FCC Test Report

FCC ID	:	**IPH-A04580**
Equipment	:	**Marine Stereo**
Model No.	:	**A04580**
Brand Name	:	**FUSION**
Applicant	:	**Garmin International, Inc.**
Address	:	**1200 E. 151st Street Olathe, KS 66062 United States**
Standard	:	**47 CFR FCC Part 15.249**
Received Date	:	**Dec. 18, 2024**
Tested Date	:	**Mar. 27 ~ Apr. 01, 2025**

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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Release Record

Report No.	Version	Description	Issued Date
FR4D1802AF	Rev. 01	Initial issue	Jun. 04, 2025

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	AC Power Line Conducted Emissions	Note[1]	N/A
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

N/A means Not Applicable.
Note[1]: The EUT consumes DC power, so the test is not required.

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)

RF General Information				
Frequency Range (MHz)	**Modulation**	**Ch. Freq. (MHz)**	**Channel Number**	**Data Rate**
2400-2483.5	GFSK	2460	1	1 Mbps

1.1.2 Antenna Details

Brand	Model	Type	Connector	Gain (dBi)
GARMIN	105-04581-00	Dipole	No	2.15

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Type	12 / 24 VDC

1.1.4 Accessories

No.	Equipment	Description
1	Power + Speaker Cable	0.2m non-shielded without core Brand: FUSION / Model: 320-01021-01
2	Audio Cable_1	0.2m shielded without core Brand: FUSION / Model:320-01022-02
3	Audio Cable_2	0.2m shielded without core Brand: FUSION / Model: 320-01423-00
4	NMEA2000 Cable	2m shielded without core Brand: FUSION / Model: 320-00387-00

1.1.5 Test Tool and Duty Cycle

Test Tool	ANT Test, V0.44	
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	59.87%	2.23

1.1.6 Power Index of Test Tool

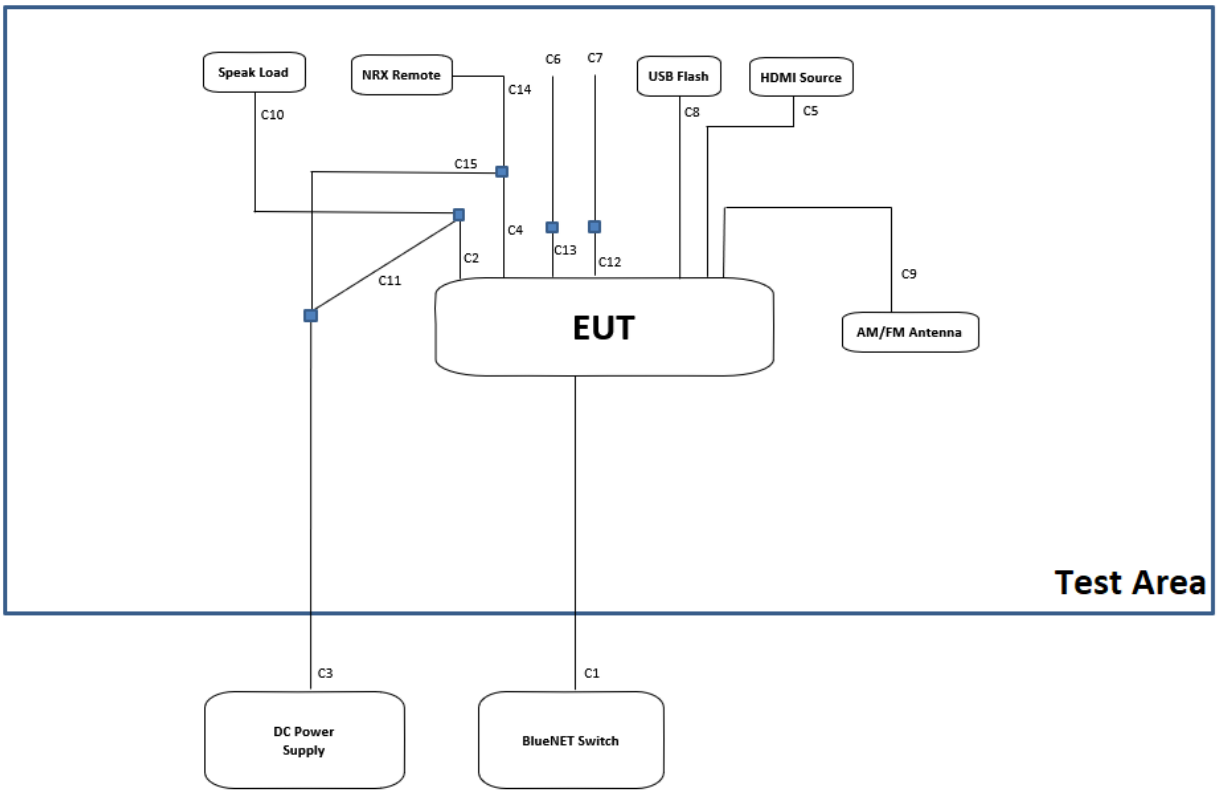
Modulation Mode	Test Frequency (MHz)
	2460
ANT	0dBm

