FCC 15B Test Report

FCC ID	:	**U4G-Q104G**
Equipment	:	**Personal Digital Assistant**
Model No.	:	**MEMOR 20 WWAN**
Brand Name	:	**Datalogic**
Applicant	:	**Datalogic S.r.l.**
Address	:	**Via S. Vitalino, 13 40012, Lippo di Calderara di Reno (BO) ITALY**
Standard	:	**FCC Part 15, Subpart B, Class B ICES-003 Issue 6, Class B ANSI C63.4:2014**
Received Date	:	**Dec. 04, 2019**
Tested Date	:	**May 15 ~ May 20, 2019 (for original test) Dec. 04 ~ Dec. 18, 2019 (for new test)**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Peter Lin / Supervisor

Approved by:

Kent Chen / Assistant Manager

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FD942301-02	Rev. 01	Initial issue	Dec. 31, 2019
FD942301-02	Rev. 02	Adding FCC ID	Jan. 16, 2020

Summary of Test Results

FCC Part 15, Subpart B Emission Tests				
Ref. Std. Clause	**Test Standard**	**Test Items**	**Measured**	**Result**
15.107	FCC Part 15, Subpart B, Class B	Conducted Emissions	-6.63dB QP@ 0.641MHz.	Pass
15.109	FCC Part 15, Subpart B, Class B	Radiated Emissions	-3.66dB QP@ 44.55MHz.	Pass

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

1 General Description

1.1 Information

The report is issued as a supplementary report to original ICC report no. FD942301. The modification is adding 2nd source panel.

original panel	2nd source panel
Brand: Ellipsiz Communications Taiwan Ltd.	Brand: LEADGIANT
Model: EA056R1021H080TF	Model: LA056R1021H080TF

1.1.1 Feature of Equipment under Test (EUT)

Power Supply Type	5-9V/3A from adapter 3.85Vdc from battery
Highest Frequency of the Internal Sources	5825MHz

1.1.2 Accessories

Accessories		
No.	**Equipment**	**Description**
1	Adapter	Brand: Channel Well Technology Co., Ltd. Model: 2ACP0183C Power Rating: I/P: 100-240Vac, 0.5A, 50/60Hz O/P: 5V⎓3A / 9V⎓2A / 12V⎓1.5A
2	Battery	Brand: DATALOGIC Model: BY-05 Rating: 3.85Vdc, 15Wh
3	USB type-C cable	1.2m shielded without core

1.2 The Equipment List

Tested date: May 15 ~ May 20, 2019

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Test Date	May 20, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Jan. 08, 2019	Jan. 07, 2020
LISN	R&S	ENV216	101579	Mar. 08, 2019	Mar. 07, 2020
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127-666	Nov. 29, 2018	Nov. 28, 2019
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 23, 2018	Oct. 23, 2019
50 ohm terminal (Support Unit)	NA	50	04	May 22, 2018	May 21, 2019
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission below 1GHz				
Test Site	966 chamber 2 / (03CH02-WS)				
Test Date	May 15, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	Agilent	N9038A	MY53290044	Sep. 17, 2018	Sep. 16, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 09, 2018	Nov. 08, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-523	Dec. 03, 2018	Dec. 02, 2019
Preamplifier	EMC	EMC02325	980194	Sep. 18, 2018	Sep. 17, 2019
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160501	Oct. 22, 2018	Oct. 21, 2019
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Oct. 22, 2018	Oct. 21, 2019
LF cable 10M	EMCC	CFD400-E	CFD400-001	Oct. 22, 2018	Oct. 21, 2019
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission above 1GHz				
Test Site	966 chamber 2 / (03CH02-WS)				
Test Date	May 16, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	Agilent	N9010A	MY53400091	Nov. 07, 2018	Nov. 06, 2019
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Sep. 22, 2018	Sep. 21, 2019
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2018	Nov. 14, 2019
Preamplifier	Agilent	83017A	MY39501309	Sep. 25, 2018	Sep. 24, 2019
Preamplifier	EMC	EMC184045B	980192	Aug. 09, 2018	Aug. 08, 2019
RF Cable	EMC	EMC105-SM-SM-8000	180512	Oct. 22, 2018	Oct. 21, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Oct. 22, 2018	Oct. 21, 2019
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Tested date: Dec. 04 ~ Dec. 18, 2019

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Test Date	Dec. 18, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Jan. 08, 2019	Jan. 07, 2020
LISN	R&S	ENV216	101579	Mar. 08, 2019	Mar. 07, 2020
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Dec. 05, 2019	Dec. 04, 2020
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 22, 2019	Oct. 21, 2020
50 ohm terminal (Support Unit)	NA	50	04	May 28, 2019	May 27, 2020
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission below 1GHz				
Test Site	966 chamber 2 / (03CH02-WS)				
Test Date	Dec. 04, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	Agilent	N9038A	MY53290044	Sep. 17, 2019	Sep. 16, 2020
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2019	Nov. 12, 2020
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 12, 2019	Jul. 11, 2020
Preamplifier	EMC	EMC02325	980194	Sep. 18, 2019	Sep. 17, 2020
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160501	Oct. 18, 2019	Oct. 17, 2020
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Oct. 18, 2019	Oct. 17, 2020
LF cable 10M	EMCC	CFD400-E	CFD400-001	Oct. 18, 2019	Oct. 17, 2020
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission above 1GHz				
Test Site	966 chamber 2 / (03CH02-WS)				
Test Date	Dec. 04, 2019				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	Agilent	N9010A	MY53400091	Nov. 15, 2019	Nov. 14, 2020
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Sep. 26, 2019	Sep. 25, 2020
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2019	Nov. 14, 2020
Preamplifier	Agilent	83017A	MY39501309	Sep. 24, 2019	Sep. 23, 2020
Preamplifier	EMC	EMC184045B	980192	Aug. 01, 2019	Jul. 31, 2020
RF Cable	EMC	EMC105-SM-SM-8000	180512	Oct. 18, 2019	Oct. 17, 2020
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Oct. 18, 2019	Oct. 17, 2020
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.3 Testing Applied Standards

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

FCC Part 15, Subpart B, Class B
ICES-003 Issue 6, Class B
ANSI C63.4:2014

1.4 Deviation from Test Standard and Measurement Procedure

None

1.5 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Measurement Uncertainty		
Test Item	**Frequency**	**Uncertainty**
Conducted Emissions	150kHz ~ 30MHz	±2.92 dB
Radiated Emissions	30MHz ~ 1GHz	±4.32 dB
	Above 1GHz	±4.90 dB

Note: The results of measurements of emissions shall reference the measurement uncertainty considerations contained in CISPR 16-4-2.

2 Test Configuration

2.1 Testing Condition

Tested date: May 15 ~ May 20, 2019

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	21°C / 59%	Alex Tsai
Radiated Emissions	03CH02-WS	23°C / 62%	Brad Wu Alex Tsai

- FCC Designation No.: TW1073
- FCC site registration No.: 933633

Tested date: Dec. 04 ~ Dec. 18, 2019

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	21°C / 62%	Alex Tsai
Radiated Emissions	03CH02-WS	24°C / 62%	Brad Wu

- FCC Designation No.: TW1073
- FCC site registration No.: 933633

2.2 The Worst Case Measurement Configuration

Radiation Pretest Mode	
Pretest Mode	**Operating Description**
1	WiFi 2.4G & 2G Link, GNSS Rx, Front/Rear Cam, EMMC R/W, 2nd display, NFC R/W, EUT Standalone
2	WiFi 5G & 3G & BT Link, GNSS Rx, VLC play video, with Adapter
3	Data + IrDa transfer, Barcode scan, USB connection with Notebook
4	LTE & BT Link, GNSS Rx, VLC play video, Wireless charging with cradle
For **Pretest Mode 4** is the worst case and only its data was record in this test report.	

Note: New sample with 2nd source panel was performed the test according to the original worst case conditions in original report no. FD942301.

