Intertek House, Cleeve Road
Leatherhead, Surrey
KT22 7SB, United Kingdom

Telephone: +44 1372 370900
Facsimile: +44 1372 370999
www.uk.intertek-etlsemko.com

EMC TEST REPORT

COMPANY: ELTAV WIRELESS MONITORING Ltd

PRODUCT : TESTING TO CFR47 PART15:247 and RSS210 ISSUE 8 ON A ELTAV WIRELESS VDA4 VALVE MONITORING SYSTEM

REPORT : EM09039849a

WRITTEN BY:	**D Legge**	
REVIEWED BY:	**D Forrest**	
TEST ENGINEER:	**D Legge**	
ISSUE: 4	**DATE: 26th April 2011**	**TOTAL PAGES: 46**

Contents Page No.

JOB DESCRIPTION 4

1. TEST SUMMARY 5
   1.1. Eltav wireless valve monitor system 5

2. EQUIPMENT UNDER TEST (EUT) 6
   2.1. Description of the EUT 6
   2.2. EUT's Modes of Operation 6
   2.3. EUT Configuration Diagram 6
   2.4. EUT Support Equipment 6
   2.5. Cables Associated With the EUT 6

3. TESTS 7
   3.1. Transmitter Output Power (Conducted) 7
   3.2. Radiated Peak Powers: CFR47 Part 15:247b(3) 7
   3.3. Band Edge Compliance 10
   3.4. -6dB Bandwidth (Part15:247(a)(2) 12
   3.5. Occupied Bandwidth (99%) Channel 18 (2.44GHz) 13

4. Radiated Emissions < 1000MHz 15
   4.1. Test Procedure 15
   4.2 Radiated Emissions > 1000MHz 22

5. Radiated Emissions CFR47 Part15:205 32
   5.1. Test Procedure – Restricted Bands 32
   5.2. Plots of Restricted Bands 33

6. CONDUCTED EMISSIONS CFR 47 pART15:247(2b) 42

7. Photographs of test setup 43

8. TEST EQUIPMENT 44

ANNEX A REGISTRATION SITES 45

TABLES

Table 1 Transmitting at 2.405GHz Data Stream 15
Table 2 Transmitting at 2.440GHz Data Stream 17
Table 3 Transmitting at 2.480GHz Data Stream 19
Table 4 Radiated Emission plots > 1000MHz 21

GRAPHS

Graph 1 Transmitting at 2.405GHz Data Stream 16
Graph 2 Transmitting at 2.440GHz Data Stream 18
Graph 3 Transmitting at 2.480GHz Data Stream 20

JOB DESCRIPTION

Equipment:	Wireless valve monitoring transmitter system operating in the frequency band 2.4 – 2.483GHz
Equipment Model No.:	VDA4
Equipment Serial No.:	None
Phase:	Compliance
Customer:	Eltav Wireless monitoring Ltd 15 Hatassia St Ranana 43654 Israel
Test Plan Reference:	-
Test Standards:	CFR 47 Part 15:247, RSS 210 Issue 8
FCC : Ident	X2VVDA1114
IC: Ident	8876A-VDA0001X
Test Location:	Intertek ETL Semko (Leatherhead) Unit D Randalls Way Leatherhead Surrey KT22 7SB
Test Work Started:	27/10/2009
Test Work Completed:	18 February 2011

1. TEST SUMMARY

1.1. Eltav wireless valve monitor system

1.1.1. CFR 47 Part 15:247 and RSS210 Issue 8 Dec 2010

TEST STANDARD	TEST	COMMENT
CFR47:Part15:247(a)(2)	- 6dB Band width	Pass
CFR47:Part15:247.3	Maximum radiated power	Pass
CFR47:Part15:247.4.d	Band Edge compliance	Pass
CFR47:Part15:247.4.d	100 kHz out of band emissions	Pass
CFR47:Part15:247.4.d	Restricted Band Emissions	Pass
CFR47:Part15:247.4.e	Power Spectral Density	Pass
RSS 210: A8.4.4	Maximum radiated Power	Pass
RSS 210: A8.5	100kHz out of band emissions	Pass
RSS 210:2.2	Restricted Band Emissions	Pass
RSS 210:A8.2(a)	-6dB Bandwidth	Pass
RSS 210:A8.2(b)	Power spectral Density	Pass
RSS – Gen: 4.6.1	Occupied Bandwidth	Pass

1.1.2. CFR 47 Part 15 and RSS 210 Issue 8

TEST STANDARD	TEST	COMMENT
CFR47 15: 209	Radiated Emissions (Note 1)	Pass
CFR47 15: 205	Restricted Bands of Operation	Pass
RSS 210:2.2	Restricted Bands of Operation	Pass
RSS 210.2.5	Radiated Emissions(note1)	Pass

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

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 Eltav Valve Device (VD) is the basic component of the Eltav Wireless Monitoring System. It is installed on top of the monitored valve or actuator and consists of a stem attached mechanically to the valve or actuator axle and is powered by two internal batteries to give 3.6vdc.

The VD incorporates the means and sensors to measure the angle which corresponds to the opening status of the valve (in degrees or opening percentage). The valve status is transmitted by an internal Bi-directional transceiver that is based on the standard Zigbee protocol. A dedicated Low Frequency receiver, in the VD supports unique maintenance and provisioning procedures and local status information is provided by visual indicators (LEDS).

The VDA4 sample tested was a modified sample which was powered by an external 3.6vdc source, and channel switching was actuated by a switch mounted on the sample.
All tests were performed at the following frequencies unless stated otherwise.

2.405GHz, 2.44GHz, 2.48GHz

2.2. EUT's Modes of Operation

Testing was performed whilst transmitting Stream Data using Direct Sequence Spread Spectrum (DSSS) signals, with Offset Quadrature Phase Shift Keying (OQPSK) modulation. The VD does not have a receive facility.

2.3. EUT Configuration Diagram

See test set up photographs.

2.4. EUT Support Equipment

None

2.5. Cables Associated With the EUT

None

3. TESTS

3.1. Transmitter Output Power (Conducted)

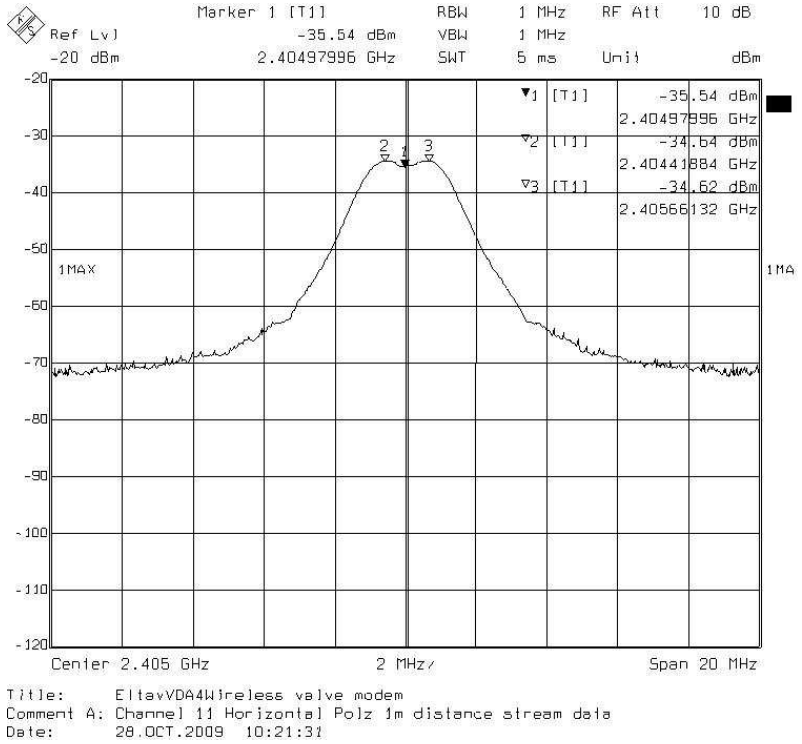
There is no external antenna connector.CFR47 Part 15:247b(3)

3.2. Radiated Peak Powers: CFR47 Part 15:247b(3)

These tests were carried out in a fully lined Anechoic chamber at a distance of one metre, using a double ridge horn antenna and micro wave cables. The radiated test signals were of stream data mode. Before formal testing commenced investigation showed that the higher field levels were in the horizontal plane.The following plots show uncorrected data with actual powers calculated below.

These tests were carried out on the 28th October 2009.

3.2.1 Stream data



Calculation for Radiated Field at 1m distance =

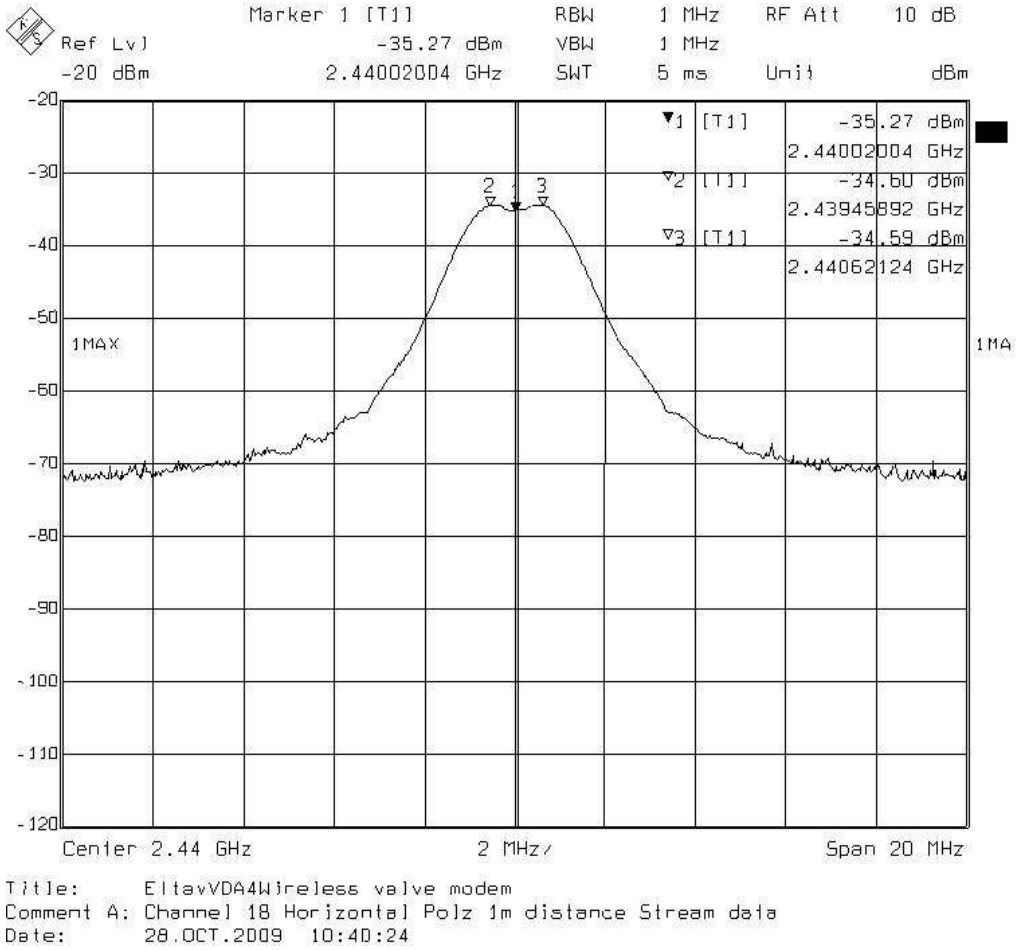
Set rdg dbm + AFdB + Cables dB – DCF = EIRPdBm

-34.64 + 107 + 28.8 + 2.4 – 106.1 = - 2.54dBm = 557µW

Peak Output Power = $P = \frac{(ed)^2}{30G} = \frac{(0.16x1)^2}{30x\ 1.64} = \frac{0.0256}{49.2} = 0.00052W$

Power Spectral Density $= P_d = \frac{P_t}{4\pi d^2} = \frac{0.000557}{12.566} = 0.000044W$

2.405GHz



Calculation for Radiated Field at 1m distance =

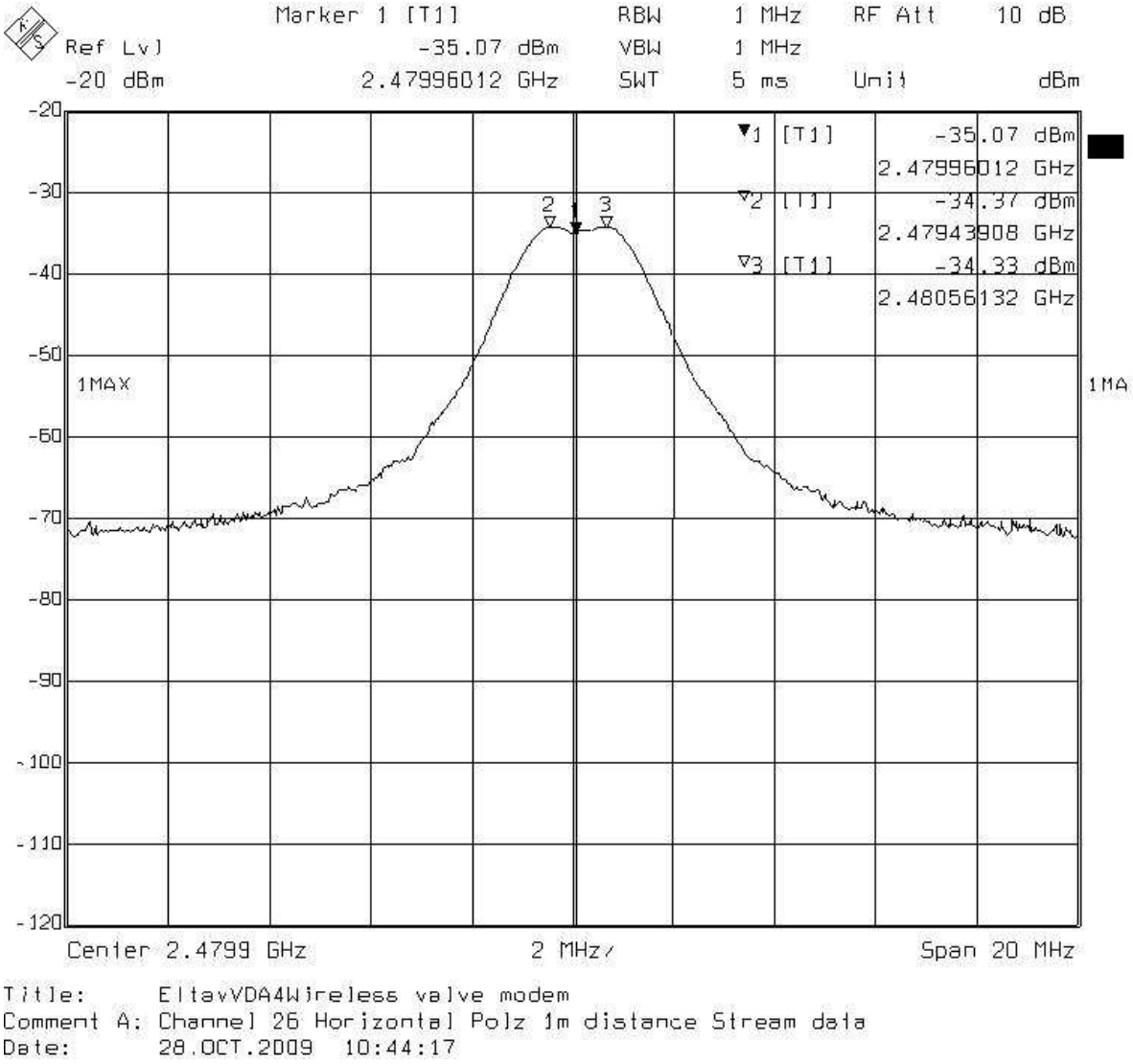
Set rdg dbm + AFdB + Cables dB – DCF = EIRPdBm

