

## COMPLIANCE WORLDWIDE INC. TEST REPORT 485-14

In Accordance with the Requirements of  
Federal Communications Commission CFR Title 47 Part 15.225, Subpart C  
Industry Canada RSS 210, Issue 8, Annex 2

Low Power License-Exempt Radio Communication Devices  
Intentional Radiators

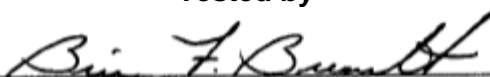
Issued to  
Thermo Fischer Scientific, Inc.  
Life Sciences Division  
246 Good Lane, Suite 100  
Guildford, CT 06437

for the  
ION Torrent  
13.56 MHz RFID Reader Module

FCC ID: 2AD9Z-INS1011976  
IC: 12763A- INS1011976

Report Issued on March 4, 2015

Tested by

  
\_\_\_\_\_  
Brian F. Breault

Reviewed by

  
\_\_\_\_\_  
Larry K. Stillings

This test report shall not be reproduced, except in full, without written permission from Compliance Worldwide, Inc.

## Table of Contents

1 Scope.....	3
2 Product Details .....	3
2.1. Manufacturer .....	3
2.2. Model Number.....	3
2.3. Serial Number .....	3
2.4. Description .....	3
2.5. Power Source.....	3
2.6. Hardware Revision.....	3
2.7. Software Revision .....	3
2.8. EMC Modifications .....	3
3. Product Configuration.....	3
3.1. Operational Characteristics & Software.....	3
3.2. EUT Hardware .....	3
3.3. EUT Connected Hardware .....	3
3.4. EUT Cables/Transducers.....	3
3.5. Support Equipment .....	3
3.6. Block Diagram.....	4
4. Measurements Parameters .....	4
4.1. Measurement Equipment Used to Perform Test .....	4
4.2. Measurement & Equipment Setup .....	4
4.3. Measurement Procedure .....	5
5. Choice of Equipment for Test Suits.....	5
5.1. Choice of Model .....	5
5.2. Presentation .....	5
5.3. Choice of Operating Frequencies .....	5
6. Measurement Summary .....	6
7. Measurement Data .....	6
7.1. Antenna Requirement .....	6
7.2. Operation within the Band 13.110 MHz – 14.010 MHz (Field Strength).....	7
7.3. Operation within the Band 13.110 MHz – 14.010 MHz (Frequency Tolerance).....	8
7.4. Transmitter Spurious Radiated Emissions.....	9
7.4. Transmitter Spurious Radiated Emissions (Harmonic Emissions) .....	20
7.5. Power Line Conducted Emissions .....	21
7.6. Occupied Bandwidth .....	24
7.7. 99% Power Bandwidth .....	25
8. Test Site Description .....	26

## 1. Scope

This test report certifies that the Thermo Fischer Scientific ION Torrent 13.56 MHz RFID Reader Module, as tested, meet the FCC Part 15.225 Subpart C, and Industry Canada RSS 210 requirements. The scope of this test report is limited to the test samples provided by the client, only in as much as those samples represent other production units. If any significant changes are made to the units, the changes shall be evaluated and a retest may be required.

## 2. Product Details

- 2.1. Manufacturer:** Thermo Fischer Scientific, Inc.
- 2.2. Model Number:** ION Torrent 13.56 MHz RFID Reader Module
- 2.3. Serial Number:** 00008
- 2.4. Description of EUT:** The EUT is a 13.56 MHz RFID Reader for collecting information from tags used in various Thermo Fischer Scientific devices.
- 2.5. Power Sources:** 5 Volts DC via USB Interface
- 2.6. Hardware Revision:** N/A
- 2.7. Software Revision:** N/A
- 2.8. EMC Modifications:** None

## 3. Product Configuration

### 3.1. Operational Characteristics & Software

The ION Torrent 13.56 MHz RFID Reader is powered up via the laptop's USB connection. After boot up, via a terminal program on the laptop the EUT is configured to continuously read RFID tags.

### 3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Frq (Hz)	Description/Function
Thermo Fischer	ION Torrent	00008	5 VDC		13.56 MHz RFID Reader Module

### 3.3. EUT Connected Hardware

Manufacturer	Model	Serial Number	Description
Dell	Latitude D620	38071886077	Laptop used to power and setup EUT

### 3.4. EUT Cables/Transducers

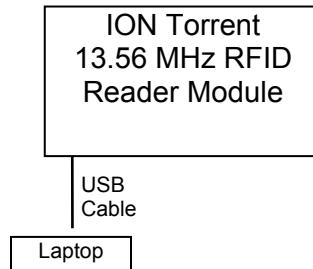
Cable Type	Length	Shield	From	To
USB Cable	1M	Yes	EUT	Dell Laptop

