Lab Code: 200167-0

FCC PART 15 SUBPART C

EMI MEASUREMENT AND TEST REPORT

For

Datalogic Automation S.r.l.

Via San Vitalino, 13
Lippo di Calderara di Reno, BO – Italy 40012

FCC ID: E36CHS1265
Model: CHS1265-01

Report Type: ☒ Original Report	**Product Type:** Passive RFID Reader / Writer
Test Engineer:	Jerry Wang
Report Number:	R0804041-209
Report Date:	2008-06-17
Reviewed By:	Boni Baniqued Sr. RF Engineer
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1 GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Datalogic Automation S.r.l.'s* product, *FCC ID: E36CHS1265,* Model: *CHS1265-01* or the "EUT" as referred to this report is a Passive RFID Reader / Writer. The EUT operates at the frequency range of 313.864 – 453.333 kHz.

** The test data gathered are from typical production sample, serial number: 06D20037 provided by the manufacturer.*

1.2 Mechanical Description

The EUT measures approximately *120mm (L) x 100mm (W) x 70mm (H)* and weighs approximately *1678 g.*

1.3 EUT Photo

Please see additional photos in Exhibit C

1.4 Objective

This type approval report is prepared on behalf of *Datalogic Automation S.r.l.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules, section 15.209 rules.

1.5 Related Submittal(s)/Grant(s)

No Related Submittals.

1.6 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Test Facility

The test site used by BACL Corp. to collect immunity test measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11, 1997 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003 & TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: C-2698 and R-2463. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is a National Institute of Standards and Technology (NIST) accredited laboratory under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0).

The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm.

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

The EUT exercise program used during radiated testing was designed to exercise the system components.

Once loaded, set the Tx channel to low, mid and high for testing.

2.3 Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	Laptop Computer	PPOIL	20-367	DOC
Escort Memory Systems	32K Byte Read/Write Tag	HS232R	05C0090	DOC
Linksys	10/100 Integrated PC Card	PCM200	A13A25503092	MQ4C2K5MX

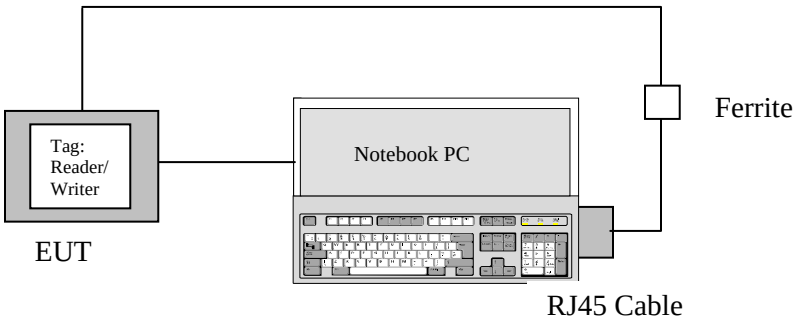
2.6 Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
ELPAC	24V DC Power Supply	MI2824	003893	DOC

