



HURSLEY
EMC
SERVICES

EMC TEST REPORT

No. 13R091 CFR

Issue#1: 2nd May 2013

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

FCC Part 15 Certification Report

for the

Autoscript Limited

WSC-RAT-A

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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1.0 DECLARATION

1.1 FCC Part 15C Statement

The Equipment Under Test (EUT), as described and reported within this document, complies with part 15.249 of the CFR 47:2013 FCC rules in accordance with ANSI C63.4:2003. The EUT operates at frequency of 902.3 MHz and complies with part 15C emission requirements.

Note: The EUT is a battery powered device.

1.2 Related Submittal(s) Grants

This is an application for certification of an Autoscript WSC-RAT-A Hand Control (transmitting at 902.3 MHz), described in this report.

The sections of FCC Part 15 that apply to the EUT are:
15.249 applied to the 902 MHz transmitter

1.3 EUT Manufacturer

Trade name:	Autoscript
Manufacturer name:	Autoscript Limited Unit 2 Heathlands Close Twickenham London TW1 4BP United Kingdom
Company representative:	Mr Andrew Yandell Tel: 44 (0)20 8891 8900

2.0 EUT DESCRIPTION

2.1 Identity

EUT: Autoscript Hand Controller s/n 1657
Model: WSC-RAT-A

The Autoscript WSC-RAT-A was configured to transmit continuously.

Sample build: Prototype
Operating frequency 902.3625 to 902.6875 MHz

2.2 Product Operation

The Autoscript WSC-RAT-A is a hand held transmitter used in TV studios for control of on screen prompted text. Control of the prompted text is via a rocker pot for forwards and backwards direction, with a centre stop. Push buttons are provided for next and previous stories.

2.3 Support Equipment

None: tested stand-alone.

2.4 Exerciser Program

For the purposes of measurement the EUT was configured to repeatedly transmit. In normal operations the transmitter will only transmit infrequently for short periods (<1s). The EUT was also measured in receive mode.

Before the start of the tests the transmitter was fitted with a new alkaline battery.

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, SO53 4BW, UK *
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EMI Measurement Site	Hursley EMC Services Ltd Trafalgar House, Trafalgar Close, Chandlers Ford, Hampshire, SO53 4BW, UK
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Test Date	19 th April – 1 st May 2013
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*The company has just moved from Unit 16, Brickfield Lane, Chandlers Ford, Hampshire.

3.2 General Operating Conditions

Testing was performed according to the procedures in ANSI C63.4:2003 and ANSI C63.10:2009. Final radiated testing was performed at an 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 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:

Computer	Animal Systems PC
Spectrum analyser	Hewlett Packard 8593EM, 30 to 1000 MHz range in peak hold mode Hewlett Packard 8593EM, >1.0 GHz, 1.0 MHz bandwidth, average and peak detector
Pre-amplifier	Hewlett Packard 8447D, 30 to 1000 MHz Hewlett Packard 8449B, 1.0 to 26.5 GHz
Antennae	Chase CBL6141 Bilog Schwarzbeck BBHA9120B Horn, 1.0 to 10.0 GHz
Cable	Sucoflex, 18GHz SMA-N

The EUT was measured in three orthogonal axes to determine which produced the highest emissions.

The data obtained from the profile scan was used as a guide for the final Open Area Test Site (OATS) measurements.

Final Measurements

The EUT was then measured at 3m in the chamber using the pre-scan results as a guide. Each emission from the EUT was maximised. 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 in the final emission measurements was as follows:

Computer	Animal Systems PC
Pre-amplifier	Hewlett Packard 8449B, 1.0 to 26.5GHz
Receiver	Rohde & Schwarz Model ESCI 7 30-7000MHz set to CISPR Quasi-Peak and Peak
Antennae	Chase CBL6141 Bilog, 30 to 1000 MHz Schwarzbeck BBHA9120B Horn, 1.0 to 10.0 GHz
Cable	Sucoflex, 18GHz SMA-N

3.4 Conducted Emissions

Note: The transmitter is battery powered therefore the conducted emissions test does not apply.

