

Amber Helm Development L.C.

92723 Michigan Hwy-152

Sister Lakes, Michigan 49047 USA

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EMC Test Report

EB1902351TX

Issued: March 19, 2020

regarding

USA: CFR Title 47, Part 15.247 (Emissions)
Canada: IC RSS-247/GENe (Emissions)

for



EXM2WH

Category: Spread Spectrum Transceiver

Judgments:

FCC 15.247, ISSED RSS-247 Compliant

Testing Completed: 12/12/19 - 03/19/20



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Revision History

Rev. No.	Date	Details	Revised By
r0	March 19, 2020	Initial Release.	J. Brunett
r1	December 19, 2019	Minor corrections.	G. Helm
r2	January 30, 2020	Full retest, new protocol.	G. Helm
r3	March 19, 2020	Full retest, power reduced.	G. Helm

Contents

Revision History	2
Table of Contents	2
1 Test Report Scope and Limitations	5
1.1 Laboratory Authorization	5
1.2 Report Retention	5
1.3 Subcontracted Testing	5
1.4 Test Data	5
1.5 Limitation of Results	5
1.6 Copyright	5
1.7 Endorsements	5
1.8 Test Location	6
1.9 Traceability and Equipment Used	6
2 Test Specifications and Procedures	7
2.1 Test Specification and General Procedures	7
3 Configuration and Identification of the Equipment Under Test	8
3.1 Description and Declarations	8
3.1.1 EUT Configuration	9
3.1.2 Modes of Operation	9
3.1.3 Variants	10
3.1.4 Test Samples	10
3.1.5 Functional Exerciser	10
3.1.6 Modifications Made	10
3.1.7 Production Intent	10
3.1.8 Declared Exemptions and Additional Product Notes	10
4 Emissions	11
4.1 General Test Procedures	11
4.1.1 Radiated Test Setup and Procedures	11
4.1.2 Conducted Emissions Test Setup and Procedures	13
4.1.3 Power Supply Variation	13
4.2 Intentional Emissions	14
4.2.1 Duty and Transmission Cycle, Pulsed Operation	14
4.2.2 Hopping Channel Dwell Time	15
4.2.3 Hopping Sequence and Spectrum Use	17
4.2.4 Channel Bandwidth	18
4.2.5 Number of Hopping Channels	20
4.2.6 Channel Separation	21
4.2.7 Effective Isotropic Radiated Power	23

4.3	Unintentional Emissions	24
4.3.1	Transmit Chain Radiated Spurious Emissions	24
4.3.2	Relative Transmit Chain Spurious Emissions	26
5	Measurement Uncertainty and Accreditation Documents	27

List of Tables

1	Test Site List.	6
2	Equipment List.	6
3	EUT Declarations.	9
4	Pulsed Emission Characteristics (Duty Cycle).	14
5	Hopping Channel Dwell Time.	15
6	Intentional Emission Bandwidth.	18
7	Measured Number of Hopping Channels.	20
8	Measured Channel Separation.	21
9	Radiated Power Results.	23
10	Transmit Chain Spurious Emissions.	24
10	Transmit Chain Spurious Emissions.	25
11	Measurement Uncertainty.	27

List of Figures

1	Photos of EUT.	8
2	EUT Test Configuration Diagram.	9
3	Radiated Emissions Diagram of the EUT.	11
4	Radiated Emissions Test Setup Photograph(s).	12
5	Conducted RF Test Setup Photograph(s).	13
6	Example Plots of Duty Cycle and Channel Dwell Time.	16
7	Intentional Emission Bandwidth.	19
8	Measured Number of Hopping Channels.	20
9	Measured Channel Separation.	22
10	Conducted RF Power Plots	23
11	Conducted Transmitter Emissions Measured.	26
12	Accreditation Documents	27

1 Test Report Scope and Limitations

1.1 Laboratory Authorization

Test Facility description and attenuation characteristics are on file with the FCC Laboratory, Columbia, Maryland (FCC Reg. No: US5348 and US5356) and with ISED Canada, Ottawa, ON (File Ref. No: 3161A and 24249). Amber Helm Development L.C. holds accreditation under NVLAP Lab Code 200129-0.

1.2 Report Retention

For equipment verified to comply with the regulations herein, the manufacturer is obliged to retain this report with the product records for the life of the product, and no less than ten years. A copy of this Report will remain on file with this laboratory until January 2030.

1.3 Subcontracted Testing

This report does not contain data produced under subcontract.

1.4 Test Data

This test report contains data included within the laboratories scope of accreditation.

1.5 Limitation of Results

The test results contained in this report relate only to the item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report. Any electrical or mechanical modification made to the test item subsequent to this test date shall require reevaluation.

1.6 Copyright

This report shall not be reproduced, except in full, without the written approval of Amber Helm Development L.C.

1.7 Endorsements

This report shall not be used to claim product endorsement by any accrediting, regulatory, or governmental agency.

1.8 Test Location

The EUT was fully tested by **Amber Helm Development L.C.**, headquartered at 92723 Michigan Hwy-152, Sister Lakes, Michigan 49047 USA. Table 1 lists all sites employed herein. Specific test sites utilized are also listed in the test results sections of this report where needed.

Table 1: Test Site List.

Description	Location	Quality Num.
OATS (3m & 10m)	92723 Michigan Hwy-152, Sister Lakes, Michigan 49047 USA	OATSA

1.9 Traceability and Equipment Used

Pertinent test equipment used for measurements at this facility is listed in Table 2. The quality system employed at Amber Helm Development L.C. has been established to ensure all equipment has a clearly identifiable classification, calibration expiry date, and that all calibrations are traceable to the SI through NIST, other recognized national laboratories, accepted fundamental or natural physical constants, ratio type of calibration, or by comparison to consensus standards.

Table 2: Equipment List.

