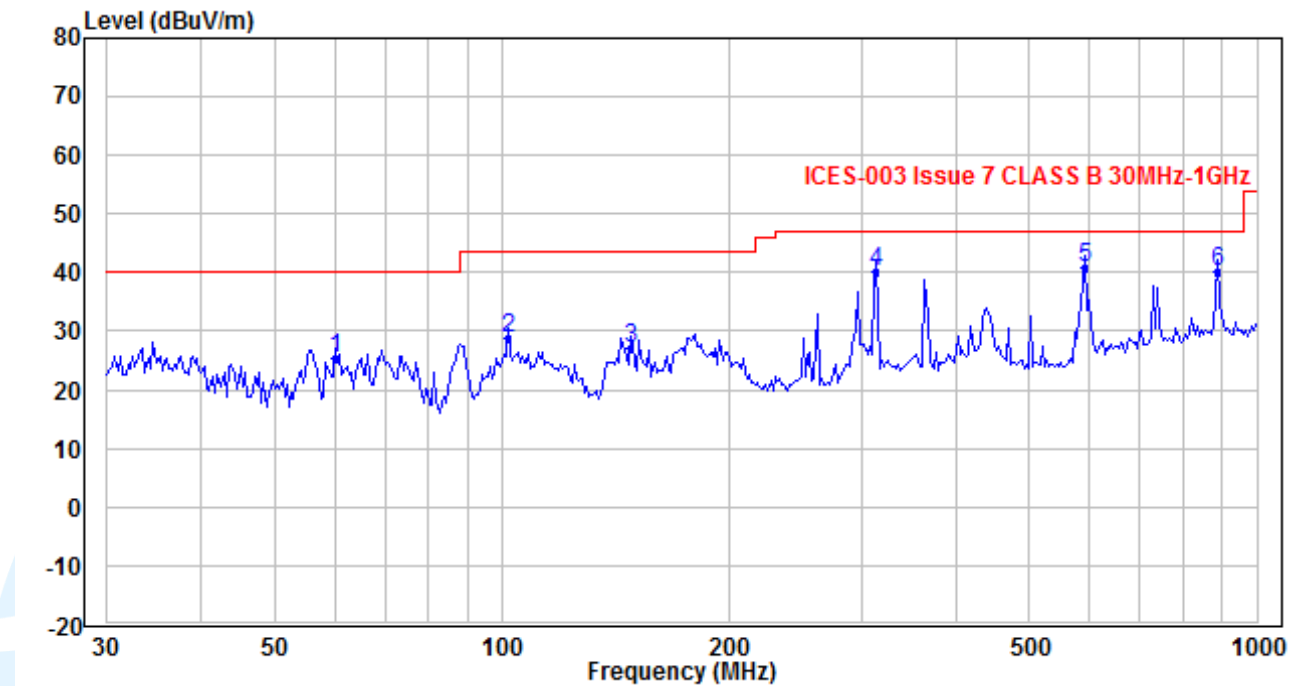
UTTR-EMC-ICES003-V1.2

The measurement data for ICES-003 Issue 7 as follows:

Below 1GHz(Quasi Peak):

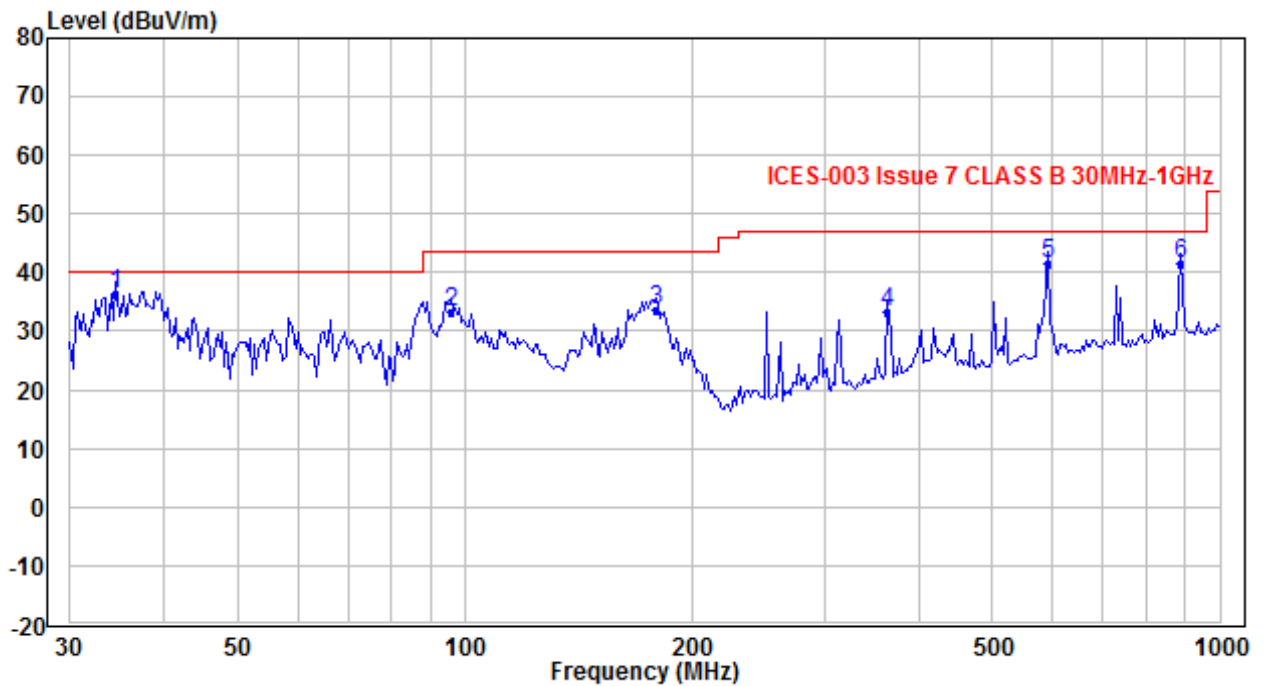
Test Mode1

Horizontal



No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	60.153	42.84	-17.60	25.24	40.00	-14.76	QP
2	101.893	44.54	-15.88	28.66	43.50	-14.84	QP
3	147.875	42.54	-15.51	27.03	43.50	-16.47	QP
4	313.648	46.02	-5.97	40.05	47.00	-6.95	QP
5	590.351	42.14	-1.28	40.86	47.00	-6.14	QP
6	887.398	36.24	4.07	40.31	47.00	-6.69	QP

Vertical



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	34.527	41.27	-4.98	36.29	40.00	-3.71	QP
2	95.649	49.09	-15.90	33.19	43.50	-10.31	QP
3	178.770	43.52	-9.91	33.61	43.50	-9.89	QP
4	363.523	38.64	-5.22	33.42	47.00	-13.58	QP
5	590.351	42.96	-1.28	41.68	47.00	-5.32	QP
6	887.398	37.33	4.07	41.40	47.00	-5.60	QP

