REPORT ON THE CERTIFICATION TESTING OF A
RADIO-TECH Ltd
SmartValve
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.249 July 2008
INTENTIONAL RADIATOR SPECIFICATION

UKAS
0728

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RADIO-TECH Ltd
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THE FCC RULES CFR 47, PART 15.249 July 2008
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 9th – 29th April 2009

TESTED BY: Daniel Winstanley — Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = <n Reason: I am the author of this document Date: 2009.07.09 12:08:13 +01'00' — D WINSTANLEY

APPROVED BY: Digitally signed by John Charters DN: CN = John Charters, C = GB, O = TRaC Telecoms & Radio Reason: I am approving this document Date: 2009.07.09 12:14:24 +01'00' — J CHARTERS RADIO PRODUCT MANAGER

DATE: 9th July 2009

Distribution:

Radio-Tech Ltd

FCC EVALUATION LABORATORIES

TRaC Telecoms & Radio

THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE

The results herein relate only to the sample tested. Full results are contained in the relevant works order file.

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UKAS 0728

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Notes:

1. Component failure during test — YES [ ] NO [X]
2. If Yes, details of failure:
3. The facilities used for the testing of the product contain in this report are FCC Listed.
4. The contents of the attached applicants declarations and other supplied information are not covered by the scope of this laboratory's UKAS or FCC accreditations' and is provided in good faith.

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	XG4556-001
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.249 July 2008
TEST RESULT:	Compliant to Specification
EQUIPMENT UNDER TEST:	SmartValve
ITU: EMISSION CODE:	379k8F1D
EQUIPMENT TYPE:	Short Range Device
PRODUCT USE:	RF Valve Control
CARRIER EMISSION:	44.67 mV/m @ 3m
ANTENNA TYPE:	Integral
ALTERNATIVE ANTENNA:	Not Applicable
FREQUENCY OF OPERATION:	914.5 MHz
CHANNEL SPACING:	Not Applicable, Wideband
NUMBER OF CHANNELS:	1
FREQUENCY GENERATION:	SAW Resonator [ ] Crystal [ ] Synthesiser [X]
MODULATION METHOD:	Amplitude [ ] Digital [X] Angle [ ]
POWER SOURCE(s):	+3Vdc
TEST DATE(s):	9th – 29th April 2009
ORDER No(s):	RTLD8916
APPLICANT:	Radio-Tech Ltd
ADDRESS:	U1 & U2 London Road Campus London Road Harlow Essex CM17 9NA United Kingdom

TESTED BY: Daniel Winstanley

Digitally signed by Daniel Winstanley
DN: CN = Daniel Winstanley, C = <n
Reason: I am the author of this document
Date: 2009.07.09 12:07:58 +01'00'

D WINSTANLEY

APPROVED BY:

Digitally signed by John Charters
DN: CN = John Charters, C = GB, O = TRaC Telecoms & Radio
Reason: I am approving this document
Date: 2009.07.09 12:14:37 +01'00'

J CHARTERS
RADIO PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	SmartValve
EQUIPMENT TYPE:	Short Range Device
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.249 July 2008
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	RTLD8916
APPLICANT'S CONTACT PERSON(s):	Mr S Pang
E-mail address:	Sukkin.Pang@radio-tech.co.uk
APPLICANT:	Radio-Tech Ltd
ADDRESS:	U1 & U2 London Road Campus London Road Harlow Essex CM17 9NA
TEL:	+44 (0)1279 635 849
FAX:	+44 (0)1279 442 261
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRaC Telecoms & Radio, Up Holland
UKAS ACCREDITATION No:	0728
TEST DATE(s)	9th – 29th April 2009
TEST REPORT No:	8F2031Q1WRP1

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
Intentional Emission Frequency:	15.249(a)	Peak	Yes
Intentional Emission Field Strength:	15.249(a)	Quasi Peak	Yes
Intentional Emission Band Occupancy:	15.249(a)	Peak	Yes
Intentional Emission ERP (mW):	N/A	-	-
Spurious Emissions – Conducted:	N/A	-	-
Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	Yes
Spurious Emissions – Radiated >1000MHz:	15.209 15.249(d)	Average	Yes
Maximum Frequency of Search:	15.33	-	Yes
Antenna Arrangements Integral:	15.203	-	Yes
Antenna Arrangements External Connector:	15.204	-	Yes
Restricted Bands	15.205	-	Yes
Extrapolation Factor	15.31(f)	-	Yes

2. Product Use: RF Valve Control

3. Emission Designator: 379k8F1D

4. Duty Cycle: 3.7%

5. Transmitter bit or pulse rate and level: bps

6. Temperatures: Ambient (Tnom) 14^{o}C

7. Supply Voltages: Vnom +3Vdc

   Note: Vnom voltages are as stated above unless otherwise shown on the test report page

