EMC TEST REPORT

NVLAP Lab Code 200033-0

Standard(s):

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

FCC ID:DGFPSDPIC100NA
IC:458A-PSDPIC100NA

Product: 3M™ PELTOR™ Professional In-Ear Communication Headset

Model(s): PIC-100NA

Company Name:
3M Company

Address:
7911 Zionsville Rd,
Indianapolis, IN 46268

Report Number: RE1910211-2
Report Issue Date: July 19, 2022

Report Prepared by:

Signature:
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Lead EMC Engineer

Tested by:
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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)(1)/ RSS-247(5.1(1))	20dB Bandwidth	**pass**	
4.2	FCC Part 15.247(b)(1)/ RSS-247(5.4(2))	Maximum Peak Conducted Output Power	**pass**	
4.3	FCC Part 15.247(a)(1)/ RSS-247(5.1(2))	Channel Separation	**pass**	
4.4	FCC Part 15.247(a)(1)/ RSS-247(5.1(4))	Number of Channels	**pass**	
4.5	FCC Part 15.247(a)(1)/ RSS-247(5.1(4))	Time of Occupancy	**pass**	
4.6	FCC Part 15.209 RSS-Gen, 8.9	Radiated Emissions in restricted band	**pass**	
4.7	FCC Part 15.247(d)/ RSS-247(5.5)	Radiated Emissions in non-restricted band	**pass**	
4.8	FCC Part 15.247(d)(1)/ RSS-247(5.5)	Band-edge Emissions Measurements	**pass**	
4.9	FCC Part 15.207/ RSS-Gen (8.8)	Conducted Emissions	**pass**	

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			
Description:	Body worn radio headset with a battery pack operating in two frequency bands			
Model(s):	PIC-100NA			
Serial number:	N/A			
3M Division:	Personal Safety			
Modifications and Special Measures:	none			
Frequency Range:	2402.0-2480.0 MHz			
Channel No.:	79			
Modulation Type:	GFSK, π/4-DQPSK and 8DPSK			
FCC Classification:	Spread Spectrum Transmitter (DSS)			
Output Power EIRP:	10.7dBm (11.7mW)			
Antenna Type and Antenna Assembly Gain:	☐ External	☒ Integral PCB Antenna	☐ Dedicated	
	☒ 2.3dBi	☒ Declared by the Manufacturer	☐ Measured	
Test Deviations or Exclusions	☐ Yes	☒ No		
Rated Power:	**Voltage:**	☒ 120VAC	☐ 230VAC	☒ 3.7VDC
	Phase:	☒ 1ph	☐ 3ph	☒ Battery
	Frequency:	☒ 50Hz	☒ 60Hz	
	Current:	0.5Amps		
Test Dates:	08/13/2021-07/18/2022			
Received Date:	08/13/2021			
Received Conditions:	☐ Poor	☒ Good		
	☒ Prototype	☐ Production		

3.0 EUT Configuration

3.1 System Configuration

No.	Product Type	Manufacturer	Model	Comments
1	Headset	3M	PIC-100	
2	Battery Pack	3M	PIC-100BA	
3	USB Charger	Samsung	ETA-U90AWS	Support Equipment

3.2 Input/Output Ports of EUT

No.	Description	Type	Comments
1	DC Power	USB-C	
2			

3.3 Cables

No.	Description	Type	Length	Shielding	Comments
1	USB-C	USB 2.0	1m	Yes	
2					

3.4 Measurement Arrangements of EUT

	Intended Operational Arrangement(s)	Comments
☒	Table-top only	
☐	Floor-standing only	
☐	Floor-standing or table-top	
☒	Other	Body-worn

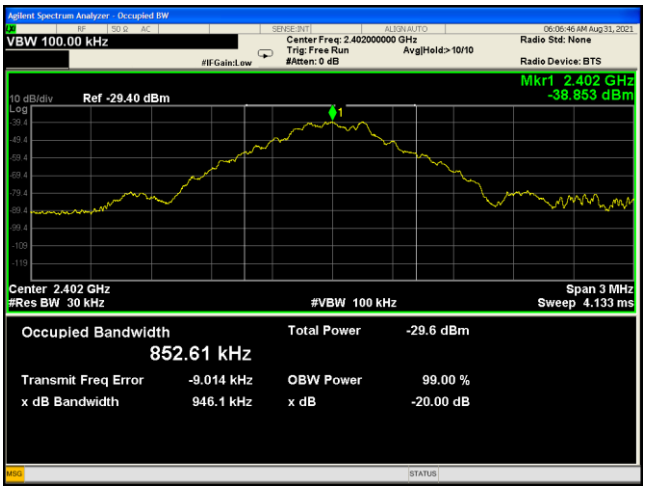
3.5 Exercising of EUT and Interfaces

No.	Mode of Operation
1	Transmitting at lowest, middle, and highest channels of operation with unmodulated CW carrier and/or hopping channels enabled
2	Device programming using Qualcomm BlueTest3 software and Anvil Radio Tester ver. 1.3 software for continuous transmission at maximum rated RF output power and Duty Cycle.
3	

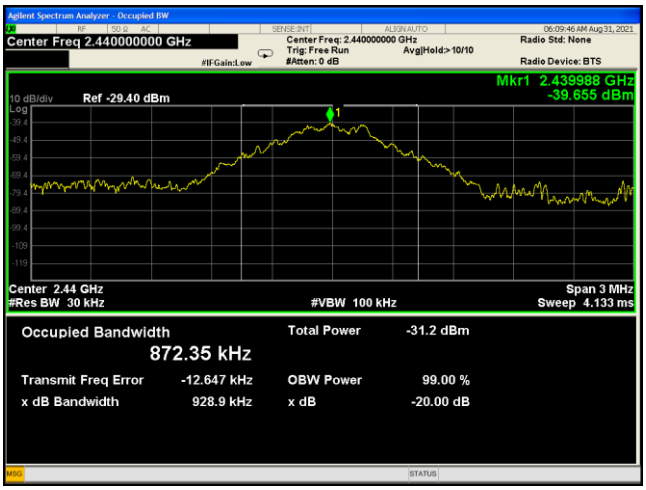
4.0 Test Conditions and Results

4.1	**20dB Bandwidth**	
	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	48%
	Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ ANSI C63.10:2013 ☒ FCC Part 15.247/RSS 247 ☒ KDB 558074	**Measurement Point** ☒ Conducted ☐ Radiated
Frequency Range:	☒ 2402.0-2480.0 MHz	RBW = 30KHz VBW ≥ 3 x RBW
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC	
Test Personnel:	Yuriy Litvinov	**Date:** 08/31/2021

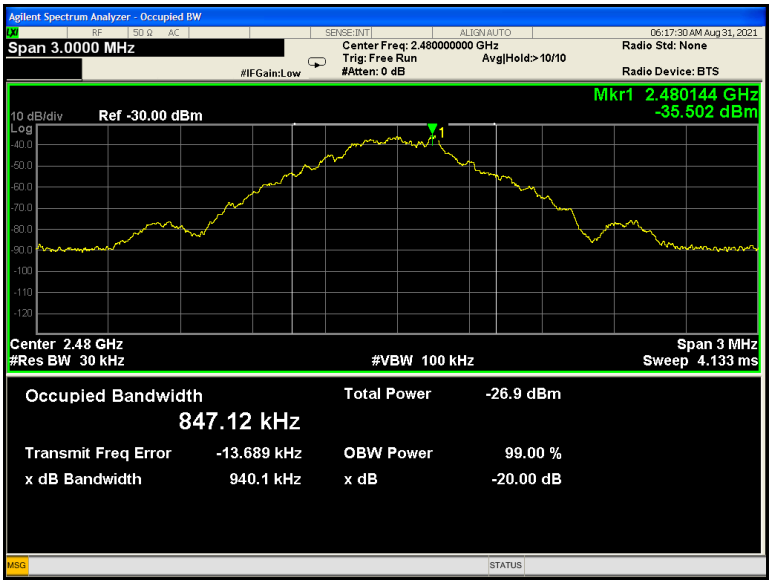
Frequency (MHz)	Data Rate	Modulations	99% Bandwidth (KHz)	20dB Bandwidth (KHz)	Results
2402	1 Mbps	GFSK	852.6	946.1	**pass**
2441	1 Mbps	GFSK	872.4	928.9	**pass**
2480	1 Mbps	GFSK	847.1	940.1	**pass**
2402	2 Mbps	π/4-DQPSK	1225	1341	**pass**
2441	2 Mbps	π/4-DQPSK	1210	1336	**pass**
2480	2 Mbps	π/4-DQPSK	1196	1313	**pass**
2402	3 Mbps	8DPSK	1137	1184	**pass**
2441	3 Mbps	8DPSK	1160	1190	**pass**
2480	3 Mbps	8DPSK	1139	1228	**pass**



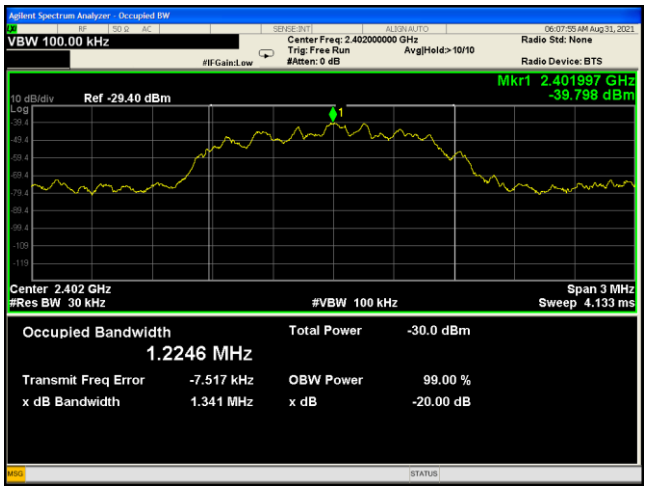
OBW –Low Channel (1Mbps)



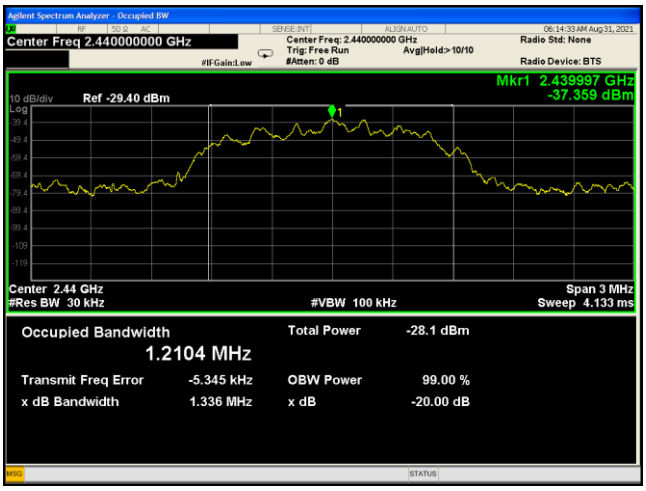
OBW – Mid Channel (1Mbps)



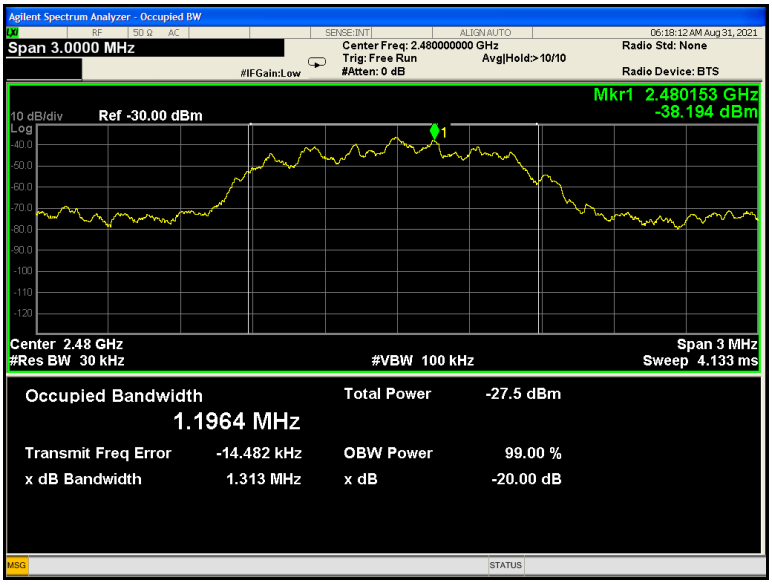
OBW – High Channel (1Mbps)



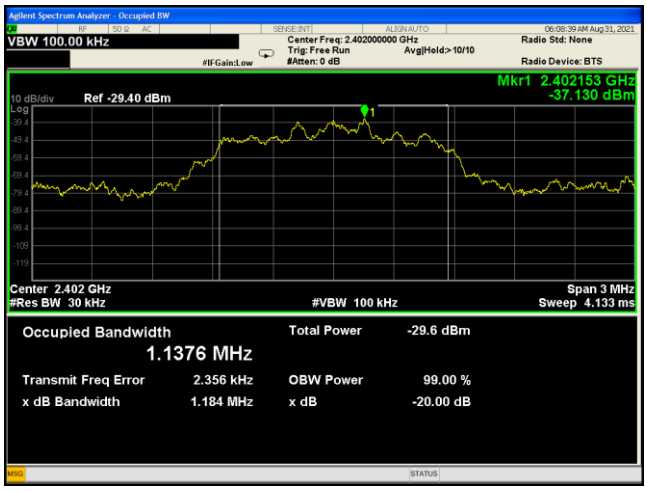
OBW –Low Channel (2Mbps)



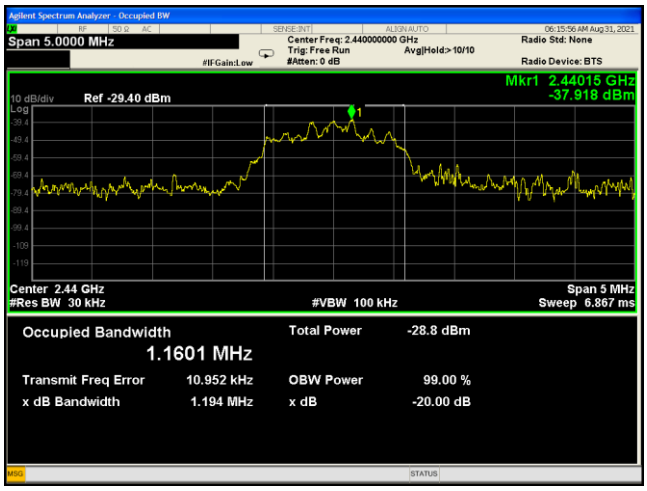
OBW – Mid Channel (2Mbps)



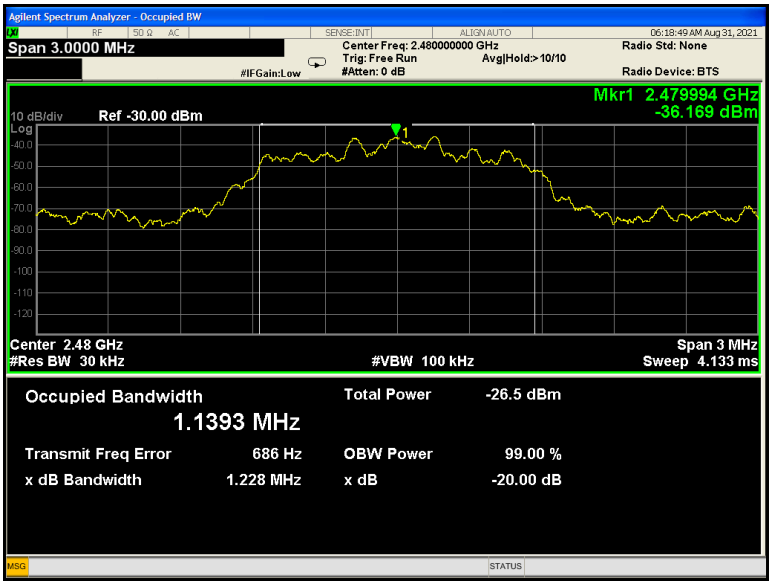
OBW – High Channel (2Mbps)



OBW –Low Channel (3Mbps)



OBW – Mid Channel (3Mbps)

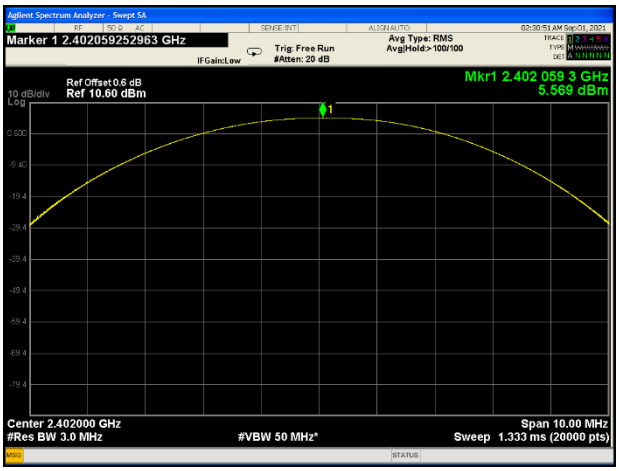


OBW – High Channel (3Mbps)

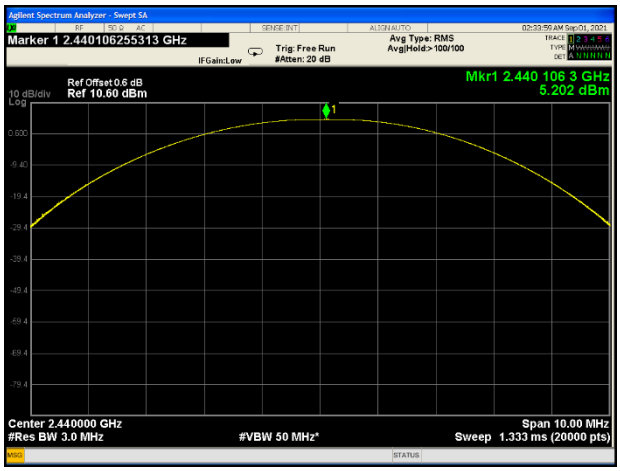
4.2	**Maximum Output Power**		
Method:	Measurements was performed with CW carrier at the highest power level at which the transmitter is intended to operate. The analyzer offset was adjusted to compensate for the attenuator and other losses.		
		Laboratory Ambient Temperature:	23°C
		Relative Humidity:	48%
		Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ ANSI C63.10:2013 ☒ FCC Part 15.247/RSS 247 ☒ KDB 558074		**Measurement Point** ☒ Conducted ☐ Radiated at 3 meters
Frequency Range:	☒ 2402.0 – 2480.0 MHz		
Antenna Gain:	2.3dBi		**Maximum Conducted Power (EIRP):**
Limit:	30 dBm		10.7dBm
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC		
Test Personnel:	Yuriy Litvinov		**Date:** 08/31/2021

Note:	EIRP (dBm) = Conducted Power (dBm) +Antenna Gain (dBi)= 8.4+2.3= 10.7dBm. All modes of operation and data were investigated. The results shown represent the worst case.

