FCC / ISED Test Report

FOR:
Garmin International, Inc.

Model Name:
A03949

Product Description:
Digital transmission system transceiver

FCC ID: IPH-03949
IC ID: 1792A-03949

Applied Rules and Standards
Title 47 CFR: Part 15.225
RSS-210 Issue 10 & RSS-Gen Issue 5

REPORT #: EMC_GARMI_077_20001_FCC_15.225_ISED_210_NFC_R2

DATE: 2021-01-29

A2LA Accredited

IC recognized #
3462B-2
CABID: US0187

***CETECOM* Inc.**
411 Dixon Landing Road ◆ Milpitas, CA 95035 ◆ U.S.A.
Phone: + 1 (408) 586 6200 ◆ Fax: + 1 (408) 586 6299 ◆ E-mail: info@cetecom.com ◆ http://www.cetecom.com
CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571

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1 Assessment

The following device as further described in section 3 of this report was evaluated for unlicensed radio according to criteria specified in Code of Federal Regulations Title 47 CFR: Part 15.225 and the relevant ISED Canada standard RSS-210 Issue 10 & RSS-Gen Issue 5.

No deviations were ascertained.

According to section 5 of this report, the overall result is PASS.

Company	Description	Model #
Garmin International, Inc.	Digital transmission system transceiver	A03949

Responsible for Testing Laboratory:

Date	Section	Name	Signature
2021-01-19	Compliance	Cindy Li (Lab Manager)	Cindy Li Digitally signed by cindy.li@cetecom.com DN: CN=cindy.li@cetecom.com Reason: I have reviewed this document Location: Date: 2021-01-29 15:18:19

Responsible for the Report:

Date	Section	Name	Signature
2021-01-19	Compliance	Yuchan Lu (Test Engineer)	Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2021.01.29 15:15:59 -08'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Lab Manager:	Cindy Li
Responsible Project Leader:	Sangeetha Sivaraman

2.2 Identification of the Client

Applicant's Name:	Garmin International, Inc.
Street Address:	1200 East 151st Street
City/Zip Code	Olathe, KS 66062
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Garmin Corporation
Manufacturers Address:	No. 68, Zhangshu 2nd Rd., Xizhi Dist.,
City/Zip Code	New Taipei City 221,
Country	TAIWAN, R.O.C.

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Firmware Version Identification Number (FVIN):	N/A
Hardware Version Identification Number (HVIN):	A03949
Product Marketing Name (PMN):	N/A
Frequency Range / number of channels:	13.56 MHz / 1 Channel
Type(s) of Modulation:	ASK
Modes of Operation:	RFID
Antenna Information as declared:	The NFC antenna is a 32mm x 26mm rectangle composed of 3 loops of 70um copper traces. There is a 100um thick ferrite sheet bonded to the bottom side of the antenna (Inpaq NF-X-F8-R0-004). This antenna is tuned to couple with a similarly tuned 13.56 MHz NFC card antenna.
Max. Output Powers:	Field Strength 49.967 dBuV/m at 3m
Power Supply/ Rated Operating Voltage Range:	Vmin: 3.5 VDC/ Vnom: 3.9 VDC / Vmax: 4.35 VDC
Operating Temperature Range:	Low -20ºC, Nominal 25ºC, High 60ºC
Sample Revision:	☐Prototype Unit; ☐Production Unit; ■Pre-Production
EUT Dimensions [mm]:	253 x 45 x 15
EUT Diameter:	■ < 60 cm ☐ Other _____

RFID Module Information	
Module Name:	NXP
Other Radios included in the device:	❖ WLAN(Wi-Fi): 802.11 b/g/n • Manufacture: Microchip • Module name/number: ATWILC1000 ❖ LTE • Manufacture: Murata • Module name/number: LBAD0XX1SC • FCC ID: HSW-TY1SC • IC ID: 4492A-TY1SC ❖ Classic BT, BLE, ANT • Manufacture: Cypress • Module name/number: BCM20719 ❖ GNSS/GPS • Manufacture: Garmin proprietary

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes / Comments
1	3340894753	1	1.13	Radiated Emissions
2	340894616	1	1.13	Frequency Stability (Varying Voltage)

3.3 Accessory Equipment (AE) details

AE #	Comments
-	According to the User Manual, No accessories are to be used with this device.

3.4 Test Sample Configuration

Set-up #	Combination of AE used for test set up	Comments
1	EUT#1	-

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	RFID ASK	Client provided a test mode and instructions to get the ability to configure the radio to: • CW mode. • Highest possible duty cycle. Instructions and commands provided by the client will not be available to the end user. For Radiated measurements: The internal antenna was connected.

3.6 Justification for Worst Case Mode of Operation

During the testing process the EUT was tested with transmitter sets the highest duty cycle, maximum output power and worst case of protocols supported.

For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to assess the performance of the EUT according to the relevant requirements specified in Code of Federal Regulations Title 47 CFR: Part 15.225 and Radio Standard Specification RSS-210 Issue 10 & RSS-Gen Issue 5 of ISED Canada.

This test report is to support a request for new equipment authorization under the:

- FCC ID: IPH-03949
- IC ID: 1792A-03949

4.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=1.

Radiated measurement

9 kHz to 30 MHz	±2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	±2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	±2.3 dB (Horn Antenna)

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: http://physics.nist.gov/cuu/Uncertainty/typeb.html. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3 dB to the limit.

4.2 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25° C
- Relative humidity: 40-60%

4.3 Dates of Testing:

09/04/2020 – 09/17/2020

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.225 (a), (b), (c) RSS-210 B.6 (a)	Field Strength (Fundamental)	Nominal	ASK	■	☐	☐	Complies
§15.225 (d) §15.209 (a) RSS-Gen 6.13 (d)	TX Spurious emissions-Radiated	Nominal	ASK	■	☐	☐	Complies
§15.225(e) RSS-210 B.6 (b)	Frequency stability	Extreme temperature and voltage conditions	ASK	■	☐	☐	Complies
RSS-Gen 6.7	99% Occupied Bandwidth	Nominal	ASK	■	☐	☐	Complies

