



HURSLEY
EMC
SERVICES

EMC TEST REPORT

No. 15R239 FR

Issue#2: 8th July 2015

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

FCC Class B Report

for

M-Cube S.P.A

Player M-Cube

FCC ID: 2AE3M-7V2261-0

Project Engineer: R. P. St John James

Approval Signatory

Approved signatories: S. M. Connolly ☒ J. A. Jones ☐

The above named are authorised Hursley EMC Services engineers.

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Document History:

Issue#1: 11th June 2015 was withdrawn and replaced by Issue#2: updated with editorial correction.

1.0 DECLARATION

1.1 FCC Class B Report

The Equipment Under Test (EUT), as described and reported within this document, complies with the part 15B (unintentional radiators) of the CFR 47:2013 FCC rules in accordance with ANSI C63.4 and the Canadian Standard ICES-003:Issue 5 (CISPR 22:2008) measurement procedure referencing the following EMC tests:-

- CONDUCTED EMISSIONS - Power Line, from 0.15 MHz to 30.0 MHz
- RADIATED EMISSIONS - Airborne, from 30.0 MHz to 2.0 GHz

Note: The highest associated operating frequency on the system, as declared by the manufacturer, was 398MHz.

The uncertainty of measurement for each test has been included to support a level of confidence of approximately 95%.

This report relates to the sample tested and may not represent the entire population. It is valid only for the product identified, either in part or in full, to the relevant electromagnetic requirements necessary for compliance.

Hursley EMC Services Limited is recognised by the Federal Communications Commissions (FCC) as an EMI laboratory, outside of the USA, for the measurement of conducted emissions and radiated emissions at three and ten metres.

1.2 Product Modifications

None to sample supplied.

1.3 EMC Test Lab Reference

Hursley EMC Services file: 15R239.

1.4 EUT Manufacturer

Trade name:	M-Cube S. P. A
Company name:	M-Cube S. P. A
Company address:	C-SO Cavour 2/2d 34132 Trieste Italy Tel: +39 040 634364
Manufacturing address:	SCEN S.r.l. Via Colombara di Vignano 13 34015 Muggia (TS) Italy
Company contact:	info@mcube.it
Test commissioned by:	Roberto Passini of Sicom Test s.r.l, Italy

2.0 EUT DESCRIPTION

2.1 Identity

Product (EUT):	In-store Radio Player Hard Drive Model: Player M-Cube Serial number: 09001
Powered by:	AC/DC Adaptor Manufacturer: FRIWO Type: FW7662/12 Serial number: 001 (designated by Hursley EMC Services)
Product build level:	Production sample

2.2 EUT Description

The EUT is an In-store Music/Radio player hard drive that connects via Ethernet to a remote host.