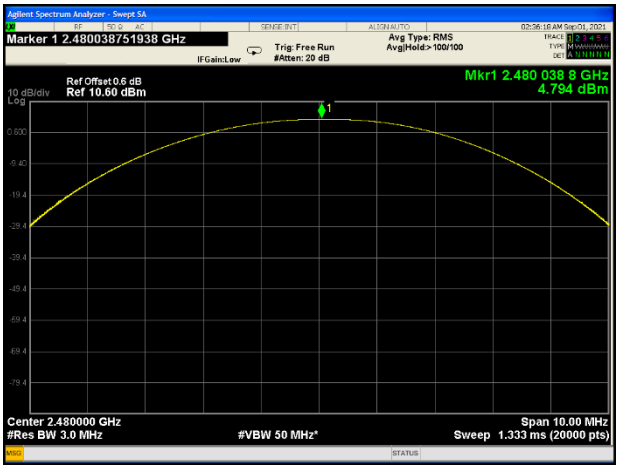
Frequency (MHz)	Data Rate	Modulations	RMS Conducted Power (dBm)	Limit (dBm)	Results
2402	1 Mbps	GFSK	5.6	30	**pass**
2440	1 Mbps	GFSK	5.2	30	**pass**
2480	1 Mbps	GFSK	4.8	30	**pass**
2402	2 Mbps	π/4-DQPSK	7.7	30	**pass**
2440	2 Mbps	π/4-DQPSK	7.5	30	**pass**
2480	2 Mbps	π/4-DQPSK	7.2	30	**pass**
2402	3 Mbps	8DPSK	8.4	30	**pass**
2440	3 Mbps	8DPSK	8.2	30	**pass**
2480	3 Mbps	8DPSK	8.0	30	**pass**



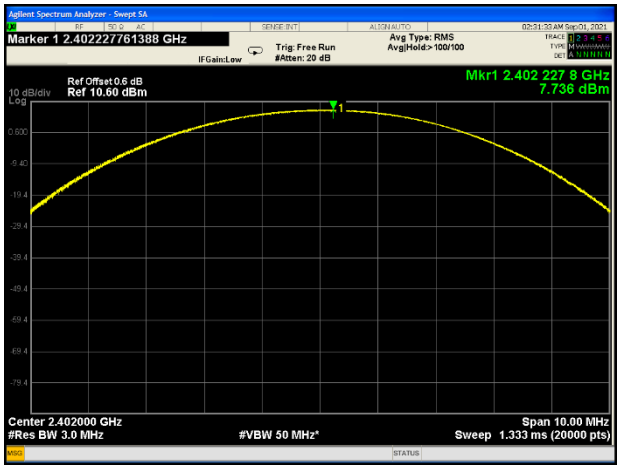
Peak Power Low Channel (1Mbps)



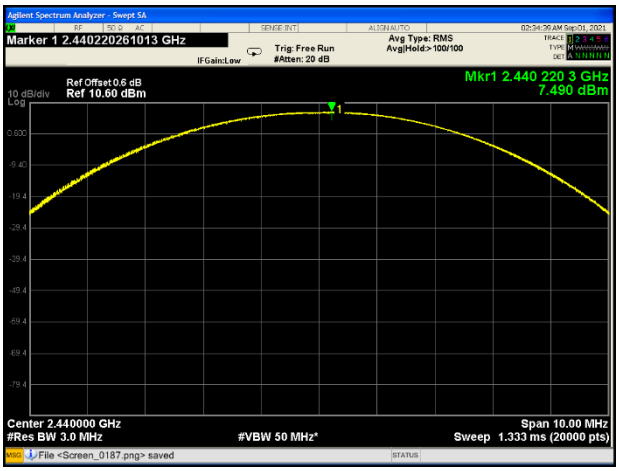
Peak Power Mid Channel (1Mbps)



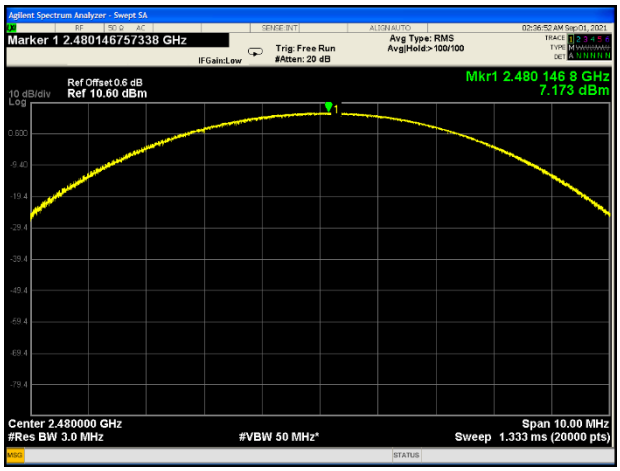
Peak Power High Channel (1Mbps)



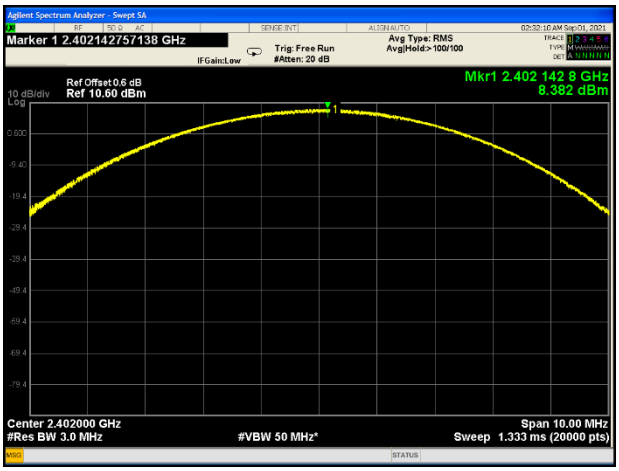
Peak Power Low Channel (2Mbps)



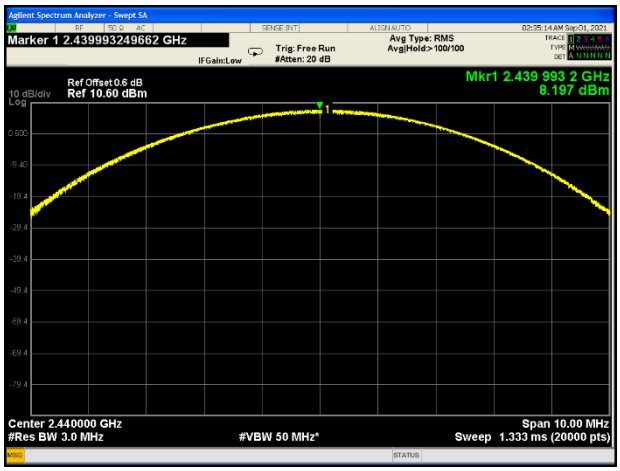
Peak Power Mid Channel (2Mbps)



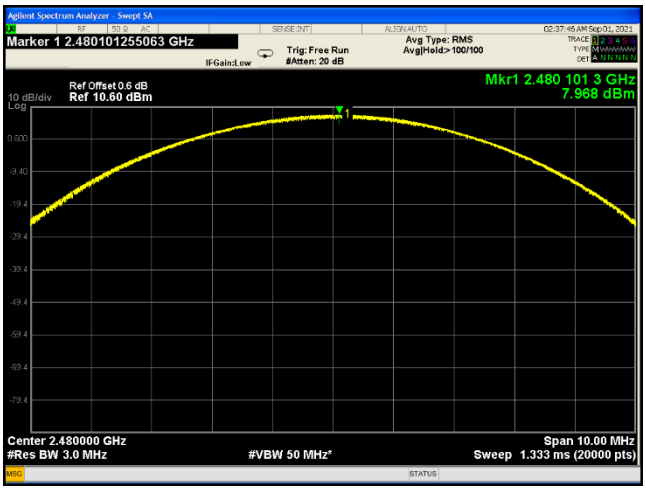
Peak Power High Channel (2Mbps)



Peak Power Low Channel (3Mbps)



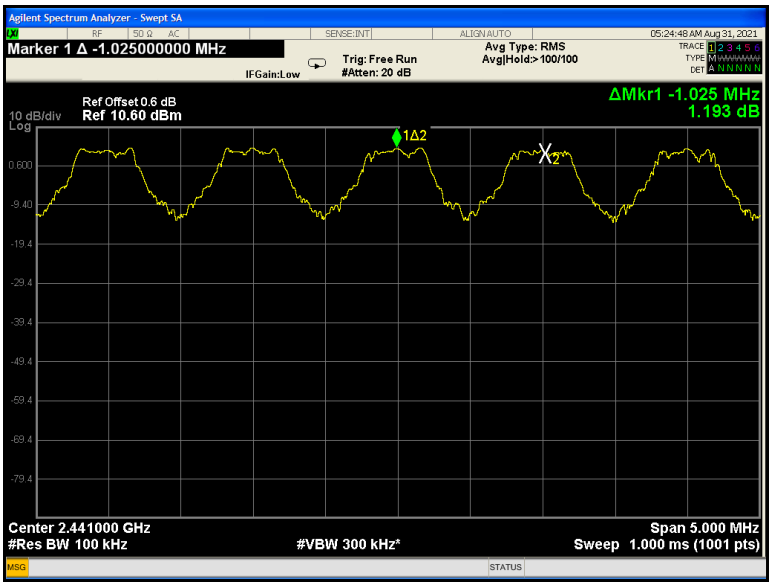
Peak Power Mid Channel (3Mbps)



Peak Power High Channel (3Mbps)

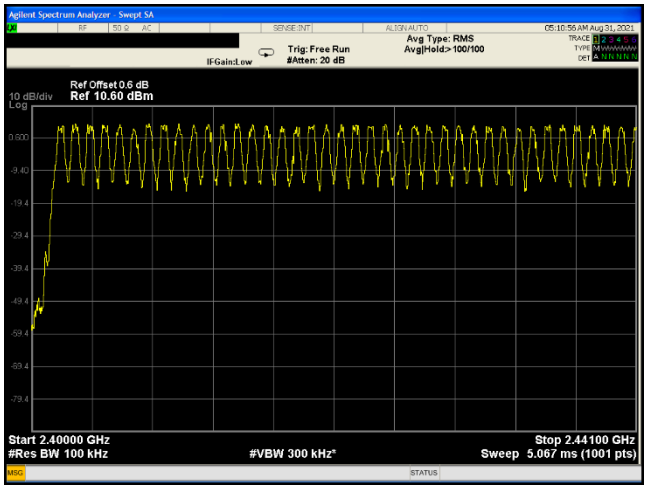
4.3	**Carrier Frequency Separation**	
Method:	The measurements were made with transmitter set to transmit a continuously with hopping function enabled.	
	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	48%
	Atmospheric Pressure:	1011 mbars
Reference Standard:	☒ ANSI C63.10:2013 ☒ FCC Part 15.247/RSS 247 ☒ KDB 558074	**Measurement Point** ☒ Conducted ☐ Radiated ☐
Frequency Range:	☒ 2401-2480MHz	
Antenna Gain:	☒ 2.3dBi	**Result**
Limit:	☐ >25KHz	
	☒ >2/3 the value of the 20dB Bandwidth ☐	1.025MHz
Nominal Voltage:	☐ 230VAC ☒ 3.7VDC	
Test Personnel:	Yuriy Litvinov	**Date:** 08/31/2021

Note:	The EUT complies with the minimum channel separation requirement when it is operating in 1x/EDR mode using 79 channels. All modes of operation and data were investigated. The results shown represent the worst case.

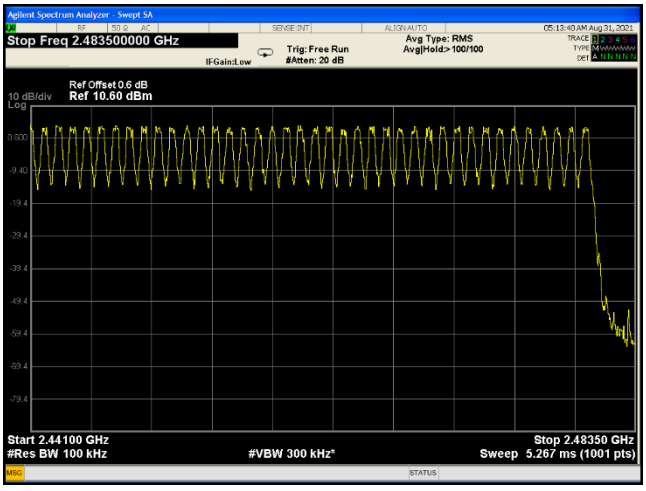


4.4	**Number of Hopping Frequencies**	
Method:	The measurements were made with transmitter set to transmit a continuously with hopping function enabled.	
	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	48%
	Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ ANSI C63.10:2013 ☒ FCC Part 15.247/RSS 247 ☒ KDB 558074	**Measurement Point** ☒ Conducted ☐ Radiated at 3 meters
Frequency Range:	☒ 2402.0 – 2480.0 MHz	
Antenna Gain:	2.3dBi	**Result**
Limit:	☒ >15 Hopping Channels	79
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC	
Test Personnel:	Yuriy Litvinov	**Date:** 08/31/2021

Note:	The frequency spectrum was broken up into two subranges to clearly show all the hopping frequencies.



