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Report of Measurements
FCC Part 15, Subpart C, Section 15.247

On

2.4 GHz ZRadio System, Train to Wayside Communications
Wayside Radio
FCC ID: 2A8HRS25442-B58-A2

Customer Name: Siemens Mobility

Customer P.O: 4510076816

Date of Report: April 11, 2023

Test Report No: R-3578P-6A

Test Start Date: August 2, 2022

Test Finish Date: February 27, 2023

Certification and Signatures We certify that this report is a true representation of the results obtained from the tests of the equipment stated. We further certify that the measurements shown in this report were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.

Richard J. Reitz Director of Engineering iNARTE Electromagnetic Compatibility Engineer EMC-050739-E	Scott Wentworth Branch Manager

Non-Warranty Provision
The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

Non-Endorsement
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This test report must not be used by the client to claim product endorsement by ANAB or any agency of the U.S. Government.

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Technical Information

Report Number:	R-3578P-6A
Applicant:	Siemens Mobility, Inc.
Address:	162 East Bridge Street
	Suite 200
	Homestead, PA 15120
FRN:	0032806093
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Comm
Model Number:	S25442-B58-A2-1.F
FCC ID:	2A8HRS25442-B58-A2
Frequency Range of Operation:	2405 to 2480 MHz
Power Output:	8.73 mW
Antenna Gain:	8.5 dBi
Equipment Class:	DTS – Digital Transmission System
Equipment Use:	Fixed
Power Requirements:	24 Vdc Derived from 120 VAC, 60 Hz, Single Phase Source
Transmission Protocols/Modulation	IEEE 802.15.4

Test Specifications:
FCC Rules and Regulations Part 15, Subpart C, Section 15.247

Test Procedures:
ANSI C63.4: 2014
ANSI C63.10: 2013

Test Facility:
Retlif Testing Laboratories
3131 Detwiler Road
Harleysville, PA 19438

FCC Registered Designation Number: US2321

Tests Performed

The test methods that were performed to demonstrate compliance with the FCC Rules are shown below:

FCC Part 15, Subpart C Rule Section	ANSI C63.10 Test Method	Test Result
1.1310 Radiofrequency Radiation Exposure Limits	N/A	Pass
15.247(a)(2), Minimum 6 dB Bandwidth	11.8 DTS Bandwidth	Pass
15.247(b)(3), Maximum Peak Conducted Output Power	11.9 Fundamental Emission Output Power	Pass
15.247(b)(4), Antenna Gain	N/A	Pass
15.247(d), Out of Band Emissions 15.209, Radiated Emissions Limits 15.205, Restricted Bands of Operation	11.11 Emissions in Non-Restricted Frequency Bands	Pass
	11.12 Emissions in Restricted Frequency Bands – 11.12.1 Radiated Emissions Measurements	Pass
	11.13 Band Edge Measurements	Pass
15.247(e), Power Spectral Density	11.10 Maximum Power Spectral Density	Pass
15.207(a), Conducted Limits	6.2 Standard Test Method for AC Power Line Conducted Emissions	Pass

All test methods listed above are included in Retlif Testing Laboratories ANSI National Accreditation Board (ANAB), ISO/IEC 17025 Scope of Accreditation, Certificate Number: L2320.02.

General Test Information

FCC Part 15.31:

- Testing was performed using the procedures specified in ANSI C63.10-2013 in accordance with 15.31(a)(3).
- Testing was performed with the transmitter continuously transmitting at the selected frequency in accordance with 15.31(c).
- Field strength measurements were made on an Open Area Test Site in accordance with 15.31(d).
- Power output measurements were performed with the supply voltage varied between 85 and 115% of the nominal rated supply voltage in accordance with 15.31(e).
- Field strength measurements were made at the distance specified in the appropriate rule section, the test results were not extrapolated in accordance with 15.31(f).
- The Device under test was positioned and adjusted to maximize the level of emissions in accordance with 15.31(g).
- Measurements of radio frequency conducted emissions were performed using a 50 ohm/50 uH line-impedance stabilization network as specified in 15.31(l).
- The test sample operates over a frequency range of 75 MHz (2405 to 2480 MHz). All testing outlined herein was performed with the device under test operating at 3 frequencies. One at the top, one near the middle and one at the bottom of the range of operation in accordance with 15.31(m).

FCC Part 15.33:

- The radio frequency spectrum was investigated from 9 kHz to the 10th harmonic of the highest fundamental frequency as specified in 15.33(a)(1).

FCC Part 15.35:

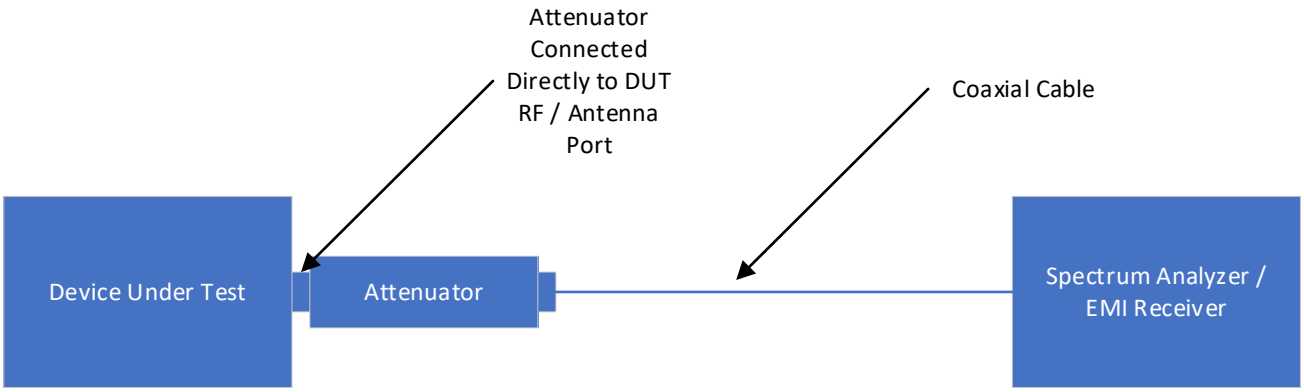
- On frequencies below or equal to 1000 MHz, measurements were made utilizing a CISPR quasi-peak detector and associated bandwidths.
- On frequencies above 1000 MHz, measurements were made utilizing an average detector and a minimum resolution bandwidth of 1 MHz

Requirements and Test Results

Requirement: 15.247(a)(2), Minimum 6 dB Bandwidth

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands. The minimum 6 dB bandwidths shall be at least 500 kHz.

- Results:
  The minimum 6 dB bandwidth measured complies with the requirement that the Bandwidth be no less than 500 kHz.



Equipment List

EN	Manufacturer	Model No.	Description	Serial No.	Due Date
8496	NARDA MICROWAVE	768-10	ATTENUATOR, COAXIAL, DC – 11 GHz	04105	6/30/2023
8816	ROHDE & SCHWARZ	ESW26	RECEIVER, EMI, 1 Hz - 26 GHz	103087	8/31/2023
8817	MICRO-COAX	LU7-022-1000	CABLE, COAXIAL, DC - 18 GHz	060-2538360 00	11/30/2023

Occupied Bandwidth	
Test Specification:	FCC Part 15, Subpart C, 15.247(a)(2), Occupied Bandwidth
Method:	ANSI C63.10, Section 11.8.1, DTS Bandwidth, Option 1
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2405 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.0 ºC
Relative Humidity:	32.5 %
Occupied Bandwidth:	1.59 MHz

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Occupied Bandwidth	
Test Specification:	FCC Part 15, Subpart C, 15.247(a)(2), Occupied Bandwidth
Method:	ANSI C63.10, Section 11.8.1, DTS Bandwidth, Option 1
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2445 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.0 ºC
Relative Humidity:	32.5 %
Occupied Bandwidth:	1.59 MHz

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Occupied Bandwidth	
Test Specification:	FCC Part 15, Subpart C, 15.247(a)(2), Occupied Bandwidth
Method:	ANSI C63.10, Section 11.8.1, DTS Bandwidth, Option 1
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2480 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.0 ºC
Relative Humidity:	32.5 %
Occupied Bandwidth:	1.64 MHz

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Requirements and Test Results

Requirement: 15.247(b)(3), Maximum Peak Conducted Output Power

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

For systems using digital modulation in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antenna and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antenna and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

- Results:
  The device operates in the 2400 to 2483.5 MHz band. The maximum peak output power was measured and was found to be 9.41 dBm (8.73 mWatts). The antenna used with the device has a directional gain of 8.5 dBi. This is 2.5 dBi above the maximum value specified in 15.247(b)(4). The output power limit is therefore reduced by 2.5 dBi. The device was found to comply with the reduced output power limit of 562.3 mW.

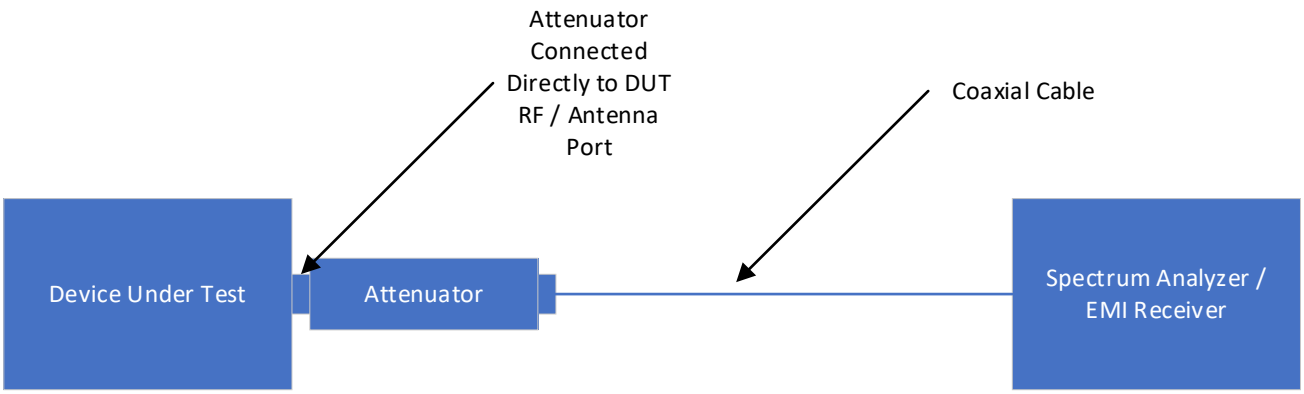
  Calculations:

  $P_{OUT} = P_{Limit} – (G_{Tx} – 6)$

  Where:
  P_{OUT} = Reduced Output Power Limit in dBm
  P_{Limit} = FCC Specified Power Output Limit = 30 dBm
  G_{Tx} = Maximum Directional Gain of the Antenna of the Device Under Test = 8.5 dBi

  $P_{OUT} = 30 \text{ dBm} – (8.5 \text{ dBi} – 6 \text{ dB})$
  $P_{OUT} = 30 \text{ dBm} – 2.5 \text{ dB}$
  $P_{OUT} = 27.5 \text{ dBm}$

  $P_{Out\ mW} = 10^{(Pout/10)}$
  $P_{Out\ mW} = 10^{(27.5/10)} = 10^{(2.75)} = 562.3 \text{ mW}$

