EMC TEST REPORT

NVLAP Lab Code 200033-0

Standard(s):

47 CFR FCC Part 15.249
RSS 210, Issue 10, 2017

FCC ID:DGFPSDPIC100NA
IC:458A-PSDPIC100NA

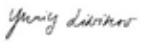
Product: 3M™ PELTOR™ Professional In-Ear Communication Headset
Model(s): PIC-100NA

Company Name:
3M Company

Address:
7911 Zionsville Rd,
Indianapolis, IN 46268

Report Number: RE1910211-3
Report Issue Date: July 6, 2022

Report Prepared by:

Signature: 
Yuriy Litvinov
Lead EMC Engineer

Tested by:
3M EMC Laboratory
410 E. Fillmore Avenue, Building 76-01-1
St. Paul, Minnesota 55107-1000, USA

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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 2.202/ RSS-Gen (6.6)	Occupied Bandwidth	**pass**	
4.2	Part 15.249 (a)&(d)/ RSS 210, Annex B.10	Field Strength of fundamental and Band-edge test	**pass**	
4.3	Part 15.249(a)/15.209 RSS 210, Annex B.10	Field strength of Harmonics and Spurious Emissions	**pass**	
4.4	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:	509/510			
3M Division:	Personal Safety			
Modifications and Special Measures:	none			
Frequency Range:	911-918.5			
Channel No.:	5			
Modulation Type:	GFSK			
FCC Classification:	Low Power Communication Device Transmitter			
Field Strength @3m:	90dBuV/m			
Antenna Type and Antenna Assembly Gain:	☐ External	☒ Integral PCB Antenna	☐ Dedicated	
	☒ 0.7dBi	☒ 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:	0.5 Amps		
Test Dates:	06/15-09/16/2021			
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

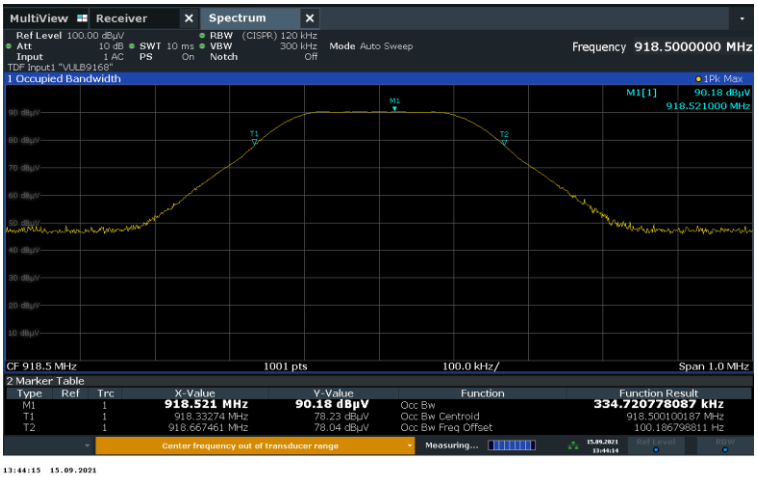
	Intended Operational Arrangement(s)	Comments
☒	Table-top only	
☐	Floor-standing only	
☐	Floor-standing or table-top	
☒	Other	Body-worn

3.5 Exercising of EUT and Interfaces

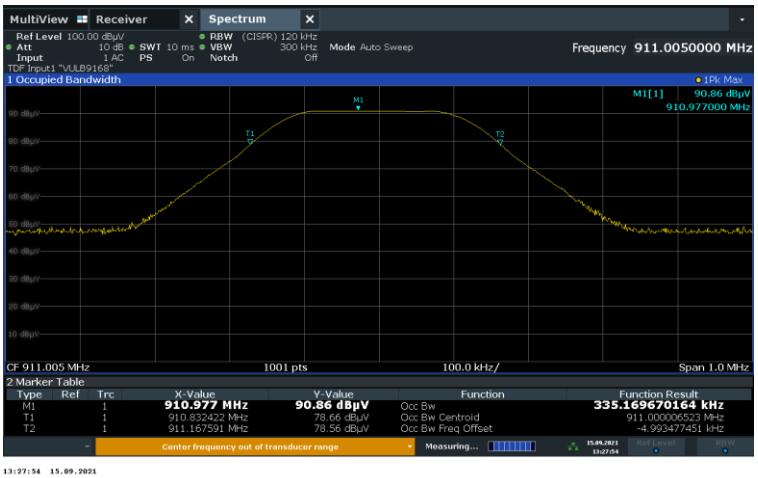
No.	Mode of Operation
1	Transmitting at lowest (0) and highest (5) channels of operation with modulated and/or unmodulated CW carrier.
2	Device programming using Anvil Radio Tester v.1.3.0 software for continues transmission at maximum rated RF output power and Duty Cycle.
3	

4.0 Test Conditions and Results

4.1	**Occupied Bandwidth**		
	Laboratory Ambient Temperature:		23°C
	Relative Humidity:		48%
	Atmospheric Pressure:		1011 mbars
Reference Standard(s):	☒ ANSI C63.10:2013 ☒ FCC Part 15.249/RSS Gen ☐ KDB 558074		**Measurement Point** ☐ Conducted ☒ Radiated
Frequency:	911MHz	918.5MHz	
99% Bandwidth:	335.2KHz	334.7KHz	
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC		
Test Personnel:	Yuriy Litvinov		**Date:** 09/15/2021



