

SENSUS METERING SYSTEMS INC. TEST REPORT

SCOPE OF WORK

RADIO TESTING – C2PC SDBSNUSCM1 / 2220A-SNUSCM1 – PART 22/RSS-132

REPORT NUMBER

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RADIO TEST REPORT

Report Number: 106310015ATL-007A

Project Number: G106310015

Report Revision Date: 05 March 2026

PMN: SNUSCM1

Model/HVIN: GM02S

FCC ID: SDBSNUSCM1

IC: 2220A-SNUSCM1

Standards: 47 CFR Part 22, Subpart H
RSS-132, Issue 4
ANSI C63.26-2015
RSS-GEN, Issue 5

Test Location

Intertek
1950 Evergreen Blvd., Suite 100
Duluth, GA 30096 USA
FCC Designation: US1046
ISED CAB Designator: US0128
ISO 17025 A2LA Accreditation: 1455.01

Client

Sensus Metering Systems Inc.
639 Davis Drive
Morrisville, NC 27560 USA

Report prepared by



Jeremy Pickens / Senior Staff Engineer

Report reviewed by



Michael Carlson / Staff Engineer

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1 Introduction and Conclusion

The tests indicated in Section 2 were performed on the product constructed as described in Section 4. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

2 Test Summary

Section	Test Description	Test Specification		Result
		FCC Rule Part	ISED RSS	
6	RF Output Power	2.1046 22.913	RSS-GEN S6.12 RSS-132 S5.4	Compliant
7	Spurious Emissions at Antenna Terminals	2.1051 22.355	RSS-Gen S6.13 RSS-132 S5.5	Compliant
8	Field Strength of Spurious Emissions	2.1053 22.917	RSS-Gen S6.13 RSS-132 S5.5	Compliant

3 Client Information

This evaluation was performed at the request of:

Client: Sensus Metering Systems Inc.
639 Davis Drive
Morrisville, NC 27560 USA

Contact: James Francisco

Email: James.Francisco@xylem.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Sensus Metering Systems Inc.
639 Davis Drive
Morrisville, NC 27560 USA

Equipment Under Test			
Description	Manufacturer	Model Number (HVIN)	Serial Number
Transceiver Module	Sensus Metering Systems Inc.	525M	125852894 ¹ 125852916 ²
Cellular Modem	Sequans	GM02S	IMEI: 359197352743240 ¹ IMEI: 359197352743042 ²

- 1) Conducted Measurements
- 2) Radiated Measurements

Receive Date:	03 September 2025
Received Condition:	Good
Type:	Production

Description of Equipment Under Test

The equipment under test was the 525M SmartPoint that incorporates a Sensus FLEXNET 900MHz transceiver, a sub-GHz 902-928MHz DTS transceiver, and a Cat M / NBIoT cellular modem. The device does not support simultaneous transmission among the radios.

The SmartPoint® 525M pit set module is a radio transceiver designed for use in submersible, pit set environments. With true two-way communication ability, it serves as a walk-by end point, drive-by end point, fixed-base end point or any combination of those. This versatility gives you highly flexible data collection options and simplifies both current operations and network evolution.

Certification Purpose

This test report is to support a Class II Permissive Change of the cellular modem to address a trace layout change to an onboard antenna. Testing related to the sub-GHz radios are documented in separate test reports.

Equipment Under Test Power Configuration

Rated Voltage	Rated Current	Rated Frequency	Number of Phases
3.65Vdc	1.1A	NA	NA

Operating modes of the EUT

No.	Descriptions of EUT Exercising
1	The on-board eSIM was programmed as a test SIM. Using FieldLogic NAMU software, commands were sent over USB and then over the air via an NFC Smart Card Reader. The EUT was configured in a regulatory mode to allow constant connection to a CMW-500 communications test set. The CMW was used to control the band, channel, and force the radio to transmit at max power.

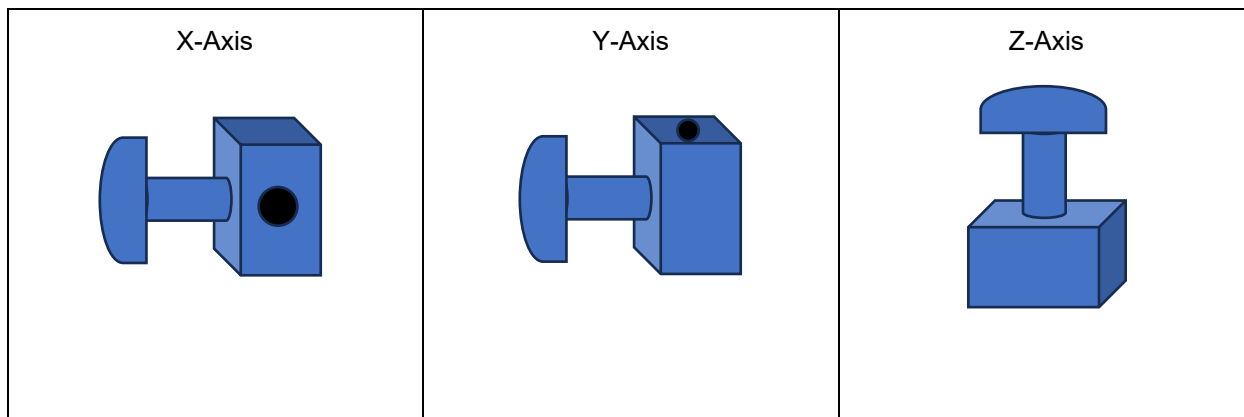
Test Channels						
FCC Rule Part	ISED RSS	LTE Band	Frequency Band (MHz)	Channel Location	Test Frequency (MHz)	
					CatM	NBLoT
Part 22H	RSS-132	5	824 - 849	Low	826.5	824.2
				Middle	836.5	836.5
				High	846.5	848.8

Software used by the EUT

No.	Description of Control Software
1	FieldLogic NAMU 2.4.34.14

Radio/Receiver Characteristics (Band 5)	
Frequency Ranges	824-849MHz
Modulation Type(s)	CatM: QPSK / 16QAM NBLoT: $\pi/2$ BPSK / $\pi/4$ QPSK
Maximum Output Power (Conducted):	25dBm (0.316W) – Including tune up tolerance
Power Setting	Max
MIMO Information (# of Transmit and Receive antenna ports)	1 (SISO)
Equipment Type	Full Module
Antenna Type and Gain	PCB Patch Antenna (+0.7dBi)

Note: The worst-case CatM configuration from the original certification was QPSK modulation and 1RB Pos 0. For NBLoT, the worst-case setting was QPSK modulation and 3 tones with 15kHz BW. The worst-case orientation for radiated field strength measurements was the Y-Axis.