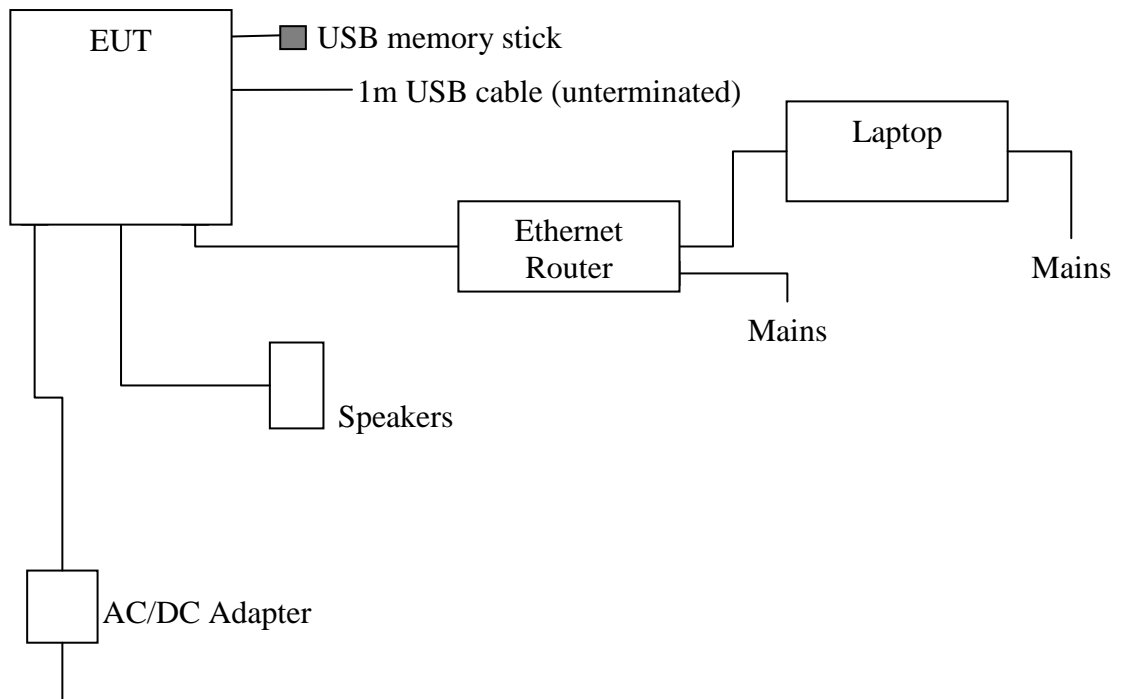
2.3 EUT Test Exerciser

The EUT was connected to a set of speakers and played a continuous 1kHz tone. A programme called “ping” was used to continuously exercise the EUT Ethernet connection.

2.4 Support Equipment

Item	Part/Model number	Serial number
Samsung Laptop	N150	ZN7193KZ201465J
Linksys Router	-	MK9006B08373
USB Stick	n/a	n/a
5m Ethernet cable (UTP)	n/a	n/a
Pure Speakers (x2)	12M21	062 & 061
1m USB Cable	n/a	n/a

2.5 EUT Test Configuration



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, Hampshire
Test Date	28 th & 29 th May 2015

3.2 General Operating Conditions

Testing was performed according to the procedures in ANSI C63.4:2003 & ANSI C63.4:2014¹. Final radiated testing was performed at an EUT to antenna distance of ten metres on an FCC registered open area measurement facility, above 1GHz testing was performed at 3m.

Note 1: The Test site meets the requirements of CISPR 22 using CISPR 16 -1-4 to 6GHz and therefore the ANSI C63.4:2014 to 6GHz, the test site is registered under an MRA using UKAS accreditation. This Lab is UKAS accredited for CISPR 22 (CISPR 16-1-4) and ANSI C63.4:2003 but not ANSI C63.4:2014.

3.3 Environmental Ambient

Temperature	21° Celsius
Relative Humidity	40 to 44%
Atmospheric Pressure	997 to 1008 millibars

3.4 Conducted Emissions

Test Configuration

A filtered 115V/60Hz supply was fed to the EUT via a 50Ω/50μH Line Impedance Stabilisation Network (LISN). The LISN was directly bonded to a conductive ground plane.

Test Measurement

The worst-case emissions were identified on both the neutral and phase(s) with a spectrum analyser set to scan from 0.15 MHz to 30.0 MHz.

The worst-case peaks were then identified and measured using an RF receiver using a quasi-peak detector and compared to the frequency range and limits of CISPR 22 as specified by ANSI C63.4.

The worst-case results are presented in this report.

Test instrumentation used in the conducted test was as follows:

#ID	CP	Manufacturer	Type	Serial Nø	Description	Calibration due date
003	1	Rohde & Schwarz	ESH-3	872994/027	Test receiver (9kHz-30MHz)	19/09/2015
010	1	HP	8568B	2601A02322	Spectrum analyser	Internal
147	1	Rohde & Schwarz	ESH3 Z5	846695/011	Single phase (LISN / AMN)	06/07/2015
189	1	Rohde & Schwarz	ESH3-Z2	-	Pulse limiter N type	09/07/2015

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

3.5 Radiated Emissions

Initial Scan

Radiated profile scans were taken on eight azimuths between 30.0 MHz and 2.0 GHz in both the vertical and horizontal polarities of the antennae in a semi-anechoic chamber. The resulting data obtained from these scans was used to determine subsequent measurement for final measurement evaluation.