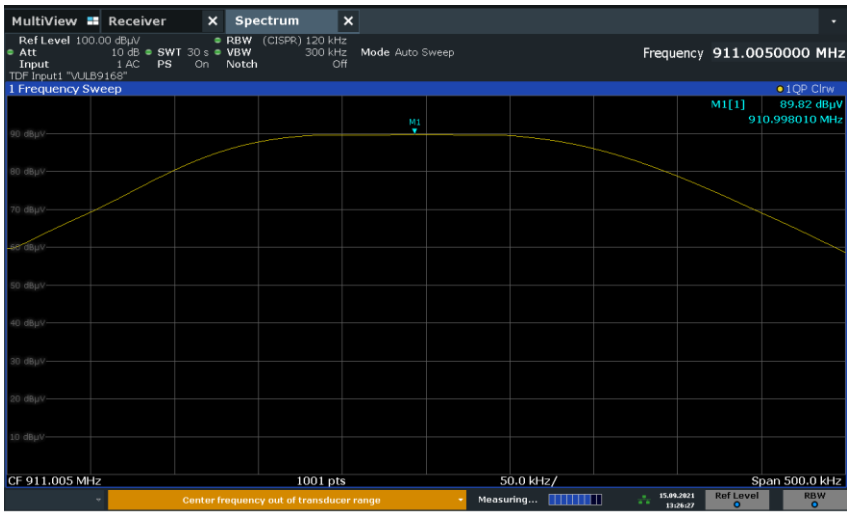
OBW – Low Channel



OBW – High Channel

4.2	**Field Strength of fundamental and Band-edge test**		
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 15.209/RSS 210 ☐ KDB 558074	**Measurement Point** ☐ Conducted ☒ Radiated at 3 meters
Frequency Range:		☒ 911-918.5 MHz	
Antenna Gain:		0.7dBi	**Field Strength @3m**
Limit:		94dBuV/m	90dBuV/m
Nominal Voltage:		☐ 120VAC ☒ 3.7VDC	
Test Personnel:		Yuriy Litvinov	**Date:** 09/15/2021

Note:	



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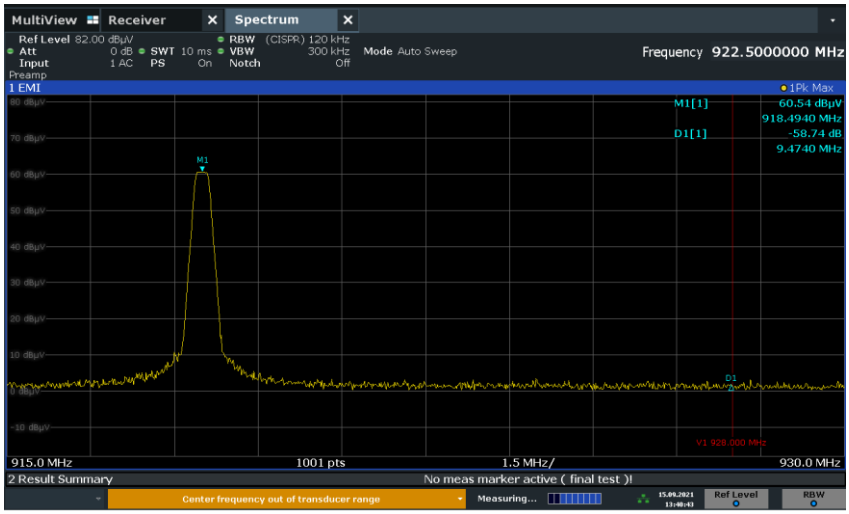

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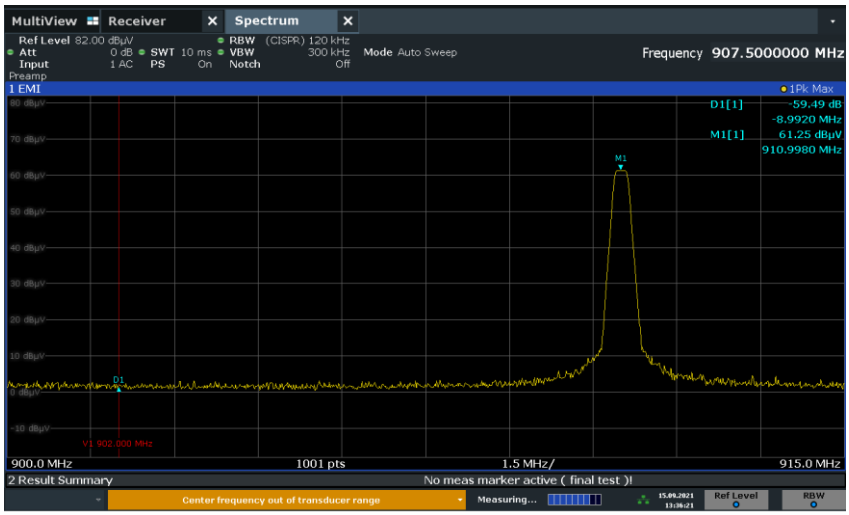

