



HURSLEY
EMC
SERVICES

EMC TEST REPORT

No. 14R162 FR

Issue#2: 28th May 2014

UKAS Accredited
EU Notified Body
FCC & VCCI Registered
BSMI Lab ID: SL2-IN-E-3008
KC Lab ID: EU0184

FCC Part 15C & Industry Canada Certification Report for the AURA 21 Display

Project Engineer: R. P. St John James

Approval Signatory

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Document History:

Issue#1: 9th May 2014 was withdrawn and replaced by Issue#2: page 11 details corrected.

1.0 DECLARATION

1.1 FCC Part 15C Statement and Industry Canada (IC) Statement

The Equipment Under Test (EUT), as described and reported within this document, complies with IC RSS-Gen 3 Issue 3:2010 and IC RSS-210 Issue 8 and the parts 15.109, 15.209 and 15.249 of the CFR 47:2013 FCC rules in accordance with ANSI C63.4:2003. The EUT operates at frequencies of 902.5 to 927.5 MHz and complies with part 15C emission requirements.

1.2 Related Submittal(s) Grants

This is an application for certification of an AURA 21 Display (transmitting at 902.5 to 927.5 MHz), described in this report.

The sections of FCC Part 15 that apply to the EUT are:

15.209 General requirements
15.249 Operation within the band 902 to 928 MHz
15.109 applied to the EUT in receive model.

Note: The EUT in receiver mode complies with part 15B of the FCC rules for unintentional radiators.

1.3 EUT Manufacturer

Trade name:	Displaydata Limited
Company name:	Displaydata Limited
Company address:	Century Court Millenium Way Bracknell Berkshire RG12 2XT United Kingdom
Manufacturing address:	As above.
Company representative:	Mr Simon Cox Tel: +44 (0) 1344 887685

2.0 EUT DESCRIPTION

2.1 Identity

EUT:	Electronic Shelf Label
Model:	AURA 21
Serial numbers:	KB0000428B (Transmitter) KB0000406B (Receiver)
Sample build:	Production

2.2 Product Operation

The EUT is part of a system for electronic shelf labels to be used within retail outlets such as shops and super markets. The EUT is an electronic shelf edge label that displays product and price information. The EUT is always installed in a vertical position. The EUT contains a radio for receiving and transmitting data to a base unit known as a Dynamic Communicator. The EUT transmits infrequently, typically once a day for a few milliseconds.

2.3 Support Equipment

SUPPORTING EQUIPMENT	PART/MODEL NUMBER	SERIAL NUMBER
Dell Laptop	Precision M4800	17883430057
Dell Power Supply	Dell WW4XY	CN-OWW4XY-48661-3C6-6040G-A03
NetGear Hub	FS 108P	ZHK1163E007A7
NetGear Power Supply	NU60-F-480125-I	2411231811029004GP
Displaydata Communicator	Dynamic Communicator	ZC0000025

2.4 Exerciser Program

The EUT was set to transmit continuously at the top, middle and bottom of the 902-928MHz radio operating range. The laptop, via the Ethernet Hub to the Dynamic Communicator, was used to set the operating frequency of the EUT. Once transmitting the EUT was tested standalone in the semi-anechoic chamber.

The EUT was also tested in receive mode, a second sample was used for this test.

3.0 MEASUREMENT PROCEDURE AND INSTRUMENTATION

3.1 EMI Site Address & Test Date

EMI Company Offices	Hursley EMC Services Ltd Trafalgar House, Trafalgar Close, Chandlers Ford, Hampshire
EMI Measurement Site	Hursley EMC Services Ltd Hursley Park, Winchester; FCC Registered UK Designation number: UK0006 Industry Canada Registration Number : 7104A
Test Dates	14 th April & 6 th May 2014
HEMCS References:	14R162

3.2 General Operating Conditions

Testing was performed according to the procedures in ANSI C63.4:2003. Final radiated testing was performed at a EUT to antenna distance of three metres.