The instrumentation used in the chamber was as below:

#ID	CP	Manufacturer	Type	Serial Nø	Description	Calibration due date
008	1	HP	8568B	2517A01791	Spectrum analyser	Internal
013	1	Schaffner	CBL6140A	1235	Antenna X-wing (chamber)	Internal
033	1	HP	8593EM	3726U00203	Spectrum analyser (9kHz-26.5GHz)	06/07/2015
053	1	HP	8449B	3008A01394	Pre-amplifier (1.0-26.5GHz)	10/07/2015
073	3	Schwarzbeck	BBHA9120B	237	Horn antenna (1-10GHz)	03/07/2016
132	1	HP	8447D	2944A07094	Pre-amplifier (30-1000MHz)	Internal

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

Final Measurements

The EUT was then measured on a ten metre Open Area Test Site (OATS) in the chamber using the pre-scan results as a guide. Emissions from the EUT were maximised by revolving the system on the turntable and moving the antennae in height and azimuth. Cable and system component positions had been investigated for maximum emissions, and the system under test represented the worst-case configuration. The highest values obtained are presented in this report.

The instrumentation used in the OATS was as below:

#ID	CP	Manufacturer	Type	Serial Nø	Description	Calibration due date
109	3	Schwarzbeck	VULB 9163	9163-321	Trilog antenna (OATS)	19/10/2015
289	1	Rohde & Schwarz	ESCI 7	100765	CISPR 7GHz Receiver	12/06/2015

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.

4.0 TEST DATA

The EUT was tested for radiated and conducted disturbance measurements. The worst-case results are reported within this document.

4.1 Power Line Conducted Emissions; 0.15 to 30.0 MHz

A search was made of the frequency spectrum between 0.15 MHz to 30.0 MHz and the measurements reported here are the highest emissions relative to the CISPR 22 Class B limits. Emissions that meet the average limit on a quasi-peak measurement are deemed to meet both the average and quasi-peak specification.

4.1.1 Data

MAINS – LINE

Frequency (MHz)	Quasi-peak value (dB μ V)		Average value (dB μ V)		Status
	Measured	Limit	Measured	Limit	
0.150	37.20	66.00	25.30	56.00	Pass
0.228	36.80	62.53	20.00	52.53	Pass
0.343	35.30	59.12	16.50	49.12	Pass
0.450	47.30	56.87	26.20	46.87	Pass
0.459	47.60	56.72	20.10	46.72	Pass
0.537	35.00	56.00	10.20	46.00	Pass
0.897	26.20	56.00	9.60	46.00	Pass
2.122	36.70	56.00	14.10	46.00	Pass
3.057	37.50	56.00	16.80	46.00	Pass
6.842	29.37	60.00	15.57	50.00	Pass

MAINS – NEUTRAL

Frequency (MHz)	Quasi-peak value (dB μ V)		Average value (dB μ V)		Status
	Measured	Limit	Measured	Limit	
0.246	26.60	61.90	7.80	51.90	Pass
0.345	38.70	59.08	26.60	49.08	Pass
0.462	49.40	56.65	28.70	46.65	Pass
0.591	39.50	56.00	9.50	46.00	Pass
0.950	33.80	56.00	13.40	46.00	Pass
2.018	37.30	56.00	16.90	46.00	Pass
3.474	36.30	56.00	16.90	46.00	Pass

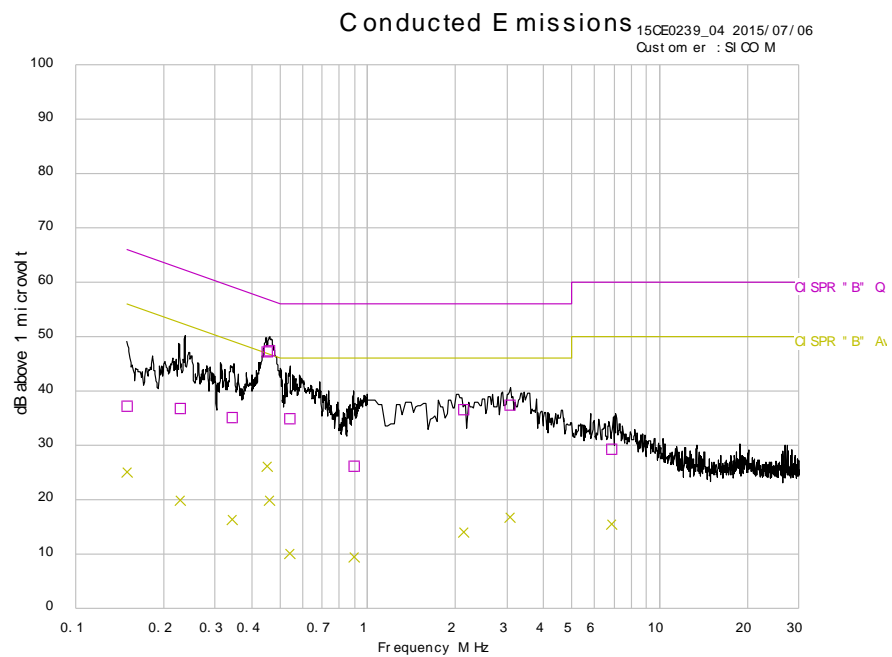
Uncertainty of measurement: ± 3.22 dB μ V for a 95% confidence level.

