Nalloy, LLC

REVISED TEST REPORT TO 106407-45

RB9F2Z

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.225
(13.110-14.010MHz)

Report No.: 106407-45A

Date of issue: June 1, 2022

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:

Nalloy, LLC
2301 5th Avenue
Seattle, WA 98108

REPRESENTATIVE: Naga Suryadevara
Customer Reference Number: 2D-07565727

REPORT PREPARED BY:

Darcy Thompson
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 106407/106571

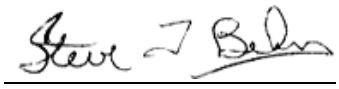
DATE OF EQUIPMENT RECEIPT: December 6, 2021
DATE(S) OF TESTING: December 6, 2021 - February, 3, 2022 and April 28, 2022

Revision History

Original: Testing of the RB9F2Z to FCC Part 15 Subpart C Section(s) 15.207 & 15.225 (13.110-14.010MHz).
Revision A: Replaced 15.225(a)-(c) Field Strength of Fundamental, 15.225(d) Radiated Emissions & Band Edge, and 15.207 AC Conducted Emissions with new data due to new antenna matching.

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.
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 - 15.225

Test Procedure	Description	Modifications	Results
15.215(c)	Occupied Bandwidth	NA	Pass
15.225(a)-(c)	Field Strength of Fundamental	NA	Pass
15.225(e)	Frequency Stability	NA	Pass
15.225(d)	Field Strength of Spurious Emissions	NA	Pass
15.207	AC Conducted Emissions	NA	Pass

NA = Not Applicable

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 (Gala NFC Em)

Equipment Tested:

Device	Manufacturer	Model #	S/N
None	Nalloy, LLC	RB9F2Z	NA

Support Equipment:

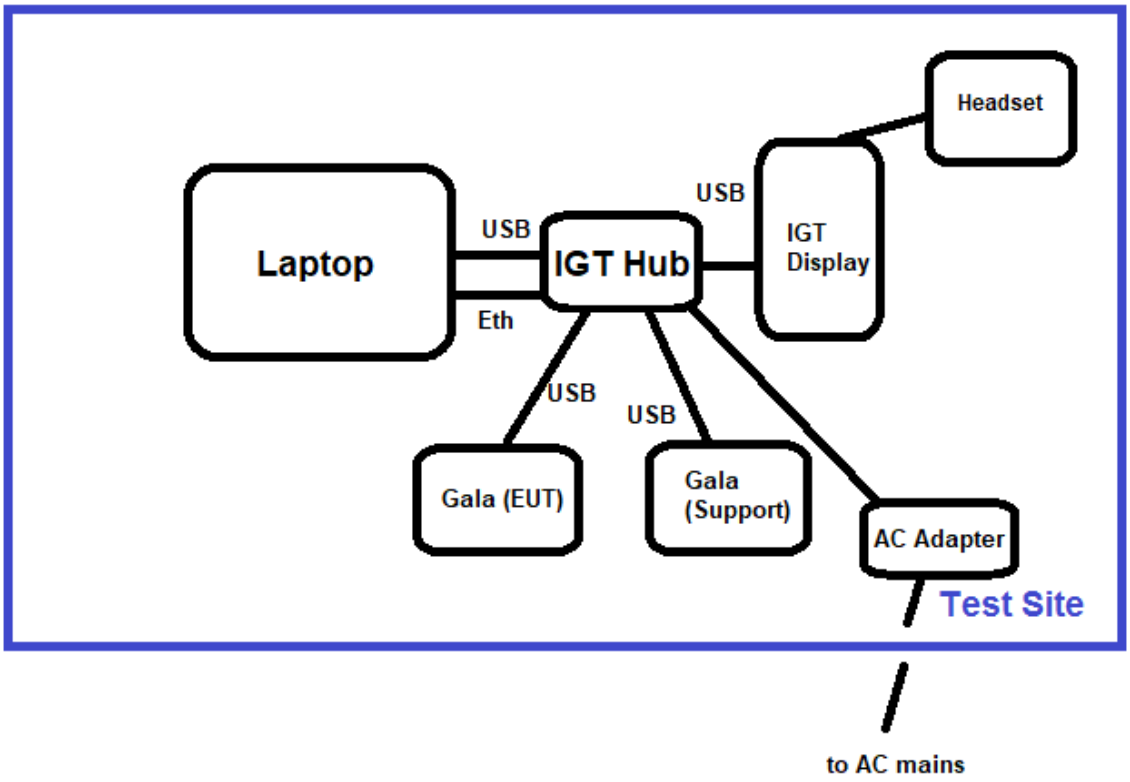
Device	Manufacturer	Model #	S/N
None	Nalloy, LLC	A2D0US	G3A1VF02138600G
None	Nalloy, LLC	RB9F2Z	Note: 2nd unit as support
AC Adapter	Delta Electronics, Inc.	MDS-030AAC15	NA
Headphones	Poly	C5220T	NA
Laptop	HP	Elitebook	NA
USB to Ethernet Adapter	Amazon	Gigabit Ethernet Adapter	0050B6E212BA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	NFC A, NFC B, NFC F (ASK)
Maximum Duty Cycle:	Assume 100% as worst case
Antenna Type(s) and Gain:	Rectangular Loop, 64 x 18 x 0.44mm. 0.9uH inductance @ 13.56MHz.
Antenna Connection Type:	Integral
Nominal Input Voltage:	120VAC, 60Hz
Firmware / Software used for Test:	fw_revision 1.0.99.0
The validity of results is dependent on the stated product details, the accuracy of which the manufacturer assumes full responsibility.	

Block Diagram of Test Setup(s)

Test Setup Block Diagram



FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

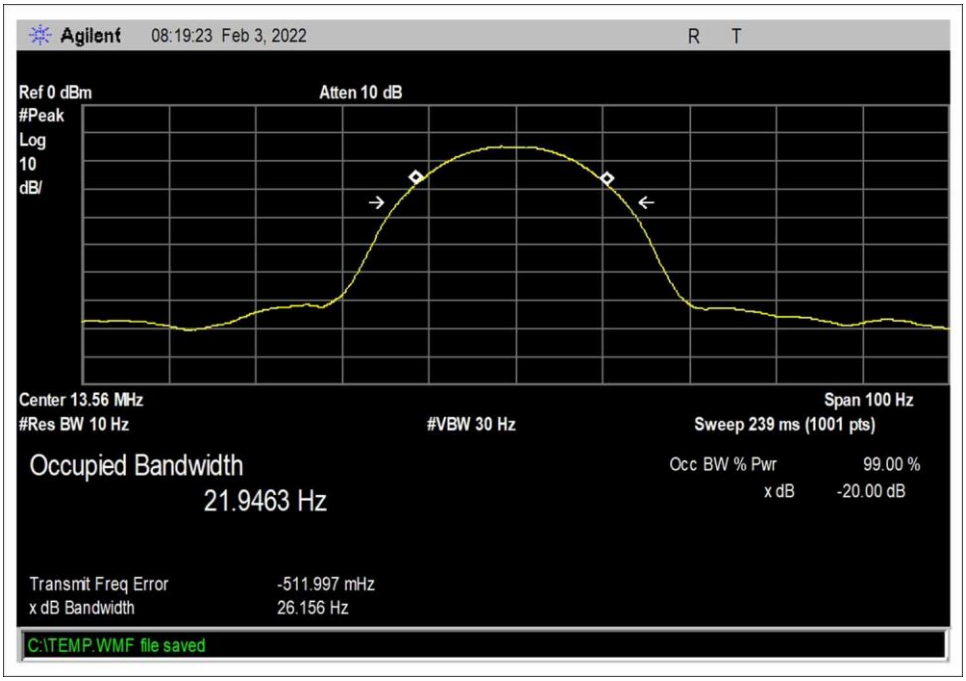
Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	2/3/2022
Configuration:	1		
Test Setup:	EUT is continuously transmitting, a near field probe connected to a spectrum analyzer is used for measurement. NFC A, NFC B, NFC F modes investigated. NFC A data reported is representative of worst case. RBW could not meet the RBW/OBW ratio as defined in ANSI C63.10 (2013) due to the nature of signal profile.		

