

**REPORT ON THE CERTIFICATION TESTING OF A
COMARK Ltd
RF515
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.247 July 2008
INTENTIONAL RADIATOR SPECIFICATION**

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COMARK Ltd
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WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.247 July 2008
INTENTIONAL RADIATOR SPECIFICATION**

TRaC
testing regulatory and compliance

TEST DATE: 6th – 9th April 2009

TESTED BY: _____ D WINSTANLEY

APPROVED BY: _____ J CHARTERS
RADIO PRODUCT
MANAGER

DATE: _____

Distribution:

- Copy Nos:
1. Comark Ltd
 2. FCC EVALUATION LABORATORIES
 3. 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.

UP HOLLAND

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Notes:		
1. Component failure during test	YES	<input type="checkbox"/>
	NO	<input checked="" type="checkbox"/>
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: TVHRF515

PURPOSE OF TEST: Certification

TEST SPECIFICATION: FCC RULES CFR 47, Part 15.247 July 2008

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: RF515

EQUIPMENT TYPE: Digital Spread Spectrum Transmitter

PRODUCT USE: Temperature Monitor

CARRIER EMISSION: 0.00147 Watts

ANTENNA TYPE: Unique Antenna Connector

ANTENNA GAIN: 2.1 dBi Maximum Gain Antenna

FREQUENCY OF OPERATION: 2405 MHz

CHANNEL SPACING: N/A Wideband Channel

NUMBER OF CHANNELS: 1

FREQUENCY GENERATION: SAW Resonator ☐ Crystal ☐ Synthesiser ☒

MODULATION METHOD: FHSS ☐ DSSS ☒ Other ☐

POWER SOURCE(s): 1.5Vdc or 110Vac

TEST DATE(s): 6th – 9th April 2009

ORDER No(s): SO6736

APPLICANT: Comark Ltd

ADDRESS: Comark House
Gunnels Wood Park
Gunnels Wood Road
Stevenage
Hertfordshire
SG1 2TS
United Kingdom

TESTED BY: _____ D WINSTANLEY

APPROVED BY: _____ J CHARTERS
RADIO
PRODUCT
MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	RF515		
EQUIPMENT TYPE:	Digital Spread Spectrum Transmitter		
PURPOSE OF TEST:	Certification		
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.247 July 2008		
TEST RESULT:	COMPLIANT	Yes No	[X] []
APPLICANT'S CATEGORY:	MANUFACTURER IMPORTER DISTRIBUTOR TEST HOUSE AGENT		[X] [] [] [] []
APPLICANT'S ORDER No(s):	SO6736		
APPLICANT'S CONTACT PERSON(s):	Mr P Morrison		
E-mail address:	paulmorrison@comarkltd.com		
APPLICANT:	Comark Ltd		
ADDRESS:	Comark House Gunnels Wood Park Gunnels Wood Road Stevenage Hertfordshire SG1 2TS United Kingdom		
TEL:	+44 (0) 1483 367367		
FAX:	+44 (0) 1483 367400		
EUT(s) COUNTRY OF ORIGIN:	United Kingdom		
TEST LABORATORY:	TRaC Telecoms & Radio		
UKAS ACCREDITATION No:	0728		
TEST DATE(s)	6 th – 9 th April 2009		
TEST REPORT No:	8F2025Q1		

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.247(b)	Peak	Yes
	Intentional Emission Field Strength:	-	-	No
	Intentional Emission Band Occupancy:	15.247(a)	Peak	Yes
	Intentional Emission ERP (mW):	15.247(b)	Peak	Yes
	Spurious Emissions – Conducted:	15.247(b)	Peak	Yes
	Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	Yes (Note 1)
	Spurious Emissions – Radiated >1000MHz:	15.209	Average	Yes (Note 1)
	Spectral power Density	15.247(e)	Peak	Yes
	Spurious Emission – Power Line TX	15.207	Quasi Peak Average	Yes
	Spurious Emission – Power Line TX	15.107	Quasi Peak 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

Note 1: The Manufacturer States that this unit is not intended to be operated within 20cm of the body.

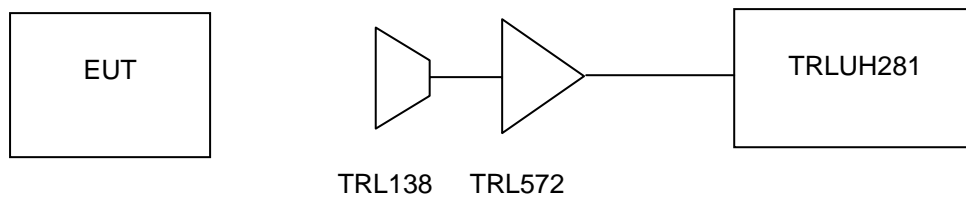
- | | | |
|--|--|---|
| 2. | Product Use: | Temperature Monitor |
| 3. | Emission Designator: | 1k49F1D |
| 4. | Duty Cycle: | <100% |
| 5. | Transmitter bit or pulse rate and level: | 250Kbps |
| 6. | Temperatures: | Ambient (Tnom) 20°C |
| 7. | Supply Voltages: | Vnom +1.5Vdc
+110Vac |
| Note: Vnom voltages are as stated above unless otherwise shown on the test report page | | |
| 8. | Equipment Category: | Single channel [X]
Multi-channel [] |
| 9. | Channel spacing: | Narrowband []
Wideband [X] |

TRANSMITTER TESTS

TRANSMITTER 6dB BANDWIDTH – RADIATED – PART 15.247(a)(2)

Ambient temperature	=	20°C(<1GHz)	3m measurements	[X]
Relative humidity	=	48% (<1GHz),	1m measurements	[]
Conditions	=	Open Area Test Site (OATS)		
Supply voltage	=	+110Vac		
Channel number	=	1		

Diagram



Frequency (MHz)	F _{LOWER} (MHz)	F _{HIGHER} (MHz)	Occupied Bandwidth (MHz)	Limits (kHz)
2405 MHz	2404.243269	2405.892808	1.49	>500 kHz

Notes: 1 See Annex E for Emissions Graph(s)

Test Method: 1 The 6db bandwidth was recorded with the EUT Actively Transmitting Data

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

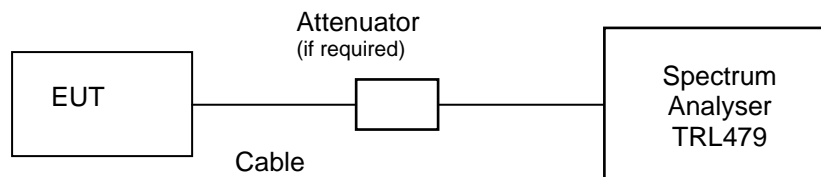
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010 - 3580	138	X
PRE AMPLIFIER	AGILENT	8449B	3008A016	572	X
SPECTRUM ANALYSER	R & S	FSU	200034	UH281	X

TRANSMITTER TESTS

TRANSMITTER - MAXIMUM PEAK POWER - CONDUCTED - PART 15.247(B)(3)

Ambient temperature = 20°C
Relative humidity = 48%
Conditions = Radio Lab
Supply voltage = +110vac

Diagram



Frequency MHz	Peak Power dBm	Peak Power Watts	Antenna Gain dBi	Average Power Watts	Limit Watts
2404.590	-0.42	0.000907	2.1	0.00147	1

Notes:

- 1 Gain of antenna 2.1dBi, maximum gain antenna supplied by manufacturer.
- 2 For analyser plot see annex F.

Test Method:

- 1 The EUT was connected to the spectrum analyser via the unique antenna connector a cable and attenuator - if applicable.
- 2 The EUT was operated in transmit mode with modulation.
- 3 The level on the analyser was recorded.
- 4 The resolution bandwidth of the analyser was set to > than the 6dB bandwidth
- 5 The analyser level is offset to take the antenna gain (2.1dBi) & cable loss into account.

Test equipment used for Peak Power measurement:

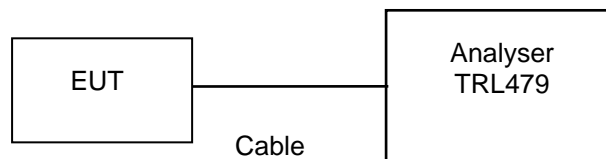
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X

TRANSMITTER TESTS

TRANSMITTER POWER SPECTRAL DENSITY – CONDUCTED - PART 15.247(E)

Ambient temperature = 20°C
Relative humidity = 48%
Conditions = Radio Lab
Supply voltage = +110Vac

Diagram



Frequency	Measured Power Spectral Density	Limit
2404.534 MHz	-9.07 dBm	+8 dBm

Notes: 1 For analyser plots see annex G.

Test Method:

- 1 The EUT was connected to the analyser via the unique antenna connector & a cable
- 2 The resolution bandwidth on the analyser was set to 3kHz and trace set to max hold.
- 3 The span is set to 3MHz
- 4 The sweep time is 1000 seconds (Span/3kHz).
- 5 The analyser level is offset to take the antenna gain (2.1dBi) & cable loss into account.

