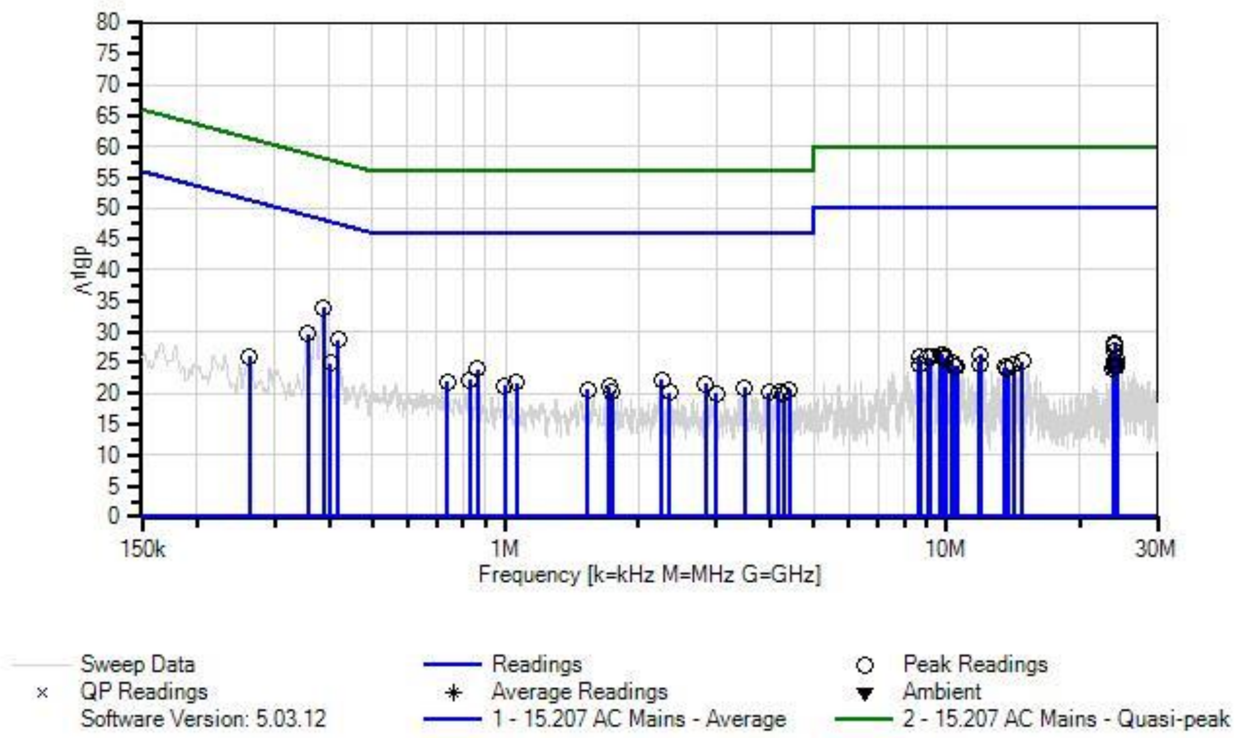
Itron, Inc. WO#: 103955 Sequence#: 11 Date: 6/12/2020
15.207 AC Mains - Average Test Lead: 120V 60Hz L1-Line



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07545	Attenuator	SA18N10W-06	1/18/2019	1/18/2021
T2	ANP07338	Cable	2249-Y-240	12/24/2019	12/24/2021
	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T3	AN02610	High Pass Filter	HE9615-150K-50-720B	10/22/2019	10/22/2021
T4	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/10/2020	3/10/2021
	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/10/2020	3/10/2021
T5	ANP06986	Cable-Line L1(dB)	90cm-extcord	3/31/2020	3/31/2022
	ANP06986	Cable-Neutral L2(dB)	90cm-extcord	3/31/2020	3/31/2022