The Determined Worst Case Configurations	
Conducted Emissions	
Test Mode	**Operating Description**
1	Original panel:WiFi 5G & 3G & BT Link, GNSS Rx, VLC play video, with Adapter (Battery 40%)
2	Original panel:Data + IrDa transfer, Barcode scan, USB connection with Notebook (Battery 48%) -
3	Original panel:LTE & BT Link, GNSS Rx, VLC play video, Wireless charging with cradle (Battery 42%)
4	2nd source panel: WiFi 5G & 3G & BT Link, GNSS Rx, VLC play video, with Adapter (Battery 33%)
5	2nd source panel: Data + IrDa transfer, Barcode scan, USB connection + Notebook (Battery 45%)
6	2nd source panel: LTE & BT Link, GNSS Rx, VLC play video, Wireless charging with cradle(Battery 40%)

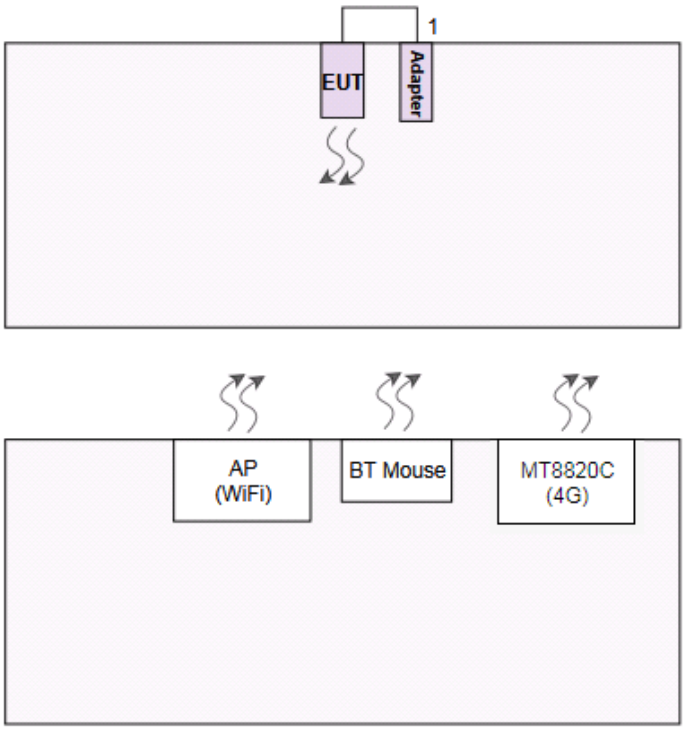
Radiated Emissions	
Test Mode ≤ 1GHz	**Operating Description**
1	Original panel:LTE & BT Link, GNSS Rx, VLC play video, Wireless charging with cradle (Battery 45%)
2	2nd source panel: LTE & BT Link, GNSS Rx, VLC play video, Wireless charging with cradle (Battery 46%)
Test Mode > 1GHz	**Operating Description**
1	Original panel:LTE & BT Link, GNSS Rx, VLC play video, Wireless charging with cradle (Battery 45%)
2	2nd source panel: LTE & BT Link, GNSS Rx, VLC play video, Wireless charging with cradle (Battery 46%)

2.3 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**S/N**	**Remarks**
1	Wireless AP	D-LINK	DIR-850L	RZ1Q4G6000261	---
2	Mouse	Logitech	M337	1602LZ0P89V8	---
3	Notebook	DELL	Latitude E6440	8VXMD12	---
4	Printer	EPSON	XP-30	QSDK002461	---
5	USB 3.0 HDD	WD	WDBKXH5000 ABK	WX31AB210213	---
6	Mouse	DELL	MS111-L	2C3-00N9	---
7	Cradle	DATALOGIC	SSDL	---	Provided by applicant.
8	Radio Communication Analyzer	ANRITSU	MT8820C	6201240341	---

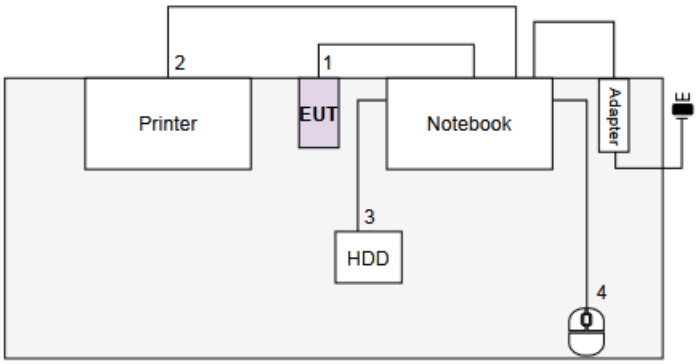
2.4 Test Setup Chart

Test Setup Diagram (Adapter mode)



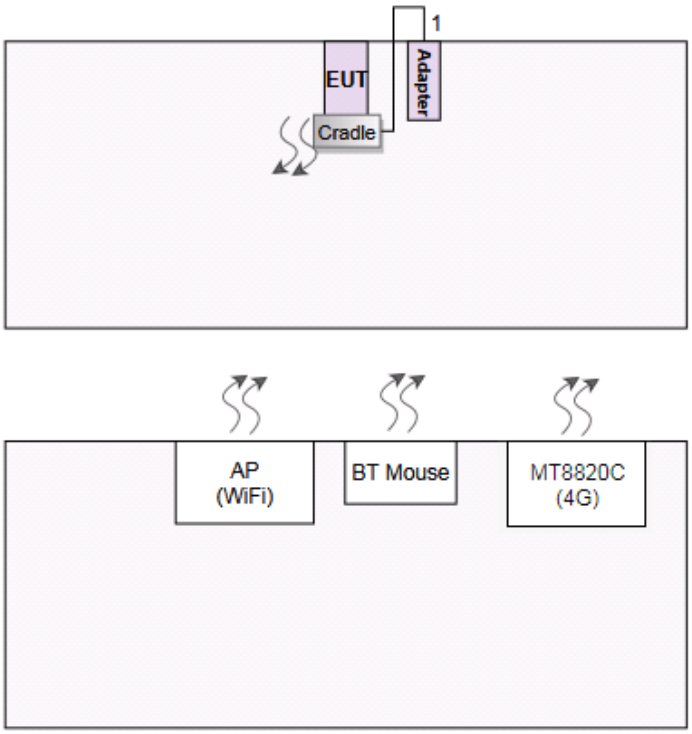
No.	Signal cable / Length (m)
1	USB type-C, 1.2m shielded.

Test Setup Diagram (USB mode)



No.	Signal cable / Length (m)
1	USB type-C, 1.2m shielded.
2	USB, 1.8m shielded.
3	USB, 0.5m shielded.
4	USB, 1.8m shielded.

Test Setup Diagram (Cradle mode)



No.	Signal cable / Length (m)
1	USB type-C, 1.2m shielded.

2.5 Test Software and Operating Condition

<Adapter mode>

a. The EUT consumes power from adapter.
b. The EUT backlight set up to 100%.
c. The EUT links with AP by WiFi.
d. The EUT links with Mouse by BT.
e. The EUT links with MT8820C by LTE.
f. The EUT executes “VLC” application for playing “colorbar” video.

<USB mode>

a. The EUT consumes power from support notebook via USB type-C cable.
b. The EUT backlight set up to 100%.
c. The support notebook executes “WinEMC.exe” to send “H” patterns to its monitor and the monitor displayed them.
d. The support notebook executes “WinEMC.exe” to send “H” patterns to the printer.
e. The support notebook executes “WinEMC.exe” to read and write data from USB 3.0 HDD.
f. The support notebook copies files to EUT via USB type-C cable.
g. The support notebook executes “scan engine.bat” for barcode auto scan in USB mode.
h. The support notebook executes “IrDA_Receive.bat” & “IrDA_Send.bat” for data transferring in USB mode.

<Cradle mode>

a. The EUT consumes power from wireless charging cradle.
b. The EUT backlight set up to 100%.
c. The EUT links with AP by WiFi.
d. The EUT links with Mouse by BT.
e. The EUT links with MT8820C by LTE.
f. The EUT executes “VLC” application for playing “colorbar” video.

3 Emission Tests Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0,15 to 0,5	66 - 56 *	56 - 46 *
0,5 to 5	56	46
5 to 30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

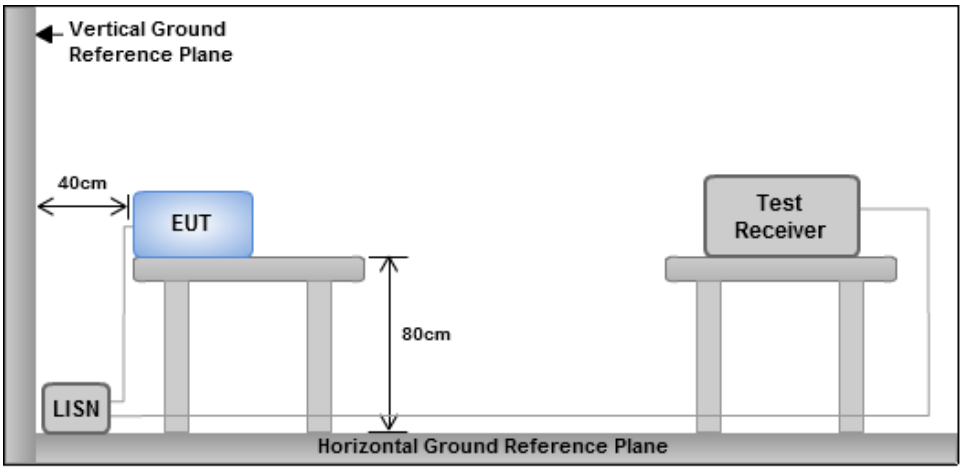
3.1.2 Test Procedures

a. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.

b. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.

c. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.