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	X

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – Part 15.247(c) and 15.209

Ambient temperature	=	18°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	58% (<1GHz),	3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 1m	[]
Supply voltage	=	+110Vac		

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 - 25GHz	4810.993 7214.116	37.80 34.11	1.80 2.10	32.70 35.80	34.90 35.10	37.34 36.91	- -	73.62 70.06	500 500
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 25GHz		500μV/m @ 3m						

Notes:

- Results quoted are extrapolated as indicated.
- Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a.
- Measurements >1GHz @ 3m as per Part 15.31f(1).
- Receiver detector >1GHz = CISPR, Quasi-Peak, 120kHz bandwidth.
- Receiver detector >1GHz = Average, 1MHz resolution bandwidth, Peak for scans.
- New batteries used for battery-powered products.
- Initial pre scans were performed see Annex H for plots.
- Only emissions with in 20dB of limit are recorded.
- Emissions not directly related to the transmitter are reported under receiver tests.
- Peak Measurements taken and were not more than 20 dB above the average limit

Test Method:

- As per Radio – Noise Emissions, ANSI C63.4: 2003
- Measuring distances as Notes 1 to 4 above
- EUT 0.8 metre above ground plane
- 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 orthogonal 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
HORN ANTENNA	EMCO	3115	9010 - 3581	139	
RECEIVER	R & S	ESVS 10	855594/003	352	X
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	
PRE AMPLIFIER	AGILENT	8449B	3008A016	572	X
RECEIVER	R & S	ESHS 10	830051/001	UH03	
RECEIVER	R & S	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	X
BILOG ANTENNA	YORK	CBL6111	1519	UH70	X
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
RECEIVER	R & S	ESVS 10	841431/014	UH186	
RECEIVER	R & S	ESHS 10	841429/012	UH187	
BILOG ANTENNA	YORK	CBL611/A	1618	UH191	
SPECTRUM ANALYSER	R & S	FSU	200034	UH281	X
30 MHz – 1GHz PRE-APMLIFIER	WATKINS JOHNSON	6201-69	2740	UH372	X

TRANSMITTER TESTS

TRANSMITTER BAND EDGE EMISSIONS – RADIATED – Part 15.247(c)

Ambient temperature = 18°C
 Relative humidity = 48%
 Conditions = Radiated OATS
 Supply voltage = +110Vac

Test Result

Channel Frequency	Emission Frequency (MHz)	Emission Level	Limit
Bottom	2399.864 MHz	-37.08 dBc	-20 dBc
Top	No Significant Emissions Within 20 dB of Limit		54 dBµV/m @ 3m

See spectrum analyser scan plots – Annex I

Measure as compliant see analyser plots

Notes:
 1 The EUT was set in a hopping mode using all hopping channels.
 2 See Annex I for analyser plots.

Test Method:
 1 As per section 15.247
 2 A plot covering the lowest channel and band edge was taken. A marker was set on the peak emission of the lowest channel. The delta marker function was then used to measure the highest out of band emissions. (If no peaks exist outside the band the level is taken at the band edge).
 3 A plot covering the highest channel and band edge was taken. A marker was set on the peak emission of the highest channel. The delta marker function was then used to measure the highest out of band emissions. (If no peaks exist outside the band the level is taken at the band edge).

The test equipment used for the tests is shown below:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	ROHDE & SCHWARZ	ESHS 10	825892/006	UH04	
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU46	200034	UH281	X
RANGE 1	TRL	3 METRE	N/A	UH06	
BILOG ANTENNA	CHASE	CBL6112B	2803	UH93	
HORN ANTENNA	EMCO	3115	9010-3580	138	X
PRE APMLIFIER	AGILENT	8449B	3008A016	572	X

TRANSMITTER and RECEIVER TESTS

CONDUCTED EMISSIONS – AC POWER LINE Parts 15.207 & 15.107

Ambient temperature = 18°C
Relative humidity = 48%
Conditions = Radiated OATS
Supply voltage = +110Vdc

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
0.205	35.21	Average	Neutral	53.41
0.240	39.92	Average	Neutral	51.10

Notes:

- 1 See attached plot annex J
- 2 EUT transmitting Carrier 1 per second and in permanent RX mode.
- 3 Worst-case result recorded.

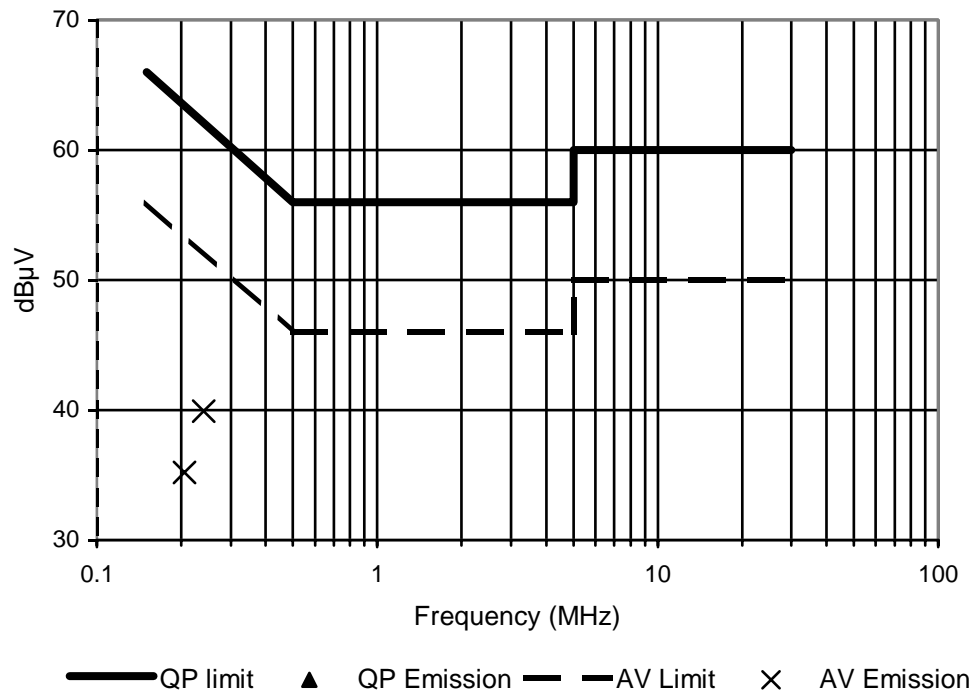
Test Method:

- 1 As per Radio – Noise Emissions, ANSI C63.4: 2003

The test equipment used for the Transmitter Conducted Emissions – AC Power Line Part 15.207 test was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	863906/018	UH05	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	841429/012	UH187	X
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	8407 31/015	UH195	X

POWER LINE CONDUCTION EMISSIONS



RECEIVER TESTS

UNINTENTIONAL RADIATED EMISSIONS– Part 15.109

Ambient temperature	=	17°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	=	+1.5Vdc		

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 6
0.49MHz - 1.705MHz									Note 6
1.705MHz - 30MHz									Note 6
30MHz - 88MHz									Note 6
88MHz - 216MHz									Note 6
216MHz - 960MHz									Note 6
960MHz - 1GHz									Note 6
1GHz - 16.3GHz									Note 6
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 16.3GHz		500µV/m @ 3m						

Notes:

- Results quoted are extrapolated as indicated
- Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a
- Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
- Receiver detector >1GHz = Average, 1MHz resolution bandwidth
- New batteries used for battery-powered products.
- Only emissions within 20 dB of the limit are recorded.
- See Annex K for emissions plots

Test Method:

- As per Radio – Noise Emissions, ANSI C63.4: 2003
- Measuring distances as Notes 1 to 4 above
- EUT 0.8 metre above ground plane
- 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 orthogonal 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
HORN ANTENNA	EMCO	3115	9010 - 3581	139	
RECEIVER	R & S	ESVS 10	855594/003	352	X
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	
PRE AMPLIFIER	AGILENT	8449B	3008A016	572	X
RECEIVER	R & S	ESHS 10	830051/001	UH03	
RECEIVER	R & S	ESVS 10	825892/003	UH04	
RANGE 1	TRL	3 METRE	N/A	UH06	X
BILOG ANTENNA	YORK	CBL6111	1519	UH70	X
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
RECEIVER	R & S	ESVS 10	841431/014	UH186	
RECEIVER	R & S	ESHS 10	841429/012	UH187	
BILOG ANTENNA	YORK	CBL611/A	1618	UH191	
SPECTRUM ANALYSER	R & S	FSU	200034	UH281	X
30 MHz – 1GHz PRE-APMLIFIER	WATKINS JOHNSON	6201-69	2740	UH372	X