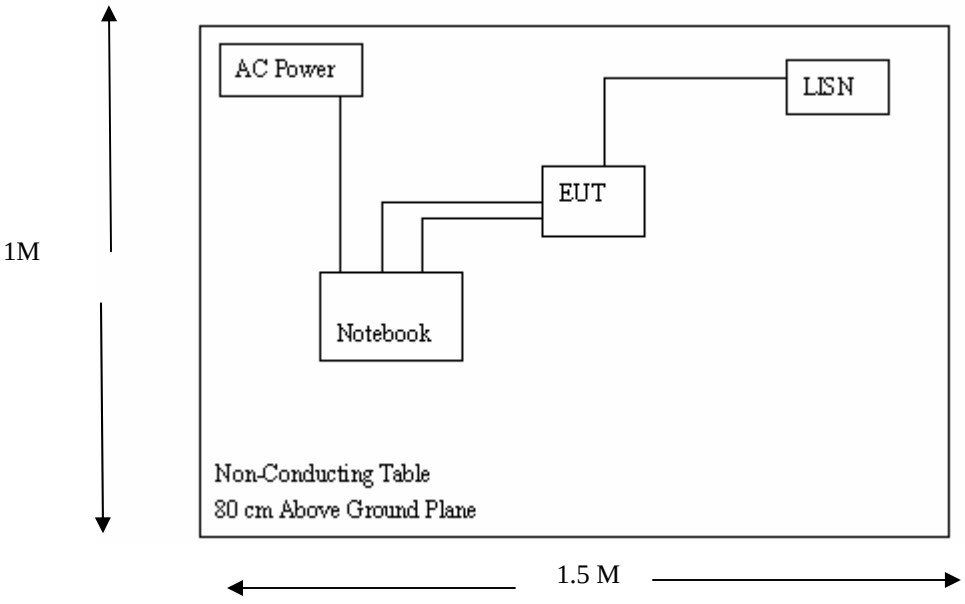
2.7 Interface Ports and Cabling

Cable Description	Length (M)	From	To
Shielded Cable	2	Serial Port / Host Laptop	10/100 Integrated PC Card
Shielded Power Cable	1.1	Serial Port / Host Laptop	DC power supply

2.8 Emission Test Setup Block Diagram



2.9 Conducted Test Setup Block Diagram



3 SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Complaint
§15.205	Restricted Bands of Operation	Complaint
§15.207	AC Line Conduction	Complaint
§15.209 (a)	Radiated Emission	Complaint *

*: Within measurement uncertainty

4 §15.203 - ANTENNA REQUIREMENT

4.1 Standard Applicable

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

The antenna used with the EUT is an integral antenna.

5 FCC §15.207 - CONDUCTED EMISSIONS

5.1 Applicable Standard

For an intentional radiator 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 µH/50 ohms line impedance stabilization network (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 frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

** Decreases with the logarithm of the frequency.*

5.2 EUT Setup

The conducted emissions tests were performed in the 10-meter test chamber, using the setup in accordance with ANSI C63.4-2003 measurement procedures. The specifications used were in accordance with FCC Part 15 Standard, Class B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

The EUT Power Cable was connected to a 120 V, 60 Hz AC line power source.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Solar Electronics	Line Impedance Network	9252-R-24-BNC	511205	2007-07-30
Rohde & Schwarz	EMI Test Receiver	ESCI 3	100337	2008-04-21

****Statement of Traceability*:** BACL Corp. attests that all calibrations have been performed according to NVLAP requirements, traceable to the NIST.

5.4 Test Procedure

During the conducted emissions test, the power cord of the host system was connected to the LISN-1.

Maximizing procedure was performed on the six (6) highest emission readings from the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Average readings are labeled "AV", and Quasi-peak readings are labeled "QP," in the test data hereinafter.