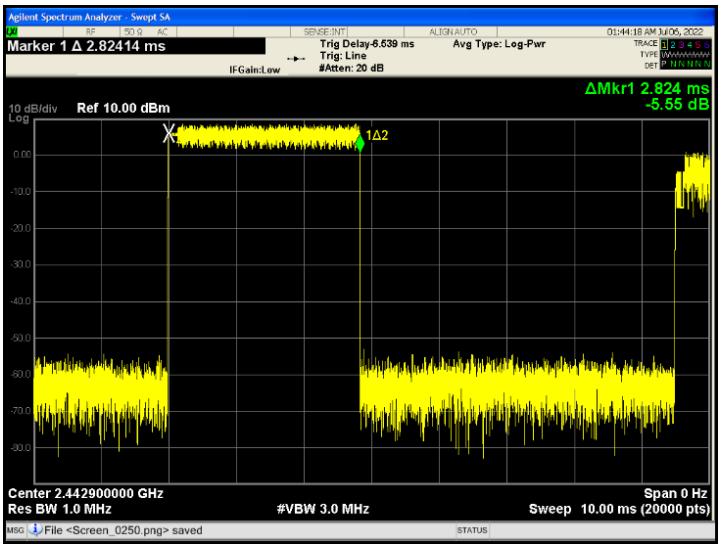
Low End Spectrum



High End Spectrum

4.5	**Time of Occupancy**	
Method:	The measurements were made with transmitter set to transmit a continuously with hopping function enabled.	
	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	48%
	Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ ANSI C63.10:2013 ☒ FCC Part 15.247/RSS 247 ☒ KDB 558074	**Measurement Point** ☒ Conducted ☐ Radiated at 3 meters
Frequency Range:	☒ 2402.0 – 2480.0 MHz	
Antenna Gain:	2.3dBi	**Result**
Limit (dwell time):	☒ <0.4 sec within a period of 0.4 sec x *N* hopping channels	62ms/channel
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC	
Test Personnel:	Yuriy Litvinov	**Date:** 08/31/2021

Note:	Typically, Bluetooth 1x/EDR mode has a channel hopping rate of 1600hops/s. Since 1x/EDR use 5 transmit and 1 receive slot the actual hopping rate 1600/6=266.67 hops/slot. ○ 400ms x 79 channels=31.6 (Time of Occupancy). ○ Worst case BT has 266.67 hops/second 1x/(EDR modes DH5 operation). ○ 266.67/79 = 3.38 hops/second (#of hops/second on one channel). ○ 3.38 x 31.6=106.67 (#hops over a 31.6 second period). ○ 106.67x 2.824 /channel=301.2ms (worst case dwell time for one channel in 1x/EDR)



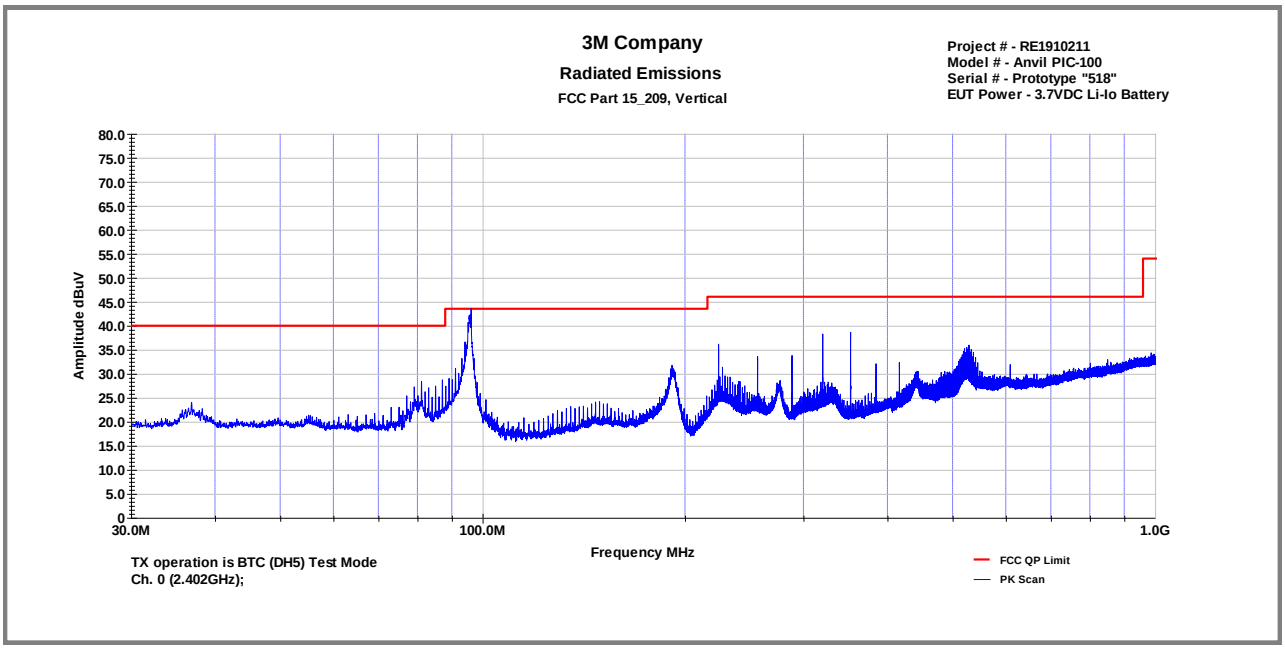
4.6	**Radiated Emissions in restricted band**
Method:	Measurements were made in a 3-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4 standards. EUT was rotated through three orthogonal axes to determine which attitude (orientation) and arrangement produces the highest emission relative 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 ware 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.

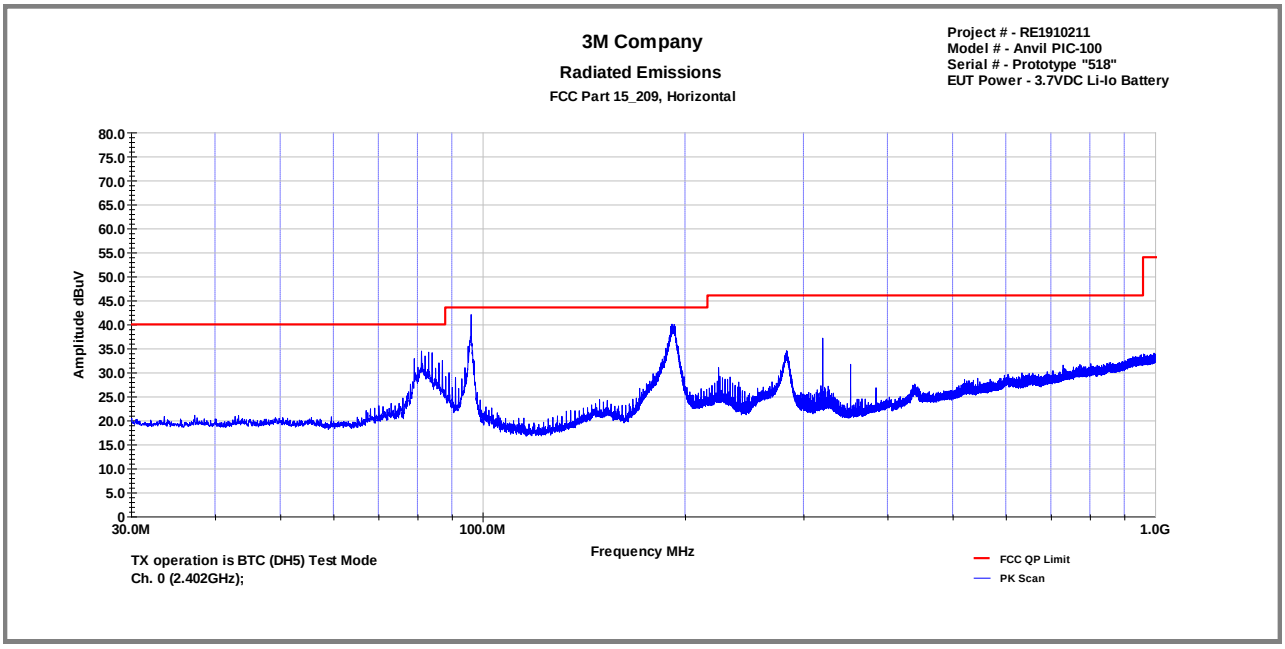
Test Verification: ☒	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	55%
	Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ ANSI C63.10:2013, Section 11.12.1 ☒ FCC Part 15.247/RSS 247 ☒ KDB 558074	**Measurement Distance** ☒ 3 Meters ☐
Frequency Range:	☒ 30 MHz to 1 GHz ☒ 1 GHz to 25 GHz	
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC	
Test Personnel:	Keith Schwartz KS	**Date:** 09/09/2021

Limits –15.209 and RSS Gen

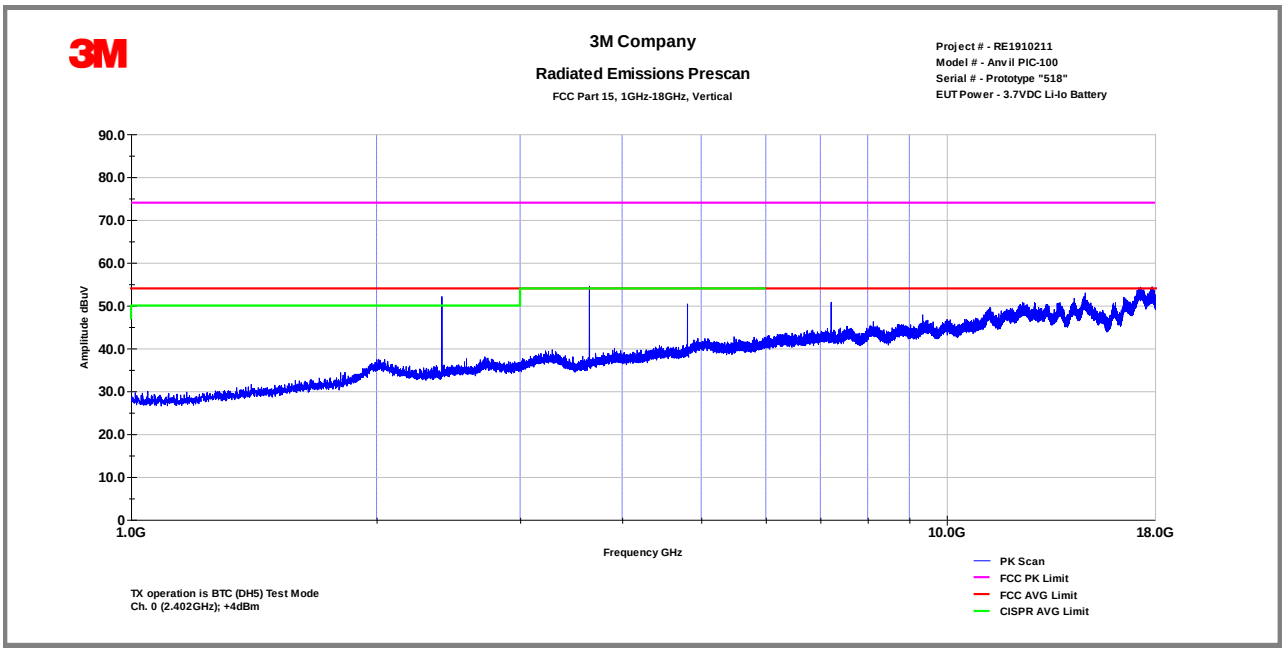
Frequency (MHz)	Limit dB (µV/m)				
	Quasi-Peak	Average	Peak	Distance	Results
0.009-0.490		2400/F(KHz)		300	**N/A**
0.490-1.705	24000/F(KHz)			30	**N/A**
1.705-30	30			30	**N/A**
30 to 88	40			3	**pass**
88 to 216	43.5			3	**pass**
216 to 960	46			3	**pass**
Above 960		54	74	3	**pass**

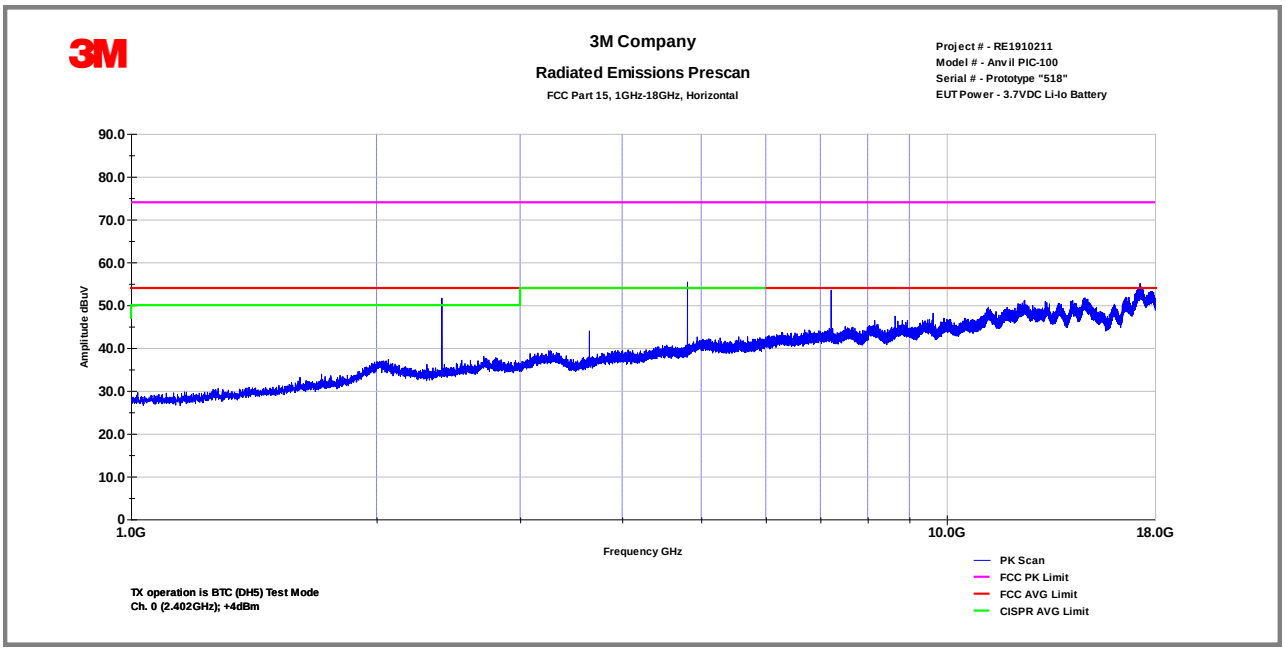
Modifications:	
Note:	The lower limit applies at the transition frequency. An inverse proportionality factor of 20 dB per decade has been used to normalize the measured data to the specified distance for determining compliance. All modes of operation and data were investigated. The results shown represent the worst case. No radiated spurious emissions were detected above 18GHz. No significant radiated emissions were found in the 2310-2390 restricted band. DCCF was used for the measurements above 1GHz in the restricted band. DH5 (worst case) mode adjusted channel hope rate = 133.33hops/second Time per channel hop = 1/133.33 hops/second=7.5ms Time to cycle through all channels +7.5x20 channels = 150ms Number of times transmitter hits on one channel = 100ms/150ms = 1 time (worst dwell =7.5ms) Duty cycle correction factor 20 log (7.5ms/100ms) = -22.5dB



