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**REPORT ON THE RADIO PERFORMANCE TESTING OF A
MANTRACOURT ELECTRONICS Ltd
RAD24 RADIO MODULE
WITH THREE ANTENNA OPTIONS
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.247 MAY 2007
INTENTIONAL RADIATOR SPECIFICATION**



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MANTRACOURT ELECTRONICS Ltd
RAD24 RADIO MODULE
WITH THREE ANTENNA OPTIONS
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INTENTIONAL RADIATOR SPECIFICATION**

TEST DATE: 27th June – 12th November 2007

TESTED BY: S HODGKINSON

APPROVED BY: J CHARTERS
RADIO SECTION
LEADER

DATE: 11th December 2007

Distribution:

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 2. FCC EVALUATION LABORATORIES
 3. TRL Compliance Ltd

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Notes:

- | | | | |
|----|--|-----|-----|
| 1. | Component failure during test: | YES | [] |
| | | NO | [X] |
| 2. | If Yes, details of failure: | | |
| 3. | All measurement uncertainty calculations detailed in this report are carried out in accordance with ETR 028 (4), corresponding to an expansion factor $k = 1.96$ providing for a 95% confidence level. | | |
| 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. | | |



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CERTIFICATE OF CONFORMITY & COMPLIANCE

PURPOSE OF TEST: Radio Performance Testing

TEST SPECIFICATION(s): FCC RULES CFR 47 Part 15.247 May 2007

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: RAD24 2.4GHz Radio module

EQUIPMENT SERIAL No: Chip Antenna : FFC5A0
External Antenna : FFC5A3

BAND(s) OF OPERATION: 2.4GHz – 2.4835GHz

EQUIPMENT TYPE: 2.4GHz radio module

EQUIPMENT USE: Telemetry

TRANSMITTER Pnom: 1.12mW eirp

ANTENNA TYPE: 3dBi Integral Chip antenna
6dBi External antenna
2.9dBi SMA Connected Antenna

CHANNEL SPACING: Wideband

NUMBER OF CHANNELS: 16

FREQUENCY GENERATION: SAW Resonator ☐ Crystal ☐ Synthesiser ☒

MODULATION METHOD: Amplitude ☐ Digital ☒ Angle ☐

POWER SOURCE(s): +3Vdc

TEST DATE(s): 27th June – 12th November 2007

ORDER No(s): 042630

APPLICANT: Mantrcourt Electronics Ltd

TESTED BY: S HODGKINSON

APPROVED BY: J CHARTERS
RADIO SECTION
LEADER

RU1355/7973

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	RAD24 2.4GHz Radio module		
EQUIPMENT TYPE:	2.4GHz radio module		
EQUIPMENT SERIAL No:	Chip Antenna :	FFC5A0	
	External Antenna :	FFC5A3	
PURPOSE OF TEST:	Certification		
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.247 May 2007		
TEST RESULT:	COMPLIANT	Yes	<input checked="" type="checkbox"/>
		No	<input type="checkbox"/>
APPLICANT'S CATEGORY:	MANUFACTURER	<input checked="" type="checkbox"/>	
	IMPORTER	<input type="checkbox"/>	
	DISTRIBUTOR	<input type="checkbox"/>	
	TEST HOUSE	<input type="checkbox"/>	
	AGENT	<input type="checkbox"/>	
APPLICANT'S ORDER No(s):	042630		
APPLICANT'S CONTACT PERSON(s):	Mr Brett James		
E-mail address:	Brett@mantracourt .co.uk		
APPLICANT:	Mantracourt Electronics Ltd		
ADDRESS:	The Drive Farringdon Exeter Devon EX5 2JB		
TEL:	+44 (0)1396 232020		
FAX:	+44 (0) 1396 233190		
MANUFACTURER:	Mantracourt Electronics Ltd		
EUT(s) COUNTRY OF ORIGIN:	United Kingdom		
TEST LABORATORY:	TRL Compliance Ltd		
UKAS ACCREDITATION No:	0728		
TEST DATE(s):	27 th June – 19 th November 2007		
TEST REPORT No:	RU1355/7973		

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 6dB:	15.247 (a)	Peak	Yes
	Intentional Emission ERP (mW):	15.247 (b)	Peak	Yes
	Spurious Emissions – Conducted:	15.247 (c)	Peak	Yes
	Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	Yes
	Spurious Emissions – Radiated >1000MHz:	15.209	Average	Yes
	Spectral Power Density:	15.247 (e)	Peak	Yes
	Spurious Emissions – Power Line TX:	15.207	Quasi Peak Average	Yes
	Spurious Emissions – Power Line RX:	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

- | | | | |
|----|--|----------------|---------|
| 2. | Emission Designator: | 1M6GID | |
| 3. | Duty Cycle: | | <100% |
| 4. | Transmitter bit or pulse rate and level: | | 250kBps |
| 5. | Temperatures: | Ambient (Tnom) | 20°C |
| 6. | Supply Voltages: | Vnom | +3.0Vdc |

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

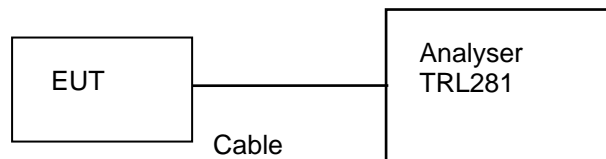
- | | | | |
|----|---------------------|--|-------------------|
| 7. | Equipment Category: | Single channel
Two channel
Multi-channel | []
[]
[X] |
| 8. | Channel Allocation: | Narrowband
Wideband | []
[X] |

TRANSMITTER TESTS

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

Ambient temperature = 20°C(<1GHz)
Relative humidity = 62%(<1GHz)
Conditions = Radio Lab
Supply voltage = +3Vdc

Diagram



Frequency	Channel	Measured Bandwidth	Limit
2405 MHz	1	1.59MHz	>500kHz
2440 MHz	8	1.60MHz	>500kHz
2480 MHz	16	1.60MHz	>500kHz

Notes:

- 1 For analyser plot of middle channel see annex C.
- 2 In the 2.4 – 2.4835GHz band channels are 1-16

Test Method:

- 1 An antenna connector is supplied on the EUT to allow conducted measurements
- 2 The 6dB bandwidth was recorded with the EUT transmitting at maximum data rate.

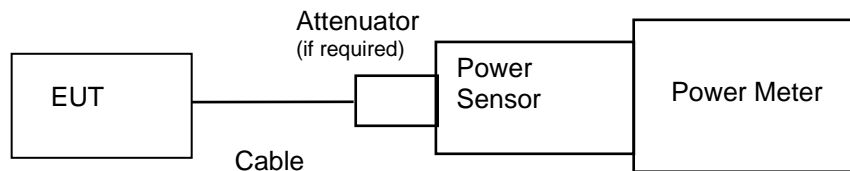
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU	200034	UH281	X
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

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

Ambient temperature = 20°C (<1GHz)
 Relative humidity = 62% (<1GHz)
 Conditions = Radio Lab
 Supply voltage = +3Vdc

Diagram



Frequency MHz	Channel	Peak Power on Meter dBm	Attenuator & Cable loss dB	Peak Power Watts	EUT Antenna Gain dBi	Average Power Watts	Limit Watts
2405 MHz	1	-33.91	27.7	-6.21	6	0.95mW	1 Watt
2440 MHz	8	-33.73	27.58	-6.15	6	0.96mW	1 Watt
2480 MHz	16	-33.32	27.48	-5.48	6	1.12mW	1 Watt

Notes:

- 1 Gain of antenna 6dBi, maximum gain antenna supplied by manufacturer.
- 2 In the 2.4 – 2.4835GHz band channels are 1-16

Test Method:

- 1 The EUT was connected to the power sensor via a temporary antenna connector a cable and attenuator - if applicable.
- 2 The EUT was operated in transmit mode with modulation on top middle and bottom operating channels
- 3 The level on the power meter was recorded.

Test equipment used for Peak Power measurement:

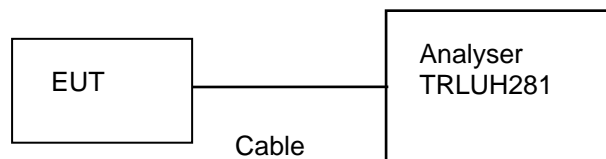
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
POWER METER	MARCONI	6960B	237034/019	UH132	X
POWER SENSOR	MARCONI	6920	1564	UH228	X
ATTENUATOR	JFW	50PF-030	N/A	N/A	X

TRANSMITTER TESTS

TRANSMITTER BAND EDGE EMISSIONS – CONDUCTED – Part 15.247(D)

Ambient temperature = 18°C(<1GHz)
Relative humidity = 71%
Conditions = Conducted – Radio Lab
Supply voltage = +3Vdc

Diagram



Test Result

Measured as compliant, see analyser plots

Notes:

- 1 The EUT was set into a transmit mode with modulation on top and bottom operating frequencies.
- 2 The EUT was connected to the analyser via the temporary antenna connector.
- 3 See Annex D for analysers plots.
In the 2.4 – 2.4835GHz band channels are

Test Method:

- 1 A plot covering transmission and lower 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).
- 2 A plot covering transmission and upper 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:

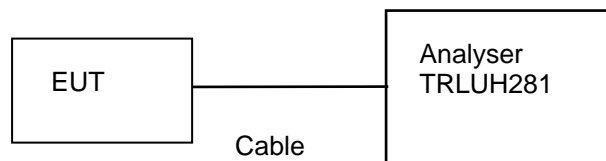
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU	200034	UH281	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

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

Ambient temperature = 20°C(<1GHz)
 Relative humidity = 62% (<1GHz)
 Conditions = Radio Lab
 Supply voltage = +3Vdc

Diagram



Frequency (MHz)	Channel	Measured Power Spectral Density (dBm)	EUT Antenna Gain (dBi)	Power Spectral Density (dBm)	Limit (dBm)
2405 MHz	1	-17.91	6	-11.91	8
2440 MHz	8	-18.42	6	-12.42	8
2480 MHz	16	-19.41	6	-13.41	8

Notes:

- 1 For analyser plots see annex E.
- 2 In the 2.4 – 2.4835GHz band channels are 1-16

Test Method:

- 1 The EUT was connected to the analyser via the temporary antenna connector and cable with a sweep time of 1000 seconds
- 2 The resolution bandwidth on the analyser was set to 3kHz and trace set to max hold.

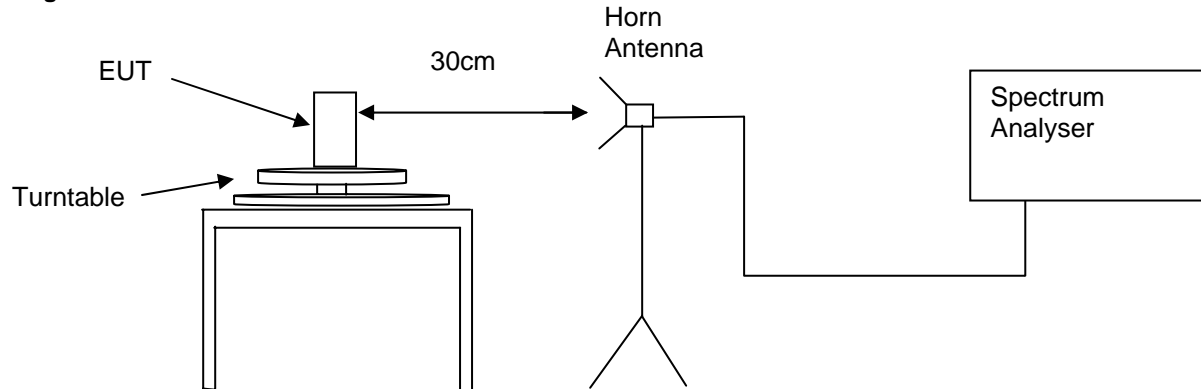
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU	200034	UH281	X
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

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

Ambient temperature = 18°C
 Relative humidity = 62%
 Conditions = Radiated– Radio Lab
 Supply voltage = +3Vdc

Diagram



Test Result

Chip Antenna

Frequency	Measured Result (dBμV)	Cable (dB)	Ant Factor (dB/m)	Pre Amp Gain (dB)	Measured Result dBμV/m	Limit dBμV/m
2.4000GHz	46.06	0.94	28.74	35.0	40.74	64.88 (20dbc)
2.4839GHz	56.55	0.93	28.80	35.0	51.28	54.0 (restricted band)

External Antenna

Frequency	Measured Result (dBμV)	Cable (dB)	Ant Factor (dB/m)	Pre Amp Gain (dB)	Measured Result dBμV/m	Limit dBμV/m
2.3999GHz	49.85	0.94	28.74	35.0	44.53	68.69 (20dbc)
2.4840GHz	57.10	0.93	28.80	35.0	51.83	54.0 (restricted band)

SMA Connected External Antenna

Frequency	Measured Result (dBμV)	Cable (dB)	Ant Factor (dB/m)	Pre Amp Gain (dB)	Measured Result dBμV/m	Limit dBμV/m
2.4000GHz	46.33	0.94	28.74	35.0	41.01	66.22 (20dbc)
2.4841GHz	49.93	0.93	28.80	35.0	44.66	54.0 (restricted band)

Notes:

- 1 The EUT was set into a transmit mode with modulation on top and bottom operating frequencies.
- 2 Peak Detector for un restricted bands (20dBc).
- 3 Average Detector for restricted bands If peak measurement did not meet average limit. The EUT was placed on a turntable and rotated.
See Annex D for analysers plots.
In the 2.4 – 2.4835GHz band

Test Method:

- 1 A plot covering transmission and lower 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).
- 2 A plot covering transmission and upper 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:

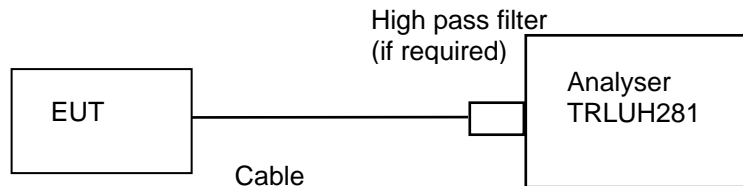
TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU	200034	UH281	X
CABLE	TRL	N TYPE	N/A	UH274	X
HORN ANTENNA	EMCO	3115	9010 3581	TRL138	X

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – CONDUCTED – Part 15.247(D)

Ambient temperature = 18°C
 Relative humidity = 62%
 Conditions = Conducted –Radio Lab
 Supply voltage = +3Vdc

Diagram



Bottom Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level (dBm)	Cable loss (dB)	Level (dBm)	Limit (dBm)
30 – 26000	No Significant Emissions within 20dBs of the Limit				-25.29dBm

Middle Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level (dBm)	Cable loss (dB)	Level (dBm)	Limit (dBm)
30 – 26000	No Significant Emissions within 20dBs of the Limit				-25.29dBm

Top Channel

Range Frequency (MHz)	Emission Frequency (MHz)	Emission Level (dBm)	Cable loss (dB)	Level (dBm)	Limit (dBm)
30 – 26000	No Significant Emissions within 20dBs of the Limit				-25.29dBm

Notes:

- 1 Section 15.247(c) states that all spurious emissions measured within a 100kHz bandwidth shall be attenuated by at least 20dB below the level of the highest fundamental level measured within a 100kHz bandwidth.
- 2 Emissions with levels 20dB less than the limit are not necessarily recorded.
- 3 See Annex F for Plots of top and Bottom operating frequencies.

Test Method:

- 1 The EUT was connected to the analyzer using a cable and high pass filter (if required).
- 2 Frequency sweeps were performed to check for spurious emissions.
- 3 Any emissions discovered were checked for compliance against the limit.

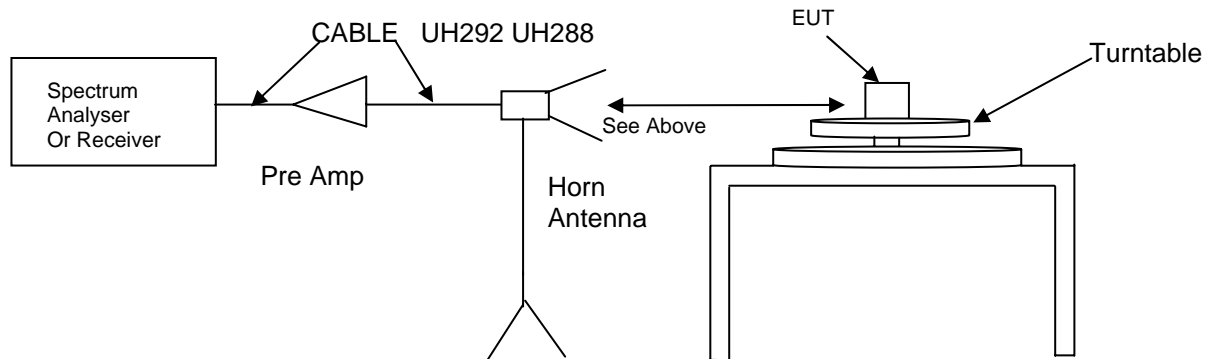
The test equipment used for the tests is shown below:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU	200034	UH281	X

TRANSMITTER TESTS - CHIP ANTENNA

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

Ambient temperature	=	16°C(>1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	68% (>1GHz)	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+3Vdc		



Bottom Channel 2405 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBμV/m)	Result (μV/m)	Limit (μV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	7215.608	41.45	2.3	35.8	36.3	43.25	145.37	500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Middle Channel 2440 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBμV/m)	Result (μV/m)	Limit (μV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	4880.410 7320.653	38.69 48.34	2.55 2.35	33.9 35.9	36.50 36.40	38.64 50.19	85.51 323.22	500 500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Top Channel 2480 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBµV/m)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	4960.416 7440.620	37.77 42.94	2.7 3.3	34.0 37.4	36.0 36.1	38.47 47.54	83.85 238.23	500 500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Notes:

- 1 Initial pre scans were performed see Annex G for plots <1GHz.
- 2 See Annex H for radiated bandedge compliance plots.
- 3 Emissions above 1GHz were measured with both a peak and average detectors.
- 4 Measurements <1GHz were performed at 3 meters.
- 5 Measurements >1GHz were performed at 3 metres.
- 6 0.3m to 3m extrapolated as per part 15.31
- 7 Only emissions with in 20dB of limit are recorded.
- 8 Emissions not directly related to the transmitter are reported under receiver tests.