Environmental Conditions			
Temperature (ºC)	21	Relative Humidity (%):	33

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
03698	Spectrum Analyzer	Agilent	E4404B	5/29/2020	5/29/2022

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (Hz)	Limit (Hz)	Results
13.56	1	NFC A	26.156	None	N/A

Plot(s)


Agilent 08:19:23 Feb 3, 2022
R T
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
Center 13.56 MHz
#Res BW 10 Hz
#VBW 30 Hz
Span 100 Hz
Sweep 239 ms (1001 pts)
Occupied Bandwidth
21.9463 Hz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error -511.997 mHz
x dB Bandwidth 26.156 Hz
C:\TEMP.WMF file saved

15.225(a)-(c) Field Strength of Fundamental

Test Data Summary - Voltage Variations					
Frequency (MHz)	Modulation / Ant Port	$V_{Minimum}$ (dBuV/m@30m)	$V_{Nominal}$ (dBuV/m@30m)	$V_{Maximum}$ (dBuV/m@30m)	Max Deviation from $V_{Nominal}$ (dB)
13.56	NFC A	12.5	12.5	12.5	0.0

Test performed using operational mode with the highest output power, representing worst case.

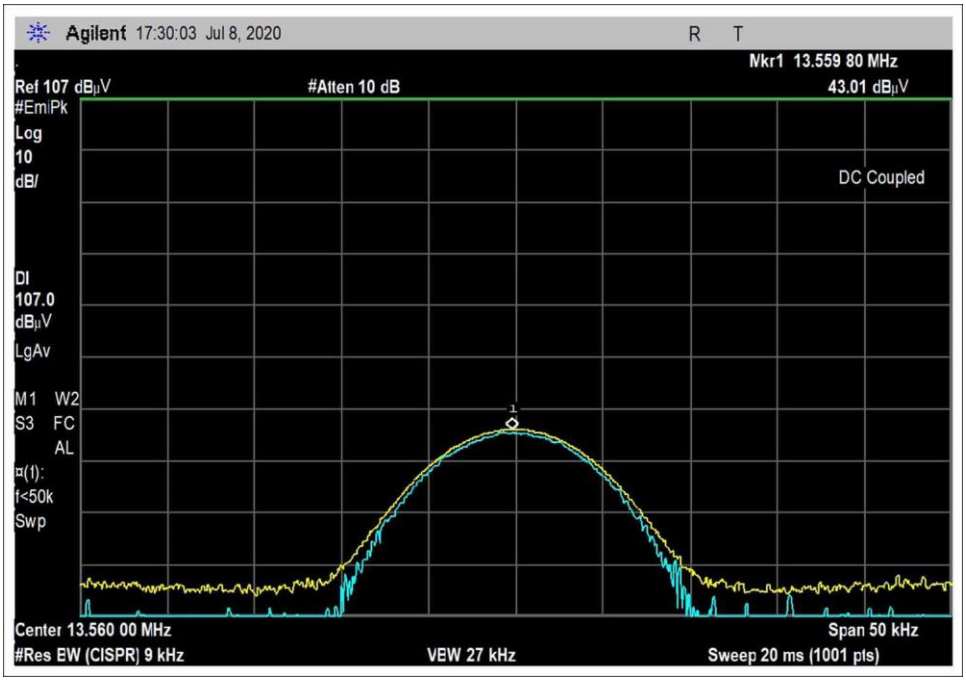
Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	120 VAC
$V_{Minimum}$:	102.00 VAC
$V_{Maximum}$:	138.00 VAC

Test Data Summary – Radiated Field Strength Measurement					
Frequency (MHz)	Modulation	Ant. Type	Measured (dBuV/m @ 30m)	Limit (dBuV/m @ 30m)	Results
13.56	NFC A	Loop	12.5	≤84	Pass

Plot



Emissions Mask Data

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425-402-1717		
Customer:	**Nalloy, LLC**		
Specification:	**15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**		
Work Order #:	**106337**	Date:	4/28/2022
Test Type:	**Maximized Emissions**	Time:	14:00:08
Tested By:	Matt Harrison	Sequence#:	9
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 44%
Pressure: 102.1kPa