1.2 Local Support Equipment List

Accessories					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
C2	Power + Speaker Cable	FUSION	320-01021-01	---	Provided by applicant.
C12	Audio Cable	FUSION	320-01022-02	---	Provided by applicant.
C13	Audio Cable	FUSION	320-01423-00	---	Provided by applicant.
C4	NMEA2000 Cable	FUSION	320-00387-00	---	Provided by applicant.
Support Equipment List					
C1	BlueNET Network cable	GARMIN	320-01038-02	---	Provided by applicant.
C3	DC Cable *2	ICC	DCC-10m-R DCC-10m-B	---	---
C5	HDMI Cable	UNITEK	C1049GB	---	Provided by applicant.
C6	Audio cable with load	FUSION	CA_AUD_1.85M	---	Provided by applicant.
C7	Audio cable with load	FUSION	CA_AUD_1.85M	---	Provided by applicant.
C8	USB extended cable	GARMIN	320-01674-00	---	Provided by applicant.
C9	AM/FM Antenna	Techbrands	AR-3250	---	Provided by applicant.
C10	Speaker cable	FUSION	CA_SPK_5M	---	Provided by applicant.
C11	Power cable	FUSION	CA_PWR_5M	---	Provided by applicant.
C14	NMEA2000 Cable	FUSION	320-00387-05	---	Provided by applicant.
C15	NMEA2000 Cable	FUSION	320-00389-00	---	Provided by applicant.
1	HDMI source	PX	HA2-130eS	---	Provided by applicant.
2	USB Flash	SanDisk	SDDDC4-032G-G46	---	Provided by applicant.
3	NRX Remote	FUSION	MS-NRX300	---	Provided by applicant.
4	Speak load	FUSION	LD_4R100W-4C	---	Provided by applicant.
5	BlueNet Switch	GARMIN	A04222	---	Provided by applicant.
6	DC Power supply	GW INSTEK	GPC-6030D	---	---

1.3 Test Setup Chart

Test Setup Diagram



No.	Signal cable / Length (m)
C1	BlueNET Network cable, 12.19m shielded.
C2	Power + Speaker cable, 0.2m non-shielded.
C3	DC cable, 10m non-shielded(x2).
C4	NMEA2000 cable, 2m shielded.
C5	HDMI cable, 3m shielded.
C6	Audio cable with load, 1.85m shielded.
C7	Audio cable with load, 1.85m shielded.
C8	USB cable, 2m shielded.
C9	RF cable, 4.2m shielded.
C10	Speaker cable, 5m non-shielded.
C11	Power cable, 5m non-shielded.
C12	Audio cable, 0.2m shielded.
C13	Audio cable, 0.2m shielded.
C14	NMEA2000 cable, 6m shielded.
C15	NMEA2000 power cable, 2m shielded.

