



TEST REPORT

Product Name: Module

Trade Mark: CINTERION

Model No. / HVIN: PLS83-X-B

FCC ID: QIPPLS83-X-B

Report Number: 220730733EMC-1

Test Standards: FCC 47 CFR Part 15 Subpart B

ICES-003 Issue 7

Test Result: PASS

Date of Issue: October 26, 2022

Prepared for:

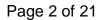
Thales DIS AIS Deutschland GmbH Siemensdamm 50, 13629 Berlin, Germany

Prepared by:

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Version

Version No. Date Descriptio		Description
V1.0	October 26, 2022	Original





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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Thales DIS AIS Deutschland GmbH
Address of Applicant:	Siemensdamm 50, 13629 Berlin, Germany
Manufacturer:	Thales DIS AIS Deutschland GmbH
Address of Manufacturer:	Werinherstr.81, 81541 Munich, Germany

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Module
Product Name.	Module
Model No. / HVIN:	PLS83-X-B
Trade Mark:	CINTERION
DUT Stage:	Production Unit
Rated Voltage:	□ DC3.8V provide from adaptor 120V~60Hz
Classification of digital devices:	Class B
Highest Internal Frequency:	2.6 GHz
Sample Received Date:	August 25, 2020
Sample Tested Date:	September 1, 2020 to September 16, 2020
EUT identification	200722022-A01/2
Firmware number	MDM9607.TX.1.0-00097-STD.PROD-1.366947.1.367976.1

1.2.2 Description of Accessories

None

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
Adaptor	N/A	CD139	20359	Applicant
PCB board	N/A	DSB75		Applicant
PCB board	N/A	AH8		Applicant
50 ohm terminal	N/A	N/A	N/A	UnionTrust

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by

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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.

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No.	ltem	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

Test Cases					
Test Item Test Requirement Test Method					
Conducted Emission	FCC 47 CFR Part 15.107 ICES-003 Issue 7 Section 3.2.1	ANSI C63.4-2014	Pass (SEE NOTE 1)		
Radiated Emission	FCC 47 CFR Part 15.109 ICES-003 Issue 7 Section 3.2.2	ANSI C63.4-2014	Pass (SEE NOTE 1)		

This report is based on the previous report that changed the software version and ICES-003 standard version. The main change is that the module only supports data services. Please refer to declaration of difference for more details. After the evaluation, all technical data is referred to previous report no. 200722022EMC-1 dated February 3, 2021.

Test Plan:

- 1) According to the difference description, PLS83-X-B shares the same data from the PLS83-X original report (Report No.: 200722022EMC-1).
- 2) The difference is defined by the applicant and the referenced data complies with FCC/ISED regulations, and the applicant assumes full responsibility.
- The data of PLS83-X-B was used for PLS83-X as bellow:

Test Item	Description		
Conducted Emission	Reuse		
Radiated Emission	Reuse		



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)	
\boxtimes	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 03, 2018	Dec. 03, 2021	
\boxtimes	Receiver	R&S	ESIB26	100114	Nov. 24, 2019	Nov. 23, 2020	
	Loop Antenna	ETS-LINDGREN	6502	00202525	Nov. 16, 2019	Nov. 15, 2020	
\boxtimes	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Nov. 16, 2019	Nov. 15, 2020	
\boxtimes	6dB Attenuator	Talent	RA6A5-N- 18	18103001	Nov. 16, 2019	Nov. 15, 2020	
\boxtimes	Preamplifier	HP	8447F	2805A02960	Nov. 24, 2019	Nov. 23, 2020	
	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	Nov. 24, 2019	Nov. 23, 2020	
	6dB Attenuator	Talent	RA6A5-N- 18	18103002	Nov. 24, 2019	Nov. 23, 2020	
	Horn Antenna	ETS-LINDGREN	3117	00164202	Nov. 16, 2019	Nov. 15, 2020	
X	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May. 30, 2020	May. 29, 2021	
	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jun. 19, 2020	Jun. 18, 2021	
	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Nov. 16, 2019	Nov. 15, 2020	
\boxtimes	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A	
\boxtimes	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)	
\boxtimes	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Nov. 24, 2019	Nov. 23, 2020	
\boxtimes	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Nov. 24, 2019	Nov. 23, 2020	
\boxtimes	LISN	R&S	ESH2-Z5	860014/024	Nov. 24, 2019	Nov. 23, 2020	
	LISN	ETS-Lindgren	3816/2SH	00201088	Nov. 24, 2019	Nov. 23, 2020	
\boxtimes	Test Software	Audix	e3	Software Version: 9.160323		0323	