3.5 Environmental Ambient

Test Type	Temperature	Humidity	Atmospheric Pressure
Radiated	19 to 24 degrees Celsius	23 to 48% relative	983 to 1011 millibars

3.6 EMC Test Equipment

#ID	CP	Manufacturer	Type	Serial Nø	Description	Calibration due date
040	1	HP	8593EM	3536A00137	Spectrum analyser (9kHz-26.5GHz)	06/09/2013
073	3	Schwarzbeck	BBHA9120B	237	Horn antenna (1-10GHz)	17/06/2013
250	1	HP	8449B	3008A01077	Pre-amplifier (1.0-26.5GHz)	29/06/2013
271	1	Sucoflex	106		Cable SMA (18GHz)	19/05/2013
289	1	Rohde Schwarz	ESCI 7	100765	CISPR 7GHz Receiver	23/06/2013
392	1	HP	8447	1726A01042	Pre- Amp 0.01 to 1GHz	13/05/2013
433	1	Rhophase	NPS-2803	H0867	NPS-2803-1000-NPS Cable	17/05/2013
452	3	CHASE	CBL 6141	4013	Antenna 30-2000MHz	01/10/2014

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

3.7 Field Strength Calculation Examples

The actual values given in the following tables have been corrected for transducer losses and gains using the following formulae. The cable factors, antenna factors and amplifier gain are obtained from tables of calibrated data associated with each instrument.

For 30-1000MHz ; At each frequency the maximum receiver reading (Rx) plus the Cable Loss (C) plus the Antenna Factor (Af) equals the Actual Quasi Peak Value (E) in dB microvolt per metre.

$$Rx + C + Af = E \text{ (dB}\mu\text{V/m)}$$

So for example at 902MHz

$$E = 14.9 + 23.2 + 2.4 = 40.5 \text{ dB}\mu\text{V/m} \text{ where } C = 2.4\text{dB, } AF = 23.2\text{dB and } Rx = 14.9\text{dB}$$

For 1-10GHz ; At each frequency the maximum analyser reading (Rx) plus the Cable Loss (C) plus the Antenna Factor (Af) less the amplifier gain (G) equals the Peak or Average Value (E) in dB microvolt per metre.

$$Rx + C + Af - G = E \text{ (dB}\mu\text{V/m)}$$

So for example at 1.8GHz

$$E = 53.7 + 25.9 + 4.0 - 39 = 44.6 \text{ dB}\mu\text{V/m} \text{ where } C = 4.0\text{dB, } AF = 25.9\text{dB, } G = 39\text{dB and } Rx = 53.7\text{dB}$$

4.0 TEST DATA

4.1 Transmitter – Radiated Emissions

A search was made of the frequency spectrum from 30.0 MHz to 10.0 GHz in all three orthogonal axes and the measurements reported are the highest emissions relative to the FCC CFR 47 Section 15.249 limits at a measuring distance of three metres.

	Actual quasi-peak value	Specified limit	
Frequency	@ 3m	@3m	
MHz	dBµV/m	dBµV/m	µV/m
901.95	40.1	46.0	200
902.00	40.5	46.0	200
928.00	33.7	46.0	200

*902.365 MHz was the recorded transmitter frequency.

	Actual average value	Specified average limit	
Frequency	@ 3m	@3m	
GHz	dBµV/m	dBµV/m	µV/m
*0.902365	89.9	94.0	50,000
1.807	41.1	54.0	500
2.698	40.5	54.0	500
4.510	42.7	54.0	500

	Actual peak value	Specified peak limit	
Frequency	@ 3m	@3m	
GHz	dBµV/m	dBµV/m	µV/m
*0.902365	93.4	114.0	500,000
1.807	44.6	74.0	5,000
2.698	44.0	74.0	5,000
4.510	46.2	74.0	5,000

Procedure: In accordance with ANSI C63.4:2003.

Note: To confirm the average results an oscilloscope was connected to the video out on the spectrum analyzer and the duty cycle was measured according to the method described by ANSI C63.4 H.4.J. The duty cycle was measured as $(66.4\text{ms}) / 100\text{ms} = 0.664$ which equates to -3.5dB.

The average results are derived from the peak value by deducting the duty cycle factor (calculated as -3.5dB) from the peak results.

Procedure: In accordance with ANSI C63.4:2003.