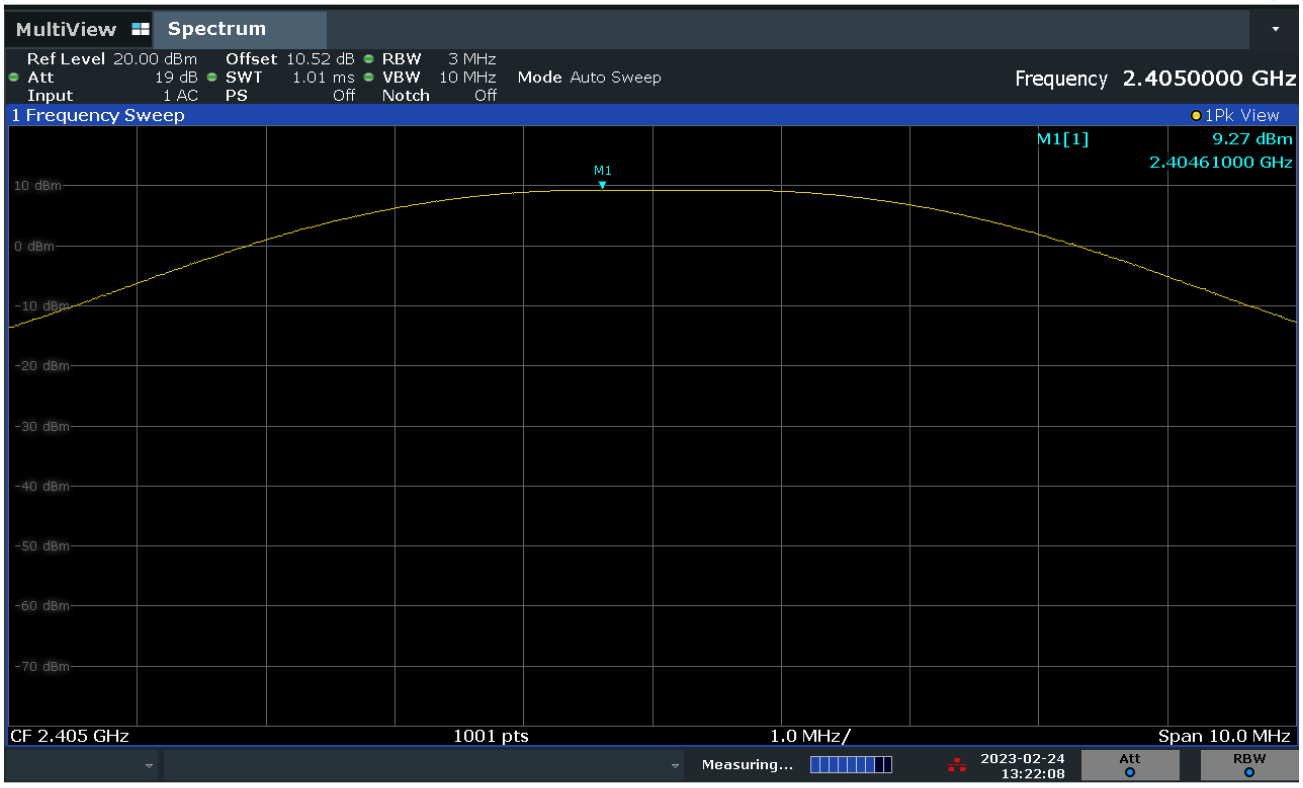


Equipment List

EN	Manufacturer	Model No.	Description	Serial No.	Due Date
8496	NARDA MICROWAVE	768-10	ATTENUATOR, COAXIAL, DC – 11 GHz	04105	6/30/2023
8816	ROHDE & SCHWARZ	ESW26	RECEIVER, EMI, 1 Hz - 26 GHz	103087	8/31/2023
8817	MICRO-COAX	LU7-022-1000	CABLE, COAXIAL, DC - 18 GHz	060-2538360 00	11/30/2023

POWER OUTPUT	
Test Specification:	FCC Part 15, Subpart C, 15.247(b)(3), Power Output
Method:	ANSI C63.10, Section 11.9.1.1, Maximum Peak Conducted Output Power
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2405 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.2 ºC
Relative Humidity:	32.1 %
Maximum Power Output:	9.29 dBm

120 VAC Nominal Rated Supply Voltage



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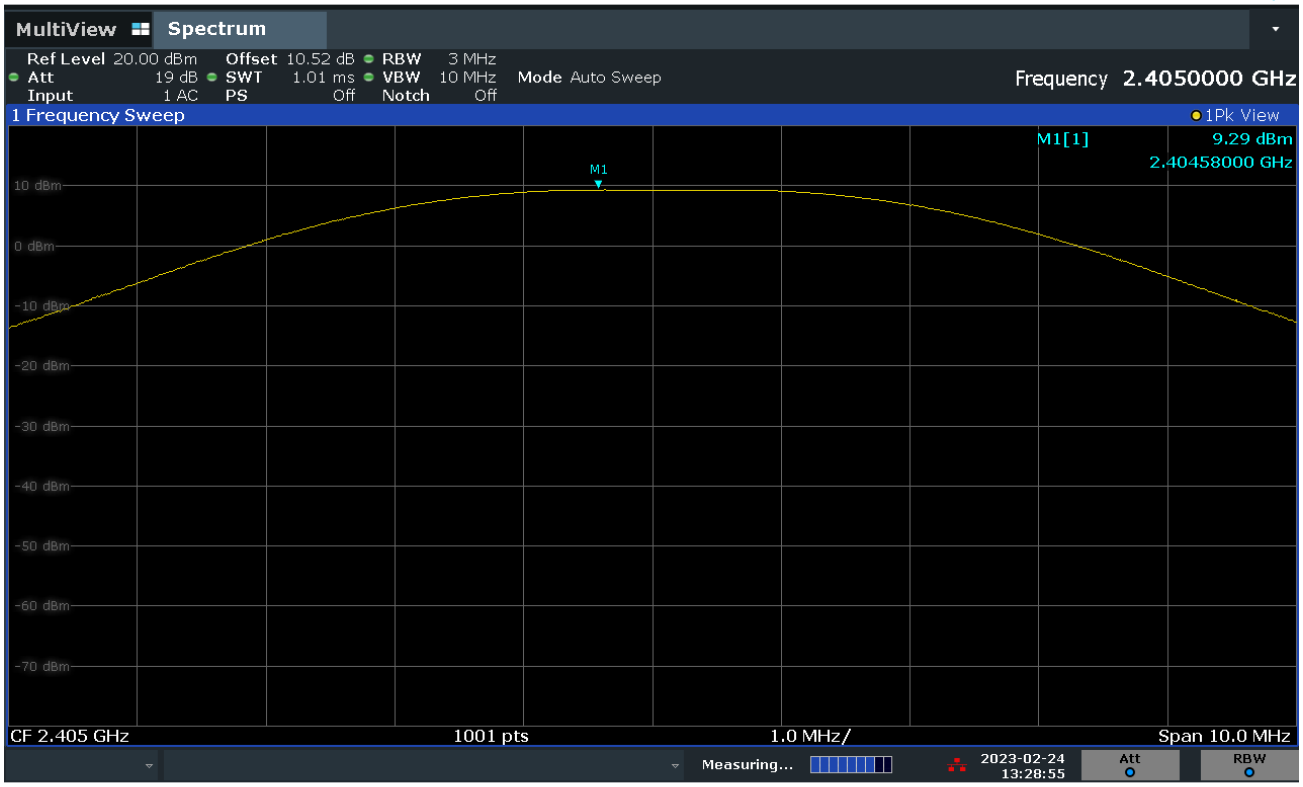
85% Nominal Rated Supply Voltage



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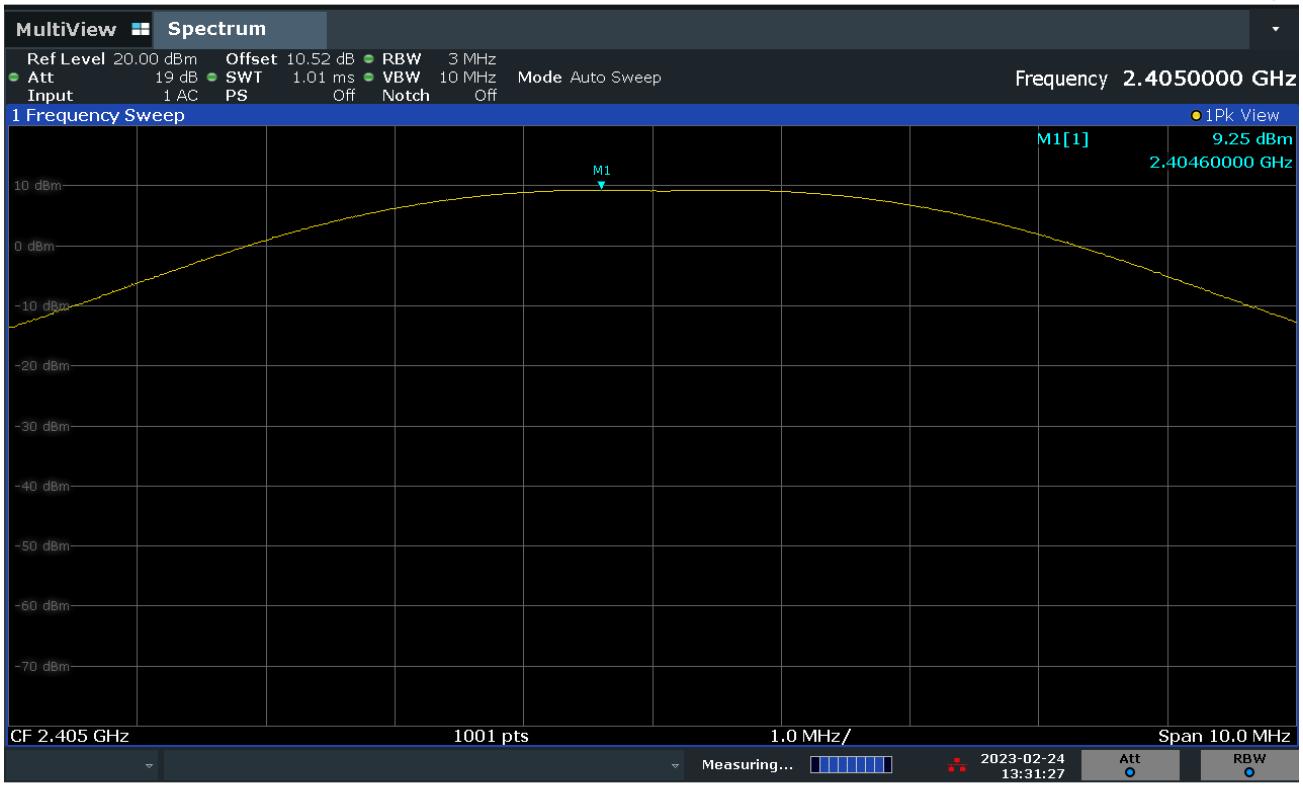

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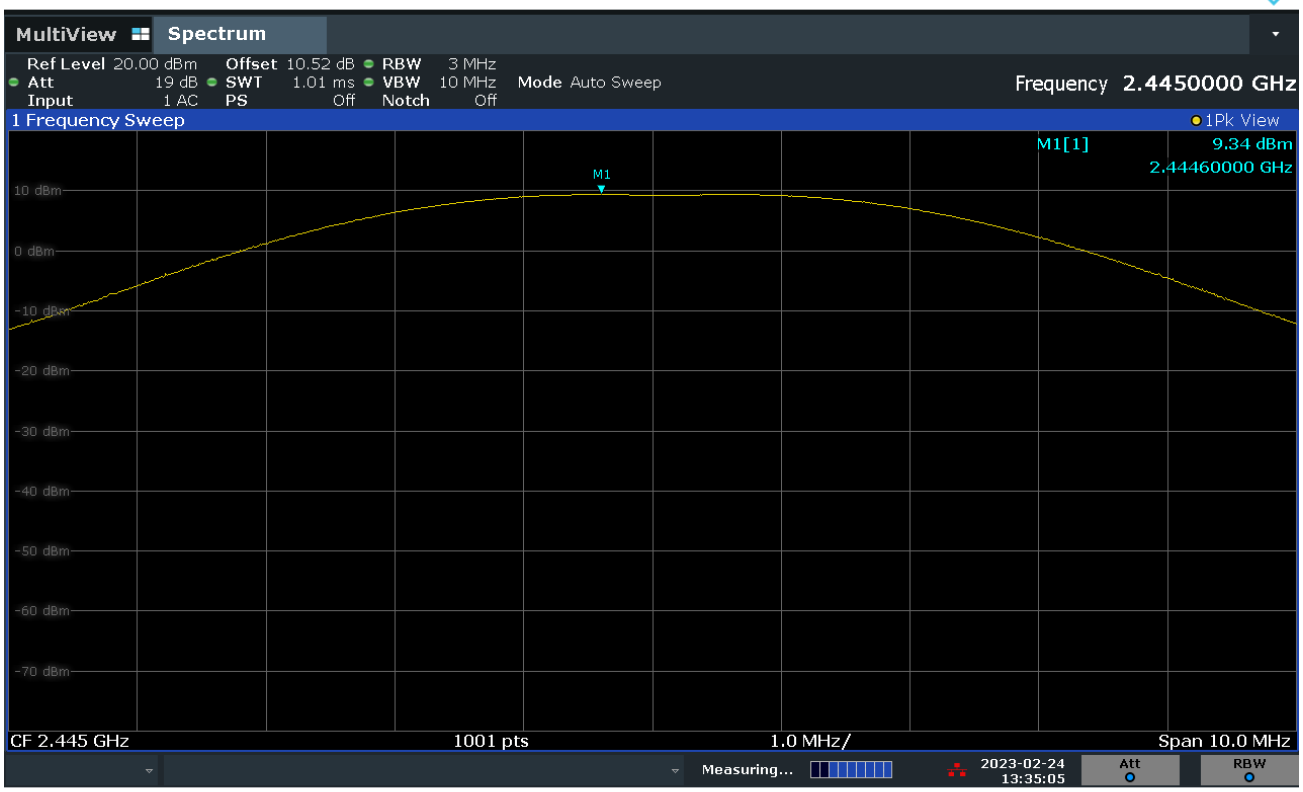
POWER OUTPUT	
Test Specification:	FCC Part 15, Subpart C, 15.247(b)(3), Power Output
Method:	ANSI C63.10, Section 11.9.1.1, Maximum Peak Conducted Output Power
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2445 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.2 ºC
Relative Humidity:	32.1 %
Maximum Power Output:	9.39 dBm

