

Ittron, Inc.

EMC TEST REPORT FOR

AMR Transceiver Device for Communicating with Utility Meters Models: IMRC-INTand IMRC-EXT

Tested to The Following Standards:

FCC Part 101 Subpart C
Fixed Microwave Services

Report No.: 103955-29

Date of issue: August 5, 2020



Test Certificate # 803.01

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Ittron, Inc.
2111 N. Molter Road
Liberty Lake WA 99019

Representative: Jay Holcomb
Customer Reference Number: 208224

DATE OF EQUIPMENT RECEIPT:

DATE(S) OF TESTING:

REPORT PREPARED BY:

Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 103955

June 11, 2020

June 11-12, 2020 and July 15-16, 2020

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19
EMITest Immunity	5.03.10

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Japan
Canyon Park, Bothell, WA	US0081	US1022	A-0136
Brea, CA	US0060	US1025	A-0136
Fremont, CA	US0082	US1023	A-0136
Mariposa, CA	US0103	US1024	A-0136

*CKC's list of NIST designated countries can be found at: <https://standards.gov/cabs/designations.html>

SUMMARY OF RESULTS

Standard / Specification: FCC Part 2 / 101 Subpart C

Test Procedure	Description	Modifications	Results
2.1055 / 101.107(a)	Frequency Tolerance	NA	Pass
2.1049 / 101.109(c)	Bandwidth	NA	Pass
2.1051 / 101.111(a)(5)	Emissions Limitations- Conducted	NA	Pass
2.1053 / 101.111(a)(5)	Emissions Limitations- Radiated	NA	Pass
2.1046 / 101.113	Transmitter Power Limitations	NA	Pass
2.1047	Modulation Characteristics	NA	NA1

NA = Not Applicable

NA1 = Not applicable because the EUT does not employ any modulation types outlined in the rules.

ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions

No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions

Note: EUT with internal antenna and EUT with external antenna use the same modulation and channel configuration. The only difference between them is the power output. Hence, the data measured on the internal antenna unit can be used for both except RF conducted power and spurious emissions.

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-INT	66034285
10" Tablet	Panasonic	FZ-G1	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
Power Distribution Box	Itron, Inc.	Generic	NA
12Vdc AC Adapter	Husky	FW 1288	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
10" Tablet	Panasonic	FZ-G1	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
Power Distribution Box	Itron, Inc.	Generic	NA
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-EXT	66034368

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 3

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-INT	66034283
Power Distribution Box	Itron, Inc.	Generic	NA
10" Tablet	Panasonic	FZ-G1	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
5Vdc AC Adapter	zip	SG-511	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 4

Equipment Tested:

Device	Manufacturer	Model #	S/N
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-INT	66034283
Power Distribution Box	Itron, Inc.	Generic	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
5Vdc AC Adapter	zip	SG-511	NA
7" Tablet	Panasonic	FZ-M1	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614

Configuration 5

Equipment Tested:

Device	Manufacturer	Model #	S/N
Power Distribution Box	Itron, Inc.	Generic	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
10" Tablet	Panasonic	FZ-G1	NA
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-EXT	66034368

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614
50ohm load	Generic	NA	NA

Configuration 6

Equipment Tested:

Device	Manufacturer	Model #	S/N
Power Distribution Box	Itron, Inc.	Generic	NA
Automobile Adapter	Lind Electronics, Inc.	PA1555-2155 FB	NA
AMR transceiver device for communicating with utility meters	Itron, Inc.	IMRC-EXT	66034368
7" Tablet	Panasonic	FZ-M1	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Topward	6306D	988614
50ohm load	Generic	NA	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	Land-Mobile Transmitter and Receiver (27.41-960 MHz) (MAS transmitter)
Operating Frequency Range:	952.0-959.85MHz
Number of Hopping Channels:	NA
Modulation Type(s):	24.76-57.78Hz AM
Maximum Duty Cycle:	100%
Number of TX Chains:	1
Antenna Gain:	Internal, directional 2dBi External, Vehicular mount 5dBi monopole, 3dBi Rubber Duck
Beamforming Type:	NA
Antenna Connection Type:	Integral/External Connector
Nominal Input Voltage:	Internal antenna unit: 5VDC Adapter External antenna unit: 13.8VDC (7 to 18VDC)
Firmware / Software used for Test:	Arm Version: 7.73.00.01 DSP Version: 5.76.00.07 FPGA Version: 3.02 MC3 SuperRaptor Test ver.4.0.3.5
Tablets FCC ID:	7" tablet – Panasonic FZ-M1 FCC ID: ACJ9TGWL15B IC: 216A-CFWL15B contains: FCC ID: ACJ9TGWW13B3 IC: 216A-CFWW13B 10" tablet – Panasonic FZ-G1 FCC ID: ACJ9TGWL15A IC: 216A-CFWL15A contains: FCC ID: ACJ9TGWW13B1 IC: 216A-CFWW13B

EUT and Accessory Photo(s)



IMRC-INT for Conducted



IMRC-INT



IMRC-EXT



3dBi Antenna



5dBi Antenna



5VDC Adapter



12VDC Adapter



Power Distribution



Tablet Power Adapter



Tablet #1



Tablet #2

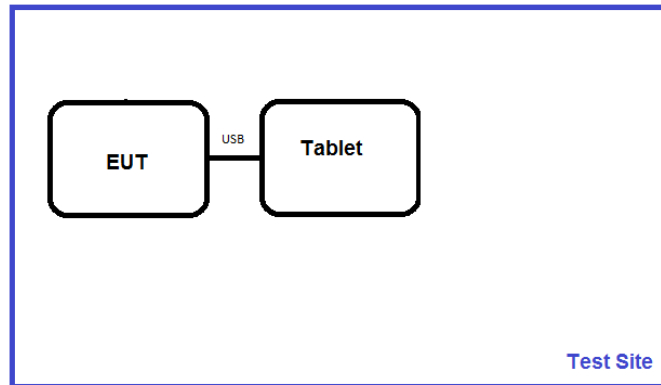
Support Equipment Photo(s)



12VDC Power Supply

Block Diagram(s) of Test Setup

Test Setup Block Diagram



FCC Part(s) 101 Subpart C

2.1055 / 101.107(a) Frequency Tolerance

Test Setup / Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.26 (2015), Section 5.6	Test Date(s):	6/12/2020
Configuration:	1		
Test Setup:	The EUT is placed inside temperature chamber. The EUT is connected to an external power supply and set to transmit continuously. Operating frequency: 952-959.85MHz Frequency range of measurement: 952, 956, 959.85MHz		

Environmental Conditions			
Temperature (°C)	25	Relative Humidity (%):	46

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
01878	Temperature Chamber	Thermotron Corp.	S 1.2 Mini-Max	3/26/2019	3/26/2021
02869	Spectrum Analyzer	Agilent	E4440A	7/25/2019	7/25/2020
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/22/2019	10/22/2021
P07338	Cable	Pomona	2249-Y-240	12/24/2019	12/24/2021

Test Data

Temperature (°C)	Voltage	Frequency (MHz)	Frequency Tolerance (%)	Limit (%)	Results
-30	V _{Nominal}	951.998441	0.0000445	0.00015	Pass
-20	V _{Nominal}	951.998498	0.0000386	0.00015	
-10	V _{Nominal}	951.998673	0.0000202	0.00015	
0	V _{Nominal}	951.998976	0.0000117	0.00015	
10	V _{Nominal}	951.998964	0.0000104	0.00015	
20	V _{Minimum}	951.998865	0.0000000	0.00015	
20	V _{Nominal}	951.998865	0.0000000	0.00015	
20	V _{Maximum}	951.998865	0.0000000	0.00015	
30	V _{Nominal}	951.998761	0.0000109	0.00015	
40	V _{Nominal}	951.998642	0.0000234	0.00015	
50	V _{Nominal}	951.998662	0.0000213	0.00015	
Nominal Frequency:		951.998865			

Temperature (°C)	Voltage	Frequency (MHz)	Frequency Tolerance (%)	Limit (%)	Results
-30	V _{Nominal}	955.998516	0.0000430	0.00015	Pass
-20	V _{Nominal}	955.998615	0.0000326	0.00015	
-10	V _{Nominal}	955.998787	0.0000146	0.00015	
0	V _{Nominal}	955.998968	0.0000043	0.00015	
10	V _{Nominal}	955.998982	0.0000058	0.00015	
20	V _{Minimum}	955.998927	0.0000000	0.00015	
20	V _{Nominal}	955.998927	0.0000000	0.00015	
20	V _{Maximum}	955.998927	0.0000000	0.00015	
30	V _{Nominal}	955.998703	0.0000234	0.00015	
40	V _{Nominal}	955.998633	0.0000308	0.00015	
50	V _{Nominal}	955.998642	0.0000298	0.00015	
Nominal Frequency:		955.998927			

Temperature (°C)	Voltage	Frequency (MHz)	Frequency Tolerance (%)	Limit (%)	Results
-30	V _{Nominal}	959.848519	0.0000426	0.00015	Pass
-20	V _{Nominal}	959.848638	0.0000302	0.00015	
-10	V _{Nominal}	959.848807	0.0000126	0.00015	
0	V _{Nominal}	959.848962	0.0000035	0.00015	
10	V _{Nominal}	959.848972	0.0000046	0.00015	
20	V _{Minimum}	959.848928	0.0000000	0.00015	
20	V _{Nominal}	959.848928	0.0000000	0.00015	
20	V _{Maximum}	959.848928	0.0000000	0.00015	
30	V _{Nominal}	959.848677	0.0000261	0.00015	
40	V _{Nominal}	959.848630	0.0000310	0.00015	
50	V _{Nominal}	959.848653	0.0000287	0.00015	
Nominal Frequency:		959.848928			

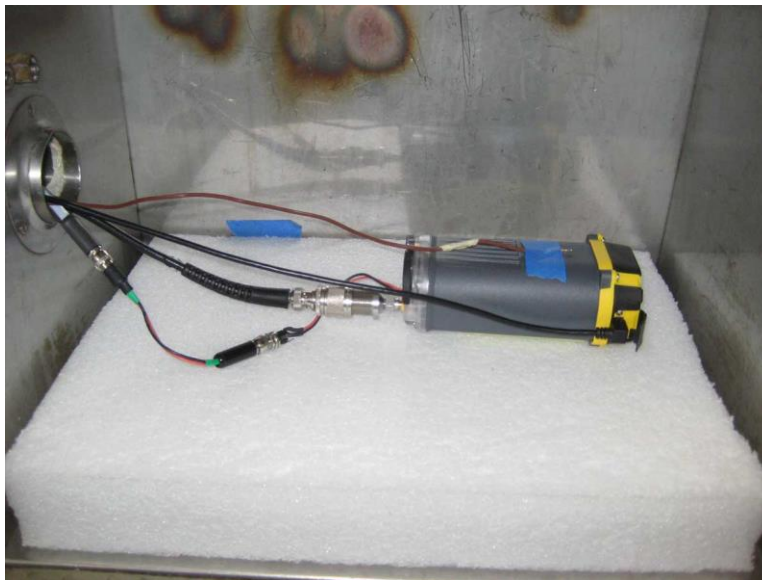
Measurements performed at input voltage $V_{\text{nominal}} \pm 15\%$. (AC Input)

Measurements performed at input voltage according to manufacturer specification. (DC Input)

Parameter	Value
V_{Nominal} :	115VAC / 12VDC
V_{Minimum} :	97VAC / 7VDC
V_{Maximum} :	133VAC / 18VDC

Note: see 101.107(a), note 5 for limit reference.