### 3.5. Support Equipment

Manufacturer	Model	Serial Number	Input Voltage	Frq (Hz)	Description/Function
N/A					

### 3. Product Configuration (continued)

#### 3.6. Block Diagram



### 4. Measurements Parameters

#### 4.1. Measurement Equipment Used to Perform Tests

Device	Manufacturer	Model No.	Serial No.	Cal Due	Interval
EMI Test Receiver, 9kHz - 7GHz <sup>1</sup>	Rohde & Schwarz	ESR7	101156	4/4/2015	2 Years
Spectrum Analyzer 20 Hz – 40 GHz <sup>2</sup>	Rohde & Schwarz	FSV40	100899	6/5/2015	2 Years
Spectrum Analyzer, 9 kHz to 40 GHz <sup>3</sup>	Rohde & Schwarz	FSVR40	100909	5/15/2015	2 Years
EMI Receiver	Hewlett Packard	8546A	3650A00360	6/4/2016	2 Years
Loop Antenna	EMCO	6512	9309-1139	9/23/2016	2 Years
Biconilog Antenna, 30 MHz to 2 GHz	Sunol Sciences Corp	JB1	25509	5/15/2015	2 Years
LISN 50 Ω 50 μH, 9 kHz to 30 MHz	EMCO	3825/2	9109-1860	6/2/2015	1 Year
Power Supply	Hewlett Packard	6296A	7M0599	8/26/2015	1 Year
Digital Barometer	Control Company	4195	ID236	2/25/2015	2 Years
Temperature Chamber	Associated Research	E-0029	N/A	N/A	---

<sup>1</sup> ESR7 Firmware revision: V2.26, Date installed: 8/15/2014 Previous V2.17, installed 6/11/2014.  
<sup>2</sup> FSV40 Firmware revision: V2.30 SP1 Date installed: 10/22/2014 Previous V2.30, installed 7/23/2014.  
<sup>3</sup> FSVR40 Firmware revision: V2.23, Date installed: 10/20/2014 Previous V1.63 SP1, installed 8/28/2013.

#### 4. Measurements Parameters (continued)

##### 4.2. Measurement & Equipment Setup

Test Dates:	December 16 <sup>th</sup> , 30 <sup>th</sup> , 2014, January 22 <sup>nd</sup> , 2015
Test Engineer:	Larry Stillings, Tom Charron
Normal Site Temperature (15 - 35°C):	22.0
Relative Humidity (20 -75%RH):	33%
Frequency Range:	.150 kHz to 1 GHz
Measurement Distance:	3 Meters
EMI Receiver IF Bandwidth:	200 Hz – 9 kHz to 150 kHz 9 kHz – 150 kHz to 30 MHz 120 kHz - 30 MHz to 1 GHz 1 MHz - Above 1 GHz
EMI Receiver Avg Bandwidth:	300 Hz – 9 kHz to 150 kHz 30 kHz – 150 kHz to 30 MHz 300 kHz - 30 MHz to 1 GHz 3 MHz - Above 1 GHz
Detector Function:	Peak, QP, Avg – 150 kHz to 30 MHz Peak, QP - 30 MHz to 1 GHz Peak, Avg - Above 1 GHz Unless otherwise specified.

##### 4.3. Measurement Procedure

The test measurements contained in this report are based on the requirements detailed in FCC Part 15, Subpart C - Intentional Radiators, notably Section 15.225, Operation within the band 13.110 – 14.010 MHz.

The test methods used to generate the data in this test report are in accordance with ANSI C63.10: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices, Section 15.

#### 5. Choice of Equipment for Test Suits

##### 5.1. Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

##### 5.2. Presentation

The test sample was tested complete with all required ancillary equipment. Refer to Section 3 of this report for the product equipment configuration.

##### 5.3. Choice of Operating Frequencies

The transmitter in the unit under test utilizes a single operating frequency at approximately 13.56 MHz

The other, non-transmitter oscillator frequencies also used in this device are as follows:

27.12 MHz Main Board

## 6. Measurement Summary

Test Requirement	FCC Part 15 Reference	RSS Reference	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-GEN Section 7.1.2	7.1	Compliant	
Operation within the Band 13.110 MHz – 14.010 MHz (Field Strength)	15.225 (a), (b), (c)	RSS-210 Section A2.6	7.2	Compliant	
Operation within the Band 13.110 MHz – 14.010 MHz (Frequency Tolerance)	15.225 (e)	RSS-210 Section A2.6	7.3	Compliant	
Spurious Radiated Emissions	15.209		7.4	Compliant	
Power Line Conducted Emissions	15.207	RSS-GEN Section 7.2.4	7.5	Compliant	Reference ANSI C63.4 Annex H, Paragraph H1(b)
Occupied Bandwidth/ Lower and Upper Band Edges	15.215(c) C63.10	N/A	7.6	Compliant	
99% Power Bandwidth	N/A	RSS-GEN Section 4.6.1	6.7	Compliant	

## 7. Measurement Data

### 7.1. Antenna Requirement (Section 15.203, RSS-GEN 7.1.2)

**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.

**Result:** Compliant.

**Status:** The unit under test employs a permanent, internally mounted antenna that is etched into the PC board.

## 7. Measurement Data (continued)

### 7.2. Operation within the Band 13.110 MHz – 14.010 MHz (15.225 (a), (b) and (c))

**Requirement:** The field strength of any emissions within the band 13.553 - 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

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.

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.

