

# EMC TEST REPORT



**Standard(s):**

**47 CFR FCC Part 15.247  
RSS 247, Issue 2, 2017**

**FCC ID:T5E201051  
IC:6453A-201051**

**Product: 3M™ Scott™ Electronic Management System – Repeater Unit  
Model(s): SEMS II Repeater**

**Company Name:  
3M Company**

**Address:  
Fire & SCBA Solutions  
4320 Goldmine Road, Monroe, NC 28110**

**Report Number: HRE202208369-1  
Report Issue Date: February 20, 2023**

**Report Prepared by:**

**Signature:**   
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## 1.0 Test Summary

Based on the results of our investigation, we have concluded the product tested **comply** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

	Requirement – Test	Test Description	Result	Comments
4.1	FCC Part 15.247(a)(2)/ RSS-247(5.2)/RSS-Gen (6.6)	DTS Bandwidth	<b>pass</b>	
4.2	FCC Part 15.247(b)(3)/ RSS-247(5.4(4))	Maximum Peak Conducted Output Power	<b>pass</b>	
4.3	FCC Part 15.247(e)/ RSS-247(5.2(b))	Maximum Power Spectral Density level	<b>pass</b>	
4.4	FCC Part 15.209 RSS-Gen, 8.9	Radiated Emissions in restricted band	<b>pass</b>	
4.5	FCC Part 15.247(d)/ RSS-247(5.5)	Radiated Emissions in non-restricted band	<b>pass</b>	
4.6	FCC Part 15.247(d)(1)/ RSS-247(5.5)	DTS Band-edge Emissions Measurements	<b>pass</b>	
4.7	FCC Part 15.207/ RSS-Gen (8.8)	Conducted Emissions	<b>pass</b>	
4.8	FCC Part 15.247(i)/ RSS 102 Issue 5	RF Exposure Compliance	<b>pass</b>	

**Note:**

## 1.1 Measurement Uncertainty

The measured value related to the corresponding limit will be used to decide whether the equipment meets the requirements. The measurement uncertainty figures were calculated and correspond to a coverage factor of k=2, providing a confidence level of respectively 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian).

Radiated emissions 30MHz to 1000MHz	4.9 dB
Radiated emissions 1GHz to 18GHz	4.6 dB
Conducted emissions 150KHz to 30MHz (AMN)	2.7 dB
Conducted emissions 150KHz to 30MHz (AAN)	1.92 dB
RF frequency	$\pm 3 \times 10^{-8}$
RF power, conducted	1.4 dB
RF Power Spectral Density	0.96 dB



## 2.0 Equipment Description

2.1 Equipment Under Test				
<b>Description:</b>	The purpose of the SEMS II REPEATER UNIT is to provide a stationary unit in the SEMS II Accountability System mesh network to maintain a consistent link between the base station and all of the SEMS II Personal Distress Alarms (PDA's)			
<b>Model(s):</b>	SEMS II Repeater (p/n 201051)			
<b>Serial number:</b>	30013001			
<b>3M Division:</b>	Personal Safety			
<b>Modifications and Special Measures:</b>	none			
<b>Frequency Range:</b>	Repeater - 2405.0MHz, Pak-Tracker – 2425.00			
<b>Channel No.:</b>	1			
<b>Modulation Type:</b>	GFSK			
<b>FCC Classification:</b>	Digital Transmission System (DTS)			
<b>RF Output Power (Peak Conducted):</b>	Repeater - 20.1dBm (0.1W) Pak-Tracker - 13.1dBm (0.02W)			
<b>Antenna Type and Antenna Assembly Gain:</b>	<input type="checkbox"/> External	<input checked="" type="checkbox"/> Integral PCB Antenna	<input type="checkbox"/> Dedicated	
	<input checked="" type="checkbox"/> 4.3dBi (Repeater) <input checked="" type="checkbox"/> 0.7dBi (Tracker)	<input type="checkbox"/> Declared by the Manufacturer	<input checked="" type="checkbox"/> Measured	
<b>Test Deviations or Exclusions</b>	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No		
<b>Rated Power:</b>	<b>Voltage:</b>	<input type="checkbox"/> 120VAC	<input type="checkbox"/> 230VAC	<input type="checkbox"/> 9VDC
	<b>Phase:</b>	<input type="checkbox"/> 1ph	<input type="checkbox"/> 3ph	<input checked="" type="checkbox"/> 6 AA Batteries
	<b>Frequency:</b>	<input type="checkbox"/> 50Hz	<input type="checkbox"/> 60Hz	
	<b>Current:</b>			
<b>Test Dates:</b>	12/13/2023-02/202023			
<b>Received Date:</b>	12/12/2022			
<b>Received Conditions:</b>	<input type="checkbox"/> Poor	<input checked="" type="checkbox"/> Good		
	<input type="checkbox"/> Prototype	<input checked="" type="checkbox"/> Production		

### 3.0 EUT Configuration

#### 3.1 System Configuration

No.	Product Type	Manufacturer	Model	Comments
1	Repeater	3M	SEMS II Repeater	p/n 201051
2	Console PASS 2013	3M	p/n 200424-11	Support Equipment
3	Data Emulation Interface	Ember		Support Equipment
4	POE Switch	Netgear	FS108P	Support Equipment

#### 3.2 Input/Output Ports of EUT

No.	Description	Type	Comments
1	Repeater Control		Ember ISA command control
2	Console		Console Pak-Tracker Control

#### 3.3 Cables

No.	Description	Type	Length	Shielding	Comments
1	Repeater Control	Ribbon	0.1m		
2	Console	Twisted Pair	1m		

#### 3.4 Measurement Arrangements of EUT

	Intended Operational Arrangement(s)	Comments
<input checked="" type="checkbox"/>	Table-top only	
<input type="checkbox"/>	Floor-standing only	
<input type="checkbox"/>	Floor-standing or table-top	
<input type="checkbox"/>	Other	

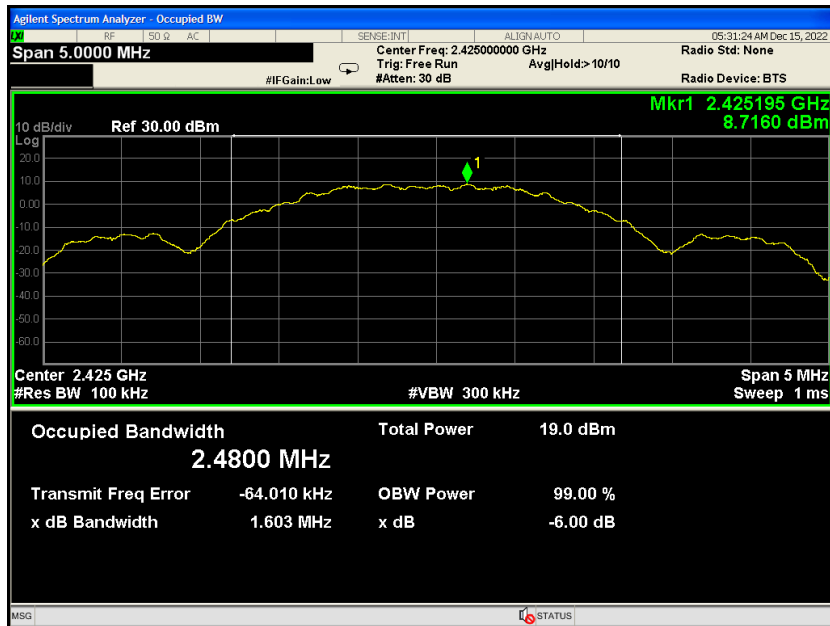
#### 3.5 Exercising of EUT and Interfaces

No.	Mode of Operation
1	Continues transmission of modulated and CW signals at 2405.0MHz and 2425.0MHz
2	SEMS II Repeater programming using PuTTY software over Ember control box for continues transmission at maximum rated RF output power and Duty Cycle.
3	SEMS II Pak-Tracker programming using Console PASS 2013 interface assembly for continues transmission at maximum rated RF output power and Duty Cycle.