Test Method:

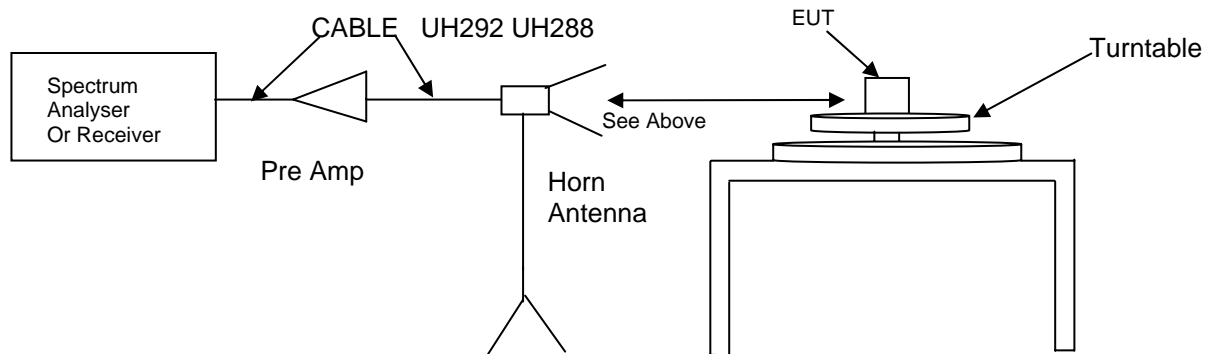
- 1 As per section 15.247.
- 2 Measuring distances as notes 5 to 6 above.
- 3 EUT 0.8 metre above ground plane.
- 4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m >30MHz.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthogonal planes. Maximum results recorded.

The test equipment used for the tests is shown on page 19:

TRANSMITTER TESTS – EXTERNAL ANTENNA

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

Ambient temperature	=	16°C(>1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	68% (>1GHz)	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+3Vdc		



Bottom Channel 2405 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBµV/m)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	4810.436 7215.640	38.16 46.10	2.4 2.3	33.8 35.8	36.4 36.3	37.96 47.90	79.06 248.31	500 500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Middle Channel 2440 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBµV/m)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	4880.423 7320.639	41.87 43.22	2.55 2.35	33.9 35.9	36.50 36.40	41.82 45.07	123.31 179.26	500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Top Channel 2480 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBµV/m)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	4960.440 7440.649	45.80 43.25	2.7 3.3	34.0 37.4	36.0 36.1	46.57 47.85	213.06 246.88	500 500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Notes:

- 1 Initial pre scans were performed see Annex G for plots <1GHz.
- 2 See Annex H for radiated bandedge compliance plots.
- 3 Emissions above 1GHz were measured with both a peak and average detectors.
- 4 Measurements <1GHz were performed at 3 meters.
- 5 Measurements >1GHz were performed at 3 metres.
- 6 0.3m to 3m extrapolated as per part 15.31
- 7 Only emissions with in 20dB of limit are recorded.
- 8 Emissions not directly related to the transmitter are reported under receiver tests.

Test Method:

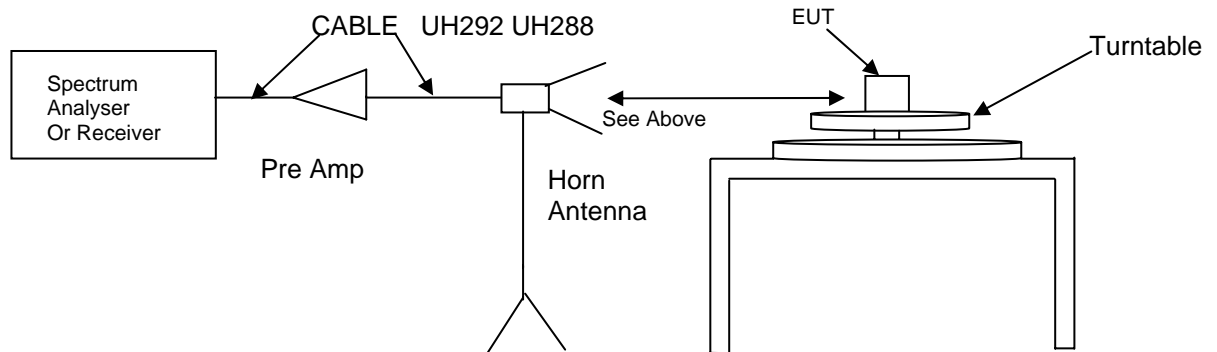
- 1 As per section 15.247.
- 2 Measuring distances as notes 5 to 6 above.
- 3 EUT 0.8 metre above ground plane.
- 4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m >30MHz.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthogonal planes. Maximum results recorded.

The test equipment used for the tests is shown on page 19:

TRANSMITTER TESTS – SMA CONNECTED EXTERNAL ANTENNA

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

Ambient temperature	=	16°C(>1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	68% (>1GHz)	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+3Vdc		



Bottom Channel 2405 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBµV/m)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	2257.206	42.11	1.86	28.05	35.0	37.02		500
	2261.204	42.72	1.86	28.05	35.0	37.63		500
	4810.436	43.81	2.40	33.80	36.4	43.61		500
	7215.640	47.76	2.30	35.80	36.3	49.56		500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Middle Channel 2440 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBµV/m)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	4880.423 7320.639	40.54 42.11	2.55 2.35	33.9 35.9	36.50 36.40	40.49 43.96		500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Top Channel 2480 MHz	Emission Frequency (MHz)	Meas. Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain	Field Strength (dBµV/m)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						100
88MHz – 216MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						200
960MHz – 1GHz Restricted bands	Note 7	No Significant Emissions within 20dBs of the Limit						500
1GHz – 26GHz Restricted bands	2328.209	45.83	1.90	28.2	35.0	40.93		500
	2332.216	45.04	1.90	28.2	35.0	40.14		500
	2352.239	41.39	1.90	28.2	35.0	36.49		500
	4960.440	38.40	2.70	34.0	36.0	39.10		500
	7440.649	35.96	3.30	37.4	36.1	40.56		500
30MHz -26GHz	Note 7	No Significant Emissions within 20dBs of the Limit						-20dBc
See annex G for initial pre scan results.								

Notes:

- 1 Initial pre scans were performed see Annex G for plots <1GHz.
- 2 See Annex H for radiated bandedge compliance plots.
- 3 Emissions above 1GHz were measured with both a peak and average detectors.
- 4 Measurements <1GHz were performed at 3 meters.
- 5 Measurements >1GHz were performed at 3 metres.
- 6 0.3m to 3m extrapolated as per part 15.31
- 7 Only emissions with in 20dB of limit are recorded.
- 8 Emissions not directly related to the transmitter are reported under receiver tests.

Test Method:

- 1 As per section 15.247.
- 2 Measuring distances as notes 5 to 6 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 orthogonal planes. Maximum results recorded.

The test equipment used for the tests is shown below:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010-3580	138	
HORN ANTENNA	EMCO	3115	9010-3581	139	X
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	X
RANGE 1	TRL	3 METRE	N/A	UH06	X
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	X
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU	200034	UH281	X
PRE AMP	AGILENT	8449B	3008A01610	572	X

TRANSMITTER and RECEIVER TESTS

TRANSMITTER CONDUCTED EMISSIONS – AC POWER LINE Parts 15.207 & 15.107

CHIP ANTENNA(worse case)

Ambient temperature	=	18°C(<1GHz)
Relative humidity	=	62%(<1GHz)
Conditions	=	Power Line Laboratory
Supply voltage	=	+110V AC
Supply Frequency	=	60Hz

SIGNIFICANT EMISSIONS

Transmitting On Bottom Channel Part 15.207

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
16MHz	47.10	Quasi Peak	Live	60.0
16MHz	46.78	Average	Live	50.0
24MHz	34.41	Average	neutral	50.0

SIGNIFICANT EMISSIONS

Transmitting On Top Channel Part 15.207

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
16MHz	45.44	Quasi Peak	Live	60.0
16MHz	45.10	Average	Live	50.0
24MHz	35.95	Average	Live/Neutral	50.0

The test equipment used for the Transmitter Conducted Emissions – AC Power Line are shown on page 20:

SIGNIFICANT EMISSIONS**CHIP ANTENNA(worse case)**

Receiving On Bottom Channel Part 15.107

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dB μ V)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dB μ V)
16MHz	43.48	Quasi Peak	Live	60.0
16MHz	42.94	Average	Live/ Neutral	50.0
24MHz	33.13	Average	Neutral	50.0

SIGNIFICANT EMISSIONS

Receiving On Top Channel Part 15.107

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dB μ V)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dB μ V)
16MHz	45.84	Quasi Peak	Live	60.0
16MHz	45.39	Average	Live	50.0
24MHz	33.90	Average	Neutral	50.0

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

- Notes:**
- 1 See attached plots annex I (Worst Case Scan for TX and RX).
 - 2 Only emissions within 20 dB of the limit are recorded.
 - 3 +110Vac to power supply Supplying unit with +3.0Vdc

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:

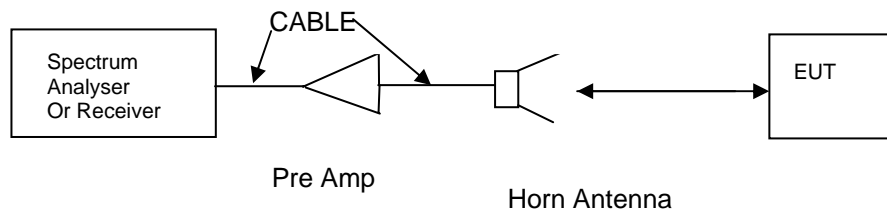
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	X
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	840731/015	UH195	X

RECEIVER TESTS

RECEIVER SPURIOUS EMISSIONS – RADIATED – PART 15.109

RX BOTTOM CHANNEL

Ambient temperature	=	16°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	68% (<1GHz)	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+3Vdc		



	FREQ. EMISSION (MHz)	MEAS. Rx.	CABLE LOSS (dB)	ANT FACTOR	PRE AMP GAIN	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
30MHz – 88MHz	32.0	15.55	0.95	17.20	-	33.7	48.42	100
	40.0	12.11	0.99	12.90	-	26.0	19.95	100
	48.0	13.03	1.07	8.60	-	22.7	13.64	100
	56.0	14.24	1.16	5.60	-	21.0	11.22	100
88MHz – 216MHz		No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz		No Significant Emissions within 20dBs of the Limit						200
960MHz – 1.0GHz		No Significant Emissions within 20dBs of the Limit						500
1GHz – 12.75GHz	4.806GHz	37.31	2.4	33.8	36.4	37.31	73.36	500

Notes:

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

Test Method:

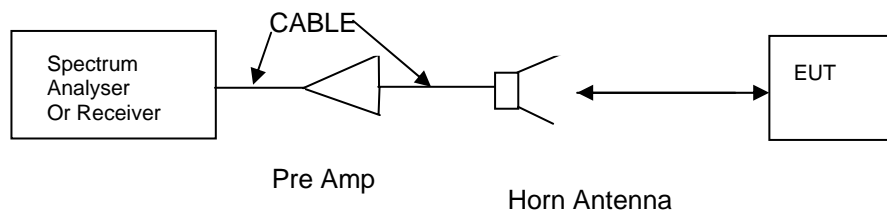
- 1 As per Radio – Noise Emissions, ANSI C63.4: 2003.
- 2 Measuring distances as Notes 1 to 4 above.
- 3 EUT 0.8 metre above ground plane.
- 4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m.
Horizontal and vertical polarisations,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

RECEIVER TESTS

RECEIVER SPURIOUS EMISSIONS – RADIATED – PART 15.109

RX TOP CHANNEL

Ambient temperature	=	16°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	68% (<1GHz)	0.3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)	3m extrapolated from 0.3m	[X]
Supply voltage	=	+3Vdc		



	FREQ. EMISSION (MHz)	MEAS. Rx.	CABLE LOSS (dB)	ANT FACTOR	PRE AMP GAIN	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
30MHz – 88MHz	32.0	15.55	0.95	17.20	-	33.7	48.42	100
	40.0	12.11	0.99	12.90	-	26.0	19.95	100
	48.0	13.03	1.07	8.60	-	22.7	13.64	100
	56.0	14.24	1.16	5.60	-	21.0	11.22	100
88MHz – 216MHz		No Significant Emissions within 20dBs of the Limit						150
216MHz – 960MHz		No Significant Emissions within 20dBs of the Limit						200
960MHz – 1.0GHz		No Significant Emissions within 20dBs of the Limit						500
1GHz – 12.75GHz	4.990GHz	36.01	2.7	34.2	36.6	36.31	65.38	500

Notes:

- 1 Initial pre scans were performed see Annex J for plots <1GHz.
- 2 Emissions above 1GHz were measured with both a peak and average detectors.
- 3 Measurements <1GHz were performed at 3 meters.
- 4 Measurements >1GHz were performed at 3 meters.
- 5 Only emissions within 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 orthogonal planes.
Maximum results recorded.

The test equipment used for the Receiver 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	
HORN ANTENNA	EMCO	3115	9010-3581	139	X
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
RECEIVER	ROHDE & SCHWARZ	ESVS 10	841431/014	UH186	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