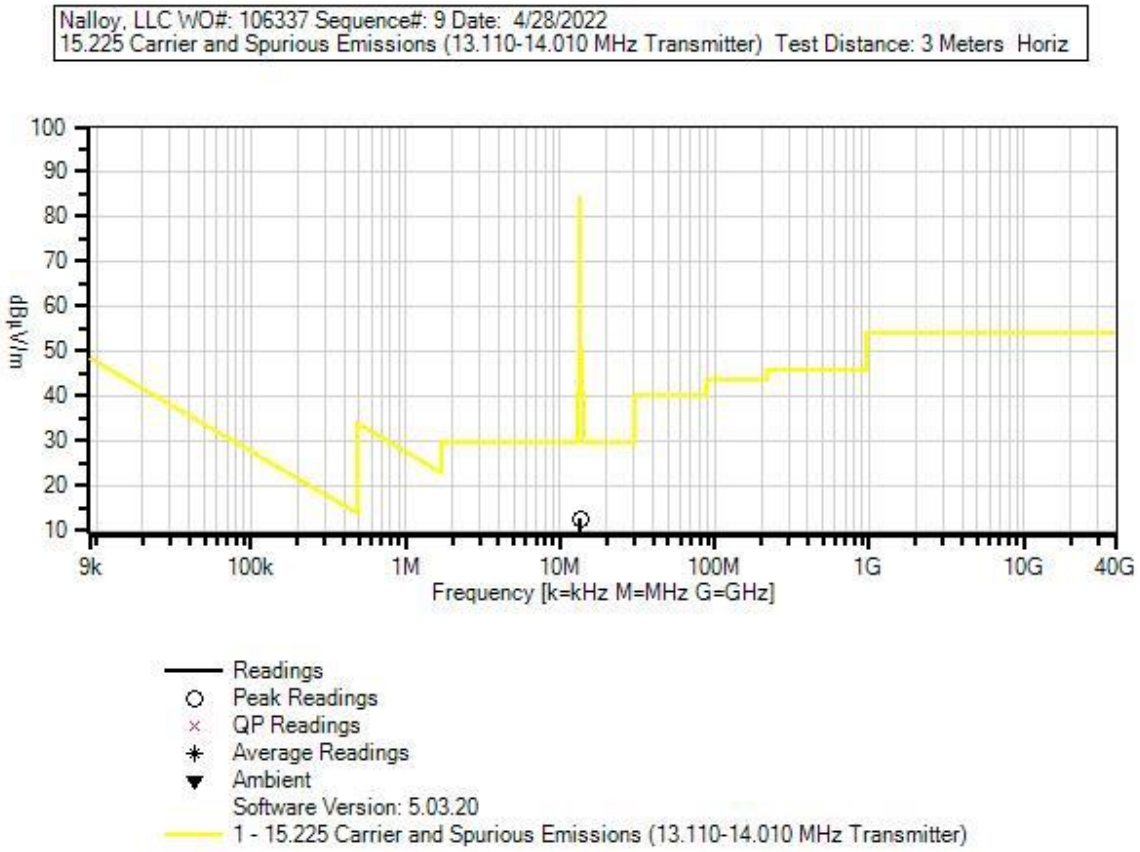
Method: ANSI C63.10: 2013

Frequency range: Fundamental

Setup:
Gala units (with new matching network) NFC transmitting at 13.56MHz.
Investigated a single as well as 2 units transmitting simultaneously, worst case reported.
(Only 1 unit to be connected/transmits at a time for normal use case)

XYZ EUT axes investigated, 3 x orthogonal measurement antenna axes investigated, worst case reported.

NFC A mode as worst case after also investigated NFC B and NFC F



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	13.560M	43.0	+0.0	+0.2	+9.3		-40.0	12.5	84.0	-71.5	Horiz

15.225(e) Frequency Stability

Test Setup/Conditions			
Test Location:	Brea Lab Bench	Test Engineer:	M. Atkinson
Test Method:	ANSI C63.10 (2013)	Test Date(s):	2/2/2022
Configuration:	1		
Test Setup:	EUT is continuously transmitting inside of a temperature chamber, a near field probe connected to a spectrum analyzer is used for measurement. NFC A, NFC B, NFC F modes investigated. NFC A data reported is representative of worst case.		

Environmental Conditions			
Temperature (ºC)	21	Relative Humidity (%):	33

Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02757	Temperature Chamber	Bemco	F100/350-8	12/16/2020	12/16/2022
03029	Thermometer, Digital Infrared	Fluke	566	3/11/2021	3/11/2023
03698	Spectrum Analyzer	Agilent	E4404B	5/29/2020	5/29/2022
01318	Multimeter	Fluke	Fluke 85	6/16/2021	6/16/2023
01505B	AC Power Supply	PPS	345AMXT-UPC32	6/15/2021	6/15/2023

Test Data Summary

Temperature (ºC)	Voltage	Frequency (MHz)	Deviation (%)	Limit (%)	Results
-20	$V_{Nominal}$	13.56021	0.00037	±0.01	Pass
-10	$V_{Nominal}$	13.56024	0.00059	±0.01	
0	$V_{Nominal}$	13.56024	0.00059	±0.01	
10	$V_{Nominal}$	13.56024	0.00059	±0.01	
20	$V_{Minimum}$	13.56016	0	±0.01	
20	$V_{Nominal}$	13.56016	0	±0.01	
20	$V_{Maximum}$	13.56016	0	±0.01	
30	$V_{Nominal}$	13.56021	0.00029	±0.01	
40	$V_{Nominal}$	13.56024	0.00007	±0.01	
50	$V_{Nominal}$	13.56024	0.00007	±0.01	
Nominal Frequency:		13.560000			

Parameter Definitions:

Measurements performed at input voltage Vnominal ± 15%.

Parameter	Value
$V_{Nominal}$:	120 VAC
$V_{Minimum}$:	102.00 VAC
$V_{Maximum}$:	138.00 VAC

15.225(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:	**Nalloy, LLC**		
Specification:	**15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**		
Work Order #:	**106337**	Date:	4/28/2022
Test Type:	**Maximized Emissions**	Time:	13:21:15
Tested By:	Matt Harrison	Sequence#:	8
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 44%
Pressure: 102.1kPa

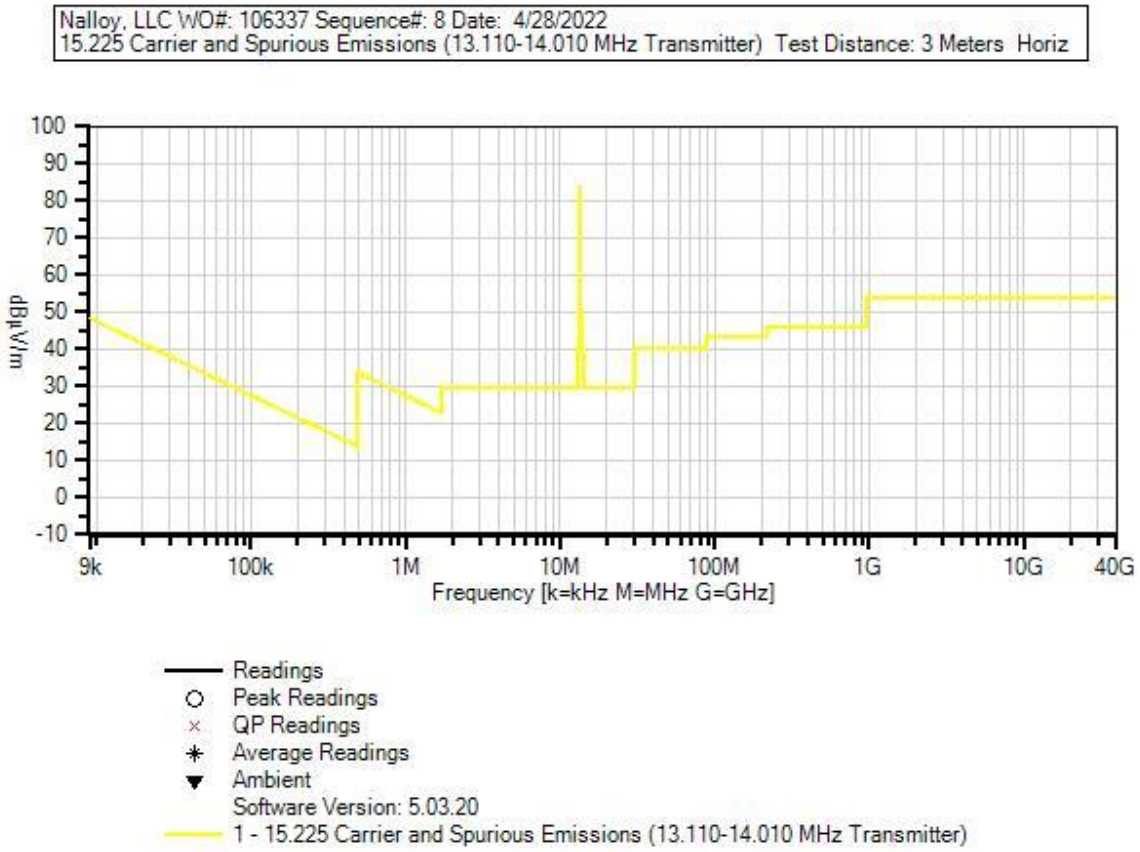
Method: ANSI C63.10: 2013

Frequency range: 9k-30MHz:

Setup:
Gala units (with new matching network) NFC transmitting at 13.56MHz.
Investigated a single as well as 2 units transmitting simultaneously, worst case reported.
(Only 1 unit to be connected/transmits at a time for normal use case)

XYZ EUT axes investigated, 3 x orthogonal measurement antenna axes investigated, worst case reported.

