

FCC Co-Location Test Report

FCC ID : IPH-A4263
Equipment : Outdoor GPS Watch
Model No. : AA4263
Brand Name : GARMIN
Applicant : Garmin International, Inc.
Address : 1200 E. 151st Street Olathe, KS 66062 United States
Standard : 47 CFR FCC Part 15.247
47 CFR FCC Part 15.249
47 CFR FCC Part 15.225
Received Date : Apr. 13, 2023
Tested Date : Jul. 06, 2023

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

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Appendix A. Unwanted Emissions Into Restricted Frequency Bands

Release Record

Report No.	Version	Description	Issued Date
FR341301CO	Rev. 01	Initial issue	Aug. 07, 2023

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 677.96MHz 32.73 (Margin -13.27dB) - PK	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 Specification of the Equipment under Test (EUT)

WLAN	
Operating Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz
Modulation Type	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)
BT	
Operating Frequency	2402 MHz ~ 2480 MHz
Modulation Type	Bluetooth LE: GFSK Bluetooth BR (1Mbps): GFSK Bluetooth EDR (2Mbps): $\pi/4$ -DQPSK Bluetooth EDR (3Mbps): 8-DPSK
NFC	
Operating Frequency	13.56 MHz
Modulation Type	ASK
ANT+	
Operating Frequency	2402 MHz ~ 2480 MHz
Modulation Type	GFSK

1.1.2 Antenna Details

For WLAN, BT & ANT+

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)
1	Garmin	145-03859-00	Slot	No	-6.31

For NFC

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)
1	INPAQ TECH CO LTD	NF-C-F9-R0-157	Loop	-	-

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc from host 3.87Vdc from battery
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1.2 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Jul. 06, 2023				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 03, 2023	Mar. 02, 2024
Spectrum Analyzer	R&S	FSV40	101498	Nov. 21, 2022	Nov. 20, 2023
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 01, 2022	Oct. 31, 2023
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 03, 2022	Aug. 02, 2023
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Nov. 25, 2022	Nov. 24, 2023
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 27, 2022	Oct. 26, 2023
Preamplifier	EMC	EMC02325	980225	Jun. 28, 2023	Jun. 27, 2024
Preamplifier	EMC	EMC118A45SE	980898	Jul. 16, 2022	Jul. 15, 2023
Preamplifier	EMC	EMC184045SE	980903	Jul. 16, 2022	Jul. 15, 2023
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 04, 2022	Oct. 03, 2023
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 04, 2022	Oct. 03, 2023
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 04, 2022	Oct. 03, 2023
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 04, 2022	Oct. 03, 2023
RF Cable	EMC	EMC104-35M-35M- 8000	210920	Oct. 04, 2022	Oct. 03, 2023
RF Cable	EMC	EMC104-35M-35M- 3000	210922	Oct. 04, 2022	Oct. 03, 2023
HIGHPASS FILTER 3.1-18G	WHK	WHK3.1/18G-10SS	39	Oct. 06, 2022	Oct. 05, 2023
Attenuator	Pasternack	PE7005-10	10-1	Oct. 06, 2022	Oct. 05, 2023
Measurement Software	Sporton	SENSE-EMI	V5.10.8	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.3 Test Standards

47 CFR FCC Part 15.247
47 CFR FCC Part 15.249
47 CFR FCC Part 15.225
ANSI C63.10-2013

1.4 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02
FCC KDB 412172 D01 Determining ERP and EIRP v01r01
FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

1.5 Deviation from Test Standard and Measurement Procedure

None

1.6 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
Unwanted Emission \leq 1GHz	± 3.41 dB
Unwanted Emission $>$ 1GHz	± 4.59 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	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
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode
Unwanted Emissions	Mode 1: WLAN 2.4G 11b 2437MHz + NFC 13.56MHz Mode 2: BT EDR GFSK 2480MHz + NFC 13.56MHz Mode 3: ANT+ 2441MHz + NFC 13.56MHz
NOTE: The selected channel is the maximum power channel of Wi-Fi mode.	