Measurements below 1.0 GHz performed with a quasi-peak detector (120kHz Bandwidth) except the transmit frequency. The amplitude of the transmit frequency was recorded with a peak detector. Measurements above 1.0 GHz performed with a peak detector (1MHz Bandwidth), average result calculated by subtracting 3.5dB.

Test Data (continued)**4.2 Transmitter (Standby) – Radiated Emissions**

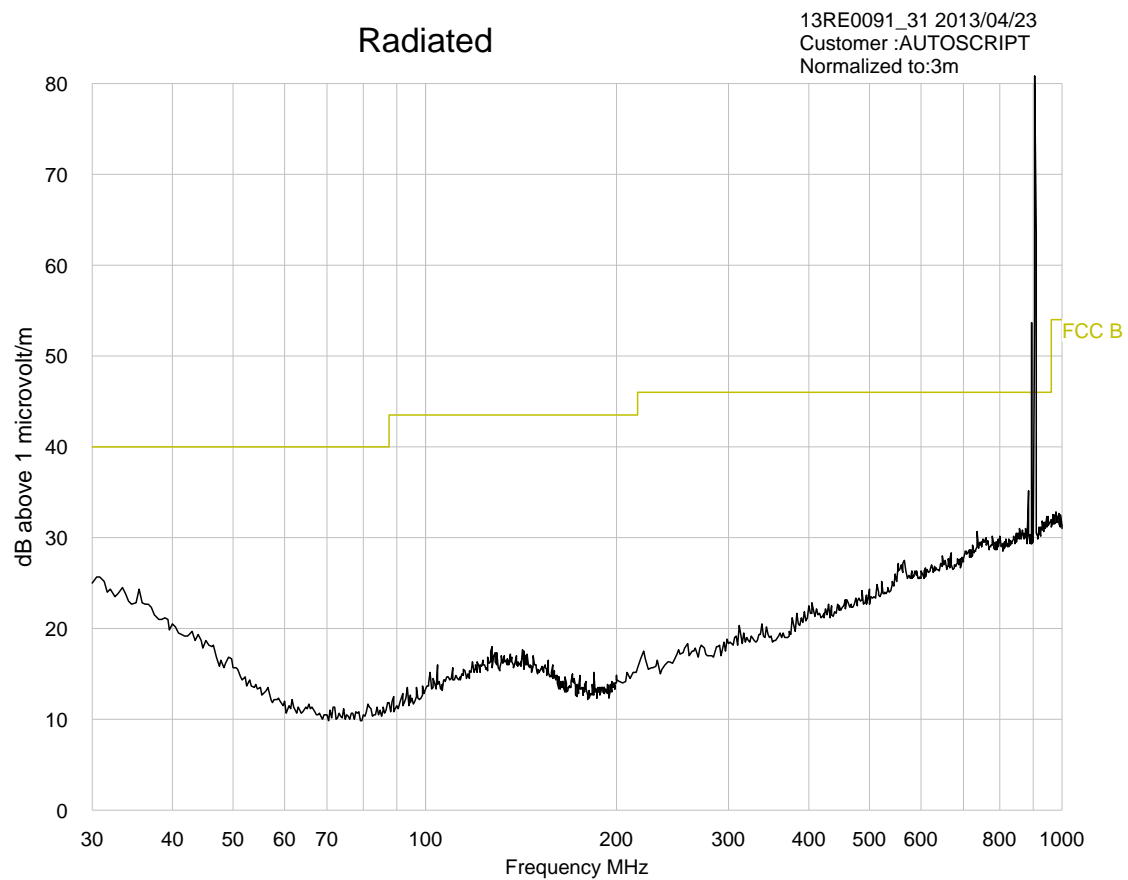
A search was made of the frequency spectrum from 30 MHz to 10 GHz and the measurements reported are the highest emissions relative to the 'FCC CFR 47 Section 15.109 Limits' at a measuring distance of three metres.

All emission were below the noise floor of the measuring system.