Description	Manufacturer/Model	SN	Quality Num.	Cal/Ver By / Date Due
Spectrum Analyzer	R & S / FSV30	101660	RSFSV30001	RS / Apr-2021
EMI Receiver	HP / 85460A/85462A	3704A00422, 3807A00465	HP8546A	Std and Cal / May-2020
LISN	Solar / 8012-50-R-24-BNC	962138	LISN7	AHD / April-2021
BiconiLog Antenna	EMCO / 3142	1169	BILO3142	Lib.Labs / May-2020
(3m) LMR-400 Coax	AHD / LMR400	C090804	LMR400	AHD / Jan-2020
(LCI) DS Coax	AHD / RG58/U	920809	RG58U	AHD / Jul-2020
Double Ridged Horn	EMCO / 3115	2788	RH3115	Lib.Labs. / July-2020

2 Test Specifications and Procedures

2.1 Test Specification and General Procedures

The goal of Elkhart Brass Mfg Co, Inc. is to demonstrate that the Equipment Under Test (EUT) complies with the Rules and/or Directives below. Detailed in this report are the results of testing the Elkhart Brass Mfg Co, Inc. EXM2WH for compliance to:

Country/Region	Rules or Directive	Referenced Section(s)
United States	Code of Federal Regulations	CFR Title 47, Part 15.247
Canada	ISED Canada	IC RSS-247/GENe

It has been determined that the equipment under test is subject to the rules and directives above at the date of this testing. In conjunction with these rules and directives, the following specifications and procedures are followed herein to demonstrate compliance (in whole or in part) with these regulations.

ANSI C63.4:2014	"Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
ANSI C63.10:2013	"American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
KDB 558074 D01 v05r02	"GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES "
TP0102RA	"AHD Internal Document TP0102 - Radiated Emissions Test Procedure"
TP0106RC	"AHD Internal Document TP0106 - Emissions Measurement Procedures (above 40 GHz)"
ISED Canada	"The Measurement of Occupied Bandwidth"

3 Configuration and Identification of the Equipment Under Test

3.1 Description and Declarations

The EUT is wireless controller used on a motor vehicle. The EUT is approximately 10 x 7 x 5 cm in dimension, and is depicted in Figure 1. It is powered by 3.6 Vdc lithium battery. In use this product is mounted to a fire engine water nozzle, typically on the end of the extendable ladder. Table 3 outlines provider declared EUT specifications.



Figure 1: Photos of EUT.

Table 3: EUT Declarations.

General Declarations	
Equipment Type:	Spread Spectrum Transceiver
Country of Origin:	USA
Nominal Supply:	3.6 Vdc
Oper. Temp Range:	not declared
Frequency Range:	902 – 928 MHz
Antenna Dimension:	Integral
Antenna Type:	Integral
Antenna Gain:	Not Declared
Number of Channels:	26
Channel Spacing:	750 kHz
Alignment Range:	Not Declared
Type of Modulation:	2FSK
United States	
FCC ID Number:	QT8EXM2WH
Classification:	DSS
Canada	
IC Number:	4637A-EXM2WH
Classification:	Spread Spectrum (902-928 MHz)

3.1.1 EUT Configuration

The EUT is configured for testing as depicted in Figure 2.

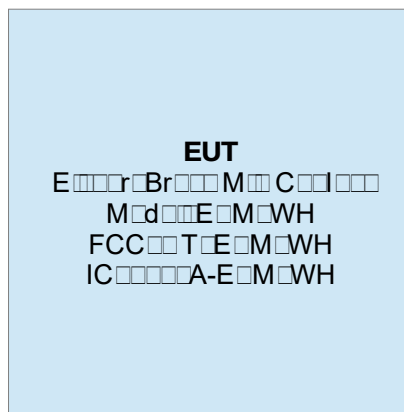


Figure 2: EUT Test Configuration Diagram.

3.1.2 Modes of Operation

The EUT is capable of operating in 2FSK mode. Test samples were placed into worst-case operating mode (highest data rate, highest operating power that may be employed). Additionally, CW mode was employed with the EUT in order to determine integral antenna gain.

3.1.3 Variants

There is only a single electrical version and PCB design of the EUT, but there are two variants of the button overlay front plastic that may be populated on the unit (English and Chinese). Only the English version is sold in Canada.

3.1.4 Test Samples

Two samples of the EUT were provided for emissions testing, one radiated sample and one sample for RF conducted measurements.

3.1.5 Functional Exerciser

EUT functionality was confirmed by measurement of transmitted signals.

3.1.6 Modifications Made

There were no modifications made to the EUT by this laboratory. However, in order to bring the device into compliance with line conducted emissions the manufacturer chose to have the input resistance increased of the standby power supply.

3.1.7 Production Intent

The EUT appears to be a production ready sample.

3.1.8 Declared Exemptions and Additional Product Notes

None.

4 Emissions

4.1 General Test Procedures

4.1.1 Radiated Test Setup and Procedures

Radiated electromagnetic emissions from the EUT are first pre-scanned in our screen room. Spectrum and modulation characteristics of all emissions are recorded. Instrumentation, including spectrum analyzers and other test equipment as detailed in Section 1.8 are employed. After pre-scan, emission measurements are made on the test site of record. If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in relevant test standards are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 3. All intentionally radiating elements that are not fixed-mounted in use are placed on the test table lying flat, on their side, and on their end (3-axes) and the resulting worst case emissions are recorded. If the EUT is fixed-mounted in use, measurements are made with the device oriented in the manner consistent with installation and then emissions are recorded. If the EUT exhibits spurious emissions due to internal receiver circuitry, such emissions are measured with an appropriate carrier signal applied.

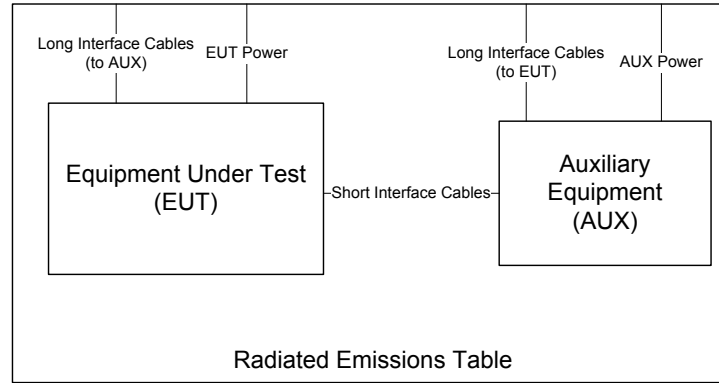


Figure 3: Radiated Emissions Diagram of the EUT.