Instrumentation, including receiver and spectrum analyser bandwidth, comply with the requirements of ANSI C63.2:1996.

3.3 Environmental Ambient

Test Type	Temperature	Humidity	Atmospheric Pressure
Radiated & Conducted	20 - 21 degrees Celsius	42 - 47% relative	997-1000 millibars

3.4 Radiated Emissions

Initial Scan

A radiated profile scan was taken at a three metre distance on eight azimuths of the system under test in both vertical and horizontal polarities of the antenna in a semi-anechoic chamber. Instrumentation used in the chamber as below:

#ID	CP	Manufacturer	Type	Serial No	Description	Calibration due date
033	1	HP	8593EM	3726U00203	Spectrum analyser (9kHz-26.5GHz)	30/05/2014
050	1	HP	8447D	1937A02341	Pre-amplifier (30-1000MHz)	Internal
250	1	HP	8449B	3008A01077	Pre-amplifier (1.0-26.5GHz)	16/05/2014
452	3	CHASE	CBL 6141	4013	Pink 30M-2G Antenna	02/10/2014
466	2	Schwarzbeck	BBHA 9120 571	571	1-10GHz Horn	29/01/2015

The data obtained from the profile scan was used as a guide for the final measurements.

Final Measurements

The system under test was then measured at three metres in the Open Area Test site (OATS) using a receiver. The data obtained from the chamber profile-scan was used to guide the test engineer. Above 30 MHz, each emission from the transmitter was maximised by revolving the system on the turntable and moving the antennae in height and azimuth. The worst-case data is presented in this report. Test instrumentation used was as follows:

#ID	CP	Manufacturer	Type	Serial No	Description	Calibration due date
250	1	HP	8449B	3008A01077	Pre-amplifier (1.0-26.5GHz)	16/05/2014
289	1	Rohde & Schwarz	ESCI 7	100765	CISPR 7GHz Receiver	28/05/2014
452	3	CHASE	CBL 6141	4013	Pink 30M-2G Antenna	02/10/2014
466	2	Schwarzbeck	BBHA 9120 571	571	1-10GHz Horn	29/01/2015

CP = Interval period [year] prescribed for external calibrations

Note: 'Calibration due date' means that the instrument is certified with a UKAS or traceable calibration certificate.
 'Internal' means internally calibrated using HEMCS procedures

4.0 TEST DATA

4.1 FCC – Radiated Emissions (Transmitting)

A search was made of the frequency spectrum from 30 MHz to 10 GHz and the measurements reported are the highest emissions relative to the 'FCC CFR 47 Section 15.209 and 15.249 Limits' at a measuring distance of three metres.

Testing was performed with the EUT at top, bottom and middle transmitter operating frequencies. Below 1 GHz a quasi-peak detector was used (bandwidth 120 kHz), above 1 GHz a peak and average detector was used (bandwidth 1 MHz). The worst-case results from all tests are presented here.

RESULTS - 30 MHz to 1000 MHz

Frequency MHz	Receiver amplitude dB μ V	Antenna factor dB	Cable loss dB	Actual quasi-peak value @ 3m dB μ V/m	Specified limit @ 3m dB μ V/m
33.800	-12.0	11.3	0.7	26.1	40.0
83.400	-9.0	7.9	1.1	14.1	40.0
100.050	-12.9	11.6	1.3	19.6	40.0
139.540	-9.9	8.4	1.5	19.1	40.0
563.340	-21.5	17.9	3.6	29.3	46.0
901.950	-26.9	21.9	5.0	35.5	46.0
902.000	-26.9	21.9	5.0	34.3	46.0
*902.500	-26.9	21.9	5.0	77.4	94.0
*913.500	-26.9	21.9	5.0	76.2	94.0
*927.500	-27.1	22.0	5.1	82.7	94.0
928.000	-27.1	22.0	5.1	38.1	46.0
928.050	-27.1	22.0	5.1	37.4	46.0

*Transmitter frequency

Uncertainty of measurements: ± 4.2 dB μ V for a 95% confidence level.

