

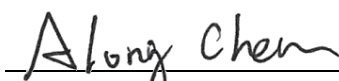
FCC Test Report

FCC ID : JVPZA13-DW-D
Equipment : Mouse for e-Sports
Model No. : ZA13-DW-D, ZA13-DW
(Please refer to section 1.1.1 for more details)
Brand Name : ZOWIE
Applicant : BENQ CORPORATION
Address : 16 Jihu Road, Neihu, Taipei 114, Taiwan
Standard : 47 CFR FCC Part 15.249
Received Date : Jun. 19, 2024
Tested Date : Jun. 20 ~ Jun. 21, 2024

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Approved by:



Along Chen / Assistant Manager



Gary Chang / Manager

Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Local Support Equipment List	7
1.3	Test Setup Chart	7
1.4	The Equipment List	9
1.5	Test Standards	11
1.6	Deviation from Test Standard and Measurement Procedure.....	11
1.7	Measurement Uncertainty	11
2	TEST CONFIGURATION.....	12
2.1	Testing Facility	12
2.2	The Worst Test Modes and Channel Details	12
3	TRANSMITTER TEST RESULTS	13
3.1	Unwanted Emission.....	13
3.2	20dB and Occupied Bandwidth.....	16
3.3	AC Power Line Conducted Emissions	17
4	TEST LABORATORY INFORMATION	18
 Appendix A. Unwanted Emission		
Appendix B. 20dB and Occupied Bandwidth		
Appendix C. AC Power Line Conducted Emissions		

Release Record

Report No.	Version	Description	Issued Date
FR461901	Rev. 01	Initial issue	Aug. 14, 2024

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	[dBuV]: 0.779MHz 25.67 (Margin -20.33dB) - AV	Pass
15.249(a)	Field Strength of Fundamental	Meet the requirement of limit	Pass
15.249(a)(d)	Field Strength of Harmonics and Emissions Radiated outside of the Specified Frequency Bands	Meet the requirement of limit	Pass
15.215(c)	20dB bandwidth	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	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.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
ZOWIE	ZA13-DW-D	Mouse for e-Sports	Regulatory name
	ZA13-DW		Marketing name

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Frequency Range (MHz)	Modulation	Ch. Freq. (MHz)	Channel Number	Data Rate
2400-2483.5	GFSK	2403-2481	1-79 [79]	2Mbps

1.1.3 Antenna Details

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)
1	BENQ Corporation	ZA13-DW ANT	insert molding metal antenna	NA	2.09

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Type	5Vdc from host 3.7Vdc from battery
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1.1.5 Accessories

No.	Equipment	Description
1	Battery	Brand: Hangzhou Future Power Technology Co., Ltd Model: FT602030P/300mAh Rating: 300mAh, 3.7V
2	USB cable	Brand: Le Prestique Electronics Manufacturing Model: USB Type-C Cable Line: 2m shielded without core

1.1.6 Channel List

Frequency band (MHz)				2400~2483.5			
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	79	2481
20	2422	40	2442	60	2462	---	---

1.1.7 Test Tool and Duty Cycle

Test Tool	RadioTest	
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	100.00%	0.00

1.1.8 Power Index of Test Tool

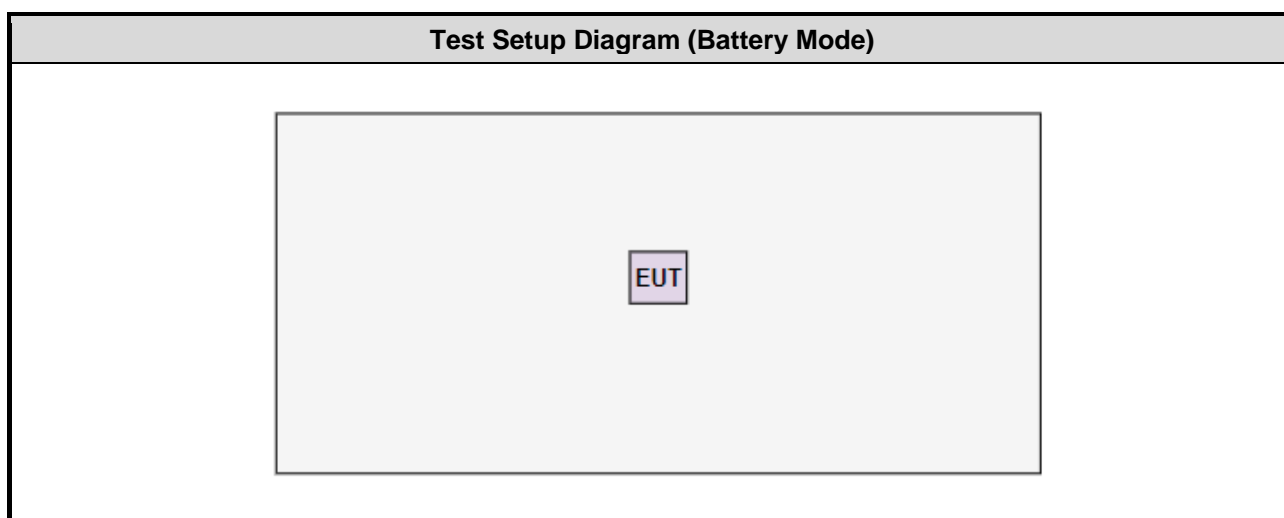
Modulation Mode	Test Frequency (MHz)		
	2403	2440	2481
GFSK	4dBm	4dBm	4dBm

1.2 Local Support Equipment List

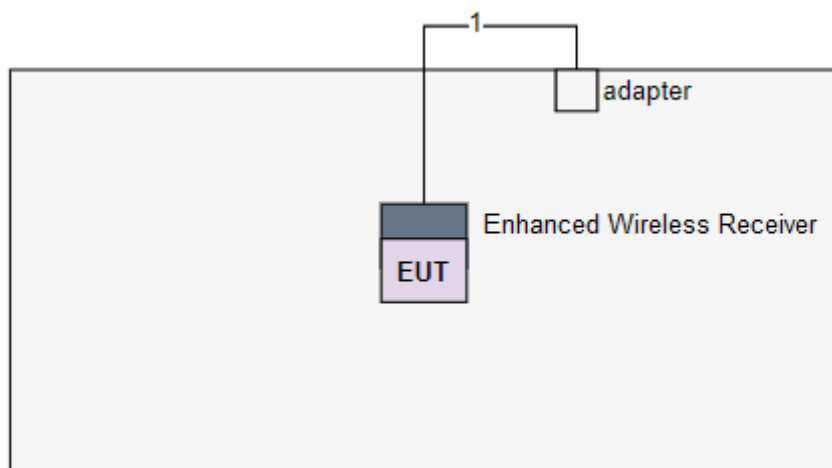
Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Laptop	DELL	Latitude 5400	DoC	---
For charging mode use only					
2	Enhanced Wireless Receiver	ZOWIE	ER2-80	---	Provided by applicant.
3	Adapter	Samsung	ETA-U90JWS	---	---

Note: The support Laptop was removed from test table after sending command to control EUT to transmit continuously.