8. Equipment Category:
   Single channel [X]
   Two channel [ ]
   Multi-channel [ ]

9. Channel spacing:
   Narrowband [ ]
   Wideband [X]

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	15^{o}C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	54% (<1GHz),	3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 1m	[ ]
Supply voltage	=	+3Vdc		

Bottom Channel	**FREQ. (MHz)**	**MEAS Rx (dBµV)**	**CABLE LOSS (dB)**	**ANT FACT. (dB/m)**	**PRE AMP (dB)**	**FIELD ST'GH (dBµV/m)**	**DCCF FACT (dB)**	**FIELD ST'GH (µV/m)**	**LIMIT (µV/m)**
0.009MHz - 0.49MHz									**Note 9**
0.49MHz - 1.705MHz									**Note 9**
1.705MHz - 30MHz									**Note 9**
30MHz - 88MHz									**Note 9**
88MHz - 216MHz									**Note 9**
216MHz - 960MHz									**Note 9**
960MHz - 1GHz									**Note 9**
1GHz - 10GHz	9144.607	52.82	2.9	37.9	35.8	57.82	20	77.80	500
Limits	0.009 MHz to 0.49 MHz			2400/f(kHz) µV/m @ 300m					
	0.49 MHz to 1.705 MHz			24000/f(kHz) µV/m @ 30m					
	1.705MHz to 30MHz			30µV/m @ 30m					
	30MHz to 88MHz			100µV/m @ 3m					
	88MHz to 216MHz			150µV/m @ 3m					
	216MHz to 960MHz			200µV/m @ 3m					
	960MHz to 1GHz			500µV/m @ 3m					
	1GHz to 10GHz			500µV/m @ 3m					

Notes:
1 Results quoted are extrapolated as indicated
2 Emissions were searched to: (**x**) 1000MHz inclusive, as per Part 15.33a
3 Extrapolation factor 9.5dB from 1m to 3m, as per Part 15.31f
4 Measurements >1GHz @ 3m as per Part 15.31f(1)
5 Receiver detector >1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
6 Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth for scans
7 New batteries used for battery-powered products.
8 See Annex F for Emissions Graph(s)
9 Only emissions within 20 dB of the limit are recorded
10 See Annex G For DCCF Calculation

Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2003
2 Measuring distances as Notes 1 to 4 above
3 EUT 0.8 metre above ground plane
4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes.
Maximum results recorded.

The test equipment used for the Transmitter Spurious Emissions – Radiated – Part 15.209 tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010 - 3580	138	**X**
RECEIVER	R & S	ESVS 10	844594/003	352	**X**
PRE AMPLIFIER	AGILENT	8449B	3008A016	572	**X**
BILOG ANTENNA	YORK	CBL611/A	1618	UH191	**X**
SPECTRUM ANALYSER	R & S	FSU	200034	UH281	**X**
PRE AMPLIFIER	WATKINS JOHNSON	6201-69	2740	UH372	**X**

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.249 July 2008

Ambient temperature	=	14^{o}C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	54%<1GHz),	10m measurements @ fc	[ ]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
Supply voltage	=	+3Vdc	30m extrapolated from 3m	[ ]
Channel number	=	1	30m extrapolated from 10m	[ ]

FREQ. (MHz)	**MEASUREMENT Rx. READING (dBµV)**	**CABLE LOSS (dB)**	**ANT FACTOR (dB/m)**	**FIELD STRENGTH (dBµV/m)**	**FIELD STRENGTH (mV/m)**
914.5	62.4	6.3	24.3	93.0	44.67

Limit value @ fc	**50 (mV/m)**	
Band occupancy @ -20 dBc	**f lower**	**f higher**
	914.29724359 MHz	914.67705128 MHz

See spectrum analyser plot – Annex E

Notes:
1 Results quoted are extrapolated as indicated
2 Receiver detector @ fc = Quasi Peak 120kHz bandwidth
3 When battery powered the EUT was powered with new batteries

Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 1992
2 Measuring distances 3m
3 EUT 0.8 metre above ground plane
4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes.
Maximum results recorded

The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.249 July 2008 tests is shown below:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
RECEIVER	R & S	ESVS 10	844594/003	352	**X**
BILOG ANTENNA	YORK	CBL611/A	1618	UH191	**X**

RECEIVER TESTS

RECEIVER SPURIOUS EMISSIONS – RADIATED – PART 15.109

Ambient temperature	=	17^{o}C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	62% (<1GHz),	3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 1m	[ ]
Supply voltage	=	+3.3Vdc		