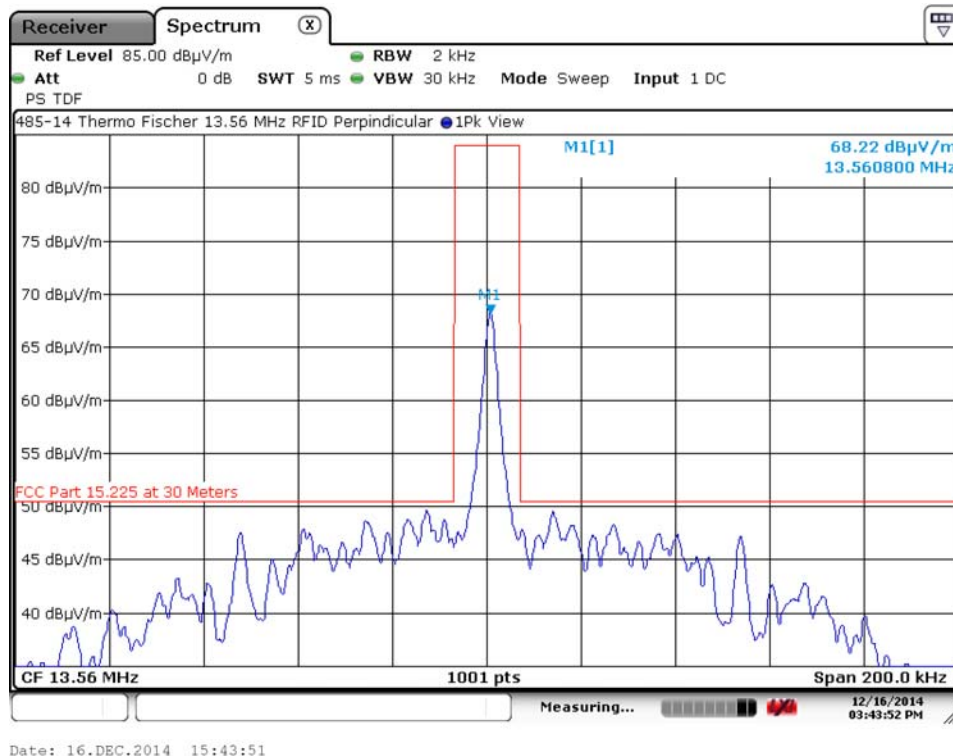
**Result:** The unit under test complies with the requirements detailed in FCC Part 15.225 (a), (b) and (c).

Freq. MHz	Dist. Meters	Meas. Field Strength dBμV	Ant. Factor <sup>1</sup> dB	Cable Loss <sup>1</sup> dB	Corr. Field Strength dBμV/m	Limit <sup>2</sup> dBμV/m	Margin (dB)
13.56	10	32.54	35.07	0.61	68.22	84.00	15.78

<sup>1</sup> Correction factors are included in the measurement analyzer.

<sup>2</sup> Limit at 30 meters.

#### 7.2.1. Measurement Plot – Perpendicular was worse case



## 7. Measurement Data (continued)

### 7.3. Operation within the Band 13.110 MHz – 14.010 MHz (§ 15.225 (e))

**Requirement:** The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  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.

**Result:** The unit under test complies with the requirements detailed in FCC Part 15.225 (e).

#### 7.3.1. Temperature Variation

Marker	Temp °C	Meas Freq.	Limit			Offset	Result
		(MHz)	F <sub>MIN</sub> (MHz)	F <sub>MAX</sub> (MHz)	%	(%)	
-	Ambient	13.5609750	N/A			N/A	
1	-20	13.5611000	13.559619	13.562331	$\pm 0.01$	0.00092176	Compliant
2	-10	13.5611500	13.559619	13.562331	$\pm 0.01$	0.00129047	Compliant
3	0	13.5611250	13.559619	13.562331	$\pm 0.01$	0.00110612	Compliant
4	+10	13.5611250	13.559619	13.562331	$\pm 0.01$	0.00110612	Compliant
5	+20	13.5610750	13.559619	13.562331	$\pm 0.01$	0.00073741	Compliant
6	+30	13.5611500	13.559619	13.562331	$\pm 0.01$	0.00129047	Compliant
7	+40	13.5610250	13.559619	13.562331	$\pm 0.01$	0.00036871	Compliant
8	+50	13.5610750	13.559619	13.562331	$\pm 0.01$	0.00073741	Compliant

<sup>1</sup> Nominal frequency at ambient (~22°C)

#### 7.3.2. Voltage Variation (Temperature - 22°C)

Marker	VAC	Meas Freq.	Limit			Offset	Result
		(MHz)	F <sub>MIN</sub> (MHz)	F <sub>MAX</sub> (MHz)	%	(%)	
-	120.00	13.5609750	N/A			N/A	
1	102.00	13.5610750	13.559619	13.562331	$\pm 0.01$	0.00073741	Compliant
2	108.00	13.5611250	13.559619	13.562331	$\pm 0.01$	0.00110612	Compliant
3	114.00	13.5609500	13.559619	13.562331	$\pm 0.01$	0.00018435	Compliant
4	126.00	13.5611000	13.559619	13.562331	$\pm 0.01$	0.00092176	Compliant
5	132.00	13.5610500	13.559619	13.562331	$\pm 0.01$	0.00055306	Compliant
6	138.00	13.5613250	13.559619	13.562331	$\pm 0.01$	0.00258094	Compliant

<sup>1</sup> Nominal voltage

<sup>2</sup> Nominal frequency at ambient (~22°C)



**7. Measurement Data (continued)****7.4. Transmitter Spurious Radiated Emissions (15.225 (d), 15.209)**

Requirement: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table (Reference FCC 15.209):

Frequency Range (MHz)	Distance (Meters)	Limit (dB $\mu$ V/m) <sup>1</sup>
0.009 to 0.490	3	128.5 to 93.8
0.490 to 1.705	3	73.8 to 63.0
1.705 to 30	3	69.5
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
>960	3	54.0

<sup>1</sup> Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

<sup>2</sup> Extrapolation below 30 MHz is calculated at 40 dB/decade.