Measurements made according to the FCC rules and Hursley EMC Services test procedure CON-02.

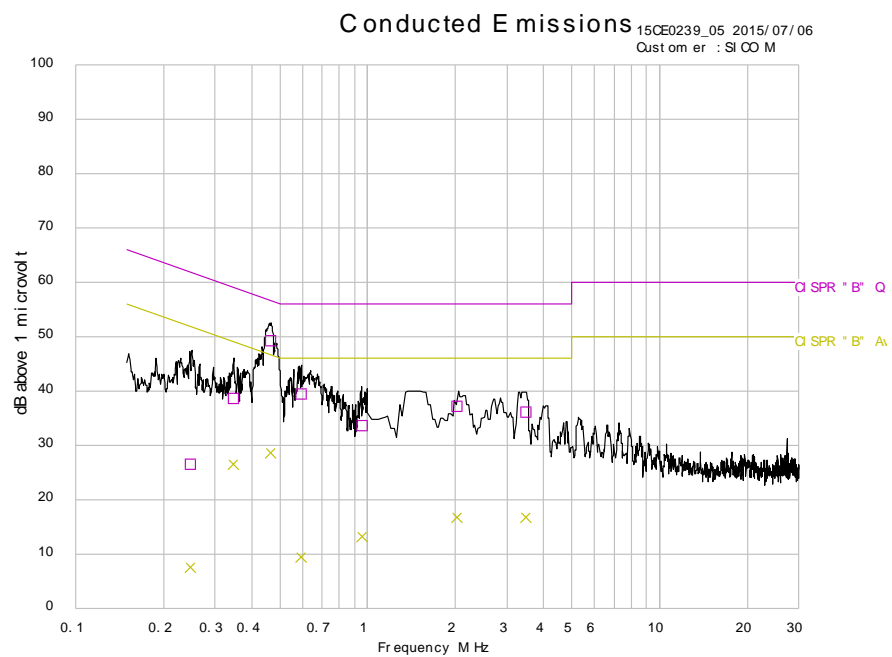
TEST ENGINEER: Allan Wheelen

4.1.2 Profiles

0.15 MHz to 30.0 MHz, line



0.15 MHz to 30.0 MHz, neutral



4.2 Radiated Emissions

4.2.1 Data; 30 to 1000 MHz

The measurements reported are the highest emissions relative to the FCC & CISPR Class B limits and take into account the antenna and cable loss factors. The measurements were made according to CISPR & ANSI C63:4 Class B test standard and Hursley EMC Services test procedure RAD-01.

The measurements were taken at a distance of ten metres.

Emission frequency (MHz)	Antenna polarity	Measured quasi-peak value (dB μ V/m)	Class B specified quasi-peak limit (dB μ V/m)	Status
31.4300	Vertical	18.49	30.00	Pass
32.0500	Vertical	17.17	30.00	Pass
39.4500	Vertical	25.50	30.00	Pass
202.7705	Vertical	25.03	30.00	Pass
250.0000	Vertical	28.55	37.00	Pass
304.1303	Vertical	27.39	37.00	Pass
405.5384	Vertical	32.74	37.00	Pass
410.2662	Vertical	23.69	37.00	Pass
500.0023	Vertical	28.20	37.00	Pass
600.0000	Vertical	32.37	37.00	Pass
709.5900	Horizontal	30.95	37.00	Pass
750.0000	Vertical	35.29	37.00	Pass
811.0000	Horizontal	23.10	37.00	Pass
912.3492	Horizontal	27.01	37.00	Pass

Uncertainty of measurement: $\pm 4.2\text{dB}\mu\text{V}$ for a 95% confidence level for 30–1000 MHz