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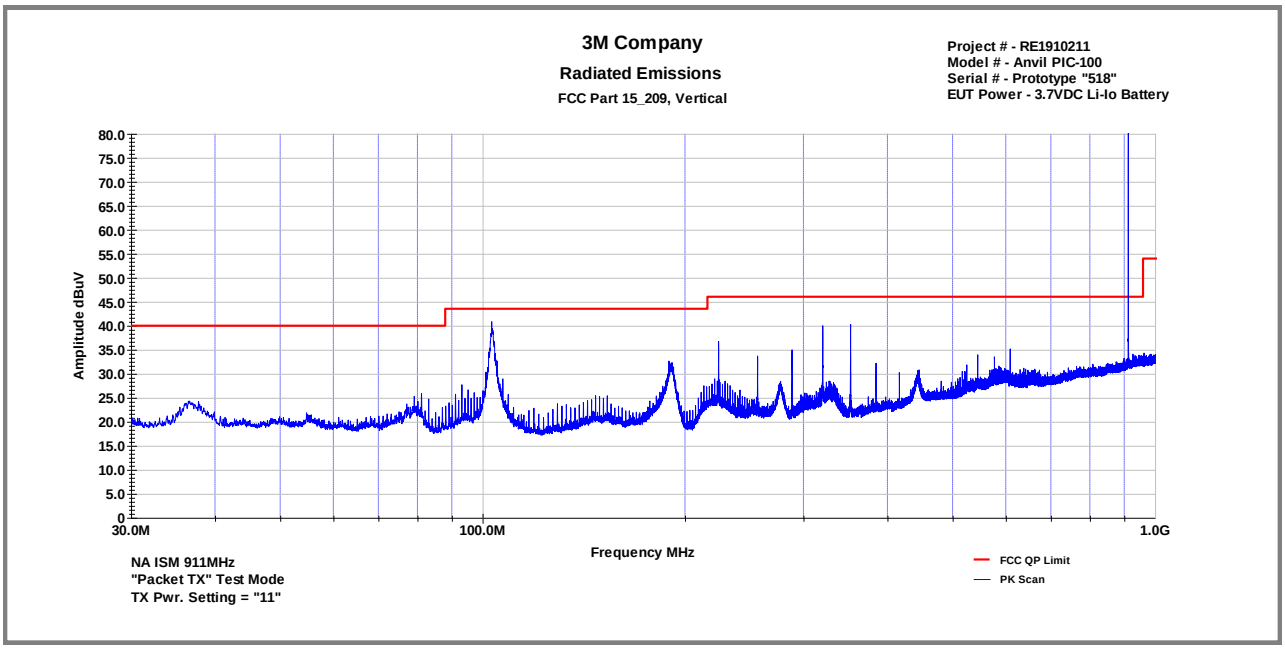
4.3	**Radiated Emissions in restricted band**
Method:	Measurements were made in a 3-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4 standards. EUT was rotated through three orthogonal axes to determine which attitude (orientation) and arrangement produces the highest emission relative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

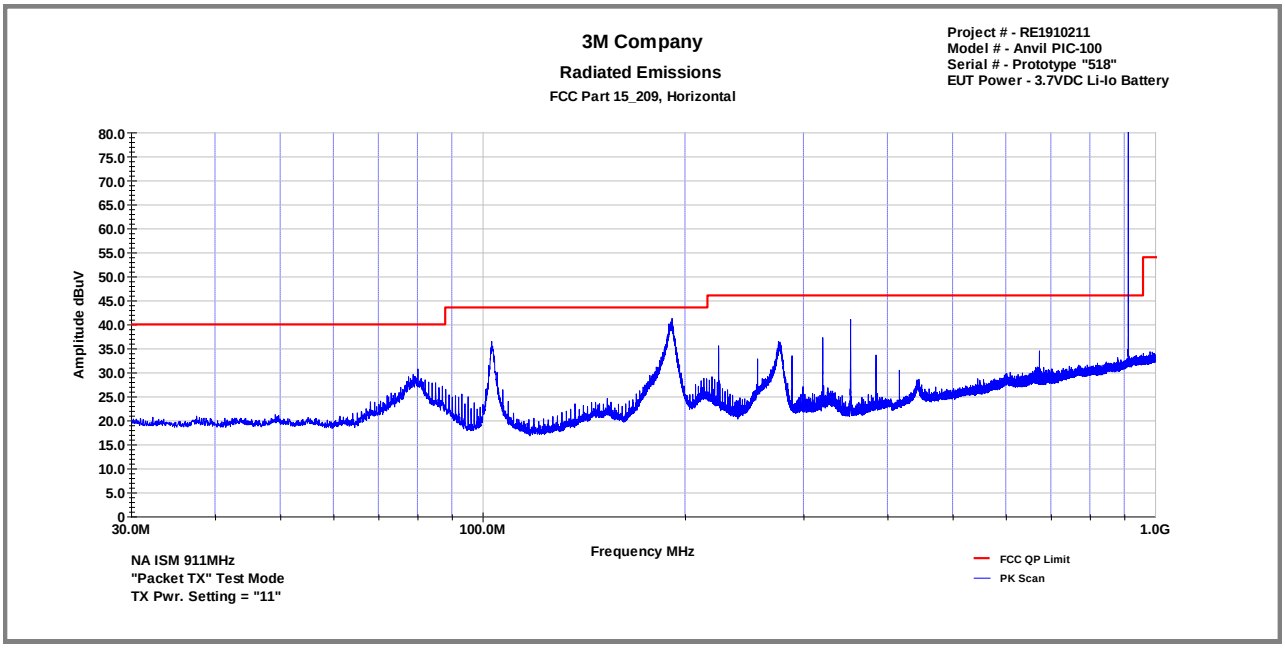
Test Verification: ☒	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	55%
	Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ ANSI C63.10:2013, Section 11.12.1 ☒ FCC Part 15.209/RSS 210 ☐ KDB 558074	**Measurement Distance** ☒ 3 Meters ☐
Frequency Range:	☒ 30 MHz to 1 GHz ☒ 1 GHz to 10 GHz	
Nominal Voltage:	☐ 120VAC ☒ 3.7VDC	
Test Personnel:	Keith Schwartz KS	**Date:** 09/09/2021

