



Underwriters Laboratories Inc.
1285 Walt Whitman Rd.
Melville, NY 11747

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Job Number:	712047
File Number:	MC15667
Date:	28 June 2007
Model:	AC-1100
FCC ID:	VFACS1215

Electromagnetic Compatibility Test Report

For

KEYMATRIX

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1285 Walt Whitman Rd.
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Job Number: 712047
Model Number: AC-1100
Client Name: KEYMATRIX
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Test Report Details

Tests Performed By: **Underwriters Laboratories Inc.
1285 Walt Whitman Rd.
Melville, NY 11747**

Tests Performed For: **KEYMATRIX
1 TECHNOLOGY LANE
EXPORT, PA 15632**

Applicant Contact: **PAUL ROMANKO**
Phone: **(724) 733-2000**
E-mail: **promanko@aamatrix.com**

Test Report Date: **28 June 2007**

Product Type: **Low Power Transmitter – 125kHz RFID Reader**

Product standards **FCC Part 15, Subpart C**

Model Number: **AC-1100**

Sample Serial Number: **Not provided**

EUT Category: **Low Power Transmitter**

Testing Start Date: **22 June 2007**

Date Testing Complete: **22 June 2007**

Overall Results: Compliant

Underwriters Laboratories Inc. reports apply only to the specific samples tested under stated test conditions. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. Underwriters Laboratories Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from Underwriters Laboratories Inc. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or endorsement by NVLAP, A2LA, or any agency of the US government.

This report may contain test results that are not covered by the NVLAP or A2LA accreditation. The scope of accreditation is limited to the specific tests that are listed on the NVLAP and/or A2LA websites referenced at the end of this report.

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
28 June 2007	Original	--	--
02 July 2007	Removed setups for short term confidentiality request.	B. DeLisi	--

1.0 GENERAL - Product Description

1.1 Equipment Description

The AC-1100 is a proximity card reader, which reads Hitag™ 1, Hitag™ 2 and H4102 (a.k.a. EM4102) transponder technologies at the industry standard frequency of 125 kHz. A piezo buzzer and a tri-color LED indicate scanner status. The AC-1100 reader is used with standalone system controllers to create KeyMaster access control systems. Mount the unit against any surface, in any orientation, after setting the address and connecting the cables. The circuitry of the AC-1100 is encased in a durable, waterproof resin suitable for indoor/outdoor use.

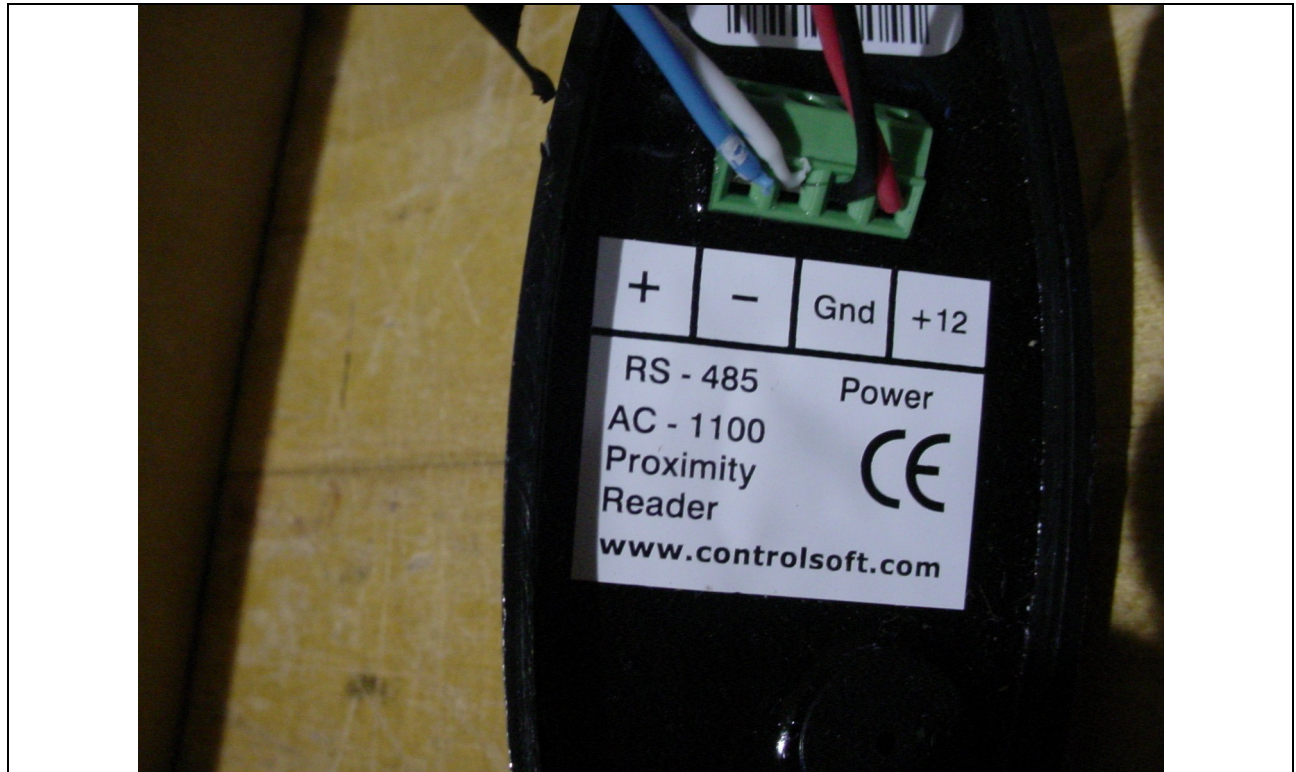
The antenna is integral to the device and cannot be removed.

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1.2 Equipment Marking Plate



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1.3 Device Configuration During Test

1.3.1 Equipment Used During Test:

Use	Product Type	Manufacturer	Model	Comments
EUT	RFID Reader	KEYMATRIX	AC-1100	None
AE	Control Panel	KEYMATRIX	AC-4311	None
SIM	Power Supply	Universal Power Source	6050A	Linear Power Supply to convert 120Vac to 12Vdc
Note: EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment, or SIM - Simulator (Not Subjected to Test)				

1.3.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
0	Enclosure	N/E	—	—	None
1	Mains	DC	Y	N	None
1	RS-485	I/O	Y	Y	None
Note: AC = AC Power Port DC = DC Power Port N/E = Non-Electrical I/O = Signal Input or Output Port (Not Involved in Process Control) TP = Telecommunication Ports					

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1.3.3 EUT Internal Operating Frequencies:

Frequency (MHz)	Description	Frequency (MHz)	Description
0.125	Fundamental	16	Oscillator

1.3.4 Power Interface:

Mode # /Rated	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated	12	-	-	DC	-	None
1	120	-	-	AC-60Hz	Single Phase	Linear Power Supply to convert 120Vac to 12Vdc

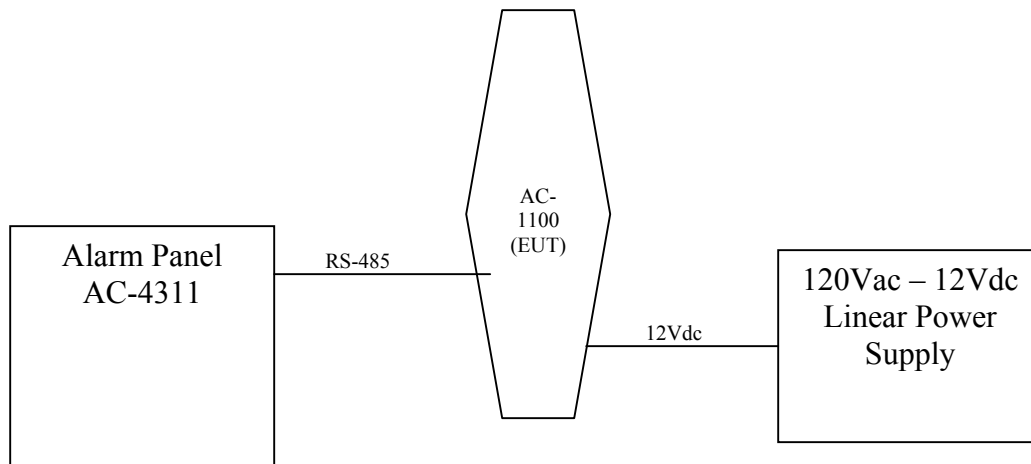
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1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



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1.5 EUT Operation Modes

Mode #	Description
1	Continuous transmit.

