Nalloy, LLC

REVISED TEST REPORT TO 106997-52

JU3NF9

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.207 & 15.225
(13.110-14.010MHz)

Report No.: 106997-52A

Date of issue: November 17, 2022

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.

Test Certificate # 803.01

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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-08401347

REPORT PREPARED BY:

Kim Romero
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 106997

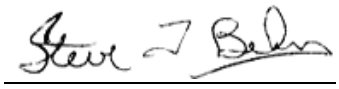
DATE OF EQUIPMENT RECEIPT: August 18, 2022
DATE(S) OF TESTING: August 18 and 22 and September 9 and 15, 2022

Revision History

Original: Testing of JU3NF9 to FCC Part 15 Subpart C Section(s) 15.207 & 15.225 (13.110-14.010MHz).
Revision A: Updated 15.225(a)-(c) Field Strength of Fundamental Test Data Summary Tables. Updated Radiated Band Edge Summary Table. Updated Datasheets throughout report.

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

Equipment Tested:

Device	Manufacturer	Model #	S/N
None	Nalloy LLC, Amazon retail LLC	JU3NF9	NA

Support Equipment:

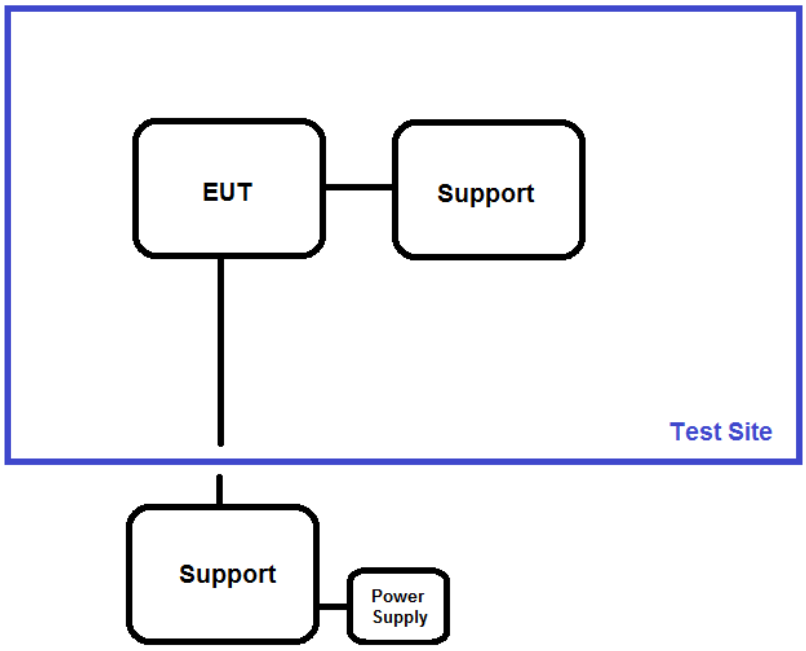
Device	Manufacturer	Model #	S/N
AC Adapter	Delta Electronics, Inc.	MDS-090AAS15B	NA
Headphones	Poly	M3-C5220T	NA
Laptop	Chuwi	CWI514	NA
USB to Ethernet Adapter	Amazon	Gigabit Ethernet Adapter	0050B6E212BA

General Product Information:

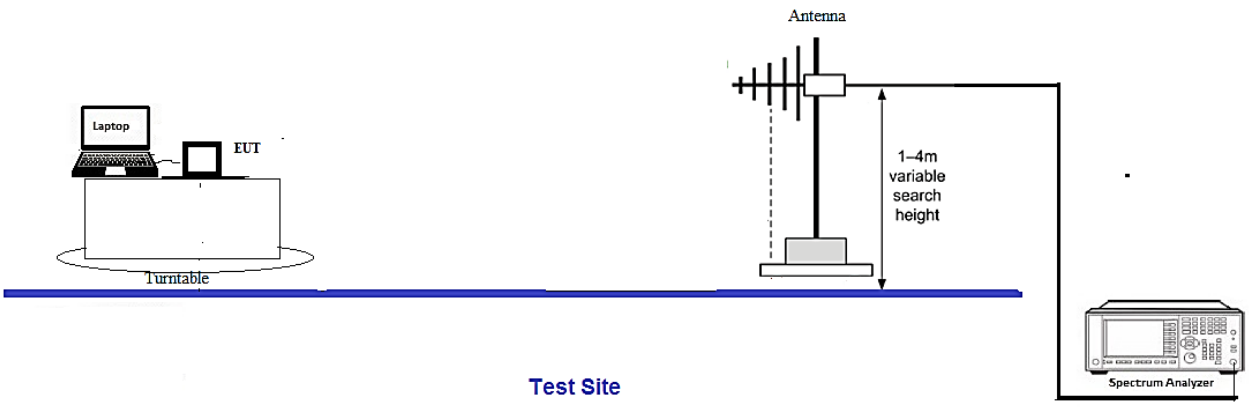
Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Modulation Type(s):	NFC, RFID
Maximum Duty Cycle:	Tested as 100%
Antenna Type(s) and Gain:	NA
Antenna Connection Type:	Integral
Nominal Input Voltage:	120VAC/60Hz
Firmware / Software used for Test:	IGT FW Version: 2229 Wisepad – WPS33.01-41027 Baxter - 1.0.62.0 RFIdeas configuration utility – 6.0.5 Putty – 0.77
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



Radiated test setup



FCC Part 15 Subpart C

15.215(c) Occupied Bandwidth (20dB BW)

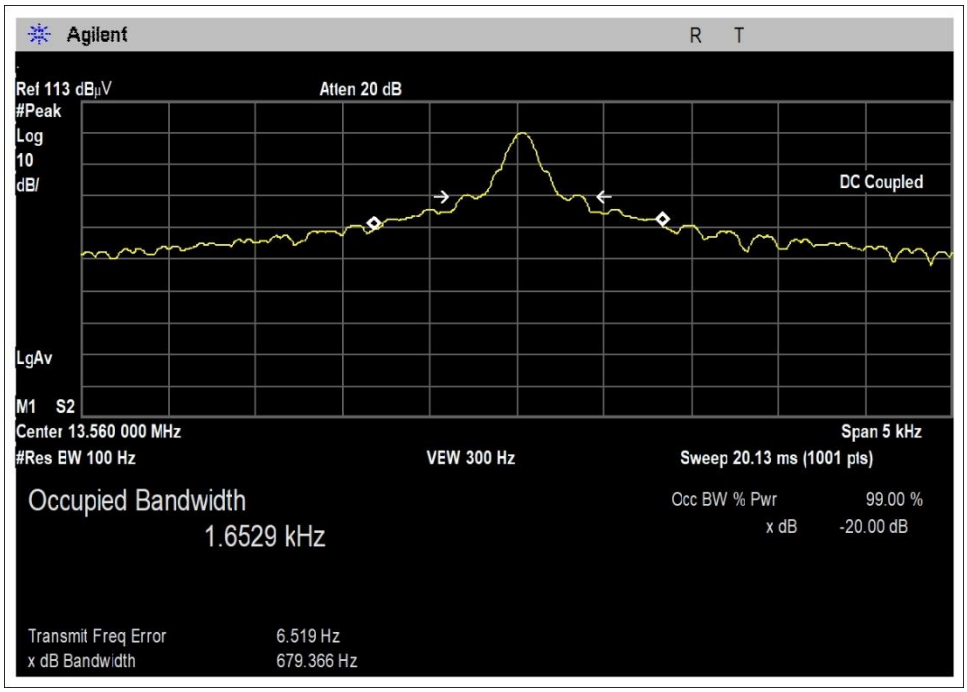
Test Setup/Conditions			
Test Location:	Bothell Lab C3	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	9/15/2022
Configuration:	1		
Test Setup:	The EUT is on a test bench inside a semi anechoic chamber. Reported data represents maximum measured emissions with both NFC and RFID transmitters operating simultaneously.		

