

Itron, Inc.

TEST REPORT FOR

MC3 & MC4Max

Model: MC3C*

*(See Appendix A for Manufacturer's Declaration)

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

**15.247
(FHSS 902-928MHz)**

Report No.: 107795-2

Date of issue: January 26, 2023



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:

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

Representative: Jack McPeck
Customer Reference Number: 269629

REPORT PREPARED BY:

Viviana Prado
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 107795

DATE OF EQUIPMENT RECEIPT:

December 2, 2022

DATE(S) OF TESTING:

December 2-12 and 16-23, 2022

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.

A handwritten signature in black ink that reads "Steve Behm".

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.
 Canyon Park
 22116 23rd Drive S.E., Suite A
 Bothell, WA 98021

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.20

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	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 15 Subpart C - 15.247 (FHSS 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)(i)	Occupied Bandwidth	NA	NP
15.247(a)(1)	Carrier Separation	NA	NP
15.247(a)(1)(i)	Number of Hopping Channels	NA	NP
15.247(a)(1)(i)	Average Time of Occupancy	NA	NP
15.247(b)(2)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	NP
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable

NA1 = Not applicable because the unit is battery powered from a vehicle only.

NP = CKC Laboratories was not contracted to perform test.

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

None

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 (Radiated Laptop)

Equipment Tested:

Device	Manufacturer	Model #	S/N
MC3 & MC4Max	Ittron, Inc.	MC3C	74008263

Support Equipment:

Device	Manufacturer	Model #	S/N
12VDC Power Supply	Lamda	LUS-10A-12	91K121691
5dBi Antenna	PCTEL	Generic	NA
Receiver Antenna	PCTEL	SUB-0275-001/H	S15180005
Laptop	Panasonic	CF-33	1GTSA65082

Configuration 2 (Radiated Tablet)

Equipment Tested:

Device	Manufacturer	Model #	S/N
MC3 & MC4Max	Ittron, Inc.	MC3C	74008263

Support Equipment:

Device	Manufacturer	Model #	S/N
12VDC Power Supply	Lamda	LUS-10A-12	91K121691
5dBi Antenna	PCTEL	Generic	NA
Receiver Antenna	PCTEL	SUB-0275-001/H	S15180005
Tablet	Panasonic	FZ-G1	990005071111034

Configuration 3 (Conducted Laptop)

Equipment Tested:

Device	Manufacturer	Model #	S/N
MC3 & MC4Max	Ittron, Inc.	MC3C	74008263

Support Equipment:

Device	Manufacturer	Model #	S/N
12VDC Power Supply	Lamda	LUS-10A-12	91K121691
Laptop	Panasonic	CF-33	1GTSA65082

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	FHSS
Operating Frequency Range:	908-924MHz
Number of Hopping Channels:	81
Receiver Bandwidth and Synchronization:	The manufacturer declares the receiver input bandwidth matches the transmit channel bandwidth and shifts frequencies in synchronization with the transmitter.
Modulation Type(s):	12.5kbps FM
Maximum Duty Cycle:	45mS
Number of TX Chains:	1
Antenna Type(s) and Gain:	External Omni / 5dbi
Beamforming Type:	NA
Antenna Connection Type:	External Connector
Nominal Input Voltage:	13.8VDC from car battery
Firmware / Software used for Test:	ARM version: 7.73.00.09 DSP version: 5.76.00.13 FPGA version: 3.02 TX version: 1.03 PSoC version: 3.01 MC3 Test 4.2.0.0 and 4.0.2.3
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

EUT Photo(s)



Support Equipment Photo(s)



Laptop



Tablet



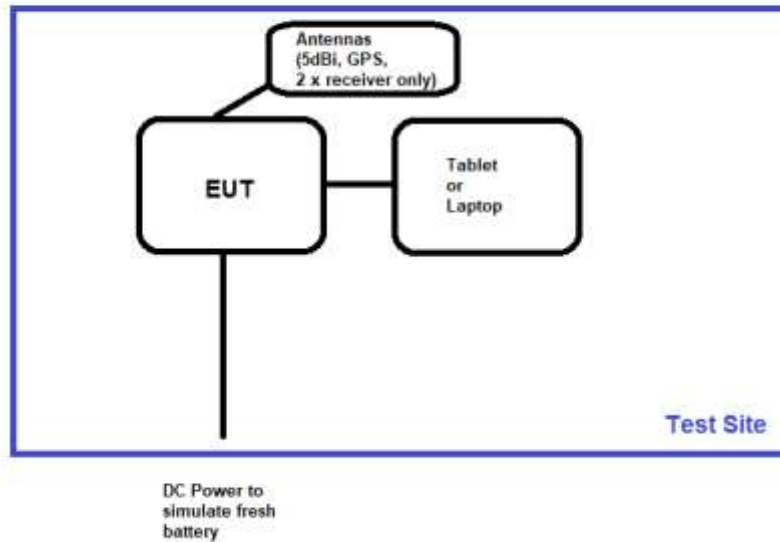
2xReceiver Antenna



5dBi and GPS Antenna

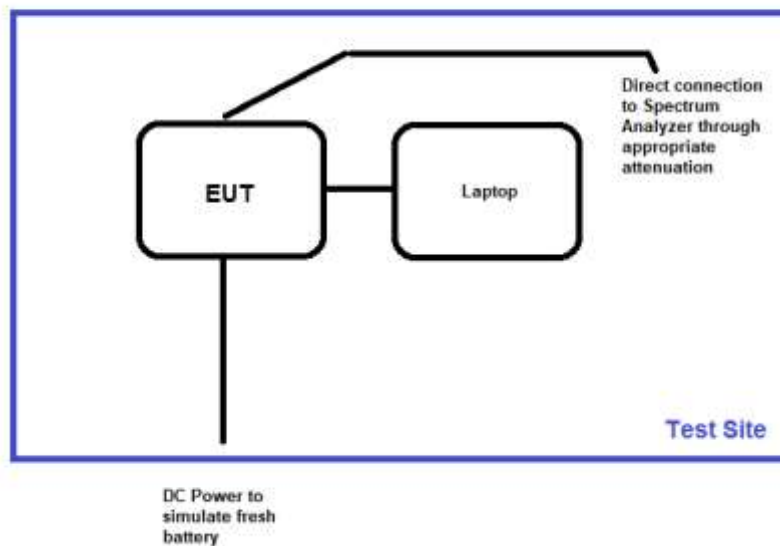
Block Diagram of Test Setup(s)

Test Setup Block Diagram



Radiated (Configuration 1 and 2)

Test Setup Block Diagram



RF Conducted (Configuration 3)

FCC Part 15 Subpart C

15.247(b)(2) Output Power

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	12/2/2022 – 12/12/2022
Configuration:	3		
Test Setup:	The EUT is placed on test bench. Powered from external power supply. USB port is connected to support computer. The EUT is continuously transmitting. The EUT is connected to a spectrum analyzer through appropriate cables and attenuation.		

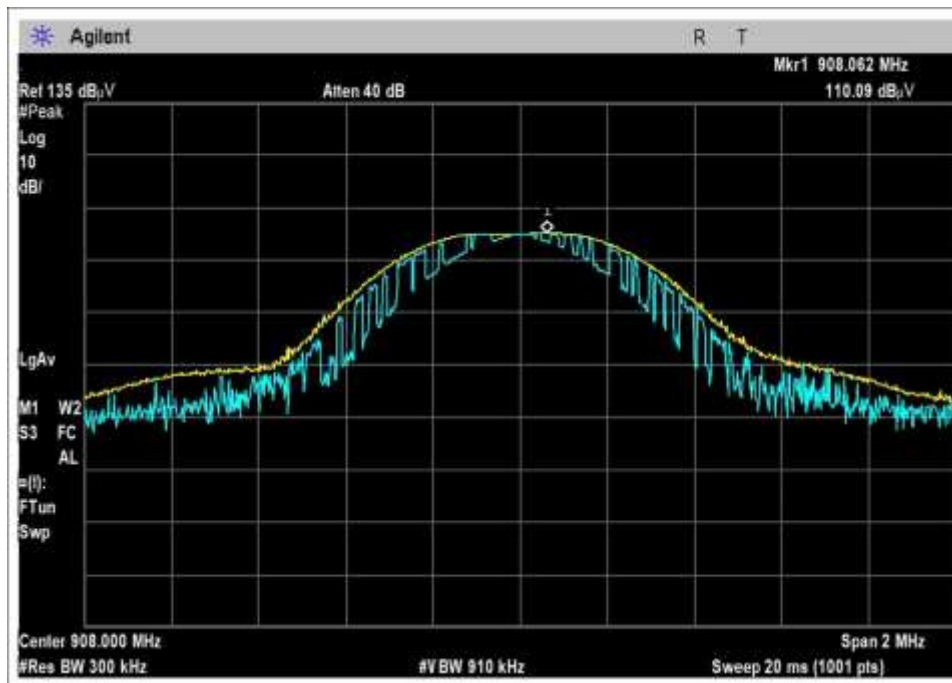
Environmental Conditions			
Temperature (°C)	20.5-22	Relative Humidity (%):	31-42

Test Data Summary - Voltage Variations

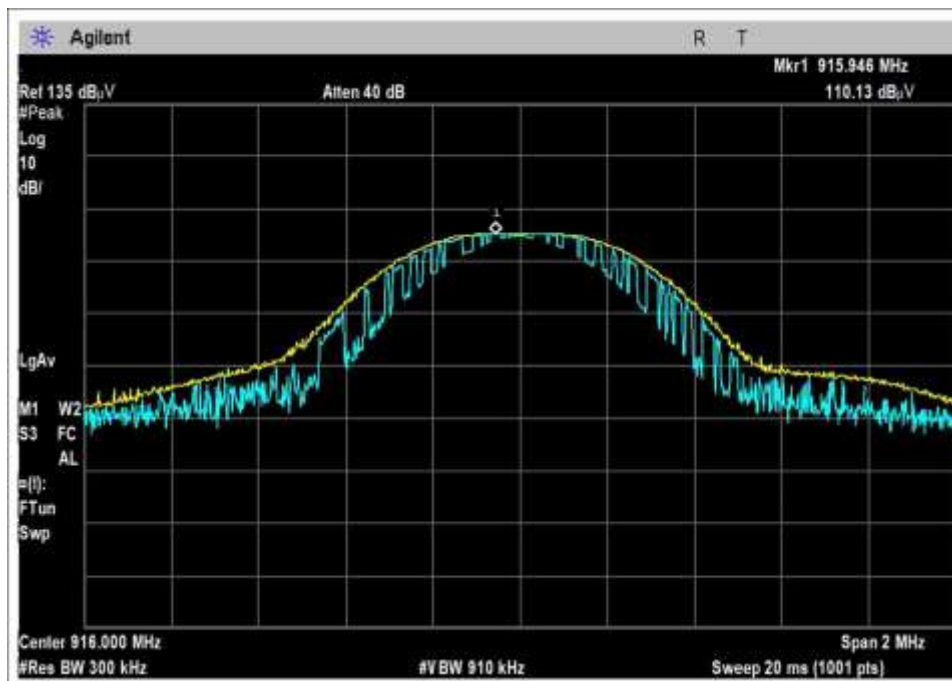
This equipment is battery powered. Power output tests were performed using an external power supply to simulate a fresh battery (13.8VDC).