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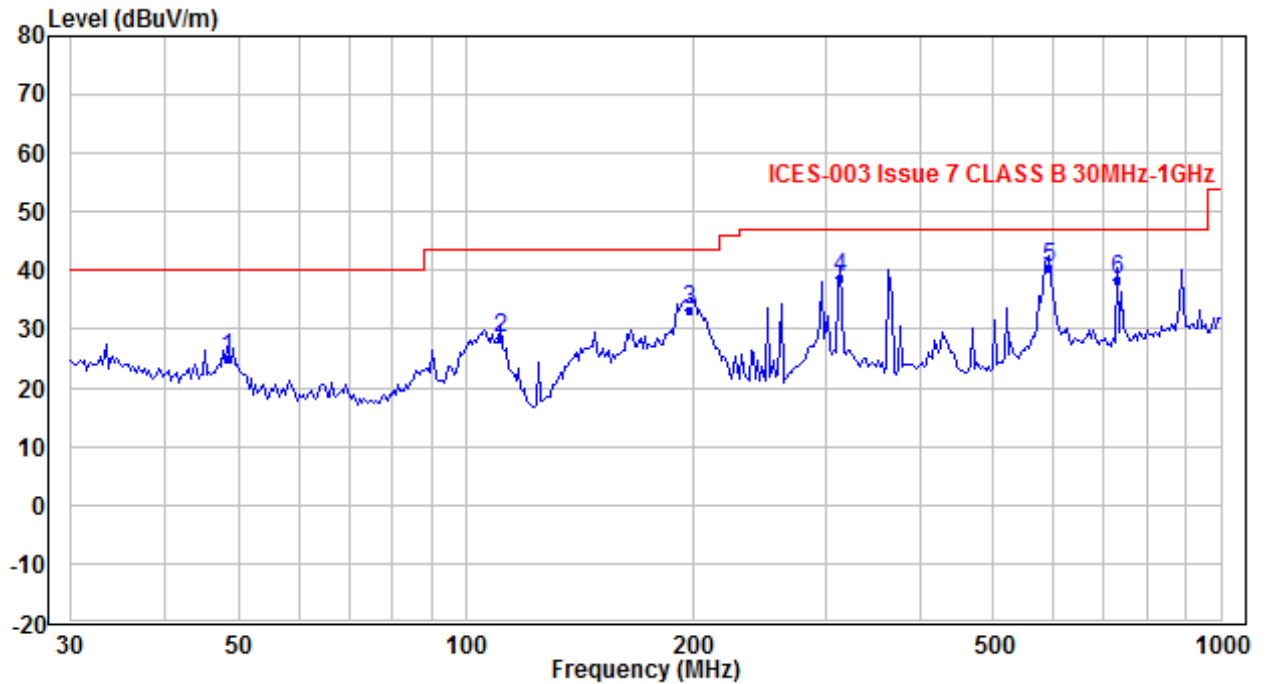
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Below 1GHz(Quasi Peak):
Test Mode 6
Horizontal



No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	48.378	38.64	-13.71	24.93	40.00	-15.07	QP
2	110.858	44.28	-15.85	28.43	43.50	-15.07	QP
3	197.251	43.95	-10.64	33.31	43.50	-10.19	QP
4	313.648	44.64	-5.97	38.67	47.00	-8.33	QP
5	590.351	41.81	-1.28	40.53	47.00	-6.47	QP
6	728.897	36.78	1.63	38.41	47.00	-8.59	QP

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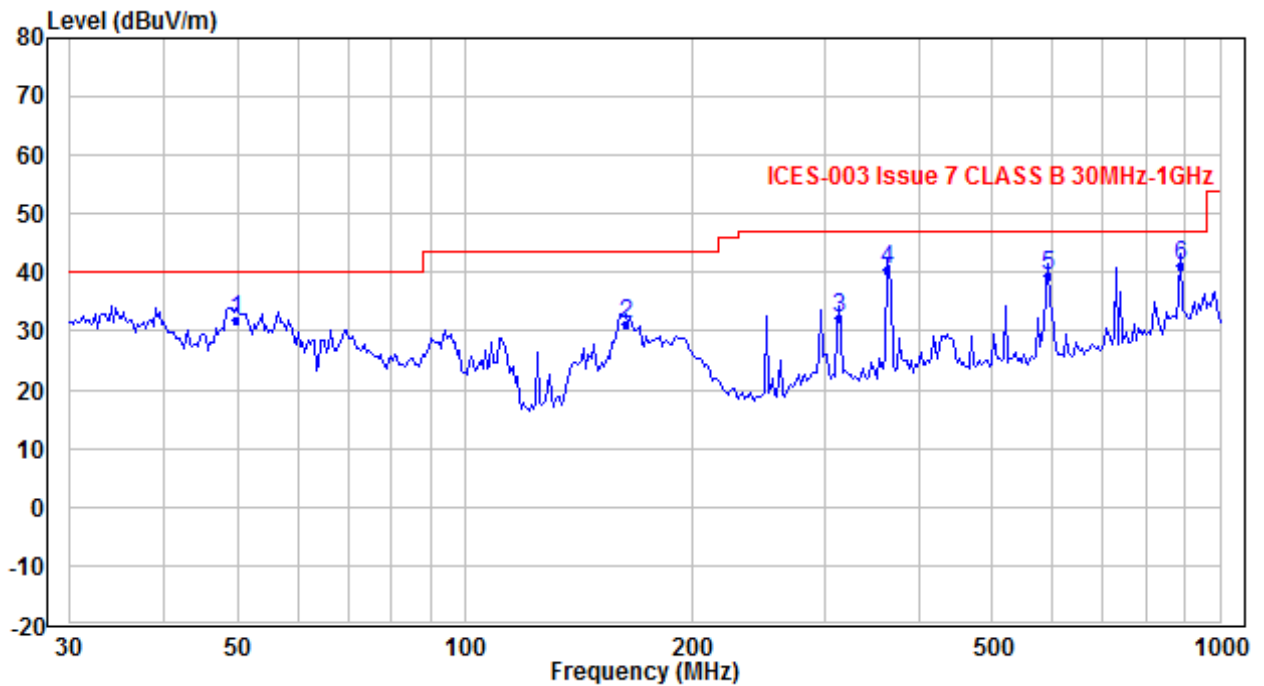
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Vertical



No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	49.757	46.58	-14.62	31.96	40.00	-8.04	QP
2	163.162	43.68	-12.62	31.06	43.50	-12.44	QP
3	313.648	38.33	-5.97	32.36	47.00	-14.64	QP
4	363.523	45.63	-5.22	40.41	47.00	-6.59	QP
5	590.351	40.85	-1.28	39.57	47.00	-7.43	QP
6	887.398	37.04	4.07	41.11	47.00	-5.89	QP

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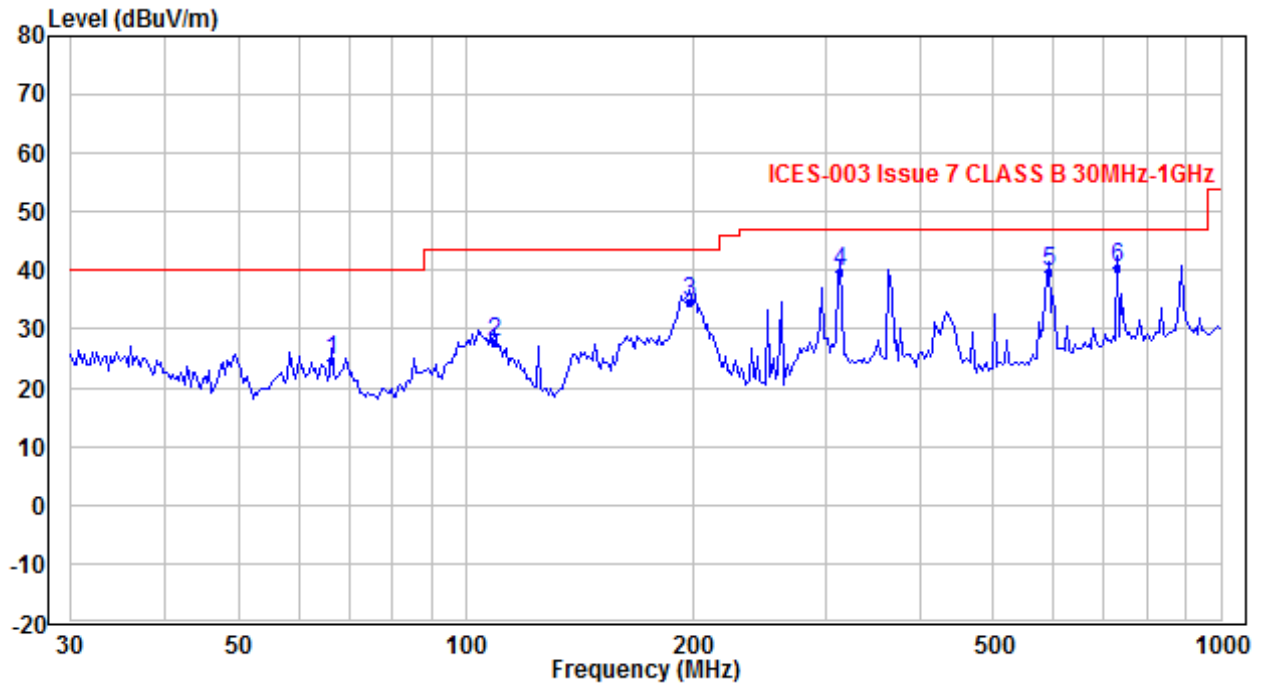
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Below 1GHz(Quasi Peak):
Test Mode 7
Horizontal