1.3 Test Setup Chart



Test Setup Diagram (Charging Mode)



No.	Signal cable / Length (m)
1	USB, 2m shielded.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Jun. 20, 2024				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101658	Feb. 23, 2024	Feb. 22, 2025
LISN	R&S	ENV216	101579	May 09, 2024	May 08, 2025
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 11, 2023	Oct. 10, 2024
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127666	Mar. 05, 2024	Mar. 04, 2025
50 ohm terminal (Support Unit)	NA	50	03	Aug. 08, 2023	Aug. 07, 2024
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Jun. 21, 2024				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 05, 2024	Mar. 04, 2025
Spectrum Analyzer	R&S	FSV40	101498	Nov. 23, 2023	Nov. 22, 2024
Loop Antenna	R&S	HFH2-Z2	100330	Oct. 31, 2023	Oct. 30, 2024
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 31, 2023	Jul. 30, 2024
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Nov. 27, 2023	Nov. 26, 2024
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 30, 2023	Oct. 29, 2024
Preamplifier	EMC	EMC02325	980225	Jun. 28, 2023	Jun. 27, 2024
Preamplifier	EMC	EMC118A45SE	980898	Jul. 14, 2023	Jul. 13, 2024
Preamplifier	EMC	EMC184045SE	980903	Jul. 17, 2023	Jul. 16, 2024
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 03, 2023	Oct. 02, 2024
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 03, 2023	Oct. 02, 2024
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 03, 2023	Oct. 02, 2024
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 03, 2023	Oct. 02, 2024
RF Cable	EMC	EMC104-35M-35M- 8000	210920	Oct. 03, 2023	Oct. 02, 2024
RF Cable	EMC	EMC104-35M-35M- 3000	210922	Oct. 03, 2023	Oct. 02, 2024
Attenuator	Pasternack	PE7005-10	10-1	Oct. 05, 2023	Oct. 04, 2024
HIGHPASS FILTER 3.1-18G	WHK	WHK3.1/18G-10SS	39	Oct. 05, 2023	Oct. 04, 2024
Measurement Software	Sporton	SENSE-15247_FS	V5.11	NA	NA
Measurement Software	Sporton	SENSE-EMI	V5.11	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

47 CFR FCC Part 15.249
ANSI C63.10-2013

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$)).

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.130 Hz
AC conducted emission	± 2.92 dB
Unwanted Emission ≤ 1 GHz	± 3.41 dB
Unwanted Emission > 1 GHz	± 4.59 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, 03CH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISSED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Mode	Test Frequency (MHz)	Data Rate	Test Configuration
AC Power Line Conducted Emissions	Charging	-	-	-
Field Strength of Fundamental	GFSK	2403, 2440, 2481	2Mbps	-
Unwanted Emissions ≤ 1GHz	GFSK	2403	2Mbps	-
	Charging	-	-	-
Unwanted Emissions > 1GHz	GFSK	2403, 2440, 2481	2Mbps	-
20dB bandwidth	GFSK	2403, 2440, 2481	2Mbps	-

3 Transmitter Test Results

3.1 Unwanted Emission

This section includes field strength of fundamental, field strength of harmonics and emissions radiated outside of the operating frequency bands.

3.1.1 Limit of field strength of fundamental and field strength of harmonics

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
2400–2483.5 MHz	50	500

3.1.2 Limit of Unwanted Emissions

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in below table, whichever is the lesser attenuation.

Radiated emission limits			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:

Quasi-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

Note 2:

Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.1.3 Test Procedures

1. 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 test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. 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.
3. 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.

Note:

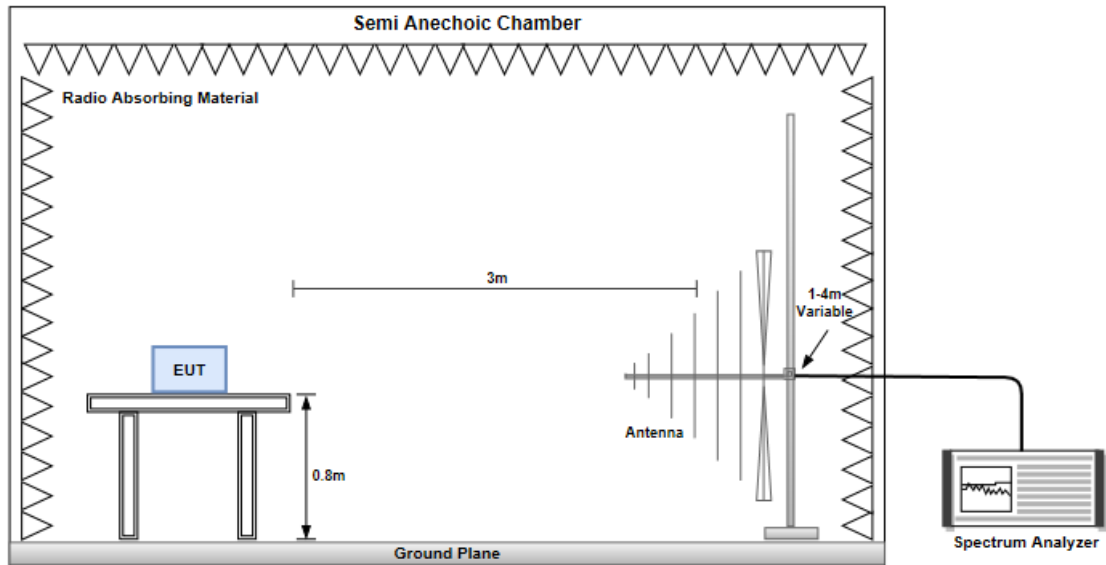
1. Radiated emission below 1GHz
120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission
2. Radiated emission above 1GHz / Peak value except fundamental
RBW=1MHz, VBW=3MHz and Peak detector
3. Radiated emission above 1GHz / Average value for field strength of fundamental and harmonics
The average value is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

$$20\log (\text{Duty cycle}) = 20\log \frac{0.0924375 \times 401\text{ms}}{100 \text{ ms}} = -8.62\text{dB}$$

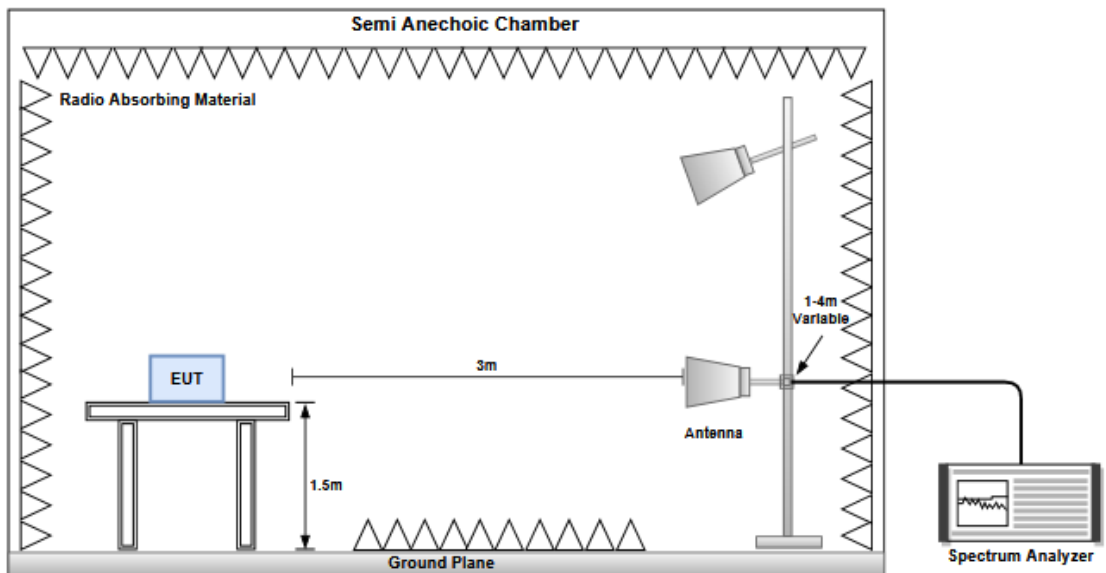
4. Radiated emission above 1GHz / Average value for other emissions
RBW=1MHz, VBW=1/T and Peak detector
5. Radiated emission Peak value for fundamental
RBW=2MHz, VBW=10MHz and Peak detector

