REPORT ON THE CERTIFICATION TESTING OF A
COMARK Ltd
RF500Lite
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.247 July 2008
INTENTIONAL RADIATOR SPECIFICATION

TEST REPORT NO: RU1538/8939

COPY NO: 1

ISSUE NO: 1

FCC ID: TVHRF500Lite

REPORT ON THE CERTIFICATION TESTING OF A
COMARK Ltd
RF500 RF500Lite
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.247 July 2008
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 18th – 24th November 2008

TESTED BY: S HODGKINSON — Digitally signed by S HODGKINSON DN: CN = S HODGKINSON, C = GB, O = TRL COMPLIANCE LTD Reason: I am the author of this document Date: 2009.01.05 11:06:47 Z — S HODGKINSON

APPROVED BY: John Charters — Digitally signed by John Charters DN: CN = John Charters, C = GB, O = TRL Compliance Ltd Reason: I am approving this document Date: 2009.01.05 13:06:39 Z — J CHARTERS RADIO SECTION LEADER

DATE: 5th January 2009

Distribution:

Copy Nos:
1. Comark Ltd
2. TCB: TRL COMPLIANCE Ltd
3. TRL Compliance Ltd

UKAS TESTING 0728
Moss View, Nipe Lane, Up Holland, West Lancashire, WN8 9PY, UK.
T +44 (0)1695 556666
F +44 (0)1695 557077
E test@trlcompliance.com

CONTENTS

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.

TRL Compliance
part of TRAC global

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	TVHRF500Lite					
PURPOSE OF TEST:	Certification					
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.247 July 2008					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	RF500Lite					
ITU: EMISSION CODE:	1M58F1D					
EQUIPMENT TYPE:	Temperature Monitor					
CARRIER EMISSION:	0.0106W e.i.r.p.					
ANTENNA TYPE:	Unique Antenna Connector					
GAIN ANTENNA:	7.0 dBi Maximum Gain antenna					
FREQUENCY OF OPERATION:	2.404GHz					
CHANNEL SPACING:	N/A Wideband channel					
NUMBER OF CHANNELS:	1					
FREQUENCY GENERATION:	SAW Resonator	[ ]	Crystal	[ ]	Synthesiser	[X]
MODULATION METHOD:	FHSS	[ ]	DSSS	[X]	Other	[ ]
POWER SOURCE(s):	+110Vac					
TEST DATE(s):	18th -24th November 2008					
ORDER No(s):	506627					
APPLICANT:	Comark Ltd.					
ADDRESS:	Comark House Gunnels Wood Park Gunnelswood Road Stevenage Heartforshire SG1 2TS United Kingdom					

TESTED BY: S HODGKINSON — Digitally signed by S HODGKINSON
DN: CN = S HODGKINSON, C = GB, O = TRL COMPLIANCE LTD
Reason: I am the author of this document
Date: 2009.01.05 11:07:01 Z

S HODGKINSON

APPROVED BY: John Charters — Digitally signed by John Charters
DN: CN = John Charters, C = GB, O = TRL Compliance Ltd
Reason: I am approving this document
Date: 2009.01.05 13:07:02 Z

J CHARTERS
RADIO SECTION LEADER

TRAC

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	RF500Lite
EQUIPMENT TYPE:	Wireless monitoring system
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.247 July 2008
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	506627
APPLICANT'S CONTACT PERSON(s):	Mr P Morrison
E-mail address:	paulmorrison@comarkltd.com
APPLICANT:	Comark Ltd
ADDRESS:	Comark House Gunnels Wood Park Gunnelswood Road Stevenage Heartforshire SG1 2TS United Kingdom
TEL:	+44 1483 367367
FAX:	+44 1483 367400
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL Compliance Ltd
UKAS ACCREDITATION No:	0728
TEST DATE(s):	18th -24th November 2008
TEST REPORT No:	RU1538/8939

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
Intentional Emission Frequency:	15.247	Peak	Yes
Intentional Emission Field Strength:	-	-	No
Intentional Emission Band Occupancy:	15.247(a)1	Peak	Yes
Intentional Emission EIRP (mW):	15.247(b)1	Peak	Yes
Spurious Emissions – Conducted:	15.207	Quasi Peak Average	Yes
Spurious Emissions – Conducted:	15.247	Peak	Yes
Spurious Emissions – Radiated <1000MHz:	15.209 ,15.247	Quasi Peak	Yes
Spurious Emissions – Radiated >1000MHz:	15.247 15.209	Peak average	Yes
Transmitter Carrier Frequency Separation:	15.247(a)(1)	Peak	Yes
Transmitter Maximum Peak Power Output Power:	15.247(b)(1)	Peak	Yes
Transmitter Band Edge Conducted Emissions:	15.247(c)	Peak	Yes
Transmitter Band Edge Radiated Emission:	15.247(c)	Peak	Yes
Extrapolation Factor:	15.31(f)	-	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

2. Product Description : 1M49F1D

3. Temperatures: Ambient (Tnom) 16^{o}C

4. Supply Voltages: Vnom +110Vac

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

5. Equipment Category: Single channel [X]
Multi-channel [ ]

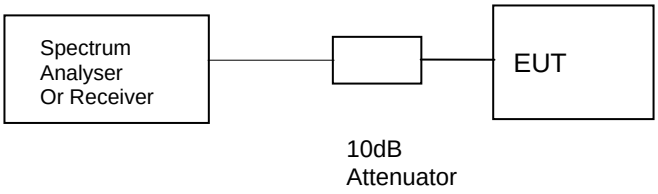
6. Channel spacing: Narrowband [ ]
Wideband [X]

TRANSMITTER TESTS

TRANSMITTER 6dB BANDWIDTH – CONDUCTED - PART 15.247(A)(2)

Ambient temperature = 20°C
Relative humidity = 60%
Conditions = Radio Lab
Supply voltage = +110Vac

Diagram



Frequency	Channel	F_{lower}	F_{Higher}	Measured Bandwidth	Limit
2.404MHz	1	2.404182GHz	2.405769GHz	1.5865MHz	>500kHz

Notes: 1 For analyser plots see annex G.

Test Method: 1 The 6dB bandwidth was recorded with the EUT activity transmitting data.

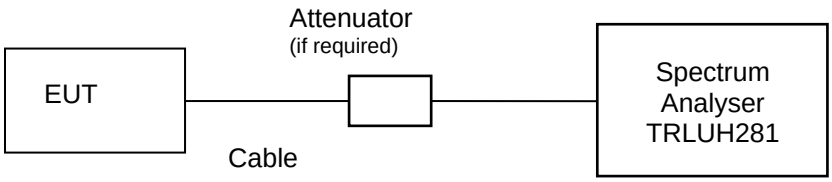
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	**X**
ATTENUATOR	BIRD	8304-100-N-10dB	N/A	TRL222	**X**
CABLE	TRL	RG223	N/A	TRL373	**X**

TRANSMITTER TESTS

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

Ambient temperature = 16°C
Relative humidity = 60%
Conditions = Radio Lab
Supply voltage = +110Vac

Diagram



Frequency MHz	Channel	Peak Power dBm	Peak Power Watts	Antenna Gain dBi	Power Watts	Limit Watts
2.405	1	3.26	0.00211	7.0	0.0106	1

Notes:
1 Gain of antenna 7.0dBi, maximum gain antenna supplied by manufacturer.
2 For analyser plots see annex H.

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 level greater than the 6dB bandwidth
5 The analyser level is offset to take the attenuator and cable into account.