No.	Frequency (MHz)	Reading (dBμV/m)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	66.371	42.02	-17.30	24.72	40.00	-15.28	QP
2	109.311	43.96	-16.03	27.93	43.50	-15.57	QP
3	197.251	45.43	-10.64	34.79	43.50	-8.71	QP
4	313.648	45.65	-5.97	39.68	47.00	-7.32	QP
5	590.351	40.96	-1.28	39.68	47.00	-7.32	QP
6	728.897	38.99	1.63	40.62	47.00	-6.38	QP

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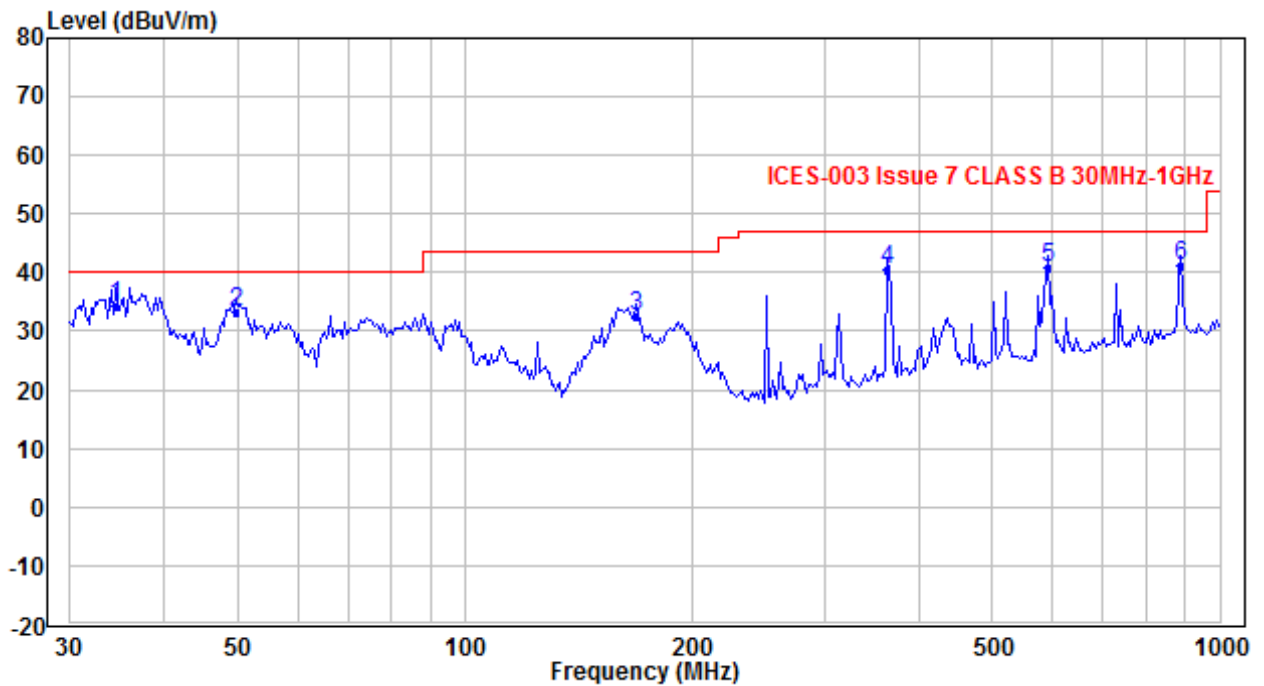
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Vertical



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	34.527	39.44	-4.98	34.46	40.00	-5.54	QP
2	49.757	47.85	-14.62	33.23	40.00	-6.77	QP
3	168.997	44.07	-11.55	32.52	43.50	-10.98	QP
4	363.523	45.81	-5.22	40.59	47.00	-6.41	QP
5	590.351	42.13	-1.28	40.85	47.00	-6.15	QP
6	887.398	36.93	4.07	41.00	47.00	-6.00	QP

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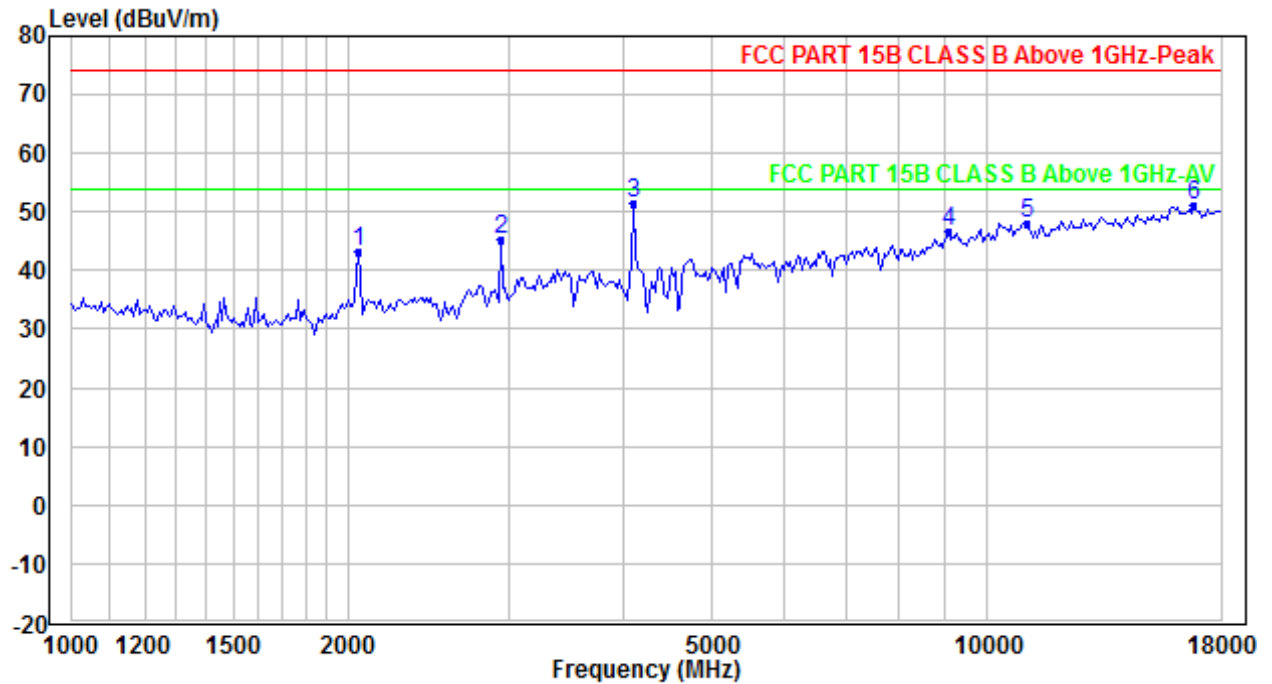
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Above 1GHz(Peak & Average)
Test Mode 1
Horizontal



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	2050.838	52.75	-9.45	43.30	74.00	-30.70	Peak
2	2936.954	52.21	-6.93	45.28	74.00	-28.72	Peak
3	4109.610	54.29	-2.94	51.35	74.00	-22.65	Peak
4	9087.293	41.71	5.09	46.80	74.00	-27.20	Peak
5	11065.320	40.69	7.38	48.07	74.00	-25.93	Peak
6	16791.350	38.68	12.61	51.29	74.00	-22.71	Peak