Test Data Summary - RF Conducted Measurement					
$\text{Limit} = \begin{cases} 30\text{dBm Conducted}/36\text{dBm EIRP} & \geq 50 \text{ Channels} \\ 24\text{dBm Conducted}/30\text{dBm EIRP} & < 50 \text{ Channels (min 25)} \end{cases}$					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
908	12.5k FM	Omni, 5dBi	29.3	≤30	Pass
916	12.5k FM	Omni, 5dBi	29.4	≤30	Pass
924	12.5k FM	Omni, 5dBi	29.2	≤30	Pass

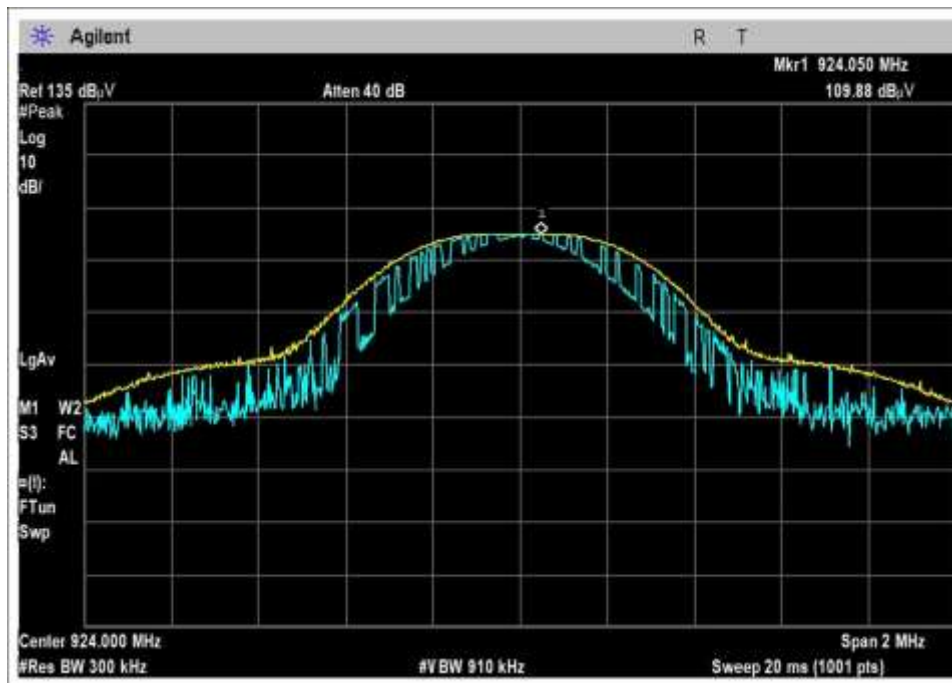
Plots



Low Channel



Middle Channel



High Channel

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717
 Customer: **Itron, Inc.**
 Specification: **15.247(b) Power Output (902-928 MHz FHSS >50 Channels)**
 Work Order #: **107795** Date: 12/12/2022
 Test Type: **Conducted Emissions** Time: 13:33:58
 Tested By: Michael Atkinson Sequence#: 1
 Software: EMITest 5.03.20 13.8VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 3			

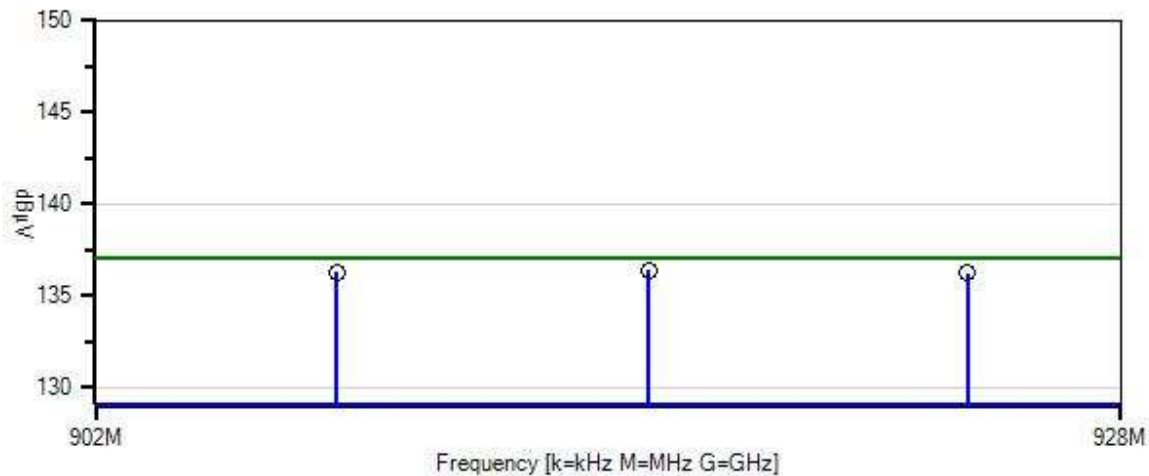
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 3			

Test Conditions / Notes:

Frequency: Fundamental
Test Setup: Conducted Measurement, LMH channels.

Itron, Inc. WO#: 107795 Sequence#: 1 Date: 12/12/2022
15.247(b) Power Output (902-928 MHz FHSS >50 Channels) Test Lead: 13.8VDC RF Port



— Sweep Data
— Readings
○ Peak Readings
× QP Readings
* Average Readings
▼ Ambient
Software Version: 5.03.20
— 1 - 15.247(b) Power Output (902-928 MHz FHSS >50 Channels)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07623	Attenuator	47-20-34	3/16/2022	3/16/2024
T2	ANP07746	Attenuator	PE7004-6	2/11/2021	2/11/2023
T3	ANP06452	Cable	Heliac	1/17/2022	1/17/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data:

Reading listed by margin.

Test Lead: RF Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	Dist dB	Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	915.946M	110.1	+19.7	+5.8	+0.8		+0.0	136.4	137.0	-0.6	RF Po
2	908.062M	110.1	+19.7	+5.8	+0.7		+0.0	136.3	137.0	-0.7	RF Po
3	924.054M	109.9	+19.7	+5.8	+0.8		+0.0	136.2	137.0	-0.8	RF Po

Test Setup Photo(s)



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **107795** Date: 12/21/2022
 Test Type: **Maximized Emissions** Time: 15:20:07
 Tested By: Michael Atkinson Sequence#: 41
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment Conditions:

Temperature: 20°C

Humidity: 37%

Pressure: 102.2kPa

Test Method: ANSI C63.10 (2013)

Frequency: 9kHz-10GHz

Test Setup: EUT is continuously transmitting with modulation. Horizontal and vertical measurement antenna polarities investigated above 30MHz, 3 x orthogonal axes investigated below 30MHz, worst-case reported. EUT XYZ axes investigated, worst-case reported. Also investigated with MAS boards removed, as well as receiver only boards removed, the fully loaded unit is representative of worst-case.

Power supply is remotely located outside of chamber with filter caps at chamber wall.

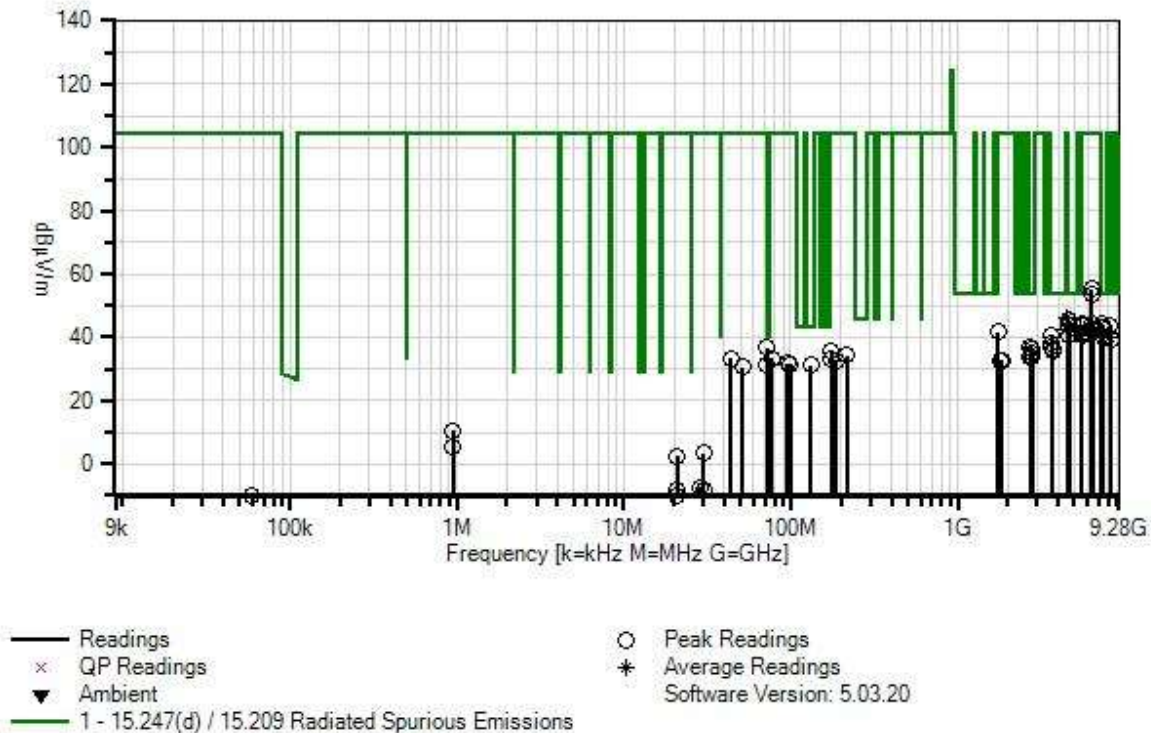
Investigated with antenna at 1.5m height, as well as moving the entire setup so the EUT is at 1.5m height, worst-case reported.

MC4Max with Laptop

Duty correction factor is applied to harmonics of the fundamental above 1GHz.

Correction factor = $20\log(44.67\text{ms}/100\text{ms}) = -7.0\text{dB}$

Itron, Inc. WO#: 107795 Sequence#: 41 Date: 12/21/2022
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T2	ANP06540	Cable	Heliac	1/17/2022	1/17/2024
T3	ANP05305	Cable	ETSI-50T	9/15/2021	9/15/2023
T4	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T5	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T6	AN00052	Loop Antenna	6502	5/11/2022	5/11/2024
T7	AN03170	High Pass Filter	HM1155-11SS	9/16/2021	9/16/2023
T8	AN03540	Preamplifier	83017A	5/14/2021	5/14/2023
T9	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T10	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T11	AN45% DCCF	Test Data Adjustment		12/15/2022	12/15/2024

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	4539.835M	49.6	+0.0 +0.0 +0.3	+0.6 +0.0 +32.1	+3.5 +0.6 -6.9	+0.0 -33.6	+0.0	46.2	54.0 908	-7.8	Vert
^	4539.830M	53.5	+0.0 +0.0 +0.3	+0.6 +0.0 +32.1	+3.5 +0.6 -6.9	+0.0 -33.6	+0.0	50.1	54.0 908	-3.9	Vert
3	4580.170M	49.0	+0.0 +0.0 +0.4	+0.6 +0.0 +32.2	+3.5 +0.5 -6.9	+0.0 -33.6	+0.0	45.7	54.0 916	-8.3	Horiz
4	4579.860M	47.9	+0.0 +0.0 +0.4	+0.6 +0.0 +32.2	+3.5 +0.5 -6.9	+0.0 -33.6	+0.0	44.6	54.0 916	-9.4	Vert
^	4579.860M	51.9	+0.0 +0.0 +0.4	+0.6 +0.0 +32.2	+3.5 +0.5 -6.9	+0.0 -33.6	+0.0	48.6	54.0 916	-5.4	Vert
6	7328.260M	41.4	+0.0 +0.0 +0.7	+1.3 +0.0 +37.5	+4.5 +0.6 -6.9	+0.0 -34.9	+0.0	44.2	54.0 916	-9.8	Vert
7	8171.560M	39.5	+0.0 +0.0 +0.7	+1.2 +0.0 +38.6	+5.1 +0.7 -6.9	+0.0 -35.0	+0.0	43.9	54.0 908	-10.1	Vert
8	4620.020M	47.0	+0.0 +0.0 +0.4	+0.6 +0.0 +32.4	+3.5 +0.4 -6.9	+0.0 -33.6	+0.0	43.8	54.0 924	-10.2	Horiz
9	7263.900M	41.2	+0.0 +0.0 +0.7	+1.2 +0.0 +37.2	+4.5 +0.3 -6.9	+0.0 -34.9	+0.0	43.3	54.0 908	-10.7	Vert
10	5448.165M	43.3	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	43.2	54.0 908	-10.8	Horiz
^	5448.165M	49.2	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	49.1	54.0 908	-4.9	Horiz
12	7327.840M	40.2	+0.0 +0.0 +0.7	+1.3 +0.0 +37.5	+4.5 +0.6 -6.9	+0.0 -34.9	+0.0	43.0	54.0 916	-11.0	Horiz
13	4540.000M	45.7	+0.0 +0.0 +0.3	+0.6 +0.0 +32.1	+3.5 +0.6 -6.9	+0.0 -33.6	+0.0	42.3	54.0 908	-11.7	Horiz
^	4540.040M	49.5	+0.0 +0.0 +0.3	+0.6 +0.0 +32.1	+3.5 +0.6 -6.9	+0.0 -33.6	+0.0	46.1	54.0 908	-7.9	Horiz
15	130.900M	16.3	+0.0 +13.5 +0.0	+0.1 +0.0 +0.0	+0.5 +0.0 +0.0	+0.7 +0.0	+0.0	31.1	43.5	-12.4	Horiz