Test Setup Photo(s)



Inside Temperature Chamber



Outside Temperature Chamber

2.1049 / 101.109(c) Bandwidth

Test Setup/Conditions

Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.26 (2015), Section 5.4	Test Date(s):	6/11/2020
Configuration:	1		
Test Setup:	The EUT is placed on test bench and connected to an external power supply. USB port is connected to a touchscreen computer. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5. The EUT is set to continuously transmit. Operating frequency: 952-959.85MHz Frequency range of measurement: 952-959.85MHz RBW=10Hz, VBW=30Hz (24Hz AM modulation) RBW=68Hz, VBW=220Hz (57Hz AM modulation)		

Environmental Conditions

Temperature (°C)	24.9	Relative Humidity (%):	33
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Test Equipment

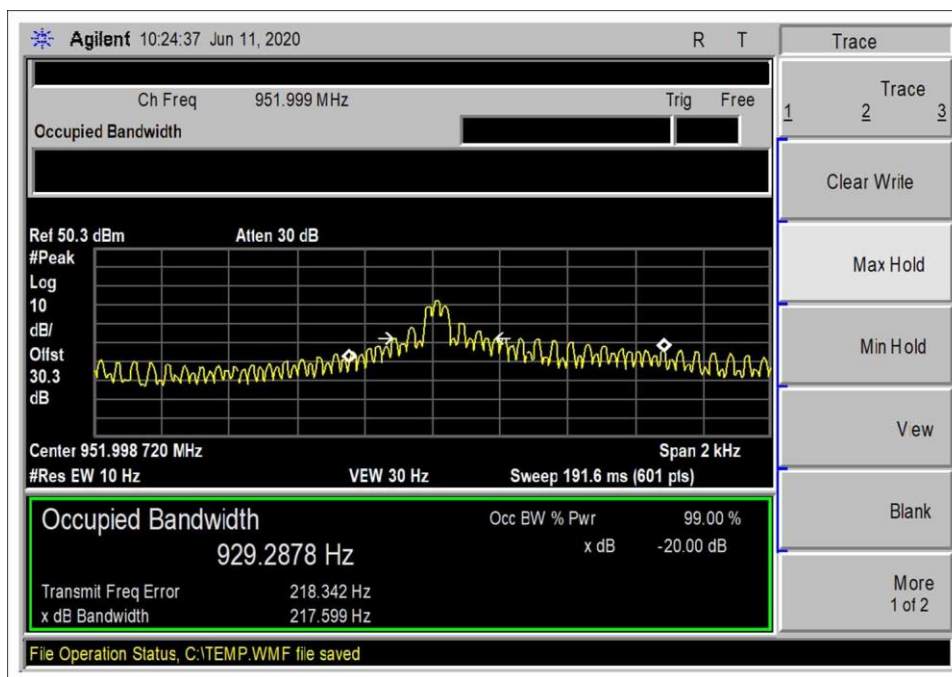
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02869	Spectrum Analyzer	Agilent	E4440A	7/25/2019	7/25/2020
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/22/2019	10/22/2021
P07243	Cable	H&S	32022-29094K-29094K-24TC	5/29/2020	5/29/2022

Test Data Summary-99% Bandwidth

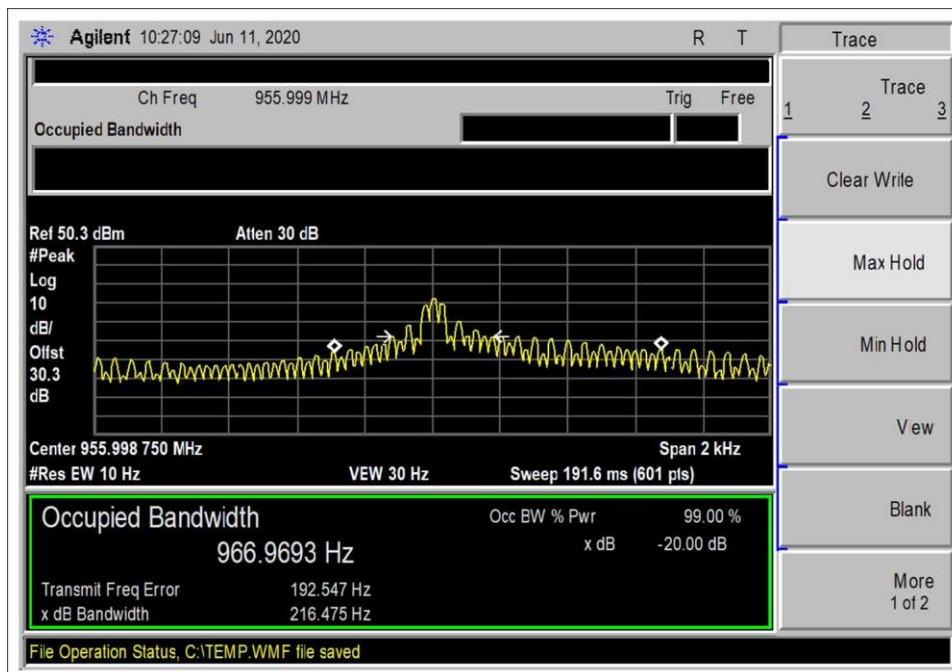
Frequency (MHz)	Modulation	Measured (kHz)	Limit* (kHz)	Results
952.0	24.76 Hz AM	0.929	<12.5	Pass
956.0	24.76 Hz AM	0.967	<12.5	Pass
959.85	24.76 Hz AM	0.965	<12.5	Pass
952.0	57.78 Hz AM	5.542	<12.5	Pass
956.0	57.78 Hz AM	5.785	<12.5	Pass
959.85	57.78 Hz AM	5.783	<12.5	Pass

*See note 5 in the standard which references 101.147(b)(1) to (4)

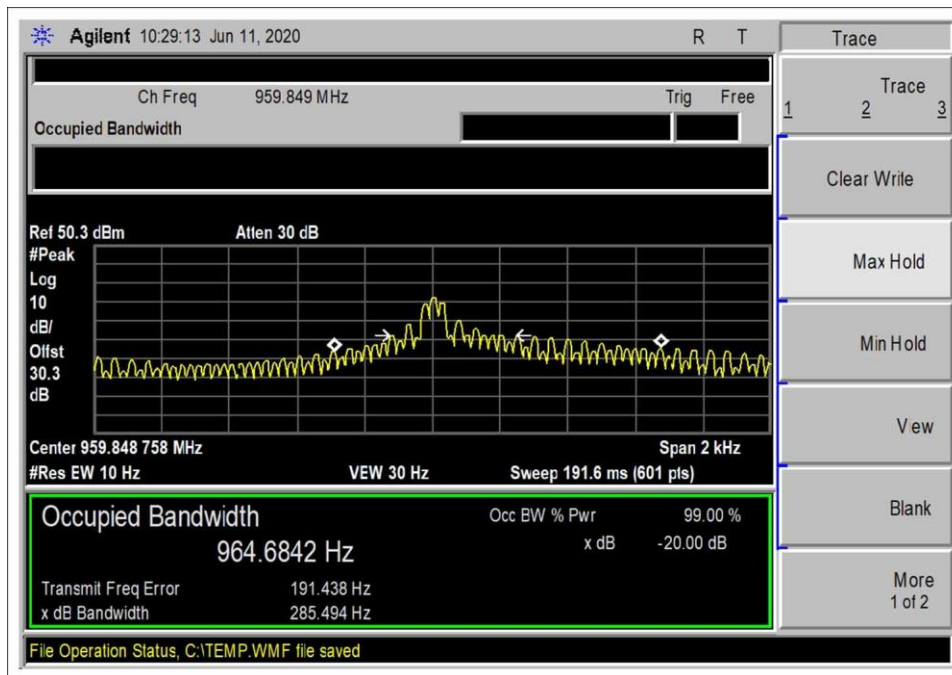
Plot(s)



Low Channel 24Hz



Middle Channel 24Hz



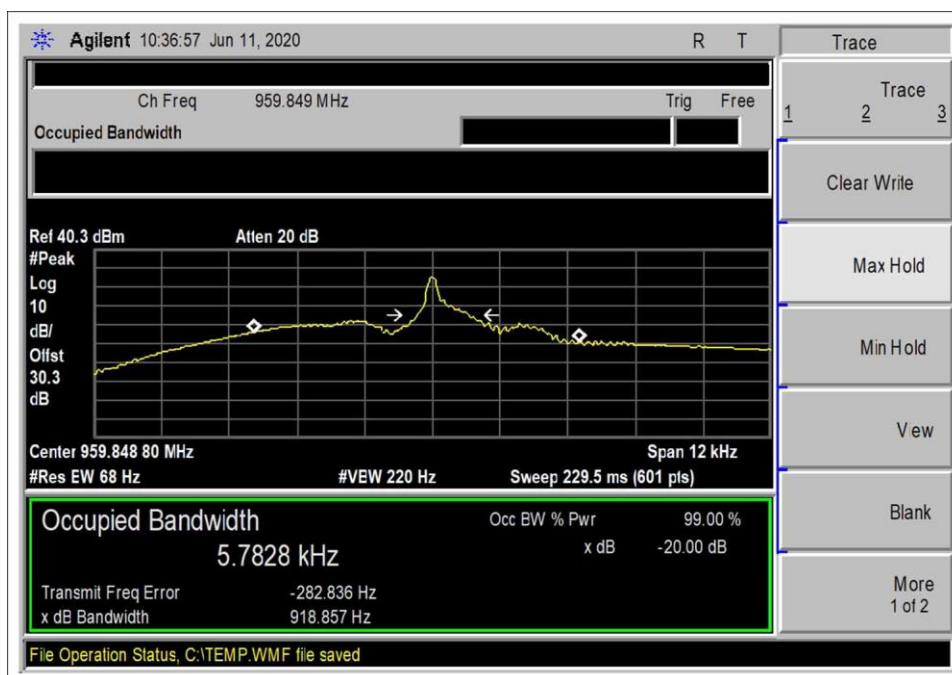
High Channel 24Hz



Low Channel 57Hz

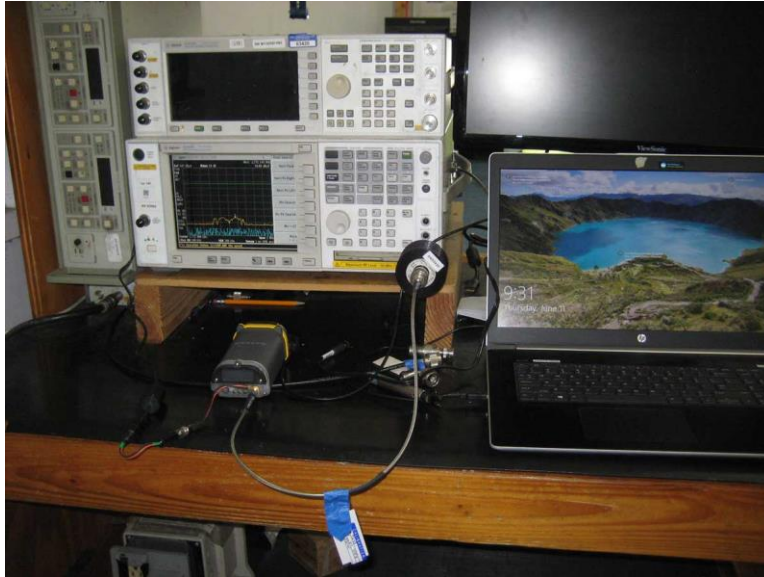


Middle Channel 57Hz



High Channel 57Hz

Test Setup Photo(s)



2.1051 / 101.111(a)(5) Emissions Limitations - Conducted

Test Conditions / Setup

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.26 (2015), Section 5.7	Test Date(s):	7/15/2020
Configuration:	1 and 2		
Test Setup:	The EUT is placed on test bench and connected to an external power supply. USB port is connected to a touchscreen computer. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5 The EUT is set to continuously transmit. Power setting: 4W Operating frequency: 952-959.85MHz Frequency range of measurement = 9kHz-10GHz RBW=62Hz*, VBW=20Hz (within +/- 15kHz of authorized bandwidth) RBW=100kHz, VBW=300kHz (outside of +/-15kHz of authorized bandwidth, 9kHz-1000MHz) RBW=1MHz, VBW=3MHz (1-10GHz) *Per Reference Bandwidth definition on section 3.1, RBW=1% OBW.		

Environmental Conditions

Temperature (°C)	24	Relative Humidity (%):	45
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Test Equipment

Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02869	Spectrum Analyzer	Agilent	E4440A	7/25/2019	7/25/2020
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/22/2019	10/22/2021
P07243	Cable	H&S	32022-29094K-29094K-24TC	5/29/2020	5/29/2022

Test Data

Spurious emissions outside of +/- 15kHz of authorized bandwidth-Configuration 1			
Frequency (MHz)	Measure power (dBm)	Limit (dbm)	Result
1904	-38.2	-20	Pass
1912	-39.0	-20	Pass
1920	-39.2	-20	Pass
2856	-35.9	-20	Pass
2868	-36.9	-20	Pass
2879.5	-36.8	-20	Pass
6664	-39.5	-20	Pass
6692	-40.4	-20	Pass
6718.95	-41.1	-20	Pass

Spurious emissions outside of +/- 15kHz of authorized bandwidth-Configuration 2			
Frequency (MHz)	Measure power (dBm)	Limit (dbm)	Result
1904	-42.7	-20	Pass
1912	-45.4	-20	Pass
1920	-46.2	-20	Pass
2856	-38.8	-20	Pass
2868	-39.3	-20	Pass
2879.5	-39.9	-20	Pass
6664	-46.1	-20	Pass
6692	-43.8	-20	Pass
6718.95	-42.8	-20	Pass

Note: Data is recorded with the worst-case modulation.
Measurement Uncertainty: 0.67dB