5 System Setup and Method

Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
1	DC Power	10.0	None	None	DC Power Supply

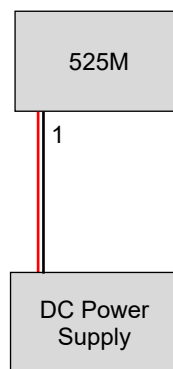
System Configuration			
Description	Manufacturer	Model Number	Serial Number
Transceiver Module	Sensus Metering Systems Inc.	525M	125852894 ¹ 125852916 ²
Cellular Modem	Sequans	GM02S	IMEI: 359197352743240 ¹ IMEI: 359197352743042 ²
DC Power Supply	Kikusui	PAS 60-18	ML000349

- 1) Conducted Measurements
- 2) Radiated Measurements

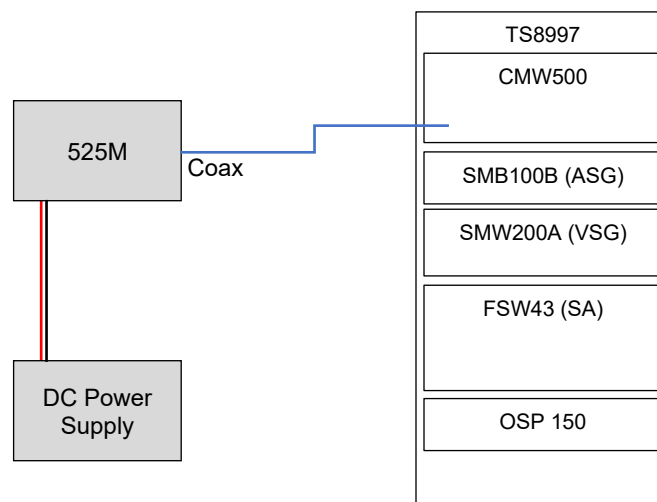
5.1 Method

Configuration as required by ANSI C63.26.

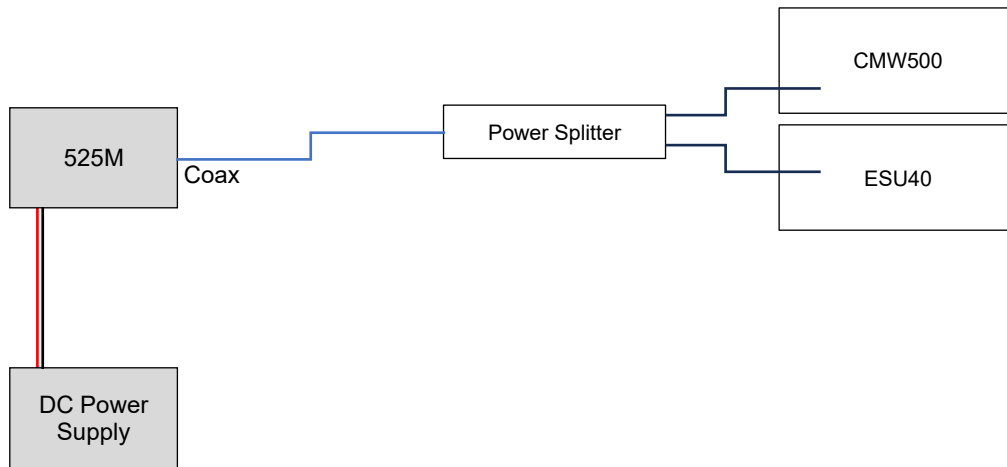
5.2 EUT Block Diagram – Radiated Measurements



5.3 EUT Block Diagram – Conducted Measurements (Power)



5.4 EUT Block Diagram – Conducted Measurements (Spurious Emissions)



6 RF Output Power

6.1 Method

The methods defined in ANSI C63.26, Sections 5.2.4.2 were applied for measuring the average (RMS Burst) output power. The antenna port was connected directly to a CMW500 through a coaxial cable. THE CMW was configured with both the signaling and measurement capabilities. The attenuation was accounted for by applying an offset on the CMW.

TEST SITE: RF Bench

The RF bench consists of a Rohde & Schwarz TS8997 automated test system coupled with a temperature/humidity environmental chamber. Where applicable, 2.4 and 5GHz radio measurements are automated using the Rohde & Schwarz EMC32 test software. The TS8997 system houses a switch matrix (OSP), along with a spectrum analyzer, vector network analyzer, and analog signal generator.

6.2 Test Equipment

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
212165	Temperature/Humidity/Pressure Sensor	Extech	SD700	110344	04/29/2025	04/29/2026
213500	Analog Signal Generator (8kHz-40GHz)	Rohde & Schwarz	SMB100B	106096	08/20/2024	08/20/2026
213499	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	172359	08/08/2025	08/08/2027
213503-01	Megaphase	OSP DUT Cable 1	KC12-K1K1-80	20815001 001	VBU	VBU

Software Utilized

Name	Manufacturer	Version
CMW-KS300 NB-IOT SIG	Rohde & Schwarz	4.0.230.8
CMW-KS590 LTE MTC SIG	Rohde & Schwarz	4.0.230.5
CMW-KS500 LTE FDD R8 SIG BASIC	Rohde & Schwarz	4.0.230.5
CMW-KM300 NB-IOT R13/14 TX MEAS	Rohde & Schwarz	4.0.230.8
CMW-KM500 LTE FDD R8 TX MEAS	Rohde & Schwarz	4.0.230.5
CMW-KM550 LTE TDD R8 TX MEAS	Rohde & Schwarz	4.0.230.5

6.3 Results

The sample tested was found to Comply.

6.4 Test Data

FCC Rule Part / RSS	Frequency (MHz)	Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	ERP (dBm)	FCC ERP Limit (dBm)	ISED EIRP Limit (dBm)
CatM							
22H / RSS-132	826.5	23.61	0.7	24.31	22.16	38.45	40.61
22H / RSS-132	836.5	23.26	0.7	23.96	21.81	38.45	40.61
22H / RSS-132	846.5	23.56	0.7	24.26	22.11	38.45	40.61
NB IoT							
22H / RSS-132	824.2	23.42	0.7	24.12	21.97	38.45	40.61
22H / RSS-132	836.5	23.28	0.7	23.98	21.83	38.45	40.61
22H / RSS-132	848.8	23.61	0.7	24.31	22.16	38.45	40.61

Calculation: $P_{EIRP} = \text{Power} + \text{Antenna Gain (dBi)}$
 $P_{ERP} = \text{Power} + \text{Antenna Gain (dBi)} - 2.15$
 2.15 is the conversion from EIRP to ERP

Test Personnel: Jeremy Pickens 

Test Date: 30 January 2026

Ambient Temperature: 17.5°C

Reference Standard: ANSI C63.26

Relative Humidity: 18.2%

Atmospheric Pressure: 97.9kPa

7 Spurious Emissions at Antenna Terminals

7.1 Method

The methods defined in ANSI C63.26, Section 5.7.3 were applied for measuring the out of band emissions. The antenna port was connected directly to a spectrum analyzer and CMW500 through cables and attenuator(s). Tile software was used to collect the data from the spectrum analyzer in ranges with the preselector active to prevent overloading. The RF path attenuation was accounted for by applying a correction factor to the data collected from the spectrum analyzer. The spectrum analyzer was configured with the following Resolution Bandwidth (RBW) settings:

Frequency Range (MHz)	RBW
30 – 1000	100 kHz
1000 – 10000	1 MHz

TEST SITE: RF Bench

The RF bench consists of a Rohde & Schwarz TS8997 automated test system coupled with a temperature/humidity environmental chamber. Where applicable, 2.4 and 5GHz radio measurements are automated using the Rohde & Schwarz EMC32 test software. The TS8997 system houses a switch matrix (OSP), along with a spectrum analyzer, vector network analyzer, and analog signal generator.

7.2 Test Equipment

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
200162	EMI Receiver (20Hz-40GHz)	Rohde & Schwarz	ESU 40	100314	10/07/2025	10/07/2026
212166	Temperature/Humidity/Pressure Sensor	Extech	SD700	110392	04/02/2025	04/02/2026
213499	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	172359	08/08/2025	08/08/2027
213500	Analog Signal Generator (8kHz-40GHz)	Rohde & Schwarz	SMB100B	106096	08/20/2024	08/20/2026
213502	Spectrum Analyzer (2Hz-43.5GHz)	Rohde & Schwarz	FSW43	102972	08/01/2024	08/01/2026
213503-01	Megaphase	OSP DUT Cable 1	KC12-K1K1-80	20815001001	VBU	VBU
213503-02	Megaphase	OSP DUT Cable 2	KC12-K1K1-80	20815001002	VBU	VBU
213503-03	Megaphase	OSP DUT Cable 3	KC12-K1K1-80	20815001003	VBU	VBU
213507-06	Tojoin	6dB SMA Attenuator	6dB	240425	VBU	VBU
213530	Mini-Circuits	Power Divider	ZC2PD-5R263-S+	5383081	VBU	VBU

1) Note: The signal generator and spectrum analyzer were used to characterize the path losses.