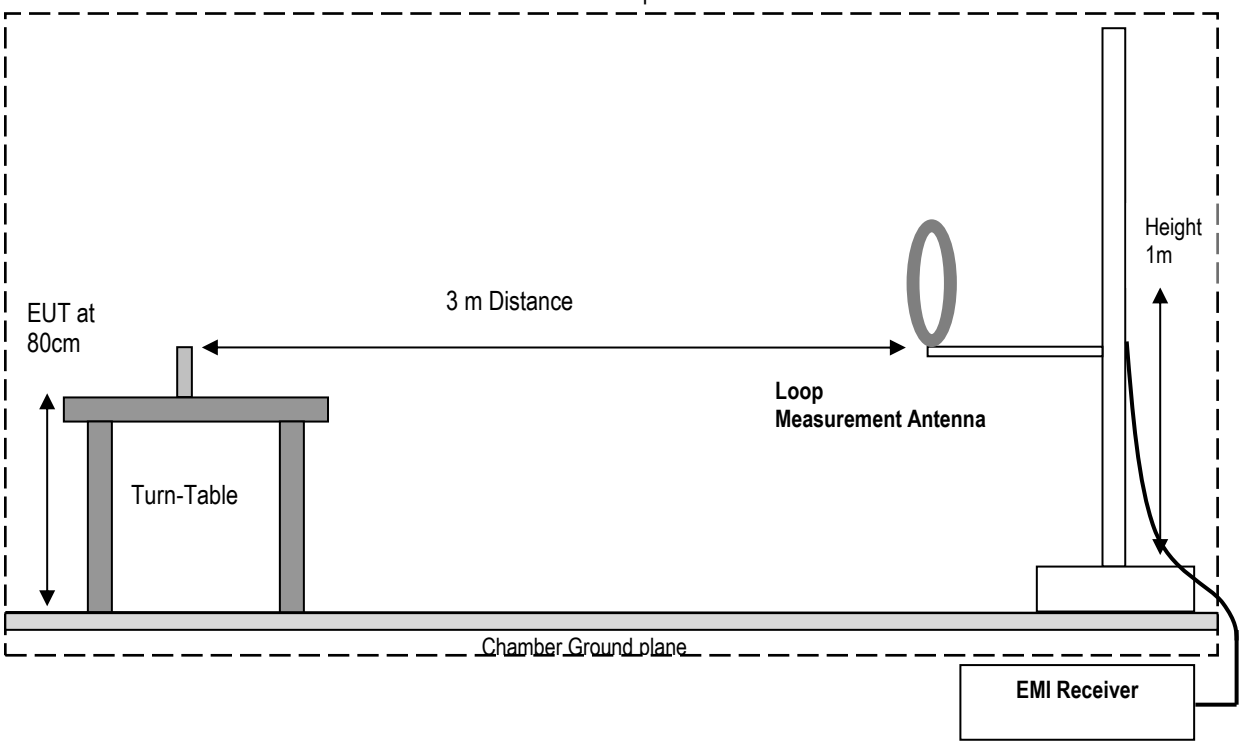
6 Measurement Procedures

6.1 Radiated Measurement

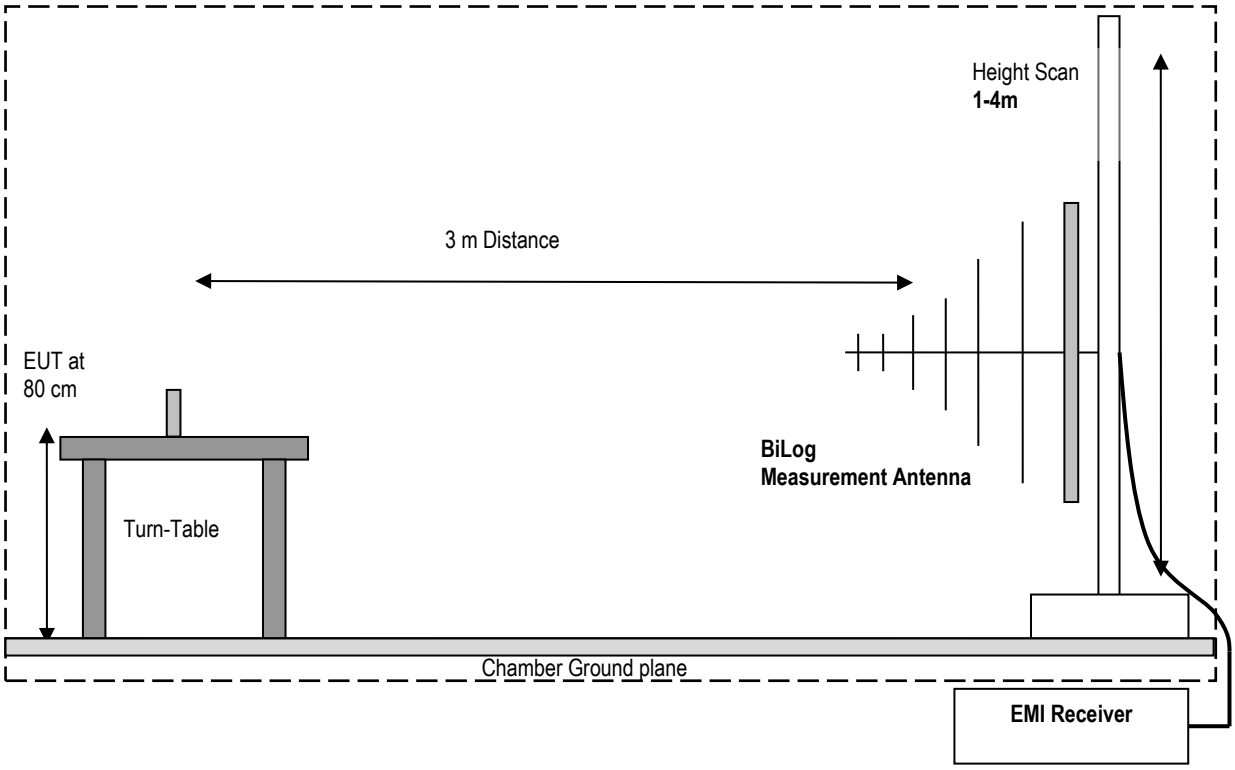
The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 360° continuous measurement of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

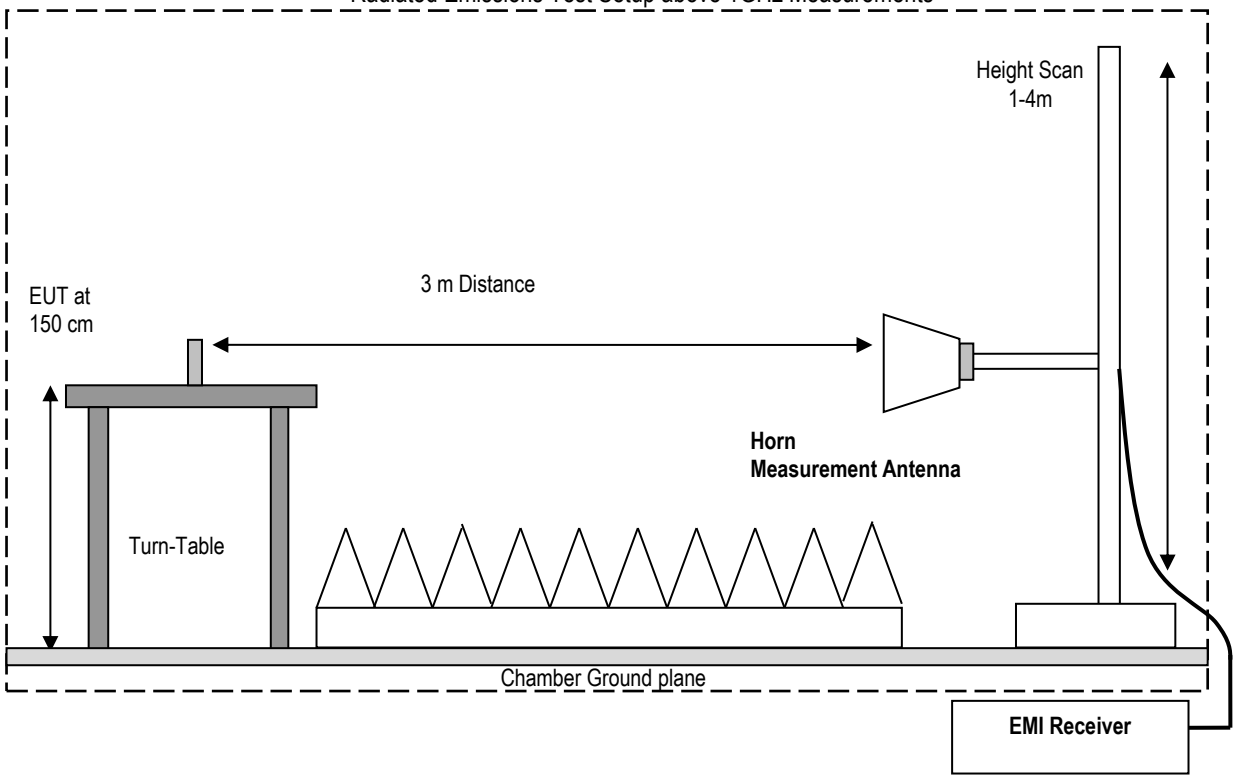
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