3.1.4 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.1.5 Test Results

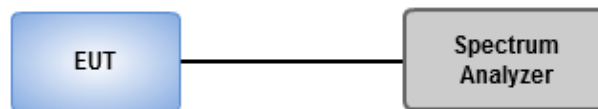
Refer to Appendix A.

3.2 20dB and Occupied Bandwidth

3.2.1 Test Procedures

1. Set resolution bandwidth (RBW) = 20 kHz, Video bandwidth = 100 kHz.
2. Detector = Peak(20 dB bandwidth) / Sample(Occupied bandwidth), Trace mode = max hold
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission.
5. Use the occupied measurement function of spectrum analyzer to measure 99% occupied bandwidth.

3.2.2 Test Setup



3.2.3 Test Results

Ambient Condition	26°C / 64%	Tested By	Allen Lee
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Refer to Appendix B.

3.3 AC Power Line Conducted Emissions

3.3.1 Limit of AC Power Line Conducted Emissions

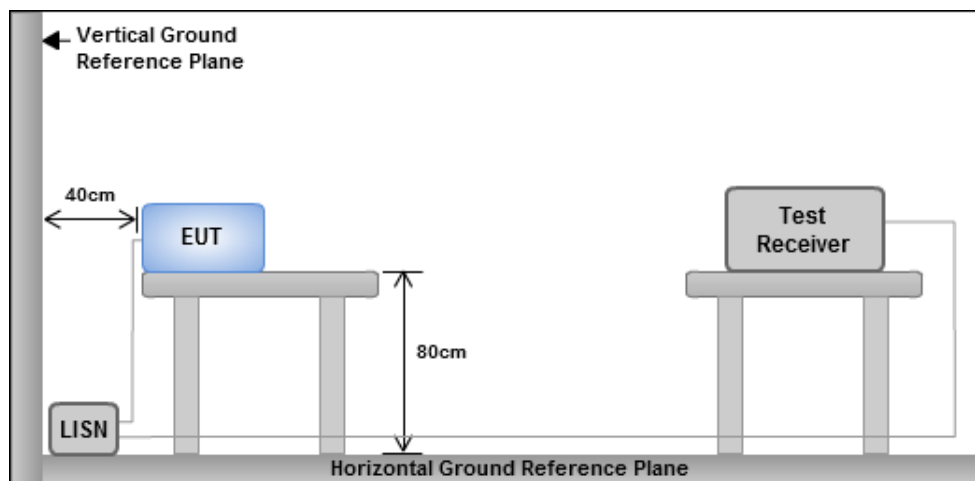
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

3.3.2 Test Procedures

1. 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.
2. 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.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

3.3.3 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

3.3.4 Test Results

Refer to Appendix C.

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 Corporation (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

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan
(R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

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St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

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

Tel: 886-3-271-8666

Fax: 886-3-318-0345

Email: ICC_Service@icertifi.com.tw

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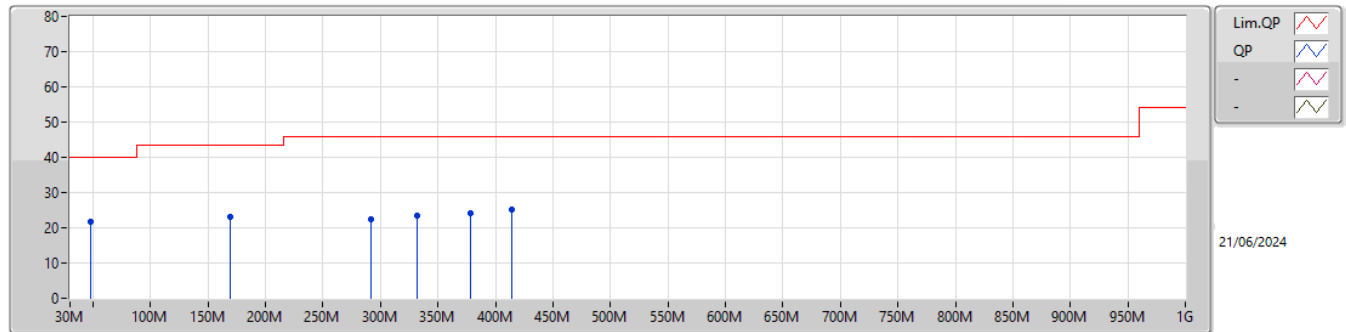


Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	PK	50.6M	22.88	40.00	-17.12	Vertical
Mode 2	Pass	PK	65.4M	31.53	40.00	-8.47	Vertical



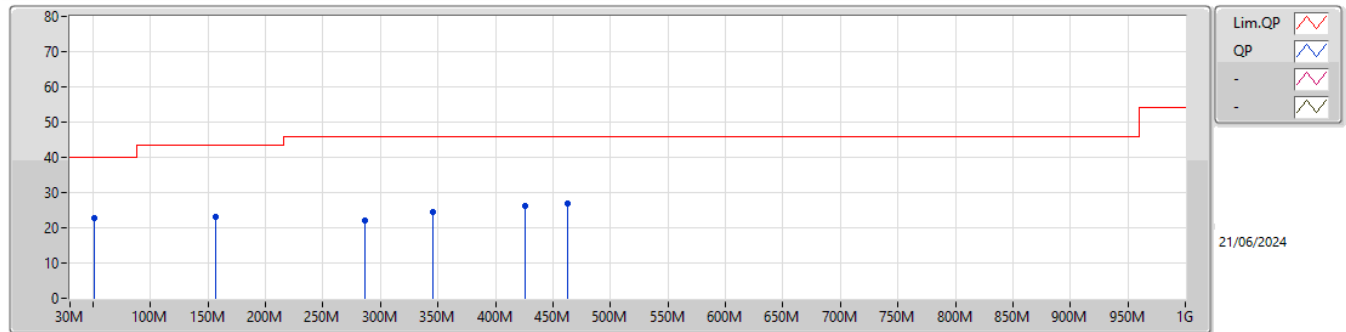
Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)		
PK	48.3M	21.75	40.00	-18.25	-7.84	3	Horizontal	-	-	-	29.59	19.60	0.63	28.07		
PK	169.4M	23.11	43.50	-20.39	-9.28	3	Horizontal	-	-	-	32.39	17.92	1.22	28.42		
PK	291.5M	22.54	46.00	-23.46	-8.29	3	Horizontal	-	-	-	30.83	18.50	1.63	28.42		
PK	331.8M	23.52	46.00	-22.48	-7.17	3	Horizontal	-	-	-	30.69	19.50	1.72	28.39		
PK	378.4M	23.99	46.00	-22.01	-5.97	3	Horizontal	-	-	-	29.96	20.57	1.81	28.35		
PK	414.5M	25.21	46.00	-20.79	-4.94	3	Horizontal	-	-	-	30.15	21.49	1.89	28.32		