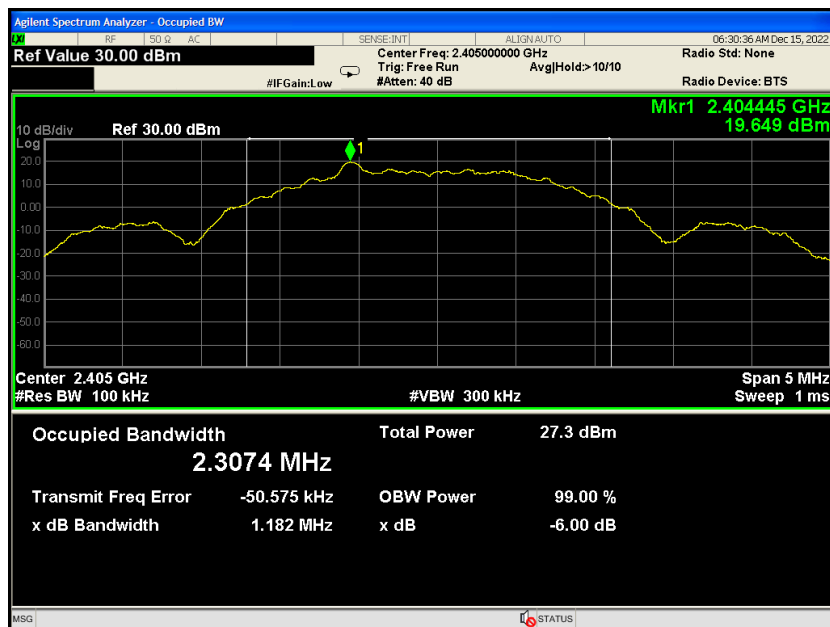
**4.0 Test Conditions and Results**

<b>4.1</b>	<b>DTS Bandwidth</b>		
	Laboratory Ambient Temperature:	23°C	
	Relative Humidity:	48%	
	Atmospheric Pressure:	1011 mbars	
<b>Reference Standard(s):</b>	<input checked="" type="checkbox"/> ANSI C63.10:2013 <input checked="" type="checkbox"/> FCC Part 15.247/RSS 247 <input checked="" type="checkbox"/> KDB 558074	<b>Measurement Point</b>	
		<input checked="" type="checkbox"/> Conducted <input type="checkbox"/> Radiated	
<b>Frequency Range:</b>	<input checked="" type="checkbox"/> 2405.0MHz <input checked="" type="checkbox"/> 2425.0MHz	RBW = 100KHz VBW ≥ 3 x RBW	
<b>Nominal Voltage:</b>	<input type="checkbox"/> 120VAC <input checked="" type="checkbox"/> 9VDC		
<b>Test Personnel:</b>	Yuriy Litvinov <i>Yuriy Litvinov</i>	<b>Date:</b> 12/14/2022	

Frequency (MHz)	Data Rate	99%dB Bandwidth (KHz)	6dB Bandwidth (KHz)	6dB OBW Limit (KHz)	Results
2405	N/A	2307	1182	> 500	pass
2425	N/A	2480	1603	> 500	pass



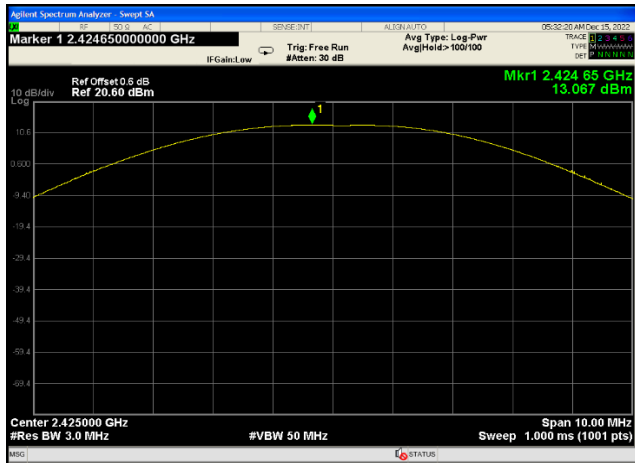
OBW – Pak-Traker



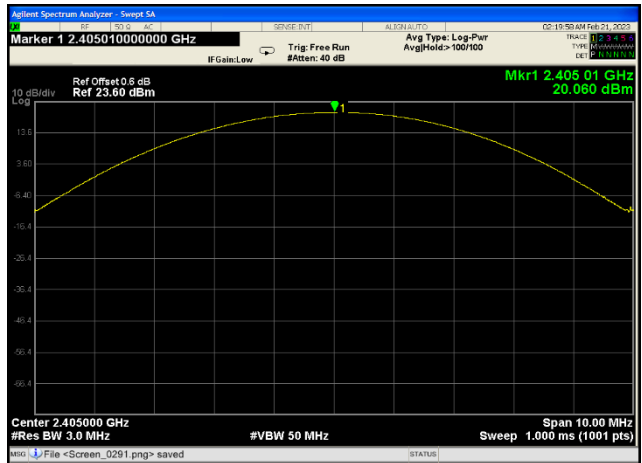
OBW – Repeater

<b>4.2</b>	<b>Maximum Output Power</b>		
<b>Method:</b>	Measurements was performed at the appropriated frequencies and at the highest power level at which the transmitter is intended to operate. The analyzer offset was adjusted to compensate for the attenuator and other losses.		
	Laboratory Ambient Temperature:	23°C	
	Relative Humidity:	48%	
	Atmospheric Pressure:	1011 mbars	
<b>Reference Standard(s):</b>	<input checked="" type="checkbox"/> ANSI C63.10:2013 <input checked="" type="checkbox"/> FCC Part 15.247/RSS 247 <input checked="" type="checkbox"/> KDB 558074	<b>Measurement Point</b>	
<b>Frequency Range:</b>	<input checked="" type="checkbox"/> 2405.0MHz <input checked="" type="checkbox"/> 2425.0MHz	<input checked="" type="checkbox"/> Conducted <input type="checkbox"/> Radiated at 3 meters	
<b>Antenna Gain:</b>	<input checked="" type="checkbox"/> 4.3dBi (repeater) <input checked="" type="checkbox"/> 0.7dBi (tracker)	<b>Maximum Peak Conducted Power:</b>	
<b>Limit:</b>	30 dBm		Pac-Tracker 13.1 dBm Repeater 20.1dBm
<b>Nominal Voltage:</b>	<input type="checkbox"/> 120VAC <input checked="" type="checkbox"/> 9VDC		
<b>Test Personnel:</b>	Yuriy Litvinov <i>Yuriy Litvinov</i>		<b>Date:</b> 02/20/2023

**Note:** EIRP Tracker (dBm) = Conducted Power (dBm) +Antenna Gain (dBi)= 13.1+0.7= 13.8dBm  
 EIRP Repeater (dBm) = Conducted Power (dBm) +Antenna Gain (dBi)= 20.1+4.3= 24.4dBm



**Pak-Tracker**

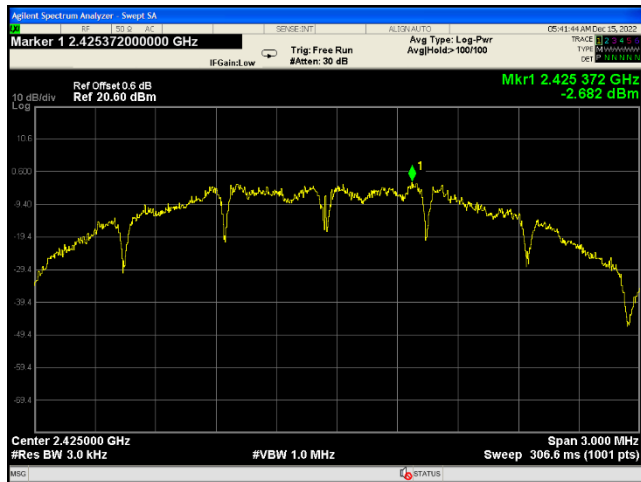


**Repeater**

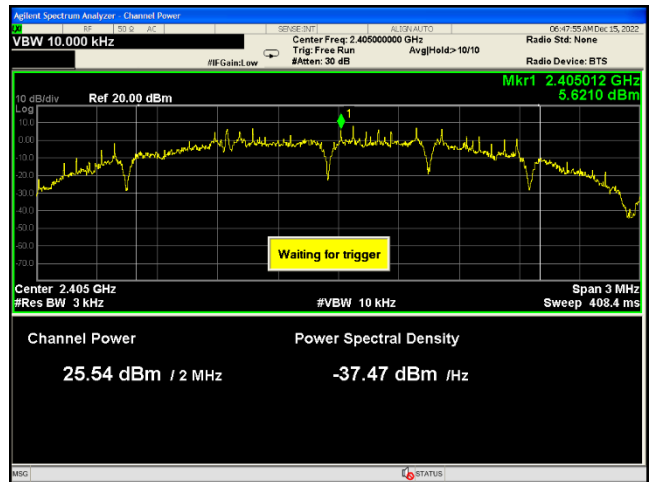


<b>4.3</b>	<b>Maximum Power Spectral Density level</b>		
<b>Method:</b>	Measurements was performed with modulated carrier at the highest power level at which the transmitter is intended to operate. The analyzer offset was adjusted to compensate for the attenuator and other losses.		
	Laboratory Ambient Temperature:	23°C	
	Relative Humidity:	48%	
	Atmospheric Pressure:	1011 mbars	
<b>Reference Standard(s):</b>	<input checked="" type="checkbox"/> ANSI C63.10:2013 <input checked="" type="checkbox"/> FCC Part 15.247/RSS 247 <input checked="" type="checkbox"/> KDB 558074	<b>Measurement Point</b>	
		<input checked="" type="checkbox"/> Conducted <input type="checkbox"/> Radiated at 3 meters	
<b>Frequency Range:</b>	<input checked="" type="checkbox"/> 2405.0MHz <input checked="" type="checkbox"/> 2425.0MHz	<b>PSD Results</b>	
<b>PSD Limit:</b>	8 dBm in any 3KHz band	Pac-Tracker -2.7 dBm/3kHz Repeater -2.7 dBm/3KHz	
<b>Nominal Voltage:</b>	<input type="checkbox"/> 120VAC <input checked="" type="checkbox"/> 9VDC		
<b>Test Personnel:</b>	Yuriy Litvinov <i>Yuriy Litvinov</i>	<b>Date:</b> 12/14/2022	