ANNEX A
PHOTOGRAPHS



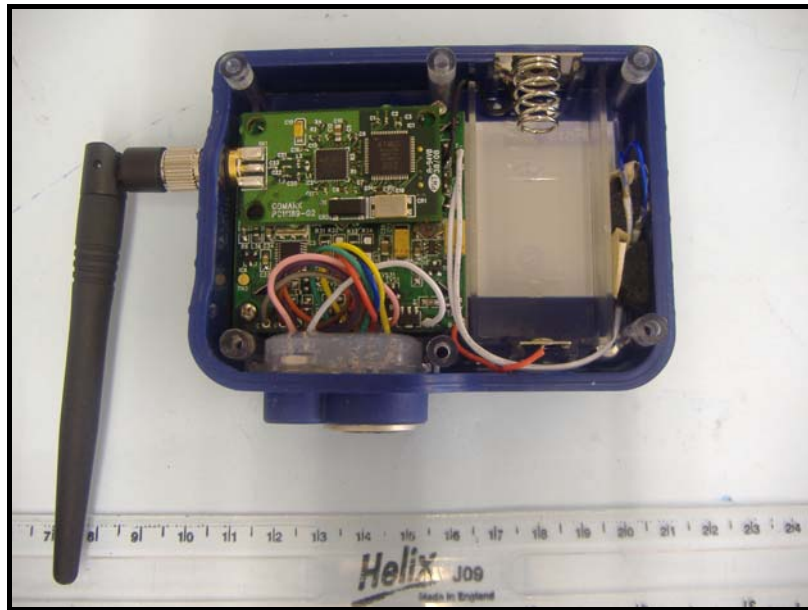
PHOTOGRAPH No. 2

TRANSMITTER FRONT VIEW



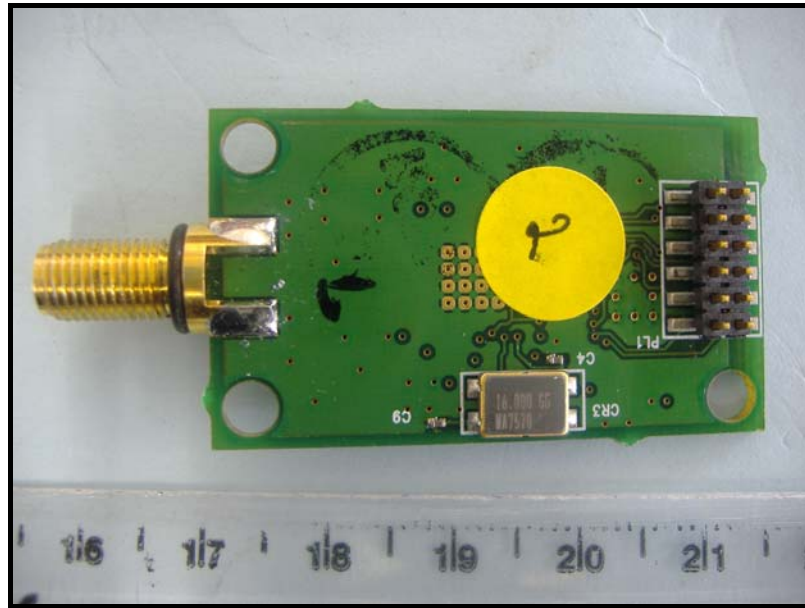
PHOTOGRAPH No. 3

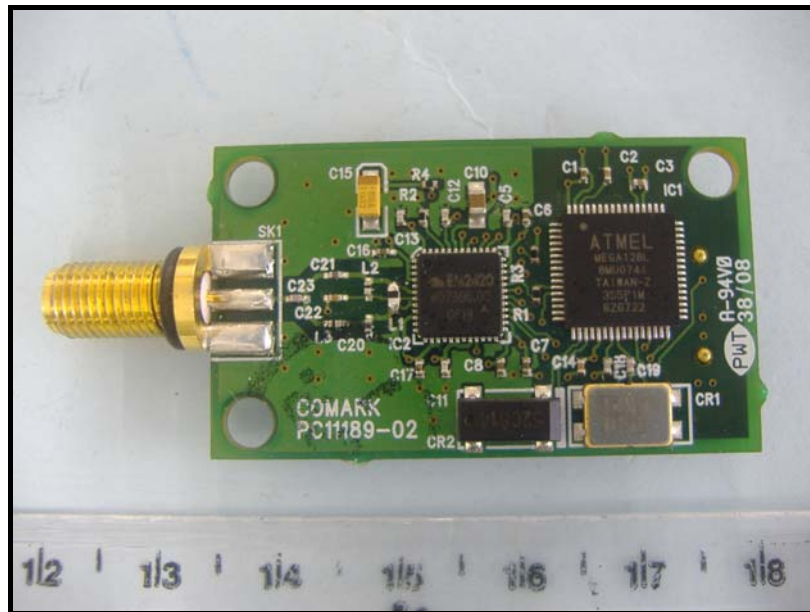
TRANSMITTER OPEN OVERVIEW



PHOTOGRAPH No. 4

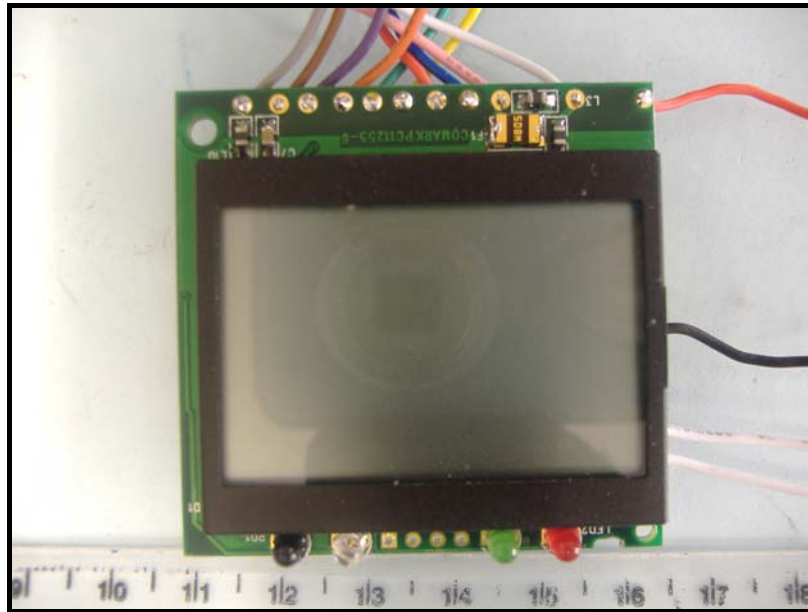
TRANSMITTER PCB TRACK SIDE





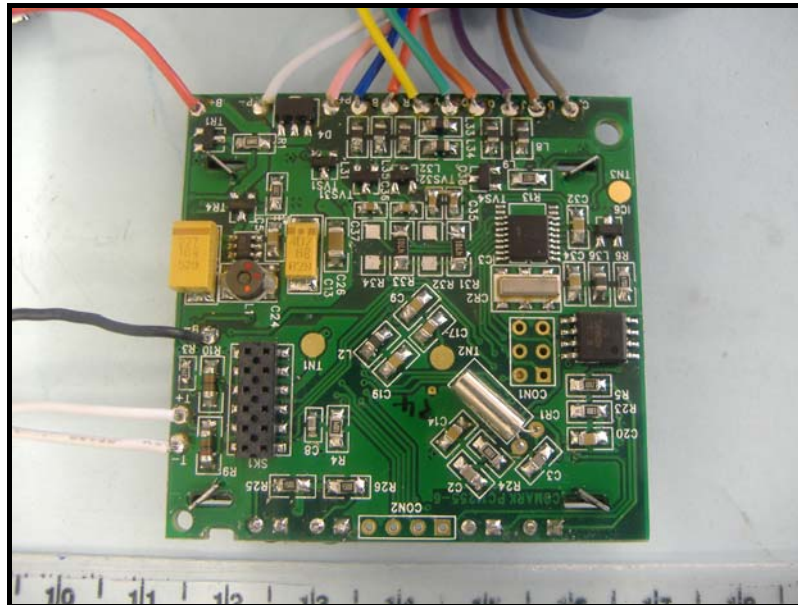
PHOTOGRAPH No. 6

CONTROL PCB LCD SIDE



PHOTOGRAPH No. 7

CONTROL PCB TRACK 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	[]
		-	Rx	[X]
		-	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