Bottom Channel	**FREQ. (MHz)**	**MEAS Rx (dBµV)**	**CABLE LOSS (dB)**	**ANT FACT. (dB/m)**	**PRE AMP (dB)**	**FIELD ST'GH (dBµV/m)**	**EXTRAP FACT (dB)**	**FIELD ST'GH (µV/m)**	**LIMIT (µV/m)**
0.009MHz - 0.49MHz									**Note 8**
0.49MHz - 1.705MHz									**Note 8**
1.705MHz - 30MHz									**Note 8**
30MHz - 88MHz									**Note 8**
88MHz - 216MHz									**Note 8**
216MHz - 960MHz									**Note 8**
960MHz - 1GHz									**Note 8**
1GHz - 10GHz	5485.689	50.02	1.88	34.70	34.86	51.74	-	386.36	500

Limits	0.009 MHz to 0.49 MHz	2400/f(kHz) µV/m @ 300m
	0.49 MHz to 1.705 MHz	24000/f(kHz) µV/m @ 30m
	1.705MHz to 30MHz	30µV/m @ 30m
	30MHz to 88MHz	100µV/m @ 3m
	88MHz to 216MHz	150µV/m @ 3m
	216MHz to 960MHz	200µV/m @ 3m
	960MHz to 1GHz	500µV/m @ 3m
	1GHz to 10GHz	500µV/m @ 3m

Notes:
1 Results quoted are extrapolated as indicated
2 Emissions were searched to: (**x**) 1000MHz inclusive, as per Part 15.33a
3 Extrapolation factor 9.5dB from 1m to 3m, as per Part 15.31f
4 Measurements >1GHz @ 3m as per Part 15.31f(1)
5 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
6 Receiver detector >1GHz = Average, 1MHz resolution bandwidth, Peak for scans
7 New batteries used for battery-powered products.
8 Only emissions within 20 dB of the limit are recorded.
9 See Annex H for plots.

Test Method:
1 As per Radio – Noise Emissions, ANSI C63.4: 2003
2 Measuring distances as Notes 1 to 4 above
3 EUT 0.8 metre above ground plane
4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes.
Maximum results recorded.

The test equipment used for the Transmitter Spurious Emissions – Radiated – Part 15.209 tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010 - 3580	138	**X**
RECEIVER	R & S	ESVS 10	844594/003	352	**X**
PRE AMPLIFIER	AGILENT	8449B	3008A016	572	**X**
BILOG ANTENNA	YORK	CBL611/A	1618	UH191	**X**
SPECTRUM ANALYSER	R & S	FSU	200034	UH281	**X**
PRE AMPLIFIER	WATKINS JOHNSON	6201-69	2740	UH372	**X**

ANNEX A

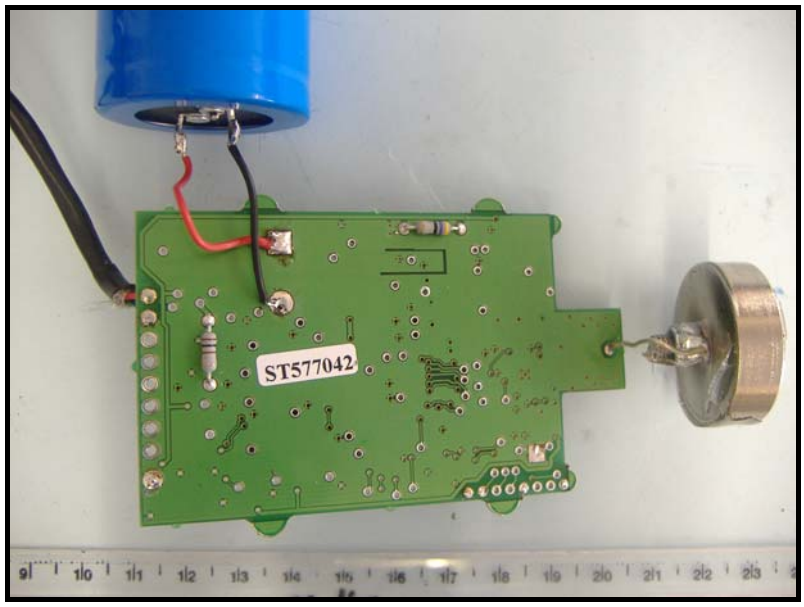
PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP**