Limit Line for Spurious Conducted Emission

$$\text{REQUIRED ATTENUATION} = 50 + 10 \log P \text{ DB}$$

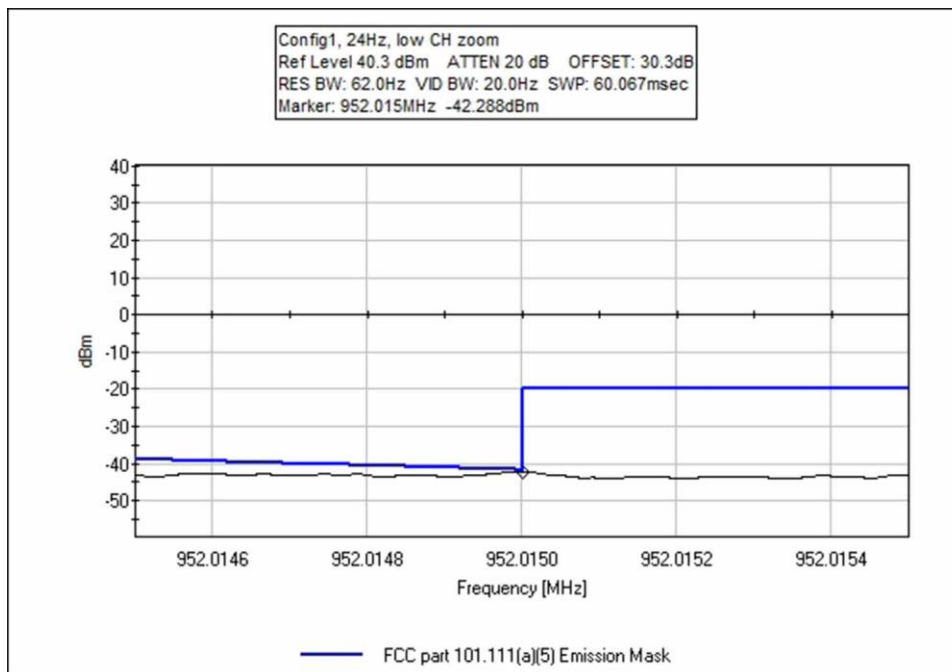
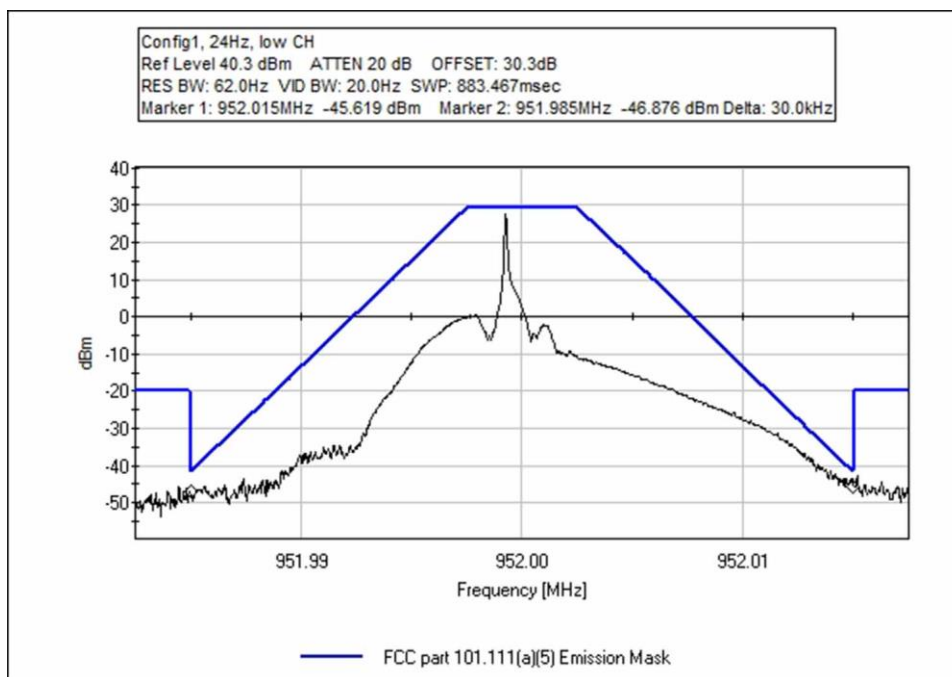
$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

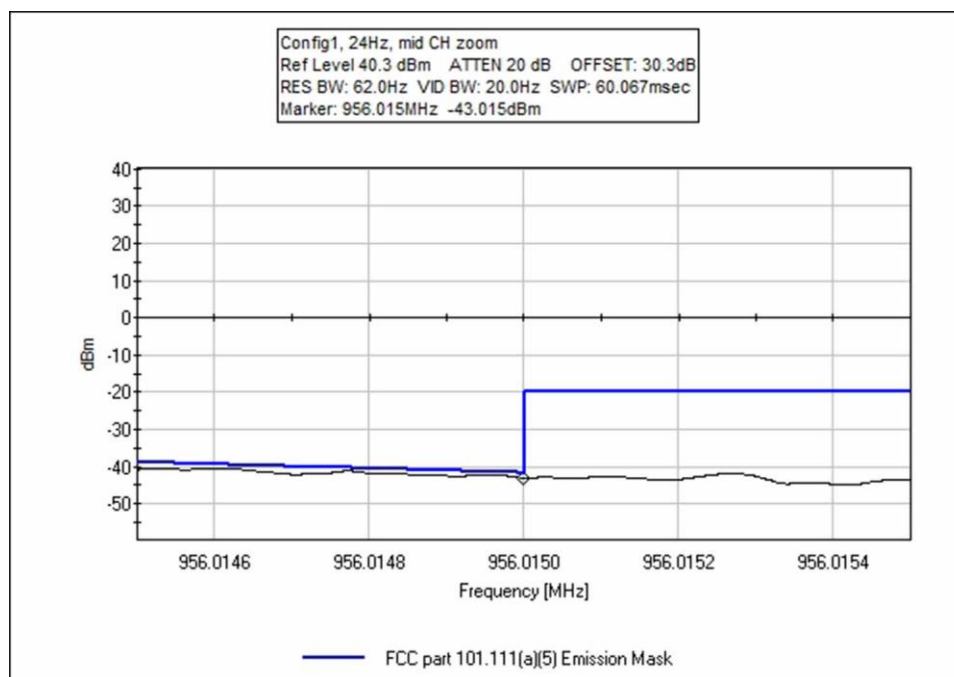
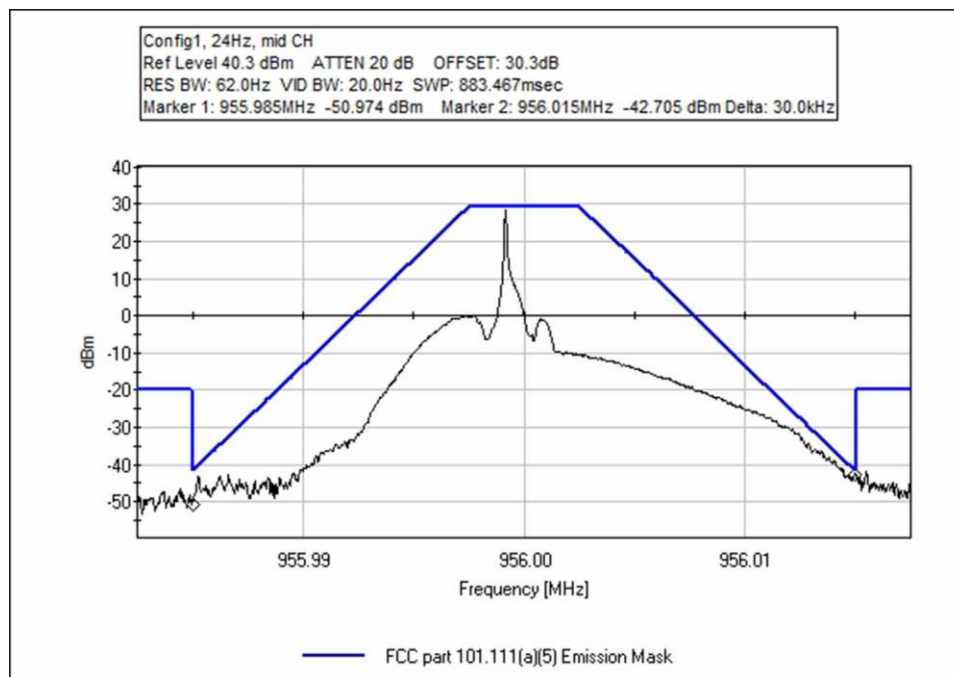
$$\begin{aligned} V_{\text{dBuV}} &= 20 \log \frac{V}{1 \times 10^{-6}} \\ &= 20 (\log V - \log 1 \times 10^{-6}) \\ &= 20 \log V - 20 \log 1 \times 10^{-6} \\ &= 20 \log V - 20 (-6) \\ &= 20 \log V + 120 \end{aligned}$$

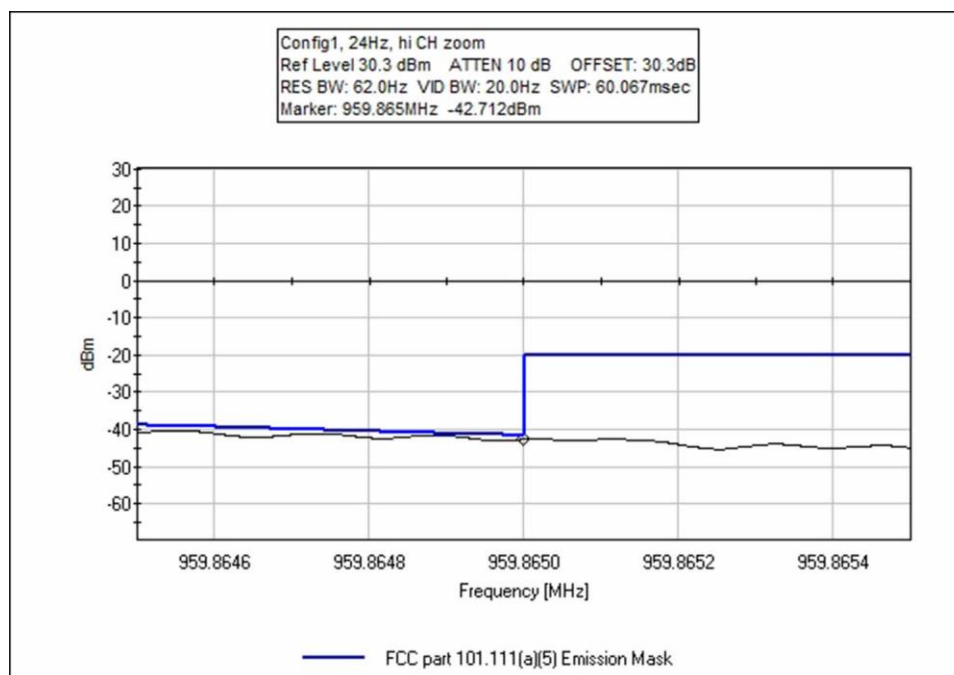
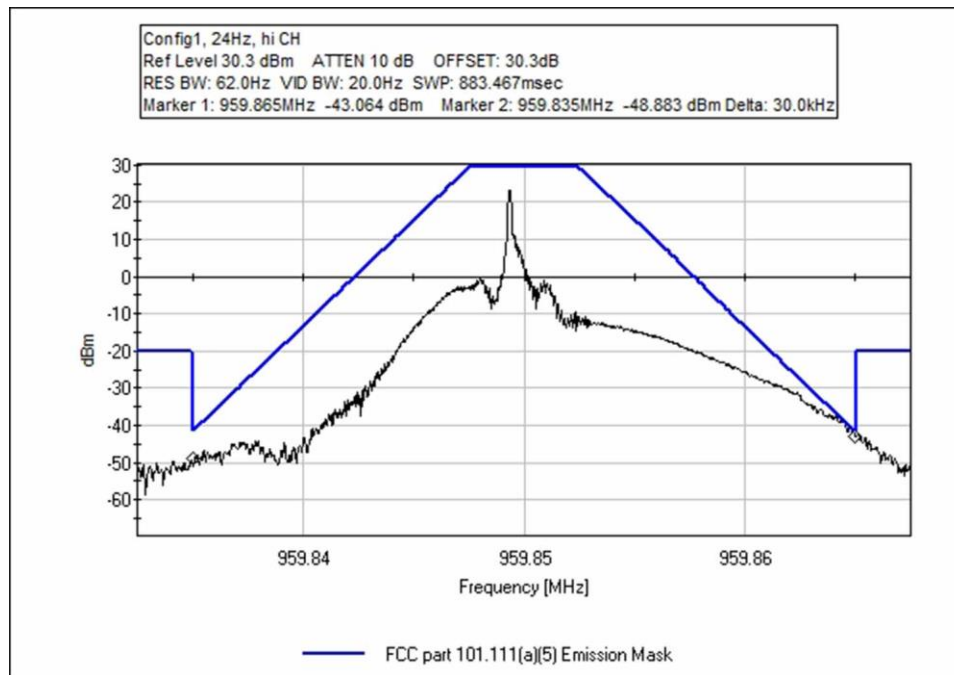
$$\begin{aligned} \text{Attenuation} &= 50 + 10 \log P \\ &= 50 + 10 \log \frac{V^2}{R} \\ &= 50 + 10 (\log V^2 - \log R) \\ &= 50 + 10 (2 \log V - \log R) \\ &= 50 + 20 \log V - 10 \log R \end{aligned}$$