1.6 EUT Configurations

Mode #	Description
1	Stand-alone. RS-485 connected to control panel and power is connected directly to reader from a 120Vac-12Vdc linear power supply.

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2.0 Summary

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The applicant determined the list of tests performed were applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

2.1 Deviations from standard test methods

None

2.2 Device Modifications Necessary for Compliance

None

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2.3 Reference Standards

Standard Number	Standard Name	Standard Date
FCC Part 15, Subpart C, 15.207, 15.209	Code of Federal Regulations, Part 15, Radio Frequency Devices	2006

2.4 Results Summary

Requirement – Test	Result (Compliant / Non-Compliant)*
Conducted Emissions	Compliant
Radiated Emissions	Compliant



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3.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is one year or the manufacturers' recommendation, whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

4.0 EMISSIONS TEST RESULTS

The emissions tests were performed according to following regulations:

----- United States -----

Code of Federal Regulations Title 47	Part 15, Subpart C, Radio Frequency Devices
--------------------------------------	---

Unless specified otherwise in the individual Methods, the tests shall be conducted under the following ambient conditions. Confirmation of these conditions shall be verified at the time the test is conducted.

Ambient Temperature, °C	22.5 ± 2.5	Relative Humidity, %	45 ± 15	Barometric Pressure, mBar	950 ± 150
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4.1 Test Conditions and Results – MAINS TERMINAL – CONDUCTED EMISSIONS

Test Description	Measurements were made on a ground plane. All power was connected to the system through Artificial Mains Network (AMN). Conducted voltage measurements on mains lines were made at the output of the AMN.	
Basic Standard	FCC Part 15, Subpart C, 15.207	
UL LPG	80-EM-S0026	
	Frequency range on each side of line	Measurement Point
Fully configured sample scanned over the following frequency range	150kHz to 30MHz	Mains
Limits		
Frequency (MHz)	Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50
Supplementary information: None		

Table 1 Conducted Emissions EUT Configuration Settings

Power Interface Mode #	EUT Configurations Mode #	EUT Operation Mode #
1	1	1
Supplementary information: None		

Table 2 Conducted Emissions Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
Conducted Emissions – Shield Room			
Spectrum Analyzer	Agilent	E7405A	19695
LISN	EMCO	3825/2R	ME5-629
Switch Driver	HP	11713A	44403
RF Switch Box	UL	2	44400
Measurement Software	UL	Version 9.3	44743
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	43736

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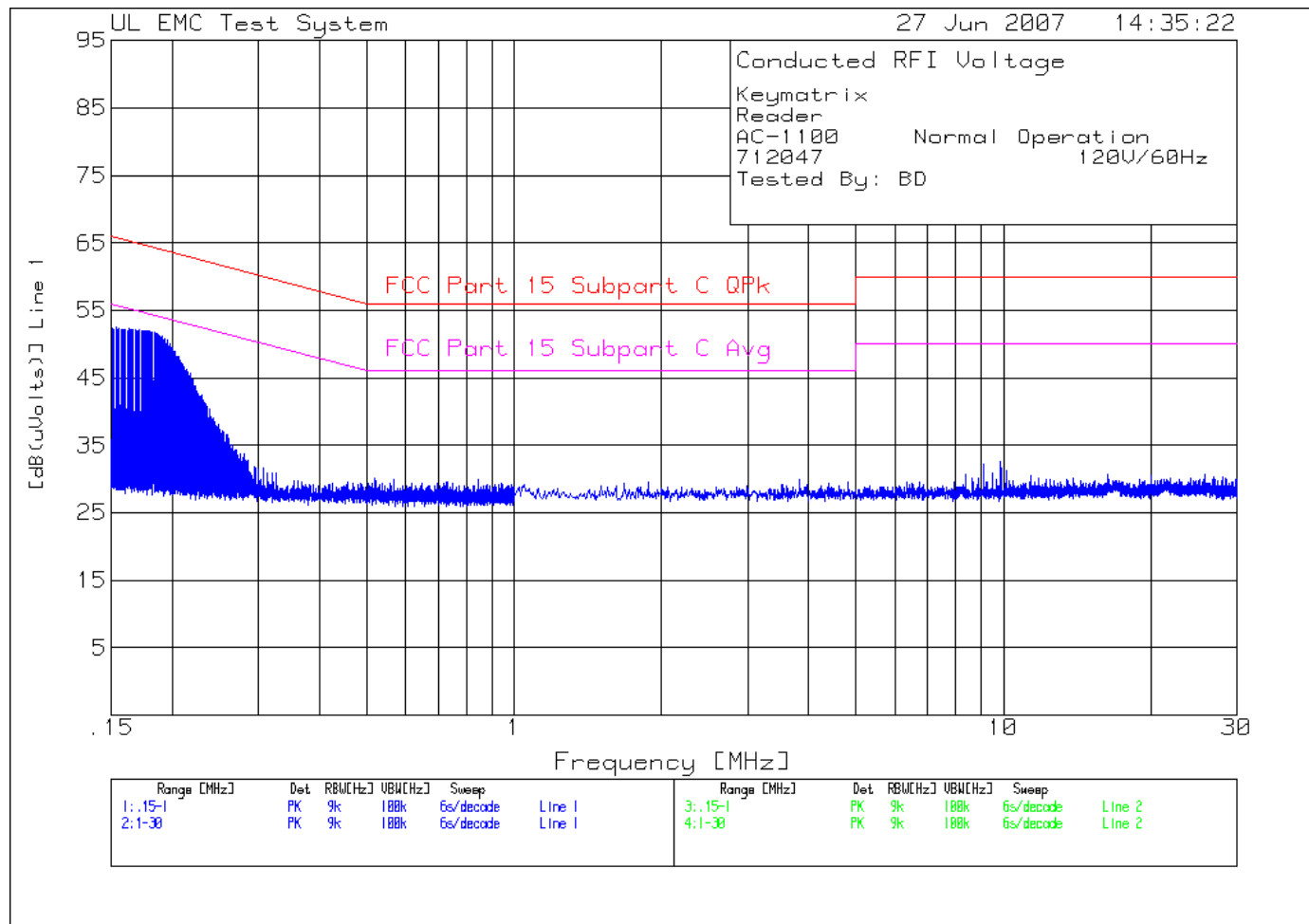
Figure 1 Test Setup for Conducted Emissions – See Setup Exhibit

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Figure 2 Conducted Emissions Graph



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Table 3 Conducted Emissions Data Points