16	3663.960M	45.2	+0.0 +0.0 +0.4	+0.6 +0.0 +31.7	+3.3 +0.2 -6.9	+0.0 -33.8	+0.0	40.7	54.0 916	-13.3	Horiz
17	3663.790M	45.2	+0.0 +0.0 +0.4	+0.6 +0.0 +31.7	+3.3 +0.2 -6.9	+0.0 -33.8	+0.0	40.7	54.0 916	-13.3	Vert
18	4620.220M	43.9	+0.0 +0.0 +0.4	+0.6 +0.0 +32.4	+3.5 +0.4 -6.9	+0.0 -33.6	+0.0	40.7	54.0 924	-13.3	Vert
19	5448.545M Ave	40.7	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	40.6	54.0 908	-13.4	Vert
^	5448.540M	49.5	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	49.4	54.0 908	-4.6	Vert
21	7391.900M	37.2	+0.0 +0.0 +0.7	+1.3 +0.0 +37.4	+4.5 +0.7 -6.9	+0.0 -34.9	+0.0	40.0	54.0 924	-14.0	Vert
22	8172.265M Ave	35.5	+0.0 +0.0 +0.7	+1.2 +0.0 +38.6	+5.1 +0.7 -6.9	+0.0 -35.0	+0.0	39.9	54.0 908	-14.1	Horiz
^	8172.265M	42.8	+0.0 +0.0 +0.7	+1.2 +0.0 +38.6	+5.1 +0.7 -6.9	+0.0 -35.0	+0.0	47.2	54.0 908	-6.8	Horiz
24	8315.590M	34.4	+0.0 +0.0 +0.7	+1.2 +0.0 +38.7	+5.2 +0.9 -6.9	+0.0 -34.9	+0.0	39.3	54.0 924	-14.7	Horiz
25	3632.033M	42.3	+0.0 +0.0 +0.4	+0.6 +0.0 +31.7	+3.3 +0.3 -6.9	+0.0 -33.8	+0.0	37.9	54.0 908	-16.1	Horiz
26	2724.150M	44.7	+0.0 +0.0 +0.5	+0.5 +0.0 +29.4	+2.7 +0.2 -6.9	+0.0 -34.1	+0.0	37.0	54.0 908	-17.0	Vert
27	3631.910M	41.3	+0.0 +0.0 +0.4	+0.6 +0.0 +31.7	+3.3 +0.3 -6.9	+0.0 -33.8	+0.0	36.9	54.0 908	-17.1	Vert
28	2748.120M	44.3	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	36.6	54.0 916	-17.4	Vert
29	3696.130M	40.8	+0.0 +0.0 +0.3	+0.6 +0.0 +31.9	+3.3 +0.2 -6.9	+0.0 -33.8	+0.0	36.4	54.0 924	-17.6	Vert
30	3696.020M	40.1	+0.0 +0.0 +0.3	+0.6 +0.0 +31.9	+3.3 +0.2 -6.9	+0.0 -33.8	+0.0	35.7	54.0 924	-18.3	Horiz
31	2748.000M	43.0	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	35.3	54.0 916	-18.7	Vert
32	2772.000M	42.8	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	35.1	54.0 924	-18.9	Horiz

33	2747.680M	41.6	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	33.9	54.0 916	-20.1	Horiz
34	2772.020M	41.5	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	33.8	54.0 924	-20.2	Vert
35	2724.333M	41.4	+0.0 +0.0 +0.5	+0.5 +0.0 +29.4	+2.7 +0.2 -6.9	+0.0 -34.1	+0.0	33.7	54.0 908	-20.3	Horiz
36	6356.490M	54.9	+0.0 +0.0 +0.6	+0.9 +0.0 +35.1	+4.4 +0.4 -6.9	+0.0 -34.0	+0.0	55.4	104.5 908	-49.1	Horiz
37	6356.590M	53.2	+0.0 +0.0 +0.6	+0.9 +0.0 +35.1	+4.4 +0.4 -6.9	+0.0 -34.0	+0.0	53.7	104.5 908	-50.8	Vert
38	6411.510M	43.9	+0.0 +0.0 +0.6	+0.9 +0.0 +35.0	+4.5 +0.5 -6.9	+0.0 -34.0	+0.0	44.5	104.5 916	-60.0	Vert
39	5544.400M	44.2	+0.0 +0.0 +0.5	+0.8 +0.0 +34.6	+4.0 +0.5 -6.9	+0.0 -33.6	+0.0	44.1	104.5 924	-60.4	Horiz
40	5544.110M	43.9	+0.0 +0.0 +0.5	+0.8 +0.0 +34.6	+4.0 +0.5 -6.9	+0.0 -33.6	+0.0	43.8	104.5 924	-60.7	Vert
41	6412.500M	42.0	+0.0 +0.0 +0.6	+0.9 +0.0 +35.0	+4.5 +0.5 -6.9	+0.0 -34.0	+0.0	42.6	104.5 916	-61.9	Horiz
42	6468.250M	41.7	+0.0 +0.0 +0.7	+0.9 +0.0 +34.9	+4.5 +0.6 -6.9	+0.0 -34.0	+0.0	42.4	104.5 924	-62.1	Vert
43	6467.490M	41.0	+0.0 +0.0 +0.7	+0.9 +0.0 +34.9	+4.5 +0.6 -6.9	+0.0 -34.0	+0.0	41.7	104.5 924	-62.8	Horiz
44	1744.000M	46.8	+0.0 +0.0 +0.3	+0.4 +0.0 +26.2	+2.1 +0.6 +0.0	+0.0 -34.8	+0.0	41.6	104.5	-62.9	Vert
45	5495.670M	41.5	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	41.4	104.5 916	-63.1	Vert
46	5496.340M	40.7	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	40.6	104.5 916	-63.9	Horiz
47	71.700M	23.0	+0.0 +12.9 +0.0	+0.1 +0.0 +0.0	+0.4 +0.0 +0.0	+0.5 +0.0	+0.0	36.9	104.5	-67.6	Vert
48	173.600M	18.6	+0.0 +15.6 +0.0	+0.1 +0.0 +0.0	+0.6 +0.0 +0.0	+0.9 +0.0	+0.0	35.8	104.5	-68.7	Vert
49	216.200M	16.0	+0.0 +16.5 +0.0	+0.1 +0.0 +0.0	+0.7 +0.0 +0.0	+1.0 +0.0	+0.0	34.3	104.5	-70.2	Horiz

50	43.600M	18.2	+0.0 +14.3 +0.0	+0.1 +0.0 +0.0	+0.3 +0.0 +0.0	+0.5 +0.0 +0.0	+0.0	33.4	104.5	-71.1	Vert
51	76.600M	19.6	+0.0 +12.7 +0.0	+0.1 +0.0 +0.0	+0.4 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0	33.4	104.5	-71.1	Vert
52	173.600M	16.0	+0.0 +15.6 +0.0	+0.1 +0.0 +0.0	+0.6 +0.0 +0.0	+0.9 +0.0 +0.0	+0.0	33.2	104.5	-71.3	Horiz
53	1831.940M	43.5	+0.0 +0.0 +0.3	+0.4 +0.0 +27.5	+2.1 +0.6 -6.9	+0.0 -34.7 +0.0	+0.0	32.8	104.5 916	-71.7	Vert
54	1816.070M	43.5	+0.0 +0.0 +0.3	+0.4 +0.0 +27.4	+2.1 +0.6 -6.9	+0.0 -34.7 +0.0	+0.0	32.7	104.5 908	-71.8	Vert
55	188.100M	15.5	+0.0 +15.4 +0.0	+0.1 +0.0 +0.0	+0.7 +0.0 +0.0	+0.9 +0.0 +0.0	+0.0	32.6	104.5	-71.9	Vert
56	1848.040M	42.9	+0.0 +0.0 +0.3	+0.4 +0.0 +27.6	+2.1 +0.6 -6.9	+0.0 -34.7 +0.0	+0.0	32.3	104.5 924	-72.2	Vert
57	96.000M	17.3	+0.0 +13.3 +0.0	+0.1 +0.0 +0.0	+0.5 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0	31.8	104.5	-72.7	Vert
58	98.900M	16.6	+0.0 +13.7 +0.0	+0.1 +0.0 +0.0	+0.5 +0.0 +0.0	+0.6 +0.0 +0.0	+0.0	31.5	104.5	-73.0	Horiz
59	71.700M	17.2	+0.0 +12.9 +0.0	+0.1 +0.0 +0.0	+0.4 +0.0 +0.0	+0.5 +0.0 +0.0	+0.0	31.1	104.5	-73.4	Horiz
60	51.300M	17.5	+0.0 +12.3 +0.0	+0.1 +0.0 +0.0	+0.3 +0.0 +0.0	+0.5 +0.0 +0.0	+0.0	30.7	104.5	-73.8	Vert
61	949.200k	40.8	+0.0 +0.0 +0.0	+0.1 +9.5 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	10.5	104.5	-94.0	Perp
62	950.100k	36.0	+0.0 +0.0 +0.0	+0.1 +9.5 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	5.7	104.5	-98.8	Para
63	29.855M	39.4	+0.0 +0.0 +0.0	+0.1 +3.7 +0.0	+0.3 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	3.5	104.5	-101.0	Groun
64	20.894M	36.0	+0.0 +0.0 +0.0	+0.1 +6.2 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	2.5	104.5	-102.0	Groun
65	28.347M	28.1	+0.0 +0.0 +0.0	+0.1 +4.3 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	-7.3	104.5	-111.8	Para
66	29.855M	27.8	+0.0 +0.0 +0.0	+0.1 +3.7 +0.0	+0.3 +0.0 +0.0	+0.0 +0.0 +0.0	-40.0	-8.1	104.5	-112.6	Perp

67	20.894M	25.1	+0.0	+0.1	+0.2	+0.0	-40.0	-8.4	104.5	-112.9	Para
			+0.0	+6.2	+0.0	+0.0					
			+0.0	+0.0	+0.0						
68	58.428k	60.6	+0.0	+0.1	+0.0	+0.0	-80.0	-9.7	104.5	-114.2	Para
			+0.0	+9.6	+0.0	+0.0					
			+0.0	+0.0	+0.0						
69	20.894M	23.7	+0.0	+0.1	+0.2	+0.0	-40.0	-9.8	104.5	-114.3	Perp
			+0.0	+6.2	+0.0	+0.0					
			+0.0	+0.0	+0.0						



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **107795** Date: 12/21/2022
 Test Type: **Maximized Emissions** Time: 16:15:33
 Tested By: Michael Atkinson Sequence#: 42
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