1.4 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber3 / (03CH03-WS)				
Tested Date	Mar. 27 ~ Apr. 01, 2025				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Mar. 11, 2025	Mar. 10, 2026
Spectrum Analyzer	R&S	FSV40	101499	Mar. 27, 2025	Mar. 26, 2026
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 05, 2024	Nov. 04, 2025
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Jul. 02, 2024	Jul. 01, 2025
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 20, 2024	Dec. 19, 2025
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 18, 2024	Nov. 17, 2025
Preamplifier	EMC	EMC02325	980187	Jun. 27, 2024	Jun. 26, 2025
Preamplifier	EMC	EMC118A45SE	980897	Aug. 05, 2024	Aug. 04, 2025
Preamplifier	EMC	EMC184045SE	980903	Jul. 30, 2024	Jul. 29, 2025
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 02, 2024	Oct. 01, 2025
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800 -001	Sep. 20, 2024	Sep. 19, 2025
LF cable-3M	EMC	EMC8D-NM-NM-300 0	131103	Sep. 20, 2024	Sep. 19, 2025
LF cable-13M	EMC	EMC8D-NM-NM-130 00	131104	Sep. 20, 2024	Sep. 19, 2025
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Sep. 20, 2024	Sep. 19, 2025
RF cable-8M	EMC	EMC104-SM-SM-80 00	181107	Sep. 20, 2024	Sep. 19, 2025
Attenuator	Pasternack	PE7005-10	10-3	Sep. 20, 2024	Sep. 19, 2025
HIGHPASS FILTER	WI	WHK3.1-18G-10SS	43	Sep. 20, 2024	Sep. 19, 2025
Measurement Software	Sporton	SENSE-EMI	V5.11	NA	NA
Measurement Software	Sporton	SENSE-15247_DTS	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
Unwanted Emission ≤ 1GHz	±3.96 dB
Unwanted Emission > 1GHz	±4.51 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	TH01-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.)
Test Site	03CH03-WS
Address of Test Site	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807C
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Field Strength of Fundamental	GFSK	2460	1 Mbps	-
Unwanted Emissions ≤ 1GHz Unwanted Emissions > 1GHz 20dB bandwidth	GFSK	2460	1 Mbps	-

NOTE:

1. The EUT supports DC 12V and 24V, both options were assessed and DC 12V was found to be the worst case and was selected for the final test.

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:
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.

3.1.3 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:

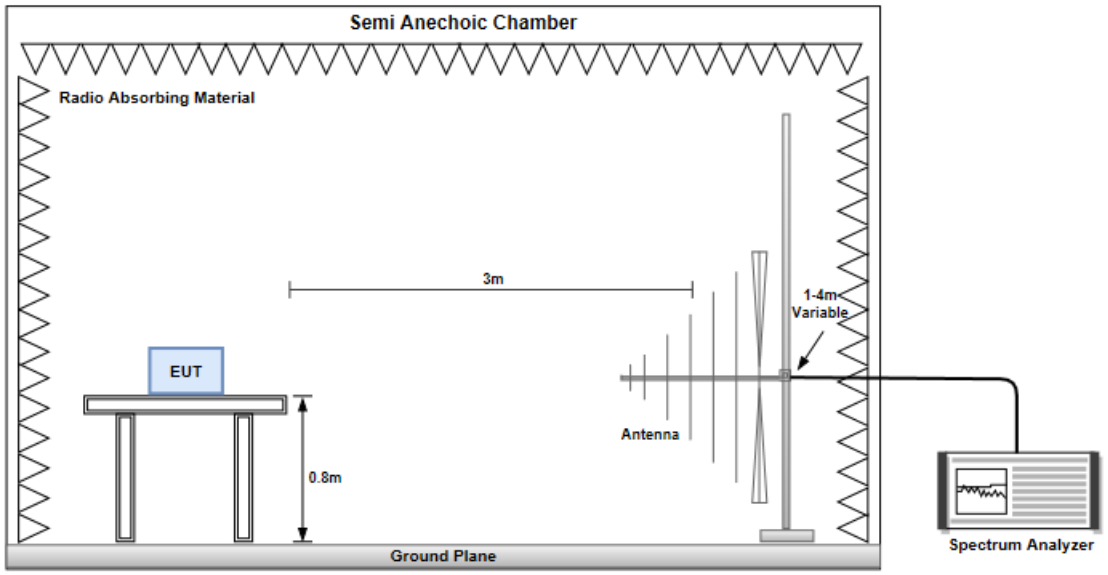
1. Radiated emission below 1GHz
   120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission
2. Radiated emission above 1GHz / Peak value except fundamental
   RBW=1MHz, VBW=3MHz and Peak detector
3. Radiated emission above 1GHz / Average value for field strength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

$$20\log(\text{Duty cycle}) = 20\log\frac{0.27971*2\ \text{ms}}{100\ \text{ms}} = -45.05\text{dB}$$