Keymatrix
 Reader
 AC-1100 Normal Operation
 712047 120V/60Hz
 Tested By: BD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====									
Line 1	.15 - 1MHz	-----							
1	.15085	40.26 pk	12	0	52.26	66	56	-	-
				Margin [dB]		-13.74	-3.74	-	-
2	.15212	40.21 pk	12	0	52.21	65.9	55.9	-	-
				Margin [dB]		-13.69	-3.69	-	-
3	.15339	40.52 pk	12	0	52.52	65.8	55.8	-	-
				Margin [dB]		-13.28	-3.28	-	-
4	.15445	40.1 pk	12	0	52.1	65.8	55.8	-	-
				Margin [dB]		-13.7	-3.7	-	-
5	.15573	40.35 pk	12	0	52.35	65.7	55.7	-	-
				Margin [dB]		-13.35	-3.35	-	-
6	.157	40.27 pk	11.9	0	52.17	65.6	55.6	-	-
				Margin [dB]		-13.43	-3.43	-	-
7	.15806	40.24 pk	11.9	0	52.14	65.6	55.6	-	-
				Margin [dB]		-13.46	-3.46	-	-
8	.15933	40.19 pk	11.9	0	52.09	65.5	55.5	-	-
				Margin [dB]		-13.41	-3.41	-	-
9	.1606	40.18 pk	11.9	0	52.08	65.4	55.4	-	-
				Margin [dB]		-13.32	-3.32	-	-
10	.16187	40.12 pk	11.9	0	52.02	65.4	55.4	-	-
				Margin [dB]		-13.38	-3.38	-	-
11	.16293	40.36 pk	11.9	0	52.26	65.3	55.3	-	-
				Margin [dB]		-13.04	-3.04	-	-
12	.16421	40.32 pk	11.8	0	52.12	65.2	55.2	-	-
				Margin [dB]		-13.08	-3.08	-	-
13	.16548	40.44 pk	11.8	0	52.24	65.2	55.2	-	-
				Margin [dB]		-12.96	-2.96	-	-
14	.16654	40.44 pk	11.8	0	52.24	65.1	55.1	-	-
				Margin [dB]		-12.86	-2.86	-	-
15	.16781	40.33 pk	11.8	0	52.13	65.1	55.1	-	-
				Margin [dB]		-12.97	-2.97	-	-
16	.16908	40.21 pk	11.8	0	52.01	65	55	-	-
				Margin [dB]		-12.99	-2.99	-	-
17	.17014	40.1 pk	11.8	0	51.9	65	55	-	-
				Margin [dB]		-13.1	-3.1	-	-
18	.17141	40.46 pk	11.7	0	52.16	64.9	54.9	-	-
				Margin [dB]		-12.74	-2.74	-	-

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Test No.	Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====									
Line 1	.15	- 1MHz	-----						
19	.17269	40.27 pk	11.7	0	51.97	64.8	54.8	-	-
				Margin [dB]		-12.83	-2.83	-	-
20	.17396	40.18 pk	11.7	0	51.88	64.8	54.8	-	-
				Margin [dB]		-12.92	-2.92	-	-
21	.17502	40.29 pk	11.7	0	51.99	64.7	54.7	-	-
				Margin [dB]		-12.71	-2.71	-	-
22	.17629	40.23 pk	11.7	0	51.93	64.7	54.7	-	-
				Margin [dB]		-12.77	-2.77	-	-
23	.17756	40.33 pk	11.7	0	52.03	64.6	54.6	-	-
				Margin [dB]		-12.57	-2.57	-	-
24	.17862	40.42 pk	11.6	0	52.02	64.5	54.5	-	-
				Margin [dB]		-12.48	-2.48	-	-
25	.1799	40.32 pk	11.6	0	51.92	64.5	54.5	-	-
				Margin [dB]		-12.58	-2.58	-	-
26	.18117	40.16 pk	11.6	0	51.76	64.4	54.4	-	-
				Margin [dB]		-12.64	-2.64	-	-
27	.18223	40.08 pk	11.6	0	51.68	64.4	54.4	-	-
				Margin [dB]		-12.72	-2.72	-	-
28	.1835	40.16 pk	11.6	0	51.76	64.3	54.3	-	-
				Margin [dB]		-12.54	-2.54	-	-
29	.18477	40.04 pk	11.5	0	51.54	64.3	54.3	-	-
				Margin [dB]		-12.76	-2.76	-	-
30	.18604	40.02 pk	11.5	0	51.52	64.2	54.2	-	-
				Margin [dB]		-12.68	-2.68	-	-
31	.1871	39.9 pk	11.5	0	51.4	64.2	54.2	-	-
				Margin [dB]		-12.8	-2.8	-	-
32	.18838	39.75 pk	11.5	0	51.25	64.1	54.1	-	-
				Margin [dB]		-12.85	-2.85	-	-
33	.18965	39.55 pk	11.5	0	51.05	64.1	54.1	-	-
				Margin [dB]		-13.05	-3.05	-	-
34	.19071	39.62 pk	11.5	0	51.12	64	54	-	-
				Margin [dB]		-12.88	-2.88	-	-
35	.19198	39.15 pk	11.5	0	50.65	64	54	-	-
				Margin [dB]		-13.35	-3.35	-	-
36	.19325	39.35 pk	11.5	0	50.85	63.9	53.9	-	-
				Margin [dB]		-13.05	-3.05	-	-
37	.19431	38.75 pk	11.4	0	50.15	63.9	53.9	-	-
				Margin [dB]		-13.75	-3.75	-	-
38	.19559	39.17 pk	11.4	0	50.57	63.8	53.8	-	-
				Margin [dB]		-13.23	-3.23	-	-
39	.19686	38.32 pk	11.4	0	49.72	63.7	53.7	-	-
				Margin [dB]		-13.98	-3.98	-	-
40	.19813	38.74 pk	11.4	0	50.14	63.7	53.7	-	-
				Margin [dB]		-13.56	-3.56	-	-
41	.19919	38.03 pk	11.4	0	49.43	63.6	53.6	-	-
				Margin [dB]		-14.17	-4.17	-	-

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No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====									
Line 1	.15 - 1MHz	-----							
42	.20046	38.12 pk	11.4	0	49.52	63.6	53.6	-	-
				Margin [dB]		-14.08	-4.08	-	-
43	.20173	37.55 pk	11.4	0	48.95	63.5	53.5	-	-
				Margin [dB]		-14.55	-4.55	-	-
44	.20279	37.53 pk	11.4	0	48.93	63.5	53.5	-	-
				Margin [dB]		-14.57	-4.57	-	-
45	.20407	36.83 pk	11.4	0	48.23	63.4	53.4	-	-
				Margin [dB]		-15.17	-5.17	-	-
46	.20534	36.92 pk	11.3	0	48.22	63.4	53.4	-	-
				Margin [dB]		-15.18	-5.18	-	-
47	.20661	36.86 pk	11.3	0	48.16	63.3	53.3	-	-
				Margin [dB]		-15.14	-5.14	-	-
48	.20767	36.36 pk	11.3	0	47.66	63.3	53.3	-	-
				Margin [dB]		-15.64	-5.64	-	-
49	.20894	35.93 pk	11.3	0	47.23	63.2	53.2	-	-
				Margin [dB]		-15.97	-5.97	-	-

LIMIT 1: FCC Part 15 Subpart C QPk
 LIMIT 2: FCC Part 15 Subpart C Avg

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection

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Keymatrix
Reader
AC-1200 Normal Operation
712047 120V/60Hz
Tested By: BD

