

EMC TEST REPORT

COMPANY: CONVERSOR Ltd

**PRODUCT : TESTING TO CFR47 PART 95G
ON A CONVERSOR LTD CONVERSOR
TV PRO LPRS ANSMITTER**

REPORT : EM10047208A

WRITTEN BY: D Forrest _____

REVIEWED BY: D Feasey _____

TEST ENGINEER: D Forrest _____

ISSUE: 2 **DATE: 28th July 2010** **TOTAL PAGES: 20**

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Contents

Page No.

1. TEST SUMMARY	4
1.1. Conversor TV Pro Transmitter.....	4
2. EQUIPMENT UNDER TEST (EUT).....	5
2.1. Description of the EUT.....	5
2.2. EUT's Modes of Operation.....	5
2.3. EUT Configuration Diagram.....	5
2.4. EUT Support Equipment.....	5
2.5. Cables Associated With the EUT.....	5
3. TESTS	6
3.1. Radiated Peak Power	6
3.2. Occupied Bandwidth	7
3.4 Radiated Emissions < 1000MHz	8
Test Procedure.....	8
3.5 Radiated Emissions > 1000MHz	11
3.6 Uncertainty Budget Calculations	15
4 Photographs of test setups	16
5 TEST EQUIPMENT	19
Annex 1	20

TABLES

Table 1: Radiated Emissions below 1GHz.....	9
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GRAPHS

Graph 1 : Radiated Emissions below 1 GHz.....	10
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JOB DESCRIPTION

Equipment: Low Power Radio Service Transmitter operating at 216MHz

Equipment Model No.: Conversor TV Pro

Equipment Serial No.: None

Phase: Compliance

Customer: Conversor Ltd
The Landsbury Estate
102 Guildford Road
Woking
Surrey
GU21 2EP

Test Plan Reference: -

Test Standards: CFR 47 Part 95G

FCC Ident QA6 - CONVERSTV

Test Location: Intertek ETL Semko (Leatherhead)
Unit D
Randalls Way
Leatherhead
Surrey KT22 TS

Test Work Started: 10/06/2010

Test Work Completed: 14/06/2010

1. TEST SUMMARY

1.1. Conversor TV Pro Transmitter

1.1.1. CFR 47 Part 95 : sub part G

TEST STANDARD	TEST	COMMENT
CFR47:Part 2:1046	Radiated Power	Pass
CFR47:Part 2:1049	Occupied Bandwidth	Pass
CFR47:Part 2:1053	Spurious Radiations Note 1	Pass

Note 1: This test was carried out in a FCC registered chamber, which complies with FCC limits for Radiated Emissions over the frequency range 30MHz to 1000MHz.

See Annex 1 for certification number.

1.1.2. CFR 47 Part 15: sub part C (Intentional Radiators)

TEST STANDARD	TEST	COMMENT
CFR47 15: 209	Radiated Emissions (Note 1)	Pass
CFR47 15: 205	Restricted Bands of Operation	Pass

Note 1: This test was carried out in a FCC registered chamber, which complies with FCC limits for Radiated Emissions over the frequency range 30MHz to 1000MHz.

All the above tests have been carried out to meet the requirements of ANSI C63.4:2003 Test procedures.

2. EQUIPMENT UNDER TEST (EUT)

2.1. Description of the EUT

The Conversor Limited “Conversor TV Pro” is a discreet radio transmitter that connects to an audio source and transmits sound to a loop inductor pendant necklace personal hearing aid. The unit can be handheld or placed on a surface near to the sound source.

The transmitter is powered by an internal battery of 3.7vdc and operates in the LPRS 216MHz frequency band with a maximum radiated power limit of 100mWatts.

The EUT was as received with no external visible signs of damage and was of production quality.

2.2. EUT's Modes of Operation

All tests are performed with FM modulation, with a maximum of 1mW radiated power.

Standard test mode waveform profile is FM.

2.3. EUT Configuration Diagram

See test set up photographs.

2.4. EUT Support Equipment

None

2.5. Cables Associated With the EUT

PORT	TYPE	LENGTH (m)	TERMINATION/LOAD
13A Plugtoptransformer	Twin	1.0m	Twin Plug jack.
EUT audio skt(plug jack)	3core	1.0m	plug jack

3. TESTS

3.1. Radiated Peak Power

Test method

The EUT(transmitter) was set up in semi lined anechoic chamber at a test distance of 3m.

The EUT has an integral antenna and is designed to operate at 216.54 MHz and was placed on a non conducting support at a height of 1m. The measuring receiving antenna was traversed from 1 to 4m height whilst the EUT was rotated through 360° to maximise the radiated field level in both vertical and horizontal planes. The maximum level was recorded.

The EUT was replaced with a substitution antenna, which was connected via a coaxial cable to a calibrated signal generator. The signal generator was set to the required frequency and the output level adjusted so as to give the same level as recorded for the EUT radiated power level. The ERP was then calculated as below.