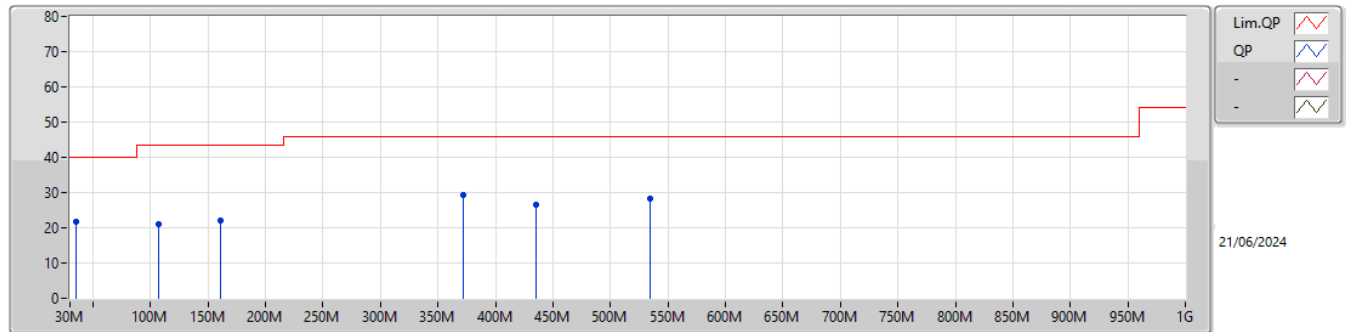
Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)		
PK	50.6M	22.88	40.00	-17.12	-7.88	3	Vertical	-	-	-	30.76	19.56	0.64	28.08		
PK	156.4M	22.99	43.50	-20.51	-8.68	3	Vertical	-	-	-	31.67	18.56	1.17	28.41		
PK	286.4M	22.21	46.00	-23.79	-8.31	3	Vertical	-	-	-	30.52	18.50	1.61	28.42		
PK	346.1M	24.49	46.00	-21.51	-7.04	3	Vertical	-	-	-	31.53	19.60	1.74	28.38		
PK	426.2M	26.10	46.00	-19.90	-4.67	3	Vertical	-	-	-	30.77	21.72	1.92	28.31		
PK	463.1M	27.05	46.00	-18.95	-3.77	3	Vertical	-	-	-	30.82	22.46	2.04	28.27		

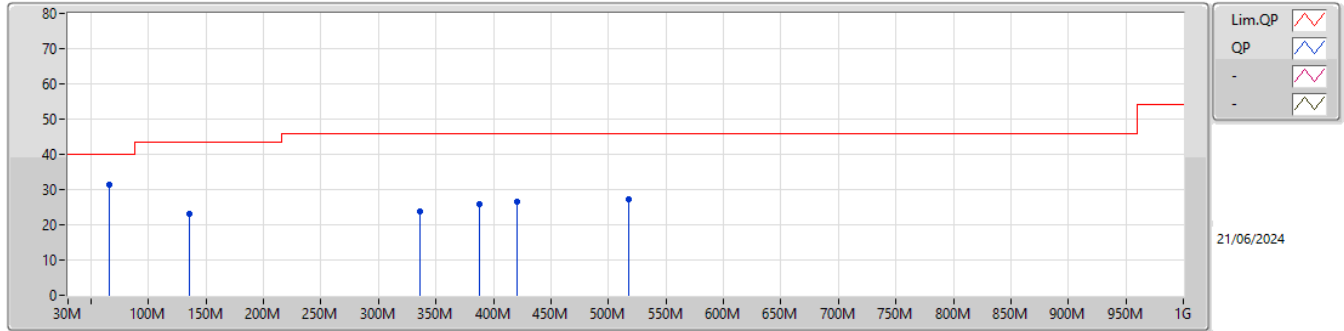


Mode 2



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)		
PK	35.8M	21.60	40.00	-18.40	-9.53	3	Horizontal	-	-	-	31.13	17.92	0.55	28.00		
PK	106.8M	21.03	43.50	-22.47	-12.16	3	Horizontal	-	-	-	33.19	15.24	0.98	28.38		
PK	161.2M	22.24	43.50	-21.26	-8.85	3	Horizontal	-	-	-	31.09	18.38	1.19	28.42		
PK	371.8M	29.35	46.00	-16.65	-6.20	3	Horizontal	-	-	-	35.55	20.37	1.79	28.36		
PK	435.8M	26.39	46.00	-19.61	-4.33	3	Horizontal	-	-	-	30.72	22.02	1.95	28.30		
PK	535M	28.17	46.00	-17.83	-2.48	3	Horizontal	-	-	-	30.65	23.50	2.26	28.24		

Mode 2



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)		
PK	65.4M	31.53	40.00	-8.47	-10.12	3	Vertical	-	-	-	41.65	17.30	0.75	28.17		
PK	135.9M	23.09	43.50	-20.41	-9.61	3	Vertical	-	-	-	32.70	17.70	1.09	28.40		
PK	335.6M	23.88	46.00	-22.12	-7.16	3	Vertical	-	-	-	31.04	19.51	1.72	28.39		
PK	387.5M	25.83	46.00	-20.17	-5.66	3	Vertical	-	-	-	31.49	20.85	1.83	28.34		
PK	420.8M	26.62	46.00	-19.38	-4.78	3	Vertical	-	-	-	31.40	21.62	1.91	28.31		
PK	518M	27.36	46.00	-18.64	-2.62	3	Vertical	-	-	-	29.98	23.40	2.22	28.24		

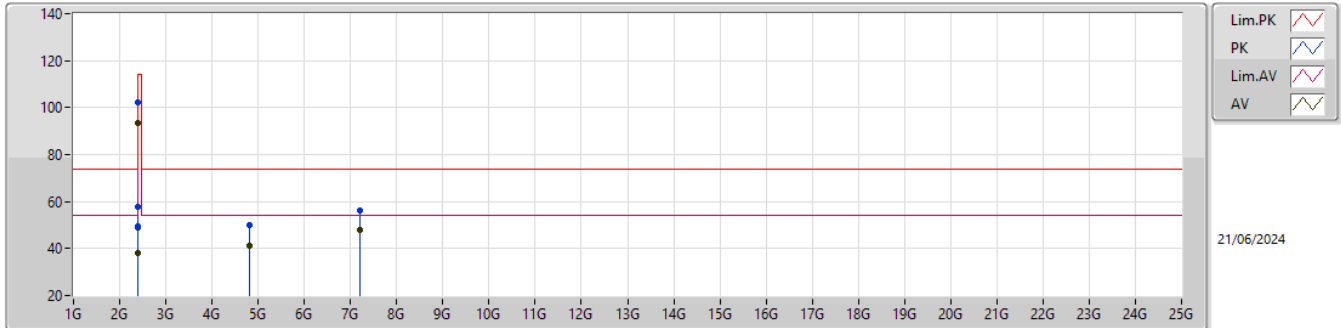


Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
SRD	Pass	AV	2.4835G	53.63	54.00	-0.37	3	Horizontal	180	2.43	-

