

	Test Report Serial No.:	041511-T1095-E249U	Report Issue Date:	July 15, 2011	
	Measurement Date(s):	June 6 -10 , 2011	Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §15.249	FCC Test Firm Reg. No.:	714830	
	IC Standard(s):	RSS-210 RSS-Gen	IC Test Site No.:	IC 3874A-1	
					Test Lab Certificate No. 2470.01

DECLARATION OF COMPLIANCE - ELECTROMAGNETIC COMPATIBILITY (FCC/IC) FCC PART 15.249 & IC RSS-210 (Issue 8)

Test Lab Information	Name	CELLTECH LABS INCORPORATED		
	Address	21-364 Lougheed Road, Kelowna, British Columbia V1X 7R8 Canada		
Test Lab Registration No.(s)	FCC	714830		
	IC	3874A-1		
Applicant Information	Name	GARMIN INTERNATIONAL INC.		
	Address	1200, East 151 st Street, Olathe, KS, 66062 USA		
Standard(s) & Procedure(s)	FCC	47 CFR Part 15.249		
	IC	RSS-210 Issue 8; RSS-Gen Issue 3		
	ANSI	C63.4-2003		
Device Classification(s)	FCC	Low Power Communication Device (DXX)		
	IC	Low-power Licence-exempt Radiocommunication Device (Category 1)		
Application Type(s)	FCC	TCB Certification		
	IC	CB Certification		
Device Identifier(s)	FCC ID:	IPH-01767		
	IC:	1792A-01767		
Device Model(s) Tested	Rino 650, Rino 655t (with camera)			
Test Sample Serial No.	1766382247995203 (Identical Prototype) - Rino 655t			
Transmit Frequency Band	2400 – 2483.5 MHz			
Transmit Frequency Range	2402 - 2479 MHz			
Max. RF Output Power Tested	94.3 dBuV/m (Peak) 46.8 dBuV/m (Avg)			
Modulation Type(s)	Pulsed GFSK			
Transmitter Duty Cycle(s)	Normal Operation = 0.210 ms(on) T= 50 ms ~ 0.5% on air time			
Antenna Type(s) Tested	Printed inverted F-antenna			
Power Source(s) Tested	Li-Ion 7.8V (nominal) 2300mAh P/N: 011-02526-30			
<p>This wireless device has demonstrated compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC 47 CFR Part 15.249; Industry Canada RSS-210 Issue 8 and RSS-Gen Issue 3; and ANSI C63.4-2003.</p> <p>I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.</p> <p>The results and statements contained in this report pertain only to the device(s) evaluated.</p> <p>This report shall not be reproduced partially or in full without the prior written approval of Celltech Labs Inc.</p>				
Test Report Approved By		Sean Johnston	Laboratory Manager	Celltech Labs Inc.

Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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TEST SUMMARY

Referenced Standard(s):	FCC CFR Title 47 Part 15 Subpart C
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<u>Appendix</u>	<u>Description of Test</u>	<u>Procedure Reference</u>	<u>Limit Reference</u>	<u>Test Start</u>	<u>Test End</u>	<u>Result</u>
A	Duty Cycle	ANSI C63.4-2003	n/a	June 6	June 6	n/a
B	Occupied Band width and Band Edge	ANSI C63.4-2003	15.205,15.209	June 6	June 6	Pass
C	Field Strength of the Fundamental Radiated Spurious Emissions	ANSI C63.4-2003	15.249(d),15.209	June 10	June 10	Pass
E	Antenna Requirements	n/a	15.203	n/a	n/a	Pass

Referenced Standard(s):	Industry Canada RSS-210 Issue 8
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<u>Appendix</u>	<u>Description of Test</u>	<u>Procedure Reference</u>	<u>Limit Reference</u>	<u>Test Start</u>	<u>Test End</u>	<u>Result</u>
C	Field Strength of the Fundamental Radiated Spurious Emissions	ANSI C63.4-2003	RSS-210 A8.2(a)	June 10	June 10	Pass
D	Radiated RX Spurious Emissions	RSS-Gen 4.10	RSS-Gen 6.(a)	June 10	June 10	Pass

REVISION LOG

Revision	Description	Implemented By	Issue Date
1.0	Initial Release	Jonathan Hughes	July 15, 2011

SIGNATORIES

Prepared By		Reviewed By		Date
	Jonathan Hughes / Report Writer		Sean Johnston / Lab Manager	

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1.0 SCOPE

This report outlines the measurements made and results collected during electromagnetic emissions testing of the Garmin International Inc. Model: Rino 650,655t. The measurement results were applied against the applicable EMC requirements and limits outlined in the technical rules and regulations set forth in the Federal Communication's Commission Code of Federal Regulations Title 47 Part 15 Subpart C and Industry Canada Radio Standards Specification RSS-210 Issue 8 and RSS-Gen Issue 3.