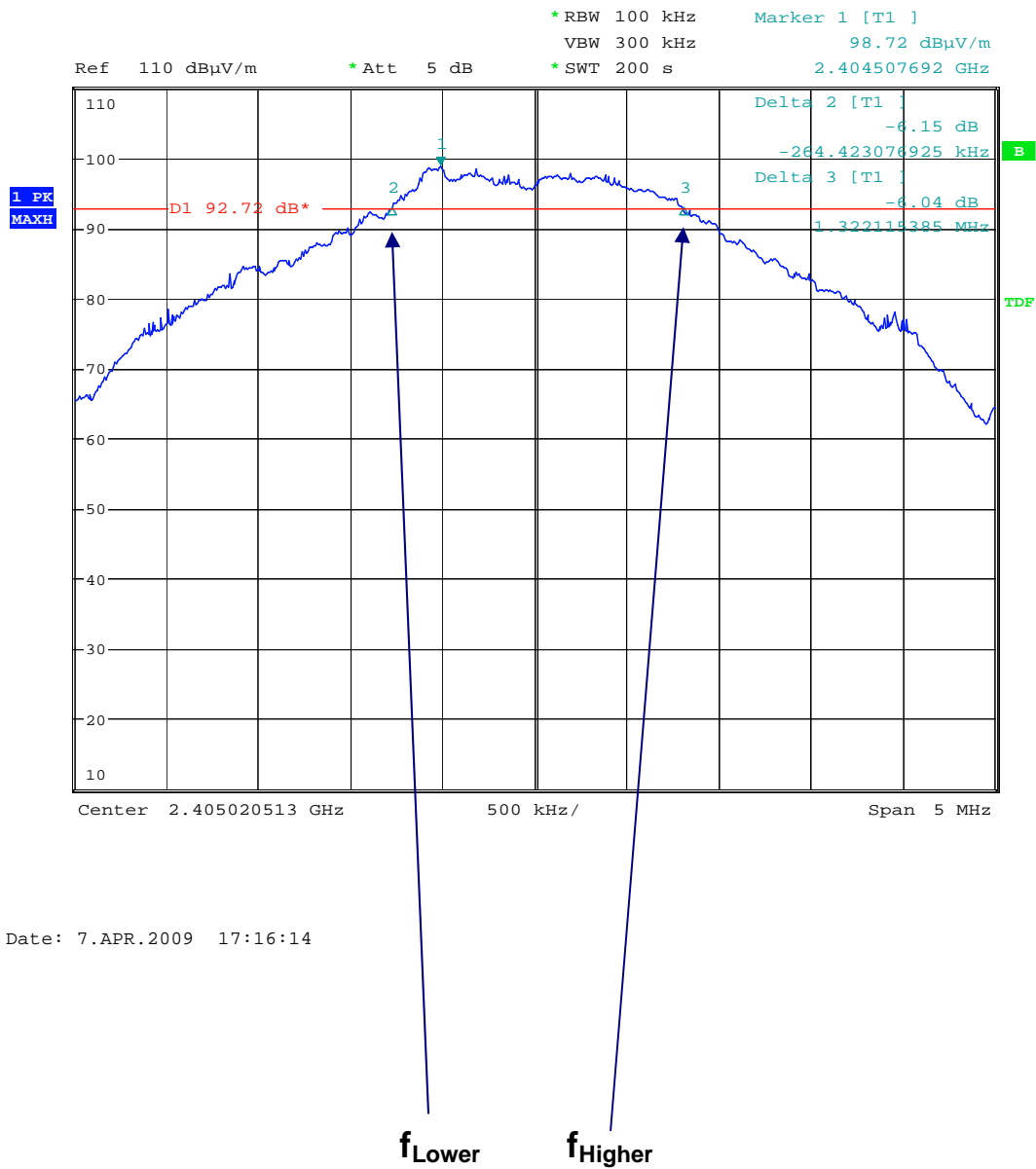
Uncertainty in test result = **7.98%**

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
UH195	LISN	R&S	19/01/2009	12	19/01/2010
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
L479	Analyser	Anritsu	22/09/2008	12	22/09/2009
L572	Pre Amplifier	Agilent	04/07/2008	12	04/07/2009

ANNEX E
6dB BANDWIDTH PLOT

BANDWIDTH PLOT

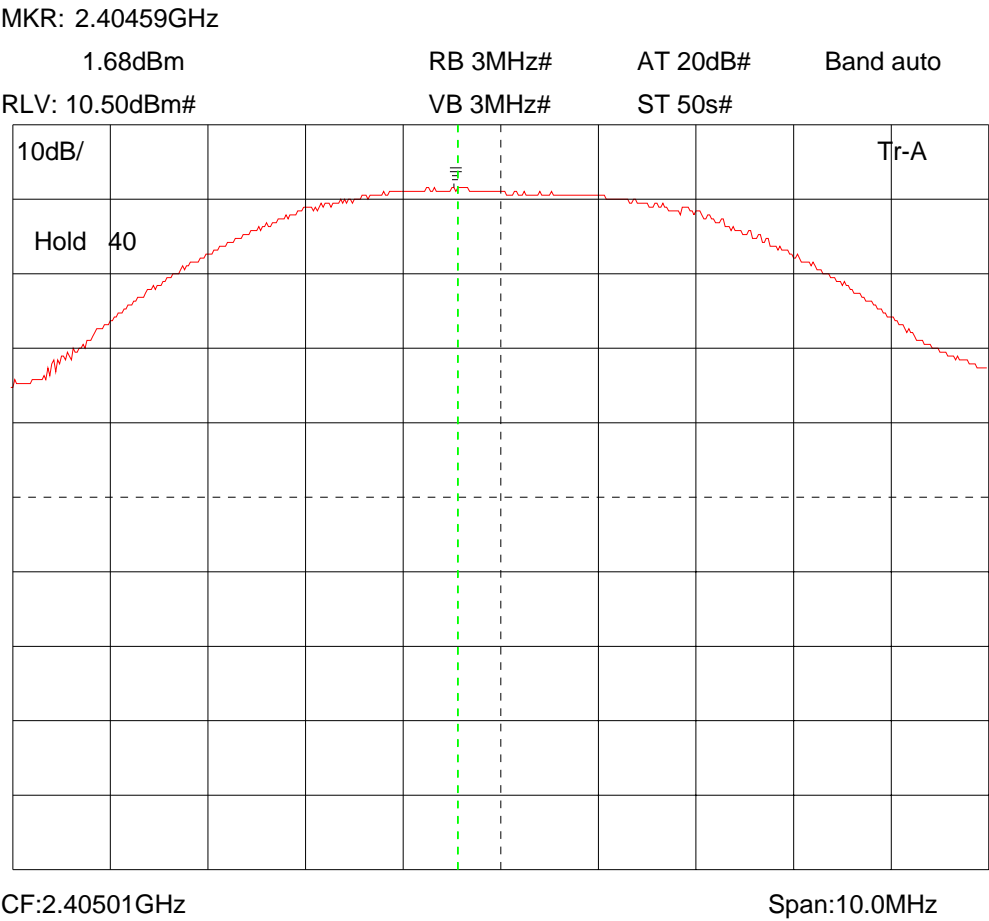


Date: 7.APR.2009 17:16:14

f_{Lower} = 2404.243269 MHz
 f_{Higher} = 2405.892808 MHz
Occupied Bandwidth = 1.49 MHz

