

Application Submittal Report Supporting Class 2 Permissive Change Grant of Certification

For

Model: A03302
1616.0-1626.5 MHz
Mobile Earth Station

FCC ID: IPH-03302

IC: 1792A-03302

FOR

Garmin International, Inc.

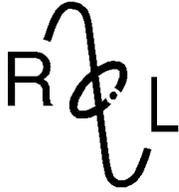
1200 East 151st Street
Olathe, KS 66062

FCC Designation: US5305

IC Test Site Registration: 3041A-1

Test Report Number: 171204a

Authorized Signatory: *Scot D. Rogers*
Scot D. Rogers



ROGERS LABS, INC.

4405 West 259th Terrace
Louisburg, KS 66053
Phone / Fax (913) 837-3214

Engineering Test Report For Class 2 Permissive Change Application

FOR
47CFR, PART 25,
Industry Canada RSS-170
Licensed Non-Broadcast Short Burst Data Transceiver module

For

Garmin International, Inc.

1200 East 151st Street
Olathe, KS 66062

Model: A03302
Mobile Earth Station
Frequency Range 1616.0-1626.5 MHz
FCC ID: IPH-03302
IC: 1792A-03302

Test Date: December 4, 2017

Certifying Engineer: *Scot D. Rogers*
Scot D. Rogers
Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053
Telephone/Facsimile: (913) 837-3214

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Rogers Labs, Inc.
4405 West 259th Terrace
Louisburg, KS 66053
Phone/Fax: (913) 837-3214
Revision 2

Garmin International, Inc.
Model: A03302
Test #: 171204a
Test to: 47CFR (Part 25), RSS-170
File: A03302 C2PC TstRpt 171204 r2

SN's: 5HT000004 / 5HT000001
FCC ID: IPH-03302
IC: 1792A-03022
Date: April 26, 2018
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Revisions

Revision 2 Issued April 26, 2018 – Added additional date informing to test equipment list
 Revision 1 Issued April 17, 2018

Foreword

The following information is submitted for consideration in processing Class 2 Permissive Change (C2PC) to authorized equipment. The module model: A03302, was granted a module authorization operating under 47CFR part 25 and Industry Canada RSS-170 operations in the 1616.0-1626.5 MHz frequency band. The original Grants restricted use for mobile use and prohibited collocation use with other transceivers. This report presents documentation supporting the use of this module in a portable host which also houses a low power transceiver circuitry operating in the 2402-2480 MHz band under regulation of 47CFR 15.249 and RSS-210 in a hand-held configuration.

Name of Applicant: Garmin International, Inc.
 1200 East 151st Street
 Olathe, KS 66062

Model: A03302
 FCC I.D.: IPH-03302 IC: 1792A-03302
 Frequency Range: 1616.0-1626.5 MHz
 Operating Power: 1.43 Watts, Occupied Bandwidth 99% 33.1 kHz
 IPH-03302, 1792A-03302 module information, 1.43, 1616-1626 MHz, 33K1Q7D

Opinion / Interpretation of Results

Test Performed per 47CFR	Minimum Margin (dB)	Results
Radiated Emissions (General Out-of-Band)	-25.1	Complies
Radiated Emissions (harmonics)	-20.3	Complies

Equipment Tested

<u>Equipment</u>	<u>Model / PN</u>	<u>FCC Identifier</u>	<u>IC Identifier</u>
EUT	A03302	IPH-03302	1792A-03302
EUT (#2)	A03302	IPH-03302	1792A-03302

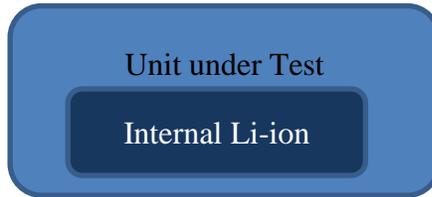
Test results in this report relate only to the items tested

Equipment Function and Configuration

The EUT is a Satellite short burst data transceiver module with operation capability in the 1616.0-1626.5 MHz frequency band. The assembled product adds 2.4 GHz wireless communications capabilities with compatible wireless equipment as well as incorporating the IPH-03302 (IC: 1792A-03302) wireless module. The design provides the ability to send data using the 1616-1626 MHz data link. The portable host design offers a hand held or body clipped satellite communications capability as well as the use of the low power FHSS 2.4 GHz transceiver. The product operates from internal rechargeable battery only and provides micro USB interface connection port for use with AC adapter or computer equipment. Recharge of internal battery is accomplished with the use of the USB interface cable which may be connected to compatible USB interface port, AC adapter or DC adapter for battery recharge. The design utilizes internal fixed antenna systems and offers no provision for antenna replacement or modification. Two samples were provided for testing, one representative of production design and the other modified for testing purposes replacing integral antenna with RF connection port. Test samples were provided with test software enabling testing personnel ability to enable transmitter function on defined channels and operational modes. The antenna modification offered testing facility ability to connect test equipment to the temporary antenna port for antenna port conducted emission testing. The EUT was arranged as described by the manufacturer for testing purposes. The EUT offers no other interface connections than those in the configuration options shown below as described by the manufacturer. For testing purposes, the EUT received power from freshly charged internal battery and configured to operate in available modes. As requested by the manufacturer and required by regulations, the equipment was tested for emissions compliance using the available configurations with the worst-case data presented. Test results in this report relate only to the products described in this report.

Equipment Configuration

- 1) Unit operating off internal battery



- 2) Unit Transmitting data through 1.6 GHz wireless communications



Application for Certification

- (1) Manufacturer: Garmin International, Inc.
 1200 East 151st Street
 Olathe, KS 66062
- (2) Identification: Model: A03302
 FCC ID: IPH-03302 IC: 1792A-03302
- (3) Instruction Book:
 Refer to Original Filing Exhibit for Instruction Manual.
- (4) Description of Circuit Functions:
 Refer to Original Filing Exhibit of Operational Description.
- (5) Block Diagram with Frequencies:
 Refer to Original Filing Exhibit of Operational Description.
- (6) Report of Measurements:
 Report of measurements follows in this Report.
- (7) Photographs: Construction, Component Placement, etc.:
 Refer to Original Filing Exhibit for photographs of equipment.
- (8) List of Peripheral Equipment Necessary for operation. The equipment operates from direct current internal battery power. The battery may be recharged through the provided interface options as documented in this report. The design provides USB interface port for use with compatible equipment as presented in this documentation. The EUT offers no other connection ports than those presented in this filing.
- (9) Transition Provisions of CFR47 15.37 are not requested.
- (10) Not Applicable. The unit is not a scanning receiver.
- (11) Not Applicable. The EUT does not operate in the 59 – 64 GHz frequency band.
- (12) The equipment is not software defined and this section is not applicable.
- (13) Applications for certification of U-NII devices in the 5.15-5.35 GHz and the 5.47-5.85 GHz bands must include a high-level operational description of the security procedures that control the radio frequency operating parameters and ensure that unauthorized modifications cannot be made. This requirement is not applicable to his DTS device.
- (14) Contain at least one drawing or photograph showing the test set-up for each of the required types of tests applicable to the device for which certification is requested. These drawings or photographs must show enough detail to confirm other information contained in the test report. Any photographs used must be focused originals without glare or dark spots and must clearly show the test configuration used. This information is provide in this report and Test Setup Exhibits provided with the application filing.

