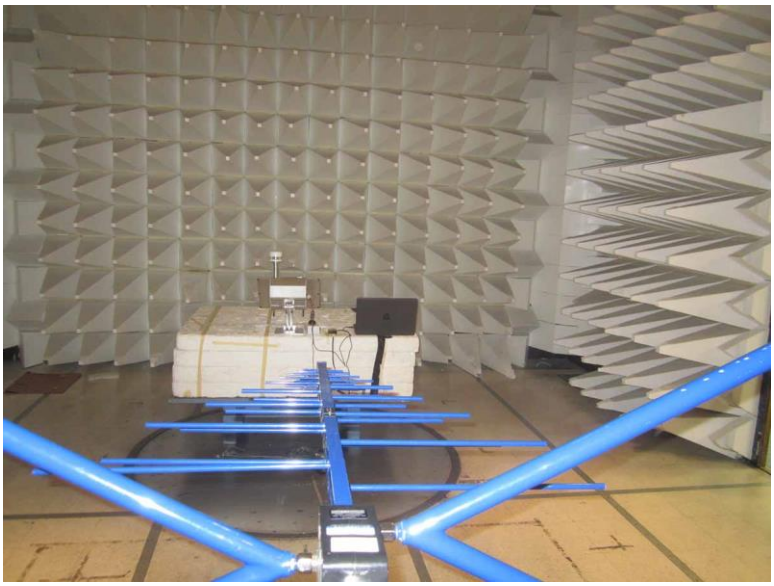
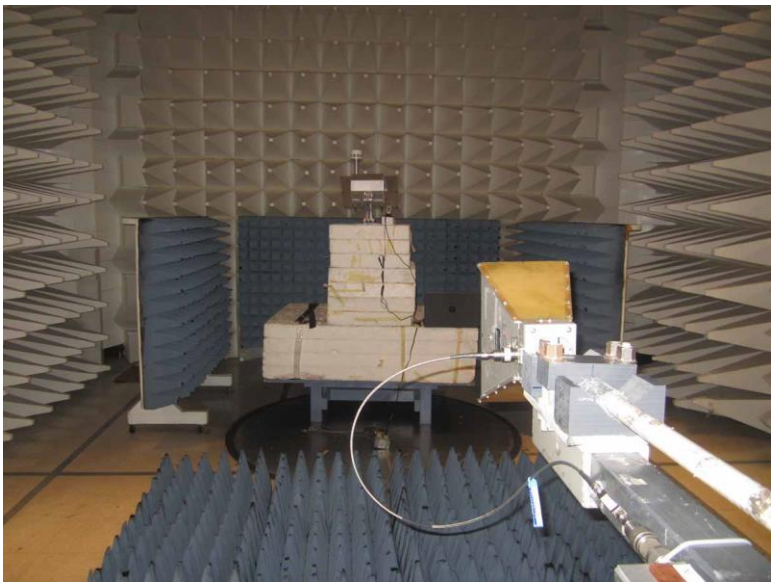
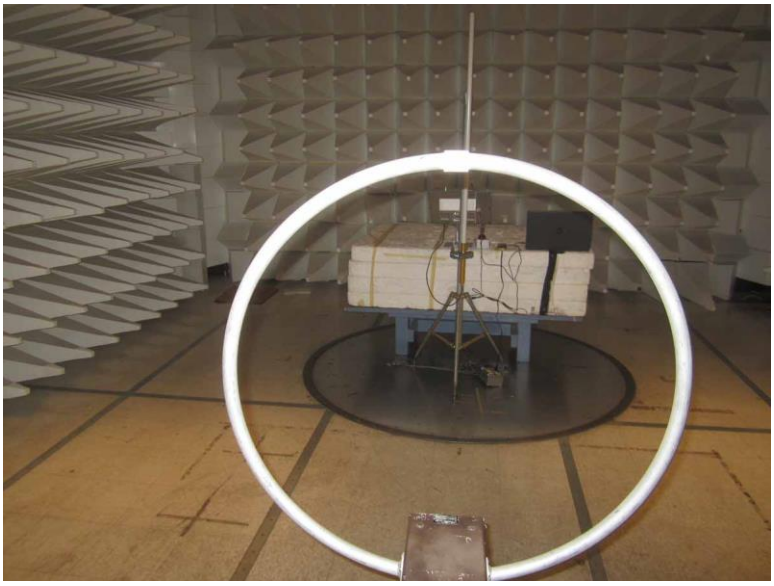