-34.6 + 107 + 28.8 + 2.4 – 106.1 = - 2.5dBm = 562µW

Peak Output Power = $P = \frac{(ed)^2}{30G} = \frac{(0.16x1)^2}{30x\ 1.64} = \frac{0.0256}{49.2} = 0.00052W$

Power Spectral Density $= P_d = \frac{P_t}{4\pi d^2} = \frac{0.000557}{12.566} = 0.000044W$

2.44GHz



Calculation for Radiated Field at 1m distance =

Set rdg dbm + AFdB + Cables dB – DCF = EIRPdBm

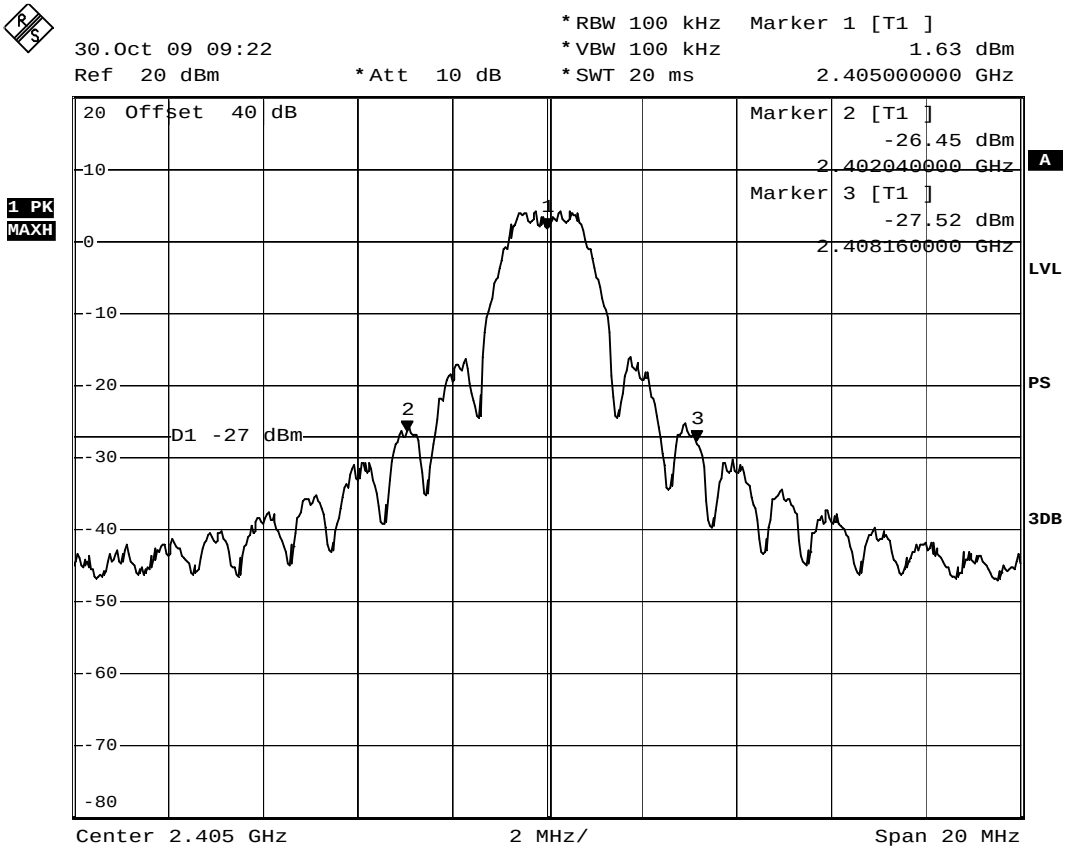
-34.37 + 107 + 28.8 + 2.4 – 106.1 = - 2.27dBm = 592µW

Peak Output Power = $P = \frac{(ed)^2}{30G} = \frac{(0.16x1)^2}{30x\ 1.64} = \frac{0.0256}{49.2} = 0.00052W$

Power Spectral Density $= P_d = \frac{P_t}{4\pi d^2} = \frac{0.000557}{12.566} = 0.000044W$

2.48GHz

3.3. Band Edge Compliance

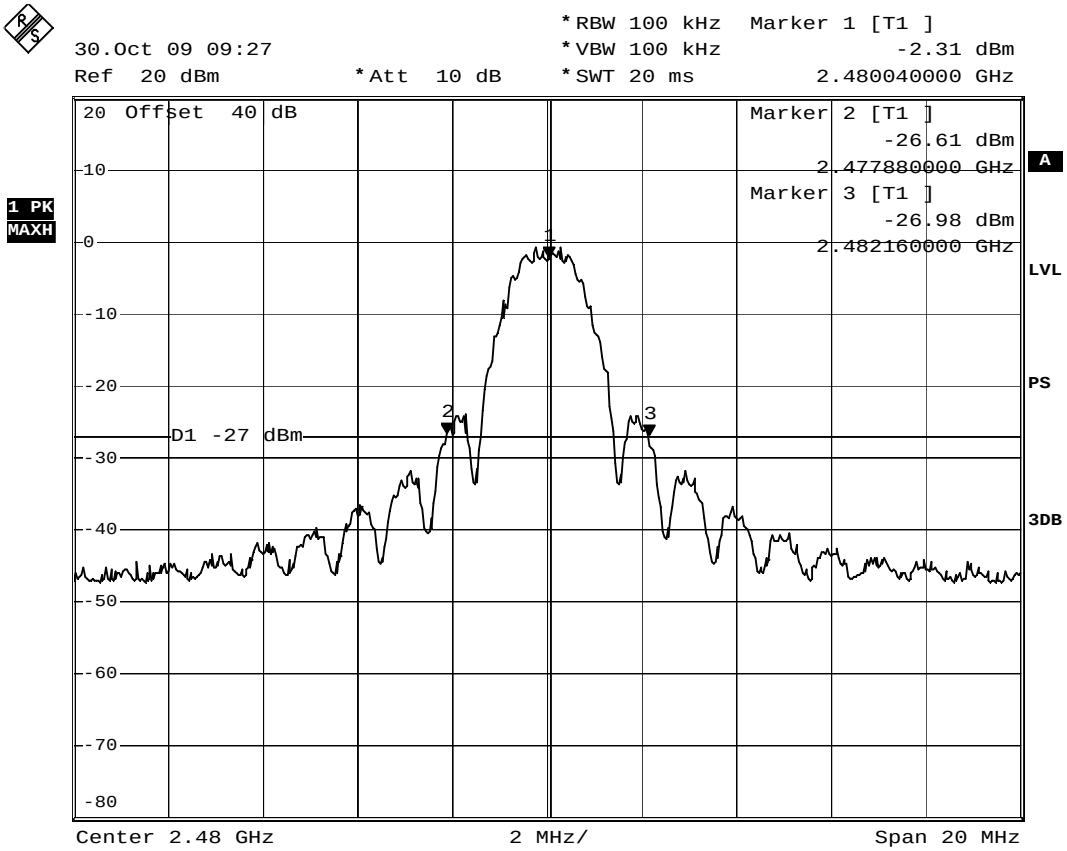


Env chamber \11 ambient 21deg 3.6vdc

Date: 30.OCT.2009 09:22:05

Lower Band Edge frequency = 2.402GHz

Channel 11 - 2.405GHz



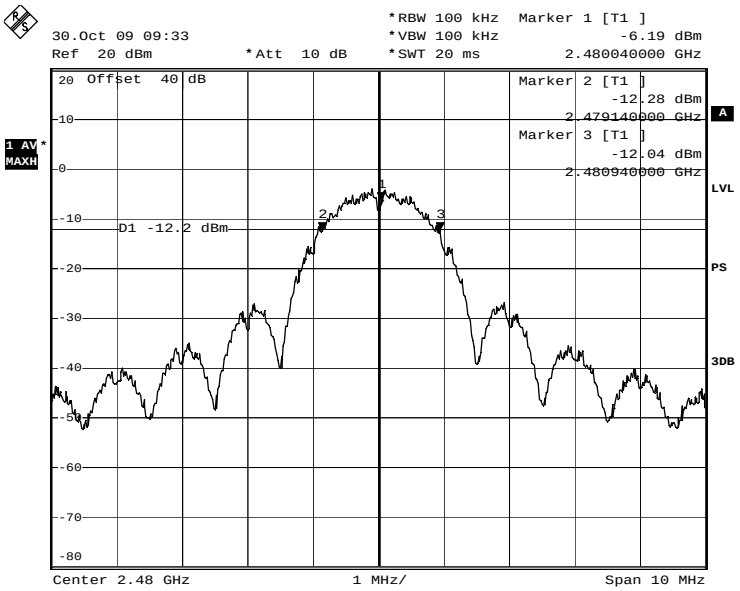
Env chamber \26 ambient 21deg 3.6vdc

Date: 30.OCT.2009 09:27:08

Upper band edge Frequency = 2.482GHz

Channel 26 – 2.48GHz

3.4. -6dB Bandwidth (Part15:247(a)(2)

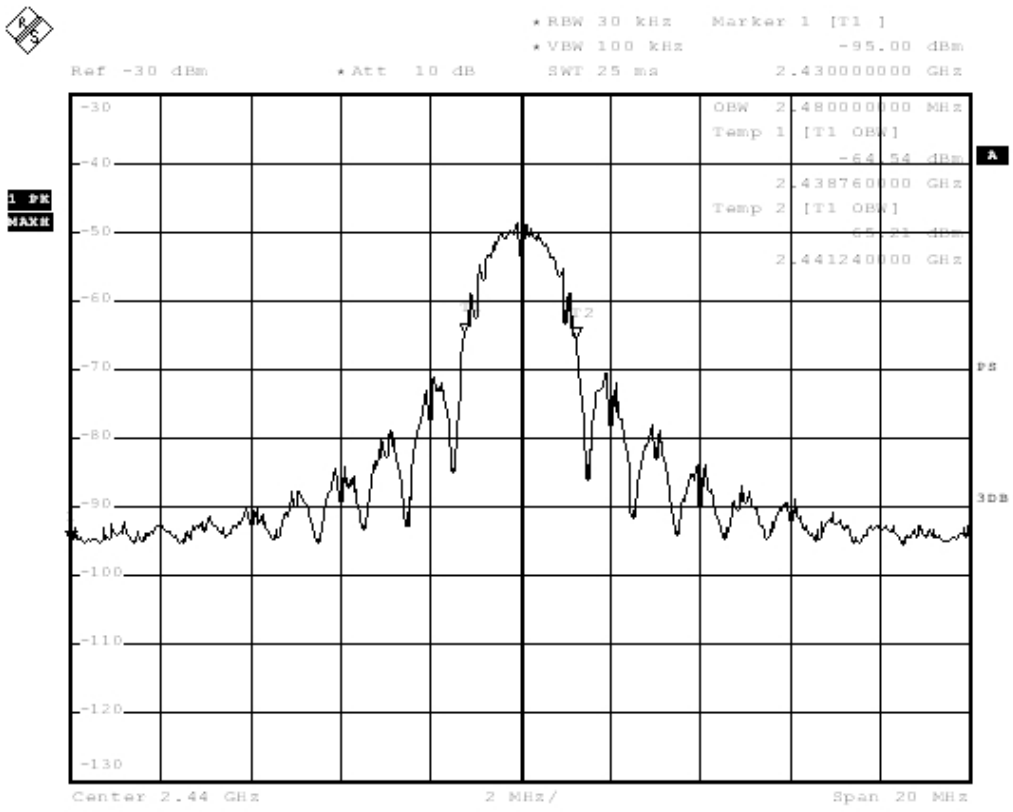


Env chamber \26 ambient 21deg 3.6vdc (IC-6dB B/W Av)

Date: 30.OCT.2009 09:33:19

-6dB bandwidth = Upper 2.480904GHz - Lower 2.479140GHz = 1.764MHz

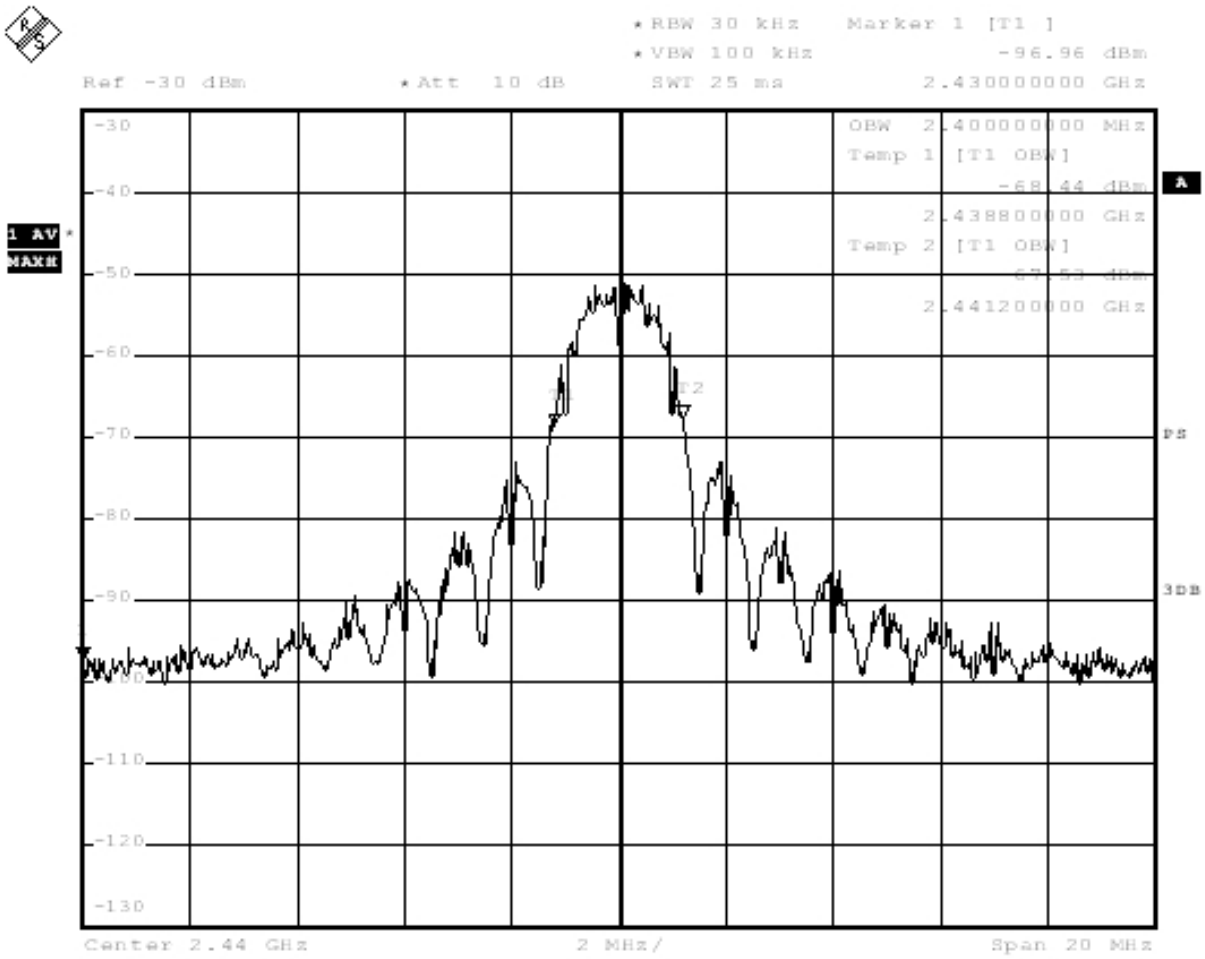
3.5. Occupied Bandwidth (99%) Channel 18 (2.44GHz)



Eltav VDA Occupied bandwidth ch 18 Pk

Date: 18.FEB.2011 12:06:21

Occupied Band Peak Bandwidth = 2.43MHz



Eltav VDA Occupied bandwidth ch 18 Av

Date: 18.FEB.2011 12:07:22

Occupied Bandwidth Average = 2.43GHz

4. RADIATED EMISSIONS < 1000MHZ

4.1. 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.