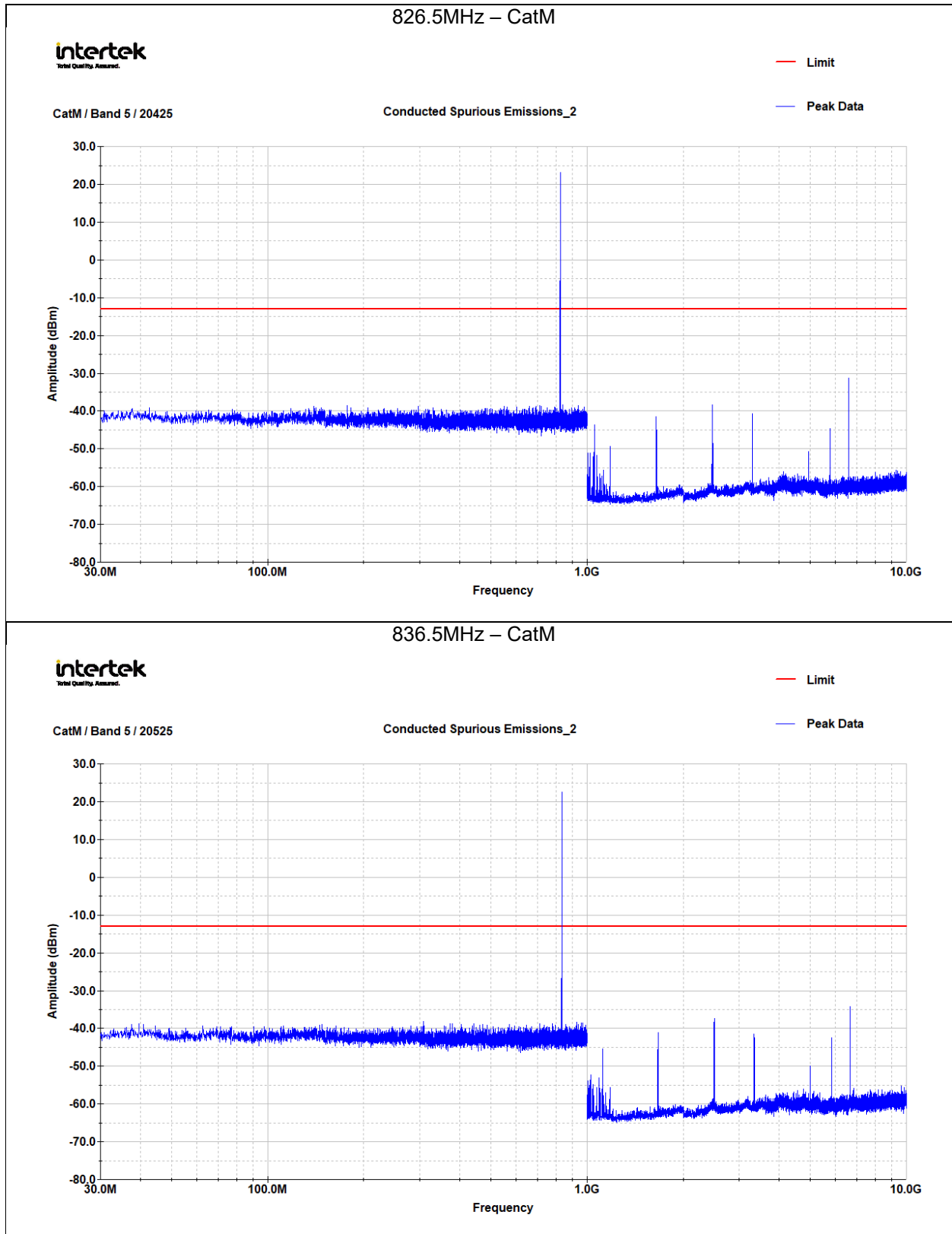
Software Utilized

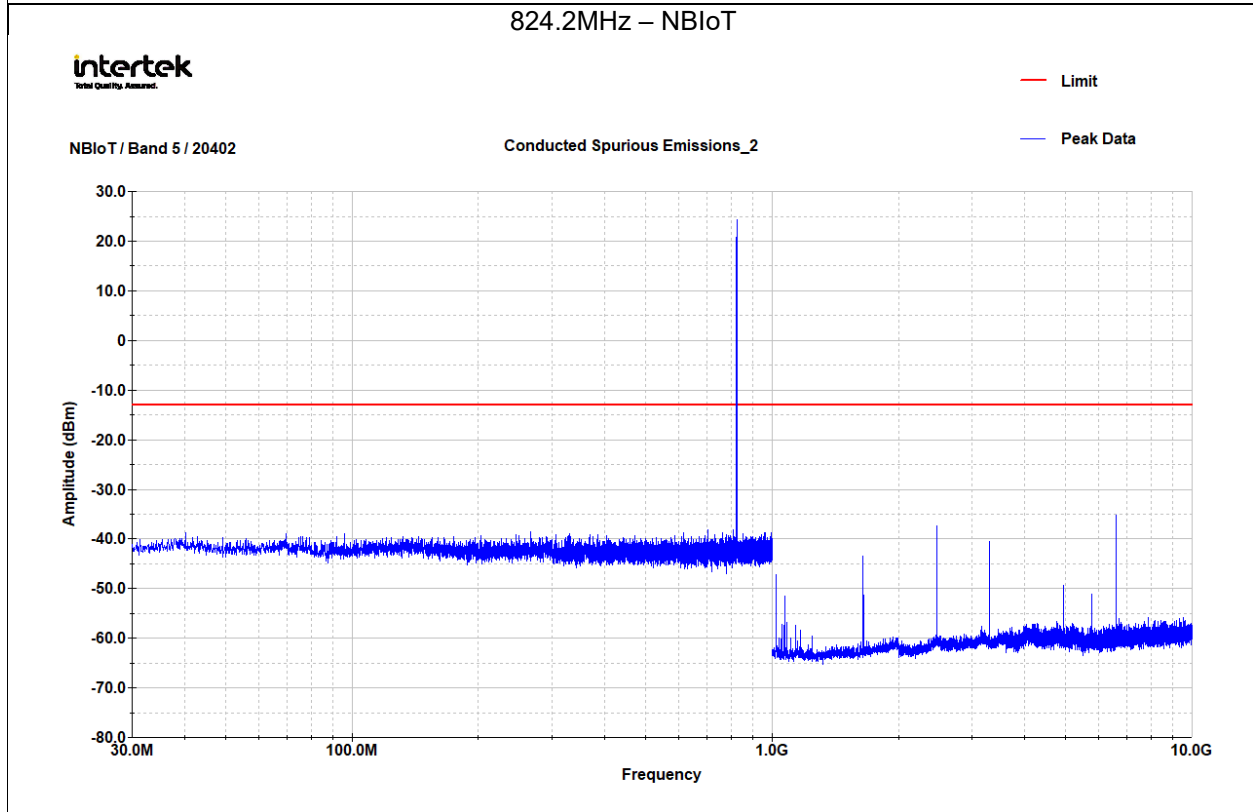
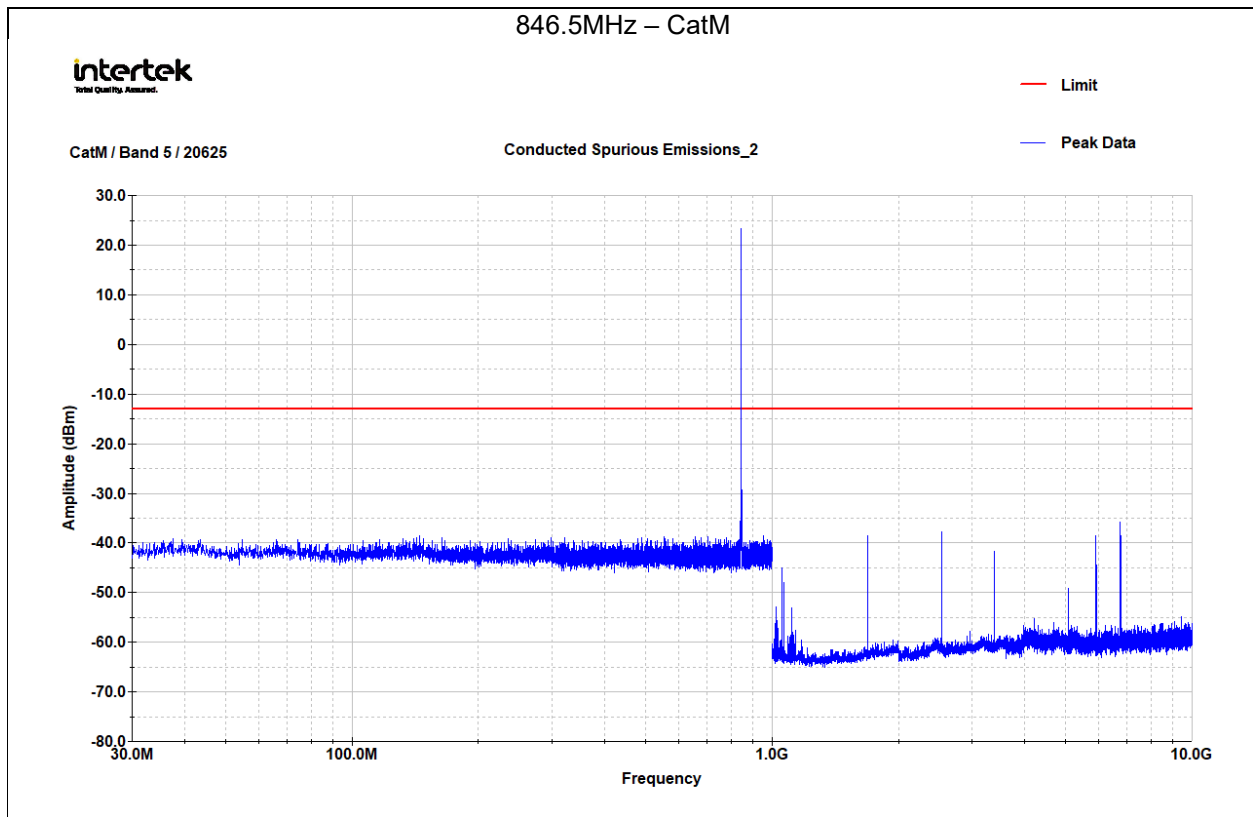