30MHz-1GHz



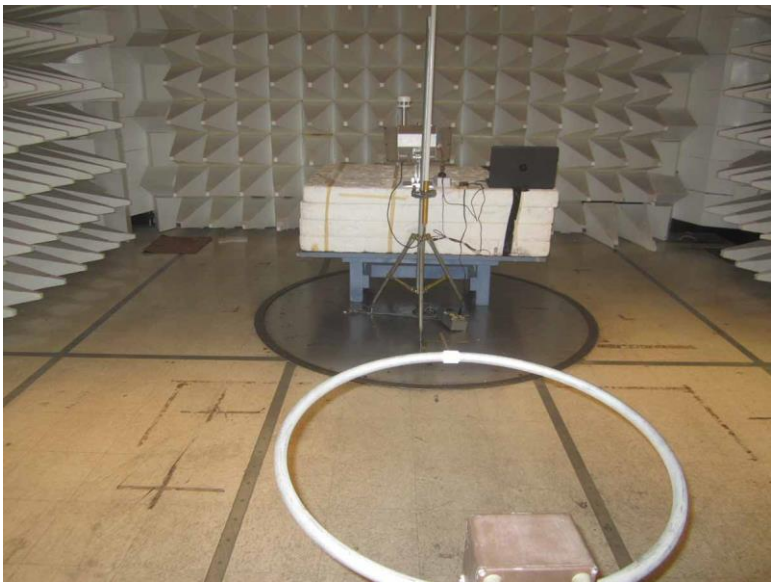
1-10GHz

6dBi Omni

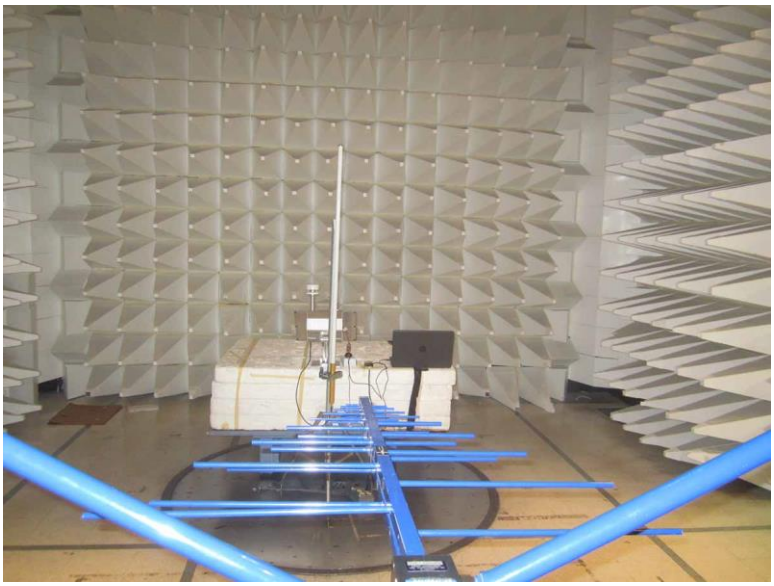


9kHz-30MHz, Parallel

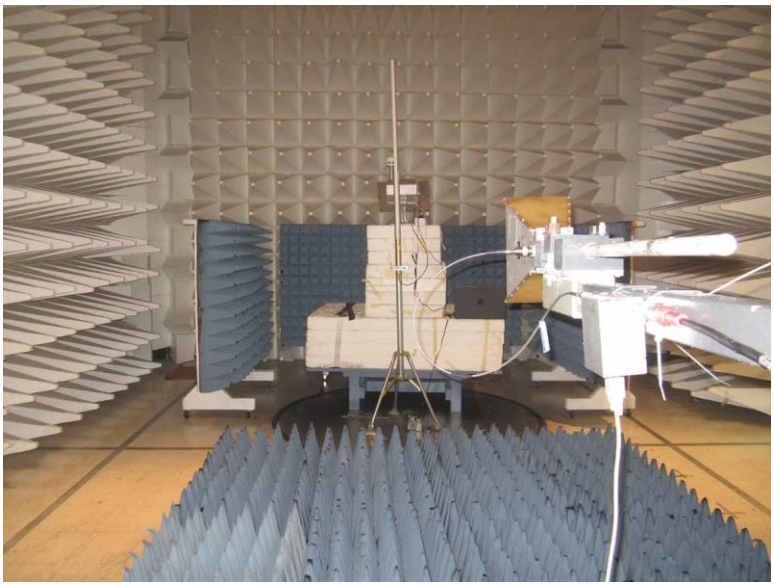
9kHz-30MHz, Perpendicular



9kHz-30MHz, Z Axis

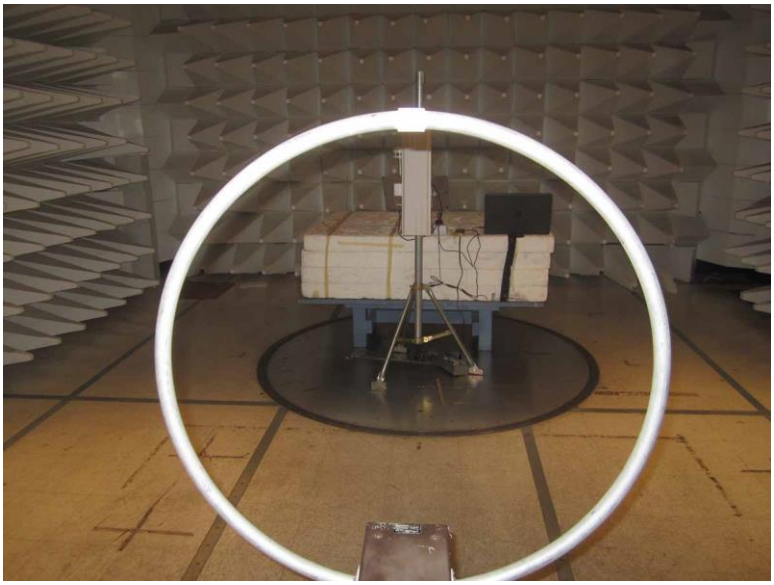


30MHz-1GHz

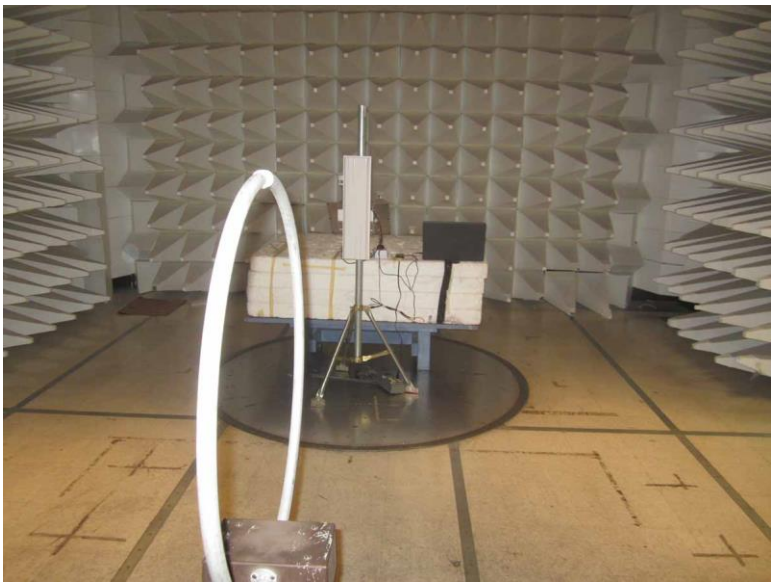