Environmental Conditions			
Temperature (ºC)	23	Relative Humidity (%):	53

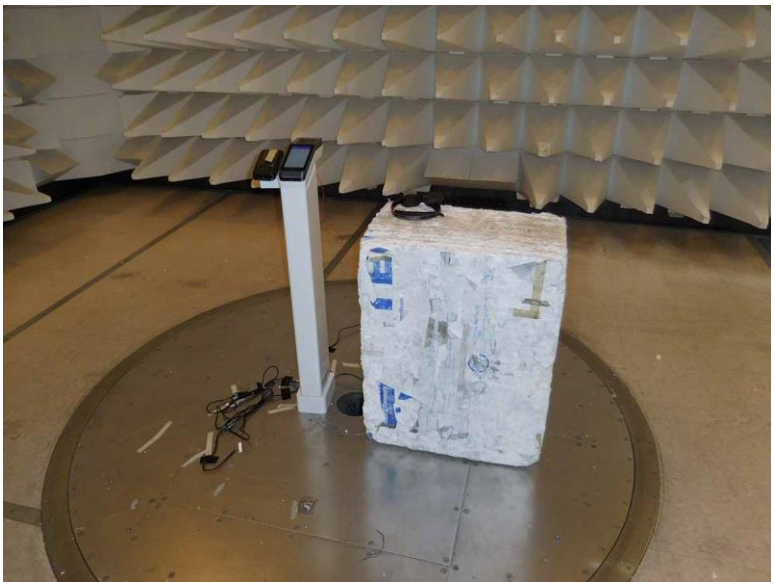
Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
00052	Loop Antenna	EMCO	6502	5/11/2022	5/11/2024
02872	Spectrum Analyzer	Agilent	E4440A	11/29/2021	11/29/2023

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (Hz)**	**Limit (Hz)**	**Results**
13.56	NA	NFC / RFID	680	None	NA

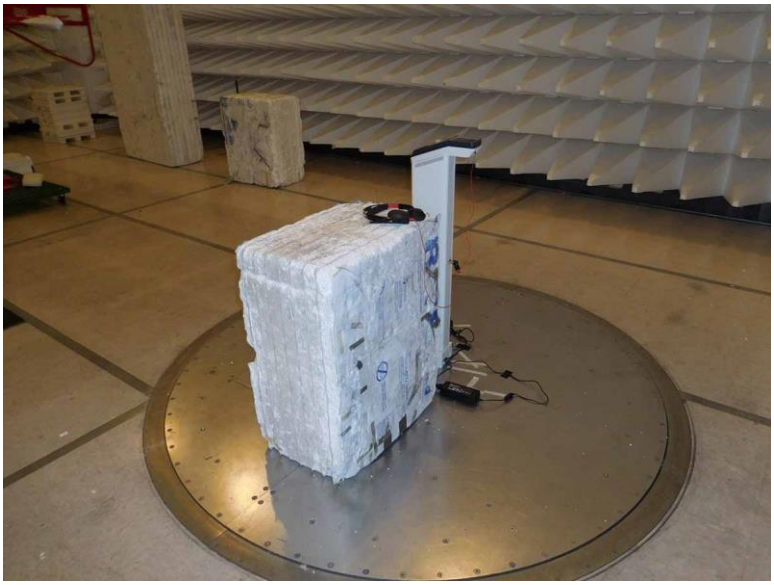
Plot(s)


Agilent
R T
Ref 113 dBµV
Atten 20 dB
#Peak
Log
10
dB/
DC Coupled
LgAv
M1 S2
Center 13.560 000 MHz
Span 5 kHz
#Res BW 100 Hz
VEW 300 Hz
Sweep 20.13 ms (1001 pts)
Occupied Bandwidth
1.6529 kHz
Occ BW % Pwr 99.00 %
x dB -20.00 dB
Transmit Freq Error 6.519 Hz
x dB Bandwidth 679.366 Hz

Test Setup Photo(s)



Below 1GHz; View 1



Below 1GHz; View 2

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

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	8/22/2022
Configuration:	1		
Test Setup:	The EUT is on a test bench inside a semi anechoic chamber. Measurements are made at 3m test distance with distance correction applied to correct to a 10m measurement. XYZ EUT axes investigated, 3 x orthogonal antenna polarities investigated, worst case reported. Reported data represents maximum measured emissions with both NFC and RFID transmitters operating simultaneously.		

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
00052	Loop Antenna	EMCO	6502	5/11/2022	5/11/2024
02872	Spectrum Analyzer	Agilent	E4440A	11/29/2021	11/29/2023

Test Data Summary - Voltage Variations					
Frequency (MHz)	**Modulation**	**$V_{Minimum}$ (dBuV/m@3m)**	**$V_{Nominal}$ (dBuV/m@3m)**	**$V_{Maximum}$ (dBuV/m@3m)**	**Max Deviation from $V_{Nominal}$ (dB)**
13.56	NFC/RFID	32.6	32.6	32.6	0.0

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

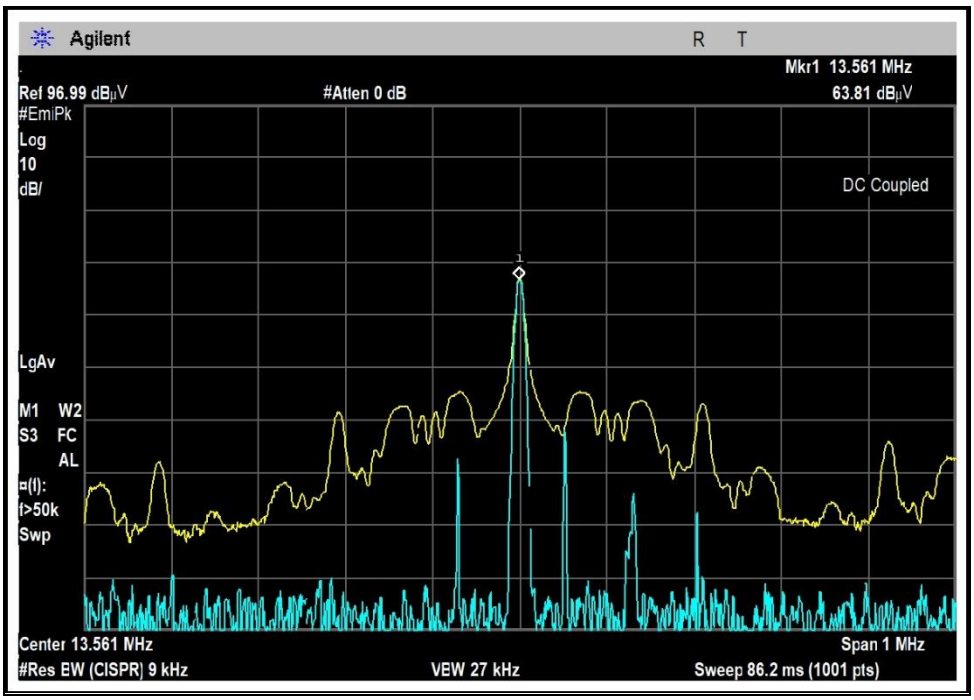
Parameter Definitions:

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 @ 3m)**	**Limit (dBuV/m @ 3m)**	**Results**
13.56	NFC/RFID	NA	32.6	≤84	Pass

Plot(s)


Agilent
R T
Mkr1 13.561 MHz
Ref 96.99 dBµV
#Atten 0 dB
63.81 dBµV
#EmiPk
Log
10
dB/
DC Coupled
LgAv
M1 W2
S3 FC
AL
ε(f):
f>50k
Swp
Center 13.561 MHz
Span 1 MHz
#Res EW (CISPR) 9 kHz
VEW 27 kHz
Sweep 86.2 ms (1001 pts)

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 #:	**106997**	Date:	8/22/2022
Test Type:	**Radiated Scan**	Time:	14:54:43
Tested By:	Matt Harrison	Sequence#:	35
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: 25°C
Humidity: 45%
Pressure: 101.4kPa

Frequency Range: 9k-30MHz

Highest Clock: 3.6GHz

Test Setup: EUT is Method: ANSI C63.4: 2013

Frequency range: 9k-30MHz

Highest Clock: 3.6 GHz

Setup:
EUT is setup in a combination of floor-standing and tabletop configuration. It is connected to a power supply, headphones, and a remote laptop via Ethernet Cable.