For devices with intentional emissions below 30 MHz, a shielded loop antenna and/or E-field and H-Field broadband probes are used depending on the regulations. Shielded loops are placed at a 1 meter receive height at the desired measurement distance. For exposure in this band, the broadband probes employed are 10cm diameter single-axis shielded transducers and measurements are repeated and summed over three axes.

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. For both horizontal and vertical polarizations, the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected. The EUT is then rotated through 360° in azimuth until the highest emission is detected. The test antenna is then raised and lowered one last time from 1 to 4 m and the worst case value is recorded. Emissions above 1 GHz are characterized using standard gain or broadband ridge-horn antennas on our OATS with a 4×5 m rectangle of ECCOSORB absorber covering the OATS ground screen and a 1.5m table height. Care is taken to ensure that test receiver resolution and video bandwidths meet the regulatory requirements, and that the emission bandwidth of the EUT is not reduced. Photographs of the test setup employed are depicted in Figure 4.

Where regulations allow for direct measurement of field strength, power values (dBm) measured on the test receiver / analyzer are converted to $\text{dB}\mu\text{V}/\text{m}$ at the regulatory distance, using

$$E_{\text{dist}} = 107 + P_R + K_A - K_G + K_E - C_F$$

where P_R is the power recorded on spectrum analyzer, in dBm, K_A is the test antenna factor in dB/m, K_G is the combined pre-amplifier gain and cable loss in dB, K_E is duty correction factor (when applicable) in dB, and C_F is a distance conversion (employed only if limits are specified at alternate distance) in dB. This field strength value is then compared with the regulatory limit. If effective isotropic radiated power (EIRP) is computed, it is computed as

$$\text{EIRP}(\text{dBm}) = E_{3\text{m}}(\text{dB}\mu\text{V}/\text{m}) - 95.2.$$

When presenting data at each frequency, the highest measured emission under all possible EUT orientations (3-axes) is reported.

Where regulations call for substitution method measurements, the EUT is replaced by a substitution antenna if field strength measurements indicate the emission is close to the regulatory limit. This antenna is co-polarized with the test antenna and tuned (when necessary) to the emission frequency, after which the test antenna height is again optimized. The substitution antenna's signal level is adjusted such that its emission is equal to the level measured from the EUT. The signal level applied to the substitution antenna is then recorded. Effective isotropic radiated power (EIRP) and effective radiated power (ERP) in dBm are formulated from

$$EIRP = P_T - G_A = ERP + 2.16, \quad (1)$$

where P_T is the power applied to substitution antenna in dBm, including correction for cable loss, and G_A is the substitution antenna gain, in dBi.



Figure 4: Radiated Emissions Test Setup Photograph(s).

4.1.2 Conducted Emissions Test Setup and Procedures

Transmit Antenna Port Conducted Emissions At least one sample EUT supplied for testing was provided with a 50 Ω antenna port. Conducted transmit chain emissions measurements (where applicable) are made by connecting the EUT antenna port directly to the test receiver port. Photographs of the test setup employed are depicted in Figure 5.

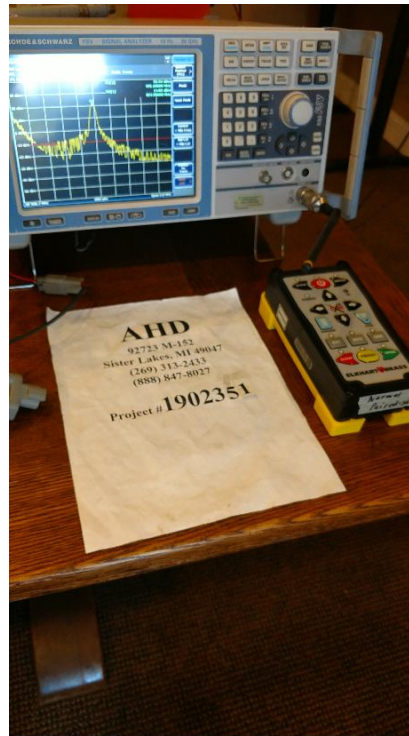


Figure 5: Conducted RF Test Setup Photograph(s).

The EUT is not subject to measurement of power line conducted emissions as it is powered solely by its internal battery.

4.1.3 Power Supply Variation

Tests at extreme supply voltages are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report.

In the case the EUT is designed for operation from a battery power source, the extreme test voltages are evaluated over the range specified in the test standard; no less than $\pm 10\%$ of the nominal battery voltage declared by the manufacturer. For all battery operated equipment, worst case intentional and spurious emissions are re-checked employing a new (fully charged) battery.

4.2 Intentional Emissions

4.2.1 Duty and Transmission Cycle, Pulsed Operation

The details and results of testing the EUT for pulsed operation are summarized in Table 4.

Table 4: Pulsed Emission Characteristics (Duty Cycle).

Frequency Range
f > 1 000 MHz

Det
Pk

IFBW
3 MHz

VBW
5 MHz

Test Date:
Test Engineer:
EUT
Meas. Distance:

21-Jan-20
Gordon Helm
Elkhart Brass HW
Conducted

Pulsed Operation / Duty Cycle								
Transmit Mode	Symbol Rate (Msym/s)	Mod. / Data Rate (Mbps)	Voltage (V)	Observation Freq (MHz)	Tx Cycle Time* (ms)	On-Time** (ms)	Duty Cycle (%)	Single Channel Duty (>1GHz only) (dB)
Hopping	-	2FSK	3.6	914.0	>100	27.4	27.4	11.2
Transmit Mode	Symbol Rate (Msym/s)	Mod. / Data Rate (Mbps)	Voltage (V)	Observation Freq (MHz)	Exposure Window (ms)	On-Time*** (ms)	Duty Cycle (%)	Exposure Duty Correction (dB)
Hopping	-	2FSK	3.6	Full Band	400.000	35.2	8.8	-10.6

* For a single button press the EUT hopping transmission does not traverse all 50 channels. Only a single transmitted frame at any given channel occurs in a single manual activation.