3 Transmitter Test Results

3.1 Unwanted Emissions into Restricted Frequency Bands

3.1.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
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:
Qusai-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.

3.1.2 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:

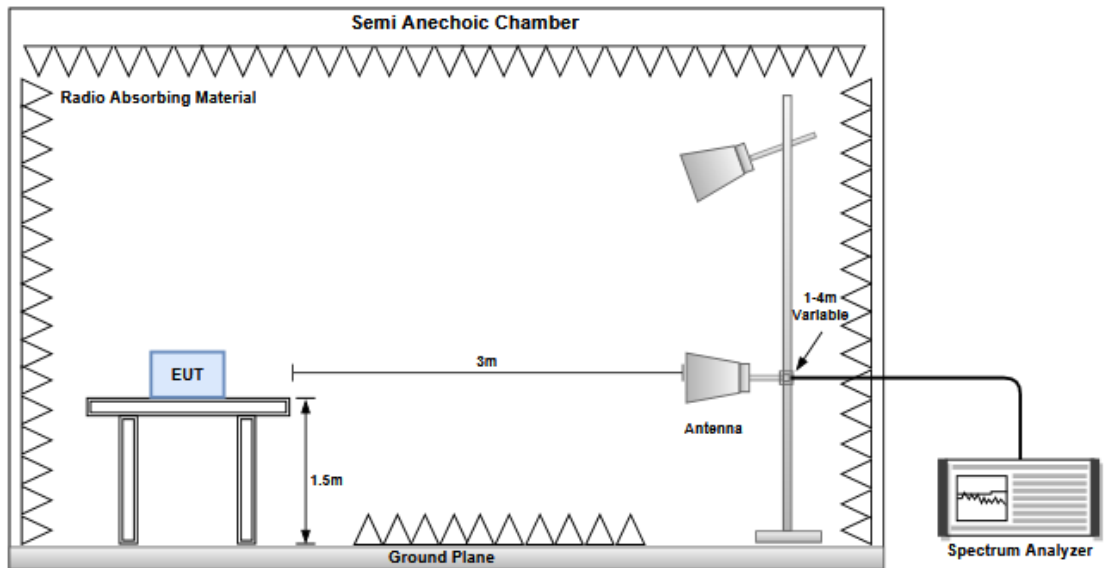
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.1.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.1.4 Test Results

Ambient Condition	26°C / 61%	Tested By	Sean Yu
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Refer to Appendix A.

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

No.3-1, Lane 6, Wen San 3rd
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

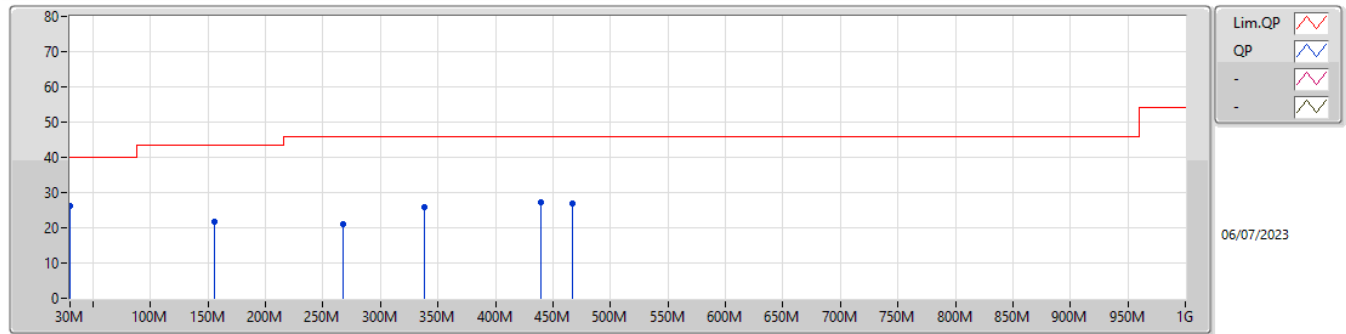
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Summary