Signal Generator dBm	Cable Loss dB	Antenna Gain dB	Total dBm	Total μWatt	Limit mWatt
-36.5	0.4	3.3	- 32.8	0.54	100

The EUT complies with FCC Part2, subpart J : 2.1046

The antenna gain was calculated as follows: -

$$G_d = 20\text{Log}(f_{\text{MHz}}) - 31.9 - \text{Antenna factor} = 20\text{Log}(216.54) - 31.9 - 11.55 = 3.3\text{dB}$$

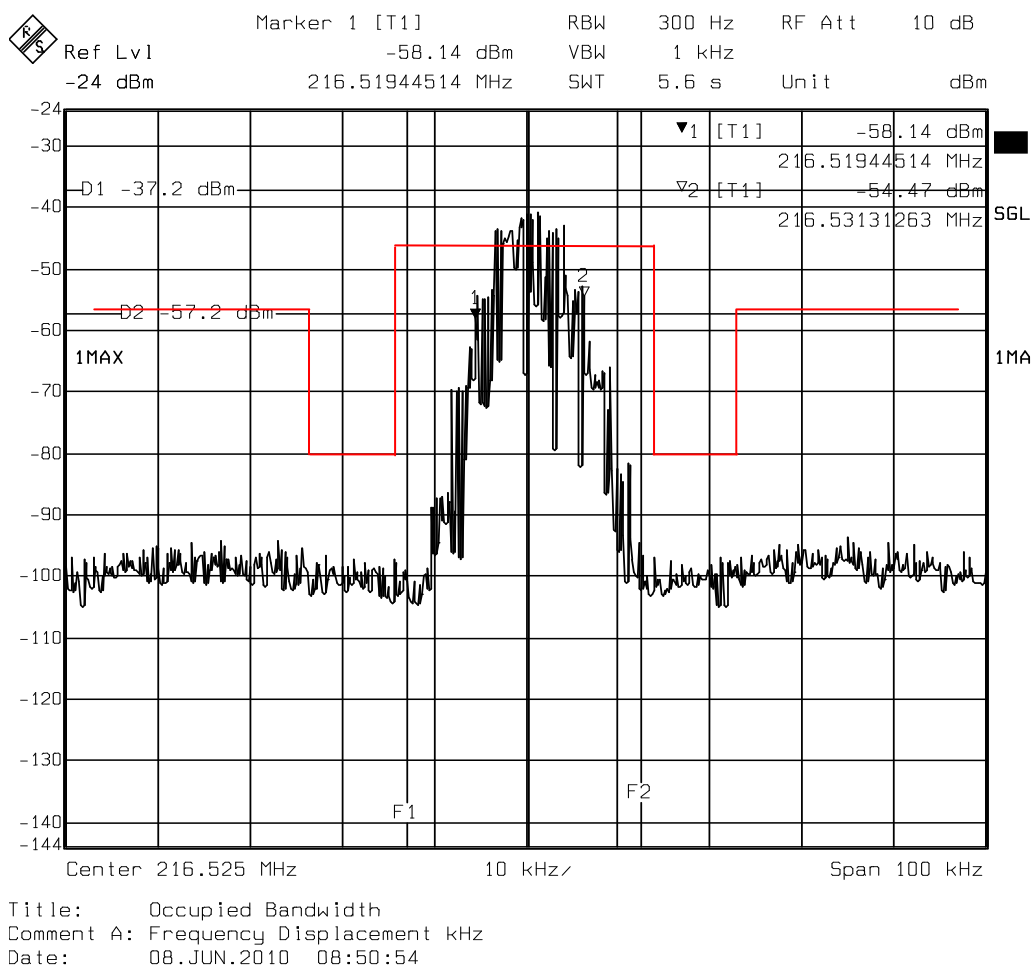
These tests carried out on 10th June 2010

3.2. Occupied Bandwidth

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are equal to 0.5% of the total mean power radiated by a given emission.

This test was carried out with the EUT in an environmental chamber, thus equating the relative peak power to -37.2dBm or 0.54μW actual peak power. With a modulation frequency of 2500Hz it was established that to give 50% modulation a signal level of 25mV was required. The test level being +16dB greater than this requires 160mV signal level. Using a resolution bandwidth of 100kHz, measuring the peak power of the unmodulated carrier giving a reference peak power. Changing the resolution bandwidth to 300Hz, modulate the carrier and measure - 20dBc from the reference level onto the modulated signal plot to give the the lower and upper frequency points.

The plot below shows those points.



$$\text{- 20 dBc bandwidth} = 216.5313\text{MHz} - 216.5194\text{MHz} = 11.9\text{kHz.}$$

Therefore EUT complies with FCC Part 2 Subpart J: 2.1049 and 95.635

3.4 RADIATED EMISSIONS < 1000MHZ

Test Procedure

These tests were carried out using an FCC registered test site at a distance of 3 metres and an automated test system covering the frequency range 30MHz to 1000MHz. Tests were carried out with the transmitter operating at normal output power.

As the spurious emissions levels are less than 64.4dB μ V/m at 3m distance, substitution measurements are not required.

These tests were carried out on the 09th June 2010

Table 1 and Graph 1 show the results for the transmitter operational.

