

UMTS-2100

Exhibit F – Test Report

UMTS-2100



FCC CFR47 PART 15 SUBPART B
ICES-003 Issue 9, 2004 + A1:2005 +A2:2006 +A3:2007

VERIFICATION TEST REPORT

FOR

GSM UMTS CELLULAR UNIT

MODEL NUMBER: UMTS-2100

REPORT NUMBER: 08U11830-1

ISSUE DATE: JULY 2, 2008

Prepared for
ROCKWELL COLLINS, INC.
400 COLLINS ROAD N.E.
CEDAR RAPIDS, IA 52498, U.S.A.

Prepared by
COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
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TEL: (510) 771-1000
FAX: (510) 661-0888



NVLAP LAB CODE 200065-0

UMTS-2100

REPORT NO: 08U11830-1
EUT: GSM UMTS CELLULAR UNIT

DATE: JULY 02 2008
MODEL: UMTS-2100

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
-	07/02/08	Initial Issue	F. Ibrahim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ROCKWELL COLLINS, INC.
400 COLLINS ROAD N.E.
CEDAR RAPIDS, IA 52498, U.S.A.

EUT DESCRIPTION: GSM UMTS CELLULAR UNIT

MODEL: UMTS-2100

SERIAL NUMBER: 822-2635-001

DATE TESTED: MAY 20, 2008

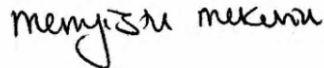
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART B	PASS
ICES-003 Issue 9, 2004 + A1:2005 +A2:2006 +A3:2007	PASS

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:



FRANK IBRAHIM
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

MENGISTU MEKURIA
EMC ENGINEER
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, and in accordance with ICES-003 Issue 9, 2004 + A1:2005 +A2:2006 +A3:2007.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Power Line Conducted Emission	+/- 2.3 dB
Radiated Emission	+/- 3.4 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is UMTS-2100 which is a GSM/UMTS Cellular Unit.

GENERAL INFORMATION

CHASSIS MATERIAL	METAL
ENCLOSURE MATERIAL	METAL
POWER REQUIREMENTS	115 VAC / 60-800 Hz
POWERLINE FILTER MANUFACTURER AND MODEL	BUILT-IN
LIST OF ALL OSCILLATOR FREQUENCIES GREATER THAN OR EQUAL TO 9 kHz	2170 MHz (Modem) 500 MHz (CPU) 33 MHz (PCI Bus)

SUBASSEMBLIES

The EUT was constructed using the following subassemblies:

Subassembly Description	Manufacturer	Part Number
Sierra Wireless Module	Sierra Wireless	MC 8780
Power Supply Unit	Formation Inc.	N/A
I/O Board	Formation Inc.	N/A
Carrier Board	Formation Inc.	N/A

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5.2. TEST CONFIGURATION

The following configuration was investigated during testing:

EUT Configuration	Description
Typical Configuration	AC Powered EUT Connected to a support laptop PC via Quadrax Ethernet Cable

5.3. MODE(S) OF OPERATION

Mode	Description
Normal Mode	EUT was pinging a support laptop PC.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was MS-DOS cmd.

5.5. MODIFICATIONS

No modifications were made during testing.

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5.6. DETAILS OF TESTED SYSTEM

SUPPORT EQUIPMENT & PERIPHERALS

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop PC	Dell	Latitude D600	CN-0G5152-48643-49Q-5555	Doc
AC Adapter	Dell	NADP-90KB A	TH-09T215-17971-349-38E0	Doc

I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	AC	Un-Shielded	2.0 m	N/A
2	DC	1	DC	Un-Shielded	2.0 m	N/A
3	Ethernet	2	RJ45	Un-Shielded	5.0 m	N/A
4	Antenna	1	N-Type	Shielded	8.0 m	N/A