Procedure: Test measurements were made in accordance with ANSI C63.4-2009, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

Test Notes: First, the intentional radiators were disabled and a scan of the unit under test was performed. The intentional radiators were then enabled and a second scan was performed. The two scans were compared to determine the contribution of the intentional radiators to the overall emissions profile.

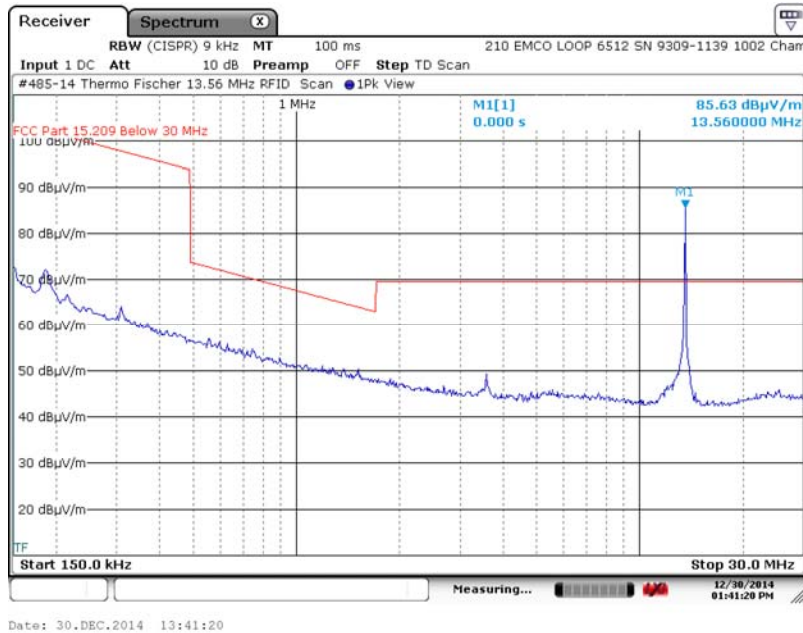
Results: The transmitter installed in the unit under test meet the FCC Part 15.209 emissions requirements.

## 7. Measurement Data (continued)

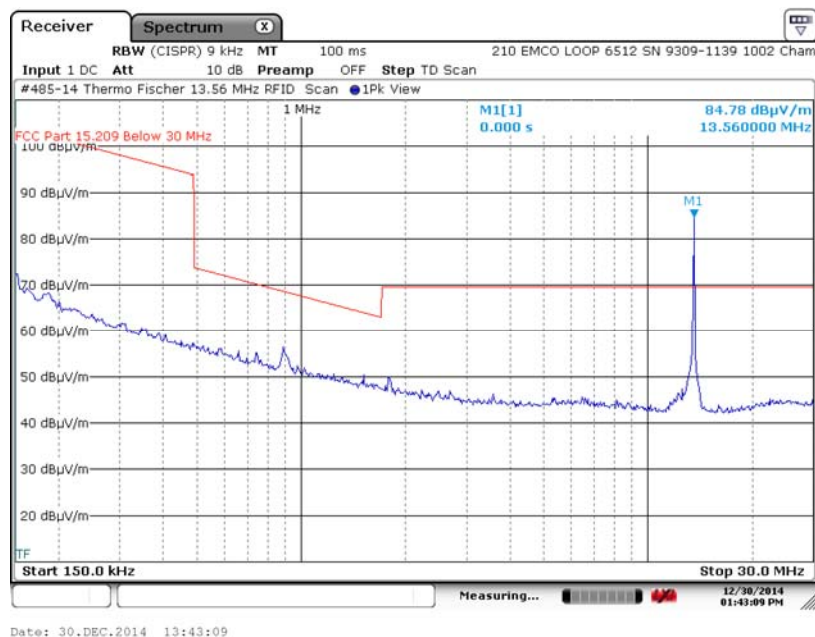
### 7.4. Transmitter Spurious Radiated Emissions (15.209) (continued)