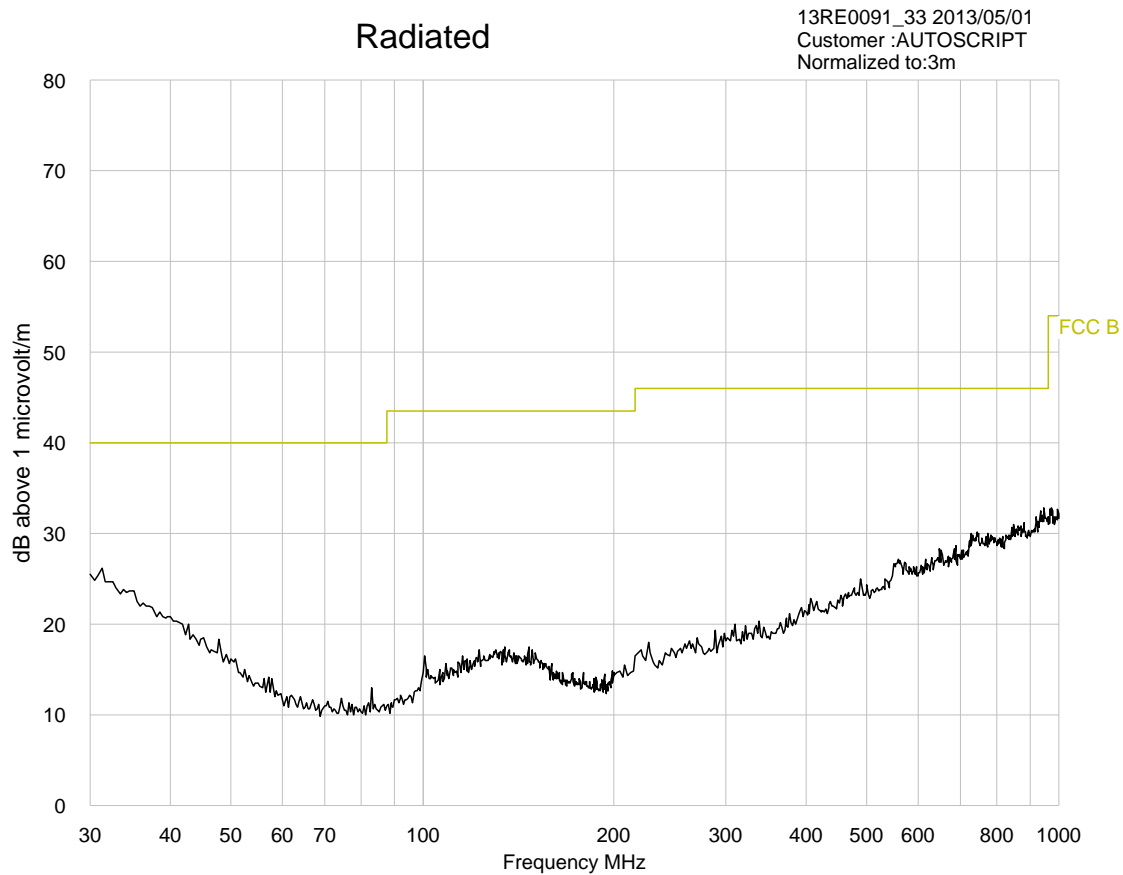
Procedure: In accordance with ANSI C63.4:2003.

