Test Location:	CKC Laboratories, Inc. • 22116 23rd Dr SE • Bothell, WA 98021 • 800-500-4362		
Customer:	**Nalloy, LLC.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**102802**	Date:	4/1/2020
Test Type:	**Conducted Emissions**	Time:	08:16:45
Tested By:	Matthew Harrison	Sequence#:	89
Software:	EMITest 5.03.12		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: 22° C
Humidity: 28%

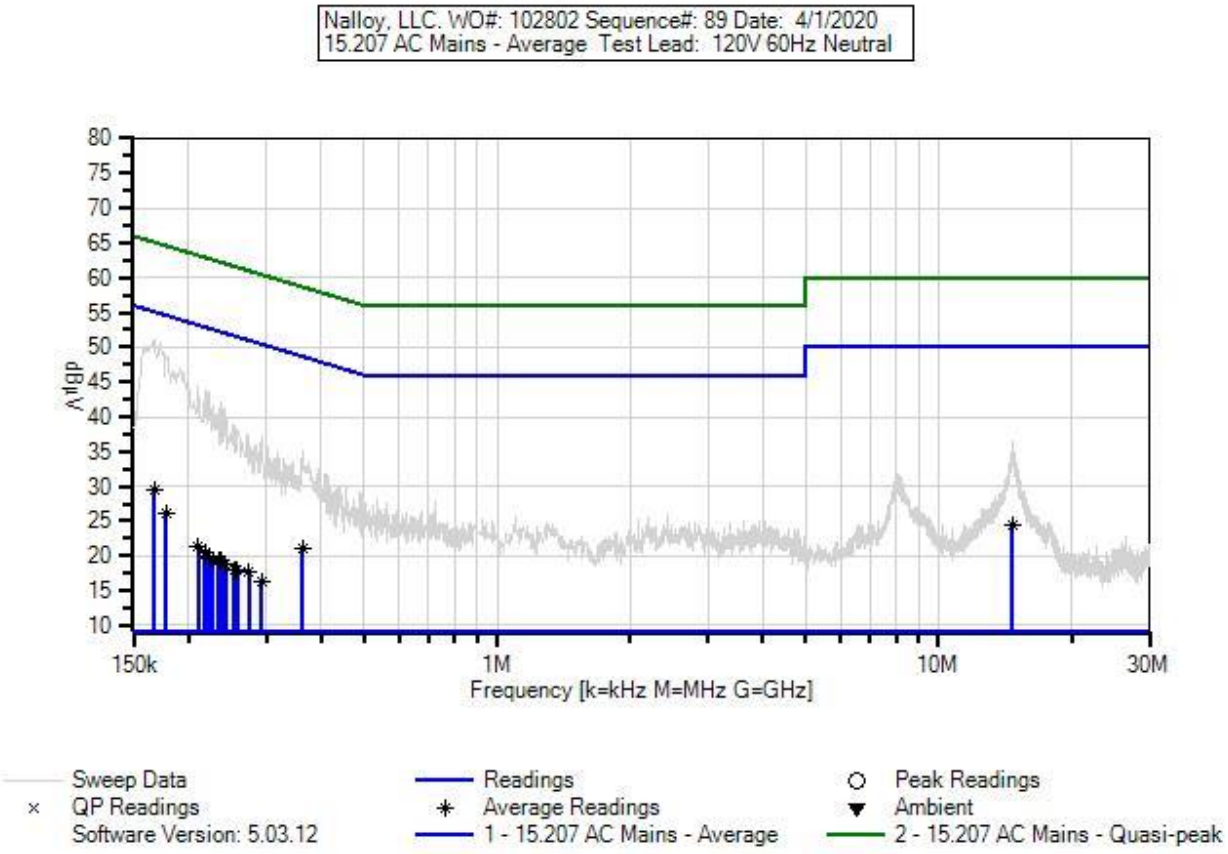
Frequency Range: 150kHz-30MHz
Frequency tested: 5745 MHz
Firmware power setting: 14 dBm
EUT Firmware:
Protocol /MCS/Modulation: 802.11a, 20MHz BW, 6Mbps(worst-case)

Antenna type: Linear Polarized
Antenna Gain: 5.9 dBi.

Duty Cycle: 100% Modulated

Test Method: ANSI C63.10: 2013
Test Mode: Transmitting
Test Setup: EUT is setup for conducted measurements.
Setup: EUT is connected to a Laptop via USB and Audio cable.