Limits –15.209 and RSS Gen

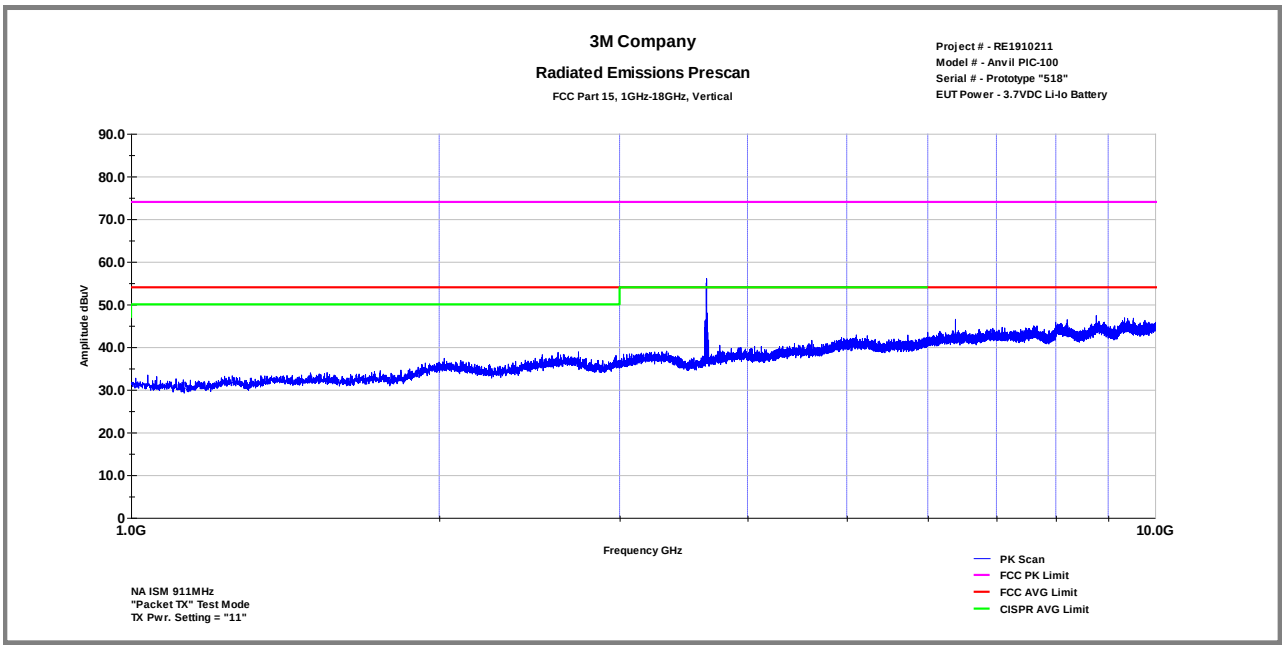
Frequency (MHz)	Limit dB (µV/m)				
	Quasi-Peak	Average	Peak	Distance	Results
0.009-0.490		2400/F(KHz)		300	**N/A**
0.490-1.705	24000/F(KHz)			30	**N/A**
1.705-30	30			30	**N/A**
30 to 88	40			3	**pass**
88 to 216	43.5			3	**pass**
216 to 960	46			3	**pass**
Above 960		54	74	3	**pass**

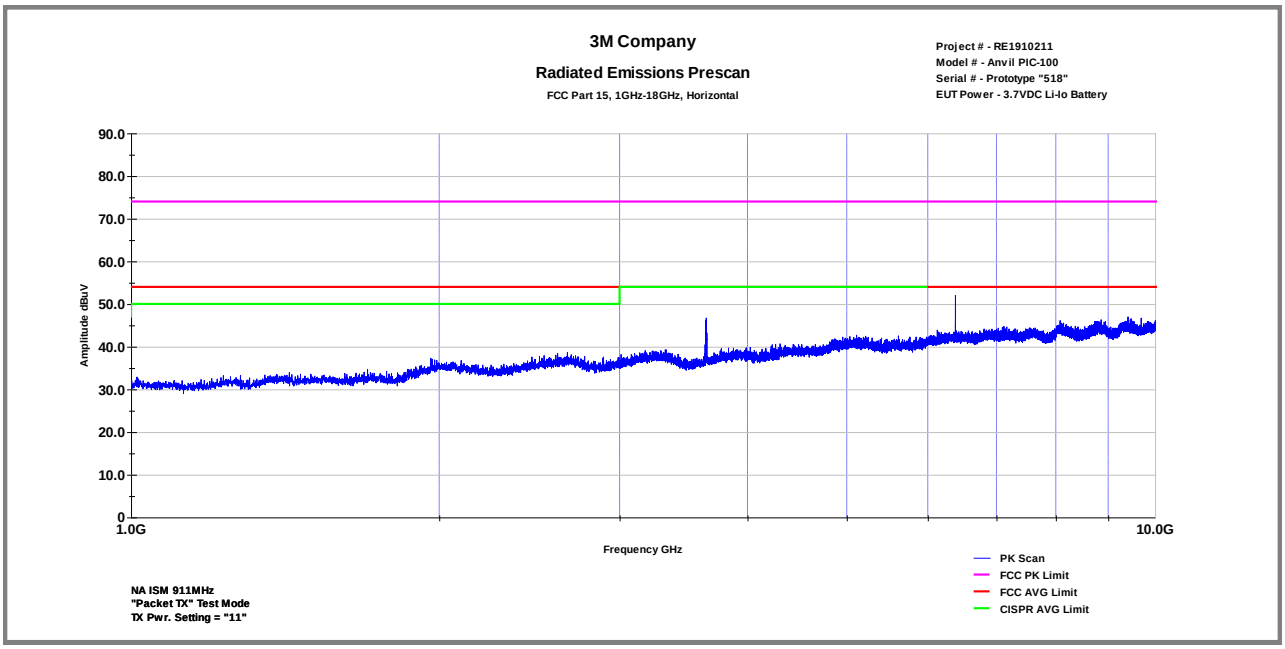
Modifications:	
Note:	The lower limit applies at the transition frequency. An inverse proportionality factor of 20 dB per decade has been used to normalize the measured data to the specified distance for determining compliance For emission in the restricted bands, the limit of 15.209 was used.