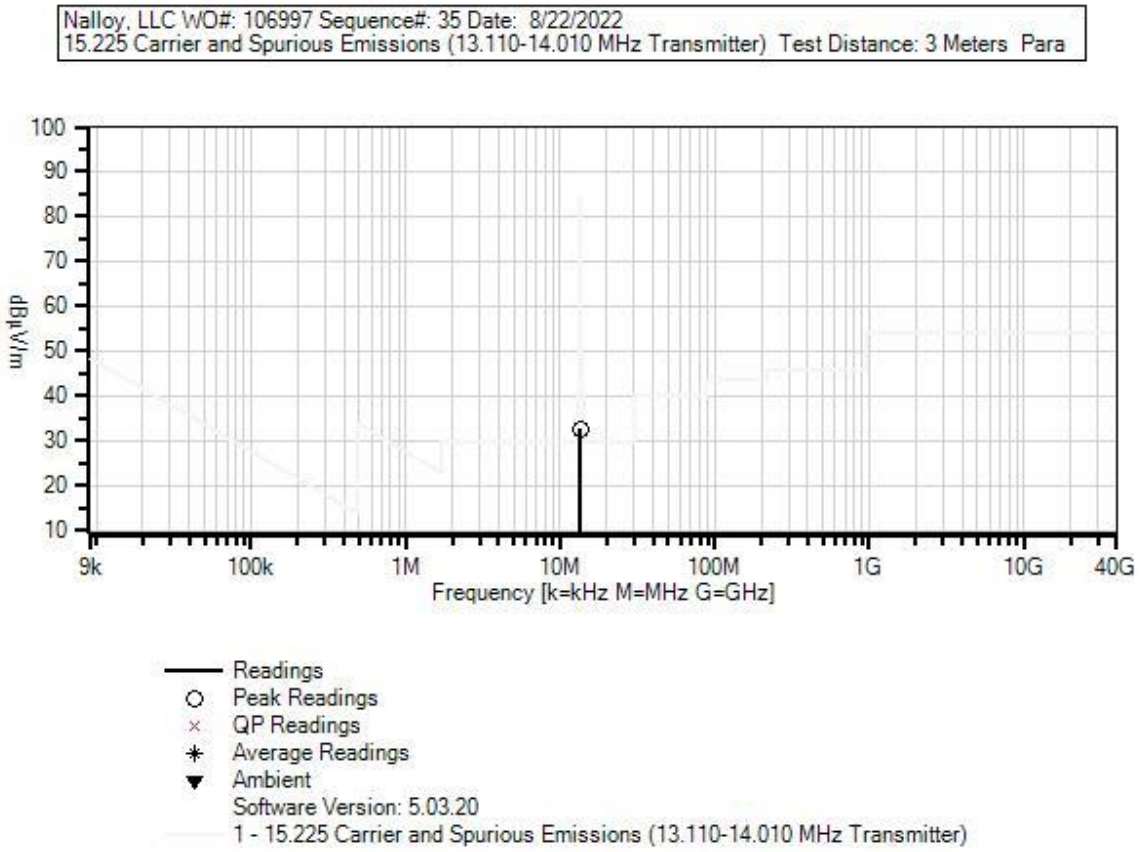
Mode 1:
Honecrisp:
Fuji- CPU DDR MMC Stress
Audio 1kHz Tone on Headphone at 100% Volume
Display Max Brightness
USB to Caramel 480Mbps

Opal: No Stressor

Caramel:
Ethernet 100Mbps
USB 2.0 x1 12Mbps to Wisepad
USB B No Stressor to Baxter

Wisepad:
Tap Mode at 13.56MHz

USB 2.0 12Mbps Baxter: Ethernet 100Mbps Prefect- Stressors on CPU DDR MMC Relay continuously cycling Tamper sensor enabled Audio over speaker playing representative tone Microphone on USB on Baxter Mass Storage devices no cable USB A to B from Baxter to Caramel No Stressor Badge Reader: On at 13.56MHz



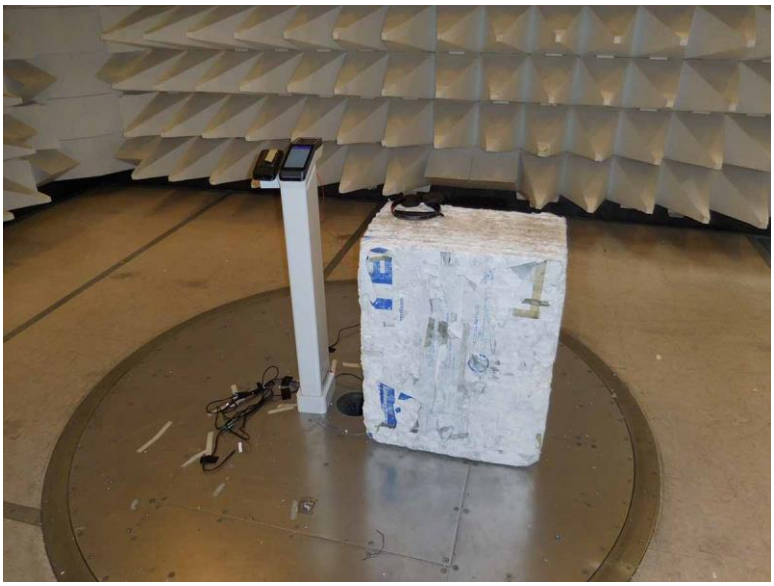
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06515	Cable	Heliax	5/23/2022	5/23/2024
T2	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T3	AN00052	Loop Antenna	6502	5/11/2022	5/11/2024

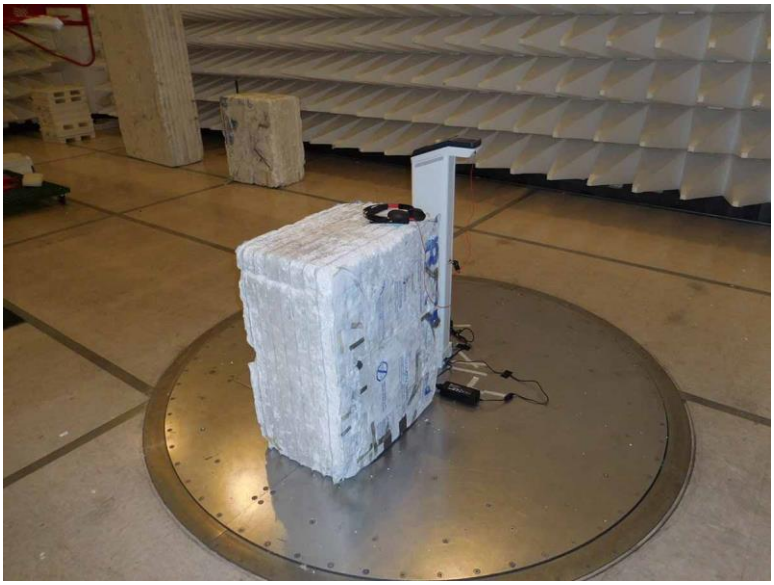
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	13.561M	63.8	+0.2	+0.0	+8.6		-40.0	32.6	84.0	-51.4	Para

Test Setup Photo(s)



Below 1GHz; View 1



Below 1GHz; View 2

15.225(e) Frequency Stability

Test Setup/Conditions			
Test Location:	Bothell Lab Bench	Test Engineer:	M. Harrison
Test Method:	ANSI C63.10 (2013)	Test Date(s):	9/9/2022
Configuration:	1		
Test Setup:	EUT is setup in a temperature chamber.		