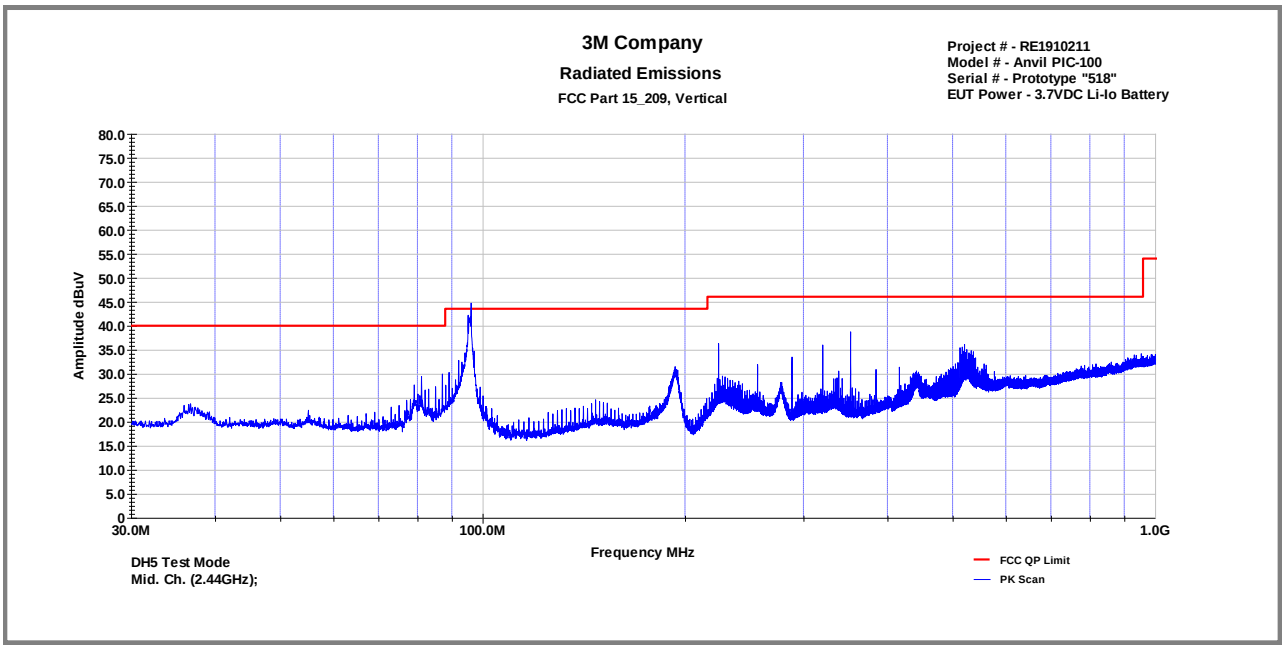


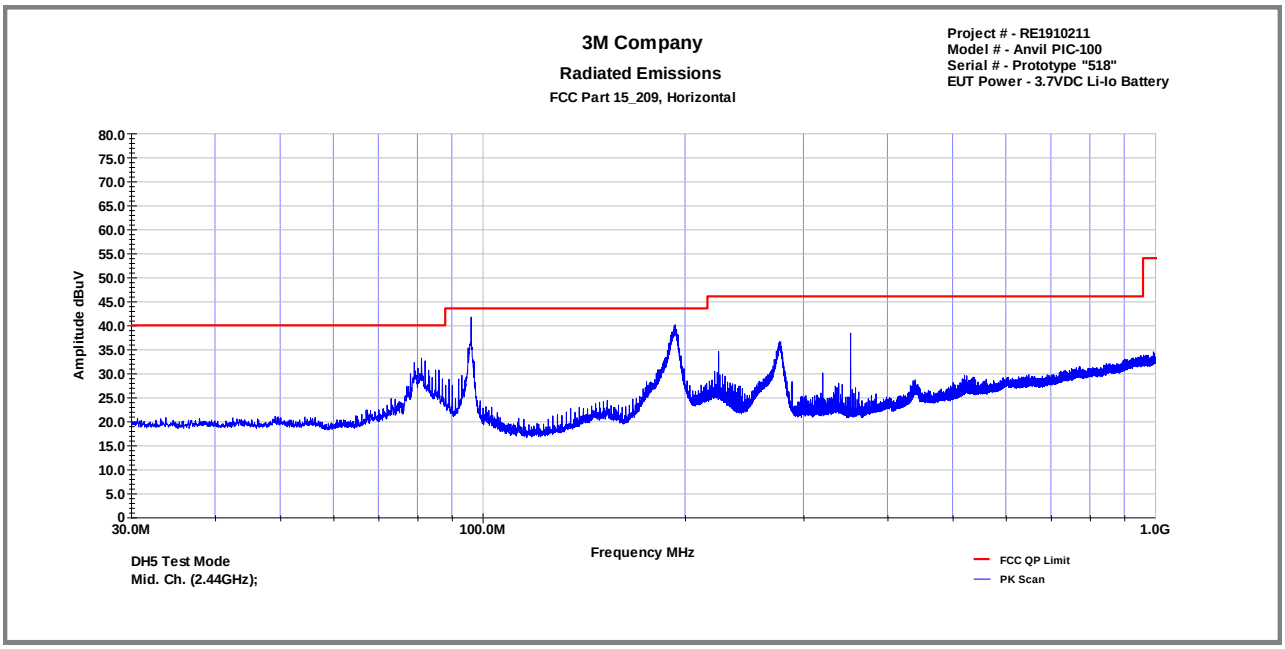
FCC Part 15.209 Radiated Emissions in restricted band – Low Channel (DH5)



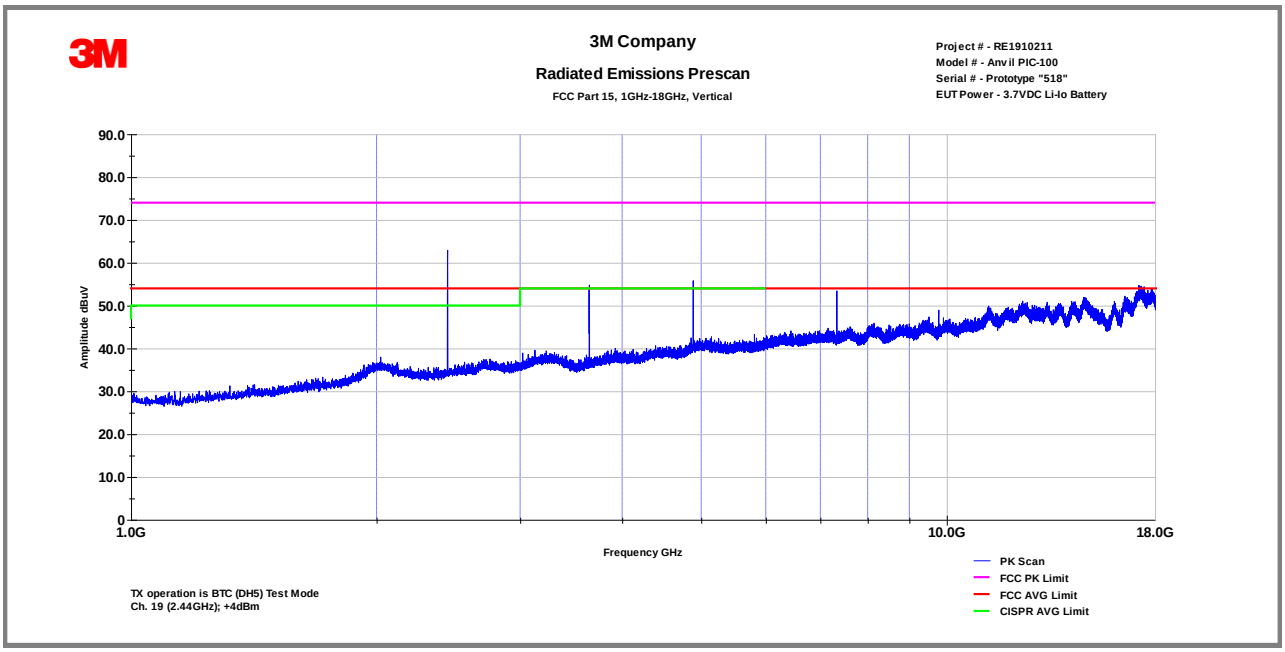


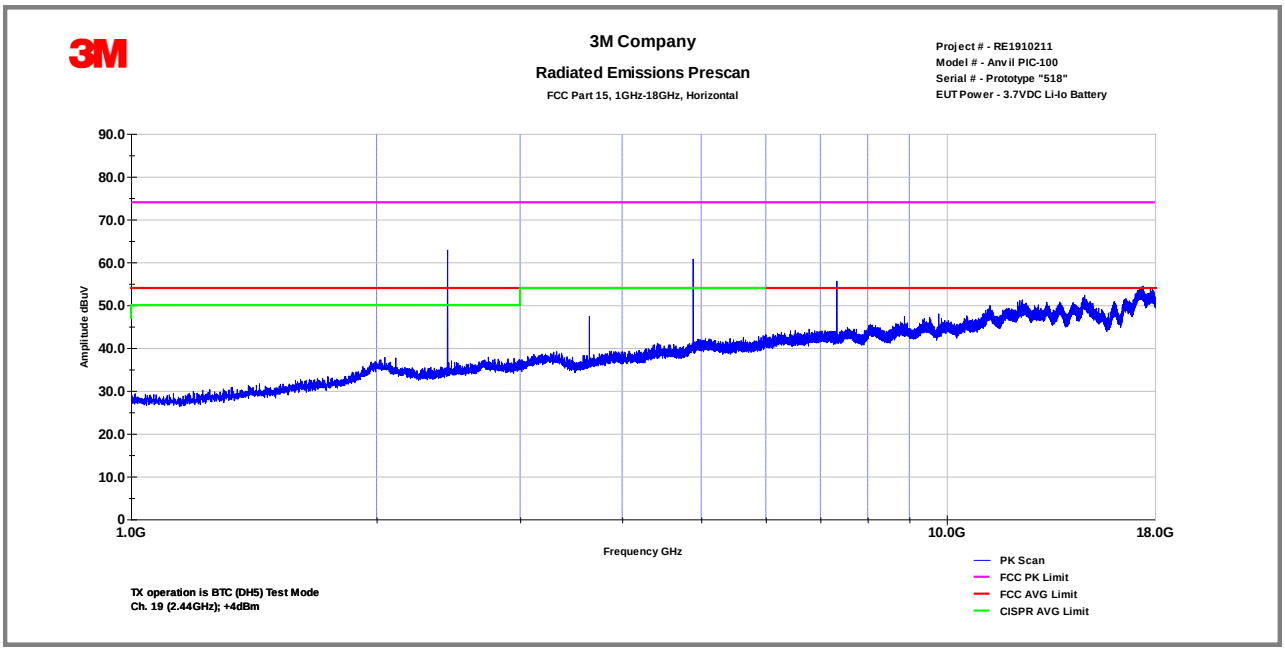
FCC Part 15.209 Radiated Emissions in restricted band – Low Channel (DH5)



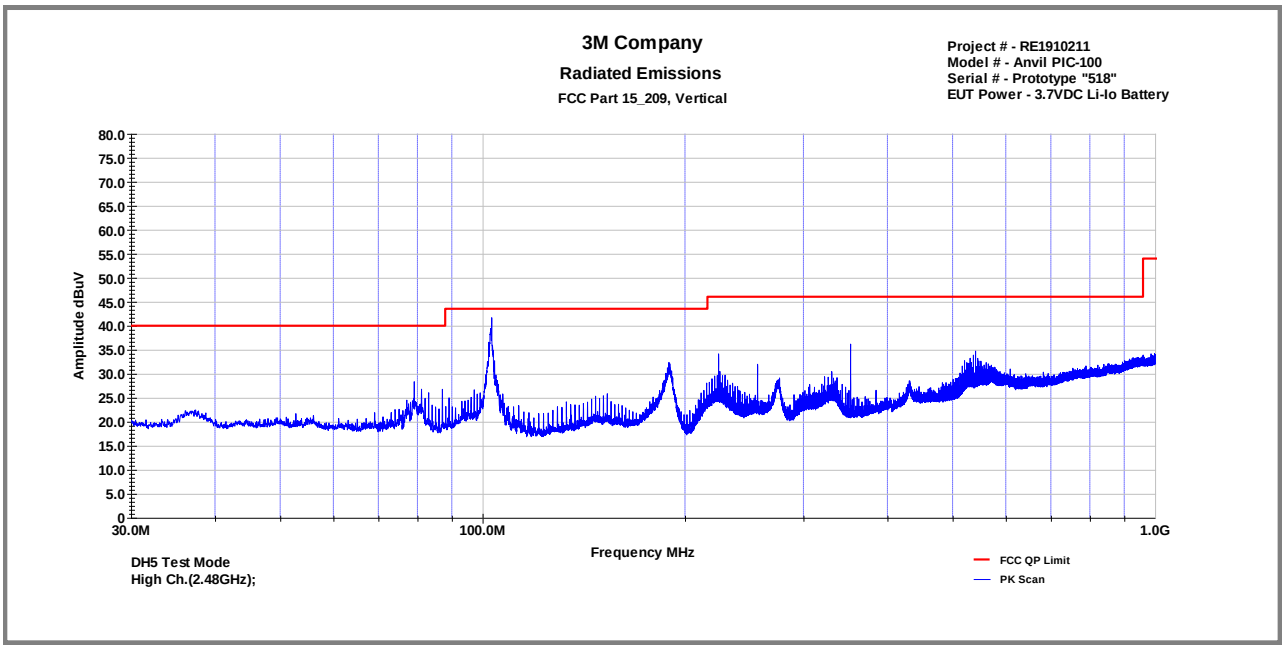


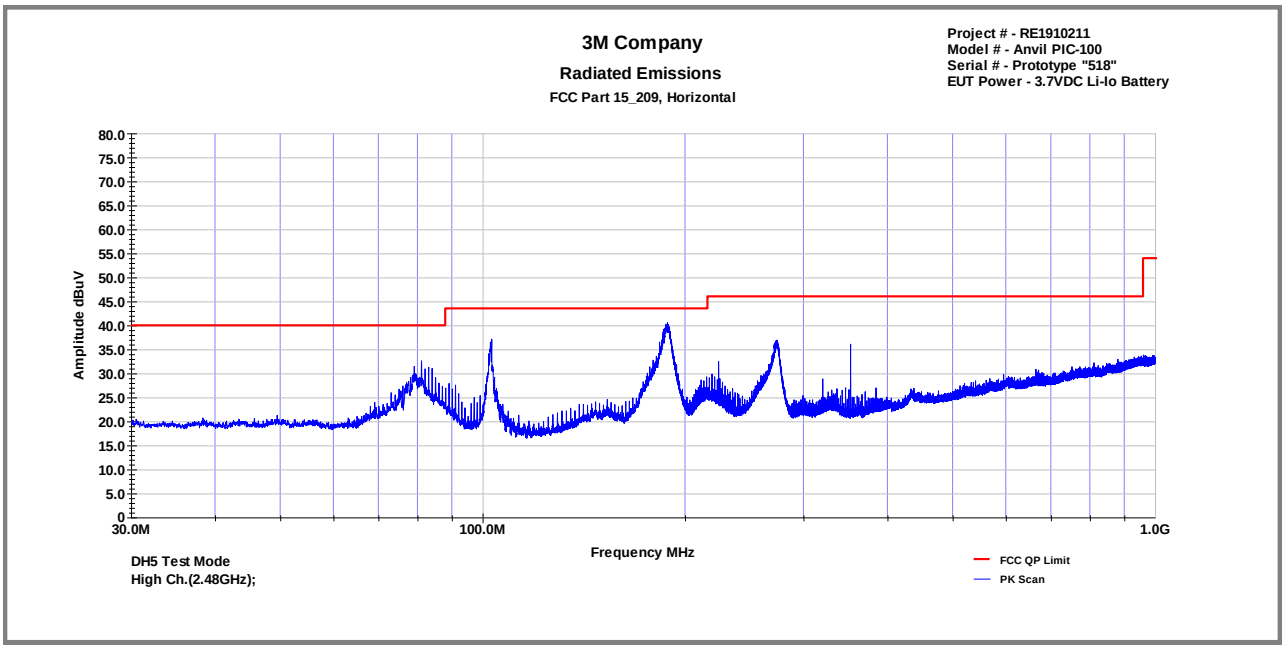
FCC Part 15.209 Radiated Emissions in restricted band – Mid Channel (DH5)