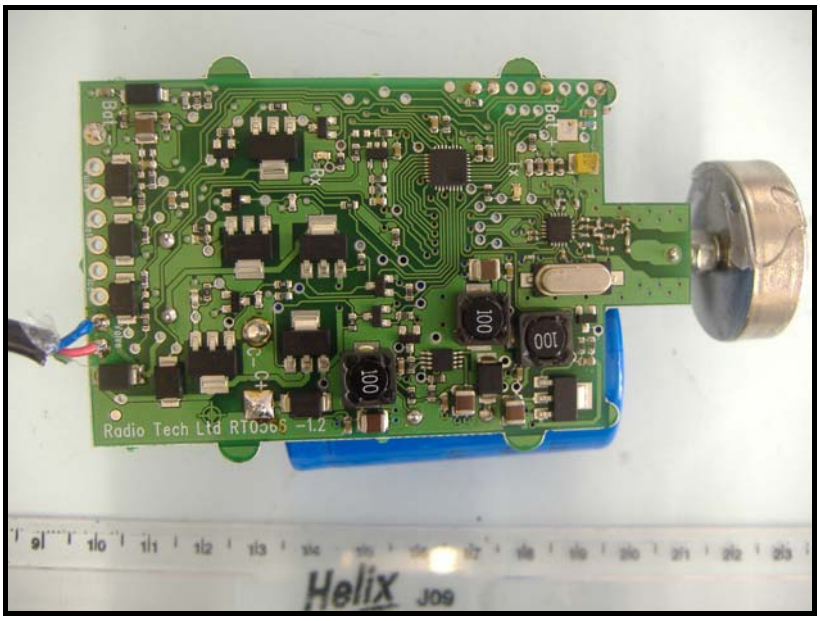
PHOTOGRAPH No. 2 **TRANSMITTER FRONT VIEW**

PHOTOGRAPH No. 3 **TRANSMITTER REAR VIEW**

PHOTOGRAPH No. 4 **TRANSMITTER PCB TRACK SIDE**



PHOTOGRAPH No. 5 **TRANSMITTER PCB COMPONENT SIDE**



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[X]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[X]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[ ]
		-	DRAWINGS	[ ]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
h.	CIRCUIT DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
i.	COMPONENT LOCATION	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
j.	PCB TRACK LAYOUT	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
k.	BILL OF MATERIALS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C

MEASUREMENT UNCERTAINTY

Radio Testing – General Uncertainty Schedule

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

[1] Adjacent Channel Power

Uncertainty in test result = **1.86dB**

[2] Carrier Power

Uncertainty in test result (Equipment - TRLUH120) = **2.18dB**
Uncertainty in test result (Equipment – TRL05) = **1.08dB**
Uncertainty in test result (Equipment – TRL479) = **2.48dB**

[3] Effective Radiated Power

Uncertainty in test result = **4.71dB**

[4] Spurious Emissions

Uncertainty in test result = **4.75dB**

[5] Maximum frequency error

Uncertainty in test result (Equipment - TRLUH120) = **119ppm**
Uncertainty in test result (Equipment – TRL05) = **0.113ppm**
Uncertainty in test result (Equipment – TRL479) = **0.265ppm**

[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**, Uncertainty in test result (30MHz – 1GHz) = **4.6dB**, Uncertainty in test result (1GHz-18GHz) = **4.7dB**

[7] Frequency deviation

Uncertainty in test result = **3.2%**

[8] Magnetic Field Emissions

Uncertainty in test result = **2.3dB**

[9] Conducted Spurious

Uncertainty in test result (Equipment TRL479) Up to 8.1GHz = **3.31dB**
Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB**
Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB**
Uncertainty in test result (Equipment TRLUH120) Up to 26GHz = **3.14dB**

[10] Channel Bandwidth

Uncertainty in test result = **15.5%**

[11] Amplitude and Time Measurement – Oscilloscope

Uncertainty in overall test level = **2.1dB**, Uncertainty in time measurement = **0.59%,** Uncertainty in Amplitude measurement = **0.82%**

[11] Power Line Conduction

Uncertainty in test result = **3.4dB**

[12] Spectrum Mask Measurements

Uncertainty in test result = **2.59% (frequency)**
Uncertainty in test result = **1.32dB (amplitude)**