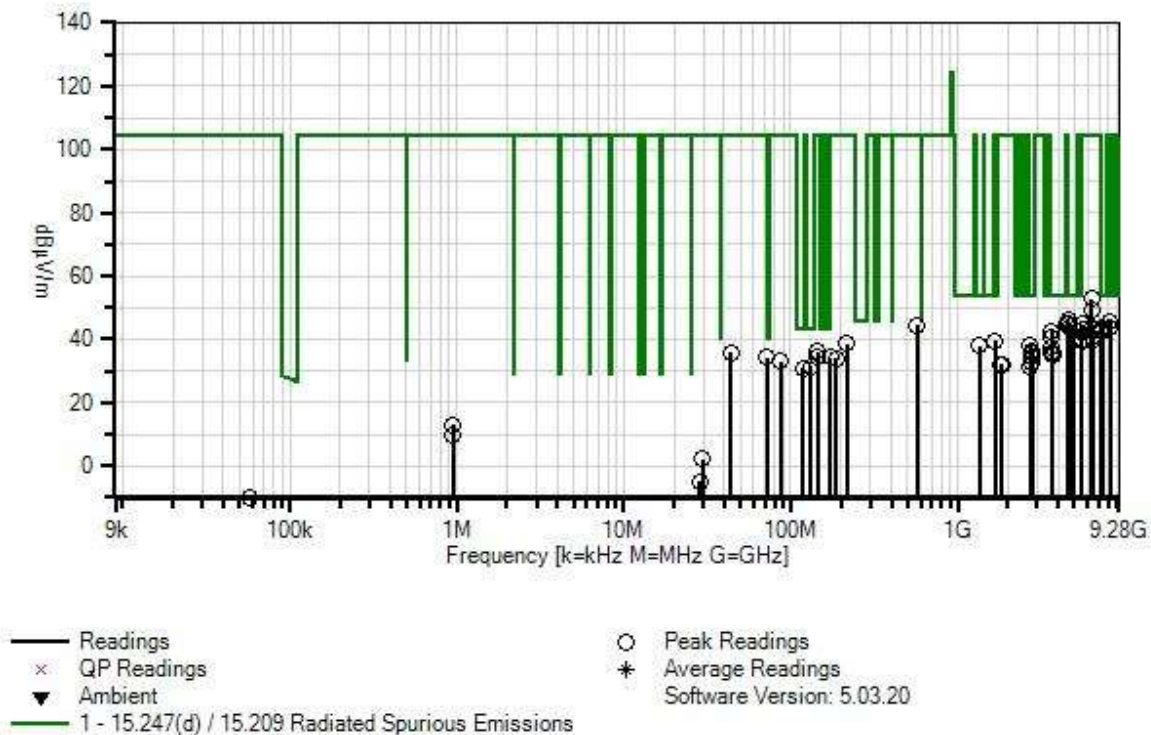
Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

<p>Test Environment Conditions:</p> <p>Temperature: 20°C</p> <p>Humidity: 37%</p> <p>Pressure: 102.2kPa</p> <p>Test Method: ANSI C63.10 (2013)</p> <p>Frequency: 9kHz-10GHz</p> <p>Test Setup: EUT is continuously transmitting with modulation. Horizontal and vertical measurement antenna polarities investigated above 30MHz, 3 x orthogonal axes investigated below 30MHz, worst-case reported. EUT XYZ axes investigated, worst-case reported. Also investigated with MAS boards removed, as well as receiver only boards removed, the fully loaded unit is representative of worst-case.</p> <p>Power supply is remotely located outside of chamber with filter caps at chamber wall.</p> <p>Investigated with antenna at 1.5m height, as well as moving the entire setup so the EUT is at 1.5m height, worst-case reported.</p> <p>MC4Max with Tablet</p> <p>Duty correction factor is applied to harmonics of the fundamental above 1GHz</p> <p>Correction factor = $20\log(44.67\text{ms}/100\text{ms}) = -7.0\text{dB}$</p>
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Itron, Inc. WO#: 107795 Sequence#: 42 Date: 12/21/2022
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T2	ANP06540	Cable	Heliac	1/17/2022	1/17/2024
T3	ANP05305	Cable	ETSI-50T	9/15/2021	9/15/2023
T4	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T5	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T6	AN00052	Loop Antenna	6502	5/11/2022	5/11/2024
T7	AN03170	High Pass Filter	HM1155-11SS	9/16/2021	9/16/2023
T8	AN03540	Preamplifier	83017A	5/14/2021	5/14/2023
T9	ANP07504	Cable	CLU40-KMKM-02.00F	1/26/2021	1/26/2023
T10	AN02374ANSI	Horn Antenna	RGA-60	5/25/2021	5/25/2023
T11	AN45% DCCF	Test Data Adjustment		12/15/2022	12/15/2024

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7 T11	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	4580.160M	49.7	+0.0 +0.0 +0.4	+0.6 +0.0 +32.2	+3.5 +0.5 -6.9	+0.0 -33.6	+0.0	46.4	54.0 916	-7.6	Horiz
2	8172.360M	41.3	+0.0 +0.0 +0.7	+1.2 +0.0 +38.6	+5.1 +0.7 -6.9	+0.0 -35.0	+0.0	45.7	54.0 908	-8.3	Horiz
3	4540.060M	48.6	+0.0 +0.0 +0.3	+0.6 +0.0 +32.1	+3.5 +0.6 -6.9	+0.0 -33.6	+0.0	45.2	54.0 908	-8.8	Horiz
4	4620.310M	48.1	+0.0 +0.0 +0.4	+0.6 +0.0 +32.4	+3.5 +0.4 -6.9	+0.0 -33.6	+0.0	44.9	54.0 924	-9.1	Horiz
5	172.600M	17.0	+0.0 +15.6 +0.0	+0.1 +0.0 +0.0	+0.6 +0.0 +0.0	+0.9 +0.0	+0.0	34.2	43.5	-9.3	Horiz
6	4620.140M Ave	47.2	+0.0 +0.0 +0.4	+0.6 +0.0 +32.4	+3.5 +0.4 -6.9	+0.0 -33.6	+0.0	44.0	54.0 924	-10.0	Vert
^	4620.140M	51.2	+0.0 +0.0 +0.4	+0.6 +0.0 +32.4	+3.5 +0.4 -6.9	+0.0 -33.6	+0.0	48.0	54.0 924	-6.0	Vert
8	7264.250M	41.8	+0.0 +0.0 +0.7	+1.2 +0.0 +37.2	+4.5 +0.3 -6.9	+0.0 -34.9	+0.0	43.9	54.0 908	-10.1	Horiz
9	4539.650M Ave	46.9	+0.0 +0.0 +0.3	+0.6 +0.0 +32.1	+3.5 +0.6 -6.9	+0.0 -33.6	+0.0	43.5	54.0 908	-10.5	Vert
^	4539.650M	51.9	+0.0 +0.0 +0.3	+0.6 +0.0 +32.1	+3.5 +0.6 -6.9	+0.0 -33.6	+0.0	48.5	54.0 908	-5.5	Vert
11	8172.270M	39.0	+0.0 +0.0 +0.7	+1.2 +0.0 +38.6	+5.1 +0.7 -6.9	+0.0 -35.0	+0.0	43.4	54.0 908	-10.6	Vert
12	7327.610M	40.4	+0.0 +0.0 +0.7	+1.3 +0.0 +37.5	+4.5 +0.6 -6.9	+0.0 -34.9	+0.0	43.2	54.0 916	-10.8	Vert
13	4579.700M Ave	46.2	+0.0 +0.0 +0.4	+0.6 +0.0 +32.2	+3.5 +0.5 -6.9	+0.0 -33.6	+0.0	42.9	54.0 916	-11.1	Vert
^	4579.700M	51.7	+0.0 +0.0 +0.4	+0.6 +0.0 +32.2	+3.5 +0.5 -6.9	+0.0 -33.6	+0.0	48.4	54.0 916	-5.6	Vert
15	7327.710M	40.0	+0.0 +0.0 +0.7	+1.3 +0.0 +37.5	+4.5 +0.6 -6.9	+0.0 -34.9	+0.0	42.8	54.0 916	-11.2	Horiz

16	7264.410M	40.5	+0.0 +0.0 +0.7	+1.2 +0.0 +37.2	+4.5 +0.3 -6.9	+0.0 -34.9	+0.0	42.6	54.0 908	-11.4	Vert
17	3663.780M	47.0	+0.0 +0.0 +0.4	+0.6 +0.0 +31.7	+3.3 +0.2 -6.9	+0.0 -33.8	+0.0	42.5	54.0 916	-11.5	Vert
18	5448.380M Ave	42.3	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	42.2	54.0 908	-11.8	Horiz
^	5448.380M	47.7	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	47.6	54.0 908	-6.4	Horiz
20	5448.410M Ave	42.1	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	42.0	54.0 908	-12.0	Vert
^	5448.430M	48.8	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	48.7	54.0 908	-5.3	Vert
22	130.900M	16.6	+0.0 +13.5 +0.0	+0.1 +0.0 +0.0	+0.5 +0.0 +0.0	+0.7 +0.0	+0.0	31.4	43.5	-12.1	Horiz
23	4989.223M Ave	35.5	+0.0 +0.0 +0.7	+0.7 +0.0 +33.8	+3.8 +0.6 +0.0	+0.0 -33.4	+0.0	41.7	54.0	-12.3	Vert
^	4989.220M	47.8	+0.0 +0.0 +0.7	+0.7 +0.0 +33.8	+3.8 +0.6 +0.0	+0.0 -33.4	+0.0	54.0	54.0	+0.0	Vert
25	118.300M	16.1	+0.0 +13.4 +0.0	+0.1 +0.0 +0.0	+0.5 +0.0 +0.0	+0.7 +0.0	+0.0	30.8	43.5	-12.7	Vert
26	4989.000M Ave	35.0	+0.0 +0.0 +0.7	+0.7 +0.0 +33.8	+3.8 +0.6 +0.0	+0.0 -33.4	+0.0	41.2	54.0	-12.8	Horiz
^	4989.000M	47.0	+0.0 +0.0 +0.7	+0.7 +0.0 +33.8	+3.8 +0.6 +0.0	+0.0 -33.4	+0.0	53.2	54.0	-0.8	Horiz
28	3663.950M	44.9	+0.0 +0.0 +0.4	+0.6 +0.0 +31.7	+3.3 +0.2 -6.9	+0.0 -33.8	+0.0	40.4	54.0 916	-13.6	Horiz
29	1662.000M	45.4	+0.0 +0.0 +0.3	+0.4 +0.0 +25.8	+2.0 +0.4 +0.0	+0.0 -34.9	+0.0	39.4	54.0	-14.6	Vert
30	1354.000M	45.3	+0.0 +0.0 +0.2	+0.3 +0.0 +25.4	+1.8 +0.7 +0.0	+0.0 -35.6	+0.0	38.1	54.0	-15.9	Vert
31	2723.870M	45.6	+0.0 +0.0 +0.5	+0.5 +0.0 +29.4	+2.7 +0.2 -6.9	+0.0 -34.1	+0.0	37.9	54.0 908	-16.1	Vert
32	3632.350M	41.7	+0.0 +0.0 +0.4	+0.6 +0.0 +31.7	+3.3 +0.3 -6.9	+0.0 -33.8	+0.0	37.3	54.0 908	-16.7	Horiz

33	2748.120M	44.0	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	36.3	54.0 916	-17.7	Vert
34	3696.050M	40.4	+0.0 +0.0 +0.3	+0.6 +0.0 +31.9	+3.3 +0.2 -6.9	+0.0 -33.8	+0.0	36.0	54.0 924	-18.0	Horiz
35	2771.960M	43.5	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	35.8	54.0 924	-18.2	Horiz
36	3632.130M	40.1	+0.0 +0.0 +0.4	+0.6 +0.0 +31.7	+3.3 +0.3 -6.9	+0.0 -33.8	+0.0	35.7	54.0 908	-18.3	Vert
37	3695.960M	39.4	+0.0 +0.0 +0.3	+0.6 +0.0 +31.9	+3.3 +0.2 -6.9	+0.0 -33.8	+0.0	35.0	54.0 924	-19.0	Vert
38	2772.020M	42.3	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	34.6	54.0 924	-19.4	Vert
39	2747.970M	40.4	+0.0 +0.0 +0.5	+0.5 +0.0 +29.3	+2.7 +0.3 -6.9	+0.0 -34.1	+0.0	32.7	54.0 916	-21.3	Horiz
40	2724.200M	39.1	+0.0 +0.0 +0.5	+0.5 +0.0 +29.4	+2.7 +0.2 -6.9	+0.0 -34.1	+0.0	31.4	54.0 908	-22.6	Horiz
41	6356.260M	52.3	+0.0 +0.0 +0.6	+0.9 +0.0 +35.1	+4.4 +0.4 -6.9	+0.0 -34.0	+0.0	52.8	104.5 908	-51.7	Horiz
42	6356.440M	48.8	+0.0 +0.0 +0.6	+0.9 +0.0 +35.1	+4.4 +0.4 -6.9	+0.0 -34.0	+0.0	49.3	104.5 908	-55.2	Vert
43	5544.310M	44.9	+0.0 +0.0 +0.5	+0.8 +0.0 +34.6	+4.0 +0.5 -6.9	+0.0 -33.6	+0.0	44.8	104.5 924	-59.7	Horiz
44	571.300M	15.8	+0.0 +25.6 +0.0	+0.2 +0.0 +0.0	+1.1 +0.0 +0.0	+1.8 +0.0	+0.0	44.5	104.5	-60.0	Vert
45	6411.400M	43.2	+0.0 +0.0 +0.6	+0.9 +0.0 +35.0	+4.5 +0.5 -6.9	+0.0 -34.0	+0.0	43.8	104.5 916	-60.7	Vert
46	6468.360M	42.4	+0.0 +0.0 +0.7	+0.9 +0.0 +34.9	+4.5 +0.6 -6.9	+0.0 -34.0	+0.0	43.1	104.5 924	-61.4	Vert
47	5544.160M	43.0	+0.0 +0.0 +0.5	+0.8 +0.0 +34.6	+4.0 +0.5 -6.9	+0.0 -33.6	+0.0	42.9	104.5 924	-61.6	Vert
48	6411.770M	40.2	+0.0 +0.0 +0.6	+0.9 +0.0 +35.0	+4.5 +0.5 -6.9	+0.0 -34.0	+0.0	40.8	104.5 916	-63.7	Horiz
49	6467.580M	39.5	+0.0 +0.0 +0.7	+0.9 +0.0 +34.9	+4.5 +0.6 -6.9	+0.0 -34.0	+0.0	40.2	104.5 924	-64.3	Horiz