6.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dBµV
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dBµV/m) = Measured Value on SA (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

7 Test Result Data

7.1 Field strength

7.1.1 References

- **FCC Part 15 Subpart C-Intentional Radiators**
  §15.225 Operation within the band 13.110-14.010 MHz

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

- **RSS-210 – License-Exempt Radio Apparatus:**
  Category I Equipment

B.6 Band 13.110-14.010 MHz

a. the field strength of any emission shall not exceed the following limits:
   i. 15.848 mV/m (84 dBµV/m) at 30 m, within the band 13.553-13.567 MHz
   ii. 334 µV/m (50.5 dBµV/m) at 30 m, within the bands 13.410-13.553 MHz and 13.567-13.710 MHz
   iii. 106 µV/m (40.5 dBµV/m) at 30 m, within the bands 13.110-13.410 MHz and 13.710-14.010 MHz
   iv. RSS-Gen general field strength limits for frequencies outside the band 13.110-14.010 MHz

7.1.2 Limits

According to ANSI C63.10-2013 Section 6.4.4

➢ Equation (1):
$d_{\text{near field}} = 47.77 / f_{\text{MHz}}$
$d_{\text{near field}} \approx 3.5$ meters

➢ Equation (2)
$FS_{\text{limit}} = FS_{\text{max}} - 40\log (d_{\text{near field}} / d_{\text{measure}}) - 20\log (d_{\text{limit}} / d_{\text{near field}})$

The limit applied to the measurement result, is converted to 3 meters, by using:

- 40 dB/decade extrapolation factor for distance < λ/2π and;
- 20 dB/decade extrapolation factor for distance > λ/2π

Where:
- FS_{limit} : is the calculation of field strength at the limit distance, expressed in dBµV/m
- FS_{max} : is the measured field strength, expressed in dBµV/m ≈ 84 dBµV/m (See note 1)
- $d_{\text{near field}}$: is the λ/2π distance ≈ 3.5 meters
- d_{measure} : is the distance of the measurement point from the EUT = 3 meters
- d_{limit} : is the reference limit distance = 30 meters

Note 1: The maximum allowed field strength; 15.848 mV/m (84 dBµV/m), were used as FS_{max} to adjust the mask limit at the measured distance, so equation (2) will be:

FSlimit = **FS**max + 40log (**d**near field / **d**measure) + 20log (**d**limit / **d**near field)

- Within the band 13.553-13.567 MHz

FSlimit = 84 + 18.7 + 2.7
FSlimit = 105.4 dBµV/m at 3 meters

- Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz

FSlimit = 50.5 + 18.7 + 2.7
FSlimit = 71.9 dBµV/m at 3 meters

- Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz

FSlimit = 40.5 + 18.7 + 2.7
FSlimit = 61.9 dBµV/m at 3 meters

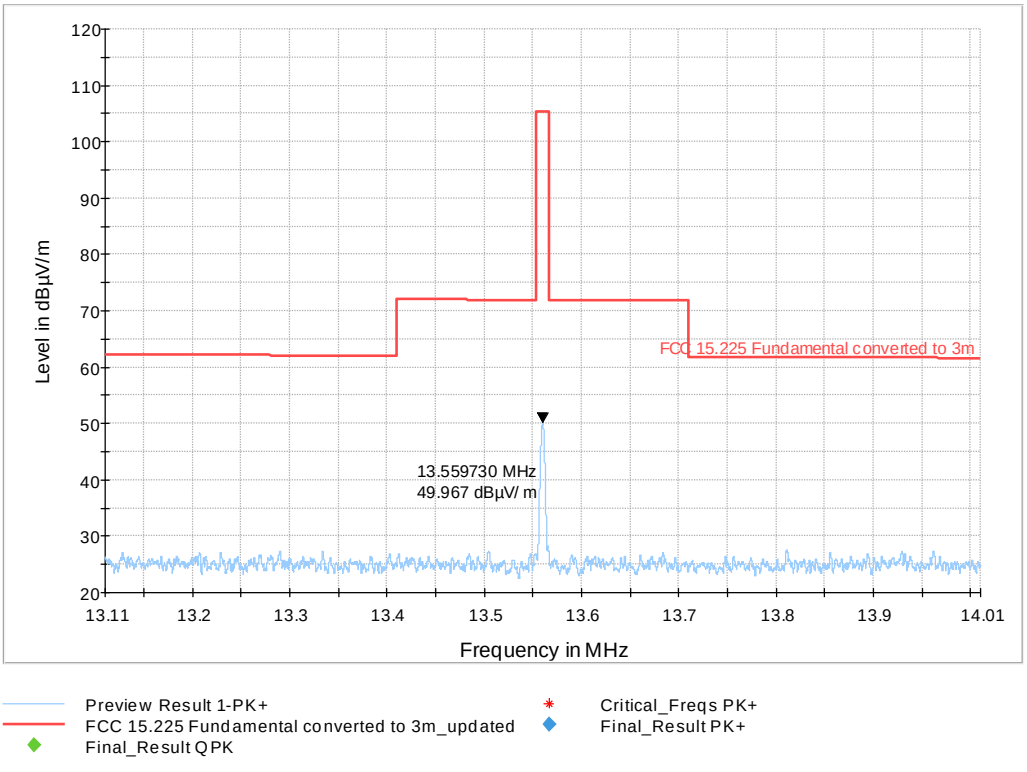
7.1.3 Test conditions and setup:

Ambient Temperature	EUT operating mode	Power Input
22° C	Op.1	Battery

7.1.4 Measurement plots:

Plot # 1 Field strength

NFC 13.56 MHz



7.2 Frequency Stability

7.2.1 References and limits

- **FCC Part 15 Subpart C-Intentional Radiators**

  §15.225 Operation within the band 13.110-14.010 MHz

  (e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to + 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

- **RSS-210 – License-Exempt Radio Apparatus:**
  Category I Equipment

  B.6 Band 13.110-14.010 MHz: the carrier frequency stability shall not exceed ±100 ppm

7.2.2 Measurement procedure

Measurements were done according to ANSI C63.10-2013 Section 6.8 Frequency stability tests

7.2.3 Measurement results

The following formula used for PPM calculation:

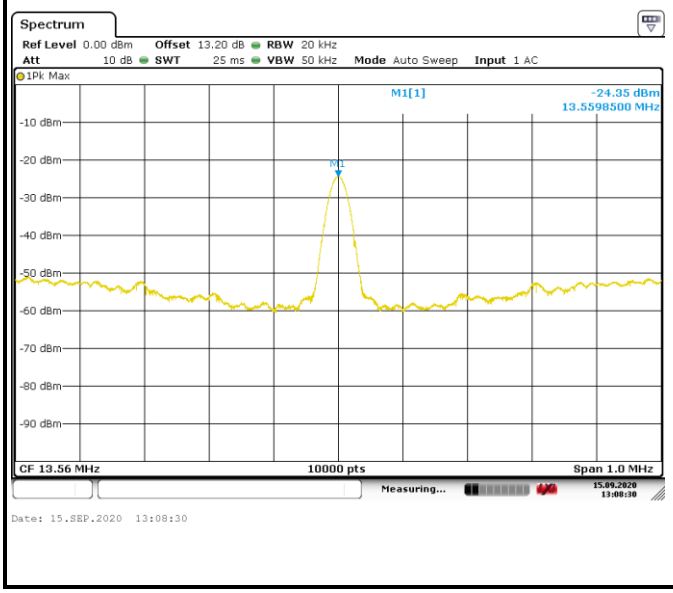
PPM = ((RCF / ACF) – 1) * 10^6

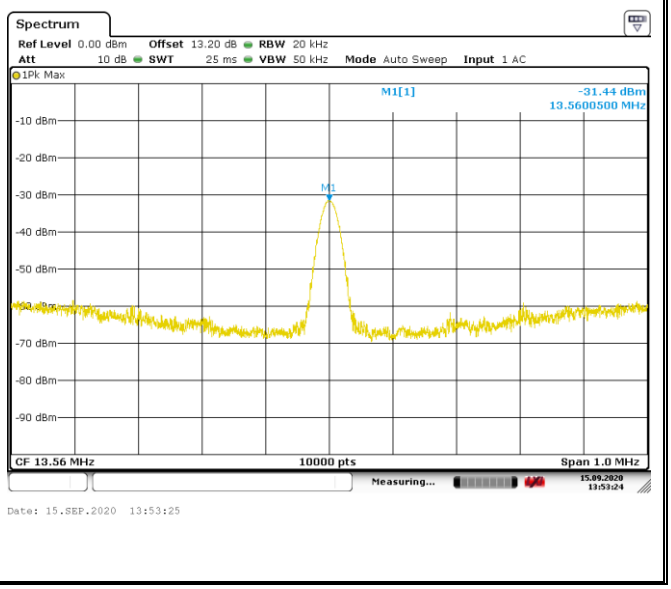
Where:
RCF : Reference Center Frequency.
ACF : Assigned Center Frequency.
Variation = RCF – ACF

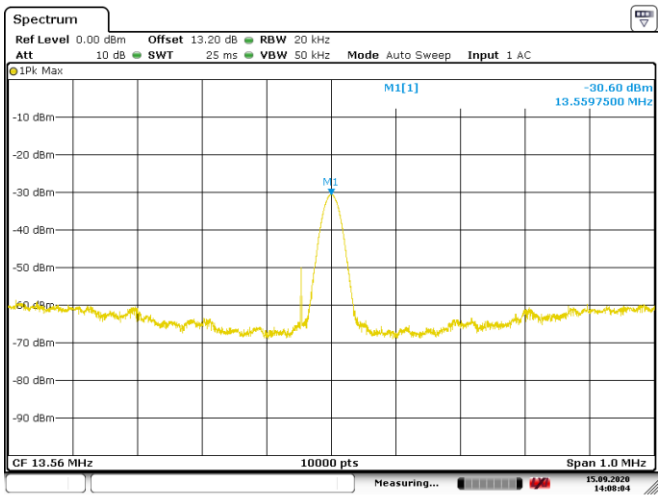
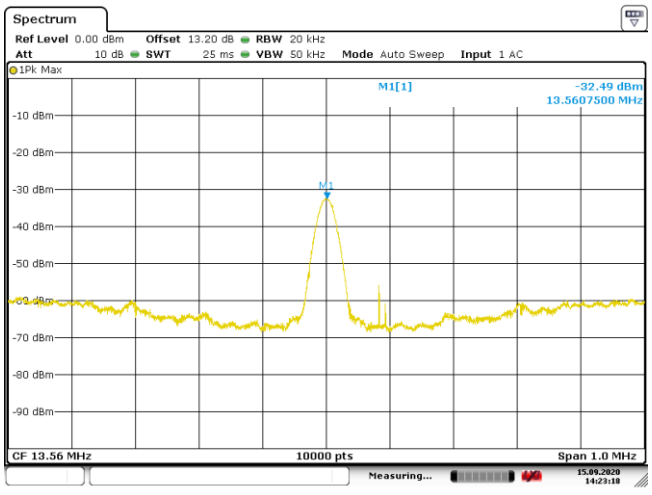
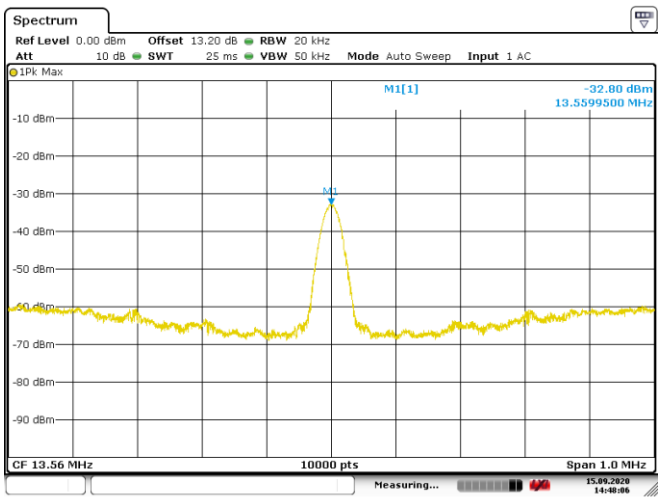
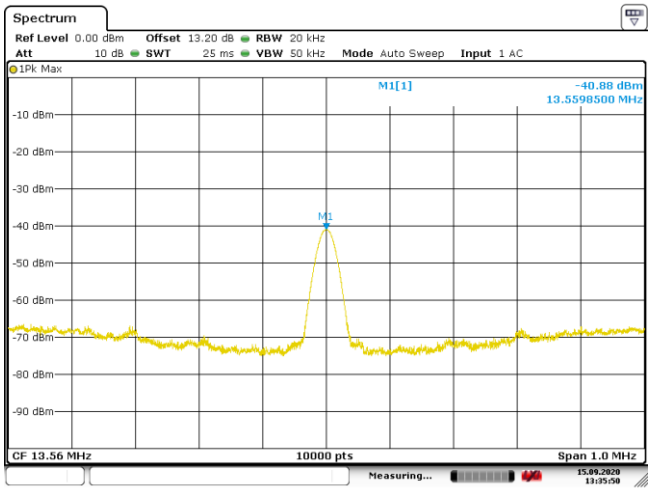
Frequency stability with respect to ambient temperature					
Plot #	Temperature	RCF	ACF	Variation	PPM
2	-	13.55985	-	-	-
3	60	13.55985	13.56005	-0.0002	-14.7492082
4	50		13.55975	0.0001	7.37476723
5	40		13.56075	-0.0009	-66.3680106
6	30		13.55995	-0.0001	-7.37465846
7	20		13.55985	0	0
8	10		13.56065	-0.0008	-58.9942223
9	0		13.55955	0.0003	22.124628
10	-10		13.56005	-0.0002	-14.7492082
11	-20		13.56005	-0.0002	-14.7492082