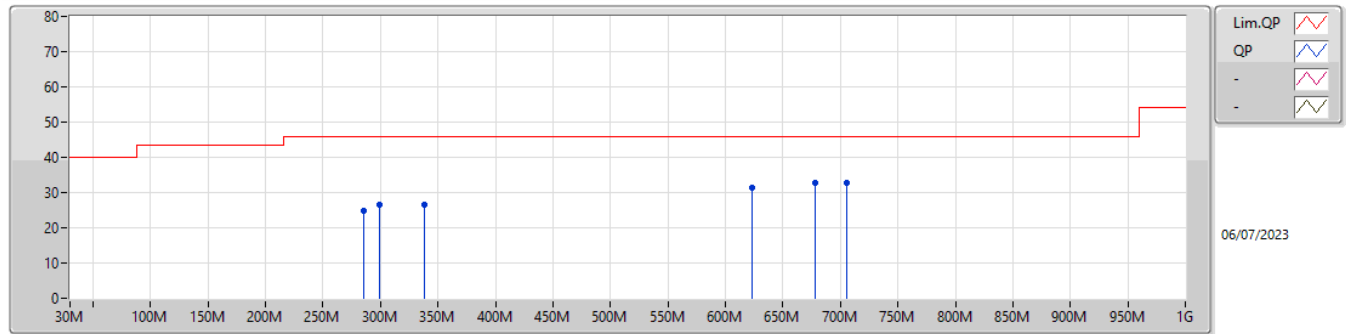
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	PK	677.96M	32.73	46.00	-13.27	Horizontal
Mode 2	Pass	PK	677.96M	32.66	46.00	-13.34	Horizontal
Mode 3	Pass	PK	705.12M	32.59	46.00	-13.41	Horizontal

Mode 1



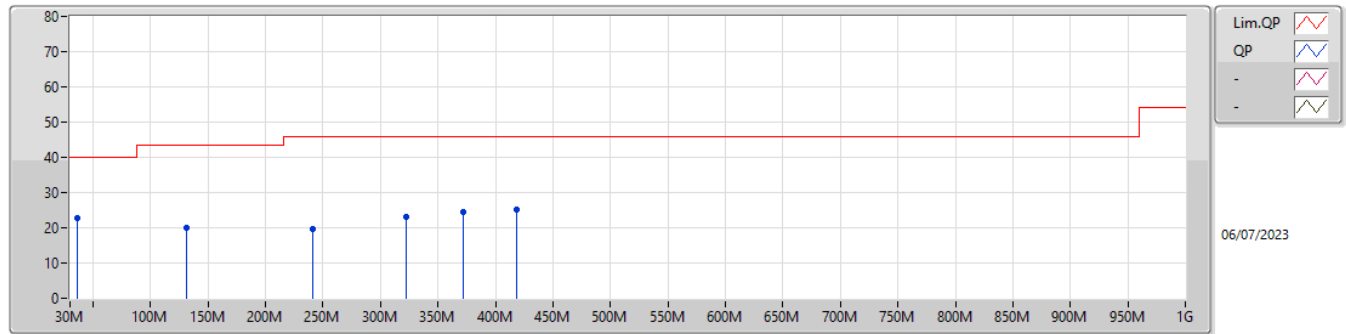
Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)		
PK	30M	26.07	40.00	-13.93	-9.91	3	Vertical	-	-	-	35.98	17.50	0.56	27.97		
PK	156.1M	21.75	43.50	-21.75	-8.92	3	Vertical	-	-	-	30.67	18.39	1.10	28.41		
PK	267.65M	21.15	46.00	-24.85	-9.00	3	Vertical	-	-	-	30.15	17.95	1.48	28.43		
PK	338.46M	25.73	46.00	-20.27	-7.23	3	Vertical	-	-	-	32.96	19.50	1.66	28.39		
PK	439.34M	27.25	46.00	-18.75	-4.43	3	Vertical	-	-	-	31.68	21.99	1.87	28.29		
PK	467.47M	26.74	46.00	-19.26	-3.84	3	Vertical	-	-	-	30.58	22.50	1.93	28.27		