#### 7.4.1. Transmitter Spurious Radiated Emissions – 150 kHz to 30 MHz

##### 7.4.1.1. Antenna is Parallel to the UUT



##### 7.4.1.2. Antenna is Perpendicular to the UUT

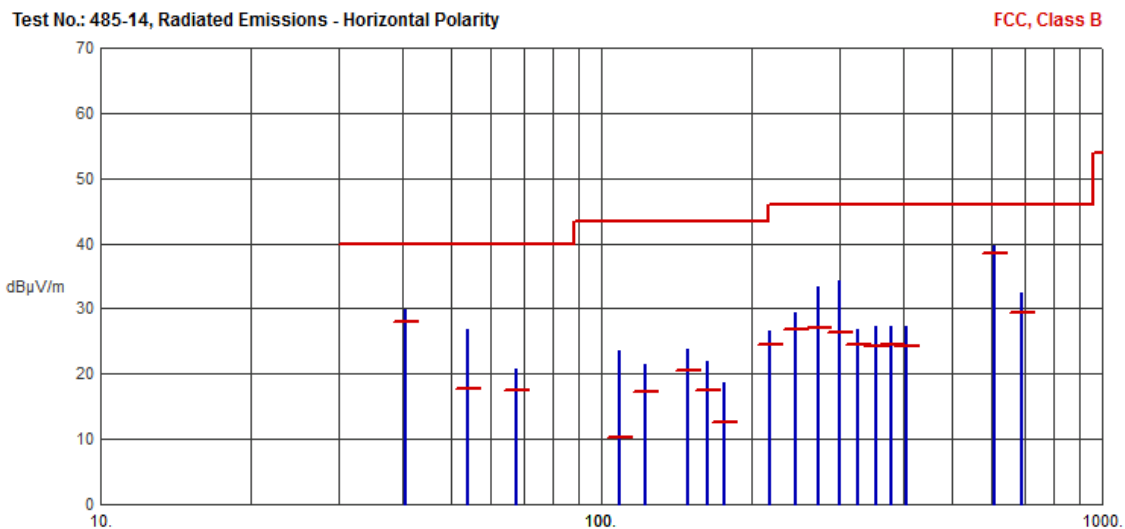


## 7. Measurement Data (continued)

### 7.4. Spurious Radiated Emissions (15.209) (continued)

#### 7.4.2. Spurious Radiated Emissions – 30 MHz to 1 GHz

##### 7.4.2.1. Antenna is Horizontal



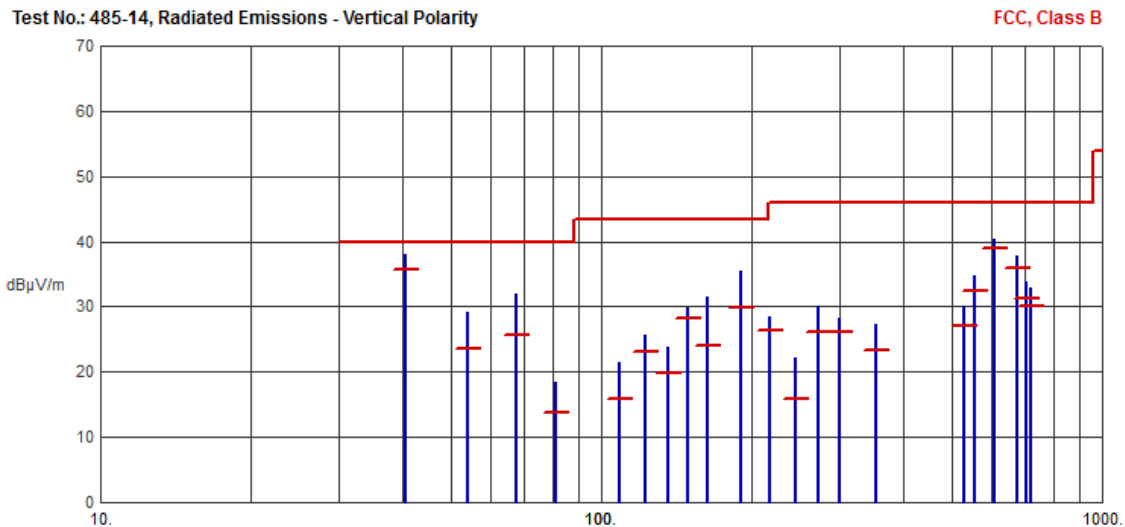
Frequency (MHz)	Pk Amp (dBμV/m)	QP Amp (dBμV/m)	QP Limit (dBμV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
40.6657	29.93	27.98	40.00	-12.02	N/A	N/A	
54.2217	26.82	17.82	40.00	-22.18	N/A	N/A	
67.8000	20.87	17.50	40.00	-22.50	N/A	N/A	
108.4507	23.63	10.21	43.50	-33.29	N/A	N/A	
122.0421	21.51	17.32	43.50	-26.18	N/A	N/A	
149.1640	23.71	20.50	43.50	-23.00	N/A	N/A	
162.7200	21.84	17.61	43.50	-25.89	N/A	N/A	
176.2870	18.73	12.71	43.50	-30.79	N/A	N/A	
216.9670	26.49	24.41	46.00	-21.59	N/A	N/A	
244.0870	29.32	26.84	46.00	-19.16	N/A	N/A	
271.2070	33.38	27.17	46.00	-18.83	N/A	N/A	
298.3270	34.31	26.36	46.00	-19.64	N/A	N/A	
325.4520	26.76	24.59	46.00	-21.41	N/A	N/A	
352.5720	27.32	24.30	46.00	-21.70	N/A	N/A	
379.6925	27.23	24.40	46.00	-21.60	N/A	N/A	
406.8125	27.22	24.37	46.00	-21.63	N/A	N/A	
610.2345	39.61	38.45	46.00	-7.55	N/A	N/A	
691.5945	32.42	29.50	46.00	-16.50	N/A	N/A	