**Note:** The peak power spectral density should not exceed +8 dBm in any 3 kHz band. The repeater output frequency was scanned, with a narrow bandwidth and reduced sweep. The power density measurement for repeater was performed using the utility built into the Agilent Spectrum Analyzer. The resultant Repeater density was then corrected by 3 kHz Bandwidth Correction of 34.8dB. Measured PSD= -37.5dBm/Hz + 34.8dB CF = -2.7dBm/3KHz



**Pak-Tracker**



**Repeater**

<b>4.4</b>	<b>Radiated Emissions in restricted band</b>
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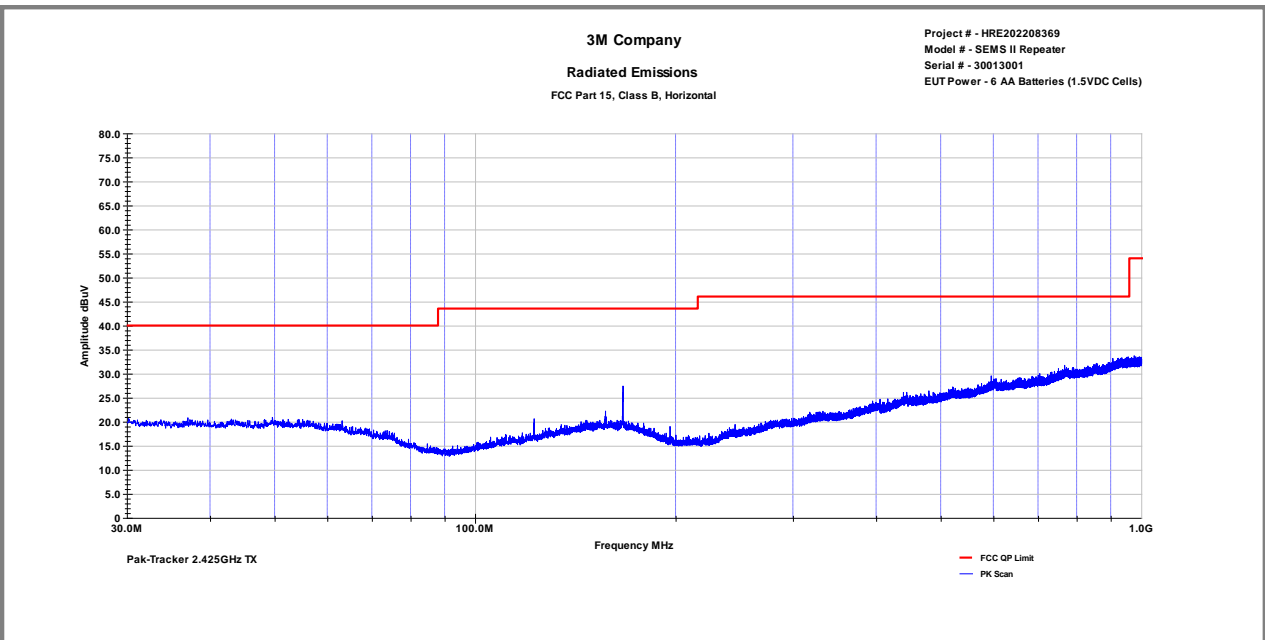
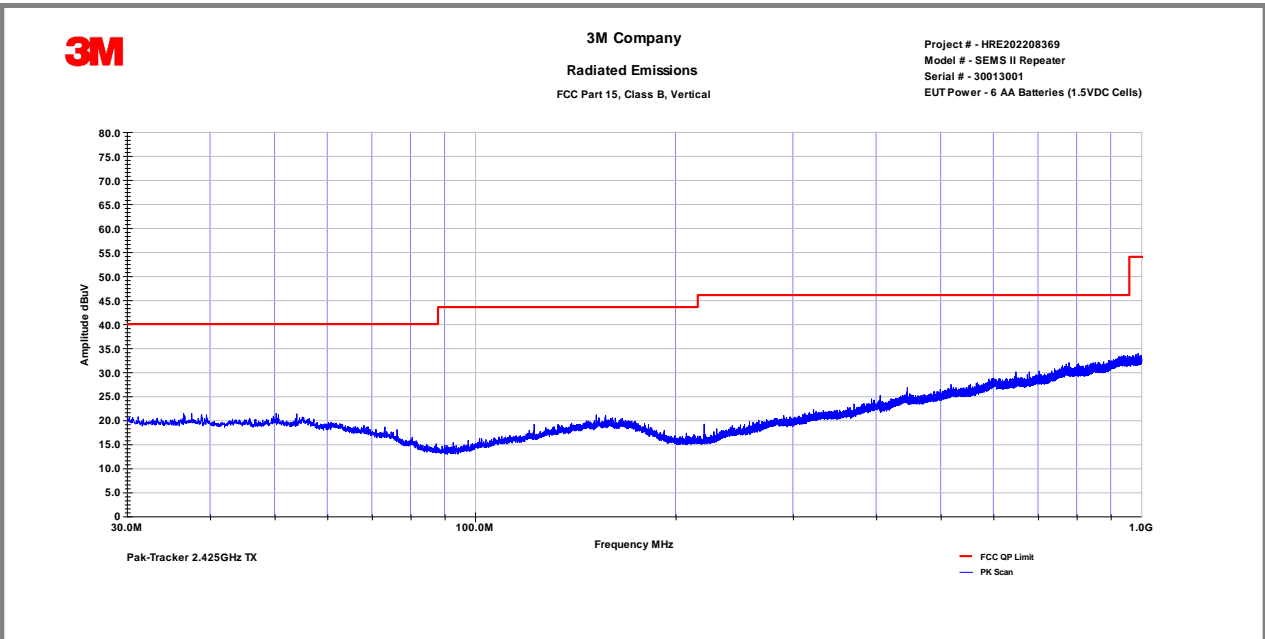
<b>Method:</b>	Measurements were made in a 3-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4 standards. EUT was rotated through three orthogonal axes to determine which attitude (orientation) and arrangement produces the highest emission relative to the limit; the attitude and device arrangement that produces the highest emission relative to the limit was used in making final radiated emission measurements. Spurious Radiated emissions measurements were performed with external preamp and a high pass filter. Final measurements were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 m. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.
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<b>Test Verification:</b> <input checked="" type="checkbox"/>	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	55%
	Atmospheric Pressure:	1011 mbars
<b>Reference Standard(s):</b>	<input checked="" type="checkbox"/> ANSI C63.10:2013, Section 11.12.1	<b>Measurement Distance</b>
	<input checked="" type="checkbox"/> FCC Part 15.247/RSS 247 <input checked="" type="checkbox"/> KDB 558074	
<b>Frequency Range:</b>	<input checked="" type="checkbox"/> 30 MHz to 1 GHz <input checked="" type="checkbox"/> 1 GHz to 25 GHz	<input checked="" type="checkbox"/> 3 Meters <input type="checkbox"/> <span style="border: 1px solid black; display: inline-block; width: 20px; height: 10px;"></span>
<b>Nominal Voltage:</b>	<input type="checkbox"/> 120VAC <input checked="" type="checkbox"/> 9VDC	
<b>Test Personnel:</b>	Keith Schwartz <i>KS</i>	<b>Date:</b> 12/13/2022