Mode 1



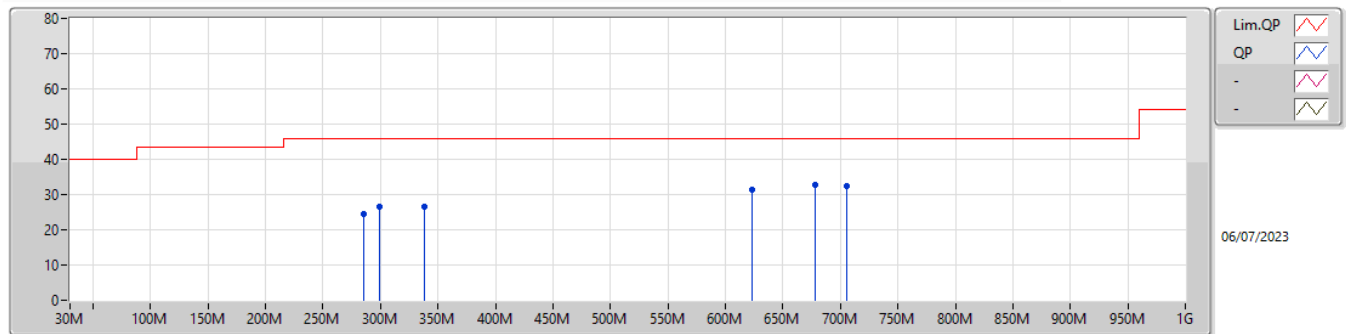
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PK	285.11M	24.69	46.00	-21.31	-8.48	3	Horizontal	-	-	-	33.17	18.40	1.54	28.42		
PK	298.69M	26.43	46.00	-19.57	-8.16	3	Horizontal	-	-	-	34.59	18.67	1.59	28.42		
PK	338.46M	26.51	46.00	-19.49	-7.23	3	Horizontal	-	-	-	33.74	19.50	1.66	28.39		
PK	623.64M	31.21	46.00	-14.79	-0.36	3	Horizontal	-	-	-	31.57	25.57	2.30	28.23		
PK	677.96M	32.73	46.00	-13.27	0.07	3	Horizontal	-	-	-	32.66	25.76	2.48	28.17		
PK	705.12M	32.66	46.00	-13.34	0.53	3	Horizontal	-	-	-	32.13	26.10	2.57	28.14		

Mode 2



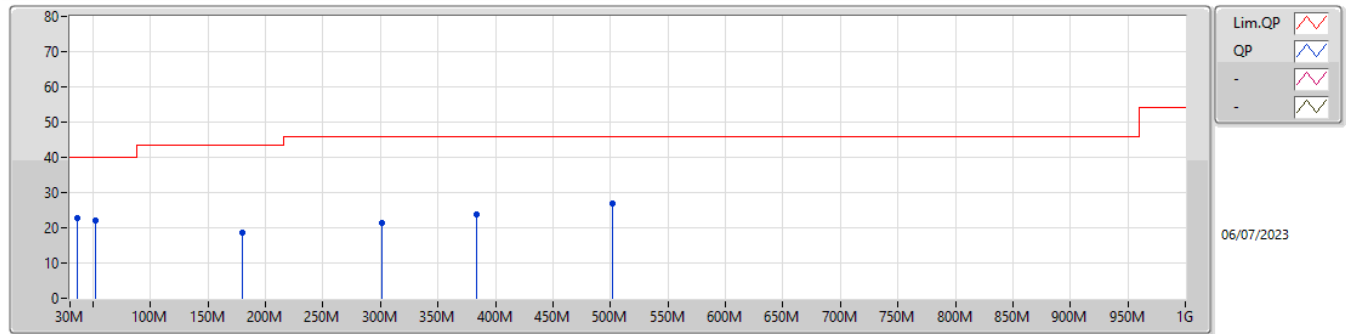
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PK	35.82M	22.93	40.00	-17.07	-9.27	3	Vertical	-	-	-	32.20	18.14	0.59	28.00		
PK	131.85M	19.90	43.50	-23.60	-10.25	3	Vertical	-	-	-	30.15	17.13	1.02	28.40		
PK	241.46M	19.75	46.00	-26.25	-10.34	3	Vertical	-	-	-	30.09	16.69	1.40	28.43		
PK	321.97M	23.06	46.00	-22.94	-7.47	3	Vertical	-	-	-	30.53	19.30	1.63	28.40		
PK	372.41M	24.47	46.00	-21.53	-6.31	3	Vertical	-	-	-	30.78	20.30	1.74	28.35		
PK	418.00M	25.19	46.00	-20.81	-5.11	3	Vertical	-	-	-	30.30	21.36	1.84	28.31		