Test equipment used for Peak Power measurement:

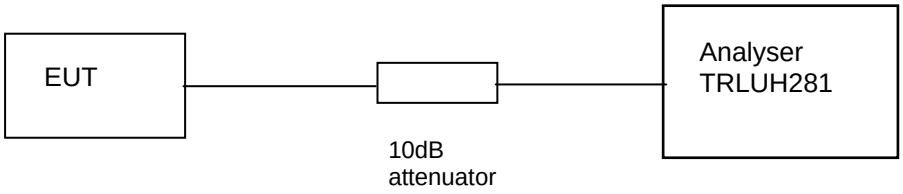
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	**X**
ATTENUATOR	BIRD	8304-100-N-10dB	N/A	TRL222	**X**
CABLE	TRL	RG223	N/A	TRL373	**X**

TRANSMITTER TESTS

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

Ambient temperature = 16°C
Relative humidity = 60%
Conditions = Radio Lab
Supply voltage = +110Vac

Diagram



Frequency	Channel	Measured Power Spectral Density	Power Spectral Density +inc Antenna Gain 7.0 dBi	Limit
2.405MHz	1	-9.94	-2.94dBm	+8 dBm

Notes: 1 For analyser plots see annex E.

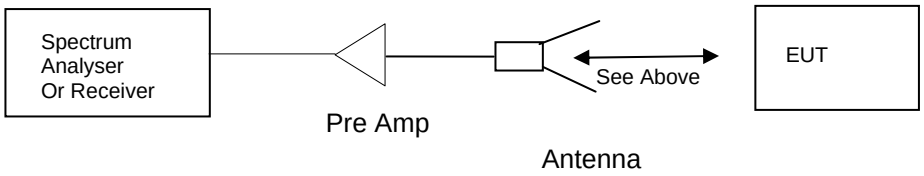
Test Method:
1 The EUT was connected to the analyser via the unique antenna connector & a cable
2 The resolution bandwidth on the analyser was set to 3kHz and trace set to max hold.
3 The span is set to 3MHz
4 The sweep time is 1000 seconds (Span/3kHz).
5 The analyser level is offset to take the attenuator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

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	RHODE & SCHWARZ	FSU46	200034	UH281	**X**
ATTENUATOR	BIRD	8304-100-N-10dB	N/A	TRL222	**X**
CABLE	TRL	RG223	N/A	TRL373	**X**

TRANSMITTER TESTS

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

Ambient temperature	=	9°C	3m measurements <1GHz	[X]
Relative humidity	=	60%	3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)		
Supply voltage	=	+110Vac		



	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss & Pre Amp Gain (dB)	Ant. Factor (dB/m)	Field Strength (dBµV/m)	Extrap. Factor (dB)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands	Note 5/6							100
88MHz – 216MHz Restricted bands	Note 5/6							150
216MHz – 960MHz Restricted bands	Note 5/6							200
960MHz – 1GHz Restricted bands	Note 5/6							500
1GHz – 26GHz Restricted bands	4810.682	53.90	-33.06	32.9	53.74Pk	-	486.40	500
30MHz -26GHz	Note 5/6							-20dBc

See annex E for initial pre scan results.

Notes:

1 Initial pre scans were performed see Annex E for plots.
2 See annex F for radiated bandedge compliance plots.
3 Emissions above 1GHz were measured with both a peak and average detectors.
4 Measurements were performed at 3 meters.
5 Only emissions with in 20dB of limit are recorded.
6 Emissions not directly related to the transmitter are reported under receiver tests.
7 Peak result under the average limit.

Test Method:

1 As per section 15.247.
2 Measuring distances as Note 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 >30MHz.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes. Maximum results recorded.

The test equipment used for the tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
HORN ANTENNA	EMCO	3115	9010-3580	138	**X**
HORN ANTENNA	EMCO	3115	9010-3581	139	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	844594/003	352	**X**
RANGE 1	TRL	3 METRE	N/A	UH06	**X**
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	**X**
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU	200034	UH281	**X**
PRE AMPLIFIER	AGILENT	8449B	3008A01610	572	**X**

TRANSMITTER and RECEIVER TESTS

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Parts 15.207 & 15.107

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
0.16	49.16	Quasi Peak	Live Line	55.46
0.27	35.11	Average	Neutral Line	50.97
2.13	31.07	Average	Neutral Line	46.00
2.18	31.40	Average	Neutral Line	46.00
2.40	27.70	Average	Neutral Line	46.00
2.70	27.58	Average	Live Line	46.00
3.17	27.97	Average	Neutral Line	46.00
7.05	37.85	Average	Live Line	50.00
8.93	35.57	Average	Live Line	50.00
9.81	36.24	Average	Neutral Line	50.00
12.07	38.87	Average	Neutral Line	50.00
13.72	38.49	Average	Neutral Line	50.00
17.84	43.76	Average	Live Line	50.00
29.23	30.83	Average	Live Line	50.00

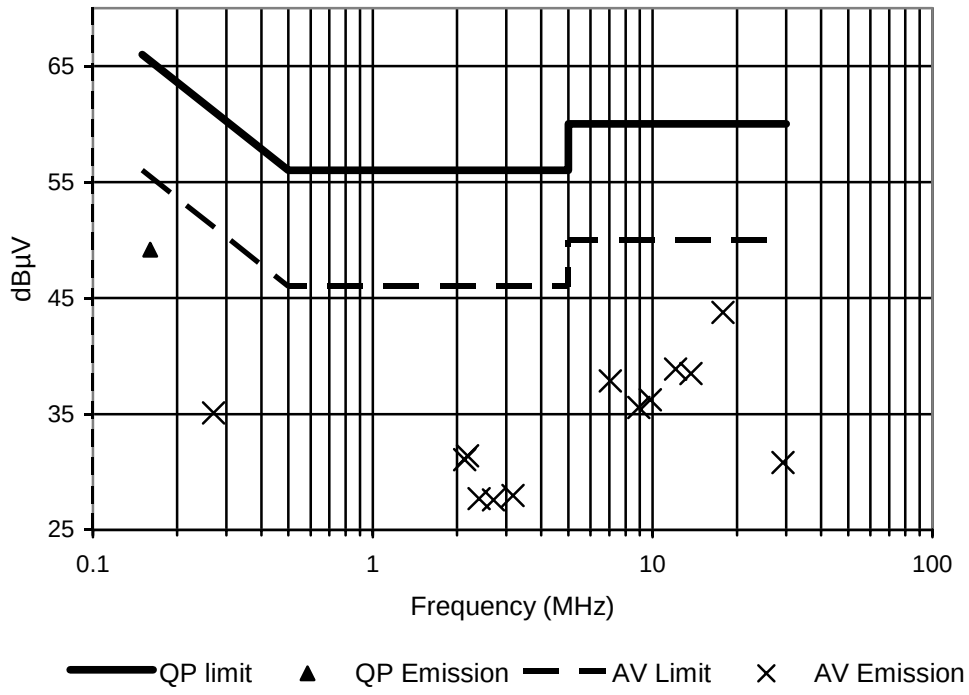
Notes: 1 See attached plot annex D
2 EUT in normal operation mode connected to PC.
3 Worst case result recorded.