2.0 REFERENCES

2.1 Normative References

ANSI/ISO 17025:2005	General Requirements for competence of testing and calibration laboratories
IEEE/ANSI C63.4-2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
CFR Title 47 Part 15C	Code of Federal Regulations Title 47: Telecommunication Part 15C: Intentional Radiators
IC Spectrum Management & Telecommunications Policy	Radio Standards Specification RSS-210 Issue 8 - Low-Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment RSS-Gen Issue 3 - General Requirements and Information for the Certification of Radiocommunication Equipment

3.0 PASS/FAIL CRITERIA

Unless otherwise noted in the Appendices, the pass/fail criteria is the limit set forth in the reference standards. The DUT is considered to have passed the requirements if the data collected during the described measurement procedure is no greater than the specified limits as defined. The pass/fail statements made in this report only apply to the unit tested.

Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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4.0 FACILITIES AND ACCREDITATIONS

The facilities used in collecting the test results outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number 714830 and Industry Canada under Test Site File Number IC 3874A-1.

5.0 GENERAL INFORMATION

5.1 Applicant Information

Company Name	GARMIN INTERNATIONAL INC.
Address	1200, East 151 st Street, Olathe, KS 66062 USA

5.2 DUT Description

Device Type	Portable FRS/GMRS Push-To-Talk Radio Transceiver with GPS	
Device Model(s) Tested	Rino 650, Rino 655t (with camera)	
Test Sample Serial No.(s)	1766382247997103 (Identical Prototype) - Rino 655t	
Device Identifier(s)	FCC ID:	IPH-01767
	IC:	1792A-01767
Power Source(s) Tested	Lithium-ion Battery (7.8V Nominal)	
Antenna Type(s) Tested	Printed inverted F-antenna	

5.3 Mode(s) of Operation Tested

Transmit Frequency Range	2400 - 2480 MHz
Transmitter Test Frequency	2402 – 2479 MHz
Transmitter Test Mode(s)	Tx set to pulsed and continuous transmit for applicable test.
Modulation Type(s)	Pulsed - GFSK

5.4 Modification(s)

None

Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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Test Lab Certificate No. 2470.01					

Appendix A – Duty Cycle

A.1 REFERENCES	
Normative Reference Standard	FCC CFR 47 §15.35(c)
Procedure Reference	ANSI C63.4:2003

Procedure for determining the average value of pulsed emissions (ANSI C63.4:2003)

When the average value of the pulsed emissions from an DUT must be determined, the average can be found by measuring the peak pulse amplitude and determining the duty cycle correction factor of the pulse modulation. The duty cycle correction factor δ may be expressed in terms of dB as

$$\delta \text{ (dB)} = 20\log(\delta)$$

This correction factor can then be applied to the peak pulse amplitude to find the average. This correction is applied for all emissions including the fundamental and harmonics. The duty cycle correction is determined as follows:

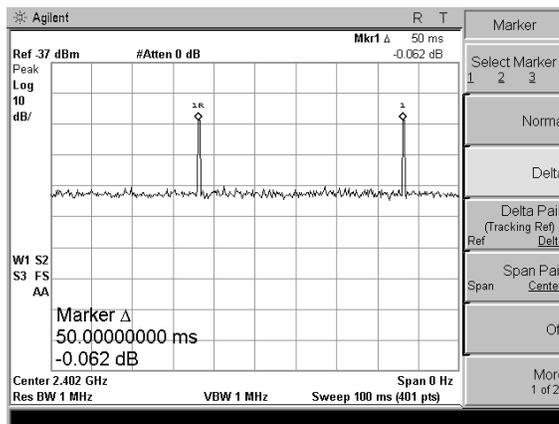
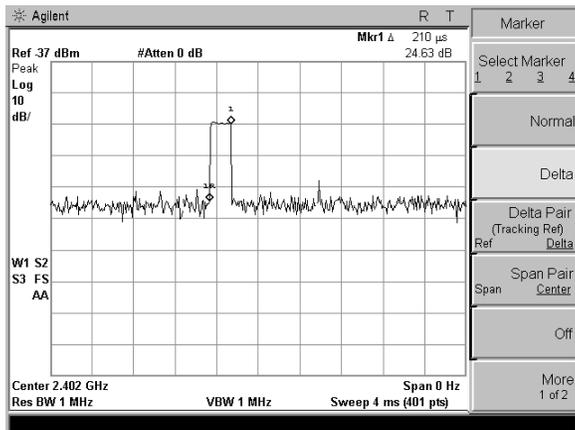
- a) Couple the final radio frequency output signal to the input of a spectrum analyzer. This can be performed by a radiated, direct connect or a “near-field” coupling method. The signal received must be of sufficient level to adequately trigger the spectrum analyzer swept display.
- b) Adjust the center frequency of the spectrum analyzer to the center of the RF signal
- c) Set the spectrum analyzer for ZERO SPAN
- d) Adjust the SWEEP TIME to obtain at least a 100 ms period of time on the horizontal display axis of the spectrum analyzer.
- e) Set the TRIGGER on the spectrum analyzer to capture the greatest amount of “on time” for pulse train length less than 100 ms, or the greatest amount of “on time” in 100 ms for pulse train length greater than 100 ms.
- f) Determine the total “on time” for one pulse train (or 100 ms).
- g) The duty cycle correction factor is the total “on time” divided by the period of the pulse train (or 100 ms)

Test Results:

$T_p = 100\text{ms}$

$T_{on} = 2 \times 210 = 420 \text{ us}$

$\delta \text{ (dB)} = 20 \text{ Log}(0.42/100) = -47.5 \text{ dB}$



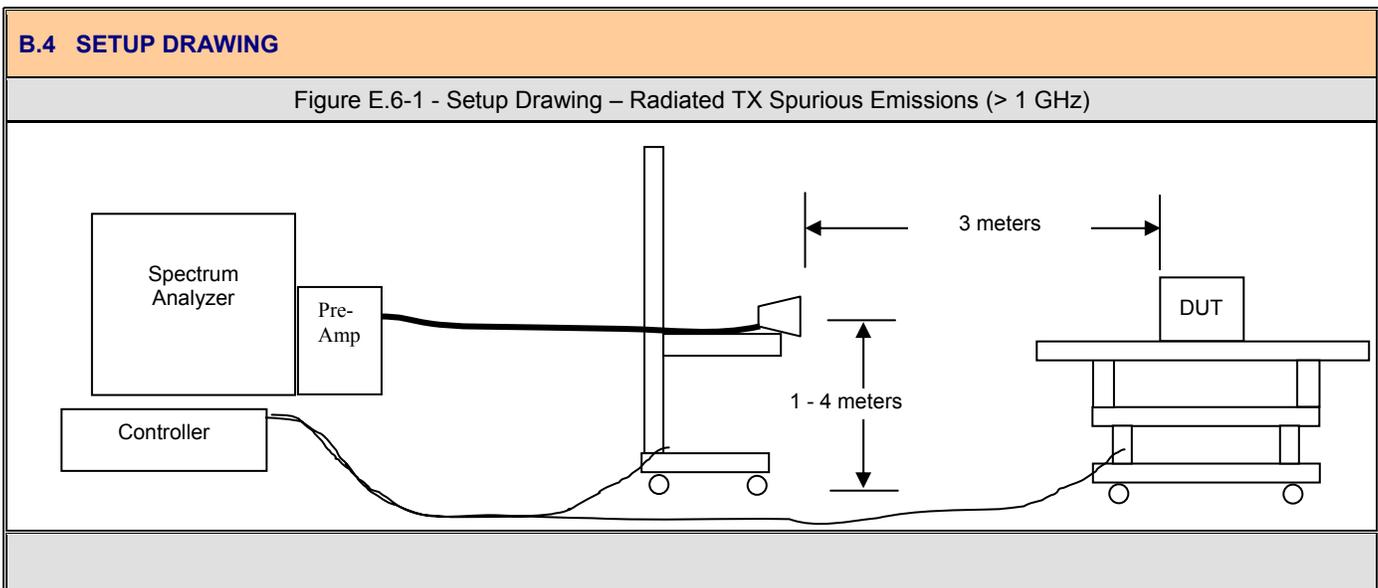
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Appendix B – Occupied Bandwidth and Band Edge

B.1 REFERENCES	
Normative Reference Standard	FCC CFR 47 §15.205; §15.209 RSS-210
Procedure Reference	ANSI C63.4:2003

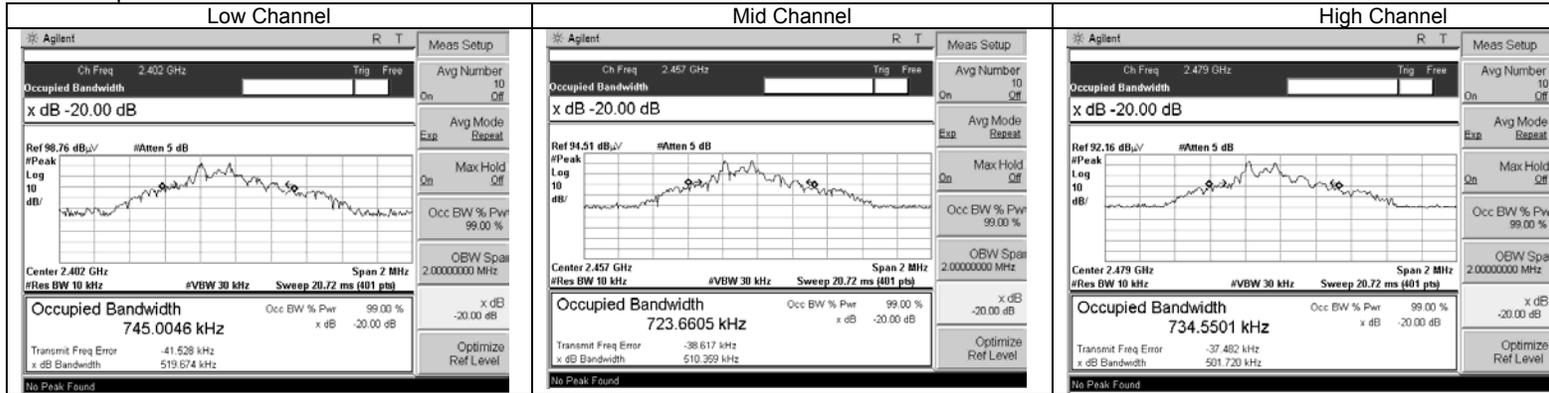
B.2 ENVIRONMENTAL CONDITIONS	
Temperature	25 +/- 5 °C
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