Table 1 and Graph 1 shows the results for the Eltav wireless valve monitoring system transmitting at 2.405GHz Data Stream mode.

Table 2 and Graph 2 shows the results for the Eltav wireless valve monitoring system transmitting at 2.44GHz in Data Stream mode.

Table 3 and Graph 3 shows the results for the Eltav wireless valve monitoring system transmitting at 2.48GHz in Data Stream mode.

Table 1 Channel 11 - Data Stream

EM09049849 22 Oct 2009 10:

Radiated Emissions

EUT:	WIRELESS VALVE MONITORING SYSTEM
Manuf:	Eltav Wireless Monitoring Limited
Op Cond:	VDA4 Transmitting
Operator:	D A Legge
Test Spec:	CFR47:Part15:209
Comment:	Vertical & Horz - 3m Distance
	Channel 11 - Stream Data
Result File:	9849e.dat : Eltav wireless - CH11 - Stream Data

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	8164

Final Measurement:		
	Detector:	X QP
	Meas Time:	2sec
	Subranges:	50
	Acc Margin:	10 dB

Final Measurement Results

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB
143.04	19.29	43.50	24.21
401.58	31.12	46.00	14.88
427.8	36.34	46.00	9.66
455.64	31.76	46.00	14.24
495.84	32.81	46.00	13.19
521.7	33.91	46.00	12.09
559.68	34.86	46.00	11.14
600.36	34.81	46.00	11.19
645.12	35.48	46.00	10.52
704.22	37.20	46.00	8.80
746.28	38.45	46.00	7.55
761.22	38.56	46.00	7.44
862.74	39.99	46.00	6.01
926.04	40.35	46.00	5.65
940.62	39.99	46.00	6.01

Graph 1

EM09049849 22 Oct 2009 10:44

Radiated Emissions

EUT:	WIRELESS VALVE MONITORING SYSTEM
Manuf:	Eltav Wireless Monitoring Limited
Op Cond:	VDA4 Transmitting
Operator:	D A Legge
Test Spec:	CFR47:Part15:209
Comment:	Vertical & Horz - 3m Distance
	Channel 11 - Stream Data
Result File:	9849e.dat : Eltav wireless - CH11 - Stream Data

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

See following page for transducer set listing.

Final Measurement:	Detector:	X QP
	Meas Time:	2sec
	Subranges:	50
	Acc Margin:	10 dB

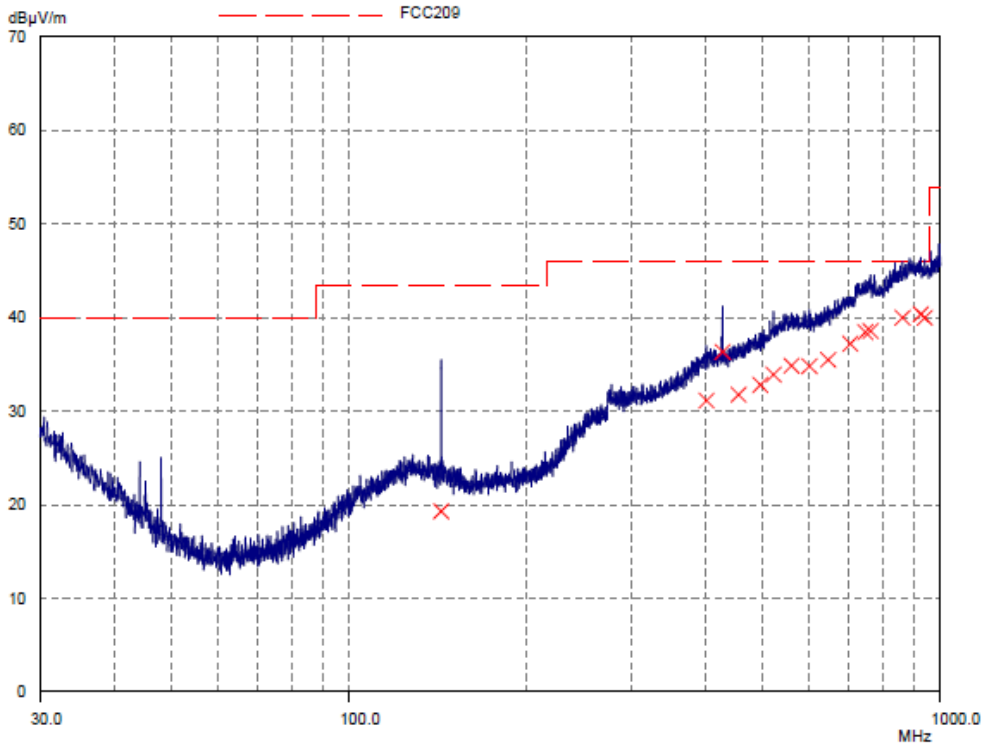


Table 2 Channel 18 - Data Stream

EM09049849 22 Oct 2009 11

Radiated Emissions

EUT:	WIRELESS VALVE MONITORING SYSTEM
Manuf:	Eltav Wireless Monitoring Limited
Op Cond:	VDA4 Transmitting
Operator:	D A Legge
Test Spec:	CFR47:Part15:209
Comment:	Vertical & Horz - 3m Distance
	Channel 18 - Stream Data
Result File:	9849f.dat : Eltav wireless - CH18 - Stream Data

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	8164

Final Measurement:		
	Detector:	X QP
	Meas Time:	2sec
	Subranges:	50
	Acc Margin:	10 dB

Final Measurement Results

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB
373.86	29.63	46.00	16.37
396.06	31.08	46.00	14.92
427.8	37.11	46.00	8.89
457.98	31.97	46.00	14.03
493.38	33.13	46.00	12.87
528.9	34.31	46.00	11.69
539.1	34.77	46.00	11.23
592.8	35.26	46.00	10.74
653.94	35.76	46.00	10.24
699.48	37.18	46.00	8.82
742.02	38.54	46.00	7.46
757.56	38.69	46.00	7.31
862.62	40.13	46.00	5.87
915.06	40.55	46.00	5.45
957.06	40.33	46.00	5.67

Graph 2

EM09049849 22 Oct 2009 11:

Radiated Emissions

EUT:	WIRELESS VALVE MONITORING SYSTEM
Manuf:	Eltav Wireless Monitoring Limited
Op Cond:	VDA4 Transmitting
Operator:	D A Legge
Test Spec:	CFR47:Part15:209
Comment:	Vertical & Horz - 3m Distance
	Channel 18 - Stream Data
Result File:	9849f.dat : Eltav wireless - CH18 - Stream Data

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

See following page for transducer set listing.

Final Measurement:		
	Detector:	X QP
	Meas Time:	2sec
	Subranges:	50
	Acc Margin:	10 dB

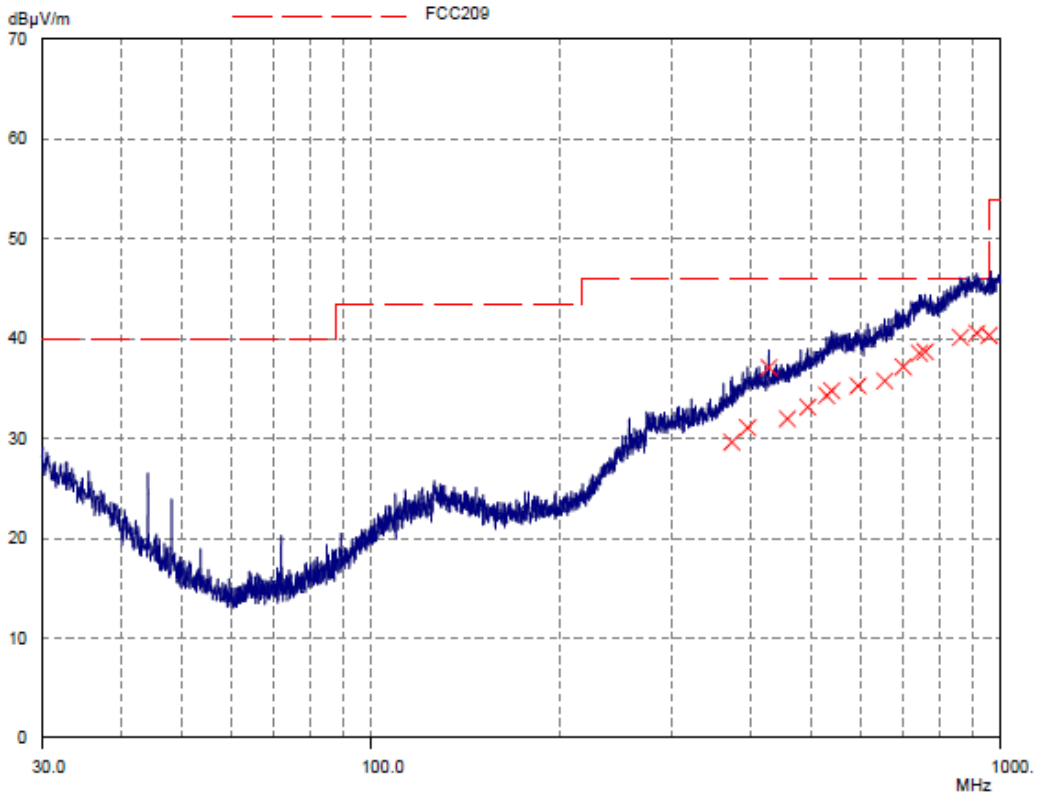


Table 3 Channel 26 - Data Stream

EM09049849 22 Oct 2009 12:0

Radiated Emissions

EUT:	WIRELESS VALVE MONITORING SYSTEM
Manuf:	Eltav Wireless Monitoring Limited
Op Cond:	VDA4 Transmitting
Operator:	D A Legge
Test Spec:	CFR47:Part15:209
Comment:	Vertical & Horz - 3m Distance
	Channel 26 - Stream Data
Result File:	9849g.dat : Eltav wireless - CH26 - Stream Data

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	8164

Final Measurement:		
	Detector:	X QP
	Meas Time:	2sec
	Subranges:	50
	Acc Margin:	10 dB

Final Measurement Results

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB
370.74	29.49	46.00	16.51
393.84	31.00	46.00	15.00
427.8	32.41	46.00	13.59
433.62	31.39	46.00	14.61
474.48	32.48	46.00	13.52
523.32	34.07	46.00	11.93
541.38	34.82	46.00	11.18
594.54	35.26	46.00	10.74
652.14	35.77	46.00	10.23
701.22	37.29	46.00	8.71
738.6	38.60	46.00	7.40
763.2	38.61	46.00	7.39
859.08	40.05	46.00	5.95
908.88	40.59	46.00	5.41
935.46	40.35	46.00	5.65

Graph 3

EM09049849 22 Oct 2009 12:05

Radiated Emissions

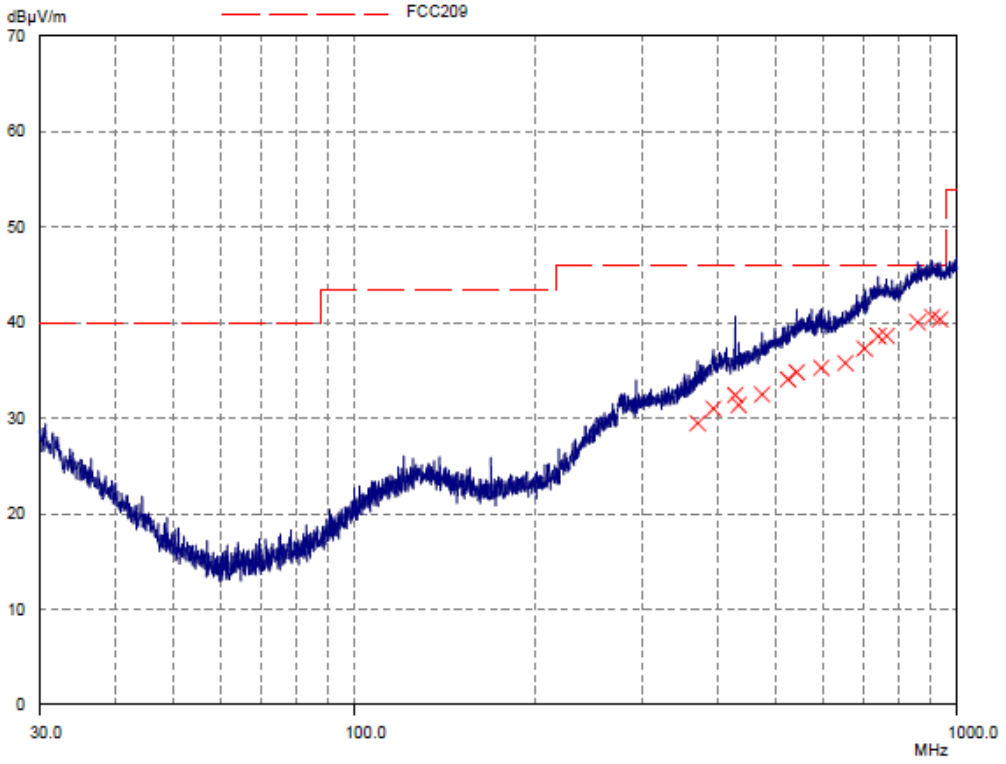
EUT:	WIRELESS VALVE MONITORING SYSTEM
Manuf:	Eltav Wireless Monitoring Limited
Op Cond:	VDA4 Transmitting
Operator:	D A Legge
Test Spec:	CFR47:Part15:209
Comment:	Vertical & Horz - 3m Distance
	Channel 26 - Stream Data
Result File:	9849g.dat : Eltav wireless - CH26 - Stream Data

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

See following page for transducer set listing.

Final Measurement:	Detector:	X QP
	Meas Time:	2sec
	Subranges:	50
	Acc Margin:	10 dB



4.2 Radiated Emissions > 1000MHz

The testing was performed as required by CFR47 Part15:247(d) in a FCC registered test site. Testing was carried out at a distance of 1 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.

The Eltav wireless valve monitoring system transmitter was tuned to a frequency of 2.406GHz and the frequency was scanned over the frequency range of 1GHz to 24.5GHz. Any frequencies with amplitudes above the measuring system noise were recorded. These measurements were carried out with a Resolution Bandwidth of 100kHz using an average detector. This procedure was then carried out at 2.44GHz and 2.477GHz. All tests were carried out on stream data test signals.