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**

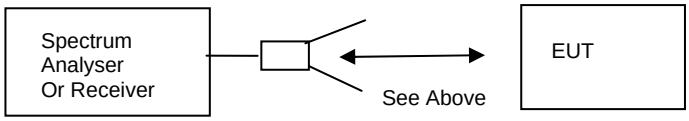
POWER LINE CONDUCTION EMISSIONS



RECEIVER TESTS

RECEIVER SPURIOUS EMISSIONS – RADIATED – PART 15.109

Ambient temperature	=	9°C	10m measurements <1GHz	[X]
Relative humidity	=	620%	3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)		
Supply voltage	=	+110Vdc		



Antenna

	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
30MHz – 88MHz	66.75	26.62	1.19	4.99	-	32.80	43.65	90
	67.90	13.78	1.19	5.03	-	20.00	10.00	90
	73.75	28.70	1.25	5.55	-	35.50	59.56	90
	86.00	17.60	1.50	7.90	-	27.00	22.38	90
88MHz – 216MHz	122.90	20.93	1.75	11.52	-	34.20	51.28	150
	133.55	23.84	1.86	11.30	-	37.00	70.79	150
	147.45	21.18	2.05	10.17	-	33.40	46.77	150
	157.50	21.08	2.08	9.34	-	32.50	42.17	150
	159.75	22.00	2.10	9.50	-	33.60	47.86	150
	167.00	21.70	2.15	9.15	-	33.00	44.66	150
	172.05	26.17	2.20	8.83	-	37.20	72.44	150
	184.35	22.77	2.30	8.33	-	33.40	46.77	150
216MHz – 960MHz	233.50	23.03	2.69	9.98	-	35.70	60.95	210
	240.05	19.36	2.70	10.84	-	32.90	44.15	210
	243.45	12.64	3.80	11.16	-	27.60	23.98	210
	258.05	12.30	2.90	12.90	-	28.10	25.41	210
	266.90	17.76	2.99	12.95	-	33.70	48.41	210
	282.60	12.86	3.08	12.56	-	28.50	26.60	210
	336.10	21.94	5.00	13.96	-	40.90	110.91	210
	384.10	14.71	3.79	15.30	-	33.80	48.97	210
	400.15	10.59	3.97	15.94	-	30.50	33.49	210
	432.10	14.02	4.18	16.40	-	34.60	53.70	210
	576.15	10.77	5.25	18.98	-	35.00	56.23	210
	672.10	8.81	5.89	19.10	-	33.80	48.97	210
	720.15	17.73	6.16	19.31	-	43.20	144.54	210
	768.15	9.78	6.35	20.07	-	36.20	64.56	210
	875.00	11.03	6.96	20.51	-	38.50	84.14	210
	912.20	8.21	7.15	20.84	-	36.20	64.56	210
960MHz – 1.0GHz								

1GHz – 25.0GHz	1.05608	56.46	0.62	24.30	36.91	44.47	167.30	300
	1.06691	54.66	0.62	24.30	36.91	42.67	135.98	300
	1.10416	52.79	0.64	24.50	36.50	41.43	117.89	300
	1.12500	54.27	0.64	24.60	36.50	43.01	141.41	300
	1.15224	51.67	0.64	24.65	36.40	40.56	106.66	300
	1.15860	48.03	0.64	24.65	36.40	36.92	70.14	300
	1.16565	51.06	0.68	24.70	36.30	40.14	101.62	300
	1.25000	58.68	0.74	24.85	36.23	48.04	252.34	300
	1.29647	53.47	0.83	24.95	36.23	43.02	141.57	300
	1.33333	56.54	0.85	24.96	36.15	46.20	204.17	300
	1.37500	48.01	0.86	24.98	36.10	37.75	77.17	300
	1.39260	54.03	0.87	25.00	36.05	43.85	155.77	300
	1.48828	53.20	0.88	25.20	36.05	43.23	145.04	300
	1.58445	49.79	0.92	25.75	36.05	40.41	104.83	300
	1.60096	56.99	0.92	25.75	35.45	48.21	257.33	300
	1.62500	51.03	0.92	25.80	35.45	42.30	130.31	300
	1.63301	45.71	0.92	25.85	35.45	37.03	71.04	300
	1.75000	53.25	0.93	26.16	35.70	44.64	170.60	300
	1.77788	45.66	0.97	26.70	35.65	37.68	76.56	300
	1.82596	46.09	0.98	26.80	35.60	38.27	81.94	300
	1.87564	49.59	0.98	26.90	35.55	41.92	124.73	300
	2.00000	51.62	1.01	27.80	35.57	44.86	174.98	300
	2.62500	42.42	1.21	28.90	35.00	37.53	75.24	300
	3.09935	41.89	1.31	30.50	35.36	38.34	82.60	300

Limits	30MHz to 88MHz	90µV/m @ 10m
	88MHz to 216MHz	150µV/m @ 10m
	216MHz to 960MHz	210µV/m @ 10m
	960MHz to 1GHz	300µV/m @ 10m
	1GHz to 5GHz	300µV/m @ 3m

Notes:

1 Initial pre scans were performed see Annex E for plots <1GHz.
2 Emissions above 1GHz were measured with both a peak and average detectors.
3 Measurements <1GHz were performed at 10 meters.
4 Measurements >1GHz were performed at 3 meters
5 Only emissions with in 20dB of limit are recorded.

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 below:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
HORN ANTENNA	EMCO	3115	9010-3580	138	**X**
HORN ANTENNA	EMCO	3115	9010-3581	139	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	844594/003	352	**X**
RANGE 1	TRL	3 METRE	N/A	UH06	**X**
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	**X**
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU	200034	UH281	**X**
PRE AMPLIFIER	AGILENT	8449B	3008A01610	572	**X**