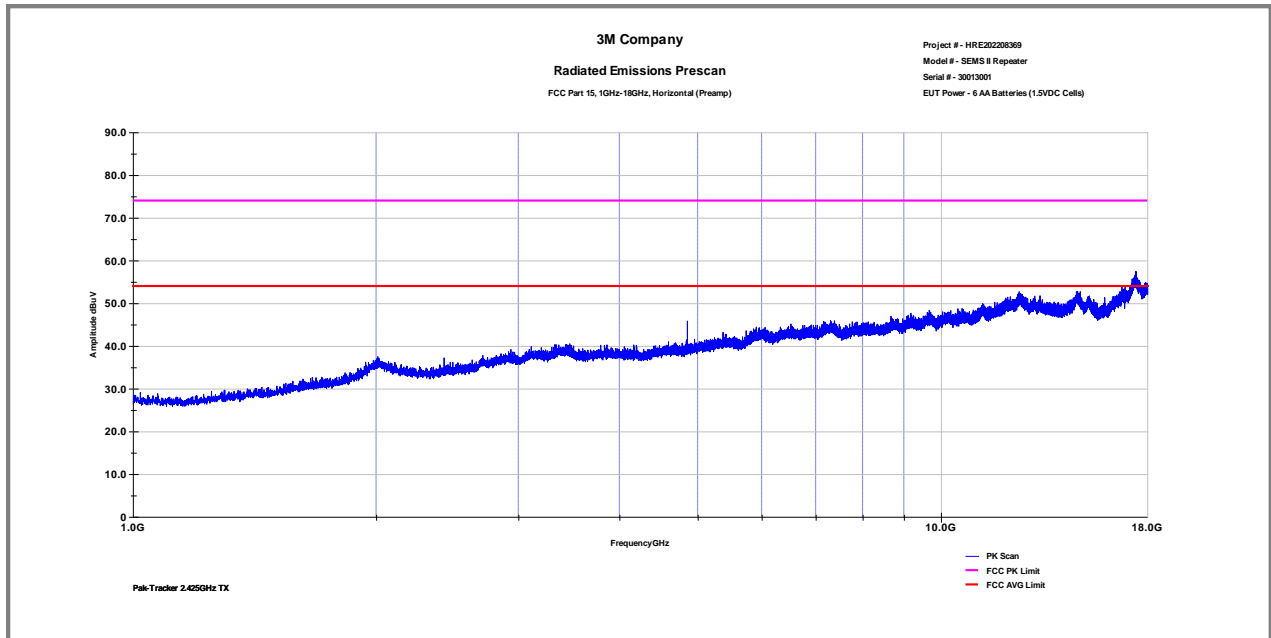
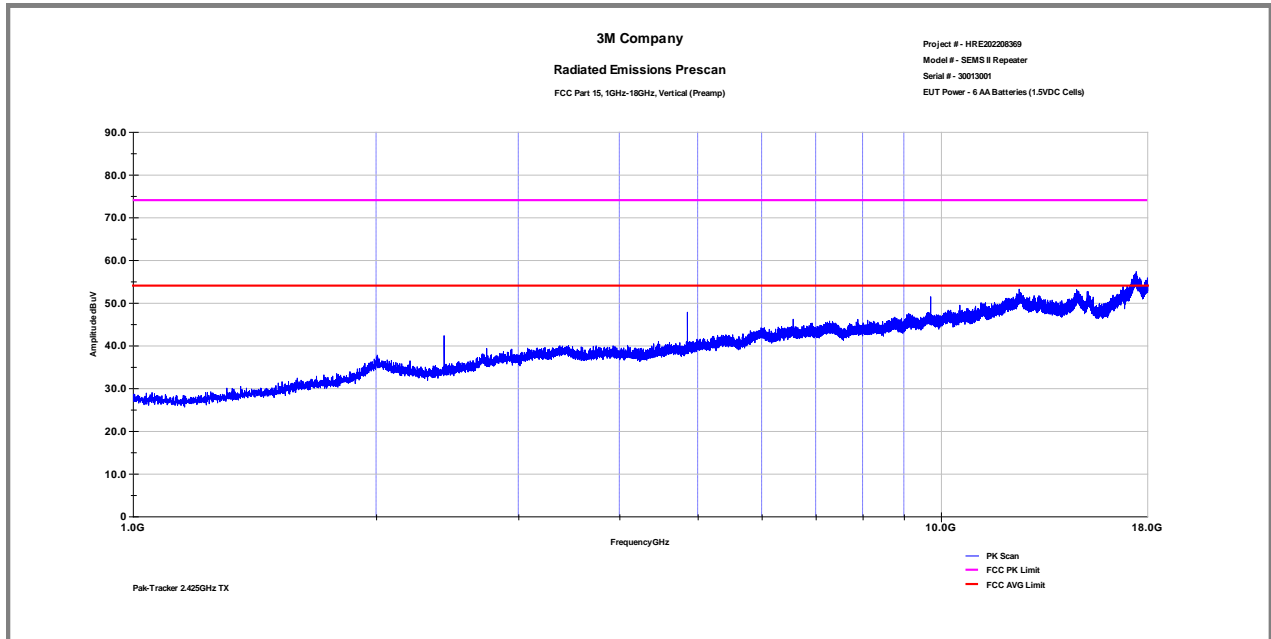
<b>Limits –15.209 and RSS Gen</b>					
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Frequency (MHz)	Limit dB (µV/m)			Distance	Results
	Quasi-Peak	Average	Peak		
0.009-0.490		2400/F(KHz)		300	<b>N/A</b>
0.490-1.705	24000/F(KHz)			30	<b>N/A</b>
1.705-30	30			30	<b>N/A</b>
30 to 88	40			3	<b>pass</b>
88 to 216	43.5			3	<b>pass</b>
216 to 960	46			3	<b>pass</b>
Above 960		54	74	3	<b>pass</b>

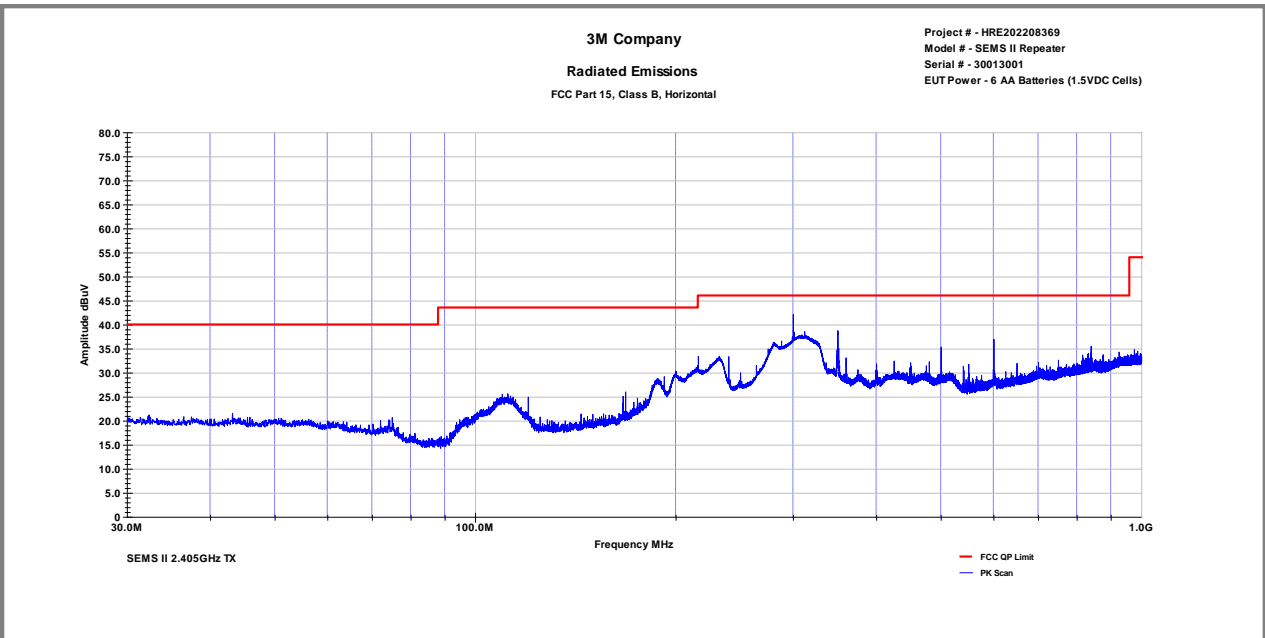
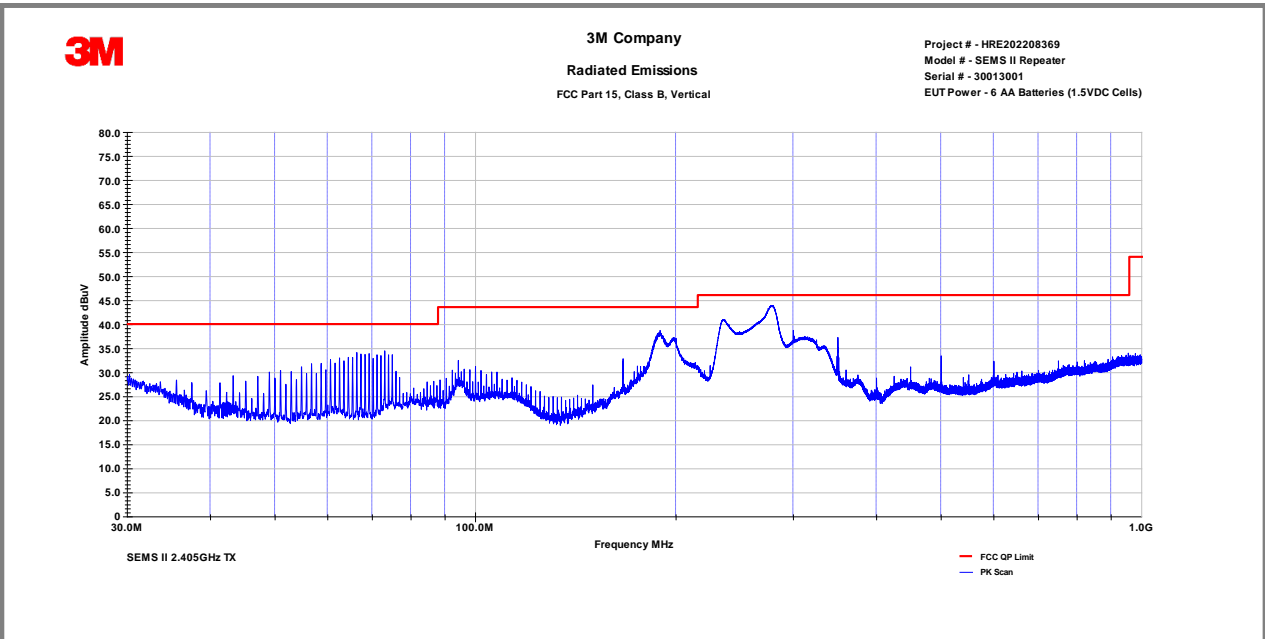
<b>Modifications:</b>	<span style="background-color: #cccccc; border: 1px solid black; display: inline-block; width: 100px; height: 15px;"></span>
<b>Note:</b>	<p>The lower limit applies at the transition frequency. An inverse proportionality factor of 20 dB per decade has been used to normalize the measured data to the specified distance for determining compliance</p> <p>For emission in the restricted bands, the limit of 15.209 was used.</p> <p>There are no emissions were detected in the restricted band within 30dB below 15.209 limit adjacent or nearby to 2400-2483.5MHz frequency band during operation at the high channel.</p> <p>The duty cycle correction factor applied to field strength measurements in the restricted band harmonics above 1GHz.</p> <p>No radiated spurious emissions were detected above 18GHz</p>