** Worst case observed on-time at a single channel (same on average for all channels in pseudo-random FHSS protocol). 1 x 27.4 ms / 100 ms

*** Worst case observed on-time over all channels upon single button press. 1 x 27.4ms + 3 x 2.6 ms / 400 ms
Equipment Used: RSFSV30001

4.2.2 Hopping Channel Dwell Time

The average time of occupancy on any hopping channel must not be greater than 0.4 seconds within a 20 second period for FHSS device with 50 operating channels. For this test, the EUT was set for data transmission with hopping enabled. Results of this testing are depicted in Table 5. Plots showing example measurements made to obtain these values are provided in Figure 6.

Table 5: Hopping Channel Dwell Time.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	21-Jan-20
25 MHz $\leq$ f $\leq$ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	Test Engineer:	Gordon Helm
f > 1 000 MHz	Pk	1 MHz	3 MHz	EUT:	Elkhart Brass HW
				Meas. Distance:	Conducted

Dwell Time								
Mode	Frequency (MHz)	# Burst #	Observation Time (sec)	Limit Window (sec)	Burst On Time*** (sec)	Total On Time** (s)	Limit (s)	Pass/Fail
Hopping	903.0	3	30.0	10.0	0.0352	0.0352	<0.4	Pass
	914.0	3	30.0	10.0	0.0352	0.0352	<0.4	Pass
	923.6	3	30.0	10.0	0.0352	0.0352	<0.4	Pass

* Dwell Time Observed with EUT manually activated hopping.

** Only a single frame occurs per channel in the hopping sequence for a single button press.

*** Worst case observed to be a single burst of 1 x 27.4 ms + 3 x 2.6 ms frames in any given 10 second window in each channel.

Equipment Used: RSFSV30001



Figure 6: Example Plots of Duty Cycle and Channel Dwell Time.

4.2.3 Hopping Sequence and Spectrum Use

It is required that the EUT hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average. In addition, system receivers are required to have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and that shift frequencies in synchronization with the transmitted signals. Furthermore, the system must be designed to comply should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section. Finally, the incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

The manufacturer has provided a separate exhibit addressing these items.

4.2.4 Channel Bandwidth

For this test, the EUT was set continuous data transmission (hopping disabled) in each modulation. The 20-dB bandwidth as well as 99% emission bandwidth were measured for the low, middle, and high channels. Results of these measurements are shown in Table 6. Plots showing example measurements employed to obtain this data are provided in Figure 9.

Table 6: Intentional Emission Bandwidth.

Frequency Range f > 1 000 MHz				Det Pk	IFBW 20 kHz	VBW 100 kHz					Test Date: 01/21/20
											Test Engineer: Gordon Helm
											EUT Elkhart Brass HW
											Meas. Distance: Conducted
Occupied Bandwidth											
Transmit Mode	Symbol Rate (Msym/s)	Data Rate* (Mbps)	Voltage (V)	Oper. Freq (MHz)	6 dB BW (kHz)	6 dB BW Limit (MHz)	99% OBW (kHz)	20 dB BW (kHz)	20 dB BW Limit (kHz)	Comments	
2FSK	-	-	3.7	903.0		-	322.3	343.9	500.0		
				915.0		-	320.7	333.5	500.0		
				926.3		-	317.5	343.1	500.0		