Radiated emissions (continued)**RESULTS - 1.0 GHz to 10.0 GHz**

Frequency GHz	Receiver amplitude dB μ V	Antenna factor dB	Cable loss dB	Pre-amp gain dB	Actual average value @ 3m dB μ V/m	Specified average limit @ 3m dB μ V/m
5.415	3.6	29.5	4.8	37.9	49.9	54.0
5.481	3.6	29.5	4.8	37.9	49.0	54.0
5.565	3.0	30.1	4.8	37.9	45.0	54.0

Frequency GHz	Receiver amplitude dB μ V	Antenna factor dB	Cable loss dB	Pre-amp gain dB	Actual peak value @ 3m dB μ V/m	Specified limit @ 3m dB μ V/m
5.915	2.7	30.1	5.1	37.9	53.6	74.0
5.981	2.7	30.1	5.1	37.9	55.2	74.0
5.565	3.0	30.1	4.8	37.9	48.9	74.0

Procedure: In accordance with ANSI C63.4:2003

Measurements below 1.0 GHz performed with a quasi-peak detector. Measurements above 1.0 GHz performed with an average and peak detector.

Note: To meet the limit the transmitter amplitude was turned down from level 7 to level 5.

TEST ENGINEER: Ross Goodenough

4.2 FCC – Radiated Emissions (Receive Mode)

A search was made of the frequency spectrum from 30 MHz to 10.0 GHz and the measurements reported are the highest emissions relative to the 'FCC CFR 47 Section 15.109 Limits' at a measuring distance of three metres.

RESULTS 30 MHz to 1000 MHz

Frequency MHz	Receiver amplitude dB μ V	Antenna factor dB	Cable loss dB	Actual quasi-peak value @ 3m dB μ V/m	Specified limit @ 3m dB μ V/m
All emissions were at or below the noise floor of the measuring system.					

Procedure: In accordance with ANSI C63.4:2003

Measurements below 1000 MHz performed with a quasi-peak detector. Measurements above 1000 MHz performed with an average and peak detector.