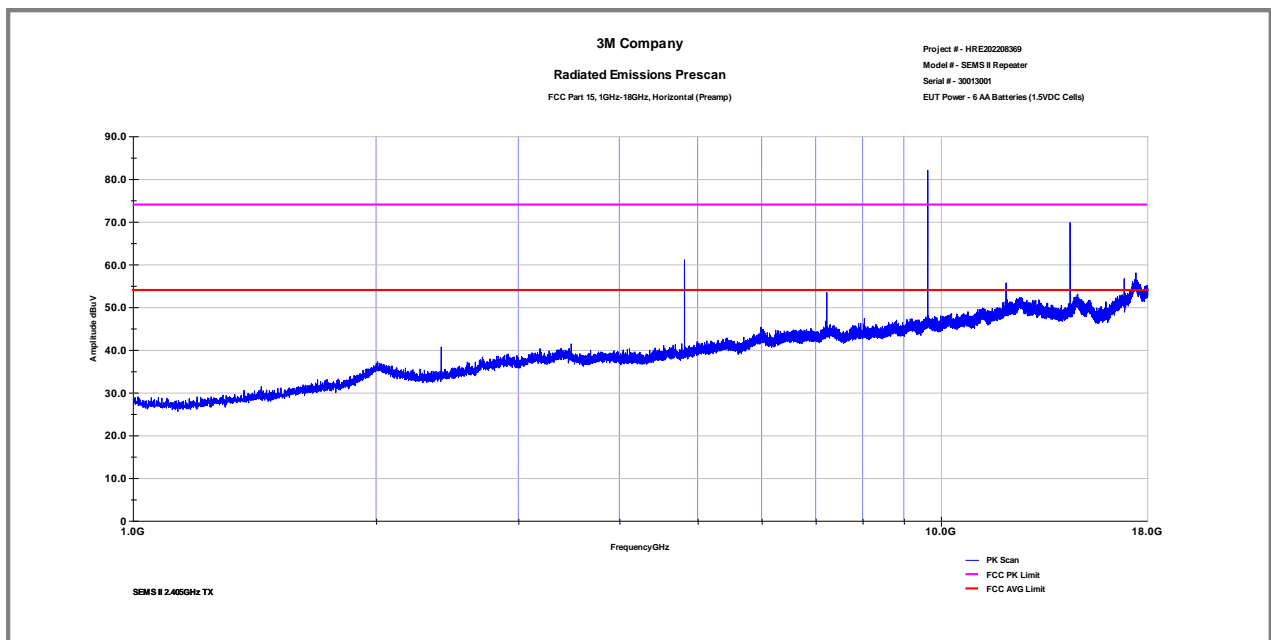
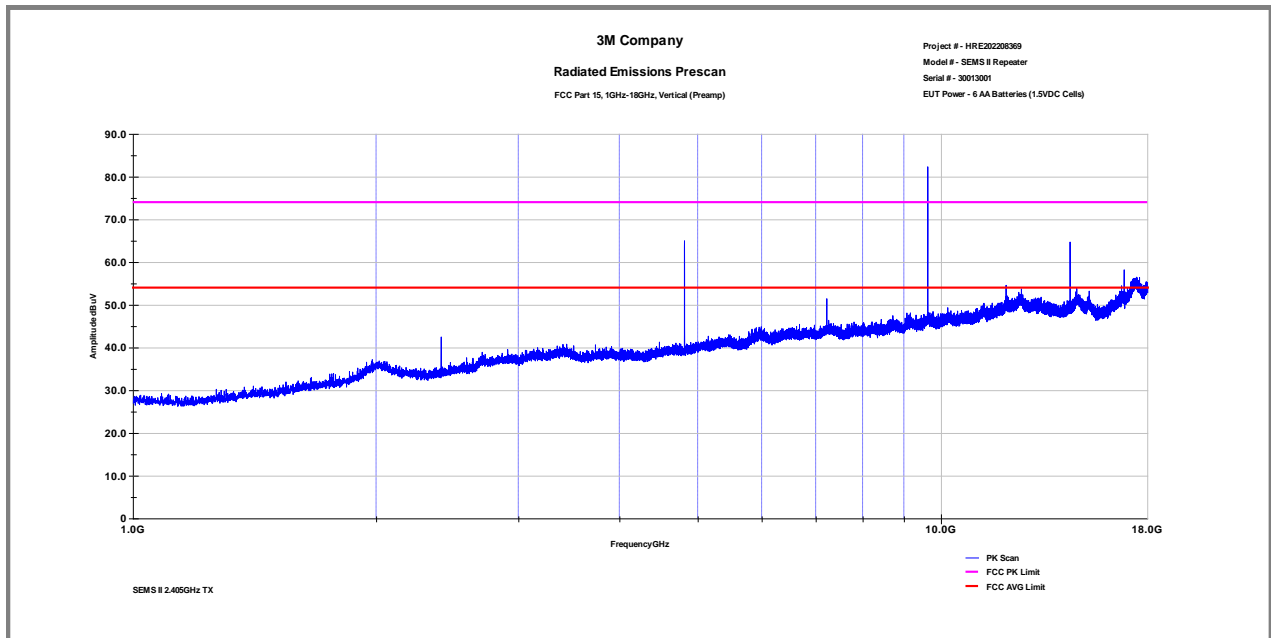
FCC Part 15.209 Radiated Emissions in restricted band – Pak-Tracker



FCC Part 15.209 Radiated Emissions in restricted band – Pak-Tracker



FCC Part 15.209 Radiated Emissions in restricted band – Repeater



FCC Part 15.209 Radiated Emissions in restricted band – Repeater

**Tables - Radiated Emissions in restricted band**

Frequency (MHz)	Pol.	QP Reading dBµV/m	Total CF dB	Net at 3 m dBµV/m	Limit (dBµV/m)	Margin dB
36.89	V	4.9	17.2	22.1	40	-17.9
167.33	V	3.8	17.9	21.7	43.5	-21.9
223.01	H	11.9	14.9	26.9	46	-19.2
988.91	V	4.9	30.1	35	54	-19
<b>Notes:</b>		Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) Pak-Tracker				