2.4-2.4835GHz_SRD

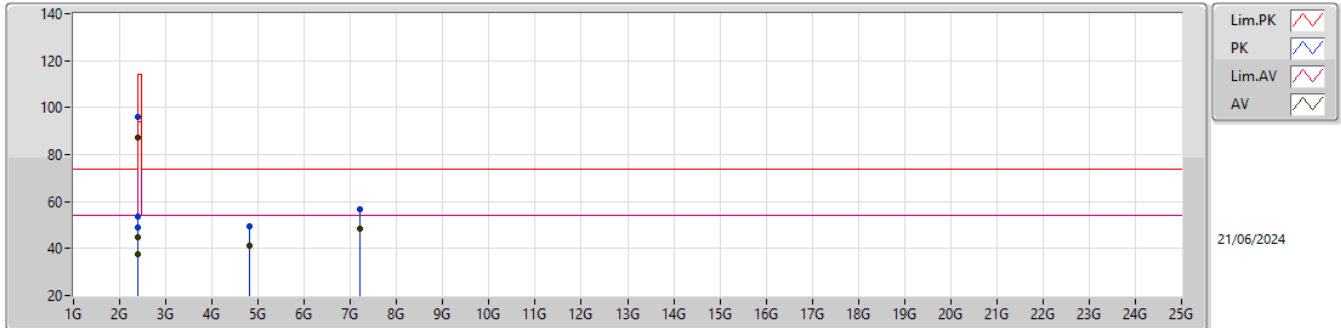
2403MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)				
AV	2.39G	37.94	54.00	-16.06	42.32	3	Horizontal	182	2.61	-	27.60	4.95	36.93				
PK	2.39G	49.59	74.00	-24.41	53.97	3	Horizontal	182	2.61	-	27.60	4.95	36.93				
AV	2.4G	49.15	54.00	-4.85	-	3	Horizontal	182	2.61	-	-	-	-				
PK	2.4G	57.77	74.00	-16.23	62.14	3	Horizontal	182	2.61	-	27.60	4.96	36.93				
AV	2.403G	93.46	94.00	-0.54	-	3	Horizontal	182	2.61	-	-	-	-				
PK	2.403G	102.08	114.00	-11.92	106.49	3	Horizontal	182	2.61	-	27.57	4.96	36.94				
AV	4.806G	41.35	54.00	-12.65	-	3	Horizontal	156	1.00	-	-	-	-				
PK	4.806G	49.97	74.00	-24.03	50.34	3	Horizontal	156	1.00	-	31.29	6.86	38.52				
AV	7.209G	47.79	54.00	-6.21	-	3	Horizontal	63	1.00	-	-	-	-				
PK	7.209G	56.41	74.00	-17.59	51.16	3	Horizontal	63	1.00	-	36.20	8.37	39.32				

2.4-2.4835GHz_SRD

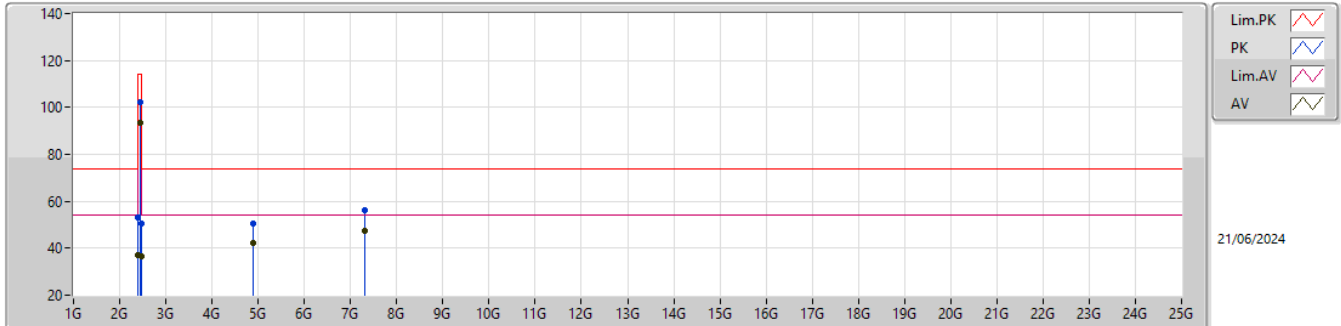
2403MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)			
AV	2.39G	37.41	54.00	-16.59	41.79	3	Vertical	236	3.22	-	27.60	4.95	36.93			
PK	2.39G	48.85	74.00	-25.15	53.23	3	Vertical	236	3.22	-	27.60	4.95	36.93			
AV	2.4G	44.76	54.00	-9.24	-	3	Vertical	236	3.22	-	-	-	-			
PK	2.4G	53.38	74.00	-20.62	57.75	3	Vertical	236	3.22	-	27.60	4.96	36.93			
AV	2.403G	87.18	94.00	-6.82	-	3	Vertical	236	3.22	-	-	-	-			
PK	2.403G	95.80	114.00	-18.20	100.21	3	Vertical	236	3.22	-	27.57	4.96	36.94			
AV	4.806G	41.10	54.00	-12.90	-	3	Vertical	12	1.00	-	-	-	-			
PK	4.806G	49.72	74.00	-24.28	50.09	3	Vertical	12	1.00	-	31.29	6.86	38.52			
AV	7.209G	48.26	54.00	-5.74	-	3	Vertical	354	1.00	-	-	-	-			
PK	7.209G	56.88	74.00	-17.12	51.63	3	Vertical	354	1.00	-	36.20	8.37	39.32			

2.4-2.4835GHz_SRD

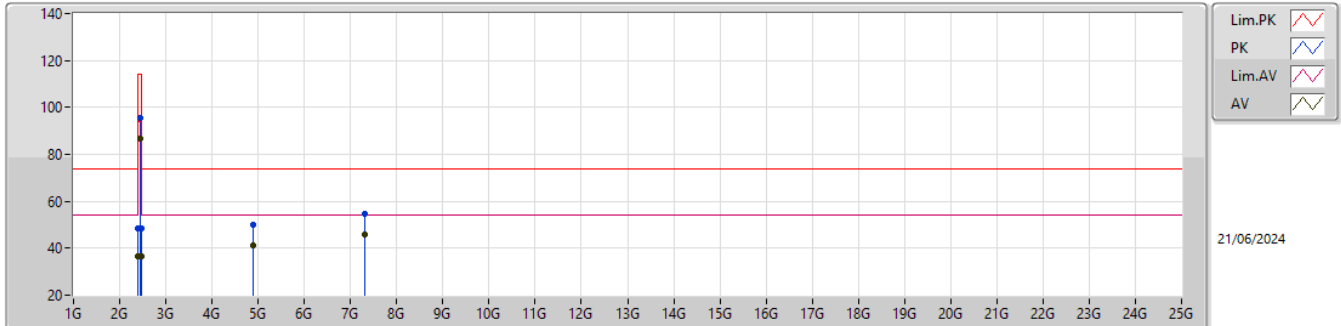
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)			
AV	2.39G	36.90	54.00	-17.10	41.28	3	Horizontal	171	1.68	-	27.60	4.95	36.93			
PK	2.39G	52.93	74.00	-21.07	57.31	3	Horizontal	171	1.68	-	27.60	4.95	36.93			
AV	2.4G	37.14	54.00	-16.86	41.51	3	Horizontal	171	1.68	-	27.60	4.96	36.93			
PK	2.4G	53.25	74.00	-20.75	57.62	3	Horizontal	171	1.68	-	27.60	4.96	36.93			
AV	2.44G	93.39	94.00	-0.61	-	3	Horizontal	171	1.68	-	-	-	-			
PK	2.44G	102.01	114.00	-11.99	106.77	3	Horizontal	171	1.68	-	27.20	5.01	36.97			
AV	2.4835G	36.78	54.00	-17.22	41.53	3	Horizontal	171	1.68	-	27.20	5.06	37.01			
PK	2.4835G	50.72	74.00	-23.28	55.47	3	Horizontal	171	1.68	-	27.20	5.06	37.01			
AV	4.88G	42.08	54.00	-11.92	-	3	Horizontal	156	1.21	-	-	-	-			
PK	4.88G	50.70	74.00	-23.30	51.21	3	Horizontal	156	1.21	-	31.14	6.92	38.57			
AV	7.32G	47.61	54.00	-6.39	-	3	Horizontal	61	1.00	-	-	-	-			
PK	7.32G	56.23	74.00	-17.77	51.10	3	Horizontal	61	1.00	-	36.16	8.43	39.46			