1-10GHz

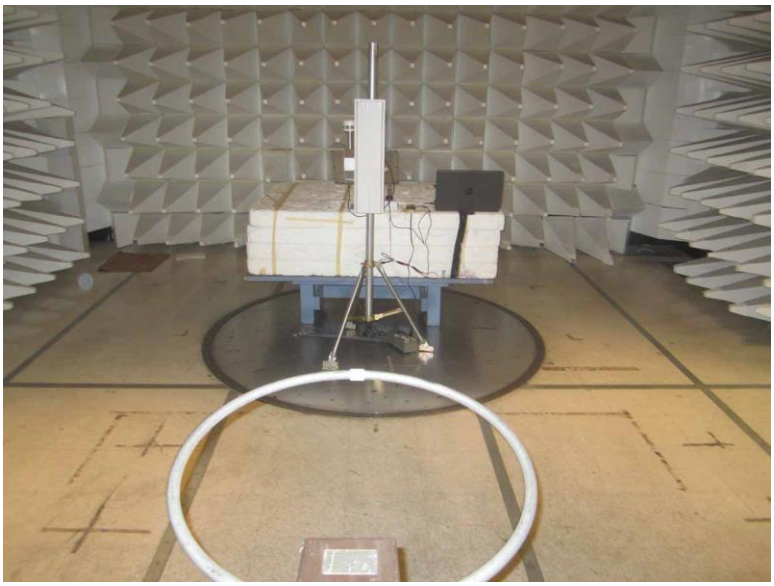
11dBi Sector



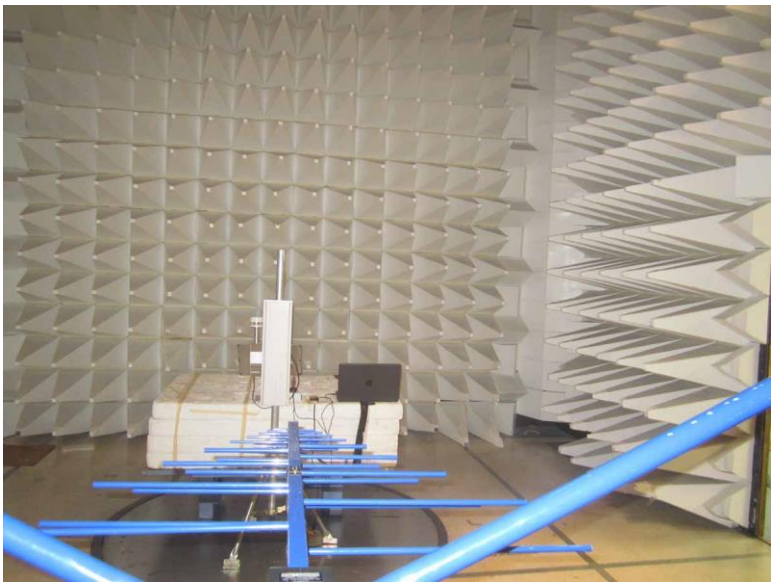
9kHz-30MHz, Parallel



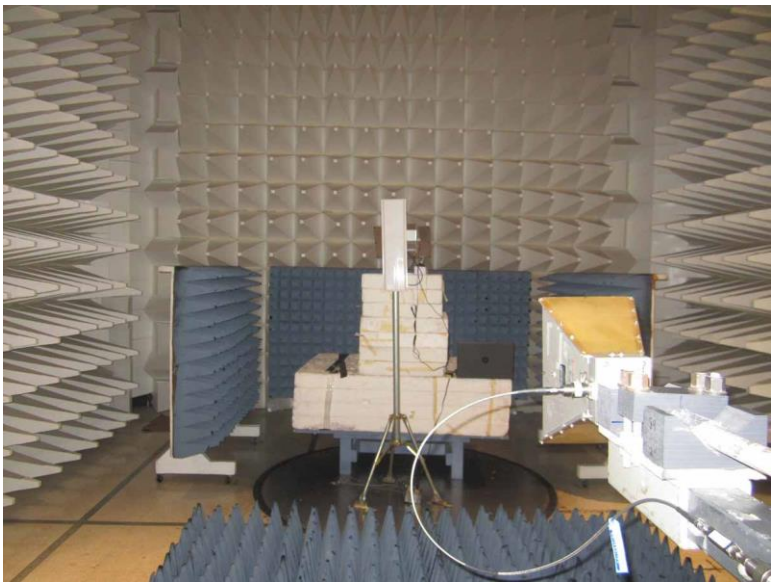
9kHz-30MHz, Perpendicular



9kHz-30MHz, Z Axis



30MHz-1GHz



1-10GHz

15.207 AC Conducted Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 209-966-5240		
Customer:	**Digital Path, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**102618**	Date:	7/29/2019
Test Type:	**Conducted Emissions**	Time:	14:09:06
Tested By:	Benny Lovan	Sequence#:	1
Software:	EMITest 5.03.12		13VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