Sample calculation

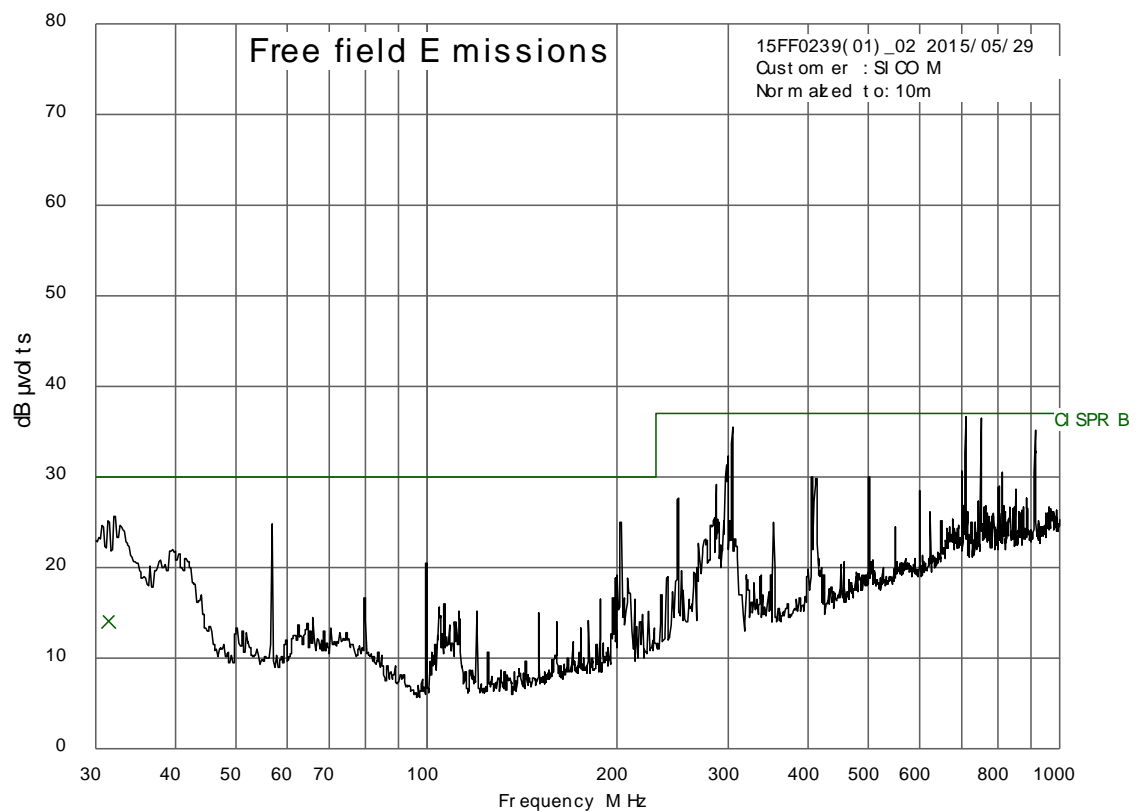
Measured value = Receiver Amplitude + Antenna Factor + Cable Loss

Example at 750MHz: $35.3 = 10.5 + 20.4 + 4.4$

TEST ENGINEER: Allan Wheelen

4.2.2 Profile; 30 to 1000 MHz

Maximum peak hold trace with quasi-peak values (X)



Radiated Disturbance (continued)**4.2.3 Data; 1.0 to 2.0 GHz**

A search was made of the frequency spectrum from 1.0 to 2.0 GHz and the measurements reported are the highest emissions relative to the CISPR 22 & FCC CFR 47 Part 15 limits at a measuring distance of three metres.

Results – 1.0 to 2.0 GHz

Frequency GHz	Receiver amplitude dB μ V	Antenna factor dB	Cable loss dB	Pre-amp gain dB	Actual Average value @ 3m		Specified average limit @ 3m	
					dB μ V/m	μ V/m	dB μ V/m	μ V/m
1.217	47.8	25.3	1.8	39.3	35.6	60.3	54.0	500
1.520	40.2	26.2	2.0	38.9	29.5	29.9	54.0	500

Frequency GHz	Receiver amplitude dB μ V	Antenna factor dB	Cable loss dB	Pre-amp gain dB	Actual peak value @ 3m		Specified limit @ 3m	
					dB μ V/m	μ V/m	dB μ V/m	μ V/m
1.217	66.1	25.3	1.8	39.3	53.9	469	74.0	5.000
1.520	57.1	26.2	2.0	38.9	46.4	209.	74.0	5.000

Uncertainty of measurement: ± 5.1 dB μ V for a 95% confidence level for 30–1000 MHz

Peak /Average value= Receiver Amplitude-+Antenna Factor + Cable Loss – Pre-amp gain

Procedure: In accordance with ANSI C63.4.