B.3 EQUIPMENT LIST				
ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
00051	HP	8566B	Spectrum Analyzer RF Section	03May12
00049	HP	85650A	Quasi-peak Adapter	06May12
00047	HP	85685A	RF Preselector	05May12
00072	EMCO	2075	Mini-mast	n/a
00073	EMCO	2080	Turn Table	n/a
00071	EMCO	2090	Multi-Device Controller	n/a
00030	HP	83017A	Microwave system amplifier	n/a
00015	HP	E4408B	Spectrum Analyzer	03May12
00050	Chase	CBL-6111A	Bilog Antenna	03May13
00034	ETS	3115	Double Ridged Guide Horn	29May12



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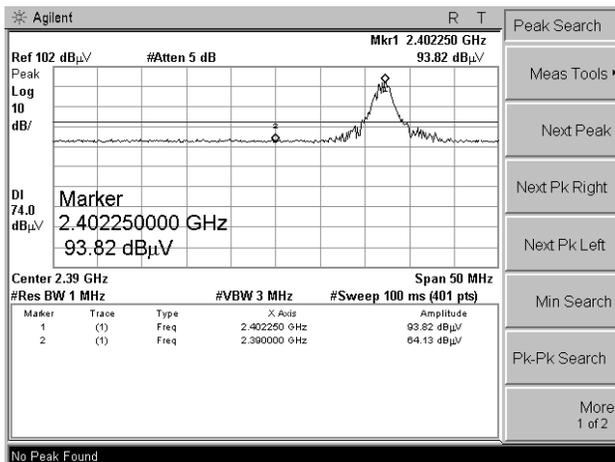
Occupied Bandwidth:



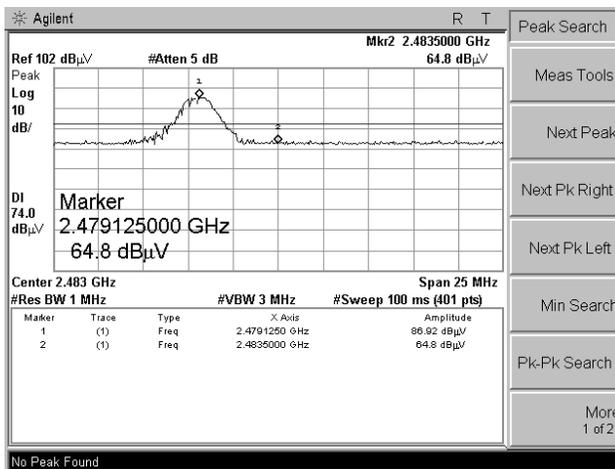
Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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Band Edge



Low Band edge Antenna Horizontal Polarization
 Measured Peak Level: 64.13 dBuV/m @ 3m
 Average Level: 64.13 – 47.5 = 16.6 dBuV/m



Upper Band edge Antenna Horizontal Polarization
 Measured Peak Level: 64.8 dBuV/m @ 3m
 Average level: 64.8 – 47.5 = 17.3 dBuV/m

Channel	Corrected Level (dBuV)		Antenna Polarity (H/V)	Limit (dBuV/m)		Margin (dB)	
	pk	avg		pk	Avg	pk	Avg
Low	64.13	16.6	H	74	54	9.87	37.40
High	64.80	17.3	H	74	54	9.20	36.70

Note:

This was a radiated emission measurement, with data shown from the worst case orientation and antenna polarization.

Remarks:

- 1) E-Field = Antenna Factor + Cable Loss + Meter Reading – Amp Gain
- 2) Peak Limit = Average Limit + 20dB

Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
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Appendix C - Radiated Spurious Emissions (TX)

C.1 REFERENCES	
Normative Reference Standard	FCC CFR 47 §15.205; §15.209; §15.249, RSS-210
Procedure Reference	ANSI C63.4:2003