120 VAC Nominal Rated Supply Voltage



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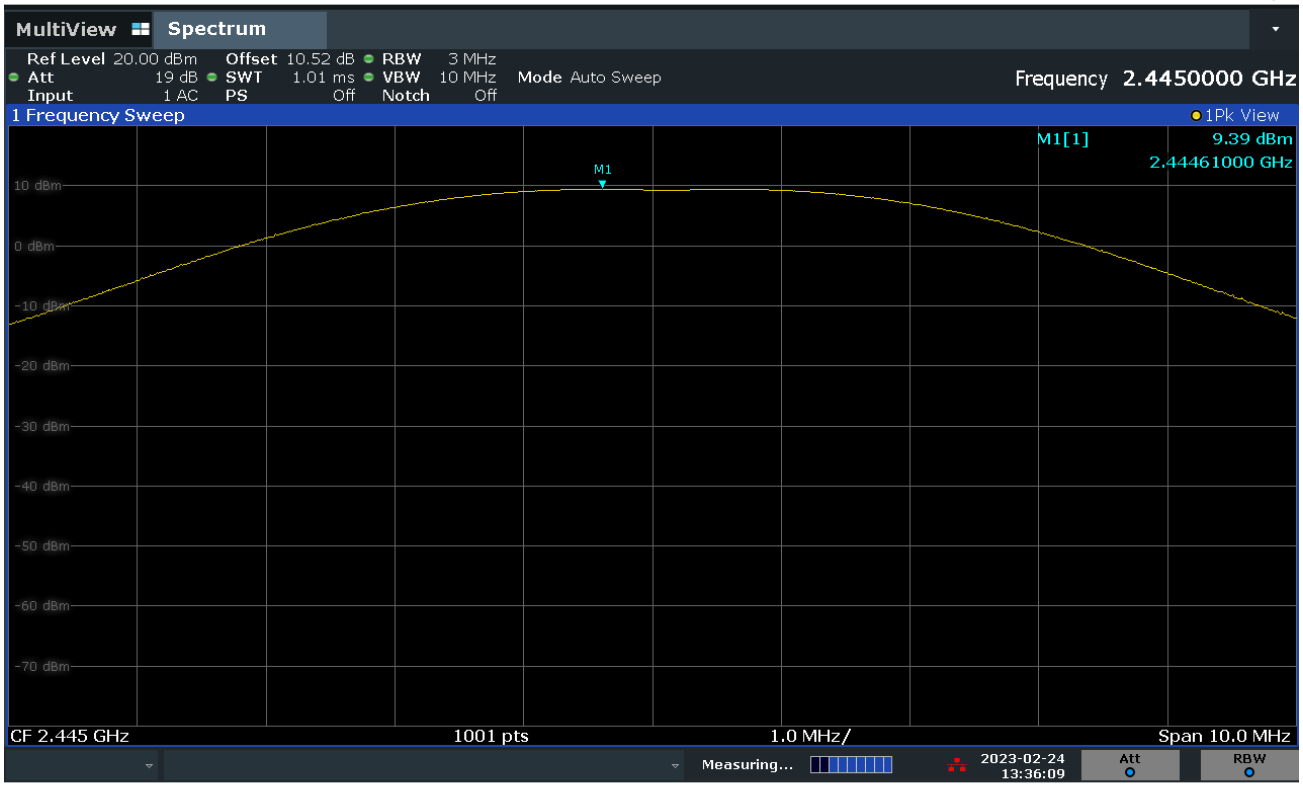

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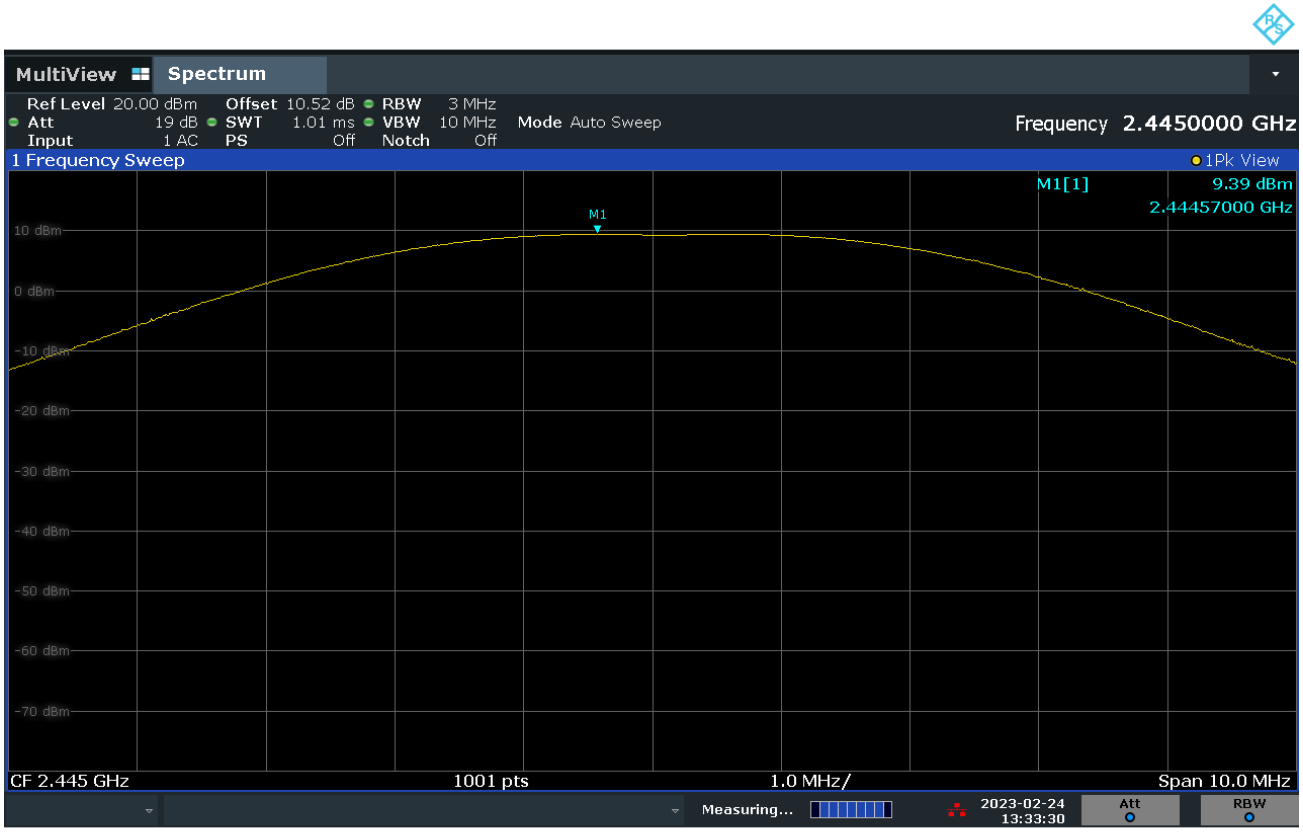

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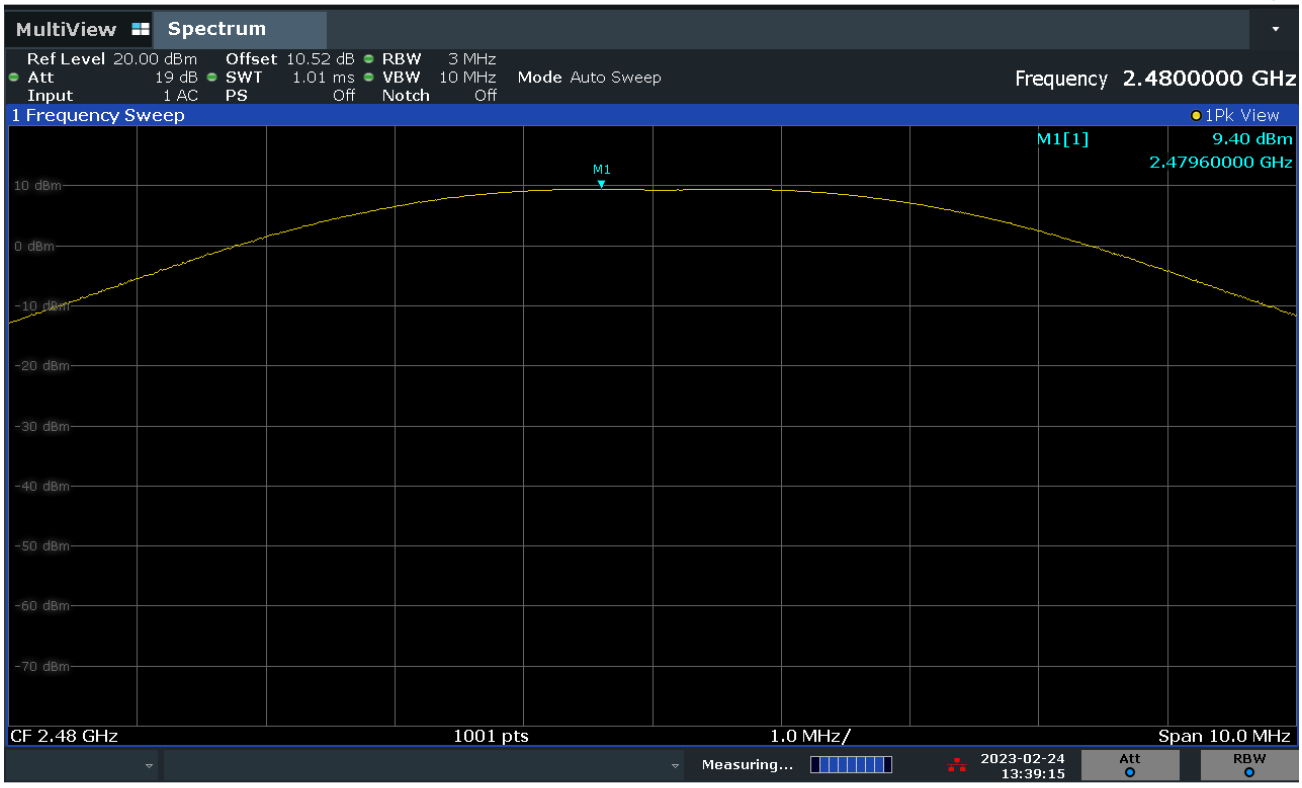
POWER OUTPUT	
Test Specification:	FCC Part 15, Subpart C, 15.247(b)(3), Power Output
Method:	ANSI C63.10, Section 11.9.1.1, Maximum Peak Conducted Output Power
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2480 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.2 ºC
Relative Humidity:	32.1 %
Maximum Power Output:	9.41 dBm

120 VAC Nominal Rated Supply Voltage



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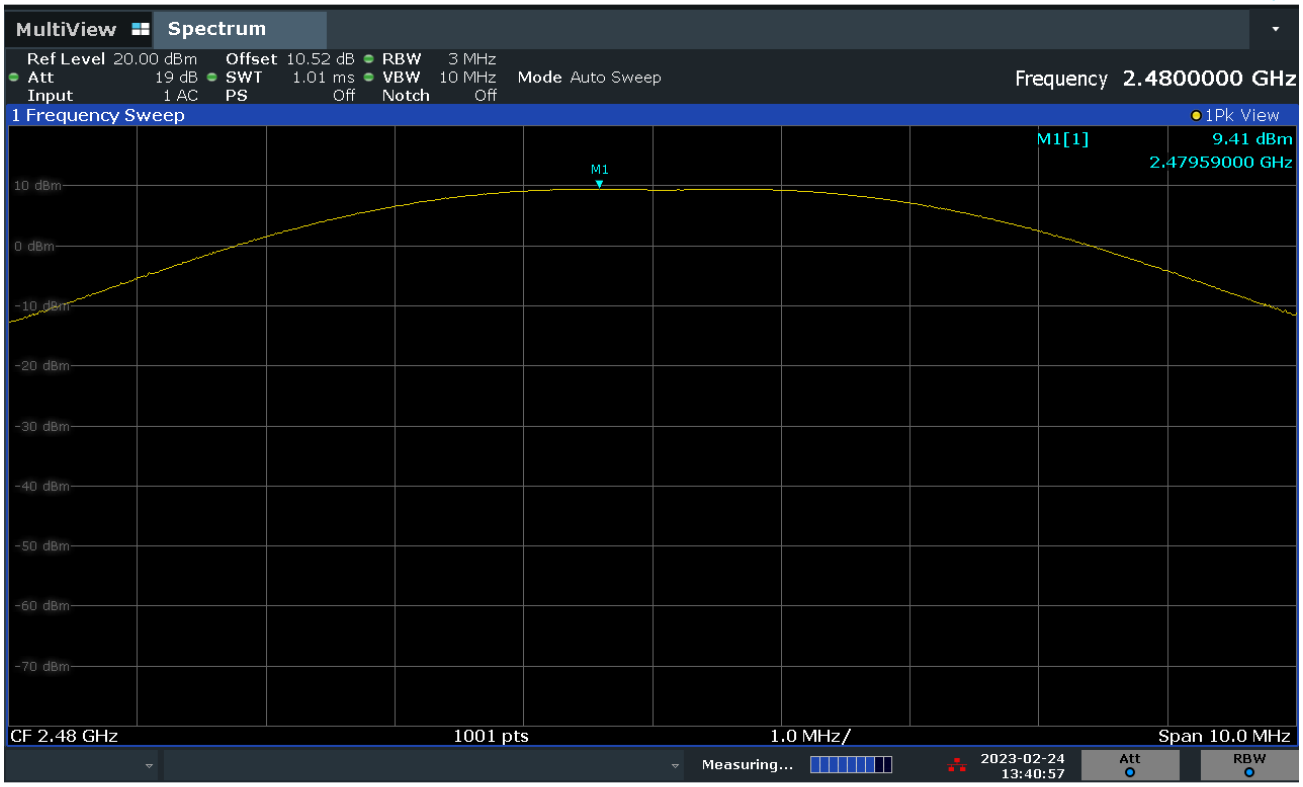
85% Nominal Rated Supply Voltage