[13] Adjacent Sub Band Selectivity

Uncertainty in test result = **1.24dB**

[14] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = **3.42dB**

[15] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = **3.36dB**

[16] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = **1.24dB**

[17] Receiver Threshold

Uncertainty in test result = **3.23dB**

[18] Transmission Time Measurement

Uncertainty in test result = **7.98%**

ANNEX D

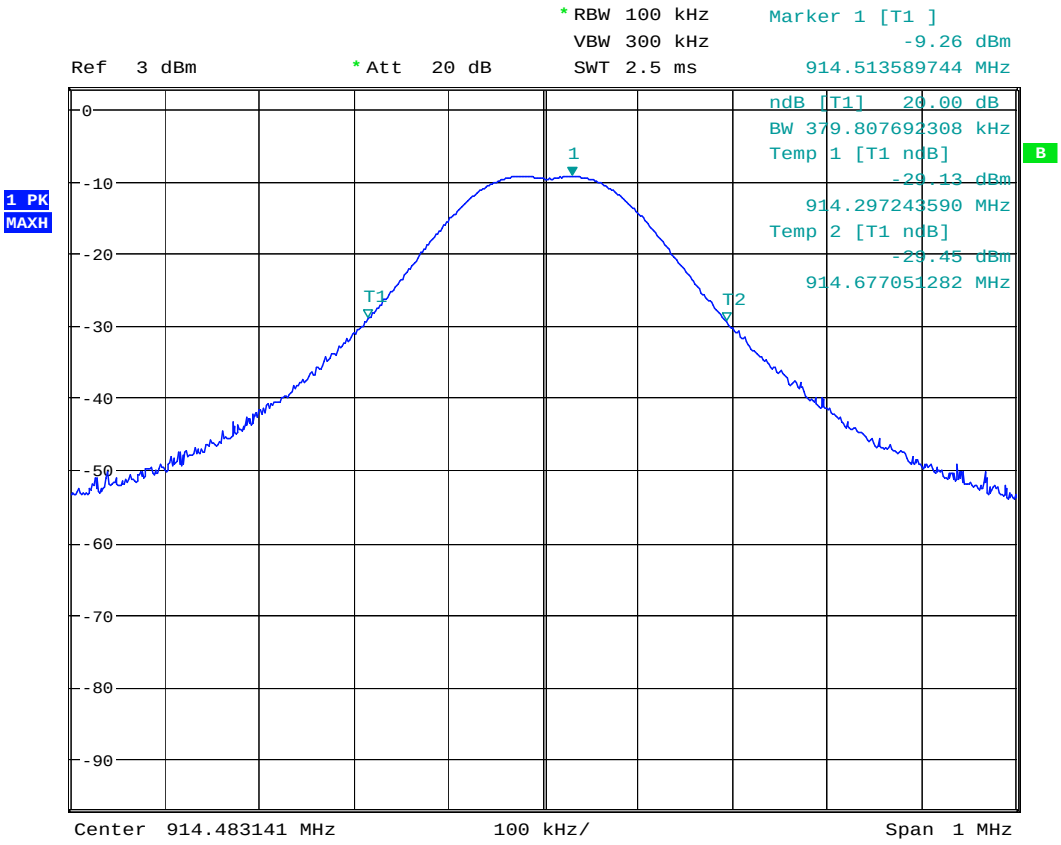
TEST EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH06/07	IC OATS Submission	TRaC	01/06/2007	24	01/06/2009
UH070	Bilog Antenna	York	13/12/2007	24	13/12/2009
UH187	Receiver	R&S	09/12/2008	12	09/12/2009
UH191	Bilog Antenna	York	01/10/2008	24	01/10/2010
UH281	Spectrum Analyser	R&S	28/10/2008	12	28/10/2009
UH372	Pre Amp	Watkins Johnson	27/11/2008	12	27/11/2009
L138	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L139	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L352	Receiver	R&S	09/12/2008	12	09/12/2009
L572	Pre Amplifier	Agilent	04/07/2008	12	04/07/2009