C.2 LIMITS																																																																								
§15.209, §15.205	TX Emission Limits 15.209 <table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>Field Strength (microvolts/meter)</th> <th>Measurement Distance (meters)</th> </tr> </thead> <tbody> <tr> <td>009-0.490</td> <td>2400/F(kHz)</td> <td>300</td> </tr> <tr> <td>0.490-1.705</td> <td>24000/F(kHz)</td> <td>30</td> </tr> <tr> <td>1.705-30.0</td> <td>30</td> <td>30</td> </tr> <tr> <td>30-88</td> <td>100**</td> <td>3</td> </tr> <tr> <td>88-216</td> <td>150**</td> <td>3</td> </tr> <tr> <td>216-960</td> <td>200**</td> <td>3</td> </tr> <tr> <td>Above 960</td> <td>500</td> <td>3</td> </tr> </tbody> </table> <p>**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.</p>	Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)	009-0.490	2400/F(kHz)	300	0.490-1.705	24000/F(kHz)	30	1.705-30.0	30	30	30-88	100**	3	88-216	150**	3	216-960	200**	3	Above 960	500	3																																															
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	Restricted Bands <table border="1"> <thead> <tr> <th>MHz</th> <th>MHz</th> <th>MHz</th> <th>GHz</th> </tr> </thead> <tbody> <tr> <td>0.090-0.110</td> <td>16.42-16.423</td> <td>399.9-410</td> <td>4.5-5.15</td> </tr> <tr> <td>¹0.495-0.505</td> <td>16.69475-16.69525</td> <td>608-614</td> <td>5.35-5.46</td> </tr> <tr> <td>2.1735-2.1905</td> <td>16.80425-16.80475</td> <td>960-1240</td> <td>7.25-7.75</td> </tr> <tr> <td>4.125-4.128</td> <td>25.5-25.67</td> <td>1300-1427</td> <td>8.025-8.5</td> </tr> <tr> <td>4.17725-4.17775</td> <td>37.5-38.25</td> <td>1435-1626.5</td> <td>9.0-9.2</td> </tr> <tr> <td>4.20725-4.20775</td> <td>73-74.6</td> <td>1645.5-1646.5</td> <td>9.3-9.5</td> </tr> <tr> <td>6.215-6.218</td> <td>74.8-75.2</td> <td>1660-1710</td> <td>10.6-12.7</td> </tr> <tr> <td>6.26775-6.26825</td> <td>108-121.94</td> <td>1718.8-1722.2</td> <td>13.25-13.4</td> </tr> <tr> <td>6.31175-6.31225</td> <td>123-138</td> <td>2200-2300</td> <td>14.47-14.5</td> </tr> <tr> <td>8.291-8.294</td> <td>149.9-150.05</td> <td>2310-2390</td> <td>15.35-16.2</td> </tr> <tr> <td>8.362-8.366</td> <td>156.52475-156.52525</td> <td>2483.5-2500</td> <td>17.7-21.4</td> </tr> <tr> <td>8.37625-8.38675</td> <td>156.7-156.9</td> <td>2690-2900</td> <td>22.01-23.12</td> </tr> <tr> <td>8.41425-8.41475</td> <td>162.0125-167.17</td> <td>3260-3267</td> <td>23.6-24.0</td> </tr> <tr> <td>12.29-12.293</td> <td>167.72-173.2</td> <td>3332-3339</td> <td>31.2-31.8</td> </tr> <tr> <td>12.51975-12.52025</td> <td>240-285</td> <td>3345.8-3358</td> <td>36.43-36.5</td> </tr> <tr> <td>12.57675-12.57725</td> <td>322-335.4</td> <td>3600-4400</td> <td>-2</td> </tr> <tr> <td>13.36-13.41</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MHz	MHz	MHz	GHz	0.090-0.110	16.42-16.423	399.9-410	4.5-5.15	¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46	2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75	4.125-4.128	25.5-25.67	1300-1427	8.025-8.5	4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2	4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5	6.215-6.218	74.8-75.2	1660-1710	10.6-12.7	6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4	6.31175-6.31225	123-138	2200-2300	14.47-14.5	8.291-8.294	149.9-150.05	2310-2390	15.35-16.2	8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4	8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12	8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0	12.29-12.293	167.72-173.2	3332-3339	31.2-31.8	12.51975-12.52025	240-285	3345.8-3358	36.43-36.5	12.57675-12.57725	322-335.4	3600-4400	-2	13.36-13.41		
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0.090-0.110	16.42-16.423	399.9-410	4.5-5.15																																																																					
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46																																																																					
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75																																																																					
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5																																																																					
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2																																																																					
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5																																																																					
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7																																																																					
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4																																																																					
6.31175-6.31225	123-138	2200-2300	14.47-14.5																																																																					
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2																																																																					
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4																																																																					
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12																																																																					
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0																																																																					
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8																																																																					
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5																																																																					
12.57675-12.57725	322-335.4	3600-4400	-2																																																																					
13.36-13.41																																																																								

Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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	Test Report Serial No.:	041511-T1095-E249U	Report Issue Date:	July 15, 2011	 
	Measurement Date(s):	June 6 -10 , 2011	Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §15.249	FCC Test Firm Reg. No.:	714830	
	IC Standard(s):	RSS-210 RSS-Gen	IC Test Site No.:	IC 3874A-1	
					Test Lab Certificate No. 2470.01

C.3 ENVIRONMENTAL CONDITIONS

Temperature	25 +/- 5 °C
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

C.4 EQUIPMENT LIST

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
00051	HP	8566B	Spectrum Analyzer RF Section	03May12
00049	HP	85650A	Quasi-peak Adapter	06May12
00047	HP	85685A	RF Preselector	05May12
00072	EMCO	2075	Mini-mast	n/a
00073	EMCO	2080	Turn Table	n/a
00071	EMCO	2090	Multi-Device Controller	n/a
00030	HP	83017A	Microwave system amplifier	n/a
00015	HP	E4408B	Spectrum Analyzer	03May12
00050	Chase	CBL-6111A	Bilog Antenna	03May13
00034	ETS	3115	Double Ridged Guide Horn	29May12