NFC A mode as worst case after also investigated NFC B and NFC F



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	19.582M	21.8	+0.1	+0.2	+7.4		-40.0	-10.5	29.5	-40.0	Horiz
2	27.821M	20.0	+0.1	+0.3	+5.2		-40.0	-14.4	29.5	-43.9	Horiz

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425-402-1717		
Customer:	**Nalloy, LLC**		
Specification:	**15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**		
Work Order #:	**106337**	Date:	4/28/2022
Test Type:	**Maximized Emissions**	Time:	10:43:27 AM
Tested By:	Matt Harrison	Sequence#:	3
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 44%
Pressure: 102.1kPa

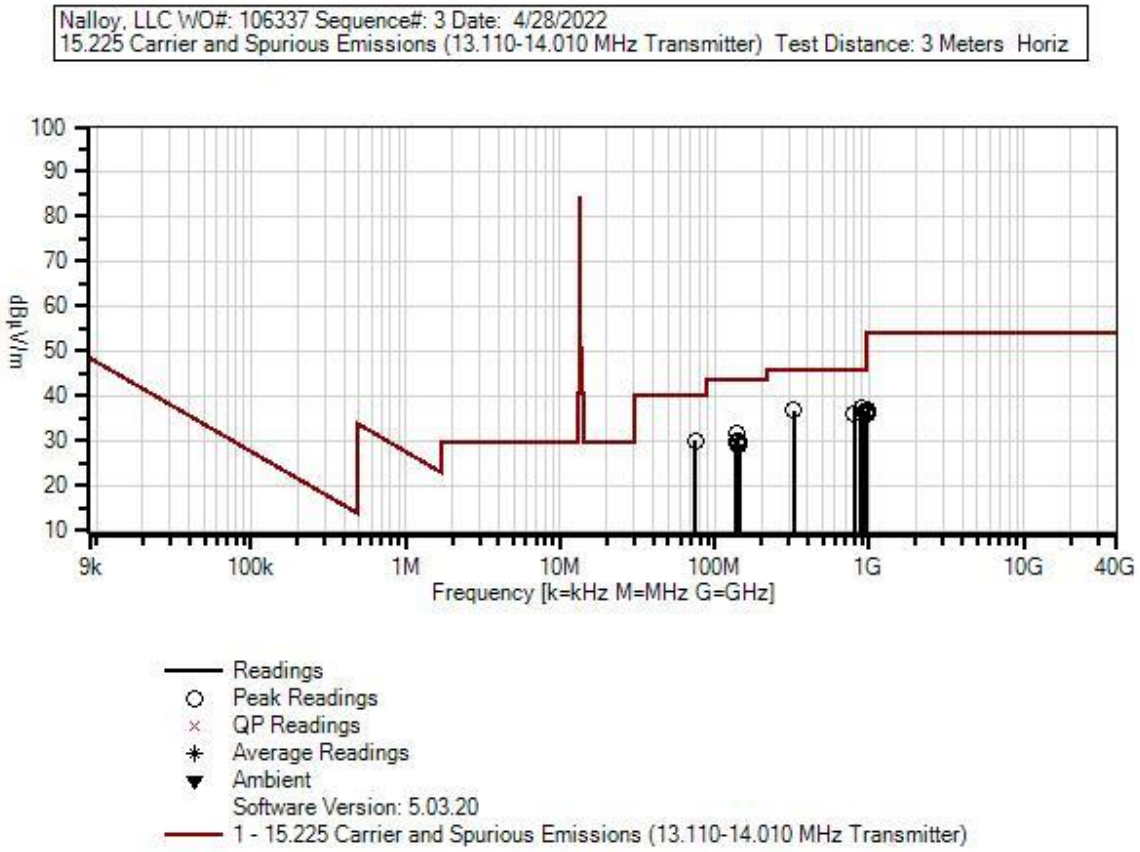
Method: ANSI C63.10: 2013

Frequency range: 30-1000MHz

Setup:
Gala units (with new matching network) NFC transmitting at 13.56MHz.
Investigated a single as well as 2 units transmitting simultaneously, worst case reported.
(Only 1 unit to be connected/transmits at a time for normal use case)

XYZ EUT axes investigated, 3 x orthogonal measurement antenna axes investigated, worst case reported.

NFC A mode as worst case after also investigated NFC B and NFC F



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T4	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T5	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	900.993M	30.8	+0.3 +29.6	+1.6	-27.4	+2.3	+0.0	37.2	46.0	-8.8	Horiz
2	322.375M	42.2	+0.2 +19.2	+0.9	-27.0	+1.2	+0.0	36.7	46.0	-9.3	Horiz
3	954.920M	28.1	+0.3 +31.0	+1.7	-27.2	+2.4	+0.0	36.3	46.0	-9.7	Horiz
4	74.588M	43.9	+0.1 +12.8	+0.4	-27.8	+0.5	+0.0	29.9	40.0	-10.1	Horiz
5	881.893M	30.2	+0.3 +28.9	+1.6	-27.4	+2.3	+0.0	35.9	46.0	-10.1	Horiz
6	797.569M	30.5	+0.3 +29.1	+1.5	-27.7	+2.2	+0.0	35.9	46.0	-10.1	Horiz
7	937.952M	27.7	+0.3 +31.1	+1.6	-27.3	+2.4	+0.0	35.8	46.0	-10.2	Horiz
8	139.192M	43.6	+0.1 +14.0	+0.6	-27.6	+0.8	+0.0	31.5	43.5	-12.0	Horiz
9	141.234M	42.0	+0.1 +13.9	+0.6	-27.6	+0.8	+0.0	29.8	43.5	-13.7	Horiz
10	138.471M	41.8	+0.1 +14.0	+0.6	-27.6	+0.8	+0.0	29.7	43.5	-13.8	Horiz
11	136.909M	41.6	+0.1 +14.0	+0.6	-27.6	+0.7	+0.0	29.4	43.5	-14.1	Horiz
12	143.276M	41.4	+0.1 +13.9	+0.6	-27.6	+0.8	+0.0	29.2	43.5	-14.3	Horiz
13	968.381M	28.9	+0.3 +30.5	+1.7	-27.2	+2.5	+0.0	36.7	54.0	-17.3	Horiz
14	963.936M	28.4	+0.3 +30.6	+1.7	-27.2	+2.5	+0.0	36.3	54.0	-17.7	Horiz
15	965.439M	28.4	+0.3 +30.5	+1.7	-27.2	+2.5	+0.0	36.2	54.0	-17.8	Horiz