50	5496.160M	39.9	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	39.8	104.5 916	-64.7	Horiz
51	5495.990M	39.4	+0.0 +0.0 +0.5	+0.8 +0.0 +34.7	+4.0 +0.4 -6.9	+0.0 -33.6	+0.0	39.3	104.5 916	-65.2	Vert
52	217.200M	20.2	+0.0 +16.5 +0.0	+0.1 +0.0 +0.0	+0.7 +0.0 +0.0	+1.0 +0.0	+0.0	38.5	104.5	-66.0	Horiz
53	144.500M	20.6	+0.0 +14.0 +0.0	+0.1 +0.0 +0.0	+0.5 +0.0 +0.0	+0.8 +0.0	+0.0	36.0	104.5	-68.5	Vert
54	43.600M	20.5	+0.0 +14.3 +0.0	+0.1 +0.0 +0.0	+0.3 +0.0 +0.0	+0.5 +0.0	+0.0	35.7	104.5	-68.8	Vert
55	145.400M	19.2	+0.0 +14.0 +0.0	+0.1 +0.0 +0.0	+0.5 +0.0 +0.0	+0.8 +0.0	+0.0	34.6	104.5	-69.9	Horiz
56	71.700M	20.3	+0.0 +12.9 +0.0	+0.1 +0.0 +0.0	+0.4 +0.0 +0.0	+0.5 +0.0	+0.0	34.2	104.5	-70.3	Vert
57	186.200M	16.8	+0.0 +15.5 +0.0	+0.1 +0.0 +0.0	+0.7 +0.0 +0.0	+0.9 +0.0	+0.0	34.0	104.5	-70.5	Vert
58	87.200M	19.6	+0.0 +12.5 +0.0	+0.1 +0.0 +0.0	+0.4 +0.0 +0.0	+0.6 +0.0	+0.0	33.2	104.5	-71.3	Vert
59	1847.580M	42.7	+0.0 +0.0 +0.3	+0.4 +0.0 +27.6	+2.1 +0.6 -6.9	+0.0 -34.7	+0.0	32.1	104.5 924	-72.4	Vert
60	1816.360M	42.9	+0.0 +0.0 +0.3	+0.4 +0.0 +27.4	+2.1 +0.6 -6.9	+0.0 -34.7	+0.0	32.1	104.5 908	-72.4	Vert
61	950.100k	43.3	+0.0 +0.0 +0.0	+0.1 +9.5 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0	-40.0	13.0	104.5	-91.5	Groun
62	949.200k	40.0	+0.0 +0.0 +0.0	+0.1 +9.5 +0.0	+0.1 +0.0 +0.0	+0.0 +0.0	-40.0	9.7	104.5	-94.8	Para
63	29.826M	38.1	+0.0 +0.0 +0.0	+0.1 +3.7 +0.0	+0.3 +0.0 +0.0	+0.0 +0.0	-40.0	2.2	104.5	-102.3	Groun
64	28.318M	30.3	+0.0 +0.0 +0.0	+0.1 +4.4 +0.0	+0.2 +0.0 +0.0	+0.0 +0.0	-40.0	-5.0	104.5	-109.5	Para
65	57.688k	60.5	+0.0 +0.0 +0.0	+0.1 +9.7 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	-80.0	-9.7	104.5	-114.2	Groun
66	57.780k	59.1	+0.0 +0.0 +0.0	+0.1 +9.7 +0.0	+0.0 +0.0 +0.0	+0.0 +0.0	-80.0	-11.1	104.5	-115.6	Para

Band Edge

Band Edge Summary

Configuration 1 (MC4Max and Laptop)

Frequency (MHz)	SC or Hopping	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902	SC	Omni	55.4	104.5	Pass
928	SC	Omni	65.6	104.5	Pass
902	Hopping	Omni	56.3	104.5	Pass
928	Hopping	Omni	64.2	104.5	Pass
614	SC	Omni	38.4	46	Pass
960	SC	Omni	42.8	54	Pass
614	Hopping	Omni	38.5	46	Pass
960	Hopping	Omni	42.8	54	Pass

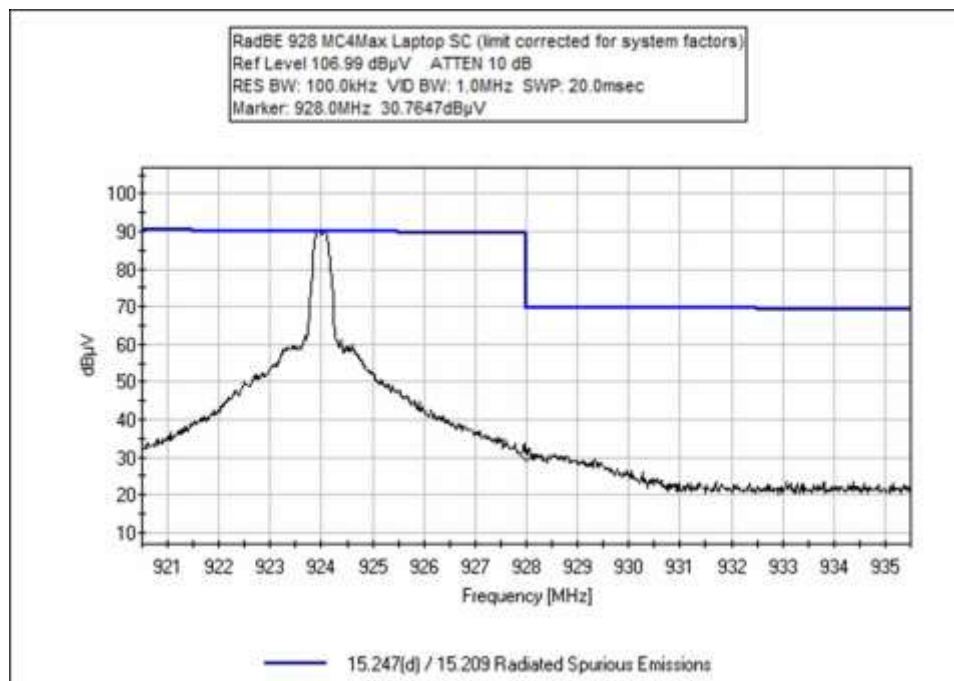
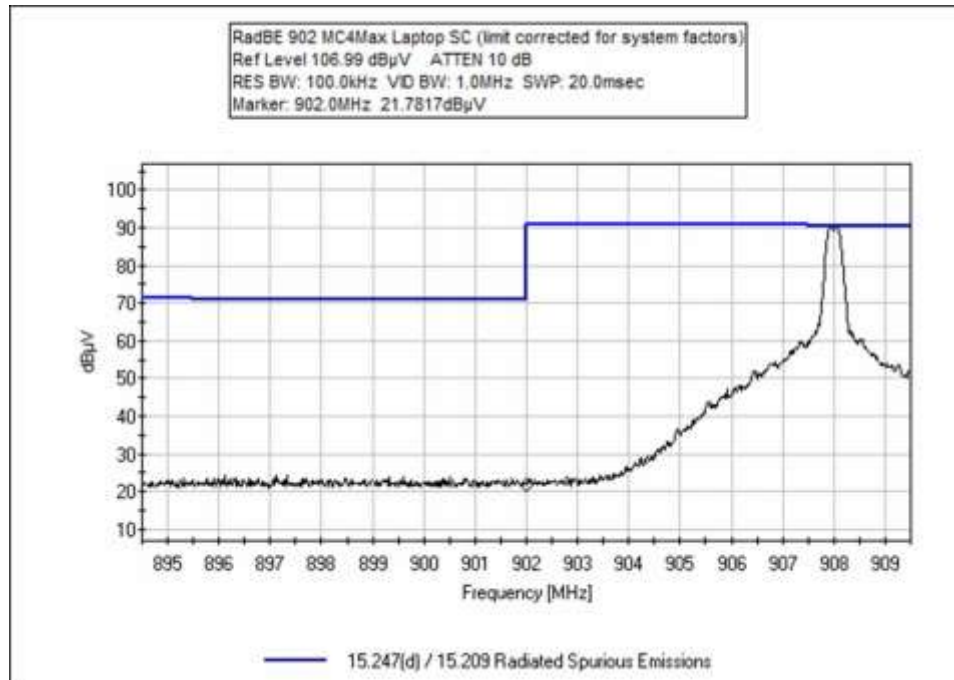
Band Edge Summary

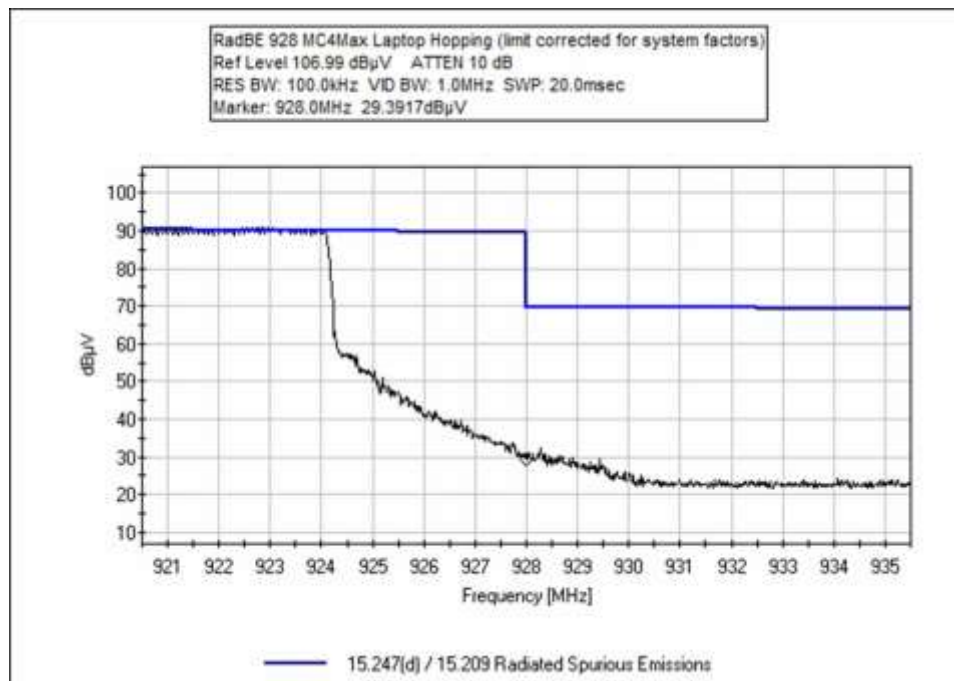
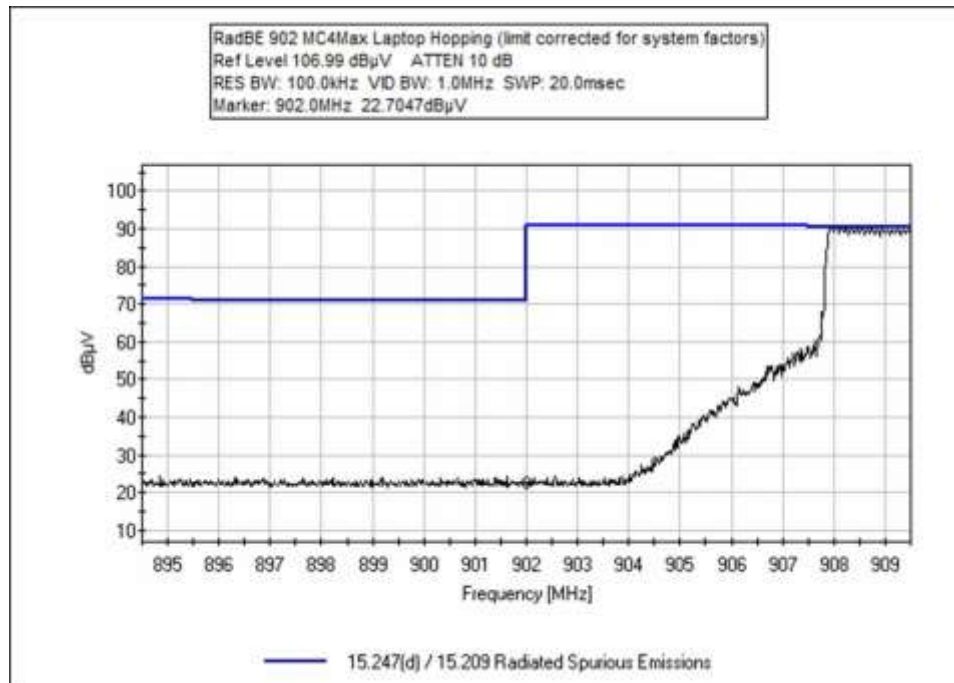
Configuration 2 (MC4Max and Tablet)