AC Conducted Emissions
Frequency Range:150kHz - 30MHz

Method: ANSI C63.10 2013

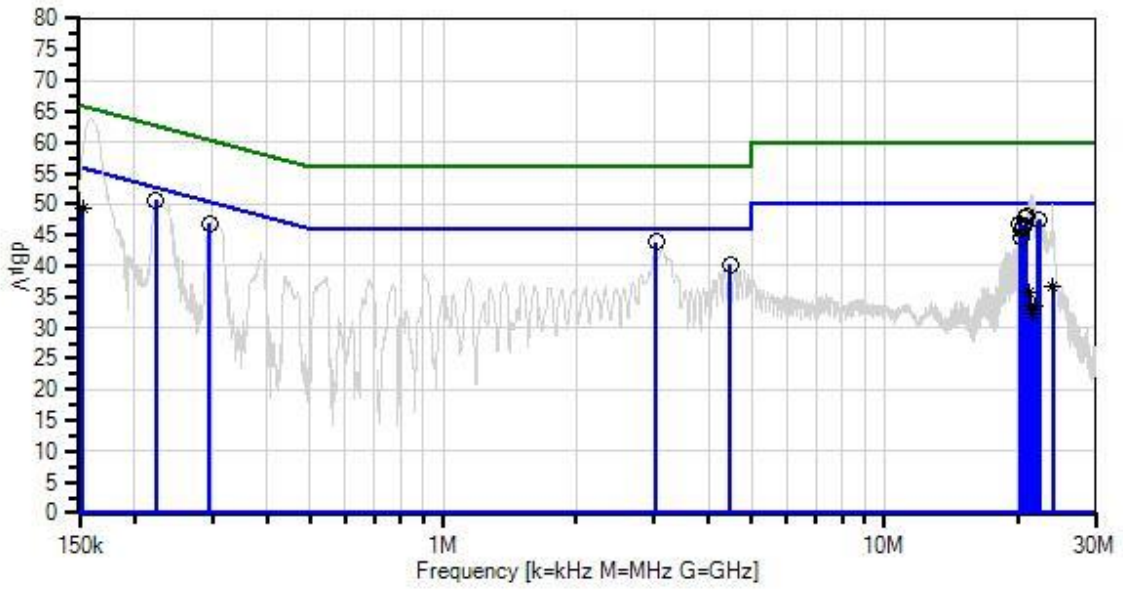
Temperature: 28°C
Relative Humidity: 42 %
Atmospheric Pressure: 100.7 kPa

Application: Putty Serial Program Version 0001
High Clock: 80MHz
Transmitting operating frequency= 902.5, 915 and 927MHz for ISM

Gain of the antenna for ISM=
OL-3043-2 = 2.5dBi
FG9026 = 6dBi
Sector09011V = 11dBi

The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is transmitting out of port 2 which is the radio that has no band pass filter.
ISM on TX Mode at Middle Channel. The EUT is connected to a laptop running the Putty serial program via USB.

Digital Path, Inc. WO#: 102618 Sequence#: 1 Date: 7/29/2019
15.207 AC Mains - Average Test Lead: 13VDC Line



Sweep Data
× QP Readings
Software Version: 5.03.12
Readings
Average Readings
1 - 15.207 AC Mains - Average
Peak Readings
Ambient
2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	5/2/2019	5/2/2021
T1	ANP05624	Attenuator	PE7010-10	2/2/2019	2/2/2021
T2	ANP06231	Cable	CXTA04A-70	3/12/2018	3/12/2020
T3	AN00374	50uH LISN-CDN Line	8028-TS-50-BNC	1/25/2019	1/25/2020
	AN00374	50uH LISN-CDN Return	8028-TS-50-BNC	1/25/2019	1/25/2020
T4	AN02609	High Pass Filter	HE9615-150K-50-720B	2/1/2019	2/1/2021
T5	ANP06847	Cable	LMR195-FR-6	7/31/2017	7/31/2019
T6	ANP06230	Cable-Insertion Loss (+45C to 15C)	CXTA04A-50	11/19/2018	11/19/2020