Mode 2



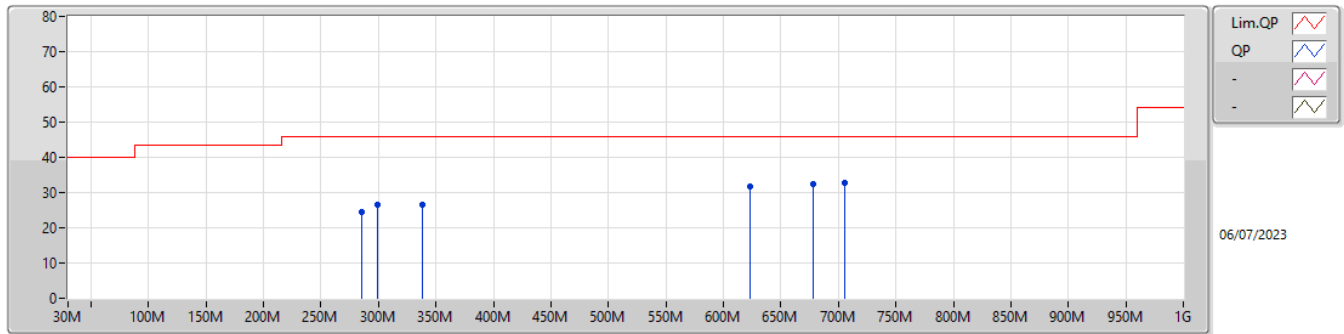
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PK	285.11M	24.63	46.00	-21.37	-8.48	3	Horizontal	-	-	-	33.11	18.40	1.54	28.42		
PK	298.69M	26.51	46.00	-19.49	-8.16	3	Horizontal	-	-	-	34.67	18.67	1.59	28.42		
PK	338.46M	26.44	46.00	-19.56	-7.23	3	Horizontal	-	-	-	33.67	19.50	1.66	28.39		
PK	623.64M	31.52	46.00	-14.48	-0.36	3	Horizontal	-	-	-	31.88	25.57	2.30	28.23		
PK	677.96M	32.66	46.00	-13.34	0.07	3	Horizontal	-	-	-	32.59	25.76	2.48	28.17		
PK	705.12M	32.48	46.00	-13.52	0.53	3	Horizontal	-	-	-	31.95	26.10	2.57	28.14		

Mode 3



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	35.82M	22.93	40.00	-17.07	-9.27	3	Vertical	-	-	-	32.20	18.14	0.59	28.00		
PK	52.31M	22.07	40.00	-17.93	-8.36	3	Vertical	-	-	-	30.43	19.00	0.73	28.09		
PK	179.38M	18.76	43.50	-24.74	-10.26	3	Vertical	-	-	-	29.02	16.96	1.21	28.43		
PK	301.6M	21.45	46.00	-24.55	-8.10	3	Vertical	-	-	-	29.55	18.73	1.59	28.42		
PK	384.05M	23.92	46.00	-22.08	-5.89	3	Vertical	-	-	-	29.81	20.68	1.77	28.34		
PK	501.42M	26.77	46.00	-19.23	-3.18	3	Vertical	-	-	-	29.95	23.03	2.03	28.24		