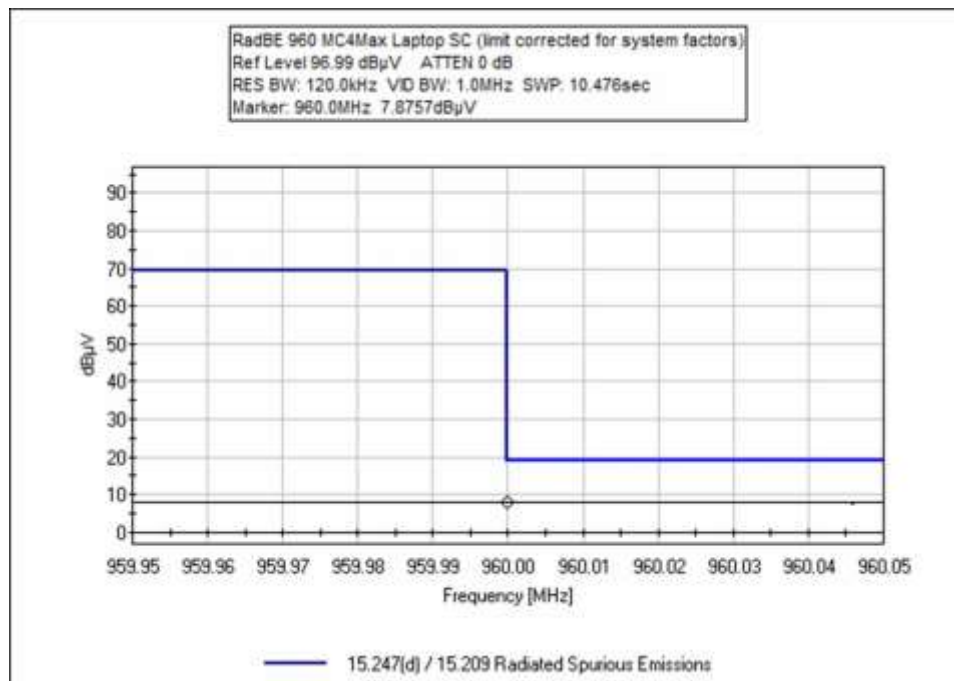
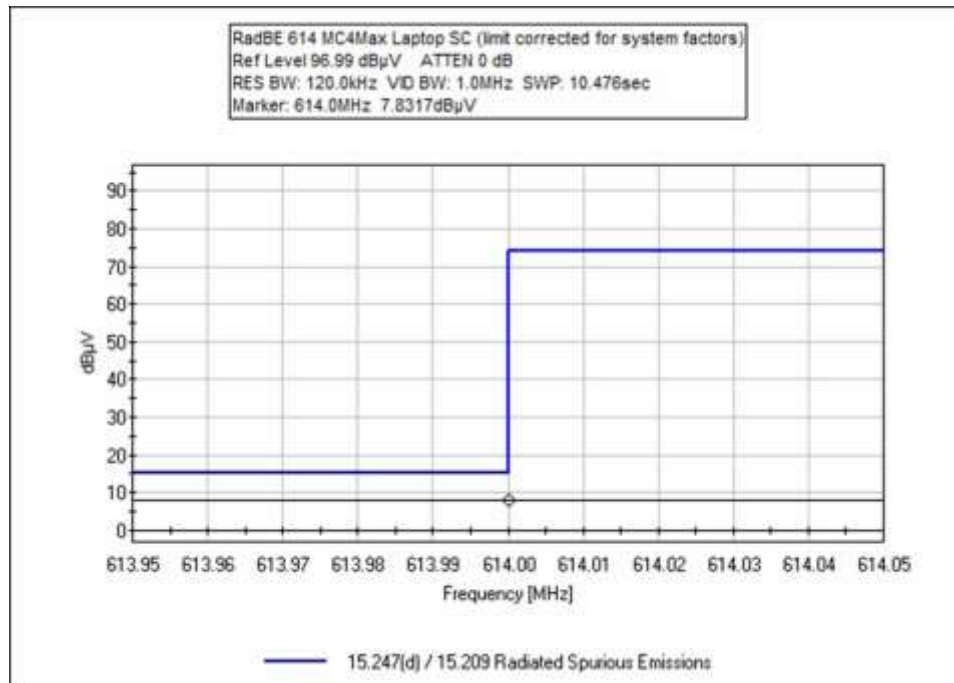
Frequency (MHz)	SC or Hopping	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
902	SC	Omni	46.5	104.5	Pass
928	SC	Omni	66.3	104.5	Pass
902	Hopping	Omni	46.7	104.5	Pass
928	Hopping	Omni	65.7	104.5	Pass
614	SC	Omni	38.5	46	Pass
960	SC	Omni	42.8	54	Pass
614	Hopping	Omni	38.4	46	Pass
960	Hopping	Omni	42.8	54	Pass

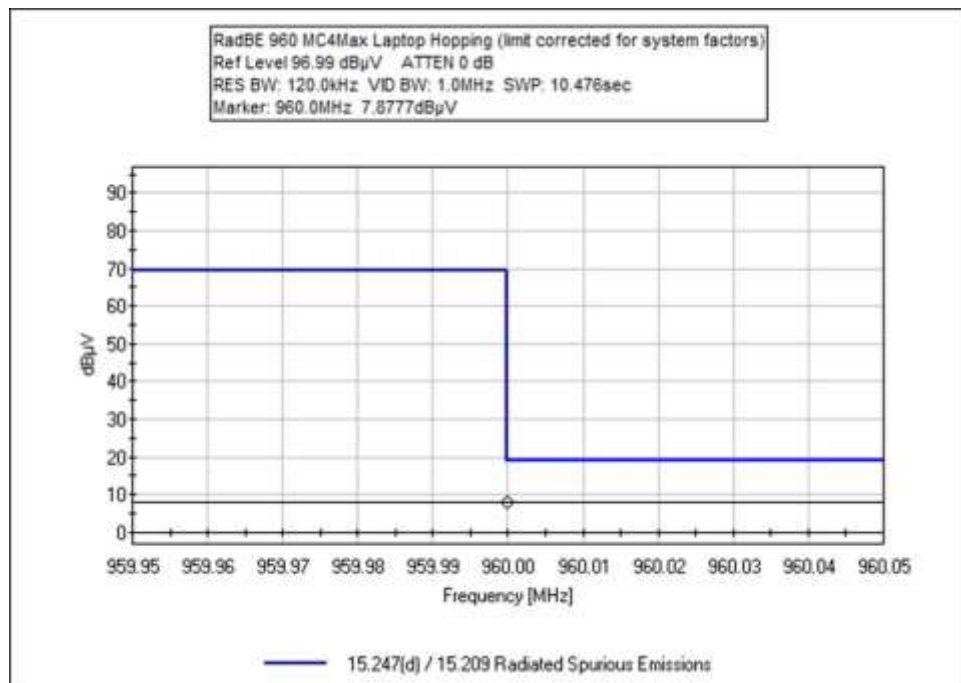
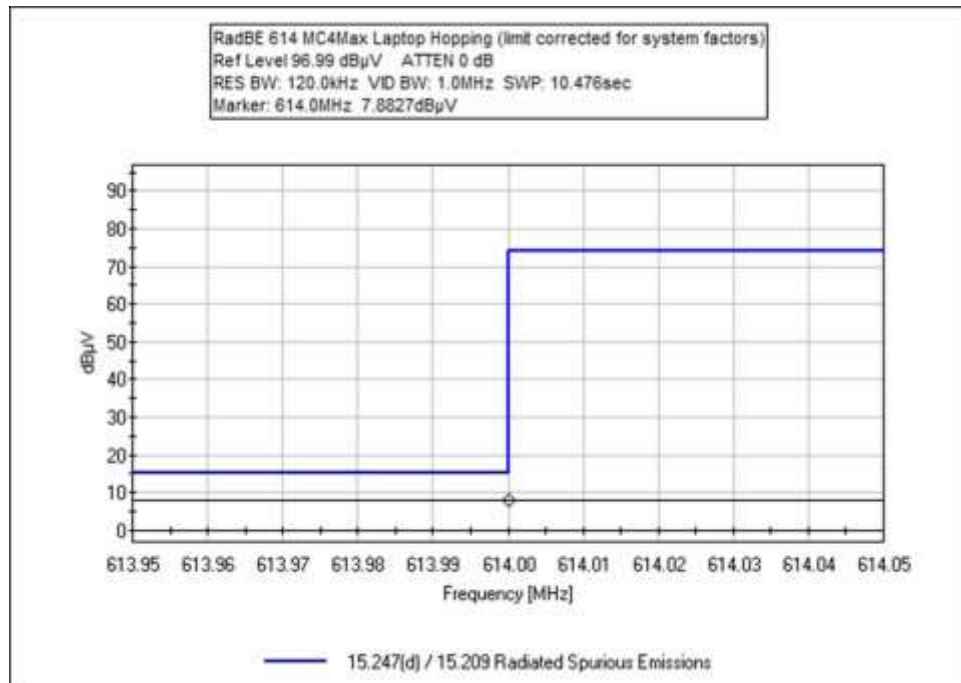
Band Edge Plots