ANNEX E

BANDWIDTH PLOT

BANDWIDTH PLOT



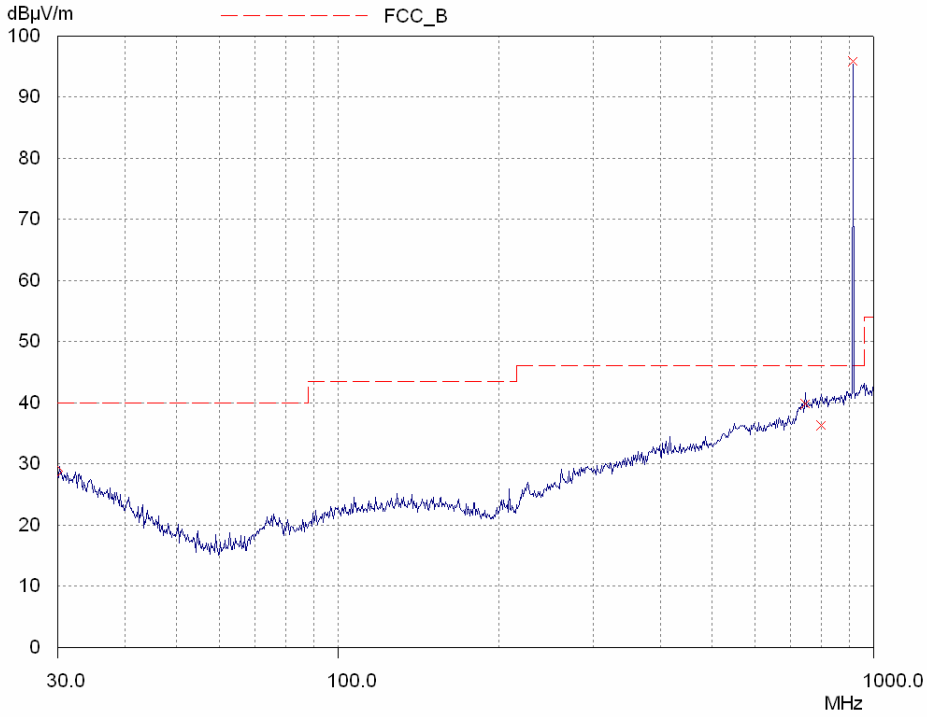
Date: 9.APR.2009 16:27:01

f_{Lower} f_{Higher}

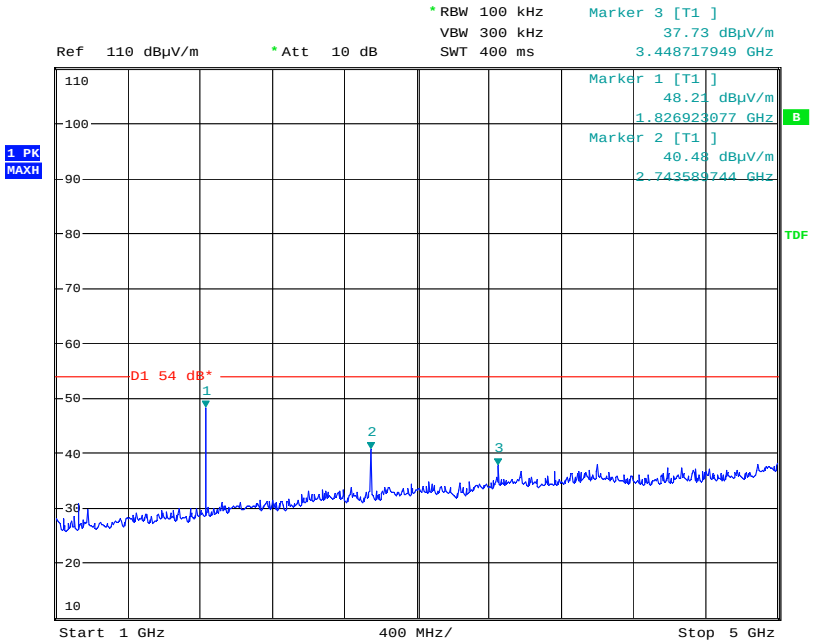
f_{Lower}	=	**914.29724359 MHz**
f_{Higher}	=	**914.66705128 MHz**
Occupied Bandwidth	=	**379.807 kHz**

ANNEX F

TRANSMITTER EMISSIONS GRAPH(s)



30MHz – 1GHz



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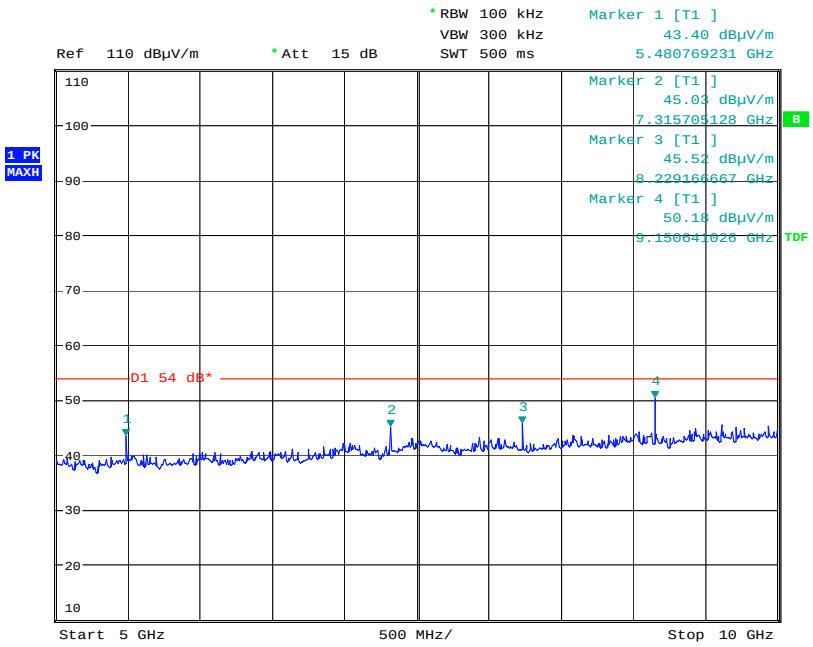
1GHz – 5GHz