Measurement Data: Reading listed by margin. Test Lead: L1-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	386.341k	27.9	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	33.9	48.1	-14.2	L1-Li
2	417.611k	22.7	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	28.7	47.5	-18.8	L1-Li
3	357.253k	23.7	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	29.7	48.8	-19.1	L1-Li
4	24.004M	20.8	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	28.1	50.0	-21.9	L1-Li
5	866.297k	17.8	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	24.0	46.0	-22.0	L1-Li
6	24.046M	20.4	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	27.7	50.0	-22.3	L1-Li
7	400.886k	18.9	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	24.9	47.8	-22.9	L1-Li
8	23.909M	19.7	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	27.0	50.0	-23.0	L1-Li
9	9.788M	19.6	+5.8 +0.2	+0.3	+0.2	+0.2	+0.0	26.3	50.0	-23.7	L1-Li
10	11.932M	19.6	+5.8 +0.3	+0.3	+0.2	+0.1	+0.0	26.3	50.0	-23.7	L1-Li
11	831.392k	16.0	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	22.2	46.0	-23.8	L1-Li
12	2.259M	16.1	+5.8 +0.0	+0.1	+0.2	+0.0	+0.0	22.2	46.0	-23.8	L1-Li
13	9.697M	19.4	+5.8 +0.2	+0.3	+0.2	+0.2	+0.0	26.1	50.0	-23.9	L1-Li
14	8.670M	19.4	+5.8 +0.2	+0.3	+0.1	+0.1	+0.0	25.9	50.0	-24.1	L1-Li
15	737.582k	15.7	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	21.9	46.0	-24.1	L1-Li
16	9.184M	19.3	+5.8 +0.2	+0.3	+0.2	+0.1	+0.0	25.9	50.0	-24.1	L1-Li
17	9.067M	19.3	+5.8 +0.2	+0.3	+0.2	+0.1	+0.0	25.9	50.0	-24.1	L1-Li
18	9.905M	19.1	+5.8 +0.2	+0.3	+0.2	+0.2	+0.0	25.8	50.0	-24.2	L1-Li
19	1.060M	15.6	+5.8 +0.0	+0.1	+0.2	+0.0	+0.0	21.7	46.0	-24.3	L1-Li
20	9.869M	19.0	+5.8 +0.2	+0.3	+0.2	+0.2	+0.0	25.7	50.0	-24.3	L1-Li
21	2.838M	15.4	+5.8 +0.1	+0.1	+0.2	+0.0	+0.0	21.6	46.0	-24.4	L1-Li
22	24.162M	18.2	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	25.5	50.0	-24.5	L1-Li
23	23.881M	18.1	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	25.4	50.0	-24.6	L1-Li
24	996.281k	15.2	+5.8 +0.0	+0.1	+0.2	+0.0	+0.0	21.3	46.0	-24.7	L1-Li

25	14.842M	18.4	+5.8 +0.4	+0.3	+0.2	+0.1	+0.0	25.2	50.0	-24.8	L1-Li
26	1.719M	15.0	+5.8 +0.0	+0.1	+0.2	+0.0	+0.0	21.1	46.0	-24.9	L1-Li
27	10.274M	18.3	+5.8 +0.2	+0.3	+0.2	+0.2	+0.0	25.0	50.0	-25.0	L1-Li
28	3.480M	14.7	+5.8 +0.1	+0.1	+0.1	+0.1	+0.0	20.9	46.0	-25.1	L1-Li
29	11.842M	18.1	+5.8 +0.3	+0.3	+0.2	+0.1	+0.0	24.8	50.0	-25.2	L1-Li
30	24.258M	17.5	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	24.8	50.0	-25.2	L1-Li
31	263.444k	20.1	+5.8 +0.0	+0.0	+0.1	+0.0	+0.0	26.0	51.3	-25.3	L1-Li
32	1.536M	14.6	+5.8 +0.0	+0.1	+0.2	+0.0	+0.0	20.7	46.0	-25.3	L1-Li
33	4.407M	14.4	+5.8 +0.1	+0.2	+0.1	+0.1	+0.0	20.7	46.0	-25.3	L1-Li
34	8.697M	18.1	+5.8 +0.2	+0.3	+0.1	+0.1	+0.0	24.6	50.0	-25.4	L1-Li
35	14.184M	17.8	+5.8 +0.4	+0.3	+0.2	+0.1	+0.0	24.6	50.0	-25.4	L1-Li
36	10.373M	17.8	+5.8 +0.2	+0.3	+0.2	+0.2	+0.0	24.5	50.0	-25.5	L1-Li
37	10.418M	17.8	+5.8 +0.2	+0.3	+0.2	+0.2	+0.0	24.5	50.0	-25.5	L1-Li
38	10.535M	17.7	+5.8 +0.2	+0.3	+0.2	+0.2	+0.0	24.4	50.0	-25.6	L1-Li
39	4.156M	14.0	+5.8 +0.1	+0.2	+0.1	+0.1	+0.0	20.3	46.0	-25.7	L1-Li
40	24.066M	17.0	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	24.3	50.0	-25.7	L1-Li
41	24.183M	17.0	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	24.3	50.0	-25.7	L1-Li
42	2.357M	14.1	+5.8 +0.0	+0.1	+0.2	+0.0	+0.0	20.2	46.0	-25.8	L1-Li
43	1.745M	14.1	+5.8 +0.0	+0.1	+0.2	+0.0	+0.0	20.2	46.0	-25.8	L1-Li
44	24.306M	16.9	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	24.2	50.0	-25.8	L1-Li
45	13.553M	17.4	+5.8 +0.4	+0.3	+0.2	+0.1	+0.0	24.2	50.0	-25.8	L1-Li
46	3.948M	13.8	+5.8 +0.1	+0.2	+0.1	+0.1	+0.0	20.1	46.0	-25.9	L1-Li
47	4.267M	13.7	+5.8 +0.1	+0.2	+0.1	+0.1	+0.0	20.0	46.0	-26.0	L1-Li
48	2.999M	13.8	+5.8 +0.1	+0.1	+0.2	+0.0	+0.0	20.0	46.0	-26.0	L1-Li
49	23.840M	16.7	+5.8 +0.7	+0.4	+0.2	+0.2	+0.0	24.0	50.0	-26.0	L1-Li
50	13.761M	17.2	+5.8 +0.4	+0.3	+0.2	+0.1	+0.0	24.0	50.0	-26.0	L1-Li