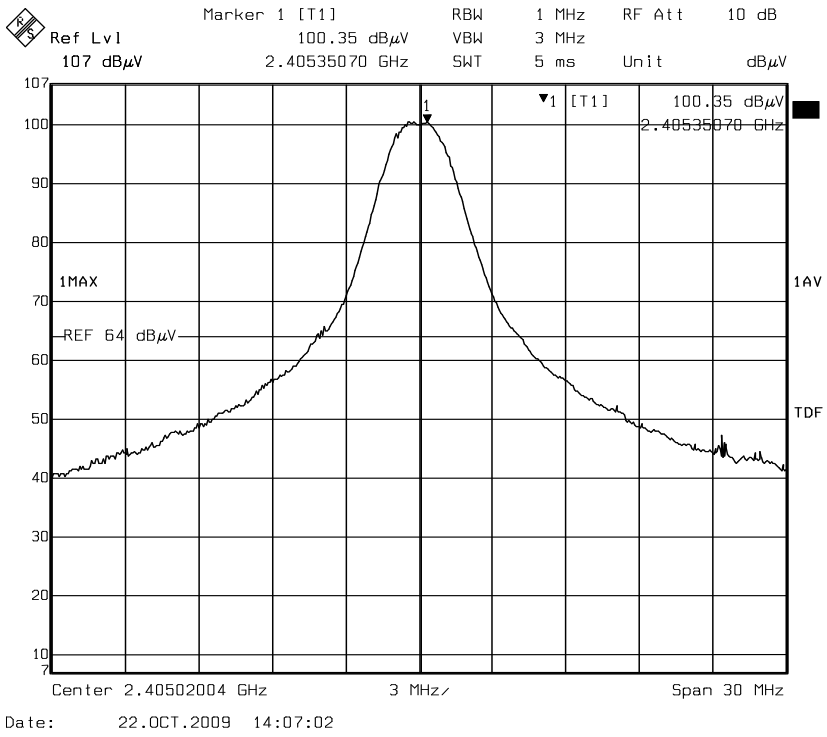
All frequencies with amplitudes recorded were found to be more than 30 dB below the intentional frequency amplitude levels.

Table 4 gives the page numbers for the plots for the three test frequencies.

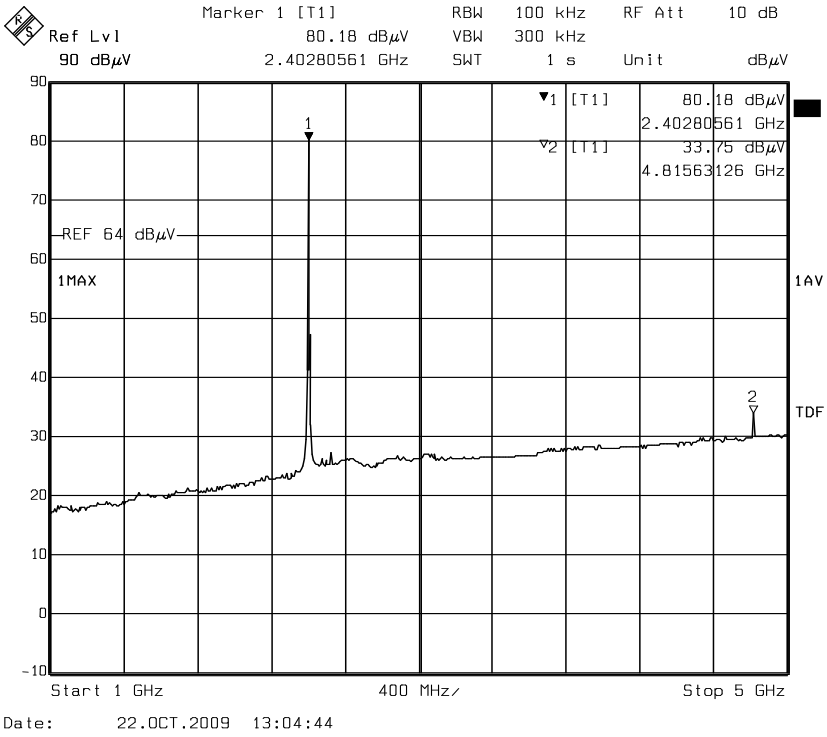
Table 4

Frequency MHz	Page numbers
2.406	23 - 25
2.44	26 - 28
2.47	29 - 31

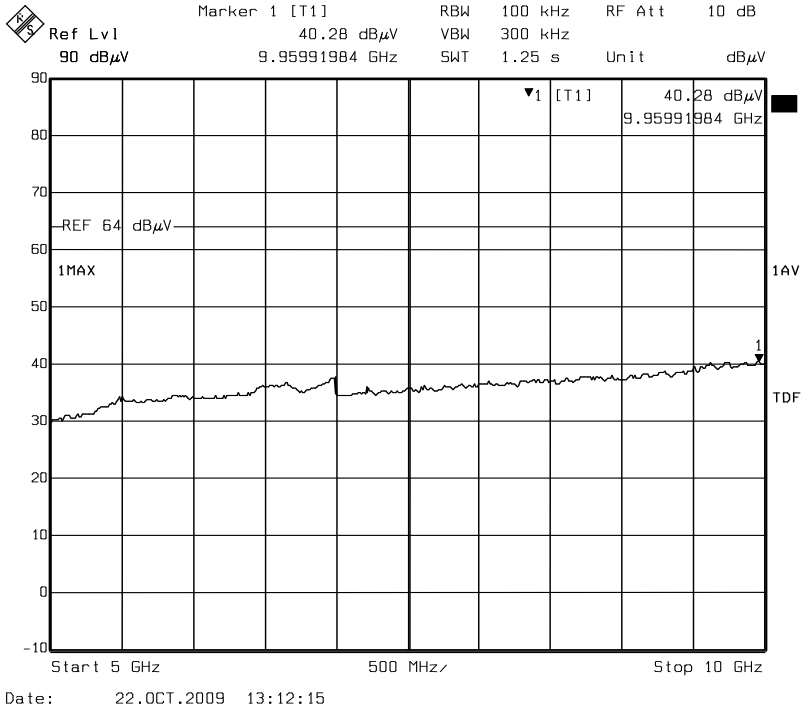
2.405GHz – Data Stream



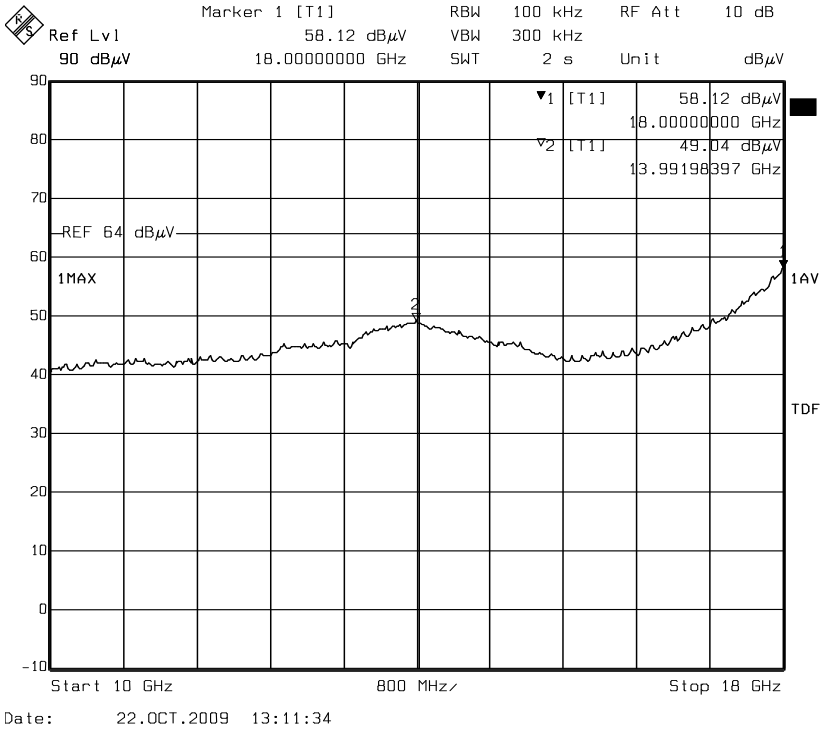
Average



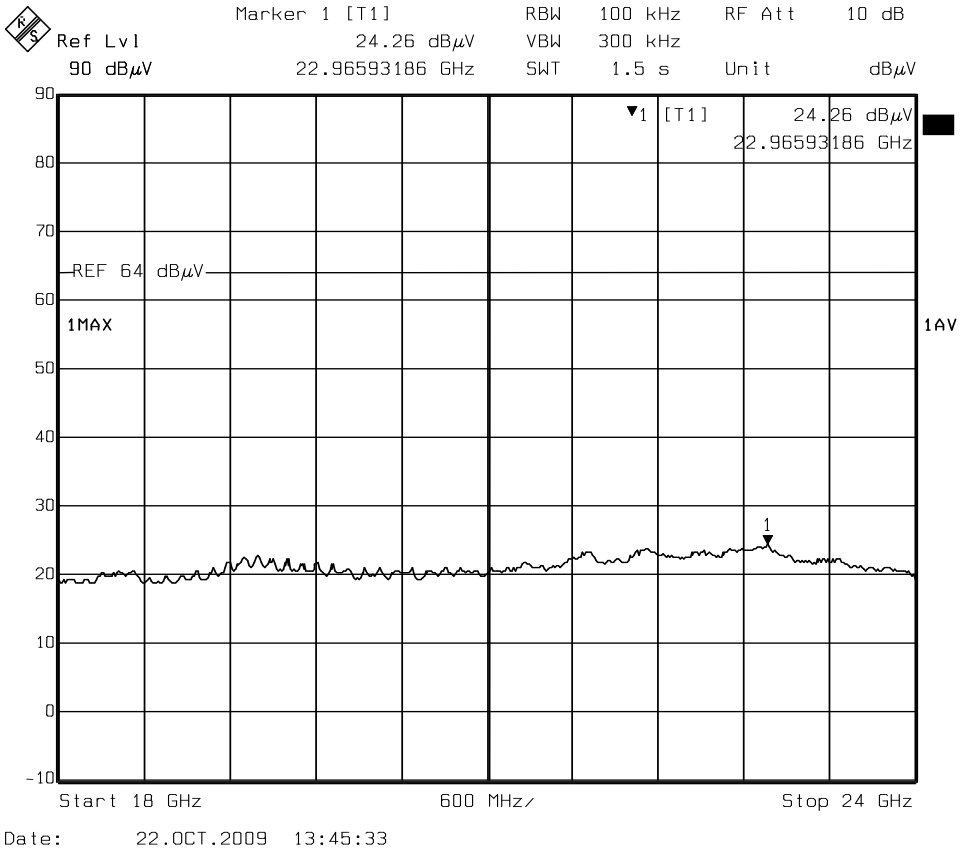
Average



Average

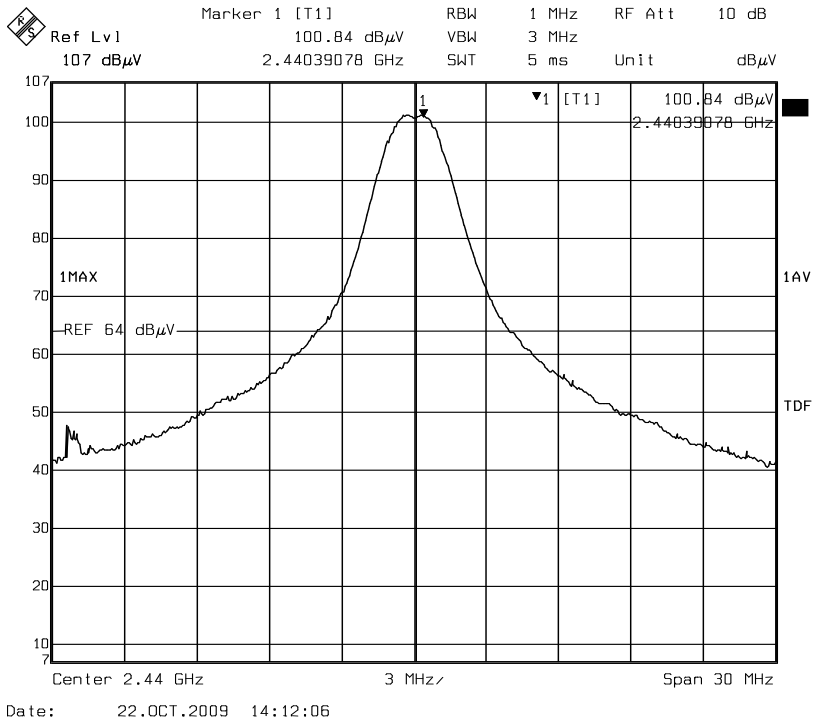


Average

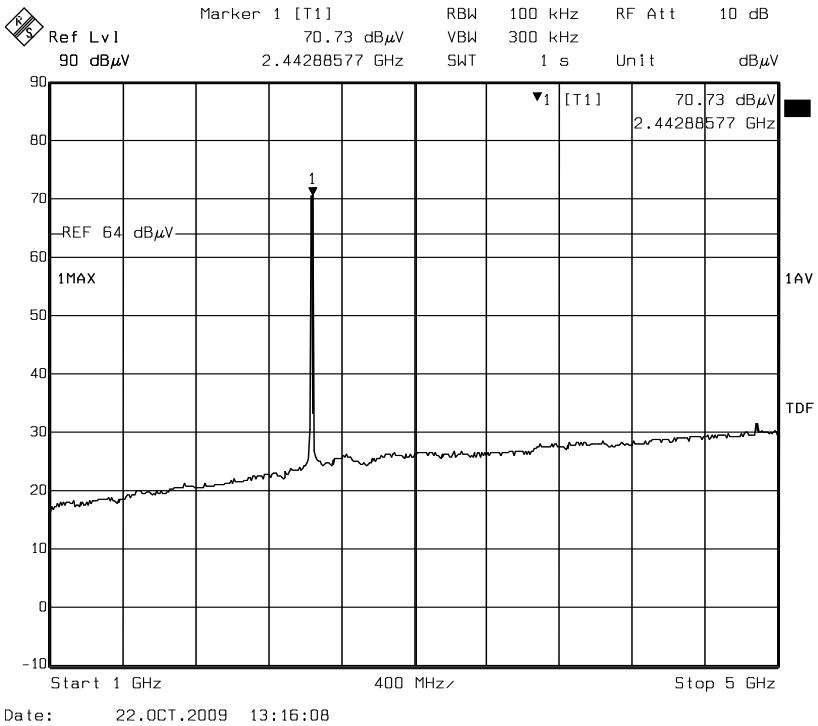

Marker 1 [T1]
RBW 100 kHz
RF Att 10 dB
Ref Lvl
24.26 dBµV
VBW 300 kHz
90 dBµV
22.96593186 GHz
SWT 1.5 s
Unit dBµV
1 [T1]
24.26 dBµV
22.96593186 GHz
REF 64 dBµV
1MAX
1AV
90
80
70
60
50
40
30
20
10
0
-10
Start 18 GHz
600 MHz/
Stop 24 GHz
Date: 22.OCT.2009 13:45:33