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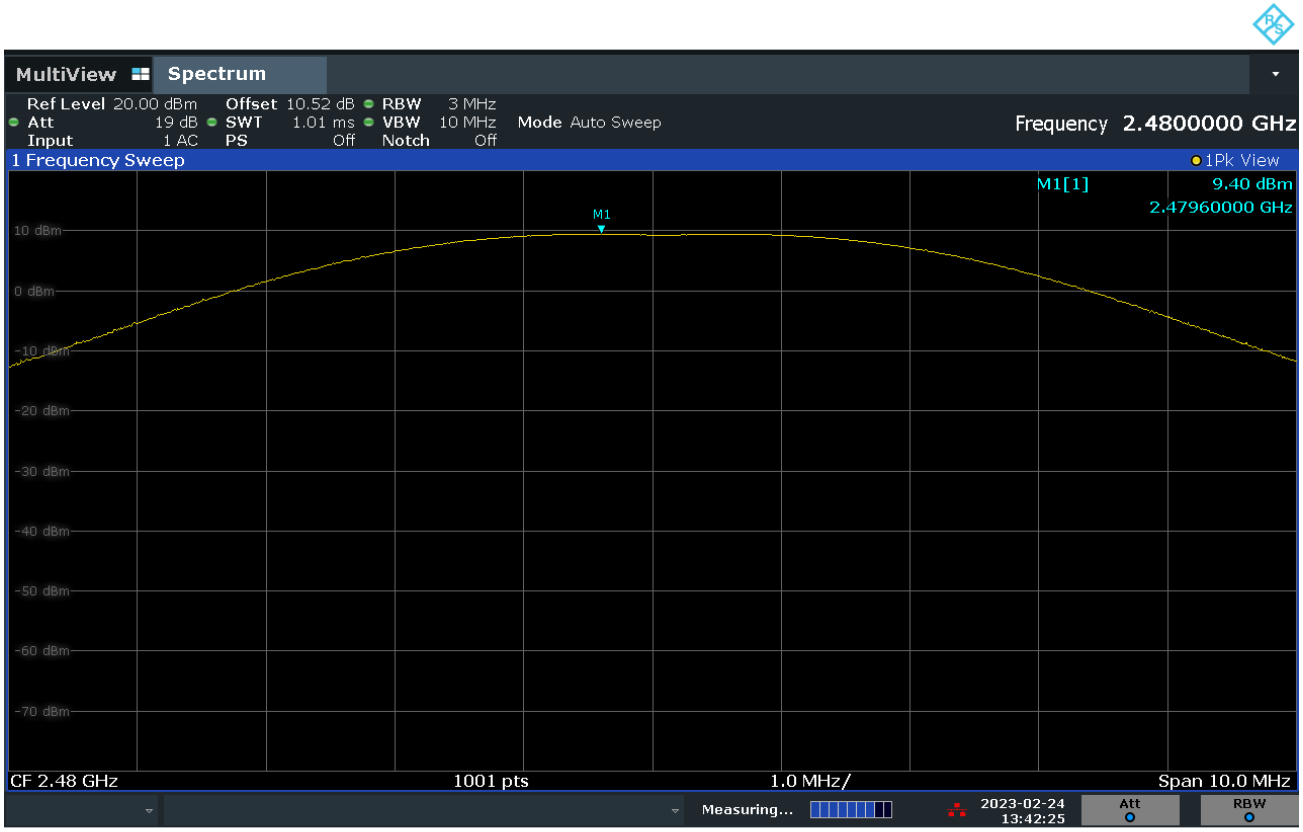

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Requirements and Test Results

Requirement: 15.247(b)(4), Antenna Gain
The conducted output power limit specified is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

- Results:
  The antenna utilized has a directional gain of 8.5 dBi. The power output limit has been reduced by 2.5 dB, the amount that the directional gain of the antenna exceeds 6 dBi.

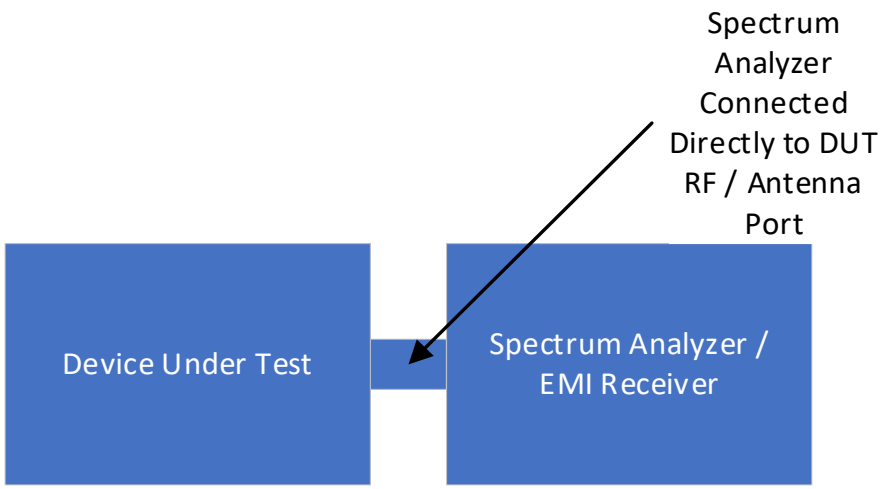
Requirements and Test Results

Requirement: 15.247(d), Out of Band Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) must also comply with the radiated emissions limits specified in Section 15.209(a) (see Section 15.205(c)).

- Results:
  In any 100 kHz bandwidth outside the frequency band in which the Spread spectrum intentional radiator was operating, the radio frequency power that was produced by the intentional radiator was at least 20 dB below that in the 100 kHz bandwidth within the band that contained the highest level of the desired power. All emissions, which fell within the restricted bands specified in 15.205(a), were measured and found to be in compliance with the limits specified in 15.209(a).

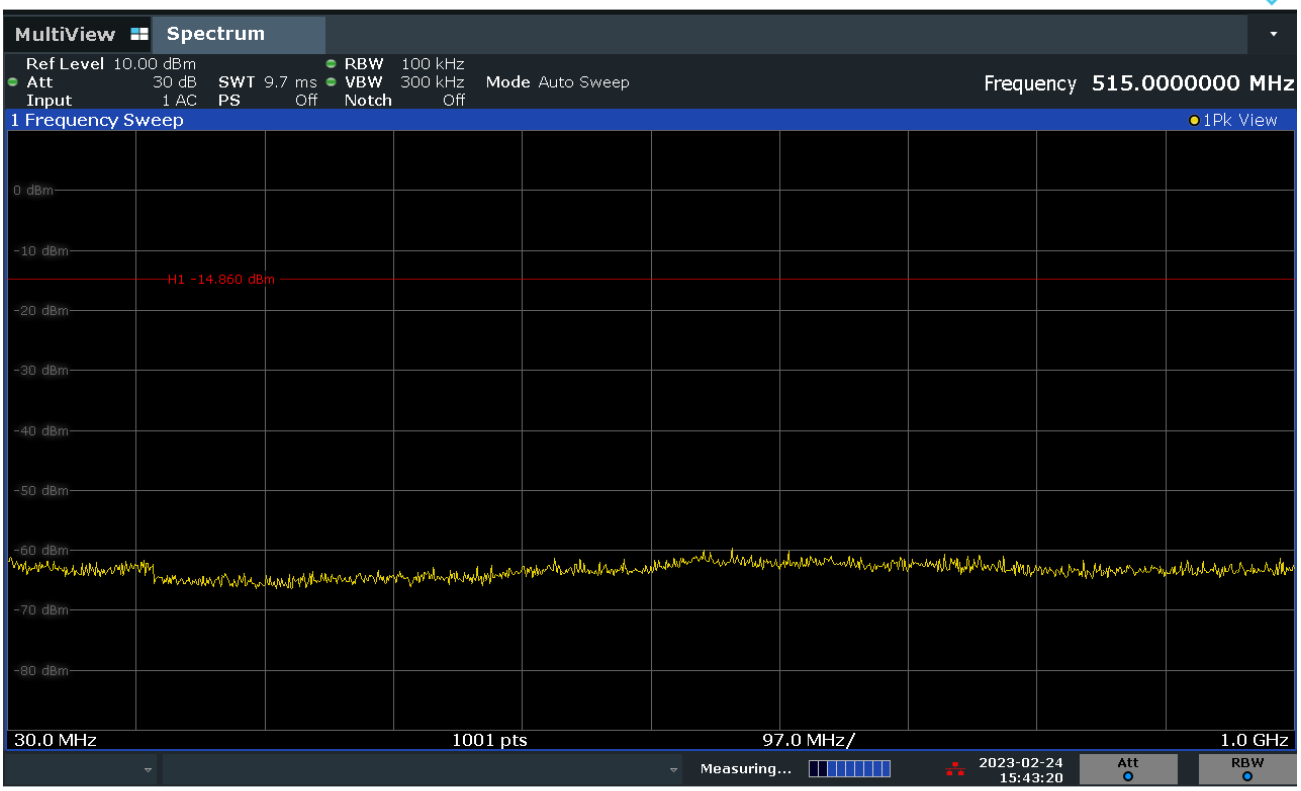
Out of Band Emissions - Conducted



EQUIPMENT LIST

EN	Manufacturer	Model No.	Description	Serial No.	Due Date
713	ROHDE & Schwarz	ESIB26	RECEIVER, EMI, 20 Hz - 26.5 GHz	834000/008	3/31/2023
8619	OMEGA	OM-73	HYGROMETER, -20 to 70 deg. C, 0-99% RH	051442102C	4/30/2023

OUT OF BAND EMISSIONS - CONDUCTED	
Test Specification:	FCC Part 15, Subpart C, 15.247(d), Antenna Conducted Emissions
Method:	ANSI C63.10, Section 11.11, Antenna-port conducted emission measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2405 MHz
Technician:	M. Nowak
Date(s):	2/24/22023
Temperature:	21.9 ºC
Relative Humidity:	50.4%



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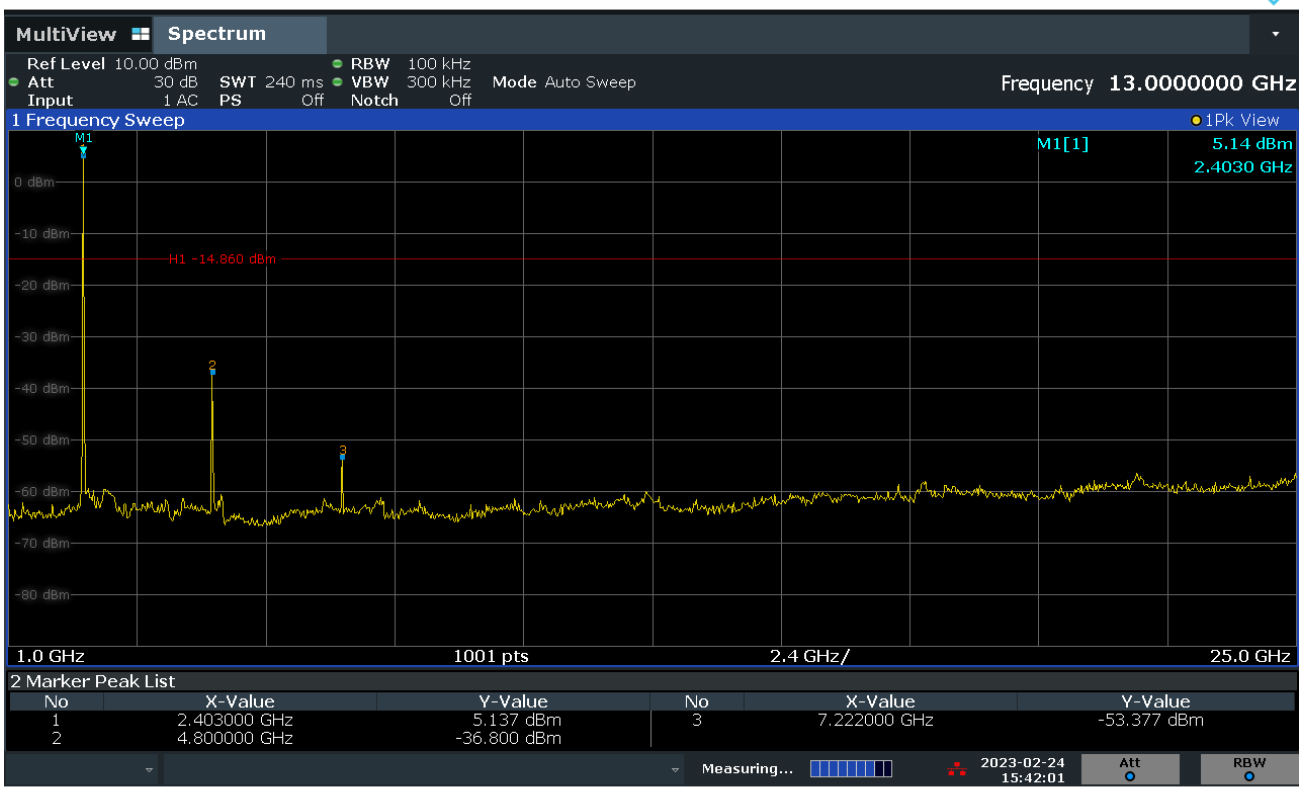