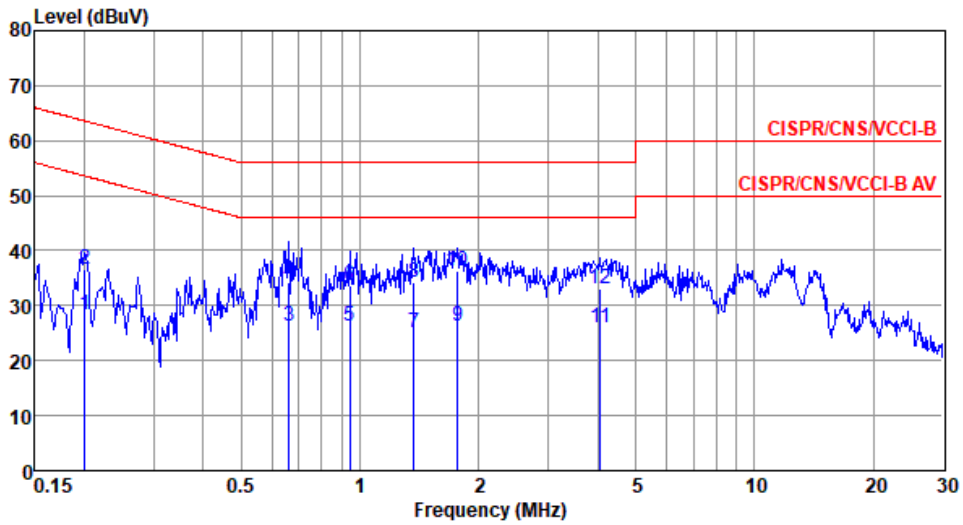
3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

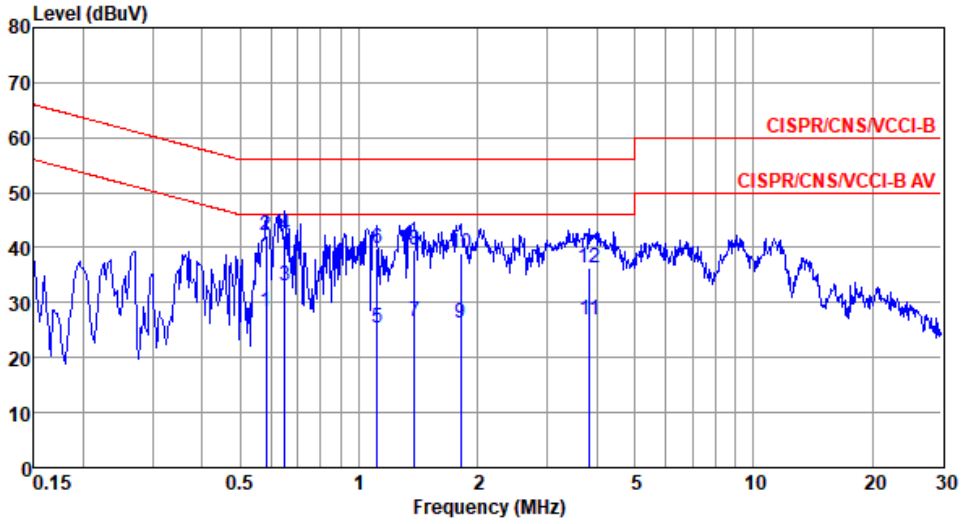
Power Phase	Line	Test Mode	1



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.201	28.29	53.58	-25.29	18.49	9.54	0.07	Average
2	0.201	36.65	63.58	-26.93	26.85	9.54	0.07	QP
3	0.661	26.32	46.00	-19.68	16.36	9.59	0.09	Average
4	0.661	34.23	56.00	-21.77	24.27	9.59	0.09	QP
5	0.943	26.13	46.00	-19.87	16.13	9.60	0.10	Average
6	0.943	33.69	56.00	-22.31	23.69	9.60	0.10	QP
7	1.367	25.07	46.00	-20.93	15.01	9.60	0.13	Average
8	1.367	34.31	56.00	-21.69	24.25	9.60	0.13	QP
9	1.772	26.22	46.00	-19.78	16.12	9.60	0.15	Average
10*	1.772	36.41	56.00	-19.59	26.31	9.60	0.15	QP
11	4.070	25.90	46.00	-20.10	15.63	9.61	0.28	Average
12	4.070	33.04	56.00	-22.96	22.77	9.61	0.28	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

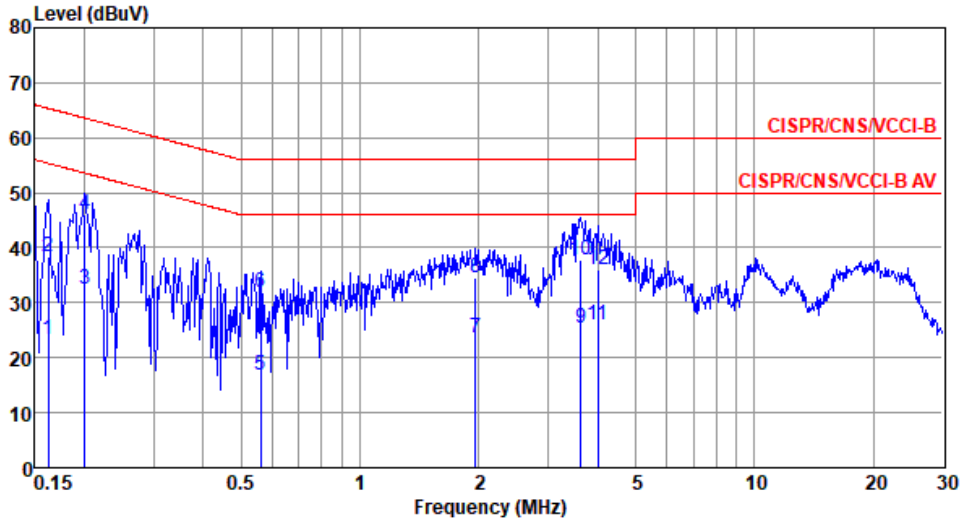
Power Phase	Neutral	Test Mode	1



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.582	28.33	46.00	-17.67	18.45	9.62	0.09	Average
2	0.582	42.21	56.00	-13.79	32.33	9.62	0.09	QP
3*	0.647	33.19	46.00	-12.81	23.29	9.63	0.09	Average
4	0.647	42.11	56.00	-13.89	32.21	9.63	0.09	QP
5	1.111	25.26	46.00	-20.74	15.28	9.64	0.11	Average
6	1.111	39.71	56.00	-16.29	29.73	9.64	0.11	QP
7	1.381	26.55	46.00	-19.45	16.54	9.64	0.13	Average
8	1.381	39.59	56.00	-16.41	29.58	9.64	0.13	QP
9	1.810	26.17	46.00	-19.83	16.12	9.65	0.15	Average
10	1.810	38.97	56.00	-17.03	28.92	9.65	0.15	QP
11	3.840	26.81	46.00	-19.19	16.62	9.66	0.27	Average
12	3.840	36.40	56.00	-19.60	26.21	9.66	0.27	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

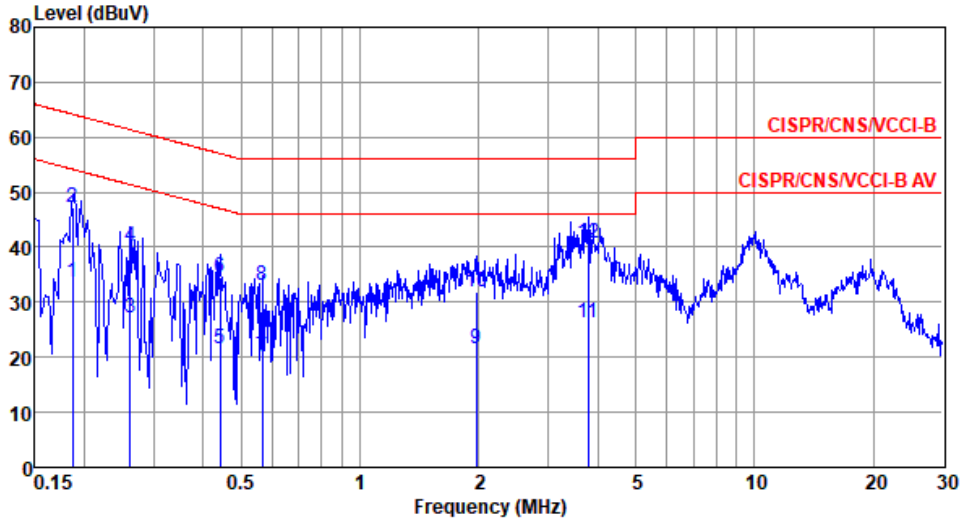
Power Phase	Line	Test Mode	2



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.162	23.36	55.34	-31.98	13.77	9.53	0.06	Average
2	0.162	38.44	65.34	-26.90	28.85	9.53	0.06	QP
3	0.201	32.56	53.58	-21.02	22.95	9.54	0.07	Average
4*	0.201	46.15	63.58	-17.43	36.54	9.54	0.07	QP
5	0.561	16.87	46.00	-29.13	7.20	9.58	0.09	Average
6	0.561	31.78	56.00	-24.22	22.11	9.58	0.09	QP
7	1.959	23.72	46.00	-22.28	13.96	9.60	0.16	Average
8	1.959	34.40	56.00	-21.60	24.64	9.60	0.16	QP
9	3.623	25.52	46.00	-20.48	15.65	9.61	0.26	Average
10	3.623	37.66	56.00	-18.34	27.79	9.61	0.26	QP
11	4.006	25.91	46.00	-20.09	16.02	9.61	0.28	Average
12	4.006	36.00	56.00	-20.00	26.11	9.61	0.28	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