5.5 Environmental Conditions

Temperature:	23.5º C
Relative Humidity:	40.5%
ATM Pressure:	1020mbar

**Testing was performed by Jerry Wang on 2008-04-08.*

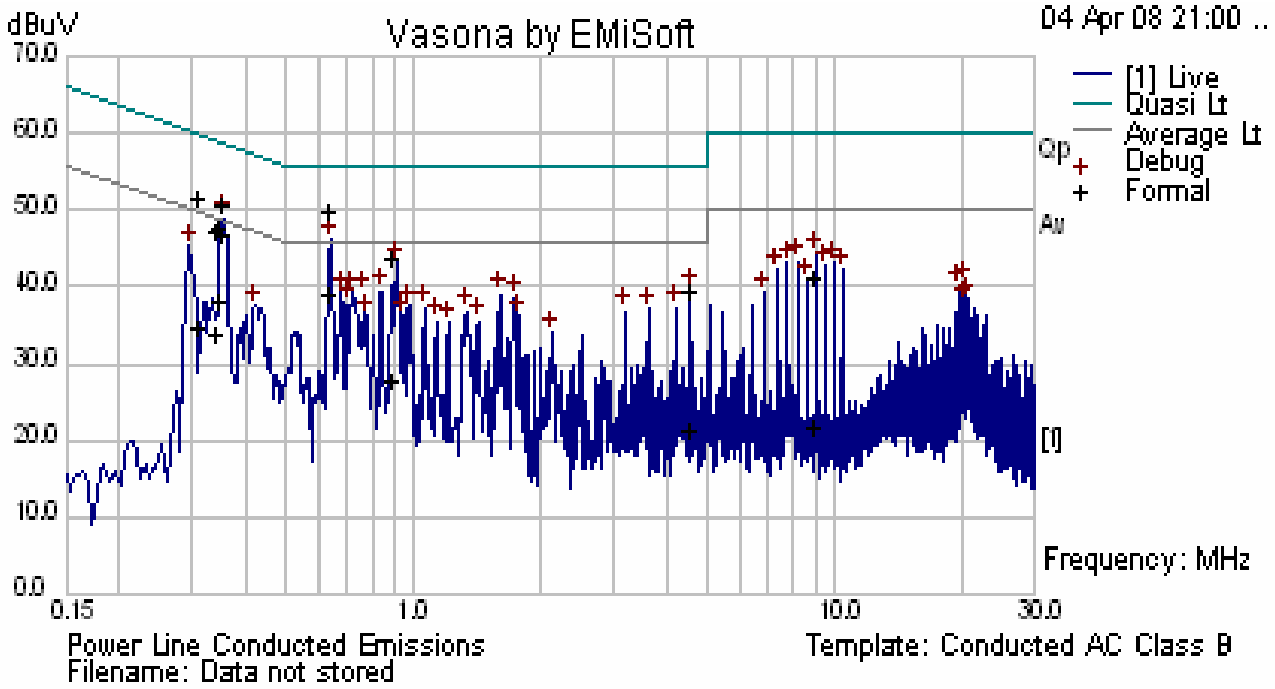
5.6 Summary of Test Results

According to the recorded data, the EUT complied with FCC §15.207 Standard, and had the worst margin reading of:

Mode: 120V/ 60 Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor (Live/Neutral)**	**Range (MHz)**
-3.25	0.356	Neutral	0.15 to 30