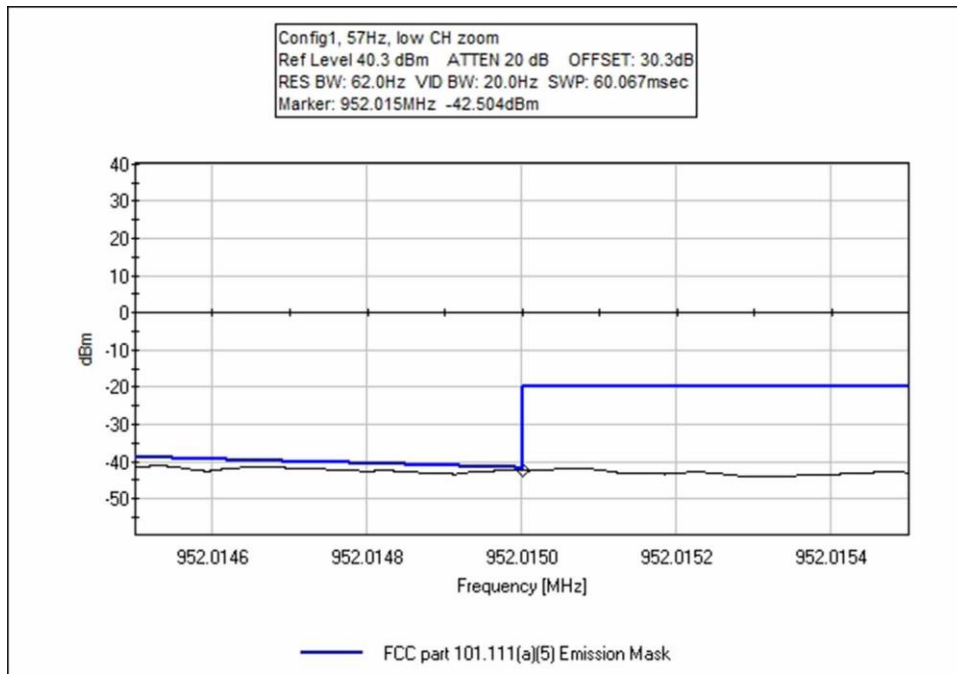
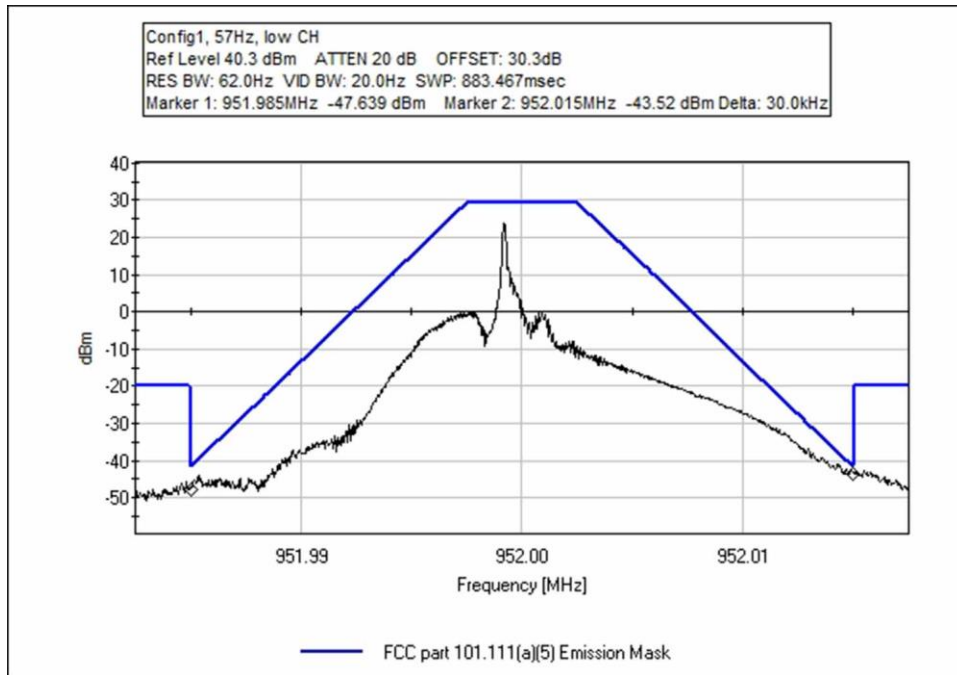
$$\begin{aligned} \text{Limit line} &= V_{\text{dBuV}} - \text{Attenuation} \\ &= 20 \log V + 120 - (50 + 20 \log V - 10 \log R) \\ &= 20 \log V + 120 - 50 - 20 \log V + 10 \log R \\ &= 20 \log V + 120 - 50 - 20 \log V + 10 \log R \\ &= 120 - 50 + 10 \log 50 \quad \text{Note : } R = 50 \Omega \\ &= 120 - 50 + 16.897 \\ &= 87 \text{ dBuV } (-20\text{dBm}) \text{ at any power level} \end{aligned}$$

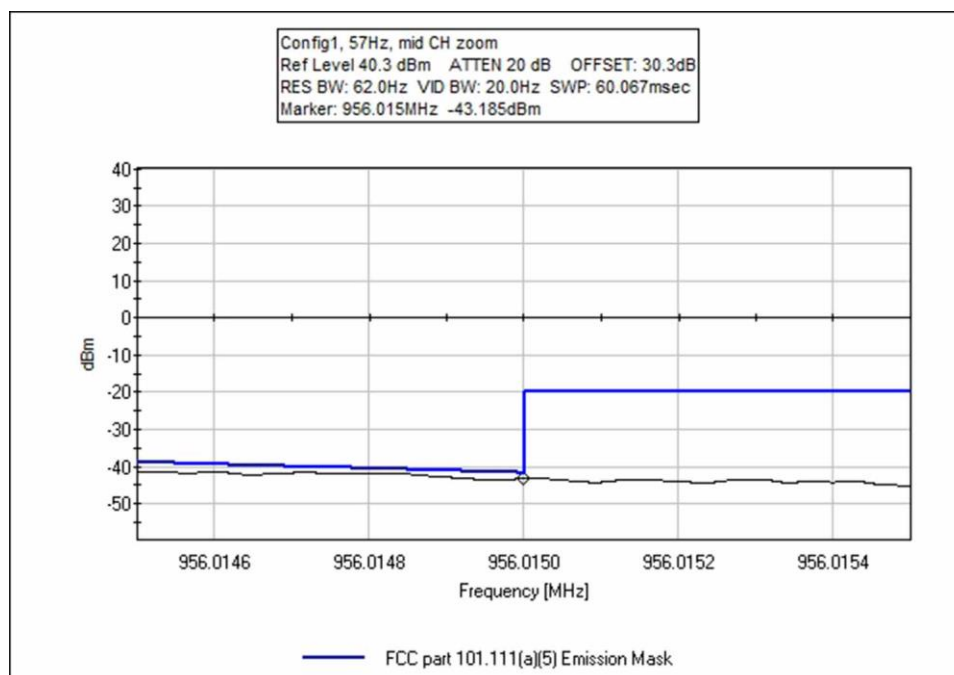
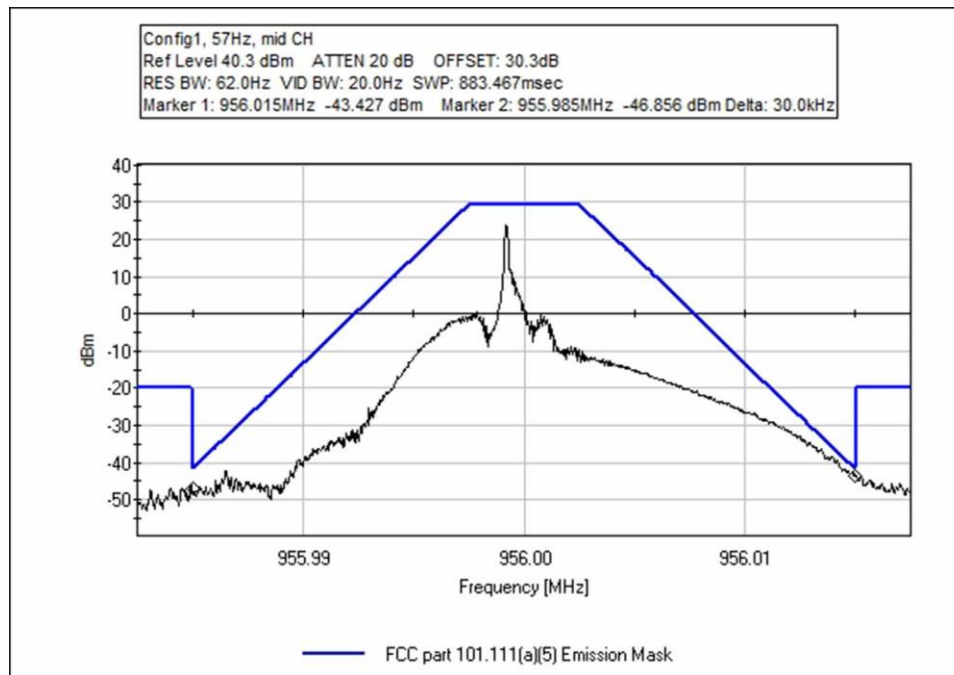
Emissions Mask Plot(s)

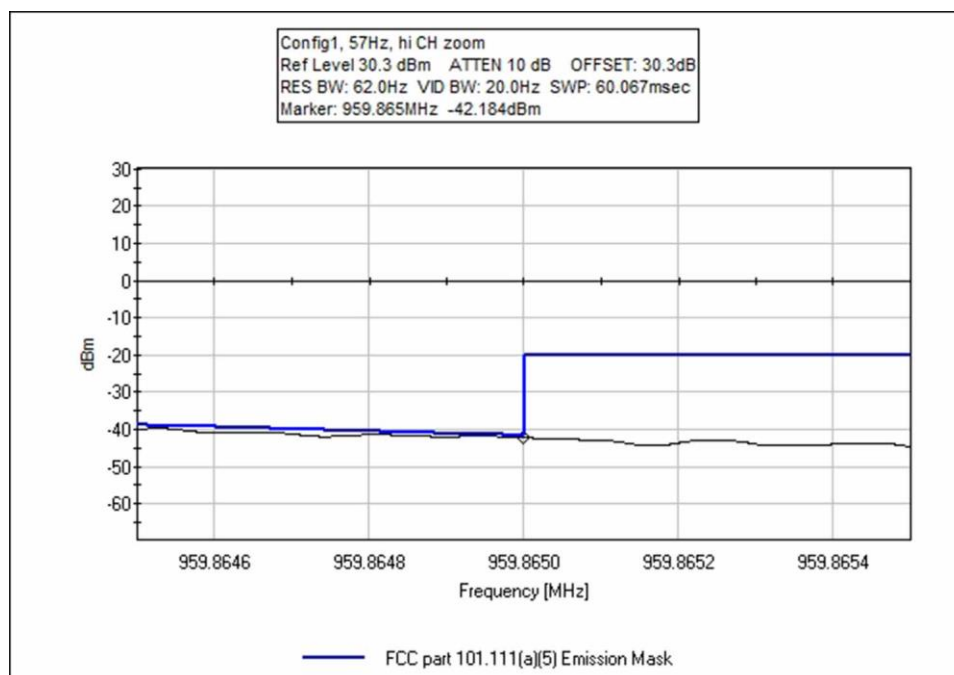
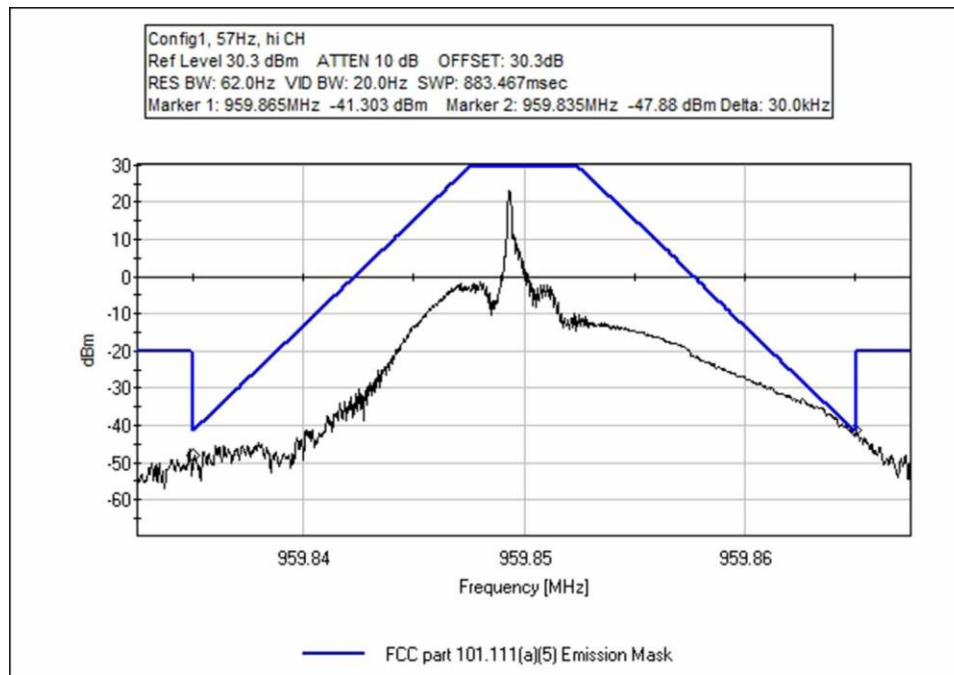