ANNEX A
PHOTOGRAPHS

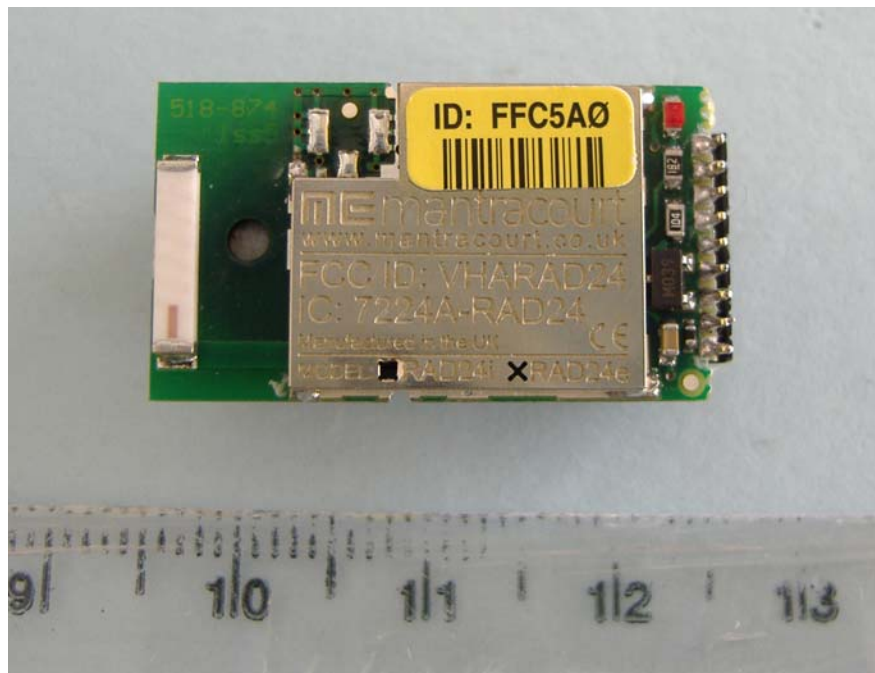
PHOTOGRAPH No. 1

TEST SETUP



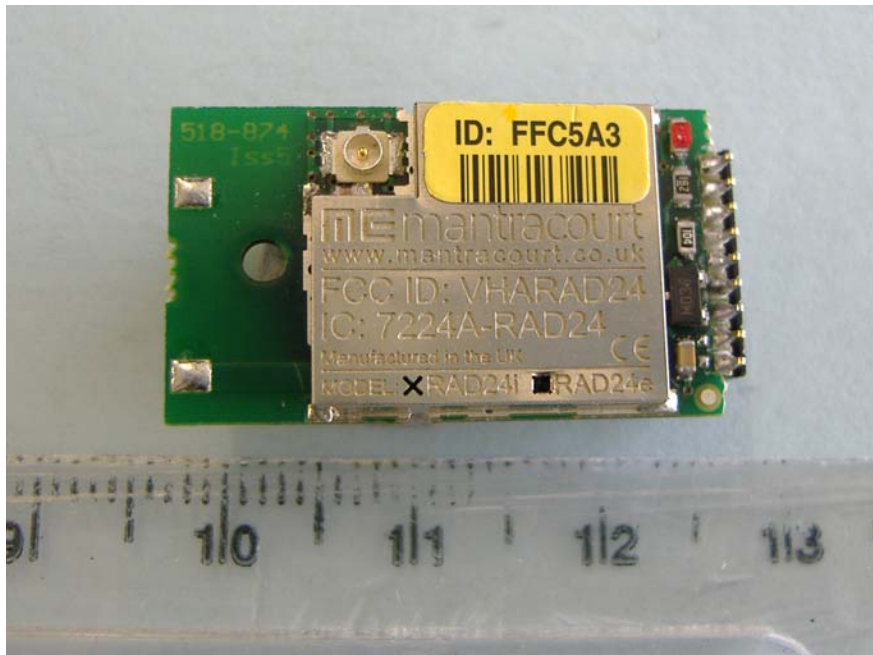
PHOTOGRAPH No. 2

TOP VIEW PCB
WITH CHIP ANTENNA



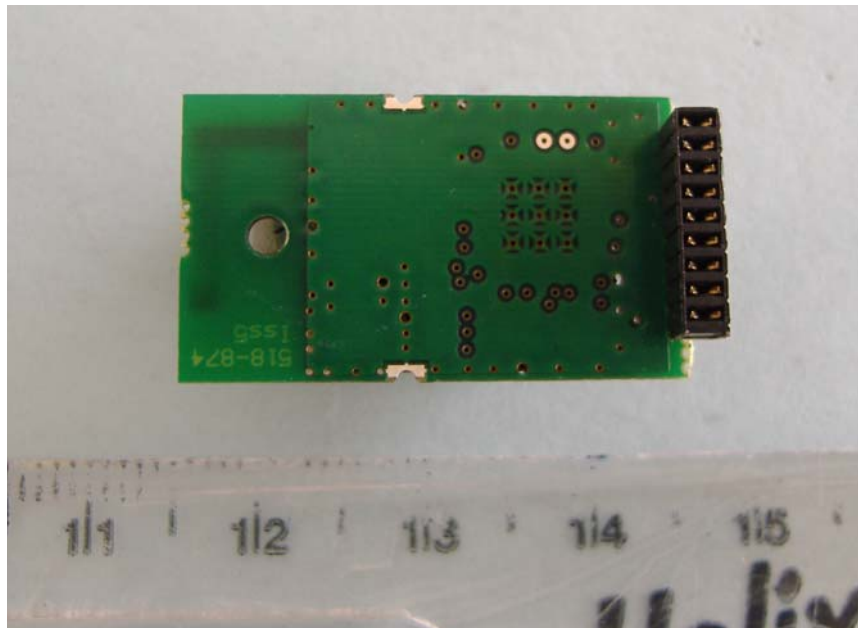
PHOTOGRAPH No. 3

TOP VIEW PCB
WITH EXTERNAL ANTENNA CONNECTOR



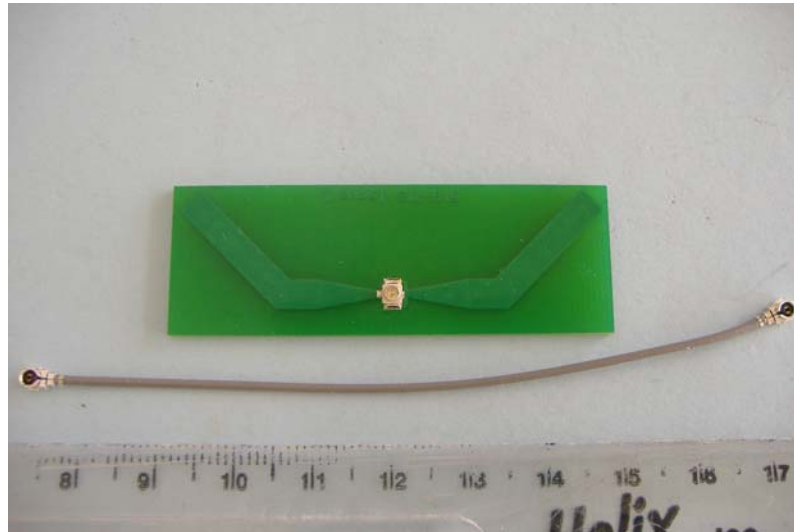
PHOTOGRAPH No. 4

BOTTOM VIEW OF PCB



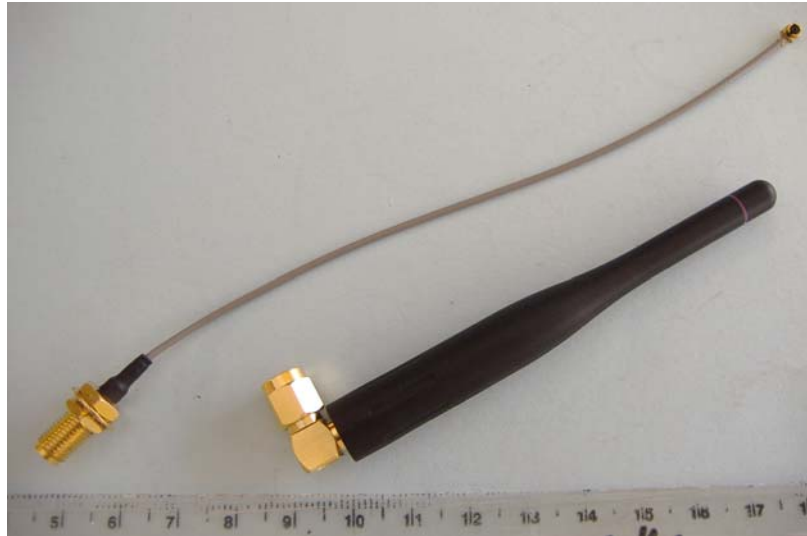
PHOTOGRAPH No. 5

EXTERNAL ANTENNA & CABLE



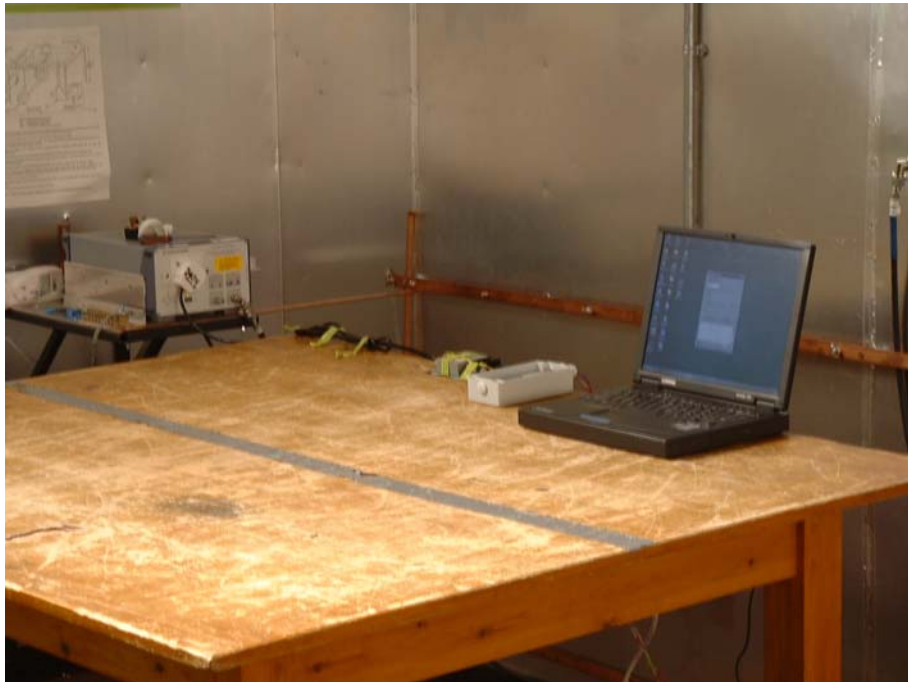
PHOTOGRAPH No. 6

EXTERNAL SMA ANTENNA & CABLE



PHOTOGRAPH No. 7

POWERLINE TEST SETUP



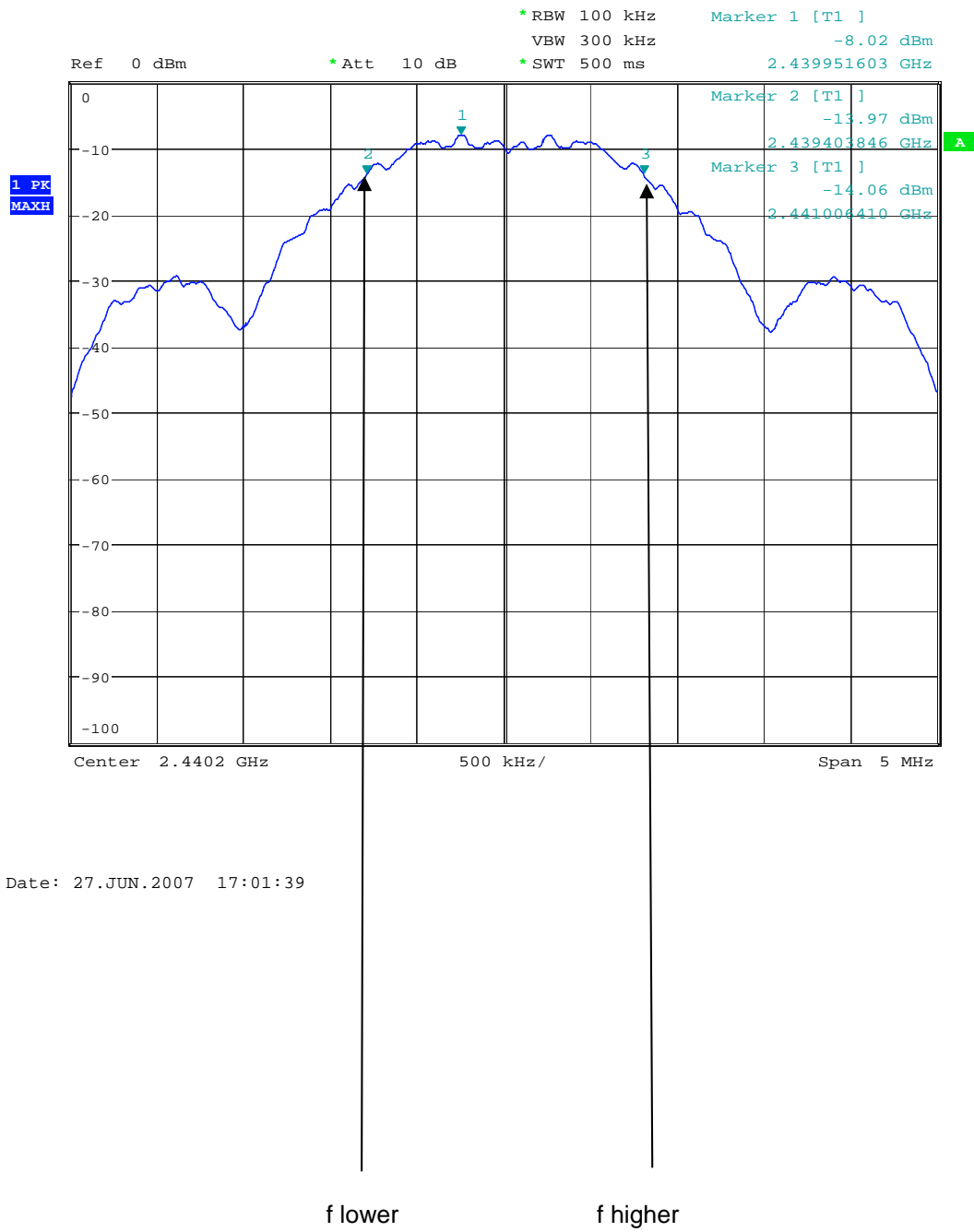
ANNEX B
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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)	-		[]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[X]
		-	DRAWINGS	[X]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[X]
		-	PSU	[]
		-	AUX	[]
h.	CIRCUIT DIAGRAMS	-	Tx	[X]
		-	Rx	[X]
		-	PSU	[]
		-	AUX	[]
i.	COMPONENT LOCATION	-	Tx	[X]
		-	Rx	[X]
		-	PSU	[]
		-	AUX	[]
j.	PCB TRACK LAYOUT	-	Tx	[X]
		-	Rx	[X]
		-	PSU	[]
		-	AUX	[]
k.	BILL OF MATERIALS	-	Tx	[X]
		-	Rx	[X]
		-	PSU	[]
		-	AUX	[]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C
6 dB BANDWIDTH

6dB Bandwidth Middle Channel

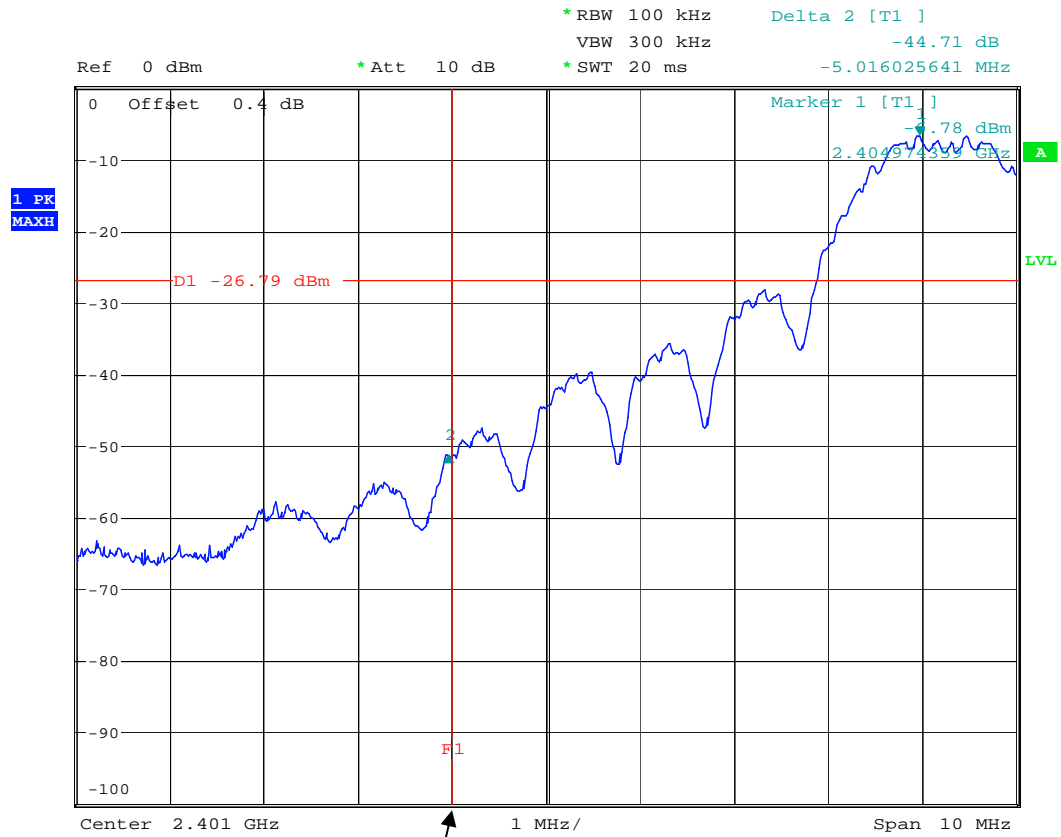


Date: 27.JUN.2007 17:01:39

Occupied bandwidth = 1.60MHz

ANNEX D
BAND EDGE COMPLIANCE (CONDUCTED)

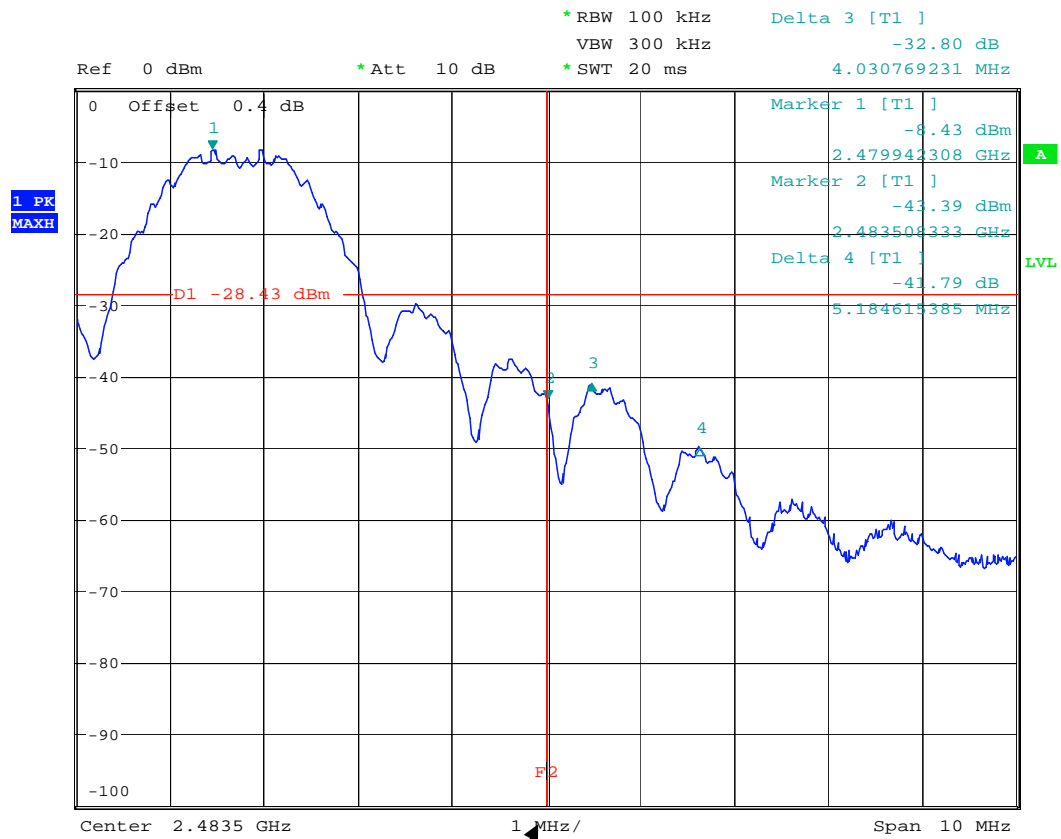
Lower Band Edge



Date: 28.JUN.2007 10:03:50

Bandedge

Upper Band Edge

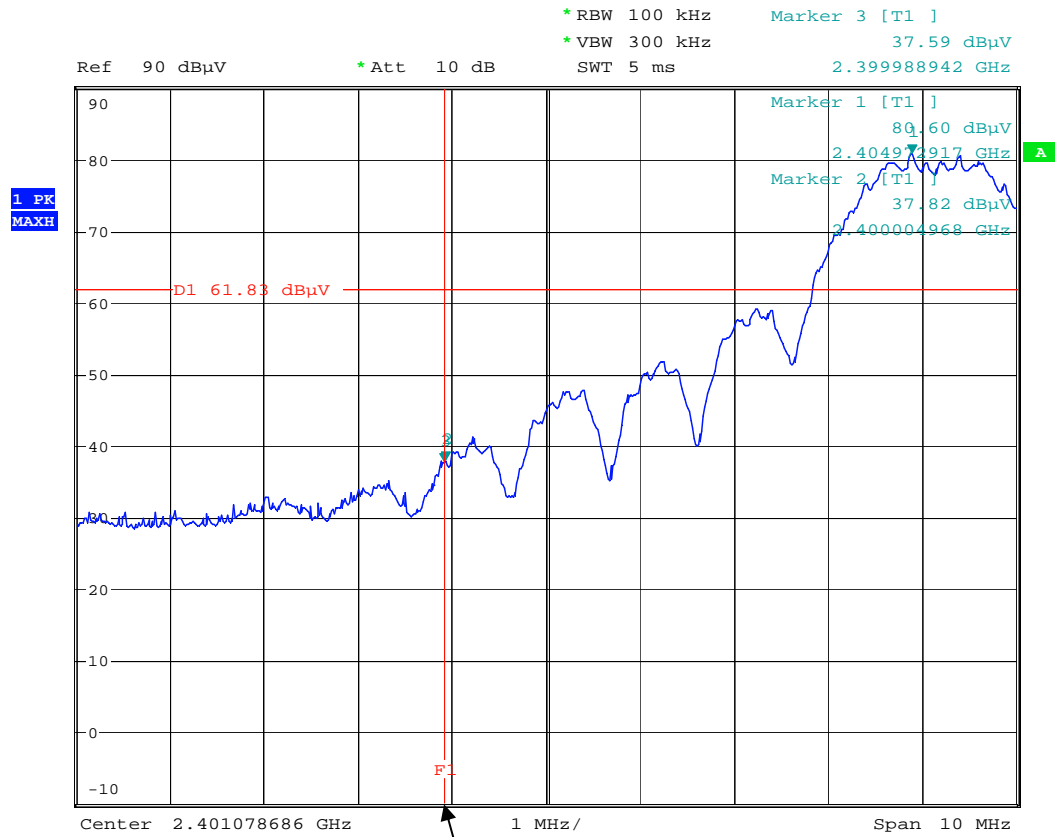


Date: 27.JUN.2007 17:44:01

Bandedge

ANNEX E
BAND EDGE COMPLIANCE (RADIATED)

