

# **FCC Test Report**

FCC ID	:	IPH-03924
Equipment	:	Hideaway Marine Stereo
Model No.	:	A03924
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	:	Nov. 18, 2019
Tested Date	:	Dec. 13 ~ Dec. 26, 2019

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. The test results contained in this report refer exclusively to the product. 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:

Approved by:

ong Cher





Along Chen // Assistant Manager Gary Chang / Manager



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# **Release Record**

Report No.	Version	Description	Issued Date
FR9N1801	Rev. 01	Initial issue	Mar. 11, 2020



# **Summary of Test Results**

FCC Rules	Test Items	Measured	Result					
15.207	AC Power Line Conducted Emissions	Note <sup>1</sup>	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 A	N/A means Not Applicable.							

Note<sup>1</sup>: 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)ModulationCh. Freq. (MHz)Channel NumberData Rate						
2460	GFSK	2460	1 [1]	1 Mbps		

### 1.1.2 Antenna Details

Ant. No.	Туре	Gain (dBi) Connector		Remark
1	PIFA	1.08		

### 1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc
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### 1.1.4 Accessories

	Accessories				
No.	Equipment	Description			
1	Power cable	Brand: FUSION Model: Ca Assy, A Port, PWR/SPKR, FusConn 0.2m non-shielded without core			
2	Audio cable 1	Brand: FUSION Model: Ca Assy, B Port, RCA, Zone 1, Zone 2, Aux, FusConn 0.2m non-shielded without core			
3	Audio cable 2	Brand: FUSION Model: Ca Assy, E Port, Zone 3, FusConn 0.2m non-shielded without core			

### 1.1.5 EUT mode and Duty Cycle

EUT mode	Hardware control				
Duty Cycle and Duty Easter	Duty Cycle (%)	Duty Factor (dB)			
Duty Cycle and Duty Factor	100	0.00			



# **1.2 Local Support Equipment List**

	Support Equipment List						
No.	Equipment	Brand	Model	FCC ID	Remarks		
1	AM/FM ANT	Techbrands	AR-3250		Provided by applicant.		
2	NRX Remote	FUSION	MS-NRX300		Provided by applicant.		
3	Resistor load	FUSION	L25J4R0E		Provided by applicant.		
4	SiriusXM /DAB Load	FUSION	25FBF52		Provided by applicant.		
5	Audio Load x2	FUSION	H810KFZA		Provided by applicant.		
6	USB Dongle	Strontium	Pollex 4 G		Provided by applicant.		
7	power cable	FUSION	842716		Provided by applicant.		
8	SPDIF / Optical Fiber	FUSION	FC100		Provided by applicant.		
9	ERX Remote	FUSION	A03775		Provided by applicant.		
10	USB cable	FUSION	FUC200		Provided by applicant.		
11	ANT Wireless Stereo Remote	FUSION	A03344		Provided by applicant.		
12	DC Cable	ICC	DCC-2m-R				
13	DC Cable	ICC	DCC-2m-B				
14	DC Battery	Top Lite	46B24L				



## 1.3 Test Setup Chart



Note: AM/FM ANT and USB dongle & audio load are placed on testing table. The others are on remote testing area.



#### The Equipment List 1.4

Test Item	Radiated Emission						
Test Site	966 chamber1 / (03CH01-WS)						
Test Date	Dec. 13 ~ Dec. 26, 2019						
Instrument	Manufacturer Model No. Serial No. Calibration Date Calibration Un						
Spectrum Analyzer	R&S	FSV40	101498	Dec. 27, 2018	Dec. 26, 2019		
Receiver	R&S	ESR3	101658	Dec. 12, 2019	Dec. 11, 2020		
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 12, 2019	Jul. 11, 2020		
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 12, 2019	Dec. 11, 2020		
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2019	Nov. 14, 2020		
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2019	Nov. 12, 2020		
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 07, 2019	Oct. 06, 2020		
Preamplifier	EMC	EMC02325	980225	Jul. 09, 2019	Jul. 08, 2020		
Preamplifier	Agilent	83017A	MY39501308	Oct. 08, 2019	Oct. 07, 2020		
Preamplifier	EMC	EMC184045B	980192	Aug. 01, 2019	Jul. 31, 2020		
RF Cable	EMC	EMC104-SM-SM-80 00	181106	Oct. 07, 2019	Oct. 06, 2020		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 07, 2019	Oct. 06, 2020		
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 07, 2019	Oct. 06, 2020		
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 07, 2019	Oct. 06, 2020		
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 07, 2019	Oct. 06, 2020		
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Oct. 07, 2019	Oct. 06, 2020		
Measurement Software	AUDIX	e3	6.120210g	NA	NA		
Note: Calibration Inter	Note: Calibration Interval of instruments listed above is one year.						

Test Item	RF Conducted	RF Conducted					
Test Site	(TH01-WS)	(TH01-WS)					
Test Date	Dec. 26, 2019						
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until		
Spectrum Analyzer	R&S	FSV40	101063	Apr. 17, 2019	Apr. 16, 2020		
Power Meter	Anritsu	ML2495A	1241002	Oct. 23, 2019	Oct. 22, 2020		
Power Sensor	Anritsu	MA2411B	1207366	Oct. 23, 2019	Oct. 22, 2020		
DC POWER SOURCE	GW INSTEK	GPC-6030D	GES855395	Oct. 29, 2019	Oct. 28, 2020		
Measurement Software	ICC	SENSE-15247_FS	V5.10.1	NA	NA		
Note: Calibration Inte	rval of instruments liste	d above is one year.					



### 1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.249 ANSI C63.10-2013

### **1.6 Deviation from Test Standard and Measurement Procedure**

None

### **1.7 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		
Parameters	Uncertainty	
Bandwidth	±34.130 Hz	
Radiated emission $\leq$ 1GHz	±3.41 dB	
Radiated emission > 1GHz	±4.59 dB	



# 2 Test Configuration

# 2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	23-24°C / 62-66%	Akun Chung Aska Huang
RF Conducted	TH01-WS	24°C / 66%	Akun Chung

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



### 2.3 Radiated Emission

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

#### 2.3.1 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

#### 2.3.2 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.



### 2.3.3 Test Procedures

- 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:

- 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
- 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:

 $20\log (\text{Duty cycle}) = 20\log \frac{0.33043 \text{ x } 2 \text{ ms}}{100 \text{ ms}} = -43.6 \text{dB}$ 

Please see page 18 for plotted duty

- 4. Radiated emission Peak value for fundamental RBW=3MHz, VBW=10MHz and Peak detector
- 5. Radiated emission Average value for fundamental RBW=3MHz, VBW=3kHz and Peak detector



### 2.3.4 Test Setup







### 2.3.5 Transmitter Radiated Unwanted Emissions (Below 1GHz)









### 2.3.6 Transmitter Radiated Unwanted Emissions (Above 1GHz)











### 2.4 20dB and Occupied Bandwidth

#### 2.4.1 Test Procedures

- 1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
- 2. Detector = Peak, 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.

### 2.4.2 Test Setup



### 2.4.3 20dB and Occupied Bandwidth

Freq. (MHz)	20dB Bandwidth (MHz)	Occupied Bandwidth (MHz)
2460	0.962	0.868





# **3** 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 <u>http://www.icertifi.com.tw</u>.

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 District, Tao Yuan City 333, Taiwan, R.O.C. Kwei Shan Site II Tel: 886-3-271-8640 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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