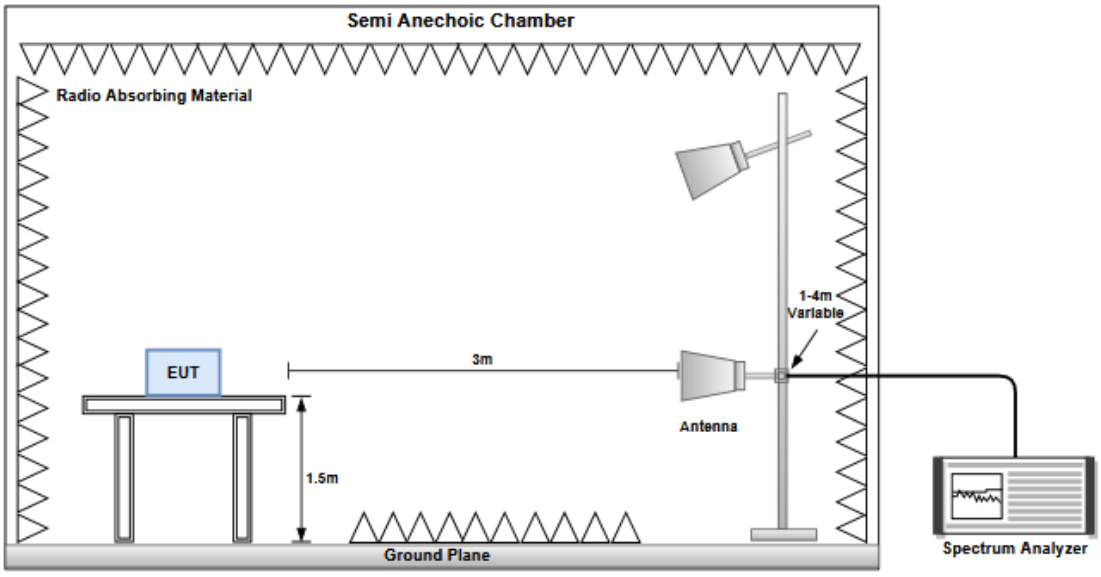
4. Radiated emission above 1GHz / Average value for other emissions
   RBW=1MHz, VBW=1/T and Peak detector
5. Radiated emission Peak value for fundamental
   RBW=2MHz, VBW=10MHz and Peak detector

3.1.4 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.1.5 Test Results

Ambient Condition	24-25°C / 62-63%	Tested By	Sean Yu / Brad Wu

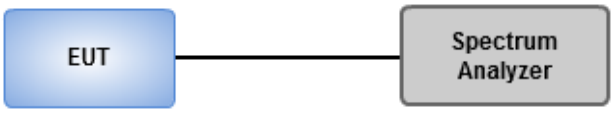
Refer to Appendix A.

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 specturm analyzer to measure 99% occupied bandwidth.

3.2.2 Test Setup



3.2.3 Test Results

Ambient Condition	25°C / 62%	**Tested By**	Sean Yu

Refer to Appendix B.

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.