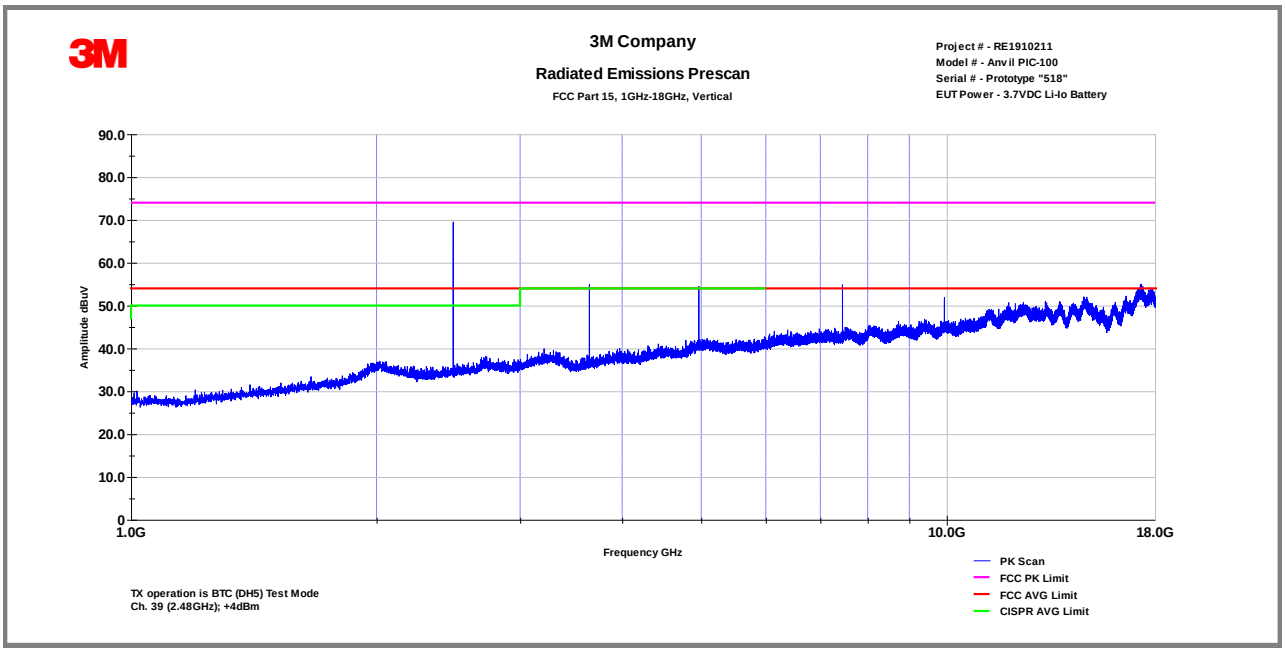


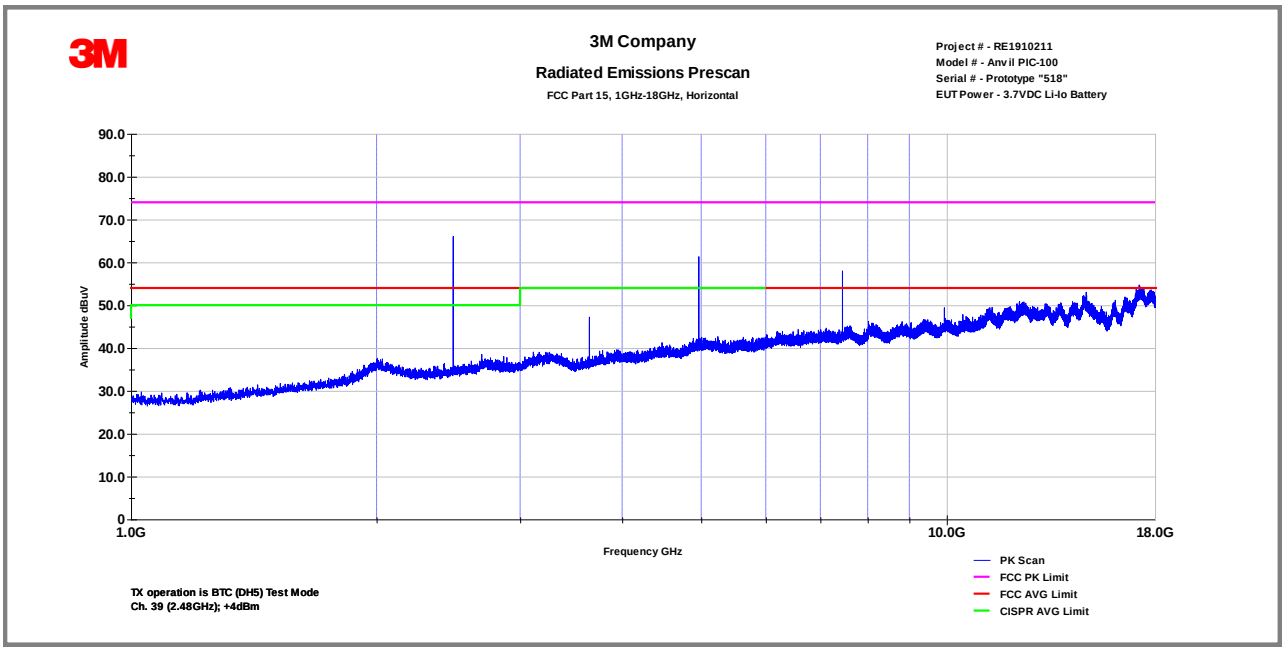
FCC Part 15.209 Radiated Emissions in restricted band – Mid Channel (DH5)





FCC Part 15.209 Radiated Emissions in restricted band – High Channel (DH5)





FCC Part 15.209 Radiated Emissions in restricted band – High Channel (DH5)

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
80.99	H	16.8	13.7	30.5	40	-9.5
96.02	V	27.7	13.3	41	43.5	-2.5
190.97	H	20.2	15.8	36	43.5	-7.5
282.32	H	10.6	18.4	29	46	-17
351.86	H	4	19.9	24	46	-22.1
528.74	H	4.5	24	28.5	46	-17.5
Notes:	Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) Low Channel-DH5					

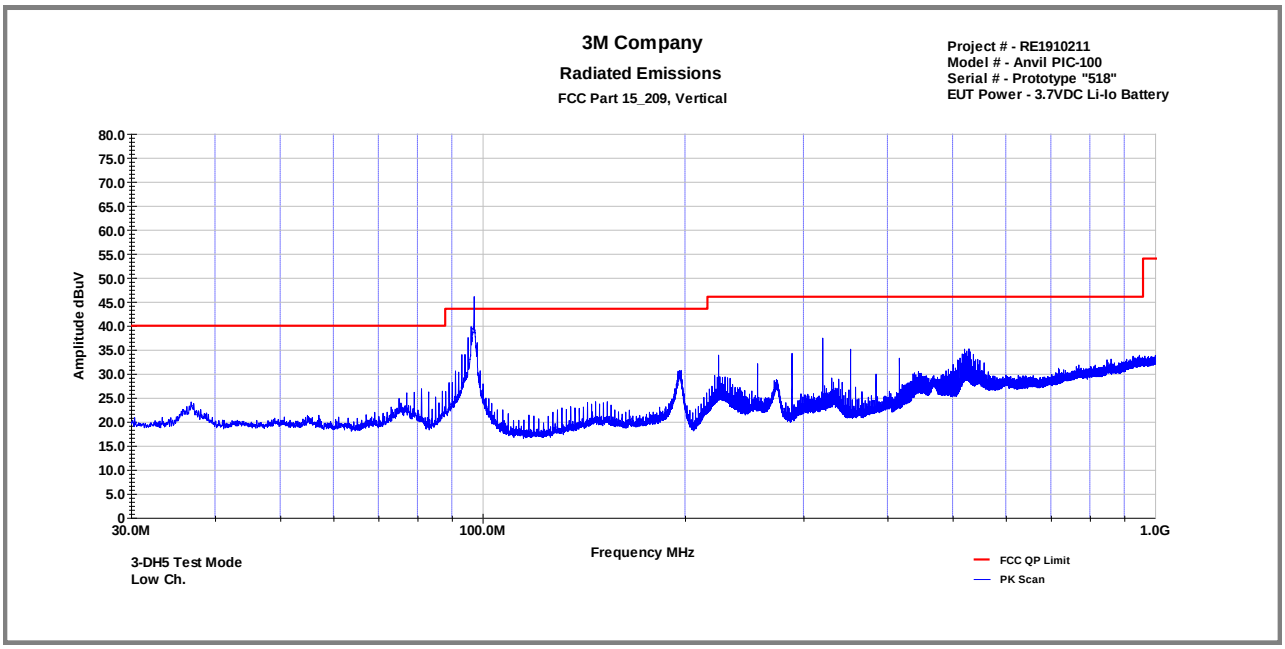
Frequency (MHz)	Pol.	QP Reading dBµV/m	Total CF dB	Net at 3 m dBµV/m	Limit (dBµV/m)	Margin dB
80.99	H	14.9	13.7	28.6	40	-11.4
95.99	V	27.7	13.3	41	43.5	-2.6
193.46	H	18	15.6	33.6	43.5	-9.9
223.01	H	12	14.9	27	46	-19
275	H	14.2	18.1	32.3	46	-13.8
352.55	V	4	19.9	24	46	-22
Notes:	Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) Mid Channel-DH5					

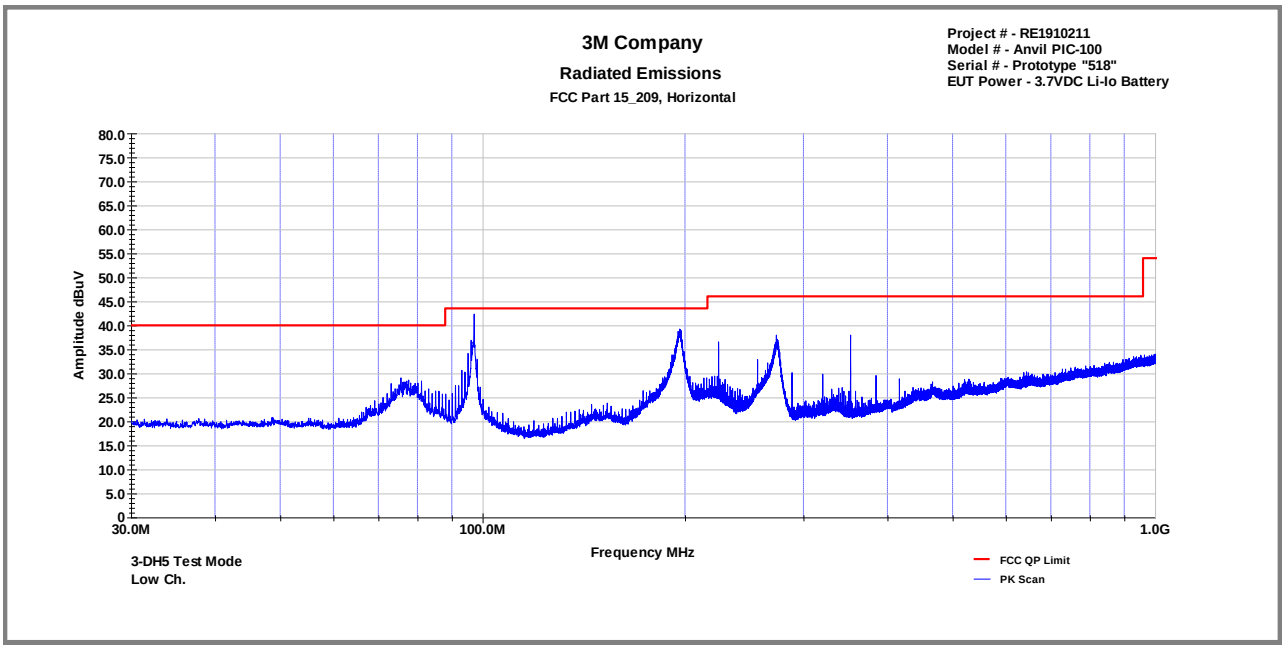
Frequency (MHz)	Pol.	QP Reading dBµV/m	Total CF dB	Net at 3 m dBµV/m	Limit (dBµV/m)	Margin dB
80.99	H	13.8	13.7	27.5	40	-12.5
103.01	V	19.4	14	33.4	43.5	-10.1
187.01	H	19.5	16.1	35.5	43.5	-8
223.01	H	11.7	14.9	26.6	46	-19.4
272.54	H	13.6	17.9	31.5	46	-14.5
351.47	V	4	19.9	23.9	46	-22.1
Notes:	Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) High Channel-DH5					

Pol	Frequency (MHz)	Peak dBµV/m	AVG dBµV/m	Total CF dB	Net Peak dBµV/m	Net AVE dBµV/m	PK Limit dBµV/m	AVE Limit dBµV/m	PK Margin dB	AVG Margin dB
V	3642.00*	71.17	37.2	-11.24	59.93	25.93	74.00	54.00	-14.07	-28.07
H	3642.00*	61.42	27.4	-11.24	50.18	16.18	74.00	54.00	-23.82	-37.82
V	4804.00	58.01	49.2	-6.22	51.79	42.99	74.00	54.00	-22.21	-11.01
H	4804.00	62.54	53.7	-6.22	56.32	47.52	74.00	54.00	-17.68	-6.48
V	7630.00	49.84		-3.69	46.15		74.00	54.00	-27.85	
H	7630.00	49.39		-3.69	45.70		74.00	54.00	-28.30	
V	9608.00	51.50		-1.60	49.90		74.00	54.00	-24.10	
H	9608.00	51.25		-1.60	49.65		74.00	54.00	-24.35	
Notes:		Net Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB))								
		Low Channel-DH5 *Device beacon. Transmit 2ms every 1s interval (DCCF -34dB)								

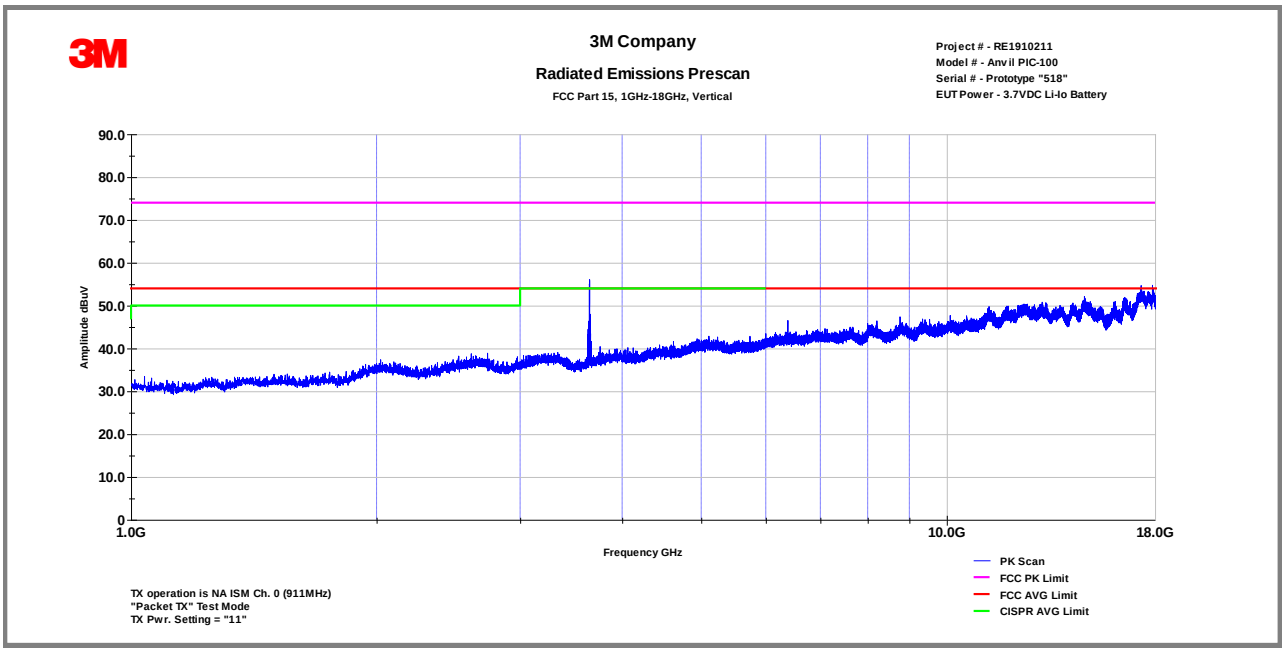
Pol	Frequency (MHz)	Peak dBµV/m	AVG dBµV/m	Total CF dB	Net Peak dBµV/m	Net AVE dBµV/m	PK Limit dBµV/m	AVE Limit dBµV/m	PK Margin dB	AVG Margin dB
V	4882.00	63.10	54.3	-5.30	57.80	49.00	74.00	54.00	-16.20	-5.00
H	4882.00	65.24	56.4	-5.30	59.94	51.14	74.00	54.00	-14.06	-2.86
V	7323.00	57.54	48.7	-3.60	53.94	45.14	74.00	54.00	-20.06	-8.86
H	7323.00	58.39	49.6	-3.60	54.79	45.99	74.00	54.00	-19.21	-8.01
V	12200.00	46.59		3.27	49.86		74.00	54.00	-24.14	
H	12200.00	46.55		3.27	49.82		74.00	54.00	-24.18	
Notes:		Net Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB))								
		Mid Channel-DH5								