Environmental Conditions			
Temperature (ºC)	22	Relative Humidity (%):	48

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02673	Spectrum Analyzer	Agilent	E4446A	2/3/2021	2/3/2023
03029	Thermometer, Digital Infrared	Fluke	566	3/11/2021	3/11/2023
D06024	Walk-In Temp/Humidity Chamber	Hastest	HPCH(R1.5)-2600NSUH	NCR	NCR

NCR = No Calibration Required

Test Data Summary Card Reader

Temperature (ºC)	Voltage	Frequency (MHz)	Deviation (%)	Limit (%)	Results
-20	$V_{Nominal}$	13.5603	0.0014	±0.01	Pass
-10	$V_{Nominal}$	13.5605	0.0000	±0.01	
0	$V_{Nominal}$	13.5605	0.0000	±0.01	
10	$V_{Nominal}$	13.5604	0.0007	±0.01	
20	$V_{Minimum}$	13.5605	0.0000	±0.01	
20	$V_{Nominal}$	13.5605	0.0000	±0.01	
20	$V_{Maximum}$	13.5605	0.0000	±0.01	
30	$V_{Nominal}$	13.5603	0.0014	±0.01	
40	$V_{Nominal}$	13.5604	0.0007	±0.01	
50	$V_{Nominal}$	13.5604	0.0007	±0.01	
Nominal Frequency:		13.560500			

Test Data Summary Badge Reader

Temperature (ºC)	Voltage	Frequency (MHz)	Deviation (%)	Limit (%)	Results
-20	$V_{Nominal}$	13.5600	0.00	±0.01	Pass
-10	$V_{Nominal}$	13.5600	0.00	±0.01	
0	$V_{Nominal}$	13.5600	0.00	±0.01	
10	$V_{Nominal}$	13.5600	0.00	±0.01	
20	$V_{Minimum}$	13.5600	0.00	±0.01	
20	$V_{Nominal}$	13.5600	0.00	±0.01	
20	$V_{Maximum}$	13.5600	0.00	±0.01	
30	$V_{Nominal}$	13.5600	0.00	±0.01	
40	$V_{Nominal}$	13.5600	0.00	±0.01	
50	$V_{Nominal}$	13.5600	0.00	±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

Test Setup Photo(s)

Inside View

Outside View

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 • 1-800-500-4EMC		
Customer:	**Nalloy, LLC**		
Specification:	**15.225 Carrier and Spurious Emissions (13.110-14.010 MHz Transmitter)**		
Work Order #:	**106997**	Date:	9/15/2022
Test Type:	**Radiated Scan**	Time:	08:32:11
Tested By:	Matt Harrison	Sequence#:	38
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: 25°C
Humidity: 45%
Pressure: 101.4kPa

Method: ANSI C63.4: 2013

Frequency range: 9k-1000MHz

Highest Clock: 3.6 GHz

Setup:
EUT is setup in a combination of floor-standing and tabletop configuration. It is connected to a power supply, headphones, and a remote laptop via Ethernet Cable.

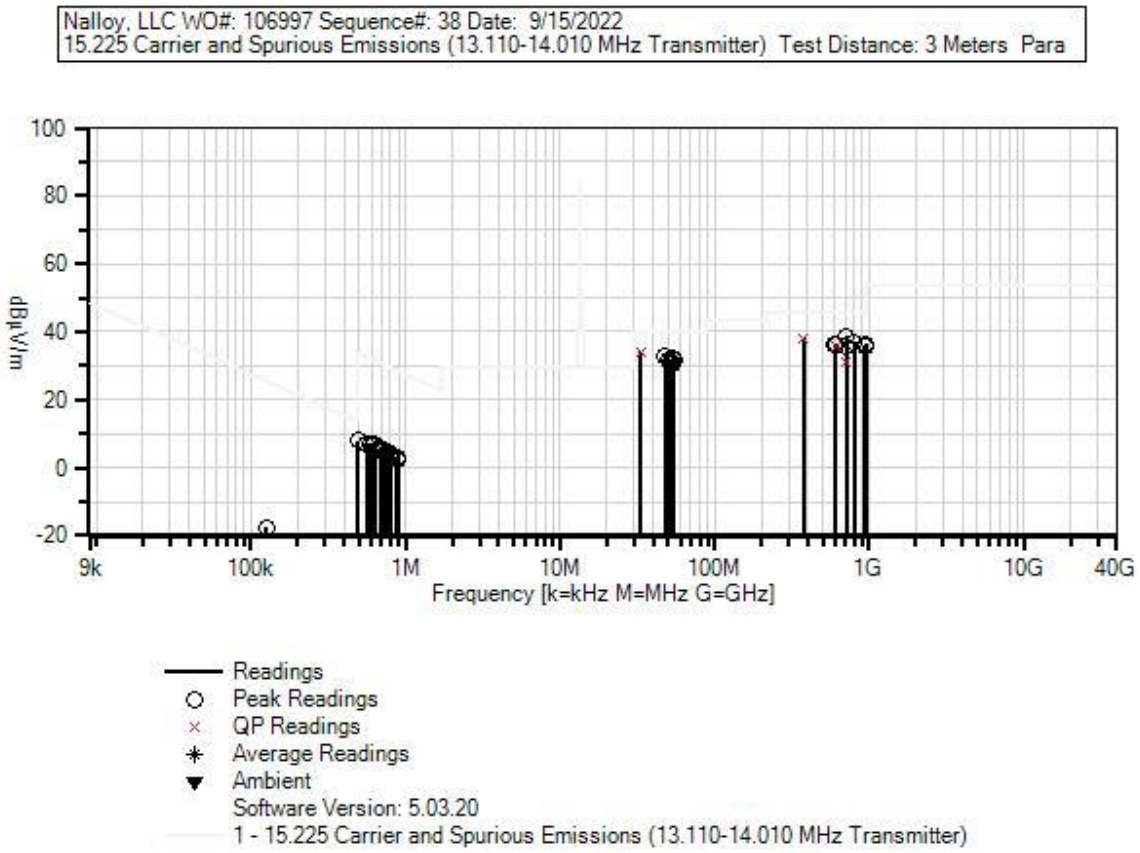
Mode 1:
Honecrisp:
Fuji- CPU DDR MMC Stress
Audio 1kHz Tone on Headphone at 100% Volume
Display Max Brightness
USB to Caramel 480Mbps

Opal: No Stressor

Caramel:
Ethernet 100Mbps
USB 2.0 x1 12Mbps to Wisepad
USB B No Stressor to Baxter

Wisepad:

Tap Mode at 13.56MHz USB 2.0 12Mbps Baxter: Ethernet 100Mbps Prefect- Stressors on CPU DDR MMC Relay continuously cycling Tamper sensor enabled Audio over speaker playing representative tone Microphone on USB on Baxter Mass Storage devices no cable USB A to B from Baxter to Caramel No Stressor Badge Reader: On at 13.56MHz



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
T2	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T3	AN00052	Loop Antenna	6502	5/11/2022	5/11/2024
T4	ANP05305	Cable	ETSI-50T	9/15/2021	9/15/2023
T5	AN02307	Preamp	8447D	1/6/2022	1/6/2024
T6	AN03628	Biconilog Antenna	3142E	6/3/2021	6/3/2023
T7	ANP05360	Cable	RG214	2/4/2022	2/4/2024