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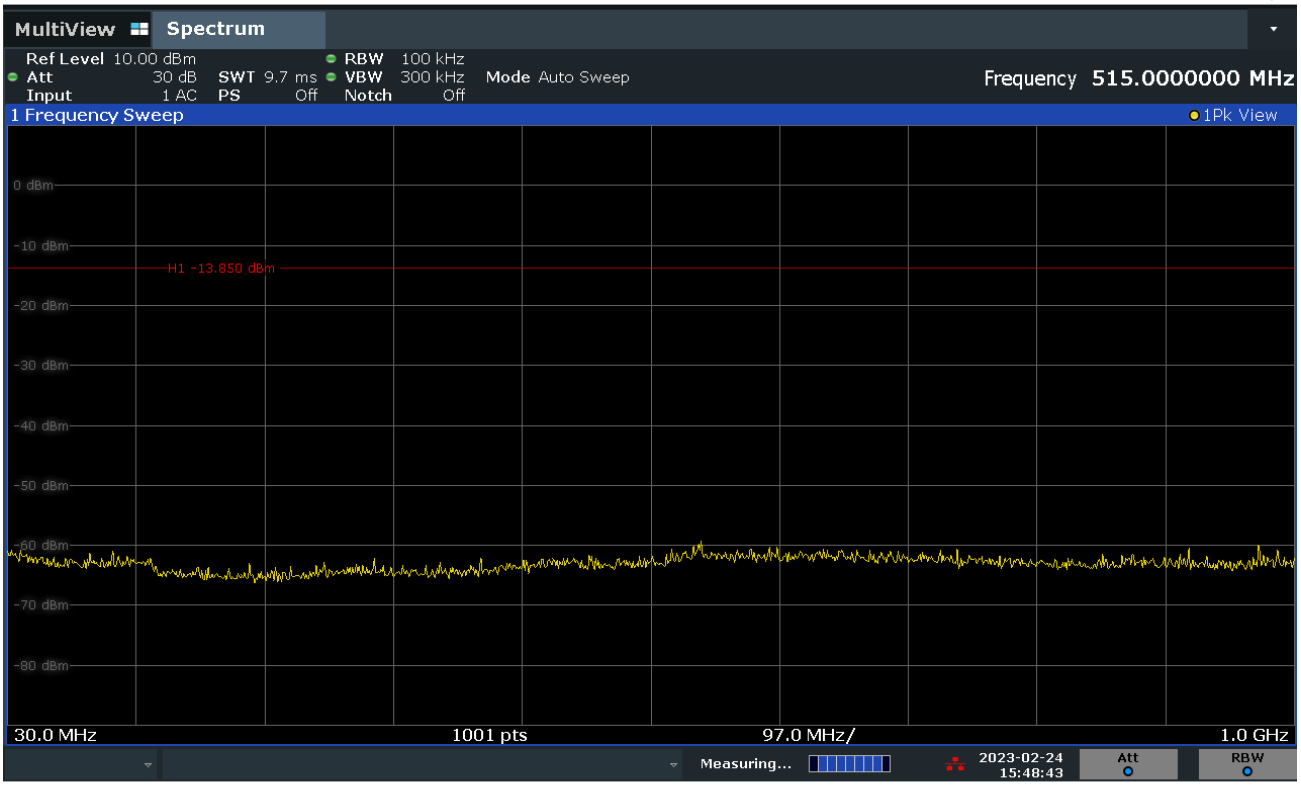
OUT OF BAND EMISSIONS - CONDUCTED	
Test Specification:	FCC Part 15, Subpart C, 15.247(d), Antenna Conducted Emissions
Method:	ANSI C63.10, Section 11.11, Antenna-port conducted emission measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2445 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.9 ºC
Relative Humidity:	50.4%



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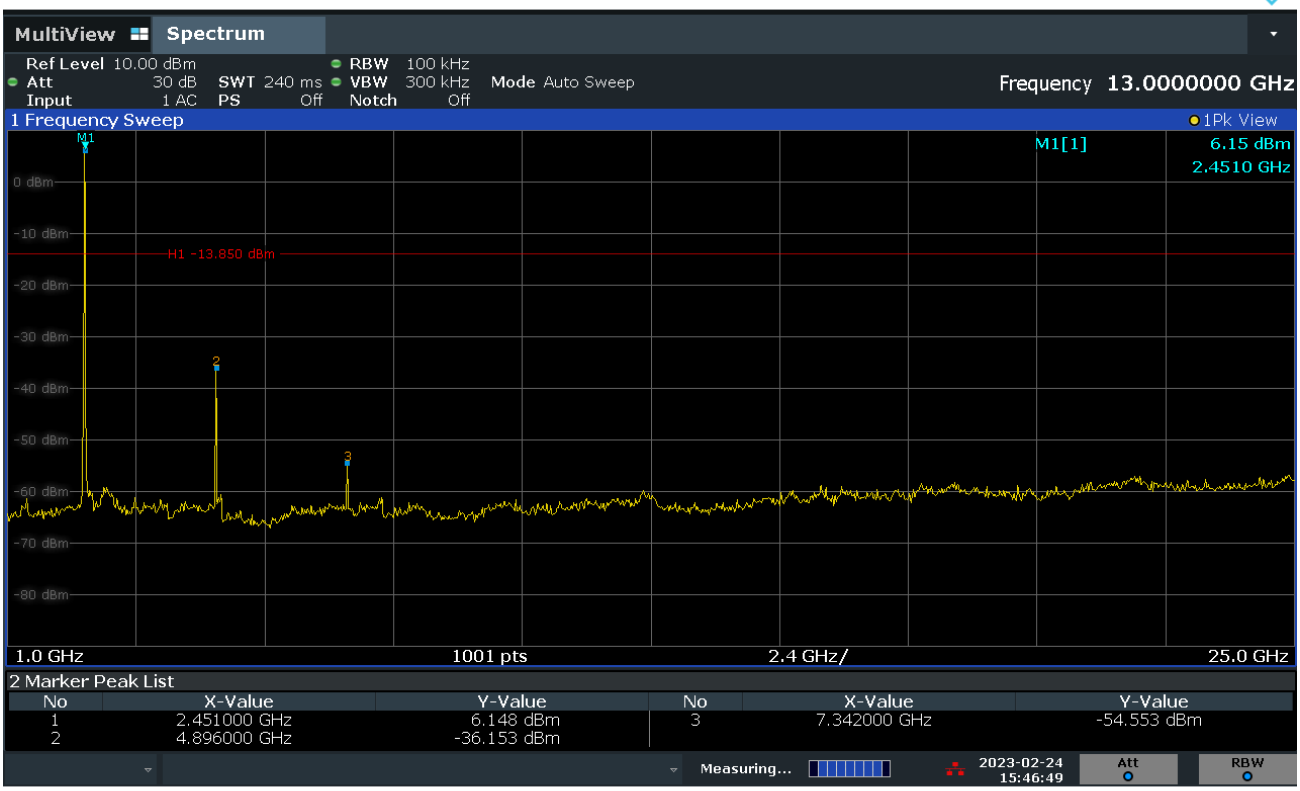

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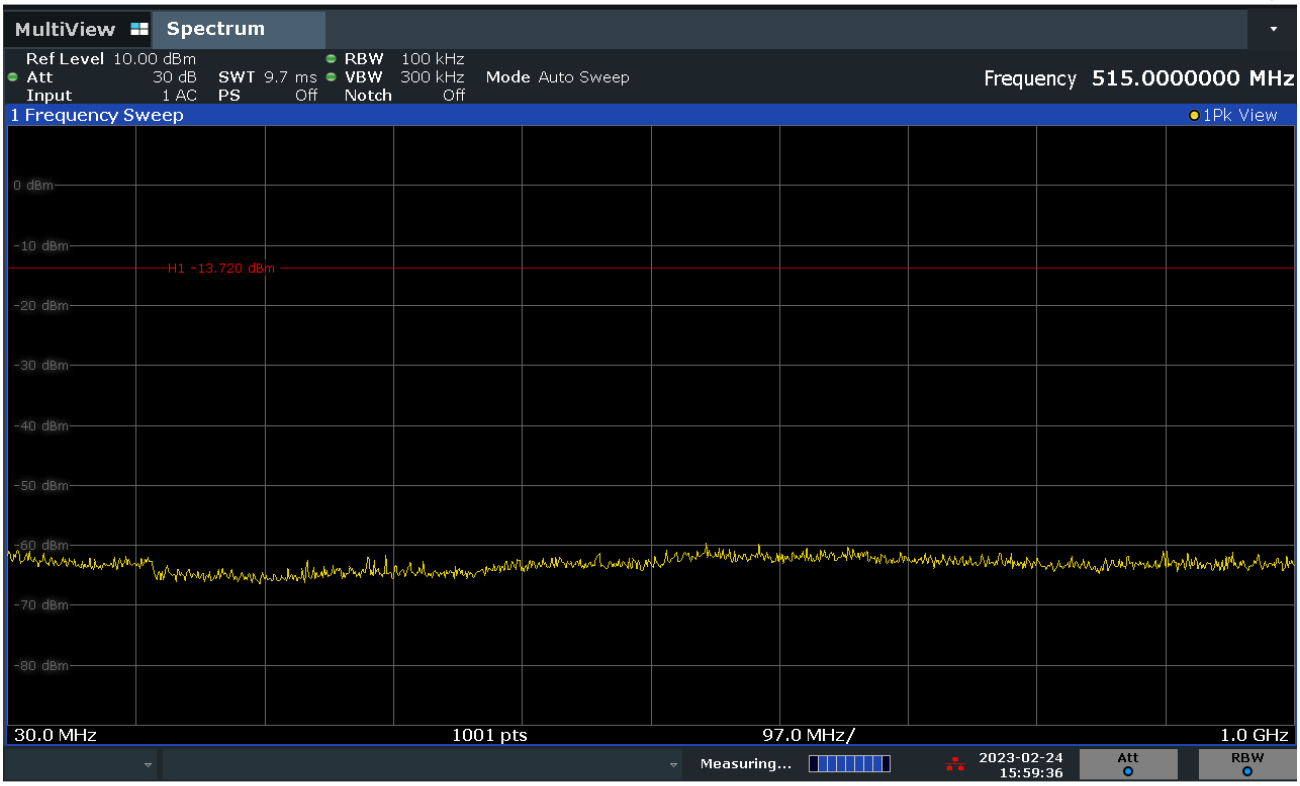
OUT OF BAND EMISSIONS - CONDUCTED	
Test Specification:	FCC Part 15, Subpart C, 15.247(d), Antenna Conducted Emissions
Method:	ANSI C63.10, Section 11.11, Antenna-port conducted emission measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2480 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.9 ºC
Relative Humidity:	50.4%