2.4-2.4835GHz_SRD

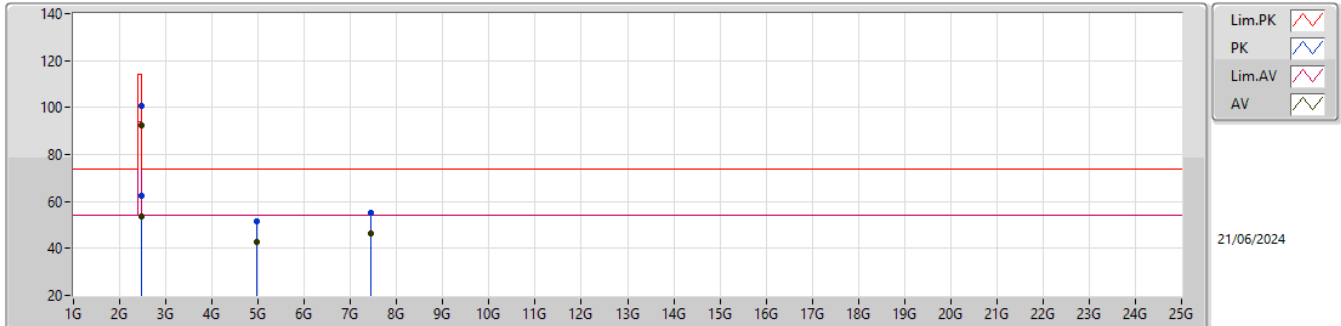
2440MHz_TX



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)			
AV	2.39G	36.69	54.00	-17.31	41.07	3	Vertical	237	3.56	-	27.60	4.95	36.93			
PK	2.39G	48.22	74.00	-25.78	52.60	3	Vertical	237	3.56	-	27.60	4.95	36.93			
AV	2.4G	36.75	54.00	-17.25	41.12	3	Vertical	237	3.56	-	27.60	4.96	36.93			
PK	2.4G	48.32	74.00	-25.68	52.69	3	Vertical	237	3.56	-	27.60	4.96	36.93			
AV	2.44G	86.67	94.00	-7.33	-	3	Vertical	237	3.56	-	-	-	-			
PK	2.44G	95.29	114.00	-18.71	100.05	3	Vertical	237	3.56	-	27.20	5.01	36.97			
AV	2.4835G	36.50	54.00	-17.50	41.25	3	Vertical	237	3.56	-	27.20	5.06	37.01			
PK	2.4835G	48.58	74.00	-25.42	53.33	3	Vertical	237	3.56	-	27.20	5.06	37.01			
AV	4.88G	41.35	54.00	-12.65	-	3	Vertical	8	1.00	-	-	-	-			
PK	4.88G	49.97	74.00	-24.03	50.48	3	Vertical	8	1.00	-	31.14	6.92	38.57			
AV	7.32G	45.94	54.00	-8.06	-	3	Vertical	287	2.99	-	-	-	-			
PK	7.32G	54.56	74.00	-19.44	49.43	3	Vertical	287	2.99	-	36.16	8.43	39.46			