5.0 TEST PLOTS

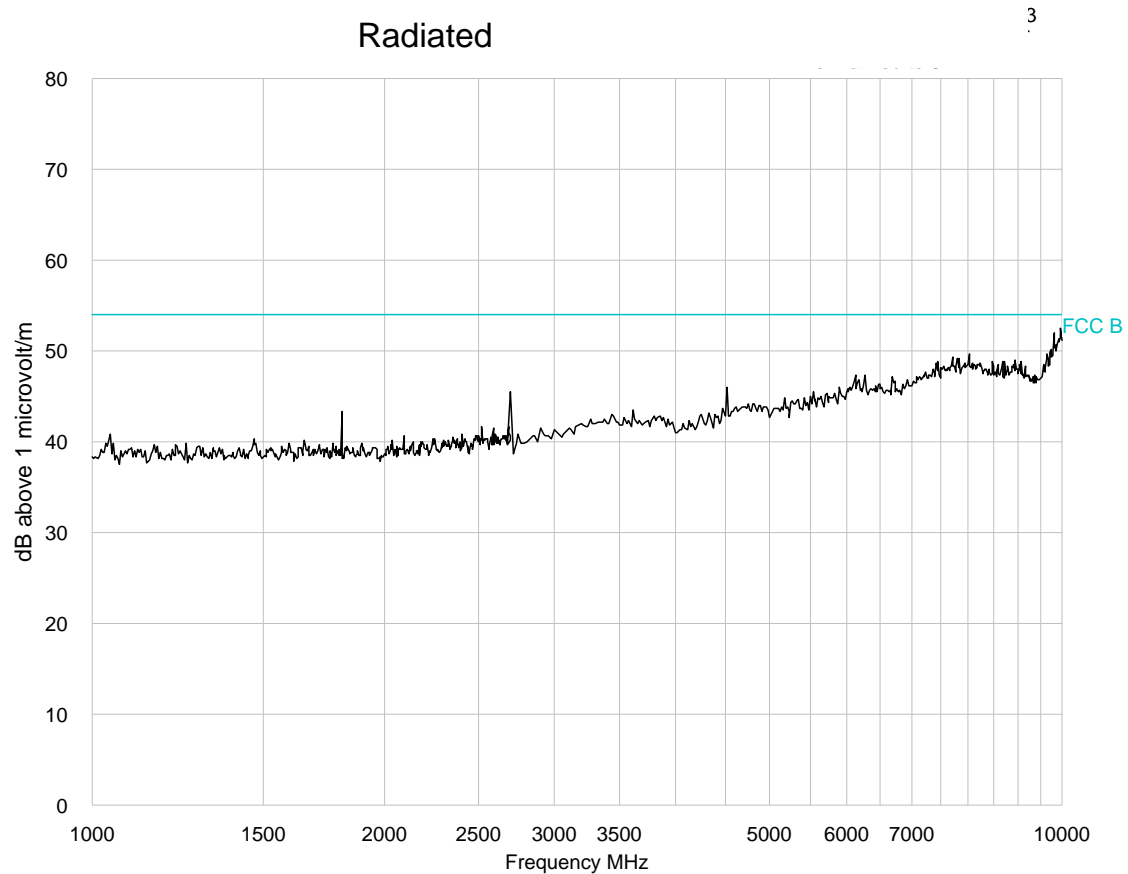
5.1 Transmitter Emission Plot, 30 to 1000 MHz



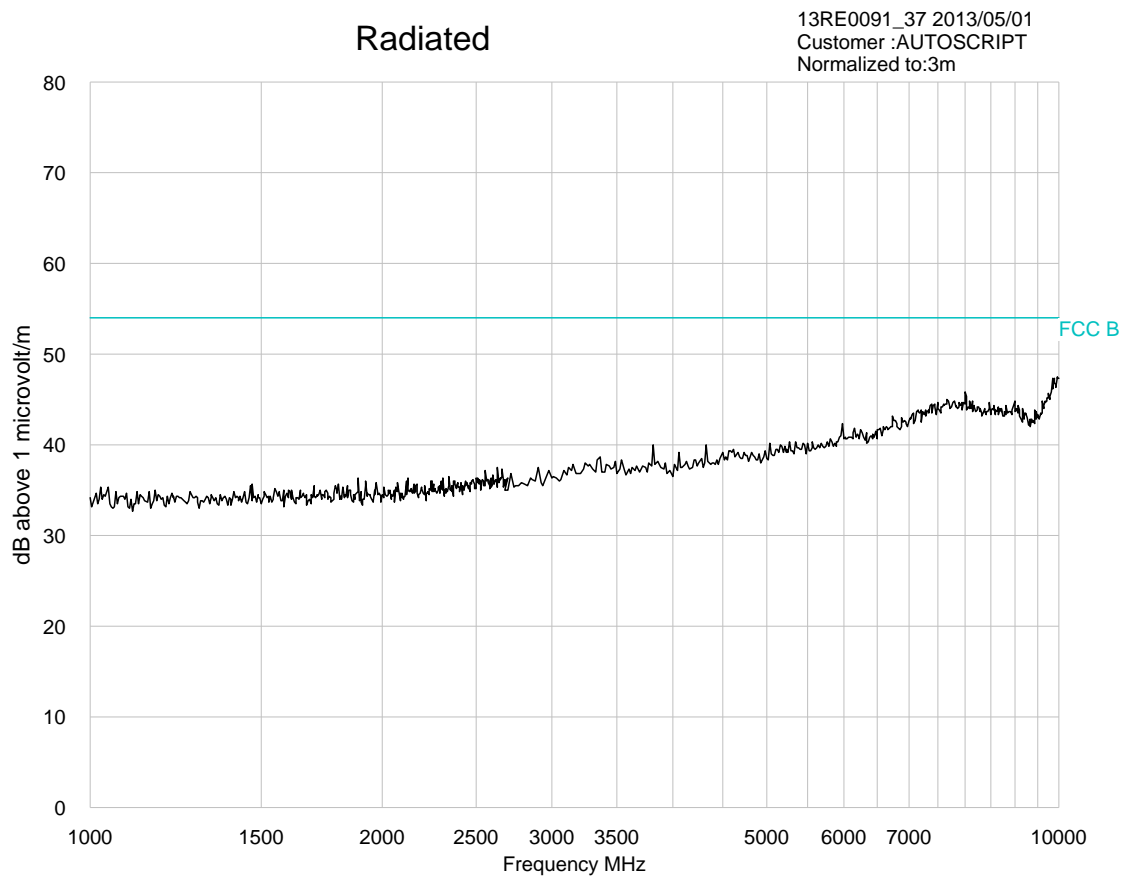
5.2 Transmitter Emissions (Standby) Plot, 30 to 1000 MHz