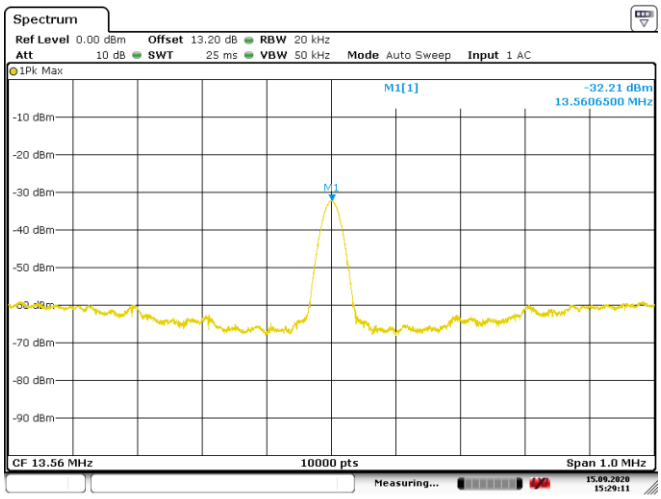
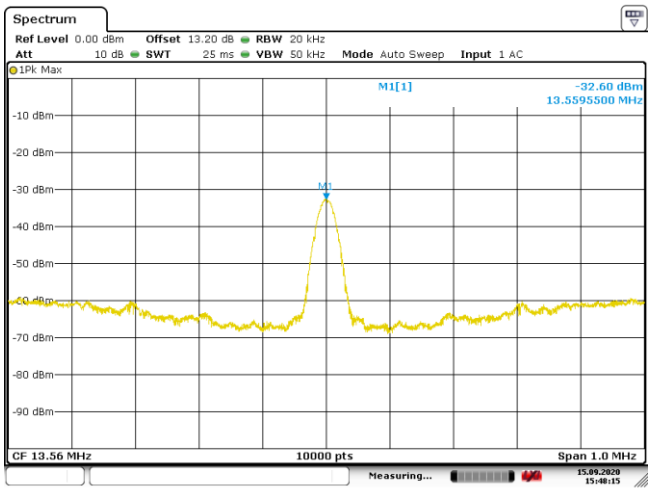
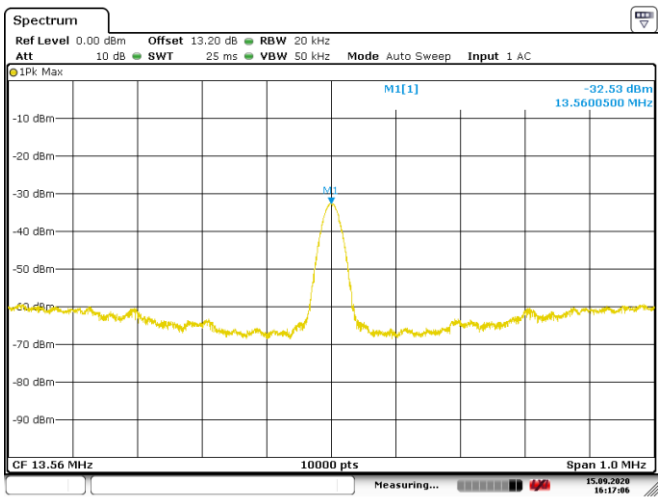
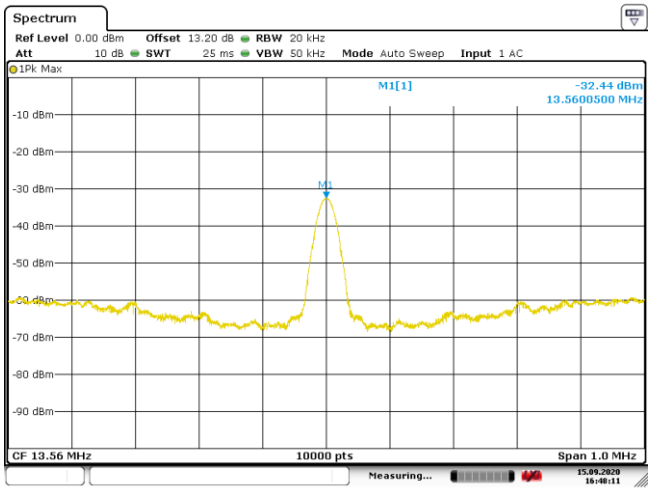
Frequency stability when varying supply voltage					
Plot #	Voltage	RCF	ACF	Variation	PPM
12	3.5	13.55985	13.56085	-0.001	**-73.7416902**
13	3.9		13.56055	-0.0007	-51.6203251
14	4.29		13.55895	0.0009	66.3768212
15	4.485		13.56005	-0.0002	-14.7492082

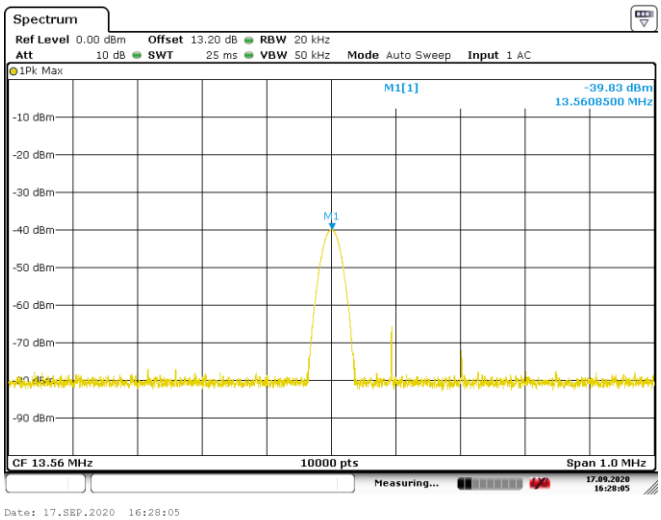
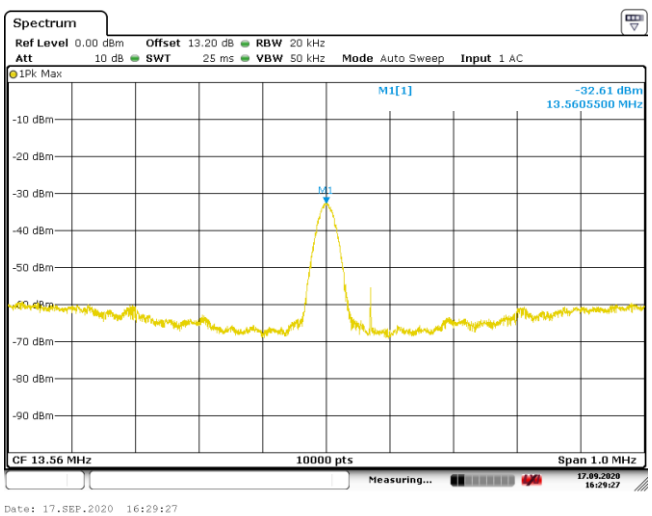
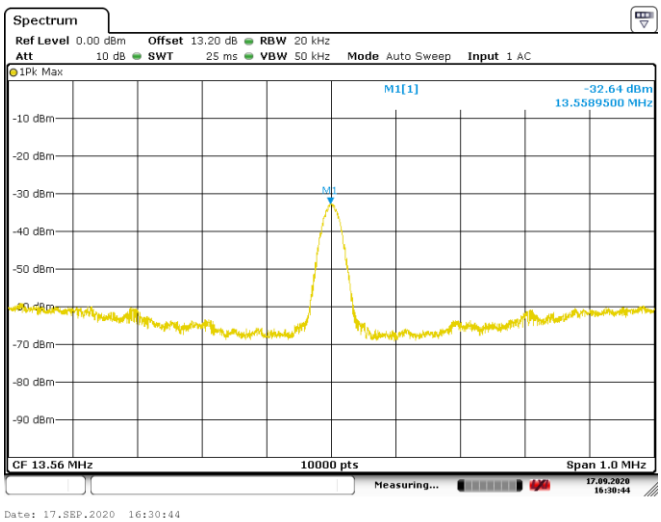
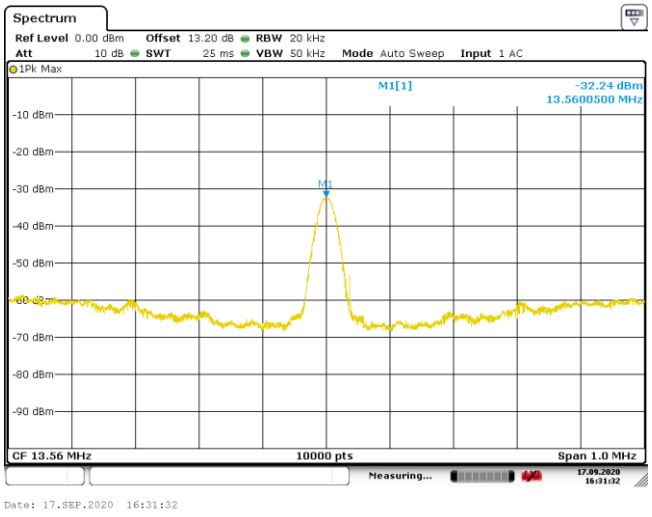
Plot #2		**Plot #3**	
13.56 MHz	Reference Measurement	13.56 MHz	Temperature: 60°C