Name	Manufacturer	Version
Tile7	ETS-Lindgren	7.9.3.6

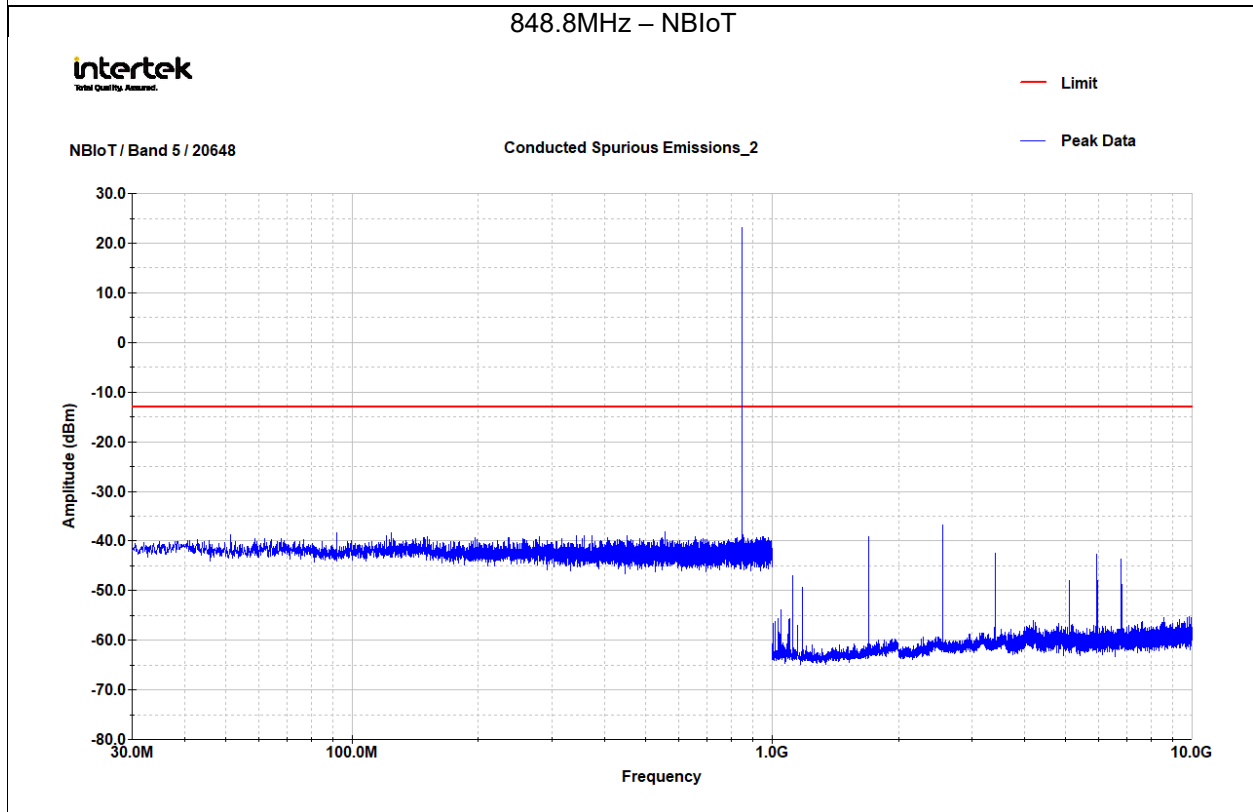
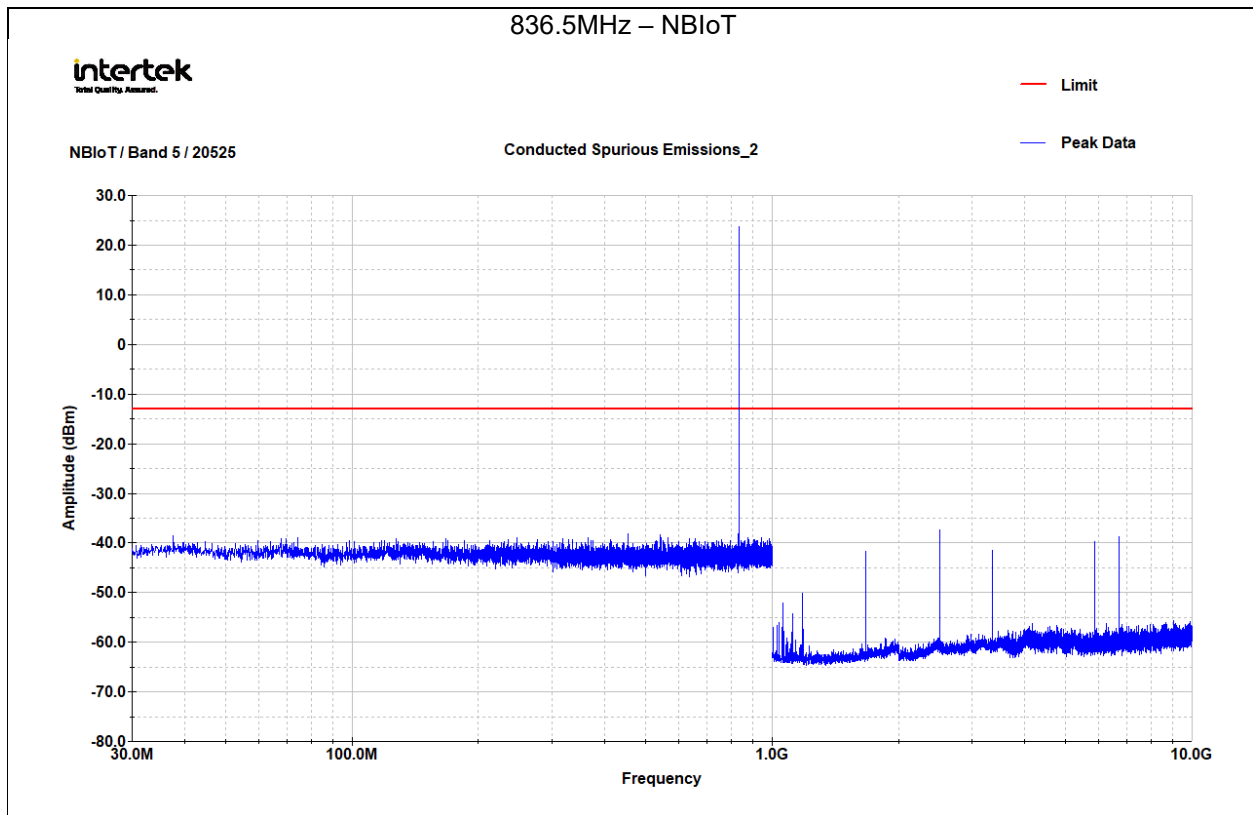
7.3 Results