Applicable Standards & Test Procedures

In accordance with the 47CFR, dated December 4, 2017, Part 2, Subpart J, Paragraphs 2.907, 2.911, 2.913, 2.925, 2.926, 2.1031 through 2.1057, and applicable parts of paragraph 25.202 and Industry Canada standards RSS-GEN Issue 4, and RSS-170 Issue 3 the following information is submitted.

Test Site Locations

Conducted EMI The AC power line conducted emissions testing performed in a shielded screen room located at Rogers Labs, Inc., 4405 West 259th Terrace, Louisburg, KS

Radiated EMI The radiated emissions tests were performed at the 3 meters, Open Area Test Site (OATS) located at Rogers Labs, Inc., 4405 West 259th Terrace, Louisburg, KS

Site Registration Refer to Annex for Site Registration Letters

NVLAP Accreditation Lab code 200087-0

Units of Measurements

Conducted EMI Data is in dB μ V; dB referenced to one microvolt

Radiated EMI Data is in dB μ V/m; dB/m referenced to one microvolt per meter

Sample Calculation:

RFS = Radiated Field Strength, FSM = Field Strength Measured

A.F. = Receive antenna factor, Gain = amplification gains and/or cable losses

$RFS (dB\mu V/m @ 3m) = FSM (dB\mu V) + A.F. (dB) - Gain (dB)$

Environmental Conditions

Ambient Temperature 23.1° C

Relative Humidity 45%

Atmospheric Pressure 1001.1 mb

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 Revision 2

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SN's: 5HT000004 / 5HT000001
 FCC ID: IPH-03302
 IC: 1792A-03022
 Date: April 26, 2018
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List of Test Equipment

<u>Equipment</u>	<u>Manufacturer</u>	<u>Model (SN)</u>	<u>Band</u>	<u>Cal Date</u>	<u>Due</u>
<input checked="" type="checkbox"/> LISN	FCC	FCC-LISN-50-2-10(1PA) (160611)	.15-30MHz	15/5/17	15/5/18
<input checked="" type="checkbox"/> Cable	Huber & Suhner Inc.	Sucoflex102ea(L10M)(303073)	9kHz-40 GHz	24/10/17	24/10/18
<input checked="" type="checkbox"/> Cable	Belden	RG-58 (L1-CAT3-11509)	9kHz-30 MHz	24/10/17	24/10/18
<input checked="" type="checkbox"/> Cable	Belden	RG-58 (L2-CAT3-11509)	9kHz-30 MHz	24/10/17	24/10/18
<input type="checkbox"/> Antenna	ARA	BCD-235-B (169)	20-350MHz	24/10/17	24/10/18
<input type="checkbox"/> Antenna	EMCO	3147 (40582)	200-1000MHz	24/10/17	24/10/18
<input checked="" type="checkbox"/> Antenna	ETS-Lindgren	3117 (200389)	1-18 GHz	15/5/17	15/5/18
<input type="checkbox"/> Antenna	Com Power	AH-118 (10110)	1-18 GHz	24/10/17	24/10/19
<input checked="" type="checkbox"/> Antenna	Com Power	AH-840 (101046)	18-40 GHz	15/5/17	15/5/19
<input checked="" type="checkbox"/> Antenna	Com Power	AL-130 (121055)	.001-30 MHz	24/10/17	24/10/18
<input checked="" type="checkbox"/> Antenna	Sunol	JB-6 (A100709)	30-1000 MHz	24/10/17	24/10/18
<input type="checkbox"/> Antenna	EMCO	3143 (9607-1277)	20-1200 MHz	15/5/17	15/5/18
<input checked="" type="checkbox"/> Analyzer	Rohde & Schwarz	ESU40 (100108)	20Hz-40GHz	15/5/17	15/5/18
<input type="checkbox"/> Analyzer	Rohde & Schwarz	ESW44 (101534)	20Hz-44GHz	22/12/17	22/12/18
<input type="checkbox"/> Analyzer	Rohde & Schwarz	FS-Z60, 90, 140, and 220	40GHz-220GHz	22/12/17	22/12/19
<input type="checkbox"/> Analyzer	HP	8591EM (3628A00871)	9kHz-1.8GHz	15/5/17	15/5/18
<input type="checkbox"/> Analyzer	HP	8562A (3051A05950)	9kHz-125GHz	15/5/17	15/5/18
<input type="checkbox"/> Analyzer	HP External Mixers	11571, 11970	25GHz-110GHz	15/5/17	15/5/18
<input checked="" type="checkbox"/> Amplifier	Com-Power	PA-010 (171003)	100Hz-30MHz	24/10/17	24/10/18
<input checked="" type="checkbox"/> Amplifier	Com-Power	CPPA-102 (01254)	1-1000 MHz	24/10/17	24/10/18
<input checked="" type="checkbox"/> Amplifier	Com-Power	PAM-118A (551014)	0.5-18 GHz	24/10/17	24/10/18
<input type="checkbox"/> Power Mtr	Agilent	N1911A with N1921A	0.05-18 GHz	15/5/17	15/5/18
<input type="checkbox"/> Generator	Rohde & Schwarz	SMB100A6 (100150)	20Hz-6 GHz	15/5/17	15/5/18
<input type="checkbox"/> Generator	Rohde & Schwarz	SMBV100A6 (260771)	20Hz-6 GHz	15/5/17	15/5/18
<input type="checkbox"/> RF Filter	Micro-Tronics	BRC50722 (009).9G notch	30-1800 MHz	15/5/17	15/5/18
<input type="checkbox"/> RF Filter	Micro-Tronics	HPM50114 (017)1.5G HPF	30-18000 MHz	15/5/17	15/5/18
<input type="checkbox"/> RF Filter	Micro-Tronics	HPM50117 (063) 3G HPF	30-18000 MHz	15/5/17	15/5/18
<input type="checkbox"/> RF Filter	Micro-Tronics	HPM50105 (059) 6G HPF	30-18000 MHz	15/5/17	15/5/18
<input type="checkbox"/> RF Filter	Micro-Tronics	BRM50702 (172) 2G notch	30-1800 MHz	15/5/17	15/5/18
<input type="checkbox"/> RF Filter	Micro-Tronics	BRC50703 (G102) 5G notch	30-1800 MHz	15/5/17	15/5/18
<input type="checkbox"/> RF Filter	Micro-Tronics	BRC50705 (024) 5G notch	30-1800 MHz	15/5/17	15/5/18
<input type="checkbox"/> RF Filter	Micro-Tronics	BRC17663 (001) 9G notch	30-1800 MHz	15/5/17	15/5/18
<input type="checkbox"/> Attenuator	Fairview	SA6NFN100W-14 (1625)	30-1800 MHz	15/5/17	15/5/18
<input type="checkbox"/> Attenuator	Mini-Circuits	VAT-3W2+ (1735)	30-6000 MHz	15/5/17	15/5/18
<input type="checkbox"/> Attenuator	Mini-Circuits	VAT-3W2+ (1436)	30-6000 MHz	15/5/17	15/5/18
<input type="checkbox"/> Attenuator	Mini-Circuits	VAT-3W2+ (14362)	30-6000 MHz	15/5/17	15/5/18
<input type="checkbox"/> Attenuator	Mini-Circuits	VAT-3W2+ (1445)	30-6000 MHz	15/5/17	15/5/18
<input type="checkbox"/> Attenuator	Mini-Circuits	VAT-3W2+ (14452)	30-6000 MHz	15/5/17	15/5/18
<input type="checkbox"/> Attenuator	Mini-Circuits	VAT-6W2+ (1438)	30-6000 MHz	15/5/17	15/5/18
<input type="checkbox"/> Attenuator	Mini-Circuits	VAT-6W2+ (1736)	30-6000 MHz	15/5/17	15/5/18