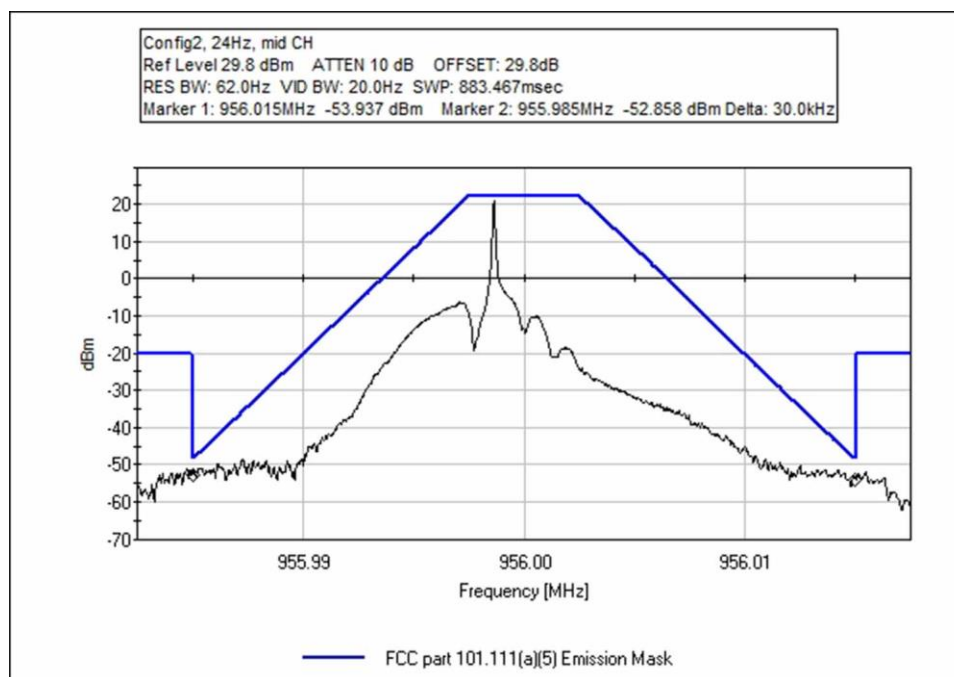
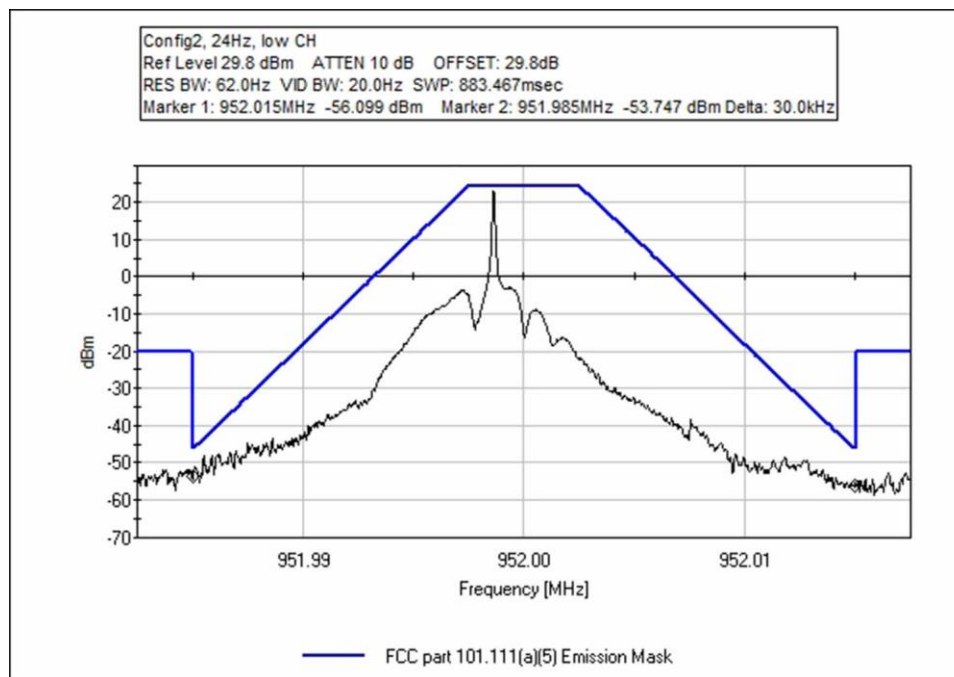


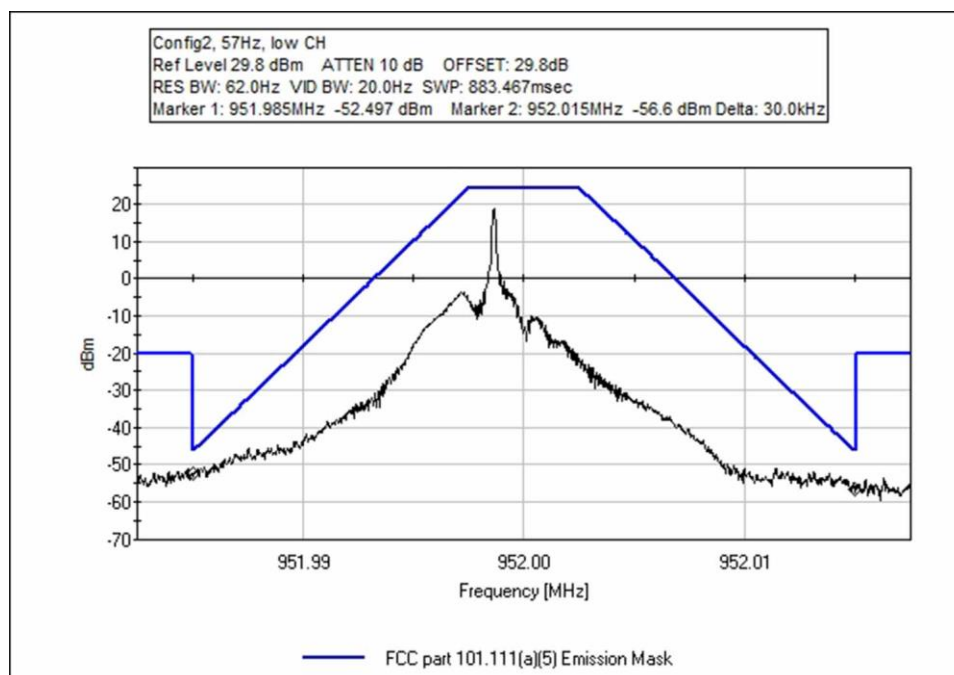
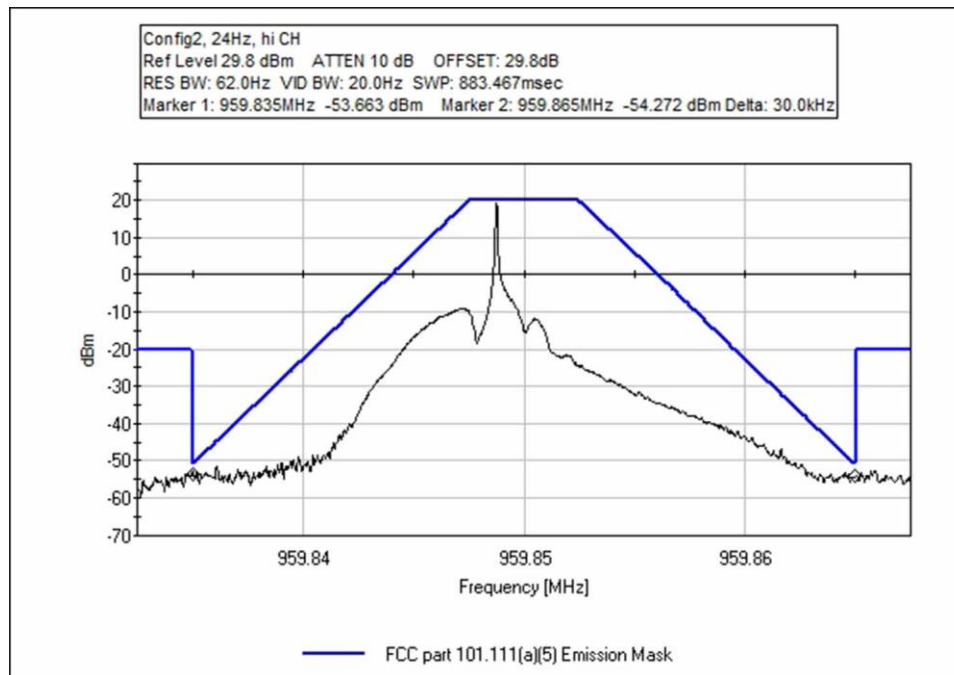


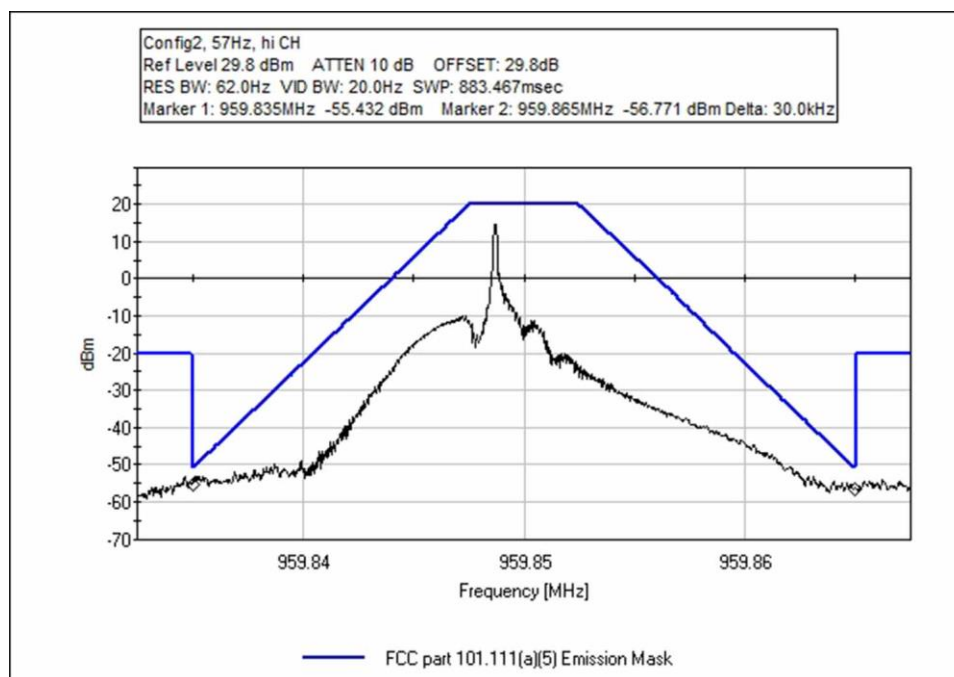
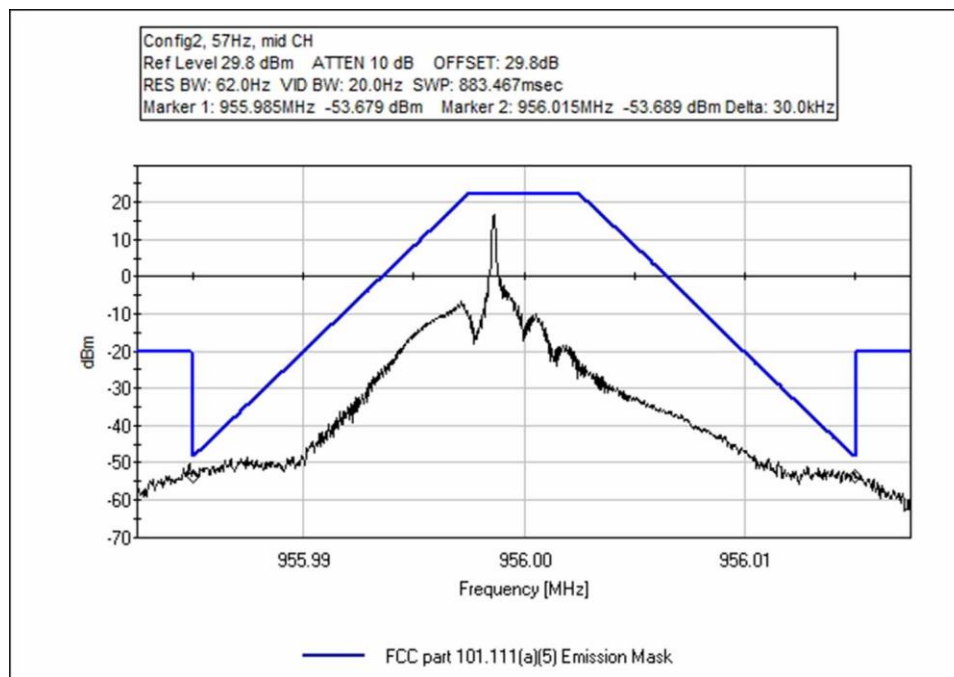




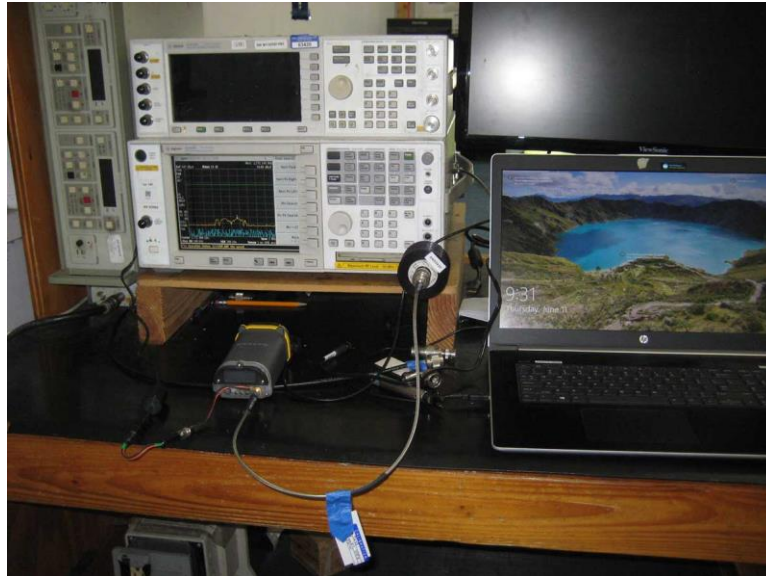








Test Setup Photo(s)



Configuration 1



Configuration 2

2.1053 / 101.111(a)(5) Emissions Limitations - Radiated

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.26 (2015), Section 5.5	Test Date(s):	7/16/2020
Configuration:	3, 4, 5, and 6		
Test Setup:	The EUT is placed on turn table and connected to external power supply. USB port is connected to a touchscreen computer. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5 The EUT is set into continuous transmitting mode. The EUT is rotated in three orthogonal orientations. Data represents the worst-case orientation. For external antenna unit, antenna port is terminated with 50ohm load. Operating frequency: 952-959.85MHz Frequency range of measurement = 9kHz-10GHz RBW=100kHz, VBW=300kHz (outside of +/-15kHz of authorized bandwidth, 9kHz-1000MHz) RBW=1MHz, VBW=3MHz (1-10GHz) The worst case emission were verified with power supply on and off the table. No change in emission level was observed.		