The sample tested was found to Comply.

7.4 Test Data







Test Personnel: Jeremy Pickens 

Test Date: 03 February 2026

Ambient Temperature: 19.1°C

Reference Standard: ANSI C63.26

Relative Humidity: 19.7%

Atmospheric Pressure: 98.3kPa

8 Field Strength of Spurious Emissions

8.1 Method

The field strength methods defined in ANSI C63.26, Section 5.5.4 were applied for measuring the radiated spurious emissions. The EUT was tested at a height of 0.8m for measurements below 1GHz and at 1.5 meters for measurements above 1GHz. Radiated field strength pre-scans were performed at a distance of 3 meters using a bandwidth of 200Hz (9kHz to 150kHz), 10kHz (15kHz-30MHz), 100kHz (30MHz-1GHz), and 1MHz above 1GHz. The video bandwidth (VBW) was set to at least 3 times the RBW. The results were compared to the EIRP limits by applying a 95.2dB conversion to the applicable limit (e.g. -13dBm + 95.2 = 82.2dBμV/m at 3 meters). For tabular data, the resulting field strength measurements were converted to EIRP using the same 95.2dB correction and compared to the applicable EIRP limit.

TEST SITE: 10 Meter Chamber

10 Meter Semi-Anechoic Chamber The test site for radiated emissions is located at 1950 Evergreen Blvd, Suite 100, Duluth, Georgia 30096. It is a 10-meter semi-anechoic chamber manufactured by Panashield. Embedded in the floor is a 3-meter diameter turntable.

Sample Calculation

The field strength was calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$\begin{aligned}\text{Correction} &= \text{AF} + \text{CF} - \text{AG} \\ \text{FS} &= \text{RA} + \text{Correction}\end{aligned}$$

Where

- FS = Field Strength in dBμV/m
- RA = Receiver Amplitude (including preamplifier) in dBμV
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

An example for the calculations in the following table is as follows.

Assume a receiver reading of 70.92 dBμV is obtained. The correction factor is calculated by adding the antenna factor of 26.26 dB and cable factor of 1.89 dB. The amplifier gain of 40.11 dB is subtracted, giving a correction factor of -11.96 dB/m. The correction factor is then added to the receiver amplitude resulting a field strength of 58.96dBμV/m.

$$\begin{aligned}\text{RA} &= 70.92 \text{ dB}\mu\text{V} \\ \text{Correction} &= -11.96 \text{ dB/m} \\ \text{FS} &= 58.96 \text{ dB}\mu\text{V/m}\end{aligned}$$

To convert from field strength to EIRP, the following equations were used

$$\text{EIRP} = (\text{E} \times \text{d})^2 / 30$$

Where:

- E = field strength in V/m
- d = measurement distance in m
- EIRP = equivalent isotropically radiated power in W

Working in dB units:

$$\text{EIRP}_{\text{dBm}} = \text{E}_{\text{dB}\mu\text{V/m}} + 20\log(\text{d}_m) - 104.77$$

For d = 3:

$$\text{EIRP}_{\text{dBm}} = \text{E}_{\text{dB}\mu\text{V/m}} - 95.2$$

Example

$$\begin{aligned}\text{FS} &= 58.96 \text{ dB}\mu\text{V/m} \\ \text{EIRP}_{\text{dBm}} &= 58.96 - 95.2 = -36.24 \text{ dBm}\end{aligned}$$

8.2 Test Equipment

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
200074	Preamplifier, 10 MHz to 2000 MHz	Mini-Circuits	ZKL-2	D052005	08/04/2025	08/04/2026
200162	EMI Receiver (20Hz-40GHz)	Rohde & Schwarz	ESU 40	100314	10/07/2025	10/07/2026
211262	Controller - Turntable and Mast	Sunol	SC99V	SC99V-1	VBU	VBU
211264	Mast - Antenna	Sunol	TWR95	NNN2	VBU	VBU
212166	Temperature/Humidity/Pressure Sensor	Extech	SD700	110392	04/02/2025	04/02/2026
213073	Antenna positioning tower	Sunol	TLT2	040314-5	VBU	VBU
213103	1GHz High Pass Filter	Micro-Tronics	HPM50108	140	06/18/2025	06/18/2026
213451	Omni -directional Comb Generator	Com-Power	CGO-520	281266	VBU	VBU
213453	Preamplifier 500MHz-18GHz	Com-Power	PAM-118A	18040030	10/20/2025	10/20/2026
213058A	Antenna, Horn, <18 GHz	A.H. Systems	SAS-200/571	246	04/03/2025	04/03/2026
MM5	RF Coax Cable 9kHz-18GHz	Maury Microwave	UC-N-MM78	1514381	04/01/2025	04/01/2026
MM12	RF Coax Cable 9kHz-18GHz	Fairview Microwave	SCE18110505-600CM	MM12	09/11/2025	09/11/2026
MM36	RF Coax Cable 9kHz-18GHz	Maury Microwave	UC-N-MM36	16 32 10	06/18/2025	06/18/2026
MP10	RF Coax Cable 9kHz-18GHz	Fairview Microwave	FMCA1282-394	MP10	6/18/2025	06/18/2026
MP14	RF Coax Cable 9kHz-18GHz	Megaphase	EC29-N1N1-276-H	20938802	9/19/2025	09/19/2026