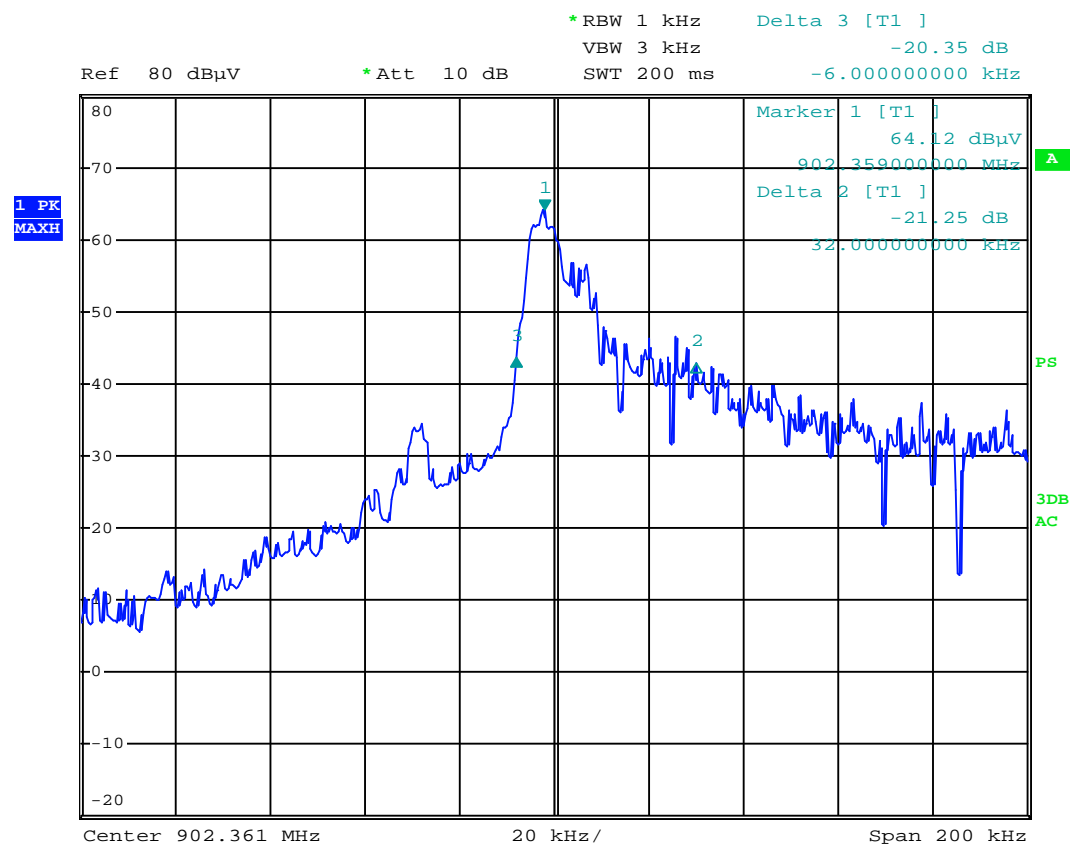
5.3 Transmitter Emissions Plot, 1.0 to 10.0 GHz