Equipment Used: RSFSV30001

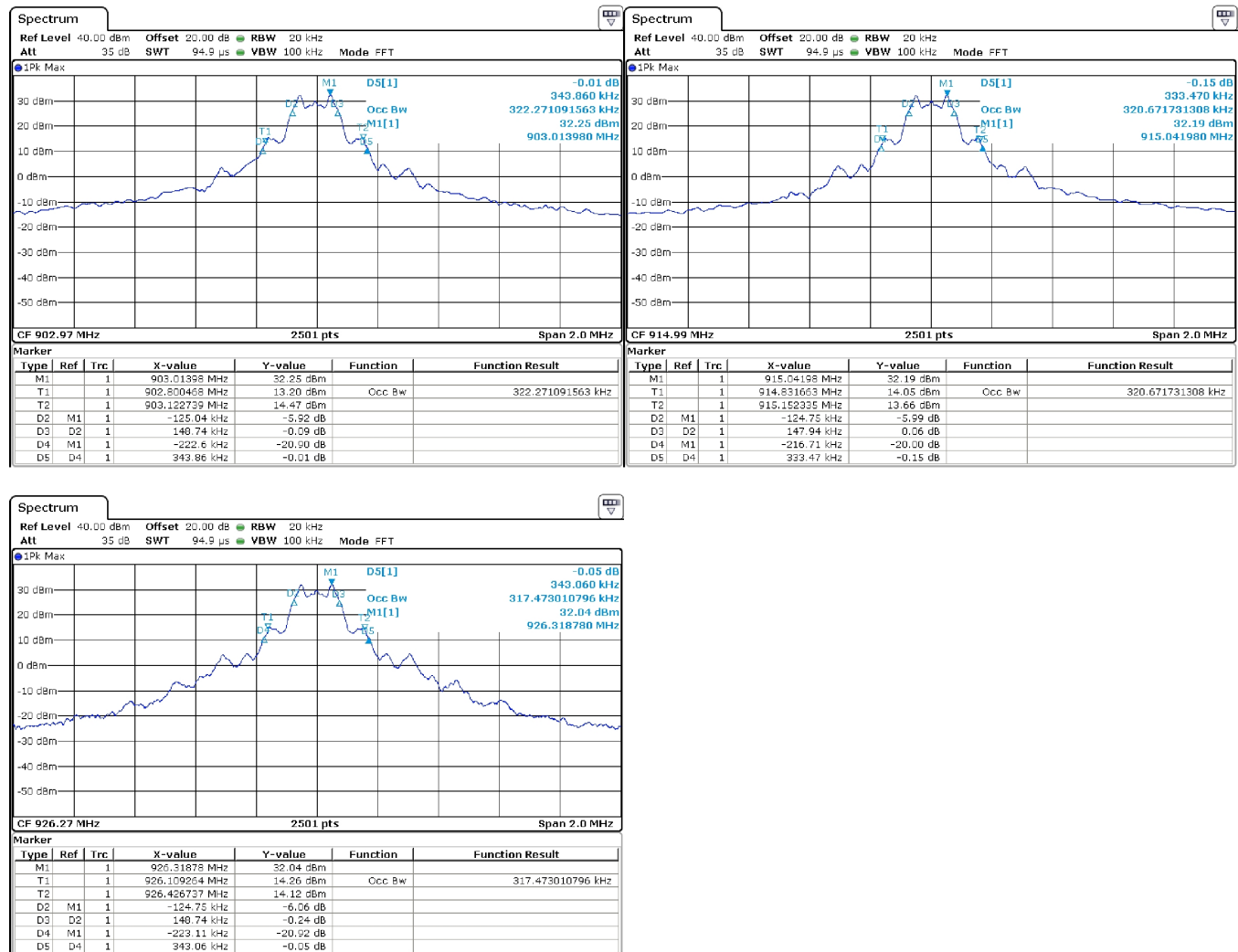


Figure 7: Intentional Emission Bandwidth.

4.2.5 Number of Hopping Channels

For this test, the EUT was enabled for data transmission with hopping. The number of channels measured is reported here in Table 7. Plots showing example measurements employed to obtain this data are provided in Figure 8.

Table 7: Measured Number of Hopping Channels.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	21-Jan-20
25 MHz $\leq$ f $\leq$ 1 000 MHz	Pk/QPk	100/120 kHz	300 kHz	Test Engineer:	Gordon Helm
f > 1 000 MHz	Pk	100 kHz	3 MHz	EUT:	Elkhart Brass HW
				Meas. Distance:	Conducted

Number of Hopping Channels						
Mode	Start Frequency (MHz)	Stop Frequency (MHz)	Number of Channels Observed (#)	Total Number (#)	Limit (#)	Pass/Fail
Hopping	903.0	926.3	26	26	25.0	Pass

Equipment Used: RSFSV30001

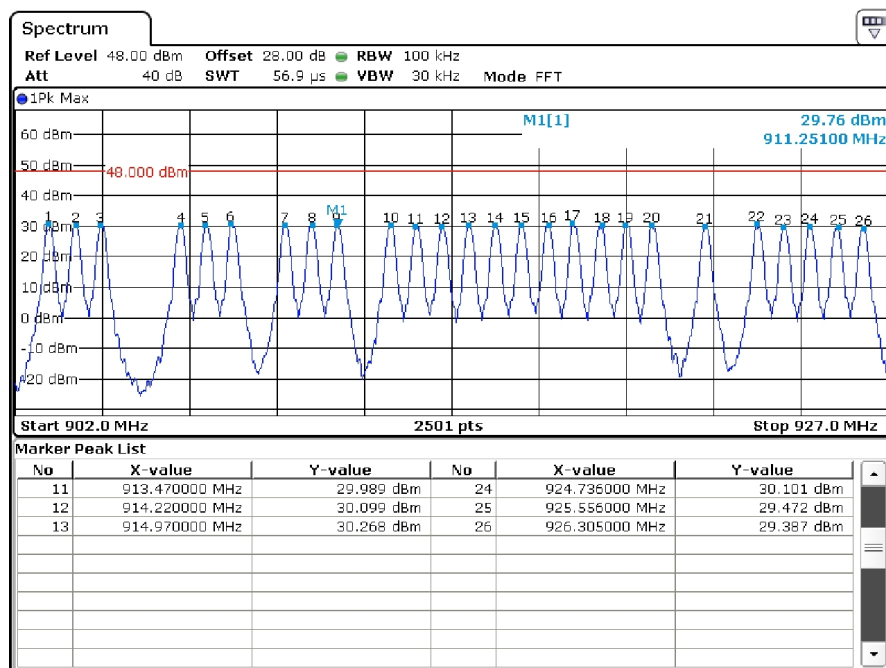


Figure 8: Measured Number of Hopping Channels.

4.2.6 Channel Separation

For this test, the EUT was enabled for data transmission with hopping. The Carrier Separation was measured for low, mid, and high channels. Results of these measurements are shown in Table 8.

Table 8: Measured Channel Separation.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	21-Jan-20
25 MHz $\leq$ f $\leq$ 1 000 MHz	Pk/QPk	100/120 kHz	300 kHz	Test Engineer:	Gordon Helm
f > 1 000 MHz	Pk	100 kHz	3 MHz	EUT	Elkhart Brass HW
				Meas. Distance:	Conducted

Hopping Frequency Separation					
Mod	Low Channel (MHz)	High Channel (MHz)	Separation (kHz)	Min. Separation Limit (kHz)	Pass/Fail
2FSK	903.0	903.3	749.700	343.86	Pass
	915.1	915.4	752.400	343.86	Pass
	926.0	926.3	751.200	343.86	Pass

* Channel Separation Observed with the Device hopping over all available channels.