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425-402-1717		
Customer:	**Nalloy, LLC**		
Specification:	**15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**		
Work Order #:	**106337**	Date:	4/28/2022
Test Type:	**Maximized Emissions**	Time:	10:42:02
Tested By:	Matt Harrison	Sequence#:	2
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 44%
Pressure: 102.1kPa

Method: ANSI C63.10: 2013

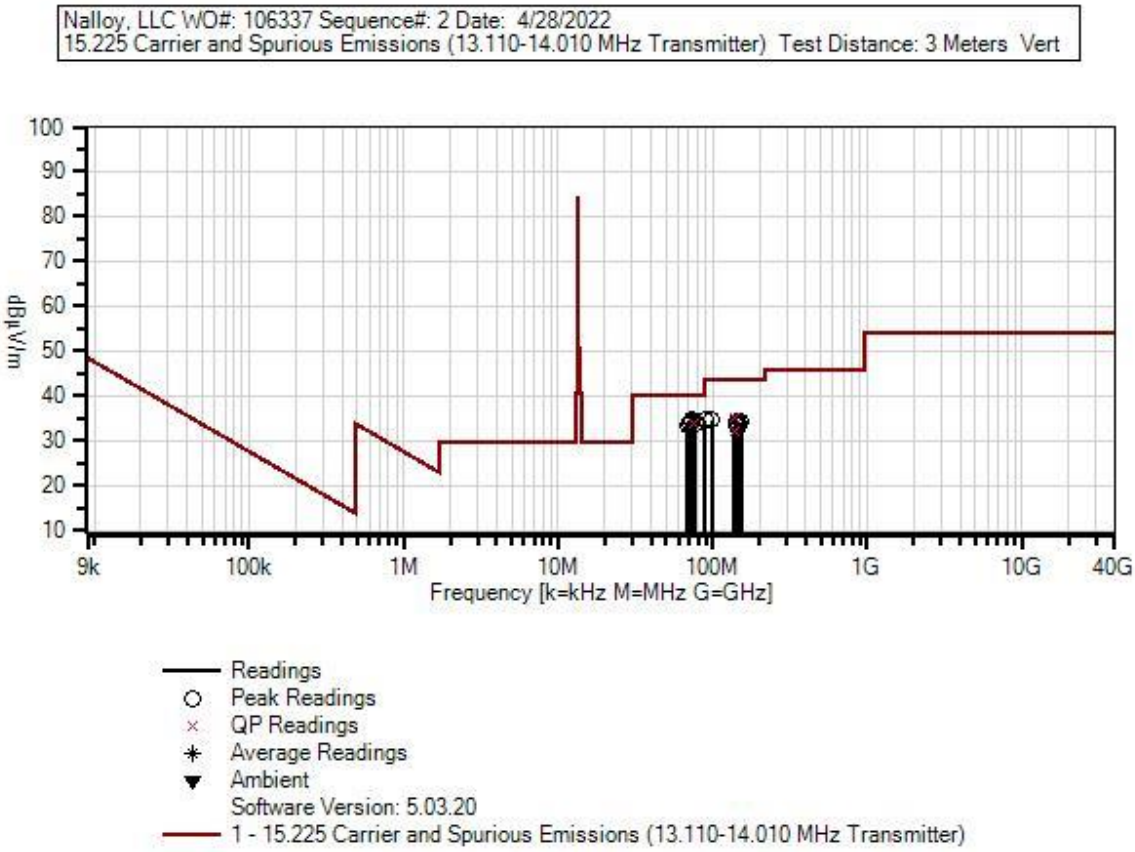
Frequency range: 30-1000MHz

Setup:

Gala units (with new matching network) NFC transmitting at 13.56MHz.
Investigated a single as well as 2 units transmitting simultaneously, worst case reported.
(Only 1 unit to be connected/transmits at a time for normal use case)

XYZ EUT axes investigated, 3 x orthogonal measurement antenna axes investigated, worst case reported.

NFC A mode as worst case after also investigated NFC B and NFC F



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T4	ANP05360	Cable	RG214	2/4/2022	2/4/2024
T5	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023

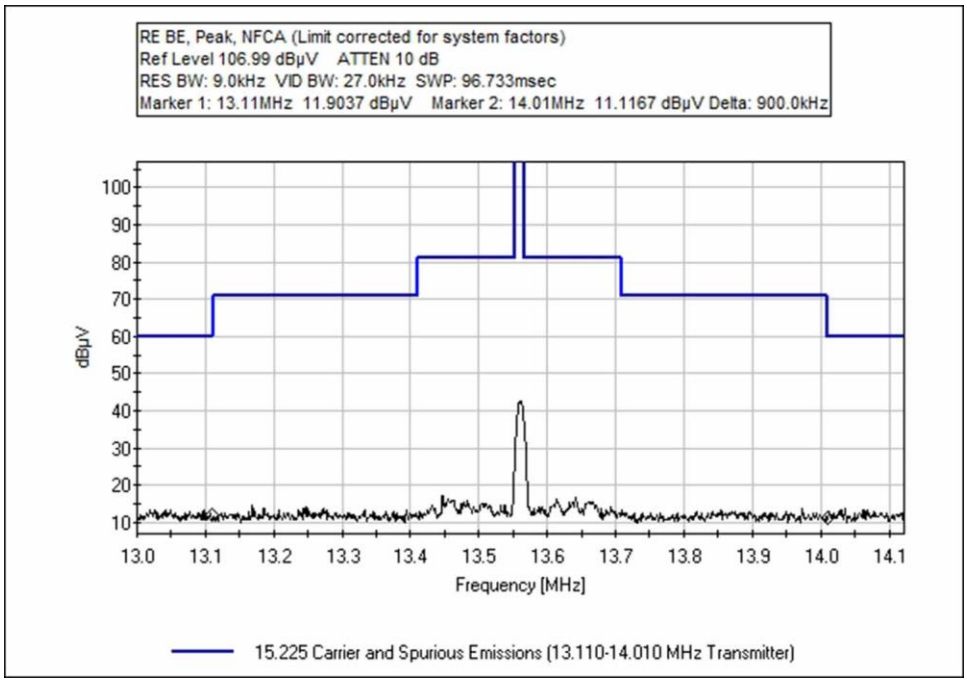
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	73.190M	48.4	+0.1 +12.9	+0.4	-27.8	+0.5	+0.0	34.5	40.0	-5.5	Vert
2	73.922M	48.4	+0.1 +12.8	+0.4	-27.8	+0.5	+0.0	34.4	40.0	-5.6	Vert
3	70.861M	47.9	+0.1 +12.9	+0.4	-27.8	+0.5	+0.0	34.0	40.0	-6.0	Vert
4	77.183M	47.6	+0.1 +12.7	+0.5	-27.8	+0.6	+0.0	33.7	40.0	-6.3	Vert
5	74.574M QP	47.6	+0.1 +12.8	+0.4	-27.8	+0.5	+0.0	33.6	40.0	-6.4	Vert
^	74.574M	51.1	+0.1 +12.8	+0.4	-27.8	+0.5	+0.0	37.1	40.0	-2.9	Vert
7	69.064M	47.3	+0.1 +12.9	+0.4	-27.8	+0.5	+0.0	33.4	40.0	-6.6	Vert
8	139.214M QP	47.1	+0.1 +14.0	+0.6	-27.6	+0.8	+0.0	35.0	43.5	-8.5	Vert
^	139.214M	49.9	+0.1 +14.0	+0.6	-27.6	+0.8	+0.0	37.8	43.5	-5.7	Vert
10	98.471M	47.5	+0.1 +13.6	+0.5	-27.7	+0.6	+0.0	34.6	43.5	-8.9	Vert
11	88.829M	48.6	+0.1 +12.6	+0.5	-27.8	+0.6	+0.0	34.6	43.5	-8.9	Vert
12	143.276M	46.5	+0.1 +13.9	+0.6	-27.6	+0.8	+0.0	34.3	43.5	-9.2	Vert
13	151.564M	44.7	+0.1 +15.4	+0.7	-27.5	+0.8	+0.0	34.2	43.5	-9.3	Vert
14	148.080M	45.3	+0.1 +14.5	+0.6	-27.5	+0.8	+0.0	33.8	43.5	-9.7	Vert
15	141.234M	45.7	+0.1 +13.9	+0.6	-27.6	+0.8	+0.0	33.5	43.5	-10.0	Vert
16	145.198M	45.4	+0.1 +14.0	+0.6	-27.6	+0.8	+0.0	33.3	43.5	-10.2	Vert
17	138.414M QP	44.1	+0.1 +14.0	+0.6	-27.6	+0.8	+0.0	32.0	43.5	-11.5	Vert
^	138.414M	46.8	+0.1 +14.0	+0.6	-27.6	+0.8	+0.0	34.7	43.5	-8.8	Vert