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

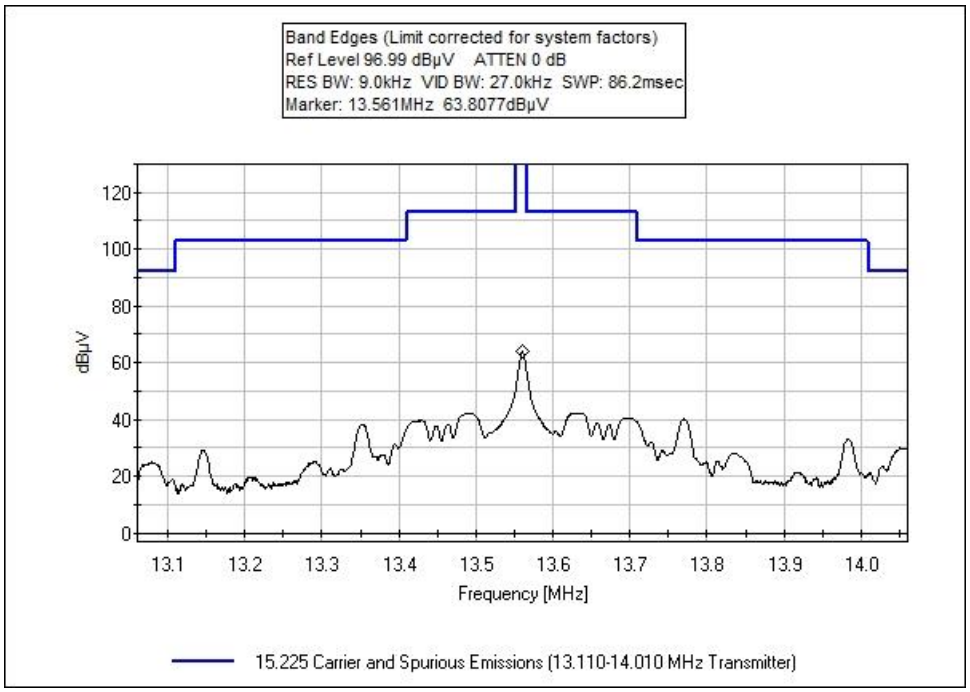
#	Freq	Rdng	T1 T5	T2 T6	T3 T7	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	33.395M	41.5	+0.1	+0.0	+0.0	+0.3	+0.0	34.0	40.0	-6.0	Vert
	QP		-27.8	+19.5	+0.4						
^	33.395M	45.1	+0.1	+0.0	+0.0	+0.3	+0.0	37.6	40.0	-2.4	Vert
			-27.8	+19.5	+0.4						
3	47.968M	47.1	+0.1	+0.0	+0.0	+0.3	+0.0	33.0	40.0	-7.0	Vert
			-27.8	+12.8	+0.5						
4	710.002M	34.4	+0.3	+0.0	+0.0	+1.3	+0.0	38.6	46.0	-7.4	Vert
			-27.9	+28.4	+2.1						
5	53.558M	47.0	+0.1	+0.0	+0.0	+0.3	+0.0	32.4	40.0	-7.6	Vert
			-27.8	+12.3	+0.5						
6	374.991M	41.4	+0.2	+0.0	+0.0	+1.0	+0.0	38.2	46.0	-7.8	Vert
	QP		-27.4	+21.7	+1.3						
^	374.991M	43.8	+0.2	+0.0	+0.0	+1.0	+0.0	40.6	46.0	-5.4	Vert
			-27.4	+21.7	+1.3						
8	54.024M	46.5	+0.1	+0.0	+0.0	+0.3	+0.0	31.9	40.0	-8.1	Vert
			-27.8	+12.3	+0.5						
9	50.431M	46.2	+0.1	+0.0	+0.0	+0.3	+0.0	31.7	40.0	-8.3	Vert
			-27.8	+12.4	+0.5						
10	50.098M	46.1	+0.1	+0.0	+0.0	+0.3	+0.0	31.6	40.0	-8.4	Vert
			-27.8	+12.4	+0.5						
11	50.896M	46.1	+0.1	+0.0	+0.0	+0.3	+0.0	31.5	40.0	-8.5	Vert
			-27.8	+12.3	+0.5						
12	52.094M	45.8	+0.1	+0.0	+0.0	+0.3	+0.0	31.2	40.0	-8.8	Vert
			-27.8	+12.3	+0.5						
13	803.695M	31.5	+0.3	+0.0	+0.0	+1.4	+0.0	36.9	46.0	-9.1	Vert
			-27.7	+29.2	+2.2						
14	803.095M	31.5	+0.3	+0.0	+0.0	+1.4	+0.0	36.9	46.0	-9.1	Vert
			-27.7	+29.2	+2.2						
15	796.248M	31.6	+0.3	+0.0	+0.0	+1.4	+0.0	36.9	46.0	-9.1	Vert
			-27.7	+29.1	+2.2						
16	53.026M	45.3	+0.1	+0.0	+0.0	+0.3	+0.0	30.7	40.0	-9.3	Vert
			-27.8	+12.3	+0.5						
17	608.981M	34.2	+0.3	+0.0	+0.0	+1.2	+0.0	36.4	47.0	-10.6	Horiz
			-28.1	+26.9	+1.9						
18	950.976M	28.3	+0.3	+0.0	+0.0	+1.5	+0.0	36.4	47.0	-10.6	Horiz
			-27.2	+31.1	+2.4						
19	596.969M	34.3	+0.3	+0.0	+0.0	+1.2	+0.0	36.0	47.0	-11.0	Horiz
			-28.1	+26.4	+1.9						
20	952.416M	27.9	+0.3	+0.0	+0.0	+1.5	+0.0	36.0	47.0	-11.0	Horiz
			-27.2	+31.1	+2.4						
21	710.963M	31.7	+0.3	+0.0	+0.0	+1.3	+0.0	35.9	47.0	-11.1	Horiz
			-27.9	+28.4	+2.1						
22	711.323M	31.6	+0.3	+0.0	+0.0	+1.3	+0.0	35.8	47.0	-11.2	Horiz
			-27.9	+28.4	+2.1						
23	938.954M	27.8	+0.3	+0.0	+0.0	+1.5	+0.0	35.8	47.0	-11.2	Horiz
			-27.3	+31.1	+2.4						

24	602.995M	33.6	+0.3	+0.0	+0.0	+1.2	+0.0	35.5	47.0	-11.5	Horiz
	QP		-28.1	+26.6	+1.9						
^	602.995M	35.7	+0.3	+0.0	+0.0	+1.2	+0.0	37.6	47.0	-9.4	Horiz
			-28.1	+26.6	+1.9						
26	711.782M	27.2	+0.3	+0.0	+0.0	+1.3	+0.0	31.3	46.0	-14.7	Vert
	QP		-27.9	+28.3	+2.1						
^	711.782M	36.2	+0.3	+0.0	+0.0	+1.3	+0.0	40.3	46.0	-5.7	Vert
			-27.9	+28.3	+2.1						
28	775.119k	35.2	+0.1	+0.0	+9.6	+0.0	-40.0	4.9	29.8	-24.9	Para
			+0.0	+0.0	+0.0						
29	630.861k	37.2	+0.1	+0.0	+9.4	+0.0	-40.0	6.7	31.6	-24.9	Para
			+0.0	+0.0	+0.0						
30	689.401k	36.2	+0.1	+0.0	+9.5	+0.0	-40.0	5.8	30.8	-25.0	Para
			+0.0	+0.0	+0.0						
31	704.036k	35.9	+0.1	+0.0	+9.5	+0.0	-40.0	5.5	30.6	-25.1	Para
			+0.0	+0.0	+0.0						
32	714.489k	35.8	+0.1	+0.0	+9.5	+0.0	-40.0	5.4	30.5	-25.1	Para
			+0.0	+0.0	+0.0						
33	597.410k	37.5	+0.1	+0.0	+9.4	+0.0	-40.0	7.0	32.1	-25.1	Para
			+0.0	+0.0	+0.0						
34	559.777k	37.7	+0.1	+0.0	+9.4	+0.0	-40.0	7.2	32.6	-25.4	Para
			+0.0	+0.0	+0.0						
35	798.117k	34.2	+0.1	+0.0	+9.6	+0.0	-40.0	3.9	29.5	-25.6	Para
			+0.0	+0.0	+0.0						
36	494.965k	38.7	+0.1	+0.0	+9.3	+0.0	-40.0	8.1	33.7	-25.6	Para
			+0.0	+0.0	+0.0						
37	745.850k	34.8	+0.1	+0.0	+9.5	+0.0	-40.0	4.4	30.1	-25.7	Para
			+0.0	+0.0	+0.0						
38	791.845k	34.0	+0.1	+0.0	+9.6	+0.0	-40.0	3.7	29.6	-25.9	Para
			+0.0	+0.0	+0.0						
39	873.382k	33.1	+0.1	+0.0	+9.6	+0.0	-40.0	2.8	28.7	-25.9	Para
			+0.0	+0.0	+0.0						
40	693.582k	35.3	+0.1	+0.0	+9.5	+0.0	-40.0	4.9	30.8	-25.9	Para
			+0.0	+0.0	+0.0						
41	890.108k	32.9	+0.1	+0.0	+9.6	+0.0	-40.0	2.6	28.6	-26.0	Para
			+0.0	+0.0	+0.0						
42	808.571k	33.6	+0.1	+0.0	+9.6	+0.0	-40.0	3.3	29.4	-26.1	Para
			+0.0	+0.0	+0.0						
43	124.997k	53.0	+0.1	+0.0	+9.3	+0.0	-80.0	-17.6	25.7	-43.3	Para
			+0.0	+0.0	+0.0						

Band Edge

Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @30m)**	**Limit (dBuV/m @30m)**	**Results**
13.110	NCF / RFID	NA	-11.6	≤29.5	Pass
14.010	NCF / RFID	NA	-11.2	≤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 #:	**106997**	Date:	8/22/2022
Test Type:	**Radiated Scan**	Time:	14:54:43
Tested By:	Matt Harrison	Sequence#:	35
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: 25°C
Humidity: 45%
Pressure: 101.4kPa

Method: ANSI C63.4: 2013

Frequency range: 9k-30MHz

Highest Clock: 3.6 GHz

Setup:
EUT is setup in a combination of floor-standing and tabletop configuration. It is connected to a power supply, headphones, and a remote laptop via Ethernet Cable.