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Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to demonstrate compliance with the CFR47 Parts 2, 15B and 25, RSS-GEN, and RSS-170 emission requirements. There were no deviations to the specifications.

General Radiated EMI Testing Procedure

The EUT was arranged in the test configuration emulating worst-case equipment configuration and operated through available modes. Preliminary testing was performed in a screen room with the EUT positioned 1 meter from the FSM. Investigations were performed to identify the frequencies, which produced the highest radiated emissions. Radiated emission investigations were performed from 9 kHz to 17,000 MHz with the EUT oriented in the manufacturer defined orientation. Frequencies of interest were recorded for use during testing on the OATS. Each investigated emission was then maximized at the OATS site before final radiated emissions measurements were performed. Final data was taken with the EUT located at the open area test site at a distance of 3 meters between the EUT and the receiving antenna. Peak and average amplitudes of frequencies above 1000 MHz were compared to the required limits with worst-case data presented below. Measured emission levels were maximized by EUT placement on the table, changing cable location, rotating the turntable through 360 degrees, varying the antenna height between 1 and 4 meters above the ground plane and changing antenna polarization between horizontal and vertical. Antennas used were Loop from 0.009 to 30 MHz, Broadband Biconical from 30 MHz to 200 MHz, Log Periodic from 200 MHz to 1 GHz, and/or Biconilog from 30 MHz to 1000 MHz, and above 1 GHz, Double Ridge or Pyramidal Horns, notch filters and appropriate amplifiers and mixers were utilized.

Table 1 General Radiated Emissions Data (worst-case)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Quasi-Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Quasi-Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)
2390.0	40.7	N/A	28.0	46.1	N/A	28.2	54.0
2483.5	41.5	N/A	28.7	41.6	N/A	28.9	54.0

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded for frequency range above 1000 MHz.

Summary of Results for General Radiated Emissions

The EUT demonstrated compliance with the radiated emissions. The EUT demonstrated a minimum margin of -25.1 dB below general unintentional radiator equipment radiated emissions requirements. There are no other significantly measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the requirements.

Operation in the Band 1616.0-1626.5 MHz

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 25.202(f), FCC CFR 47 Part 2.1051 and 2.1053.

For emissions removed less than 250% of the authorized bandwidth from the assigned frequency, measurements were performed conducted as follows:

The EUT was connected to a spectrum analyzer via a cable and attenuator. The EUT was transmitting at maximum power, for lowest, middle and highest channels. The EUT was modulated as stated in the manufactures application form from internal signal. The path loss between the EUT and analyzer was entered in to the spectrum analyzer as an attenuation offset. The reference level for the mask was set to the manufacturers declared maximum output power. The analyzer was configured with a RBW and VBW of 3 kHz and 100 kHz respectfully with the trace set to max hold using an RMS detector. $10\text{Log}(4/3) = 1.25\text{ dB}$ was added to the reference level offset to make the result relative to any 4 kHz band as per the requirement in 25.202(f) The mask as specified in clause 25.202(f) was then applied.

For emissions removed more than 250% of the authorized bandwidth from the assigned frequency, measurements were performed both conducted and radiated as follows:

Conducted: A network analyzer was used to measure the path loss and the worst case was entered as a reference level offset in to the spectrum analyzer. From 9 kHz to 3 GHz, the EUT was connected to a spectrum analyzer via an attenuator and cable. Between 3 GHz and 20 GHz a 3 GHz high pass filter was used. The EUT was configured to maximum power on lowest, middle or top highest channels with normal modulation (from EUT internal source). The spectrum analyzer was configured with an RBW and VBW of 1 MHz and 3 MHz respectfully with the trace set to max hold using an RMS detector.

Radiated; A preliminary profile of the Spurious Radiated Emissions was obtained up to a minimum of the 10th harmonic of the highest internally generated frequency by operating the EUT in a screen room. Measurements of emissions from the EUT were obtained with the

Measurement Antenna in both Horizontal and Vertical Polarizations. The profiling produced a list of the worst-case emissions. Using the information from the preliminary profiling of the EUT, the list of emissions was then confirmed on the Open Area Test Site (OATS). Emission levels were maximized by adjusting the receive antenna height, antenna polarization and turntable azimuth. The EUT was set to transmit on maximum power in turn on lowest, middle and highest channels.

For any emissions found the EUT was then removed from the OATS and replaced with a substitution antenna. Using a signal generator, the level was adjusted to achieve the same value on the measuring instrument as previously recorded with the EUT. The final result was determined by a calculation using the signal generator level, antenna gains and losses, and cable loss. Radiated emissions measurements were performed at a 3m distance unless otherwise stated. Emission measurements were performed with all transmitters active.