EM09038224

09 Jun 2010 15:01

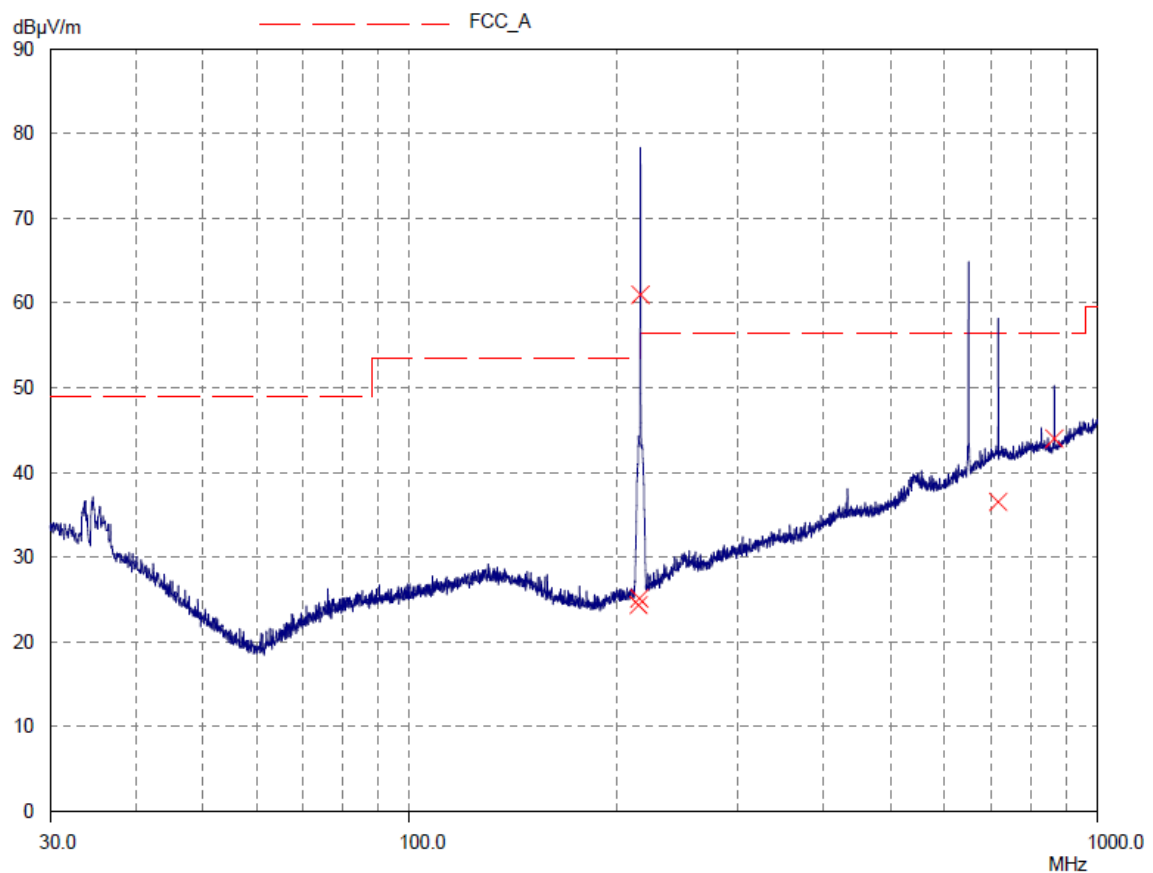
Radiated Emissions

EUT: TV Pro
Manuf: Conversor Ltd.
Op Cond: Tx/Rx
Operator: Danny Forrest
Test Spec: FCC Part 95 (15.209)
Comment: Horizontal and Vertical
Full 360 and height maximisation
Result File: 47208r.dat : Conversor Pro Rad Emissions

Scan Settings			Receiver Settings						
(1 Range)									
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
30MHz	1000MHz	60kHz	120kHz	PK	20msec	Auto	ON	60dB	

See following page for transducer set listing.

Final Measurement: Detector: X QP
Meas Time: 2sec
Peaks: 16
Acc Margin: 10 dB



Graph 1

EM09038224

09 Jun 2010 15:01

Radiated Emissions

EUT: TV Pro
Manuf: Conversor Ltd.
Op Cond: Tx/Rx
Operator: Danny Forrest
Test Spec: FCC Part 95 (15.209)
Comment: Horizontal and Vertical
Full 360 and height maximisation
Result File: 47208r.dat : Conversor Pro Rad Emissions

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	60kHz	120kHz	PK	20msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	17	30MHz	1000MHz	7602
	18	30MHz	1000MHz	8183
	19	30MHz	1000MHz	7743
	21	30MHz	1000MHz	7287
	22	30MHz	1000MHz	7840

Final Measurement: Detector: X QP
Meas Time: 2sec
Peaks: 16
Acc Margin: 10 dB

Final Measurement Results

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB
215.1	24.35	53.50	29.15
215.7	25.13	53.50	28.37
216.54	60.99*	56.40	-4.59
717.3	36.53	56.40	19.87
866.1	44.00	56.40	12.40