ANNEX F
PEAK OUTPUT POWER

OUTPUT POWER



ANNEX G
POWER SPECTRAL DENSITY

POWER SPECTRAL DENSITY

MKR: 2.404534GHz

-9.07dBm

RB 3kHz#

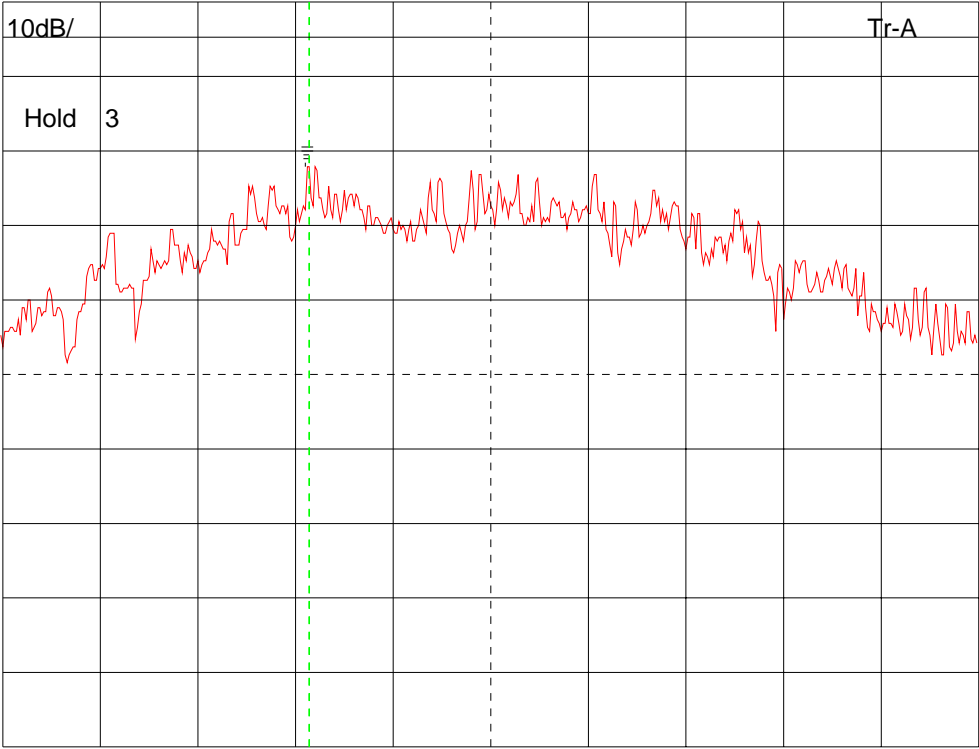
AT 20dB#

Band auto

RLV: 13.20dBm#

VB 10kHz

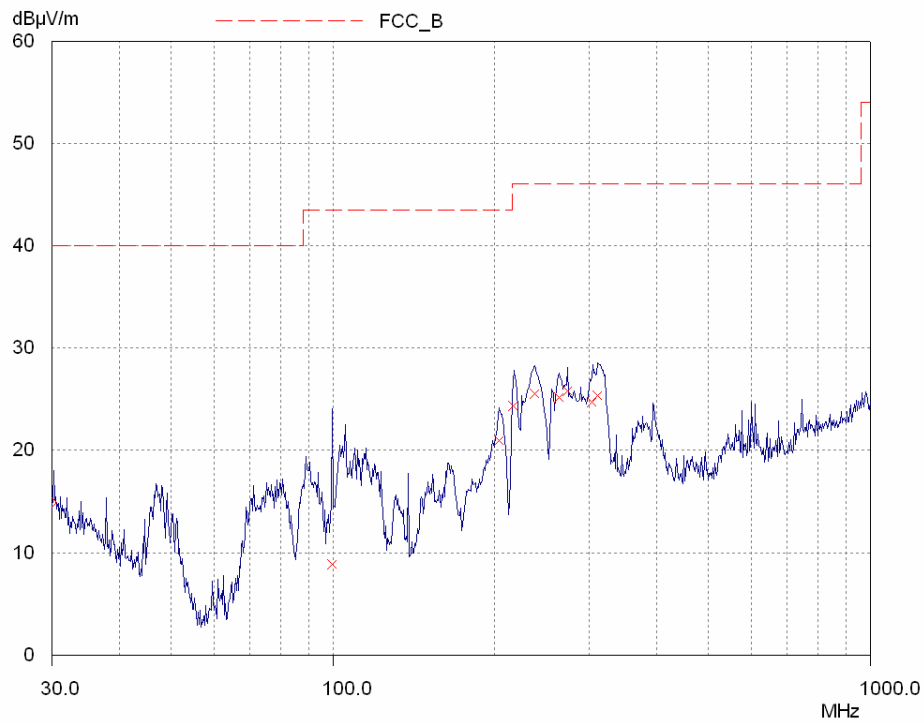
ST 1000s#



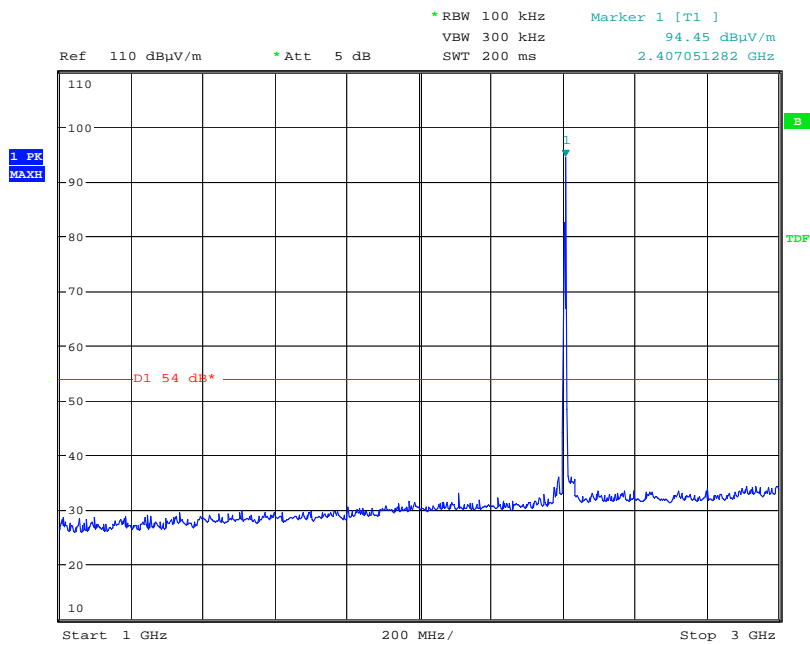
CF:2.405092GHz

Span:3.00MHz

ANNEX H
INTENTIONAL RADIATED EMISSIONS

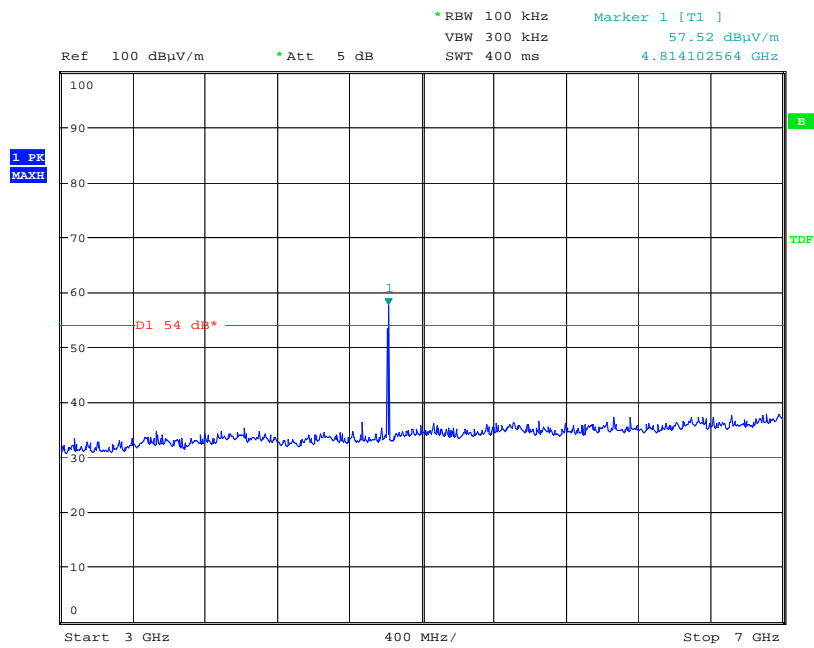


30 MHz – 1 GHz