TEST SETUP

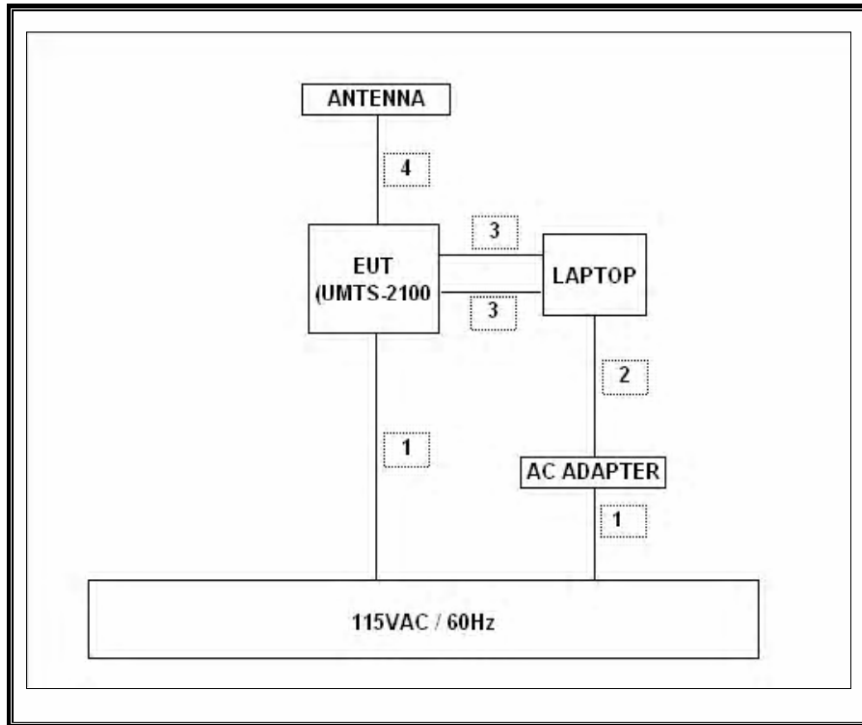
The EUT is directly connected to the support laptop PC via RJ45 cable, and data would be transferring between them.

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TEST SETUP DIAGRAM



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	7/15/1905	10/25/08
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/25/08
EMI Test Receiver	R & S	ESHS 20	827129/006	08/06/09
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942.A00286	06/12/08
RF Filter Section	HP	85420E	3705.A00256	06/12/08
Preamplifier	HP	8447D	1937.A02062	03/31/09
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008.A00369	09/27/08
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	04/22/09
Antenna, Bilog 30MHz ~ 2Ghz	Sumol Sciences	JB1	A121003	09/28/08

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7. APPLICABLE LIMITS AND TEST RESULTS

7.1. RADIATED EMISSIONS

TEST PROCEDURE

ANSI C63.4

The highest clock frequency generated or used in the EUT is 2.17 GHz; therefore the frequency range was investigated from 30 MHz to 10.85 GHz.

LIMIT

§15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Limits for radiated disturbance of Class A ITE at measuring distance of 10 m	
Frequency range (MHz)	Quasi-peak limits (dB μ V/m)
30 to 88	39
88 to 216	43.5
216 to 960	46.4
Above 960 MHz	49.5

Note: The lower limit shall apply at the transition frequency.