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Pl. • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.207 AC Mains - Average**		
Work Order #:	**103955**	Date:	6/12/2020
Test Type:	**Conducted Emissions**	Time:	10:29:08 AM
Tested By:	Don Nguyen	Sequence#:	12
Software:	EMITest 5.03.12		120V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 4			

Support Equipment:

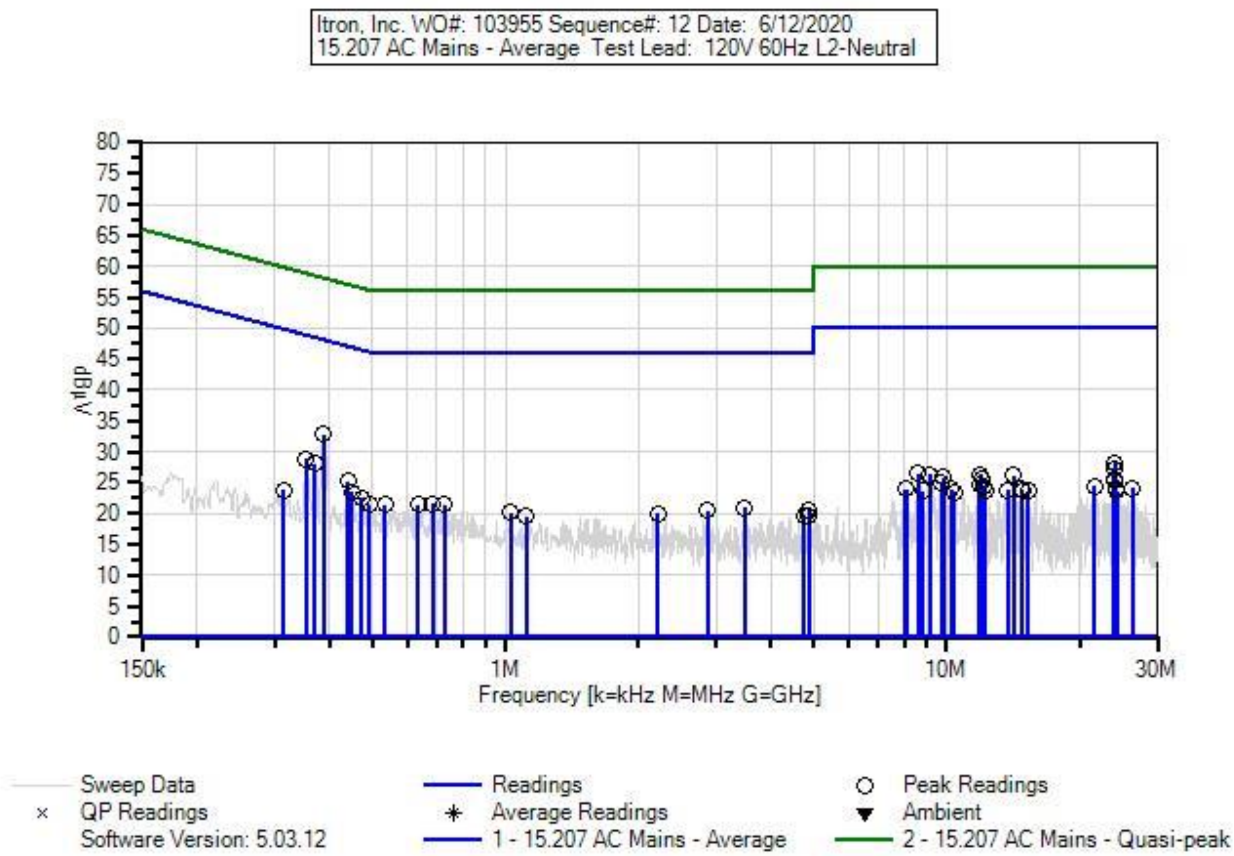
Device	Manufacturer	Model #	S/N
Configuration 4			