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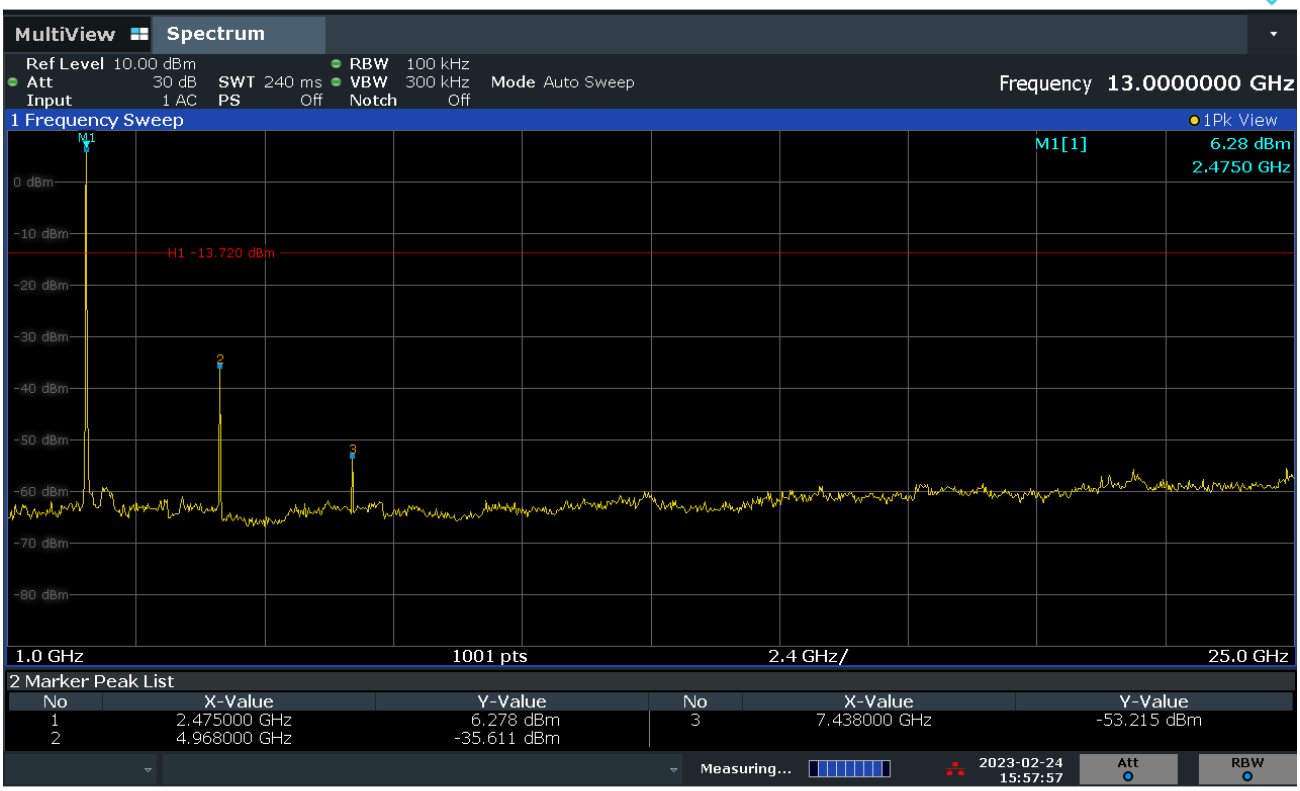

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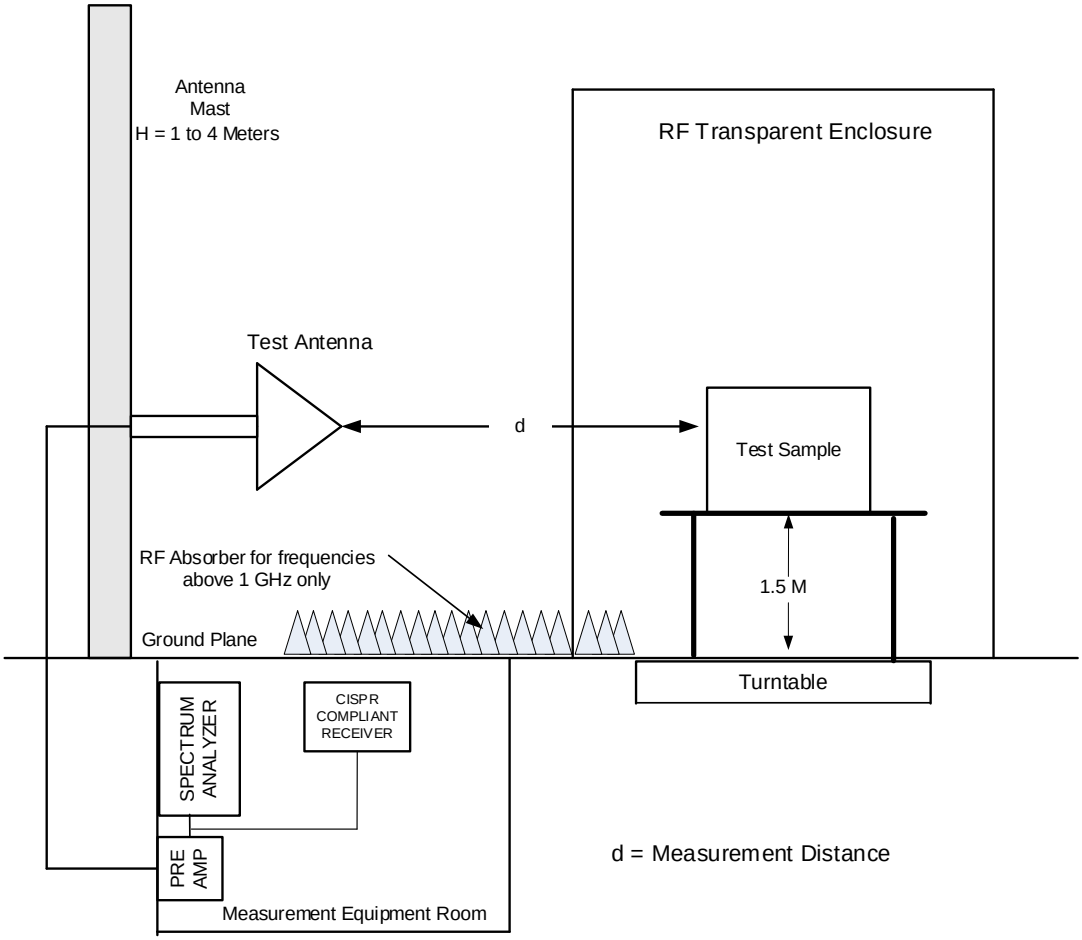
Out of Band Emissions – Radiated Emissions Restricted Bands and Band Edge



EQUIPMENT LIST

EN	Manufacturer	Model No.	Description	Serial No.	Due Date
8017	ETS / EMCO	3115	ANTENNA, DOUBLE RIDGED GUIDE, 1 - 18 GHz	2425	7/31/2024
8300	RETLIF	RPA	OPEN AREA TEST SITE, ATTENUATION, 3/10 Meter OATS	N/A	5/31/2024
8668	DIGI-SENSE	20250-31	HYGROMETER, 0 - 50 deg. c, 10 - 90 % RH	140908984	10/31/2023
8816	ROHDE &	ESW26	RECEIVER, EMI, 1 Hz - 26 GHz	103087	8/31/2023
8819	KOAXIS	NR11-KF210J-NR11-240	CABLE, COAXIAL, DC - 18 GHz	NSN	12/31/2023

OUT OF BAND EMISSIONS – RADIATED – RESTRICTED BANDS	
Test Specification:	FCC Part 15, Subpart C, 15.209, Radiated Spurious Emissions
Method:	ANSI C63.10, Section 11.12, Emissions in Restricted Frequency Bands, Radiated Emission Measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2405 MHz
Technician:	M. Nowak
Date(s):	2/27/2023
Temperature:	8.2 ºC
Relative Humidity:	27%

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
GHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
1.00							500
I							I
4.810	H / 1.50	180.0	11.8	36.3	48.1	254.10	I
4.810	V / 1.50	180.0	11.3	36.3	47.6	239.89	I
I							I
25.00							500

OUT OF BAND EMISSIONS – RADIATED – RESTRICTED BANDS	
Test Specification:	FCC Part 15, Subpart C, 15.209, Radiated Spurious Emissions
Method:	ANSI C63.10, Section 11.12, Emissions in Restricted Frequency Bands, Radiated Emission Measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2445 MHz
Technician:	M. Nowak
Date(s):	2/27/2023
Temperature:	8.2 ºC
Relative Humidity:	27%

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
GHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
1.00							500
I							I
4.890	H / 1.50	180.0	10.7	36.6	47.3	231.74	I
4.890	H / 1.50	180.0	16.3	36.6	52.9	441.58	I
I							I
7.343	H / 1.50	180.0	5.2	40.8	46.0	199.53	I
7.343	V / 1.50	180.0	5.2	40.8	46.0	199.53	I
I							I
25.00							500

OUT OF BAND EMISSIONS – RADIATED – RESTRICTED BANDS	
Test Specification:	FCC Part 15, Subpart C, 15.209, Radiated Spurious Emissions
Method:	ANSI C63.10, Section 11.12, Emissions in Restricted Frequency Bands, Radiated Emission Measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2480 MHz
Technician:	M. Nowak
Date(s):	2/27/2023
Temperature:	8.2 ºC
Relative Humidity:	27%

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
GHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
1.00							500
I							I
4.962	H / 1.50	180.0	14.4	36.7	51.1	358.93	I
4.962	V / 1.50	180.0	14.1	36.7	50.8	346.74	I
I							I
7.447	H / 1.50	180.0	5.4	40.9	46.3	206.54	I
7.447	V / 1.50	180.0	7.6	40.9	48.5	266.08	I
I							I
25.00							500

OUT OF BAND EMISSIONS – RADIATED – BAND EDGE	
Test Specification:	FCC Part 15, Subpart C, 15.209, Radiated Spurious Emissions
Method:	ANSI C63.4, Section 8, Radiated Emission Measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2405 MHz
Technician:	M. Nowak
Date(s):	2/27/2023
Temperature:	8.2 ºC
Relative Humidity:	27%
Notes: *Noise floor measurement, minimum sensitivity of measurement system.	

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
GHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
1.00							500
I							I
*2.390	H / 1.50	180.0	-2.5	31.0	28.5	26.61	I
I							I
25.00							500

OUT OF BAND EMISSIONS – RADIATED – BAND EDGE	
Test Specification:	FCC Part 15, Subpart C, 15.209, Radiated Spurious Emissions
Method:	ANSI C63.4, Section 8, Radiated Emission Measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2480 MHz
Technician:	M. Nowak
Date(s):	2/27/2023
Temperature:	8.2 ºC
Relative Humidity:	27%
Notes: *Noise floor measurement, minimum sensitivity of measurement system.	

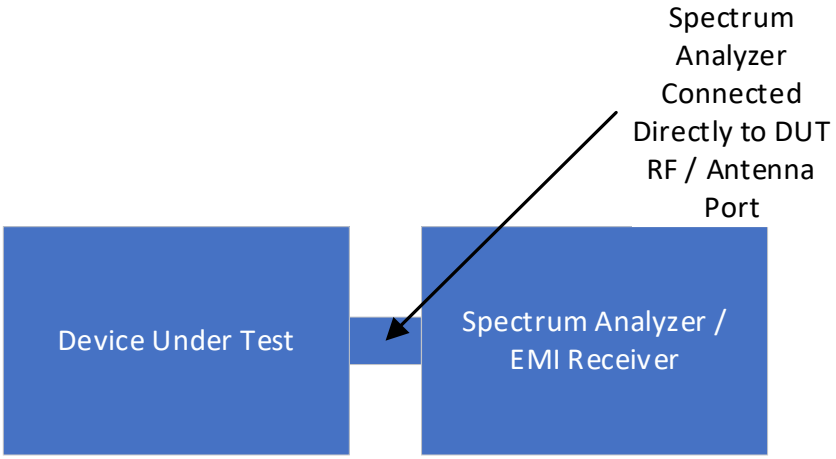
Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
GHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
1.00							500
I							I
*2.4835	H / 1.50	180.0	-2.3	30.9	28.6	26.92	I
I							I
25.00							500

Requirements and Test Results

Requirement: 15.247(e), Power Spectral Density

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power was used to determine the power spectral density.