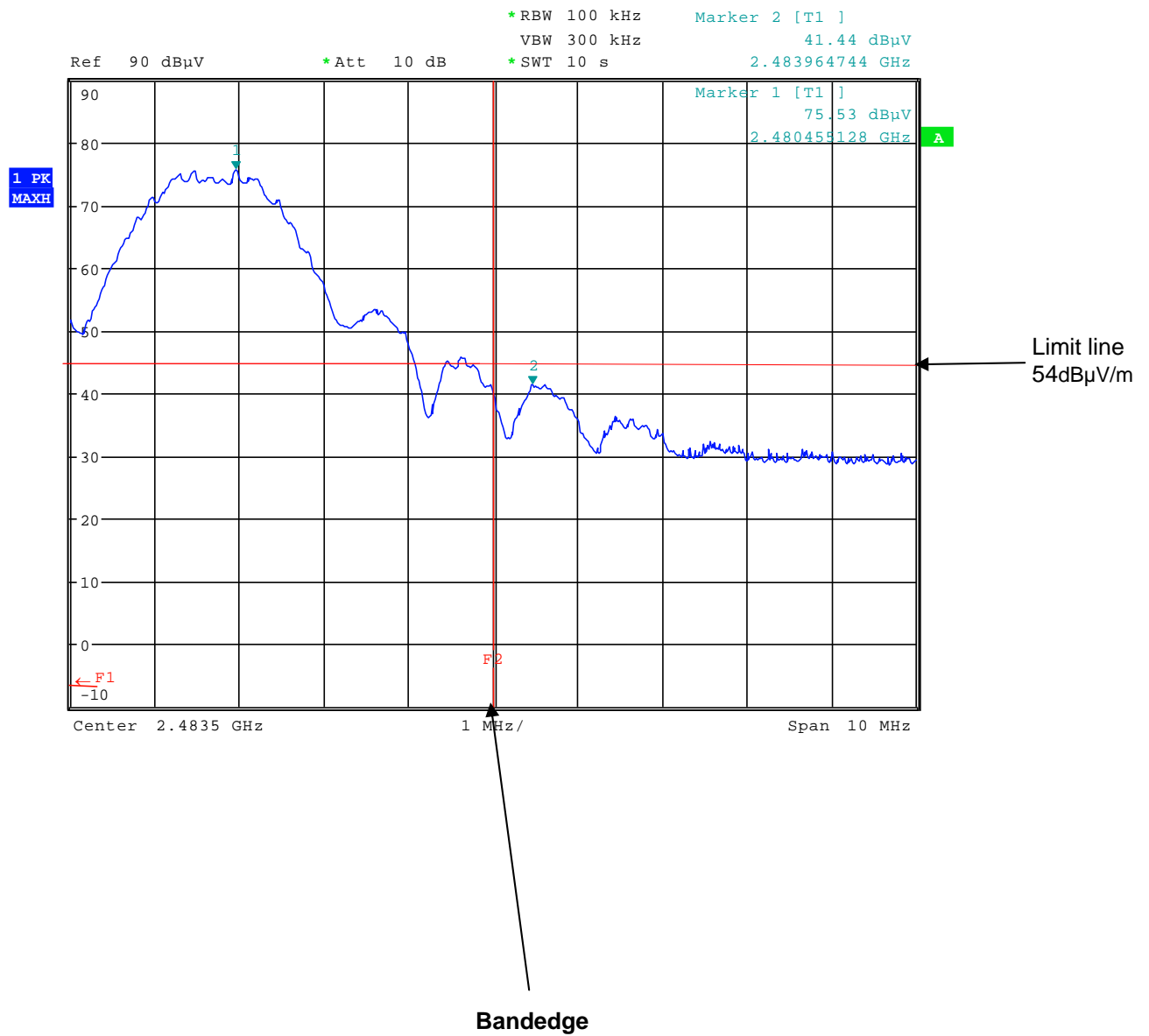
Lower Band Edge



Date: 3.JUL.2007 11:01:20

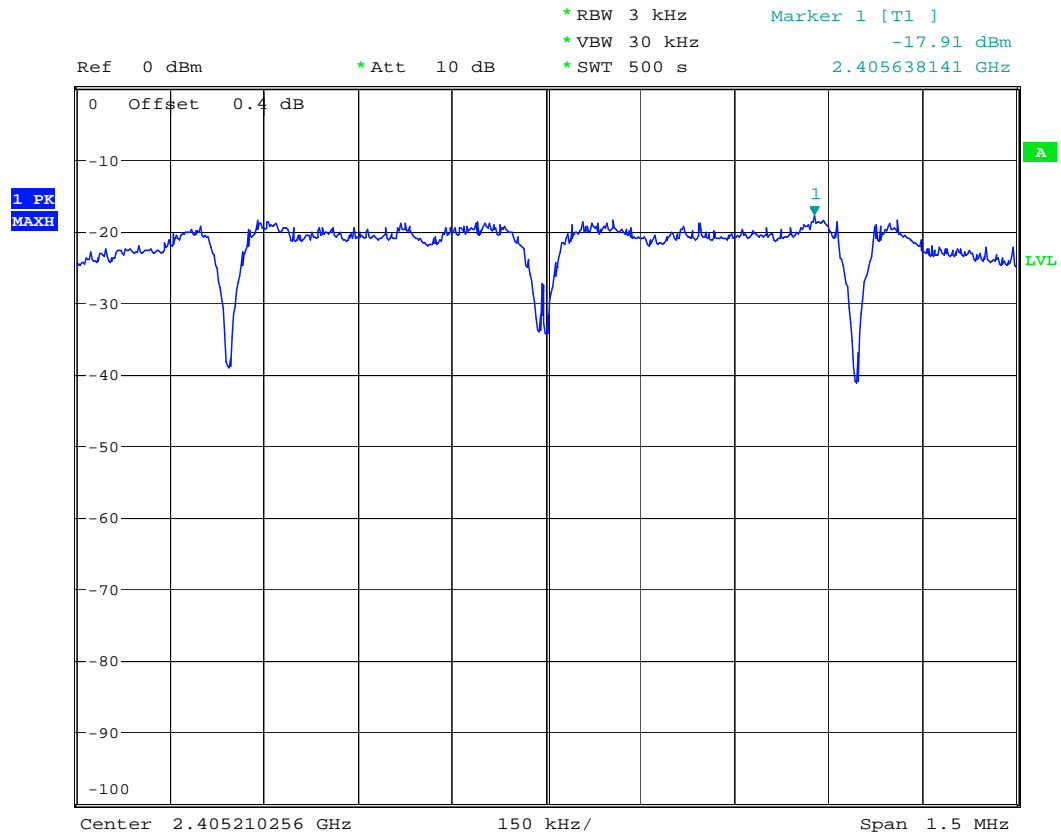
Bandedge

Upper Band Edge



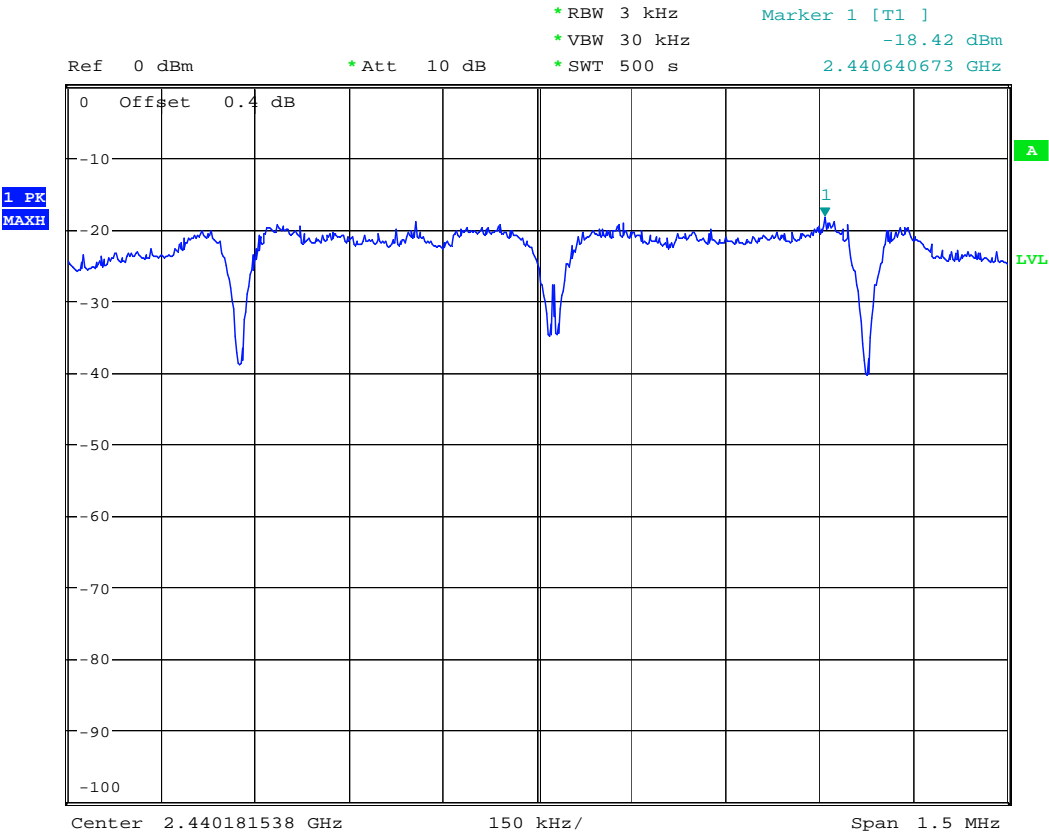
ANNEX F
POWER SPECTRAL DENSITY

Power Spectral Density Bottom Channel



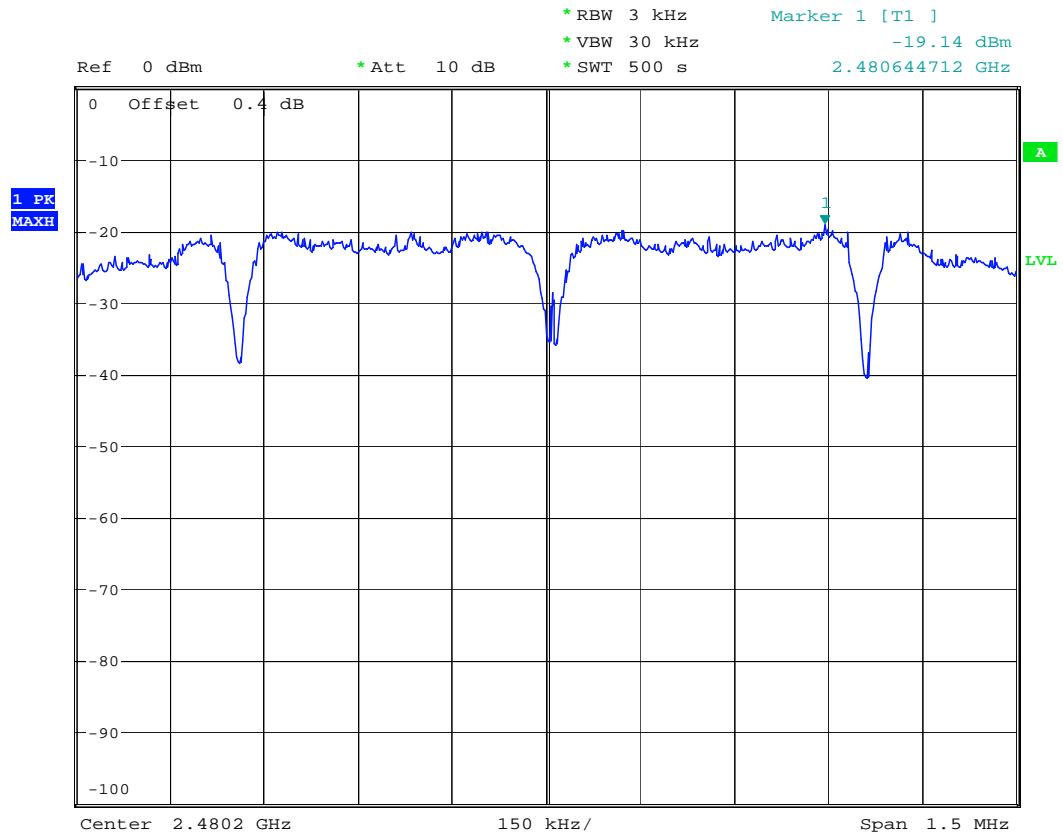
Date: 28.JUN.2007 10:38:10

Power Spectral Density Middle Channel



Date: 28.JUN.2007 10:56:07

Power Spectral Density Top Channel

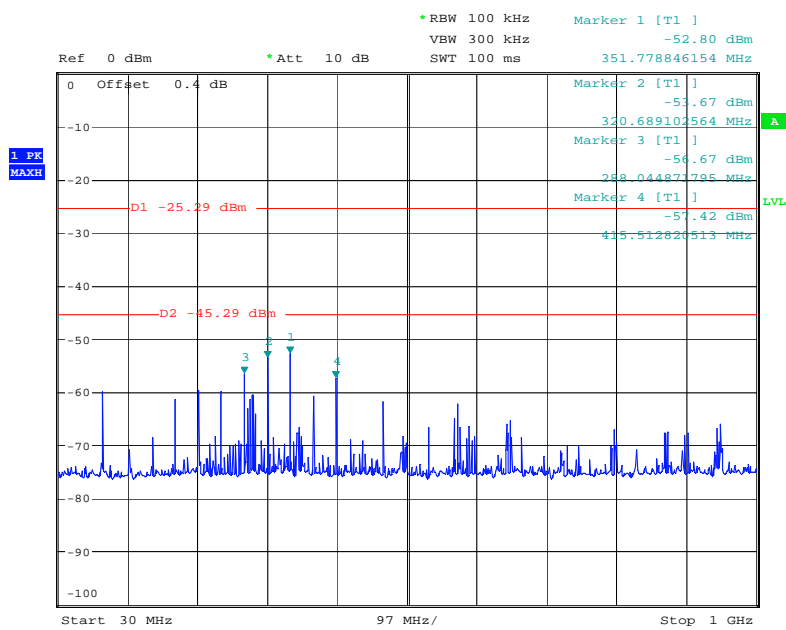


Date: 28.JUN.2007 11:25:42

ANNEX G
TRANSMITTER SPURIOUS EMISSIONS CONDUCTED

Bottom Channel

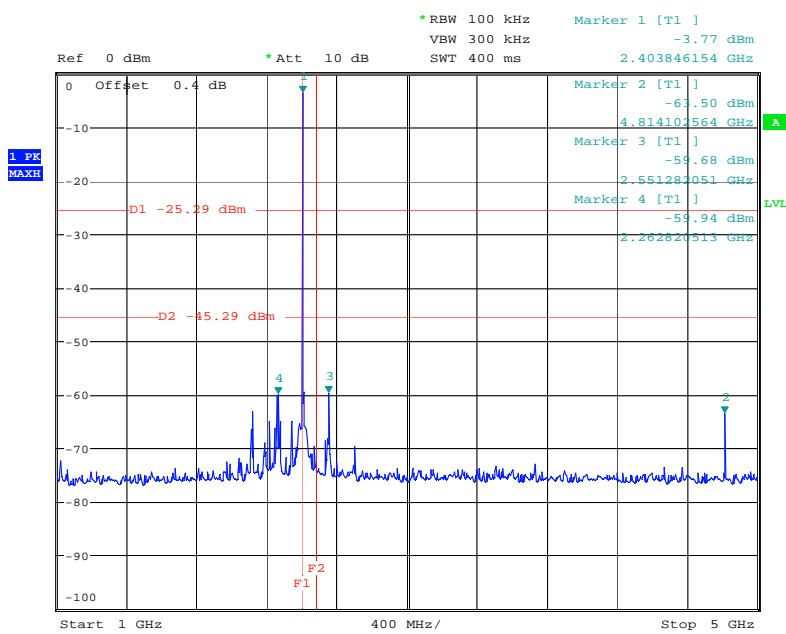
30 MHz – 1 GHz



Date: 28.JUN.2007 11:47:30

Bottom Channel

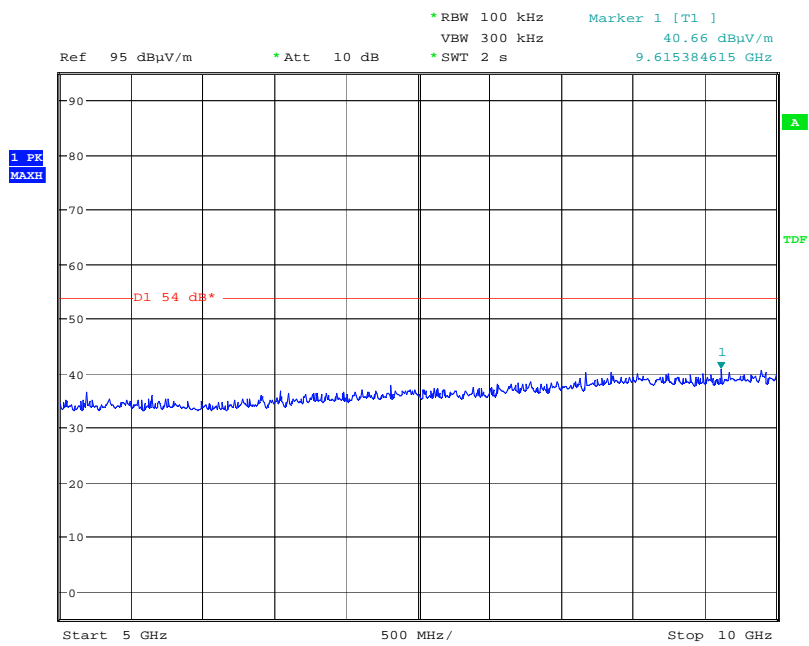
1 GHz – 5 GHz



Date: 28.JUN.2007 11:46:30

Bottom Channel

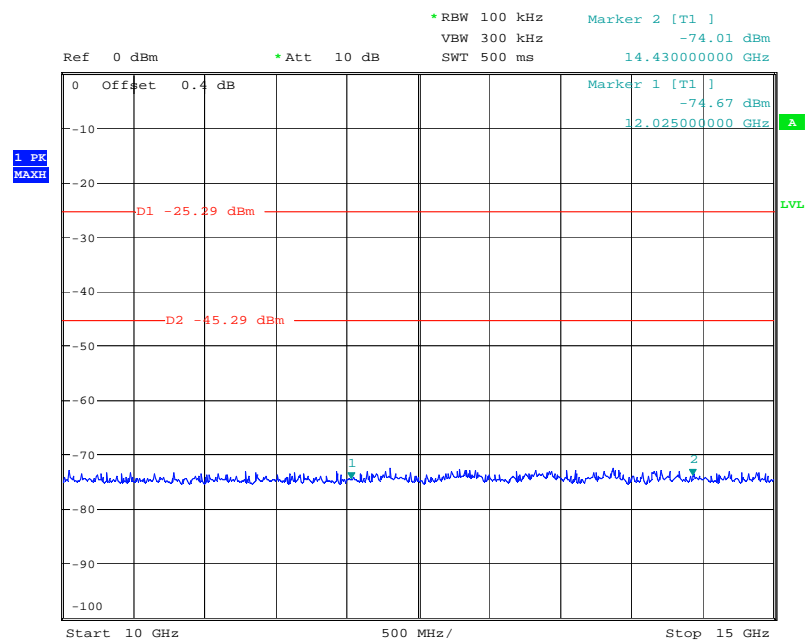
5 GHz – 10 GHz



Date: 9.NOV.2007 15:07:41

Bottom Channel

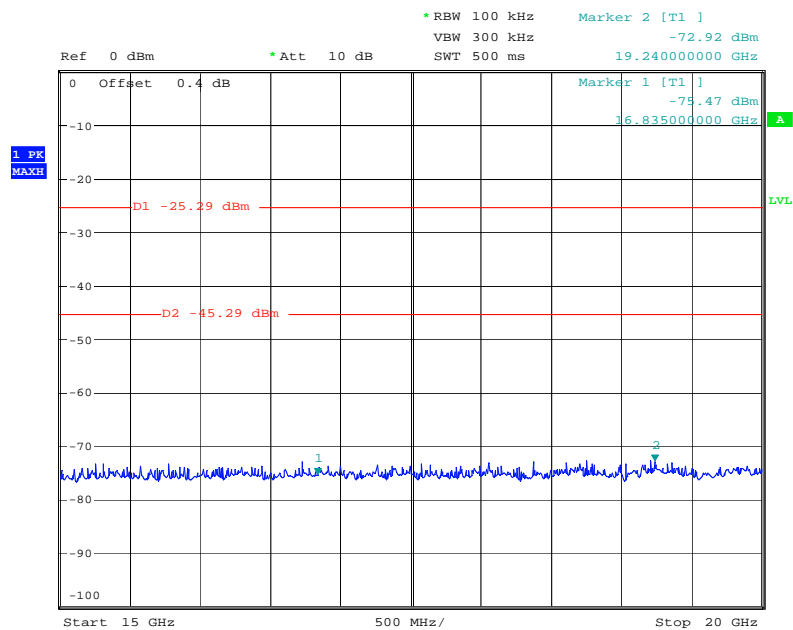
10 GHz – 15 GHz



Date: 28.JUN.2007 11:50:21

Bottom Channel

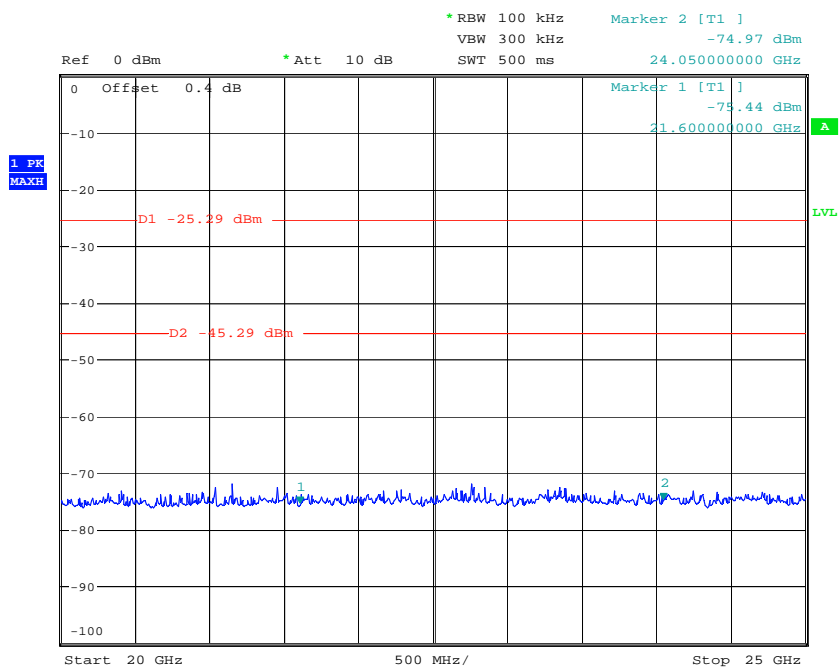
15 GHz – 20 GHz