Test Conditions / Notes:

The EUT is placed on test bench. USB port is connected to a touchscreen tablet. The EUT is connected to 12Vdc charger. The computer is sending command to the EUT using software MC3 SuperRaptor Test ver.4.0.3.5.
The EUT is set into transmitting mode.

Operating frequency: 908MHz (worst case)
Frequency of measurement: 150kHz-30MHz
RBW=9kHz, VBW=30kHz

Site A
Temperature: 25°C
Relative Humidity: 46%
Test Method: ANSI C63.10:2013



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP07545	Attenuator	SA18N10W-06	1/18/2019	1/18/2021
T2	ANP07338	Cable	2249-Y-240	12/24/2019	12/24/2021
	AN02869	Spectrum Analyzer	E4440A	7/25/2019	7/25/2020
T3	AN02610	High Pass Filter	HE9615-150K-50-720B	10/22/2019	10/22/2021
	AN00847.1	50uH LISN-(L) Line 1	3816/2NM	3/10/2020	3/10/2021
T4	AN00847.1	50uH LISN-(N) Line 2	3816/2NM	3/10/2020	3/10/2021
	ANP06986	Cable-Line L1(dB)	90cm-extcord	3/31/2020	3/31/2022
T5	ANP06986	Cable-Neutral L2(dB)	90cm-extcord	3/31/2020	3/31/2022

Measurement Data: Reading listed by margin. Test Lead: L2-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	387.069k	26.8	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	32.8	48.1	-15.3	L2-Ne
2	353.617k	22.9	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	28.9	48.9	-20.0	L2-Ne
3	370.343k	22.0	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	28.0	48.5	-20.5	L2-Ne
4	24.004M	20.7	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	28.2	50.0	-21.8	L2-Ne
5	439.427k	19.2	+5.8 +0.0	+0.0	+0.2	+0.0	+0.0	25.2	47.1	-21.9	L2-Ne
6	23.929M	19.7	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	27.2	50.0	-22.8	L2-Ne
7	23.881M	19.6	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	27.1	50.0	-22.9	L2-Ne
8	449.608k	17.3	+5.8 +0.0	+0.0	+0.3	+0.0	+0.0	23.4	46.9	-23.5	L2-Ne
9	8.625M	19.9	+5.8 +0.3	+0.3	+0.1	+0.1	+0.0	26.5	50.0	-23.5	L2-Ne
10	11.932M	19.5	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	26.4	50.0	-23.6	L2-Ne
11	9.166M	19.5	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	26.3	50.0	-23.7	L2-Ne
12	14.184M	19.2	+5.8 +0.5	+0.3	+0.2	+0.2	+0.0	26.2	50.0	-23.8	L2-Ne
13	472.152k	16.4	+5.8 +0.0	+0.0	+0.3	+0.0	+0.0	22.5	46.5	-24.0	L2-Ne
14	9.851M	19.1	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	25.9	50.0	-24.1	L2-Ne
15	11.977M	18.8	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	25.7	50.0	-24.3	L2-Ne
16	685.950k	15.4	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	21.6	46.0	-24.4	L2-Ne
17	534.691k	15.4	+5.8 +0.0	+0.0	+0.3	+0.0	+0.0	21.5	46.0	-24.5	L2-Ne
18	726.674k	15.3	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	21.5	46.0	-24.5	L2-Ne
19	24.066M	18.0	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	25.5	50.0	-24.5	L2-Ne
20	491.786k	15.4	+5.8 +0.0	+0.0	+0.3	+0.0	+0.0	21.5	46.1	-24.6	L2-Ne
21	634.319k	15.2	+5.8 +0.0	+0.1	+0.3	+0.0	+0.0	21.4	46.0	-24.6	L2-Ne
22	24.046M	17.7	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	25.2	50.0	-24.8	L2-Ne
23	3.476M	14.8	+5.8 +0.1	+0.1	+0.1	+0.1	+0.0	21.0	46.0	-25.0	L2-Ne
24	9.725M	18.2	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	25.0	50.0	-25.0	L2-Ne