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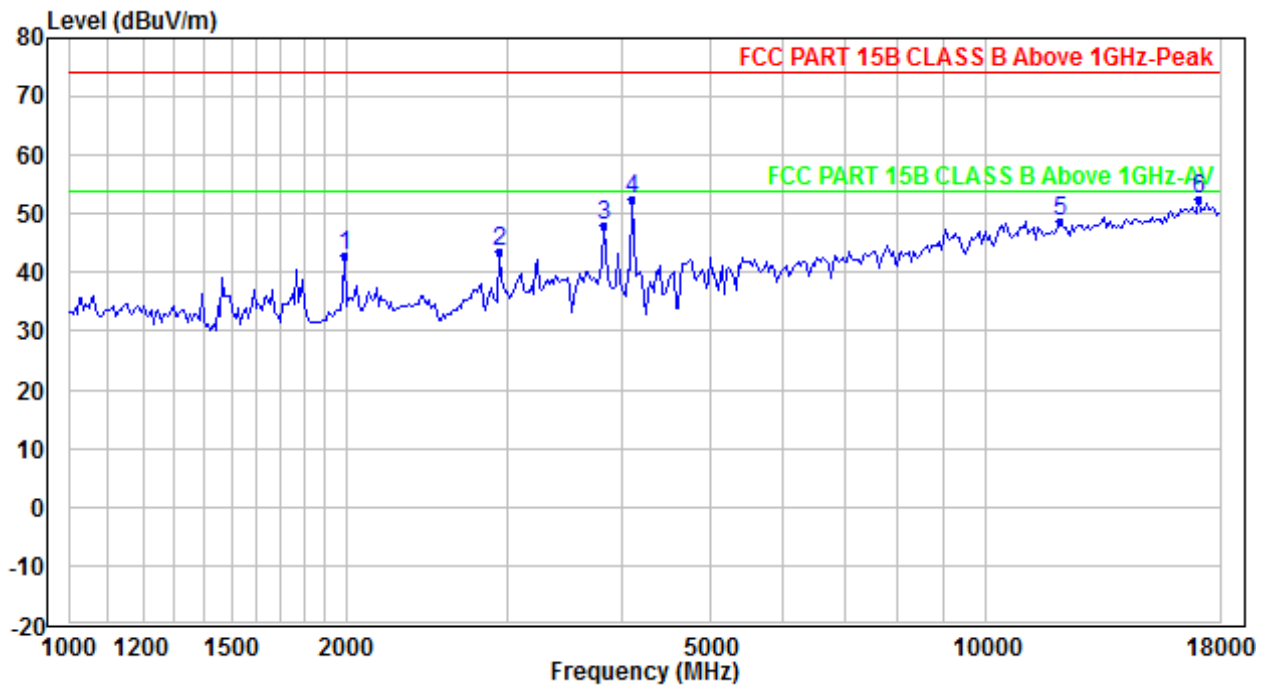
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UTTR-EMC-ICES003-V1.2

Vertical



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	1992.295	52.33	-9.59	42.74	74.00	-31.26	Peak
2	2936.954	50.51	-6.93	43.58	74.00	-30.42	Peak
3	3833.661	51.74	-3.69	48.05	74.00	-25.95	Peak
4	4109.610	55.34	-2.94	52.40	74.00	-21.60	Peak
5	12069.740	40.88	7.94	48.82	74.00	-25.18	Peak
6	17085.680	39.55	12.90	52.45	74.00	-21.55	Peak

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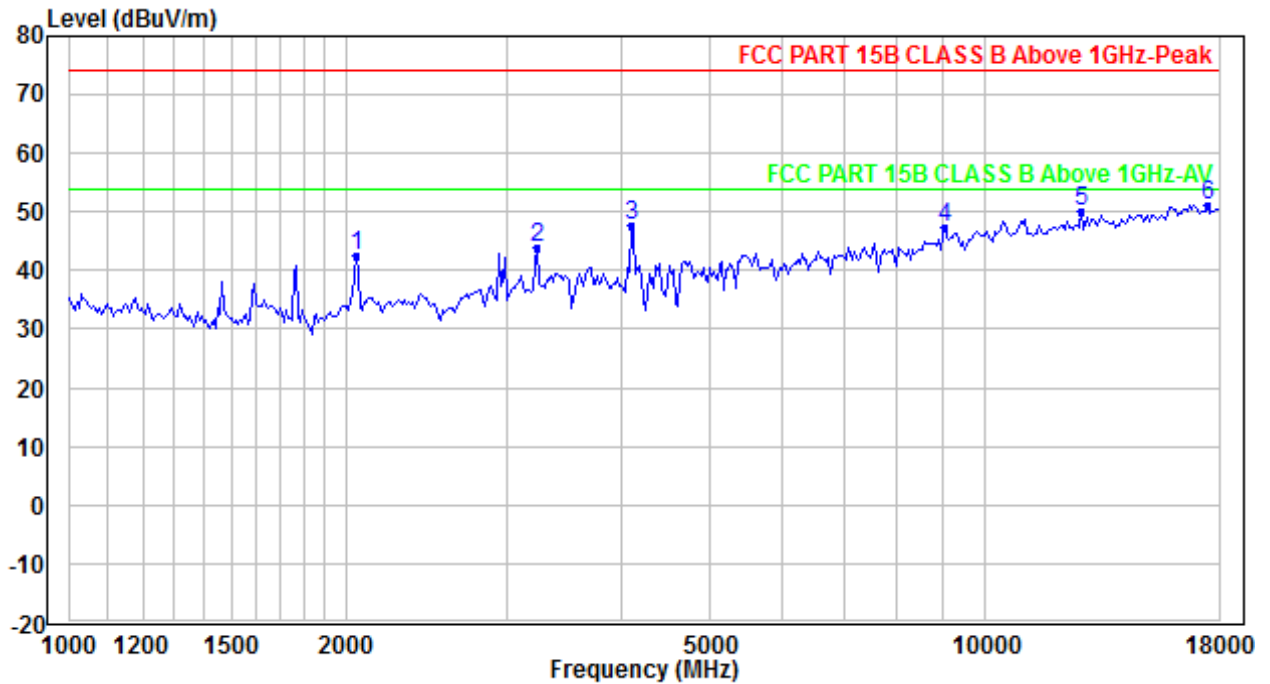
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UTTR-EMC-ICES003-V1.2

Above 1GHz(Peak & Average)
Test Mode 6
Horizontal



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	2050.838	52.08	-9.45	42.63	74.00	-31.37	Peak
2	3240.873	49.76	-5.87	43.89	74.00	-30.11	Peak
3	4109.610	50.66	-2.94	47.72	74.00	-26.28	Peak
4	9034.809	42.27	5.06	47.33	74.00	-26.67	Peak
5	12715.630	40.58	9.35	49.93	74.00	-24.07	Peak
6	17486.170	37.61	13.48	51.09	74.00	-22.91	Peak