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		
rest Condition	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NT/NV	+15 to +35 3.8 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	24.4	55	99.33	Tripp Jiang
Radiated Emission	25.6	52	100.02	Asia Yan

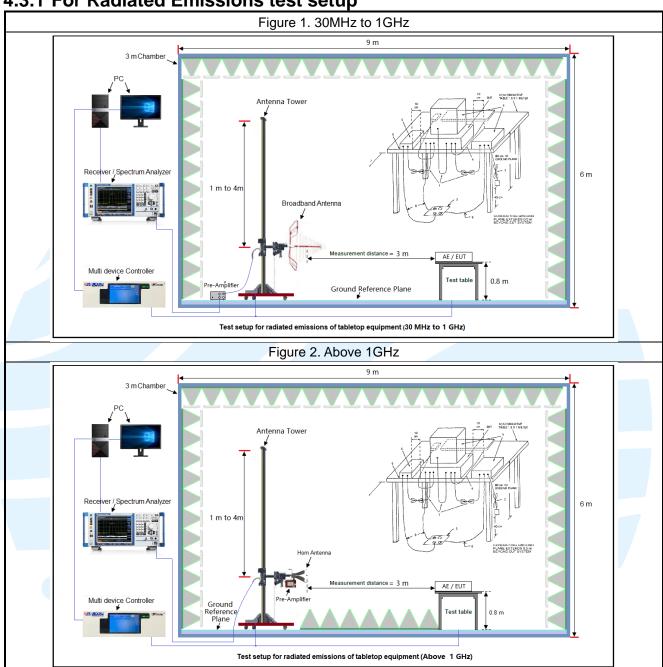
4.2 TEST MODES

Test Item	EMI Test Modes	
	Mode 1: Charging from adapter + GSM850+ GPS on	
Dadieta d Envisaire	Mode 2: Charging from adapter + WCDMA II+ GPS on	
Radiated Emission	Mode 3: Charging from adapter + LTE B2+ GPS on	
	Mode 4: ESIM select worst mode from mode1~3	
	Mode 1: Charging from adapter + GSM850+ GPS on	
On a Laster LEaster to	Mode 2: Charging from adapter + WCDMA II+ GPS on	
Conducted Emission	Mode 3: Charging from adapter + LTE B2+ GPS on	
Mode 4: ESIM select worst mode from mode1~3		
Remark: The above test modes in boldface were the worst cases, only the test data of these modes were reported.		



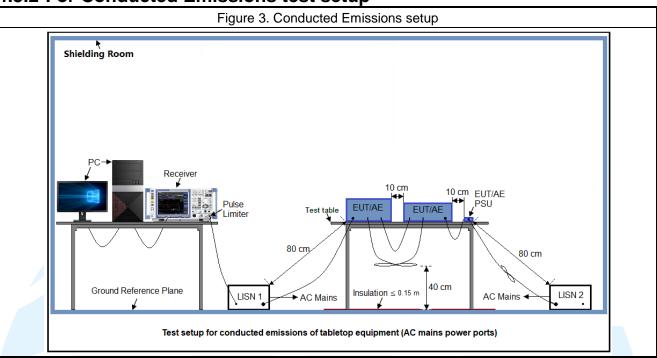
4.3 TEST SETUP

4.3.1 For Radiated Emissions test setup





4.3.2 For Conducted Emissions test 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)	Frequency: (f) Detector type Measurement receiver bandwidth		ceiver bandwidth
(MHz)	Detector type	RBW	VBW
30 ≤ f ≤ 1 000	Quasi Peak	120 kHz	300 kHz
f ≥1000	Peak	1 MHz	3 MHz
1 ≥ 1000	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

Fraguency (MHz)	limits at 3m (dBµV/m)		
Frequency (MHz)	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

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Frequency (MHz)	limits at 3m (dBμV/m)		
Frequency (MHZ)	QP Detector	PK Detector	AV Detector
30 – 88	40.0		
88 – 216	43.5		
216 – 230	46.0		



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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 $(dB\mu V/m) = 20 \log Emission level (\mu V/m)$.
- 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:

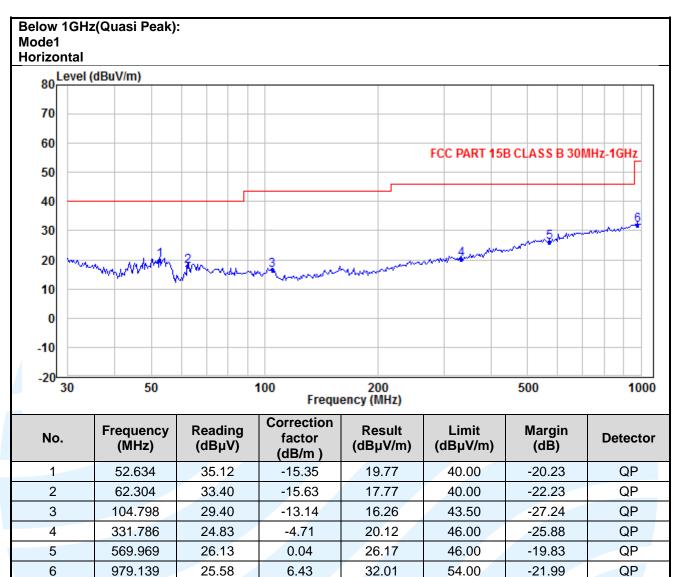
- 1. From 30 MHz to 1GHz test procedure as below:
- 1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
- 2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in 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.

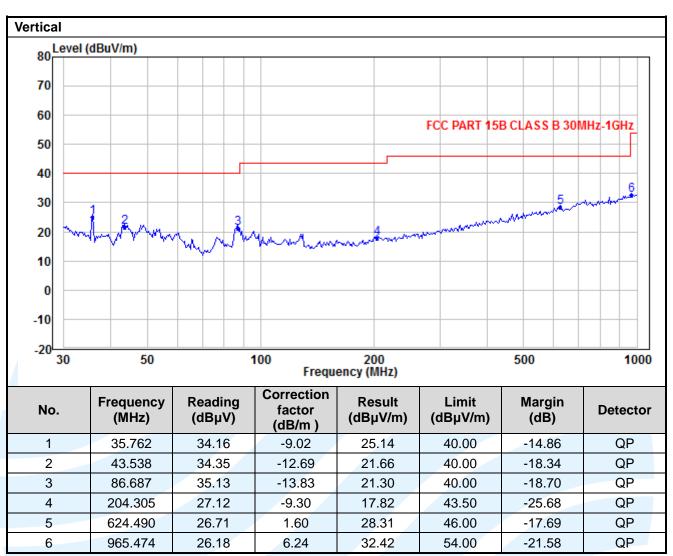
Test Result: Pass

The measurement data as follows:











5

6

14277.410

16791.350

39.10

40.22

10.36

10.21

49.46

50.43

74.00

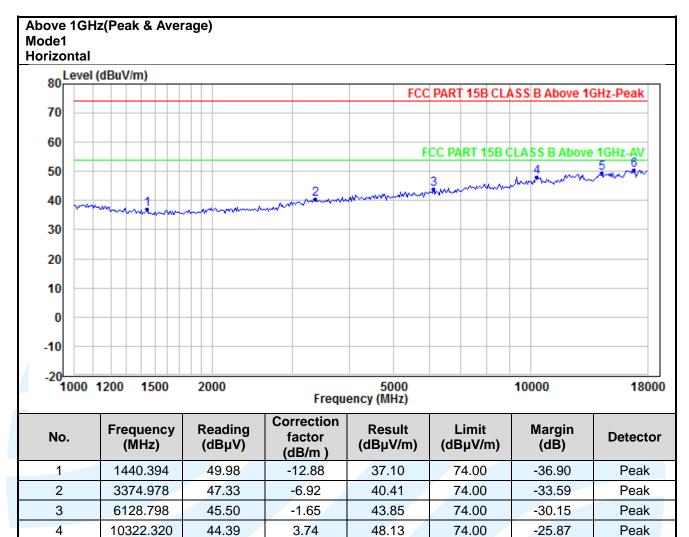
74.00

-24.54

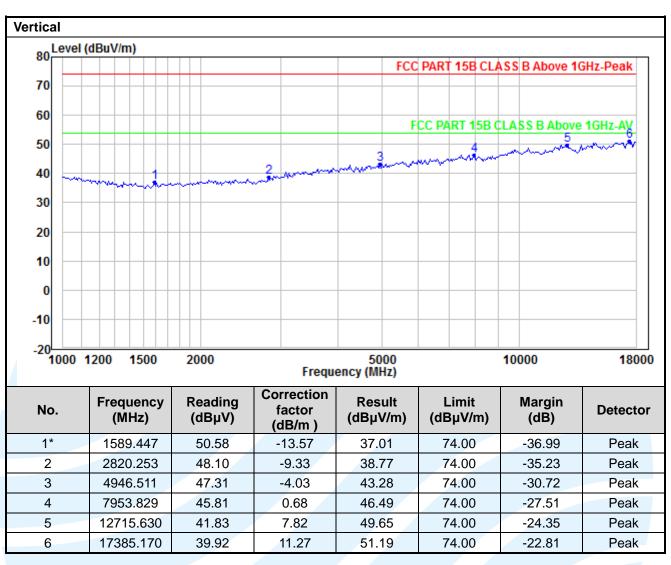
-23.57

Peak

Peak







Remark:

- 1. Correct Factor = Antenna Factor + Cable Loss Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
- Result = Reading + Correct Factor.
- 3. Margin = Result Limit
- 4. 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.
- 5. The limit of ICES-003 in the 230MHz to 960MHz band is higher than that of FCC Part 15B, so the radiation emission test data conform to the limit of ICES-003.



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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	Limits (dB(μV)		
(MHz)	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.

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.

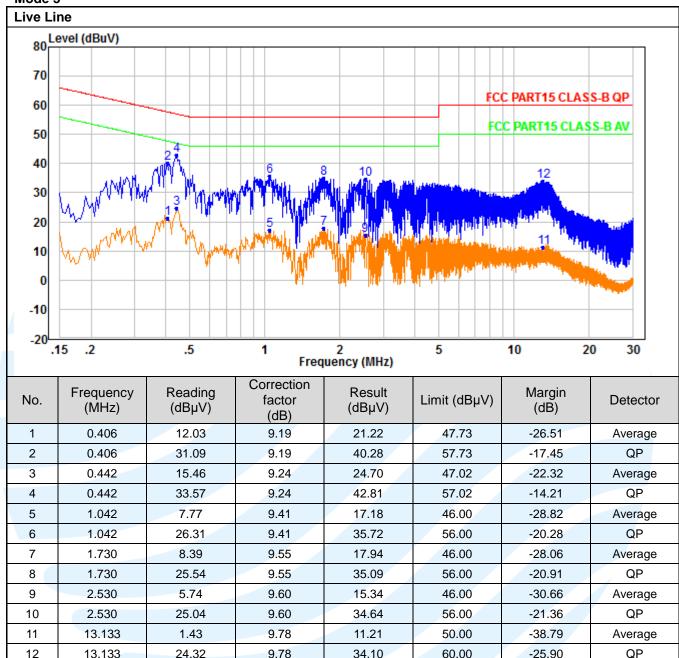
Test Result: Pass



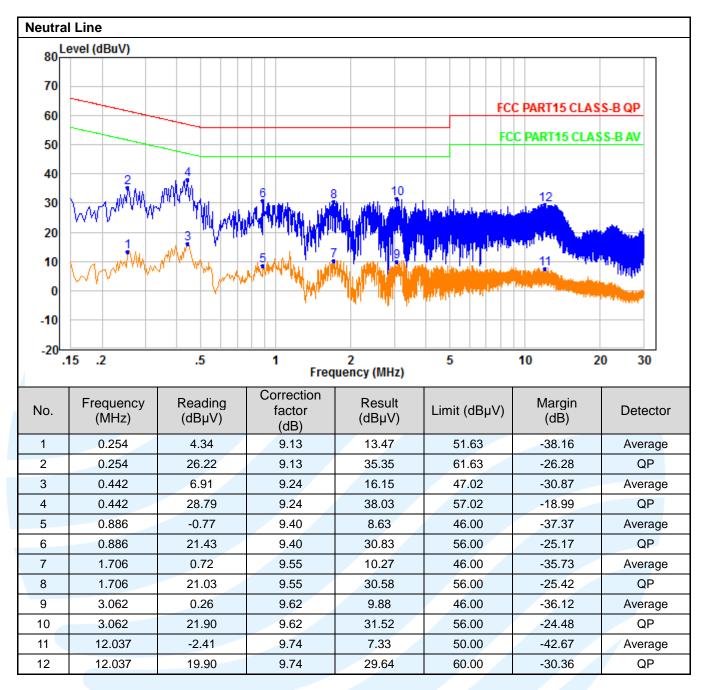
The measurement data as follows:

Quasi Peak and Average:

Mode 3







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.

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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