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	20.941M	36.4	+9.9 +0.2	+0.7 +0.4	+0.2	+0.2	+0.0	48.0	50.0	-2.0	Line
2	223.447k	40.3	+9.9 +0.0	+0.1 +0.0	+0.2	+0.2	+0.0	50.7	52.7	-2.0	Line
3	3.038M	33.1	+9.9 +0.1	+0.2 +0.2	+0.2	+0.1	+0.0	43.8	46.0	-2.2	Line
4	20.815M	36.0	+9.9 +0.2	+0.7 +0.4	+0.2	+0.2	+0.0	47.6	50.0	-2.4	Line
5	22.382M	35.8	+9.9 +0.2	+0.7 +0.5	+0.2	+0.2	+0.0	47.5	50.0	-2.5	Line
6	22.229M	35.7	+9.9 +0.2	+0.7 +0.5	+0.2	+0.2	+0.0	47.4	50.0	-2.6	Line
7	20.202M	35.2	+9.9 +0.2	+0.7 +0.4	+0.2	+0.2	+0.0	46.8	50.0	-3.2	Line
8	20.688M	35.0	+9.9 +0.2	+0.7 +0.4	+0.2	+0.2	+0.0	46.6	50.0	-3.4	Line
9	296.168k	36.5	+9.9 +0.0	+0.1 +0.0	+0.2	+0.1	+0.0	46.8	50.3	-3.5	Line
10	20.589M	34.7	+9.9 +0.2	+0.7 +0.4	+0.2	+0.2	+0.0	46.3	50.0	-3.7	Line
11	20.445M	34.2	+9.9 +0.2	+0.7 +0.4	+0.2	+0.2	+0.0	45.8	50.0	-4.2	Line
12	20.310M	32.9	+9.9 +0.2	+0.7 +0.4	+0.2	+0.2	+0.0	44.5	50.0	-5.5	Line
13	4.467M	29.4	+9.9 +0.1	+0.3 +0.2	+0.2	+0.1	+0.0	40.2	46.0	-5.8	Line
14	152.383k Ave	37.5	+9.9 +0.0	+0.1 +0.0	+0.2	+1.7	+0.0	49.4	55.9	-6.5	Line
^	152.383k	52.8	+9.9 +0.0	+0.1 +0.0	+0.2	+1.7	+0.0	64.7	55.9	+8.8	Line
16	24.004M Ave	25.1	+9.9 +0.2	+0.7 +0.5	+0.2	+0.2	+0.0	36.8	50.0	-13.2	Line
^	24.004M	39.8	+9.9 +0.2	+0.7 +0.5	+0.2	+0.2	+0.0	51.5	50.0	+1.5	Line

18	21.319M	24.1	+9.9	+0.7	+0.2	+0.2	+0.0	35.7	50.0	-14.3	Line
	Ave		+0.2	+0.4							
^	21.319M	41.4	+9.9	+0.7	+0.2	+0.2	+0.0	53.0	50.0	+3.0	Line
			+0.2	+0.4							
20	21.445M	21.9	+9.9	+0.7	+0.2	+0.2	+0.0	33.6	50.0	-16.4	Line
	Ave		+0.2	+0.5							
^	21.445M	39.8	+9.9	+0.7	+0.2	+0.2	+0.0	51.5	50.0	+1.5	Line
			+0.2	+0.5							
22	21.806M	21.7	+9.9	+0.7	+0.2	+0.2	+0.0	33.4	50.0	-16.6	Line
	Ave		+0.2	+0.5							
^	21.806M	41.1	+9.9	+0.7	+0.2	+0.2	+0.0	52.8	50.0	+2.8	Line
			+0.2	+0.5							
24	21.589M	20.5	+9.9	+0.7	+0.2	+0.2	+0.0	32.2	50.0	-17.8	Line
	Ave		+0.2	+0.5							
^	21.589M	39.7	+9.9	+0.7	+0.2	+0.2	+0.0	51.4	50.0	+1.4	Line
			+0.2	+0.5							

Test Location:	CKC Laboratories Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • 209-966-5240		
Customer:	**Digital Path, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**102618**	Date:	7/30/2019
Test Type:	**Conducted Emissions**	Time:	10:09:53
Tested By:	Benny Lovan	Sequence#:	2
Software:	EMITest 5.03.12		13VDC