All modes, channels, and data rates investigated, worst-case provided.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02872	Spectrum Analyzer	E4440A	11/18/2019	11/18/2021
T1	ANP06219	Attenuator	768-10	4/13/2018	4/13/2020
T2	ANP06515	Cable	Heliax	6/29/2018	6/29/2020
T3	ANP06540	Cable	Heliax	8/23/2019	8/23/2021
	AN01311	50uH LISN-Line1 (L)	3816/2	2/24/2020	2/24/2022
T4	AN01311	50uH LISN-Line2 (N)	3816/2	2/24/2020	2/24/2022
T5	AN02611	High Pass Filter	HE9615-150K-50-720B	1/10/2020	1/10/2022

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	14.716M	15.3	+9.1	+0.2	+0.1	-0.6	+0.0	24.3	50.0	-25.7	Neutr
Ave			+0.2								
^	14.716M	27.6	+9.1	+0.2	+0.1	-0.6	+0.0	36.6	50.0	-13.4	Neutr
			+0.2								
3	167.452k	21.4	+9.1	+0.0	+0.0	-1.5	+0.0	29.4	55.1	-25.7	Neutr
Ave			+0.4								
^	167.451k	43.1	+9.1	+0.0	+0.0	-1.5	+0.0	51.1	55.1	-4.0	Neutr
			+0.4								
5	362.343k	12.4	+9.1	+0.0	+0.0	-0.6	+0.0	21.0	48.7	-27.7	Neutr
Ave			+0.1								
^	362.343k	26.5	+9.1	+0.0	+0.0	-0.6	+0.0	35.1	48.7	-13.6	Neutr
			+0.1								
7	177.633k	17.9	+9.1	+0.0	+0.0	-1.4	+0.0	26.0	54.6	-28.6	Neutr
Ave			+0.4								
^	177.632k	40.6	+9.1	+0.0	+0.0	-1.4	+0.0	48.7	54.6	-5.9	Neutr
			+0.4								
9	210.357k	13.1	+9.1	+0.0	+0.0	-1.1	+0.0	21.4	53.2	-31.8	Neutr
Ave			+0.3								
^	210.357k	36.2	+9.1	+0.0	+0.0	-1.1	+0.0	44.5	53.2	-8.7	Neutr
			+0.3								
11	218.356k	12.1	+9.1	+0.0	+0.0	-1.1	+0.0	20.4	52.9	-32.5	Neutr
Ave			+0.3								
12	221.992k	11.4	+9.1	+0.0	+0.0	-1.0	+0.0	19.8	52.7	-32.9	Neutr
Ave			+0.3								
^	218.356k	35.5	+9.1	+0.0	+0.0	-1.1	+0.0	43.8	52.9	-9.1	Neutr
			+0.3								
^	221.992k	35.2	+9.1	+0.0	+0.0	-1.0	+0.0	43.6	52.7	-9.1	Neutr
			+0.3								
15	237.264k	10.9	+9.1	+0.0	+0.0	-0.9	+0.0	19.3	52.2	-32.9	Neutr
Ave			+0.2								
16	234.355k	10.9	+9.1	+0.0	+0.0	-0.9	+0.0	19.3	52.3	-33.0	Neutr
Ave			+0.2								
^	237.263k	33.9	+9.1	+0.0	+0.0	-0.9	+0.0	42.3	52.2	-9.9	Neutr
			+0.2								
^	234.354k	32.9	+9.1	+0.0	+0.0	-0.9	+0.0	41.3	52.3	-11.0	Neutr
			+0.2								
19	242.354k	10.3	+9.1	+0.0	+0.0	-0.9	+0.0	18.7	52.0	-33.3	Neutr
Ave			+0.2								
^	242.354k	32.9	+9.1	+0.0	+0.0	-0.9	+0.0	41.3	52.0	-10.7	Neutr
			+0.2								

21 Ave	227.083k	10.9	+9.1 +0.3	+0.0	+0.0	-1.0	+0.0	19.3	52.6	-33.3	Neutr
^	227.082k	33.1	+9.1 +0.3	+0.0	+0.0	-1.0	+0.0	41.5	52.6	-11.1	Neutr
23 Ave	273.624k	9.2	+9.1 +0.1	+0.0	+0.0	-0.8	+0.0	17.6	51.0	-33.4	Neutr
^	273.624k	29.0	+9.1 +0.1	+0.0	+0.0	-0.8	+0.0	37.4	51.0	-13.6	Neutr
25 Ave	258.353k	9.6	+9.1 +0.2	+0.0	+0.0	-0.8	+0.0	18.1	51.5	-33.4	Neutr
^	258.352k	29.7	+9.1 +0.2	+0.0	+0.0	-0.8	+0.0	38.2	51.5	-13.3	Neutr
27 Ave	253.262k	9.6	+9.1 +0.2	+0.0	+0.0	-0.8	+0.0	18.1	51.6	-33.5	Neutr
^	253.262k	30.4	+9.1 +0.2	+0.0	+0.0	-0.8	+0.0	38.9	51.6	-12.7	Neutr
29 Ave	292.531k	7.9	+9.1 +0.1	+0.0	+0.0	-0.7	+0.0	16.4	50.5	-34.1	Neutr
^	292.531k	28.8	+9.1 +0.1	+0.0	+0.0	-0.7	+0.0	37.3	50.5	-13.2	Neutr

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.