Date: 28.JUN.2007 11:50:55

Bottom Channel

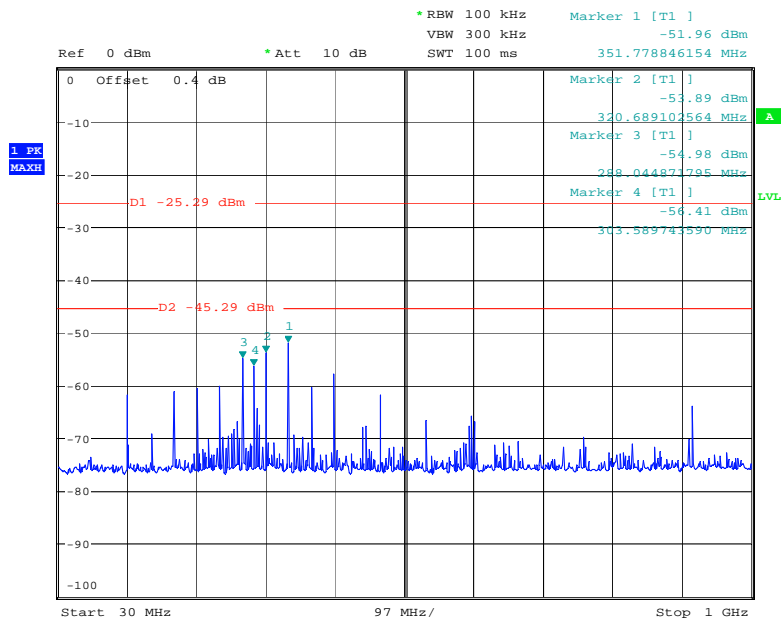
20 GHz – 25 GHz



Date: 28.JUN.2007 11:51:16

Mid Channel

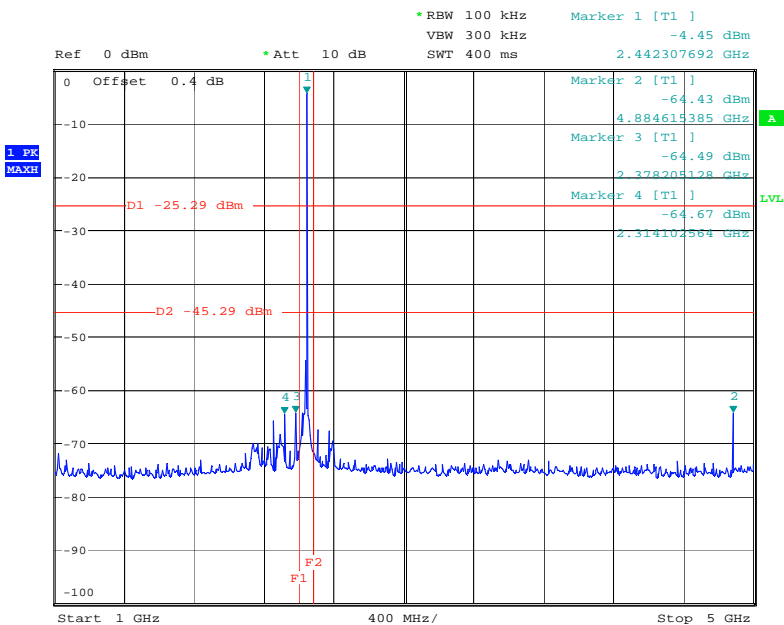
30 MHz – 1 GHz



Date: 28.JUN.2007 11:41:57

Mid Channel

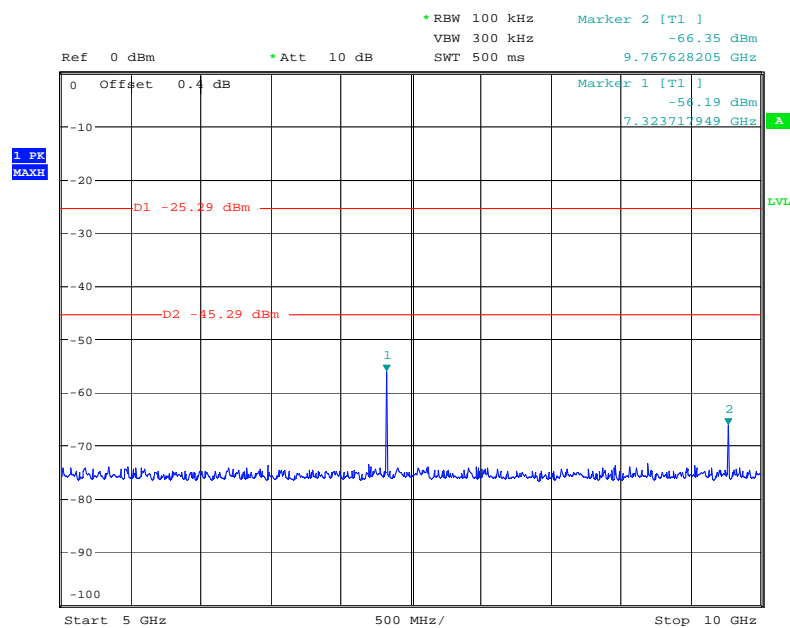
1 GHz – 5 GHz



Date: 28.JUN.2007 11:53:11

Mid Channel

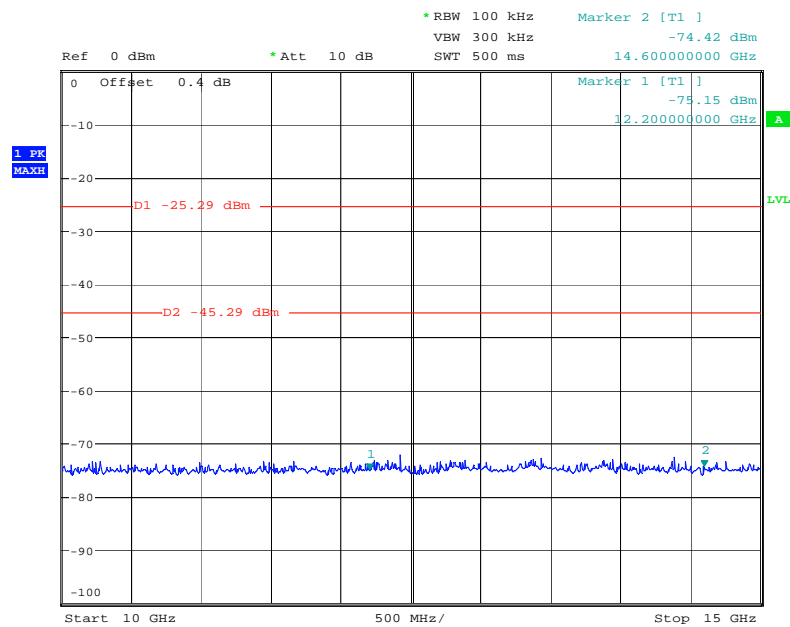
5 GHz – 10 GHz



Date: 28.JUN.2007 11:42:20

Mid Channel

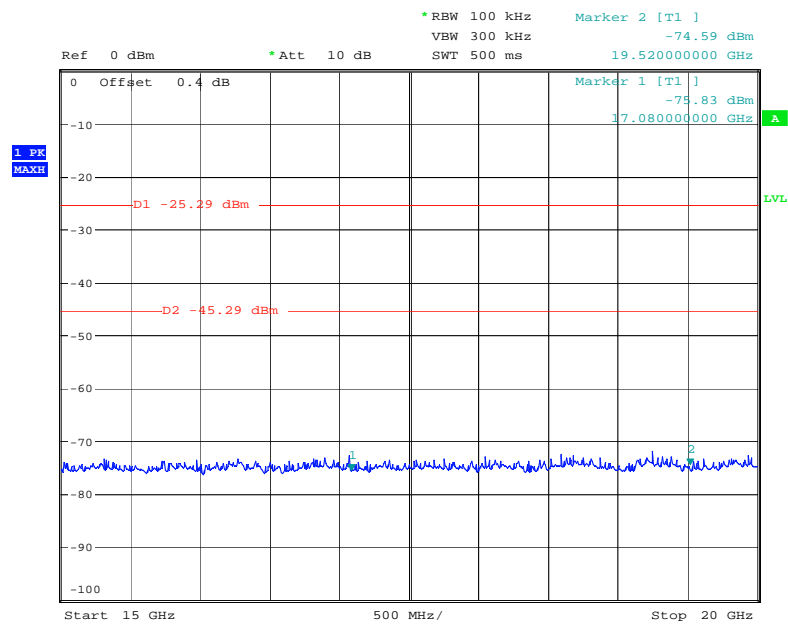
10 GHz – 15 GHz



Date: 28.JUN.2007 11:43:39

Mid Channel

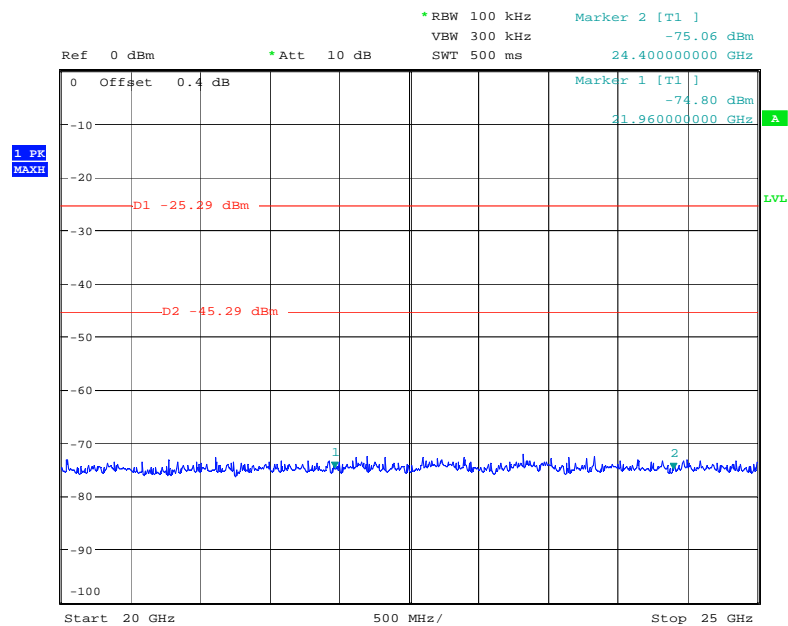
15 GHz – 20 GHz



Date: 28.JUN.2007 11:44:10

Mid Channel

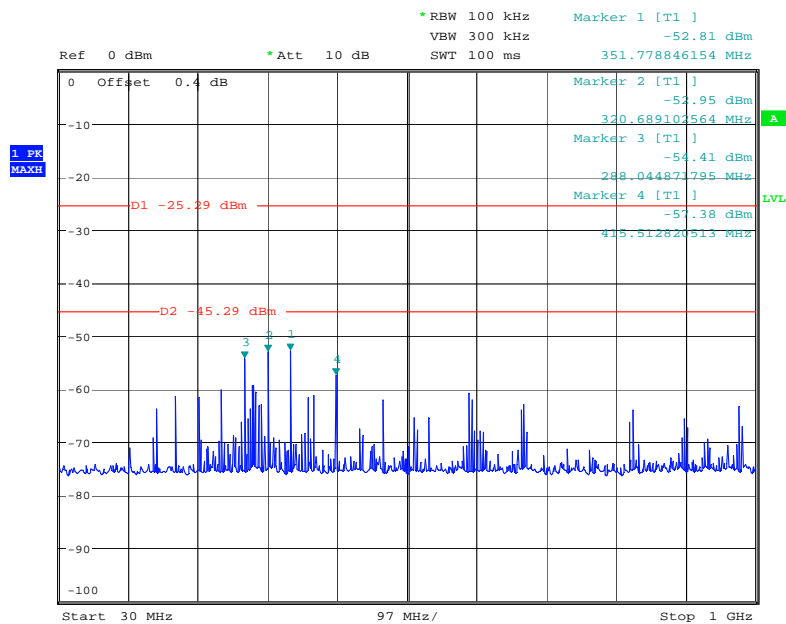
20 GHz – 25 GHz



Date: 28.JUN.2007 11:44:47

Top Channel

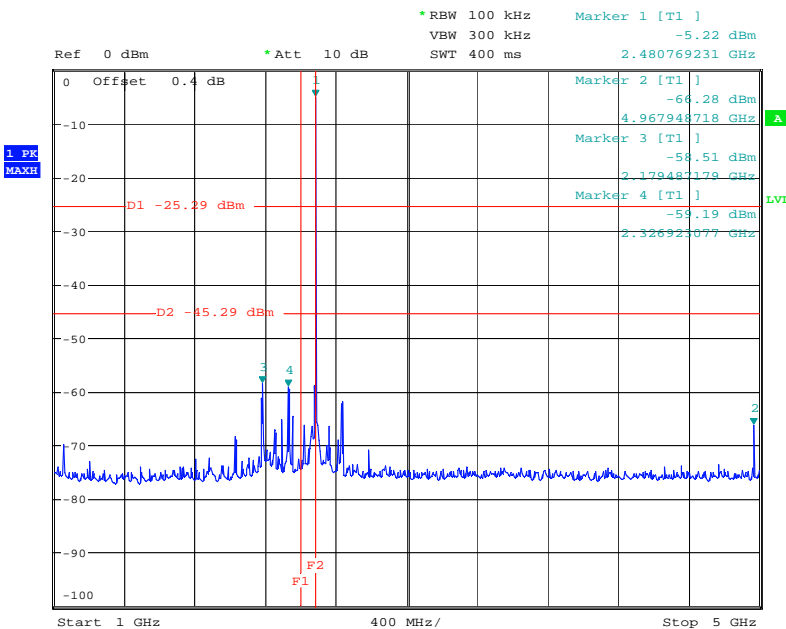
30 MHz – 1 GHz



Date: 28.JUN.2007 11:35:50

Top Channel

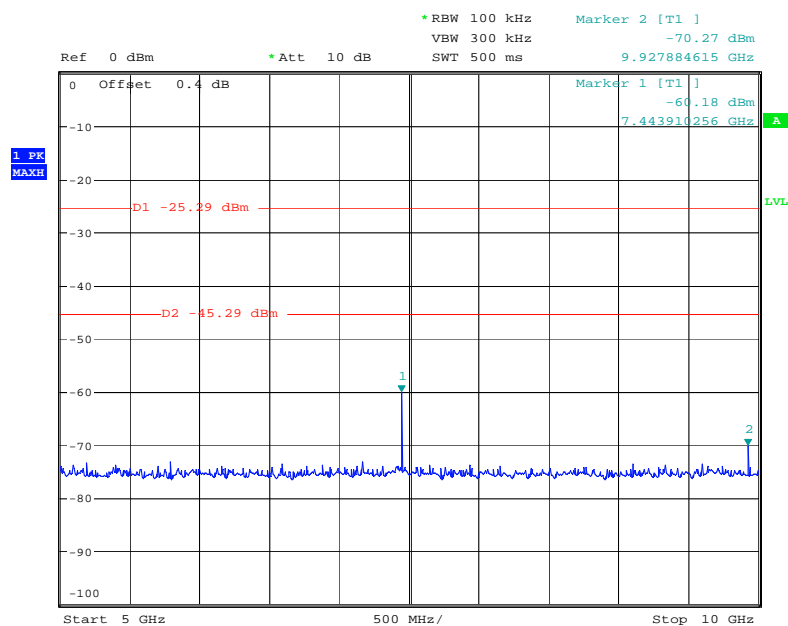
1 GHz – 5 GHz



Date: 28.JUN.2007 11:54:43

Top Channel

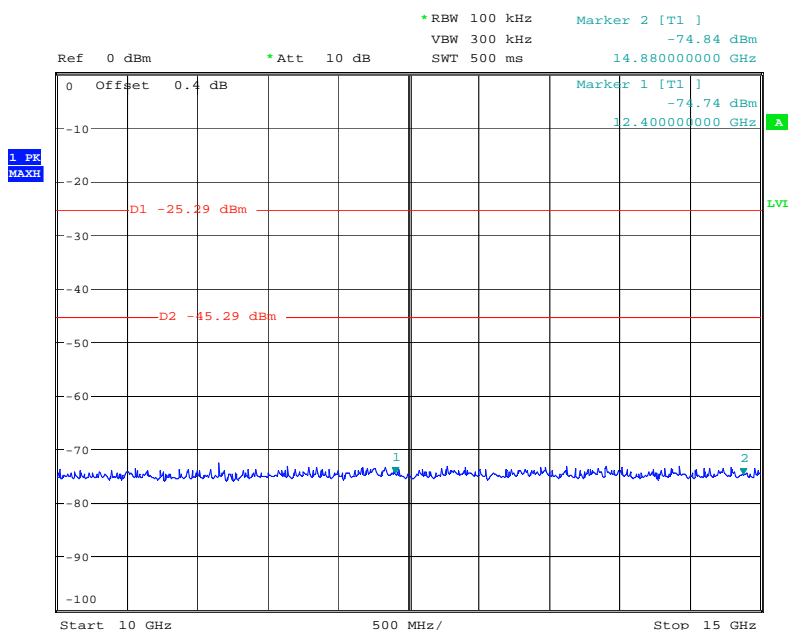
5 GHz – 10 GHz



Date: 28.JUN.2007 11:32:09

Top Channel