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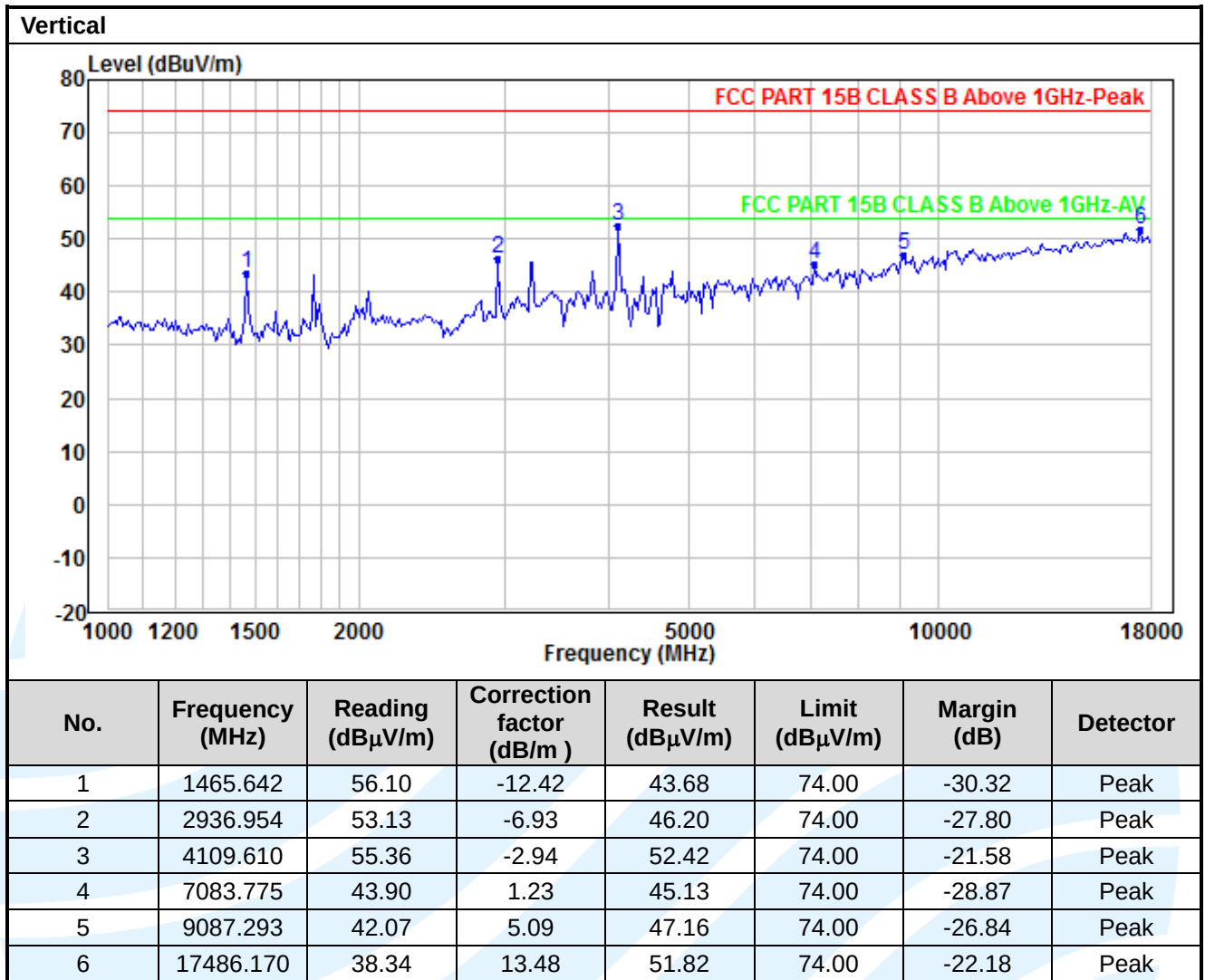
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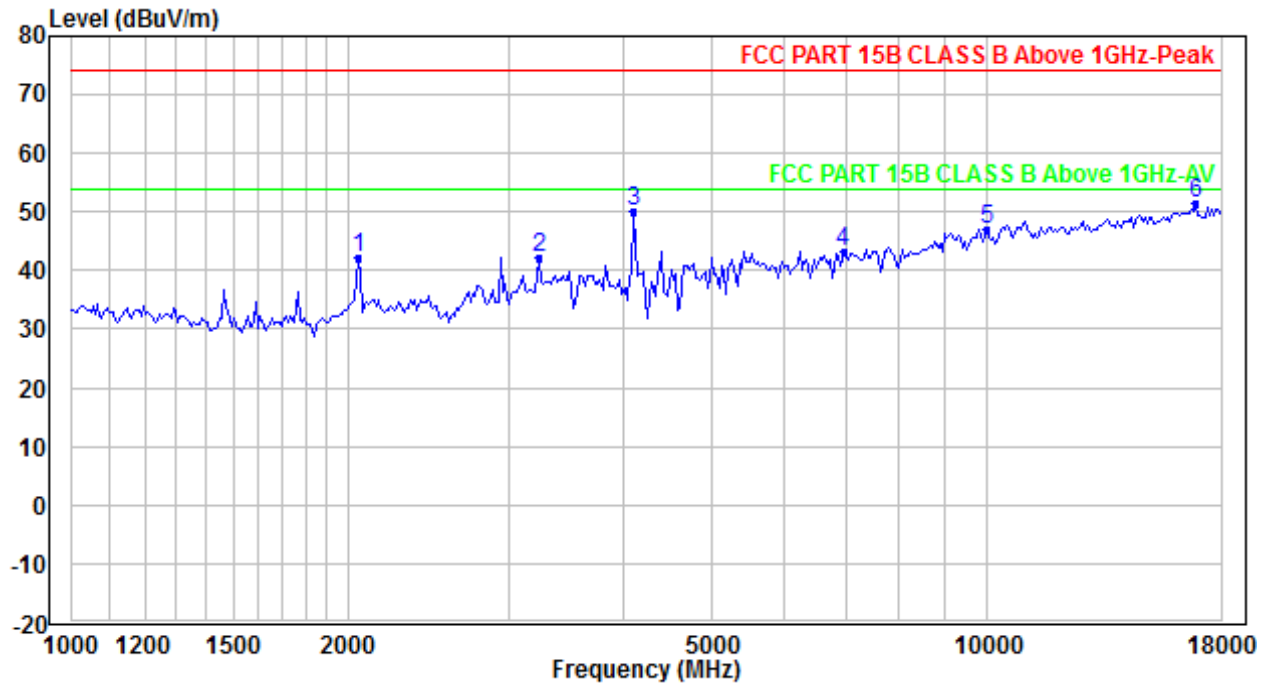
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Above 1GHz(Peak & Average)
Test Mode 7
Horizontal



No.	Frequency (MHz)	Reading (dB μ V/m)	Correction factor (dB/m)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
1	2050.838	51.81	-9.45	42.36	74.00	-31.64	Peak
2	3240.873	48.09	-5.87	42.22	74.00	-31.78	Peak
3	4109.610	53.03	-2.94	50.09	74.00	-23.91	Peak
4	6961.744	42.16	1.06	43.22	74.00	-30.78	Peak
5	9969.738	41.11	5.93	47.04	74.00	-26.96	Peak
6	16888.890	38.83	12.68	51.51	74.00	-22.49	Peak

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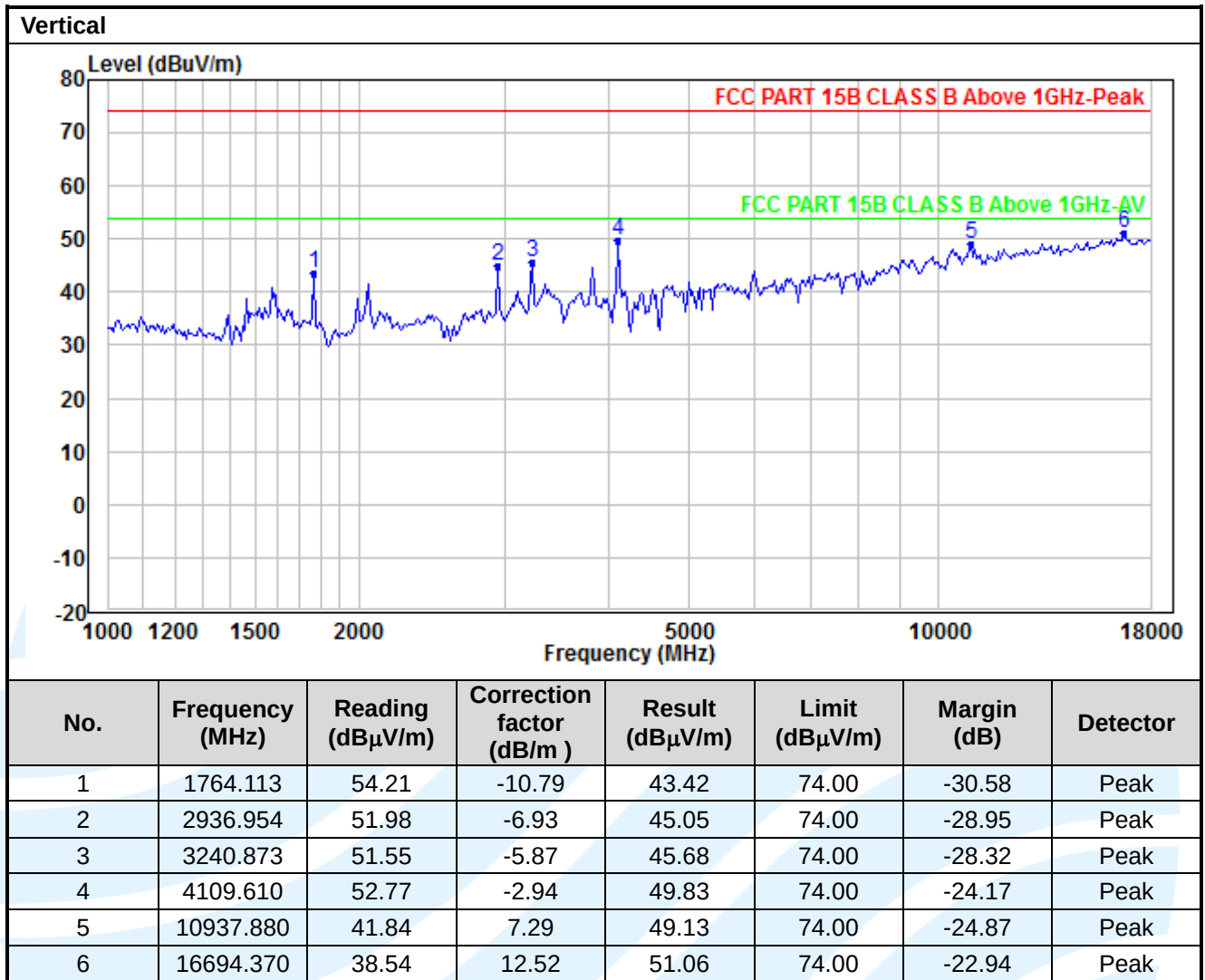
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Remark:

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, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, 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.