Environmental Conditions			
Temperature (°C)	24.3	Relative Humidity (%):	36

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
00314	Loop Antenna	EMCO	6502	4/13/2020	4/13/2022
P05198	Cable	Belden	8268	12/4/2018	12/4/2020
P05281	Attenuator	Weinschel	1B	4/7/2020	4/7/2022
01993	Biconilog Antenna	Chase	CBL6111C	6/11/2019	6/11/2021
00309	Preamplifier	HP	8447D	12/24/2019	12/24/2021
P05050	Cable	Pasternack	RG223/U	12/24/2018	12/24/2020
02869	Spectrum Analyzer	Agilent	E4440A	7/25/2019	7/25/2020
00786	Preamplifier	HP	83017A	5/20/2020	5/20/2022
00849	Horn Antenna	ETS	3115	3/17/2020	3/17/2022
P06360	Cable	Andrew	L1-PNMNM-48	8/8/2019	8/8/2021
P07243	Cable		32022-29094K-29094K-24TC	5/29/2020	5/29/2022
03169	High Pass Filter	SMI	HM1155-11SS	5/8/2019	5/8/2021

Test Data

Spurious emissions outside of +/-15kHz of authorized bandwidth-			
Configuration 3 Internal Antenna+10in tablet			
Frequency (MHz)	Measure power (dBuV/m)	Limit (dBuV/m)	Result
1904	47.2	75.2	Pass
1912	46.9	75.2	Pass
1919.7	46.9	75.2	Pass
6664	56.9	75.2	Pass
6692	57.9	75.2	Pass
6718.95	58.8	75.2	Pass

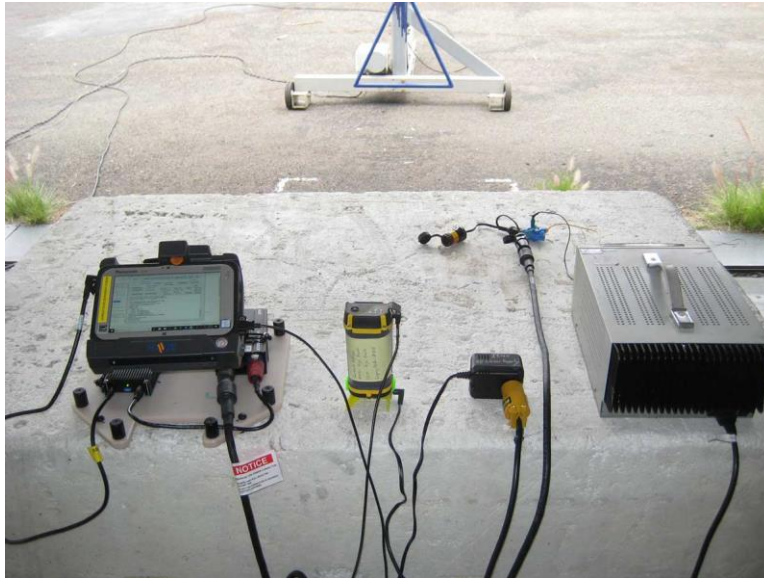
Spurious emissions outside of +/-15kHz of authorized bandwidth-			
Configuration 4 Internal Antenna+7in tablet			
Frequency (MHz)	Measure power (dBuV/m)	Limit (dBuV/m)	Result
1904	47.6	75.2	Pass
1912	47.0	75.2	Pass
1919.7	46.5	75.2	Pass
6664	56.5	75.2	Pass
6692	58.3	75.2	Pass
6718.95	58.7	75.2	Pass

Spurious emissions outside of +/-15kHz of authorized bandwidth			
Configuration 5 External Antenna+10in tablet			
Frequency (MHz)	Measure power (dBuV/m)	Limit (dBuV/m)	Result
2879.55	43.3	75.2	Pass
3808	43.7	75.2	Pass
3824	43.5	75.2	Pass
6664	52.0	75.2	Pass
6692	54.2	75.2	Pass
6718.95	53.9	75.2	Pass

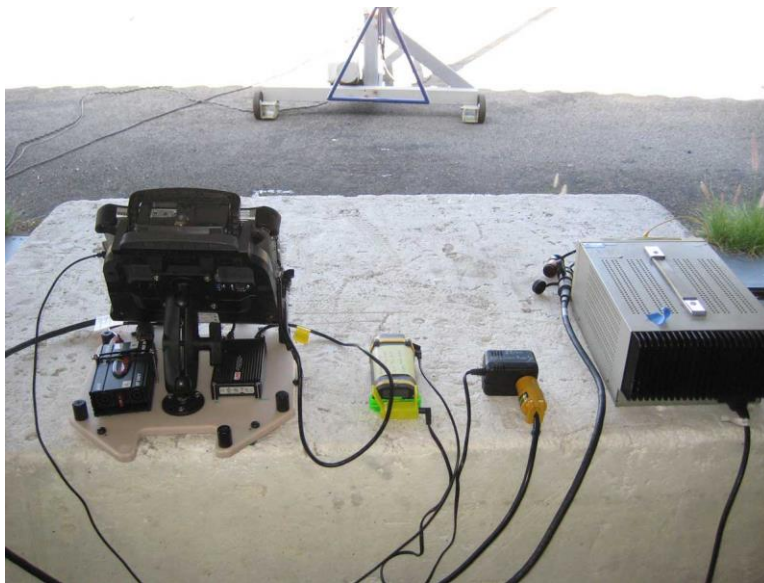
Spurious emissions outside of +/-15kHz of authorized bandwidth			
Configuration 6 External Antenna+7in tablet			
Frequency (MHz)	Measure power (dBuV/m)	Limit (dBuV/m)	Result
2879.55	43.0	75.2	Pass
3808	43.3	75.2	Pass
3824	43.7	75.2	Pass
6664	51.6	75.2	Pass
6692	54.7	75.2	Pass
6718.95	54.2	75.2	Pass

Measurement Uncertainty: 3.73dB
 Conversion to EIRP limit
 $E(\text{dBuV/m}) = P(\text{dBm}) - 20\log(3) + 104.77$

Test Setup Photo(s)



7" Tablet



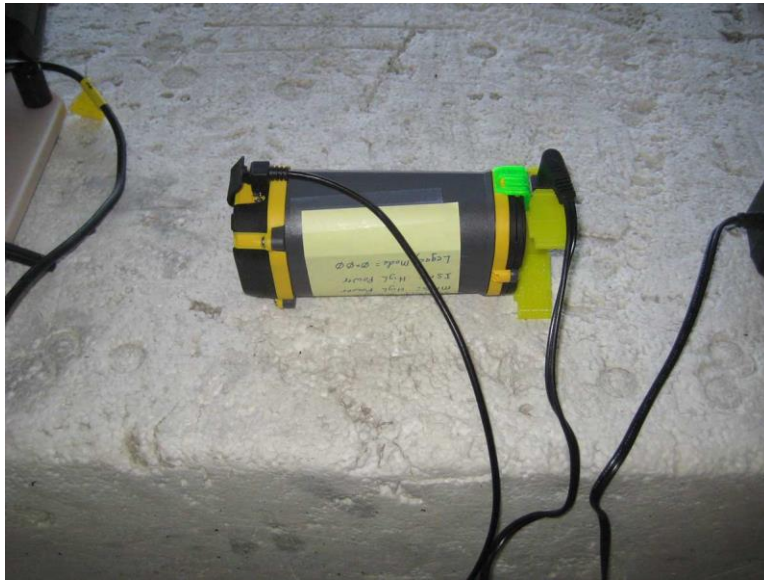
X Axis, IMRC-INT



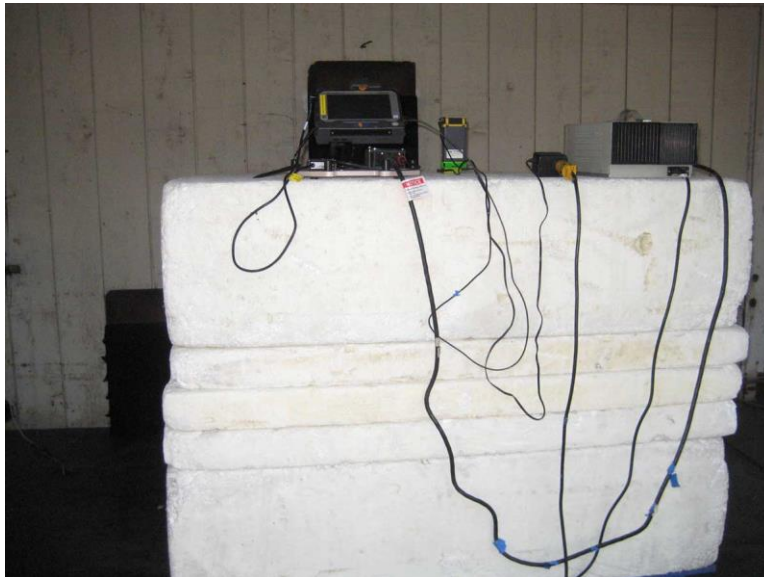
X Axis, IMRC-INT



Y Axis, IMRC-INT



Z Axis, IMRC-INT



Above 1GHz, IMRC-INT



X Axis, IMRC-EXT



X Axis, IMRC-EXT



Y Axis, IMRC-EXT



Z Axis, IMRC-EXT



Above 1GHz, IMRC-EXT



Above 1GHz, IMRC-EXT

2.1046 / 101.113 Transmitter Power Limitations

Test Conditions / Setup			
Test Location:	Brea Lab D	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.26 (2015), Section 5.2	Test Date(s):	6/11/2020
Configuration:	1 and 2		
Test Setup:	The EUT is placed on test bench. Input voltage is 13.8Vdc from external power supply. USB port is connected to a touchscreen tablet. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5 The EUT is set to continuously transmit. Power setting: 4W Operating frequency: 952 to 959.85MHz Frequency of measurement: 952 to 959.85MHz RBW=300kHz VBW=910kHz Note: There are two EUTs with the same transmitter. The difference between them is the optional receivers in one of them. The EUT used for this test is the one with optional receivers as it is the worst-case configuration.		

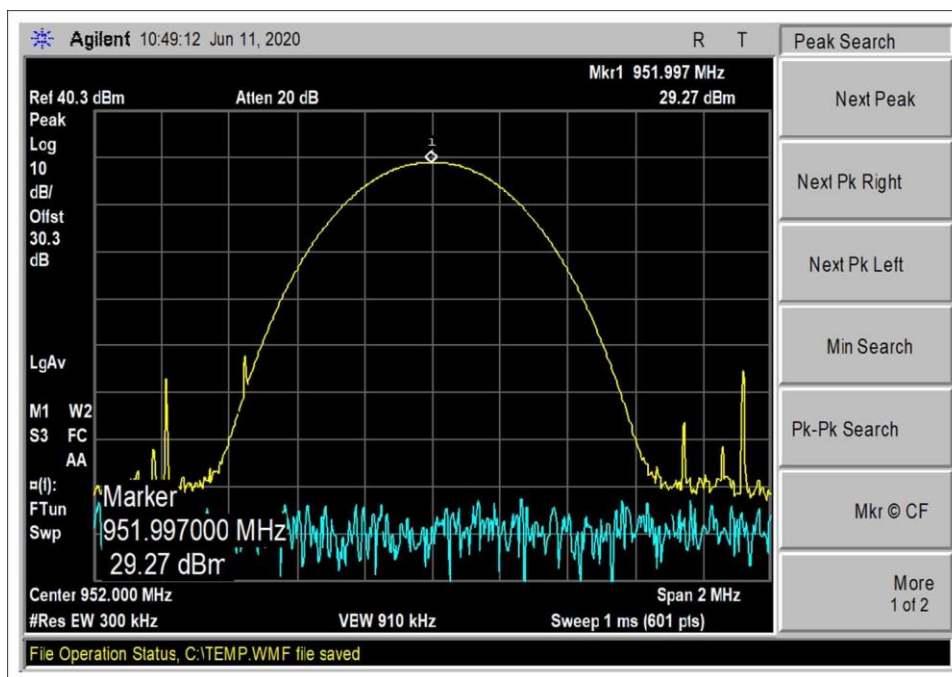
Environmental Conditions			
Temperature (°C)	24	Relative Humidity (%):	43

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02869	Spectrum Analyzer	Agilent	E4440A	7/25/2019	7/25/2020
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/22/2019	10/22/2021
P07243	Cable	H&S	32022-29094K-29094K-24TC	5/29/2020	5/29/2022