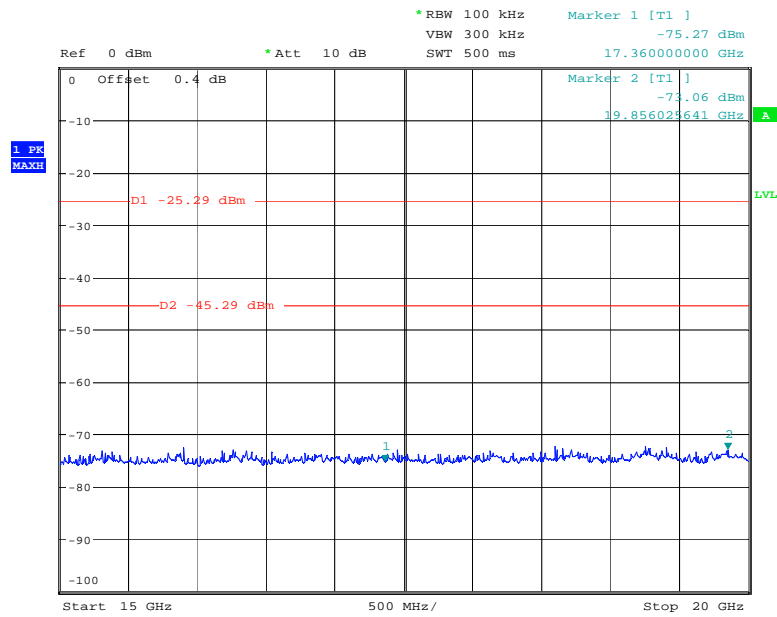
10 GHz – 15 GHz



Date: 28.JUN.2007 11:33:20

Top Channel

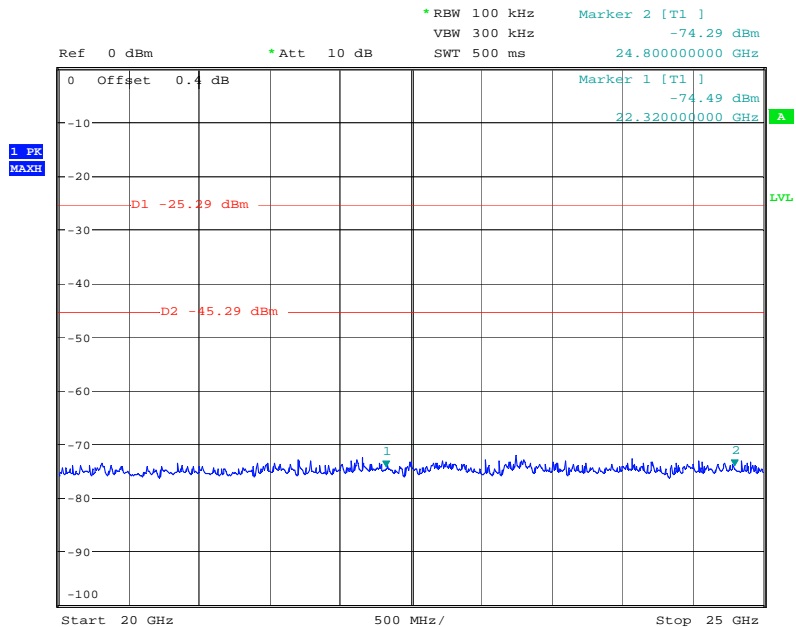
15 GHz – 20 GHz



Date: 28.JUN.2007 11:34:00

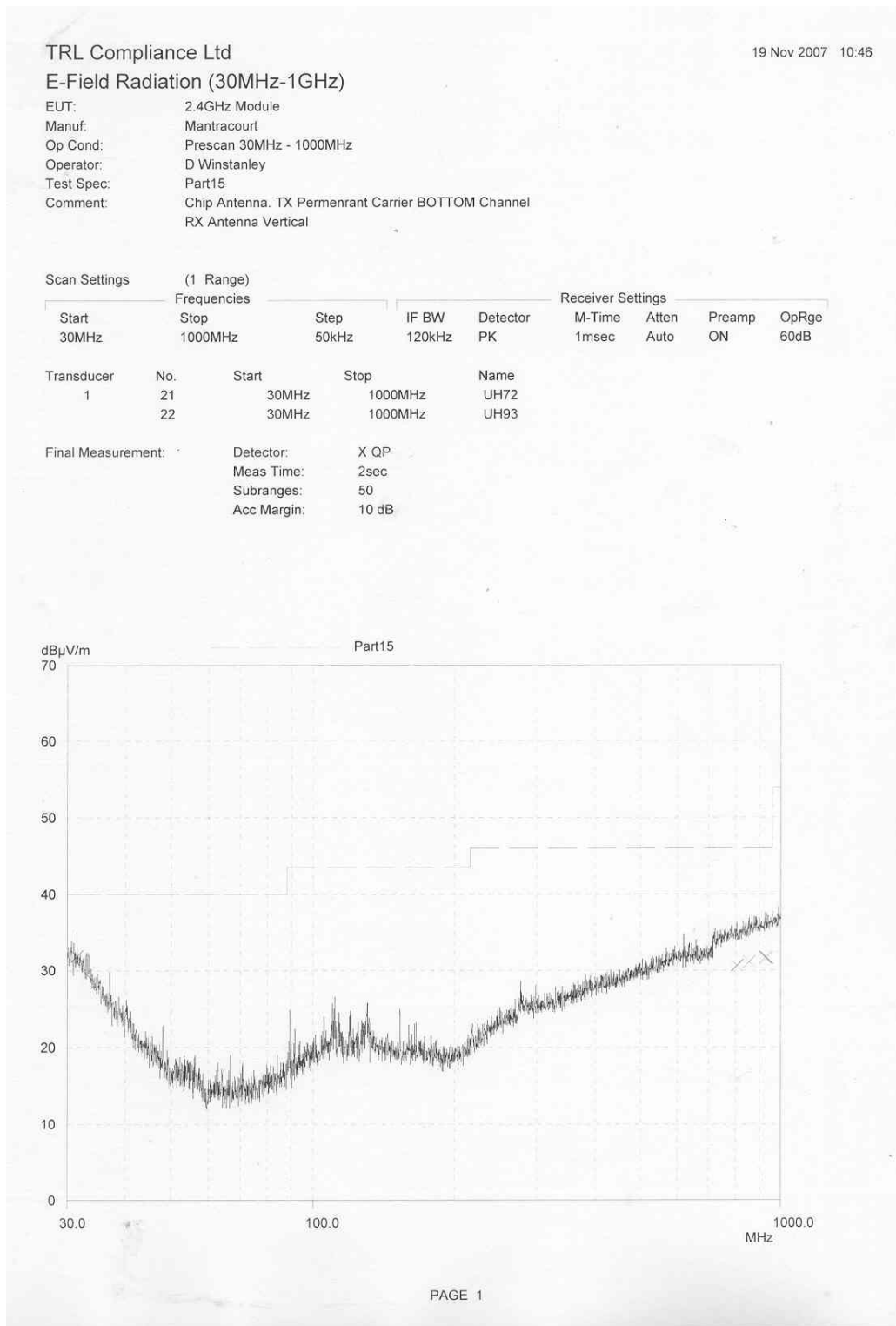
Top Channel

20 GHz – 25 GHz



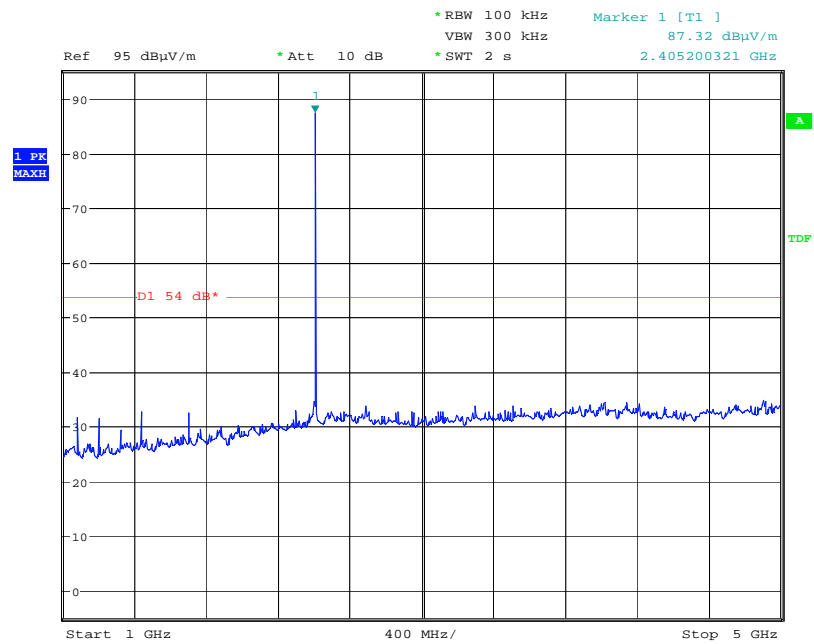
Date: 28.JUN.2007 11:34:52

ANNEX H
TRANSMITTER SPURIOUS EMISSIONS RADIATED
INTERNAL CHIP ANTENNA



Bottom Channel

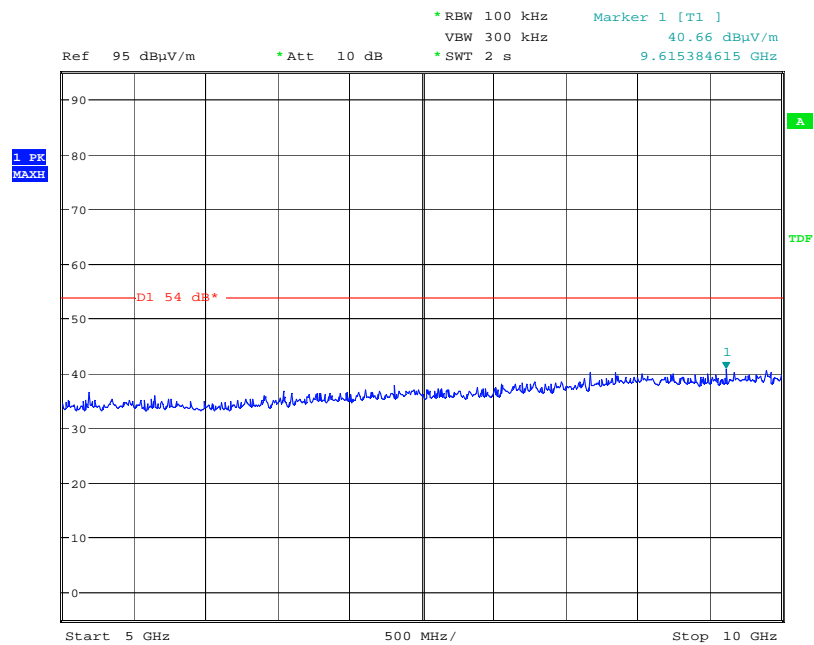
1GHz – 5GHz



Date: 9.NOV.2007 15:07:19

Bottom Channel

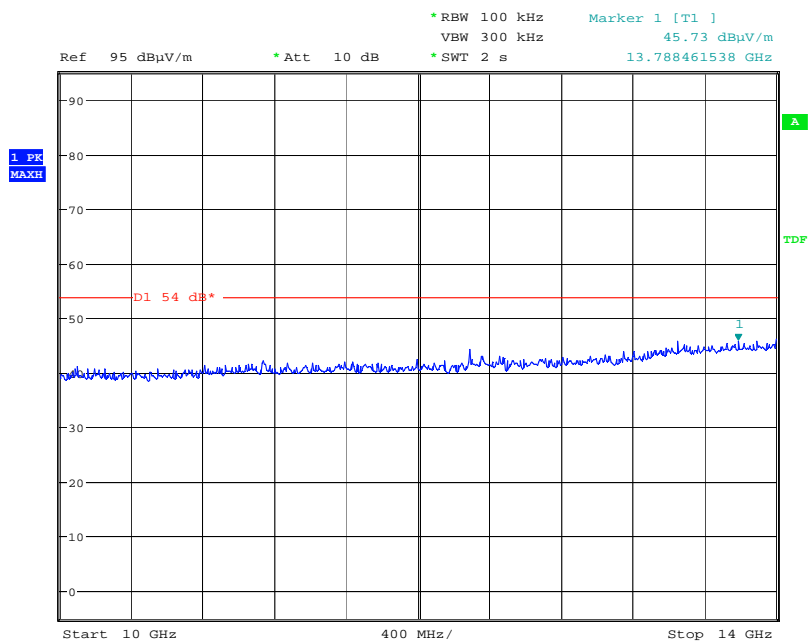
5GHz – 10GHz



Date: 9.NOV.2007 15:07:41

Bottom Channel

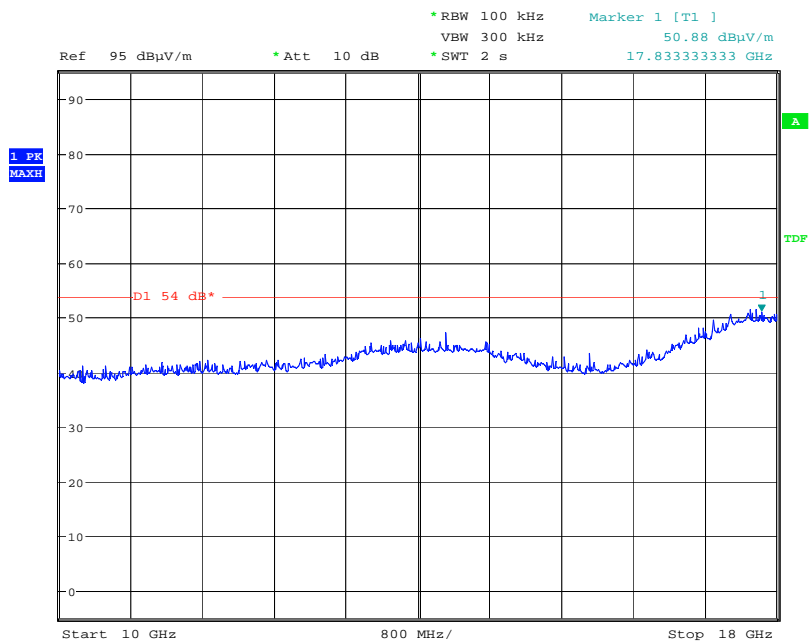
10GHz – 14GHz



Date: 9.NOV.2007 15:08:17

Bottom Channel

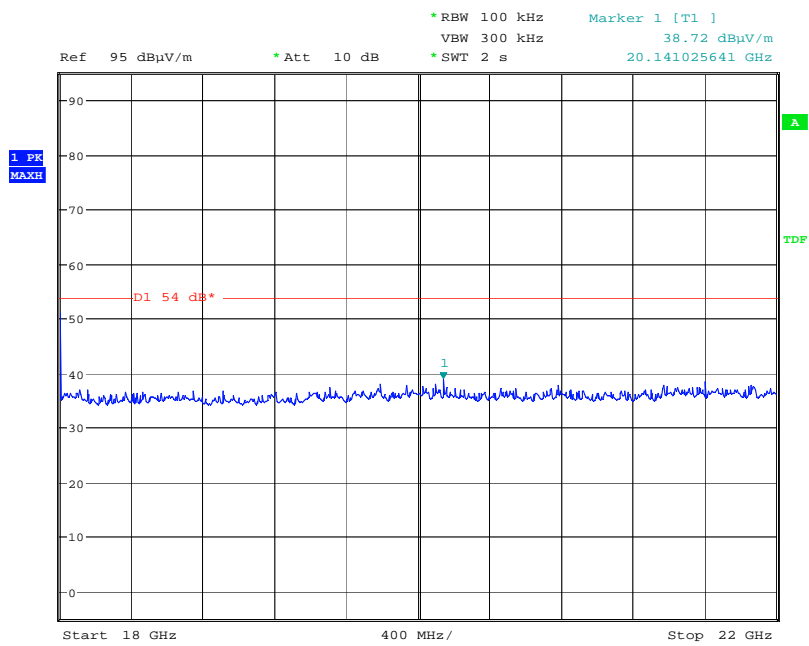
14GHz – 18GHz



Date: 9.NOV.2007 15:08:42

Bottom Channel

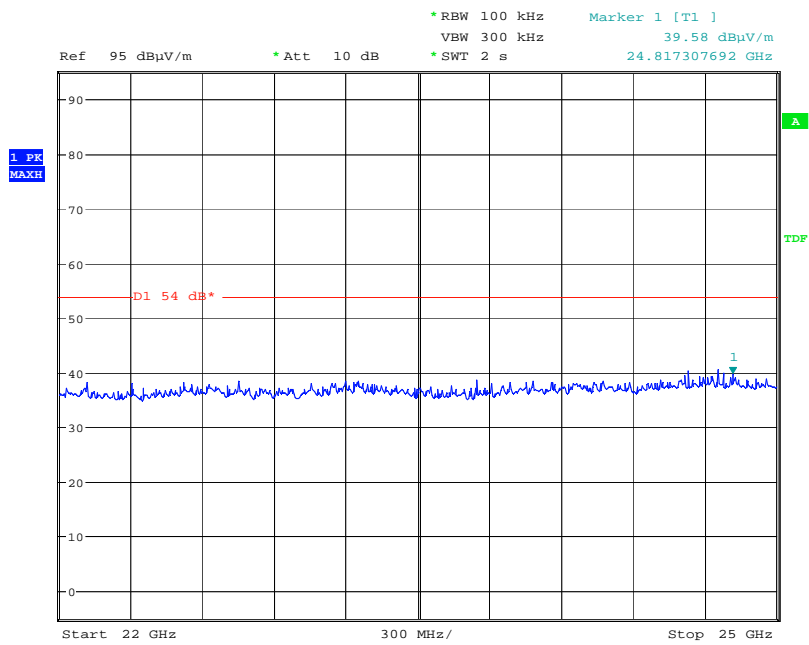
18GHz – 22GHz



Date: 9.NOV.2007 15:11:23

Bottom Channel

22GHz – 25GHz



Date: 9.NOV.2007 15:10:37

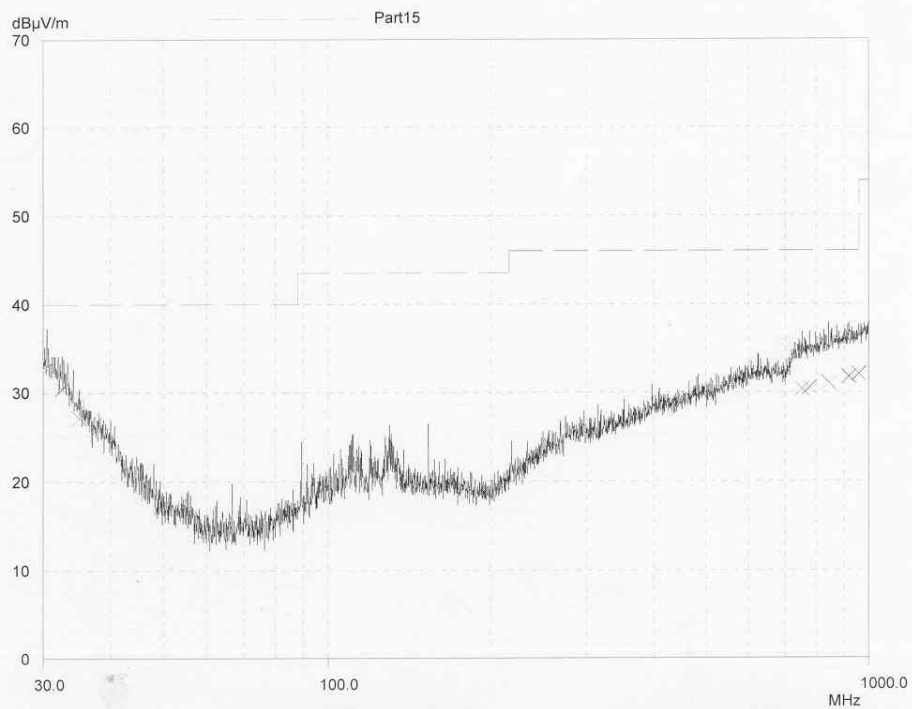
TRL Compliance Ltd

19 Nov 2007 10:59

E-Field Radiation (30MHz-1GHz)