Equipment Used: RSFSV30001

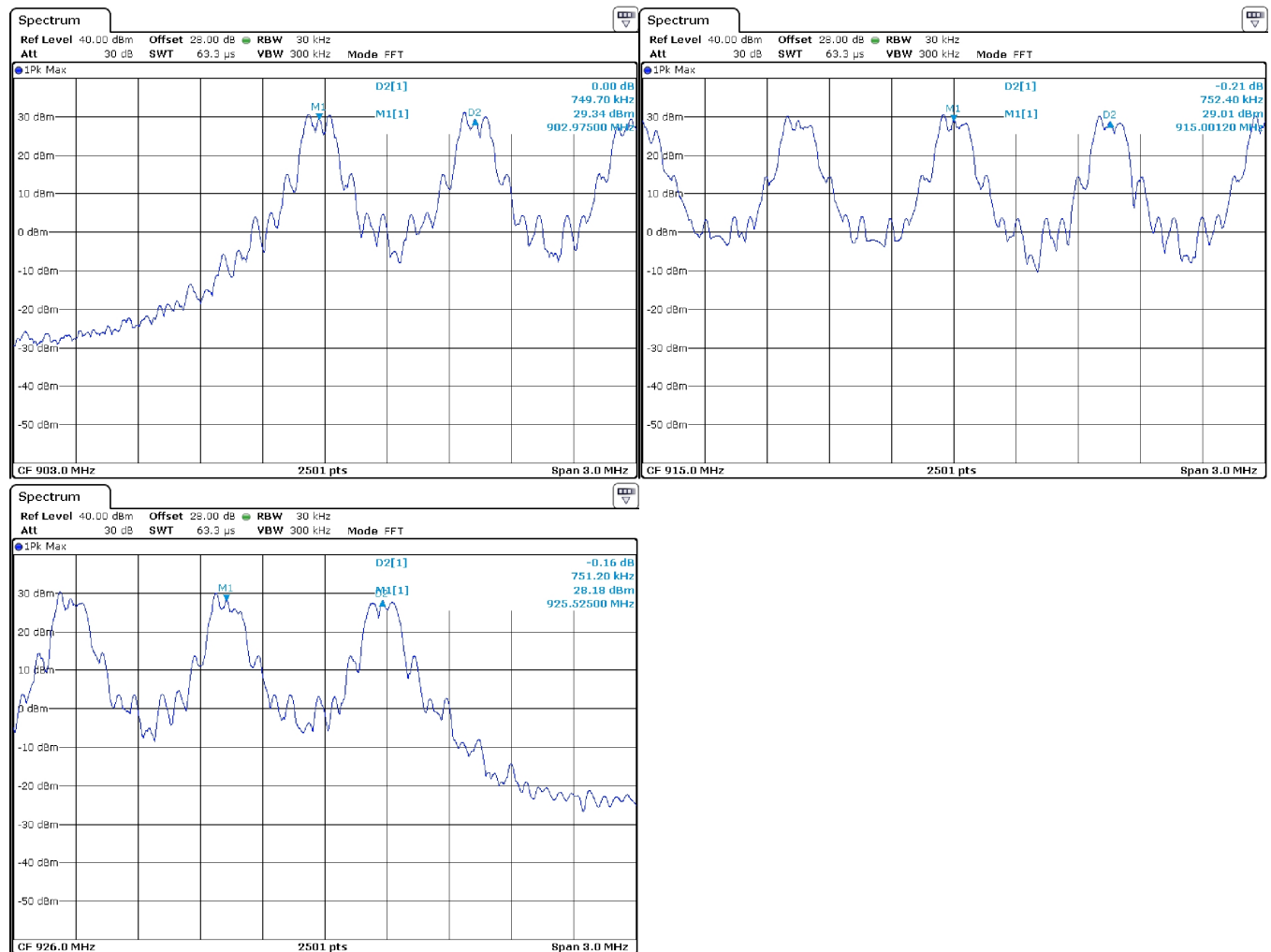


Figure 9: Measured Channel Separation.

4.2.7 Effective Isotropic Radiated Power

The EUT's radiated power is computed from antenna port conducted power measurements and the gain of the EUT antenna(s). Where the EUT is not sold with an antenna connector, a modified product has been provided including such. Peak conducted output power was measured directly from the EUT at the port where the antenna attaches. The test receiver bandwidth was set to be greater than the measured emission bandwidth of the EUT to capture the true peak. Antenna gain is either provided directly by the antenna manufacturer or measured by comparison between calculated EIRP and conducted output power. Table 9 details the results of these measurements. Plots showing conducted measurements made are depicted in Figure 10.

Table 9: Radiated Power Results.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	19-Mar-20
25 MHz ≤ f ≤ 1 000 MHz	Qpk	.12 MHz	0.3MHz	Test Engineer:	Gordon Helm
				EUT:	Elkhart Brass HW
				Meas. Distance:	3m

FCC/IC

#	Mod.	Channel	Freq. MHz	Ant. Used	Ant. Pol.	Pr (Pk)** dBuV/m	Ka dB	Kg dB	EIRP (Pk) dBm	Ant Gain dBi	Pout* (Pk) dBm	Po (Pk) Limit dBm	Pass dB	Comments
1	2GFSK	L	903.0	BILO3142	H	108.8	39.7	-0.2	13.6	1.9	11.7	24.0	12.4	
2		M	915.0	BILO3142	H	106.8	39.7	-0.2	11.6	1.8	9.8	24.0	14.2	
3		H	926.3	BILO3142	H	106.1	39.7	-0.2	10.9	1.7	9.2	24.0	14.8	
7														
#	Mod.	Channel	Freq. MHz	Supply Voltage	Ant. Pol.	Pout* (Pk) (dBm)								
8	CW	M	903.0	3.6	H/V	11.7								
9			903.0	3.3	H/V	11.7								
10			903.0	3.0	H/V	11.7								

* Measured conducted from the radio using conducted test sample.

** Measured radiated at 3 meter distance. Peak power measured with IFBW > OBW.

14:11:48 MAR 17, 2020

MARKER
903.00 MHz
11.65 dBm

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 903.00 MHz
11.65 dBm

LOG REF 25.0 dBm

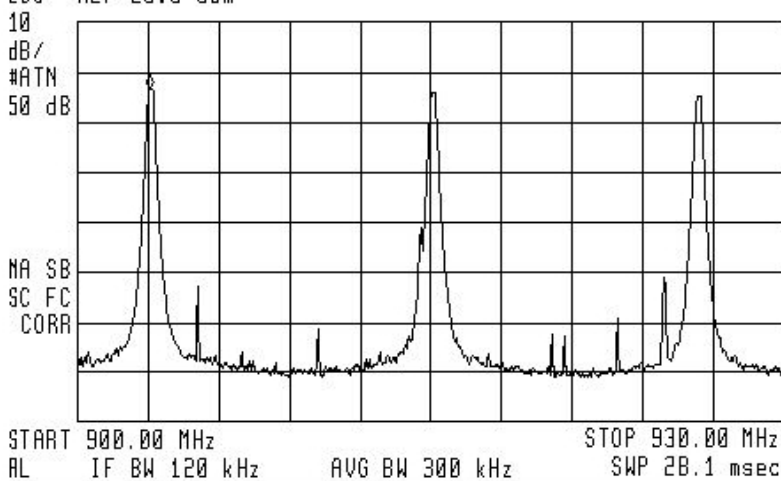


Figure 10: Conducted RF Power Plots

4.3 Unintentional Emissions

4.3.1 Transmit Chain Radiated Spurious Emissions

The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 10. Measurements are performed to 10 times the highest fundamental operating frequency.