C.5 MEASUREMENT EQUIPMENT SETUP

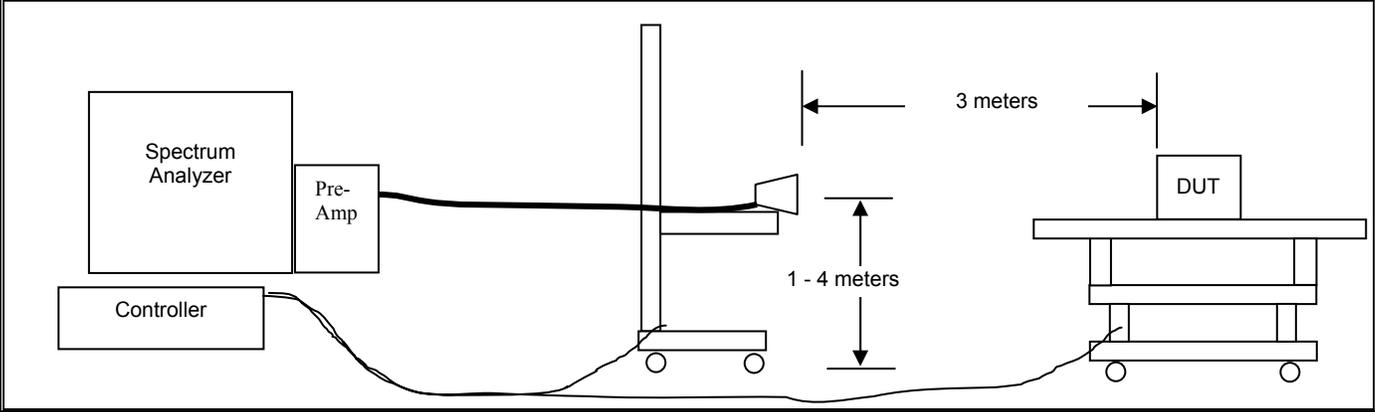
MEASUREMENT EQUIPMENT CONNECTIONS	For the field strength measurements, the measurement equipment was connected as shown in E.4. Various antenna types may be required to cover the applicable frequency range tested. The ranges in which each antenna was used are shown below.		
	Frequency Range	RX Antenna	TX Antenna
	30 MHz - 1GHz	Bilog	N/a
	1 GHz - 18 GHz	ETS 3115 Horn	N/a
MEASUREMENT EQUIPMENT SETTINGS	For the spurious out-of-band emissions, the spectrum analyzer was set to the following settings:		
	Measurement	RBW	VBW
		kHz	kHz
	< 1 GHz	100	300
	> 1 GHz	1000	3000
* As a worst-case measurement, the QP limit was applied to measurements made with a peak detector.			

Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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	IC Standard(s):	RSS-210 RSS-Gen	IC Test Site No.:	IC 3874A-1	

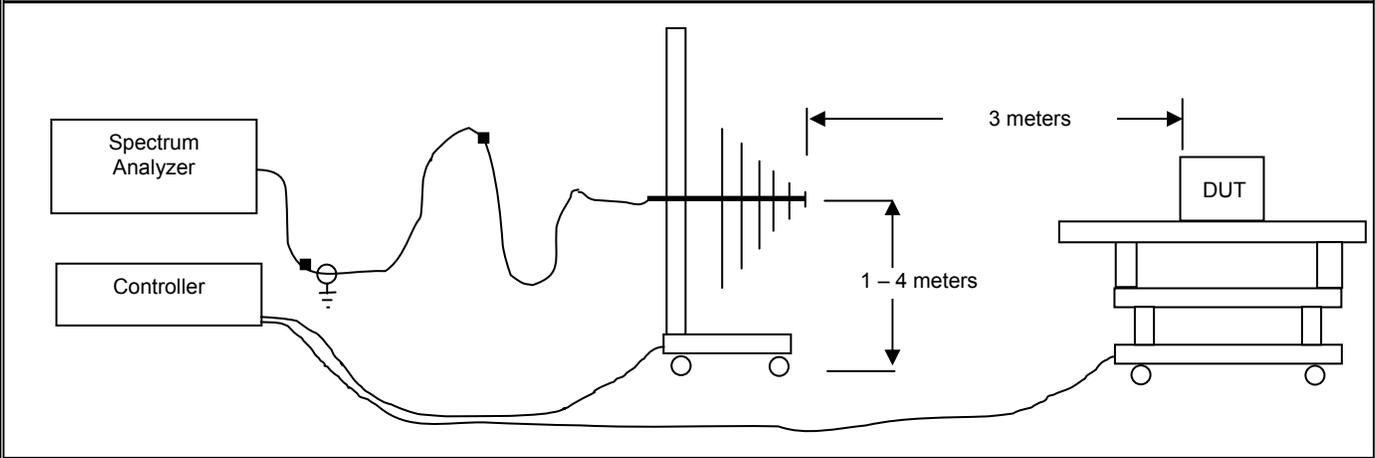
C.6 SETUP DRAWING

Figure E.6-1 - Setup Drawing – Radiated TX Spurious Emissions (> 1 GHz)



C.7 SETUP DRAWING

Figure E.7-1 - Setup Drawing – Radiated TX Spurious Emissions (< 1 GHz)



Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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	Measurement Date(s):	June 6 -10 , 2011	Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §15.249	FCC Test Firm Reg. No.:	714830	
	IC Standard(s):	RSS-210 RSS-Gen	IC Test Site No.:	IC 3874A-1	