ANNEX A

PHOTOGRAPHS

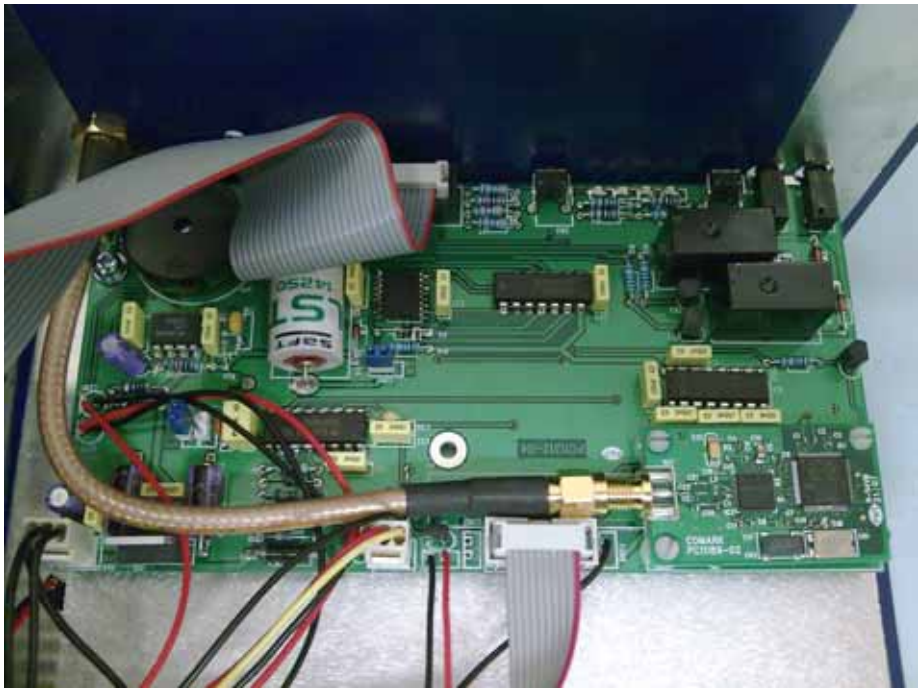
PHOTOGRAPH No. 1 **TEST SETUP**

PHOTOGRAPH No. 2 **POWERLINE TEST SETUP**

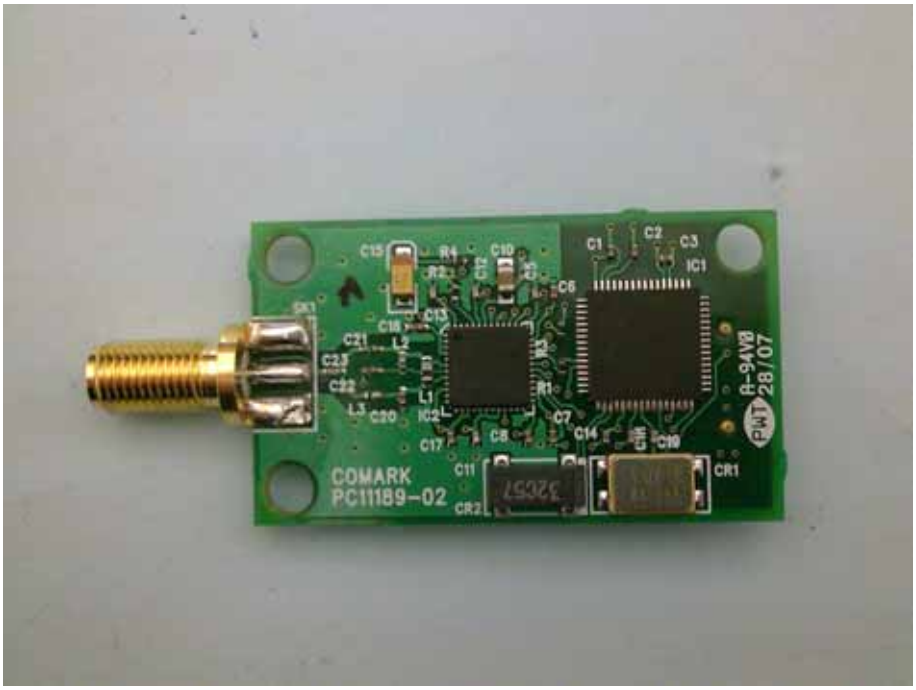
PHOTOGRAPH No. 3 **OVERVIEW**

PHOTOGRAPH No. 4 **CONNECTOR OVERVIEW**

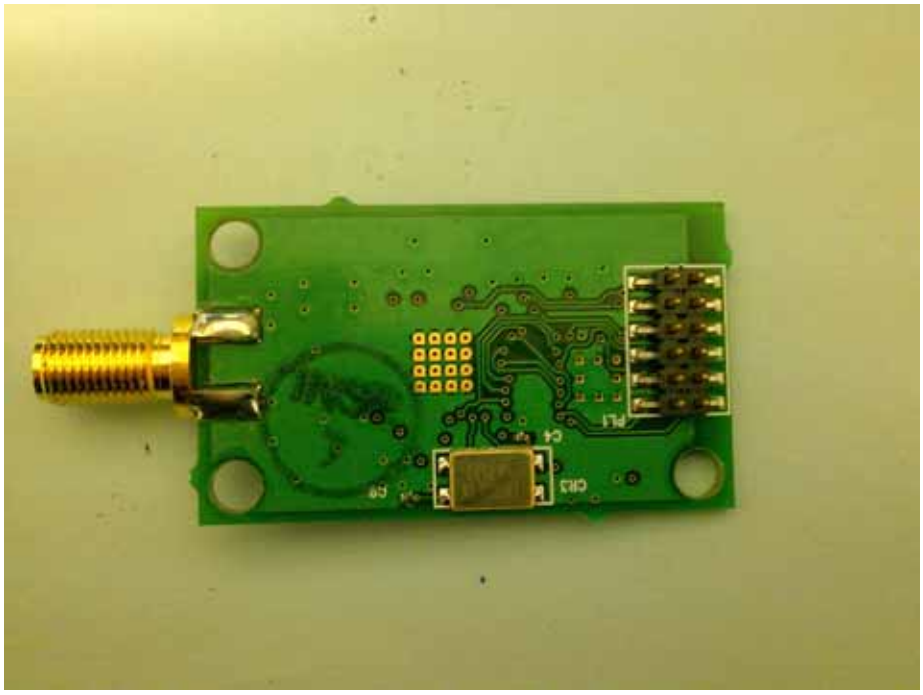
PHOTOGRAPH No. 5 **CONTROL PCB RF MODULE MOUNTED**