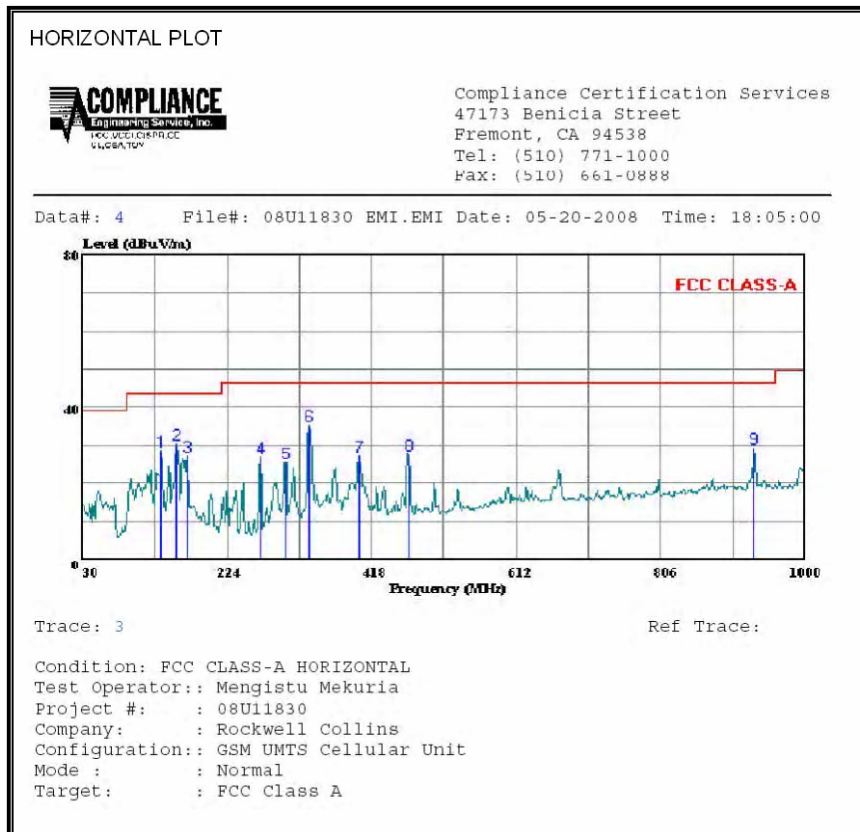
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RESULTS

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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HORIZONTAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	135.730	42.00	-13.19	28.81	43.50	-14.69	Peak
2	155.130	44.32	-14.01	30.32	43.50	-13.19	Peak
3	169.680	41.83	-14.61	27.22	43.50	-16.28	Peak
4	269.590	40.30	-13.42	26.88	46.40	-19.52	Peak
5	302.570	38.11	-12.39	25.72	46.40	-20.68	Peak
6	334.580	46.90	-11.48	35.42	46.40	-10.98	Peak
7	400.540	37.25	-10.04	27.21	46.40	-19.19	Peak
8	467.470	35.87	-8.20	27.66	46.40	-18.74	Peak
9	931.130	30.28	-0.78	29.50	46.40	-16.90	Peak

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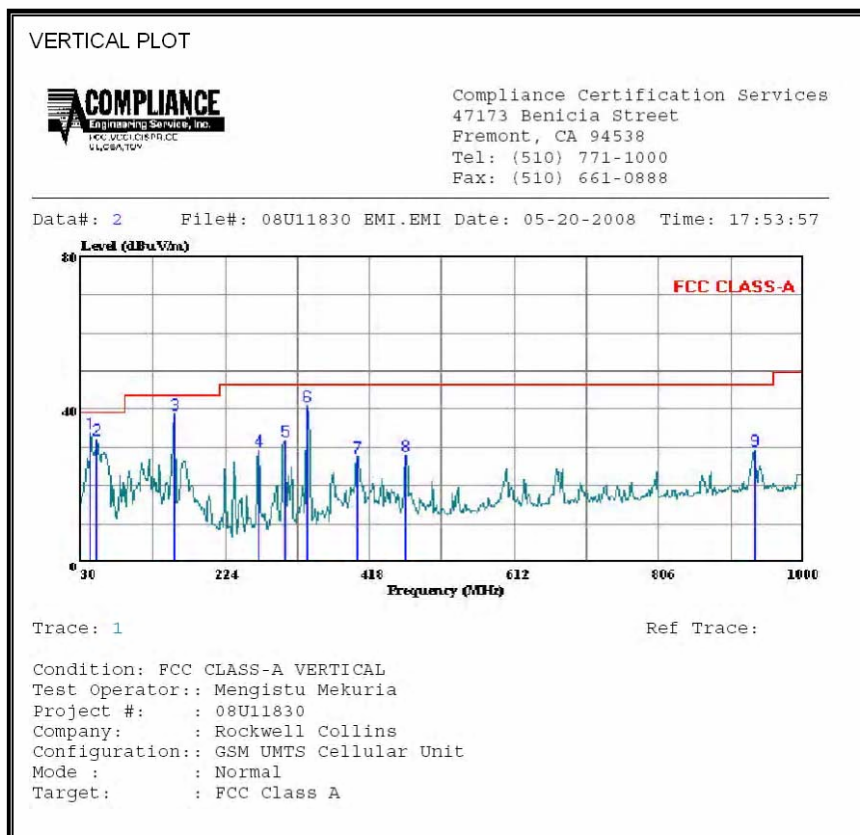
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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	43.580	48.77	-14.91	33.86	39.00	-5.14	Peak
2	51.340	51.27	-19.15	32.12	39.00	-6.88	Peak
3	155.130	52.89	-14.01	38.89	43.50	-4.62	Peak
4	269.590	42.77	-13.42	29.35	46.40	-17.05	Peak
5	303.540	44.09	-12.37	31.72	46.40	-14.68	Peak
6	334.580	52.43	-11.48	40.95	46.40	-5.45	Peak
7	400.540	37.84	-10.04	27.80	46.40	-18.60	Peak
8	465.530	36.17	-8.24	27.93	46.40	-18.47	Peak
9	934.040	29.94	-0.60	29.34	46.40	-17.06	Peak