Mode 3



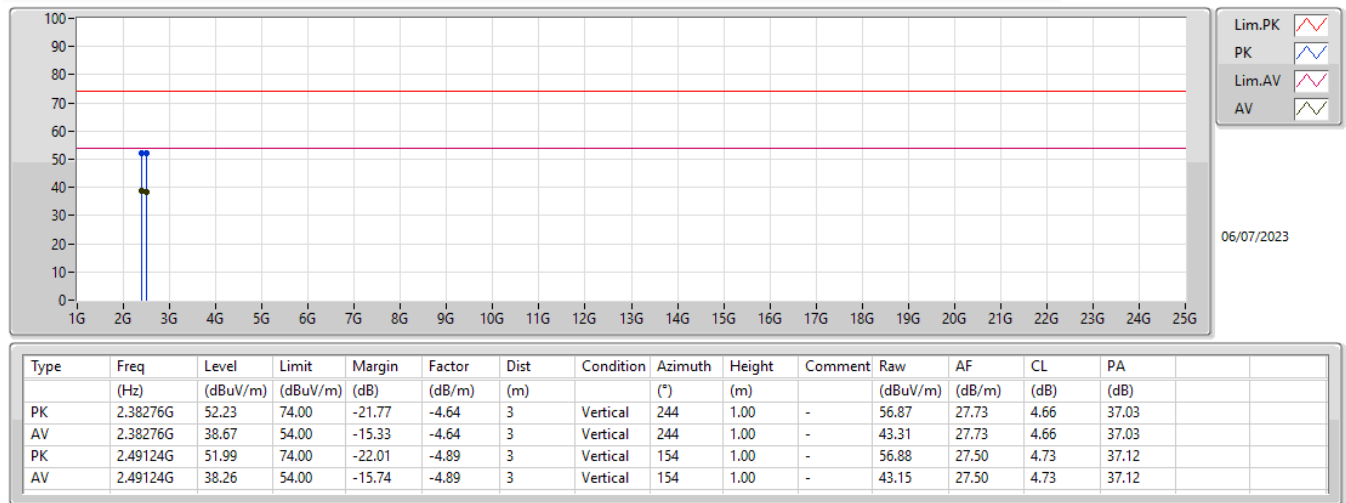
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PK	285.11M	24.57	46.00	-21.43	-8.48	3	Horizontal	-	-	-	33.05	18.40	1.54	28.42		
PK	298.69M	26.72	46.00	-19.28	-8.16	3	Horizontal	-	-	-	34.88	18.67	1.59	28.42		
PK	338.46M	26.48	46.00	-19.52	-7.23	3	Horizontal	-	-	-	33.71	19.50	1.66	28.39		
PK	623.64M	31.64	46.00	-14.36	-0.36	3	Horizontal	-	-	-	32.00	25.57	2.30	28.23		
PK	677.96M	32.47	46.00	-13.53	0.07	3	Horizontal	-	-	-	32.40	25.76	2.48	28.17		
PK	705.12M	32.59	46.00	-13.41	0.53	3	Horizontal	-	-	-	32.06	26.10	2.57	28.14		