## 7. Measurement Data (continued)

### 7.4. Spurious Radiated Emissions (15.209) (continued)

#### 7.4.2. Spurious Radiated Emissions – 30 MHz to 1 GHz

##### 7.4.2.2. Antenna is Vertical



Frequency (MHz)	Pk Amp (dBμV/m)	QP Amp (dBμV/m)	QP Limit (dBμV/m)	Margin (dB)	Ant Ht (cm)	Table (Deg)	Comments
40.6739	38.03	35.76	40.00	-4.24	N/A	N/A	
54.2051	29.09	23.60	40.00	-16.40	N/A	N/A	
67.8180	32.03	25.71	40.00	-14.29	N/A	N/A	
81.3600	18.51	13.67	40.00	-26.33	N/A	N/A	
108.5614	21.36	15.83	43.50	-27.67	N/A	N/A	
122.0339	25.55	23.20	43.50	-20.30	N/A	N/A	
135.5939	23.84	19.88	43.50	-23.62	N/A	N/A	
149.1539	29.95	28.24	43.50	-15.26	N/A	N/A	
162.7139	31.46	23.96	43.50	-19.54	N/A	N/A	
189.8339	35.42	29.89	43.50	-13.61	N/A	N/A	
216.9568	28.38	26.28	46.00	-19.72	N/A	N/A	
244.1694	22.26	15.94	46.00	-30.06	N/A	N/A	
271.1981	30.13	26.05	46.00	-19.95	N/A	N/A	
298.3445	28.33	26.18	46.00	-19.82	N/A	N/A	
352.5667	27.31	23.30	46.00	-22.70	N/A	N/A	
528.8739	30.14	27.17	46.00	-18.83	N/A	N/A	
555.9722	34.66	32.49	46.00	-13.51	N/A	N/A	
610.2370	40.34	39.08	46.00	-6.92	N/A	N/A	
678.0513	37.71	35.97	46.00	-10.03	N/A	N/A	
705.1521	33.90	31.32	46.00	-14.68	N/A	N/A	
718.7197	32.88	30.08	46.00	-15.92	N/A	N/A	

## 7. Measurement Data (continued)

### 7.5. Power Line Conducted Emissions (15.207)

Requirement: 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, as measured using a 50  $\mu$ H/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.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5.0	56	46
5.0 to 30.0	60	50

\* Decreases with the logarithm of the frequency.

Procedure: Test measurements were made in accordance with ANSI C63.4-2003, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz. Specifically, Annex H, paragraph H1(b) regarding the use of a dummy load for a Part 15 transmitter.

Results: The unit under test meets the FCC Part 15.207 conducted emissions requirements.

Test Number: 485-14

Issue Date: 03/04/2015

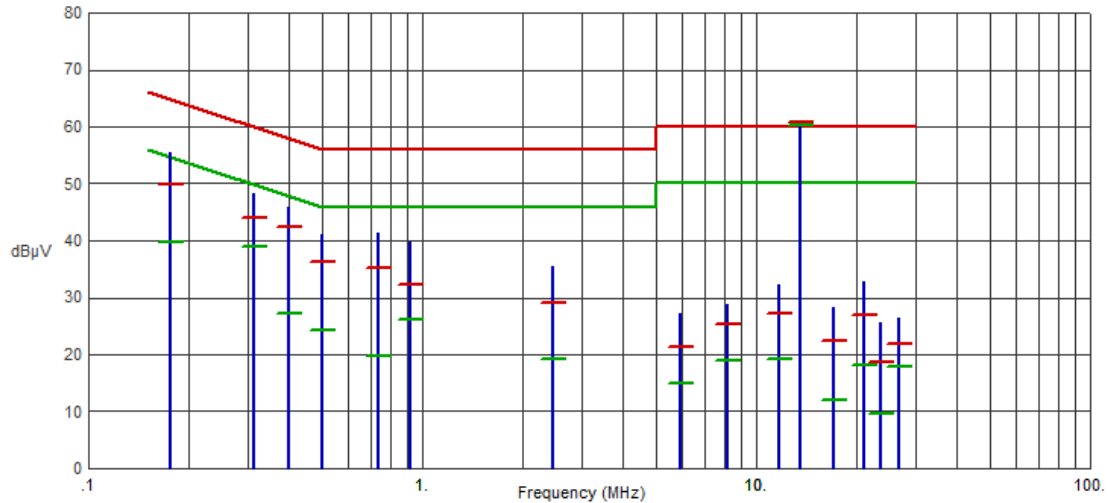
## 8. Conducted Emissions Test Results

### 7.5. Power Line Conducted Emissions (15.207)

#### 7.5.1. 120 Volts, 60 Hz Phase

Test No.: 485-14, 120 Volts, 60 Hz Phase

FCC, Class B



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1760	55.49	49.85	64.67	-14.82	39.64	54.67	-15.03	
.3116	48.22	43.89	59.93	-16.04	39.03	49.93	-10.90	
.3980	45.95	42.50	57.90	-15.40	27.27	47.90	-20.63	
.4997	40.94	36.14	56.00	-19.86	24.27	46.00	-21.73	
.7361	41.42	35.23	56.00	-20.77	19.78	46.00	-26.22	
.9221	39.84	32.26	56.00	-23.74	26.07	46.00	-19.93	
2.4602	35.48	29.03	56.00	-26.97	19.16	46.00	-26.84	
5.9530	27.15	21.45	60.00	-38.55	14.89	50.00	-35.11	
8.2373	28.92	25.44	60.00	-34.56	18.88	50.00	-31.12	
11.6518	32.29	27.33	60.00	-32.67	19.32	50.00	-30.68	
13.5607	61.14	60.81			60.30			Fundamental Freq
17.0359	28.29	22.39	60.00	-37.61	12.05	50.00	-37.95	
21.1091	32.79	26.92	60.00	-33.08	18.01	50.00	-31.99	
23.6692	25.60	18.69	60.00	-41.31	9.67	50.00	-40.33	
26.6096	26.44	21.95	60.00	-38.05	17.75	50.00	-32.25	