Band Edge

Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @30m)**	**Limit (dBuV/m @30m)**	**Results**
13.110	NFC A	Loop	-18.6	≤29.5	Pass
14.010	NFC A	Loop	-19.4	≤29.5	Pass

Band Edge Plots



Test Setup / Conditions / Data

Test Location: CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425-402-1717
Customer: **Nalloy, LLC**
Specification: **15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**
Work Order #: **106337** Date: 4/28/2022
Test Type: **Maximized Emissions** Time: 14:34:26
Tested By: Matt Harrison Sequence#: 10
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:

Environmental Conditions:
Temperature: 21°C
Humidity: 44%
Pressure: 102.1kPa

Method: ANSI C63.10: 2013

Frequency range: Fundamental

Setup:
Gala units (with new matching network) NFC transmitting at 13.56MHz.
Investigated a single as well as 2 units transmitting simultaneously, worst case reported.
(Only 1 unit to be connected/transmits at a time for normal use case)

XYZ EUT axes investigated, 3 x orthogonal measurement antenna axes investigated, worst case reported.

NFC A mode as worst case after also investigated NFC B and NFC F

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02673	Spectrum Analyzer	E4446A	2/3/2021	2/3/2023
T1	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	AN00052	Loop Antenna	6502	5/4/2020	5/4/2022

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	13.110M	11.9	+0.0	+0.2	+9.3		-40.0	-18.6	29.5	-48.1	Para
2	14.010M	11.1	+0.0	+0.2	+9.3		-40.0	-19.4	29.5	-48.9	Para

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425-402-1717		
Customer:	**Nalloy, LLC**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**106337**	Date:	4/28/2022
Test Type:	**Conducted Emissions**	Time:	14:58:02
Tested By:	Matt Harrison	Sequence#:	9
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions:
Temperature: 21°C
Humidity: 44%
Pressure: 102.1kPa

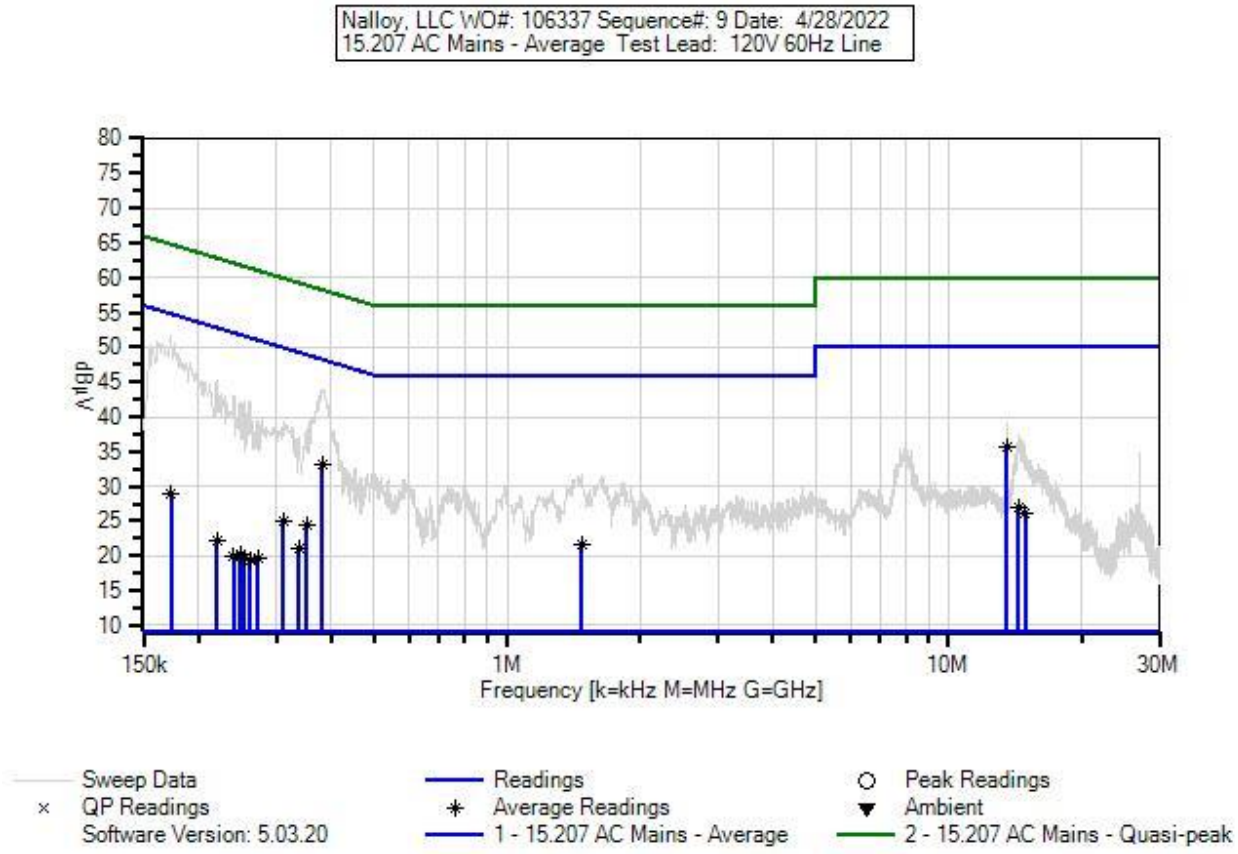
Method: ANSI C63.10: 2013

Frequency range: 150k-30MHz

Setup:
Gala units (with new matching network) NFC transmitting at 13.56MHz.
Investigated a single as well as 2 units transmitting simultaneously, worst case reported.
(Only 1 unit to be connected/transmits at a time for normal use case)

XYZ EUT axes investigated, 3 x orthogonal measurement antenna axes investigated, worst case reported.