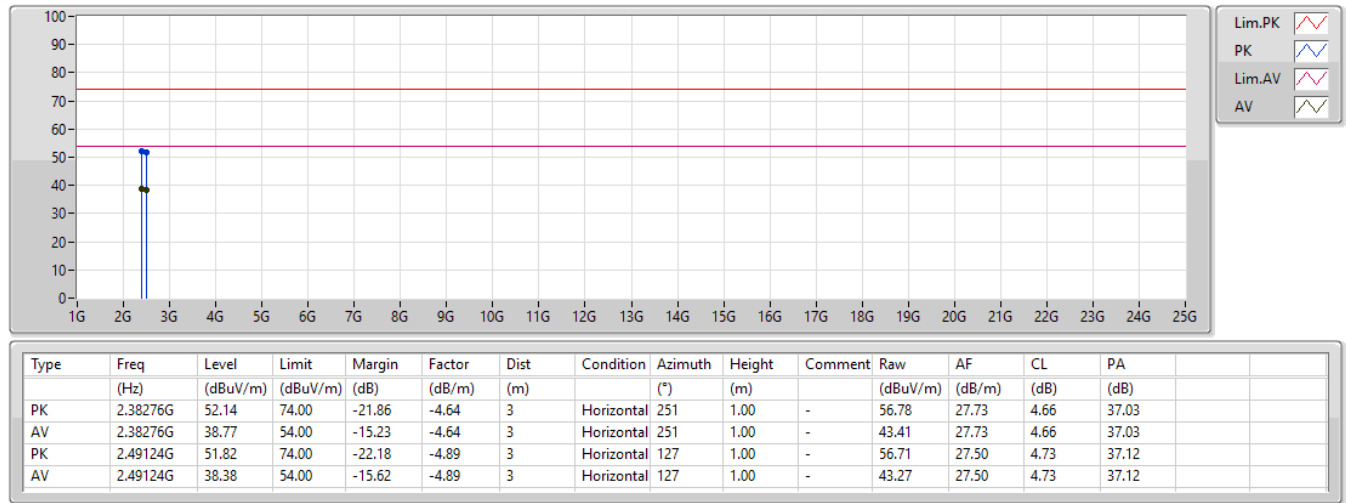
Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	AV	2.38276G	38.77	54.00	-15.23	Horizontal
Mode 2	Pass	AV	2.38508G	38.52	54.00	-15.48	Horizontal
Mode 3	Pass	AV	2.38676G	38.37	54.00	-15.63	Vertical