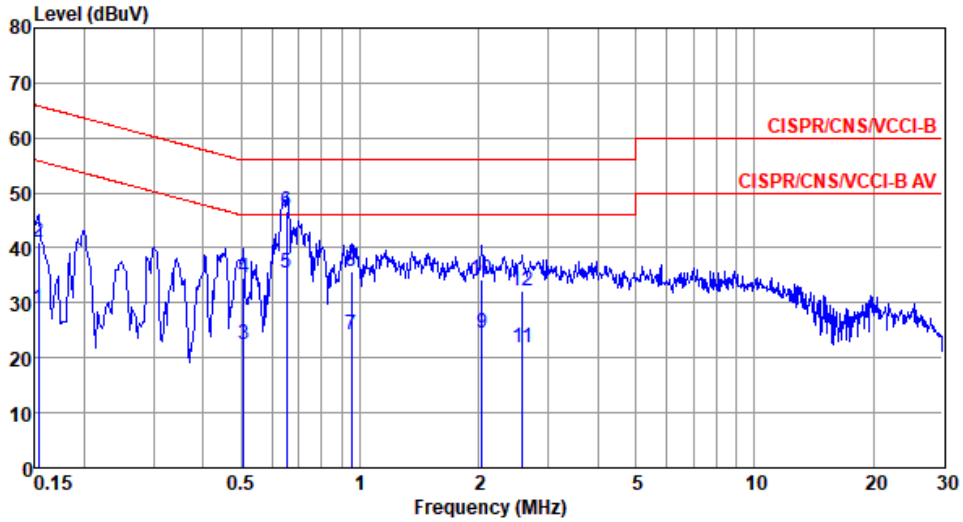
Power Phase	Neutral	Test Mode	2



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.186	33.65	54.20	-20.55	24.00	9.58	0.07	Average
2	0.186	47.16	64.20	-17.04	37.51	9.58	0.07	QP
3	0.262	27.22	51.38	-24.16	17.56	9.59	0.07	Average
4	0.262	40.28	61.38	-21.10	30.62	9.59	0.07	QP
5	0.442	21.48	47.02	-25.54	11.79	9.61	0.08	Average
6	0.442	34.57	57.02	-22.45	24.88	9.61	0.08	QP
7	0.564	20.02	46.00	-25.98	10.31	9.62	0.09	Average
8	0.564	32.95	56.00	-23.05	23.24	9.62	0.09	QP
9	1.970	21.43	46.00	-24.57	11.62	9.65	0.16	Average
10	1.970	31.86	56.00	-24.14	22.05	9.65	0.16	QP
11	3.779	26.34	46.00	-19.66	16.41	9.66	0.27	Average
12*	3.779	40.87	56.00	-15.13	30.94	9.66	0.27	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

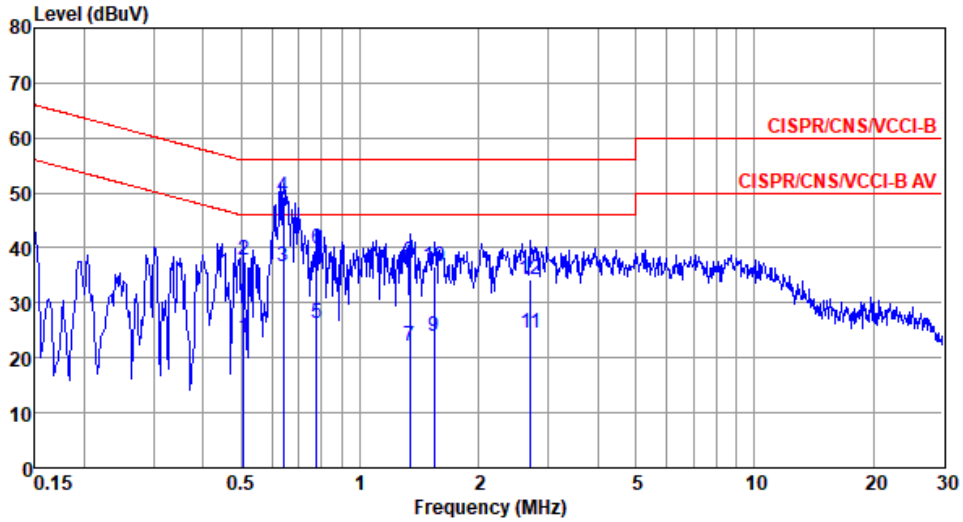
Power Phase	Line	Test Mode	3



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.153	28.79	55.82	-27.03	19.08	9.53	0.05	Average
2	0.153	41.12	65.82	-24.70	31.41	9.53	0.05	QP
3	0.507	22.45	46.00	-23.55	12.51	9.58	0.09	Average
4	0.507	34.60	56.00	-21.40	24.66	9.58	0.09	QP
5	0.651	35.34	46.00	-10.66	25.38	9.59	0.09	Average
6*	0.651	46.69	56.00	-9.31	36.73	9.59	0.09	QP
7	0.953	24.07	46.00	-21.93	14.07	9.60	0.10	Average
8	0.953	35.59	56.00	-20.41	25.59	9.60	0.10	QP
9	2.033	24.60	46.00	-21.40	14.48	9.60	0.16	Average
10	2.033	34.38	56.00	-21.62	24.26	9.60	0.16	QP
11	2.581	21.84	46.00	-24.16	11.67	9.60	0.20	Average
12	2.581	32.04	56.00	-23.96	21.87	9.60	0.20	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

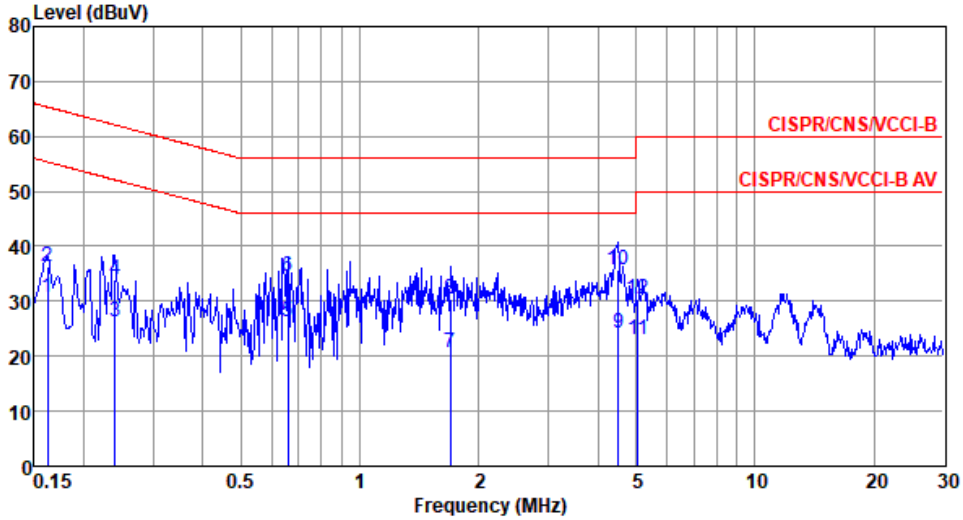
Power Phase	Neutral	Test Mode	3



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.507	23.58	46.00	-22.42	13.72	9.62	0.09	Average
2	0.507	37.79	56.00	-18.21	27.93	9.62	0.09	QP
3	0.641	36.74	46.00	-9.26	26.84	9.63	0.09	Average
4*	0.641	49.37	56.00	-6.63	39.47	9.63	0.09	QP
5	0.775	26.40	46.00	-19.60	16.48	9.63	0.09	Average
6	0.775	39.85	56.00	-16.15	29.93	9.63	0.09	QP
7	1.338	22.10	46.00	-23.90	12.09	9.64	0.13	Average
8	1.338	37.40	56.00	-18.60	27.39	9.64	0.13	QP
9	1.544	23.80	46.00	-22.20	13.77	9.65	0.14	Average
10	1.544	36.55	56.00	-19.45	26.52	9.65	0.14	QP
11	2.707	24.46	46.00	-21.54	14.35	9.65	0.21	Average
12	2.707	34.21	56.00	-21.79	24.10	9.65	0.21	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