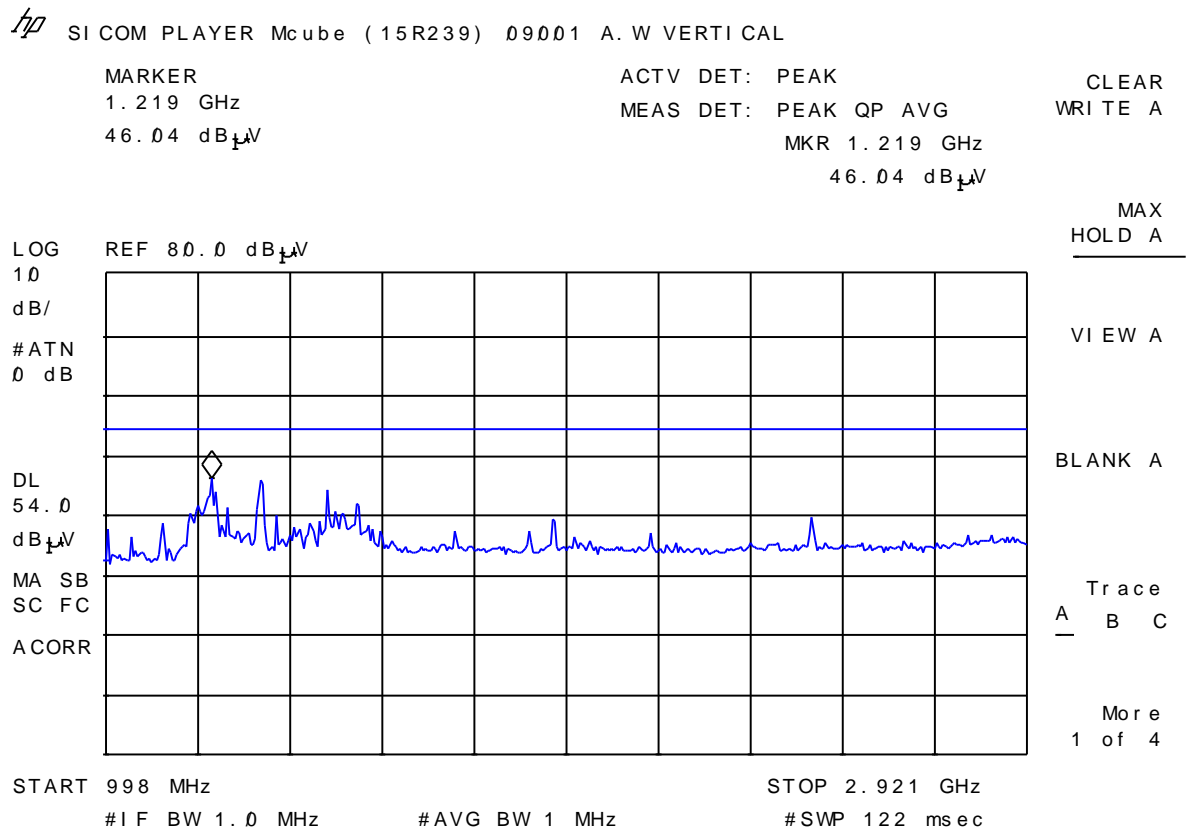
Measurements below 1.0 GHz performed with a quasi-peak detector (120kHz Bandwidth).

Measurements above 1.0 GHz performed with an average and peak detector (1MHz Bandwidth)

TEST ENGINEER: Allan Wheelen

4.2.4 Profile; 1.0 to 2.9 GHz

Maximum peak hold trace



5.0 FCC SITE COMPLIANCE STATEMENT

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

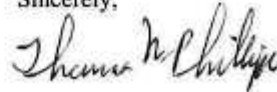
Dear Sir or Madam:

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

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