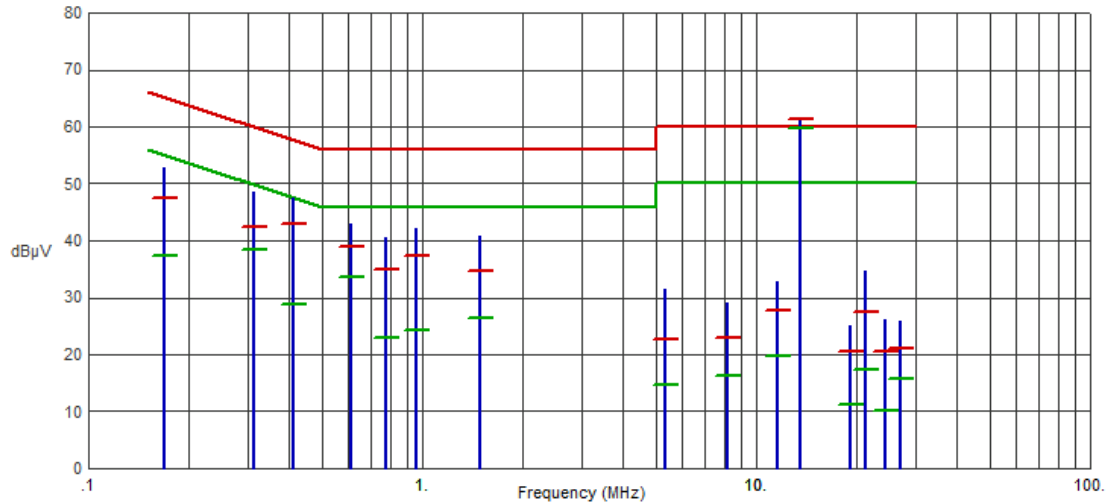
## 8. Conducted Emissions Test Results

### 7.5. Power Line Conducted Emissions (15.207)

#### 7.5.2. 120 Volts, 60 Hz Neutral

Test No.: 485-14, 120 Volts, 60 Hz Neutral

FCC, Class B



Frequency (MHz)	Pk Amp (dBμV)	QP Amp (dBμV)	QP Limit (dBμV)	QP Margin (dB)	Avg Amp (dBμV)	Avg Limit (dBμV)	Avg Margin (dB)	Comments
.1680	52.75	47.56	65.06	-17.50	37.24	55.06	-17.82	
.3115	48.40	42.38	59.93	-17.55	38.29	49.93	-11.64	
.4096	47.34	42.97	57.66	-14.69	28.82	47.66	-18.84	
.6132	43.02	38.97	56.00	-17.03	33.50	46.00	-12.50	
.7755	40.53	34.81	56.00	-21.19	22.82	46.00	-23.18	
.9560	42.16	37.33	56.00	-18.67	24.22	46.00	-21.78	
1.4927	40.68	34.63	56.00	-21.37	26.46	46.00	-19.54	
5.3282	31.41	22.70	60.00	-37.30	14.60	50.00	-35.40	
8.2154	29.02	22.85	60.00	-37.15	16.18	50.00	-33.82	
11.5932	32.87	27.84	60.00	-32.16	19.69	50.00	-30.31	
13.5609	61.62				59.63			Fundamental Freq
19.2076	25.20	20.50	60.00	-39.50	11.17	50.00	-38.83	
21.1914	34.58	27.44	60.00	-32.56	17.36	50.00	-32.64	
24.2406	26.12	20.55	60.00	-39.45	10.20	50.00	-39.80	
27.1565	25.77	21.05	60.00	-38.95	15.75	50.00	-34.25	

## 7. Measurement Data (continued)

### 7.6. Occupied Bandwidth (Section 15.215 (c) and ANSI C63.10, Section 6.9)

Requirement: Intentional radiators operating under the alternative provisions to the general emission limits, as contained in Sections 15.217 through 15.255 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule.