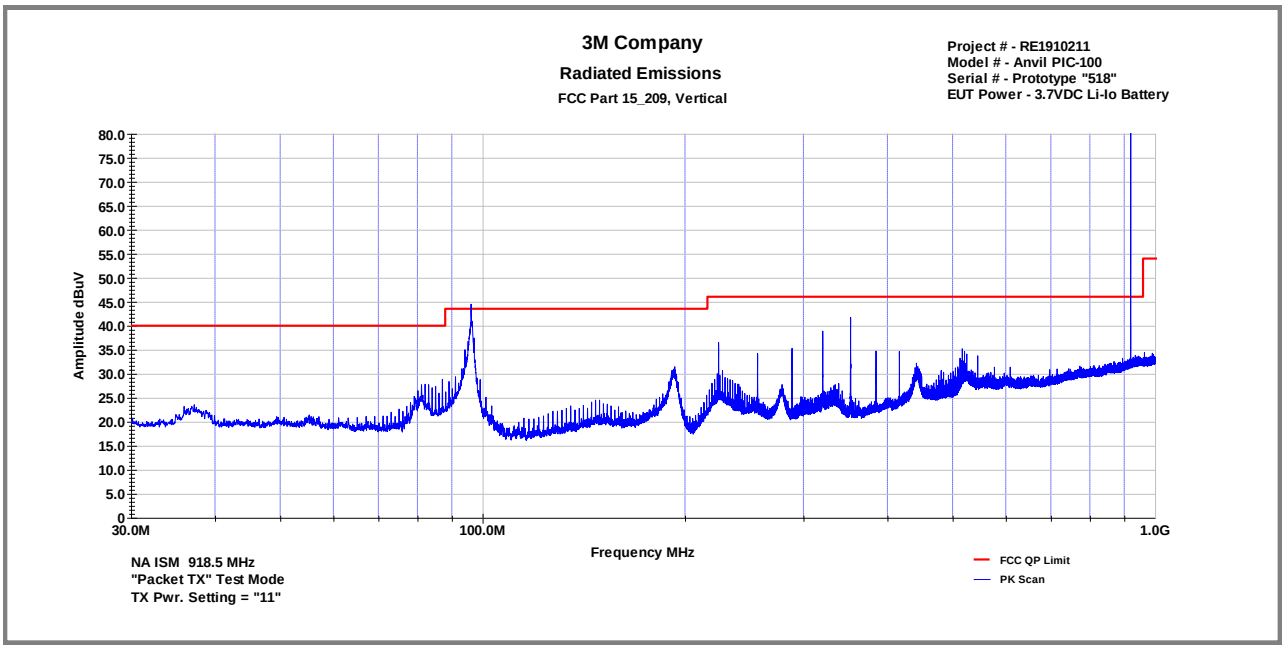


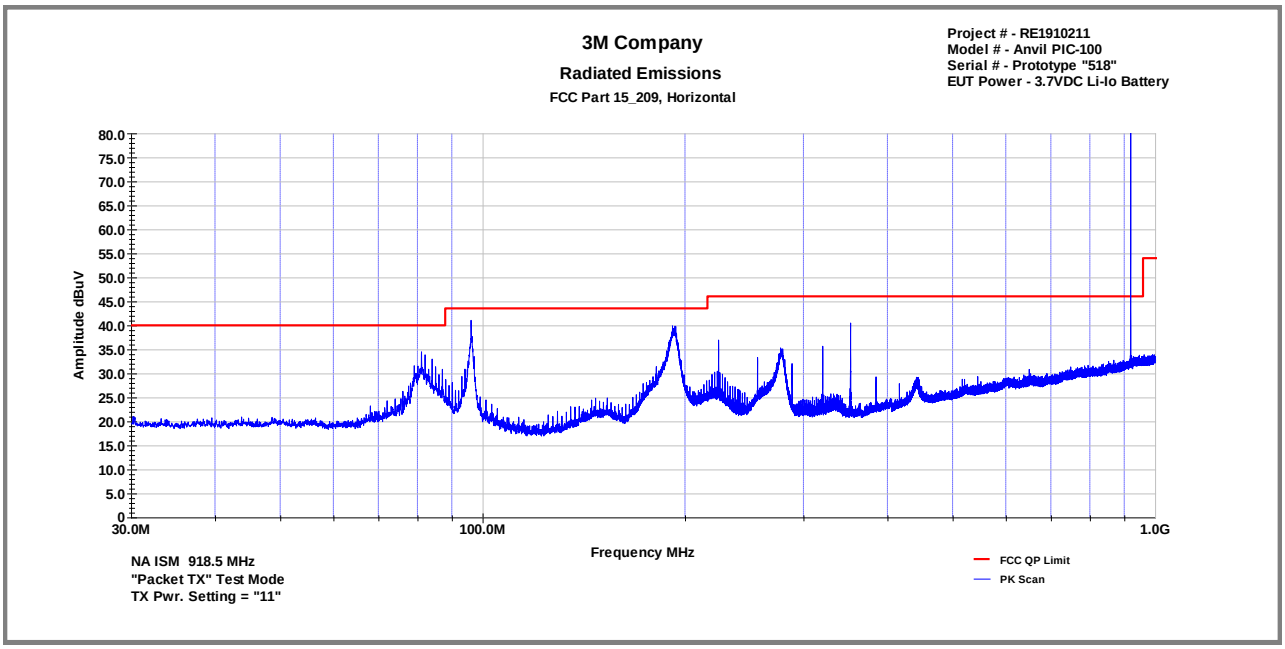
FCC Part 15.209 Radiated Emissions in restricted band – Low Channel