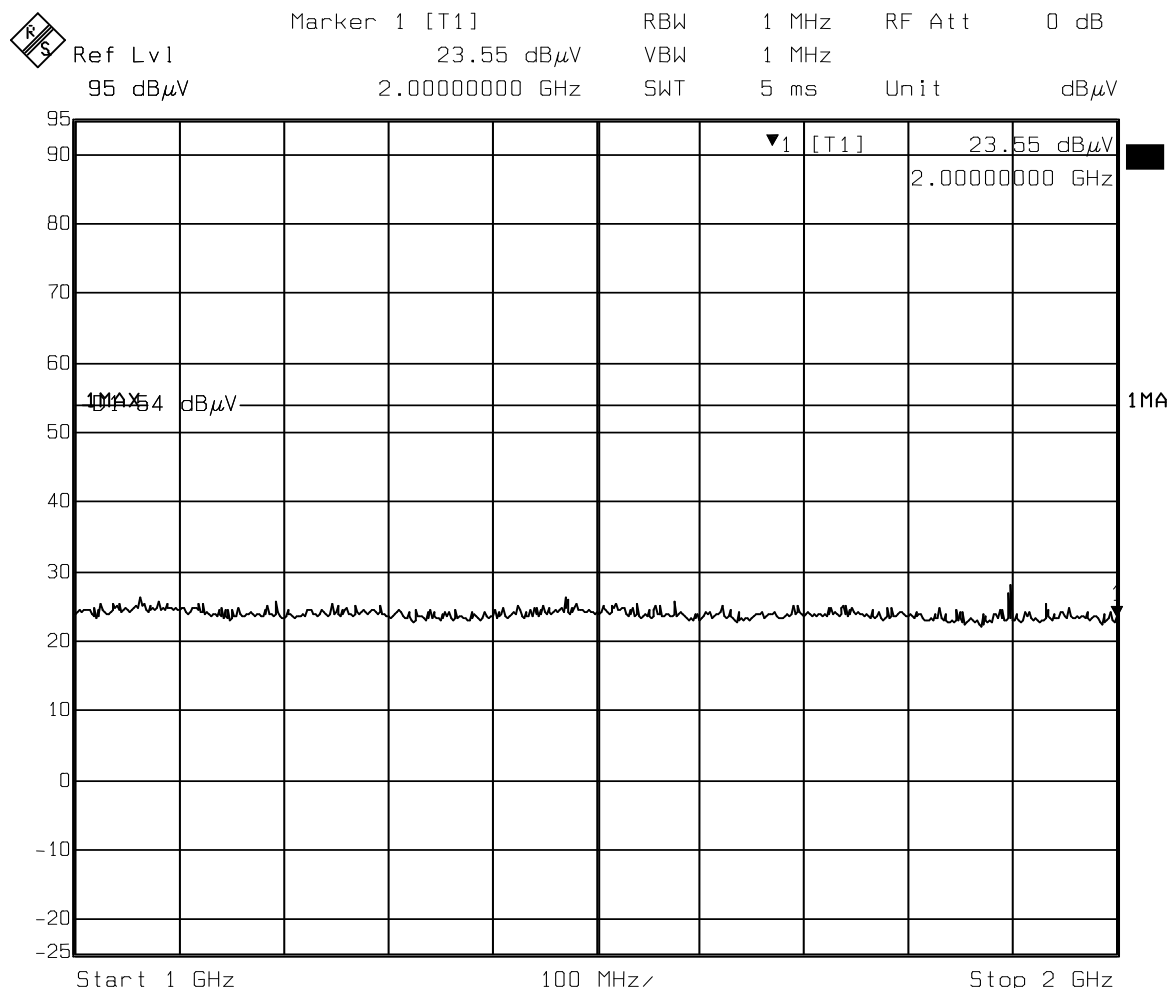
Table 1

3.5 Radiated Emissions > 1000MHz

The testing was performed as required by CFR47 Part 95 in a FCC registered test site. Testing was carried out at a distance of 3 metres with the appropriate antenna's connected to a pre amplifier and spectrum analyser situated outside the test chamber. The transducer factors for the Antenna, cables and preamplifier are automatically calculated into the test results and the results are presented with data corrected.

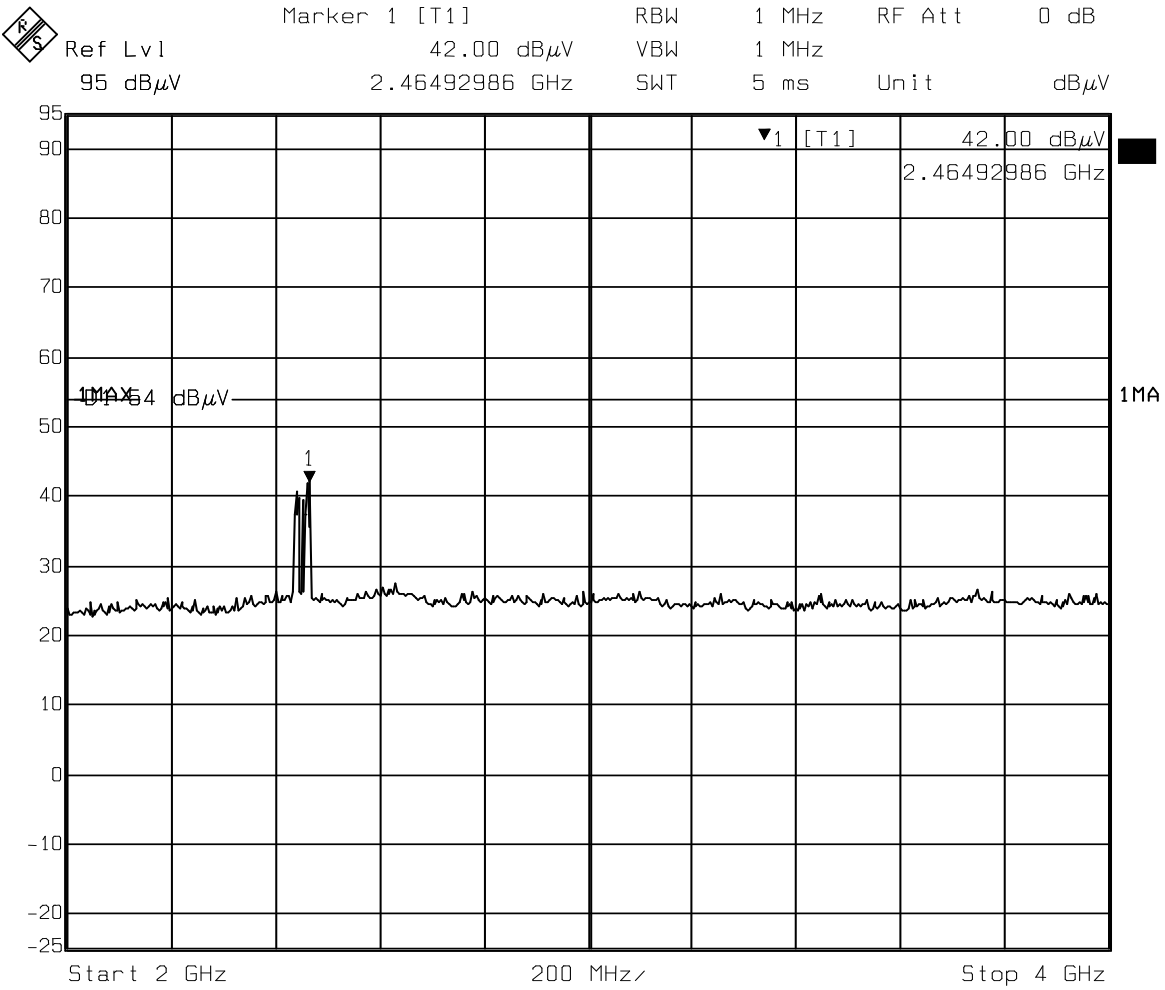
As the spurious emissions levels are less than 64.4dB μ V/m at 3m distance, substitution measurements are not required.