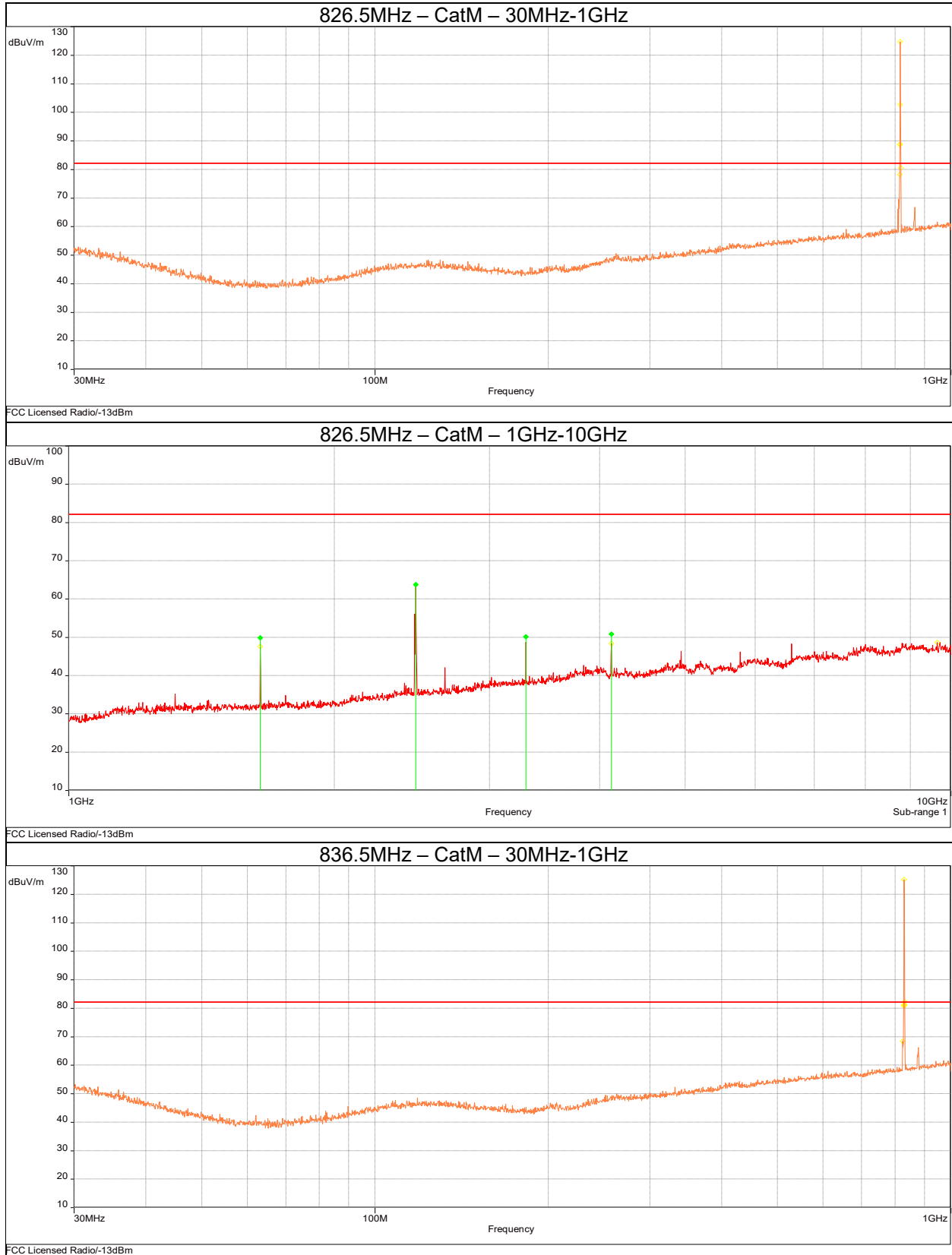
Software Utilized

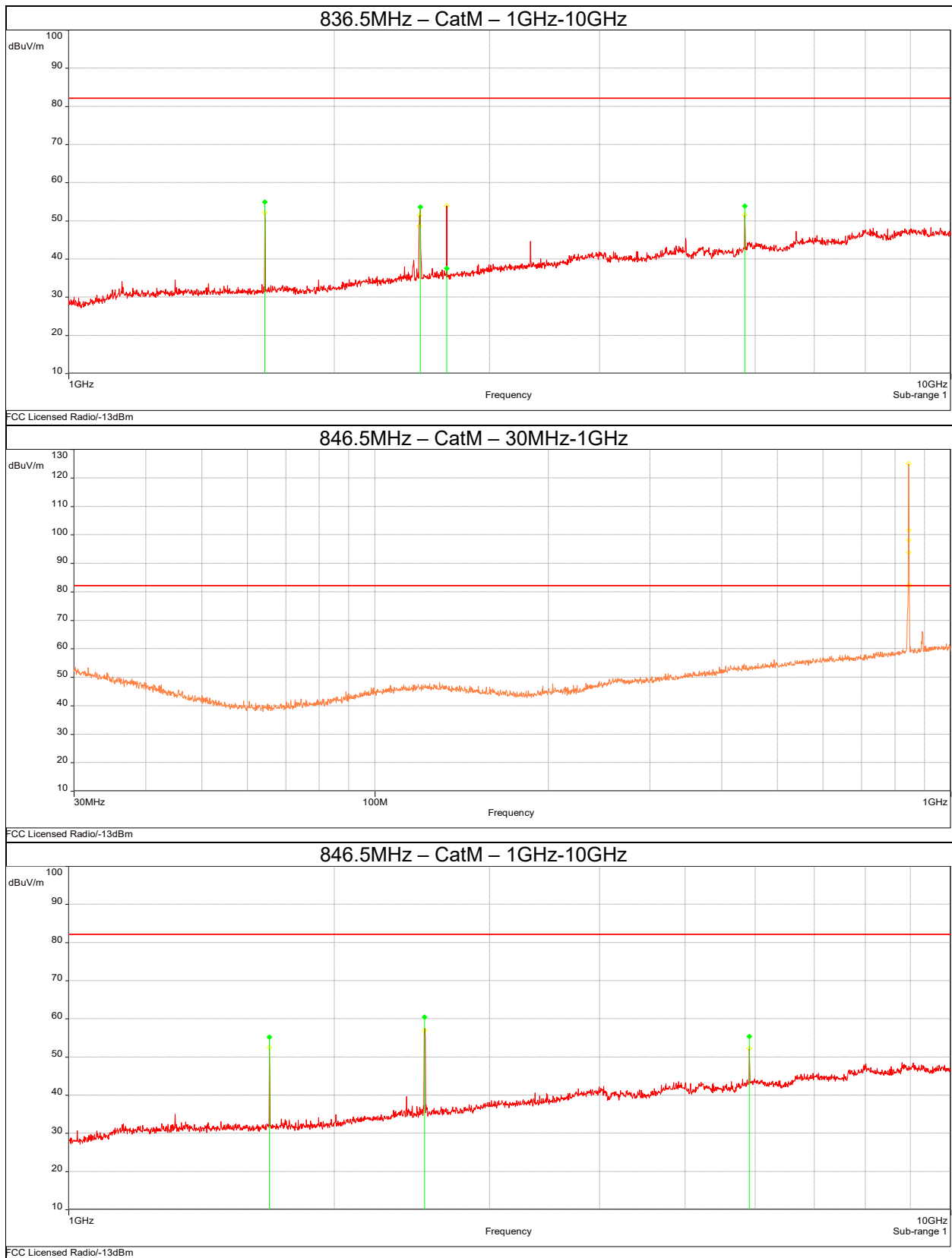
Name	Manufacturer	Version
BAT EMC	NEXIO	3.19.1.18