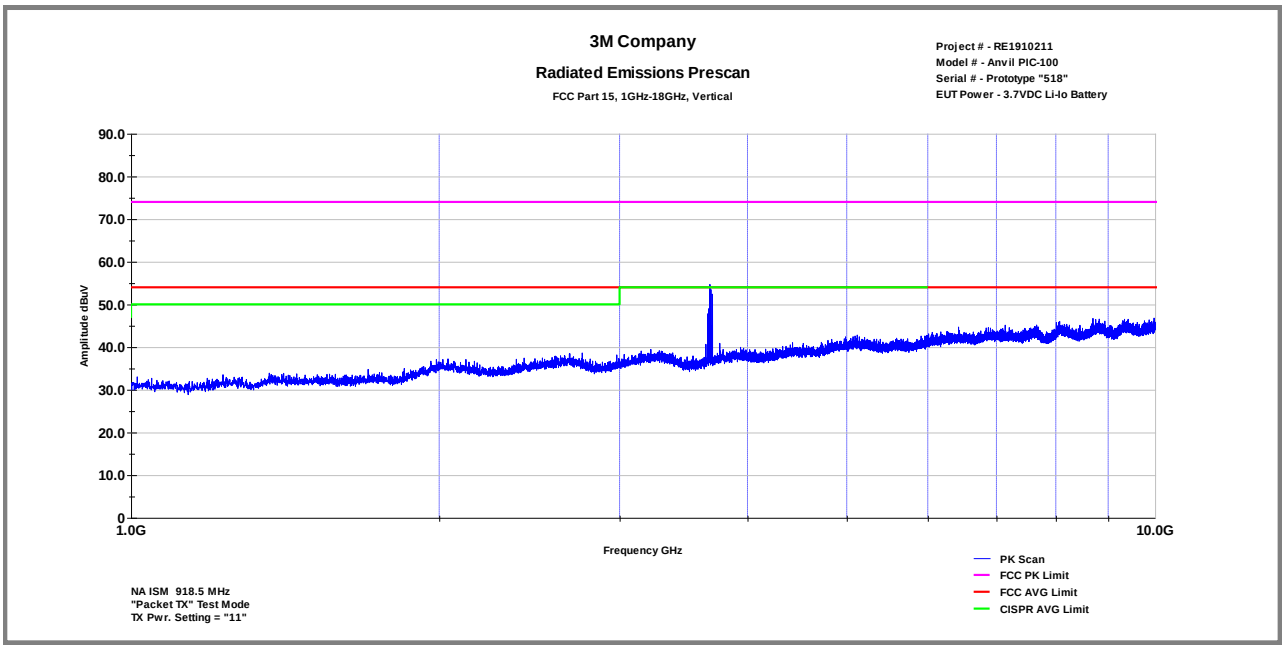


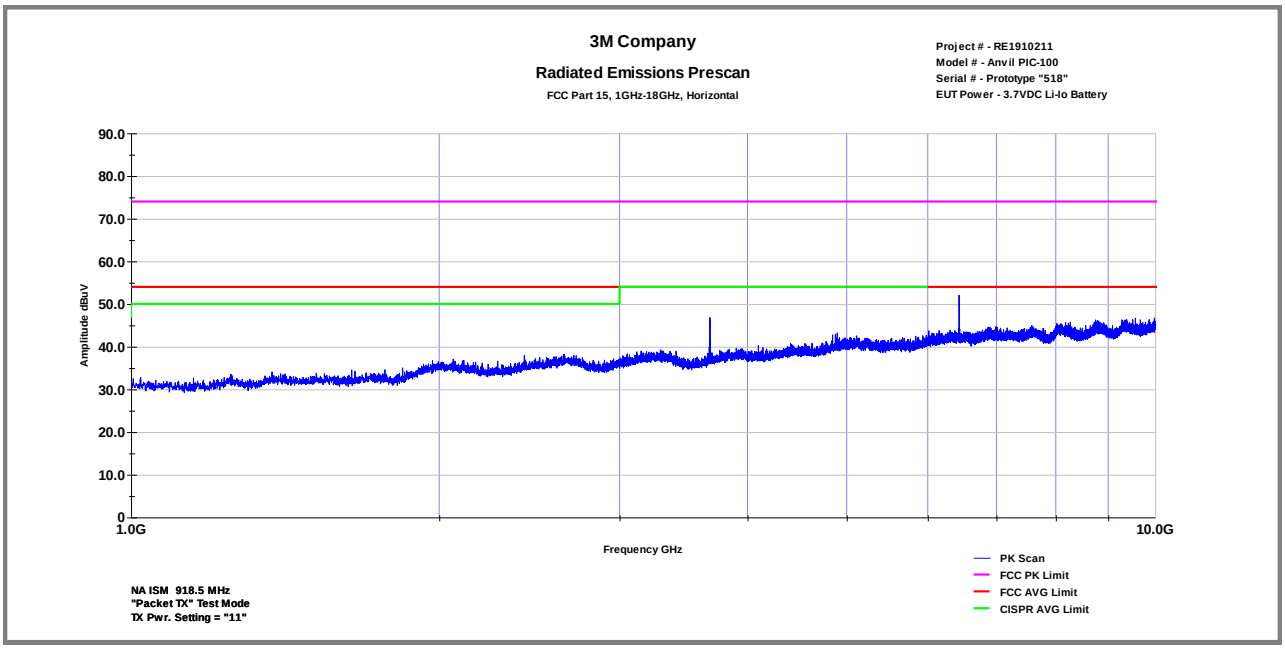
FCC Part 15.209 Radiated Emissions in restricted band – Low Channel





FCC Part 15.209 Radiated Emissions in restricted band – High Channel





FCC Part 15.209 Radiated Emissions in restricted band – High Channel

Tables - Radiated Emissions in restricted band

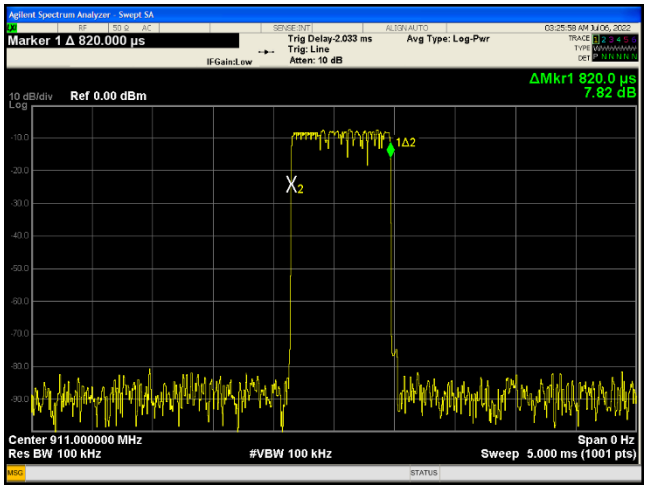
Frequency (MHz)	Pol.	QP Reading dBµV/m	Total CF dB	Net at 3 m dBµV/m	Limit (dBµV/m)	Margin dB
102.98	V	22.4	14	36.4	43.5	-7.1
190.49	H	19	15.8	34.9	43.5	-8.7
223.01	V	10.9	14.9	25.8	46	-20.2
275.3	H	12.9	18.1	31	46	-15
320	V	14.1	19.5	33.6	46	-12.4
351.98	H	14.2	19.9	34.1	46	-11.9
Notes:	Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) Low Channel					