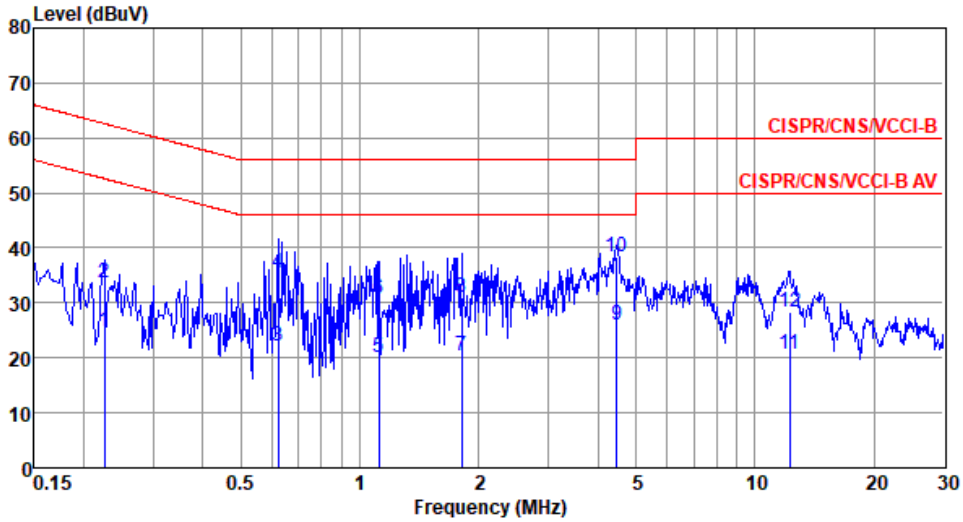
Power Phase	Line	Test Mode	4



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.162	30.71	55.34	-24.63	20.96	9.53	0.05	Average
2	0.162	36.20	65.34	-29.14	26.45	9.53	0.05	QP
3	0.240	26.24	52.08	-25.84	16.41	9.55	0.07	Average
4	0.240	34.02	62.08	-28.06	24.19	9.55	0.07	QP
5*	0.658	26.40	46.00	-19.60	16.42	9.59	0.10	Average
6	0.658	34.64	56.00	-21.36	24.66	9.59	0.10	QP
7	1.698	20.57	46.00	-25.43	10.46	9.60	0.17	Average
8	1.698	30.28	56.00	-25.72	20.17	9.60	0.17	QP
9	4.501	24.18	46.00	-21.82	13.90	9.61	0.30	Average
10	4.501	35.72	56.00	-20.28	25.44	9.61	0.30	QP
11	5.058	22.96	50.00	-27.04	12.64	9.62	0.32	Average
12	5.058	30.43	60.00	-29.57	20.11	9.62	0.32	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

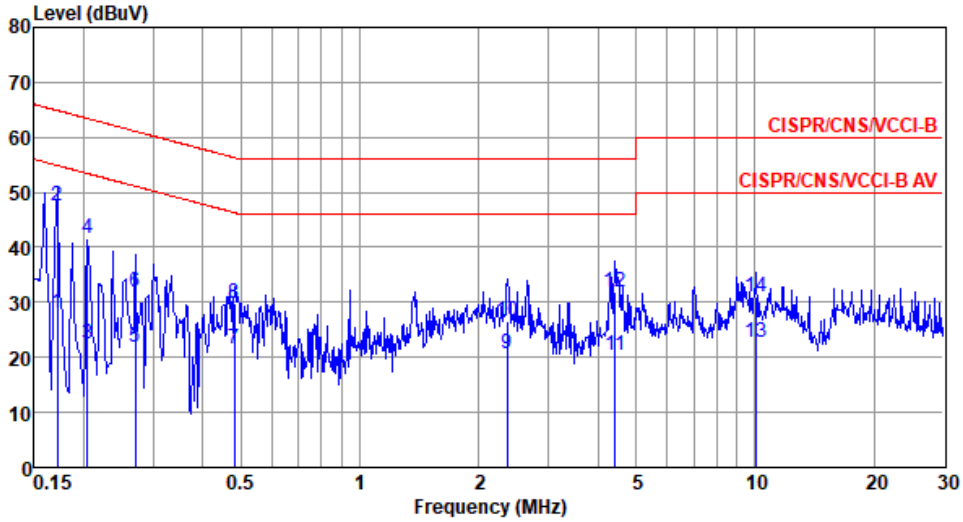
Power Phase	Neutral	Test Mode	4



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.226	24.75	52.61	-27.86	14.95	9.59	0.06	Average
2	0.226	33.77	62.61	-28.84	23.97	9.59	0.06	QP
3	0.621	22.08	46.00	-23.92	12.18	9.62	0.10	Average
4	0.621	35.54	56.00	-20.46	25.64	9.62	0.10	QP
5	1.117	20.04	46.00	-25.96	10.06	9.64	0.13	Average
6	1.117	30.68	56.00	-25.32	20.70	9.64	0.13	QP
7	1.810	20.35	46.00	-25.65	10.28	9.65	0.17	Average
8	1.810	30.88	56.00	-25.12	20.81	9.65	0.17	QP
9	4.478	25.92	46.00	-20.08	15.68	9.67	0.30	Average
10*	4.478	38.34	56.00	-17.66	28.10	9.67	0.30	QP
11	12.253	20.67	50.00	-29.33	10.08	9.74	0.50	Average
12	12.253	28.30	60.00	-31.70	17.71	9.74	0.50	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

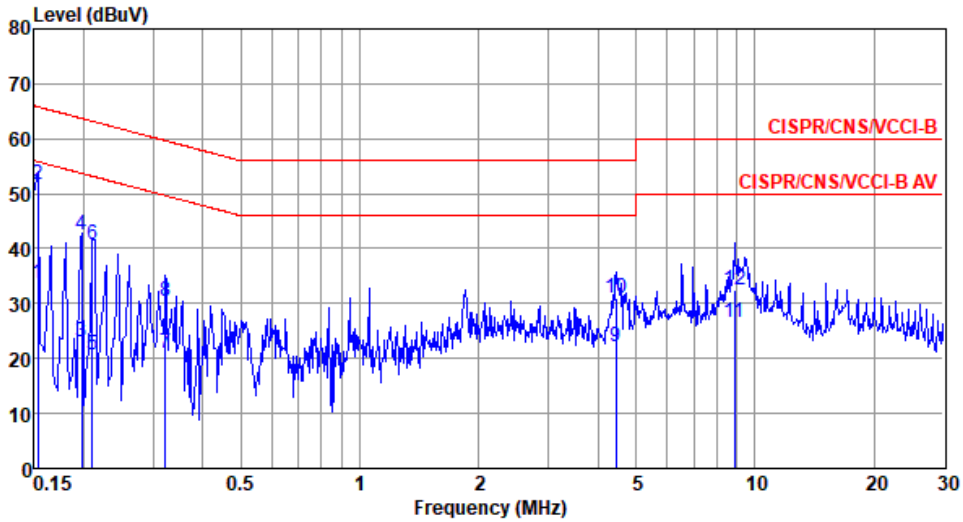
Power Phase	Line	Test Mode	5



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.171	28.16	54.90	-26.74	18.58	9.53	0.05	Average
2*	0.171	47.59	64.90	-17.31	38.01	9.53	0.05	QP
3	0.204	22.50	53.45	-30.95	12.90	9.54	0.06	Average
4	0.204	41.66	63.45	-21.79	32.06	9.54	0.06	QP
5	0.270	21.74	51.12	-29.38	12.12	9.55	0.07	Average
6	0.270	31.87	61.12	-29.25	22.25	9.55	0.07	QP
7	0.481	21.52	46.32	-24.80	11.85	9.58	0.09	Average
8	0.481	29.88	56.32	-26.44	20.21	9.58	0.09	QP
9	2.358	20.78	46.00	-25.22	10.97	9.60	0.21	Average
10	2.358	26.59	56.00	-29.41	16.78	9.60	0.21	QP
11	4.430	20.50	46.00	-25.50	10.59	9.61	0.30	Average
12	4.430	31.80	56.00	-24.20	21.89	9.61	0.30	QP
13	10.072	22.82	50.00	-27.18	12.78	9.65	0.39	Average
14	10.072	30.90	60.00	-29.10	20.86	9.65	0.39	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

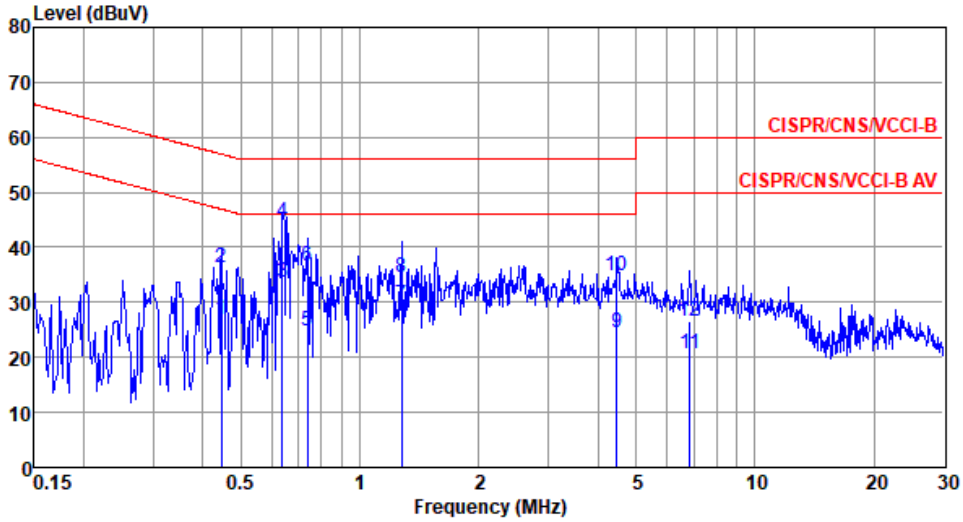
Power Phase	Neutral	Test Mode	5



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.153	33.78	55.82	-22.04	24.16	9.57	0.05	Average
2*	0.153	51.63	65.82	-14.19	42.01	9.57	0.05	QP
3	0.198	23.04	53.71	-30.67	13.40	9.58	0.06	Average
4	0.198	42.36	63.71	-21.35	32.72	9.58	0.06	QP
5	0.211	20.72	53.18	-32.46	11.08	9.58	0.06	Average
6	0.211	40.59	63.18	-22.59	30.95	9.58	0.06	QP
7	0.322	20.91	49.66	-28.75	11.24	9.60	0.07	Average
8	0.322	30.31	59.66	-29.35	20.64	9.60	0.07	QP
9	4.454	22.13	46.00	-23.87	12.16	9.67	0.30	Average
10	4.454	30.88	56.00	-25.12	20.91	9.67	0.30	QP
11	8.869	26.69	50.00	-23.31	16.61	9.70	0.38	Average
12	8.869	32.53	60.00	-27.47	22.45	9.70	0.38	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