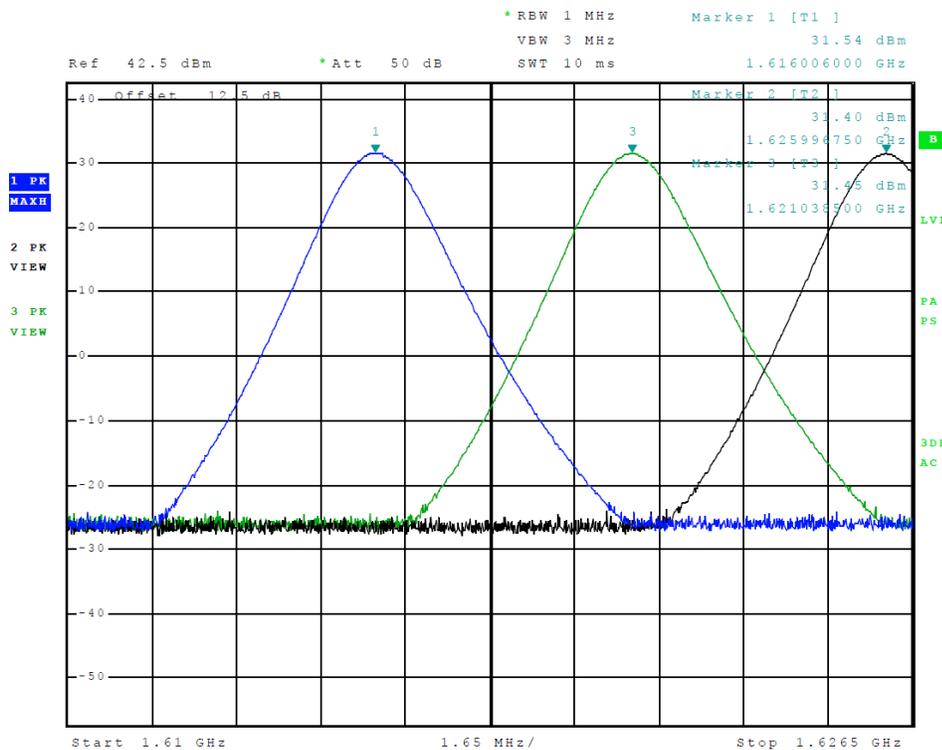


Figure 1 Plot of Operation across Frequency band

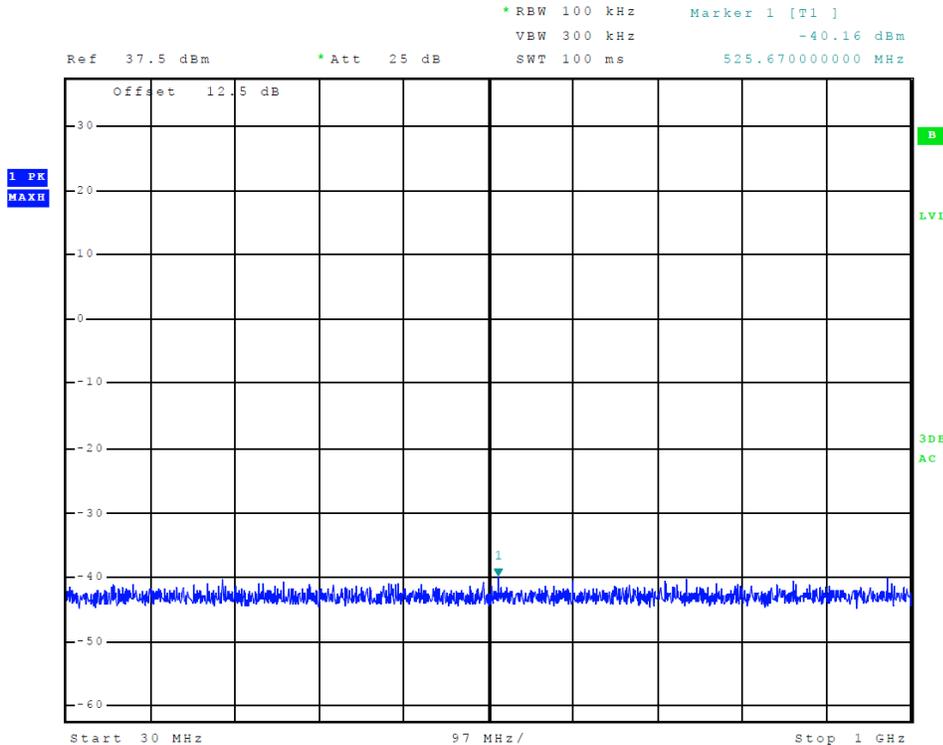


Figure 2 Plot of emissions across Frequency spectrum

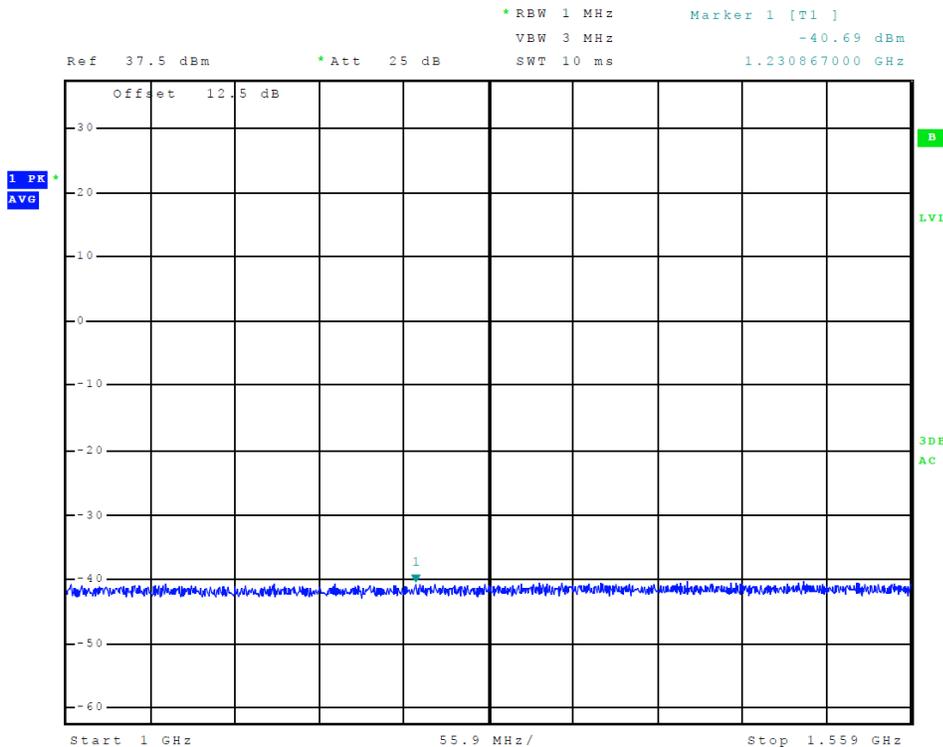


Figure 3 Plot of emissions across Frequency spectrum

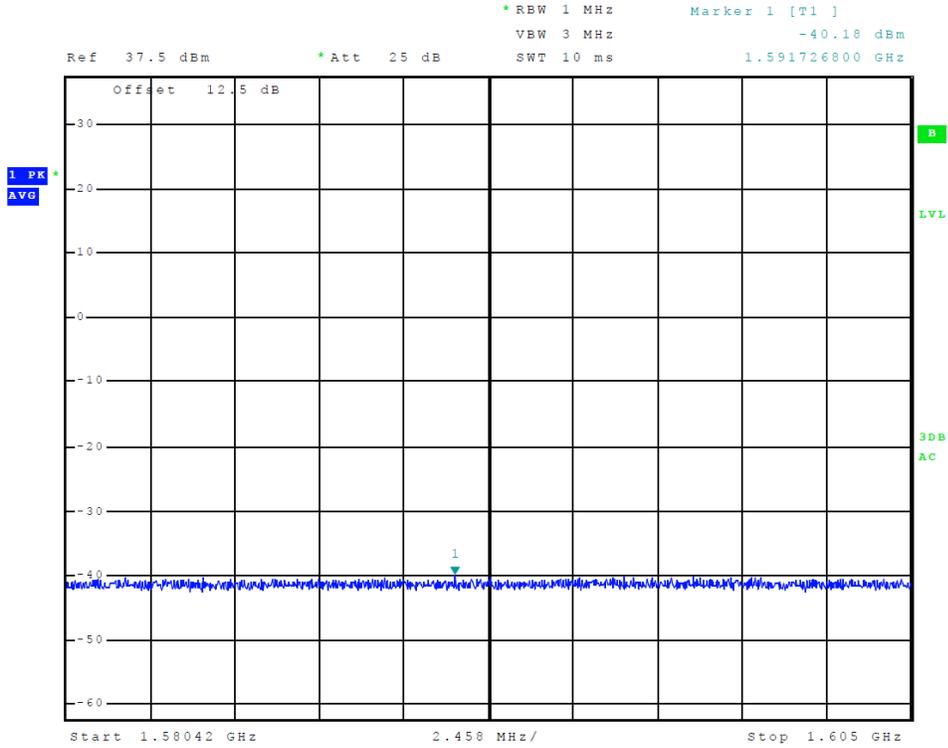


Figure 4 Plot of emissions across Frequency spectrum