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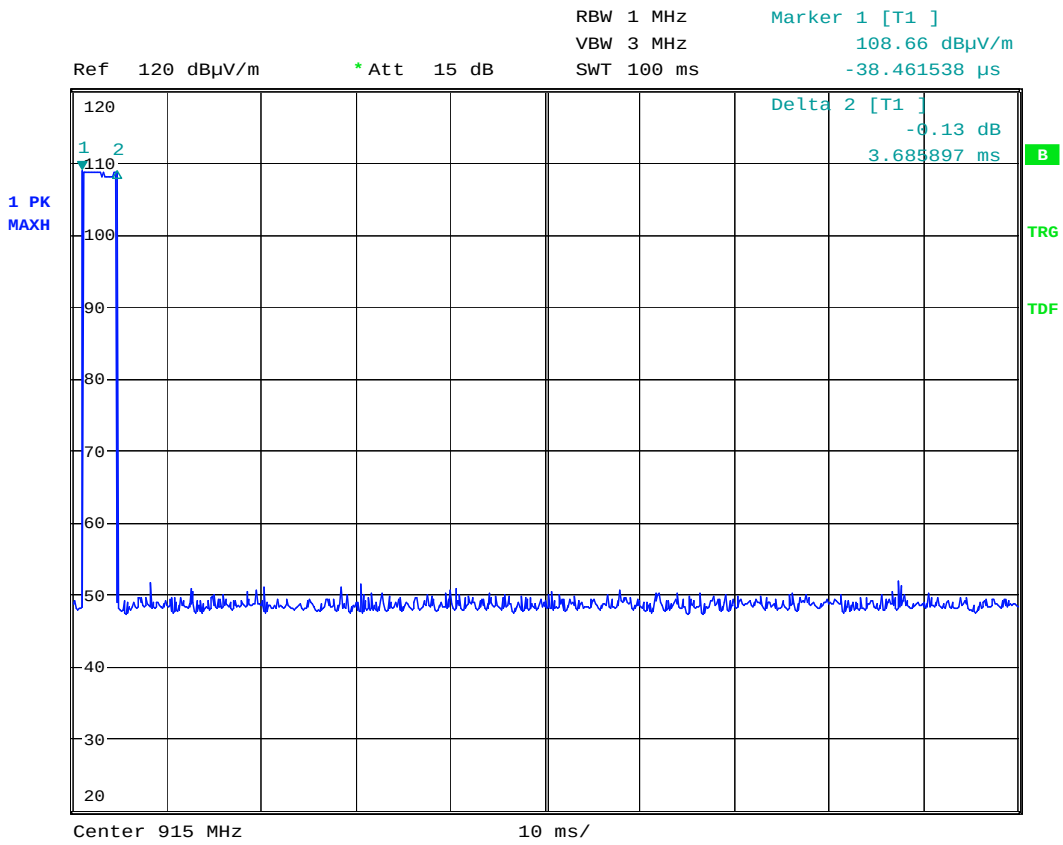
5GHz – 10GHz

ANNEX F

DUTY CYCLE



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DCCF = 20 Log (Ton/100ms)

DCCF = 20 Log (3.68ms/100ms)