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6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107
ICES-003 Issue 7 Section 3.2.1

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

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

Test Setup: Refer to section 4.3.2 for details.

Test Procedures:

- 1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- 2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- 3) For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

Equipment Used: Refer to section 3 for details.

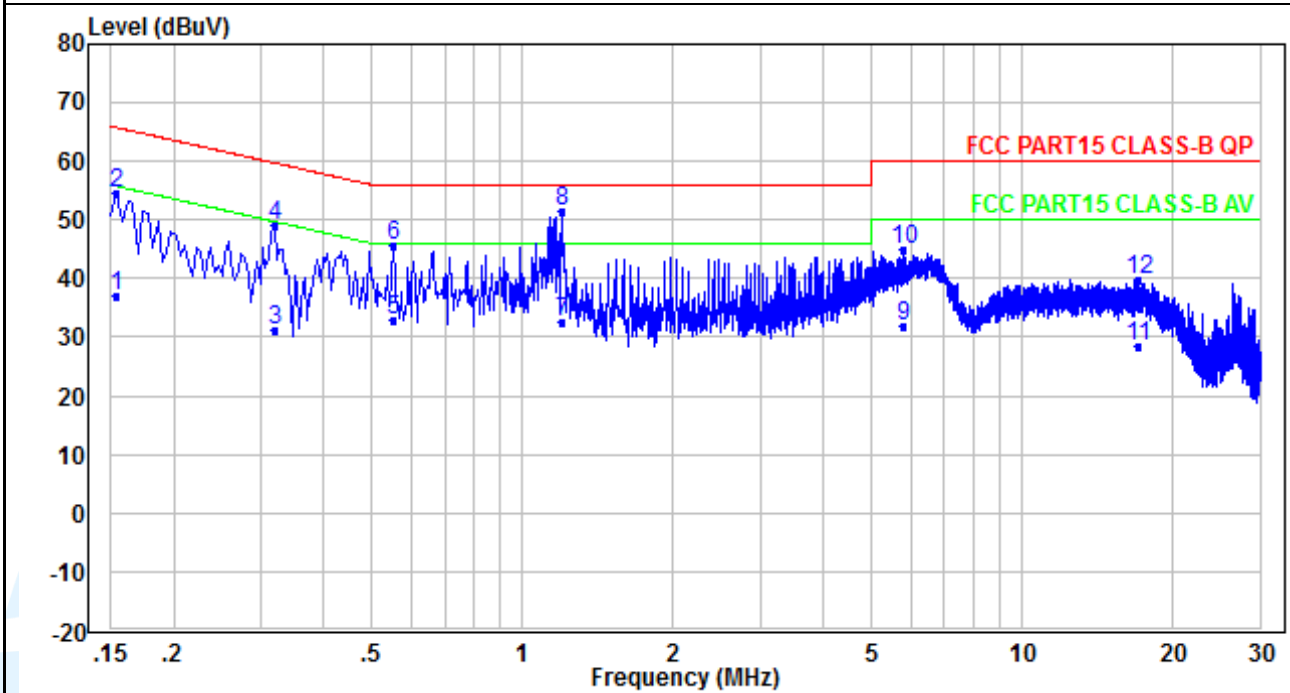
Test Result: Pass

The measurement data as follows:

Quasi Peak and Average:

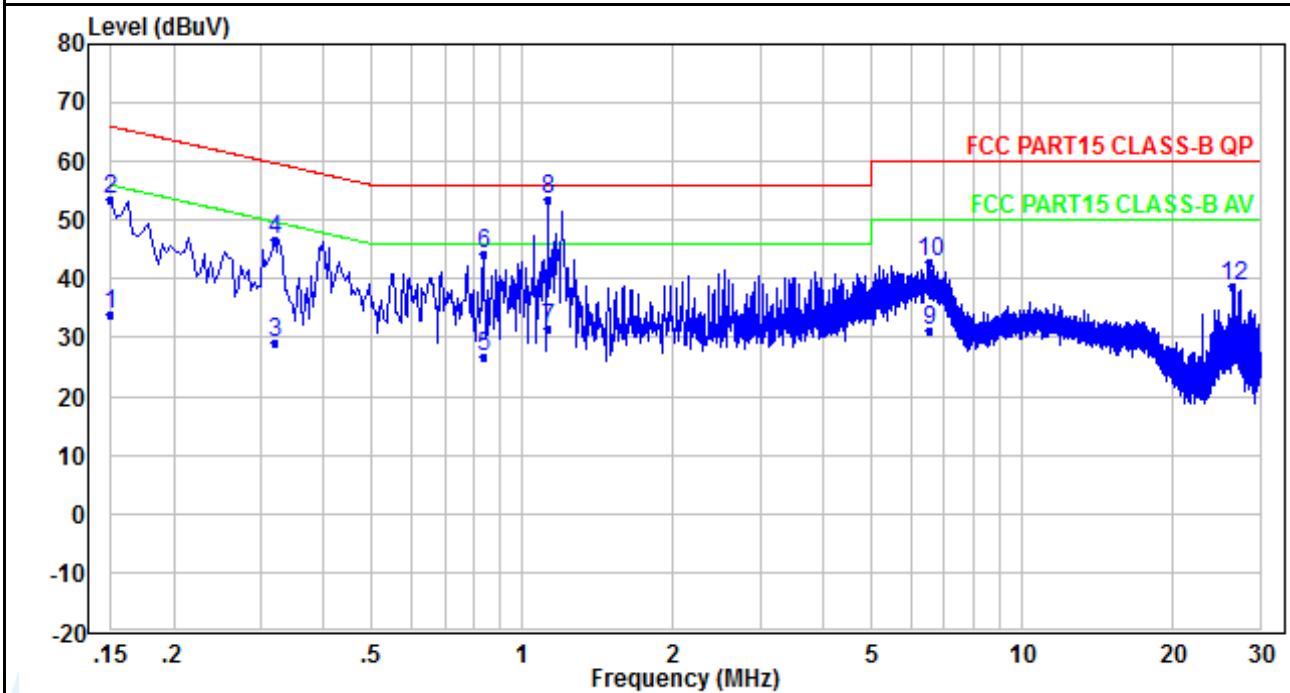
Test Mode 1

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.154	27.37	9.75	37.12	55.78	-18.66	Average
2	0.154	44.93	9.75	54.68	65.78	-11.10	QP
3	0.318	21.62	9.75	31.37	49.76	-18.39	Average
4	0.318	39.37	9.75	49.12	59.76	-10.64	QP
5	0.550	23.23	9.84	33.07	46.00	-12.93	Average
6	0.550	35.92	9.84	45.76	56.00	-10.24	QP
7	1.198	22.66	9.90	32.56	46.00	-13.44	Average
8	1.198	41.46	9.90	51.36	56.00	-4.64	QP
9	5.818	21.52	10.25	31.77	50.00	-18.23	Average
10	5.818	34.64	10.25	44.89	60.00	-15.11	QP
11	17.133	17.88	10.46	28.34	50.00	-21.66	Average
12	17.133	29.38	10.46	39.84	60.00	-20.16	QP