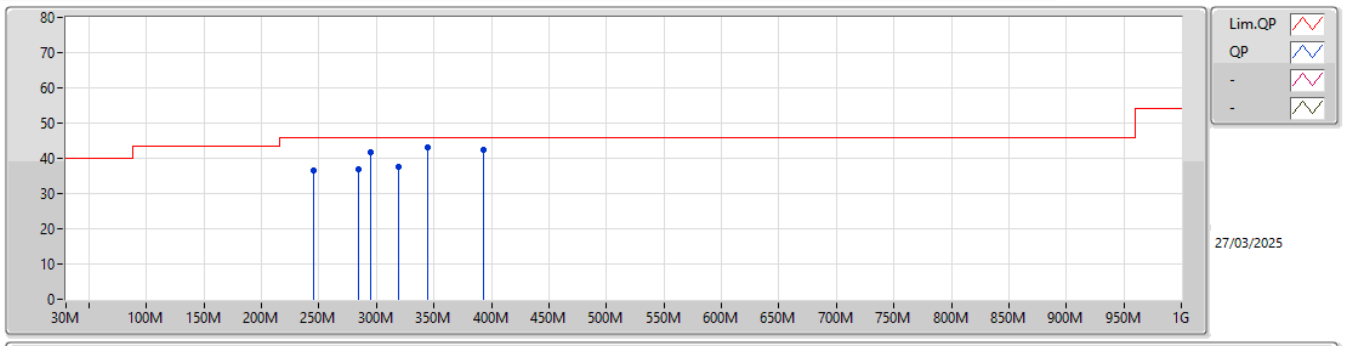
Tel: 886-3-271-8666
Fax: 886-3-318-0345
Email: ICC_Service@icertifi.com.tw

==END==

Summary

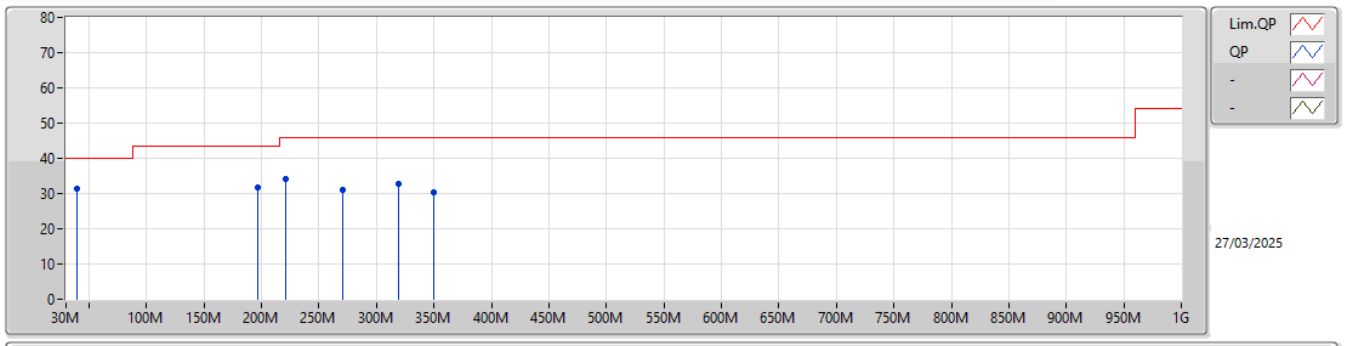
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	QP	344.1M	43.25	46.00	-2.75	Horizontal

Mode 1



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)		(dBuV)	(dB/m)	(dB)	(dB)
PK	245.7M	36.60	46.00	-9.40	-9.97	3	Horizontal	-	-	-	46.57	16.61	1.58	28.16
PK	284.62M	36.86	46.00	-9.14	-8.47	3	Horizontal	-	-	-	45.33	17.98	1.74	28.19
PK	294.9M	41.81	46.00	-4.19	-8.32	3	Horizontal	-	-	-	50.13	18.10	1.78	28.20
PK	319.5M	37.53	46.00	-8.47	-7.50	3	Horizontal	-	-	-	45.03	18.79	1.87	28.16
QP	344.1M	43.25	46.00	-2.75	-7.02	3	Horizontal	128	1.00	-	50.27	19.12	1.97	28.11
PK	393.2M	42.29	46.00	-3.71	-5.43	3	Horizontal	-	-	-	47.72	20.36	2.21	28.00