5.4 Transmitter Emission (Standby) plot, 1.0 to 10.0 GHz

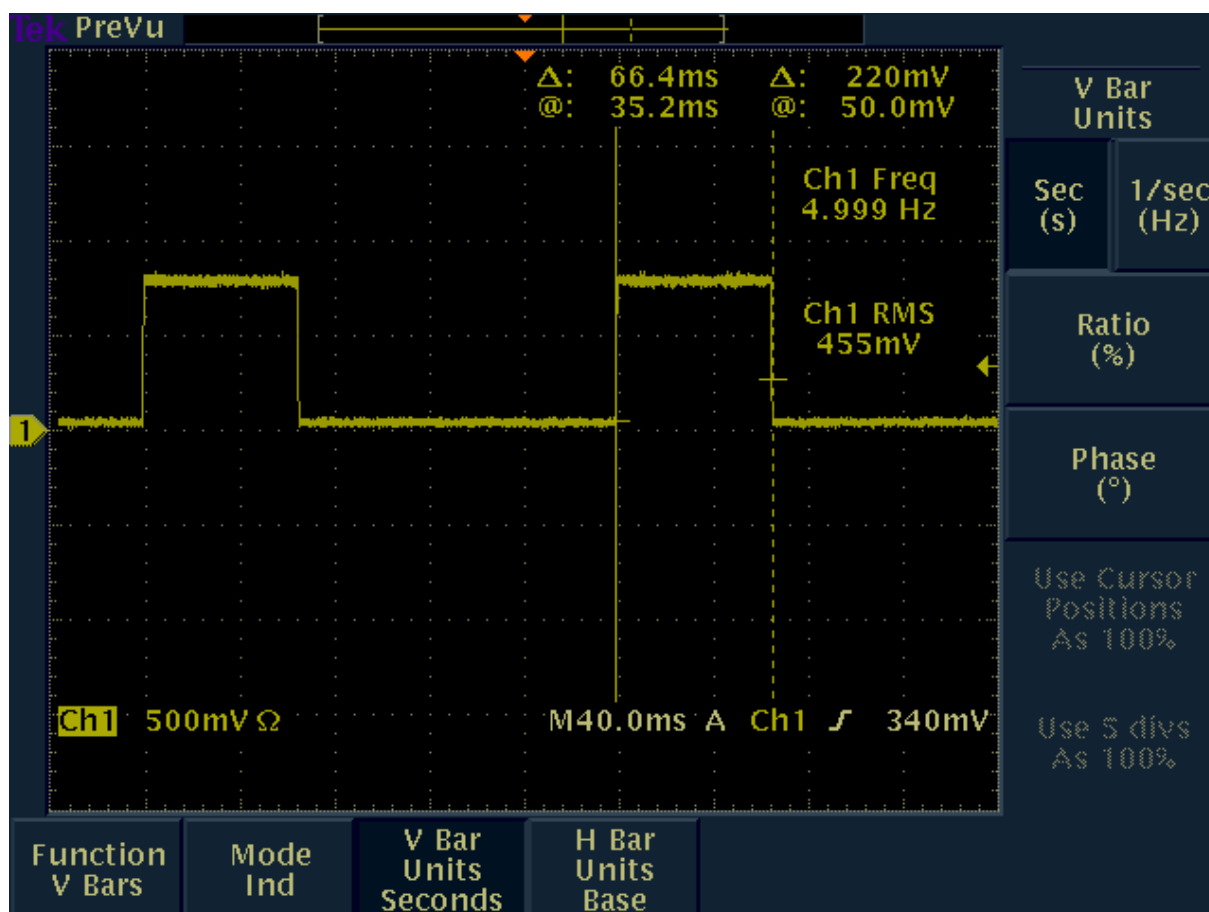


5.5 Bandwidth Plot



Date: 24.APR.2013 00:44:44

5.6 Duty Cycle Plots (ON Time)



6.0 FCC LETTER

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

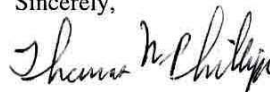
Dear Sir or Madam:

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