NFC A mode as worst case after also investigated NFC B and NFC F



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06219	Attenuator	768-10	3/23/2022	3/23/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T4	AN01311	50uH LISN-Line1 (L)	3816/2	2/23/2022	2/23/2024
	AN01311	50uH LISN-Line2 (N)	3816/2	2/23/2022	2/23/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data: Reading listed by margin. Test Lead: Line

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	13.562M Ave	26.4	+9.1	+0.2	+0.0	+0.1	+0.0	35.8	50.0	-14.2	Line
^	13.562M	29.6	+9.1	+0.2	+0.0	+0.1	+0.0	39.0	50.0	-11.0	Line
3	380.524k Ave	23.8	+9.1	+0.0	+0.1	+0.1	+0.0	33.1	48.3	-15.2	Line
^	380.524k	34.7	+9.1	+0.0	+0.1	+0.1	+0.0	44.0	48.3	-4.3	Line
5	14.400M Ave	17.7	+9.1	+0.2	+0.0	+0.1	+0.0	27.1	50.0	-22.9	Line
^	14.400M	27.9	+9.1	+0.2	+0.0	+0.1	+0.0	37.3	50.0	-12.7	Line
7	14.887M Ave	16.8	+9.1	+0.2	+0.0	+0.1	+0.0	26.2	50.0	-23.8	Line
^	14.887M	26.7	+9.1	+0.2	+0.0	+0.1	+0.0	36.1	50.0	-13.9	Line
9	1.473M Ave	12.4	+9.1	+0.0	+0.1	+0.1	+0.0	21.7	46.0	-24.3	Line
^	1.473M	22.6	+9.1	+0.0	+0.1	+0.1	+0.0	31.9	46.0	-14.1	Line
11	352.163k Ave	15.2	+9.1	+0.0	+0.1	+0.1	+0.0	24.5	48.9	-24.4	Line
^	352.163k	29.0	+9.1	+0.0	+0.1	+0.1	+0.0	38.3	48.9	-10.6	Line
13	311.440k Ave	15.6	+9.1	+0.0	+0.1	+0.1	+0.0	24.9	49.9	-25.0	Line
^	311.439k	30.0	+9.1	+0.0	+0.1	+0.1	+0.0	39.3	49.9	-10.6	Line
15	173.271k Ave	19.7	+9.1	+0.0	+0.1	+0.1	+0.0	29.0	54.8	-25.8	Line
^	173.270k	42.5	+9.1	+0.0	+0.1	+0.1	+0.0	51.8	54.8	-3.0	Line
17	337.619k Ave	11.9	+9.1	+0.0	+0.1	+0.1	+0.0	21.2	49.3	-28.1	Line
^	337.619k	27.9	+9.1	+0.0	+0.1	+0.1	+0.0	37.2	49.3	-12.1	Line
19	219.812k Ave	12.8	+9.1	+0.0	+0.1	+0.1	+0.0	22.1	52.8	-30.7	Line
^	219.811k	35.9	+9.1	+0.0	+0.1	+0.1	+0.0	45.2	52.8	-7.6	Line
21	272.171k Ave	10.5	+9.1	+0.0	+0.1	+0.1	+0.0	19.8	51.1	-31.3	Line
^	272.170k	30.1	+9.1	+0.0	+0.1	+0.1	+0.0	39.4	51.1	-11.7	Line
23	248.900k Ave	10.8	+9.1	+0.0	+0.1	+0.1	+0.0	20.1	51.8	-31.7	Line

24 Ave	253.263k	10.5	+9.1	+0.0	+0.1	+0.1	+0.0	19.8	51.6	-31.8	Line
^	253.263k	32.8	+9.1	+0.0	+0.1	+0.1	+0.0	42.1	51.6	-9.5	Line
^	248.900k	32.9	+9.1	+0.0	+0.1	+0.1	+0.0	42.2	51.8	-9.6	Line
27 Ave	261.263k	10.0	+9.1	+0.0	+0.1	+0.1	+0.0	19.3	51.4	-32.1	Line
^	261.262k	33.0	+9.1	+0.0	+0.1	+0.1	+0.0	42.3	51.4	-9.1	Line
29 Ave	240.174k	10.6	+9.1	+0.0	+0.1	+0.1	+0.0	19.9	52.1	-32.2	Line
^	240.173k	33.9	+9.1	+0.0	+0.1	+0.1	+0.0	43.2	52.1	-8.9	Line

Test Location:	CKC Laboratories, Inc. • 22116 23rd Drive SE, Suite A • Bothell, WA 98021 • 425-402-1717		
Customer:	**Nalloy, LLC**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**106337**	Date:	4/28/2022
Test Type:	**Conducted Emissions**	Time:	15:12:18
Tested By:	Matt Harrison	Sequence#:	10
Software:	EMITest 5.03.20		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Environmental Conditions:
Temperature: 21°C
Humidity: 44%
Pressure: 102.1kPa