Mode 1



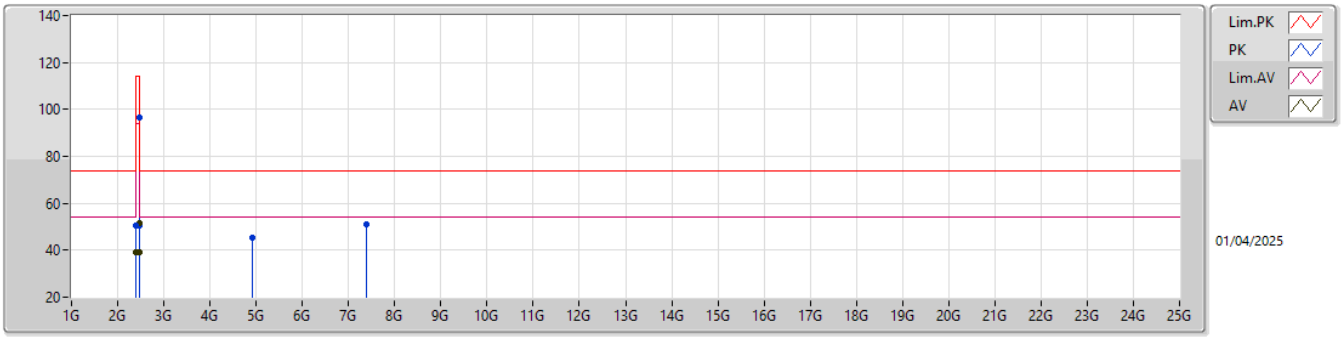
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB/m)	(m)		(°)	(m)		(dBuV)	(dB/m)	(dB)	(dB)
PK	39.42M	31.42	40.00	-8.58	-9.44	3	Vertical	-	-	-	40.86	18.04	0.54	28.02
PK	196.6M	31.89	43.50	-11.61	-11.68	3	Vertical	-	-	-	43.57	15.04	1.41	28.13
PK	221.2M	34.14	46.00	-11.86	-11.96	3	Vertical	-	-	-	46.10	14.68	1.50	28.14
PK	270.3M	31.08	46.00	-14.92	-9.18	3	Vertical	-	-	-	40.26	17.32	1.68	28.18
PK	319.5M	32.72	46.00	-13.28	-7.50	3	Vertical	-	-	-	40.22	18.79	1.87	28.16
PK	350M	30.26	46.00	-15.74	-6.90	3	Vertical	-	-	-	37.16	19.20	1.99	28.09

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	-	-	-	-	-	-	-	-	-	-	-
ANT+ (GFSK)	Pass	AV	2.4G	39.04	54.00	-14.96	3	Horizontal	48	1.58	-

2.4-2.4835GHz_ANT+ (GFSK)