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SPURIOUS EMISSIONS ABOVE 1000 MHz (WORST-CASE CONFIGURATION)

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: ROCKWELL COLLINS
Project #: 08U11830
Date: 5/20/2008
Test Engineer: MENOISTU MEKURIA
Configuration: EUT WITH SUPPORT EQUIPMENT
Mode: NORMAL

Test Equipment:

Horn: 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			FCC Class A

HF Frequency Cables:

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
		B.5m Chamber			Average Measurements RBW=1MHz, VEW=10Hz

f	Dist	Read Pk	Read Avg	AF	CL	Amp	D Corr	Fln	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	(m)	dBuV	dBuV	dBm	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)
1.000	3.0	53.1	37.3	26.4	3.2	-38.3	-10.5	0.0	34.0	18.2	69.5	49.5	-35.5	-31.3	H
1.303	3.0	47.3	37.9	27.2	3.6	-37.8	-10.5	0.0	29.9	20.4	69.5	49.5	-39.6	-29.1	H
1.402	3.0	46.7	37.0	27.5	3.8	-37.7	-10.5	0.0	29.8	20.1	69.5	49.5	-39.7	-29.4	H
1.503	3.0	47.8	41.6	27.7	3.9	-37.6	-10.5	0.0	31.4	25.2	69.5	49.5	-38.1	-24.3	H
1.990	3.0	47.2	33.9	29.0	4.5	-36.9	-10.5	0.0	33.5	20.1	69.5	49.5	-36.0	-29.4	H
1.000	3.0	54.5	42.8	26.4	3.2	-38.3	-10.5	0.0	35.4	23.8	69.5	49.5	-34.1	-25.7	V
1.203	3.0	56.8	52.5	26.9	3.5	-38.0	-10.5	0.0	38.8	34.5	69.5	49.5	-30.7	-15.0	V
1.303	3.0	52.3	47.5	27.2	3.6	-37.8	-10.5	0.0	34.8	30.1	69.5	49.5	-34.7	-19.4	V
1.330	3.0	51.9	36.2	27.3	3.7	-37.8	-10.5	0.0	34.6	18.9	69.5	49.5	-34.9	-30.6	V
1.402	3.0	51.9	43.0	27.5	3.8	-37.7	-10.5	0.0	34.9	26.0	69.5	49.5	-34.6	-23.5	V
1.503	3.0	51.1	47.3	27.7	3.9	-37.6	-10.5	0.0	34.7	30.9	69.5	49.5	-34.8	-18.6	V
1.990	3.0	48.8	35.0	29.0	4.5	-36.9	-10.5	0.0	35.0	21.2	69.5	49.5	-34.5	-28.3	V

Note: No other emissions detected above noise floor. EUT was scanned from 1 GHz to 10.85 GHz.