Table 10(a): Transmit Chain Spurious Emissions.

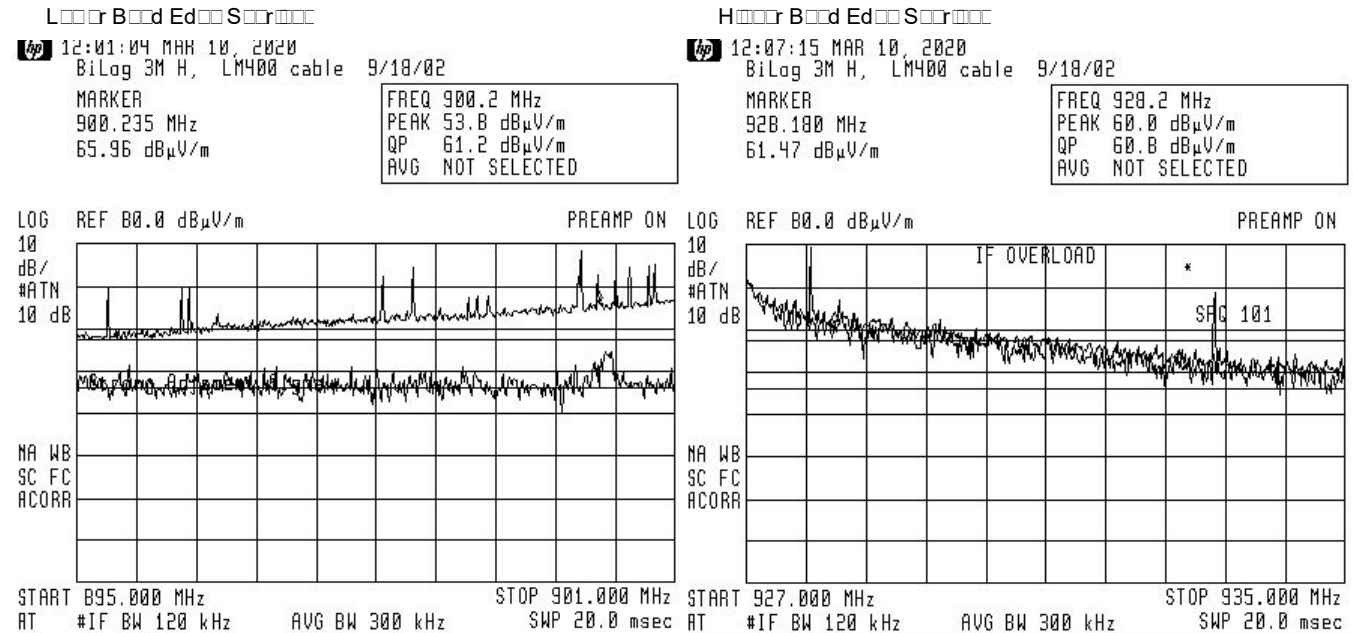


Table 10(b): Transmit Chain Spurious Emissions.

Frequency Range
 $25 \text{ MHz} \leq f \leq 1\,000 \text{ MHz}$
 $f > 1\,000 \text{ MHz}$

Det
 Pk/QPk
 Pk/Avg

IF Bandwidth
 120 kHz
 1 MHz

Video Bandwidth
 300 kHz
 3 MHz

Test Date:
Test Engineer:
EUT:
Mode:
Meas. Distance:

14-Mar-20
 Gordon Helm
 Elkhart Brass HW
 Hopping
 3m

Equipment Used: RH3115, RSFSV30001

FCC/IC													
#	Freq. Start MHz	Freq. Stop MHz	Ant. Used	Ant. Pol.	Ka dB	Kg dB			E3(Pk) dBµV/m	E3(Qpk/Avg) dBµV/m	E3 Avg Lim dBµV/m	Pass dB	Comments
1	Fundamental Band Edge (Low Side)												
2	900.0	902.0	BILO3142	H/V	39.7	0.1				61.2		-	>20 dB down at band edges
3	Fundamental Band Edge (High Side)												
4	928.0	930.0	BILO3142	H/V	39.7	0.1				60.8		-	>20 dB down at band edges
5	Harmonic / Spurious Emissions												
6	1806.0	1806.0	RH3115	H/V	30.9	0.4			69.9	58.7		-	>20 dB down
7	1830.0	1830.0	RH3115	H/V	30.9	0.4			54.2	43.0		-	>20 dB down
8	1852.6	1852.6	RH3115	H/V	30.9	0.4			51.2	40.0		-	>20 dB down
9	2779.0	2779.0	RH3115	H/V	32.6	0.6			64.1	52.9	54.0	1.1	Test Code
10	2709.0	2709.0	RH3115	H/V	32.6	0.6			63.7	52.5	54.0	1.5	Test Code
11	2778.9	2778.9	RH3115	H/V	32.6	0.6			53.9	42.7	54.0	11.3	Production code
12	2779.0	2779.0	RH3115	H/V	32.6	0.6			61.6	50.4	54.0	3.6	Production code
13	2745.0	2745.0	RH3115	H/V	32.6	0.6			62.4	51.2	54.0	2.8	Test Code
14	2709.0	2709.0	RH3115	H/V	32.6	0.6			60.9	49.7	54.0	4.3	Test Code
15	3705.3	3705.3	RH3115	H/V	35.5	0.6			53.7	42.5	54.0	11.5	Test Code
16	4515.0	4515.0	RH3115	H/V	36.6	0.6			54.7	43.5	54.0	10.5	Test Code
15	5417.0	5417.0	RH3115	H/V	39.0	0.6			53.2	42.0	54.0	12.0	Test Code
16	6405.6	6405.6	RH3115	H/V	39.0	0.6			45.4	34.2	54.0	19.8	Test Code
16													
17													
16	NO OTHER EMISSIONS OBSERVED WITHIN 20 DB OF CLASS B LIMIT – EVALUATED TO 10 GHZ.												
17													
18													
19													

*Qpk < 1 GHz, Avg > 1 GHz. Avg computed from Peak via duty cycle.