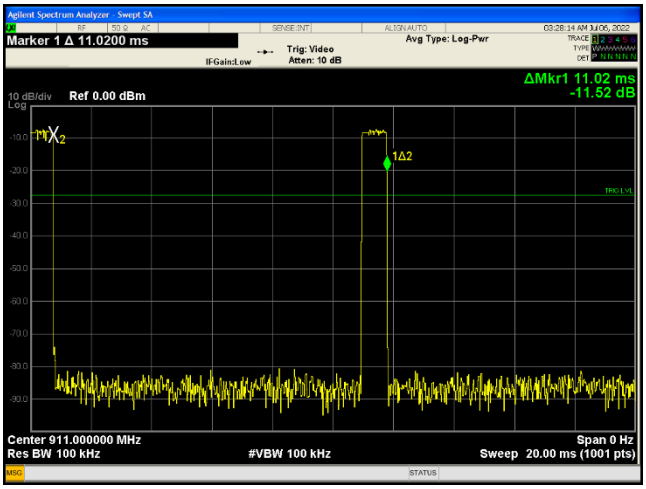
Pol	Frequency (MHz)	Peak dBµV/m	AVG dBµV/m	Total CF dB	Net Peak dBµV/m	Net AVE dBµV/m	PK Limit dBµV/m	AVE Limit dBµV/m	PK Margin dB	AVG Margin dB
V	3642.00	71.27	48.7	-11.24	60.03	37.43	74.00	54.00	-13.97	-16.57
H	3642.00	63.67	41.1	-11.24	52.43	29.83	74.00	54.00	-21.57	-24.17
V	4804.00	48.28	25.7	-6.22	42.06	19.46	74.00	54.00	-31.94	-34.54
H	4804.00	48.32	25.7	-6.22	42.10	19.50	74.00	54.00	-31.90	-34.50
V	8199.00	47.04	24.4	-1.25	45.79	23.19	74.00	54.00	-28.21	-30.81
H	8199.00	49.24	26.6	-1.25	47.99	25.39	74.00	54.00	-26.01	-28.61
Notes:	Net Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB)) Low Channel									

Frequency (MHz)	Pol.	QP Reading dBµV/m	Total CF dB	Net at 3 m dBµV/m	Limit (dBµV/m)	Margin dB
80.99	H	13.4	13.7	27.1	40	-12.9
95.99	V	26.6	13.3	39.9	43.5	-3.6
192.23	H	17.6	15.7	33.3	43.5	-10.2
224	V	15.1	14.9	30	46	-16
320	V	10.9	19.5	30.4	46	-15.6
352.01	V	14.2	19.9	34.2	46	-11.8
Notes:	Net Reading (dBuV) = Reading (dBµV) + Antenna CF(dB)+Cable CF(dB) – Amp Gain(dB) High Channel					

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	3654.00	68.13	45.5	-11.24	56.89	34.29	74.00	54.00	-17.11	-19.71
H	3654.00	60.12	37.5	-11.24	48.88	26.28	74.00	54.00	-25.12	-27.72
V	4882.00	48.06	25.5	-5.30	42.76	20.16	74.00	54.00	-31.24	-33.84
H	4882.00	48.16	25.6	-5.30	42.86	20.26	74.00	54.00	-31.14	-33.74
V	7323.00	48.05	25.5	-3.60	44.45	21.85	74.00	54.00	-29.55	-32.15
H	7323.00	48.27	25.7	-3.60	44.67	22.07	74.00	54.00	-29.33	-31.93
Notes:	Net Reading (dBuV) = Reading (dBµV) + (Antenna with amp CF(dB)+Cable CF(dB)) High Channel									

Duty Cycle Correction factor





The total number of pulses over 100ms/11ms= 9
Transmission On time per burst = 0.820ms
Total on time over 100 ms = 0.820ms x 9 = 7.5ms
Duty Cycle Correction Factor = 20 log (7.5ms/100ms) = -22.6dB