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

AC Conducted Emissions
Frequency Range:150kHz - 30MHz

Method: ANSI C63.10 2013

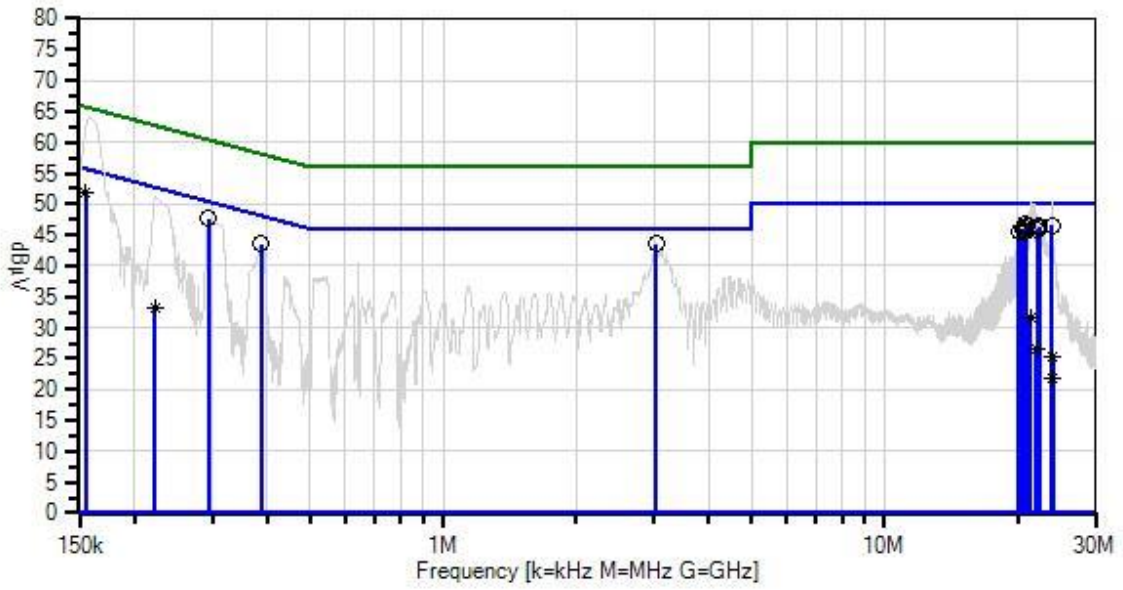
Temperature: 28°C
Relative Humidity: 42 %
Atmospheric Pressure: 100.7 kPa

Application: Putty Serial Program Version 0001
High Clock: 80MHz
Transmitting operating frequency= 902.5, 915 and 927MHz for ISM

Gain of the antenna for ISM=
OL-3043-2 = 2.5dBi
FG9026 = 6dBi
Sector09011V = 11dBi

The EUT is placed on the table and set as continuously transmitting or receiving as intended. The EUT is transmitting out of port 2 which is the radio that has no band pass filter.
ISM on TX Mode at Middle Channel. The EUT is connected to a laptop running the Putty serial program via USB.

Digital Path, Inc. WO#: 102618 Sequence#: 2 Date: 7/30/2019
15.207 AC Mains - Average Test Lead: 13VDC Return



Sweep Data
× QP Readings
Software Version: 5.03.12
Readings
Average Readings
1 - 15.207 AC Mains - Average
Peak Readings
Ambient
2 - 15.207 AC Mains - Quasi-peak

Test Equipment:

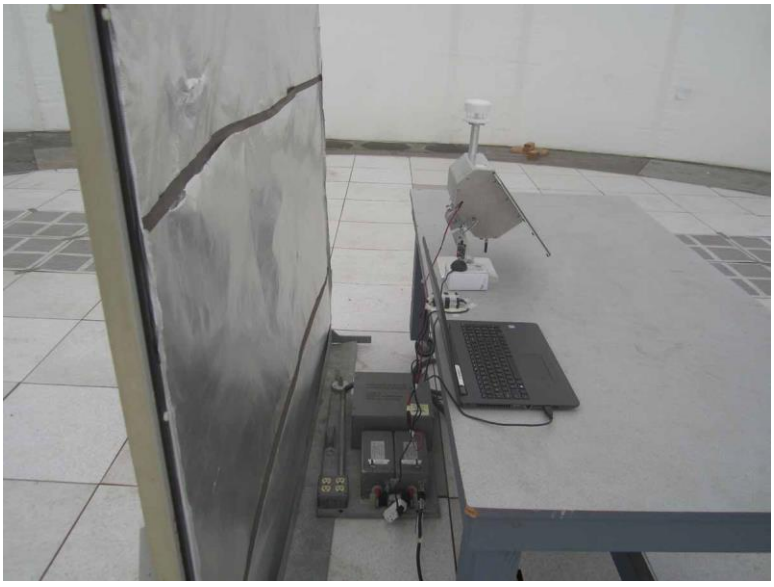
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN03470	Spectrum Analyzer	E4440A	5/2/2019	5/2/2021
T1	ANP05624	Attenuator	PE7010-10	2/2/2019	2/2/2021
T2	ANP06231	Cable	CXTA04A-70	3/12/2018	3/12/2020
	AN00374	50uH LISN-CDN Line	8028-TS-50-BNC	1/25/2019	1/25/2020
T3	AN00374	50uH LISN-CDN Return	8028-TS-50-BNC	1/25/2019	1/25/2020
T4	AN02609	High Pass Filter	HE9615-150K-50-720B	2/1/2019	2/1/2021
T5	ANP06847	Cable	LMR195-FR-6	7/31/2017	7/31/2019
T6	ANP06230	Cable-Insertion Loss (+45C to 15C)	CXTA04A-50	11/19/2018	11/19/2020