The following plots shows the results upto 4.0GHz in both horizontal and vertical polarisations.



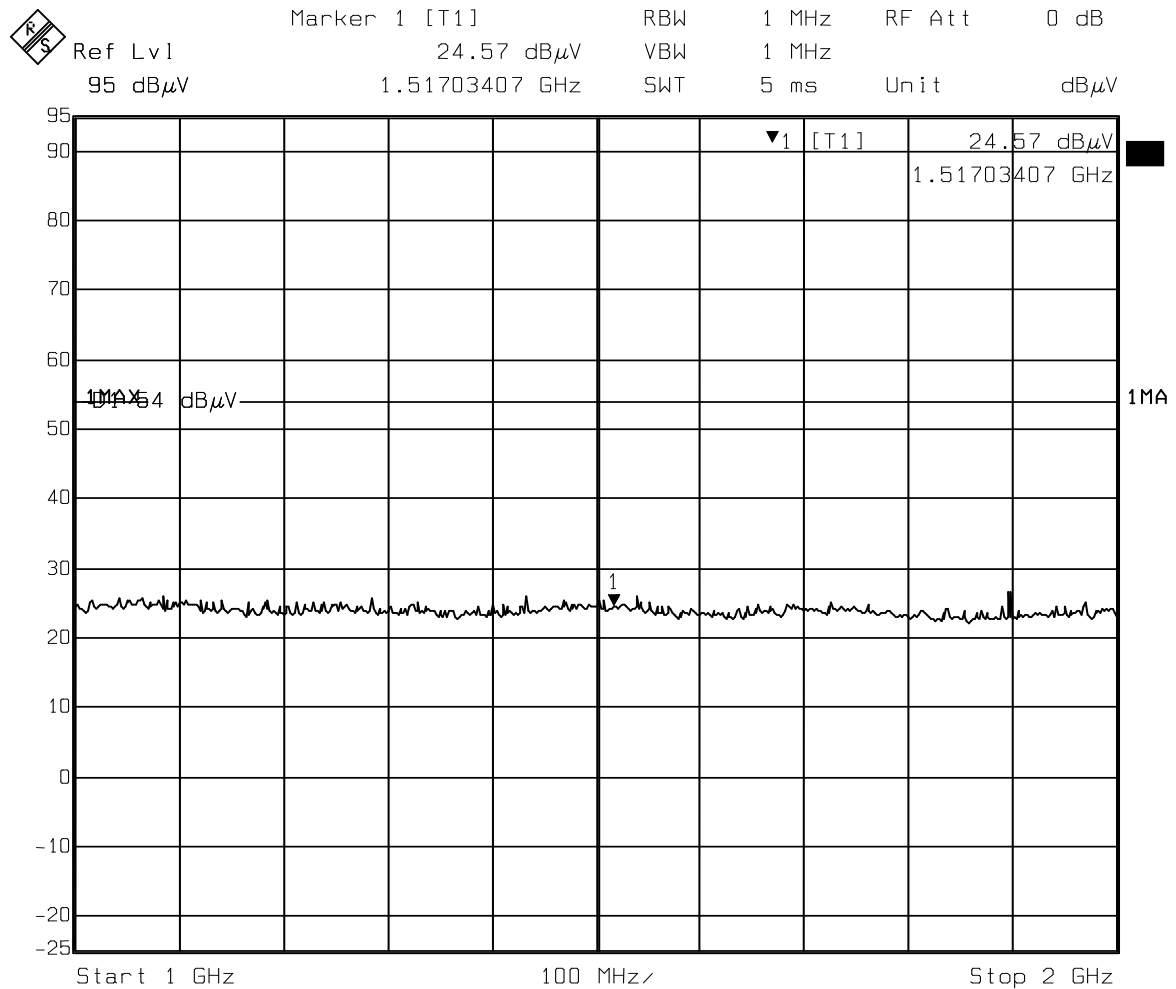
Title: Radiated Emissions
Comment A: 1 to 2 GHz
Date: 09.JUN.2010 13:46:07