Mode 1:
Honecrisp:
Fuji- CPU DDR MMC Stress
Audio 1kHz Tone on Headphone at 100% Volume
Display Max Brightness
USB to Caramel 480Mbps

Opal: No Stressor

Caramel:
Ethernet 100Mbps
USB 2.0 x1 12Mbps to Wisepad
USB B No Stressor to Baxter

Wisepad:
Tap Mode at 13.56MHz
USB 2.0 12Mbps

Baxter:
Ethernet 100Mbps
Prefect- Stressors on CPU DDR MMC
Relay continuously cycling
Tamper sensor enabled
Audio over speaker playing representative tone
Microphone on
USB on Baxter Mass Storage devices no cable
USB A to B from Baxter to Caramel No Stressor

Badge Reader:
On at 13.56MHz

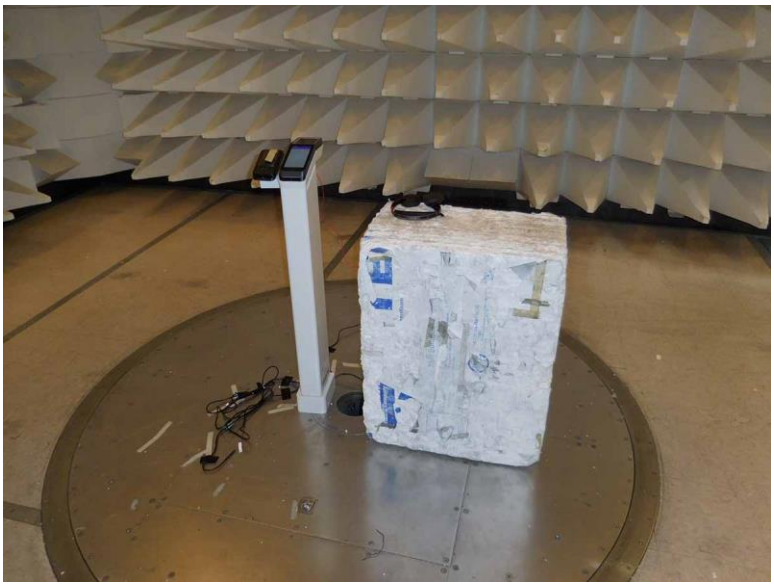
Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP06515	Cable	Heliax	5/23/2022	5/23/2024
T2	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T3	AN00052	Loop Antenna	6502	5/11/2022	5/11/2024

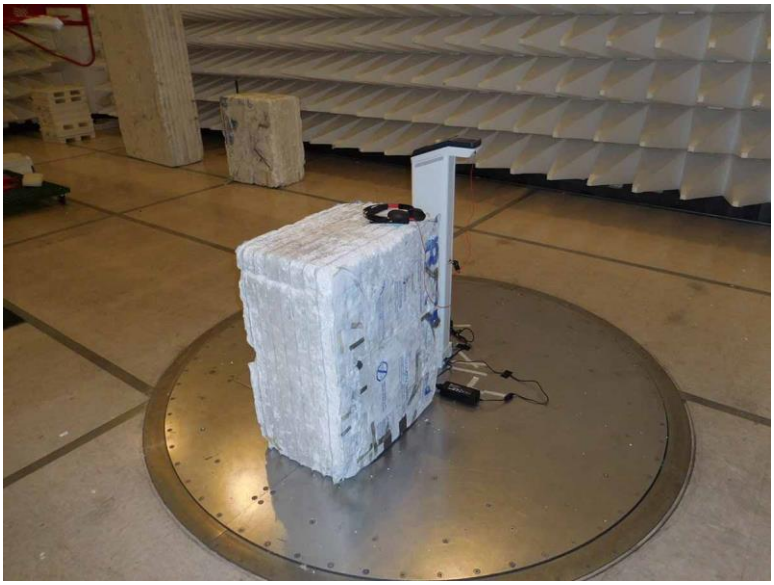
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV/m	Spec dBµV/m	Margin dB	Polar Ant
1	14.010M	20.0	+0.2	+0.0	+8.6		-40.0	-11.2	29.5	-40.7	Para
2	13.110M	19.5	+0.2	+0.0	+8.7		-40.0	-11.6	29.5	-41.1	Para
3	13.561M	63.8	+0.2	+0.0	+8.6		-40.0	32.6	84.0	-51.4	Para

Test Setup Photo(s)



Below 1GHz; View 1



Below 1GHz; View 2

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 - Quasi-peak**		
Work Order #:	**106997**	Date:	8/18/2022
Test Type:	**Conducted Emissions**	Time:	10:19:28
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:

Test Environment Conditions:
Temperature: 25°C
Humidity: 45%
Pressure: 101.4kPa

Method: ANSI C63.10: 2013

Frequency range: 150k-30MHz

Highest Clock: 3.6 GHz

Setup:
EUT is setup in a combination of floor-standing and tabletop configuration. It is connected to a power supply and a remote laptop via Ethernet Cable.

Mode 1:
Honecrisp:
Fuji- CPU DDR MMC Stress
Audio 1kHz Tone on Headphone at 100% Volume
Display Max Brightness
USB to Caramel 480Mbps

Opal: No Stressor

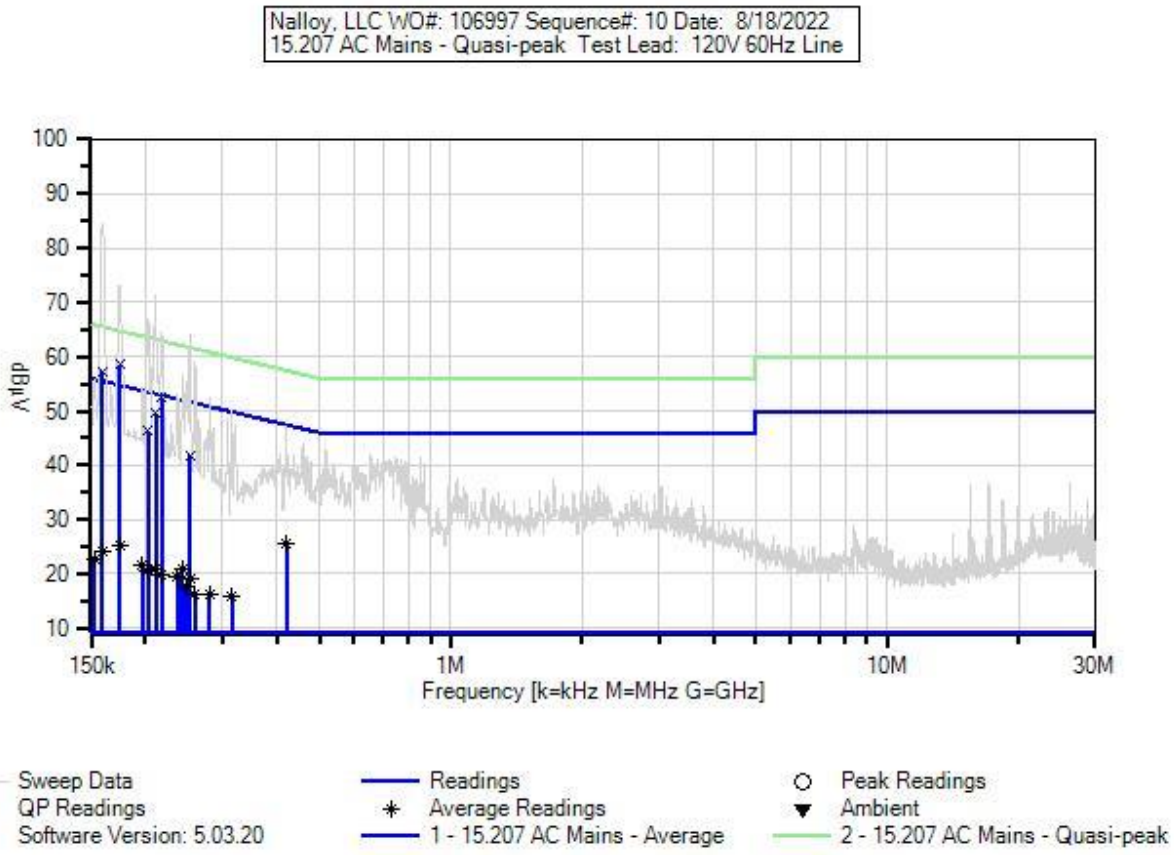
Caramel:
Ethernet 100Mbps
USB 2.0 x1 12Mbps to Wisepad
USB B No Stressor to Baxter