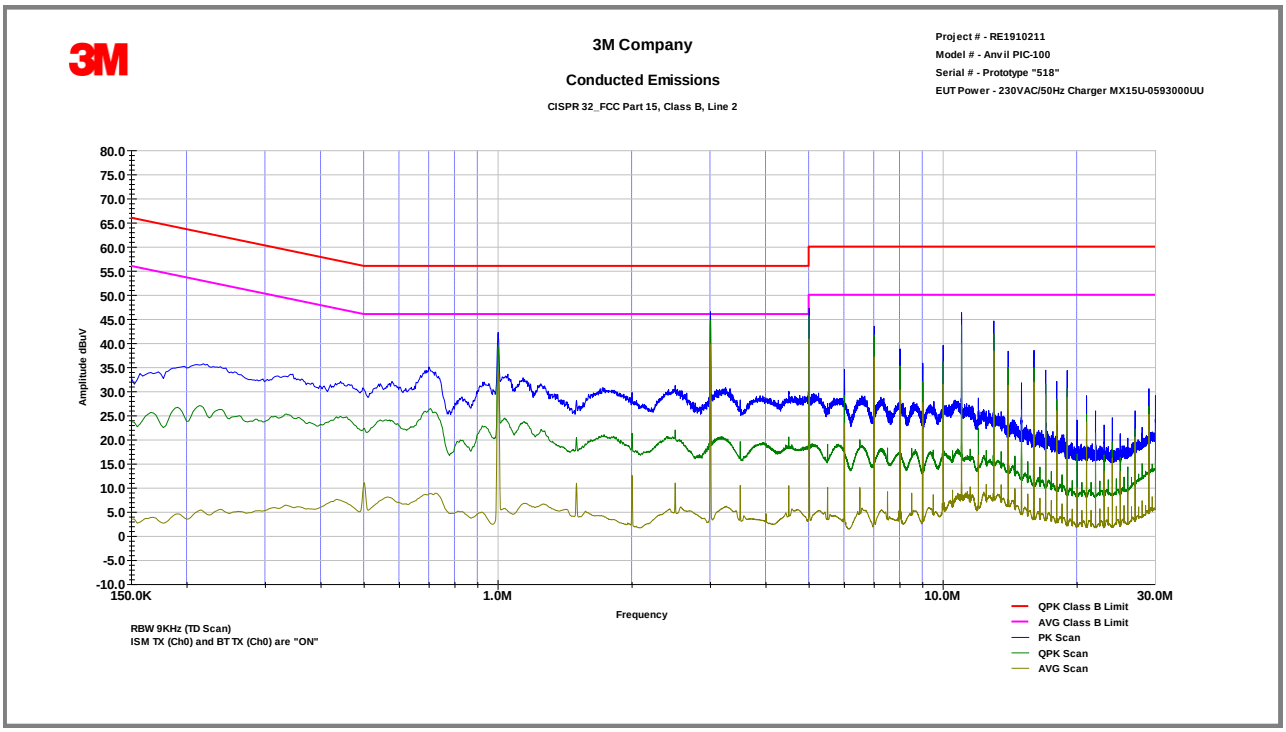
4.4	**Conducted Emissions Data**
Method:	The AMN was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane. This distance was between the closest points of the AMN and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the AMN.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

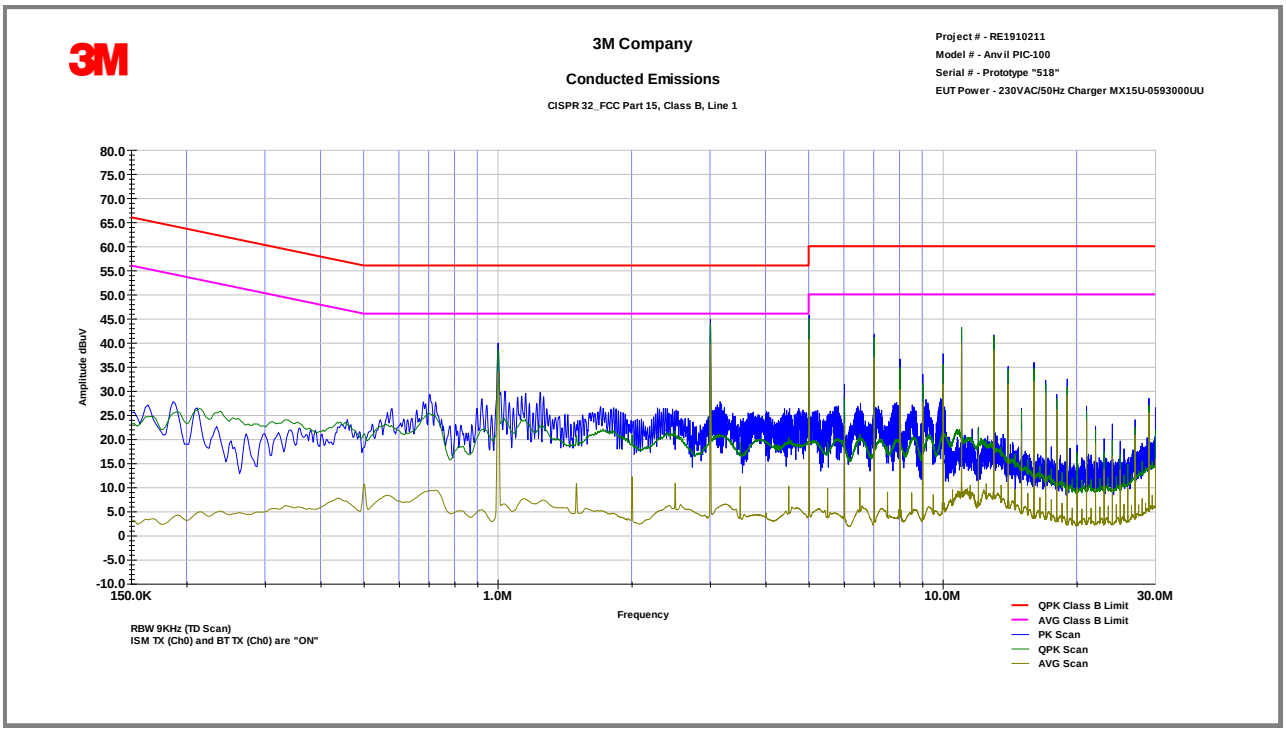
Test Verification: ☒	Laboratory Ambient Temperature:	23°C
	Relative Humidity:	48%
	Atmospheric Pressure:	1011 mbars
Reference Standard(s):	☒ RSS GEN/FCC 15.207 ☒ ANSI C63.4:2014 ☒ ANSI C63.10:2013	**Measurement Point** ☒ Mains ☐ Telecommunication ports ☐
Nominal Voltage:	☒ 120VAC ☐ 230VAC ☐ 3.7VDC	
Test 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 - 230VAC/50Hz 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 - 230VAC/50Hz 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

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	07/06/2022	RE1910211-3	Original Issue