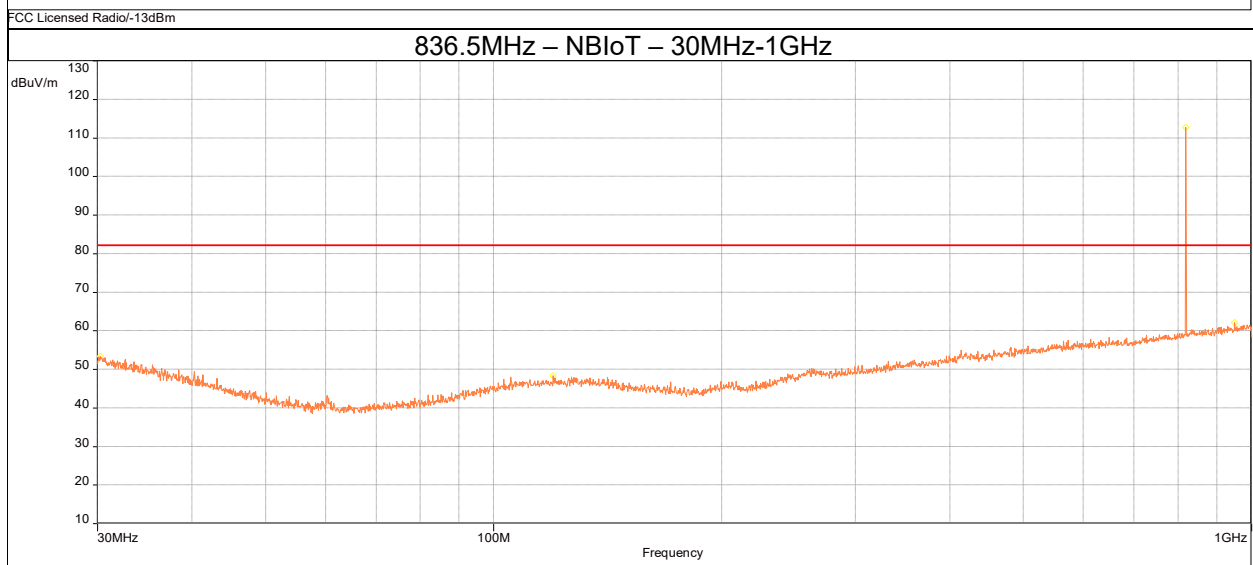
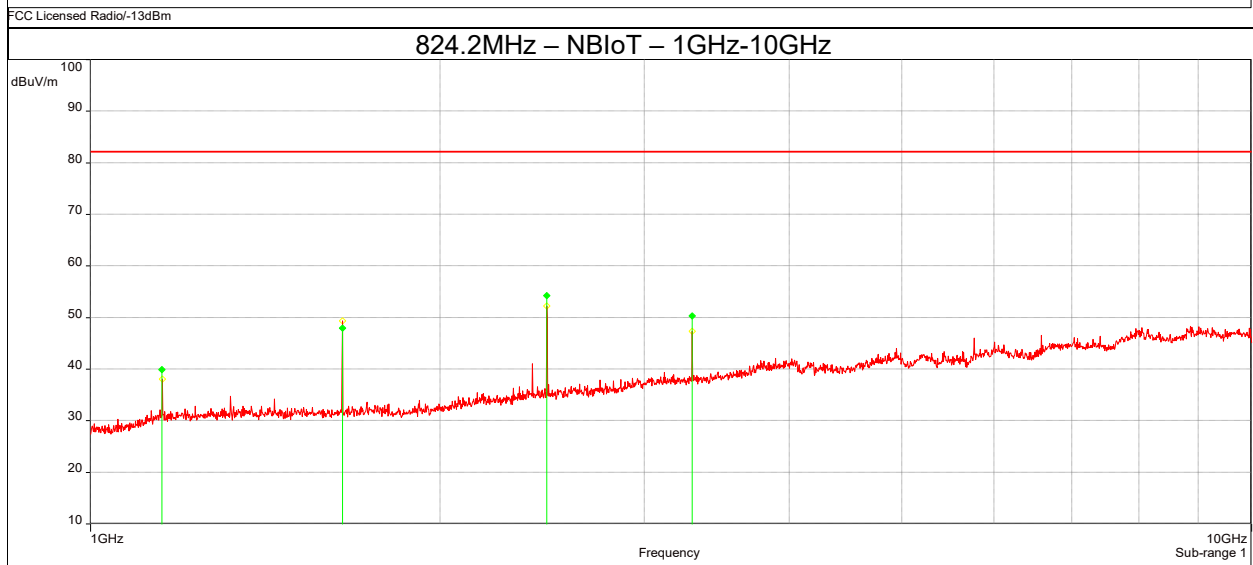
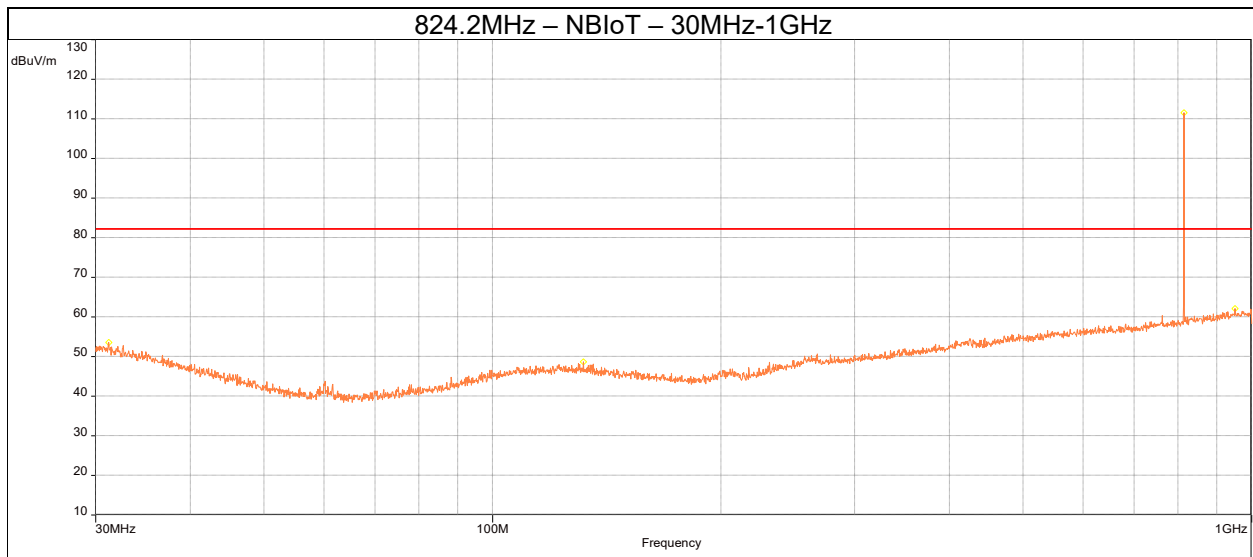
8.3 Results