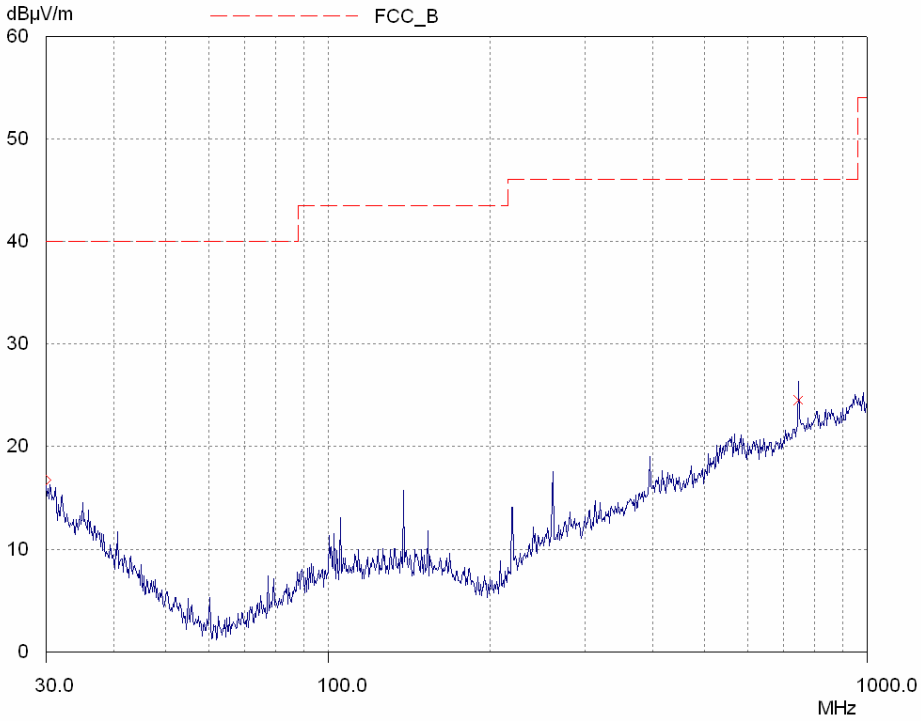
DCCF = 20 Log 0.0368

DCCF = -28.68

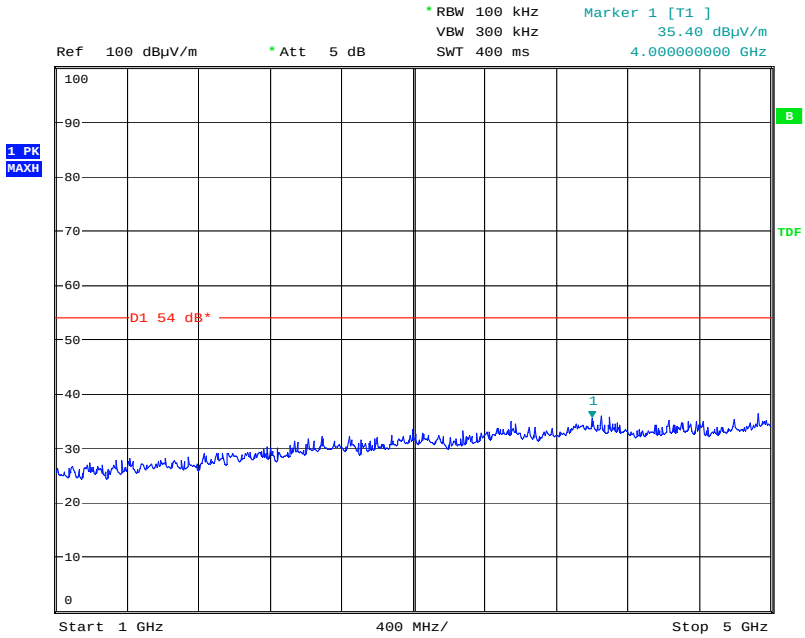
Maximum Applicable DCCF = -20 dB

ANNEX G

RECEIVER EMISSIONS GRAPH(s)



30MHz – 1GHz



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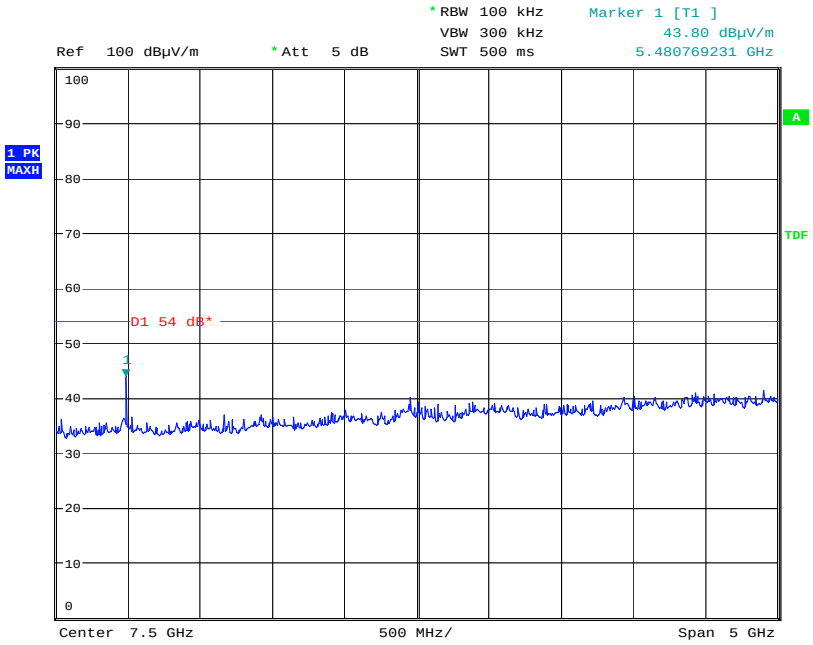
1GHz – 5GHz



Date: 9.APR.2009 14:50:57

5GHz – 10GHz