PHOTOGRAPH No. 6 **RF PCB TOP**



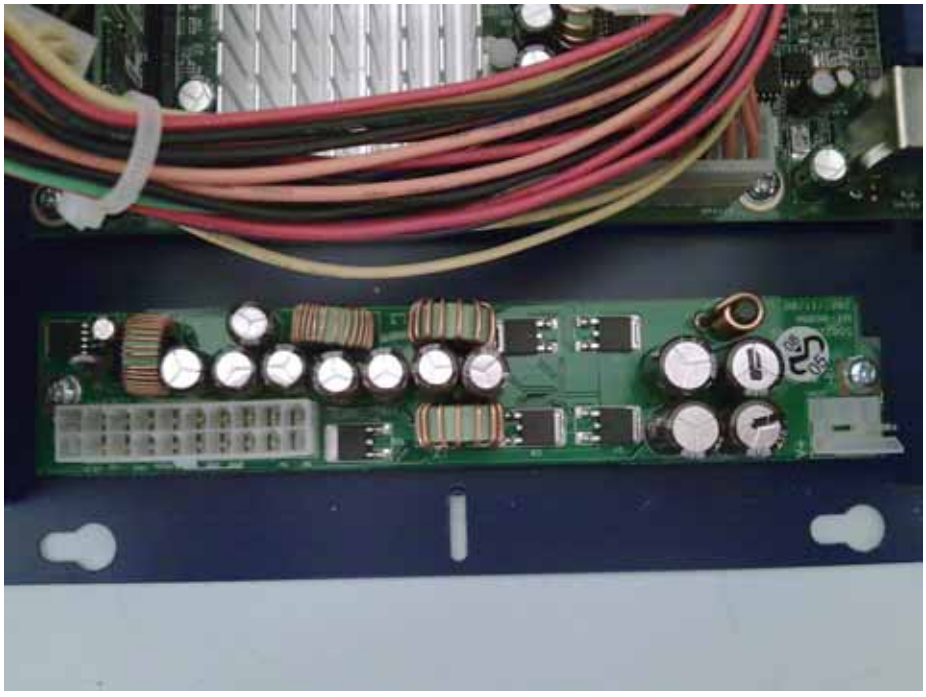
PHOTOGRAPH No. 7 **RF PCB BOTTOM**



PHOTOGRAPH No. 9

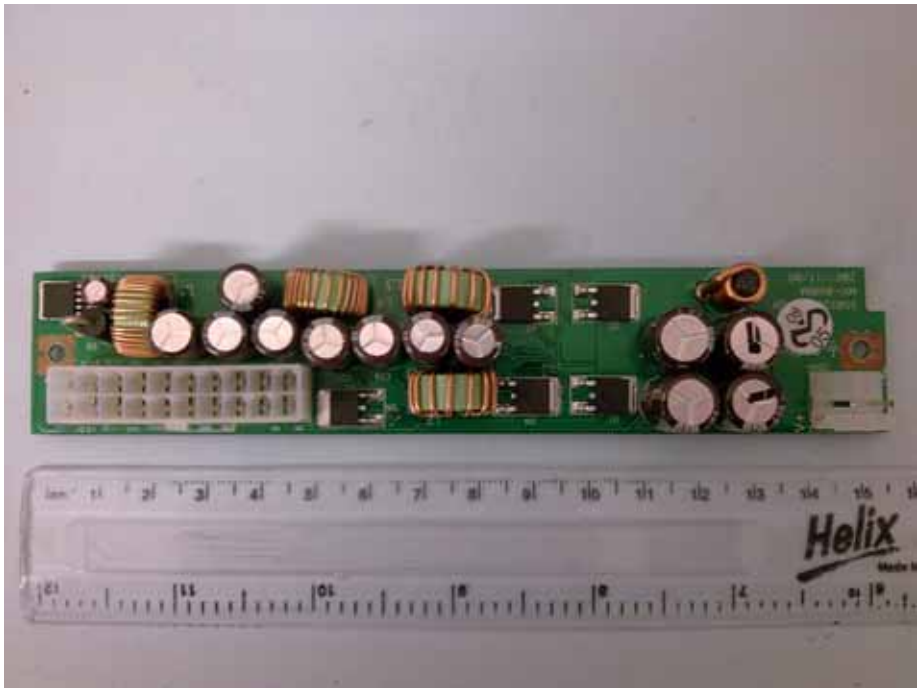
NEW POWER SUPPLY PCB MOUNTED TO CHASSIS

NEW POWER SUPPLY PCB MOUNTED
CABLES REMOVED

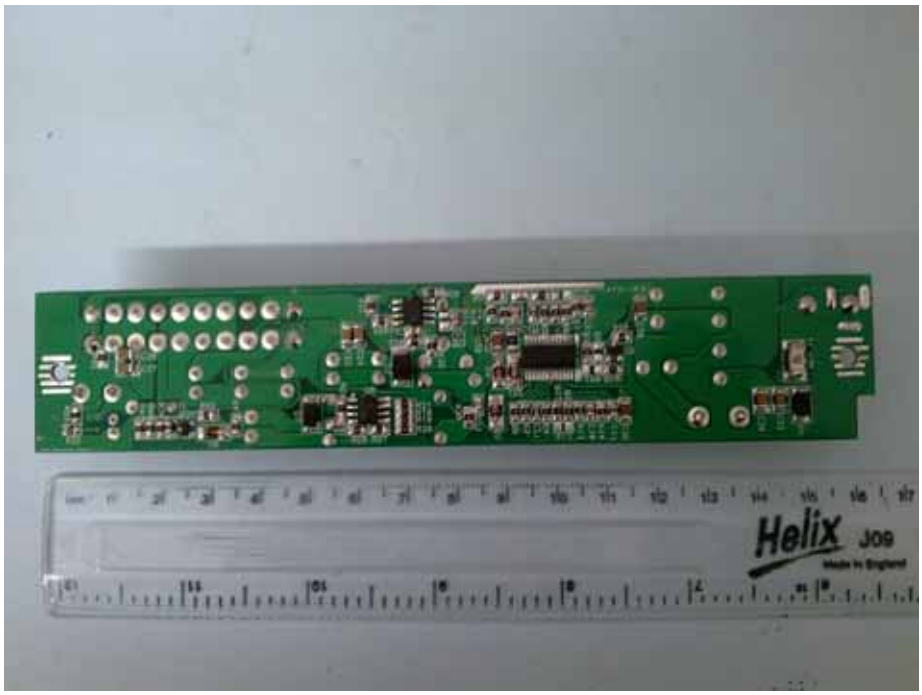


PHOTOGRAPH No. 10

TOP VIEW PCB REMOVED



UNDERSIDE VIEW PCB REMOVED



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	-		[ ]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[X]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[ ]
		-	DRAWINGS	[X]
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

EQUIPMENT CALIBRATION DETAILS

EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH06/07	IC OATS Submission	TRL	01/06/2007	24	01/06/2009
UH06/07	NSA Calibration	TRL	17/12/2007	12	17/12/2008
UH006	3m Range ERP CAL	TRL	08/12/2006	12	08/12/2007
UH028	Log Periodic Ant	Schwarbeck	30/05/2007	24	30/05/2009
UH029	Bicone Antenna	Schwarbeck	06/05/2007	24	06/05/2009
UH041	Multimeter	AVOmeter	15/01/2008	12	15/01/2009
UH093	Bilog Antenna	Chase	21/05/2007	24	21/05/2009
UH122	Oscilloscope	Tektronix	10/12/2007	24	10/12/2009
UH132	Power meter	Marconi	15/01/2008	12	15/01/2009
UH162	ERP Cable Cal	TRL	21/12/2007	12	21/12/2008
UH187	Receiver	R&S	12/12/2007	12	12/12/2008
UH195	LISN	R&S	04/01/2008	12	04/01/2009
UH228	Power Sensor	Marconi	16/01/2008	12	16/01/2009
UH253	1m Cable N type	TRL	30/01/2008	12	30/01/2009
UH254	1m Cable N type	TRL	30/01/2008	12	30/01/2009
UH269	1m Cable N type	TRL	30/01/2008	12	30/01/2009
UH270	1m Cable N type	TRL	30/01/2008	12	30/01/2009
UH271	1.5m Cable N type	TRL	30/01/2008	12	30/01/2009
UH272	1.5m Cable N type	TRL	30/01/2008	12	30/01/2009
UH273	2m Cable N type	TRL	30/01/2008	12	30/01/2009
UH274	2m Cable N type	TRL	30/01/2008	12	30/01/2009
UH281	Spectrum Analyser	R&S	24/10/2007	12	24/10/2008
UH330	K type transition	Maury M'wave	13/06/2008	24	13/06/2010
UH340	Signal Generator	HP	06/05/2008	12	06/05/2009
UH365	Harmonic Mixer	Agilent	16/07/2008	24	16/07/2010
UH366	Harmonic Mixer	Agilent	21/07/2008	24	21/07/2010
UH367	Harmonic Mixer	Agilent	02/07/2008	24	02/07/2010
L005	CMTA	R&S	30/10/2007	12	30/10/2008
L007	Loop Antenna	R&S	22/05/2007	24	22/05/2009
L138	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L139	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L176	Signal Generator	Marconi	06/05/2008	12	06/05/2009
L193	Bicone Antenna	Chase	06/05/2008	24	06/05/2010
L203	Log Periodic Ant	Chase	06/05/2008	24	06/05/2010
L263/A	Horn 18-26GHz	Flann	13/06/2008	24	13/06/2010
L300	Horn 18-26GHz	Flann	12/06/2008	24	12/06/2010
L309	SMA Transition		13/06/2008	24	13/06/2010
L352	Receiver	R&S	05/12/2007	12	05/12/2008
L426	Temperature Indicator	Fluke	22/01/2008	12	22/01/2009
L479	Analyser	Anritsu	22/09/2008	12	22/09/2009
L572	Pre Amp	Agilent	04/07/2008	12	04/07/2009

ANNEX D

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 E

POWER LINE CONDUCTION

Powerline Conduction

20 Nov 2008 12:12

150kHz - 30MHz

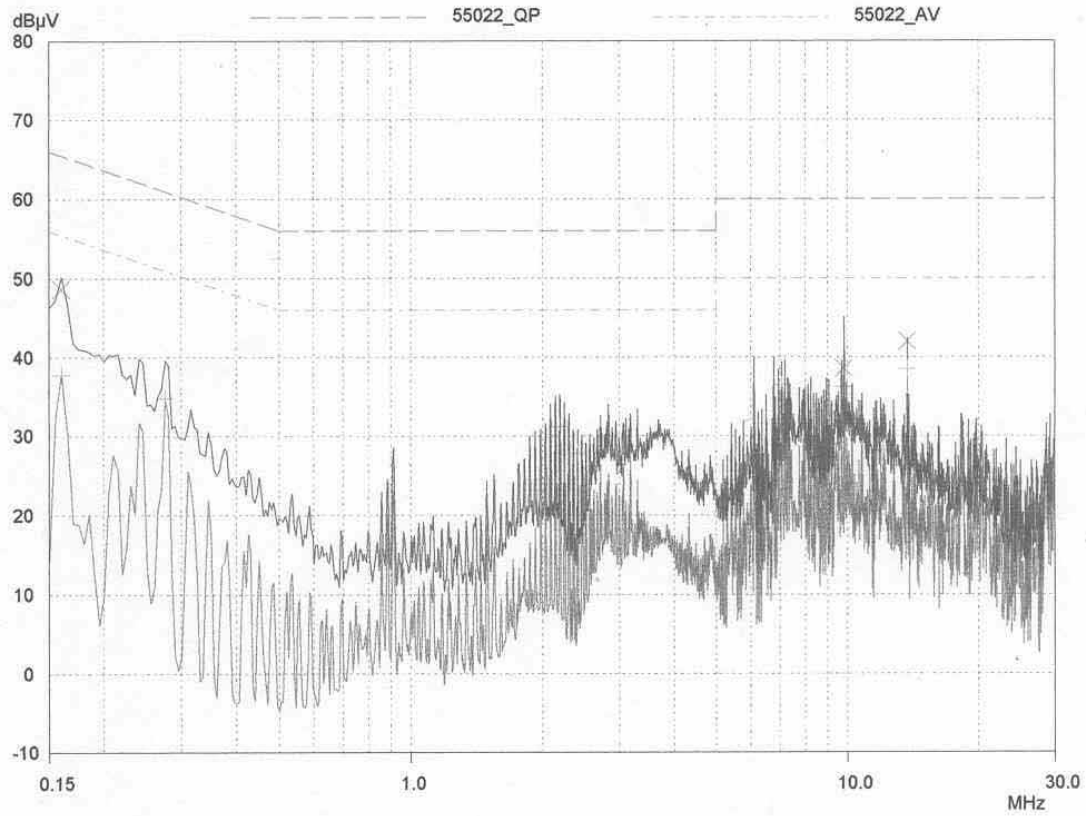
EUT:	RF500Lite
Manuf:	Comark Ltd
Op Cond:	LISN UH195, cable UH21 & Receiver UH187
Operator:	S Hodkinson
Test Spec:	EN55022 Class B (or Variant)
Comment:	Neutral Line, 110V, 60Hz
	EUT in Rx mode , connected to network via network cable,powered via switch mode pwr supply.