Neutral Line



No.	Frequency (MHz)	Reading (dB μ V)	Correction factor (dB)	Result (dB μ V)	Limit (dB μ V)	Margin (dB)	Detector
1	0.150	24.04	9.75	33.79	56.00	-22.21	Average
2	0.150	43.70	9.75	53.45	66.00	-12.55	QP
3	0.318	19.52	9.75	29.27	49.76	-20.49	Average
4	0.318	36.86	9.75	46.61	59.76	-13.15	QP
5	0.834	17.08	9.79	26.87	46.00	-19.13	Average
6	0.834	34.60	9.79	44.39	56.00	-11.61	QP
7	1.126	21.87	9.83	31.70	46.00	-14.30	Average
8	1.126	43.79	9.83	53.62	56.00	-2.38	QP
9	6.550	21.07	10.22	31.29	50.00	-18.71	Average
10	6.550	32.81	10.22	43.03	60.00	-16.97	QP
11	26.488	15.72	10.65	26.37	50.00	-23.63	Average
12	26.488	28.07	10.65	38.72	60.00	-21.28	QP

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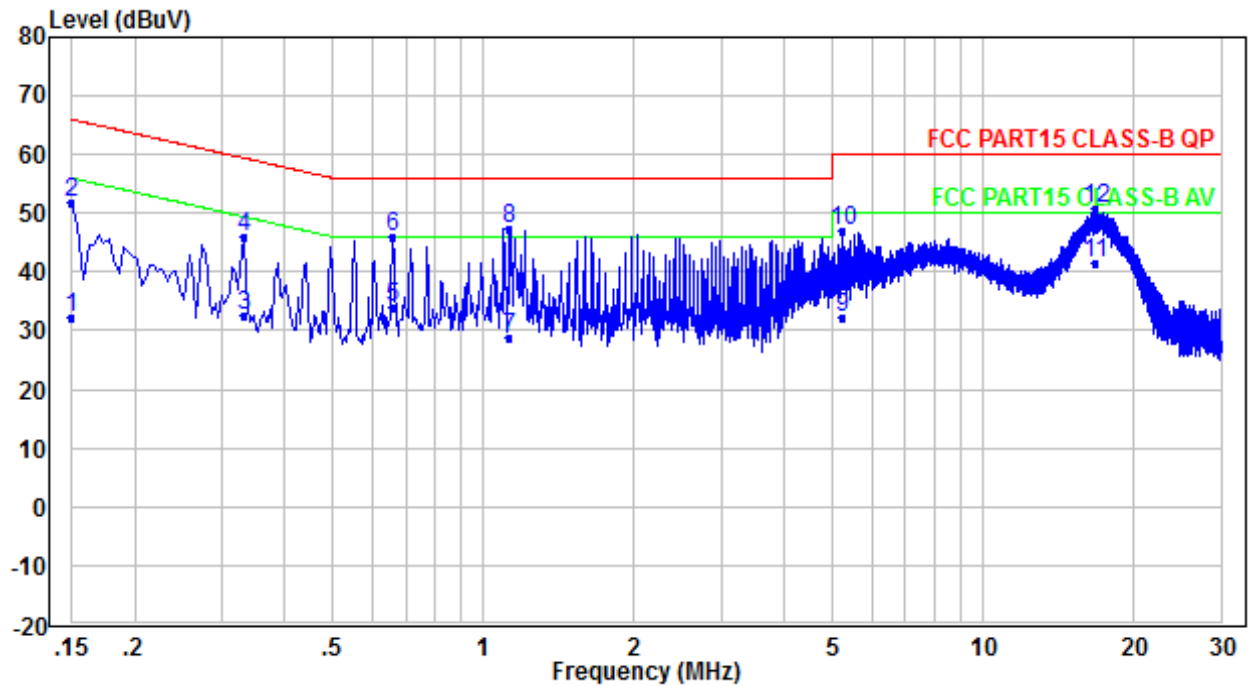
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Test Mode 6

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.150	22.55	9.75	32.30	56.00	-23.70	Average
2	0.150	42.15	9.75	51.90	66.00	-14.10	QP
3	0.330	22.84	9.77	32.61	49.45	-16.84	Average
4	0.330	36.18	9.77	45.95	59.45	-13.50	QP
5	0.658	24.20	9.85	34.05	46.00	-11.95	Average
6	0.658	36.02	9.85	45.87	56.00	-10.13	QP
7	1.130	18.83	9.89	28.72	46.00	-17.28	Average
8	1.130	37.49	9.89	47.38	56.00	-8.62	QP
9	5.222	21.91	10.24	32.15	50.00	-17.85	Average
10	5.222	36.89	10.24	47.13	60.00	-12.87	QP
11	16.809	31.03	10.44	41.47	50.00	-8.53	Average
12	16.809	40.21	10.44	50.65	60.00	-9.35	QP

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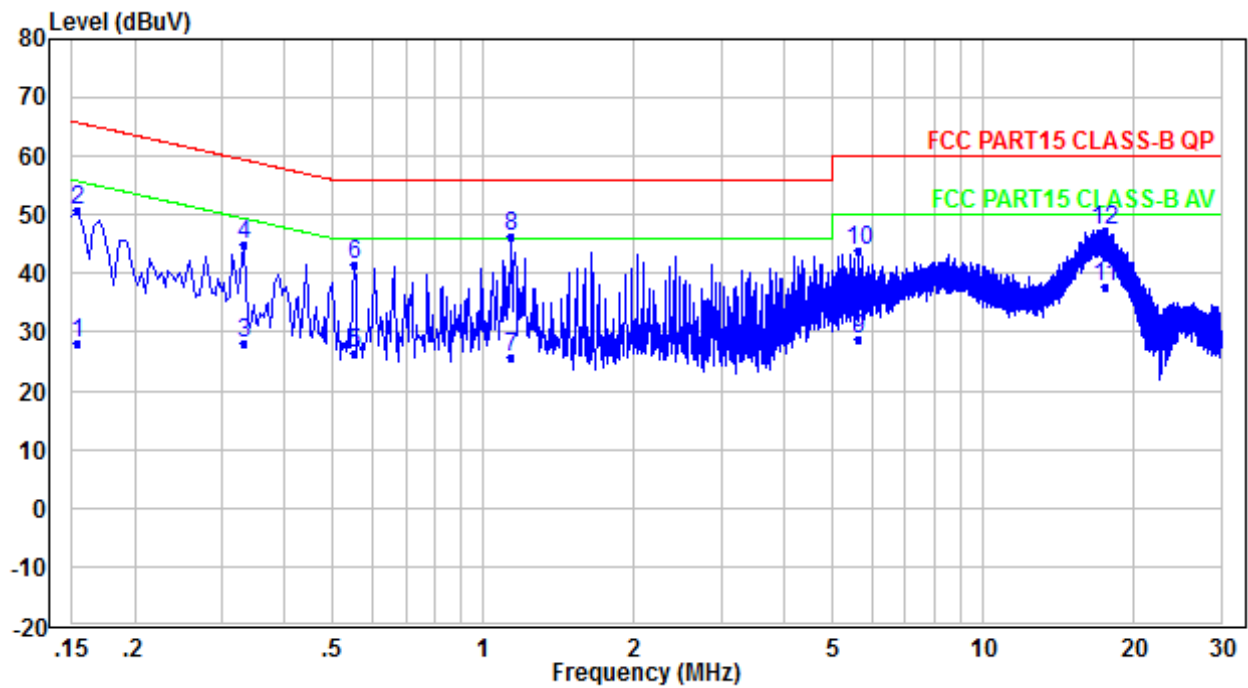
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Neutral Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.154	18.20	9.75	27.95	55.78	-27.83	Average
2	0.154	40.91	9.75	50.66	65.78	-15.12	QP
3	0.330	18.23	9.76	27.99	49.45	-21.46	Average
4	0.330	35.02	9.76	44.78	59.45	-14.67	QP
5	0.550	16.55	9.79	26.34	46.00	-19.66	Average
6	0.550	31.85	9.79	41.64	56.00	-14.36	QP
7	1.134	15.74	9.83	25.57	46.00	-20.43	Average
8	1.134	36.48	9.83	46.31	56.00	-9.69	QP
9	5.658	18.58	10.18	28.76	50.00	-21.24	Average
10	5.658	33.75	10.18	43.93	60.00	-16.07	QP
11	17.533	27.21	10.51	37.72	50.00	-12.28	Average
12	17.533	36.92	10.51	47.43	60.00	-12.57	QP