25	11.833M	17.7	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	24.6	50.0	-25.4	L2-Ne
26	21.598M	17.1	+5.8 +0.8	+0.4	+0.2	+0.2	+0.0	24.5	50.0	-25.5	L2-Ne
27	2.872M	14.1	+5.8 +0.1	+0.1	+0.2	+0.1	+0.0	20.4	46.0	-25.6	L2-Ne
28	4.862M	14.0	+5.8 +0.2	+0.2	+0.1	+0.1	+0.0	20.4	46.0	-25.6	L2-Ne
29	12.157M	17.5	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	24.4	50.0	-25.6	L2-Ne
30	1.030M	14.0	+5.8 +0.1	+0.1	+0.2	+0.0	+0.0	20.2	46.0	-25.8	L2-Ne
31	24.183M	16.6	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	24.1	50.0	-25.9	L2-Ne
32	26.362M	16.5	+5.8 +0.9	+0.4	+0.2	+0.3	+0.0	24.1	50.0	-25.9	L2-Ne
33	2.213M	13.8	+5.8 +0.1	+0.1	+0.2	+0.0	+0.0	20.0	46.0	-26.0	L2-Ne
34	315.075k	17.9	+5.8 +0.0	+0.0	+0.1	+0.0	+0.0	23.8	49.8	-26.0	L2-Ne
35	14.743M	17.0	+5.8 +0.5	+0.3	+0.2	+0.2	+0.0	24.0	50.0	-26.0	L2-Ne
36	8.112M	17.5	+5.8 +0.3	+0.2	+0.1	+0.1	+0.0	24.0	50.0	-26.0	L2-Ne
37	8.049M	17.4	+5.8 +0.3	+0.2	+0.1	+0.1	+0.0	23.9	50.0	-26.1	L2-Ne
38	10.229M	17.1	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	23.9	50.0	-26.1	L2-Ne
39	12.211M	16.9	+5.8 +0.4	+0.3	+0.2	+0.2	+0.0	23.8	50.0	-26.2	L2-Ne
40	13.743M	16.8	+5.8 +0.5	+0.3	+0.2	+0.2	+0.0	23.8	50.0	-26.2	L2-Ne
41	14.815M	16.8	+5.8 +0.5	+0.3	+0.2	+0.2	+0.0	23.8	50.0	-26.2	L2-Ne
42	8.842M	17.1	+5.8 +0.3	+0.3	+0.1	+0.1	+0.0	23.7	50.0	-26.3	L2-Ne
43	15.301M	16.6	+5.8 +0.6	+0.3	+0.2	+0.2	+0.0	23.7	50.0	-26.3	L2-Ne
44	24.141M	16.2	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	23.7	50.0	-26.3	L2-Ne
45	4.751M	13.2	+5.8 +0.2	+0.2	+0.1	+0.1	+0.0	19.6	46.0	-26.4	L2-Ne
46	1.115M	13.4	+5.8 +0.1	+0.1	+0.2	+0.0	+0.0	19.6	46.0	-26.4	L2-Ne
47	24.258M	16.1	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	23.6	50.0	-26.4	L2-Ne
48	24.162M	16.1	+5.8 +0.8	+0.4	+0.2	+0.3	+0.0	23.6	50.0	-26.4	L2-Ne
49	4.871M	13.1	+5.8 +0.2	+0.2	+0.1	+0.1	+0.0	19.5	46.0	-26.5	L2-Ne
50	10.400M	16.7	+5.8 +0.3	+0.3	+0.2	+0.2	+0.0	23.5	50.0	-26.5	L2-Ne

Test Setup Photo(s)

Configuration 3

Configuration 3

Configuration 4

Configuration 4

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.