Plot #4		Plot #5	
13.56 MHz	Temperature: 50°C	13.56 MHz	Temperature: 40°C
			
Plot #6		**Plot #7**	
13.56 MHz	Temperature: 30°C	13.56 MHz	Temperature: 20°C
			

Plot #8		Plot #9	
13.56 MHz	Temperature: 10°C	13.56 MHz	Temperature: 0°C
			
Plot #10		**Plot #11**	
13.56 MHz	Temperature: -10°C	13.56 MHz	Temperature: -20°C
			

Plot #2		Plot #3	
13.56 MHz	Voltage: 3.5 VDC	13.56 MHz	Voltage: 3.9 VDC
			
Plot #4		**Plot #5**	
13.56 MHz	Voltage: 4.29 VDC	13.56 MHz	Voltage: 4.485 VDC
			

7.3 Emission Bandwidth 99% Occupied Bandwidth

7.3.1 Measurement according to FCC 558074 D01 DTS Meas Guidance v05r02

Spectrum Analyzer settings:

- Set RBW = 1% - 5% of OBW
- Set the video bandwidth (VBW) ≥ 3 x RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

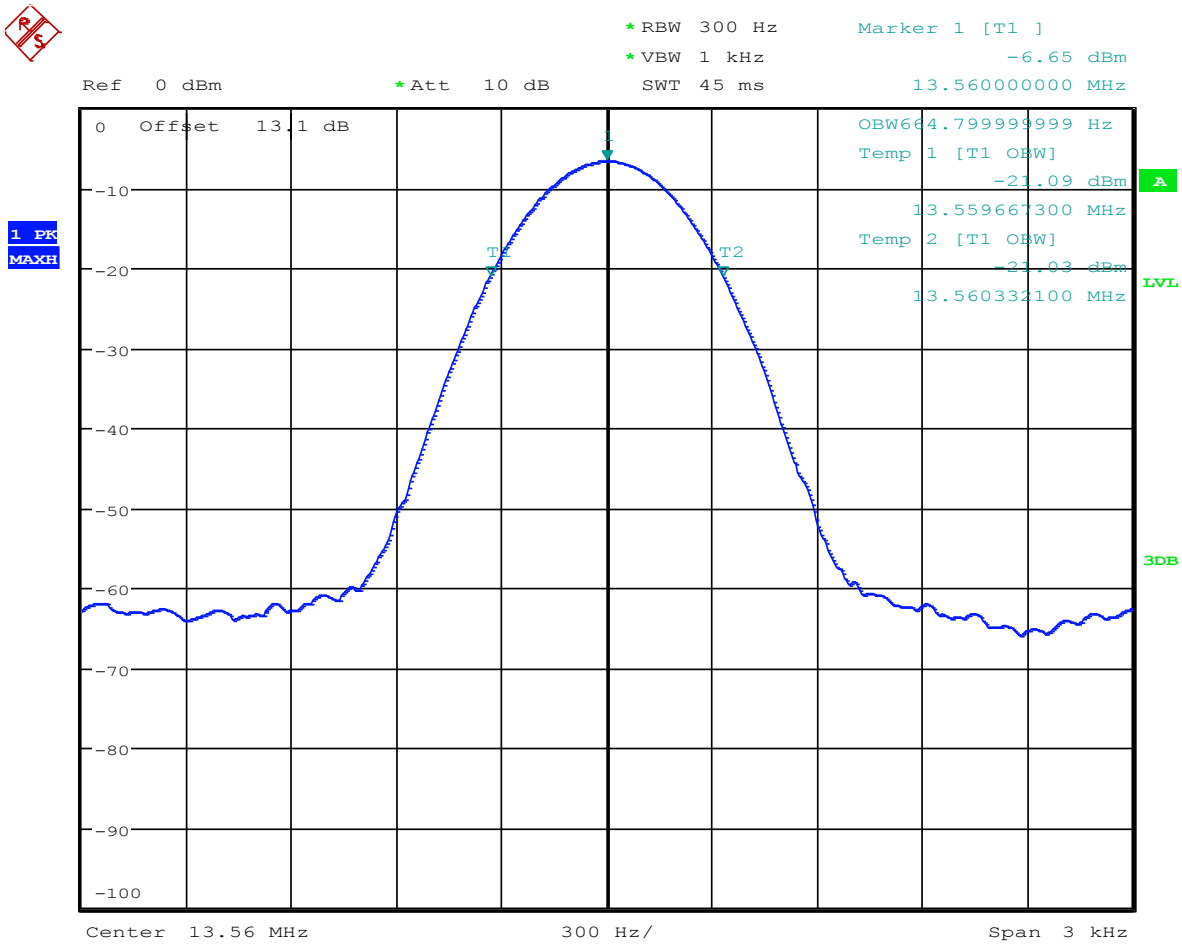
7.3.2 Test conditions and setup:

Ambient Temperature	EUT operating mode	Power Input
22° C	Op. 1	3.9 VDC

7.3.3 Measurement result:

Plot #	Frequency (MHz)	99% Occupied Bandwidth (kHz)
1	13.56	0.665

7.3.4 Measurement Plots:



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7.4 Transmitter Spurious Emissions and Restricted Bands

7.4.1 Measurement according to ANSI C63.10

Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector = Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW = 120 KHz (<1 GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1MHz

Plots reported here represent the worst case emissions for horizontal and vertical antenna polarizations and for three orientations of the EUT. Unless mentioned otherwise, the emissions outside the limit lines in the plots are from the transmit signal.

7.4.2 Limits: FCC 15.247(d)/15.209(a) /RSS-Gen 6.13

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	Above 38.6
13.36-13.41			

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
- PEAK LIMIT= 74dB µV/m
- AVG. LIMIT= 54dB µV/m

- Except as shown in CFR 47 Part 15.205 paragraph (d), only spurious emissions are permitted in any of the frequency bands listed below

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	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

Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements described in 5.4.
The highest (or worst-case) data rate shall be recorded for each measurement.