Configuration 1

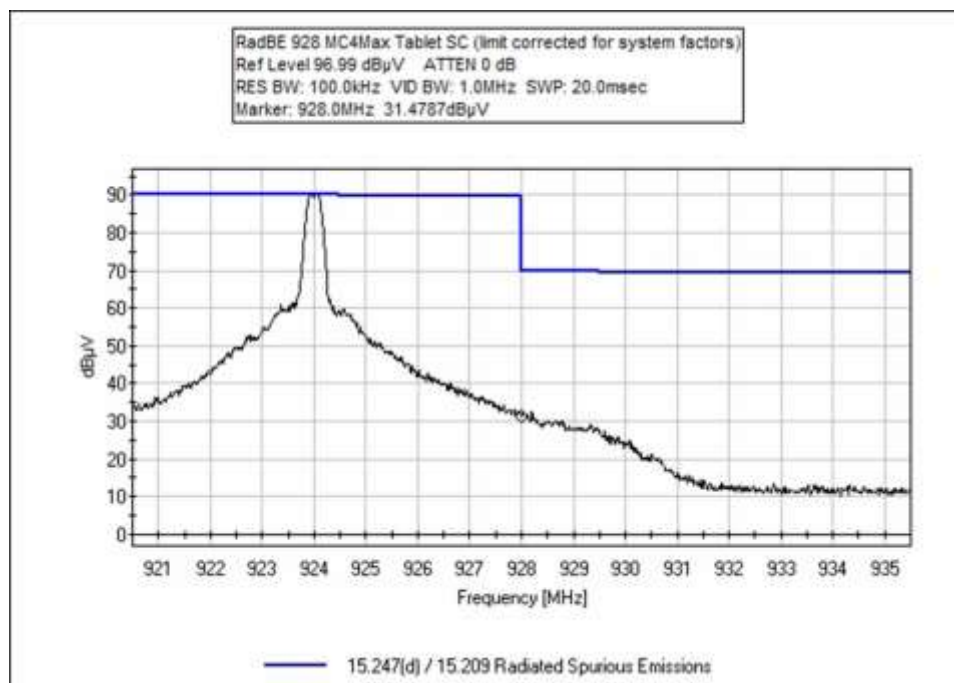
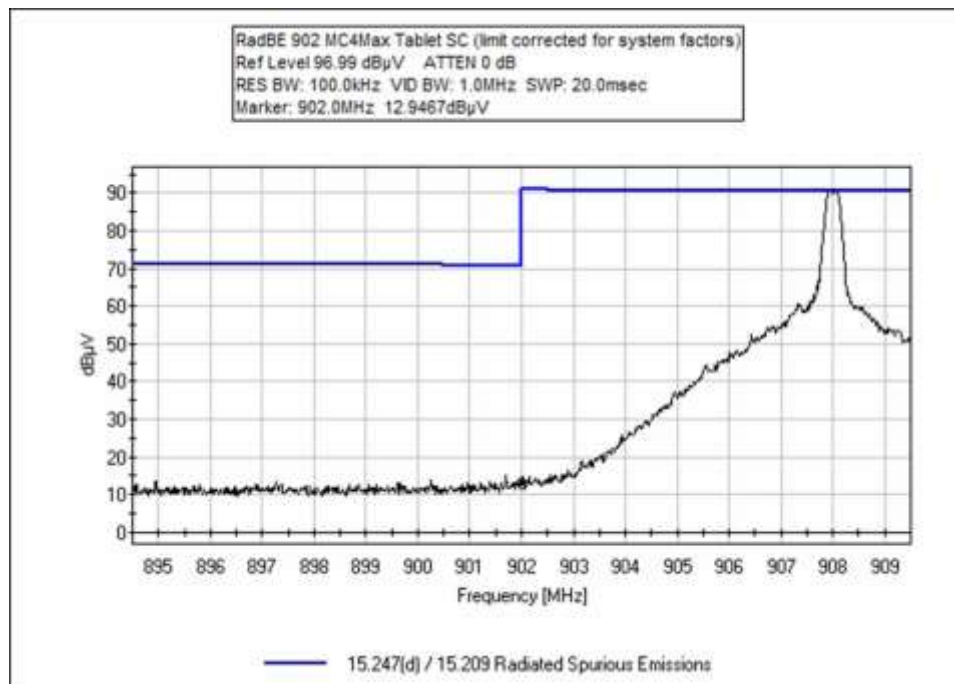


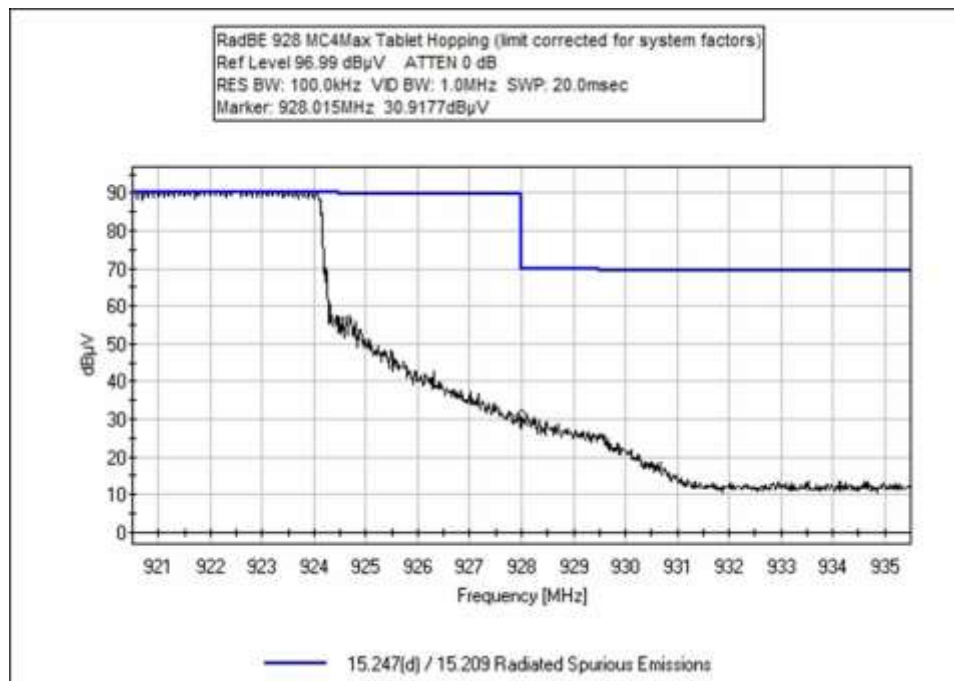
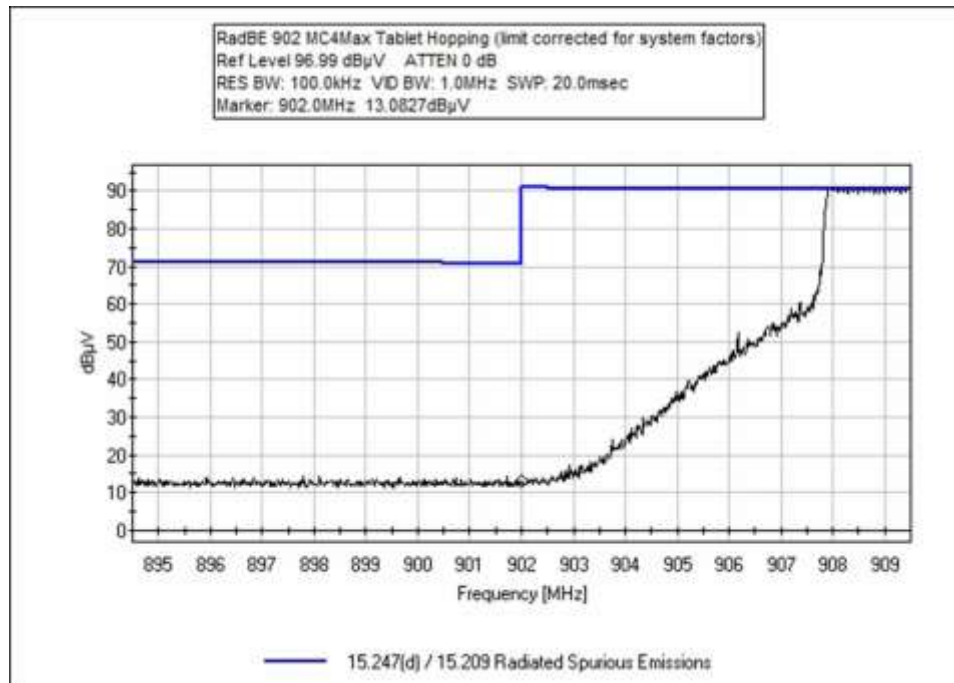


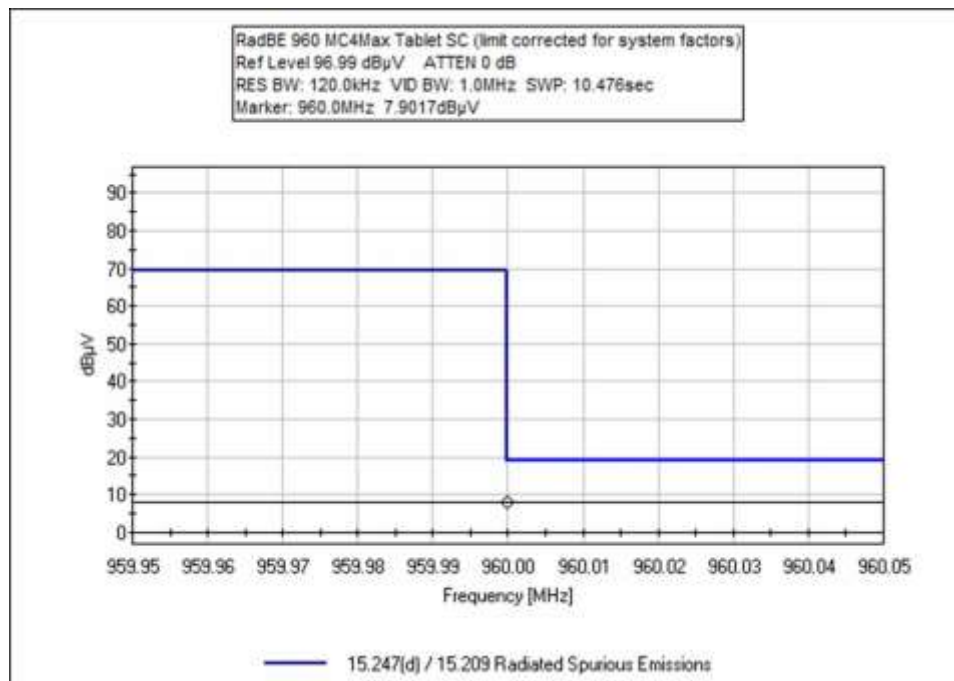
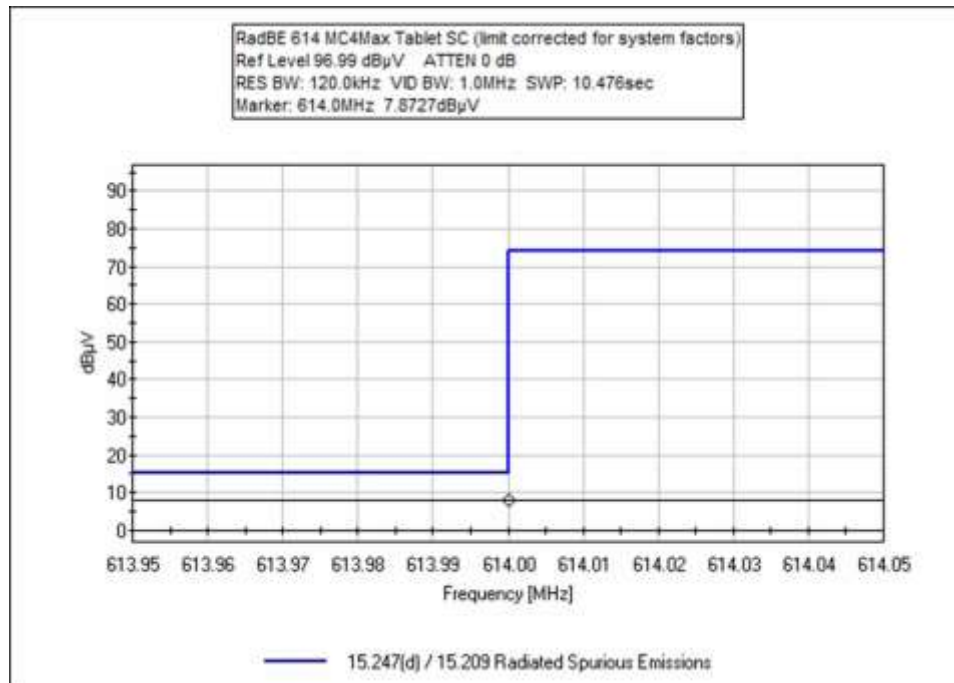