Rev. 4127

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

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7.2. AC MAINS LINE CONDUCTED EMISSIONS

TEST PROCEDURE

ANSI C63.4

LIMIT

§15.107 (b) For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms LISN. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60

Note: The lower limit shall apply at the transition frequencies

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RESULTS

6 WORST EMISSIONS

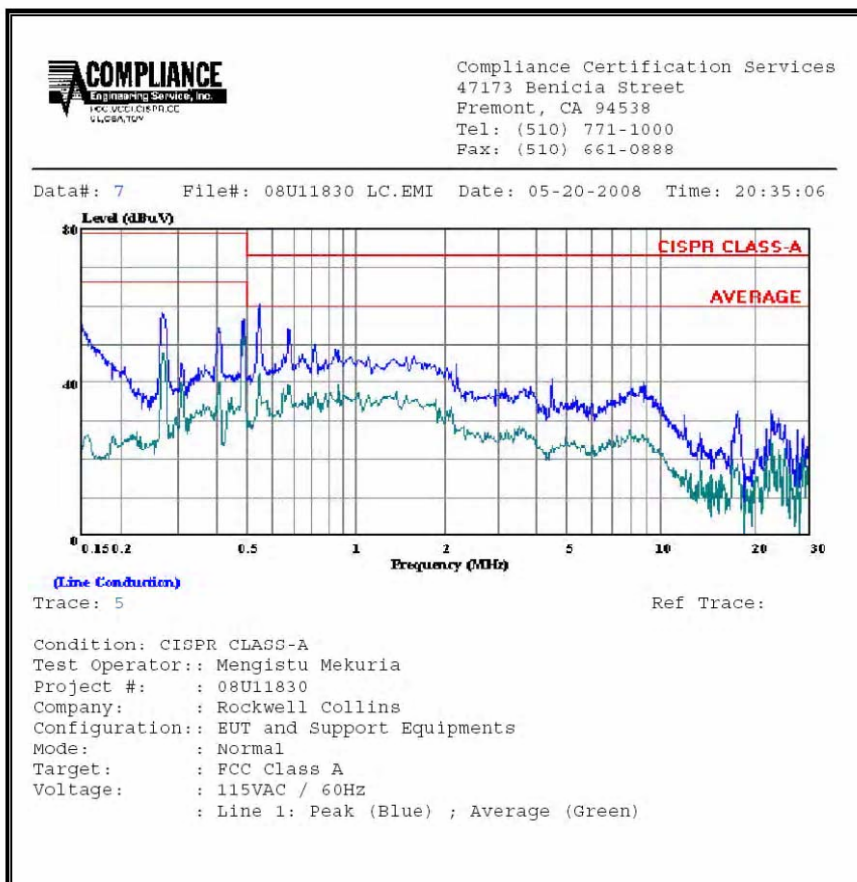
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Class (dB)	Limit QP	EN A AV	Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.27	58.12	--	47.60	0.00	79.00	66.00	-20.88	-18.40	L1
0.49	56.32	--	53.84	0.00	79.00	66.00	-22.68	-12.16	L1
0.55	60.21	--	42.35	0.00	73.00	60.00	-12.79	-17.65	L1
0.27	59.99	--	49.07	0.00	79.00	66.00	-19.01	-16.93	L2
0.41	61.10	--	48.52	0.00	79.00	66.00	-17.90	-17.48	L2
0.55	56.90	--	42.23	0.00	73.00	60.00	-16.10	-17.77	L2
6 Worst Data									