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====								
Line 1 .15 - 1MHz								
.15175	1.24 ave	12	0	13.24	65.9	55.9	-	-
			Margin [dB]:		-52.66	-42.66	-	-
.15175	1.06 ave	12	0	13.06	65.9	55.9	-	-
			Margin [dB]:		-52.84	-42.84	-	-
.15233	.79 ave	12	0	12.79	65.9	55.9	-	-
			Margin [dB]:		-53.11	-43.11	-	-
.1536	.86 ave	12	0	12.86	65.8	55.8	-	-
			Margin [dB]:		-52.94	-42.94	-	-
.15467	.88 ave	12	0	12.88	65.7	55.7	-	-
			Margin [dB]:		-52.82	-42.82	-	-
.15594	.81 ave	12	0	12.81	65.7	55.7	-	-
			Margin [dB]:		-52.89	-42.89	-	-
.15721	.8 ave	11.9	0	12.7	65.6	55.6	-	-
			Margin [dB]:		-52.9	-42.9	-	-
.15827	.75 ave	11.9	0	12.65	65.6	55.6	-	-
			Margin [dB]:		-52.95	-42.95	-	-
.15954	.78 ave	11.9	0	12.68	65.5	55.5	-	-
			Margin [dB]:		-52.82	-42.82	-	-
.16081	.69 ave	11.9	0	12.59	65.4	55.4	-	-
			Margin [dB]:		-52.81	-42.81	-	-
.16209	.79 ave	11.9	0	12.69	65.4	55.4	-	-
			Margin [dB]:		-52.71	-42.71	-	-
.16315	.62 ave	11.9	0	12.52	65.3	55.3	-	-
			Margin [dB]:		-52.78	-42.78	-	-
.16442	.63 ave	11.8	0	12.43	65.2	55.2	-	-
			Margin [dB]:		-52.77	-42.77	-	-
.16569	.64 ave	11.8	0	12.44	65.2	55.2	-	-
			Margin [dB]:		-52.76	-42.76	-	-
.16675	.71 ave	11.8	0	12.51	65.1	55.1	-	-
			Margin [dB]:		-52.59	-42.59	-	-
.16802	.64 ave	11.8	0	12.44	65.1	55.1	-	-
			Margin [dB]:		-52.66	-42.66	-	-
.16929	.68 ave	11.8	0	12.48	65	55	-	-
			Margin [dB]:		-52.52	-42.52	-	-
.17035	.62 ave	11.8	0	12.42	64.9	54.9	-	-
			Margin [dB]:		-52.48	-42.48	-	-
.17163	.71 ave	11.7	0	12.41	64.9	54.9	-	-
			Margin [dB]:		-52.49	-42.49	-	-
.1729	.68 ave	11.7	0	12.38	64.8	54.8	-	-
			Margin [dB]:		-52.42	-42.42	-	-

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 FCC ID: VFACS1215

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Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====								
Line 1 .15 - 1MHz								
.17417	.51 ave	11.7	0	12.21	64.8	54.8	-	-
			Margin [dB]:		-52.59	-42.59	-	-
.17523	.65 ave	11.7	0	12.35	64.7	54.7	-	-
			Margin [dB]:		-52.35	-42.35	-	-
.1765	.59 ave	11.7	0	12.29	64.6	54.6	-	-
			Margin [dB]:		-52.31	-42.31	-	-
.17778	.48 ave	11.6	0	12.08	64.6	54.6	-	-
			Margin [dB]:		-52.52	-42.52	-	-
.17884	.58 ave	11.6	0	12.18	64.5	54.5	-	-
			Margin [dB]:		-52.32	-42.32	-	-
.18011	.51 ave	11.6	0	12.11	64.5	54.5	-	-
			Margin [dB]:		-52.39	-42.39	-	-
.18138	.51 ave	11.6	0	12.11	64.4	54.4	-	-
			Margin [dB]:		-52.29	-42.29	-	-
.18244	.54 ave	11.6	0	12.14	64.4	54.4	-	-
			Margin [dB]:		-52.26	-42.26	-	-
.18371	.61 ave	11.6	0	12.21	64.3	54.3	-	-
			Margin [dB]:		-52.09	-42.09	-	-
.18498	.52 ave	11.5	0	12.02	64.3	54.3	-	-
			Margin [dB]:		-52.28	-42.28	-	-
.18626	.47 ave	11.5	0	11.97	64.2	54.2	-	-
			Margin [dB]:		-52.23	-42.23	-	-
.18732	.47 ave	11.5	0	11.97	64.2	54.2	-	-
			Margin [dB]:		-52.23	-42.23	-	-
.18859	.52 ave	11.5	0	12.02	64.1	54.1	-	-
			Margin [dB]:		-52.08	-42.08	-	-
.18986	.3 ave	11.5	0	11.8	64	54	-	-
			Margin [dB]:		-52.2	-42.2	-	-
.19092	.47 ave	11.5	0	11.97	64	54	-	-
			Margin [dB]:		-52.03	-42.03	-	-
.19219	.33 ave	11.5	0	11.83	63.9	53.9	-	-
			Margin [dB]:		-52.07	-42.07	-	-
.19347	.42 ave	11.5	0	11.92	63.9	53.9	-	-
			Margin [dB]:		-51.98	-41.98	-	-
.19453	.28 ave	11.4	0	11.68	63.8	53.8	-	-
			Margin [dB]:		-52.12	-42.12	-	-
.1958	.27 ave	11.4	0	11.67	63.8	53.8	-	-
			Margin [dB]:		-52.13	-42.13	-	-
.19707	.24 ave	11.4	0	11.64	63.7	53.7	-	-
			Margin [dB]:		-52.06	-42.06	-	-
.19834	.2 ave	11.4	0	11.6	63.7	53.7	-	-
			Margin [dB]:		-52.1	-42.1	-	-
.1994	.15 ave	11.4	0	11.55	63.6	53.6	-	-
			Margin [dB]:		-52.05	-42.05	-	-
.20067	.06 ave	11.4	0	11.46	63.6	53.6	-	-
			Margin [dB]:		-52.14	-42.14	-	-

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Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====								
Line 1 .15 - 1MHz								
.20195	.01 ave	11.4	0	11.41	63.5	53.5	-	-
			Margin [dB]:		-52.09	-42.09	-	-
.20301	.08 ave	11.4	0	11.48	63.5	53.5	-	-
			Margin [dB]:		-52.02	-42.02	-	-
.20428	-.01 ave	11.4	0	11.39	63.4	53.4	-	-
			Margin [dB]:		-52.01	-42.01	-	-
.20555	-.11 ave	11.3	0	11.19	63.4	53.4	-	-
			Margin [dB]:		-52.21	-42.21	-	-
.20661	-.03 ave	11.3	0	11.27	63.3	53.3	-	-
			Margin [dB]:		-52.03	-42.03	-	-
.20788	-.19 ave	11.3	0	11.11	63.3	53.3	-	-
			Margin [dB]:		-52.19	-42.19	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection

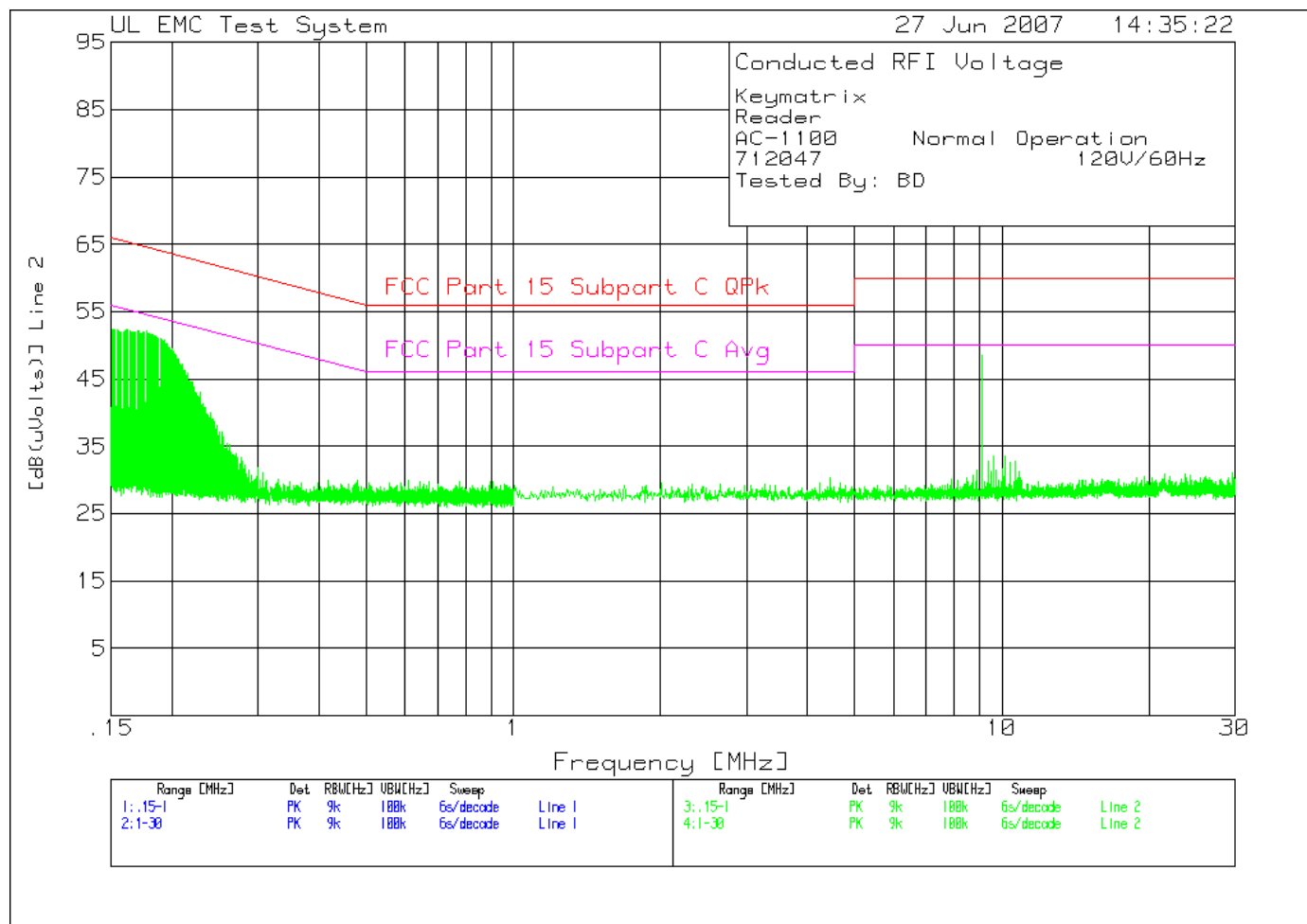
LIMIT 1: FCC Part 15 Subpart C QPk
 LIMIT 2: FCC Part 15 Subpart C Avg