4.3 Occupied Bandwidth

Section 4.6 of RSS-GEN

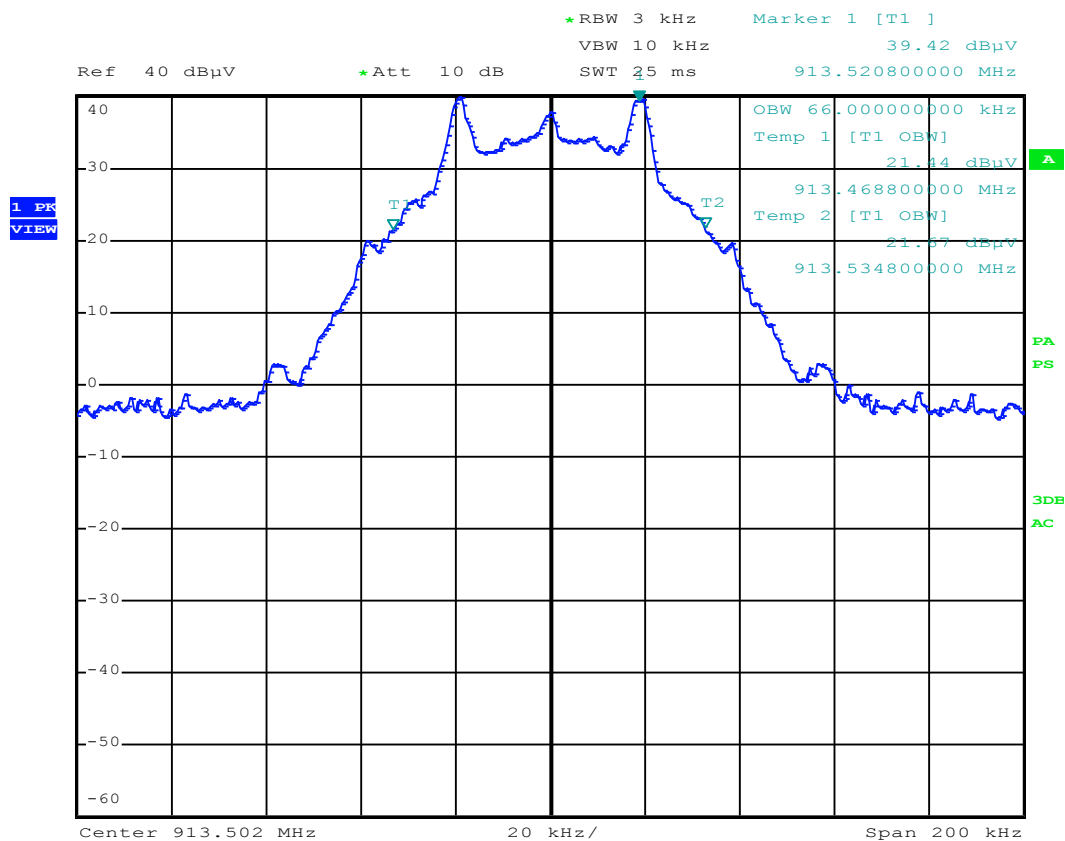
The output from the measuring antenna was fed into the input of the ESCI7 spectrum analyser/receiver. The bandwidth of the transmitter was measured with an ESCI7 analyser set to 99% Occupied Bandwidth with a sampling detector on max hold. The resolution bandwidth, span and video bandwidth are indicated on the occupied bandwidth plot (modulated) included with this report.

The bandwidth of the modulated Transmitter signal was measured as 66 kHz.