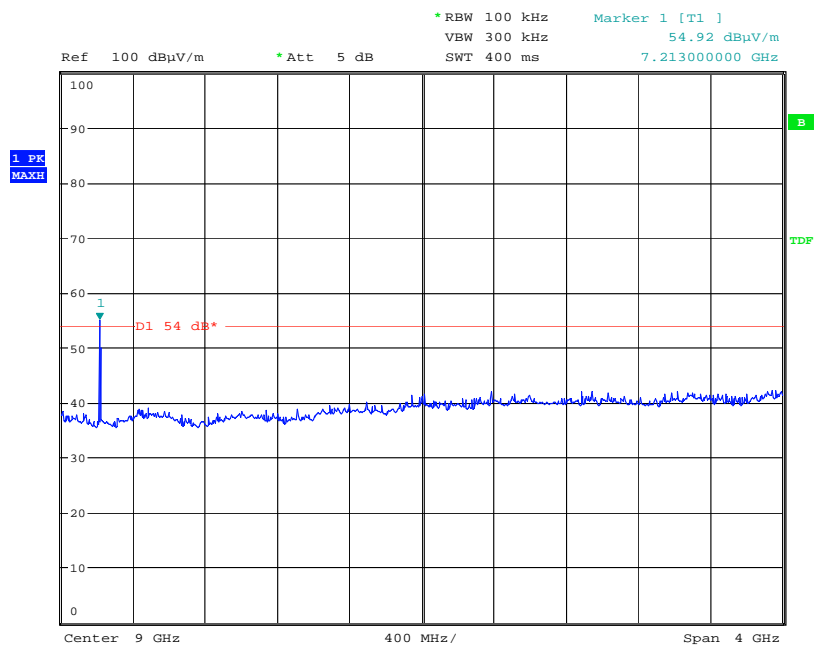
Date: 7.APR.2009 16:47:31

1 GHz – 3 GHz



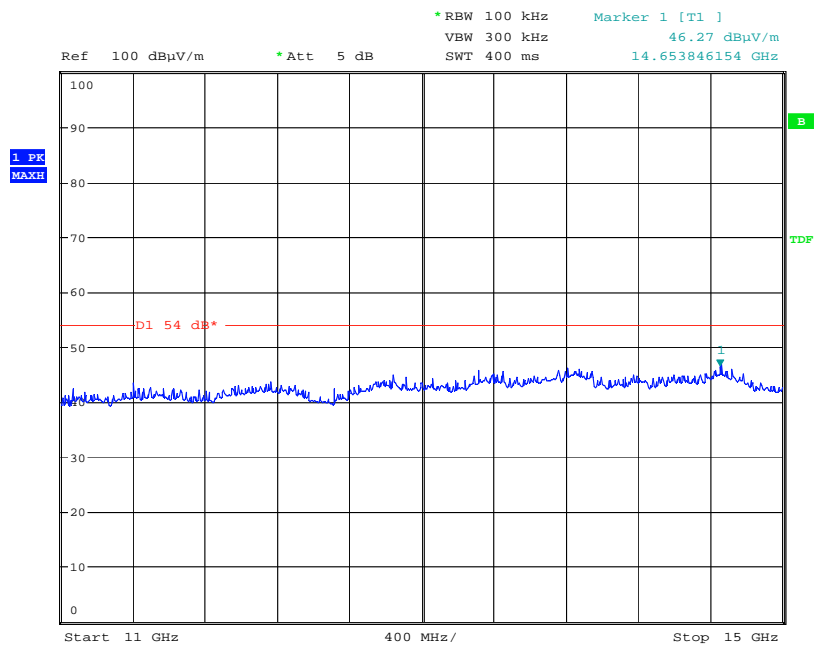
Date: 7.APR.2009 16:45:46

3 GHz – 7 GHz



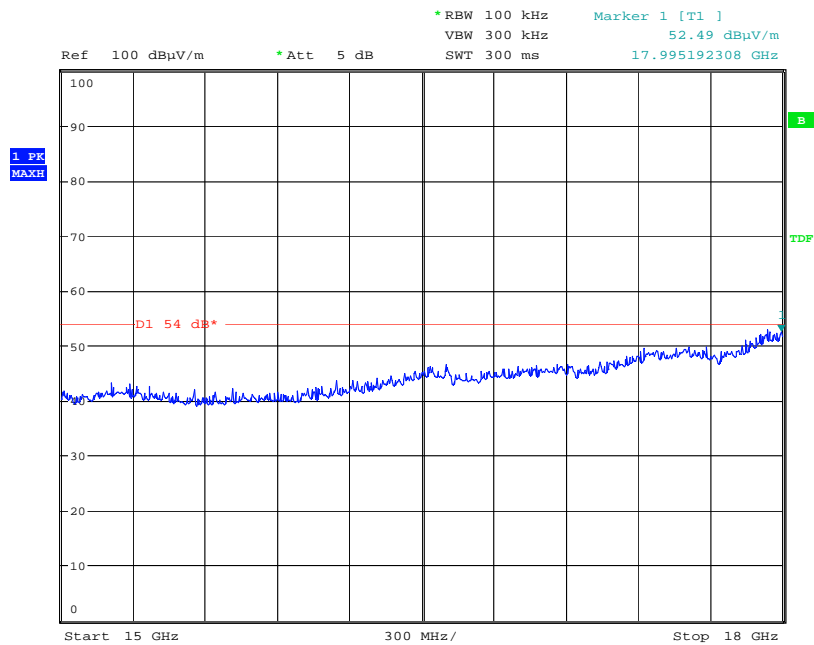
Date: 7.APR.2009 16:44:55

7 GHz – 11 GHz



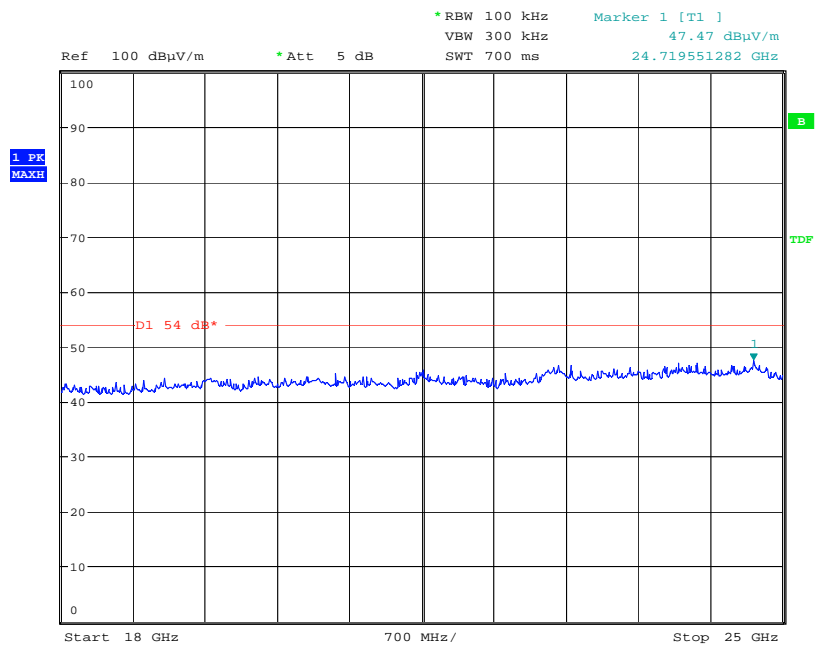
Date: 7.APR.2009 16:43:24

11 GHz – 15 GHz



Date: 7.APR.2009 16:43:00

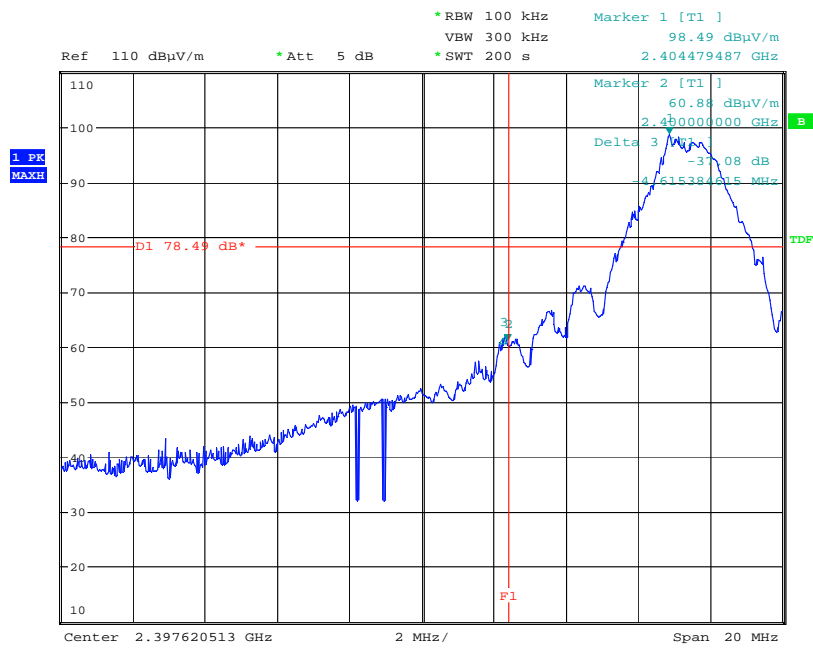
15 GHz – 18 GHz



Date: 9.APR.2009 10:14:57