For testing at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation as follow:

Conversion factor (CF) = 40 log (D/d) = 40 log (300 m / 3 m) = 80 dB

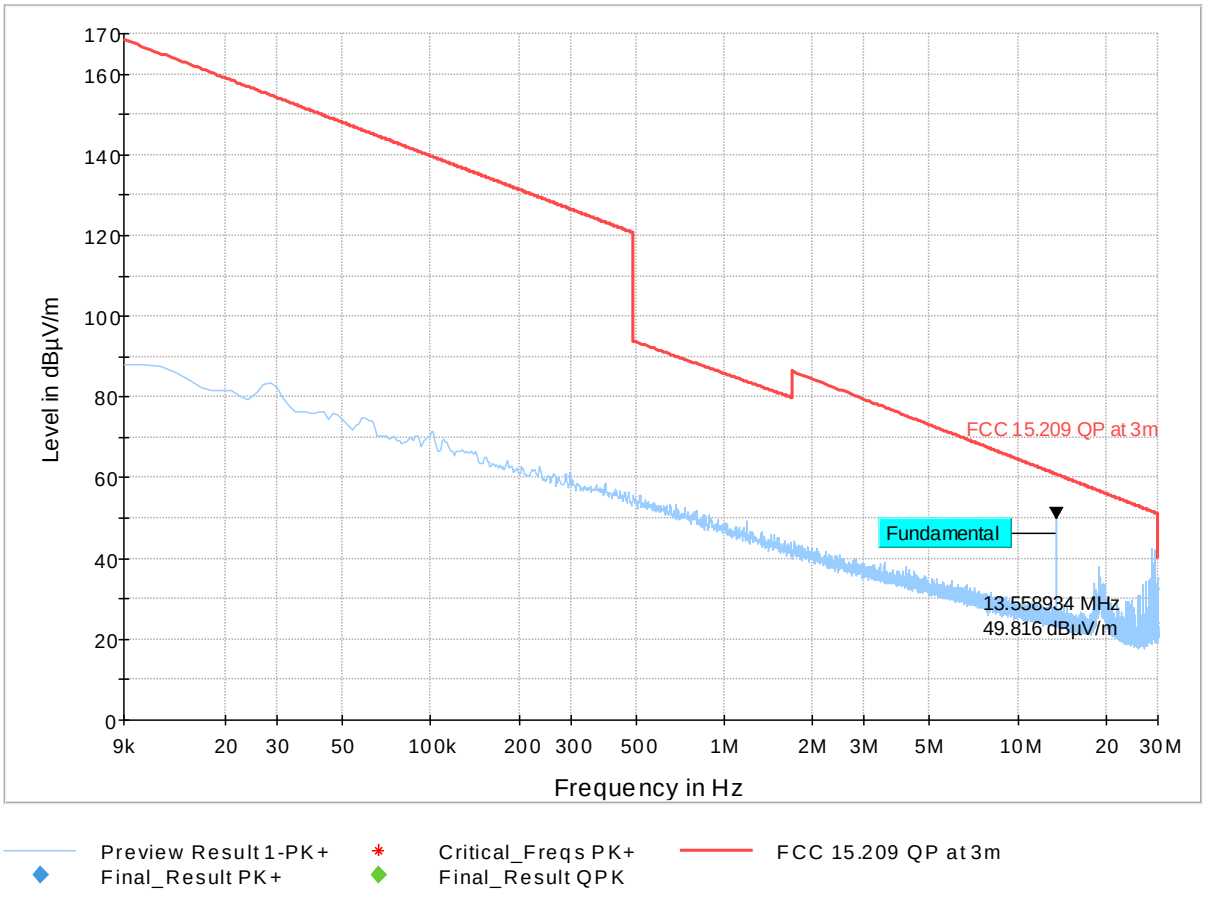
7.4.3 Test conditions and setup:

Ambient Temperature	EUT operating mode	Power Input
22° C	Op.1	Battery

7.4.4 Measurement Plots:

Plot # 1 Radiated Emissions: 9KHz – 30MHz

NFC 13.56 MHz

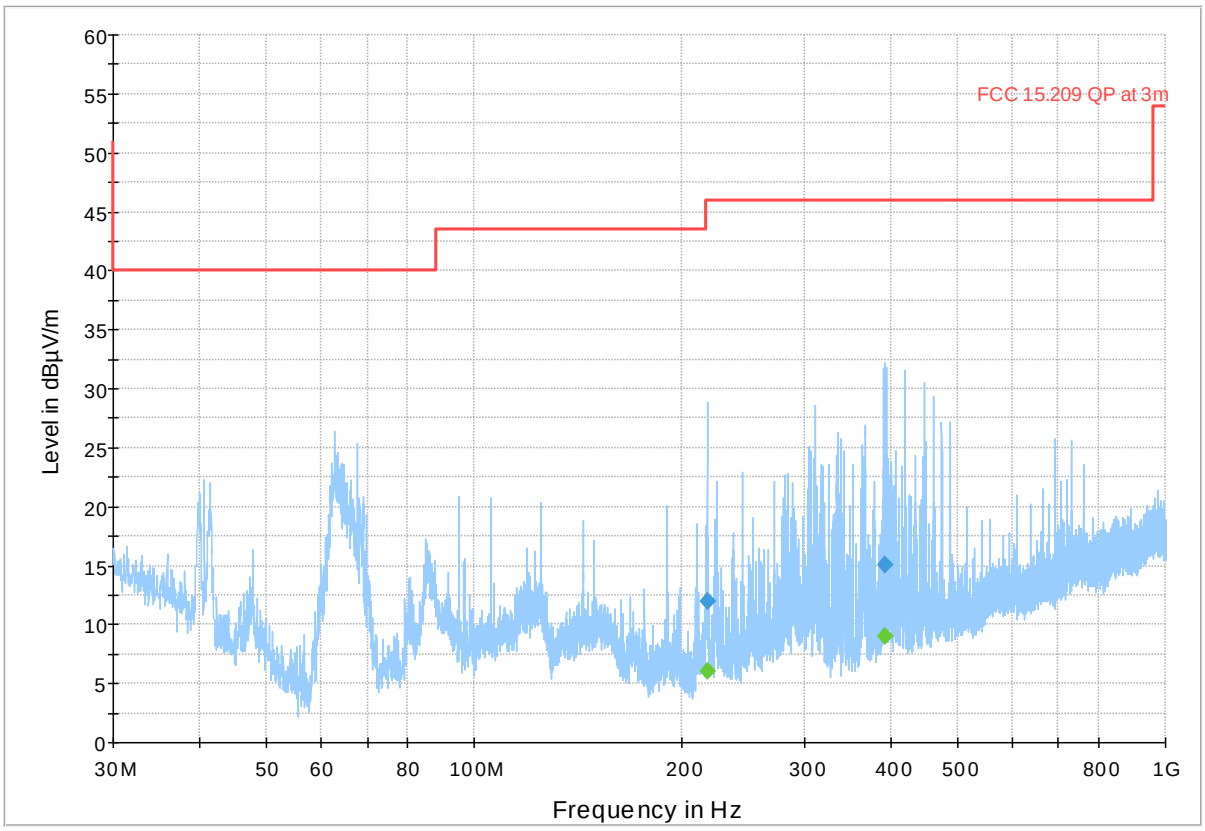


Plot # 2 Radiated Emissions: 30MHz – 1GHz

NFC 13.56 MHz

Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
216.951	---	6.05	---	---	1000.0	120.000	193.0	H	262.0	-21.4	
216.951	12.03	---	46.02	33.99	1000.0	120.000	193.0	H	262.0	-21.4	
393.200	---	8.97	---	---	1000.0	120.000	120.0	V	26.0	-18.2	
393.200	15.01	---	46.02	31.01	1000.0	120.000	120.0	V	26.0	-18.2	