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Figure 3 Conducted Emissions Graph



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Table 4 Conducted Emissions Data Points

Keymatrix
 Reader
 AC-1100 Normal Operation
 712047 120V/60Hz
 Tested By: BD

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====									
Line 2	.15	- 1MHz							
1	.15042	40.28 pk	12	0	52.28	66	56	-	-
				Margin [dB]		-13.72	-3.72	-	-
2	.15148	40.31 pk	12	0	52.31	65.9	55.9	-	-
				Margin [dB]		-13.59	-3.59	-	-
3	.15276	40.26 pk	12	0	52.26	65.8	55.8	-	-
				Margin [dB]		-13.54	-3.54	-	-
4	.15403	40.34 pk	12	0	52.34	65.8	55.8	-	-
				Margin [dB]		-13.46	-3.46	-	-
5	.1553	40.18 pk	12	0	52.18	65.7	55.7	-	-
				Margin [dB]		-13.52	-3.52	-	-
6	.15636	40.03 pk	12	0	52.03	65.7	55.7	-	-
				Margin [dB]		-13.67	-3.67	-	-
7	.15763	40.15 pk	11.9	0	52.05	65.6	55.6	-	-
				Margin [dB]		-13.55	-3.55	-	-
8	.15891	40.12 pk	11.9	0	52.02	65.5	55.5	-	-
				Margin [dB]		-13.48	-3.48	-	-
9	.15997	40.18 pk	11.9	0	52.08	65.5	55.5	-	-
				Margin [dB]		-13.42	-3.42	-	-
10	.16124	40.39 pk	11.9	0	52.29	65.4	55.4	-	-
				Margin [dB]		-13.11	-3.11	-	-
11	.16251	40.43 pk	11.9	0	52.33	65.3	55.3	-	-
				Margin [dB]		-12.97	-2.97	-	-
12	.16357	40.32 pk	11.9	0	52.22	65.3	55.3	-	-
				Margin [dB]		-13.08	-3.08	-	-
13	.16484	40.1 pk	11.8	0	51.9	65.2	55.2	-	-
				Margin [dB]		-13.3	-3.3	-	-
14	.16611	40.23 pk	11.8	0	52.03	65.2	55.2	-	-
				Margin [dB]		-13.17	-3.17	-	-
15	.16739	40.09 pk	11.8	0	51.89	65.1	55.1	-	-
				Margin [dB]		-13.21	-3.21	-	-
16	.16845	40.24 pk	11.8	0	52.04	65	55	-	-
				Margin [dB]		-12.96	-2.96	-	-
17	.16972	40.36 pk	11.8	0	52.16	65	55	-	-
				Margin [dB]		-12.84	-2.84	-	-
18	.17099	40.4 pk	11.8	0	52.2	64.9	54.9	-	-
				Margin [dB]		-12.7	-2.7	-	-

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Test No.	Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====									
Line 2	.15	- 1MHz							
19	.17205	40.15 pk	11.7	0	51.85	64.9	54.9	-	-
				Margin [dB]		-13.05	-3.05	-	-
20	.17332	40.05 pk	11.7	0	51.75	64.8	54.8	-	-
				Margin [dB]		-13.05	-3.05	-	-
21	.1746	40.32 pk	11.7	0	52.02	64.7	54.7	-	-
				Margin [dB]		-12.68	-2.68	-	-
22	.17566	40.33 pk	11.7	0	52.03	64.7	54.7	-	-
				Margin [dB]		-12.67	-2.67	-	-
23	.17693	40.41 pk	11.7	0	52.11	64.6	54.6	-	-
				Margin [dB]		-12.49	-2.49	-	-
24	.1782	40.09 pk	11.7	0	51.79	64.6	54.6	-	-
				Margin [dB]		-12.81	-2.81	-	-
25	.17947	40.13 pk	11.6	0	51.73	64.5	54.5	-	-
				Margin [dB]		-12.77	-2.77	-	-
26	.18053	40.02 pk	11.6	0	51.62	64.5	54.5	-	-
				Margin [dB]		-12.88	-2.88	-	-
27	.1818	39.89 pk	11.6	0	51.49	64.4	54.4	-	-
				Margin [dB]		-12.91	-2.91	-	-
28	.18308	39.94 pk	11.6	0	51.54	64.3	54.3	-	-
				Margin [dB]		-12.76	-2.76	-	-
29	.18414	39.79 pk	11.6	0	51.39	64.3	54.3	-	-
				Margin [dB]		-12.91	-2.91	-	-
30	.18541	39.9 pk	11.5	0	51.4	64.2	54.2	-	-
				Margin [dB]		-12.8	-2.8	-	-
31	.18668	39.68 pk	11.5	0	51.18	64.2	54.2	-	-
				Margin [dB]		-13.02	-3.02	-	-
32	.18774	39.54 pk	11.5	0	51.04	64.1	54.1	-	-
				Margin [dB]		-13.06	-3.06	-	-
33	.18901	39.48 pk	11.5	0	50.98	64.1	54.1	-	-
				Margin [dB]		-13.12	-3.12	-	-
34	.19028	39.33 pk	11.5	0	50.83	64	54	-	-
				Margin [dB]		-13.17	-3.17	-	-
35	.19156	39.11 pk	11.5	0	50.61	64	54	-	-
				Margin [dB]		-13.39	-3.39	-	-
36	.19262	39.3 pk	11.5	0	50.8	63.9	53.9	-	-
				Margin [dB]		-13.1	-3.1	-	-
37	.19389	38.68 pk	11.5	0	50.18	63.9	53.9	-	-
				Margin [dB]		-13.72	-3.72	-	-
38	.19516	38.8 pk	11.4	0	50.2	63.8	53.8	-	-
				Margin [dB]		-13.6	-3.6	-	-
39	.19622	38.31 pk	11.4	0	49.71	63.8	53.8	-	-
				Margin [dB]		-14.09	-4.09	-	-
40	.19749	38.23 pk	11.4	0	49.63	63.7	53.7	-	-
				Margin [dB]		-14.07	-4.07	-	-
41	.19877	37.99 pk	11.4	0	49.39	63.7	53.7	-	-
				Margin [dB]		-14.31	-4.31	-	-