TEST ENGINEER: Ross Goodenough

4.4 99% Bandwidth Plot

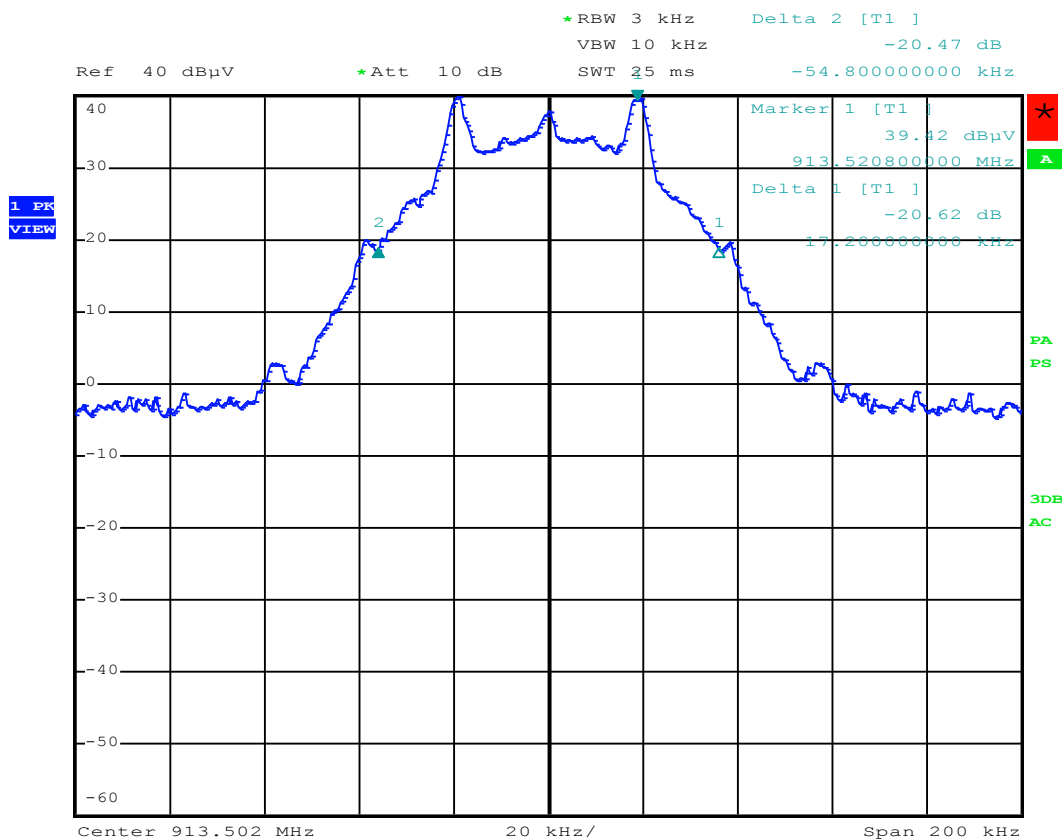
bandwidth measured as 66kHz



Date: 14.APR.2014 16:55:21

4.5 20dB Bandwidth Plot

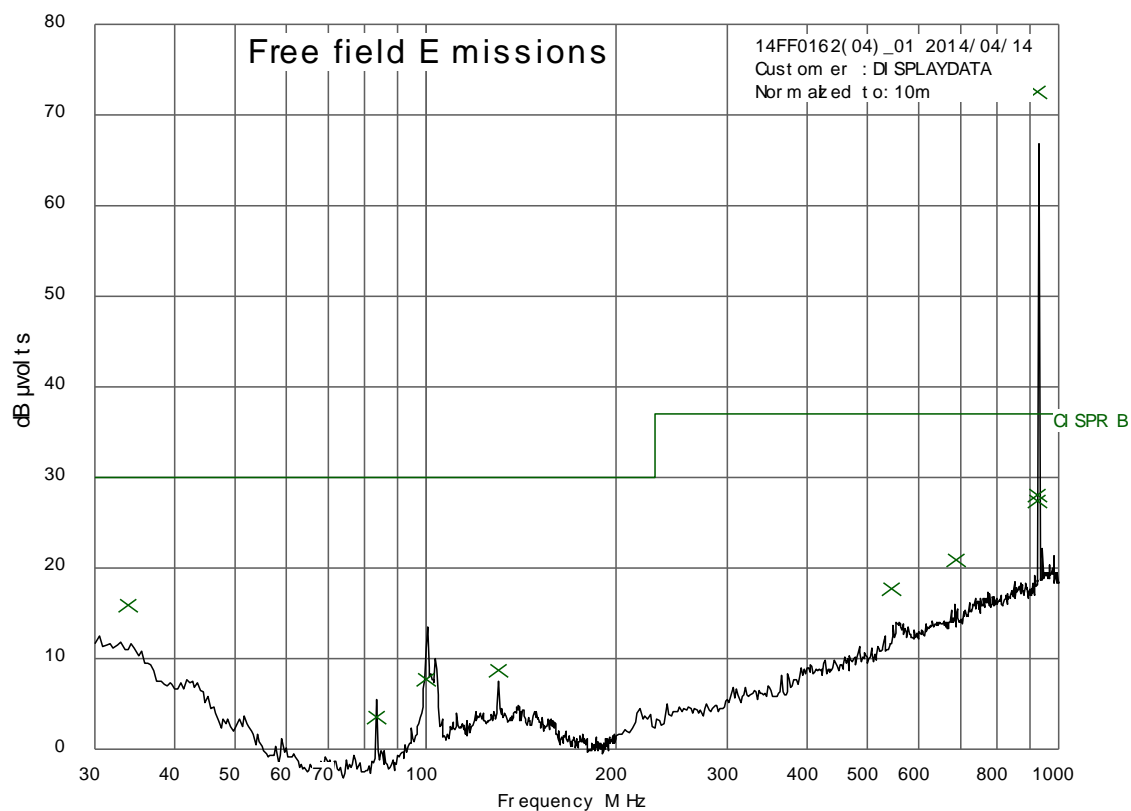
20dB bandwidth measured as 72kHz (72kHz = 54.8kHz + 17.2kHz from plot below)