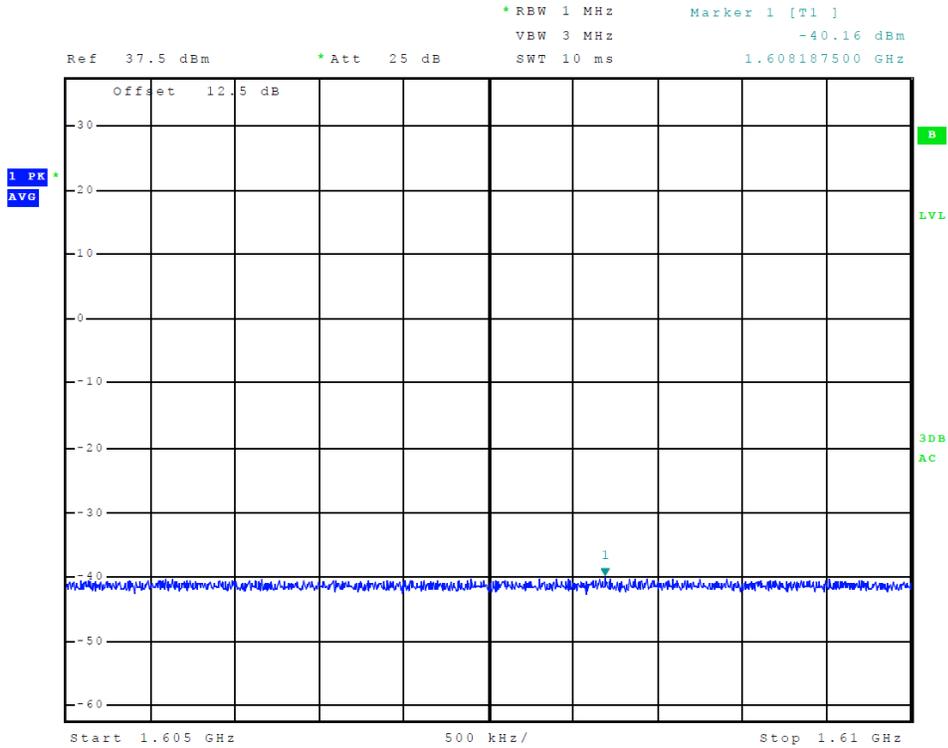


Figure 5 Plot of emissions across Frequency spectrum

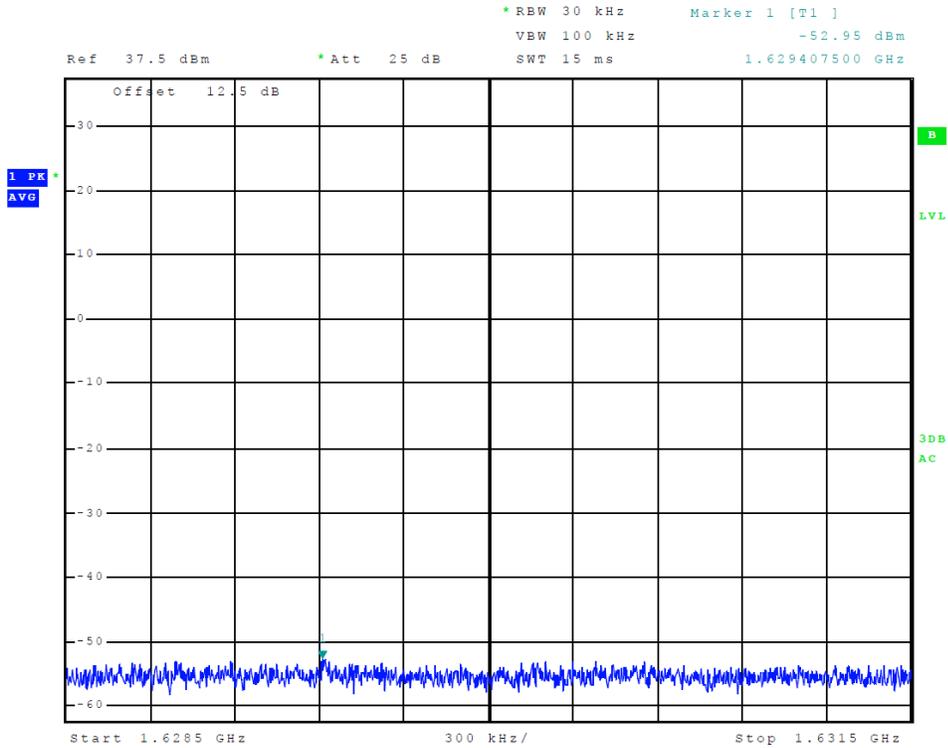


Figure 6 Plot of emissions across Frequency spectrum

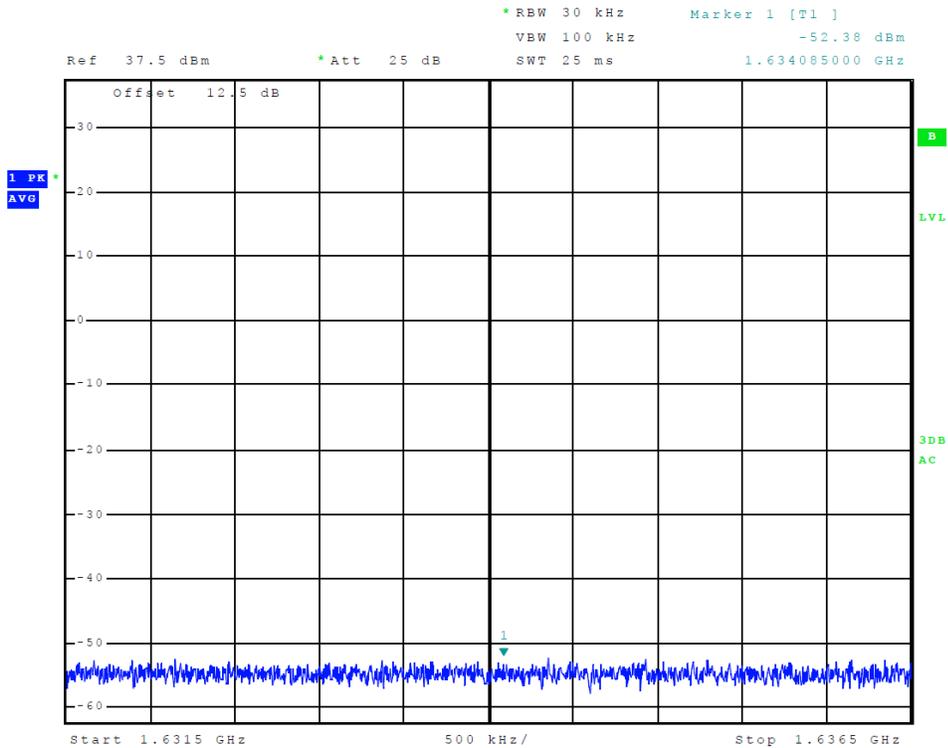


Figure 7 Plot of emissions across Frequency spectrum

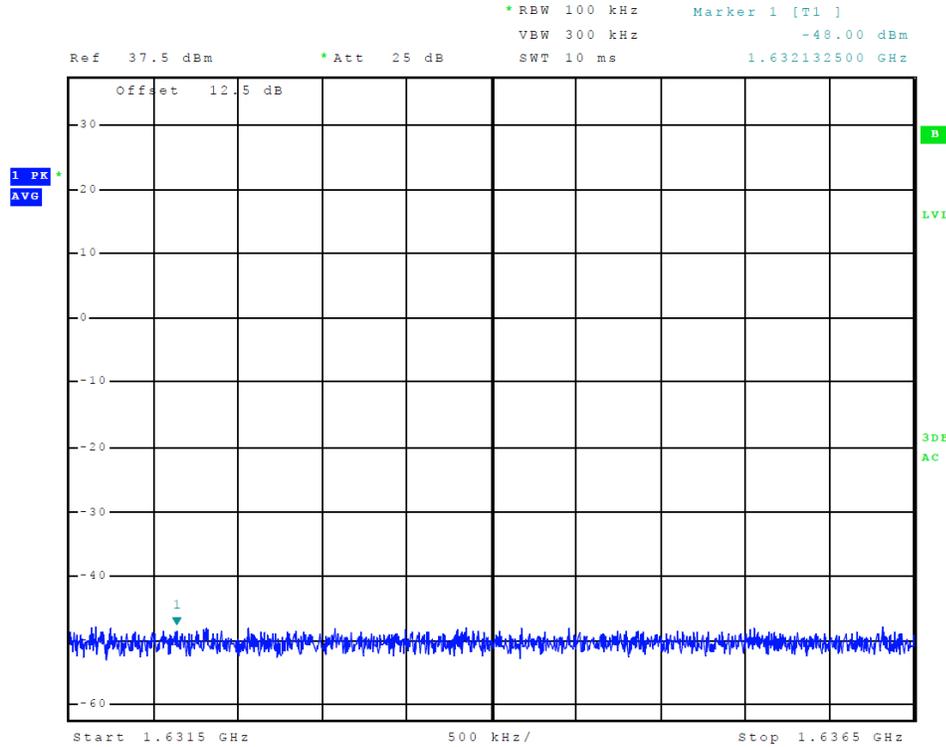


Figure 8 Plot of emissions across Frequency spectrum

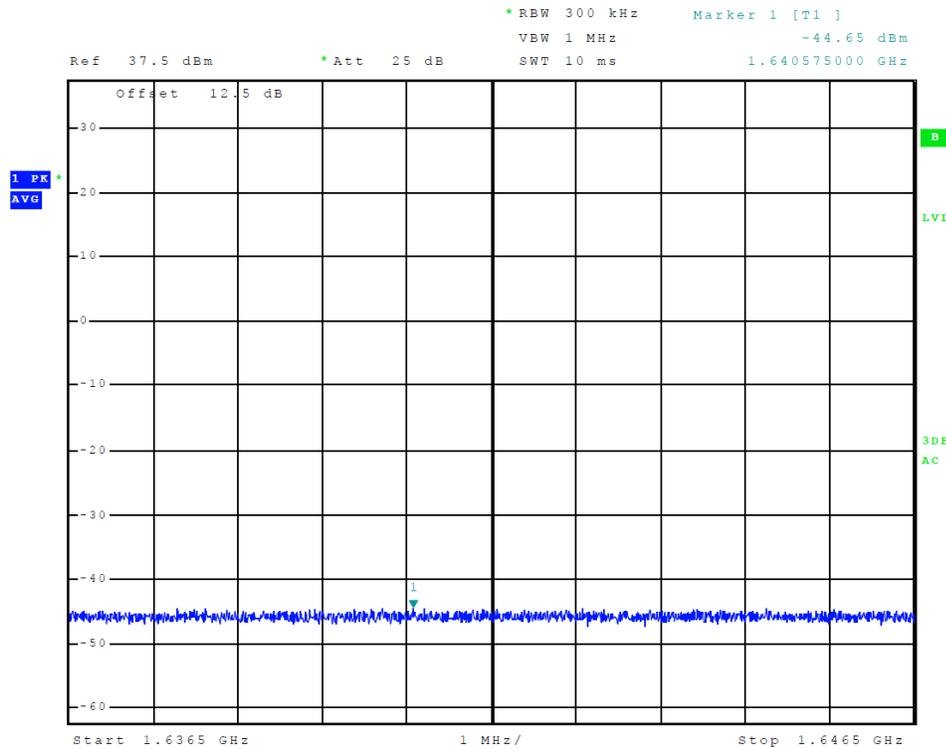