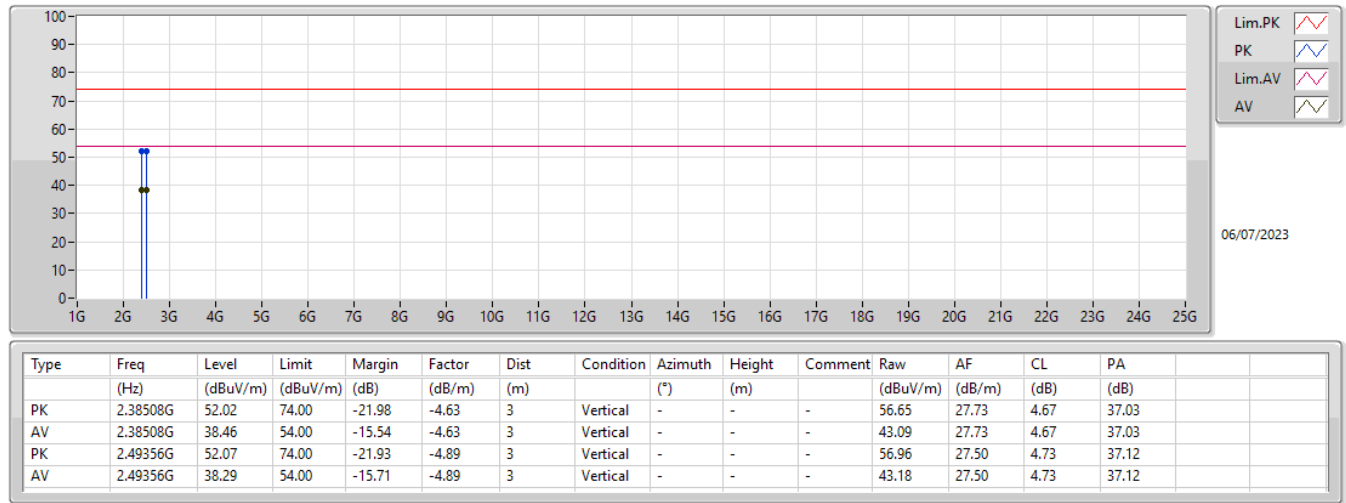
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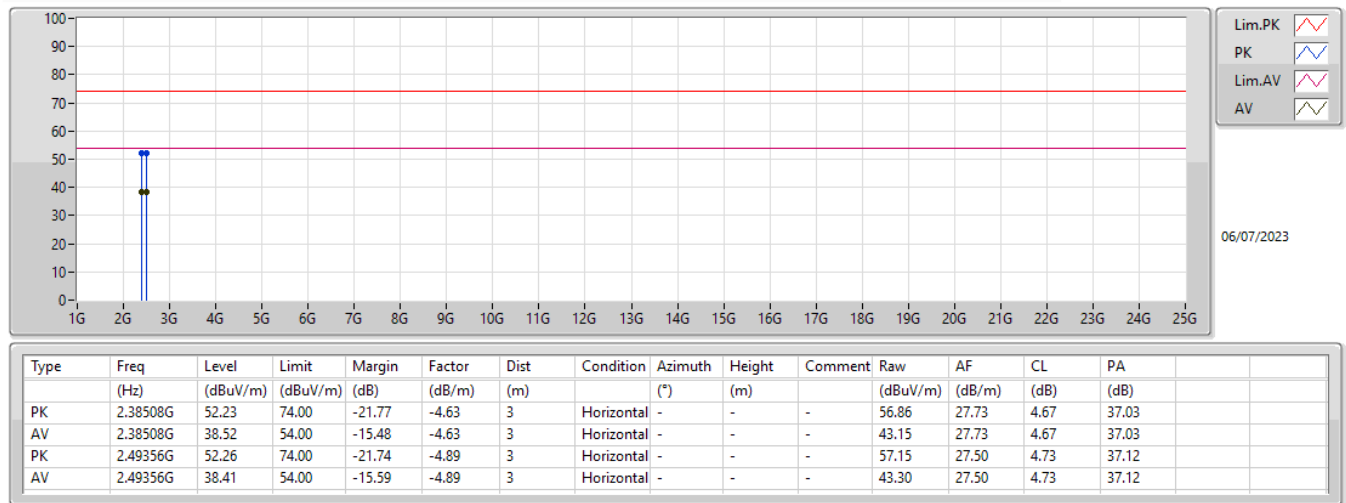
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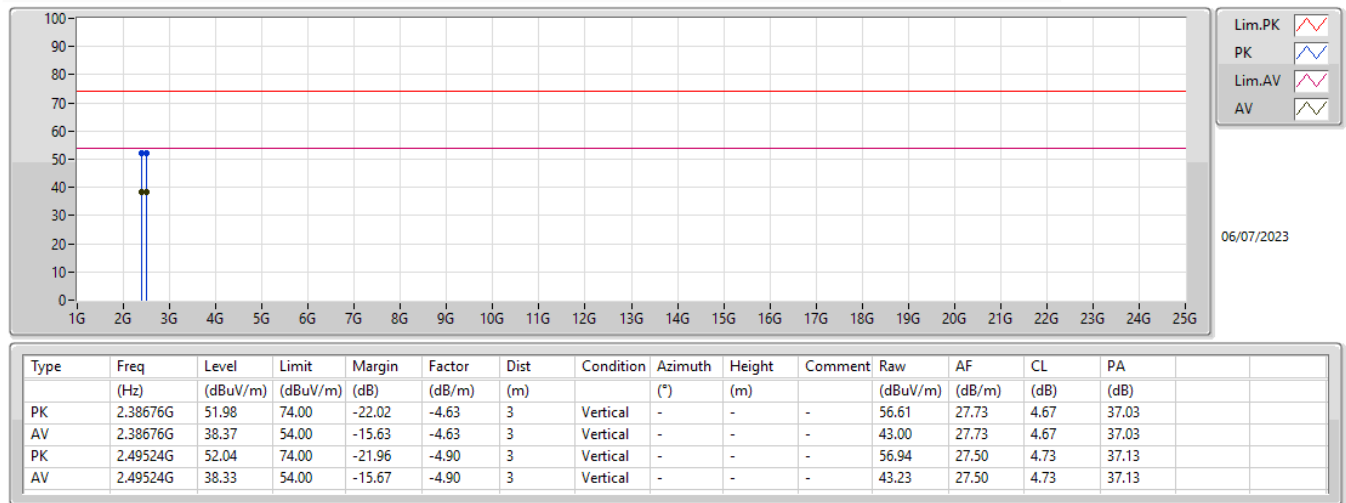
Mode 2



Mode 2



Mode 3



Mode 3