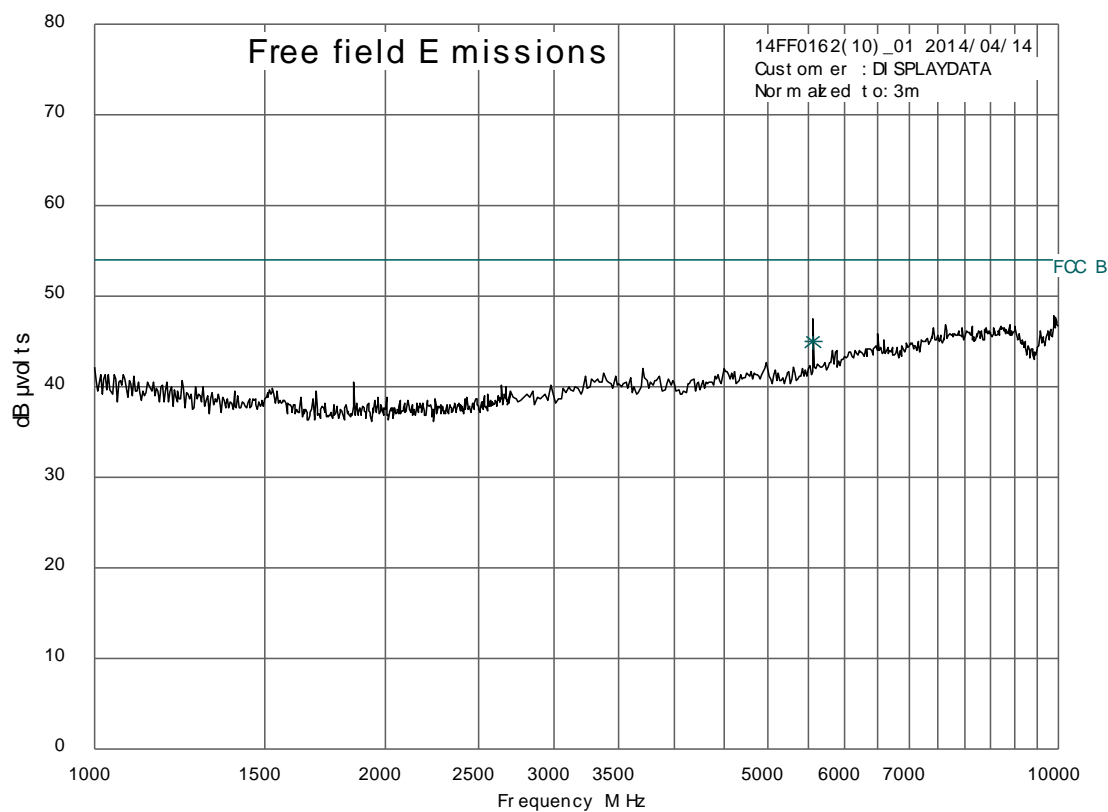
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5.0 TEST PLOTS