Fundamental										
Frequency	Antenna Pol.	DUT Orientation	E-Field Peak	δ (dB)	Corrected E-Field Avg	Limit Avg	Limit Peak	Margin Avg	Margin Peak	Result
MHz	V/H		[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	
2402	V	X	88.8	-47.50	41.30	94	114	52.7	25.2	Pass
2402	H	X	94.32	-47.50	46.82	94	114	47.18	19.68	Pass
2457	V	X	84.5	-47.50	37.00	94	114	57	29.5	Pass
2457	H	X	89.7	-47.50	42.20	94	114	51.8	24.3	Pass
2479	V	X	82.6	-47.50	35.10	94	114	58.9	31.4	Pass
2479	H	X	88.1	-47.50	40.60	94	114	53.4	25.9	Pass
Spurious Emissions										
4808	V	X	58.3	-47.50	10.80	54	74	43.2	15.70	Pass
4808	H	X	56	-47.50	8.50	54	74	45.5	18.00	Pass
4914	V	X	62.4	-47.50	14.90	54	74	39.1	11.60	Pass
4914	H	X	59.8	-47.50	12.30	54	74	41.7	14.20	Pass
4958	V	X	58.8	-47.50	11.30	54	74	42.7	15.20	Pass
4958	H	X	60.5	-47.50	13.00	54	74	41	13.50	Pass

Remarks:

- 1) E-Field = Antenna Factor + Cable Loss + Meter Reading – Amp Gain
- 2) Peak Limit = Average Limit + 20dB
- 3) All DUT Orientations investigate, only highest reported for spurious emissions.
- 4) All emissions other emissions not detectable or 20dB below the limit, up to 10th harmonic of carrier.
- 5) DUT orientations: x = Vertical, Y = Side, Z=Side rotated 90°

Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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	Measurement Date(s):	June 6 -10 , 2011	Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §15.249	FCC Test Firm Reg. No.:	714830	
	IC Standard(s):	RSS-210 RSS-Gen	IC Test Site No.:	IC 3874A-1	

Appendix D - Radiated Spurious Emissions (RX)

D.1 REFERENCES	
Normative Reference Standard	FCC CFR 47 §15.109; IC RSS-210, RSS-GEN
Procedure Reference(s)	The procedure used was ANSI C63.4-2003. The frequency was scanned from 30 MHz to 1.0 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The DUT was measured in three (3) orthogonal planes. RSS-Gen 4.10

D.2 LIMITS											
§15.109 RSS-Gen 6.(a)	<table border="1"> <thead> <tr> <th>Frequency (MHz)</th> <th>Limits</th> </tr> </thead> <tbody> <tr> <td>30-88</td> <td>40.0 dBuV/m measured @ 3 meters</td> </tr> <tr> <td>80-216</td> <td>43.5 dBuV/m measured @ 3 meters</td> </tr> <tr> <td>216-960</td> <td>46.0 dBuV/m measured @ 3 meters</td> </tr> <tr> <td>Above 960</td> <td>54.0 dBuV/m measured @ 3 meters</td> </tr> </tbody> </table>	Frequency (MHz)	Limits	30-88	40.0 dBuV/m measured @ 3 meters	80-216	43.5 dBuV/m measured @ 3 meters	216-960	46.0 dBuV/m measured @ 3 meters	Above 960	54.0 dBuV/m measured @ 3 meters
	Frequency (MHz)	Limits									
	30-88	40.0 dBuV/m measured @ 3 meters									
	80-216	43.5 dBuV/m measured @ 3 meters									
	216-960	46.0 dBuV/m measured @ 3 meters									
Above 960	54.0 dBuV/m measured @ 3 meters										

D.3 ENVIRONMENTAL CONDITIONS	
Temperature	25 +/- 5 °C
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

D.4 EQUIPMENT LIST				
ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
00072	EMCO	2075	Mini-mast	n/a
00073	EMCO	2080	Turn Table	n/a
00071	EMCO	2090	Multi-Device Controller	n/a
00015	HP	E4408B	Spectrum Analyzer	03May12
00050	Chase	CBL-6111A	Bilog Antenna	03May13
00051	HP	8566B	Spectrum Analyzer RF Section	03May12
00049	HP	85650A	Quasi-peak Adapter	06May12
00047	HP	85685A	RF Preselector	05May12
00006	R & S	SMR 20	Signal Generator (10MHz-40GHz)	30Apr12