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	5kHz	10kHz	PK+AV	50msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
1	1	9kHz	30MHz	UH21
	2	150kHz	30MHz	UH195

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	2sec
	Subranges:	25
	Acc Margin:	20 dB



PAGE 1

ANNEX F

RADIATED EMISSIONS

TRL Compliance Ltd

19 Nov 2008 09:01

E-Field Radiation (30MHz-1GHz)

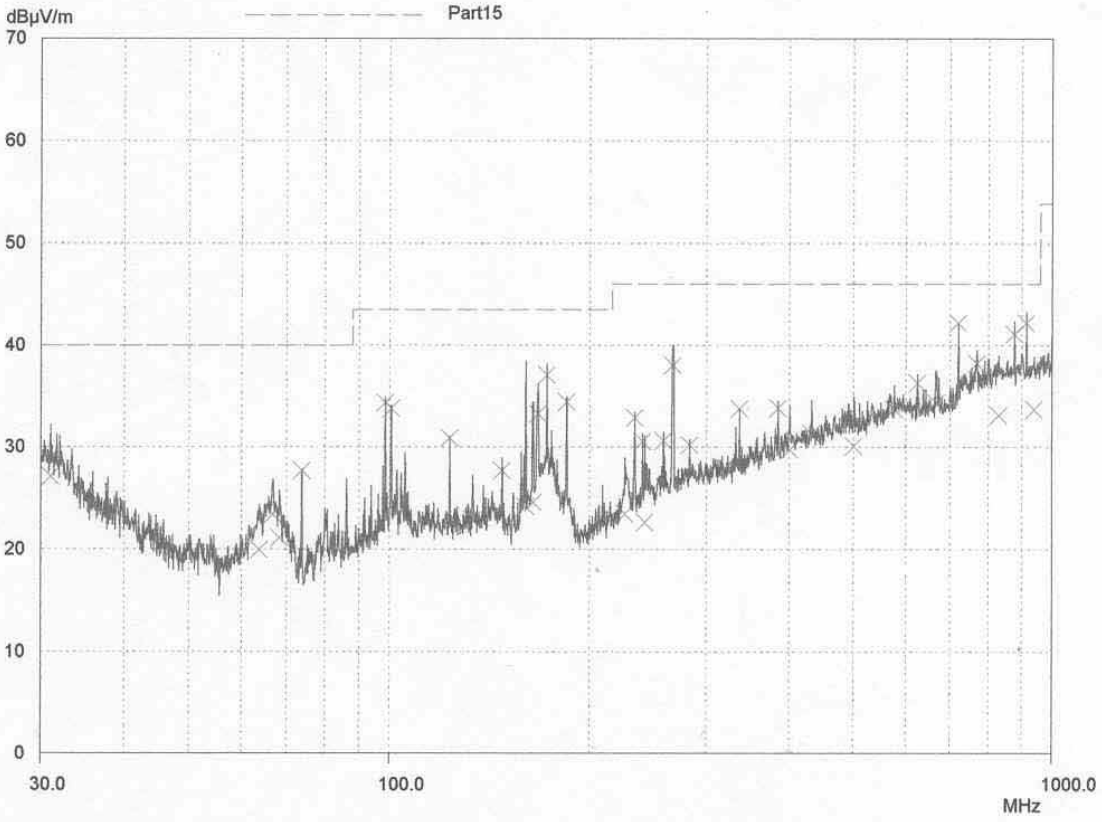
EUT:	RF500 Lite
Manuf:	Comark Ltd
Op Cond:	Prescan 30MHz - 1000MHz
Operator:	S Hodgkinson
Test Spec:	Part15
Comment:	EUT in Rx mode, connected to network via network cable, and powered via switch mode power supply. Rx antenna Vertical.

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

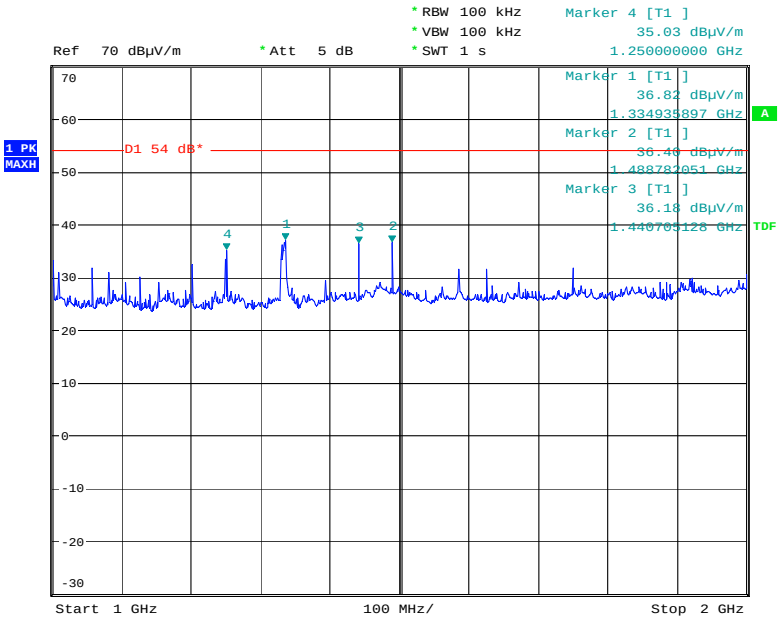
Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH93