5.7 Conducted Emissions Test Plots and Data

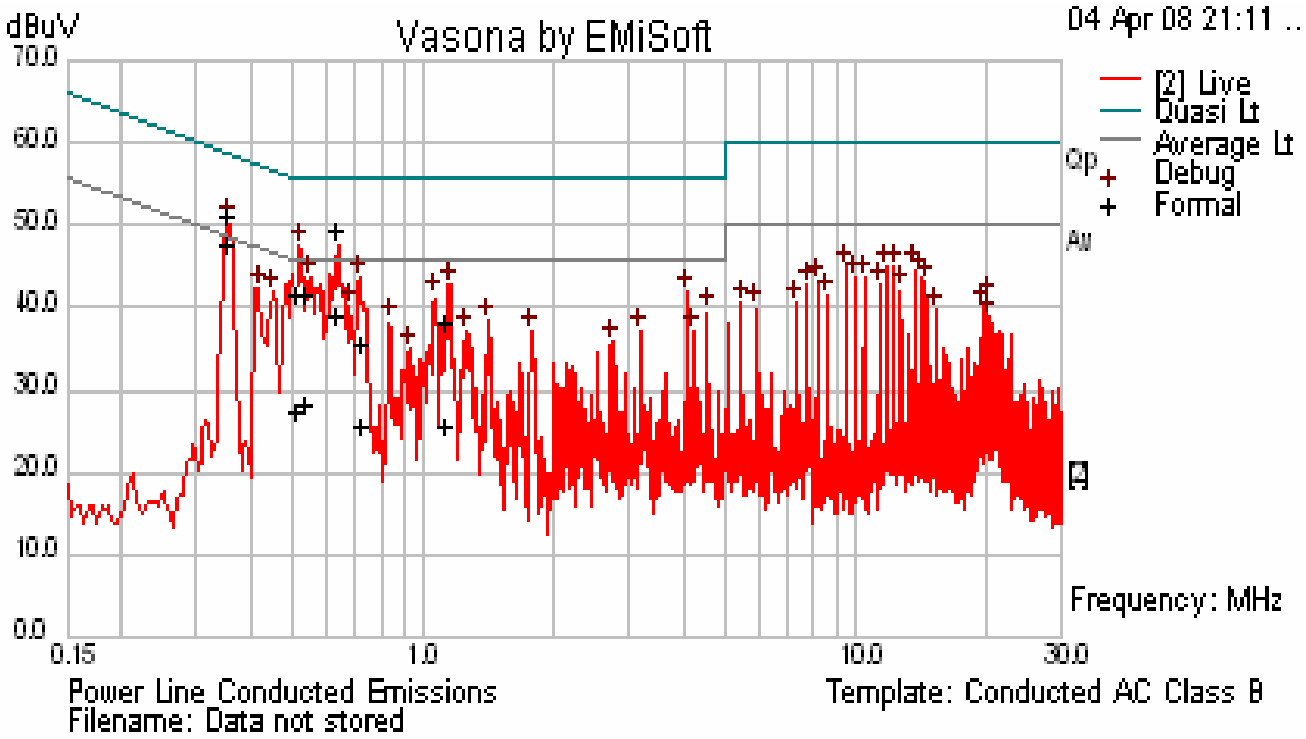
120 V, 60 Hz – Live



Quasi-Peak and Average Measurements

Frequency (MHz)	Quasi-peak (dBµV)	Conductor (Live/Neutral)	Measurement Type	Limit (dBµV)	Margin (dB)
0.633	47.86	Live	Quasi Peak	56.00	-8.14
0.355	48.88	Live	Quasi Peak	58.85	-9.97
0.314	49.77	Live	Quasi Peak	59.88	-10.10
0.349	45.63	Live	Quasi Peak	58.99	-13.36
0.347	45.31	Live	Quasi Peak	59.04	-13.73
0.907	41.90	Live	Quasi Peak	56.00	-14.10
0.355	44.82	Live	Average	48.85	-4.04
0.633	37.15	Live	Average	46.00	-8.85
0.349	36.28	Live	Average	48.99	-12.72
0.314	32.90	Live	Average	49.88	-16.97
0.347	31.99	Live	Average	49.04	-17.05
0.907	25.95	Live	Average	46.00	-20.05

120 V, 60 Hz – Neutral



Quasi-Peak and Average Measurements

Frequency (MHz)	Quasi-peak (dBµV)	Conductor (Live/Neutral)	Measurement Type	Limit (dBµV)	Margin (dB)
0.632	47.57	Neutral	Quasi Peak	56.00	-8.43
0.356	49.06	Neutral	Quasi Peak	58.83	-9.77
0.515	39.71	Neutral	Quasi Peak	56.00	-16.29
0.543	39.61	Neutral	Quasi Peak	56.00	-16.39
1.146	36.26	Neutral	Quasi Peak	56.00	-19.74
0.722	33.41	Neutral	Quasi Peak	56.00	-22.59
0.356	45.57	Neutral	Average	48.83	-3.25
0.632	37.22	Neutral	Average	46.00	-8.78
0.543	26.12	Neutral	Average	46.00	-19.88
0.515	25.45	Neutral	Average	46.00	-20.55
1.146	23.71	Neutral	Average	46.00	-22.29
0.722	23.62	Neutral	Average	46.00	-22.38

6 §15.205 & §15.209 - SPURIOUS RADIATED EMISSION

6.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is $\pm$4.0 dB.