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LINE 1 RESULTS



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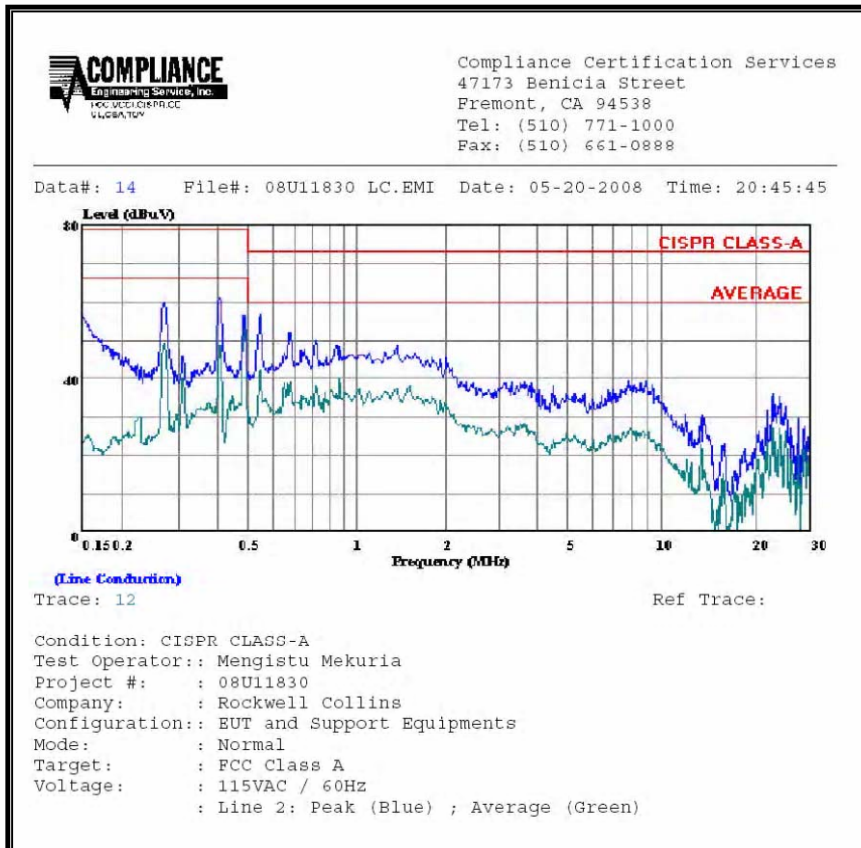
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LINE 2 RESULTS



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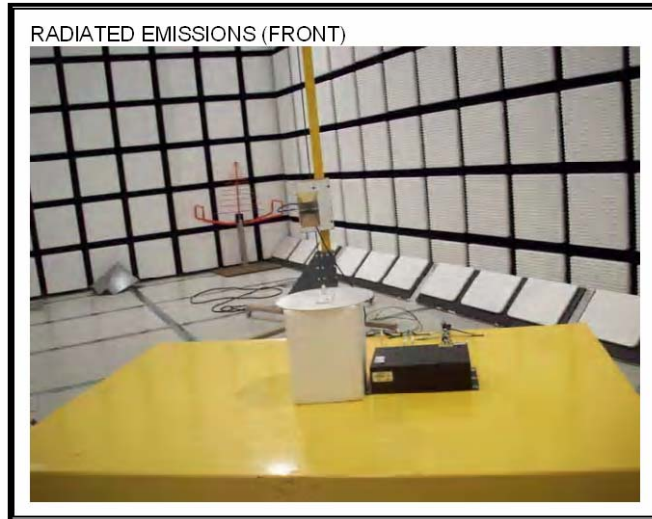
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8. SETUP PHOTOS

RADIATED EMISSION



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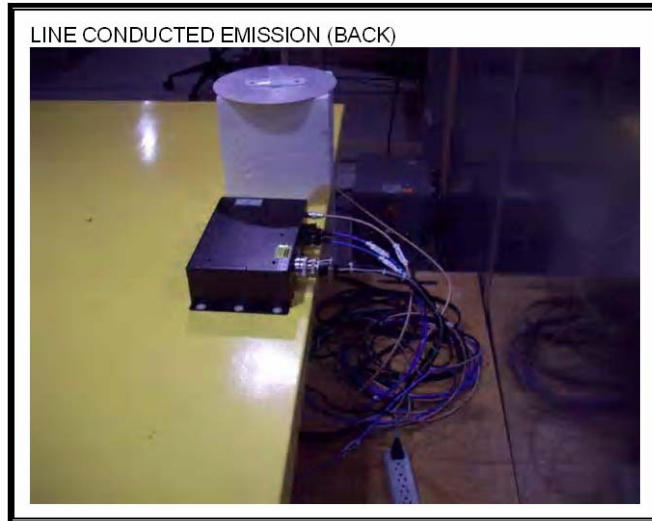
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