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



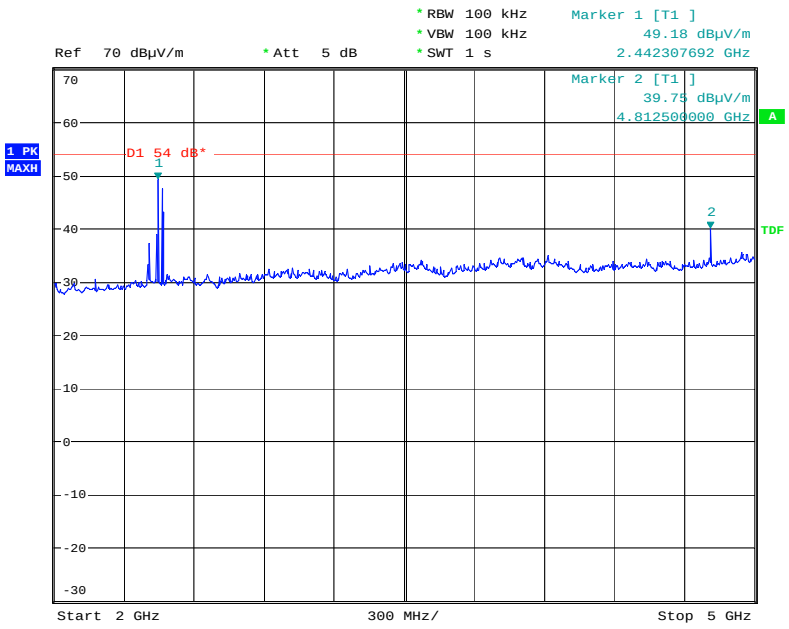
PAGE 1

RADIATED EMISSIONS 1GHz –2GHz



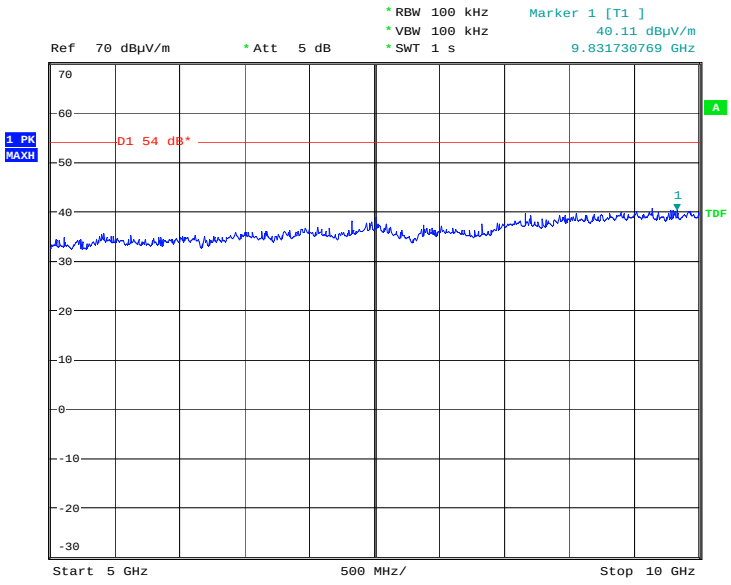
Date: 19.NOV.2008 13:12:31

RADIATED EMISSIONS 2GHz –5GHz



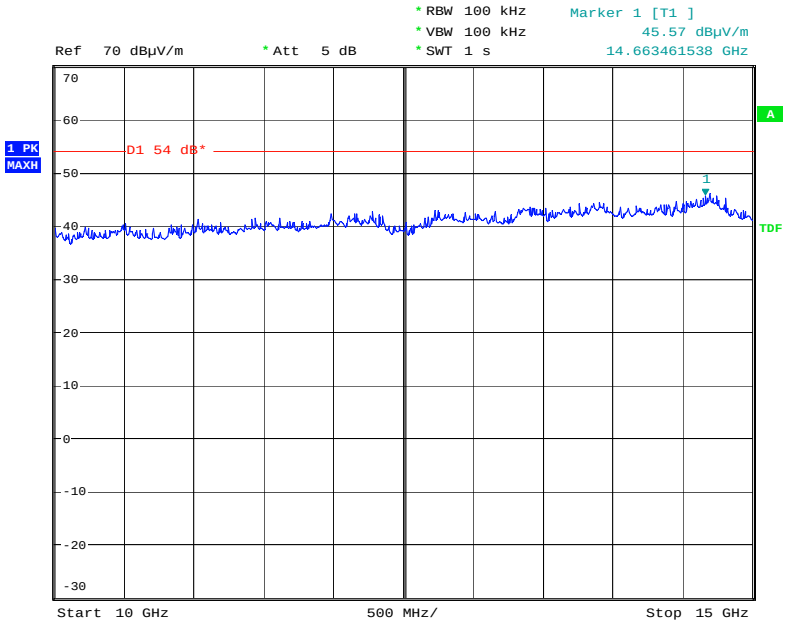
Date: 19.NOV.2008 13:25:10

RADIATED EMISSIONS 5GHz – 10GHz



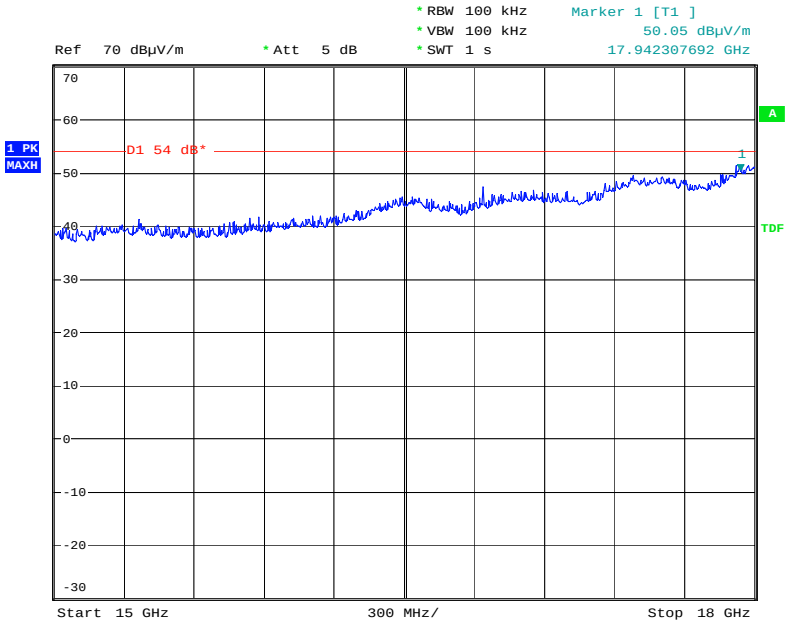
Date: 19.NOV.2008 13:26:02

RADIATED EMISSIONS 10GHz – 15GHz



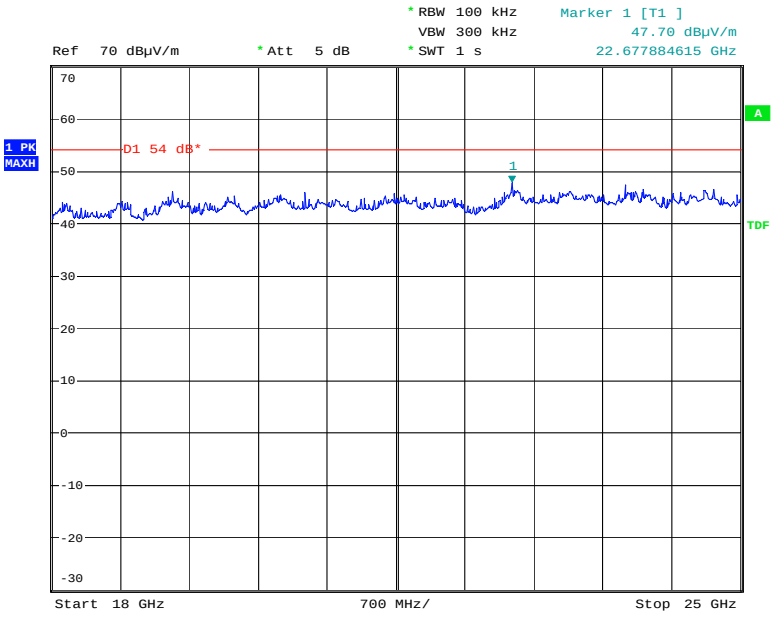
Date: 19.NOV.2008 13:26:40

RADIATED EMISSIONS 15GHz – 18GHz



Date: 19.NOV.2008 13:27:11

RADIATED EMISSIONS 18GHz – 25GHz

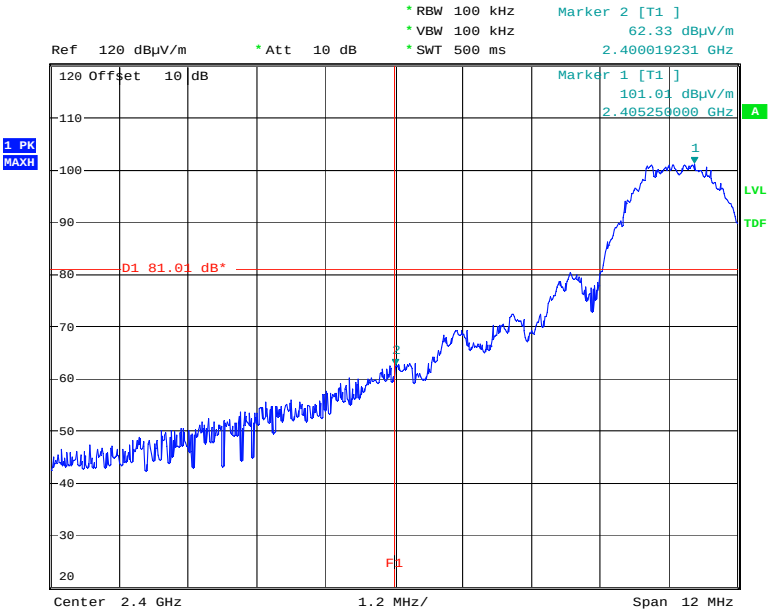