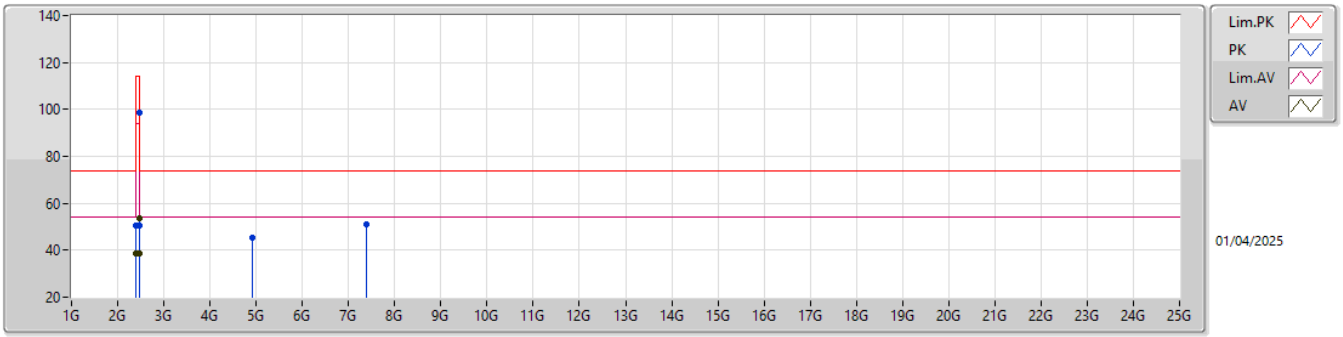
2460MHz_TX



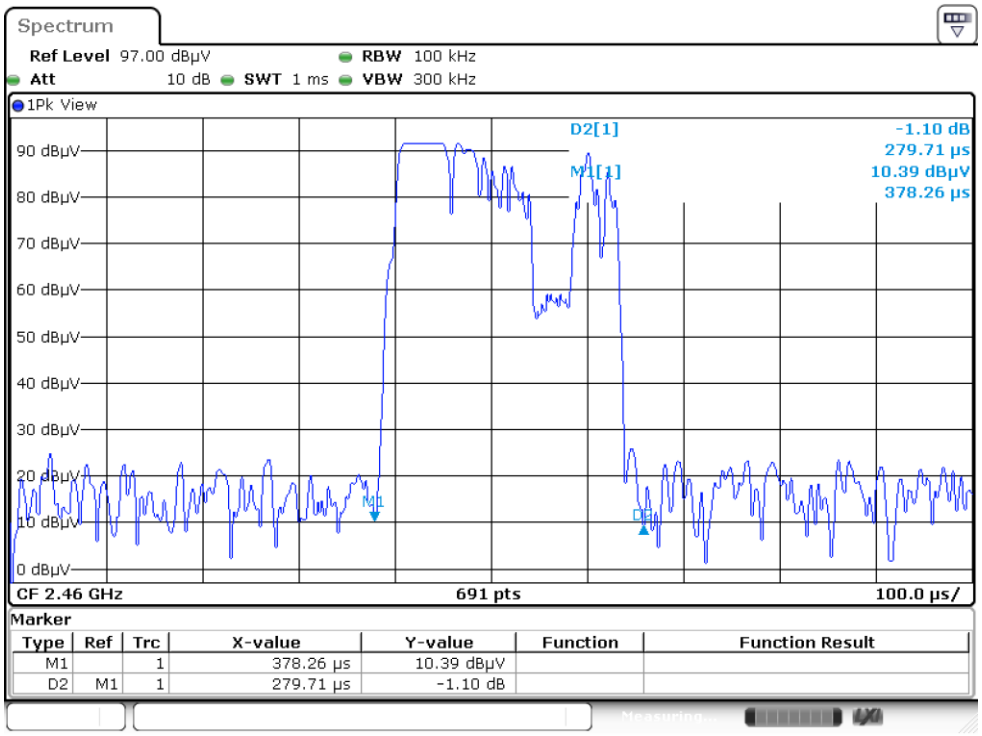
Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB/m)	(dB)	(dB)
AV	2.39G	38.93	54.00	-15.07	42.80	3	Horizontal	48	1.58	-	27.60	4.95	36.42
PK	2.39G	50.42	74.00	-23.58	54.29	3	Horizontal	48	1.58	-	27.60	4.95	36.42
AV	2.4G	39.04	54.00	-14.96	42.91	3	Horizontal	48	1.58	-	27.60	4.96	36.43
PK	2.4G	50.64	74.00	-23.36	54.51	3	Horizontal	48	1.58	-	27.60	4.96	36.43
AV	2.46G	51.56	94.00	-42.44	-	3	Horizontal	-	-	-	-	-	-
PK	2.46G	96.61	114.00	-17.39	100.60	3	Horizontal	48	1.58	-	27.50	5.00	36.49
AV	2.4835G	38.92	54.00	-15.08	42.88	3	Horizontal	48	1.58	-	27.54	5.01	36.51
PK	2.4835G	50.37	74.00	-23.63	54.33	3	Horizontal	48	1.58	-	27.54	5.01	36.51
AV	4.92G	0.09	54.00	-53.91	-	3	Horizontal	-	-	-	-	-	-
PK	4.92G	45.14	74.00	-28.86	45.33	3	Horizontal	108	1.00	-	31.28	6.81	38.28
AV	7.38G	5.88	54.00	-48.12	-	3	Horizontal	-	-	-	-	-	-
PK	7.38G	50.93	74.00	-23.07	45.55	3	Horizontal	223	1.00	-	36.34	8.27	39.23