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No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====									
Line 2	.15 - 1MHz	-----							
42	.19983	38.06 pk	11.4	0	49.46	63.6	53.6	-	-
				Margin [dB]		-14.14	-4.14	-	-
43	.2011	37.79 pk	11.4	0	49.19	63.6	53.6	-	-
				Margin [dB]		-14.41	-4.41	-	-
44	.20237	37.36 pk	11.4	0	48.76	63.5	53.5	-	-
				Margin [dB]		-14.74	-4.74	-	-
45	.20364	37.1 pk	11.4	0	48.5	63.5	53.5	-	-
				Margin [dB]		-15	-5	-	-
46	.2047	36.59 pk	11.4	0	47.99	63.4	53.4	-	-
				Margin [dB]		-15.41	-5.41	-	-
47	.20597	36.5 pk	11.4	0	47.9	63.4	53.4	-	-
				Margin [dB]		-15.5	-5.5	-	-
48	.20725	35.87 pk	11.3	0	47.17	63.3	53.3	-	-
				Margin [dB]		-16.13	-6.13	-	-

Line 2 1	- 30MHz	-----							
49	9.12347	37.92 pk	10.7	0	48.62	60	50	-	-
				Margin [dB]		-11.38	-1.38	-	-

LIMIT 1: FCC Part 15 Subpart C QPk

LIMIT 2: FCC Part 15 Subpart C Avg

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - denotes average log detection

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Keymatrix
 Reader
 AC-1100 Normal Operation
 712047 120V/60Hz
 Tested By: BD

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====								
Line 2 .15 - 1MHz								
.15175	.77 ave	12	0	12.77	65.9	55.9	-	-
			Margin [dB]:		-53.13	-43.13	-	-
.15175	.77 ave	12	0	12.77	65.9	55.9	-	-
			Margin [dB]:		-53.13	-43.13	-	-
.15276	.53 ave	12	0	12.53	65.8	55.8	-	-
			Margin [dB]:		-53.27	-43.27	-	-
.15403	.48 ave	12	0	12.48	65.8	55.8	-	-
			Margin [dB]:		-53.32	-43.32	-	-
.1553	.39 ave	12	0	12.39	65.7	55.7	-	-
			Margin [dB]:		-53.31	-43.31	-	-
.15636	.34 ave	12	0	12.34	65.7	55.7	-	-
			Margin [dB]:		-53.36	-43.36	-	-
.15763	.27 ave	11.9	0	12.17	65.6	55.6	-	-
			Margin [dB]:		-53.43	-43.43	-	-
.15891	.21 ave	11.9	0	12.11	65.5	55.5	-	-
			Margin [dB]:		-53.39	-43.39	-	-
.15997	.31 ave	11.9	0	12.21	65.5	55.5	-	-
			Margin [dB]:		-53.29	-43.29	-	-
.16124	.15 ave	11.9	0	12.05	65.4	55.4	-	-
			Margin [dB]:		-53.35	-43.35	-	-
.16251	-.04 ave	11.9	0	11.86	65.3	55.3	-	-
			Margin [dB]:		-53.44	-43.44	-	-
.16357	-.01 ave	11.9	0	11.89	65.3	55.3	-	-
			Margin [dB]:		-53.41	-43.41	-	-
.16484	-.09 ave	11.8	0	11.71	65.2	55.2	-	-
			Margin [dB]:		-53.49	-43.49	-	-
.16611	-.01 ave	11.8	0	11.79	65.2	55.2	-	-
			Margin [dB]:		-53.41	-43.41	-	-
.16739	.02 ave	11.8	0	11.82	65.1	55.1	-	-
			Margin [dB]:		-53.28	-43.28	-	-
.16845	-.08 ave	11.8	0	11.72	65	55	-	-
			Margin [dB]:		-53.28	-43.28	-	-
.16972	-.08 ave	11.8	0	11.72	65	55	-	-
			Margin [dB]:		-53.28	-43.28	-	-
.17099	-.16 ave	11.8	0	11.64	64.9	54.9	-	-
			Margin [dB]:		-53.26	-43.26	-	-
.17205	-.15 ave	11.7	0	11.55	64.9	54.9	-	-
			Margin [dB]:		-53.35	-43.35	-	-
.17332	-.1 ave	11.7	0	11.6	64.8	54.8	-	-
			Margin [dB]:		-53.2	-43.2	-	-

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Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====								
Line 2 .15 - 1MHz								
.1746	-.11 ave	11.7	0	11.59	64.7	54.7	-	-
			Margin [dB]:		-53.11	-43.11	-	-
.17566	-.16 ave	11.7	0	11.54	64.7	54.7	-	-
			Margin [dB]:		-53.16	-43.16	-	-
.17693	-.15 ave	11.7	0	11.55	64.6	54.6	-	-
			Margin [dB]:		-53.05	-43.05	-	-
.1782	-.16 ave	11.7	0	11.54	64.6	54.6	-	-
			Margin [dB]:		-53.06	-43.06	-	-
.17947	-.25 ave	11.6	0	11.35	64.5	54.5	-	-
			Margin [dB]:		-53.15	-43.15	-	-
.18053	-.23 ave	11.6	0	11.37	64.5	54.5	-	-
			Margin [dB]:		-53.13	-43.13	-	-
.1818	-.22 ave	11.6	0	11.38	64.4	54.4	-	-
			Margin [dB]:		-53.02	-43.02	-	-
.18308	-.22 ave	11.6	0	11.38	64.3	54.3	-	-
			Margin [dB]:		-52.92	-42.92	-	-
.18414	-.26 ave	11.6	0	11.34	64.3	54.3	-	-
			Margin [dB]:		-52.96	-42.96	-	-
.18541	-.13 ave	11.5	0	11.37	64.2	54.2	-	-
			Margin [dB]:		-52.83	-42.83	-	-
.18668	-.13 ave	11.5	0	11.37	64.2	54.2	-	-
			Margin [dB]:		-52.83	-42.83	-	-
.18774	-.18 ave	11.5	0	11.32	64.1	54.1	-	-
			Margin [dB]:		-52.78	-42.78	-	-
.18901	-.17 ave	11.5	0	11.33	64.1	54.1	-	-
			Margin [dB]:		-52.77	-42.77	-	-
.19028	-.25 ave	11.5	0	11.25	64	54	-	-
			Margin [dB]:		-52.75	-42.75	-	-
.19156	-.16 ave	11.5	0	11.34	64	54	-	-
			Margin [dB]:		-52.66	-42.66	-	-
.19262	-.36 ave	11.5	0	11.14	63.9	53.9	-	-
			Margin [dB]:		-52.76	-42.76	-	-
.19389	-.36 ave	11.5	0	11.14	63.9	53.9	-	-
			Margin [dB]:		-52.76	-42.76	-	-
.19516	-.37 ave	11.4	0	11.03	63.8	53.8	-	-
			Margin [dB]:		-52.77	-42.77	-	-
.19622	-.46 ave	11.4	0	10.94	63.8	53.8	-	-
			Margin [dB]:		-52.86	-42.86	-	-
.19749	-.51 ave	11.4	0	10.89	63.7	53.7	-	-
			Margin [dB]:		-52.81	-42.81	-	-
.19877	-.4 ave	11.4	0	11	63.7	53.7	-	-
			Margin [dB]:		-52.7	-42.7	-	-
.19983	-.66 ave	11.4	0	10.74	63.6	53.6	-	-
			Margin [dB]:		-52.86	-42.86	-	-
.2011	-.66 ave	11.4	0	10.74	63.6	53.6	-	-
			Margin [dB]:		-52.86	-42.86	-	-

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Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====								
Line 2 .15 - 1MHz								
.20237	-.54 ave	11.4	0	10.86	63.5	53.5	-	-
			Margin [dB]:		-52.64	-42.64	-	-
.20364	-.33 ave	11.4	0	11.07	63.5	53.5	-	-
			Margin [dB]:		-52.43	-42.43	-	-
.2047	-.3 ave	11.4	0	11.1	63.4	53.4	-	-
			Margin [dB]:		-52.3	-42.3	-	-
.20597	-.35 ave	11.4	0	11.05	63.4	53.4	-	-
			Margin [dB]:		-52.35	-42.35	-	-
.20725	-.33 ave	11.3	0	10.97	63.3	53.3	-	-
			Margin [dB]:		-52.33	-42.33	-	-
Line 2 1 - 30MHz								
9.12347	12.66 ave	10.7	0	23.36	60	50	-	-
			Margin [dB]:		-36.64	-26.64	-	-

NOTE: "+" - Indicates an emission level in excess of the applicable limit (s).