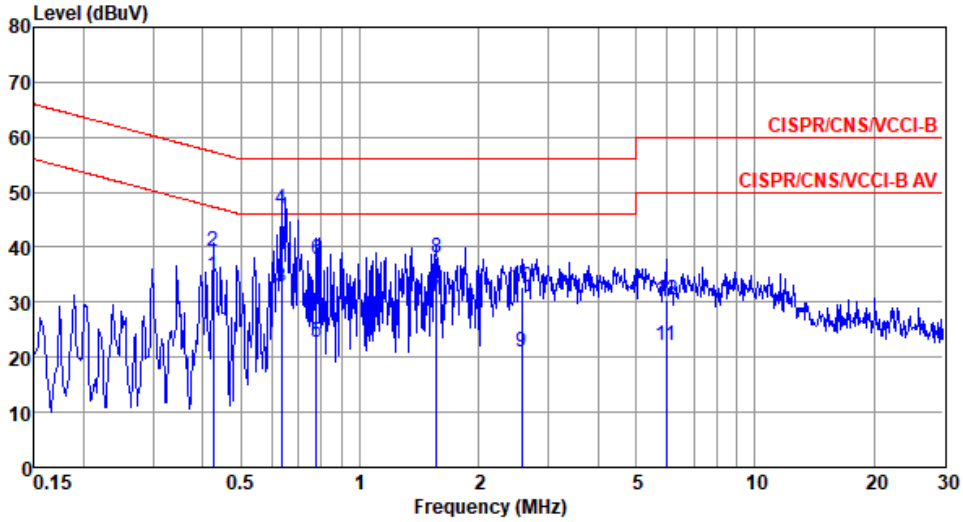
Power Phase	Line	Test Mode	6



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.447	26.82	46.93	-20.11	16.91	9.57	0.08	Average
2	0.447	36.34	56.93	-20.59	26.43	9.57	0.08	QP
3	0.637	33.77	46.00	-12.23	23.79	9.59	0.10	Average
4*	0.637	44.56	56.00	-11.44	34.58	9.59	0.10	QP
5	0.735	24.94	46.00	-21.06	14.94	9.59	0.11	Average
6	0.735	36.46	56.00	-19.54	26.46	9.59	0.11	QP
7	1.276	29.43	46.00	-16.57	19.36	9.60	0.14	Average
8	1.276	34.68	56.00	-21.32	24.61	9.60	0.14	QP
9	4.478	24.63	46.00	-21.37	14.35	9.61	0.30	Average
10	4.478	34.94	56.00	-21.06	24.66	9.61	0.30	QP
11	6.841	20.63	50.00	-29.37	10.26	9.63	0.35	Average
12	6.841	26.68	60.00	-33.32	16.31	9.63	0.35	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Power Phase	Neutral	Test Mode	6



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.426	34.75	47.33	-12.58	24.89	9.61	0.08	Average
2	0.426	39.31	57.33	-18.02	29.45	9.61	0.08	QP
3	0.634	32.84	46.00	-13.16	22.92	9.63	0.10	Average
4*	0.634	47.02	56.00	-8.98	37.10	9.63	0.10	QP
5	0.775	22.64	46.00	-23.36	12.71	9.63	0.11	Average
6	0.775	37.77	56.00	-18.23	27.84	9.63	0.11	QP
7	1.560	31.10	46.00	-14.90	21.05	9.65	0.16	Average
8	1.560	37.99	56.00	-18.01	27.94	9.65	0.16	QP
9	2.567	21.03	46.00	-24.97	10.90	9.65	0.22	Average
10	2.567	32.69	56.00	-23.31	22.56	9.65	0.22	QP
11	5.961	22.07	50.00	-27.93	11.77	9.68	0.33	Average
12	5.961	30.28	60.00	-29.72	19.98	9.68	0.33	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

3.2 Radiated Emissions

3.2.1 Limit of Radiated Emissions

According to FCC Part 15, Subpart B §15.109, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

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

Note: According to FCC Part 15, Subpart B §15.33: For an unintentional radiator is shown in the table above.

3.2.2 Test Procedures

Measuring below 1 GHz:

a. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.

b. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.

c. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Measuring above 1 GHz:

a. Same test set up as below 1GHz radiated testing.

b. The EUT was set 3 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.

c. There should be absorber placed between the EUT and Antenna and its located size should let the test site meet CISPR16-1-4 requirement.

d. The table was rotated 360 degrees to determine the position of the highest radiation.

e. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

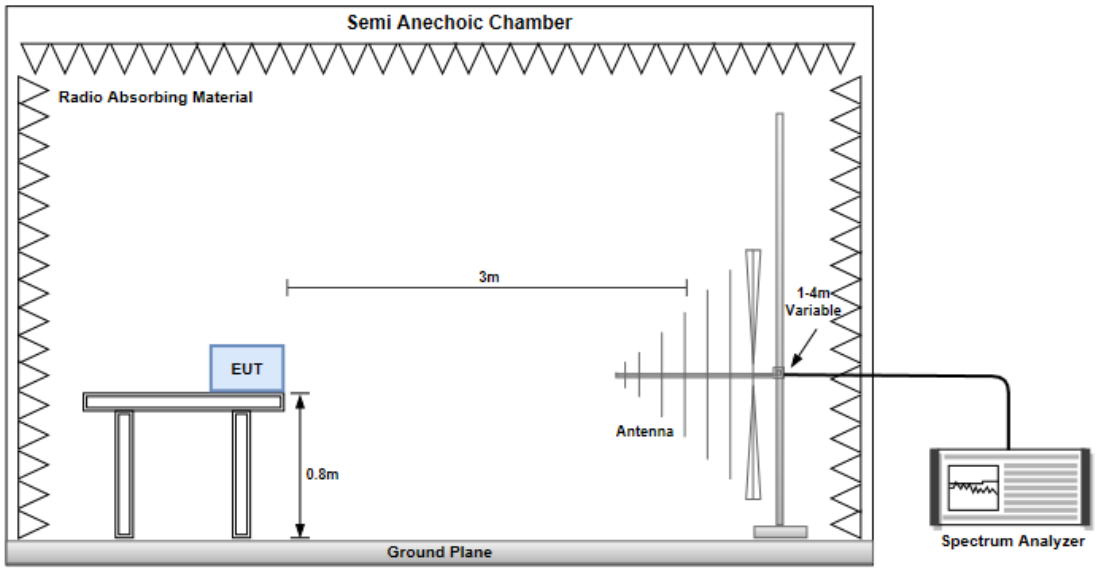
f. Set the Horn Antenna at 1m height, then run the turn table to get the maximum noise reading from Horizontal and Vertical polarity separately.

g. When EUT locating on the turn-table, the Horn Antenna must be raised up and descended down, then turning around the turn-table to get the maximum noise reading of the Horizontal and Vertical polarity separately. Note the maximum raise up height is same as the top of EUT.

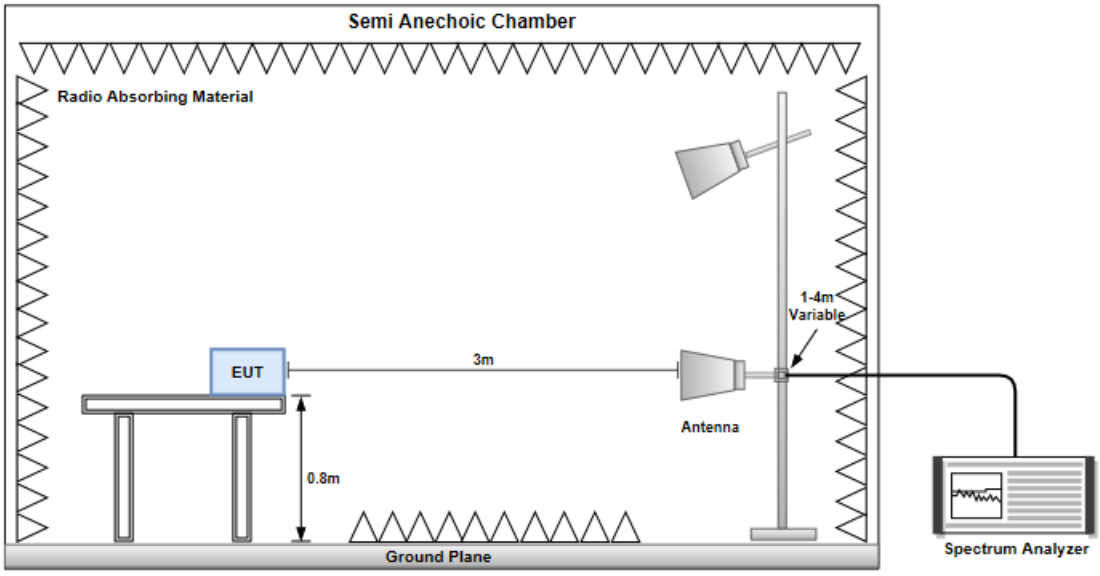
h. If emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.2.3 Test Setup