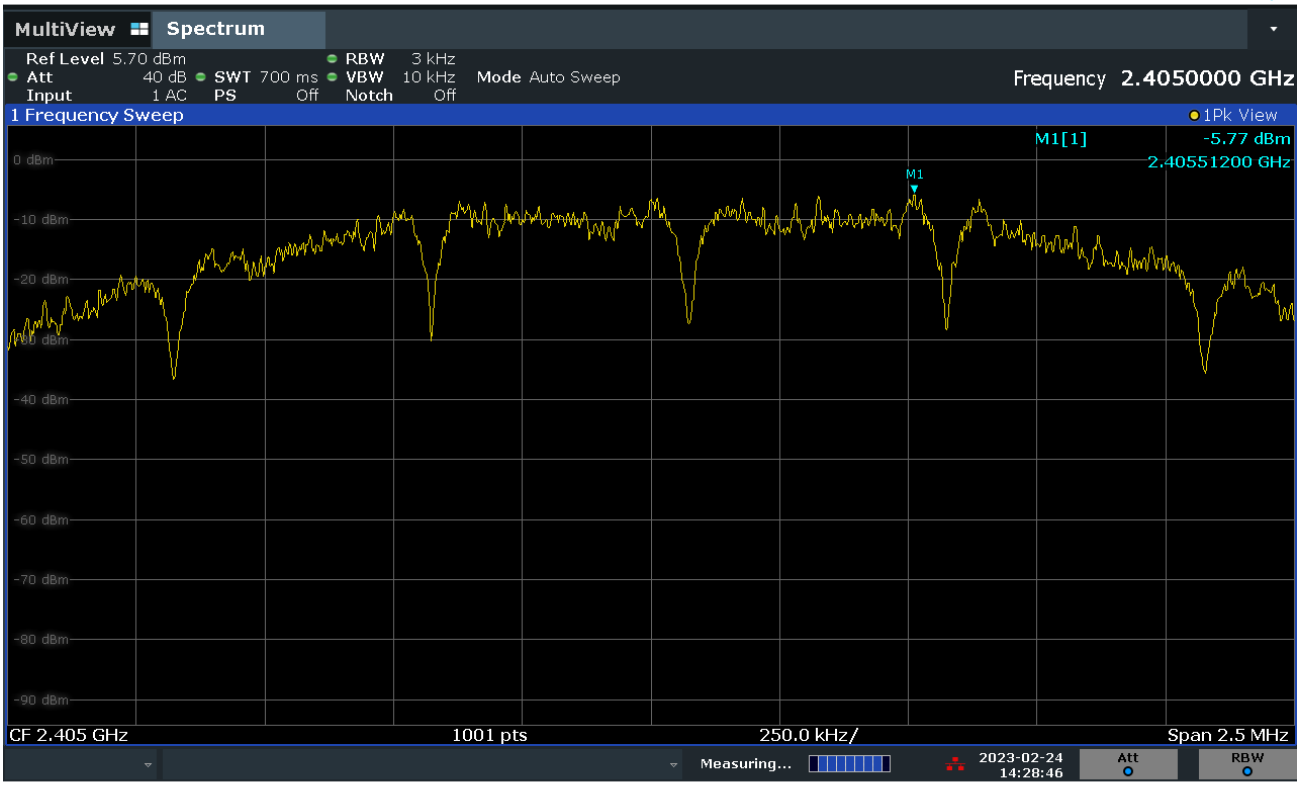
- **Results:**
  The power spectral density conducted from the intentional radiator to the antenna was not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density was determined in accordance with Section 15.247(b)(3), herein. The same method of determining the conducted output power was used to determine the power spectral density.



EQUIPMENT LIST

EN	Manufacturer	Model No.	Description	Serial No.	Due Date
713	ROHDE & Schwarz	ESIB26	RECEIVER, EMI, 20 Hz - 26.5 GHz	834000/008	3/31/2023
8619	OMEGA	OM-73	HYGROMETER, -20 to 70 deg. C, 0-99% RH	051442102C	4/30/2023

POWER SPECTRAL DENSITY	
Test Specification:	FCC Part 15, Subpart C, 15.247(e), Power Spectral Density
Method:	ANSI C63.10, Section 11.10.2, Maximum power spectral density in the fundamental emission
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2405 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.2 ºC
Relative Humidity:	32.1 %
Power Spectral Density:	-5.77 dBm



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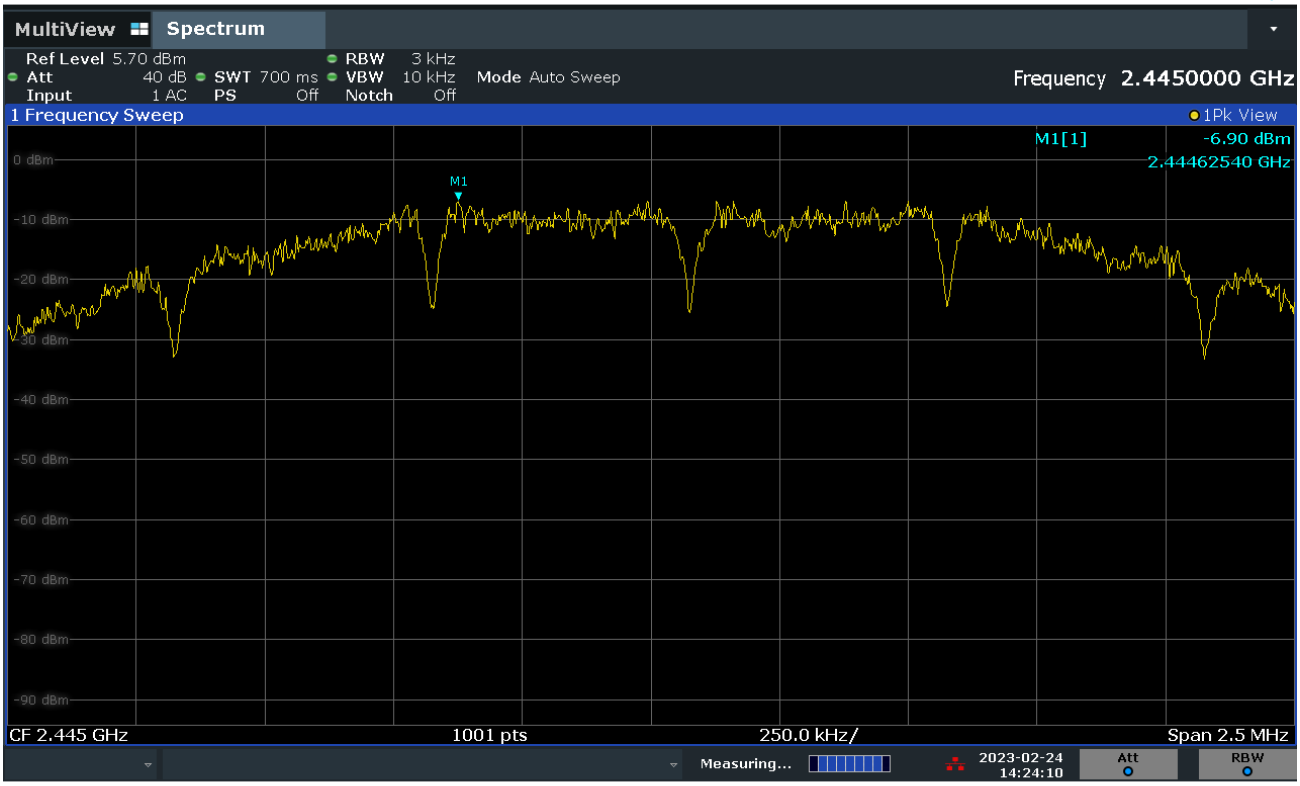
POWER SPECTRAL DENSITY	
Test Specification:	FCC Part 15, Subpart C, 15.247(e), Power Spectral Density
Method:	ANSI C63.10, Section 11.10.2, Maximum power spectral density in the fundamental emission
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2445 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.2 ºC
Relative Humidity:	32.1 %
Power Spectral Density:	-6.90 dBm



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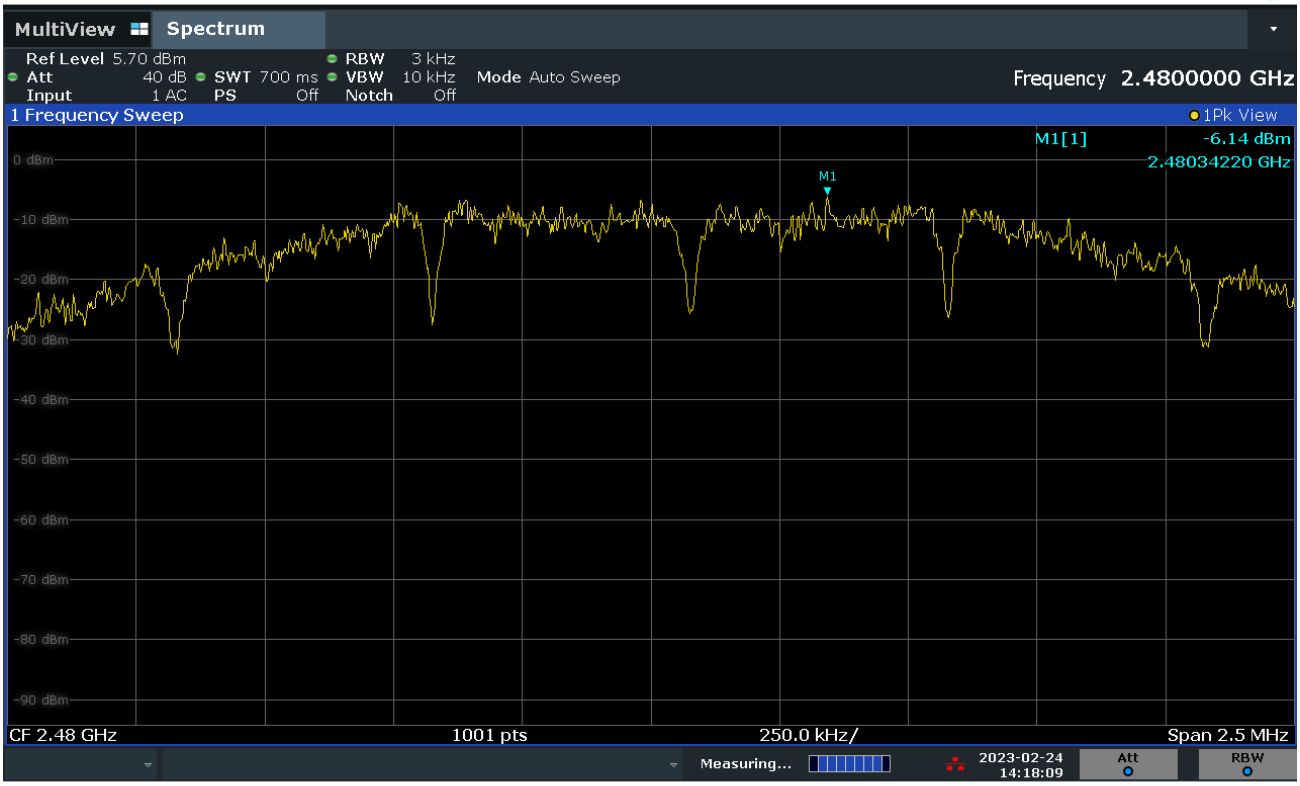
POWER SPECTRAL DENSITY	
Test Specification:	FCC Part 15, Subpart C, 15.247(e), Power Spectral Density
Method:	ANSI C63.10, Section 11.10.2, Maximum power spectral density in the fundamental emission
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F
Serial Number:	6101142365-009
Operating Mode:	Transmitting at 2480 MHz
Technician:	M. Nowak
Date(s):	2/24/2023
Temperature:	21.2 ºC
Relative Humidity:	32.1 %
Power Spectral Density:	-6.14 dBm



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Requirements and Test Results

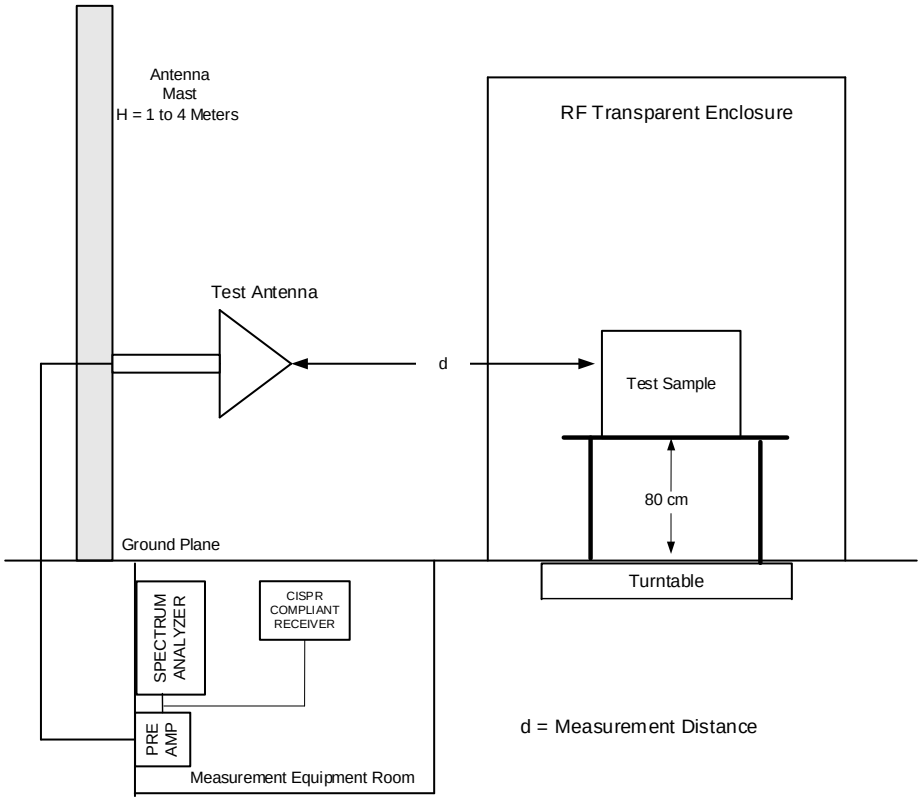
Requirement: 15.109(a)/ 15.209(a), Radiated Emissions, General Requirements

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 1.