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

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV	dBµV	dB	Ant
1	3.042M	32.8	+9.9 +0.1	+0.2 +0.2	+0.2	+0.1	+0.0	43.5	46.0	-2.5	Retur
2	294.712k	37.3	+9.9 +0.0	+0.1 +0.0	+0.2	+0.1	+0.0	47.6	50.4	-2.8	Retur
3	20.896M	35.3	+9.9 +0.2	+0.7 +0.4	+0.1	+0.2	+0.0	46.8	50.0	-3.2	Retur
4	23.936M	35.0	+9.9 +0.2	+0.7 +0.5	+0.1	+0.2	+0.0	46.6	50.0	-3.4	Retur
5	20.914M	35.0	+9.9 +0.2	+0.7 +0.4	+0.1	+0.2	+0.0	46.5	50.0	-3.5	Retur
6	22.346M	34.8	+9.9 +0.2	+0.7 +0.5	+0.1	+0.2	+0.0	46.4	50.0	-3.6	Retur
7	20.878M	34.8	+9.9 +0.2	+0.7 +0.4	+0.1	+0.2	+0.0	46.3	50.0	-3.7	Retur
8	22.238M	34.5	+9.9 +0.2	+0.7 +0.5	+0.1	+0.2	+0.0	46.1	50.0	-3.9	Retur
9	155.304k Ave	40.2	+9.9 +0.0	+0.1 +0.0	+0.2	+1.3	+0.0	51.7	55.7	-4.0	Retur
^	155.304k	55.2	+9.9 +0.0	+0.1 +0.0	+0.2	+1.3	+0.0	66.7	55.7	+11.0	Retur
11	20.544M	34.5	+9.9 +0.2	+0.7 +0.4	+0.1	+0.2	+0.0	46.0	50.0	-4.0	Retur
12	22.184M	34.4	+9.9 +0.2	+0.7 +0.5	+0.1	+0.2	+0.0	46.0	50.0	-4.0	Retur
13	387.068k	33.1	+9.9 +0.0	+0.1 +0.1	+0.2	+0.1	+0.0	43.5	48.1	-4.6	Retur
14	20.797M	33.9	+9.9 +0.2	+0.7 +0.4	+0.1	+0.2	+0.0	45.4	50.0	-4.6	Retur
15	20.166M	33.9	+9.9 +0.2	+0.7 +0.4	+0.1	+0.2	+0.0	45.4	50.0	-4.6	Retur
16	21.400M Ave	20.1	+9.9 +0.2	+0.7 +0.5	+0.1	+0.2	+0.0	31.7	50.0	-18.3	Retur
^	21.400M	38.9	+9.9 +0.2	+0.7 +0.5	+0.1	+0.2	+0.0	50.5	50.0	+0.5	Retur

18	222.720k	22.9	+9.9	+0.1	+0.2	+0.2	+0.0	33.3	52.7	-19.4	Retur
	Ave		+0.0	+0.0							
^	222.720k	46.0	+9.9	+0.1	+0.2	+0.2	+0.0	56.4	52.7	+3.7	Retur
			+0.0	+0.0							
20	22.076M	14.9	+9.9	+0.7	+0.1	+0.2	+0.0	26.5	50.0	-23.5	Retur
	Ave		+0.2	+0.5							
21	24.004M	13.8	+9.9	+0.7	+0.1	+0.2	+0.0	25.4	50.0	-24.6	Retur
	Ave		+0.2	+0.5							
^	24.004M	38.7	+9.9	+0.7	+0.1	+0.2	+0.0	50.3	50.0	+0.3	Retur
			+0.2	+0.5							
23	23.963M	10.1	+9.9	+0.7	+0.1	+0.2	+0.0	21.7	50.0	-28.3	Retur
	Ave		+0.2	+0.5							
^	23.963M	37.2	+9.9	+0.7	+0.1	+0.2	+0.0	48.8	50.0	-1.2	Retur
			+0.2	+0.5							

Test Setup Photo(s)



Appendix A: Modification Photos

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.