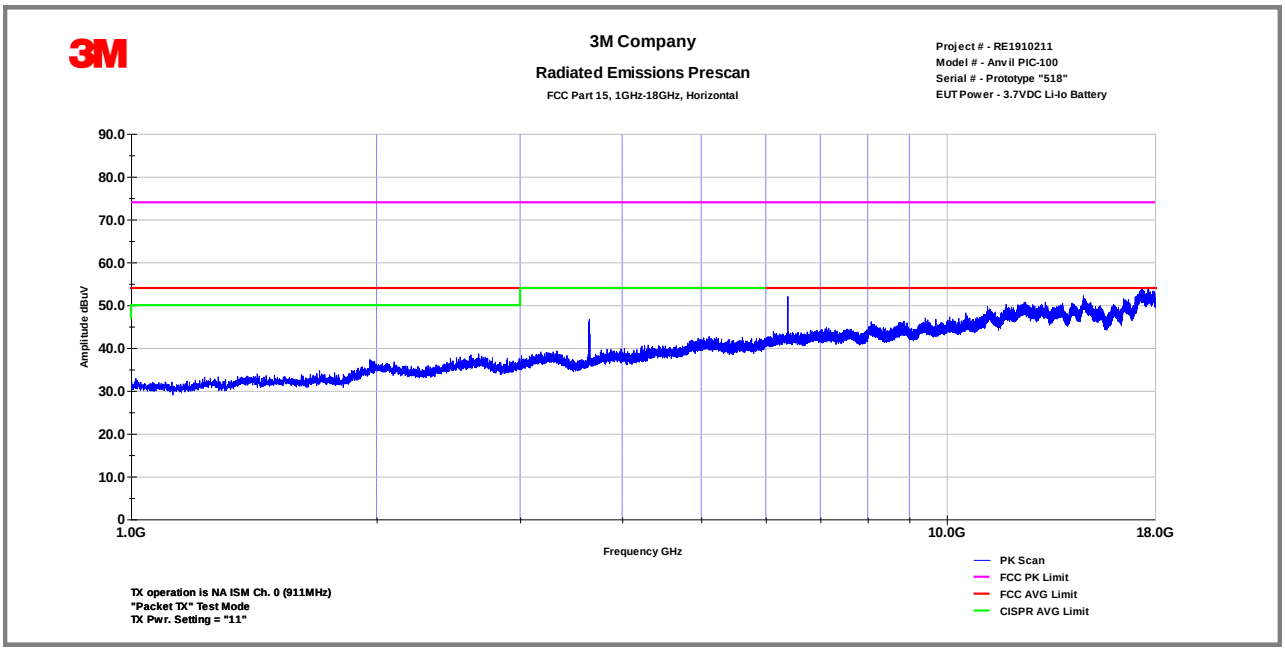
Pol	Frequency (MHz)	Peak dBµV/m	AVG dBµV/m	Total CF dB	Net Peak dBµV/m	Net AVE dBµV/m	PK Limit dBµV/m	AVE Limit dBµV/m	PK Margin dB	AVG Margin dB
V	2700.00	47.95		-5.01	42.94		74.00	54.00	-31.06	
H	2700.00	47.70		-5.01	42.69		74.00	54.00	-31.31	
V	4960.00	60.73	51.9	-5.01	55.72	46.92	74.00	54.00	-18.28	-7.08
H	4960.00	66.46	57.7	-5.01	61.45	52.65	74.00	54.00	-12.55	-1.35
V	7439.40	59.10	50.3	-2.90	56.20	47.40	74.00	54.00	-17.80	-6.60
H	7439.40	60.40	51.6	-2.90	57.50	48.70	74.00	54.00	-16.50	-5.30
V	12240.00	46.47		3.59	50.06		74.00	54.00	-23.94	
H	12240.00	46.56		3.59	50.15		74.00	54.00	-23.85	
Notes:		Net AVG VBW>1/T=2KHz Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB))								
		High Channel-DH5								



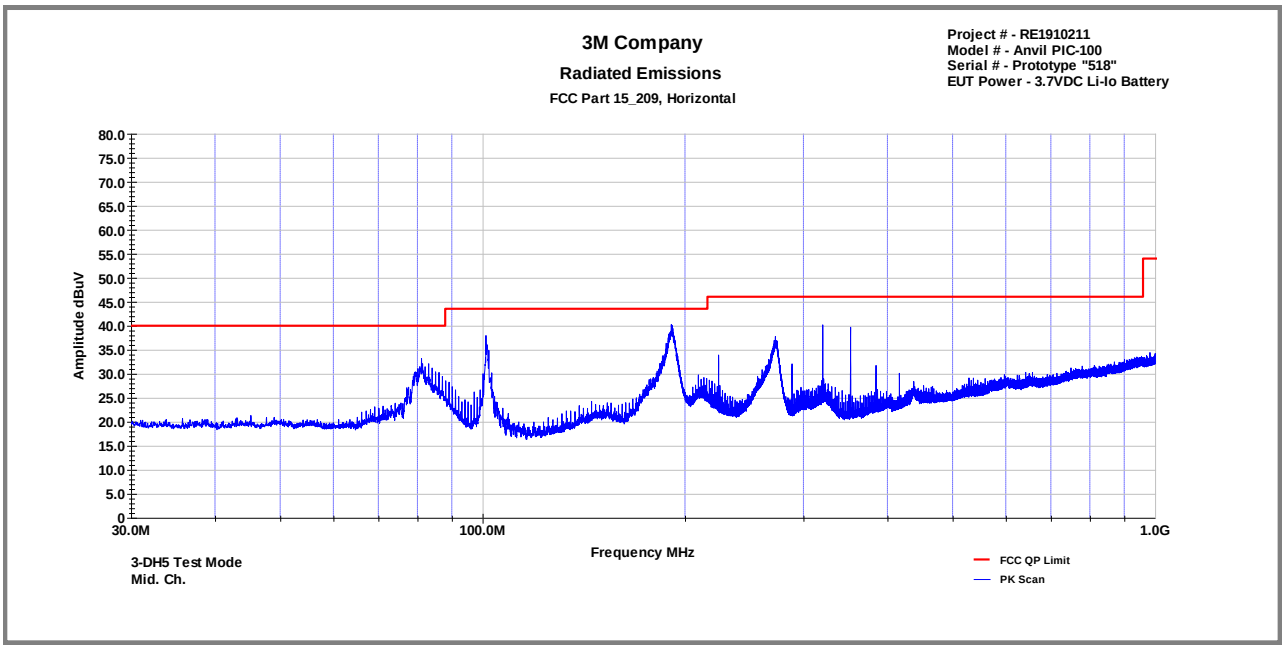


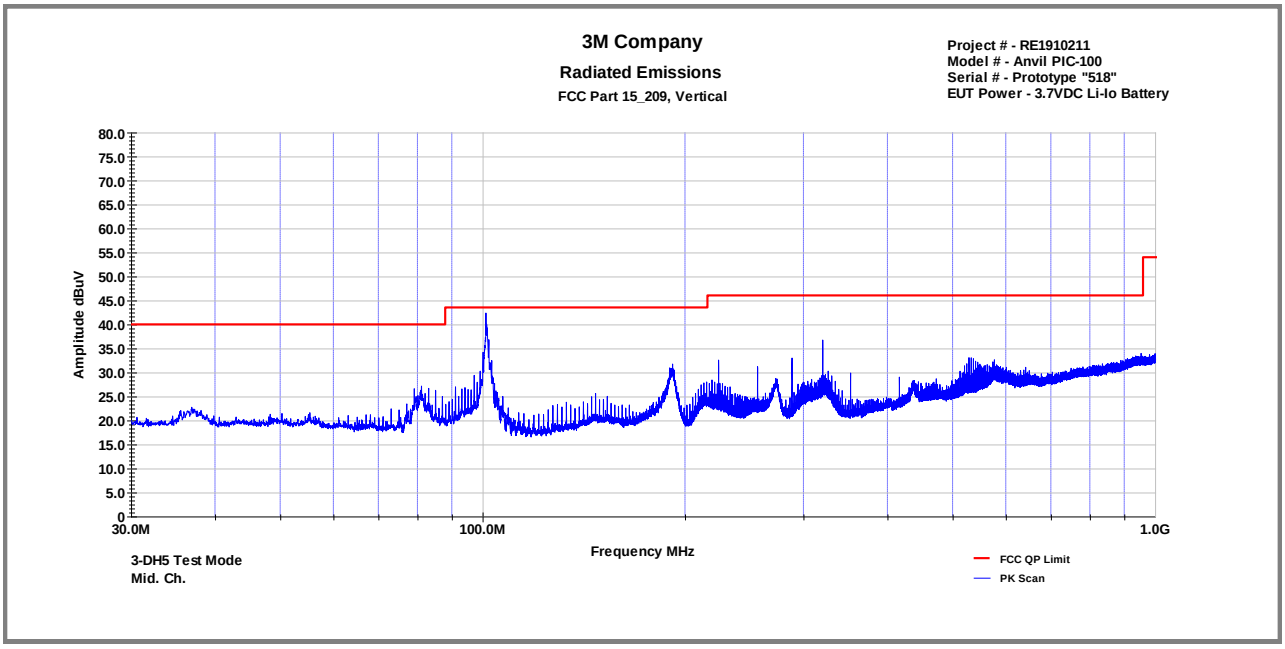
FCC Part 15.209 Radiated Emissions in restricted band – Low Channel (3-DH5)



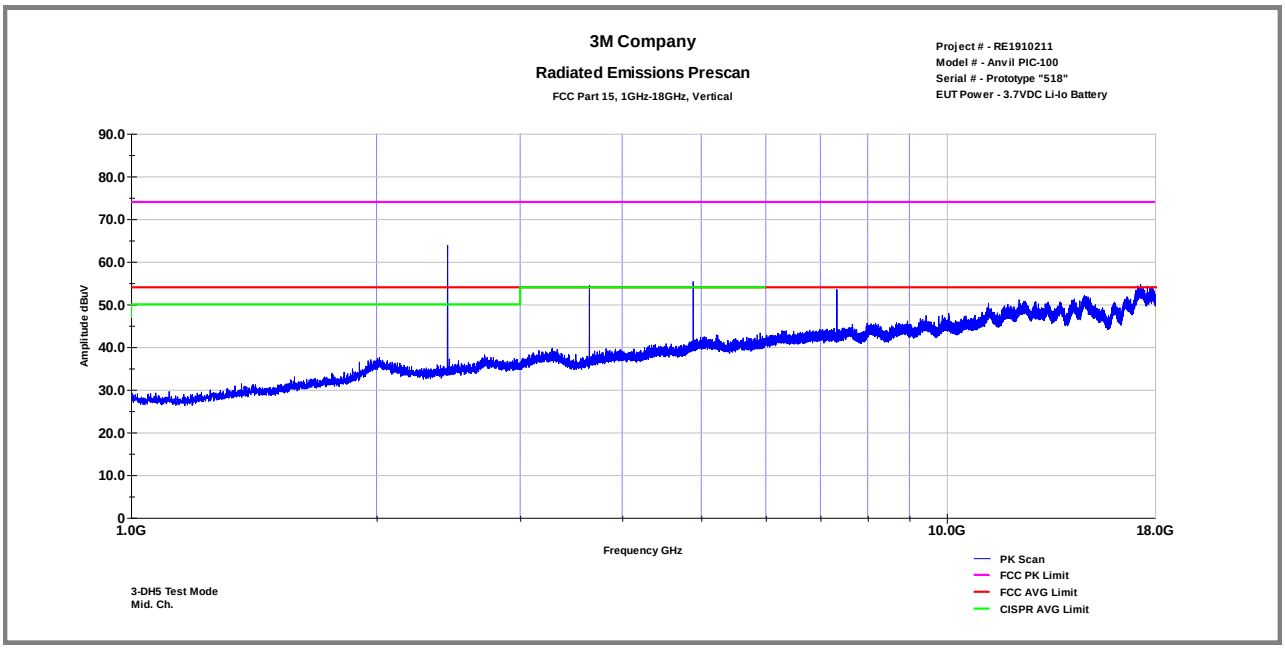


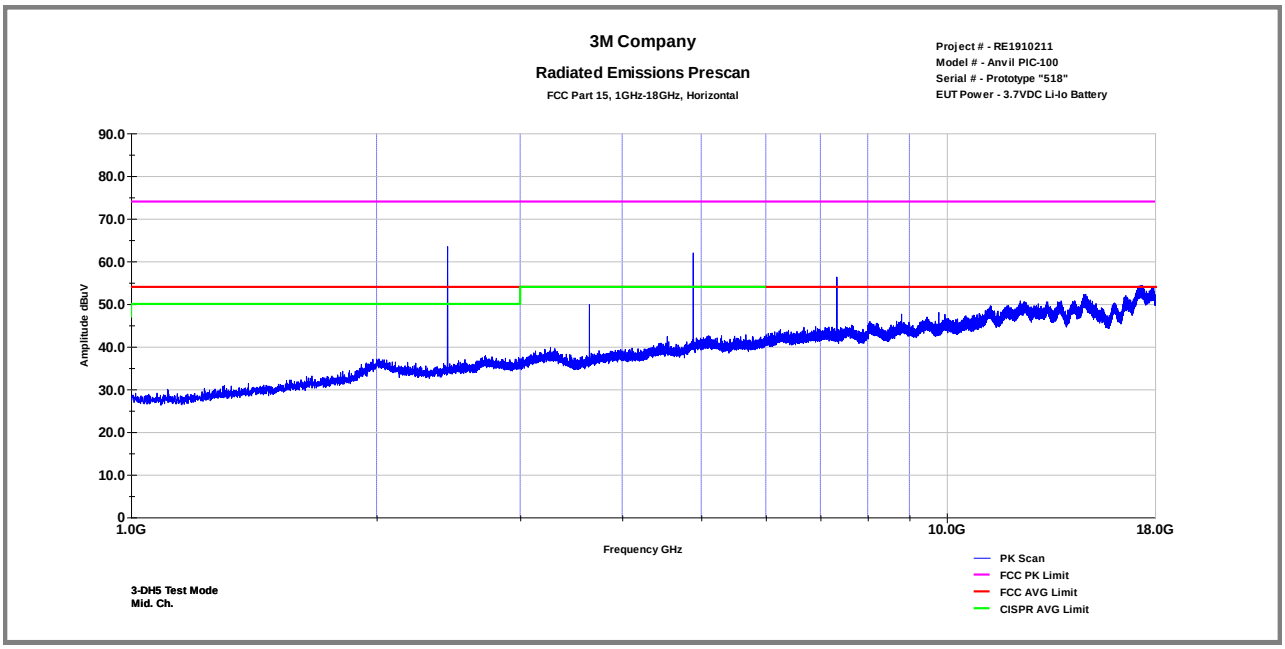
FCC Part 15.209 Radiated Emissions in restricted band – Low Channel (3-DH5)



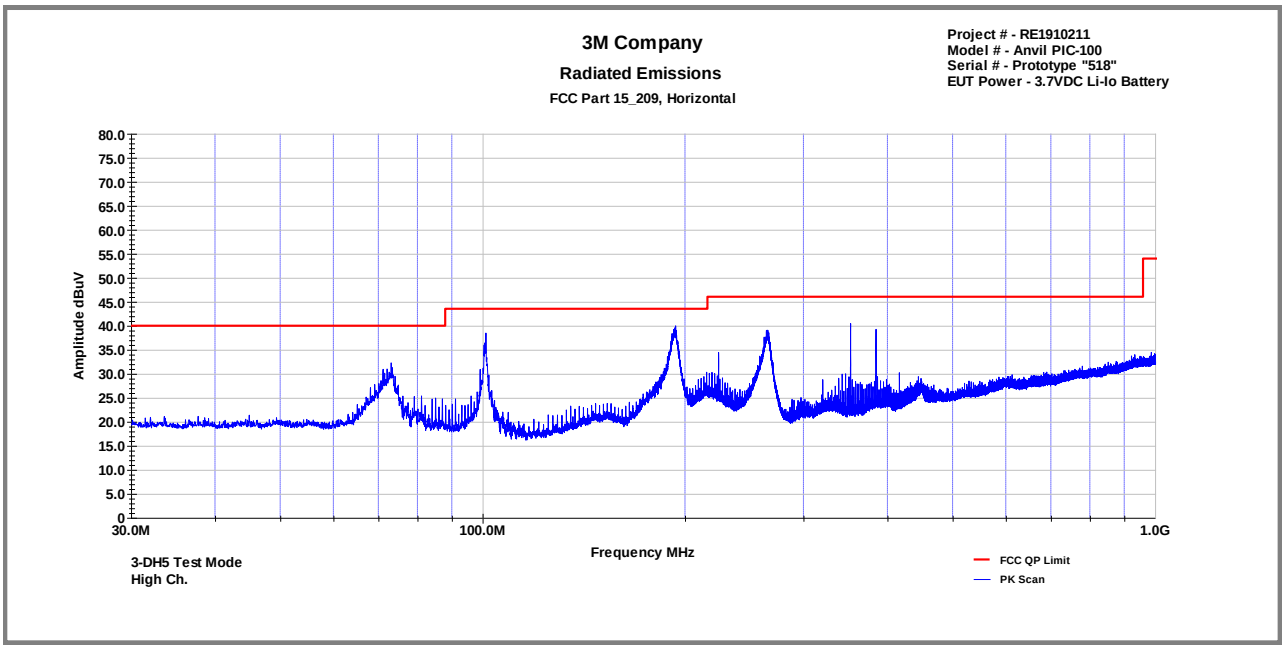


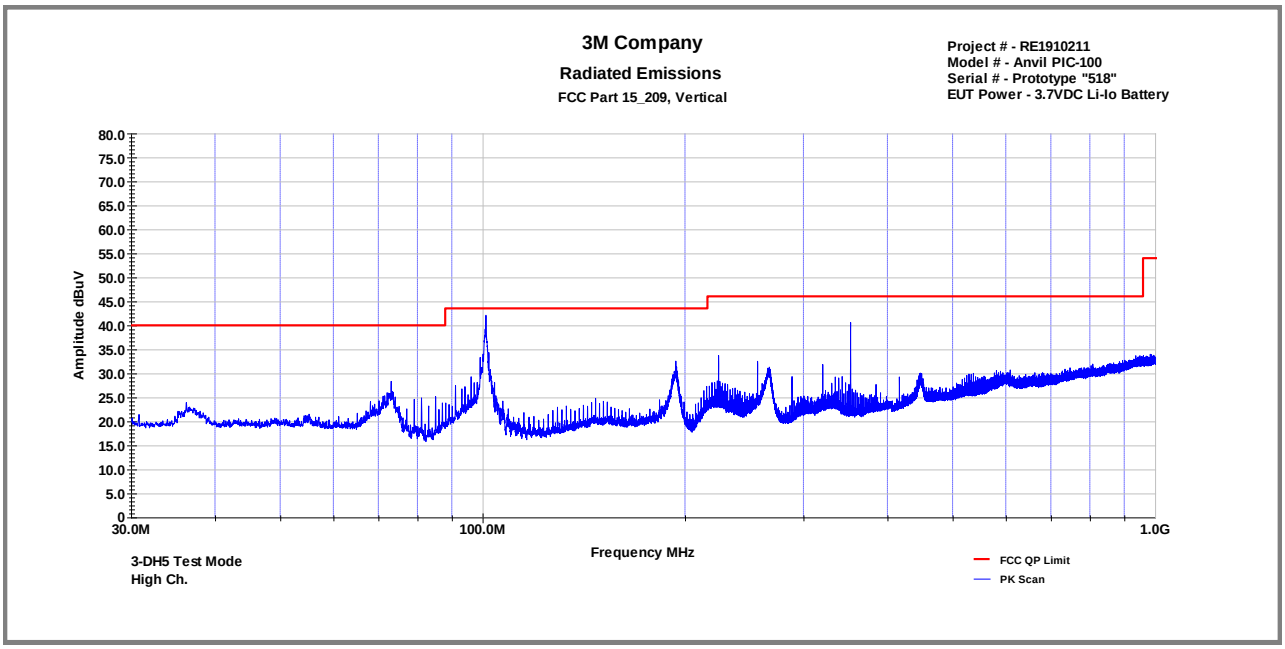
FCC Part 15.209 Radiated Emissions in restricted band – Mid Channel (3-DH5)