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection

LIMIT 1: FCC Part 15 Subpart C QPk
 LIMIT 2: FCC Part 15 Subpart C Avg

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4.2 Test [BD5]Conditions and Results – RADIATED EMISSIONS

Test Description	Measurements were made in a 10-meter semi-anechoic chamber that complies to CISPR 16/ANSI C63.4. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3-meter. The EUT was rotated 360° about its azimuth with the receive antenna located at various heights in both horizontal and vertical polarities. Final measurements (quasi-peak or average as noted) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4-meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.	
Basic Standard		
UL LPG	80-EM-S0029	
	Frequency range	Measurement Point
Fully configured sample scanned over the following frequency range	0.009 MHz – 1GHz	(3 meter measurement distance)
Limits		
Frequency (MHz)	Limit (dBμV/m)	
	Quasi-Peak	Average
	General Emissions	
0.009 – 0.090	-	128.5 – 108.5
0.090 – 0.110	108.5 – 106.7	-
0.110 – 0.490	-	106.7 – 93.8
0.490 – 1.705	73.8 – 63	-
1.705 – 30	69.5	-
30 – 88	40	-
88 – 216	43.5	-
216 – 960	46	-
960 – 1000	54	-
Supplementary information: None		

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Table 8 Radiated Emissions EUT Configuration Settings

Power Interface Mode # (See Section 1.3.4)	EUT Configurations Mode # (See Section 1.6)	EUT Operation Mode # (See 1.5)
1	1	1
Supplementary information: EUT was tested in 3 orthogonal axes. Only worst-case emissions are reported.		

Table 9 Radiated Emissions Test Equipment

Test Equipment Used			
Description	Manufacturer	Model	Identifier
9kHz-30MHz			
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
Active Loop Antenna	EMCO	6507	ME5A-288
Switch Driver	HP	11713A	ME7A-627
System Controller	Sunol Sciences	SC99V	44396
Camera Controller	Panasonic	WV-CU254	44395
RF Switch Box	UL	1	44398
Measurement Software	UL	Version 9.3	44740
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268
30-1000MHz			
EMI Receiver	Rohde & Schwarz	ESIB26	ME5B-081
Bicon Antenna	Schaffner	VBA6106A	54
Log-P Antenna	Schaffner	UPA6109	44067
Switch Driver	HP	11713A	ME7A-627
System Controller	Sunol Sciences	SC99V	44396
Camera Controller	Panasonic	WV-CU254	44395
RF Switch Box	UL	1	44398
Measurement Software	UL	Version 9.3	44740
Temp/Humidity/Pressure Meter	Cole Parmer	99760-00	4268

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Figure 6 Test setup for Radiated Emissions – 9kHz-30MHz (Front and Rear Views) – See Setup Exhibit

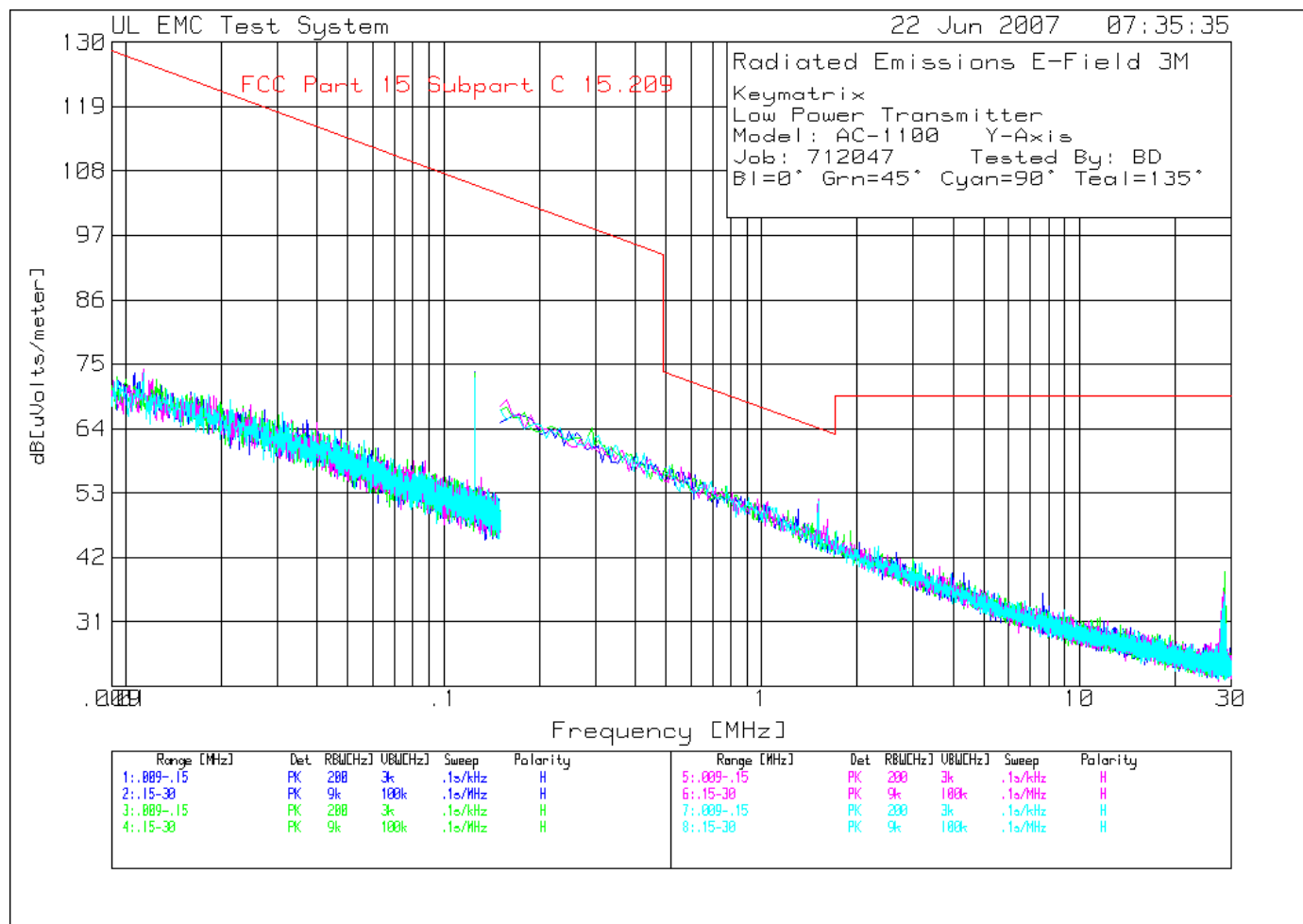
Figure 7 Test setup for Radiated Emissions – 30-1000MHz (Front and Rear Views) – See Setup Exhibit

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Figure 8 Radiated Emissions Graph



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Table 10 Radiated Emissions Data Points

Keymatrix
 Low Power Transmitter
 Model: AC-1100 Y-Axis
 Job: 712047 Tested By: BD
 Bl=0° Grn=45° Cyan=90° Teal=135°

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
=====									
0°	.009 - .15MHz	-----							
1	.01064	44.53 pk	-.1	29	73.43	127.1	-	-	-
	Azimuth:149	Height:100	Horz	Margin [dB]		-53.67	-	-	-
2	.12506	57.49 pk	.1	16.2	73.79	105.7	-	-	-
	Azimuth:6	Height:100	Horz	Margin [dB]		-31.91	-	-	-