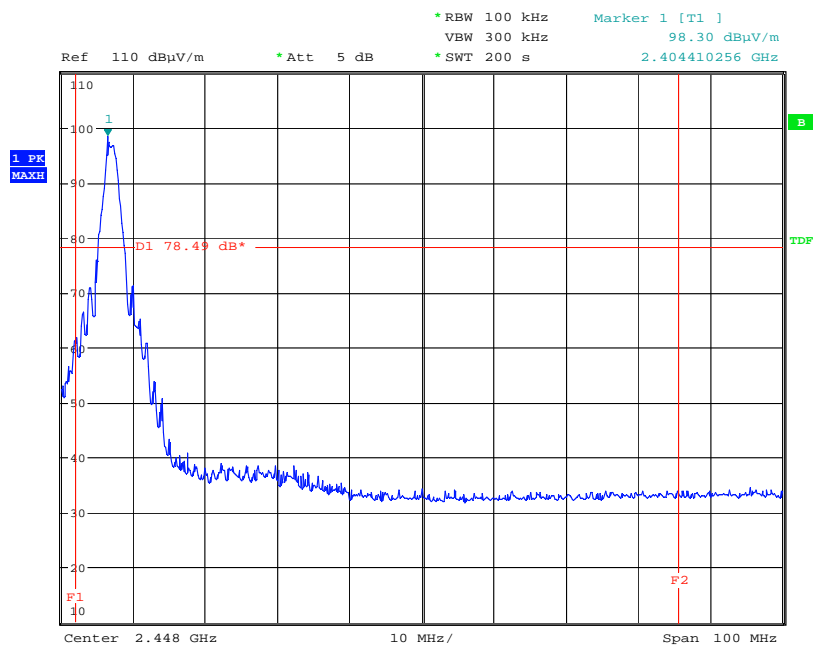
18 GHz – 25 GHz

ANNEX I
RADIATED BANDEDGE COMPLIANCE



Date: 7.APR.2009 17:23:35

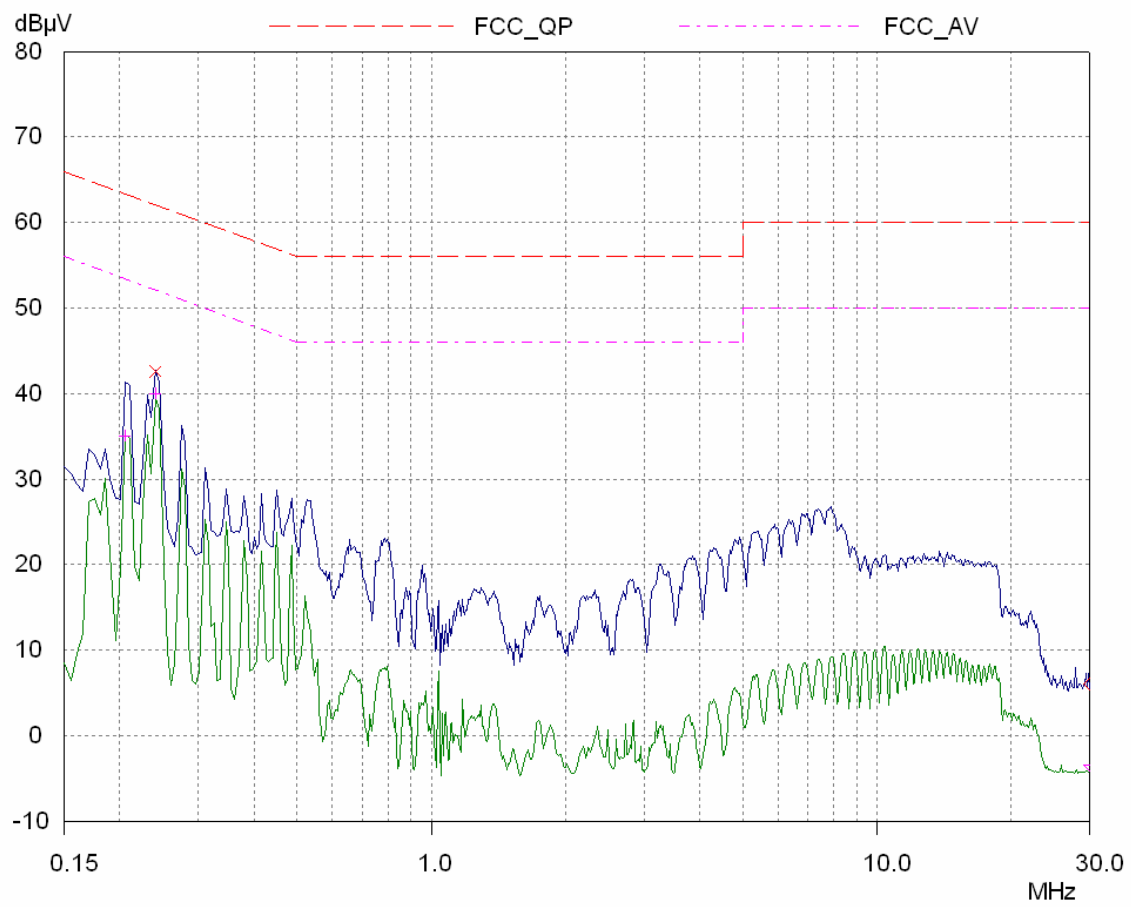
Lower bandedge Compliance



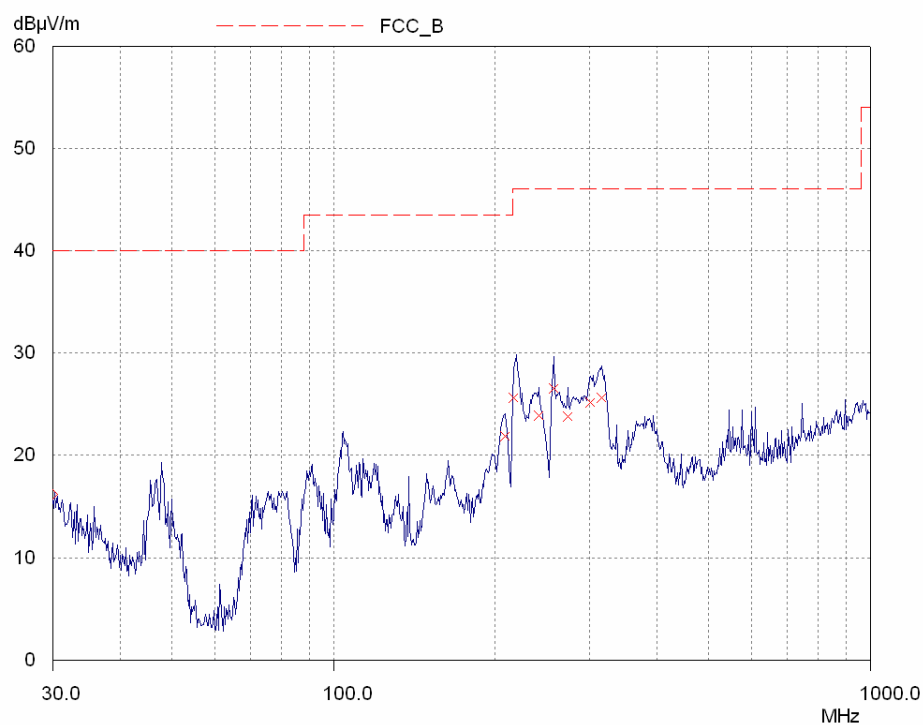
Date: 7.APR.2009 17:35:00

Upper bandedge Compliance

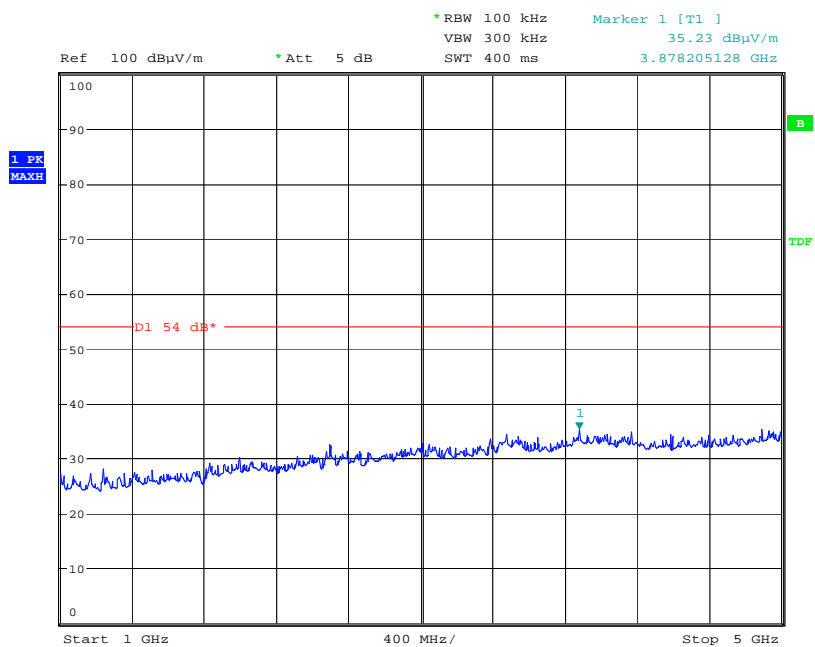
ANNEX J
POWER LINE CONDUCTION



ANNEX K
UNINTENTIONAL RADIATED EMISSIONS

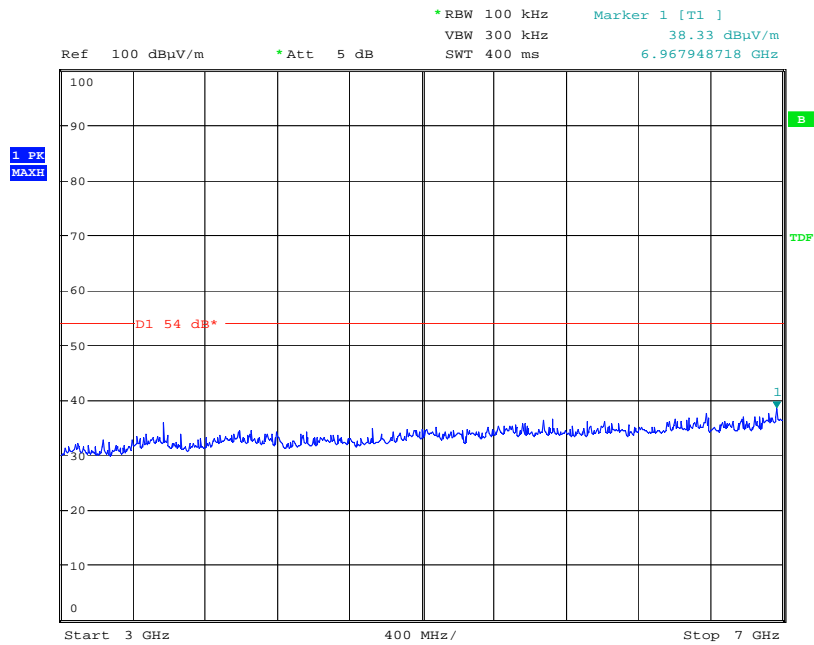