Horizontal Polarisation



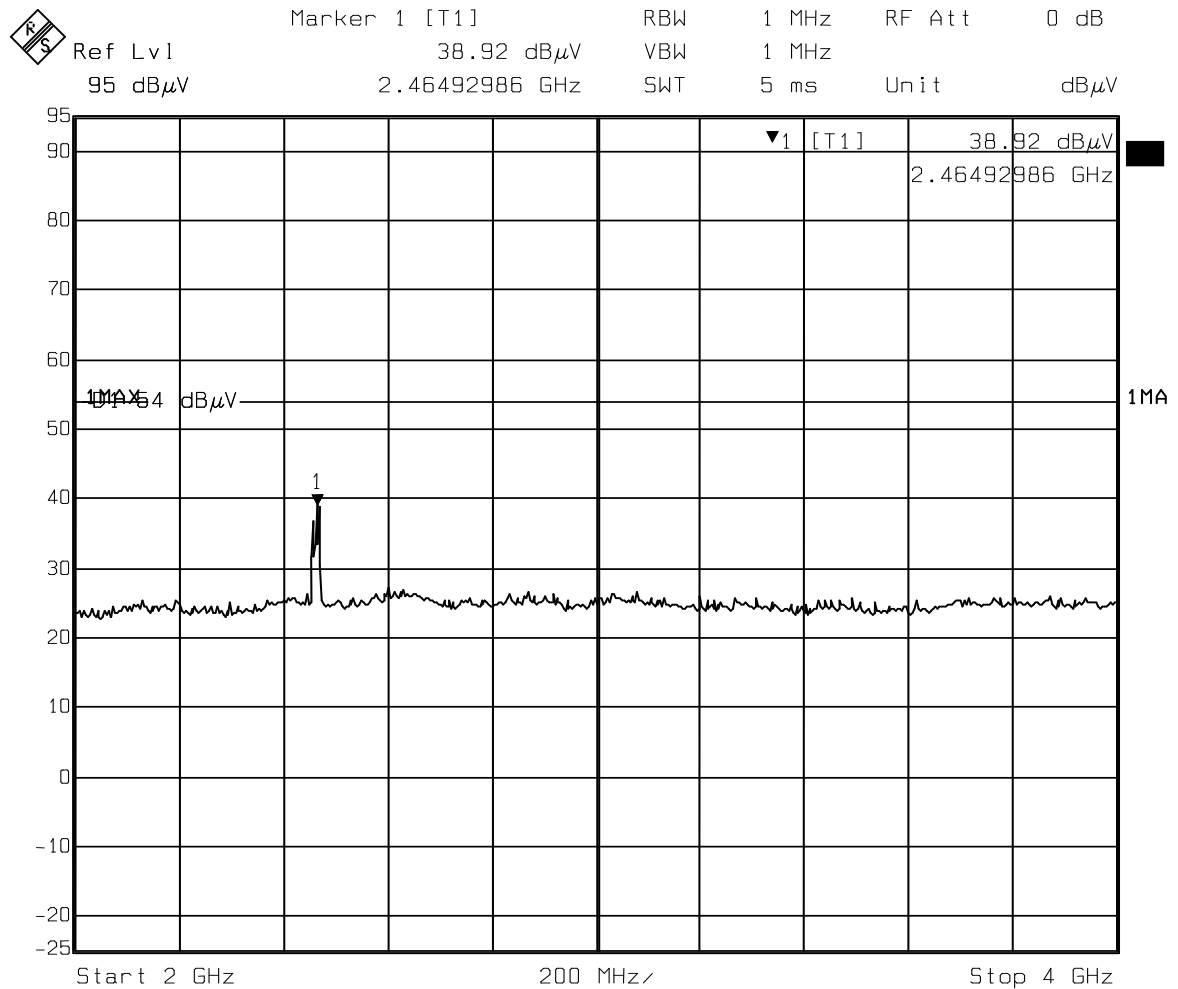
Title: Radiated Emissions
Comment A: 2 to 4 GHz
Date: 09.JUN.2010 13:44:25

Horizontal Polarisation



Title: Radiated Emissions
Comment A: 1 to 2 GHz
Date: 09.JUN.2010 13:40:22

Vertical Polarisation



Title: Radiated Emissions
Comment A: 2 to 4 GHz
Date: 09.JUN.2010 13:42:22

Vertical Polarisation

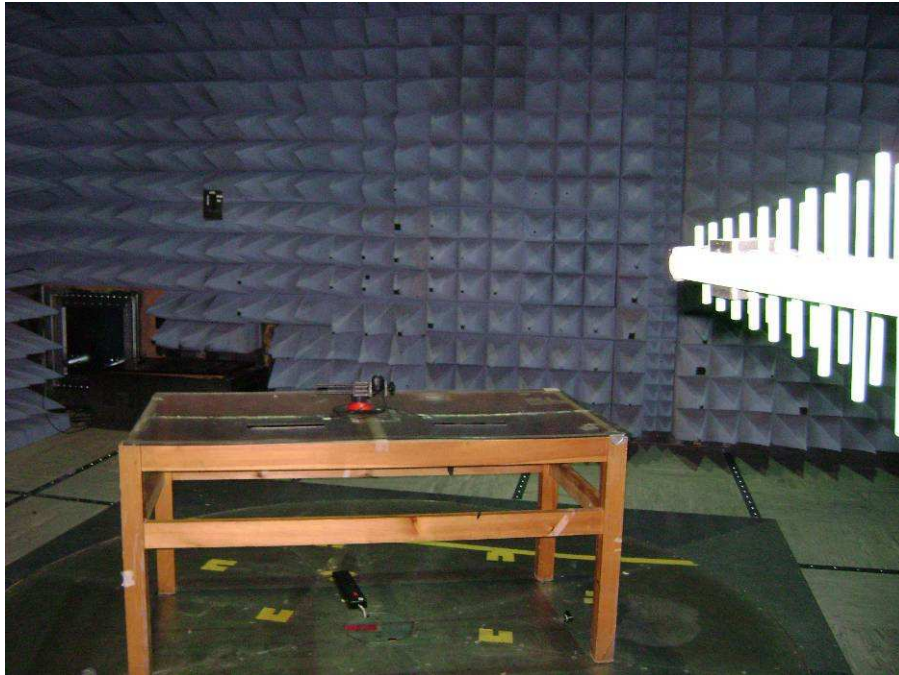
The EUT complied with FCC Part 2: Subpart J: 2.1053