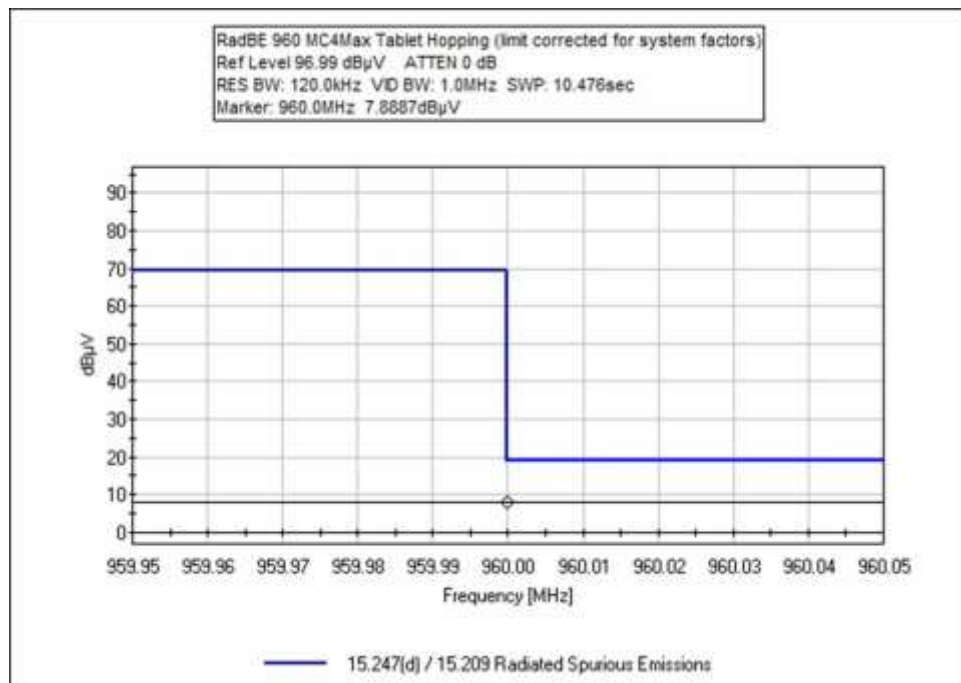
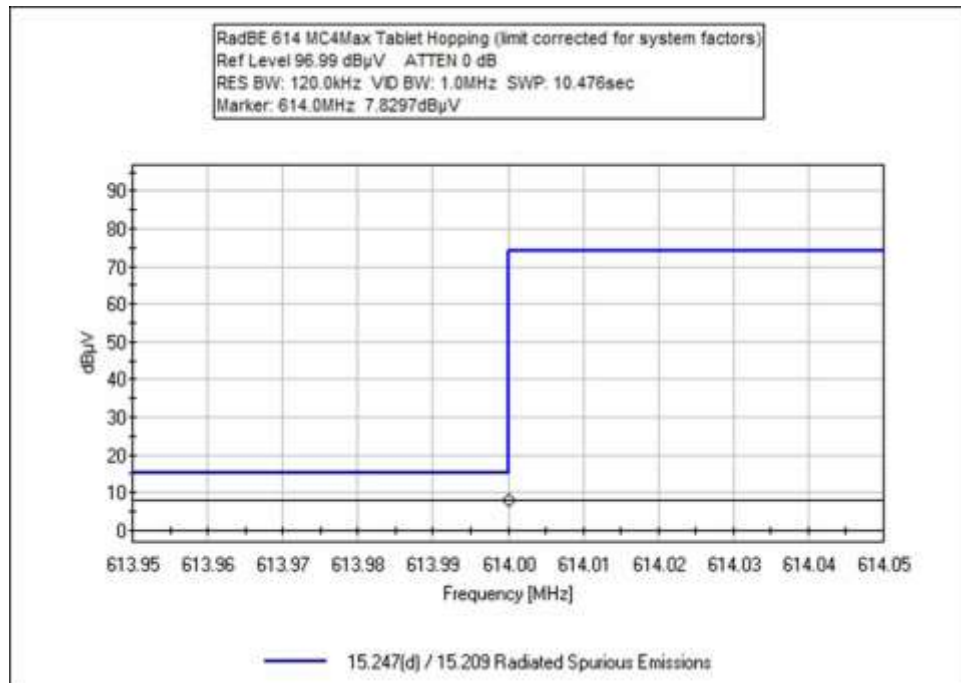


Configuration 2









Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717
 Customer: **Itron, Inc.**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **107795** Date: 12/16/2022
 Test Type: **Maximized Emissions** Time: 14:14:54
 Tested By: Michael Atkinson Sequence#: 31
 Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test Environment Conditions
 Temperature: 20°C
 Humidity: 33%
 Pressure: 102.3kPa

 Frequency: Band Edge

 Test Setup: EUT is continuously transmitting with modulation. Horizontal and vertical measurement antenna polarities investigated, worst-case reported. EUT XYZ axes investigated, worst-case reported.

 Power supply is remotely located outside of chamber with filter caps at chamber wall.

MC4Max with Laptop

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T1	ANP06540	Cable	Heliac	1/17/2022	1/17/2024
T2	ANP05305	Cable	ETSI-50T	9/15/2021	9/15/2023
T3	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T4	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023

Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	614.000M QP	7.9	+0.3	+1.2	+1.9	+27.2	+0.0	38.5	46.0 Hopping	-7.5	Vert
2	614.000M QP	7.8	+0.3	+1.2	+1.9	+27.2	+0.0	38.4	46.0 SC	-7.6	Vert
3	960.000M QP	7.9	+0.3	+1.5	+2.4	+30.7	+0.0	42.8	54.0 SC	-11.2	Vert
4	960.000M QP	7.9	+0.3	+1.5	+2.4	+30.7	+0.0	42.8	54.0 Hopping	-11.2	Vert
5	928.000M	30.8	+0.3	+1.5	+2.4	+30.6	+0.0	65.6	104.5 SC	-38.9	Vert
6	928.000M	29.4	+0.3	+1.5	+2.4	+30.6	+0.0	64.2	104.5 Hopping	-40.3	Vert
7	902.000M	22.7	+0.3	+1.4	+2.3	+29.6	+0.0	56.3	104.5 Hopping	-48.2	Vert
8	902.000M	21.8	+0.3	+1.4	+2.3	+29.6	+0.0	55.4	104.5 SC	-49.1	Vert



Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • (425) 402-1717
Customer: **Itron, Inc.**
Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
Work Order #: **107795** Date: 12/16/2022
Test Type: **Maximized Emissions** Time: 16:32:37
Tested By: Michael Atkinson Sequence#: 32
Software: EMITest 5.03.20

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

Test Environment Conditions: Temperature: 20°C Humidity: 37% Pressure: 102.2kPa Frequency: Band Edge Test Setup: EUT is continuously transmitting with modulation. Horizontal and vertical measurement antenna polarities investigated, worst-case reported. EUT XYZ axes investigated, worst-case reported. Also investigated with MAS boards removed, as well as receiver only boards removed, the fully loaded unit is representative of worst-case. Power supply is remotely located outside of chamber with filter caps at chamber wall. MC4Max with Tablet
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Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T1	ANP06540	Cable	Heliac	1/17/2022	1/17/2024
T2	ANP05305	Cable	ETSI-50T	9/15/2021	9/15/2023
T3	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T4	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023

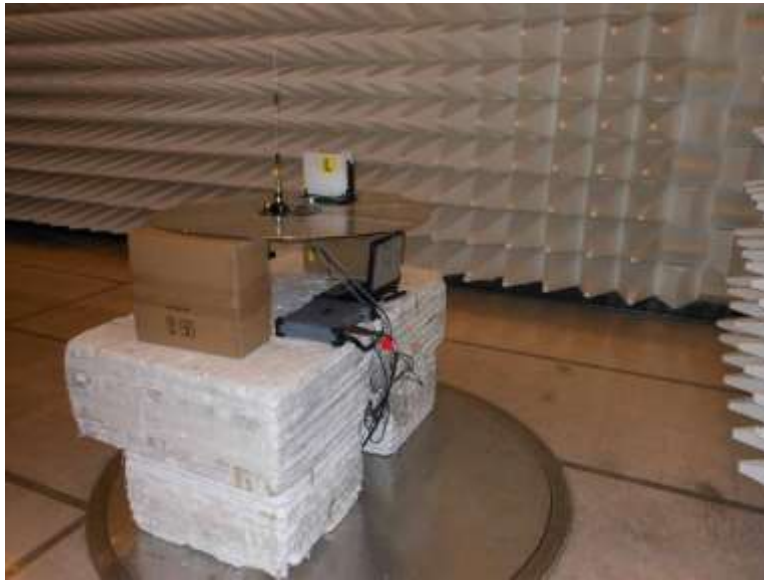
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	614.000M QP	7.9	+0.3	+1.2	+1.9	+27.2	+0.0	38.5	46.0 SC	-7.5	Vert
2	614.000M QP	7.8	+0.3	+1.2	+1.9	+27.2	+0.0	38.4	46.0 Hopping	-7.6	Vert
3	960.000M QP	7.9	+0.3	+1.5	+2.4	+30.7	+0.0	42.8	54.0 SC	-11.2	Vert
4	960.000M QP	7.9	+0.3	+1.5	+2.4	+30.7	+0.0	42.8	54.0 Hopping	-11.2	Vert
5	928.000M	31.5	+0.3	+1.5	+2.4	+30.6	+0.0	66.3	104.5 SC	-38.2	Vert
6	928.015M	30.9	+0.3	+1.5	+2.4	+30.6	+0.0	65.7	104.5 Hopping	-38.8	Vert
7	902.000M	13.1	+0.3	+1.4	+2.3	+29.6	+0.0	46.7	104.5 Hopping	-57.8	Vert
8	902.000M	12.9	+0.3	+1.4	+2.3	+29.6	+0.0	46.5	104.5 SC	-58.0	Vert

Test Setup Photo(s)



Below 1GHz; Laptop



Above 1GHz; Laptop



Below 1GHz; Tablet



Above 1GHz; Tablet



X-Axis



Y-Axis



Z-Axis

Appendix A: Manufacturer Declaration

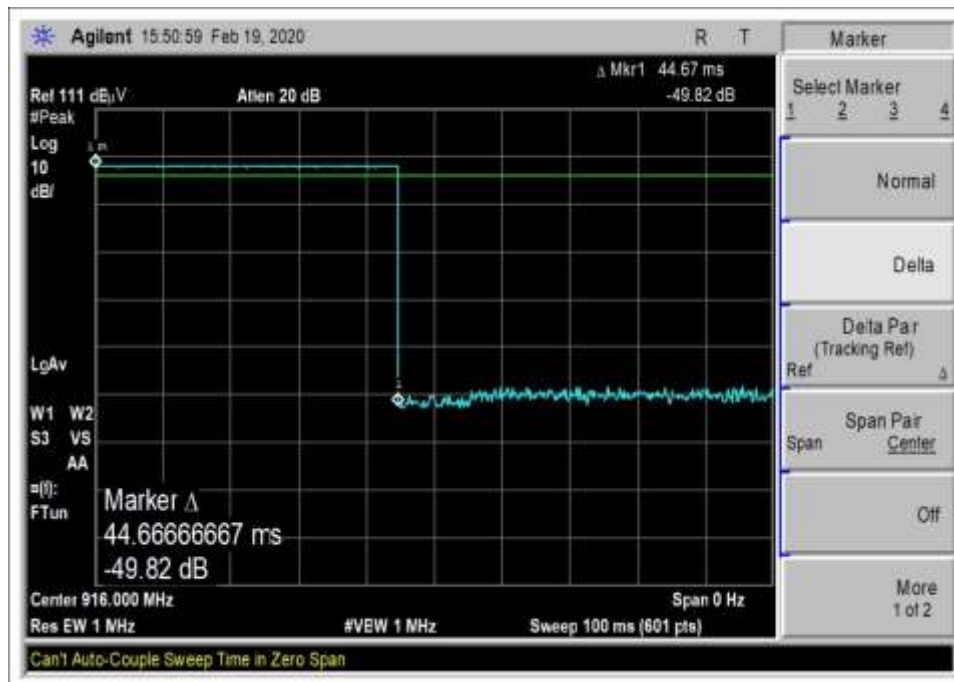
The manufacturer declares that the **MC3C** model applies to device names: **MC3** and **MC4Max**.

These are identical hardware configurations and the only difference is in the name. Testing on the **MC3C** is representative of testing on the following model(s):

MC3C1 (device name MC3Lite)

Appendix B: Manufacturer Provided Data

Duty Cycle Plot



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	($\text{dB}\mu\text{V}$)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.