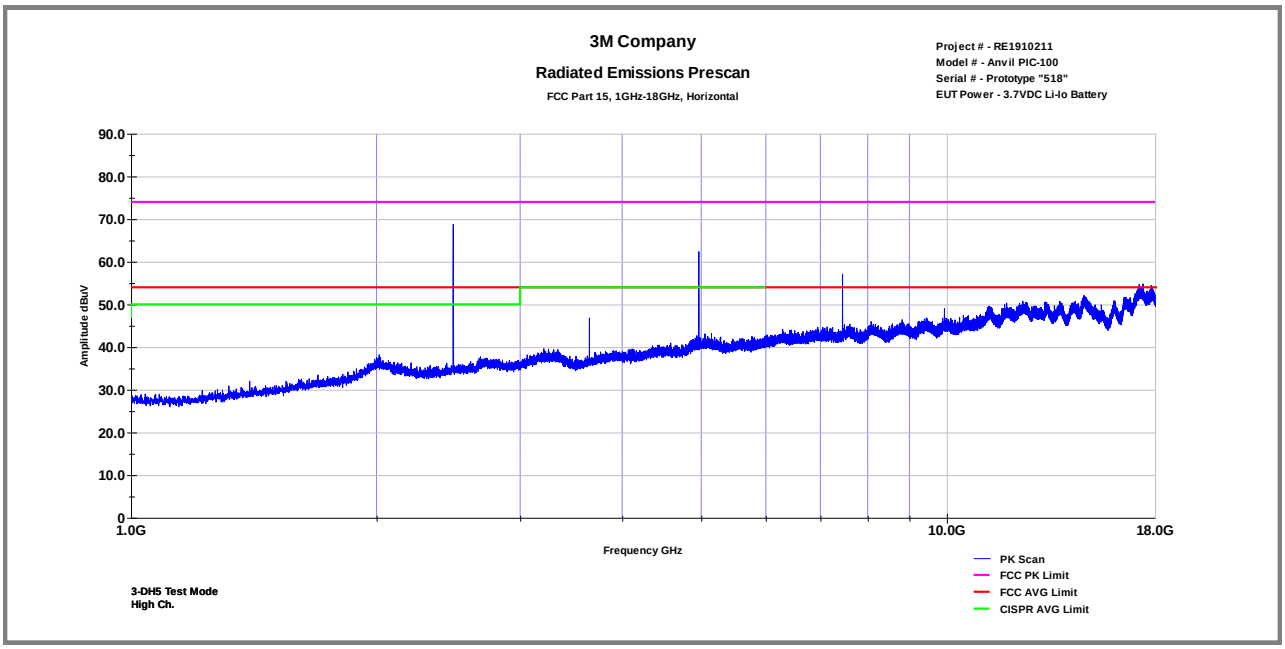


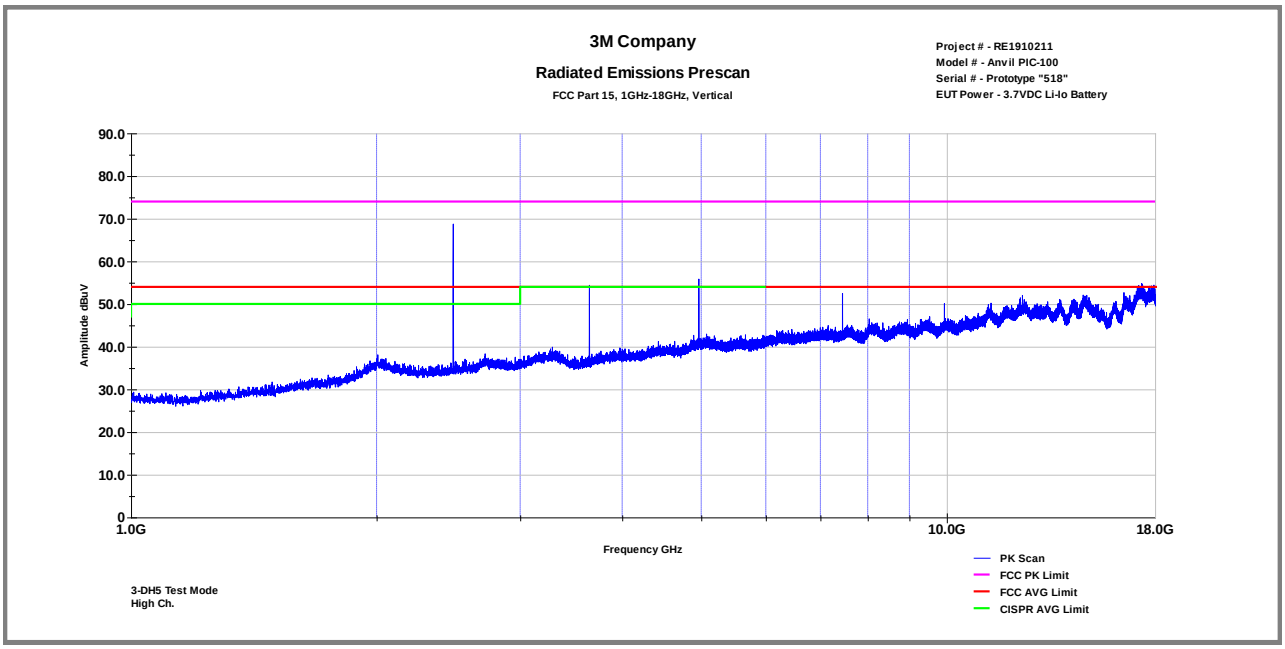
FCC Part 15.209 Radiated Emissions in restricted band – Mid Channel (3-DH5)





FCC Part 15.209 Radiated Emissions in restricted band –High Channel (3-DH5)





FCC Part 15.209 Radiated Emissions in restricted band –High Channel (3-DH5)

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
96.98	V	28.1	13.4	41.5	43.5	-2.1
196.94	H	18.3	15.2	33.5	43.5	-10
223.01	H	11.9	14.9	26.9	46	-19.1
272.39	H	11.8	17.9	29.7	46	-16.3
320	V	4.9	19.5	24.4	46	-21.6
352.13	V	4.1	19.9	24	46	-22
Notes:	Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) Low Channel-3DH5					

Frequency (MHz)	Pol.	QP Reading dBµV/m	Total CF dB	Net at 3 m dBµV/m	Limit (dBµV/m)	Margin dB
81.05	H	12.4	13.7	26.1	40	-13.9
101.42	V	19	13.8	32.8	43.5	-10.7
190.76	H	18.4	15.8	34.2	43.5	-9.4
272.24	H	12.9	17.9	30.8	46	-15.2
320.99	V	7.7	19.5	27.1	46	-18.9
352.01	H	4.9	19.9	24.8	46	-21.2
Notes:	Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) Mid Channel-3DH5					

Frequency (MHz)	Pol.	QP Reading dBµV/m	Total CF dB	Net at 3 m dBµV/m	Limit (dBµV/m)	Margin dB
73.04	H	10.5	15.8	26.3	40	-13.7
101	V	24	13.8	37.8	43.5	-5.7
193.73	H	16.1	15.6	31.7	43.5	-11.8
265.61	H	11.6	17.5	29.1	46	-16.9
352.01	V	7.3	19.9	27.3	46	-18.8
384.47	H	4.2	21	25.2	46	-20.8
Notes:	Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) Mid Channel-3DH5					

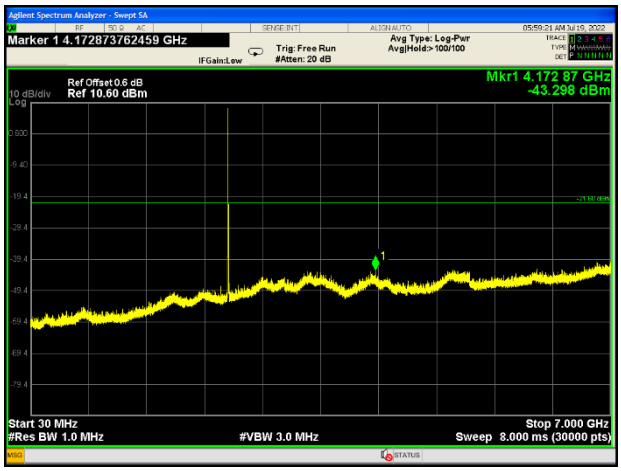
Pol	Frequency (MHz)	Peak dBµV/m	AVG dBµV/m	Total CF dB	Net Peak dBµV/m	Net AVE dBµV/m	PK Limit dBµV/m	AVE Limit dBµV/m	PK Margin dB	AVG Margin dB
V	3642.00*	71.43	37.4	-11.24	60.19	26.19	74.00	54.00	-13.81	-27.81
H	3642.00*	62.15	28.2	-11.24	50.91	16.91	74.00	54.00	-23.09	-37.09
V	4804.00	66.40	43.9	-6.22	60.18	37.68	74.00	54.00	-13.82	-16.32
H	4804.00	67.07	44.6	-6.22	60.85	38.35	74.00	54.00	-13.15	-15.65
V	7630.00	48.42		-3.69	44.73		74.00	54.00	-29.27	
H	7630.00	48.58		-3.69	44.89		74.00	54.00	-29.11	
V	9608.00	52.83	30.3	-1.60	51.23	28.73	74.00	54.00	-22.77	-25.27
H	9608.00	52.37	29.9	-1.60	50.77	28.27	74.00	54.00	-23.23	-25.73
Notes:		Net Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB))								
		Low Channel-3DH5 *Device beacon. Transmit 2ms every 1s interval (DCCF -34dB)								

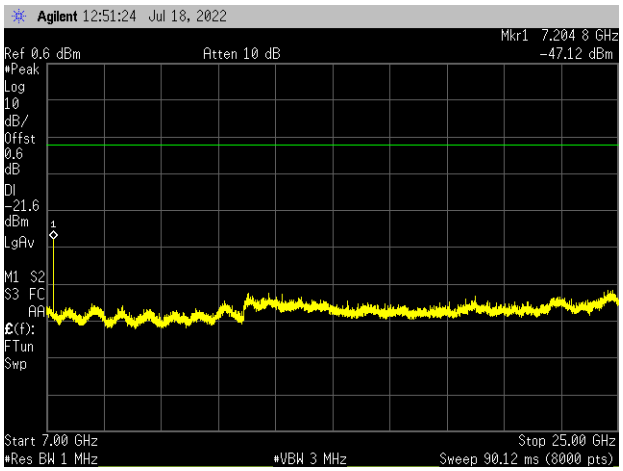
Pol	Frequency (MHz)	Peak dBµV/m	AVG dBµV/m	Total CF dB	Net Peak dBµV/m	Net AVE dBµV/m	PK Limit dBµV/m	AVE Limit dBµV/m	PK Margin dB	AVG Margin dB
V	4882.00	61.03	38.5	-5.30	55.73	33.23	74.00	54.00	-18.27	-20.77
H	4882.00	62.20	39.7	-5.30	56.90	34.40	74.00	54.00	-17.10	-19.60
V	7323.00	59.47	37.0	-3.60	55.87	33.37	74.00	54.00	-18.13	-20.63
H	7323.00	60.93	38.4	-3.60	57.33	34.83	74.00	54.00	-16.67	-19.17
V	12200.00	47.68		3.27	50.95		74.00	54.00	-23.05	
H	12200.00	46.36		3.27	49.63		74.00	54.00	-24.37	
Notes:		Net Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB))								
		Mid Channel-3DH5								

Pol	Frequency (MHz)	Peak dBµV/m	AVG dBµV/m	Total CF dB	Net Peak dBµV/m	Net AVE dBµV/m	PK Limit dBµV/m	AVE Limit dBµV/m	PK Margin dB	AVG Margin dB
V	2700.00	50.52		-5.01	45.51		74.00	54.00	-28.49	
H	2700.00	51.13		-5.01	46.12		74.00	54.00	-27.88	
V	4960.00	64.57	42.1	-5.01	59.56	37.06	74.00	54.00	-14.44	-16.94
H	4960.00	68.37	45.9	-5.01	63.36	40.86	74.00	54.00	-10.64	-13.14
V	7440.00	61.50	39.0	-2.90	58.60	36.10	74.00	54.00	-15.40	-17.90
H	7440.00	62.81	40.3	-2.90	59.91	37.41	74.00	54.00	-14.09	-16.59
V	12240.00	46.91		3.59	50.50		74.00	54.00	-23.50	
H	12240.00	46.78		3.59	50.37		74.00	54.00	-23.63	
Notes:		Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB))								
		High Channel-3DH5								

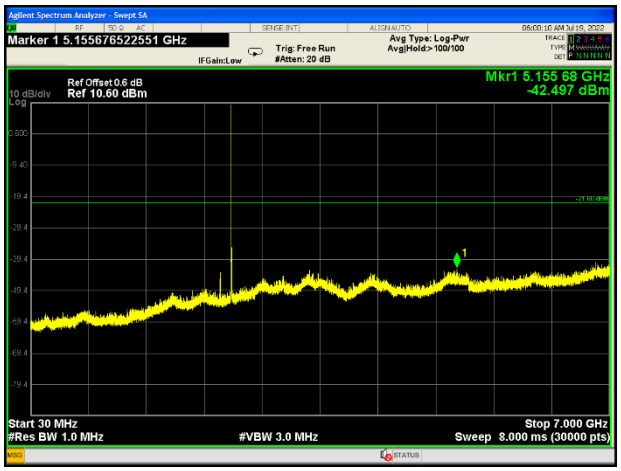
4.7	**Radiated Emissions in non-restricted band**		
Method:	Conducted out-of-band spurious emissions were investigated from 30MHz up to 25GHz to include 10th harmonic. The measurements were made with transmitter set to transmit continuously at low, medium and high channels.		
		Laboratory Ambient Temperature:	23°C
		Relative Humidity:	48%
		Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ ANSI C63.10:2013, Section 7.8.8 ☒ FCC Part 15.247/RSS 247 ☒ KDB 558074	**Measurement Point** ☒ Conducted ☐ Radiated	
Frequency Range:	☒ 2402.0-2480.0MHz		
In-band power in 100KHz:	☒ 8.4dBm	**Results:**	
Limit:	☒ -21.6dBm (30dBc below in-band power)	>51dBc	
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC		
Test Personnel:	Yuriy Litvinov	**Date:** 07/18/2022	

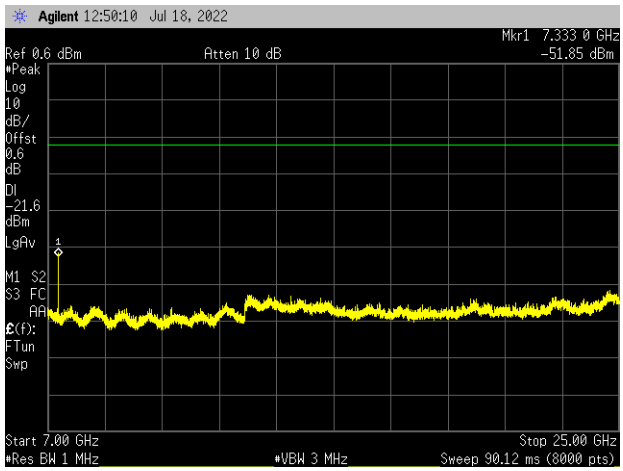
Note:	Out-of -the band conducted spurious emissions were investigated for all data rates and the worst-case emissions were found with the EUT transmitting at 3mbps.The traces on the plots were measured with 1MHz RBW to reduce test time. The display line shown on the plots is the limit at 30dB below the fundamental emissions measured in a 100KHz bandwidth.