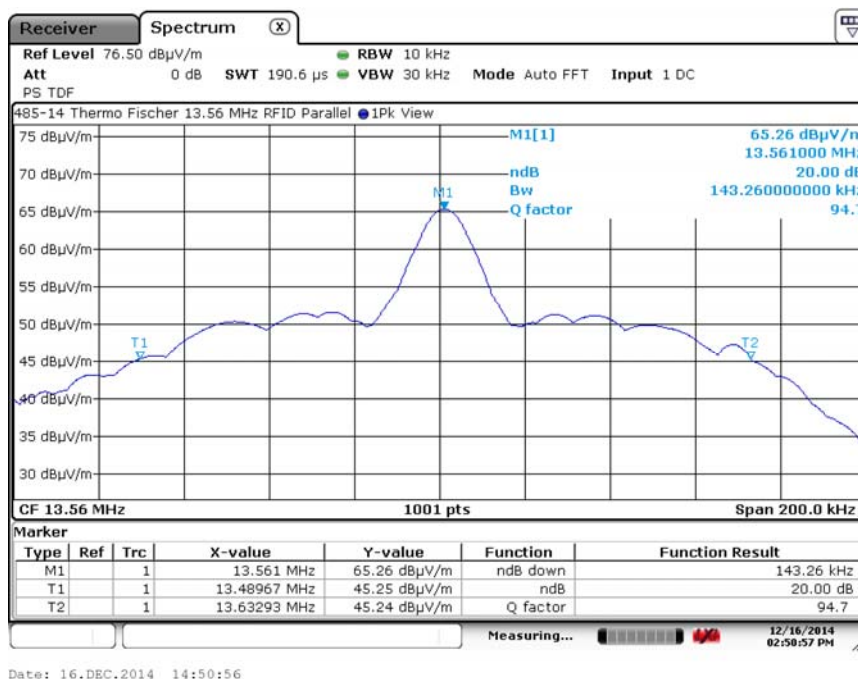
Frequency Band:  $F_{MIN} = 13.110$  MHz

$F_{MAX} = 14.010$  MHz

Test Note: The reported bandwidth represents the worst case measured bandwidth of the combined three transmitters.

	-20 dB Frequency Measured	Lower & Upper Band Edge ( $F_{MIN}$ & $F_{MAX}$ )	Result
	MHz	MHz	
$F_{LO}$	13.48967	13.11	Compliant ( $F_{LO} > F_{MIN}$ )
$F_{HI}$	13.63293	14.01	Compliant ( $F_{HI} < F_{MAX}$ )

#### 7.6.1. Plot of 20 dB Bandwidth vs. Frequency Band





## 7. Measurement Data (continued)

### 7.7. 99% Power Bandwidth (RSS-GEN Section 4.6.1)

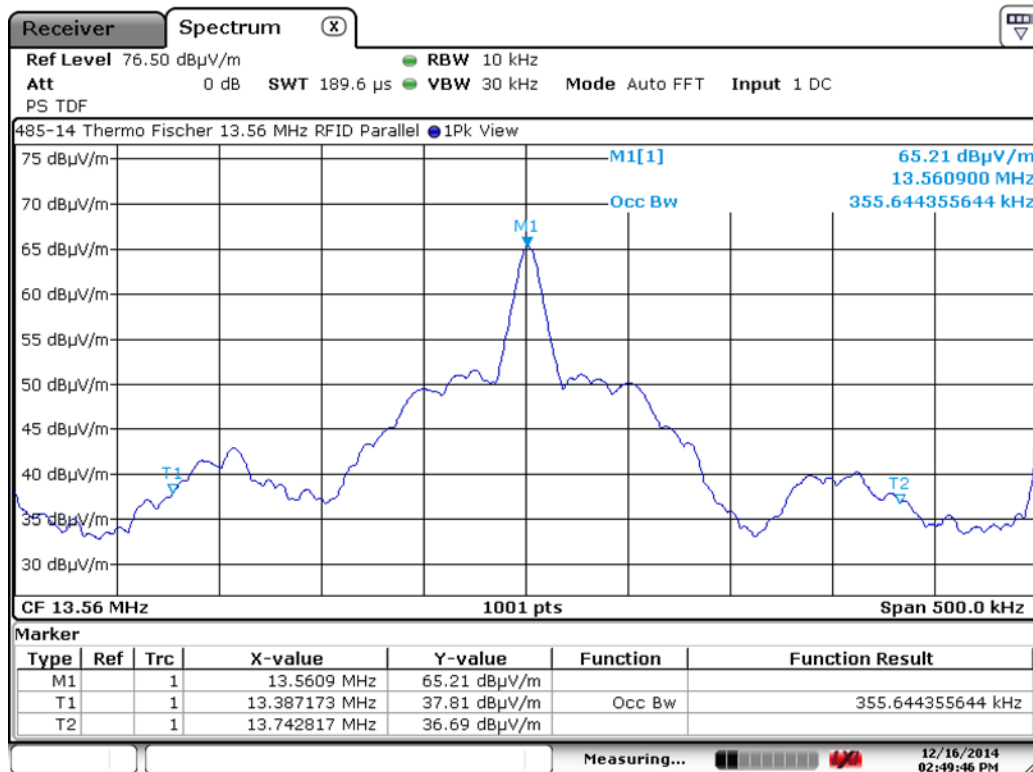
Requirement: When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.

Procedure: This test was performed utilizing the automated 99% bandwidth function of the spectrum analyzer.

Frequency	99% Power Bandwidth
(MHz)	(kHz)
13.56	355.644

#### 7.7.1. Plot of 99% Bandwidth



Date: 16.DEC.2014 14:49:45

---

**8. Test Site Description**

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC), Industry Canada, and Voluntary Control Council Interference (VCCI) standards. A description of the test sites is on file with the FCC (registration number 96392), Industry Canada (file number IC 3023A-1).

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.