Table 1 - Radiated Emission Limits

Frequency of Emission (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 to 88	100	3
88 to 216	150	3
216 to 960	200	3
Above 960	500	3

- Results:
  The field strength of spurious radiated emissions did not exceed the limits specified in Table 1.



EQUIPMENT LIST

EN	Manufacturer	Model No.	Description	Serial No.	Due Date
127A	ETS / EMCO	3104	ANTENNA, BICONICAL, 20 - 200 MHz	2319	12/31/2023
8080	ROHDE &	354-3000.56ESVP	RECEIVER, EMI, 20 - 1300 MHz	861744/015	12/31/2022
8300	RETLIF	RPA	OPEN AREA TEST SITE, ATTENUATION, 3/10 Meter OATS	N/A	5/31/2024
8300C	UNKNOWN	3 METER CABLE	CABLE, COAXIAL, 3/10 METER	N/A	8/31/2022
8644	AGILENT / HP	85662A	ANALYZER, SPECTRUM, 100 Hz - 22 GHz	2848A18175	9/30/2022
8644A	AGILENT / HP	8566B	ANALYZER, SPECTRUM, 100 Hz - 22.5 GHz	2937A06124	9/30/2022
8644B	AGILENT / HP	85685A	ANALYZER, RF PRESELECTOR, 20 Hz - 2 GHz	2724A00532	9/30/2022
8662	DIGI-SENSE	20250-30	HYGROMETER, 0 - 50 deg. c, 10 - 90 % RH	151210305	10/31/2022
8808	ETS / EMCO	3147	ANTENNA, LOG PERIODIC, 200 MHz - 5 GHz	00244881	9/30/2023

RADIATED EMISSIONS TEST DATA SHEET	
Test Specification:	FCC Part 15, Subpart C, Section 15.209(a), Radiated Emissions
Method:	ANSI C63.4, Section 8, Radiated Emission Measurements, 30 MHz to 1GHz
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F; D0014165 (P/S); 84073579
Serial Number:	6101142365-009; 220000000000217565 (P/S); EUT 2
Operating Mode:	Radio Transmitting at 2445 MHz
Technician:	M. Nowak
Date(s):	8/12/22
Temperature:	21.9 ºC
Relative Humidity:	50.4%
Detector:	Quasi-Peak
Test Distance:	3m

Notes: The frequency range was scanned from 30 MHz to 1 GHz
The emissions observed from the EUT do not exceed the specified limits. The six highest readings relative to the limit are presented.
*Noise floor measurement, minimum sensitivity of measurement system.

Frequency	Antenna Pol /Height	EUT Orientation	Meter Reading	Correction Factor	Corrected Reading	Converted Reading	Limit
MHz	(V/H) / (m)	Degrees	dBuV	dB	dBuV/m	uV/m	uV/m
30.00							100
I							I
*38.00	H / 1.00	180.0	2.2	12.8	15.0	5.63	I
I							I
88.00							100
88.00							150
I							I
*110.00	H / 1.00	180.0	4.9	13.4	18.3	8.26	I
I							I
*195.00	H / 1.00	180.0	7.2	19.1	26.3	20.66	I
I							I
216.00							150
216.00							200
I							I
*220.00	H / 1.00	180.0	7.5	13.1	20.6	10.72	I
I							I
*605.00	H / 1.00	180.0	2.2	23.5	25.7	19.28	I
I							I
960.00							200
960.00							500
I							I
*995.00	H / 1.00	180.0	3.8	29.3	33.1	45.19	I
I							I
1000.00							500

Requirements and Test Results

Requirement: 15.207(a) Conducted Limits

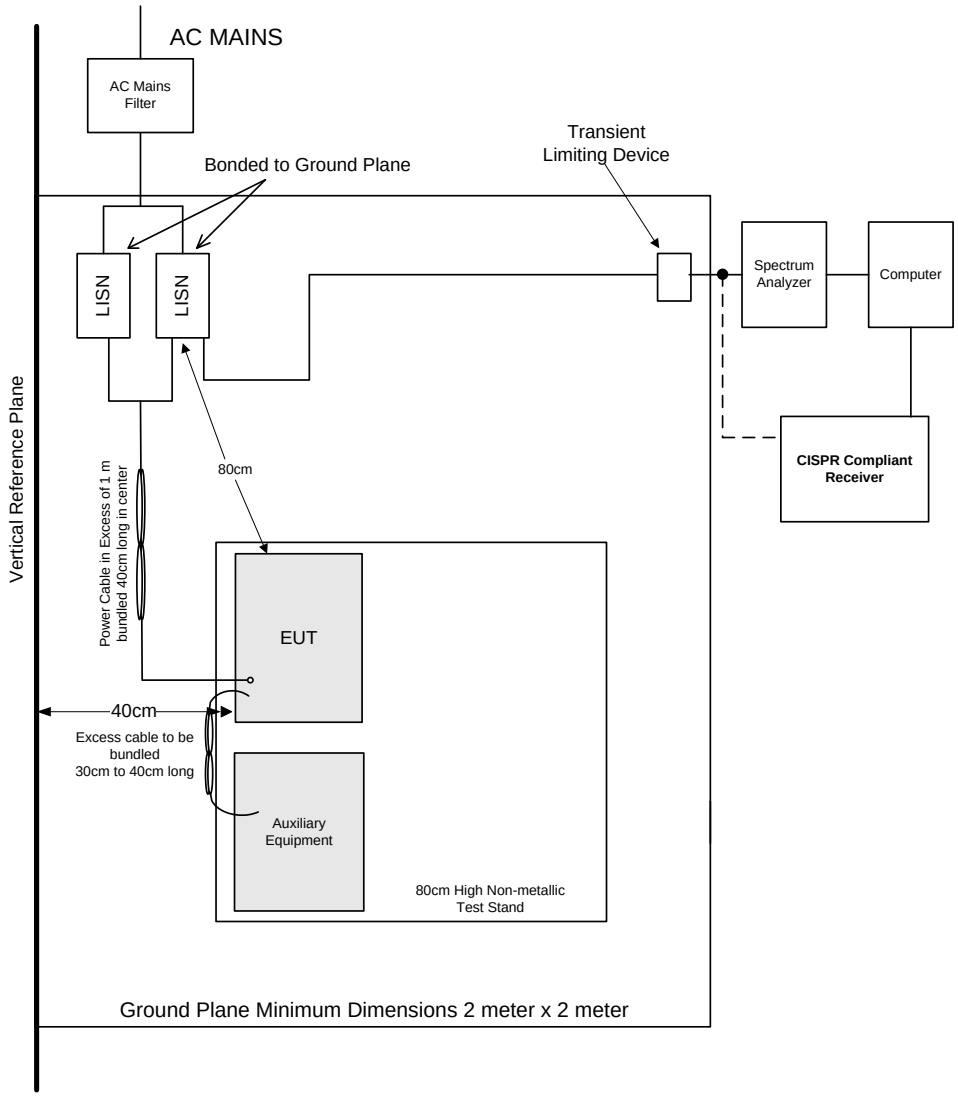
For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits shown in Table 2, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of the 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 the frequency ranges.

Table 2 - Conducted Emission Limits

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	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 frequency

- Results:
  The AC line conducted emissions did not exceed the limits specified in Table 2.



EQUIPMENT LIST

EN	Manufacturer	Model No.	Description	Serial No.	Due Date
8079	ROHDE &	ESH3	RECEIVER, EMI, 9 kHz - 30 MHz	861742/012	6/30/2023
8366A	RETLIF	20' BNC	CABLE, COAXIAL, 10 KHz - 1 GHz	n/a	5/31/2023
8496	NARDA MICROWAVE	768-10	ATTENUATOR, COAXIAL, 10 dB, DC - 11 GHz, 20 W	04105	6/30/2023
8633	SOLAR ELECTRONICS	21106-50-BP-25-BNC	LISN, 50 uH, 150 kHz - 30 MHz	21106141201	6/30/2023
8634	SOLAR ELECTRONICS	21106-50-BP-25-BNC	LISN, 50 uH, 150 kHz - 30 MHz	21106141202	6/30/2023
8750	RIGOL	DSA832E	ANALYZER, SPECTRUM, 9 kHz - 3.2 GHz	DSA8H202100157	5/31/2023

EMISSIONS TEST DATA SHEET	
Test Specification:	FCC Part 15, Subpart C, 15.207(a), Conducted Limits
Method:	ANSI C63.4, Section 7., AC power-line conducted emission measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F; D0014165 (P/S); 84073579
Serial Number:	6101142365-009; 220000000000217565 (P/S); EUT 2
Operating Mode:	Radio Transmitting at 2445 MHz
Technician:	M. Nowak
Date(s):	8/8/22
Temperature:	23.3 ºC
Relative Humidity:	52.1%
Lead Tested:	120 VAC, 60 Hz, Hot

The frequency range was scanned from 0.15 MHz to 30 MHz
The six highest emissions relative to the limit are presented.
The emissions observed from the EUT do not exceed the specified limits.

Frequency	Detector	Meter Reading	Total Correction Factor	Corrected Reading	Limit	Margin
MHz	**–**	**dBµV**	**dB**	**dBµV**	**dBµV**	**dB**
0.1527	Peak	42.4	10.1	52.5*	–	–
0.1527	Quasi-Peak	25.7	10.1	35.8	65.9	30.1
0.1527	Average	1.0	10.1	11.1	55.9	44.8
0.1854	Peak	43.5	10.1	53.6*	–	–
0.1854	Quasi-Peak	39.2	10.1	49.3	64.2	14.9
0.1854	Average	6.5	10.1	16.6	54.2	37.6
0.2075	Peak	41.0	10.2	51.2*	–	–
0.2075	Quasi-Peak	36.1	10.2	46.3	63.3	17.0
0.2075	Average	8.1	10.2	18.3	53.3	35.0
0.2593	Peak	36.3	10.2	46.5*	–	–
0.2593	Quasi-Peak	28.5	10.2	38.7	61.5	22.8
0.2593	Average	11.3	10.2	21.5	51.5	30.0
8.2640	Peak	35.5	10.4	45.9*	–	–
8.2640	Quasi-Peak	26.1	10.4	36.5	60.0	23.5
8.2640	Average	10.5	10.4	20.9	50.0	29.1
9.0272	Peak	35.3	10.4	45.7*	–	–
9.0272	Quasi-Peak	26.5	10.4	36.9	60.0	23.1
9.0272	Average	13.7	10.4	24.1	50.0	25.9

* Peak measurements are recorded for informational purposes only.

EMISSIONS TEST DATA SHEET

Test Specification:	FCC Part 15, Subpart C, 15.207(a), Conducted Limit
Method:	ANSI C63.4, Section 7., AC power-line conducted emission measurements
Job Number/Customer:	R-3578P-6A / Siemens Mobility
Test Sample:	2.4 GHz ZRadio System, Train to Wayside Communications
Model Number:	S25442-B58-A2-1.F; D0014165 (P/S); 84073579
Serial Number:	6101142365-009; 220000000000217565 (P/S); EUT 2
Operating Mode:	Radio Transmitting at 2445 MHz
Technician:	M. Nowak
Date(s):	8/8/22
Temperature:	23.3 ºC
Relative Humidity:	52.1%
Lead Tested:	120 VAC, 60 Hz, Neutral

The frequency range was scanned from 0.15 MHz to 30 MHz
The six highest emissions relative to the limit are presented.
The emissions observed from the EUT do not exceed the specified limits.

Frequency	Detector	Meter Reading	Total Correction Factor	Corrected Reading	Limit	Margin
MHz	**–**	**dBµV**	**dB**	**dBµV**	**dBµV**	**dB**
0.1527	Peak	44.8	10.1	54.9*	–	–
0.1527	Quasi-Peak	25.8	10.1	35.9	65.9	30.0
0.1527	Average	0.7	10.1	10.8	55.9	45.1
0.1838	Peak	43.9	10.1	54.0*	–	–
0.1838	Quasi-Peak	39.1	10.1	49.2	64.3	15.1
0.1838	Average	5.2	10.1	15.3	54.3	39.0
0.2025	Peak	41.5	10.2	51.7*	–	–
0.2025	Quasi-Peak	37.0	10.2	47.2	63.5	16.3
0.2025	Average	9.8	10.2	20.0	53.5	33.5
0.5303	Peak	34.6	10.2	44.8*	–	–
0.5303	Quasi-Peak	29.0	10.2	39.2	56.0	16.8
0.5303	Average	22.3	10.2	32.5	46.0	13.5
7.9073	Peak	34.2	10.4	44.6*	–	–
7.9073	Quasi-Peak	23.8	10.4	34.2	60.0	25.8
7.9073	Average	11.7	10.4	22.1	50.0	27.9
9.5184	Peak	32.9	10.4	43.3*	–	–
9.5184	Quasi-Peak	23.2	10.4	33.6	60.0	26.4
9.5184	Average	8.9	10.4	19.3	50.0	30.7

* Peak measurements are recorded for informational purposes only.