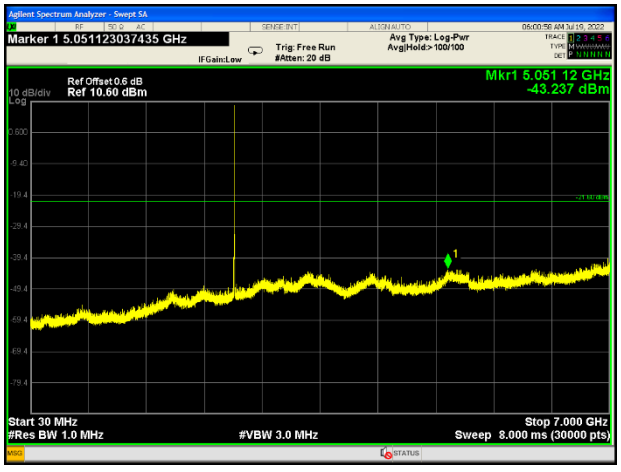


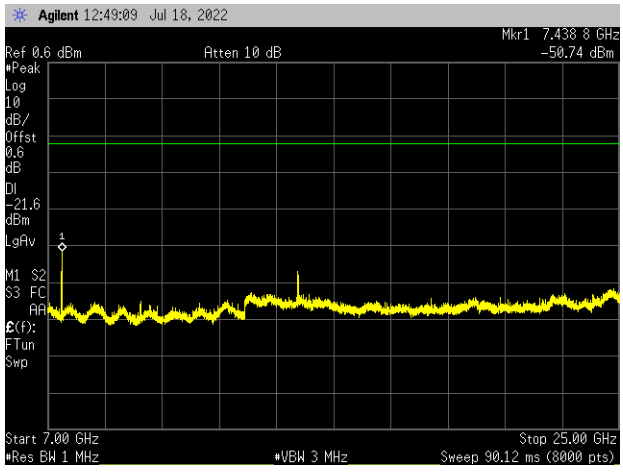
Conducted Spurious - Low Channel (3-DH5)





Conducted Spurious – Mid Channel (3-DH5)

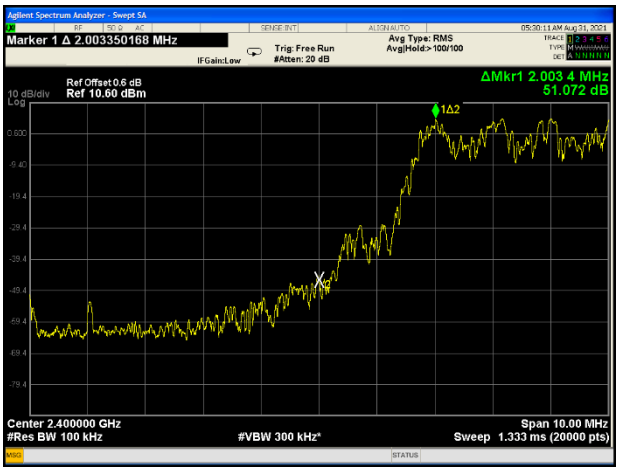




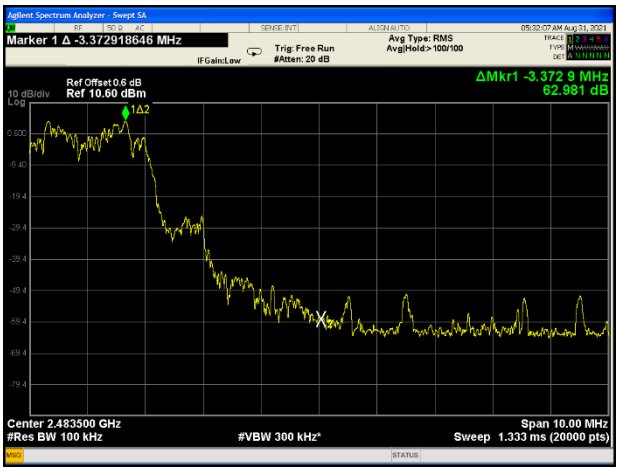
Conducted Spurious – High Channel (3-DH5)

4.8	**Band-Edge Compliance**	
Method:	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
Reference Standard(s):	☒ ANSI C63.10:2013, Section 11.13.2 ☒ FCC Part 15.247/RSS 247 ☒ KDB 558074	**Measurement Point** ☒ Conducted ☐ Radiated
Frequency Range:	☒ 2402.0-2480.0 MHz	**Results**
Limit:	☒ >20dBc	Low Ch., 2402 MHz > 51dBc High Ch., 2480 MHz > 62dBc
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC	
Test Personnel:	Yuriy Litvinov	**Date:** 08/31/2021

Note:	Out-of-band conducted spurious emissions at the band edge were investigated for all data rates in hopping and no-hopping modes. The worst-case emissions were found with the EUT transmitting at 3mbps. Plots of the worst-case emissions are shown below.



Band Edge - Low Channel
Center Freq. 2.400GHz



Band Edge - High Channel
Center Freq. 2.4835GHz

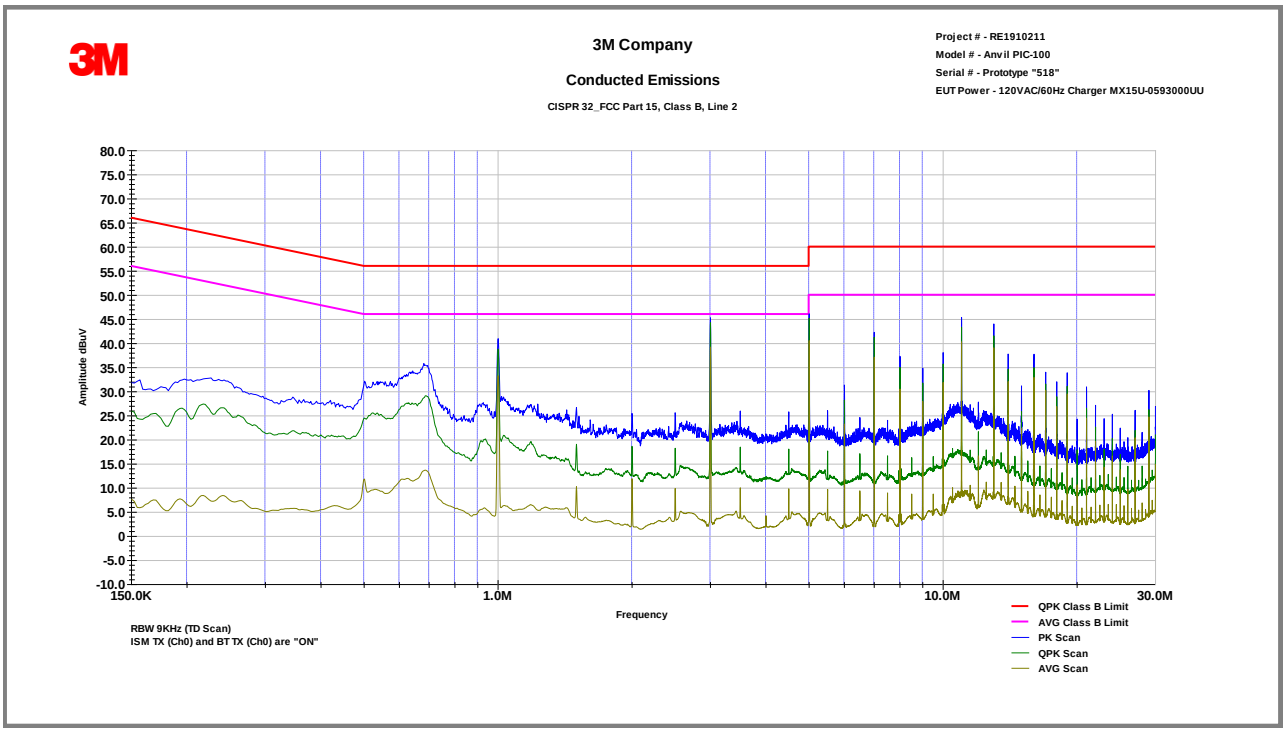
4.9	**Conducted Emissions Data**
Method:	The AMN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the AMN. 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.
	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.

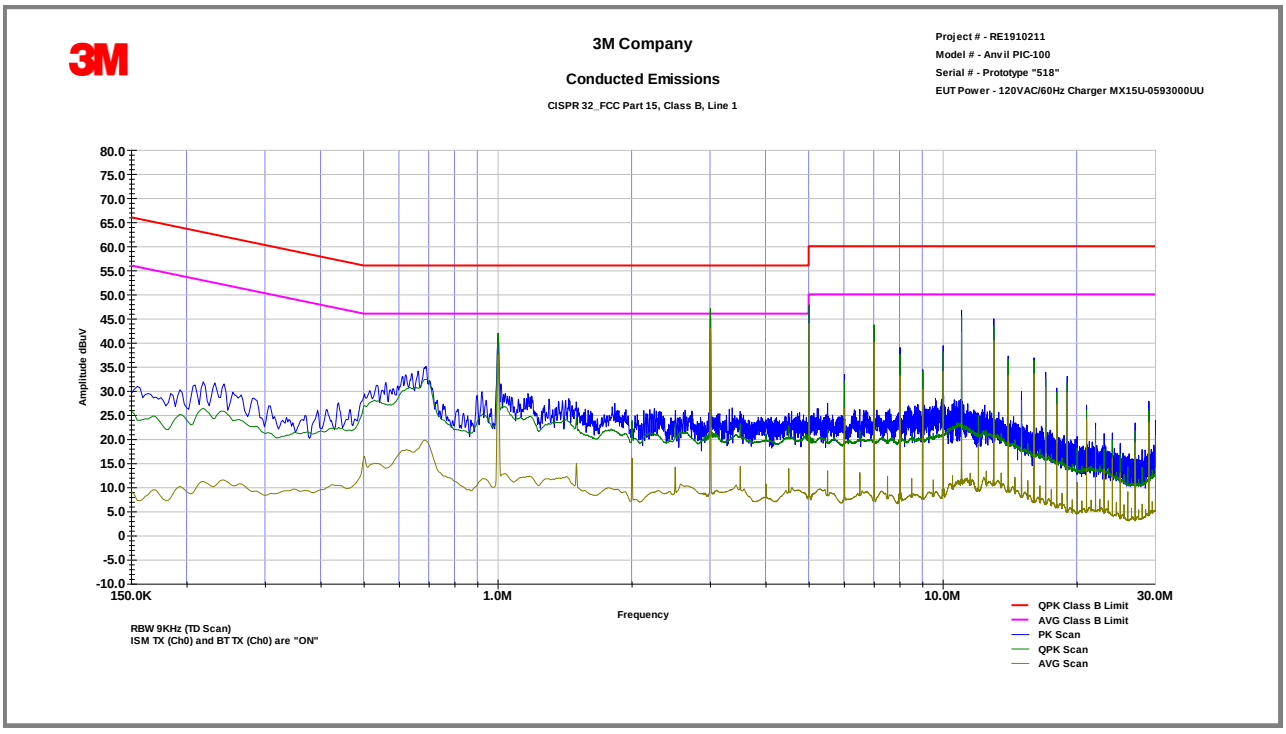
Test Verification: ☒	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	48%
	Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ RSS GEN/FCC 15.207 ☒ ANSI C63.4:2014 ☒ ANSI C63.10:2013	**Measurement Point** ☒ Mains ☐ Telecommunication ports ☐
Nominal Voltage:	☒ 120VAC ☐ 230VAC ☐ 3.7VDC	
Test Personnel:	Keith Schwartz KS	**Date:** 08/24/2021

Limits – Part 15.207/RSS Gen – AC Mains

Frequency (MHz)	Limit dB (µV)			
	Quasi-Peak	Average	Result	Comments
0.15 to 0.50	66 to 56	56 to 46	**pass**	Time Domain Scan
0.50 to 5	56	46	**pass**	Time Domain Scan
5 to 30	60	50	**pass**	Time Domain Scan

Modifications:	
Note:	


3M Company
Conducted Emissions
CISPR 32_FCC Part 15, Class B, Line 2
Project # - RE1910211
Model # - Anvil PIC-100
Serial # - Prototype "518"
EUT Power - 120VAC/60Hz Charger MX15U-0593000UU
Amplitude dBuV
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0
-5.0
-10.0
150.0K
1.0M
10.0M
30.0M
Frequency
RBW 9KHz (TD Scan)
ISM TX (Ch0) and BT TX (Ch0) are "ON"
QPK Class B Limit
AVG Class B Limit
PK Scan
QPK Scan
AVG Scan


3M Company
Conducted Emissions
CISPR 32_FCC Part 15, Class B, Line 1
Project # - RE1910211
Model # - Anvil PIC-100
Serial # - Prototype "518"
EUT Power - 120VAC/60Hz Charger MX15U-0593000UU
Amplitude dBuV
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0
-5.0
-10.0
150.0K
1.0M
10.0M
30.0M
Frequency
RBW 9KHz (TD Scan)
ISM TX (Ch0) and BT TX (Ch0) are "ON"
QPK Class B Limit
AVG Class B Limit
PK Scan
QPK Scan
AVG Scan

Frequency (MHz)	QP Line 1 dBµV	AVG Line 1 dBµV	QP Limit dBµV	AVG Limit dBµV	QP Margin dB	AVG Margin dB
1	41.97	37.3	56	46	-14.03	-8.7
2.999	47.18	42.79	56	46	-8.82	-3.21
5.001	48.09	43.9	60	50	-11.91	-6.1
7	43.96	40.03	60	50	-16.04	-9.97
8.001	37.46	32.66	60	50	-22.54	-17.34
10	37.9	33.7	60	50	-22.1	-16.3
10.999	45.12	41.71	60	50	-14.88	-8.29
13.001	43.37	40.19	60	50	-16.63	-9.81
Frequency (MHz)	**QP Line 2 dBµV**	**AVG Line 2 dBµV**	**QP Limit dBµV**	**AVG Limit dBµV**	**QP Margin dB**	**AVG Margin dB**
1	38.73	32.85	56	46	-17.27	-13.15
2.999	44.24	38.86	56	46	-11.76	-7.14
5.001	45.31	40.35	60	50	-14.69	-9.65
7	41.38	36.96	60	50	-18.62	-13.04
8.001	34.56	29.88	60	50	-25.44	-20.12
10	35.36	31.35	60	50	-24.64	-18.65
10.999	42.94	39.67	60	50	-17.06	-10.33
13.001	41.42	38.66	60	50	-18.58	-11.34
Voltage		☒ 120VAC ☐ 230VAC ☐				
Notes		**Net Reading (dBuV) = Reading (dBµV)+AMN CF(dB)+Cable CF(dB) RBW 9KHz**				

5.0	Test Equipment				
Test Equipment Used					
Description	**Manufacturer**	**Model**	**Identifier**	**Last Cal. Date**	**Check**
Biconilog Antenna	Schwarzbeck	VULB 9168	9168-1070	10/20/2020	☒
Horn Antenna	A.H. Systems	SAS 571	1010	10/20/2020	☒
Loop Antenna	A.H. Systems	EHA-51B	1213E	10/20/2020	☐
EMI Receiver	Rohde & Schwarz	ESW26	101412	10/20/2020	☒
Signal Analyzer	Agilent	N9000A	MY53031040	10/20/2020	☐
EMI Receiver	Agilent	E4448A	1530975	10/20/2020	☒
LISN	TESEQ	NNB51	1130	10/20/2020	☒
Coaxial Cable	Insulated Wire	2803	CBL2039	10/20/2020	☒
EMC Software	ETS-Lindgren	TILE 7		N/A	☒
Equipment Calibration Interval:		☒ 12 months		☐ 24 months	

6.0	Report revision history		
Revision Level	**Date**	**Report Number**	**Notes**
0	07/19/2022	RE1910211-2	Original Issue