Average

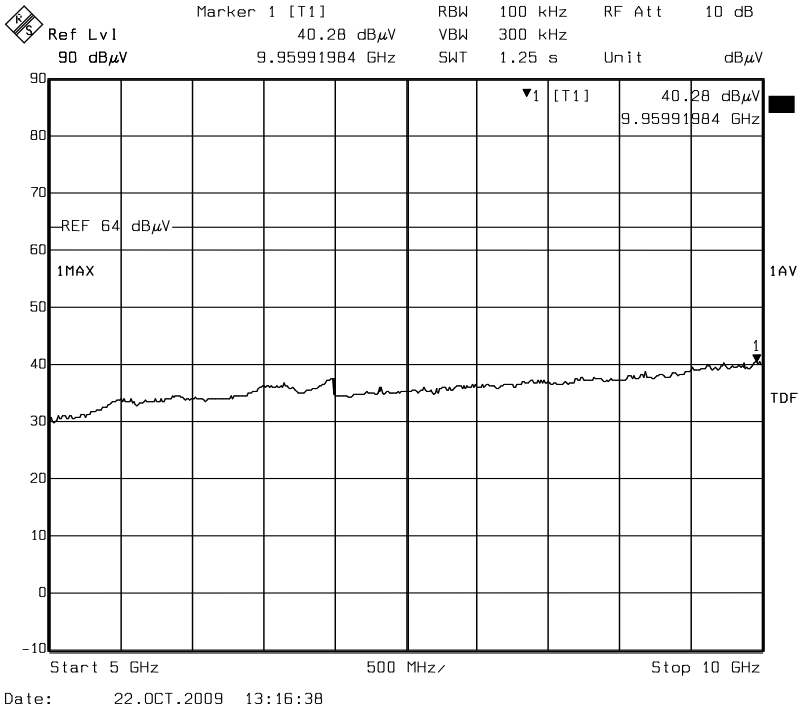
2.44GHz – Data Stream



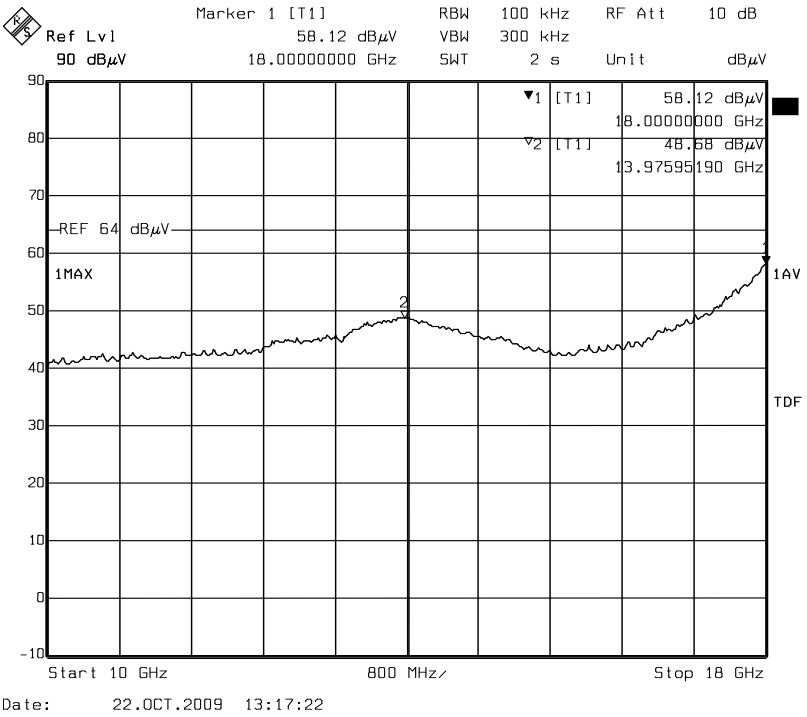
Average



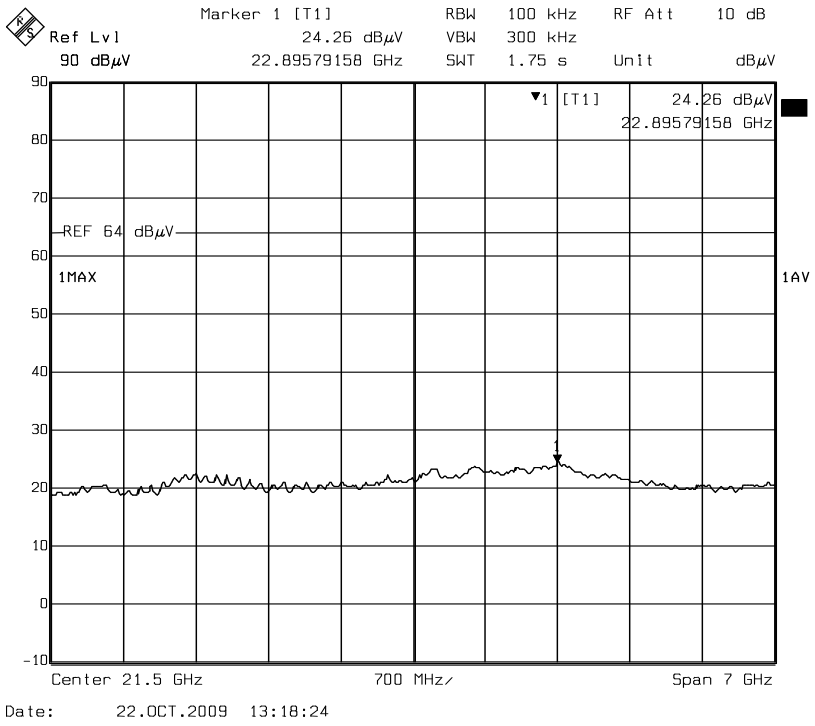
Average



Average

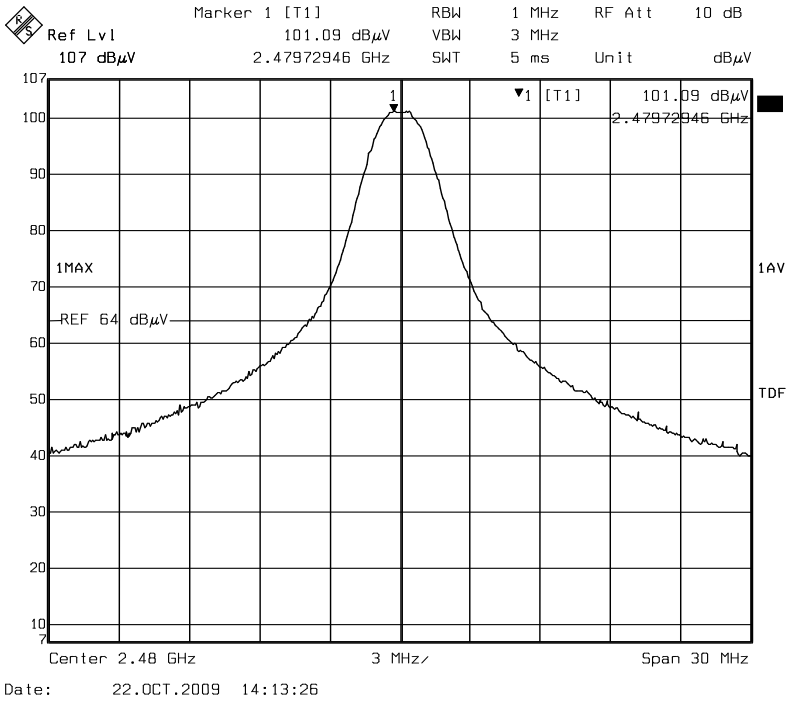


Average

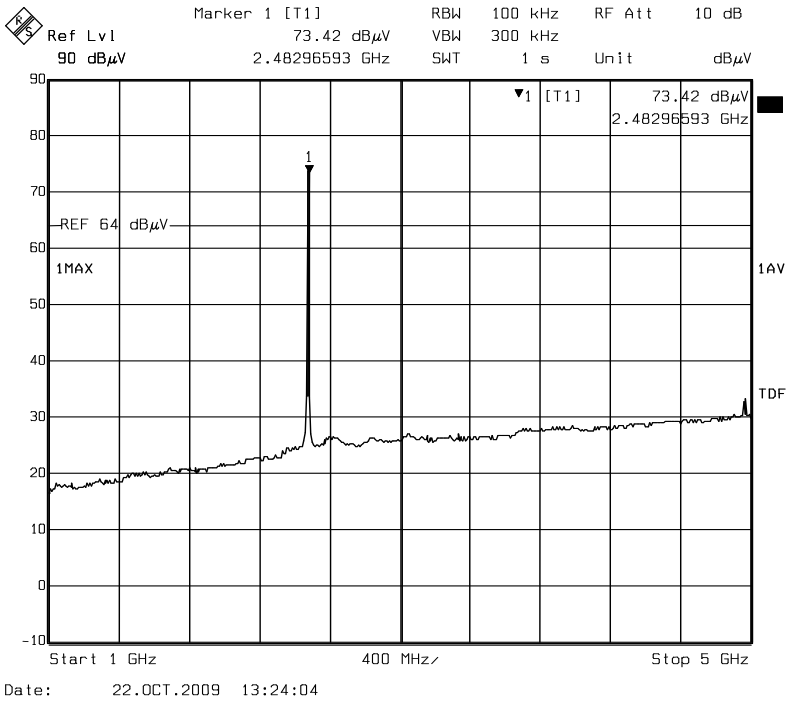

Marker 1 [T1]
RBW 100 kHz
RF Att 10 dB
Ref Lvl
24.26 dBµV
VBW 300 kHz
90 dBµV
22.89579158 GHz
SWT 1.75 s
Unit dBµV
1 [T1]
24.26 dBµV
22.89579158 GHz
REF 64 dBµV
1MAX
1AV
Center 21.5 GHz
700 MHz/
Span 7 GHz
Date: 22.OCT.2009 13:18:24

Average

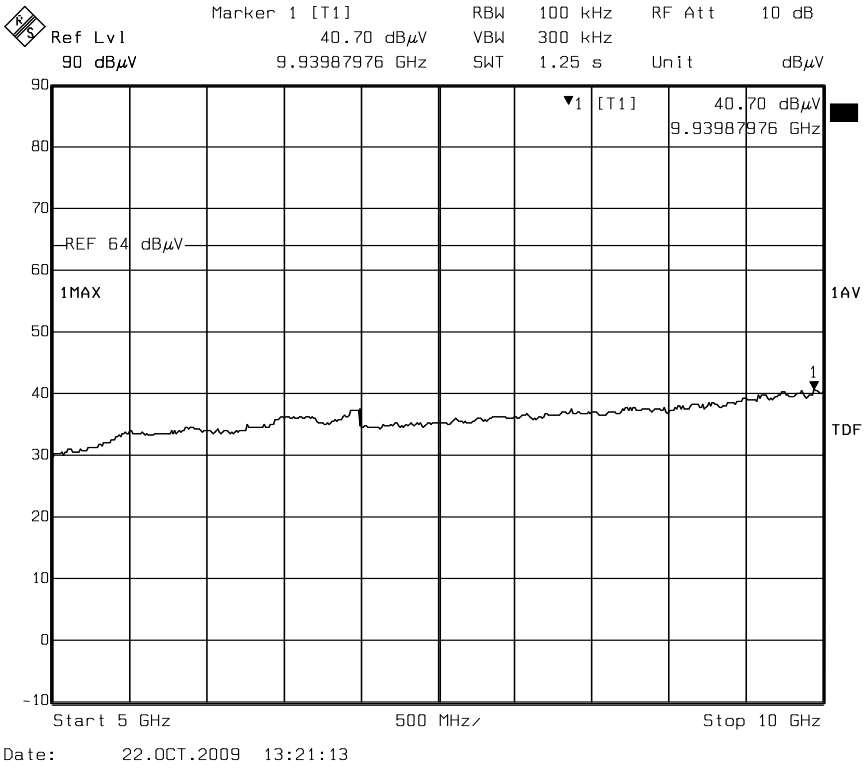
2.48GHz – Data Stream



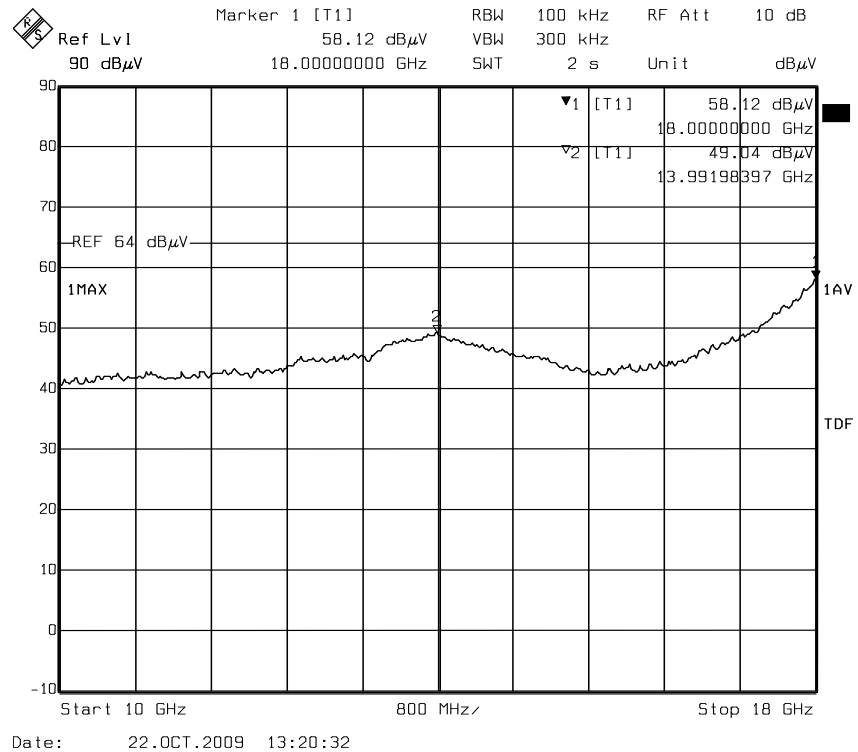
Average



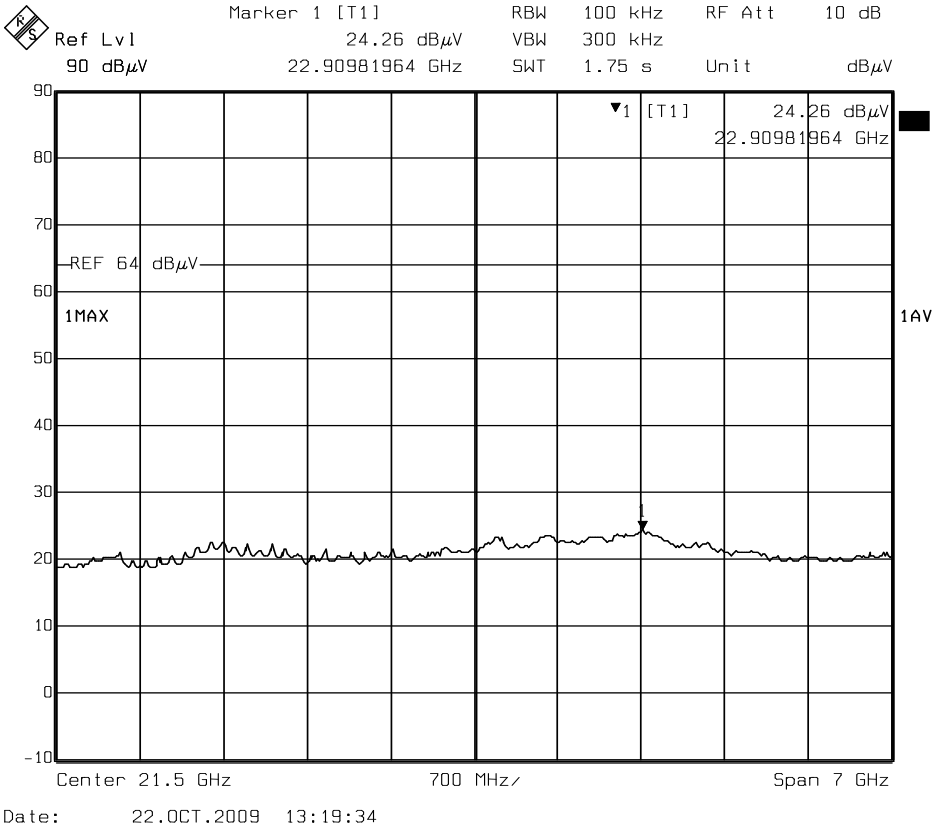
Average



Average



Average


Marker 1 [T1]
RBW 100 kHz
RF Att 10 dB
Ref Lvl
24.26 dBµV
VBW 300 kHz
90 dBµV
22.90981964 GHz
SWT 1.75 s
Unit dBµV
1 [T1]
24.26 dBµV
22.90981964 GHz
REF 64 dBµV
1MAX
1AV
90
80
70
60
50
40
30
20
10
0
-10
Center 21.5 GHz
700 MHz/
Span 7 GHz
Date: 22.OCT.2009 13:19:34