These tests carried out on the 09 June 2010

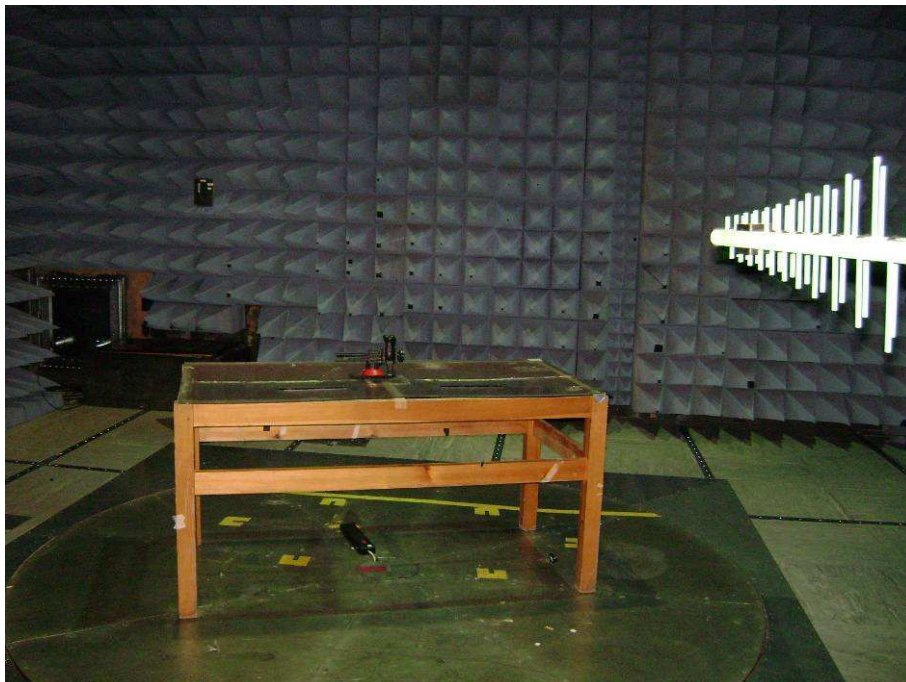
3.6 Uncertainty Budget Calculations

Symbol	Source of Uncertainty	Value	Probability distribution	Divisor	c_i	$u_i(y)$	$(u_i(y))^2$	v_i or v_{eff}	$u_i^4(y)$
RI	Receiver Indication	0.05	normal 2	2.000	1	0.03	0.001	∞	0
dV_{sw}	Receiver Sine Wave	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dV_{pa}	Receiver Pulse Amplitude	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dV_{pr}	Receiver Pulse repetition	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dV_{nf}	Noise Floor Proximity	1.60	normal 2	2.000	1	0.80	0.640	∞	0
AF	Antenna Factor Calibration	1.20	normal 2	2.000	1	0.60	0.360	∞	0
CL	Cable Loss	0.50	normal 2	2.000	1	0.25	0.063	∞	0
AD	Antenna Directivity	3.00	rectangular	1.732	1	1.73	3.000	∞	0
AH	Antenna Factor Height Dependence	1.00	rectangular	1.732	1	0.58	0.333	∞	0
AP	Antenna Phase Centre Variation	0.50	rectangular	1.732	1	0.29	0.083	∞	0
AI	Antenna Factor Frequency Interpolation	0.68	rectangular	1.732	1	0.39	0.154	∞	0
SI	Site Imperfections	4.00	triangular	2.449	1	1.63	2.667	∞	0
DV	Measurement Distance Variation	0.60	rectangular	1.732	1	0.35	0.120	∞	0
F_{step}	Frequency step error	0.00	rectangular	1.732	1	0.00	0.000	∞	0
M	Mismatch	-1.99	U-shaped	1.414	1	-1.41	1.990	∞	0
	Receiver VRC	0.216	-						0
	Antenna +Cable VRC	0.95	-						0
R_s	Measurement System Repeatability	0.96	normal 1	1.000	1	0.96	0.922	13	0.0 653 343 51
R_{EUT}	Repeatability of EUT	0.00	normal 1	1.000	1	0.00	0.000		0
$u_c(F_s)$	Combined Standard Uncertainty		normal			3.50	12.25 2	229 8	0.0 653 343 51
$U(F_s)$	Expanded Uncertainty		normal k=	1.64		5.7		229 8	