According to §15.205, except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
[1]0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2655 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.57725	240 – 285	3345.8 – 3358	36.43 – 36.5
13.36 – 13.41	322 – 335.4	3600 – 4400	([2])

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510MHz
[2] Above 38.6

Except as provided in paragraph (d) and (e), the filed strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

According to §15.209, the device shall meet radiated emission general requirements.

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of Emission (MHz)	Field Strength (Microvolts/meter)	Measurement Distance (Meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

6.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected to the power adapter which is connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the frequency was investigated from 300 KHz to 1000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10 kHz	10 kHz
30 – 1000MHz	100 kHz	100 kHz
Above 1000MHz	1MHz	1 MHz

For Average measurement: RBW = 1MHz, VBW = 10Hz (above 1000MHz)

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Amplifier, Pre (.1 ~1300MHz)	8447D	2944A10198	2007-12-19
Sunol Science	30MHz – 2 GHz Antenna	JB1	A103105-3	2008-03-25
Sunol Science	System Controller	SC99V	122303-1	N/R
Rohde & Schwarz	EMI Test Receiver	ESCI1166.5950K03	100044	2008-03-26
ETS	Antenna, Loop, H-Field, Passive	6512	34167	2007-07-12

*** Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

6.4 Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings performed only when an emission was found to be marginal (within -4 dBμV of specification limits), and are distinguished with a "**Qp**" in the data table.

6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - FCC 15.209 Limit

6.6 Environmental Conditions

Temperature:	22°C
Relative Humidity:	45%
ATM Pressure:	1021mbr

**Testing was performed by Jerry Wang on 2008-06-15*

6.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207 and 15.209, and had the worst margin of:

-5.97 dB at **627.76 KHz**, 0.3 – 30MHz

-2.12 dB at **39.187MHz** in the **Horizontal** polarization, 30 – 1000MHz

(The test data is within the measurement uncertainty ±4.0 dB)

Radiated Emission (0.3 – 30MHz) – Measured at 10 meter distance

Frequency (kHz)	Reading (dBuV)	Direction (Degree)	Ant. Height (m)	Loop Antenna Factor (dB)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Field Strength (dBuV/m)	15.209 Limit (dBuV/m)	15.209 Margin (dB)
627.76	72.14	200.00	1.20	10.90	0.00	38.28	44.76	50.73	-5.97
906.66	68.42	240.00	1.20	10.90	0.00	38.28	41.04	47.54	-6.50
453.33	79.58	300.00	1.20	10.80	0.00	38.28	52.10	73.60	-21.50
1813.32	68.76	180.00	1.20	10.90	0.10	38.28	41.48	69.54	-28.06
313.86	75.42	300.00	1.20	10.80	0.00	38.28	47.94	76.75	-28.81
1883.18	66.03	240.00	1.20	10.90	0.10	38.28	38.75	69.54	-30.79
2197.05	65.20	240.00	1.20	10.90	0.20	38.28	38.02	69.54	-31.52
2266.65	64.21	240.00	1.20	10.90	0.20	38.28	37.03	69.54	-32.51
2510.91	63.12	240.00	1.20	10.90	0.20	38.28	35.94	69.54	-33.60
2719.98	62.40	240.00	1.20	10.90	0.20	38.28	35.22	69.54	-34.32
2824.78	61.34	240.00	1.20	10.90	0.20	38.28	34.16	69.54	-35.38
3138.64	60.89	240.00	1.20	11.00	0.20	38.28	33.81	69.54	-35.73
3626.64	60.84	240.00	1.20	11.00	0.20	38.28	33.76	69.54	-35.78
3173.31	59.60	240.00	1.20	11.00	0.20	38.28	32.52	69.54	-37.02

Note:

Near-Field Measurement:

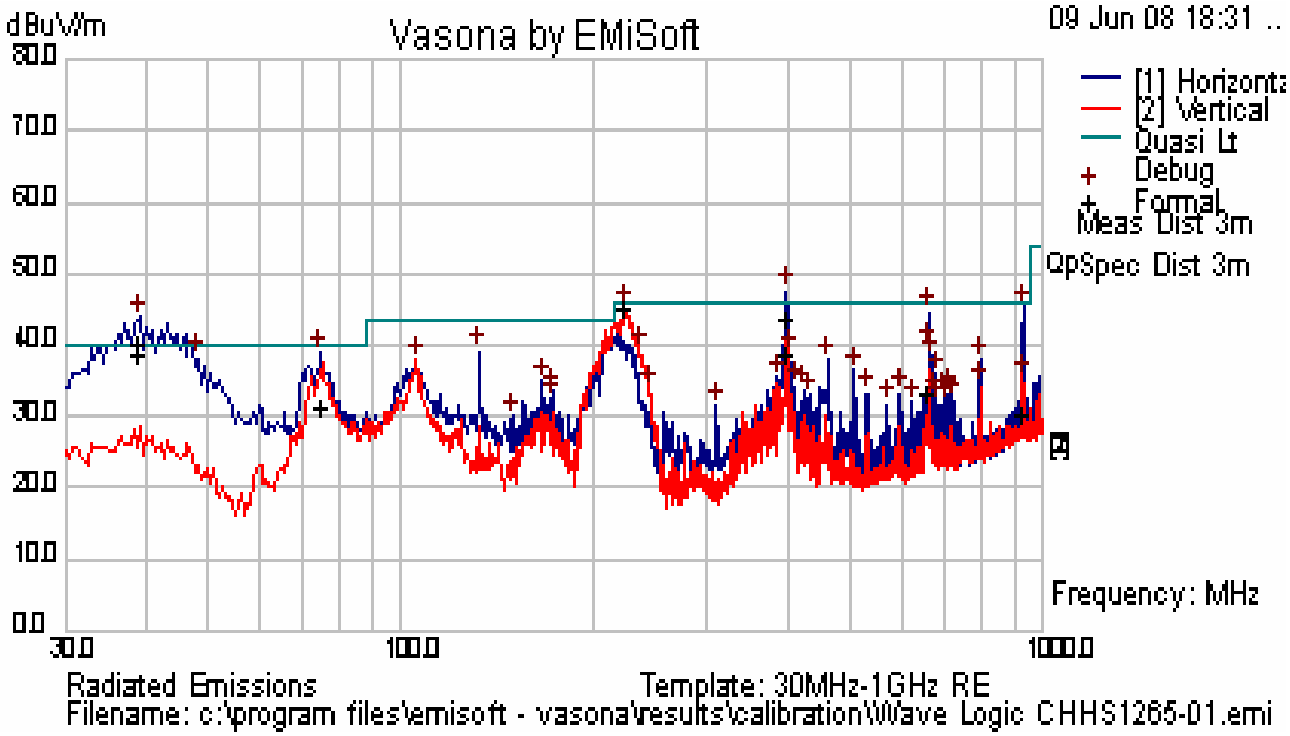
Emissions below 30MHz are measured in the near-field and an interpolation factor of 40dB per decade is used to determine the 10m limit.

Example: Measurement Distance = 10m
Specified Distance = 300m

10m Limit = Limit (at 300m) – [40 log (10/300)]

Thus for measurement at 10 m, the specified limit is increased by 59 dB.

Radiated Emission Test Result, 30 – 1000MHz



Quasi-Peak Measurements

Frequency (MHz)	Quasi-peak (dBµV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (degrees)	Limit (dBµV/m)	Margin (dB)
39.187	37.88	95	H	106	40	-2.12
222.88	42.71	99	V	250	46	-3.29
39.133	36.50	105	H	64	40	-3.50
399.019	41.29	98	H	170	46	-4.71
398.775	36.37	134	H	228	46	-9.63
75.275	29.17	116	H	325	40	-10.83
664.236	31.07	186	H	226	46	-14.93
932.771	28.22	132	H	137	46	-17.78