2.4-2.4835GHz_SRD

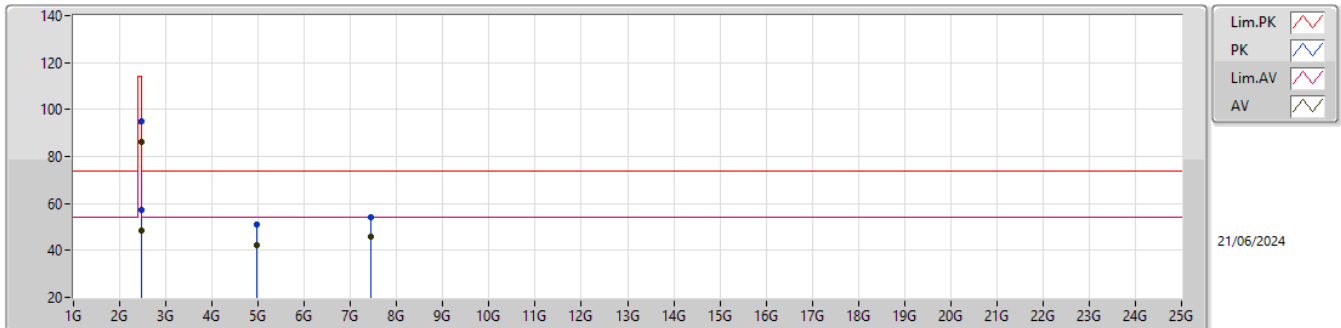
2481MHz_TX



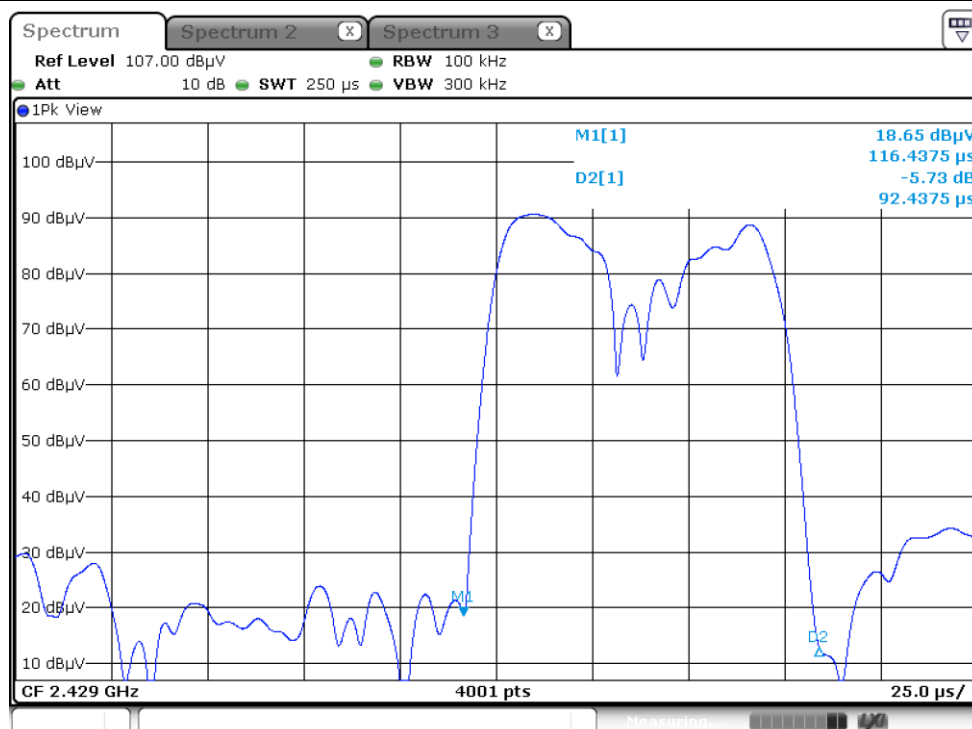
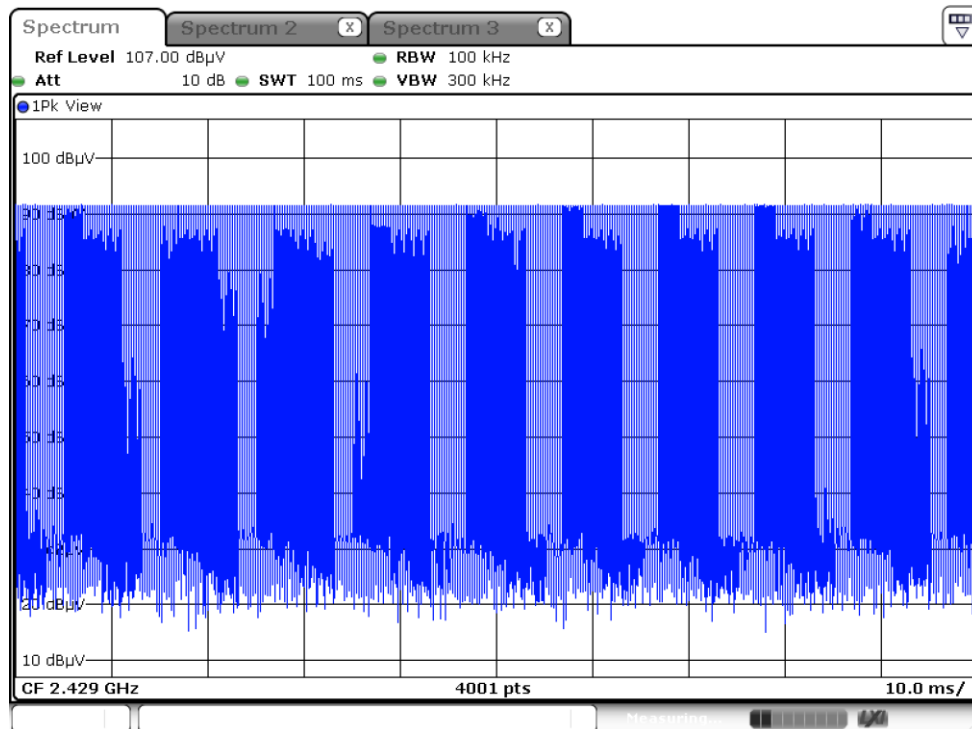
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)			
AV	2.481G	92.19	94.00	-1.81	-	3	Horizontal	180	2.43	-	-	-	-			
PK	2.481G	100.81	114.00	-13.19	105.55	3	Horizontal	180	2.43	-	27.20	5.06	37.00			
AV	2.4835G	53.63	54.00	-0.37	-	3	Horizontal	180	2.43	-	-	-	-			
PK	2.4835G	62.25	74.00	-11.75	67.00	3	Horizontal	180	2.43	-	27.20	5.06	37.01			
AV	4.962G	42.96	54.00	-11.04	-	3	Horizontal	161	1.00	-	-	-	-			
PK	4.962G	51.58	74.00	-22.42	51.83	3	Horizontal	161	1.00	-	31.37	7.00	38.62			
AV	7.443G	46.43	54.00	-7.57	-	3	Horizontal	64	1.00	-	-	-	-			
PK	7.443G	55.05	74.00	-18.95	49.80	3	Horizontal	64	1.00	-	36.36	8.50	39.61			

2.4-2.4835GHz_SRD

2481MHz_TX



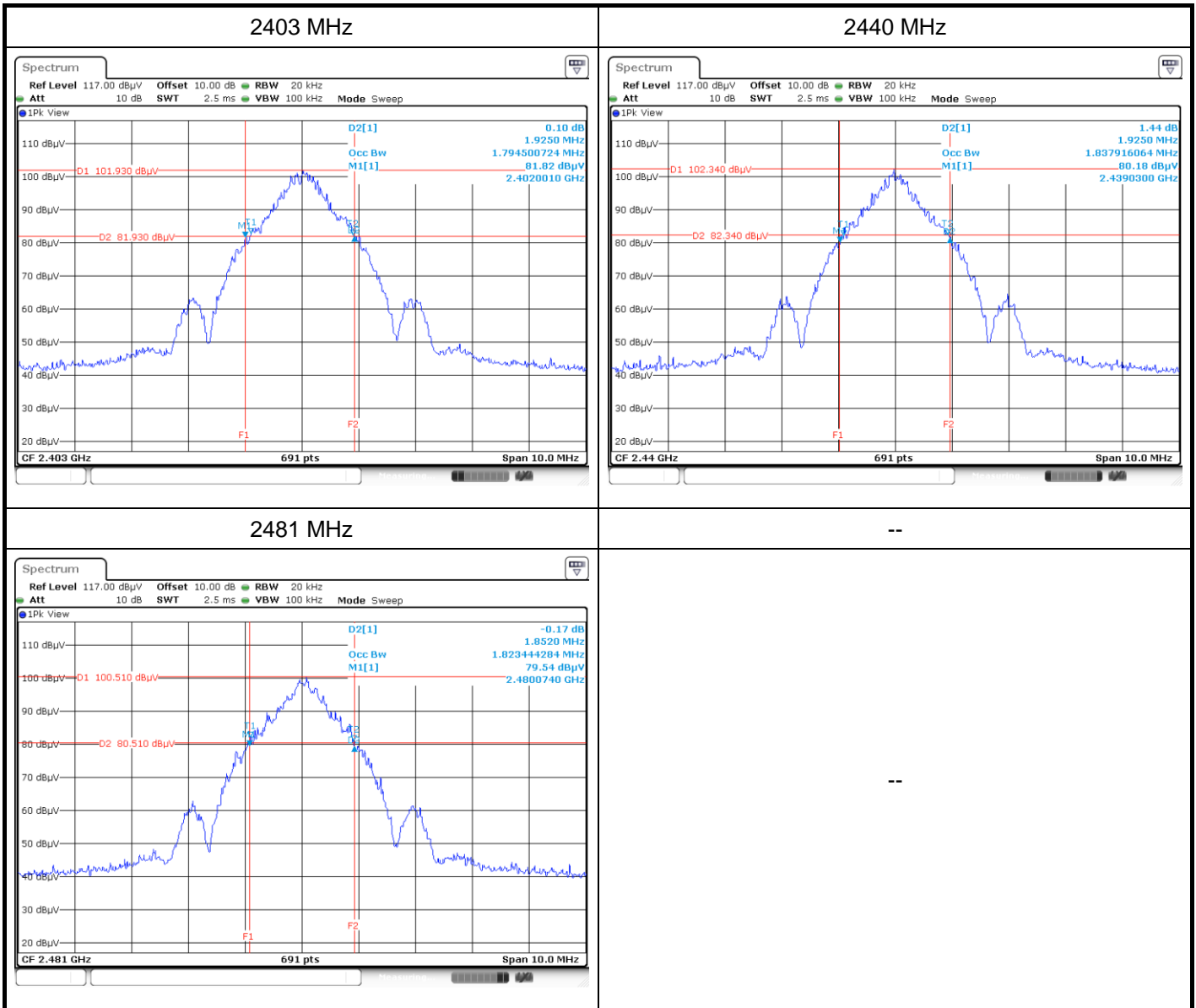
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)			
AV	2.481G	86.23	94.00	-7.77	-	3	Vertical	223	3.75	-	-	-	-			
PK	2.481G	94.85	114.00	-19.15	99.59	3	Vertical	223	3.75	-	27.20	5.06	37.00			
AV	2.4835G	48.52	54.00	-5.48	-	3	Vertical	233	3.75	-	-	-	-			
PK	2.4835G	57.14	74.00	-16.86	61.89	3	Vertical	223	3.75	-	27.20	5.06	37.01			
AV	4.962G	42.20	54.00	-11.80	-	3	Vertical	10	1.00	-	-	-	-			
PK	4.962G	50.82	74.00	-23.18	51.07	3	Vertical	10	1.00	-	31.37	7.00	38.62			
AV	7.443G	45.67	54.00	-8.33	-	3	Vertical	298	1.00	-	-	-	-			
PK	7.443G	54.29	74.00	-19.71	49.04	3	Vertical	298	1.00	-	36.36	8.50	39.61			