7.5 AC Power Line Conducted Emissions

7.5.1 Measurement according to ANSI C63.10 (2013)

Analyzer Settings:

- RBW = 9 KHz (CISPR Bandwidth)
- Pre-scan Detector = Peak / Average for
- Final Measurements Detector = Quasi-Peak / Average

7.5.2 Limits: FCC 15.207 & RSS-Gen 8.8

(a) Except as shown in paragraphs (b) and (c) of this section of the CFR, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table (1), as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

7.5.3 Test conditions and setup:

Ambient Temperature (C)	EUT Set-Up #	EUT operating mode	Power line (L1, L2, L3, N)	Power Input
22	1	Op.1	Line & Neutral	110 V / 60 Hz

7.5.4 Measurement Result:

Plot #	Port	EUT Set-Up #	EUT operating mode	Scan Frequency	Limit	Result
1	AC Mains	1	Op.1	150 kHz – 30 MHz	See section 7.4.2	Pass

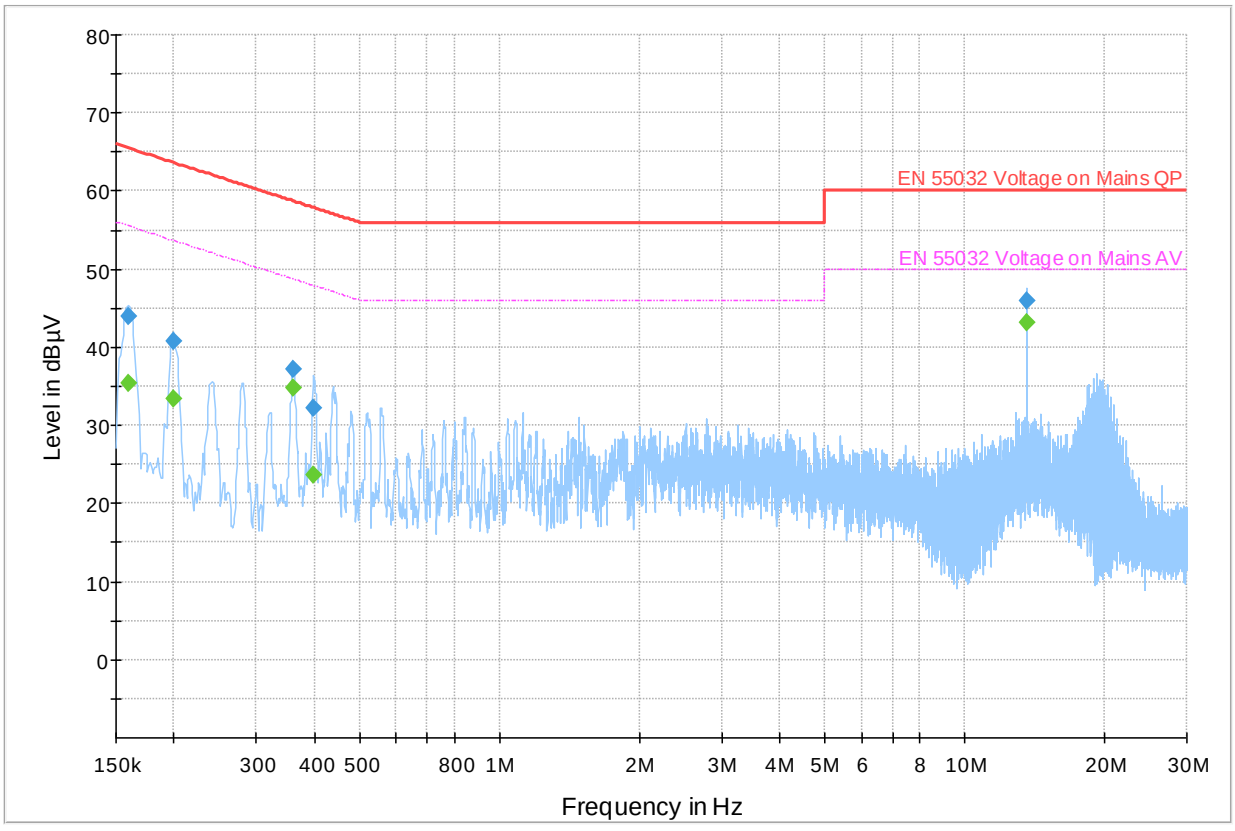
7.5.5 Measurement Plots:

Plot # 1

Disclaimer: Any measurement data within 2dB from the limit line is conditional PASS/FAIL due to measurement uncertainty considerations.

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)	Comment
0.160	---	35.47	55.49	20.02	500.0	9.000	L1	GND	10.5	
0.160	44.06	---	65.49	21.43	500.0	9.000	L1	GND	10.5	
0.199	---	33.38	53.65	20.27	500.0	9.000	L1	GND	10.2	
0.199	40.71	---	63.65	22.94	500.0	9.000	L1	GND	10.2	
0.361	37.13	---	58.70	21.57	500.0	9.000	L1	GND	10.0	
0.361	---	34.84	48.70	13.86	500.0	9.000	L1	GND	10.0	
0.398	32.21	---	57.89	25.67	500.0	9.000	L1	GND	10.0	
0.398	---	23.70	47.89	24.18	500.0	9.000	L1	GND	10.0	
13.560	45.87	---	60.00	14.13	500.0	9.000	L1	GND	10.2	
13.560	---	43.13	50.00	6.87	500.0	9.000	L1	GND	10.2	



8 Test setup photos

Setup photos are included in supporting file name: "EMC_GARMI_077_20001_FCC_Setup_Photos_R1.pdf"

9 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
ACTIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 YEARS	10/26/2017
BILOG ANTENNA	TESEO	CBL 6141B	41106	3 YEARS	11/01/2017
HORN ANTENNA	ETS.LINDGREN	3115	00035111	3 YEARS	04/17/2019
HORN ANTENNA	ETS LINDGREN	3117	00169547	3 YEARS	09/01/2020
HORN ANTENNA	ETS LINDGREN	3116C	00169535	3 YEARS	09/24/2017
WIDEBAND RADIO COMMUNICATION	R&S	CMW500	109825	3 YEARS	02/12/2018
SIGNAL ANALYZER	R&S	FSV 40	101022	2 YEARS	07/15/2019
COMPACT DIGITAL BAROMETER	CONTROL COMPANY	10510-922	200236891	3 YEARS	04/13/2020
DIGITAL THRMOMETER	CONTROL COMPANY	36934-164	191871994	2 YEARS	01/10/2019
LINE IMPEDANCE STABILIZATION NETWORK	FCC	FCC-LISN-50-25-2-08	08014	3 YEARS	07/19/2019

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels. Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

10 Revision History

Date	Report Name	Changes to report	Report prepared by
2020-10-20	EMC_GARMI_077_20001_FCC_15.225_ISED_210_NFC	Initial Version	Yuchan Lu
2020-11-19	EMC_GARMI_077_20001_FCC_15.225_ISED_210_NFC_R1	Changed Marketing name to "N/A"; Changed the client's and manufacture's addresses; Added declared antenna information and max output power; Removed the WLAN FCC and IC IDs.	Yuchan Lu
2021-01-22	EMC_GARMI_077_20001_FCC_15.225_ISED_210_NFC_R2	Updated the fundamental measurement limit in the plot	Yuchan Lu

<<The End>>