Pol	Frequency (MHz)	Peak dBµV/m	AVG dBµV/m	Total CF dB	Net Peak dBµV/m	Net AVG* dBµV/m	PK Limit dBµV/m	AVG Limit dBµV/m	PK Margin dB	AVG Margin dB
V	4849.90	55.25		-6.53	48.72	7.46	74.00	54.00	-25.28	-46.55
H	4849.90	55.87		-6.53	49.34	8.08	74.00	54.00	-24.66	-45.93
V	7372.70	48.14		-1.62	46.52	5.26	74.00	54.00	-27.48	-48.75
H	7372.70	48.14		-1.62	45.13	3.87	74.00	54.00	-28.87	-50.14
V	12481.80	46.75		7.21	53.96	12.70	74.00	54.00	-20.04	-41.31
H	12481.80	46.75		7.21	53.96	12.70	74.00	54.00	-20.04	-41.31
<b>Notes:</b>		Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB)) *includes Duty Cycle Correction Factor Emissions in the 15.205 Restricted Frequency Band Pak-Tracker								



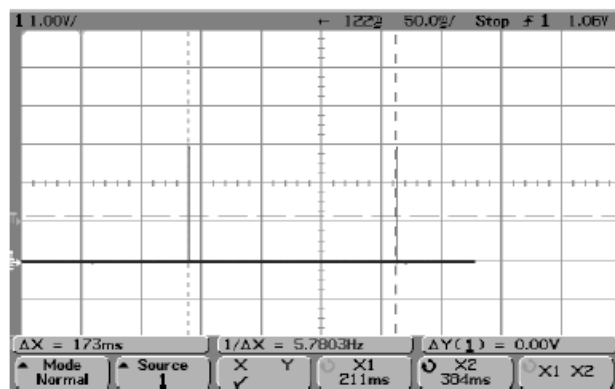
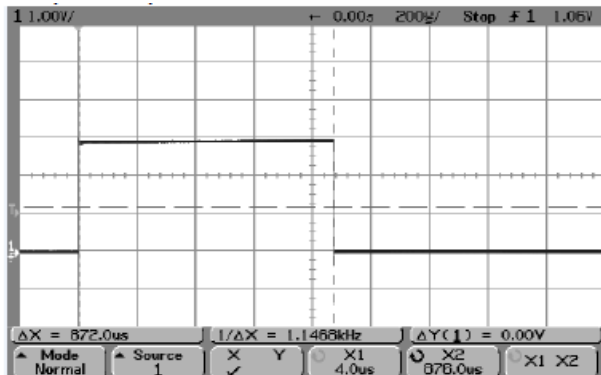
## Tables - Radiated Emissions in restricted band

Frequency (MHz)	Pol.	QP Reading dB $\mu$ V/m	Total CF dB	Net at 3 m dB $\mu$ V/m	Limit (dB $\mu$ V/m)	Margin dB
65.84	V	4	16.8	20.9	40	-19.1
72.5	V	5.1	15.8	20.9	40	-19.1
189.23	V	19.9	15.8	35.7	43.5	-7.8
277.28	V	24.9	18.1	42.9	46	-3.1
349.94	H	17.7	19.7	37.4	46	-8.6
500.03	V	10.5	23.2	33.7	46	-12.3
<b>Notes:</b>	Net Reading (dBuV) = Reading (dB $\mu$ V) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) Repeater					

Pol	Frequency (MHz)	Peak dB $\mu$ V/m	AVG dB $\mu$ V/m	Total CF dB	Net Peak dB $\mu$ V/m	Net AVG* dB $\mu$ V/m	PK Limit dB $\mu$ V/m	AVG Limit dB $\mu$ V/m	PK Margin dB	AVG Margin dB
V	2702.00	53.55		-12.10	41.45	3.85	74.00	54.00	-32.55	-50.15
H	2702.00	52.30		-12.10	40.20	2.60	74.00	54.00	-33.80	-51.40
V	4809.00	69.50		-6.70	62.80	25.20	74.00	54.00	-11.20	-28.80
H	4809.00	68.00		-6.70	61.30	23.70	74.00	54.00	-12.70	-30.30
V	12025.00	49.90		5.82	55.72	18.12	74.00	54.00	-18.28	-35.88
H	12025.00	47.20		5.82	53.02	15.42	74.00	54.00	-20.98	-38.58
V										
H										
<b>Notes:</b>	Reading (dBuV) = Reading (dB $\mu$ V) + (Antenna with amp CF(dB)+Cable CF(dB)) *includes Duty Cycle Correction Factor Emissions in the 15.205 Restricted Frequency Band Repeater									



### Duty Cycle Correction factor



### Pak-Tracker

Per theory of operation the device operates in a packet mode only. Each packet is 872  $\mu s$  long and is repeated at a rate of 4 times per second. The worst case one packet over 100ms period.

$$\text{Duty Cycle} = \text{Time On} / 100\text{ms}$$

$$0.872\text{ms} / 100\text{ms} = 0.00872 \text{ dB}$$

$$20\log(0.00872) = -41.2\text{dB}, \text{ which was applied to the Peak measurement for a corrected Average value}$$

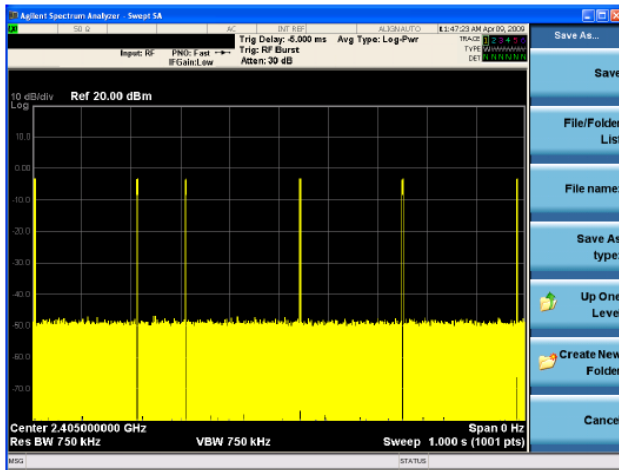


Figure 1. Normal message traffic in a 1 second period.

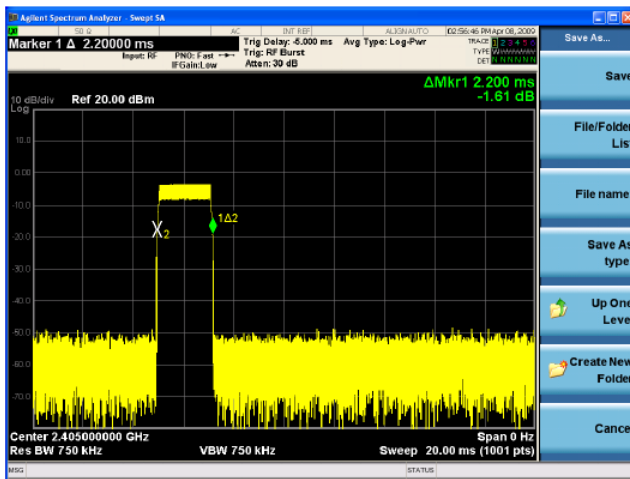


Figure 2. Status message.

### Repeater

Per theory of operation the Repeater transmits 400 Bits/Sec packets. That can be transmitted from any one node in the system. That number is then divided by the raw bit rate of the radio to arrive at the TX Duty Cycle.

The total number of pulses over 1000ms = 6

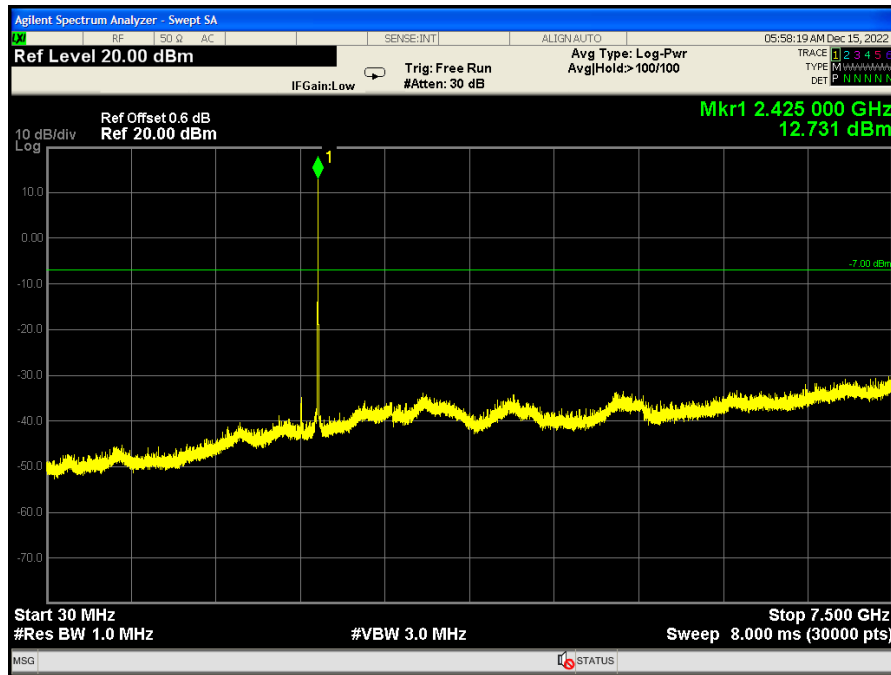
Transmission "On time" = 6 x 2.2ms = 13.2ms