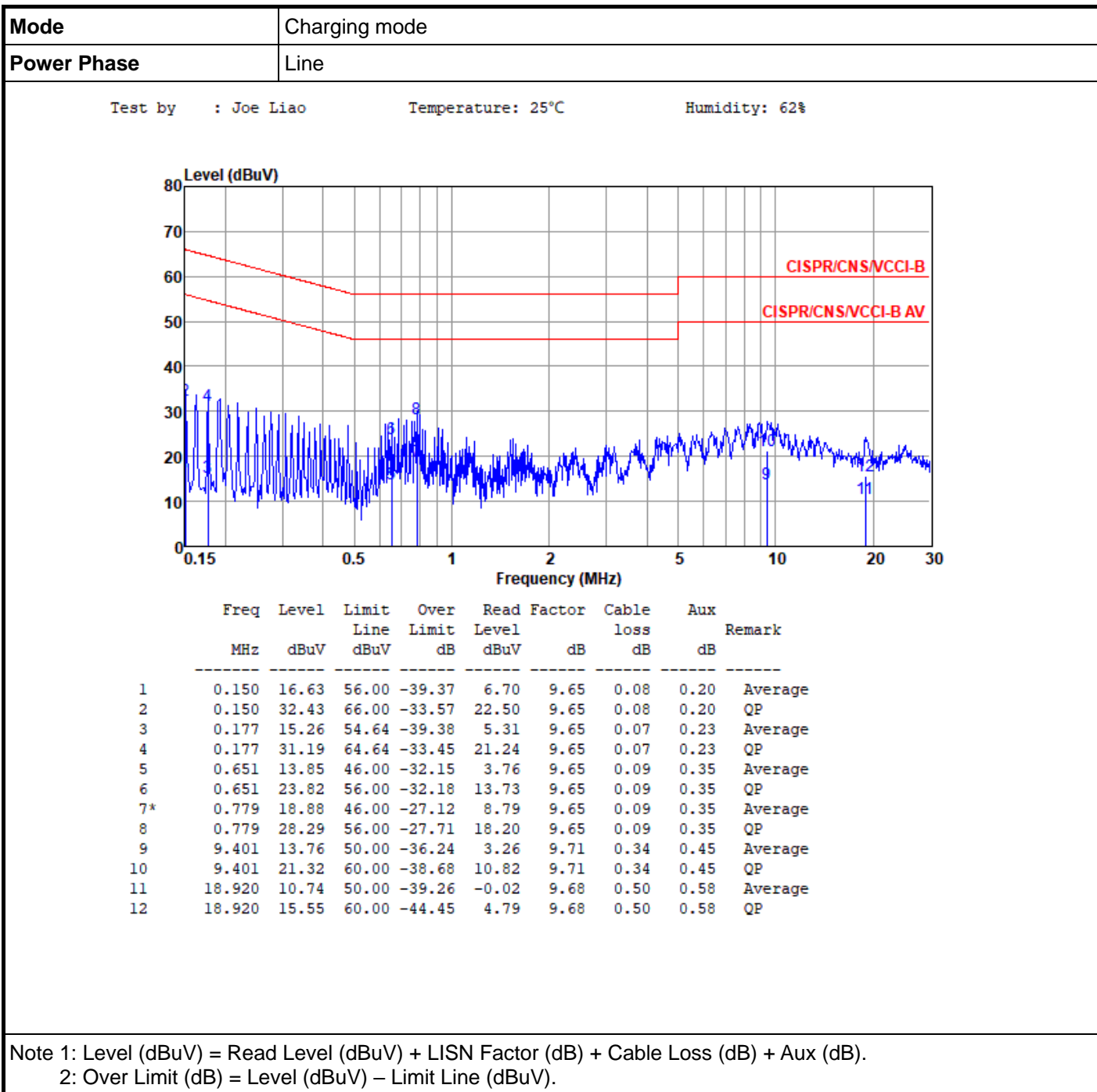


$$20\log (\text{Duty cycle}) = 20\log \frac{0.0924375 \times 401 \text{ ms}}{100 \text{ ms}} = -8.62\text{dB}$$



Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2403	1.925	1.795
2440	1.925	1.838
2481	1.852	1.823







Mode	Charging mode
Power Phase	Neutral

Test by : Joe Liao Temperature: 25°C Humidity: 62%

Level (dBuV)

Frequency (MHz)

	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.165	18.04	55.21	-37.17	8.17	9.66	0.07	0.14	Average
2	0.165	31.78	65.21	-33.43	21.91	9.66	0.07	0.14	QP
3	0.192	17.77	53.93	-36.16	7.90	9.65	0.06	0.16	Average
4	0.192	31.65	63.93	-32.28	21.78	9.65	0.06	0.16	QP
5	0.751	22.63	46.00	-23.37	12.61	9.65	0.09	0.28	Average
6	0.751	29.92	56.00	-26.08	19.90	9.65	0.09	0.28	QP
7*	0.779	25.67	46.00	-20.33	15.64	9.65	0.09	0.29	Average
8	0.779	33.12	56.00	-22.88	23.09	9.65	0.09	0.29	QP
9	8.869	20.67	50.00	-29.33	10.19	9.73	0.33	0.42	Average
10	8.869	28.14	60.00	-31.86	17.66	9.73	0.33	0.42	QP
11	19.122	13.50	50.00	-36.50	2.61	9.82	0.50	0.57	Average
12	19.122	21.46	60.00	-38.54	10.57	9.82	0.50	0.57	QP

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