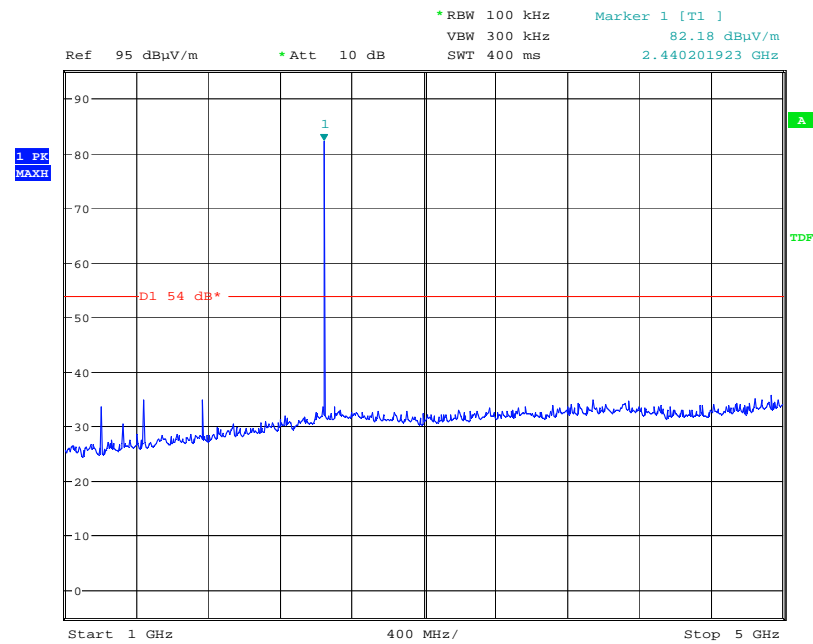
EUT: 2.4GHz Module
Manuf: Mantracourt
Op Cond: Prescan 30MHz - 1000MHz
Operator: D Winstanley
Test Spec: Part15
Comment: Chip Antenna. TX Permenrant Carrier MIDDLE Channel
RX Antenna Vertical

Scan Settings		(1 Range)			Receiver Settings				
Frequencies									
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						



Mid Channel

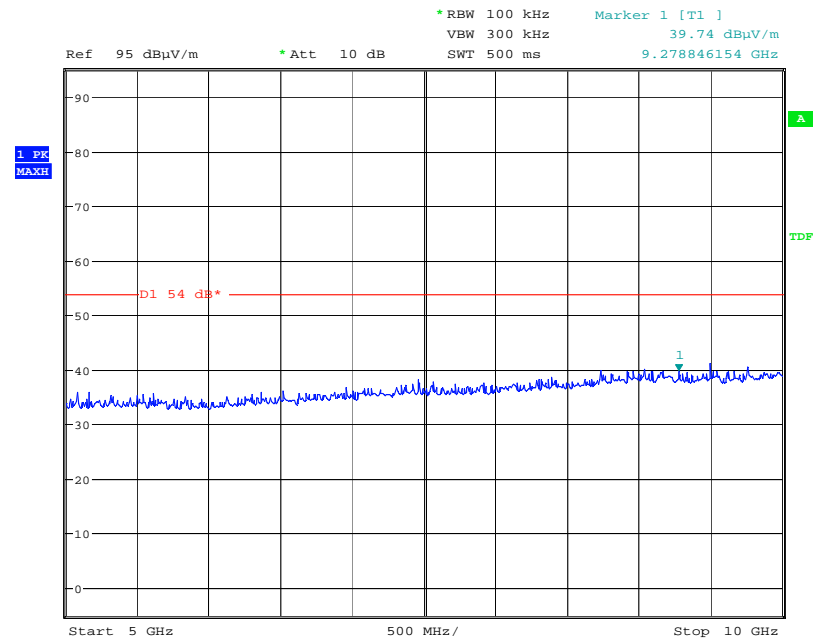
1GHz – 5GHz



Date: 9.NOV.2007 15:55:53

Mid Channel

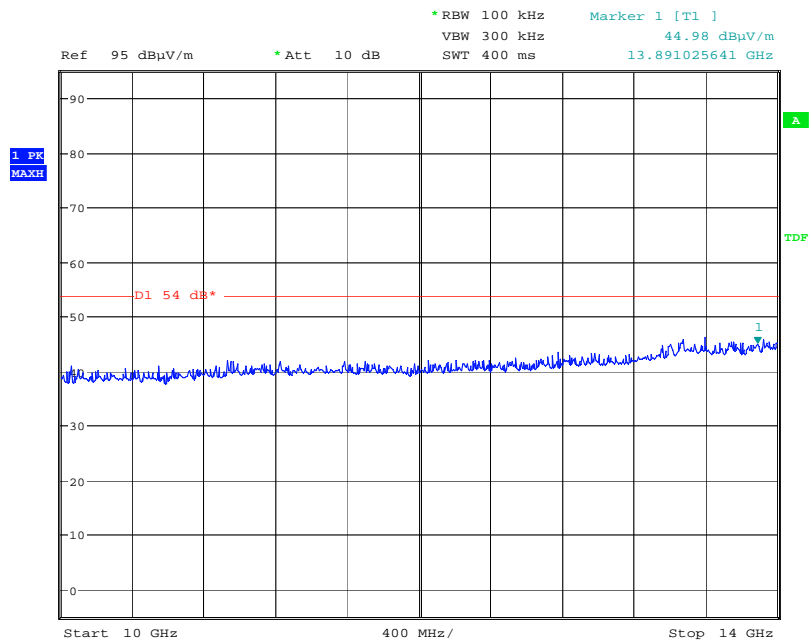
5GHz – 10GHz



Date: 9.NOV.2007 15:56:11

Mid Channel

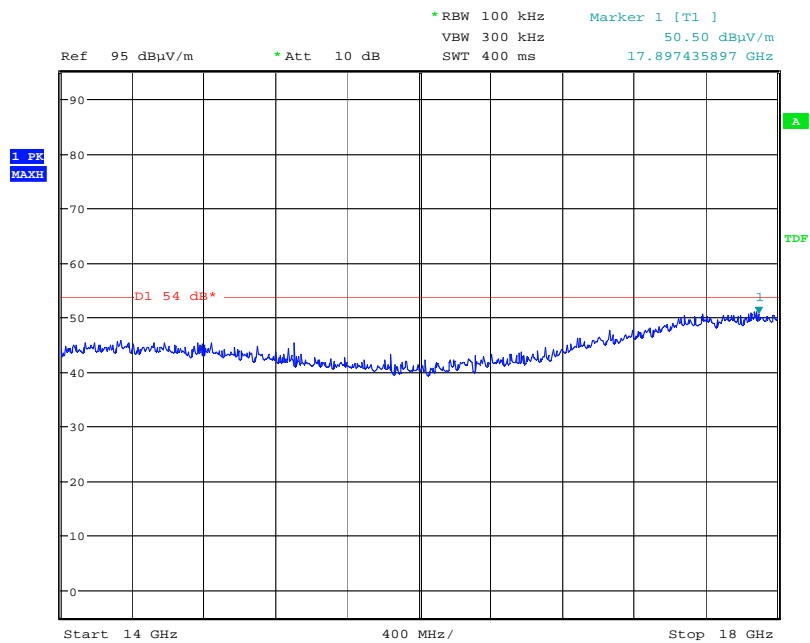
10GHz – 14GHz



Date: 9.NOV.2007 15:56:28

Mid Channel

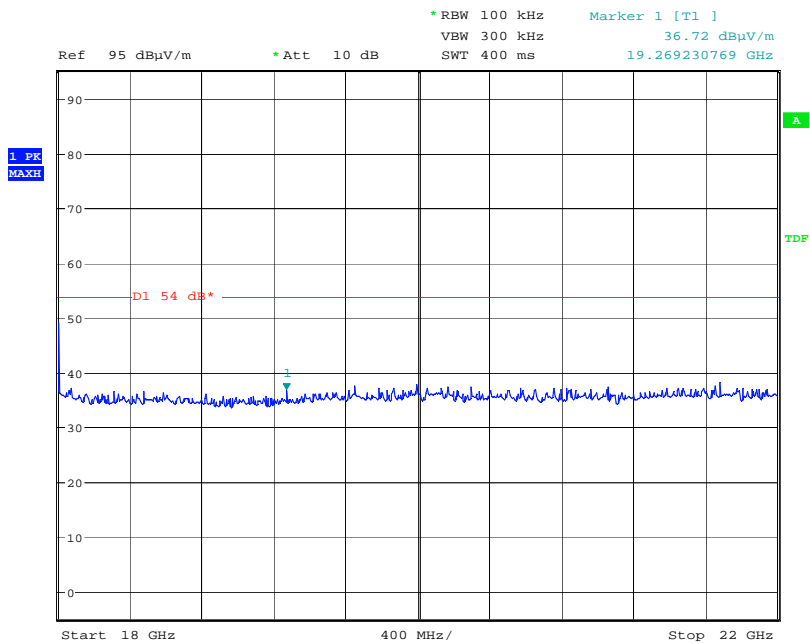
14GHz – 18GHz



Date: 9.NOV.2007 15:56:51

Mid Channel

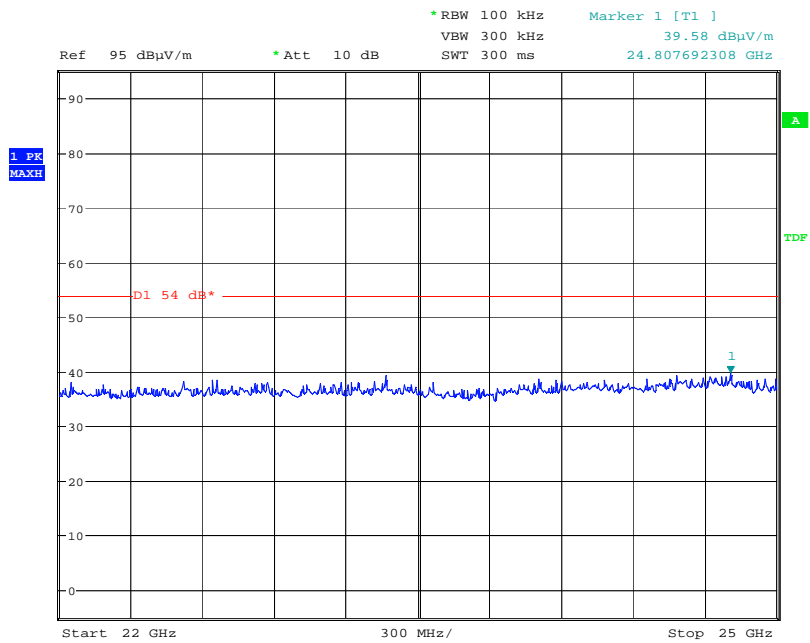
18GHz – 22GHz



Date: 9.NOV.2007 15:57:17

Mid Channel

22GHz – 25GHz



Date: 9.NOV.2007 15:57:36

Top Channel

30MHz – 1GHz

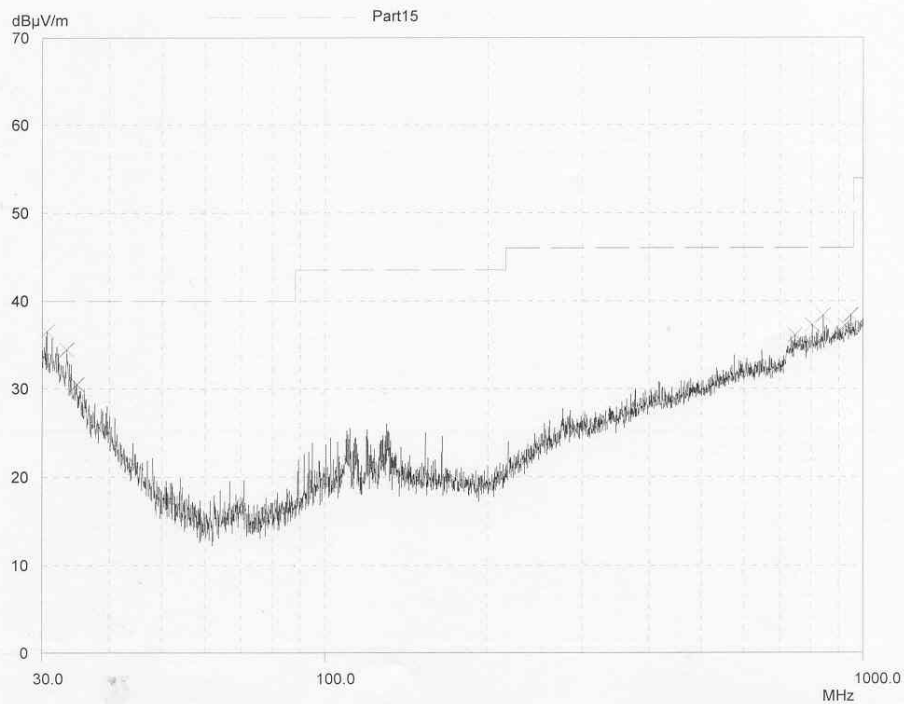
TRL Compliance Ltd

19 Nov 2007 11:09

E-Field Radiation (30MHz-1GHz)

EUT: 2.4GHz Module
 Manuf: Mantracourt
 Op Cond: Prescan 30MHz - 1000MHz
 Operator: D Winstanley
 Test Spec: Part15
 Comment: Chip Antenna. TX Permenrant Carrier TOP Channel
 RX Antenna Vertical

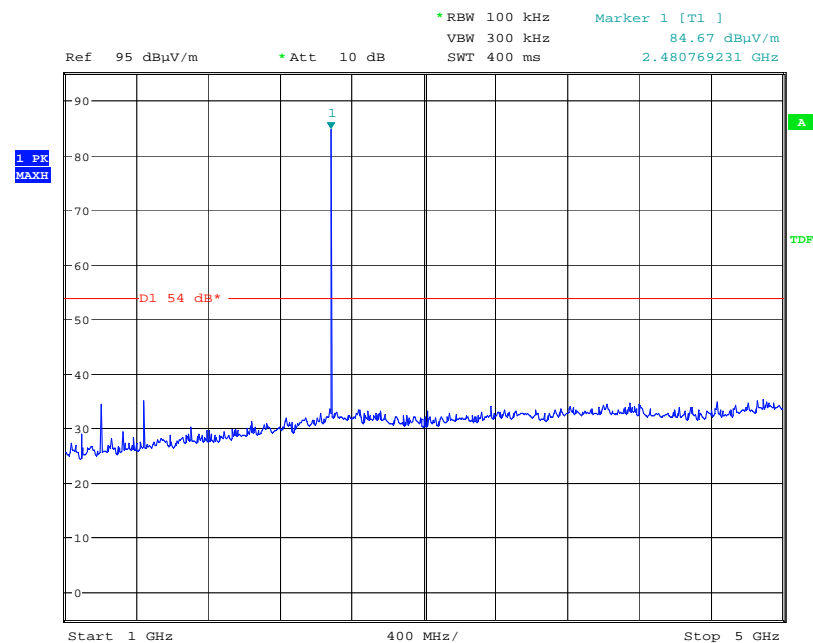
Scan Settings		(1 Range)			Receiver Settings			
Frequencies		Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
Start	Stop							
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB
Transducer	No.	Start	Stop	Name				
1	21	30MHz	1000MHz	UH72				
	22	30MHz	1000MHz	UH93				
Prescan Measurement:		Detector:	X PK					
		Meas Time:	see scan settings					
		Subranges:	50					
		Acc Margin:	10 dB					