Average

5. RADIATED EMISSIONS CFR47 PART15:205

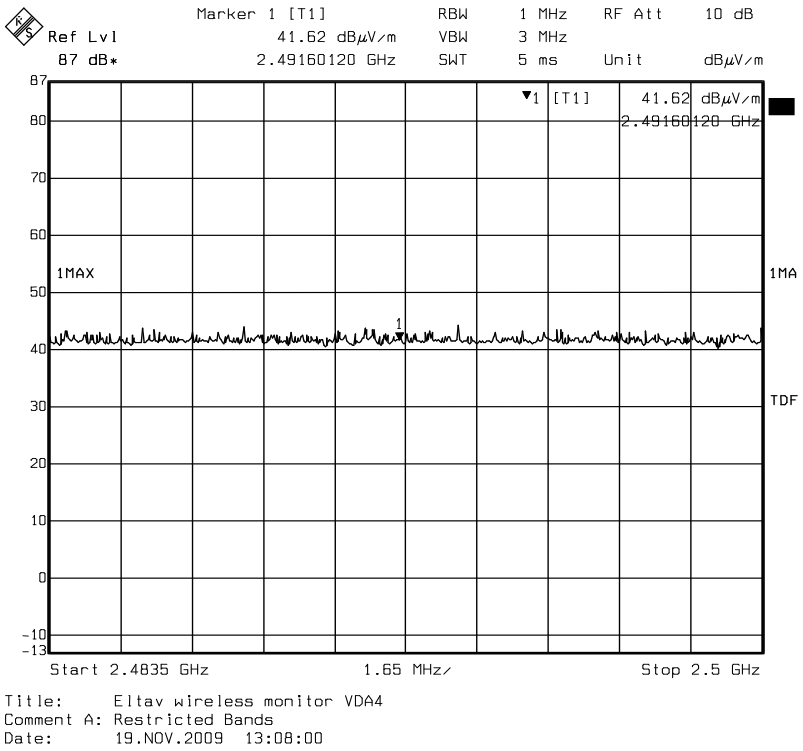
5.1. Test Procedure – Restricted Bands

The Eltav Wireless valve monitoring system transmitter was set to 2.405, 2.44 and 2.48GHz in turn, with the transmitter set to maximum output. The frequency ranges from 2.4835 to 2.5 GHz, 4.5 to 5.15GHz and 7.25 to 7.75GHz were scanned using a spectrum analyser for peak and average detectors via a preamplifier with a nominal gain of 28dB.
These tests carried out using a 1MHz RBW and a VBW of 3MHz as required by Part 15:205.

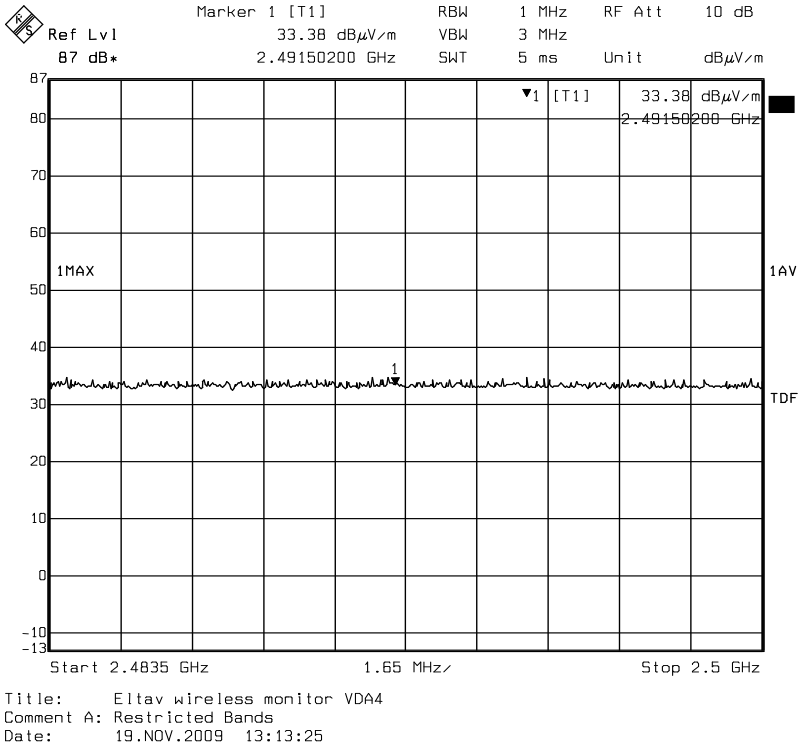
The following plots show the emission levels which include all transducer factors.

5.2. Plots of Restricted Bands

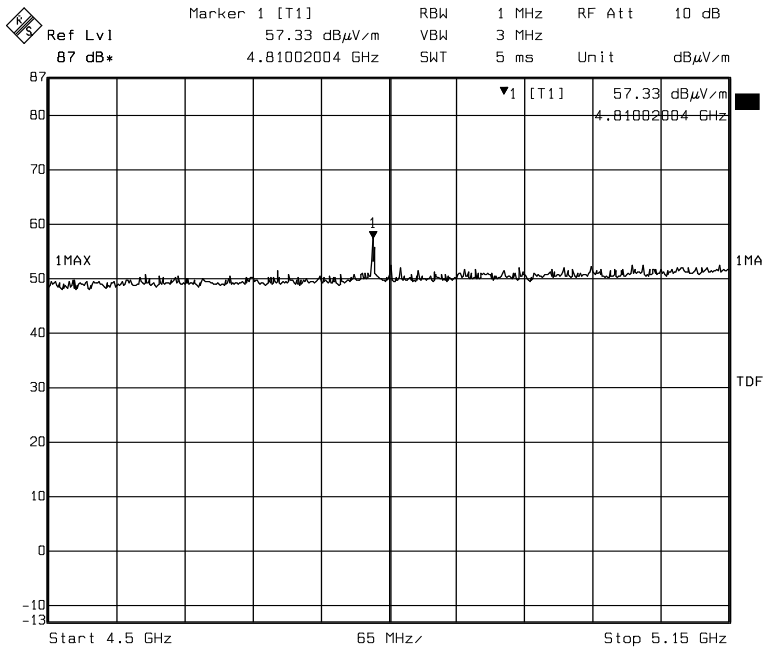
Channel 11



Peak Detector

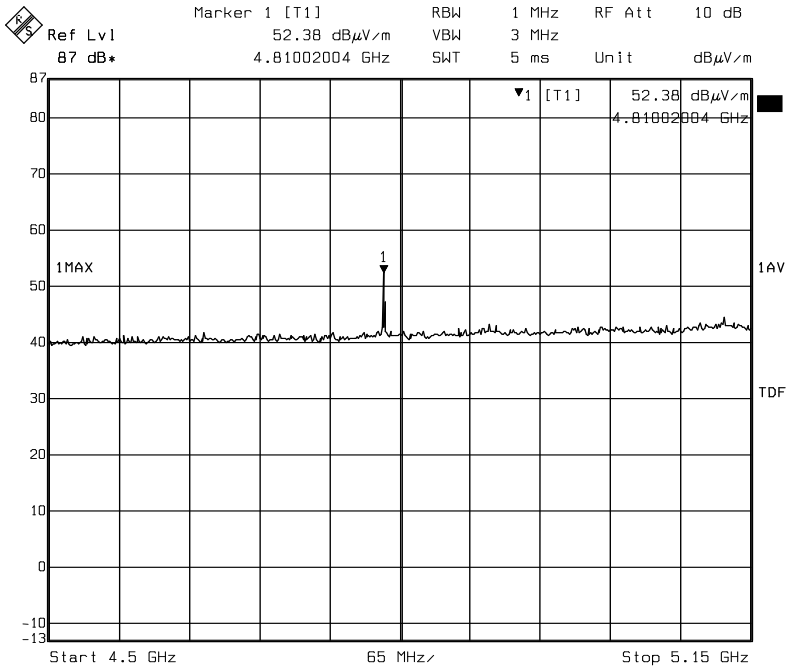


Average Detector



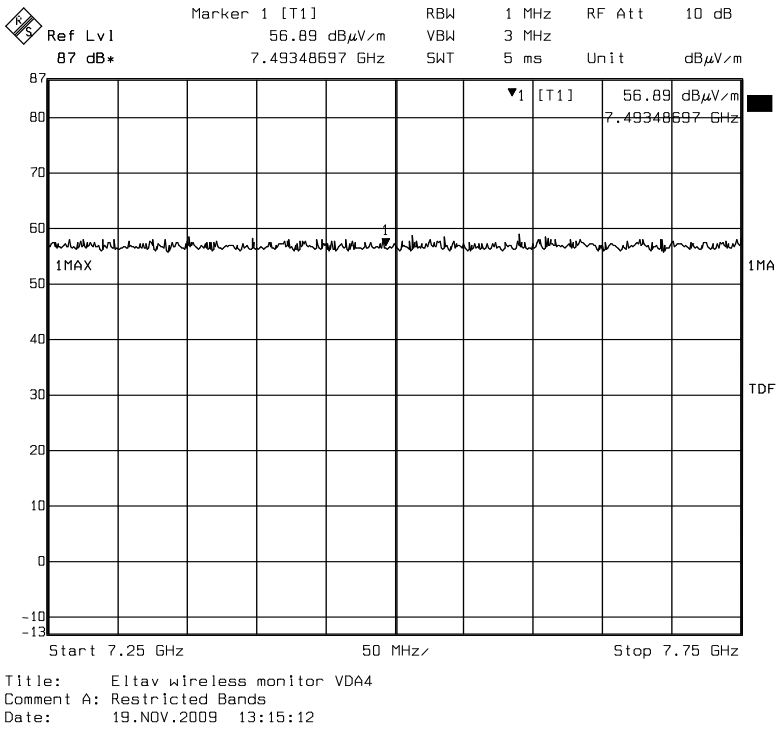
Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:11:15