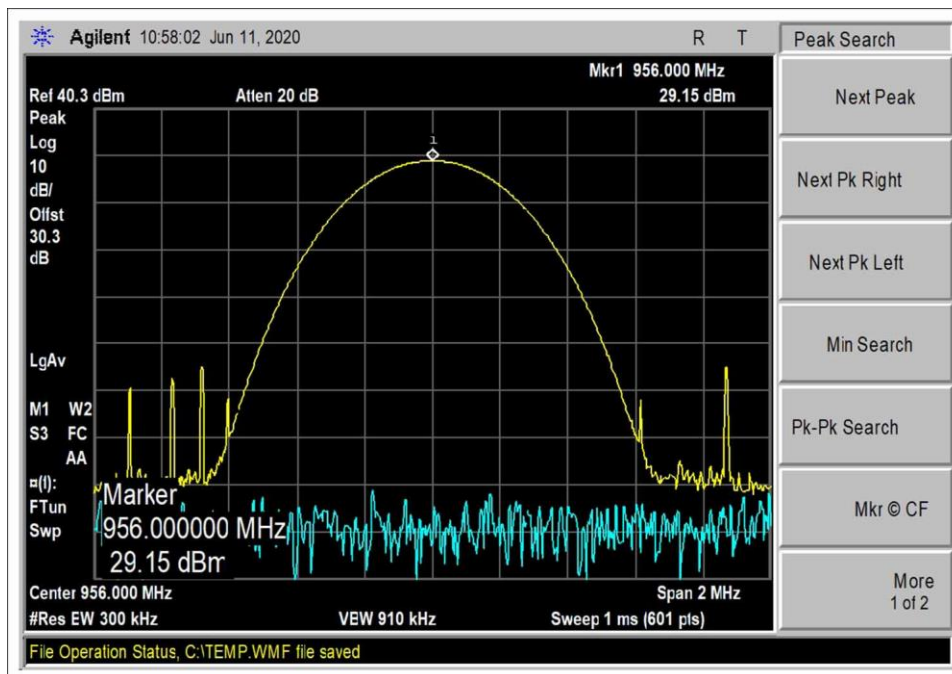
Test Data Summary - RF Conducted Measurement-							
Configuration 1 (internal antenna)							
Frequency (MHz)	Modulation	Max Ant. Gain (dBi)	Measured (dBm)	EIRP (dBm)	Limit (dBm)	Limit (dBW)	Results
952.0	24.76 Hz AM	2	29.27	31.27	≤44	≤14	Pass
956.0	24.76 Hz AM	2	29.15	31.15	≤44	≤14	Pass
959.85	24.76 Hz AM	2	29.09	31.09	≤44	≤14	Pass
952.0	57.78 Hz AM	2	29.22	31.22	≤44	≤14	Pass
956.0	57.78 Hz AM	2	29.15	31.15	≤44	≤14	Pass
959.85	57.78 Hz AM	2	29.10	31.10	≤44	≤14	Pass

Test Data Summary - RF Conducted Measurement-							
Configuration 2 (external antenna)							
Frequency (MHz)	Modulation	Max Ant. Gain (dBi)	Measured (dBm)	EIRP (dBm)	Limit (dBm)	Limit (dBW)	Results
952.0	24.76 Hz AM	5	24.40	29.40	≤44	≤14	Pass
956.0	24.76 Hz AM	5	22.25	27.25	≤44	≤14	Pass
959.85	24.76 Hz AM	5	19.86	24.86	≤44	≤14	Pass
952.0	57.78 Hz AM	5	24.40	29.40	≤44	≤14	Pass
956.0	57.78 Hz AM	5	22.23	27.23	≤44	≤14	Pass
959.85	57.78 Hz AM	5	19.85	24.85	≤44	≤14	Pass

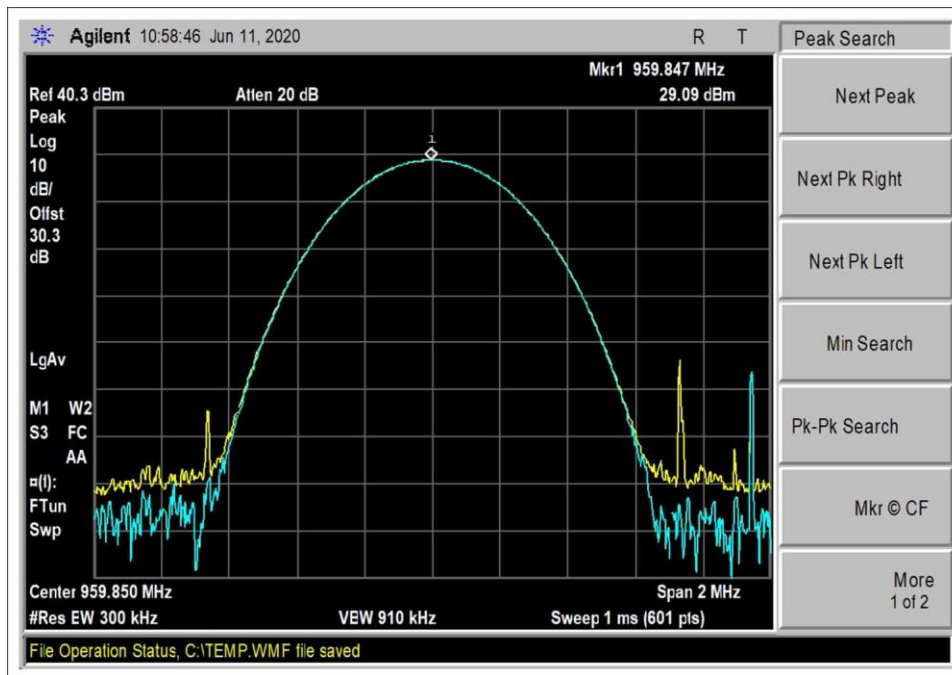
Plot(s)