0°	.15 - 30MHz	-----							
3	.17239	50.45 pk	.1	15.7	66.25	102.9	-	-	-
	Azimuth:118	Height:100	Horz	Margin [dB]		-36.65	-	-	-
5	7.68155	20.25 pk	.2	15.4	35.85	69.5	-	-	-
	Azimuth:354	Height:100	Horz	Margin [dB]		-33.65	-	-	-

45°	.15 - 30MHz	-----							
4	1.50852	34.37 pk	.1	15.3	49.77	64	-	-	-
	Azimuth:359	Height:119	Horz	Margin [dB]		-14.23	-	-	-
6	28.63402	22.79 pk	.4	16.3	39.49	69.5	-	-	-
	Azimuth:209	Height:119	Horz	Margin [dB]		-30.01	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection
 tm - Trace Math Result

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Keymatrix
Low Power Transmitter
Model: AC-1100 Y-Axis
Job: 712047 Tested By: BD
Bl=0° Grn=45° Cyan=90° Teal=135°

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	dB[uVolts/meter]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
0° .009 - .15MHz								
.1251	56.41 ave	.1	16.2	72.71	105.7	-	-	-
Azimuth: 205 Height:107 Horz			Margin [dB]:		-32.99	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

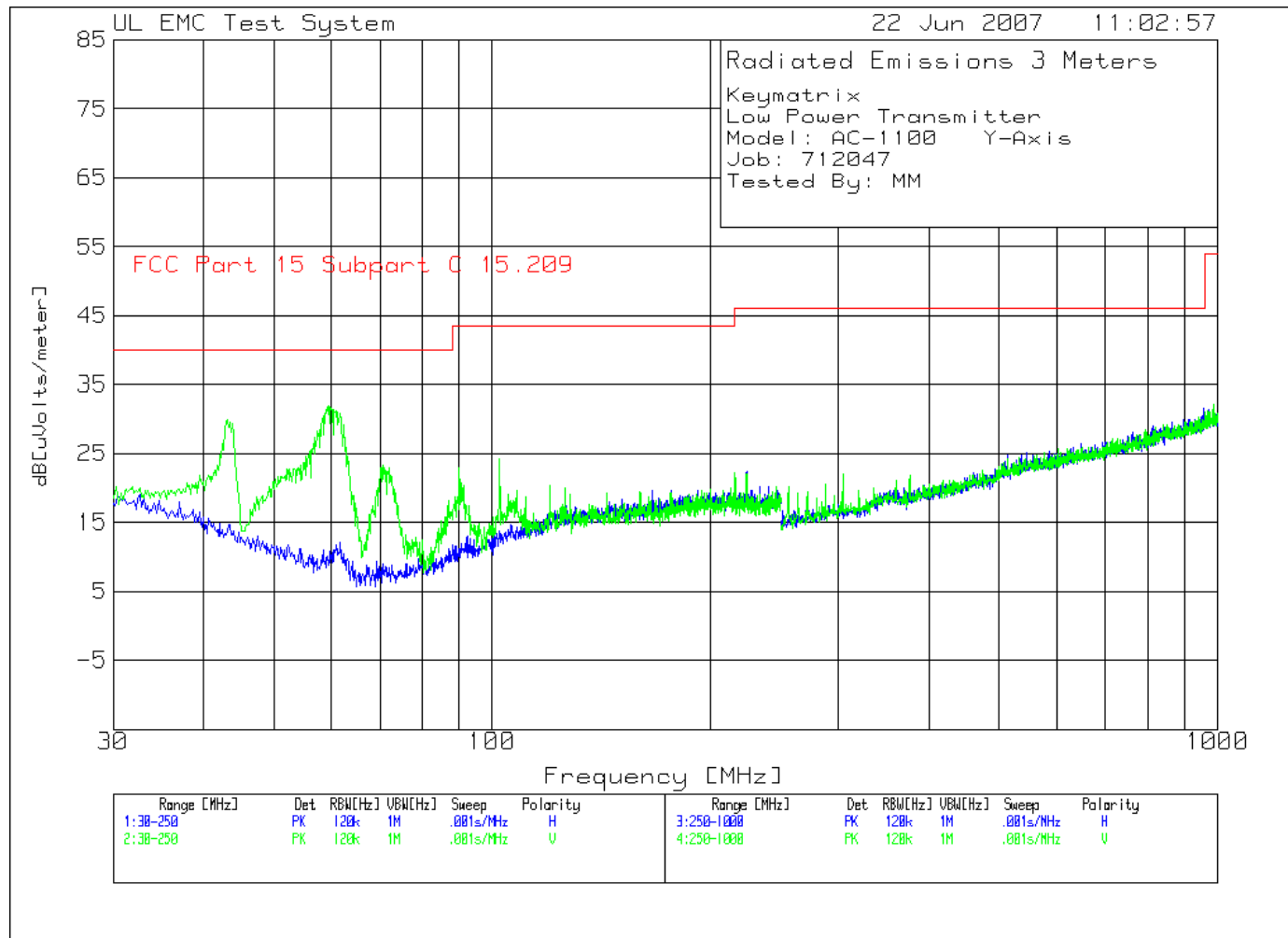
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector
avlg - Average log detector
ave - Average detector

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Figure 9 Radiated Emissions Graph



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Table 11 Radiated Emissions Data Points

Keymatrix
 Low Power Transmitter
 Model: AC-1100 Y-Axis
 Job: 712047
 Tested By: MM

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
=====									
Vertical 30 - 250MHz -----									
1	43.062	17.36 pk	-.2	12.8	29.96	40	-	-	-
	Azimuth:120	Height:101	Vert	Margin [dB]		-10.04	-	-	-
2	59.4997	25.36 pk	-.2	6.7	31.86	40	-	-	-
	Azimuth:13	Height:101	Vert	Margin [dB]		-8.14	-	-	-
3	70.8005	17.81 pk	-.1	5.5	23.21	40	-	-	-
	Azimuth:13	Height:101	Vert	Margin [dB]		-16.79	-	-	-
4	90.0267	14.09 pk	0	8.9	22.99	43.5	-	-	-
	Azimuth:267	Height:101	Vert	Margin [dB]		-20.51	-	-	-
5	102.3549	13.36 pk	0	10.8	24.16	43.5	-	-	-
	Azimuth:341	Height:101	Vert	Margin [dB]		-19.34	-	-	-
Vertical 250 - 1000MHz -----									
6	304.036	7.53 pk	.5	13.9	21.93	46	-	-	-
	Azimuth:7	Height:157	Vert	Margin [dB]		-24.07	-	-	-

LIMIT 1: FCC Part 15 Subpart C 15.209

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 ave - denotes average detection
 tm - Trace Math Result

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4.3 Example Calculations

Radiated Emissions Limit conversion from mV/m to dBuV/m (accordance with paragraph 15.209)

Radiated Emissions Limit (dBuV/m) = $20 \cdot \log(\mu\text{V/m})$

Radiated Emissions Limit (dBuV/m) = $20 \cdot \log(90)$

Radiated Emissions Limit (dBuV/m) = 39.1

Radiated Emissions test data obtained during measurements.

Field Strength (dBuV/m) = Measured field strength (dBuV) + Antenna Factor (dB/m) + Cable Factor (dB)

Field Strength (dBuV/m) = 17.36dBuV + 12.8dBdB/m + (0.2)dB

Field Strength (dBuV/m) = 29.96dBuV/m

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Appendix A

Accreditations and Authorizations



NVLAP Lab code: 100255-0

NVLAP: Recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC EN17025 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. For a full scope listing see <http://ts.nist.gov/ts/htdocs/210/214/scopes/1002550.htm>



FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland (Ref. No. 91040).



Industry Canada Industrie Canada

Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2181



VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-833, C-834 and (Conducted Emissions - Telecommunications Ports) T-160.

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ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).



NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 89/336/EEC, Article 10 (2). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.

NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).

NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6