Peak Detector

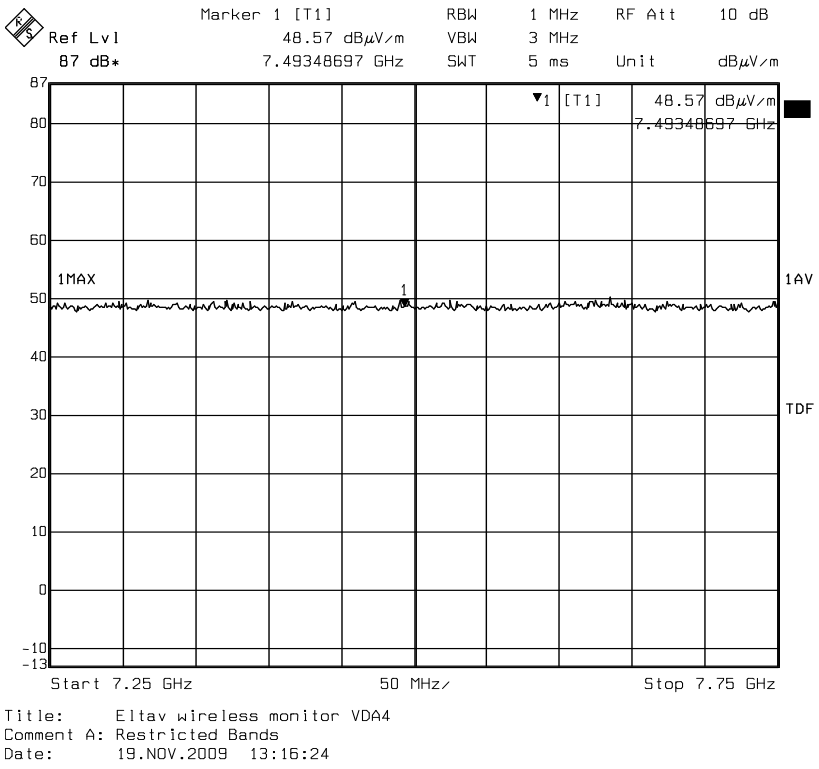


Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:12:17

Average Detectors

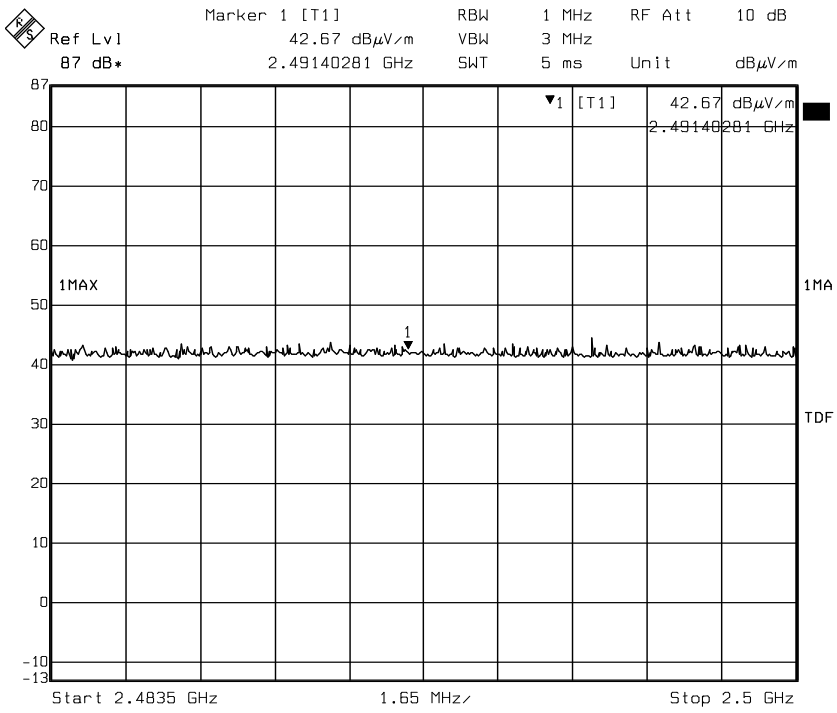


Peak Detectors

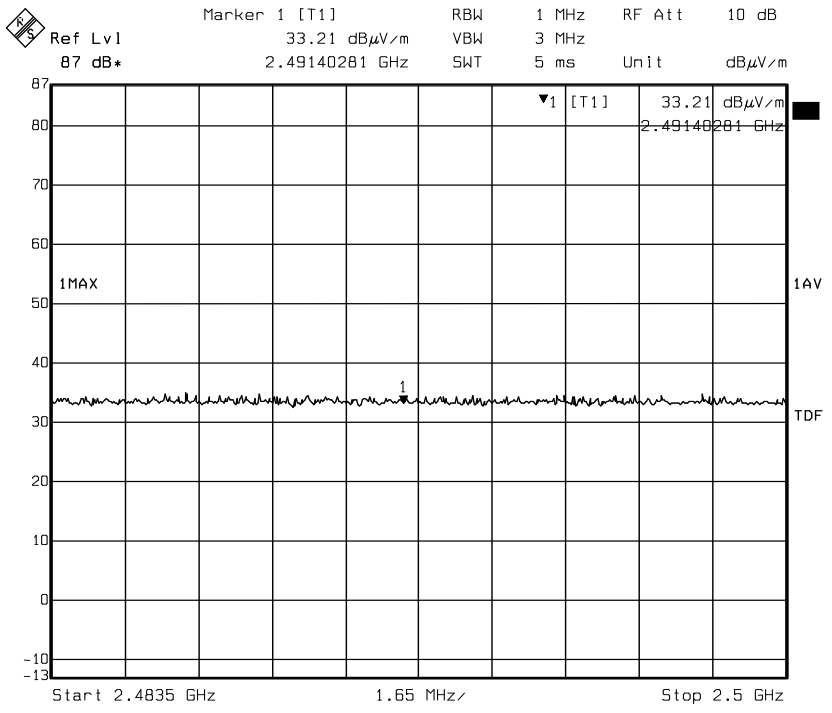


Average Detector

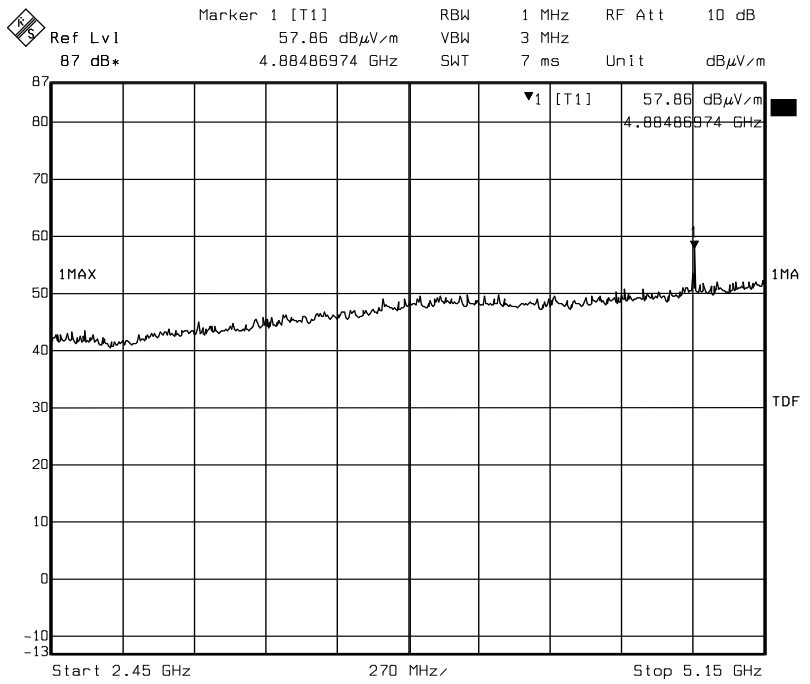
Channel 18



Peak Detector

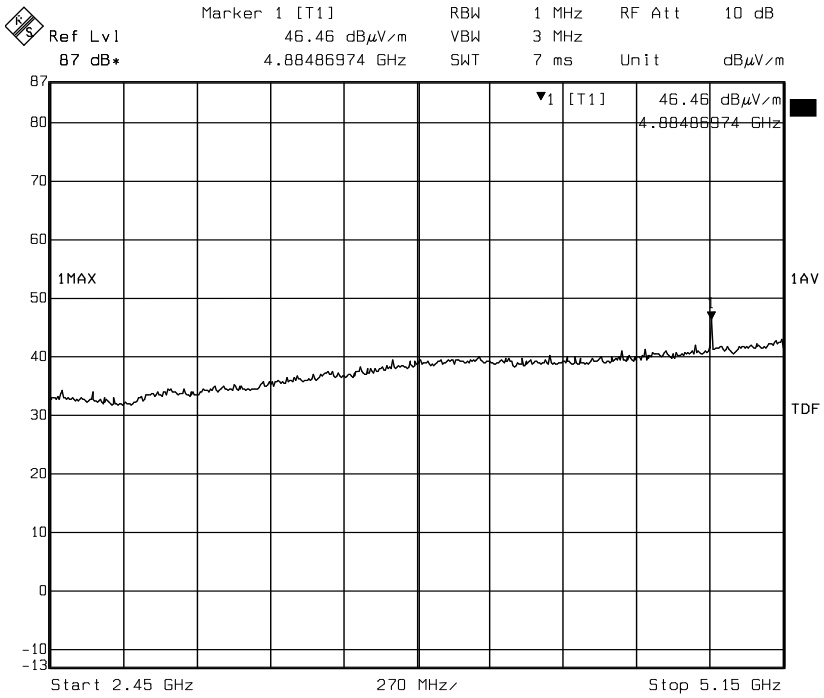


Average Detector



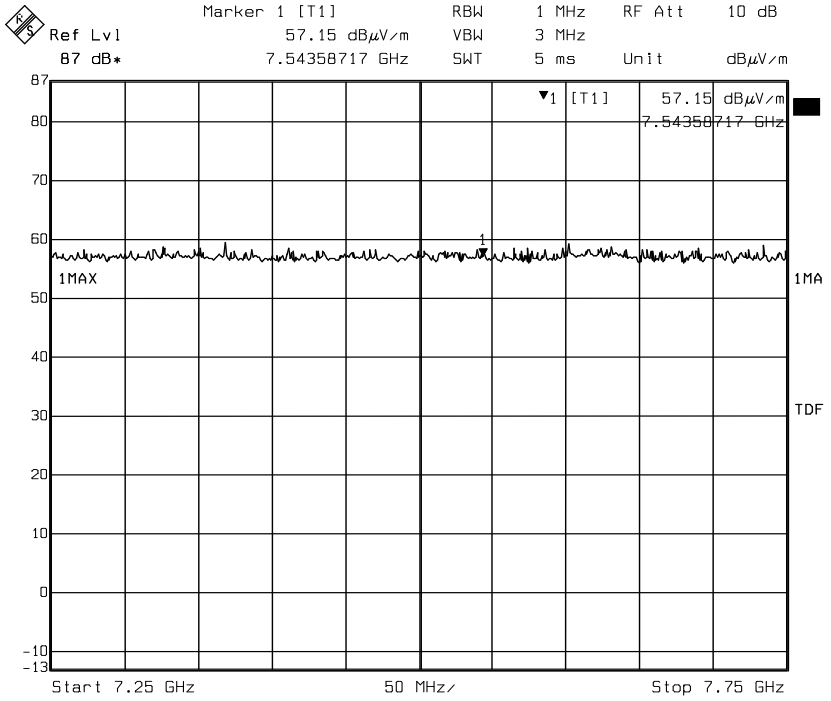
Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:24:51

Peak Detector

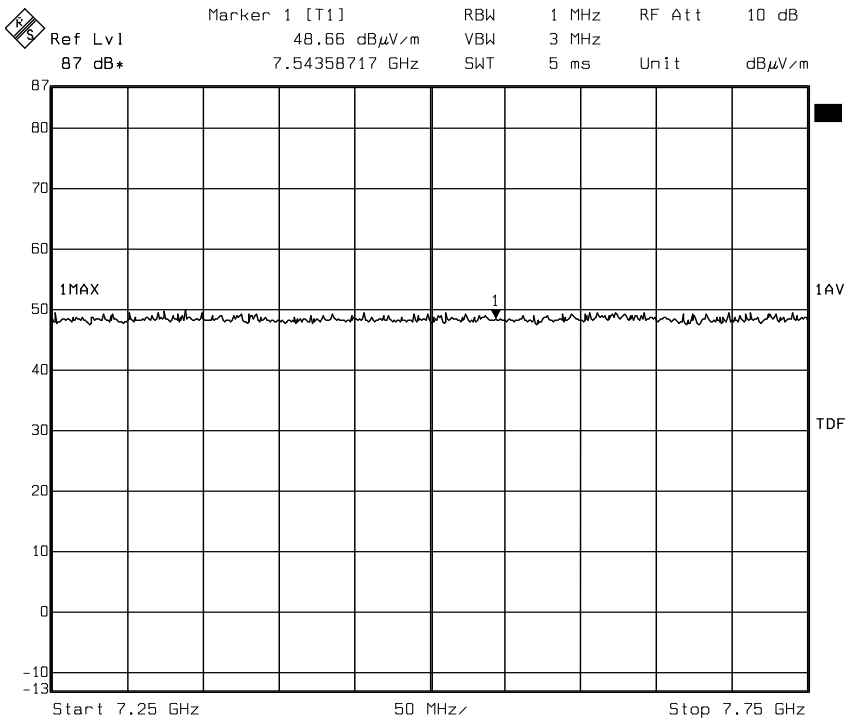


Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:26:10

Average

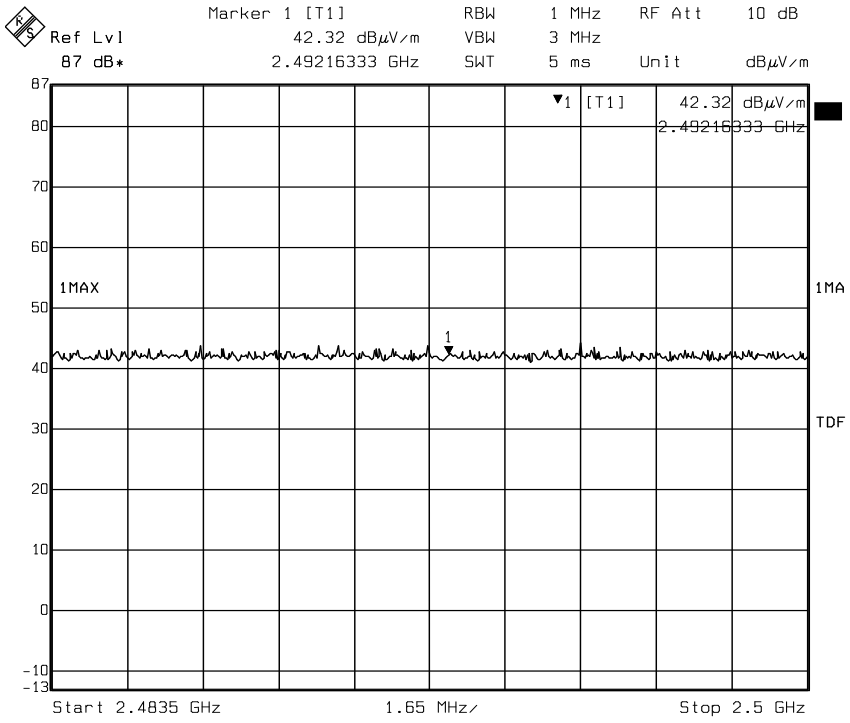


Peak Detector



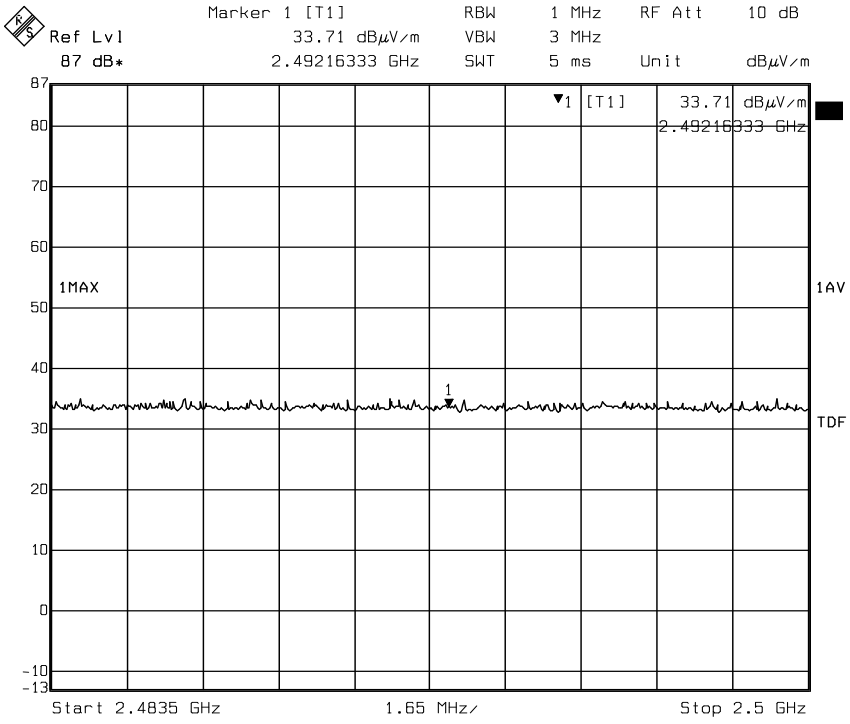
Average Detector

Channel 26



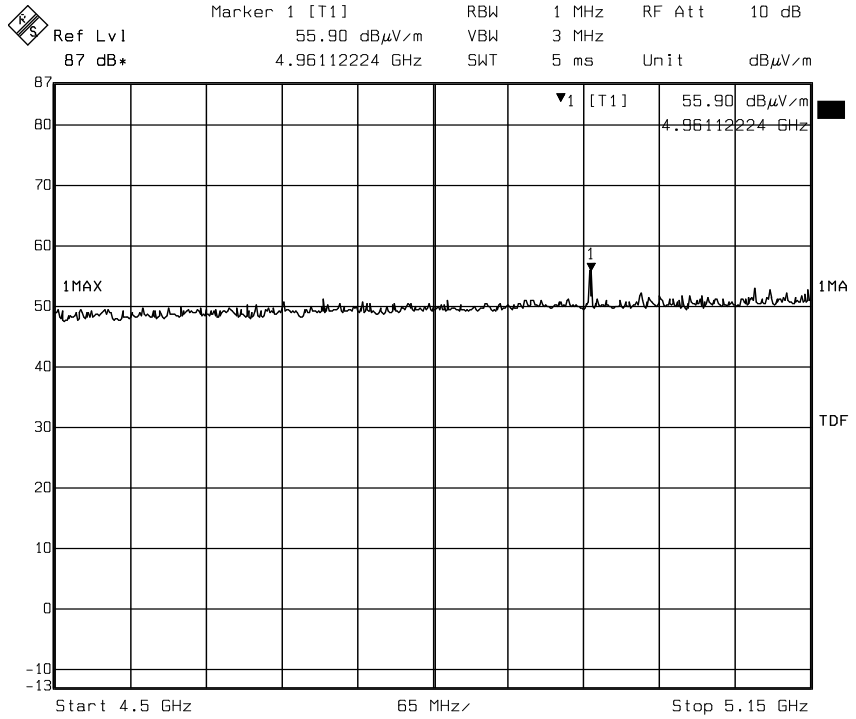
Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:35:04