Wisepad:
Tap Mode at 13.56MHz

USB 2.0 12Mbps

Baxter:
Ethernet 100Mbps
Prefect- Stressors on CPU DDR MMC
Relay continuously cycling
Tamper sensor enabled
Audio over speaker playing representative tone
Microphone on
USB on Baxter Mass Storage devices no cable
USB A to B from Baxter to Caramel No Stressor

Badge Reader:
On at 13.56MHz



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	5/23/2022	5/23/2024
T3	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T4	AN02611	High Pass Filter	HE9615-150K-50-720B	1/5/2022	1/5/2024
T5	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

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	174.724k	49.0	+9.1	+0.0	+0.1	+0.3	+0.0	58.6	64.7	-6.1	Line
	QP		+0.1								
2	159.453k	47.5	+9.1	+0.0	+0.1	+0.5	+0.0	57.3	65.5	-8.2	Line
	QP		+0.1								
3	217.629k	43.0	+9.1	+0.0	+0.1	+0.1	+0.0	52.4	62.9	-10.5	Line
	QP		+0.1								
4	211.084k	40.1	+9.1	+0.0	+0.1	+0.1	+0.0	49.5	63.2	-13.7	Line
	QP		+0.1								
5	202.358k	36.9	+9.1	+0.0	+0.1	+0.1	+0.0	46.3	63.5	-17.2	Line
	QP		+0.1								
6	253.262k	32.4	+9.1	+0.0	+0.1	+0.1	+0.0	41.8	61.6	-19.8	Line
	QP		+0.1								
7	419.792k	16.1	+9.1	+0.0	+0.1	+0.1	+0.0	25.5	47.5	-22.0	Line
	Ave		+0.1								
^	419.792k	37.7	+9.1	+0.0	+0.1	+0.1	+0.0	47.1	47.5	-0.4	Line
			+0.1								
9	174.724k	15.5	+9.1	+0.0	+0.1	+0.3	+0.0	25.1	54.7	-29.6	Line
	Ave		+0.1								
^	174.724k	63.6	+9.1	+0.0	+0.1	+0.3	+0.0	73.2	54.7	+18.5	Line
			+0.1								
11	243.081k	11.5	+9.1	+0.0	+0.1	+0.1	+0.0	20.9	52.0	-31.1	Line
	Ave		+0.1								
^	243.081k	47.3	+9.1	+0.0	+0.1	+0.1	+0.0	56.7	52.0	+4.7	Line
			+0.1								
13	159.453k	14.2	+9.1	+0.0	+0.1	+0.5	+0.0	24.0	55.5	-31.5	Line
	Ave		+0.1								
^	159.452k	74.8	+9.1	+0.0	+0.1	+0.5	+0.0	84.6	55.5	+29.1	Line
			+0.1								
15	196.540k	12.2	+9.1	+0.0	+0.1	+0.1	+0.0	21.6	53.8	-32.2	Line
	Ave		+0.1								
^	196.540k	45.1	+9.1	+0.0	+0.1	+0.1	+0.0	54.5	53.8	+0.7	Line
			+0.1								
17	211.084k	11.5	+9.1	+0.0	+0.1	+0.1	+0.0	20.9	53.2	-32.3	Line
	Ave		+0.1								
^	211.084k	61.8	+9.1	+0.0	+0.1	+0.1	+0.0	71.2	53.2	+18.0	Line
			+0.1								
19	253.262k	9.8	+9.1	+0.0	+0.1	+0.1	+0.0	19.2	51.6	-32.4	Line
	Ave		+0.1								
^	253.262k	54.7	+9.1	+0.0	+0.1	+0.1	+0.0	64.1	51.6	+12.5	Line
			+0.1								
21	236.537k	9.9	+9.1	+0.0	+0.1	+0.1	+0.0	19.3	52.2	-32.9	Line
	Ave		+0.1								
^	236.536k	43.5	+9.1	+0.0	+0.1	+0.1	+0.0	52.9	52.2	+0.7	Line
			+0.1								

23	152.908k	12.8	+9.1	+0.0	+0.1	+0.7	+0.0	22.8	55.8	-33.0	Line
	Ave		+0.1								
^	152.907k	45.7	+9.1	+0.0	+0.1	+0.7	+0.0	55.7	55.8	-0.1	Line
			+0.1								
25	217.629k	10.4	+9.1	+0.0	+0.1	+0.1	+0.0	19.8	52.9	-33.1	Line
	Ave		+0.1								
^	217.629k	55.0	+9.1	+0.0	+0.1	+0.1	+0.0	64.4	52.9	+11.5	Line
			+0.1								
27	202.358k	10.9	+9.1	+0.0	+0.1	+0.1	+0.0	20.3	53.5	-33.2	Line
	Ave		+0.1								
^	202.357k	57.4	+9.1	+0.0	+0.1	+0.1	+0.0	66.8	53.5	+13.3	Line
			+0.1								
29	315.075k	6.5	+9.1	+0.0	+0.1	+0.0	+0.0	15.8	49.8	-34.0	Line
	Ave		+0.1								
^	315.074k	40.7	+9.1	+0.0	+0.1	+0.0	+0.0	50.0	49.8	+0.2	Line
			+0.1								
31	248.172k	8.3	+9.1	+0.0	+0.1	+0.1	+0.0	17.7	51.8	-34.1	Line
	Ave		+0.1								
^	248.171k	46.1	+9.1	+0.0	+0.1	+0.1	+0.0	55.5	51.8	+3.7	Line
			+0.1								
33	280.169k	6.9	+9.1	+0.0	+0.1	+0.0	+0.0	16.2	50.8	-34.6	Line
	Ave		+0.1								
^	280.168k	42.9	+9.1	+0.0	+0.1	+0.0	+0.0	52.2	50.8	+1.4	Line
			+0.1								
35	259.807k	6.9	+9.1	+0.0	+0.1	+0.1	+0.0	16.3	51.4	-35.1	Line
	Ave		+0.1								
^	259.807k	49.8	+9.1	+0.0	+0.1	+0.1	+0.0	59.2	51.4	+7.8	Line
			+0.1								

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 #:	**106997**	Date:	8/18/2022
Test Type:	**Conducted Emissions**	Time:	10:30:15
Tested By:	Matt Harrison	Sequence#:	11
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:

Test Environment Conditions:
Temperature: 25°C
Humidity: 45%
Pressure: 101.4kPa

Method: ANSI C63.10: 2013

Frequency range: 150k-30MHz

Highest Clock: 3.6 GHz

Setup:
EUT is setup in a combination of floor-standing and tabletop configuration. It is connected to a power supply and a remote laptop via Ethernet Cable.