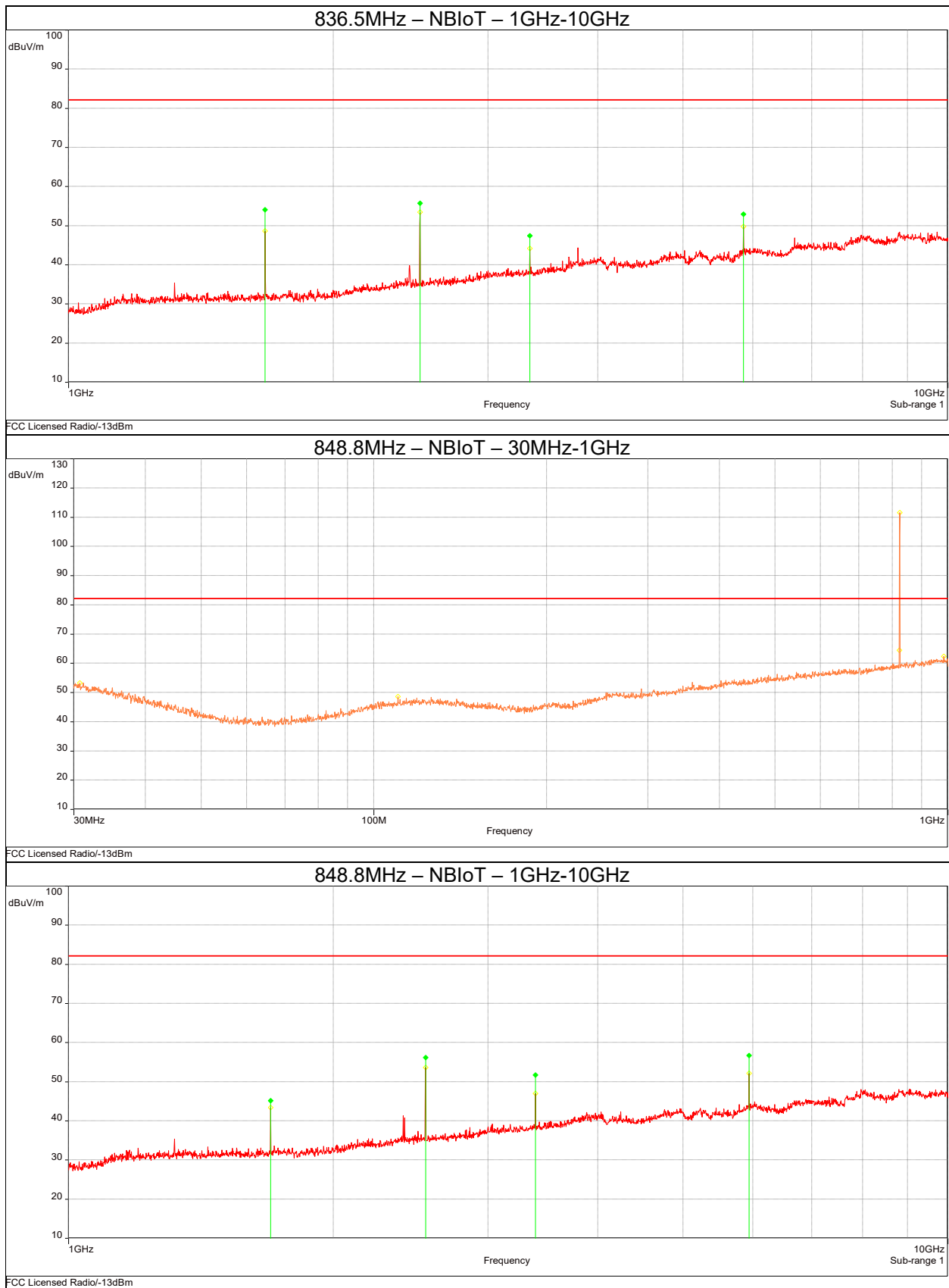
The sample tested was found to Comply.

8.4 Plots/Data









Tabular Data									
Mode	TX Frequency (MHz)	Frequency (MHz)	Reading (dBμV)	Correction (dB/m)	Field Strength (dBμV/m)	Free Space Conversion	EIRP (dBm)	Limit (dBm)	Margin (dB)
CatM Band 5	826.5	1648.600	62.70	-12.77	49.93	95.2	-45.27	-13	-32.27
CatM Band 5	826.5	2474.500	74.12	-10.35	63.77	95.2	-31.43	-13	-18.43
CatM Band 5	826.5	3297.400	56.93	-8.19	48.74	95.2	-46.46	-13	-33.46
CatM Band 5	826.5	4120.300	57.64	-6.75	50.89	95.2	-44.31	-13	-31.31
CatM Band 5	836.5	1668.700	67.57	-12.63	54.94	95.2	-40.26	-13	-27.26
CatM Band 5	836.5	2503.000	63.98	-10.34	53.64	95.2	-41.56	-13	-28.56
CatM Band 5	836.5	2681.800	47.47	-9.93	37.54	95.2	-57.66	-13	-44.66
CatM Band 5	836.5	5840.500	57.27	-3.34	53.93	95.2	-41.27	-13	-28.27
CatM Band 5	846.5	1688.695	67.64	-12.42	55.22	95.2	-39.98	-13	-26.98
CatM Band 5	846.5	2531.235	70.73	-10.24	60.49	95.2	-34.71	-13	-21.71
CatM Band 5	846.5	5910.395	58.54	-3.15	55.39	95.2	-39.81	-13	-26.81
NBLoT Band 5	824.2	1152.533	53.28	-13.37	39.91	95.2	-55.29	-13	-42.29
NBLoT Band 5	824.2	1648.280	60.78	-12.78	48.00	95.2	-47.2	-13	-34.20
NBLoT Band 5	824.2	2472.392	64.63	-10.36	54.27	95.2	-40.93	-13	-27.93
NBLoT Band 5	824.2	3296.561	58.53	-8.19	50.34	95.2	-44.86	-13	-31.86
NBLoT Band 5	836.5	1672.882	66.70	-12.58	54.12	95.2	-41.08	-13	-28.08
NBLoT Band 5	836.5	2509.287	66.07	-10.33	55.74	95.2	-39.46	-13	-26.46
NBLoT Band 5	836.5	3345.764	55.48	-8.03	47.45	95.2	-47.75	-13	-34.75
NBLoT Band 5	836.5	5854.998	56.25	-3.31	52.94	95.2	-42.26	-13	-29.26
NBLoT Band 5	848.8	1697.439	57.51	-12.37	45.14	95.2	-50.06	-13	-37.06
NBLoT Band 5	848.8	2546.208	66.36	-10.21	56.15	95.2	-39.05	-13	-26.05
NBLoT Band 5	848.8	3394.963	59.73	-8.00	51.73	95.2	-43.47	-13	-30.47
NBLoT Band 5	848.8	5941.099	59.78	-3.05	56.73	95.2	-38.47	-13	-25.47

Test Personnel: Jeremy Pickens
Jean Rene



Test Date: 23 – 26 January 2026

Ambient Temperature: 17.8 – 21.3°C

Reference Standard: ANSI C63.26

Relative Humidity: 18.5 – 20.9%

Atmospheric Pressure: 97.7 – 98.1kPa

Note: Only the worst-case modulation was evaluated for each band.

9 Measurement Uncertainty

Parameter	Expanded Uncertainty for Normal k factor equal to 2
Radio Frequency	0.07 PPM
Total RF Power (Conducted)	0.65 dB
Power Density (Conducted)	0.65 dB
RF Spurious (Conducted)	1.8 dB
Radiated Emissions (9kHz-30MHz)	4.7 dB
Radiated Emissions (30MHz-1GHz)	4.1 dB
Radiated Emissions (1GHz-18GHz)	4.5dB
Radiated Emissions (18GHz-40GHz)	4.7 dB
AC Line Conducted Emissions	2.8 dB
Temperature	0.7°
Humidity	3.9%

10 Revision History

Revision Level	Date	Prepared By	Reviewed By	Notes
0	20 February 2026	JOP	MC	Original Issue
1	05 March 2026	JOP	MC	• Corrected PMN on Page 2

END OF REPORT