Figure 9 Plot of emissions across Frequency spectrum

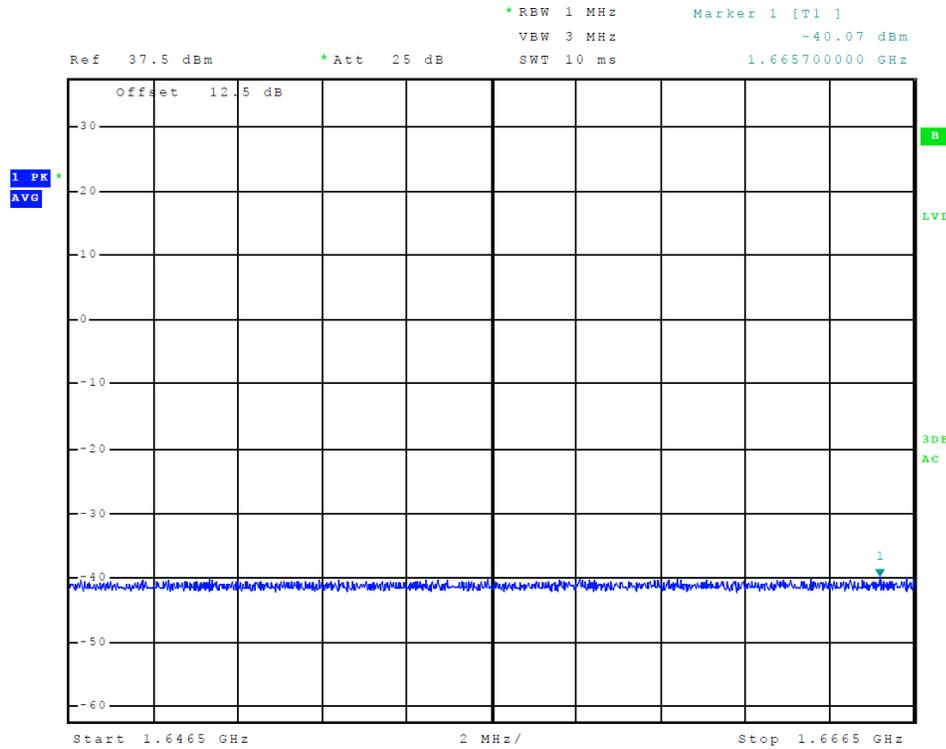


Figure 10 Plot of emissions across Frequency spectrum

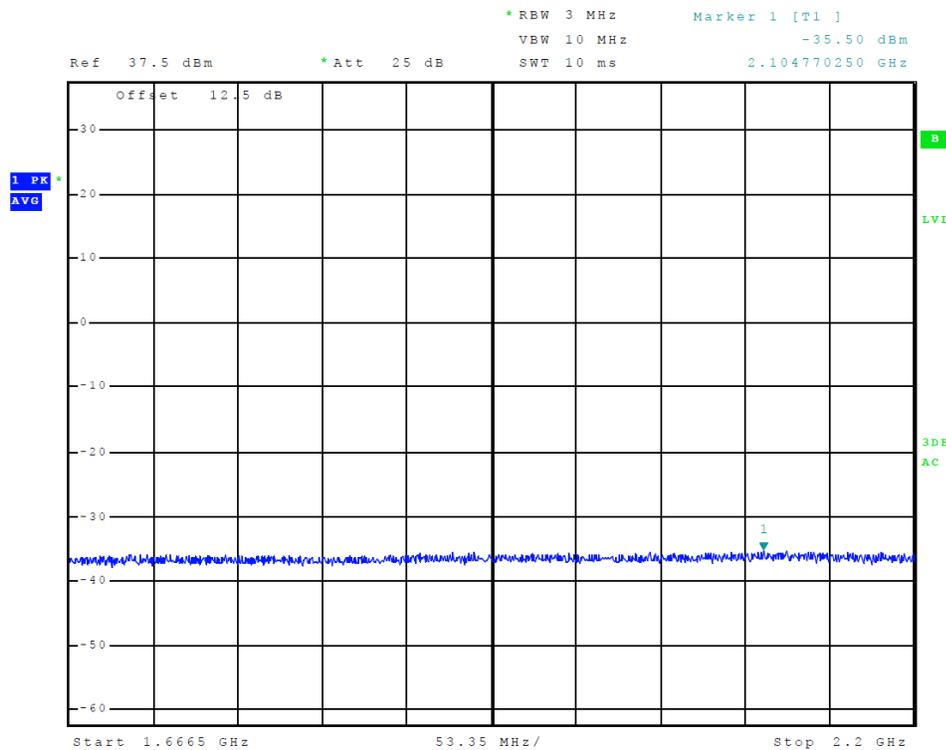


Figure 11 Plot of emissions across Frequency spectrum

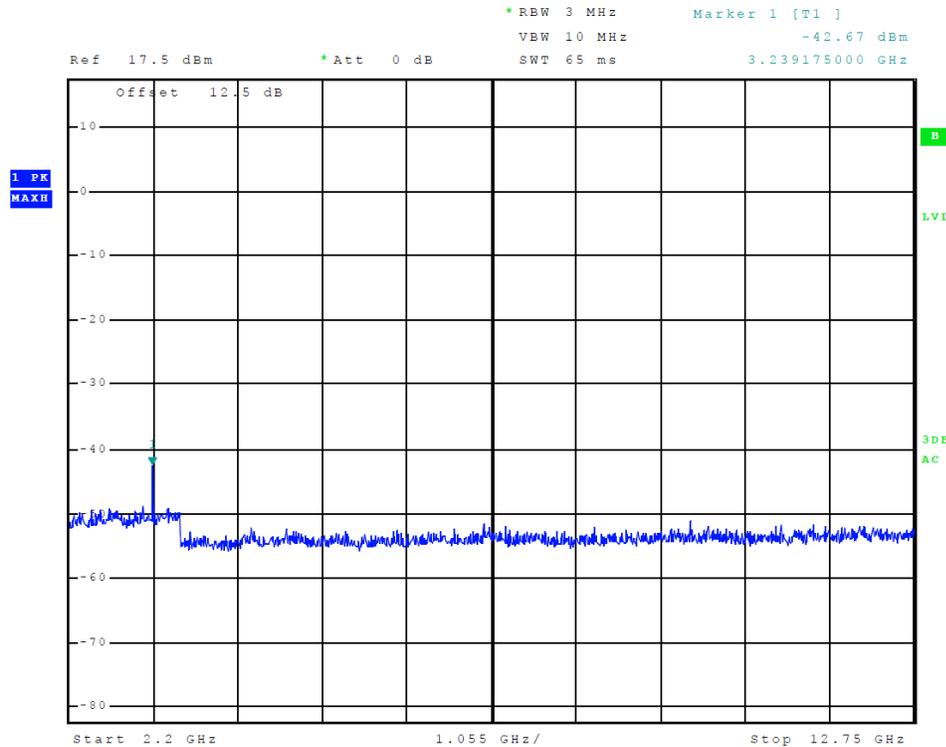


Figure 12 Plot of emissions across Frequency spectrum

Table 2 Transmitter Antenna Conducted Emissions Data

Frequency (MHz)	Harmonic Frequency (MHz)	Output Power (dBm)
1616.0		31.5
	3232.0	-50.1
1621.0		31.5
	3242.0	-48.6
1626.0		31.5
	3254.0	-47.8

The antenna conducted output power and 20-dB bandwidth were measured while operating in available modes for the lowest, middle and highest available channels. The data reported below represents the worst-case operational conditions.