Mode 1:
Honecrisp:
Fuji- CPU DDR MMC Stress
Audio 1kHz Tone on Headphone at 100% Volume
Display Max Brightness
USB to Caramel 480Mbps

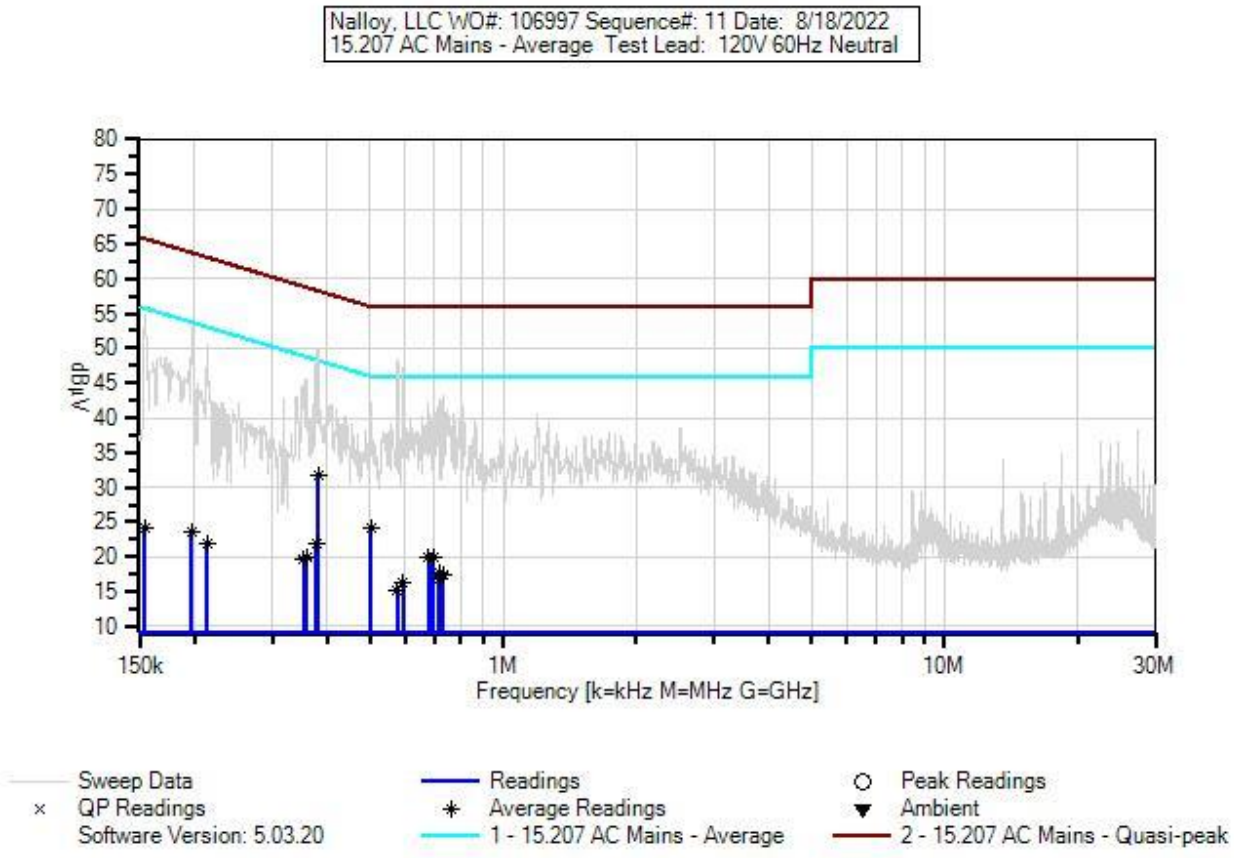
Opal: No Stressor

Caramel:
Ethernet 100Mbps
USB 2.0 x1 12Mbps to Wisepad
USB B No Stressor to Baxter

Wisepad:
Tap Mode at 13.56MHz
USB 2.0 12Mbps

Baxter:
Ethernet 100Mbps
Prefect- Stressors on CPU DDR MMC
Relay continuously cycling

Tamper sensor enabled Audio over speaker playing representative tone Microphone on USB on Baxter Mass Storage devices no cable USB A to B from Baxter to Caramel No Stressor Badge Reader: On at 13.56MHz



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	5/23/2022	5/23/2024
T3	ANP06540	Cable	Heliax	1/17/2022	1/17/2024
	AN02872	Spectrum Analyzer	E4440A	11/29/2021	11/29/2023
T4	AN02611	High Pass Filter	HE9615-150K-50-720B	1/5/2022	1/5/2024
	AN01311	50uH LISN-Line1 (L)	3816/2	2/23/2022	2/23/2024
T5	AN01311	50uH LISN-Line2 (N)	3816/2	2/23/2022	2/23/2024

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	381.979k	22.4	+9.1	+0.0	+0.1	+0.1	+0.0	31.8	48.2	-16.4	Neutr
	Ave		+0.1								
2	502.695k	14.7	+9.1	+0.0	+0.1	+0.1	+0.0	24.1	46.0	-21.9	Neutr
	Ave		+0.1								
^	502.694k	32.6	+9.1	+0.0	+0.1	+0.1	+0.0	42.0	46.0	-4.0	Neutr
			+0.1								
4	695.405k	10.5	+9.1	+0.0	+0.1	+0.2	+0.0	20.0	46.0	-26.0	Neutr
	Ave		+0.1								
^	695.404k	32.8	+9.1	+0.0	+0.1	+0.2	+0.0	42.3	46.0	-3.7	Neutr
			+0.1								
6	677.952k	10.4	+9.1	+0.0	+0.1	+0.2	+0.0	19.9	46.0	-26.1	Neutr
	Ave		+0.1								
^	677.951k	32.7	+9.1	+0.0	+0.1	+0.2	+0.0	42.2	46.0	-3.8	Neutr
			+0.1								
8	377.615k	12.5	+9.1	+0.0	+0.1	+0.1	+0.0	21.9	48.3	-26.4	Neutr
	Ave		+0.1								
^	377.615k	40.6	+9.1	+0.0	+0.1	+0.1	+0.0	50.0	48.3	+1.7	Neutr
			+0.1								
^	381.978k	40.2	+9.1	+0.0	+0.1	+0.1	+0.0	49.6	48.2	+1.4	Neutr
			+0.1								
11	715.039k	8.3	+9.1	+0.0	+0.1	+0.2	+0.0	17.8	46.0	-28.2	Neutr
	Ave		+0.1								
12	732.492k	7.9	+9.1	+0.0	+0.1	+0.1	+0.0	17.3	46.0	-28.7	Neutr
	Ave		+0.1								
^	732.492k	33.9	+9.1	+0.0	+0.1	+0.1	+0.0	43.3	46.0	-2.7	Neutr
			+0.1								
14	357.981k	10.6	+9.1	+0.0	+0.1	+0.0	+0.0	19.9	48.8	-28.9	Neutr
	Ave		+0.1								
^	357.980k	36.4	+9.1	+0.0	+0.1	+0.0	+0.0	45.7	48.8	-3.1	Neutr
			+0.1								
16	719.402k	7.3	+9.1	+0.0	+0.1	+0.2	+0.0	16.8	46.0	-29.2	Neutr
	Ave		+0.1								
^	715.039k	33.3	+9.1	+0.0	+0.1	+0.2	+0.0	42.8	46.0	-3.2	Neutr
			+0.1								
^	719.402k	33.3	+9.1	+0.0	+0.1	+0.2	+0.0	42.8	46.0	-3.2	Neutr
			+0.1								
19	352.890k	10.3	+9.1	+0.0	+0.1	+0.0	+0.0	19.6	48.9	-29.3	Neutr
	Ave		+0.1								
^	352.890k	35.5	+9.1	+0.0	+0.1	+0.0	+0.0	44.8	48.9	-4.1	Neutr
			+0.1								
21	592.868k	6.8	+9.1	+0.0	+0.1	+0.1	+0.0	16.2	46.0	-29.8	Neutr
	Ave		+0.1								
^	592.868k	37.8	+9.1	+0.0	+0.1	+0.1	+0.0	47.2	46.0	+1.2	Neutr
			+0.1								

23	197.268k	14.1	+9.1	+0.0	+0.1	+0.1	+0.0	23.5	53.7	-30.2	Neutr
	Ave		+0.1								
^	197.268k	43.6	+9.1	+0.0	+0.1	+0.1	+0.0	53.0	53.7	-0.7	Neutr
			+0.1								
25	576.143k	5.8	+9.1	+0.0	+0.1	+0.1	+0.0	15.2	46.0	-30.8	Neutr
	Ave		+0.1								
^	576.142k	39.1	+9.1	+0.0	+0.1	+0.1	+0.0	48.5	46.0	+2.5	Neutr
			+0.1								
27	213.994k	12.6	+9.1	+0.0	+0.1	+0.1	+0.0	22.0	53.0	-31.0	Neutr
	Ave		+0.1								
^	213.994k	41.1	+9.1	+0.0	+0.1	+0.1	+0.0	50.5	53.0	-2.5	Neutr
			+0.1								
29	154.363k	14.2	+9.1	+0.0	+0.1	+0.7	+0.0	24.2	55.8	-31.6	Neutr
	Ave		+0.1								
^	154.363k	44.9	+9.1	+0.0	+0.1	+0.7	+0.0	54.9	55.8	-0.9	Neutr
			+0.1								

Test Setup Photo(s)

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.