Total on time over 100 ms = 1.32ms

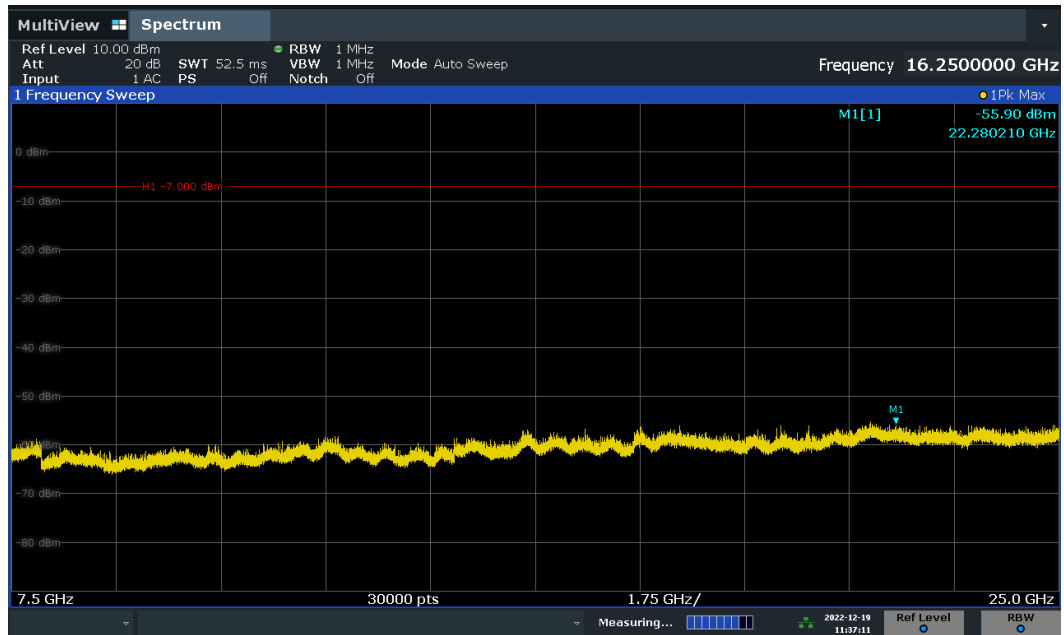
Duty Cycle Correction Factor =  $20 \log (1.3/100\text{ms}) = -37.6\text{dB}$ , which was be applied to the Peak measurement for a corrected Average value

<b>4.5</b>	<b>Radiated Emissions in non-restricted band</b>		
<b>Method:</b>	The measurements were made with transmitter set to transmit continuously low, medium and high channels.		
	Laboratory Ambient Temperature:	23°C	
	Relative Humidity:	48%	
	Atmospheric Pressure:	1011 mbars	
<b>Reference Standard(s):</b>	<input checked="" type="checkbox"/> ANSI C63.10:2013 <input checked="" type="checkbox"/> FCC Part 15.247/RSS 247 <input checked="" type="checkbox"/> KDB 558074	<b>Measurement Point</b> <input checked="" type="checkbox"/> Conducted <input type="checkbox"/> Radiated	
<b>Frequency Range:</b>	<input checked="" type="checkbox"/> 2405.0MHz <input checked="" type="checkbox"/> 2425.0MHz		
<b>In-band power in 100KHz:</b>	<input checked="" type="checkbox"/> 13.1dBm <input checked="" type="checkbox"/> 19.9dBm	<b>Results:</b>	
<b>Limit:</b>	<input checked="" type="checkbox"/> --13dBm (20dBc below in-band power) <input checked="" type="checkbox"/> 0dBm (20dBc below in-band power)	>55dBc	
<b>Nominal Voltage:</b>	<input type="checkbox"/> 120VAC <input checked="" type="checkbox"/> 6AA Batteries		
<b>Test Personnel:</b>	Yuriy Litvinov <i>Yuriy Litvinov</i>	<b>Date:</b> 12/14/2022	

<b>Note:</b>	RBW was set to 1MHz rather than 100KHz in order to increase the measurements speed.
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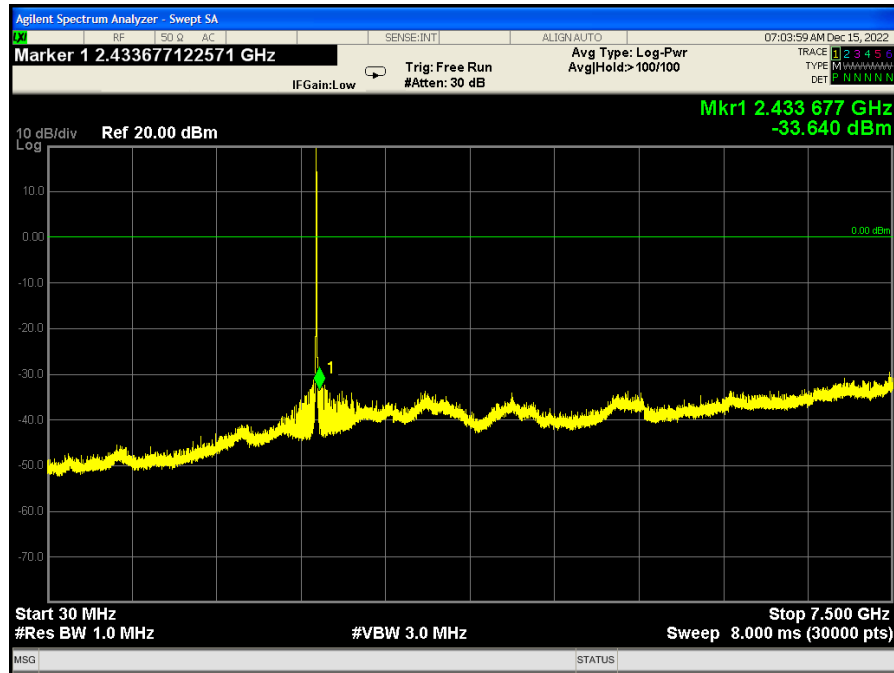