Summary of Results for Emissions of Intentional Radiator

The EUT demonstrated antenna port conducted peak output power of 31.5 dBm, 143 Watts. The EUT demonstrated a minimum out of band radiated emission margin of at least 20 dB below requirements. The EUT tested was observed in compliance with the radiated emissions requirements of 47CFR Part 25 and Industry Canada RSS-170. Other emissions were present with amplitudes at least 20 dB below the requirements. There were no other significantly measurable emissions observed other than those recorded in this report. There were no deviations or exceptions to the requirements.

Annex

- Annex A Measurement Uncertainty Calculations
- Annex B Rogers Labs Test Equipment List
- Annex C Rogers Qualifications
- Annex D Laboratory Certificate of Accreditation

Annex A Measurement Uncertainty Calculations

Measurement uncertainty calculations were made for the laboratory. Result of measurement uncertainty calculations are recorded below for AC line conducted and radiated emission measurements.

Measurement Uncertainty	$U_{(E)}$	$U_{(lab)}$
3 Meter Horizontal 30-200 MHz Measurements	2.08	4.16
3 Meter Vertical 30-200 MHz Measurements	2.16	4.33
3 Meter Vertical Measurements 200-1000 MHz	2.99	5.97
10 Meter Horizontal Measurements 30-200 MHz	2.07	4.15
10 Meter Vertical Measurements 30-200 MHz	2.06	4.13
10 Meter Horizontal Measurements 200-1000 MHz	2.32	4.64
10 Meter Vertical Measurements 200-1000 MHz	2.33	4.66
3 Meter Measurements 1-6 GHz	2.57	5.14
3 Meter Measurements 6-18 GHz	2.58	5.16
AC Line Conducted	1.72	3.43

Annex B Rogers Labs Test Equipment List

List of Test Equipment	Calibration	Date	Due
Spectrum Analyzer: Rohde & Schwarz ESU40		15/5/17	15/5/18
Spectrum Analyzer: HP 8562A, HP Adapters: 11518, 11519, and 11520		15/5/17	15/5/18
Mixers: 11517A, 11970A, 11970K, 11970U, 11970V, 11970W			
Spectrum Analyzer: HP 8591EM		15/5/17	15/5/18
Antenna: Schwarzbeck Model: BBA 9106/VHBB 9124 (9124-627)		15/5/17	15/5/18
Antenna: Schwarzbeck Model: VULP 9118 A (VULP 9118 A-534)		15/5/17	15/5/18
Antenna: EMCO Log Periodic Model: 3147		24/10/18	24/10/19
Antenna: EMCO 6509		24/10/18	24/10/19
LISN: Compliance Design Model: FCC-LISN-2.Mod.cd, 50 µHy/50 ohms/0.1 µf		24/10/18	24/10/19
R.F. Preamp CPPA-102		24/10/18	24/10/19
Attenuator: HP Model: HP11509A		24/10/18	24/10/19
Cable: Belden 8268 (L3)		24/10/18	24/10/19
Cable: Time Microwave: 4M-750HF290-750		24/10/18	24/10/19
Cable: Time Microwave: 10M-750HF290-750		24/10/18	24/10/19
Frequency Counter: Leader LDC825		23/2/17	23/2/18
Oscilloscope Scope: Tektronix 2230		23/2/17	23/2/18
Wattmeter: Bird 43 with Load Bird 8085		23/2/17	23/2/18
Power Supplies: Sorensen SRL 20-25, SRL 40-25, DCR 150, DCR 140		23/2/17	23/2/18
R.F. Generators: HP 606A, HP 8614A, HP 8640B		23/2/17	23/2/18
R.F. Power Amp 65W Model: 470-A-1010		23/2/17	23/2/18
R.F. Power Amp 50W M185- 10-501		23/2/17	23/2/18
R.F. Power Amp A.R. Model: 10W 1010M7		23/2/17	23/2/18
R.F. Power Amp EIN Model: A301		23/2/17	23/2/18
LISN: Compliance Eng. Model 240/20		23/2/17	23/2/18
LISN: Fischer Custom Communications Model: FCC-LISN-50-16-2-08		23/2/17	23/2/18
Antenna: EMCO Dipole Set 3121C		23/2/17	23/2/18
Antenna: C.D. B-101		23/2/17	23/2/18
Antenna: Solar 9229-1 & 9230-1		23/2/17	23/2/18
Audio Oscillator: H.P. 201CD		23/2/17	23/2/18
ESD Test Set 2010i		23/2/17	23/2/18
Fast Transient Burst Generator Model: EFT/B-101		23/2/17	23/2/18
Field Intensity Meter: EFM-018		23/2/17	23/2/18
KEYTEK Ecat Surge Generator		23/2/17	23/2/18
Shielded Room 5 M x 3 M x 3.0 M, Not required			

Annex C Rogers Qualifications

Scot D. Rogers, Engineer

Rogers Labs, Inc.

Mr. Rogers has approximately 17 years' experience in the field of electronics. Engineering experience includes six years in the automated controls industry and remaining years working with the design, development and testing of radio communications and electronic equipment.

Positions Held

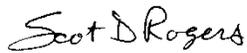
Systems Engineer: A/C Controls Mfg. Co., Inc. 6 Years

Electrical Engineer: Rogers Consulting Labs, Inc. 5 Years

Electrical Engineer: Rogers Labs, Inc. Current

Educational Background

- 1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.
- 2) Bachelor of Science Degree in Business Administration Kansas State University.
- 3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.



Scot D. Rogers

Annex D Laboratory Certificate of Accreditation

United States Department of Commerce
National Institute of Standards and Technology

NVLAP[®]

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 200087-0

Rogers Labs, Inc.
Louisburg, KS

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2017-03-01 through 2018-03-31
Effective Dates




For the National Voluntary Laboratory Accreditation Program