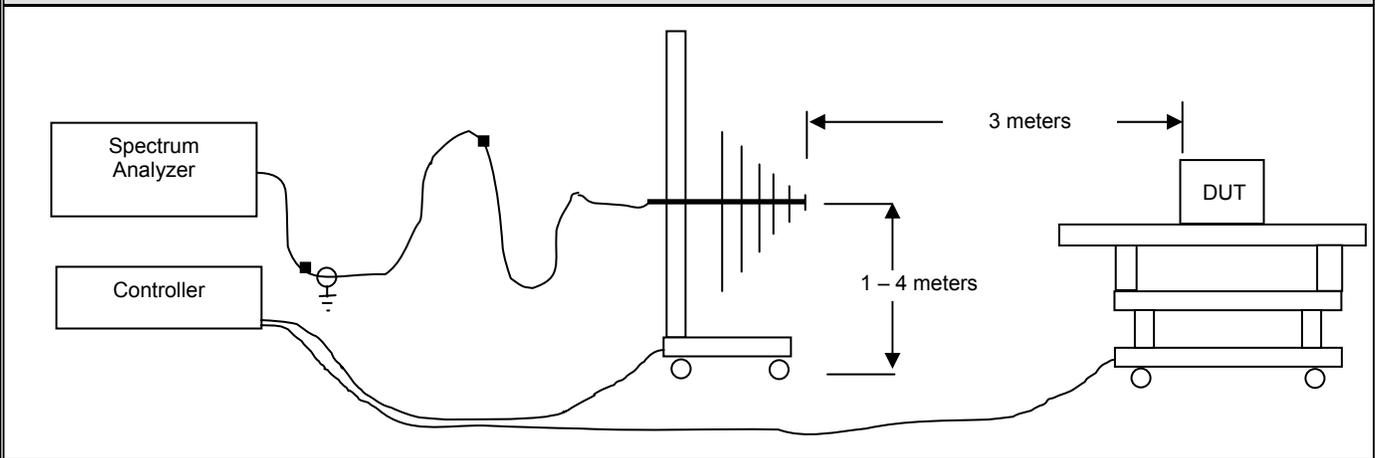
Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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D.5 MEASUREMENT EQUIPMENT SETUP

MEASUREMENT EQUIPMENT CONNECTIONS	For the field strength measurements, the measurement equipment was connected as shown in G.6. Various antenna types may be required to cover the applicable frequency range tested. The ranges in which each antenna was used are shown below.			
	Frequency Range	RX Antenna	TX Antenna	
	30 MHz - 1GHz	Bilog	N/a	
	1 GHz - 18 GHz	ETS 3115 Horn	N/a	
MEASUREMENT EQUIPMENT SETTINGS	For the spurious out-of-band emissions, the spectrum analyzer was set to the following settings:			
	Measurement	RBW	VBW	Detector
		kHz	kHz	
	< 1 GHz	100	300	Peak*
> 1 GHz	1000	3000	Peak*	
* As a worst-case measurement, the QP limit was applied to measurements made with a peak detector.				

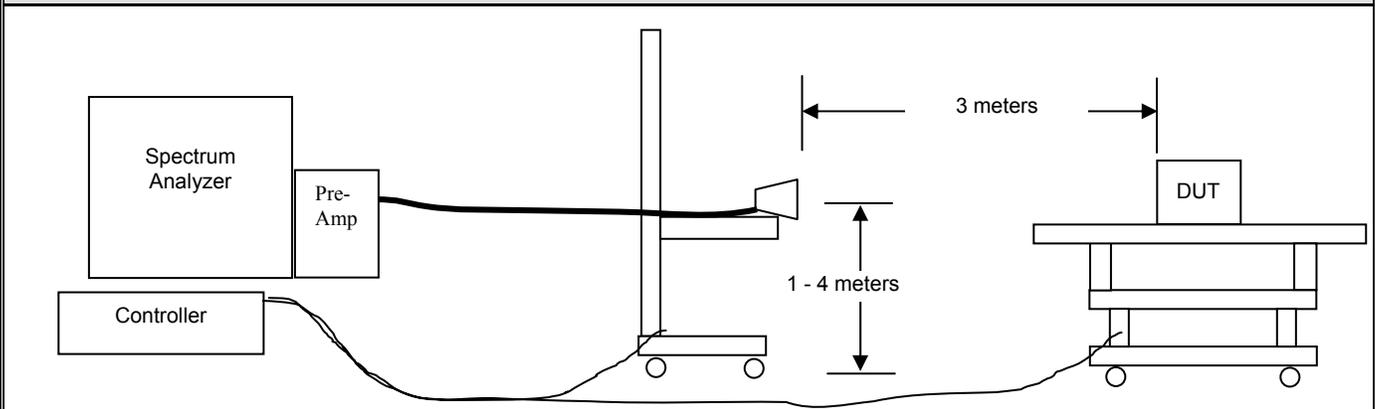
D.6 SETUP DRAWING

Figure D.66-1 - Setup Drawing – Radiated RX Spurious Emissions (< 1 GHz)



D.7 SETUP DRAWING

Figure G.7-1 - Setup Drawing – Radiated RX Spurious Emissions (> 1 GHz)



	Test Report Serial No.:	041511-T1095-E249U	Report Issue Date:	July 15, 2011	 Test Lab Certificate No. 2470.01
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	IC Standard(s):	RSS-210 RSS-Gen	IC Test Site No.:	IC 3874A-1	

D.8TEST RESULTS
There were no detectable emissions above the noise floor.

Appendix E - Antenna Requirement §15.203

§ 15.203 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The DUT complies with the antenna requirements of 15.203 as follows:

Printed Inverted F-Antenna - permanently attached antenna

END OF DOCUMENT

Applicant:	Garmin International	Model:	Rino 650, Rino 655t	FCC ID:	IPH-01767	IC:	1792A-01767	
DUT Type:	Portable 5W UHF FRS/GMRS PTT Radio Transceiver w/ GPS							
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