4.3.2 Relative Transmit Chain Spurious Emissions

The results for the measurement of transmit chain spurious emissions relative to the fundamental in a 100 kHz receiver bandwidth (at the nominal voltage and temperature) are provided in Figure 11 below.

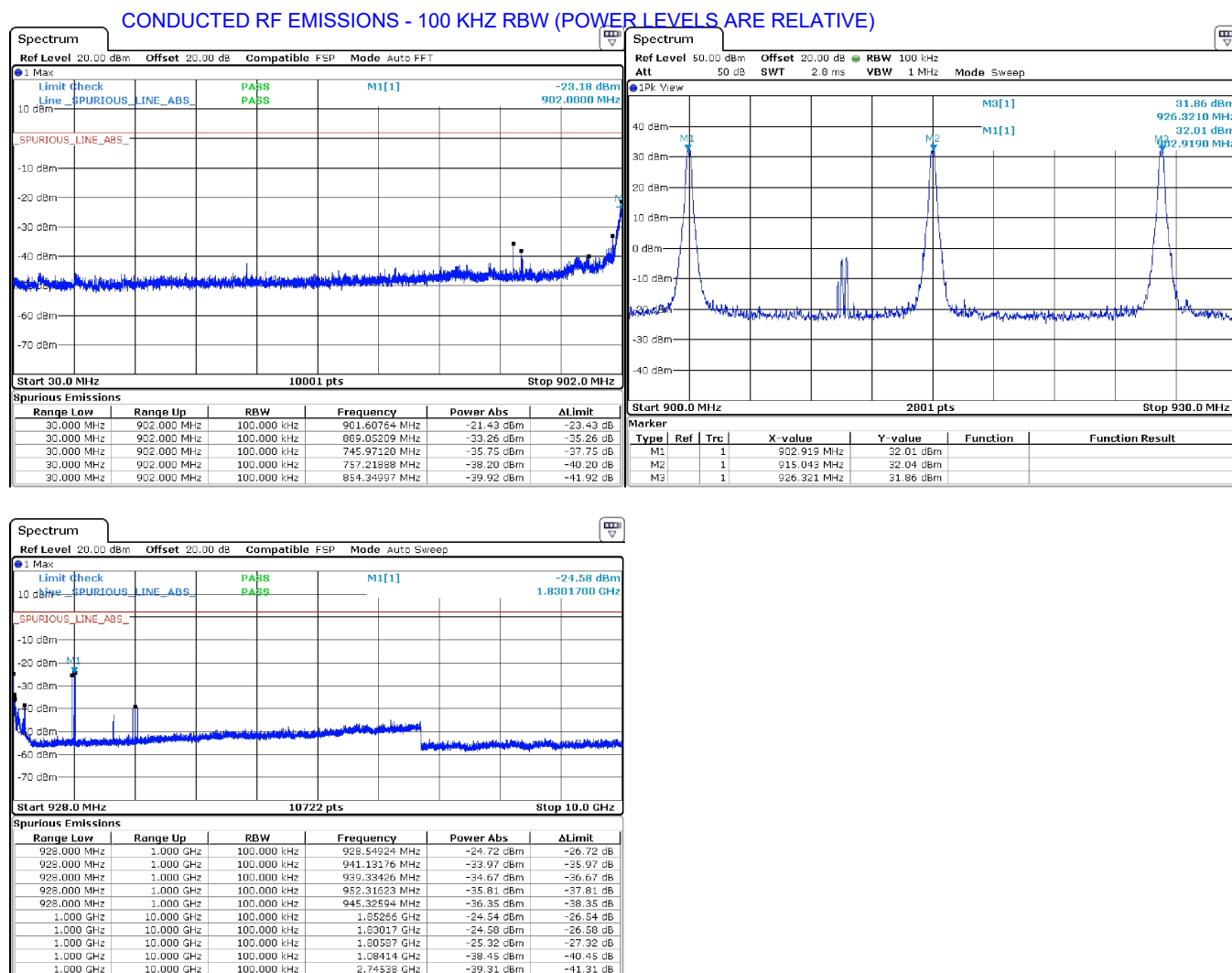


Figure 11: Conducted Transmitter Emissions Measured.

5 Measurement Uncertainty and Accreditation Documents

The maximum values of measurement uncertainty for the laboratory test equipment and facilities associated with each test are given in the table below. This uncertainty is computed for a 95.45% confidence level based on a coverage factor of $k = 2$.

Table 11: Measurement Uncertainty.

Measured Parameter	Measurement Uncertainty [†]
Radio Frequency	$\pm(f_{Mkr}/10^7 + RBW/10 + (SPN/(PTS - 1))/2 + 1 \text{ Hz})$
Conducted Emm. Amplitude	$\pm 1.9 \text{ dB}$
Radiated Emm. Amplitude (30 – 200 MHz)	$\pm 4.0 \text{ dB}$
Radiated Emm. Amplitude (200 – 1000 MHz)	$\pm 5.2 \text{ dB}$
Radiated Emm. Amplitude ($f > 1000 \text{ MHz}$)	$\pm 3.7 \text{ dB}$

[†]Ref: CISPR 16-4-2:2011+A1:2014

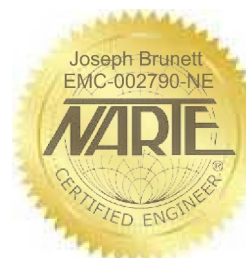


Figure 12: Accreditation Documents