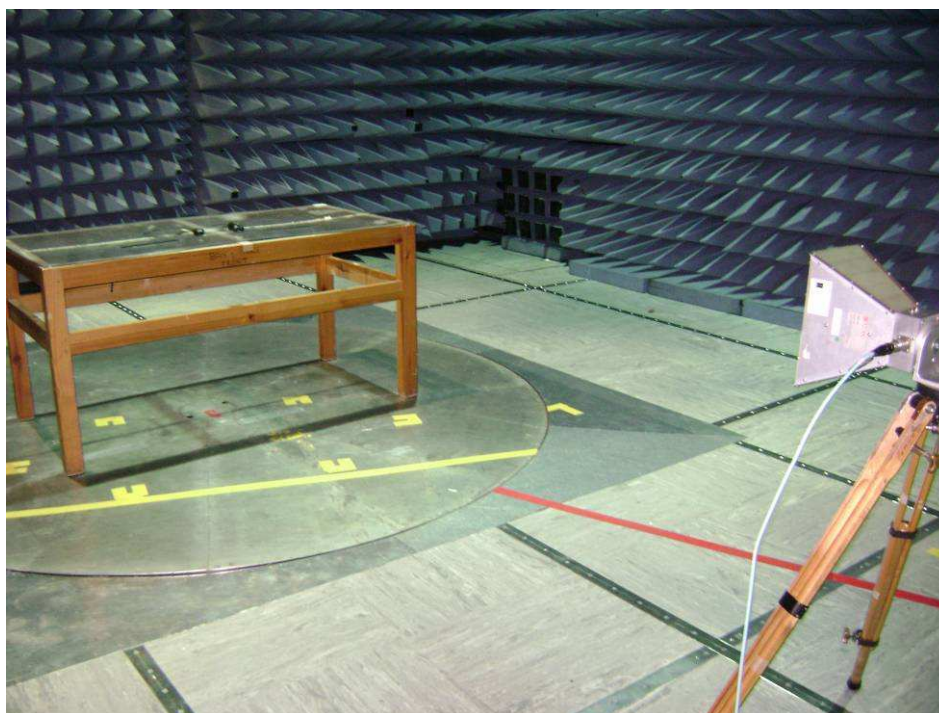
4 PHOTOGRAPHS OF TEST SETUPS



Receiver radiated emissions below 1GHz



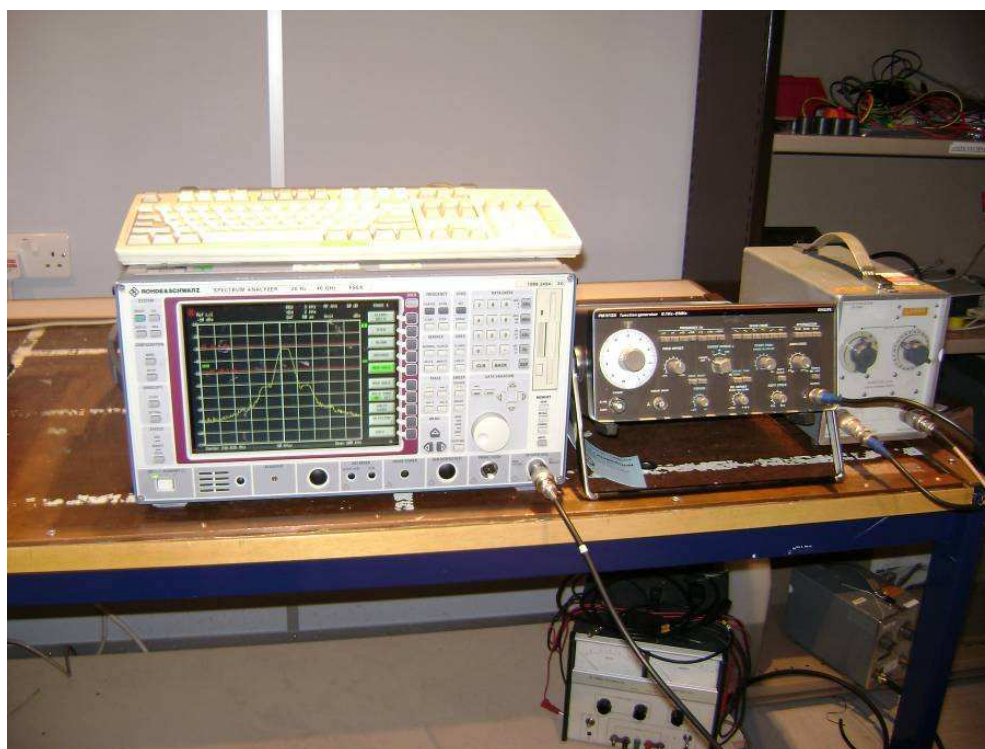
Transmitter radiated emissions below 1GHz



Radiated Emissions above 1GHz



Environmental Chamber



Occupied Bandwidth

5 TEST EQUIPMENT

Equipment	Type	ID
Test Bay 1	Environment	7400
Chase Bilog	Antenna	7485
Emco 3115 Horn	Antenna	7512
Rohde & Schwarz	Antenna	7520
Rohde & Schwarz FSEK	Spectrum Analyser	8267
Rohde & Schwarz CMTA 54	Communications Analyser	7771
Rohde & Schwarz ESVS10	Receiver	7462
Phillips PM5132	Function Generator	8005
ERA Microwave Pre-amp	WBA3-4	7534
Apel Ringway chamber	Environmental	7782
Digitron	Digital Thermocouple	7510
Fluke 79	Digital voltmeter	7854
Hewlett Packard	Step Attenuator	7950
Oregon Scientific	Environmental Sensor	7439
Cable N Type	10m	7063
Cable N Type	4m	7968
Cable N Type	1m	8185
Cable N Type	1m	8186
Cable microwave	5m	8247
Cable microwave	4m	7177
Cable microwave	2m	8185

All test equipment used was within its calibration period.

ANNEX 1

FCC Registration Certificate

FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046

March 27, 2009

Registration Number: 737726

Intertek
Unit D,
Imperial Park,
Leatherhead, KT22 7TS
United Kingdom

Attention: David Feasey

Re: Measurement facility located at Leatherhead, United Kingdom

Date of Listing: March 27, 2009

Dear Sir or Madam:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years. Please also note that this registration does not recognize the measurement facility to perform testing for products authorized under the Declaration of Conformity (DoC) process. In order to test products subject to DoC authorization process, a measurement facility must be accredited and recognized by the FCC.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,



Katie Hawkins
Electronics Engineer