Radiated Emissions below 1 GHz

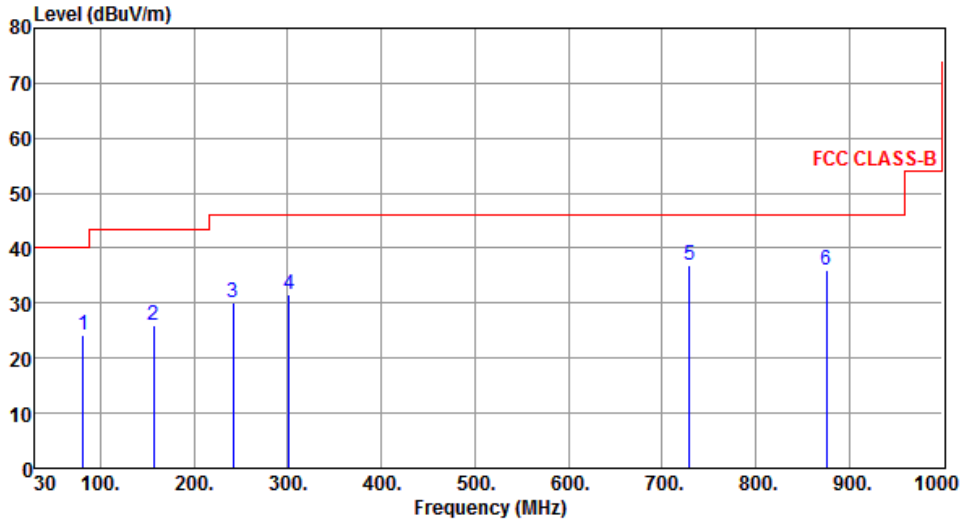


Radiated Emissions above 1 GHz



3.2.4 Radiated Emissions (Below 1GHz)

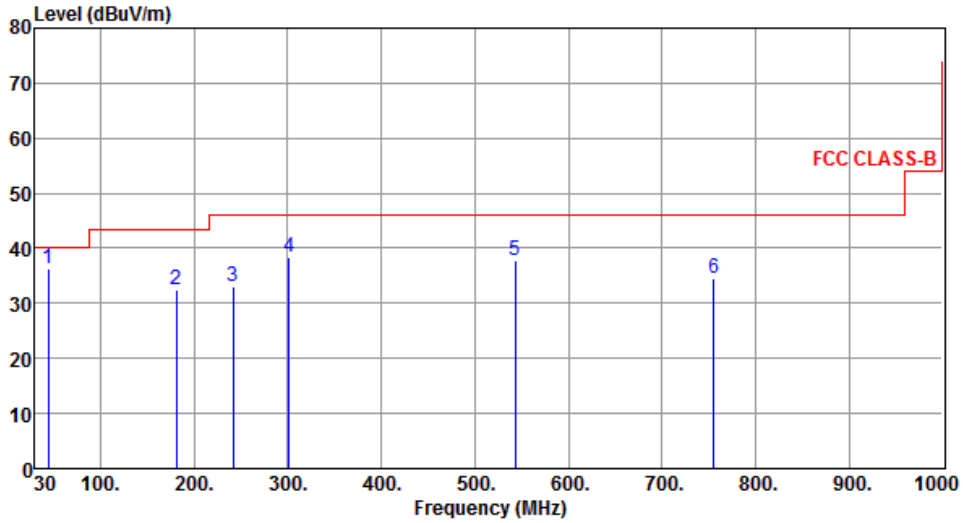
Polarization	Horizontal	Test Mode	1



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	81.41	24.20	40.00	-15.80	36.75	-12.55	Peak	---	---
2	157.07	26.02	43.50	-17.48	33.44	-7.42	Peak	---	---
3	241.46	30.13	46.00	-15.87	38.60	-8.47	Peak	---	---
4	301.60	31.71	46.00	-14.29	38.59	-6.88	Peak	---	---
5	729.37	36.95	46.00	-9.05	34.52	2.43	Peak	---	---
6	875.84	35.90	46.00	-10.10	30.86	5.04	Peak	---	---

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB)
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

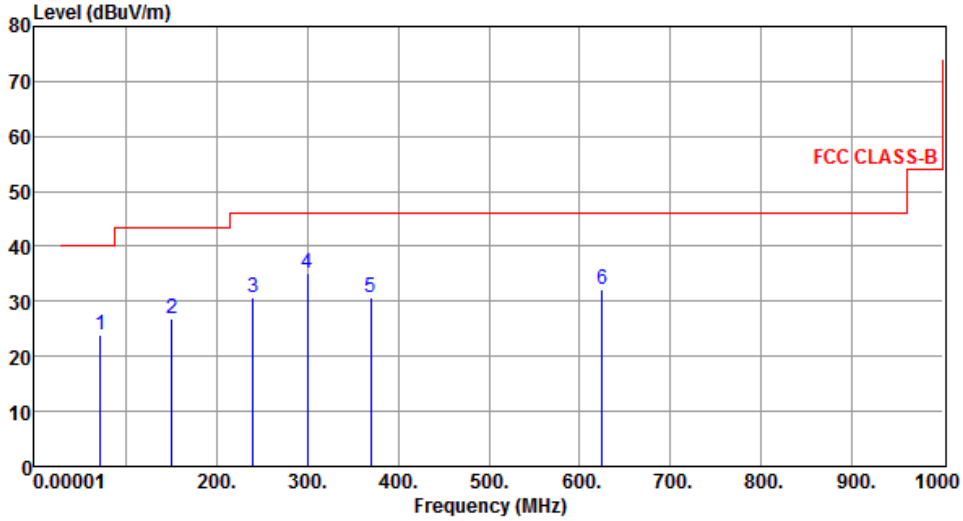
Polarization	Vertical	Test Mode	1



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	44.55	36.34	40.00	-3.66	44.09	-7.75	QP	100	95
2	181.32	32.40	43.50	-11.10	40.97	-8.57	Peak	---	---
3	241.46	33.18	46.00	-12.82	41.65	-8.47	Peak	---	---
4	301.60	38.49	46.00	-7.51	45.37	-6.88	Peak	---	---
5	543.13	37.93	46.00	-8.07	39.13	-1.20	Peak	---	---
6	755.56	34.58	46.00	-11.42	31.42	3.16	Peak	---	---

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB)
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

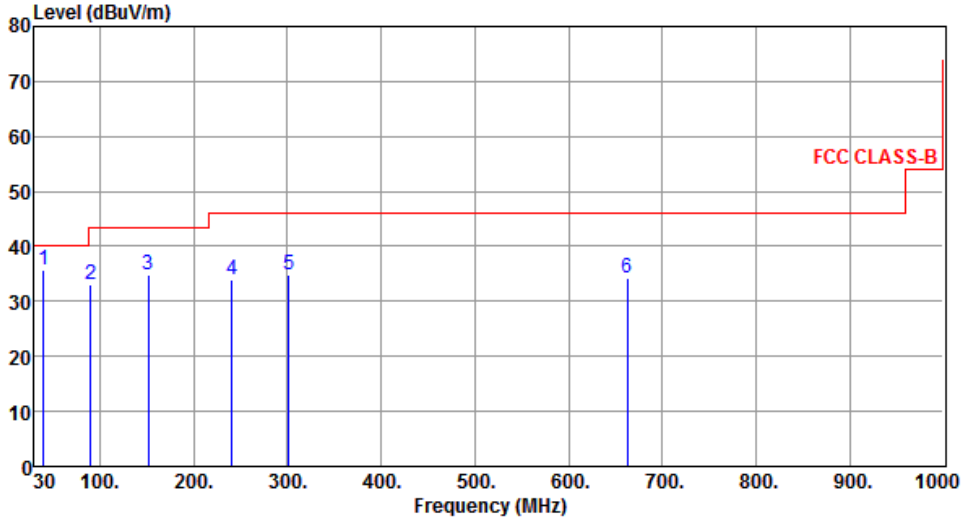
Polarization	Horizontal	Test Mode	2



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	72.68	23.82	40.00	-16.18	35.44	-11.62	Peak	---	---
2	151.25	26.95	43.50	-16.55	35.59	-8.64	Peak	---	---
3	240.49	30.56	46.00	-15.44	40.80	-10.24	Peak	---	---
4	300.63	35.04	46.00	-10.96	43.09	-8.05	Peak	---	---
5	370.47	30.73	46.00	-15.27	36.85	-6.12	Peak	---	---
6	624.61	32.15	46.00	-13.85	32.00	0.15	Peak	---	---

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB)
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