**Conducted Spurious – Pak-Tracker**

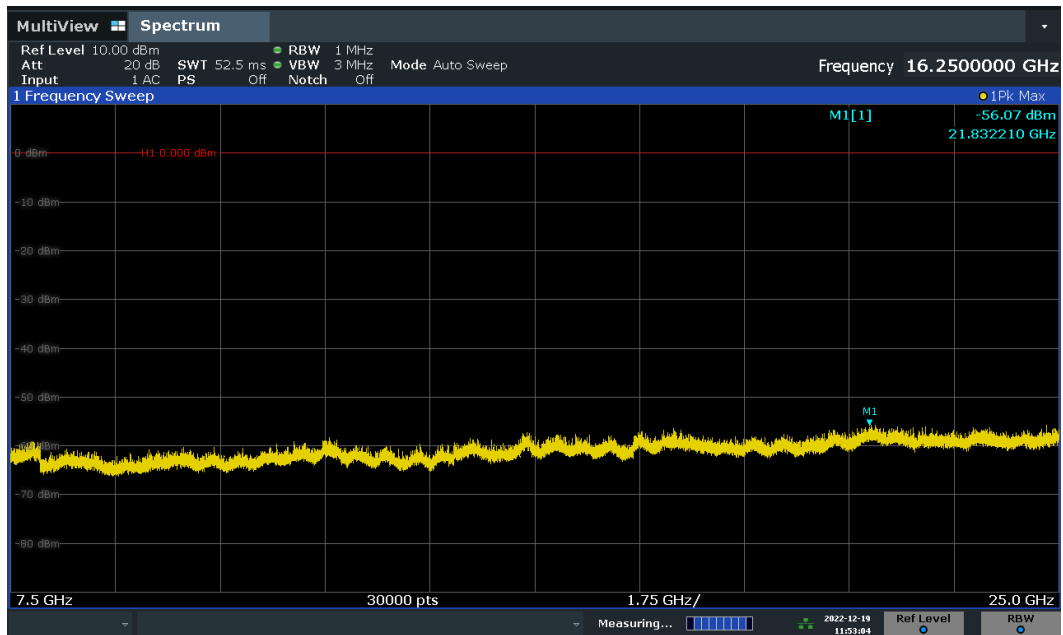


11:37:11 AM 12/19/2022

**Conducted Spurious – Pack Tracker**



Conducted Spurious – Repeater

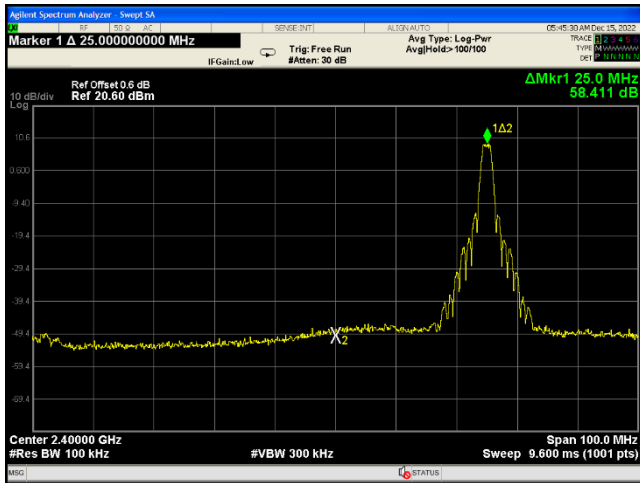


11:53:05 AM 12/19/2022

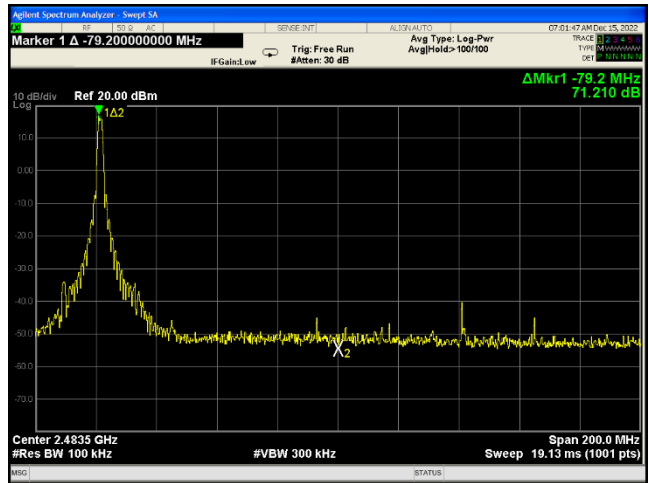
Conducted Spurious – Repeater

<b>4.6</b>	<b>Band-Edge Compliance</b>		
<b>Method:</b>	The measurements were made with transmitter set to transmit continuously with modulated signal at low and high channels.		
	Laboratory Ambient Temperature:	23°C	
	Relative Humidity:	48%	
	Atmospheric Pressure:	1011 mbars	
<b>Reference Standard(s):</b>	<input checked="" type="checkbox"/> ANSI C63.10:2013, Section 11.13.2 <input checked="" type="checkbox"/> FCC Part 15.247/RSS 247 <input checked="" type="checkbox"/> KDB 558074	<b>Measurement Point</b>	<input checked="" type="checkbox"/> Conducted <input type="checkbox"/> Radiated
<b>Frequency Range:</b>	<input checked="" type="checkbox"/> 2405.0MHz <input checked="" type="checkbox"/> 2425.0MHz	<b>Results</b>	
<b>Limit:</b>	<input checked="" type="checkbox"/> >20dBc	Pak Tacker > 58dBc Repeater > 79dBc	
<b>Nominal Voltage:</b>	<input type="checkbox"/> 120VAC <input checked="" type="checkbox"/> 6AA Batteries		
<b>Test Personnel:</b>	Yuriy Litvinov <i>Yuriy Litvinov</i>	<b>Date:</b> 10/04/2021	

<b>Note:</b>	
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Band Edge – Pak-Tracker  
Center Freq. 2.400GHz



Band Edge - Repeater  
Center Freq. 2.4835GHz

<b>4.7</b>	<b>Conducted Emissions Data</b>
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<b>Method:</b>	<p>The AMN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the AMN. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.</p> <p>All power was connected to the system through Artificial Mains Network (AMN). All tested telecommunications lines were connected to an Asymmetric Artificial Network (AAN) and conducted voltage measurements on telecommunications lines were made at the output of the ISN. Where an AAN was not appropriate or available measurements were made using a Capacitive Voltage Probe.</p>
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<b>Test Verification:</b> <input type="checkbox"/>	Laboratory Ambient Temperature:	
	Relative Humidity:	
	Atmospheric Pressure:	

<b>Reference Standard(s):</b>	<input type="checkbox"/> RSS GEN/FCC 15.207 <input type="checkbox"/> ANSI C63.4:2014 <input type="checkbox"/> ANSI C63.10:2013	<b>Measurement Point</b>
		<input type="checkbox"/> Mains <input type="checkbox"/> Telecommunication ports <input type="checkbox"/>

<b>Nominal Voltage:</b>	<input type="checkbox"/> 120VAC <input type="checkbox"/> 230VAC <input type="checkbox"/>
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<b>Test Personnel:</b>		<b>Date:</b>	
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<b>Limits – Part 15.207/RSS Gen – AC Mains</b>				
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Frequency (MHz)	Limit dB (µV)			
	Quasi-Peak	Average	Result	Comments
0.15 to 0.50	66 to 56	56 to 46	<b>N/A</b>	
0.50 to 5	56	46	<b>N/A</b>	
5 to 30	60	50	<b>N/A</b>	

<b>Modifications:</b>	
<b>Note:</b>	



4.8 RF Exposure Evaluation	
Reference Standard(s):	<input checked="" type="checkbox"/> KDB 447498 RF Exposure Guidance v06 <input type="checkbox"/> KDB 447498 Interim RF Exposure Guidance v01 <input checked="" type="checkbox"/> RSS 102, Issue 5 <input type="checkbox"/>
	<input checked="" type="checkbox"/> MPE <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> SAR Test Exclusion
Frequency Range(s):	<input checked="" type="checkbox"/> 2405.0MHz <input checked="" type="checkbox"/> 2425.0MHz <input type="checkbox"/>
Antenna Separation Distance:	>20cm
RF Exposure Conditions:	Mobile
Repeater Peak Antenna Gain:	4.3dBi (numeric gain 2.7dBi)
Repeater the source-based output power:	102mW(20.1dBm)*0.2(worst case duty cycle)=20.4mW(13.1dBm)
Repeater EIRP/ERP output power:	EIRP=13.1dBm + 4.3dBi=17.4dBm
Power Density (S=PG/4πR <sup>2</sup> ):	0.11Watts/m <sup>2</sup> /0.011 mW/cm <sup>2</sup>
Pak-Tracker the source-based output power:	20mW(13.1dBm)*0.2(worst case duty cycle)=4mW(6.0dBm)
Pak-Tracker Peak Antenna Gain:	0.7dBi (numeric gain 1.2dBi)
Pak-Tracker EIRP/ERP output power:	EIRP= 6.0dBm + 0.7dBi=6.7dBm
Power Density (S=PG/4πR <sup>2</sup> ):	0.01 Watts/m <sup>2</sup> /0.001 mW/cm <sup>2</sup>
The sum of simultaneous transmission:	0.12Watts/m <sup>2</sup> /0.012 mW/cm <sup>2</sup>
<b>MPE Limit</b>	
FCC Part 1.1310	1.0 mW/cm <sup>2</sup> @2.4GHz
RSS 102, Issue 5	5.3508 Watts/m <sup>2</sup> @2.4GHz
<b>Note:</b>	The device has two simultaneously transmitting antennas



5.0		Test Equipment			
Test Equipment Used					
Description	Manufacturer	Model	Identifier	Last Cal. Date	Check
Biconilog Antenna	Schwarzbeck	VULB 9168	9168-1070	10/20/2022	<input checked="" type="checkbox"/>
Horn Antenna	A.H. Systems	SAS 571	1010	10/20/2022	<input checked="" type="checkbox"/>
Loop Antenna	A.H. Systems	EHA-51B	1213E	10/20/2022	<input type="checkbox"/>
EMI Receiver	Rohde & Schwarz	ESW26	101412	10/20/2022	<input checked="" type="checkbox"/>
Signal Analyzer	Agilent	N9000A	MY53031040	10/20/2022	<input checked="" type="checkbox"/>
EMI Receiver	Agilent	E4448A	1530975	10/20/2022	<input checked="" type="checkbox"/>
LISN	TESEQ	NNB51	1130	10/20/2022	<input checked="" type="checkbox"/>
Coaxial Cable	Insulated Wire	2803	CBL2039	10/20/2022	<input checked="" type="checkbox"/>
EMC Software	ETS-Lindgren	TILE 7		N/A	<input checked="" type="checkbox"/>
<b>Equipment Calibration Interval:</b>		<input checked="" type="checkbox"/> 12 months		<input type="checkbox"/> 24 months	

6.0		Report revision history		
Revision Level	Date	Report Number	Notes	
0	02/20/2023	HRE202208369	Original Issue	