30 MHz – 1 GHz



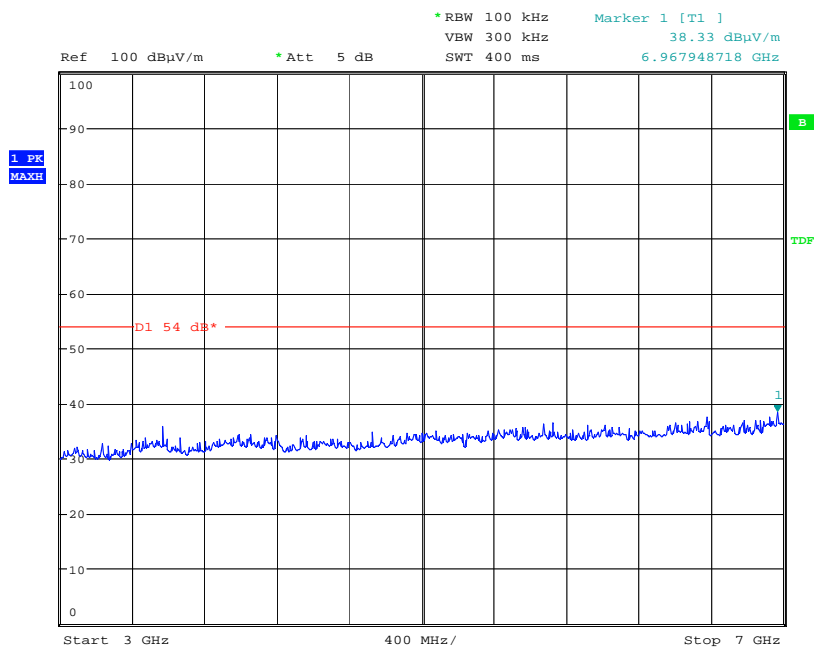
Date: 7.APR.2009 16:33:08

1 GHz – 3 GHz



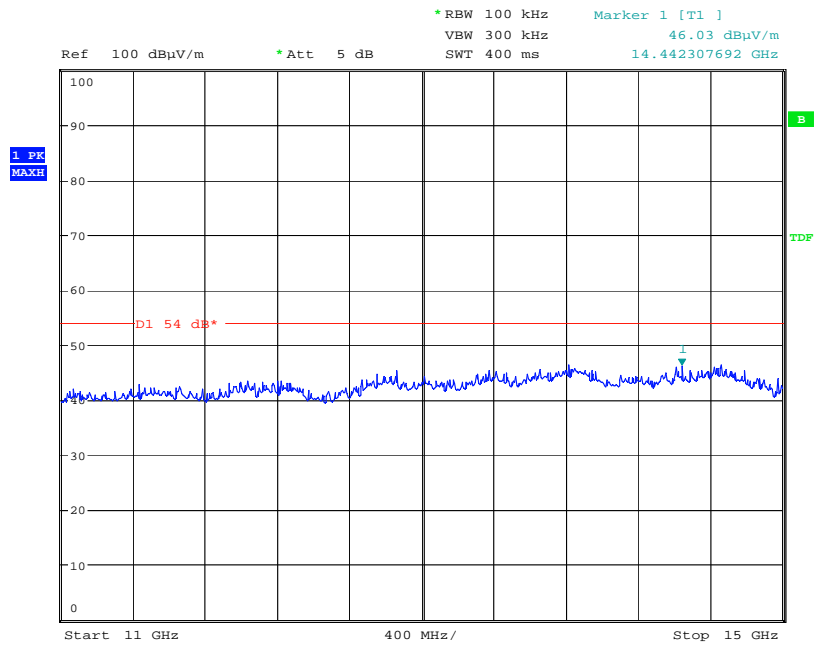
Date: 7.APR.2009 16:33:29

3 GHz – 7 GHz



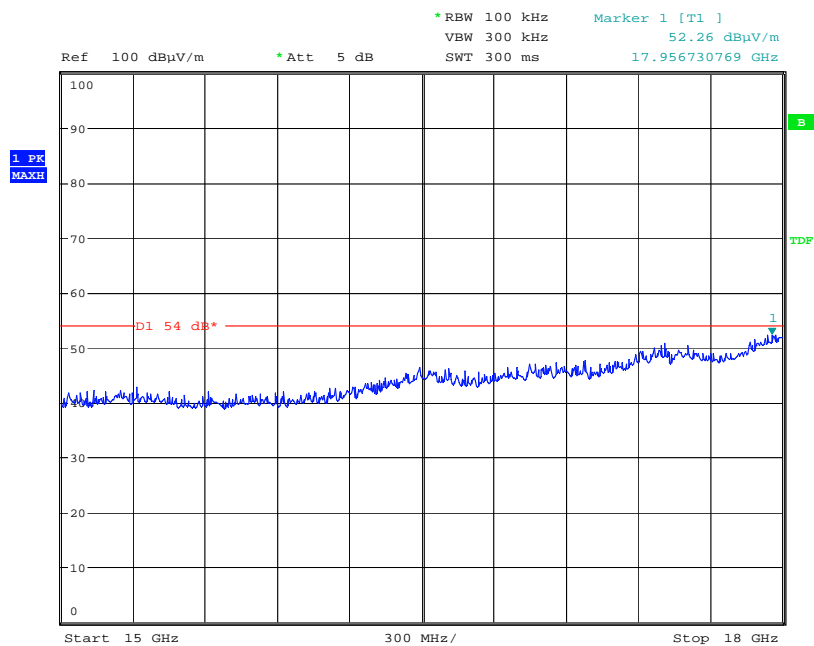
Date: 7.APR.2009 16:33:29

7 GHz – 11 GHz



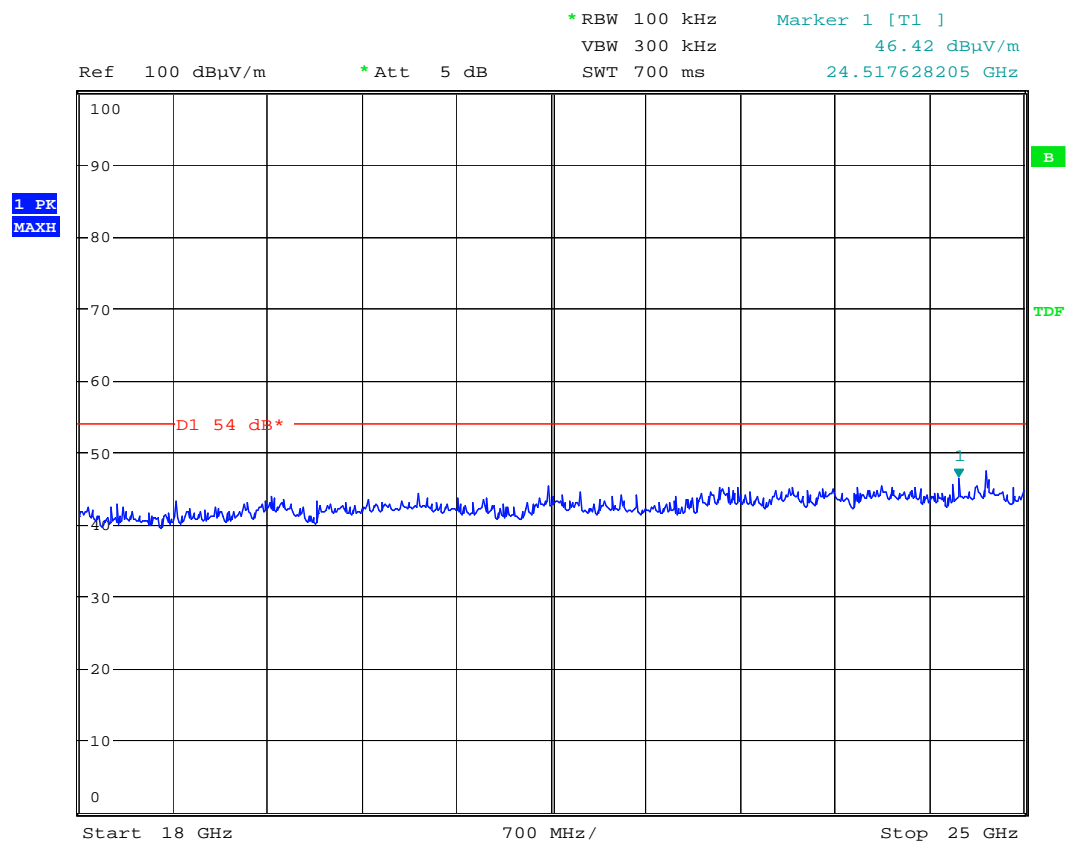
Date: 7.APR.2009 16:35:43

11 GHz – 15 GHz



Date: 7.APR.2009 16:34:15

15 GHz – 18 GHz



Date: 9.APR.2009 10:13:43

18 GHz – 25 GHz