Date: 21.NOV.2008 14:21:06

ANNEX G

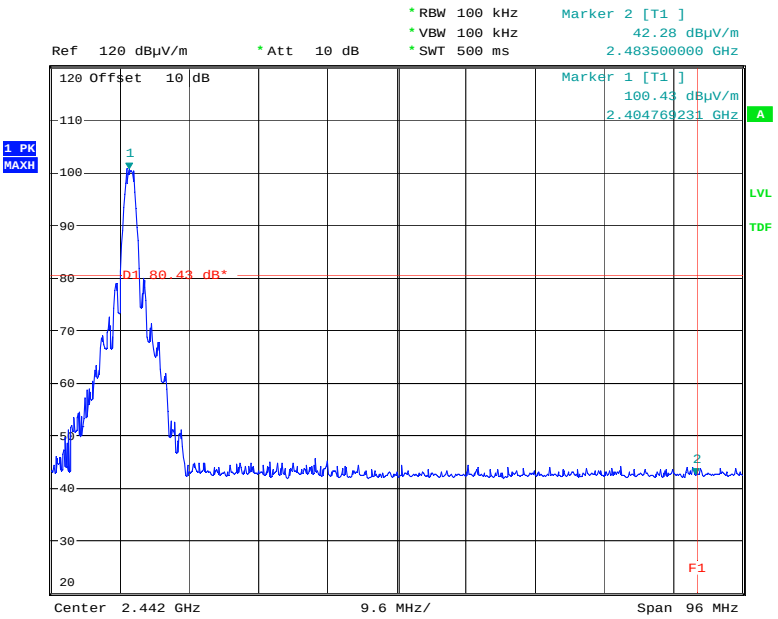
RADIATED BANDEDGE COMPLIANCE

RADIATED LOWER BAND EDGE



Date: 19.NOV.2008 12:07:43

RADIATED UPPER BAND EDGE

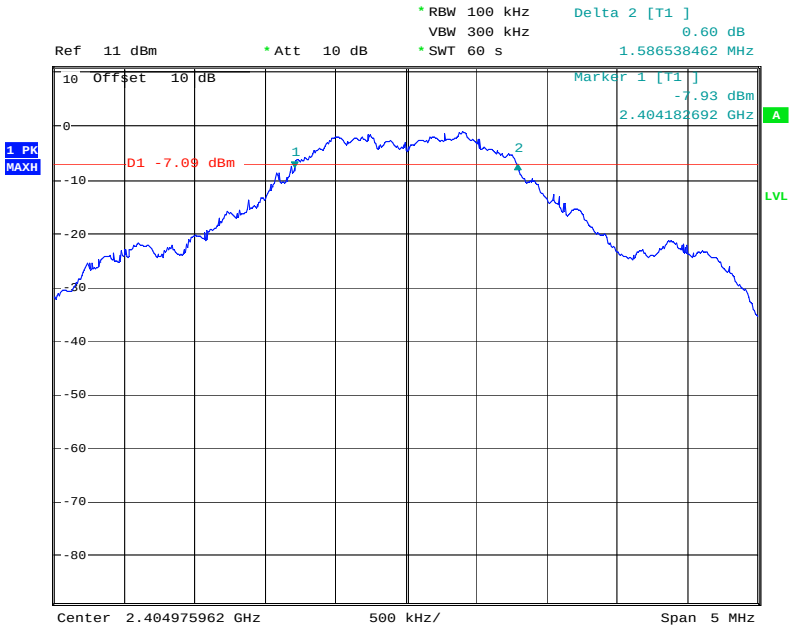


Date: 19.NOV.2008 12:15:45

ANNEX H

6dB BANDWIDTH

6dB BANDWIDTH



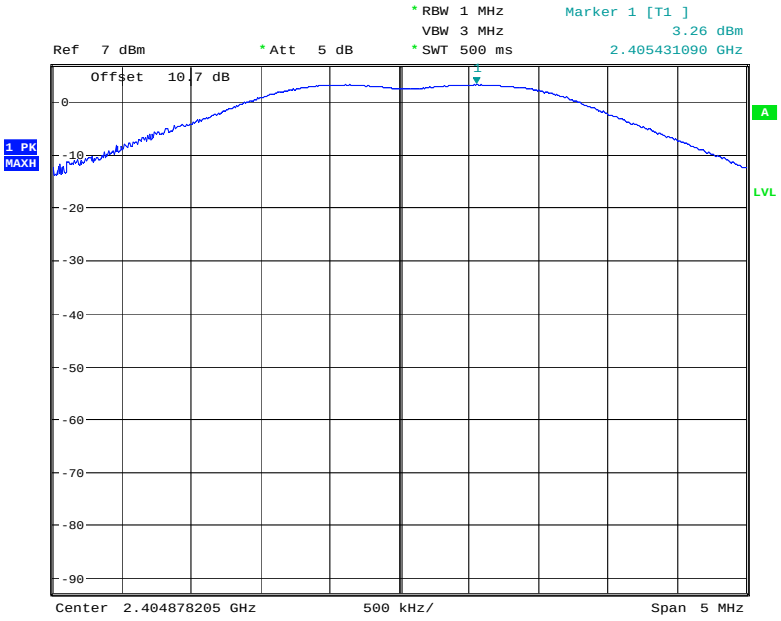
Date: 17.NOV.2008 16:25:23

f_{lower} = 2.404182GHz
f_{higher} = 2.405769GHz
6dB Bandwidth = 1.5865 MHz

ANNEX I

PEAK OUTPUT POWER

OUTPUT POWER

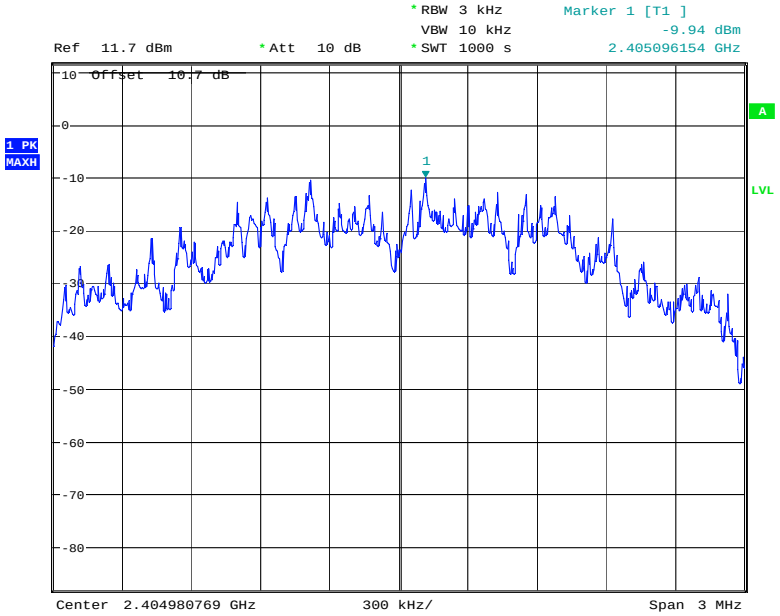


Date: 26.NOV.2008 15:50:48

ANNEX J

POWER SPECTRAL DENSITY

POWER SPECTRAL DENSITY



Date: 18.NOV.2008 09:40:09