Polarization	Vertical	Test Mode	2

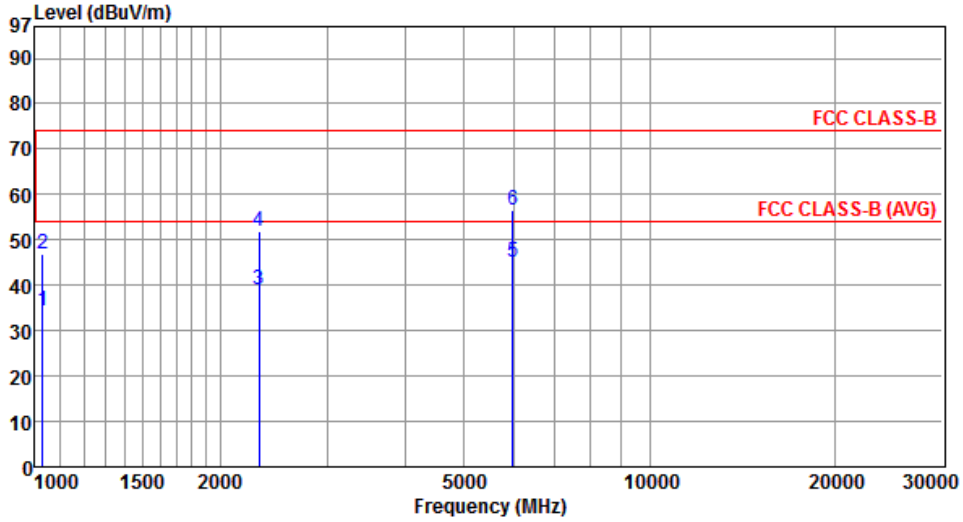


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	39.70	35.73	40.00	-4.27	44.92	-9.19	Peak	---	---
2	90.14	33.18	43.50	-10.32	47.94	-14.76	Peak	---	---
3	151.25	34.75	43.50	-8.75	43.39	-8.64	Peak	---	---
4	240.49	34.03	46.00	-11.97	44.27	-10.24	Peak	---	---
5	301.60	34.84	46.00	-11.16	42.85	-8.01	Peak	---	---
6	662.44	34.11	46.00	-11.89	33.52	0.59	Peak	---	---

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB)
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

3.2.5 Radiated Emissions (Above 1GHz)

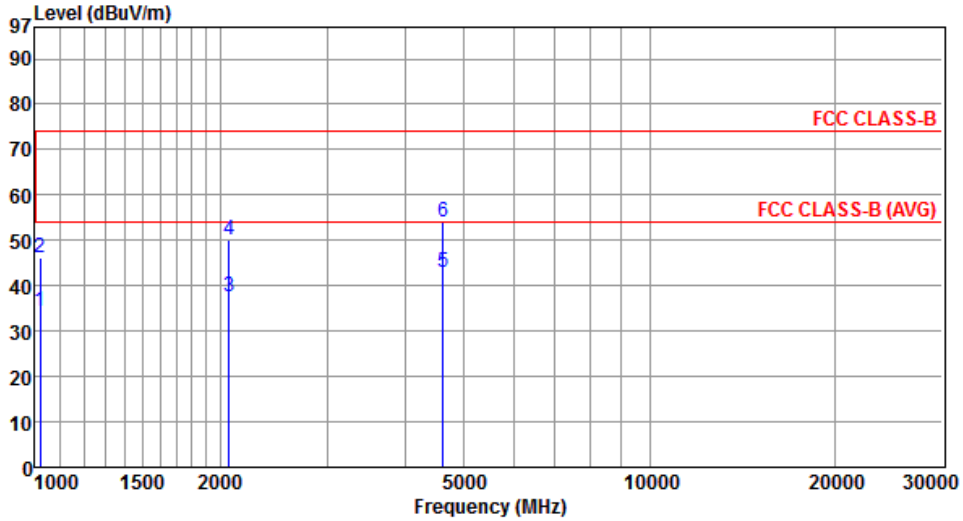
Polarization	Horizontal	Test Mode	1



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1030.00	34.36	54.00	-19.64	44.44	-10.08	Average	101	92
2	1030.00	46.82	74.00	-27.18	56.90	-10.08	Peak	101	92
3	2314.00	39.15	54.00	-14.85	41.75	-2.60	Average	116	241
4	2314.00	51.86	74.00	-22.14	54.46	-2.60	Peak	116	241
5	5996.00	45.26	54.00	-8.74	39.24	6.02	Average	100	113
6	5996.00	56.48	74.00	-17.52	50.46	6.02	Peak	100	113

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB)
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

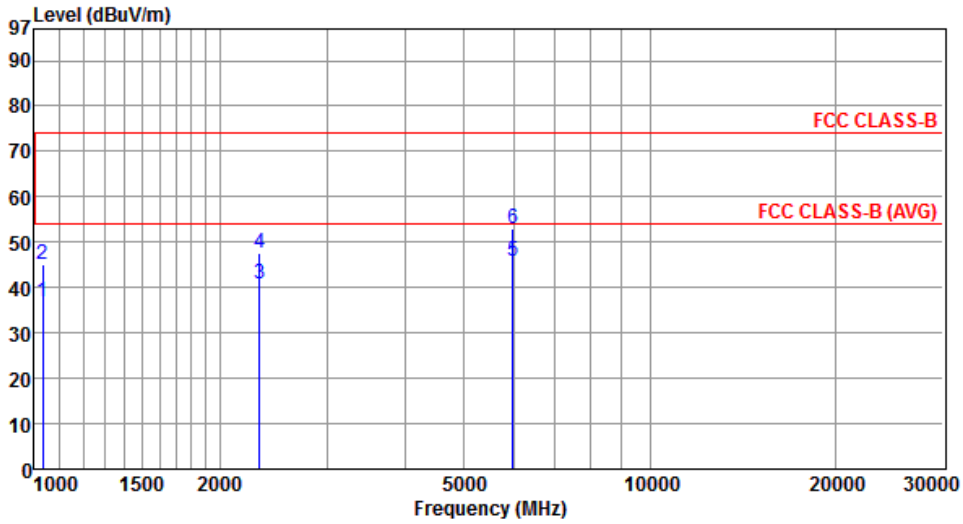
Polarization	Vertical	Test Mode	1



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1020.00	34.22	54.00	-19.78	44.39	-10.17	Average	100	214
2	1020.00	46.21	74.00	-27.79	56.38	-10.17	Peak	100	214
3	2066.00	37.69	54.00	-16.31	41.88	-4.19	Average	113	58
4	2066.00	50.02	74.00	-23.98	54.21	-4.19	Peak	113	58
5	4615.00	42.83	54.00	-11.17	39.15	3.68	Average	105	99
6	4615.00	53.94	74.00	-20.06	50.26	3.68	Peak	105	99

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB)
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

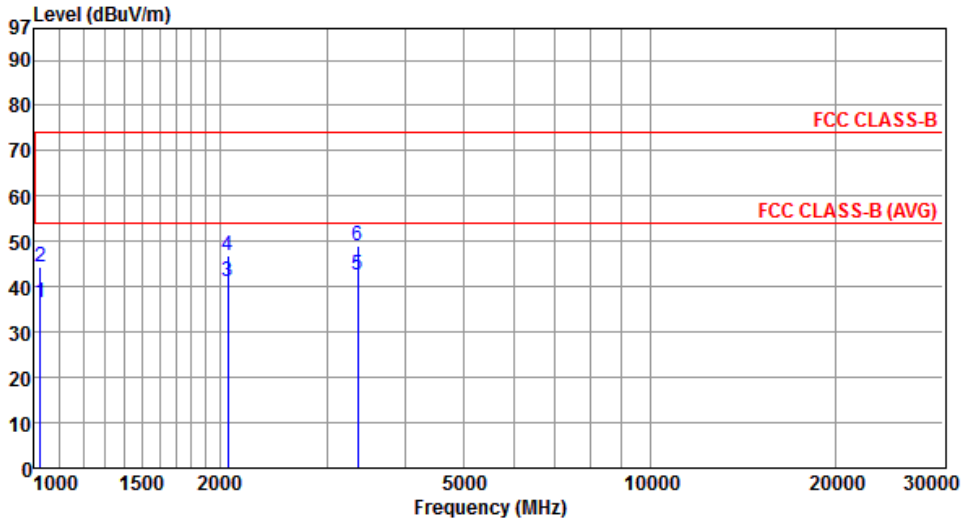
Polarization	Horizontal	Test Mode	2



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1032.17	36.97	54.00	-17.03	46.71	-9.74	Average	100	320
2	1032.17	45.22	74.00	-28.78	54.96	-9.74	Peak	100	320
3	2325.75	40.88	54.00	-13.12	43.01	-2.13	Average	110	21
4	2325.75	47.45	74.00	-26.55	49.58	-2.13	Peak	110	21
5	5988.81	45.86	54.00	-8.14	39.01	6.85	Average	100	140
6	5988.81	53.10	74.00	-20.90	46.25	6.85	Peak	100	140

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB)
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

Polarization	Vertical	Test Mode	2



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	1021.43	36.40	54.00	-17.60	46.10	-9.70	Average	107	96
2	1021.43	44.34	74.00	-29.66	54.04	-9.70	Peak	107	96
3	2063.39	41.16	54.00	-12.84	44.95	-3.79	Average	100	133
4	2063.39	46.77	74.00	-27.23	50.56	-3.79	Peak	100	133
5	3355.48	42.49	54.00	-11.51	42.55	-0.06	Average	100	105
6	3355.48	48.95	74.00	-25.05	49.01	-0.06	Peak	100	105

Note 1: Emission level (dBuV/m) = SA reading (dBuV) + Factor (dB)
2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m)

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information

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