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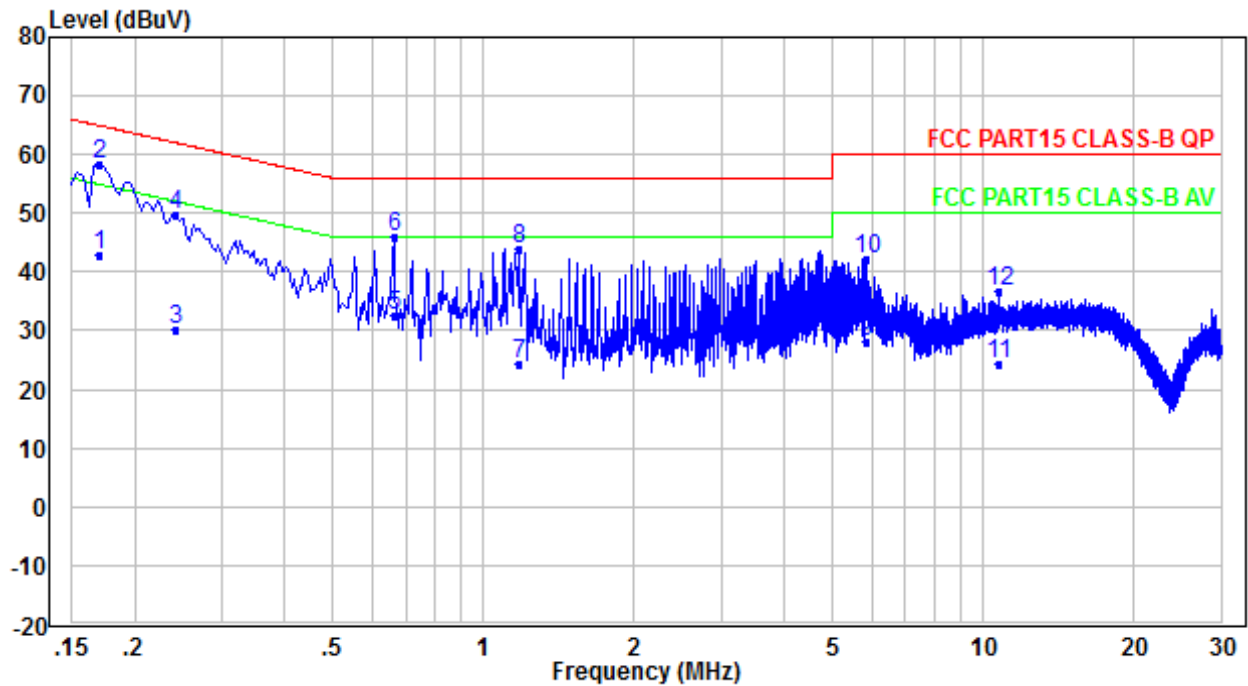
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Test Mode 7

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.170	33.13	9.75	42.88	54.96	-12.08	Average
2	0.170	48.71	9.75	58.46	64.96	-6.50	QP
3	0.242	20.29	9.74	30.03	52.03	-22.00	Average
4	0.242	40.13	9.74	49.87	62.03	-12.16	QP
5	0.662	22.77	9.85	32.62	46.00	-13.38	Average
6	0.662	35.98	9.85	45.83	56.00	-10.17	QP
7	1.174	14.54	9.90	24.44	46.00	-21.56	Average
8	1.174	33.95	9.90	43.85	56.00	-12.15	QP
9	5.830	18.01	10.25	28.26	50.00	-21.74	Average
10	5.830	31.89	10.25	42.14	60.00	-17.86	QP
11	10.765	14.22	10.27	24.49	50.00	-25.51	Average
12	10.765	26.52	10.27	36.79	60.00	-23.21	QP

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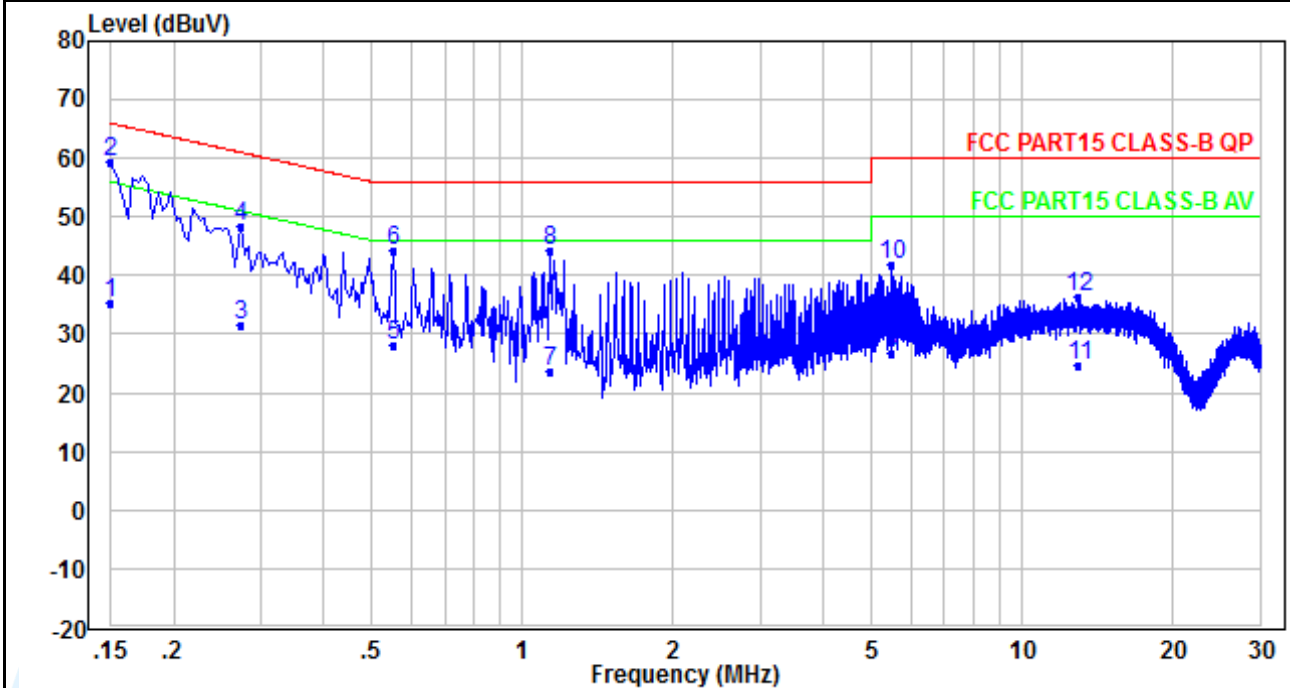
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UTTR-EMC-ICES003-V1.2

Neutral Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.150	25.60	9.75	35.35	56.00	-20.65	Average
2	0.150	49.75	9.75	59.50	66.00	-6.50	QP
3	0.274	21.93	9.75	31.68	51.00	-19.32	Average
4	0.274	38.59	9.75	48.34	61.00	-12.66	QP
5	0.550	18.20	9.79	27.99	46.00	-18.01	Average
6	0.550	34.62	9.79	44.41	56.00	-11.59	QP
7	1.134	13.67	9.83	23.50	46.00	-22.50	Average
8	1.134	34.47	9.83	44.30	56.00	-11.70	QP
9	5.498	16.47	10.17	26.64	50.00	-23.36	Average
10	5.498	31.54	10.17	41.71	60.00	-18.29	QP
11	12.989	14.25	10.43	24.68	50.00	-25.32	Average
12	12.989	25.93	10.43	36.36	60.00	-23.64	QP

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.
5. All possible modes of operation were investigated, and testing at two nominal voltages of 240V/50Hz and 120V/60Hz, only the worst case emissions reported.

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UTTR-EMC-ICES003-V1.2

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 for EUT external and internal photographs.

***** 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.