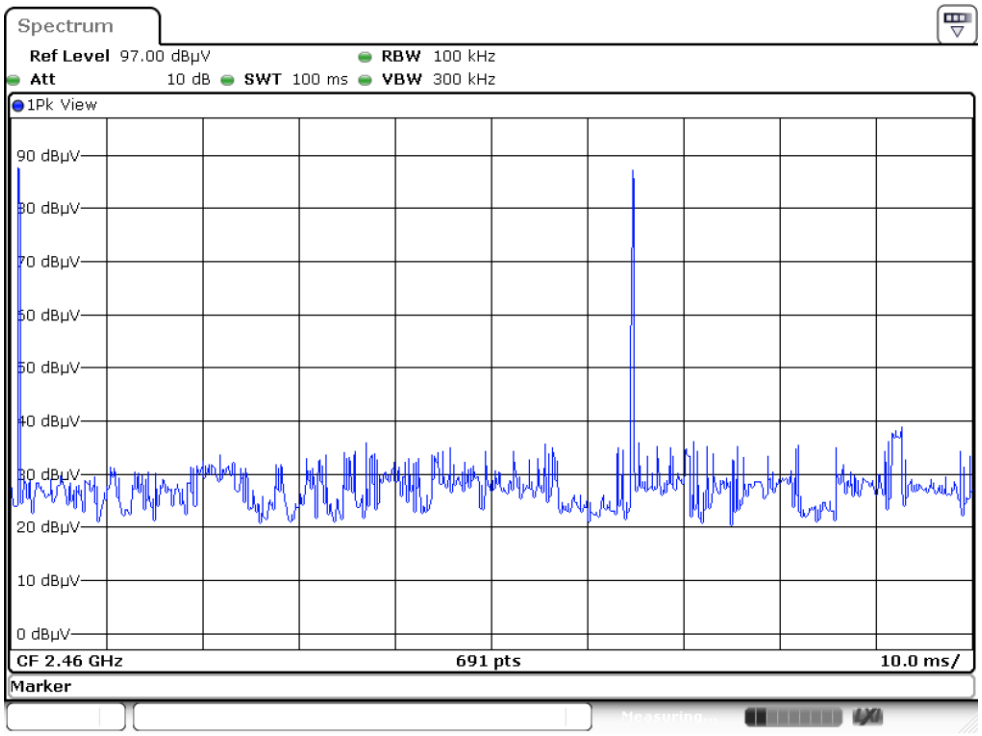
2.4-2.4835GHz_ANT+ (GFSK)

2460MHz_TX



Type	Freq	Level	Limit	Margin	Raw	Dist	Condition	Azimuth	Height	Comment	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dBuV)	(m)		(°)	(m)		(dB/m)	(dB)	(dB)
AV	2.39G	38.79	54.00	-15.21	42.66	3	Vertical	84	2.06	-	27.60	4.95	36.42
PK	2.39G	50.74	74.00	-23.26	54.61	3	Vertical	84	2.06	-	27.60	4.95	36.42
AV	2.4G	38.71	54.00	-15.29	42.58	3	Vertical	84	2.06	-	27.60	4.96	36.43
PK	2.4G	50.72	74.00	-23.28	54.59	3	Vertical	84	2.06	-	27.60	4.96	36.43
AV	2.46G	53.37	94.00	-40.63	-	3	Vertical	-	-	-	-	-	-
PK	2.46G	98.42	114.00	-15.58	102.41	3	Vertical	84	2.06	-	27.50	5.00	36.49
AV	2.4835G	38.76	54.00	-15.24	42.72	3	Vertical	84	2.06	-	27.54	5.01	36.51
PK	2.4835G	50.60	74.00	-23.40	54.56	3	Vertical	84	2.06	-	27.54	5.01	36.51
AV	4.92G	0.08	54.00	-53.92	-	3	Vertical	-	-	-	-	-	-
PK	4.92G	45.13	74.00	-28.87	45.32	3	Vertical	105	1.00	-	31.28	6.81	38.28
AV	7.38G	5.95	54.00	-48.05	-	3	Vertical	-	-	-	-	-	-
PK	7.38G	51.00	74.00	-23.00	45.62	3	Vertical	261	1.00	-	36.34	8.27	39.23





$$20\log(\text{Duty cycle}) = 20\log\frac{0.27971*2\ \text{ms}}{100\ \text{ms}} = -45.05\text{dB}$$

Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Frequency range MHz (20dB Down) fL > 2400 MHz	Frequency range MHz (20dB Down) fH < 2483.5 MHz
2460	1.114	0.991	2459.4573	2460.5716