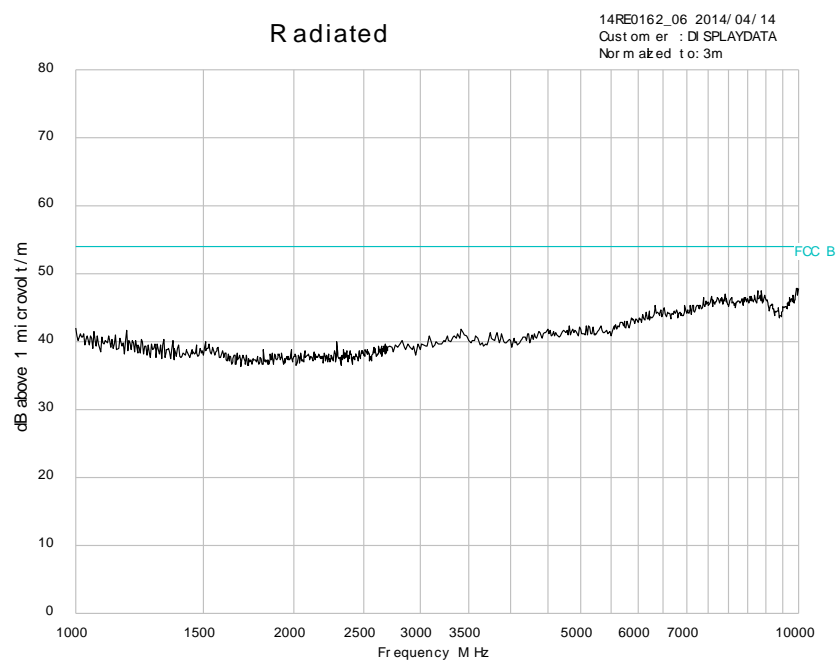
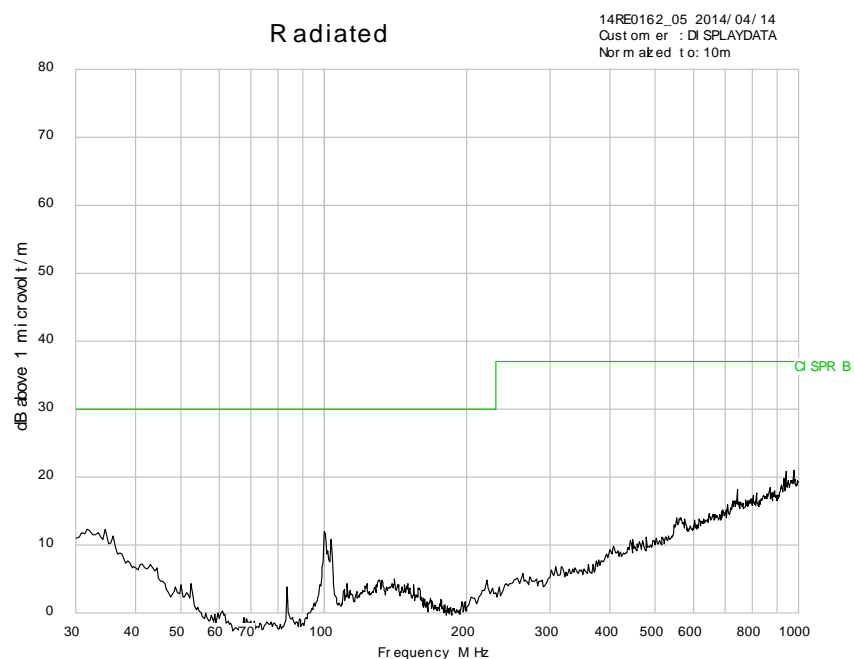
5.1 Radiated Emission Plot, 30 to 1000 MHz



5.2 Radiated Emissions Plot, 1.0 to 10.0 GHz



5.3 Radiated Emissions Plots – Receive Mode



6.0 FCC DETAILS

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

February 13, 2006

Hursley EMC Services Ltd.
Unit 16
Brickfield Lane
Chandlers Ford - Hampshire, SO53 4DB
United Kingdom
Attention: R P St John James

Re: Accreditation of Hursley EMC Services Ltd.
Designation Number: UK0006

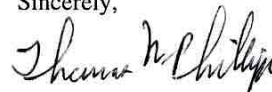
Dear Sir or Madam:

We have been notified by Department of Trade and Industry (DTI) that Hursley EMC Services Ltd. has been accredited as a Conformity Assessment Body (CAB).

At this time your organization is hereby designated to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification under Parts 15 and 18 of the Commission's Rules.

This designation will expire upon expiration of the accreditation or notification of withdrawal of designation.

Sincerely,



Thomas Phillips
Electronics Engineer