Peak Detector



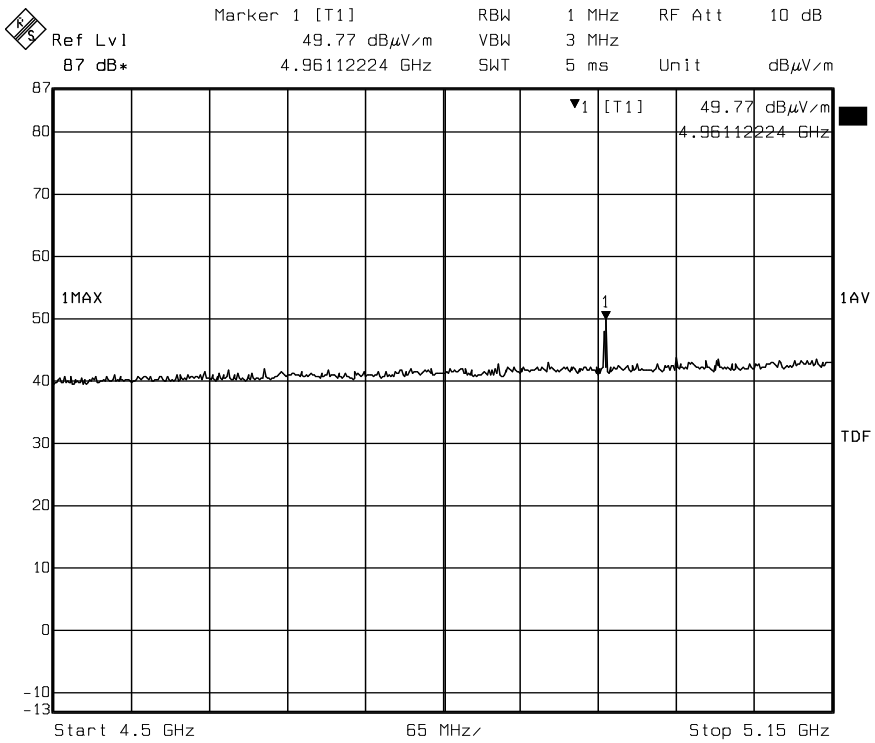
Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:36:02

Average Detector



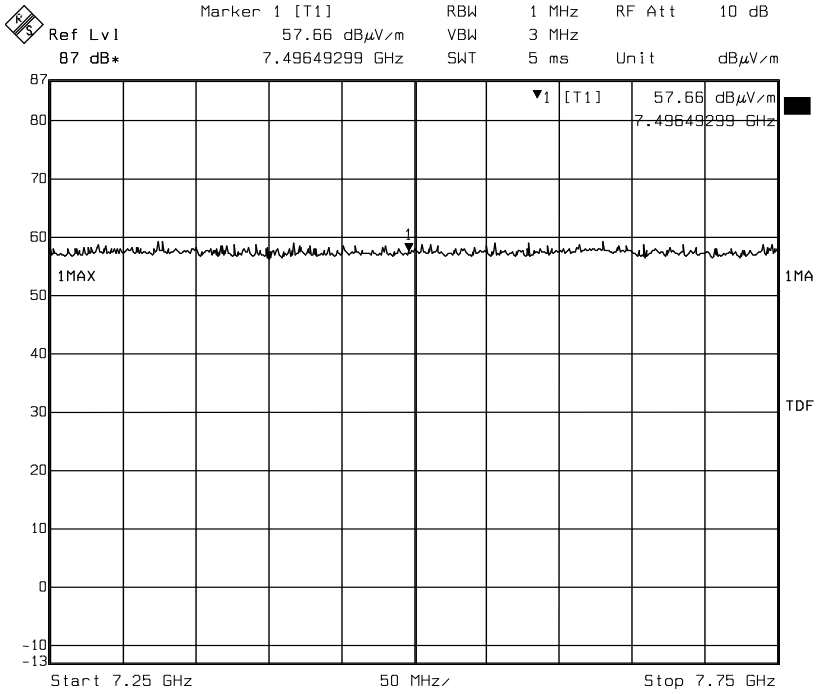
Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:37:31

Peak Detector



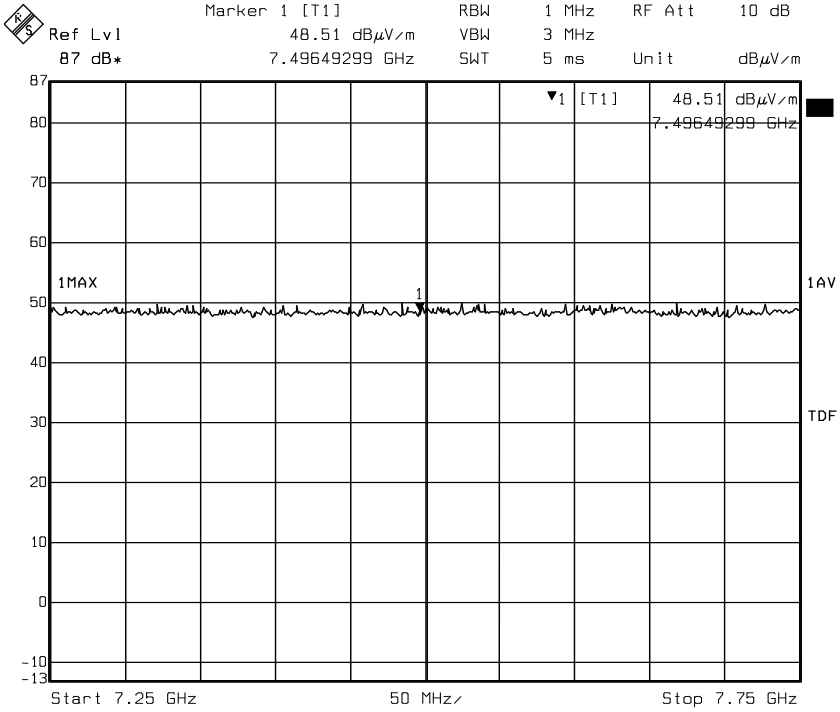
Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:38:49

Average Detector



Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:42:17

Peak Detector



Title: Eltav wireless monitor VDA4
Comment A: Restricted Bands
Date: 19.NOV.2009 13:43:13

Average Detector

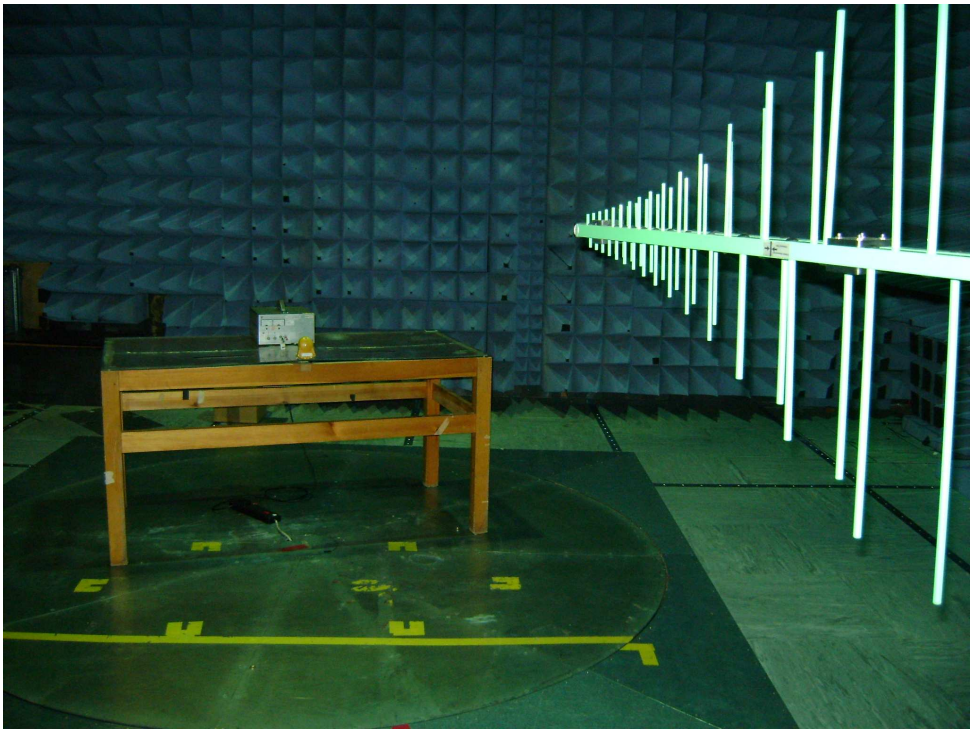
6. CONDUCTED EMISSIONS CFR 47 PART15:247(2B)

The Eltav Wireless VDA4 valve monitor transmitter does not have an external antenna connector. Therefore this test not carried out.

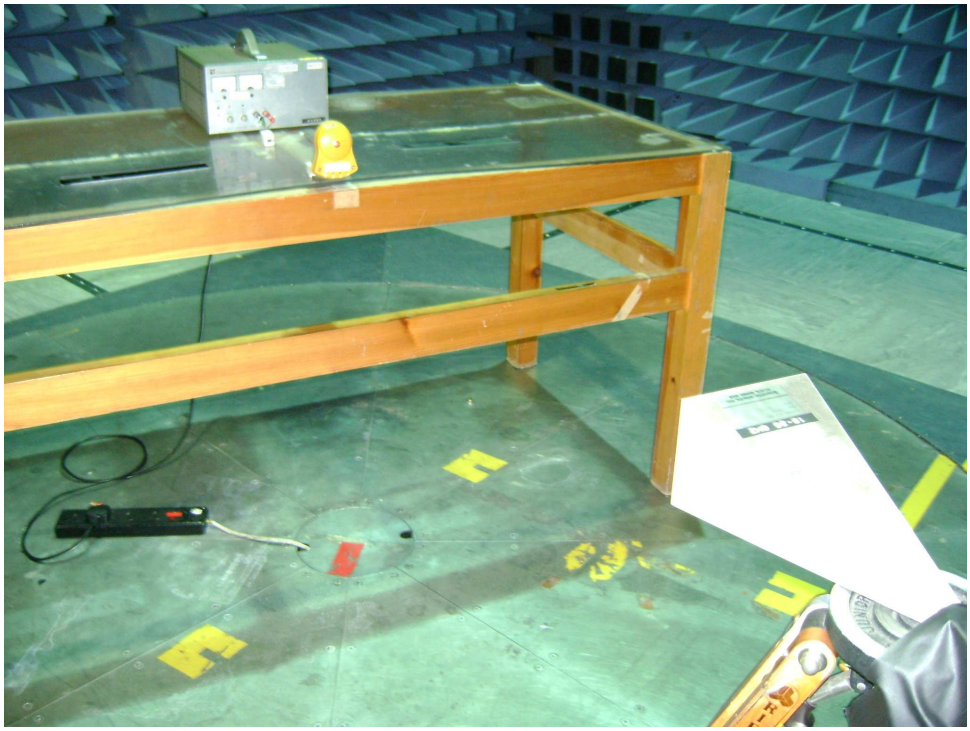
Uncertainty Budget Calculation(s)

Symbol	Source of Uncertainty	Value	Probability distribution	Divisor	c_i	u_i(y)	$(u_i(y))^2$	v_i or v_{eff}	ui^4(y)
RI	Receiver Indication	0.05	normal 2	2.000	1	0.03	0.001	∞	0
dVsw	Receiver Sine Wave	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dVpa	Receiver Pulse Amplitude	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dVpr	Receiver Pulse repetition	1.60	normal 2	2.000	1	0.80	0.640	∞	0
dVnf	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
Fstep	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	0.0653343 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	12.252	2298	0.0653343 51
$U(F_S)$	**Expanded Uncertainty**		**normal k=**	**1.64**		**5.7**		2298	

7. PHOTOGRAPHS OF TEST SETUP



Radiated Power and Spurious Emissions < 1GHz



Radiated Power and Spurious Emissions > 1GHz

8. TEST EQUIPMENT

Equipment	Type	ID
Test Bay 1	Environment	7400
Chase Bilog	Antenna	8164
3115 Horn	Antenna	7512
3160 Horn	Antenna	7614
3161 Horn	Antenna	7617
12- 12 Horn	Antenna	7615
12A – 18 Horn	Antenna	7513
Advantest R3361	Spectrum Analyser	7461
Rohde & Schwarz FSEK	Spectrum Analyser	7811
Rohde&Schwarz FSH3	Spectrum Analyser	DM006916
Rohde & Schwarz	ESS Receiver	7700
Marconi Pre-amp	54432-010A	7772
ERA Microwave Pre-amp	WBA3-4	7534
Oregon Scientific	Environmental Sensor	7916
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	7405

All test equipment used was within its calibration period.

ANNEX A REGISTRATION SITES

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

Katie Hawkins
Electronics Engineer

Industry Canada Industrie Canada

February 7, 2011

OUR FILE: 46405-2042
Submission No: 145396

Intertek Commercial & Electrical
Unit D Imperial Park Randalls Way
Leatherhead, SRY, KT22 7SB
United Kingdom

Attention: Dave Feasey

Dear Sir/Madame:

The Bureau has received your application for the renewal of a 3m alternative test site. Be advised that the information received was satisfactory to Industry Canada. The following number(s) is now associated to the site(s) for which registration / renewal was sought **(Site# 2042F-1).** Please reference the appropriate site number in the body of test reports containing measurements performed on the site. In addition, please keep for your records the following information;

- The company address code associated to the site(s) located at the above address is: **2042F**

Furthermore, to obtain or renew a unique site number, the applicant shall demonstrate that the site has been accredited to ANSI C63.4-2003 or later. A scope of accreditation indicating the accreditation by a recognized accreditation body to ANSI C63.4-2003 or later shall be accepted. Please indicate in a letter the previous assigned site number if applicable and the type of site (example: 3 metre OATS or 3 metre chamber). If the test facility is not accredited to ANSI C63.4-2003 or later, the test facility shall submit test data demonstrating full compliance with the ANSI standard. The Bureau will evaluate the filing to determine if recognition shall be granted.

The frequency for re-validation of the test site and the information that is required to be filed or retained by the testing party shall comply with the requirements established by the accrediting organization. However, in all cases, test site re-validation shall occur on an interval not to **exceed three years**. There is no fee or form associated with an OATS filing. OATS submissions are encouraged to be submitted electronically to the Bureau using the following URL;
http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/h_tt00052e.html.

If you have any questions, you may contact the Bureau by e-mail at certification.bureau@ic.gc.ca Please reference our file and submission number above for all correspondence.

Yours sincerely,

Dalwinder Gill
For: Wireless Laboratory Manager
Certification and Engineering Bureau
3701 Carling Ave., Building 94
P.O. Box 11490, Station "H"
Ottawa, Ontario K2H 8S2
Email: dalwinder.gill@ic.gc.ca
Tel. No. (613) 998-8363
Fax. No. (613) 990-4752