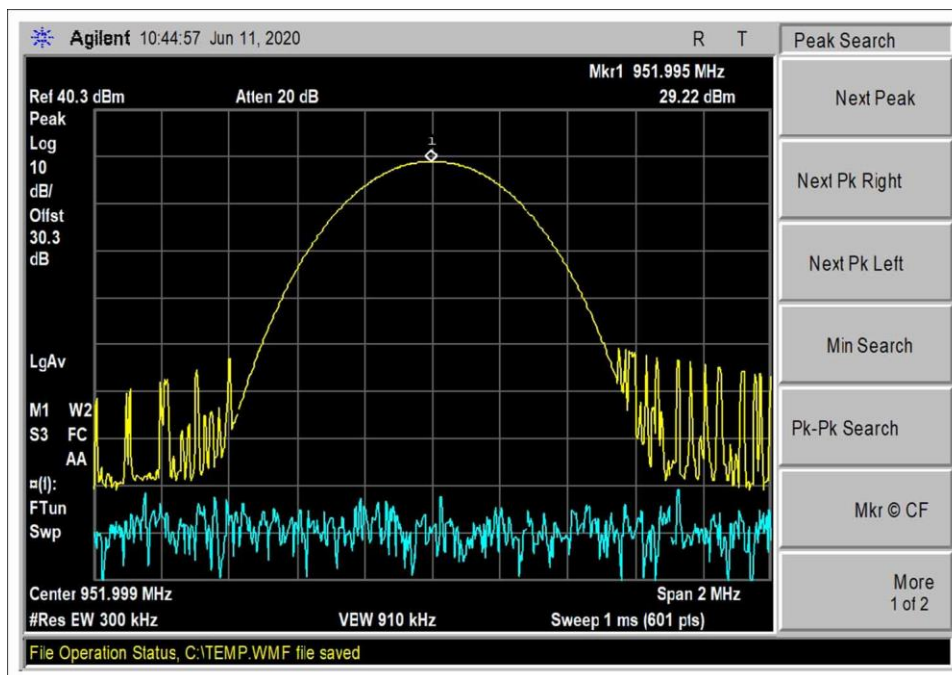
Configuration 1, Low Channel 24Hz



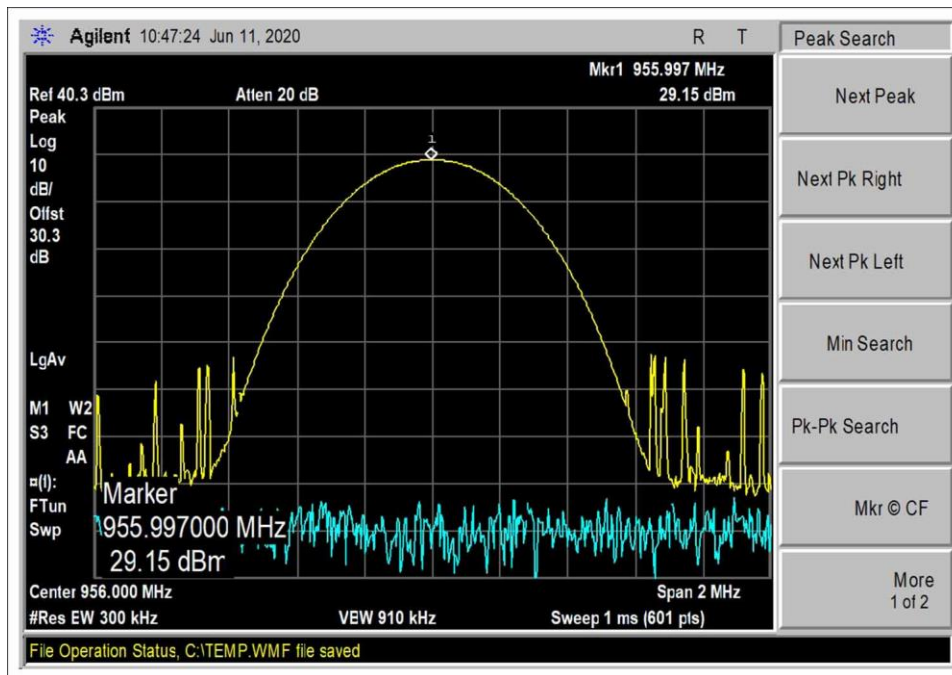
Configuration 1, Middle Channel 24Hz



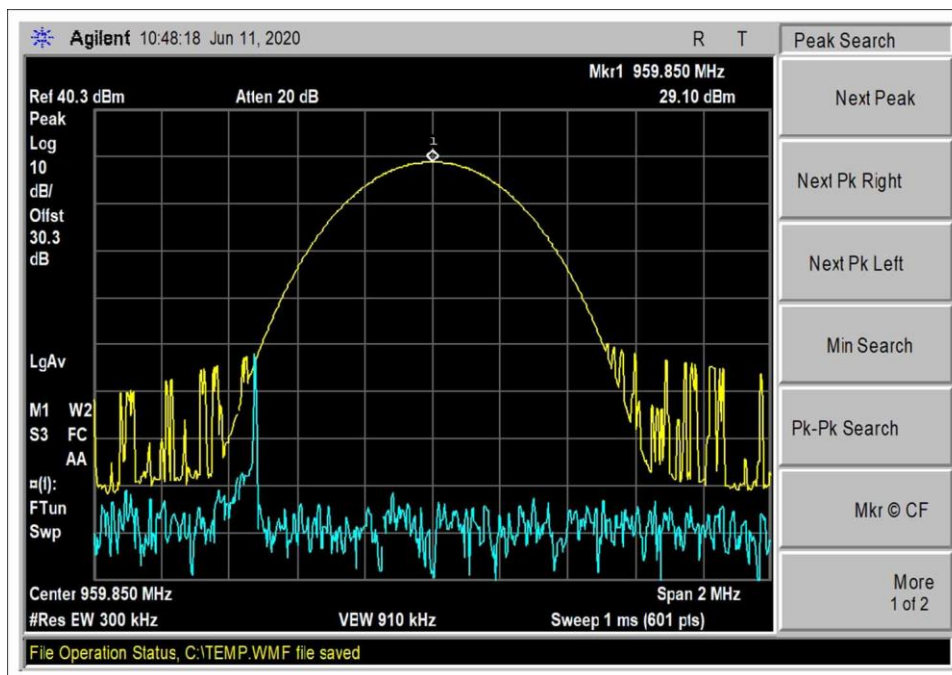
Configuration 1, High Channel 24Hz



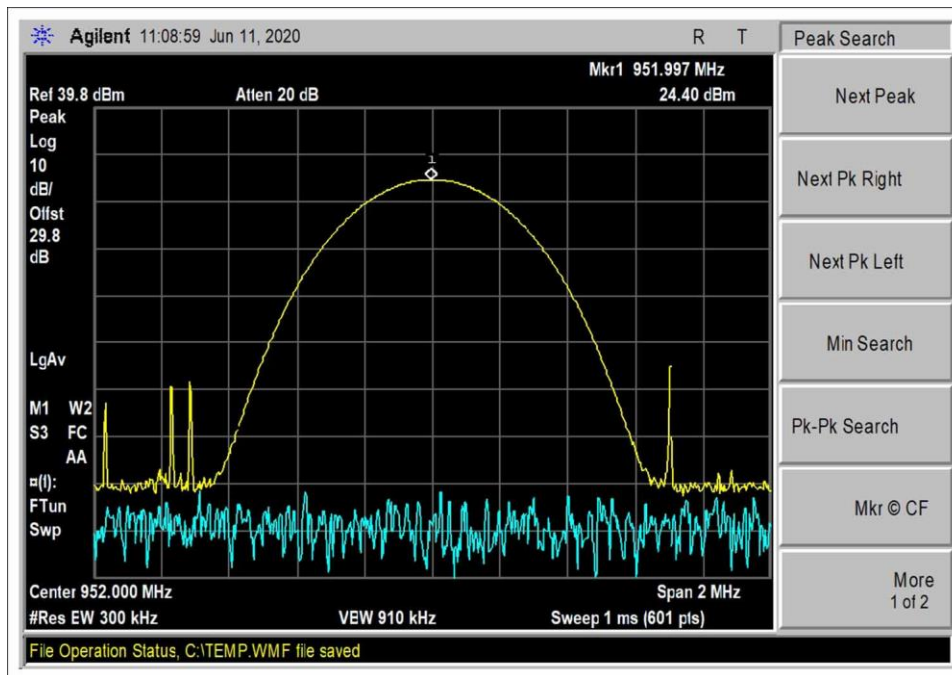
Configuration 1, Low Channel 57Hz



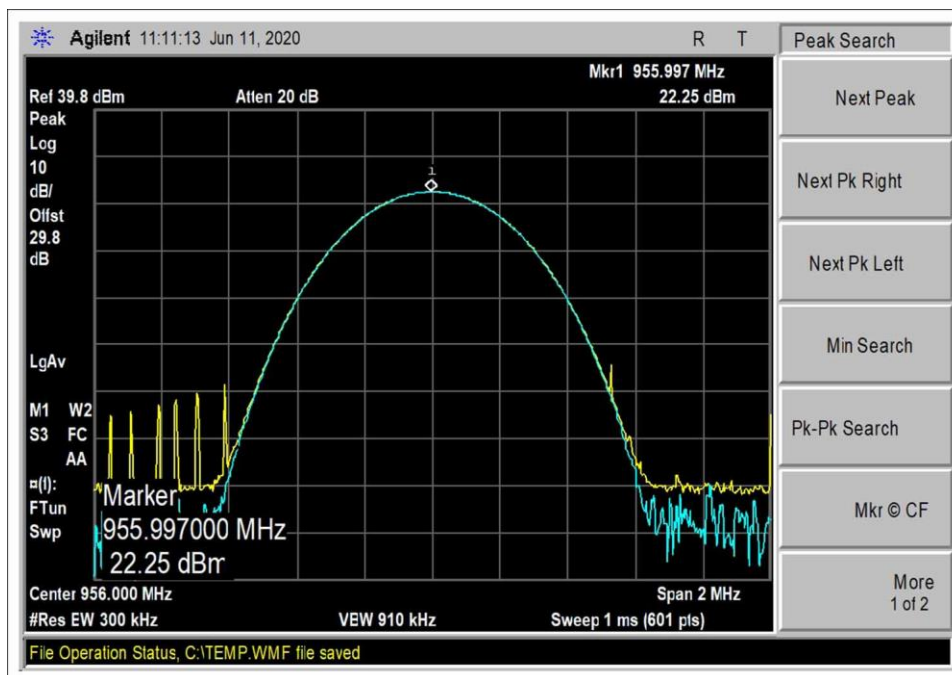
Configuration 1, Middle Channel 57Hz



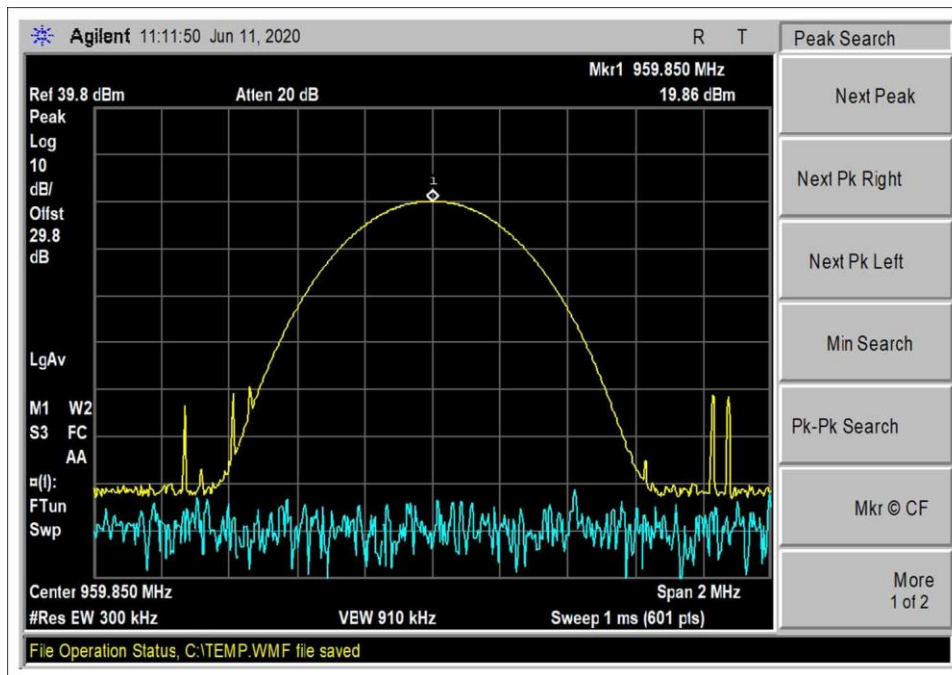
Configuration 1, High Channel 57Hz



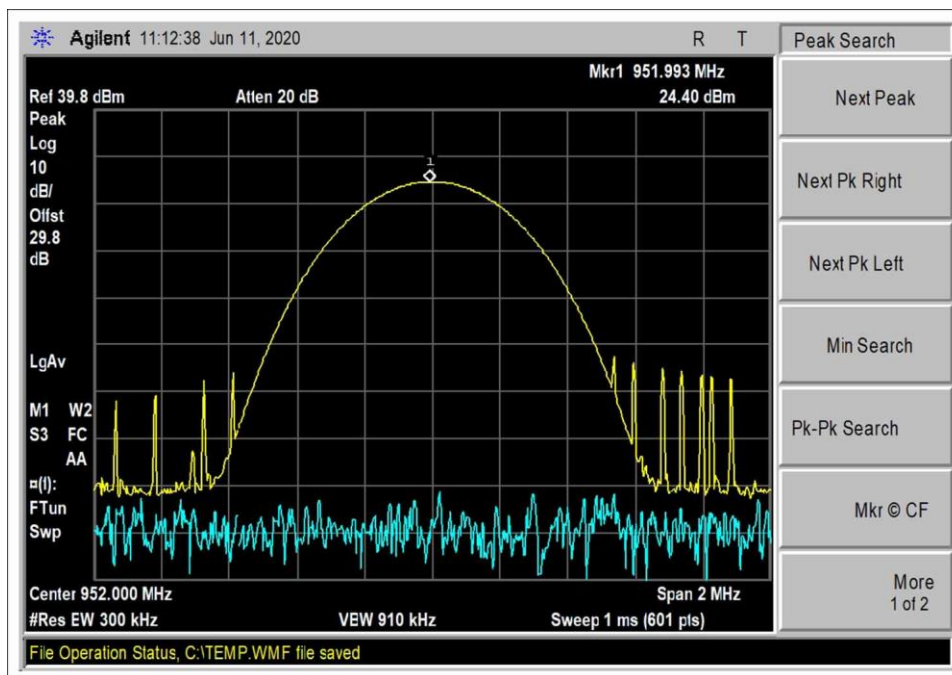
Configuration 2, Low Channel 24Hz



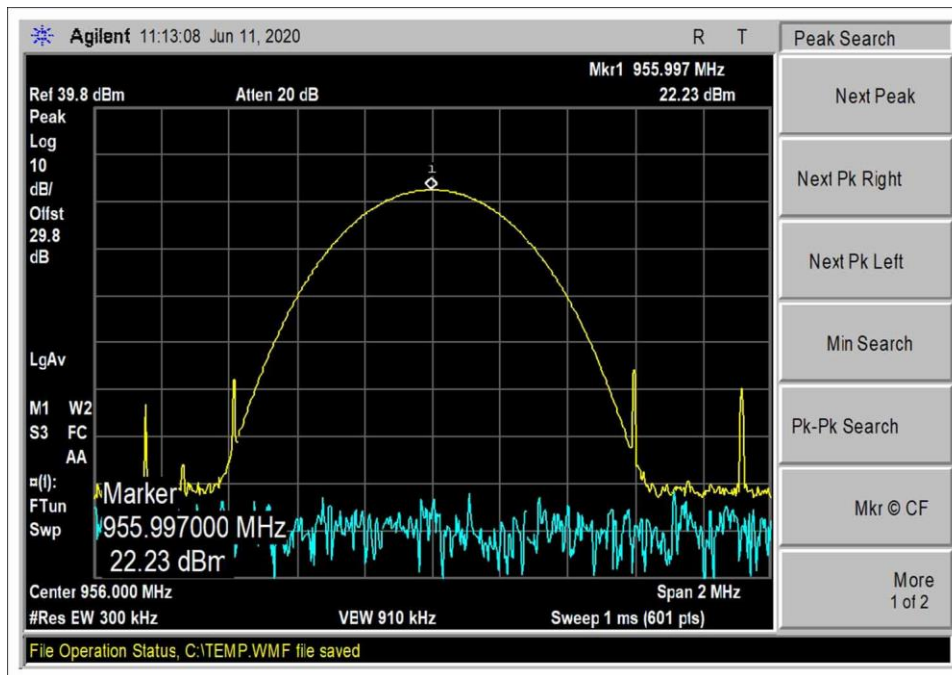
Configuration 2, Middle Channel 24Hz



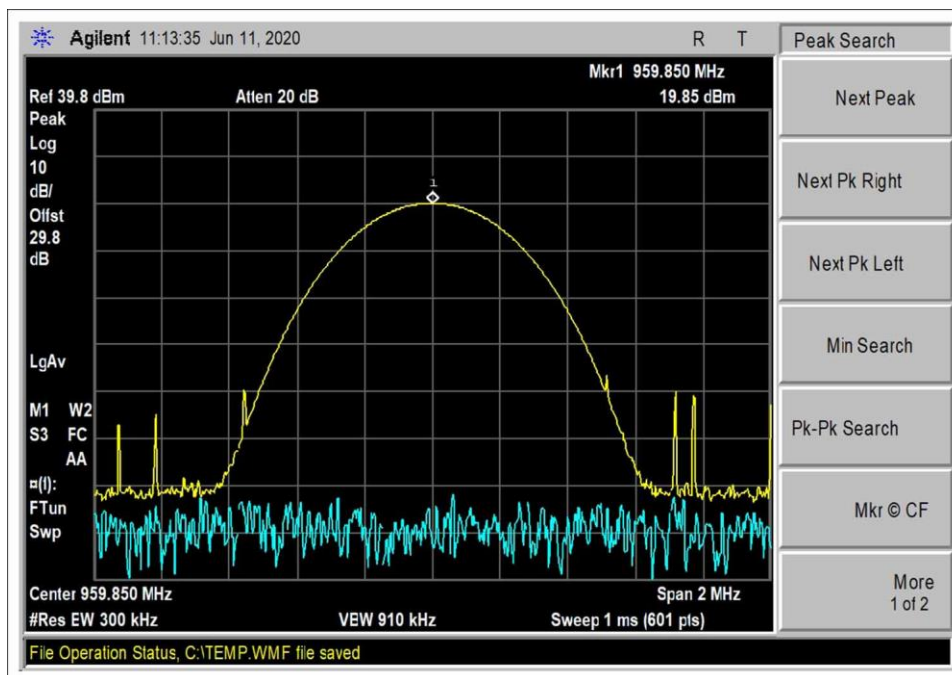
Configuration 2, High Channel 24Hz



Configuration 2, Low Channel 57Hz

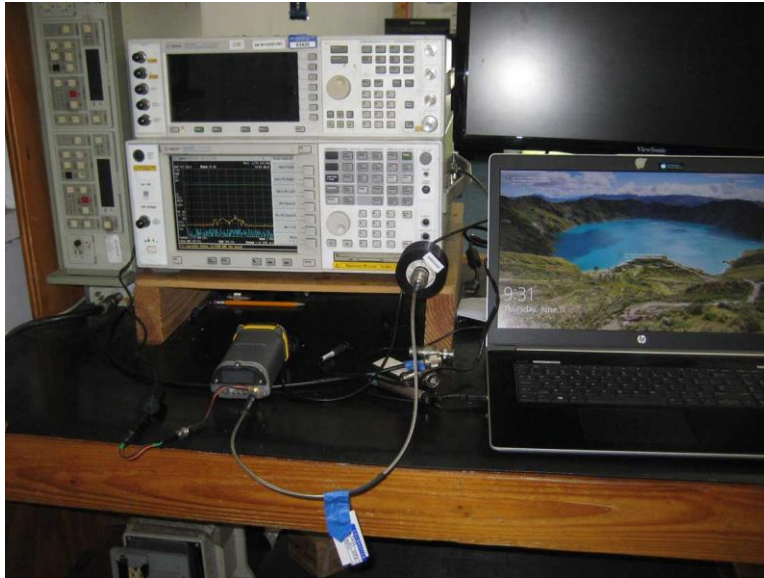


Configuration 2, Middle Channel 57Hz



Configuration 2, High Channel 57Hz

Test Setup Photo(s)



Configuration 1



Configuration 2