Method: ANSI C63.10: 2013

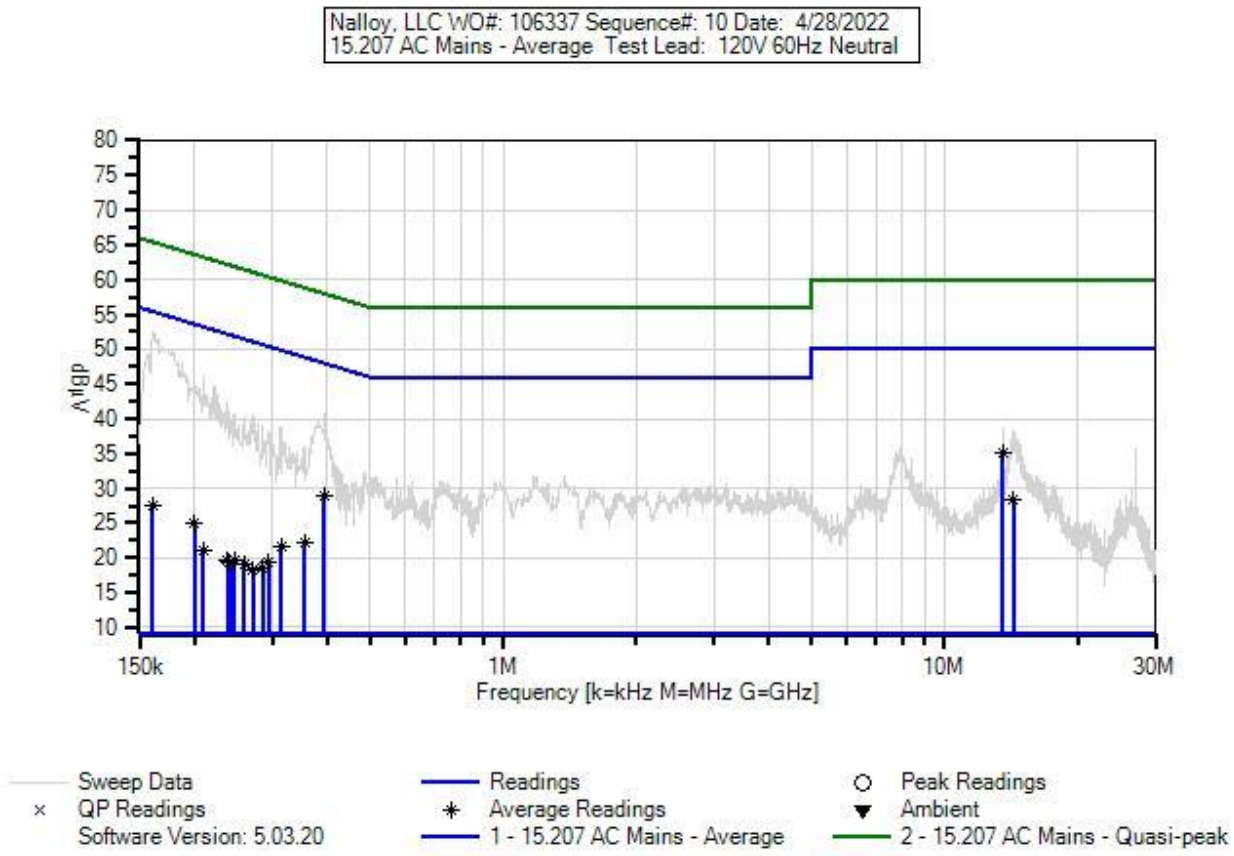
Frequency range: 150k-30MHz

Setup:

Gala units (with new matching network) NFC transmitting at 13.56MHz.
Investigated a single as well as 2 units transmitting simultaneously, worst case reported.
(Only 1 unit to be connected/transmits at a time for normal use case)

XYZ EUT axes investigated, 3 x orthogonal measurement antenna axes investigated, worst case reported.

NFC A mode as worst case after also investigated NFC B and NFC F



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06219	Attenuator	768-10	3/23/2022	3/23/2024
T2	ANP06515	Cable	Heliax	7/1/2020	7/1/2022
T3	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
	AN01311	50uH LISN-Line1 (L)	3816/2	2/23/2022	2/23/2024
T4	AN01311	50uH LISN-Line2 (N)	3816/2	2/23/2022	2/23/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023

Measurement Data: Reading listed by margin. Test Lead: Neutral

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	13.562M Ave	25.9	+9.1	+0.2	+0.0	+0.0	+0.0	35.2	50.0	-14.8	Neutr
^	13.562M	29.4	+9.1	+0.2	+0.0	+0.0	+0.0	38.7	50.0	-11.3	Neutr
3	393.614k Ave	19.6	+9.1	+0.0	+0.1	+0.1	+0.0	28.9	48.0	-19.1	Neutr
^	393.614k	31.5	+9.1	+0.0	+0.1	+0.1	+0.0	40.8	48.0	-7.2	Neutr
5	14.319M Ave	19.1	+9.1	+0.2	+0.0	+0.0	+0.0	28.4	50.0	-21.6	Neutr
^	14.319M	29.0	+9.1	+0.2	+0.0	+0.0	+0.0	38.3	50.0	-11.7	Neutr
7	355.072k Ave	12.9	+9.1	+0.0	+0.1	+0.1	+0.0	22.2	48.8	-26.6	Neutr
^	355.072k	26.8	+9.1	+0.0	+0.1	+0.1	+0.0	36.1	48.8	-12.7	Neutr
9	160.908k Ave	18.3	+9.1	+0.0	+0.1	+0.1	+0.0	27.6	55.4	-27.8	Neutr
^	160.908k	43.3	+9.1	+0.0	+0.1	+0.1	+0.0	52.6	55.4	-2.8	Neutr
11	313.621k Ave	12.2	+9.1	+0.0	+0.1	+0.1	+0.0	21.5	49.9	-28.4	Neutr
^	313.621k	29.6	+9.1	+0.0	+0.1	+0.1	+0.0	38.9	49.9	-11.0	Neutr
13	199.450k Ave	15.6	+9.1	+0.0	+0.1	+0.1	+0.0	24.9	53.6	-28.7	Neutr
^	199.450k	36.7	+9.1	+0.0	+0.1	+0.1	+0.0	46.0	53.6	-7.6	Neutr
15	294.714k Ave	10.0	+9.1	+0.0	+0.1	+0.1	+0.0	19.3	50.4	-31.1	Neutr
^	294.713k	28.9	+9.1	+0.0	+0.1	+0.1	+0.0	38.2	50.4	-12.2	Neutr
17	209.631k Ave	11.9	+9.1	+0.0	+0.1	+0.1	+0.0	21.2	53.2	-32.0	Neutr
^	209.630k	36.7	+9.1	+0.0	+0.1	+0.1	+0.0	46.0	53.2	-7.2	Neutr
19	285.260k Ave	9.2	+9.1	+0.0	+0.1	+0.1	+0.0	18.5	50.7	-32.2	Neutr
^	285.260k	29.7	+9.1	+0.0	+0.1	+0.1	+0.0	39.0	50.7	-11.7	Neutr
21	245.991k Ave	10.4	+9.1	+0.0	+0.1	+0.1	+0.0	19.7	51.9	-32.2	Neutr
^	245.991k	31.4	+9.1	+0.0	+0.1	+0.1	+0.0	40.7	51.9	-11.2	Neutr

23 Ave	259.081k	9.8	+9.1	+0.0	+0.1	+0.1	+0.0	19.1	51.5	-32.4	Neutr
^	259.080k	30.8	+9.1	+0.0	+0.1	+0.1	+0.0	40.1	51.5	-11.4	Neutr
25 Ave	237.265k	10.3	+9.1	+0.0	+0.1	+0.1	+0.0	19.6	52.2	-32.6	Neutr
26 Ave	240.174k	10.1	+9.1	+0.0	+0.1	+0.1	+0.0	19.4	52.1	-32.7	Neutr
^	237.264k	33.1	+9.1	+0.0	+0.1	+0.1	+0.0	42.4	52.2	-9.8	Neutr
^	240.173k	31.7	+9.1	+0.0	+0.1	+0.1	+0.0	41.0	52.1	-11.1	Neutr
29 Ave	271.443k	8.9	+9.1	+0.0	+0.1	+0.1	+0.0	18.2	51.1	-32.9	Neutr
^	271.443k	31.2	+9.1	+0.0	+0.1	+0.1	+0.0	40.5	51.1	-10.6	Neutr

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 dBµV/m, the spectrum analyzer reading in dBµV 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	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/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.