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Top Channel

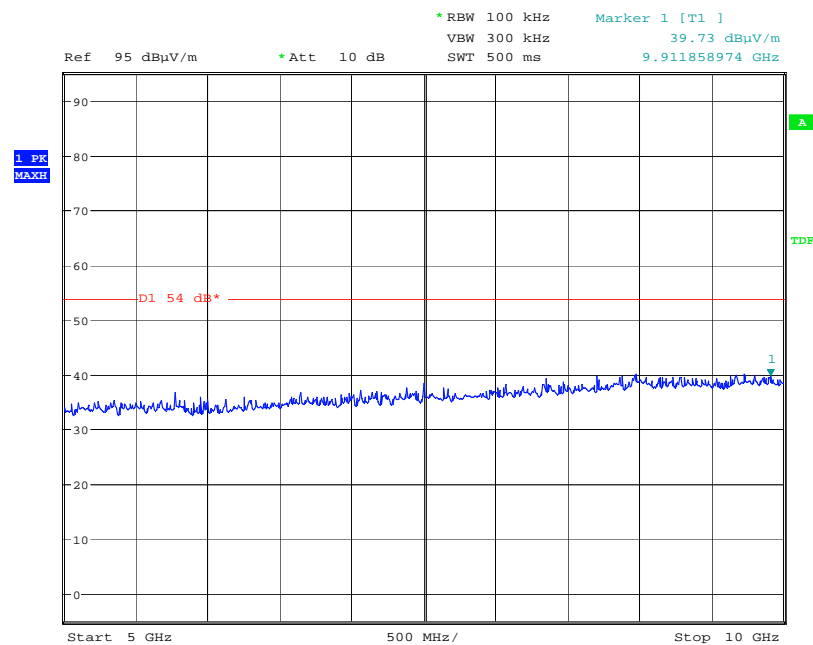
1GHz – 5GHz



Date: 9.NOV.2007 16:00:23

Top Channel

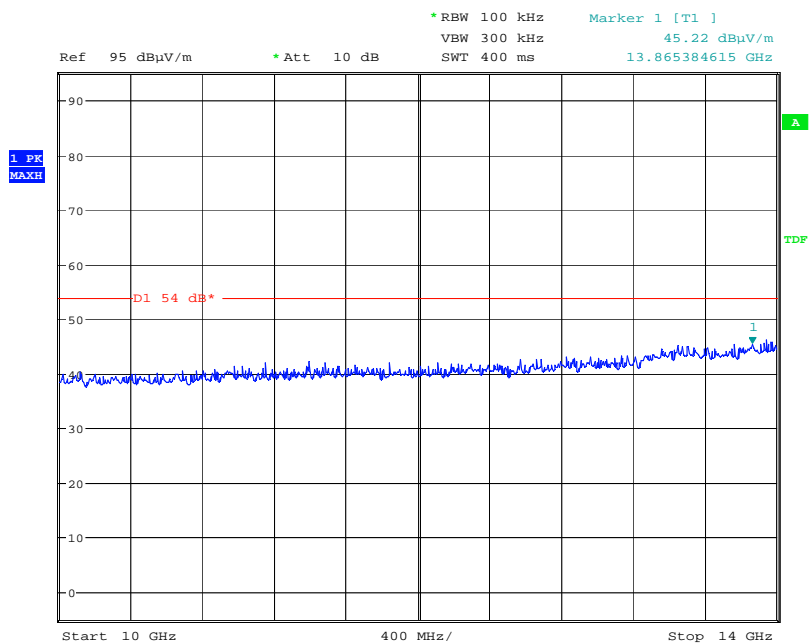
5GHz – 10GHz



Date: 9.NOV.2007 15:59:43

Top Channel

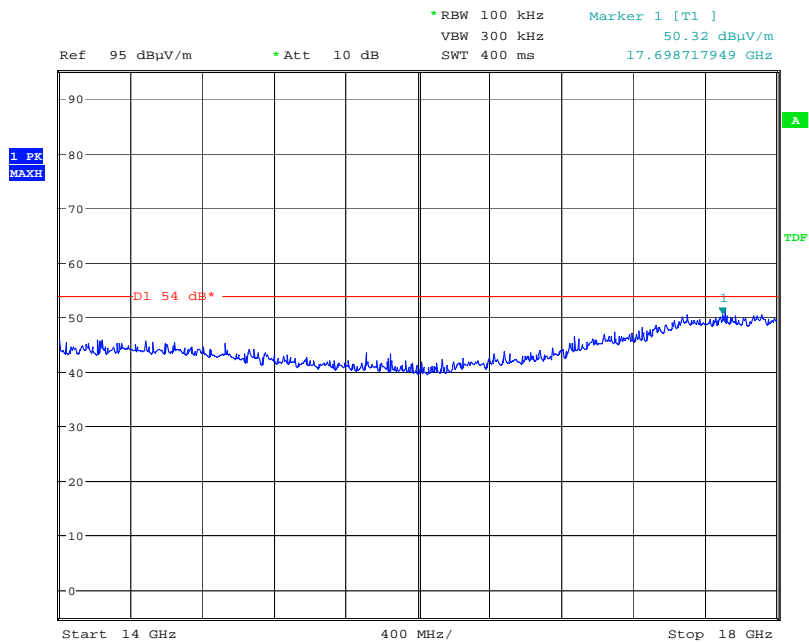
10GHz – 14GHz



Date: 9.NOV.2007 15:59:25

Top Channel

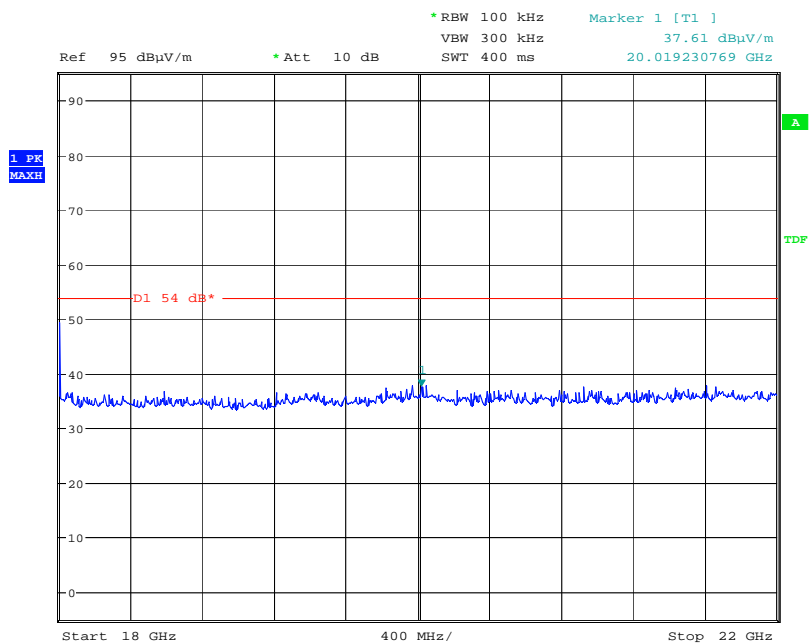
14GHz – 18GHz



Date: 9.NOV.2007 15:59:07

Top Channel

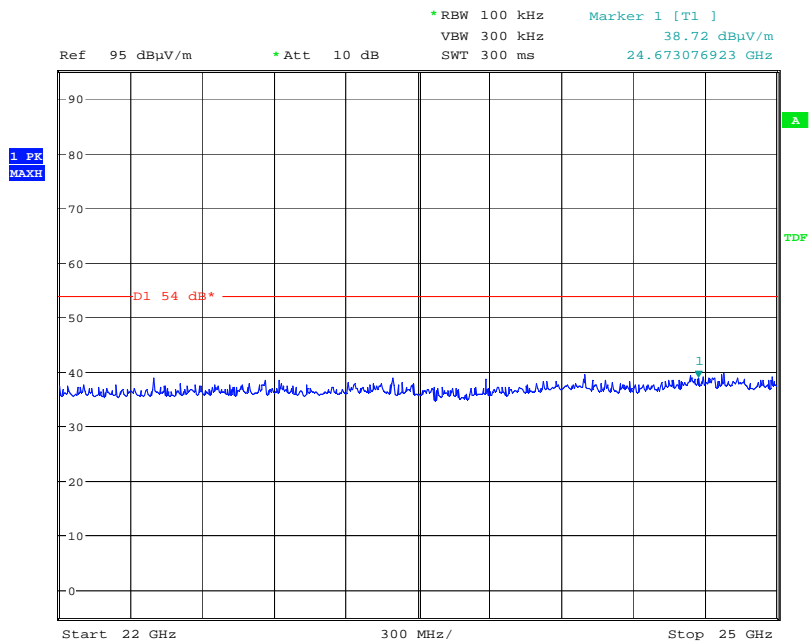
18GHz – 22GHz



Date: 9.NOV.2007 15:58:49

Top Channel

22GHz – 25GHz



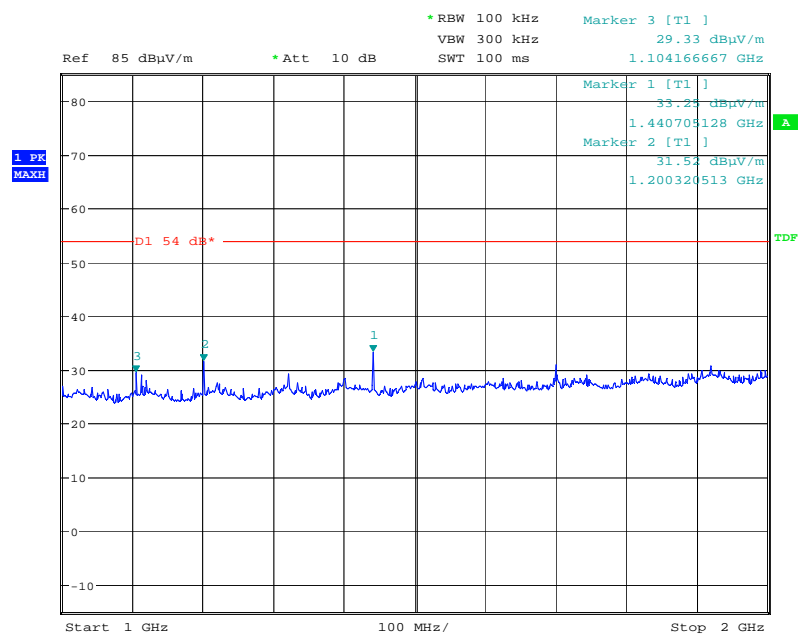
Date: 9.NOV.2007 15:58:26

ANNEX I

RECEIVER SPURIOUS EMISSIONS RADIATED

Bottom Channel

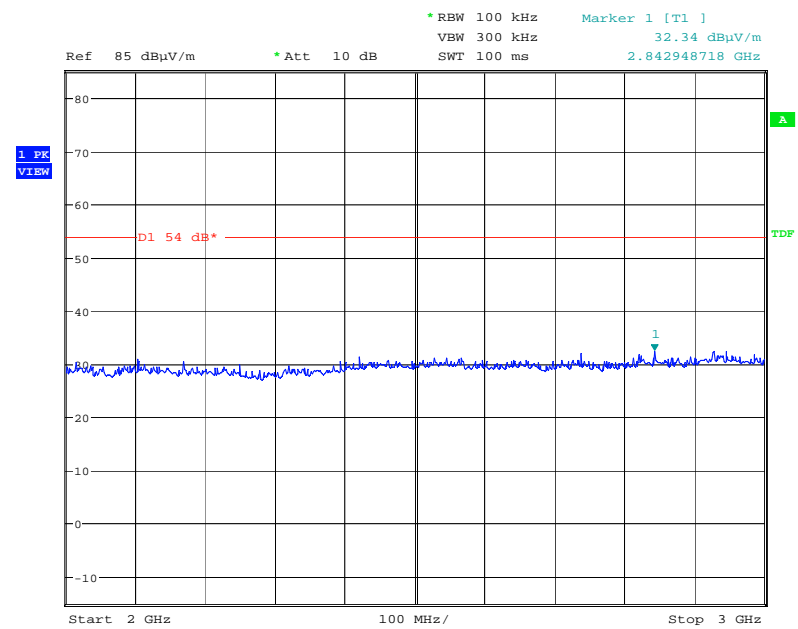
1GHz – 2GHz



Date: 3.JUL.2007 16:38:11

Bottom Channel

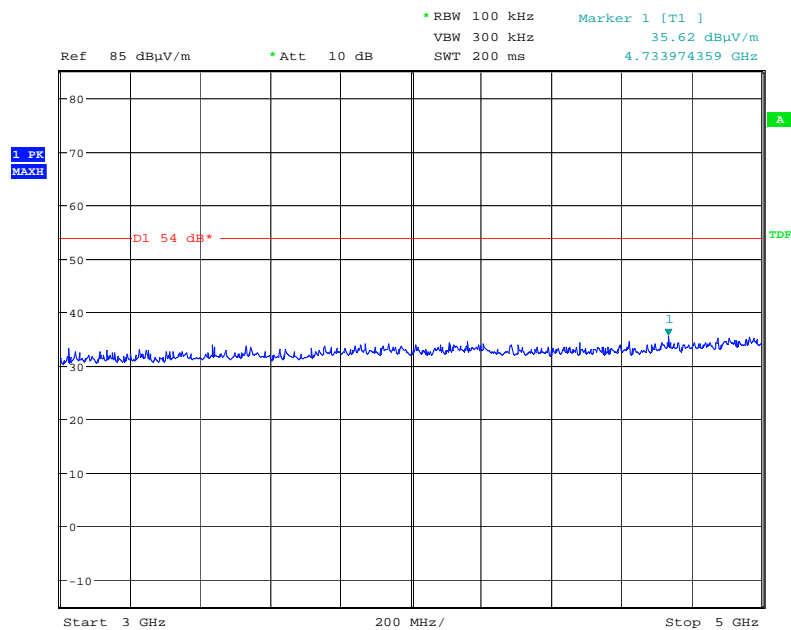
2GHz – 3GHz



Date: 3.JUL.2007 16:40:04

Bottom Channel

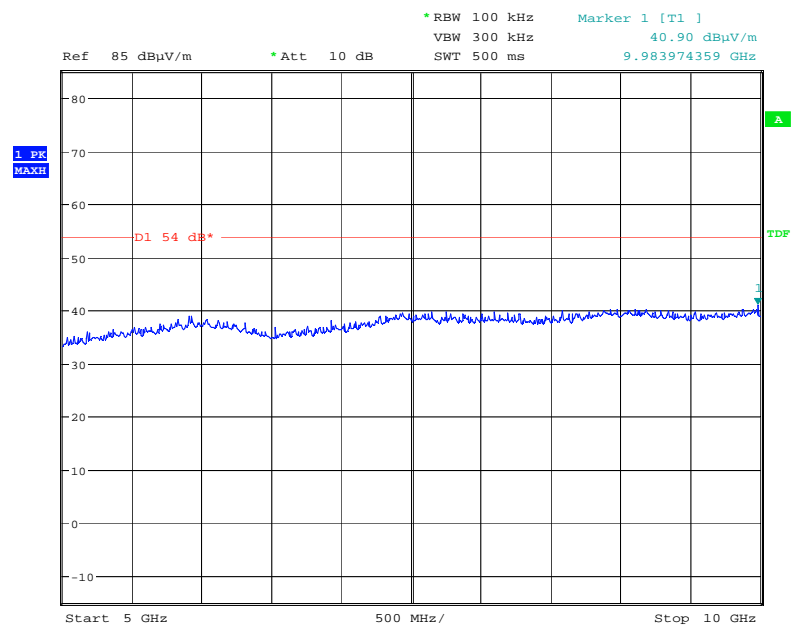
3GHz – 5GHz



Date: 3.JUL.2007 16:42:15

Bottom Channel

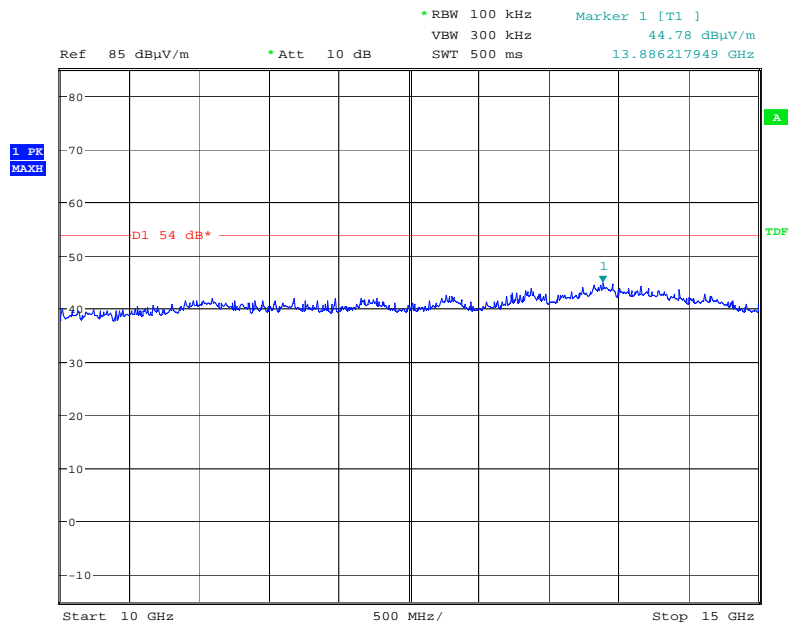
5GHz – 10GHz



Date: 3.JUL.2007 16:45:11

Bottom Channel

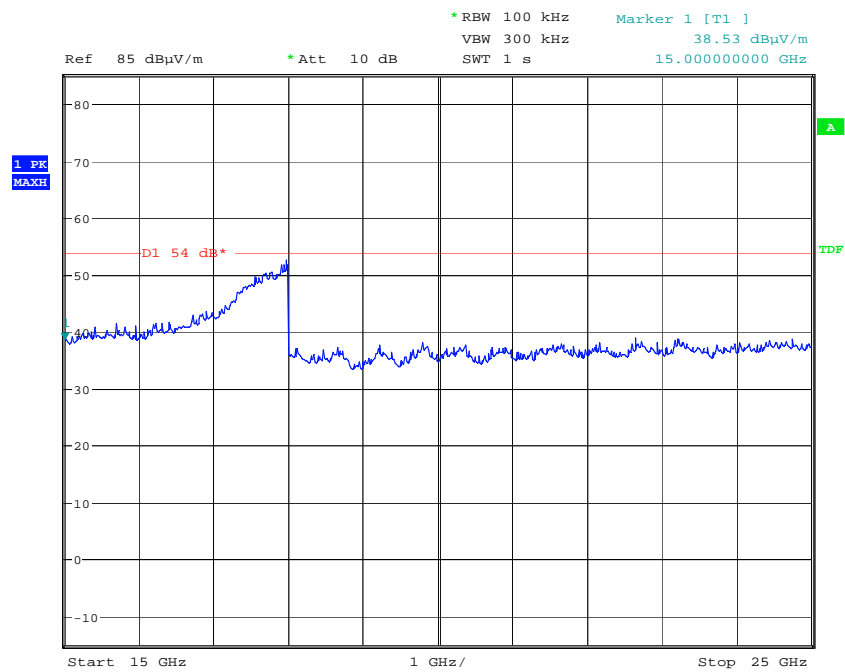
10GHz –15GHz



Date: 3.JUL.2007 16:46:36

Bottom Channel

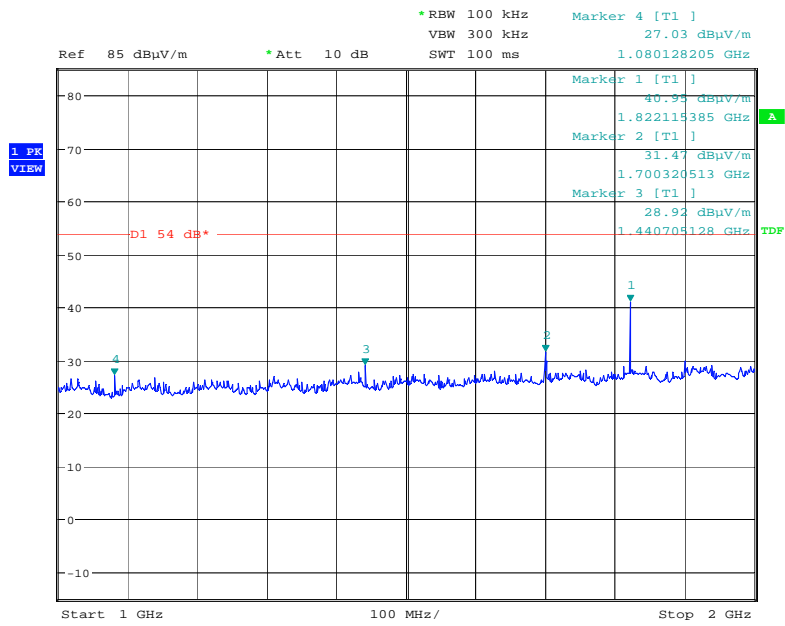
15GHz –25GHz



Date: 3.JUL.2007 16:48:09

Top Channel

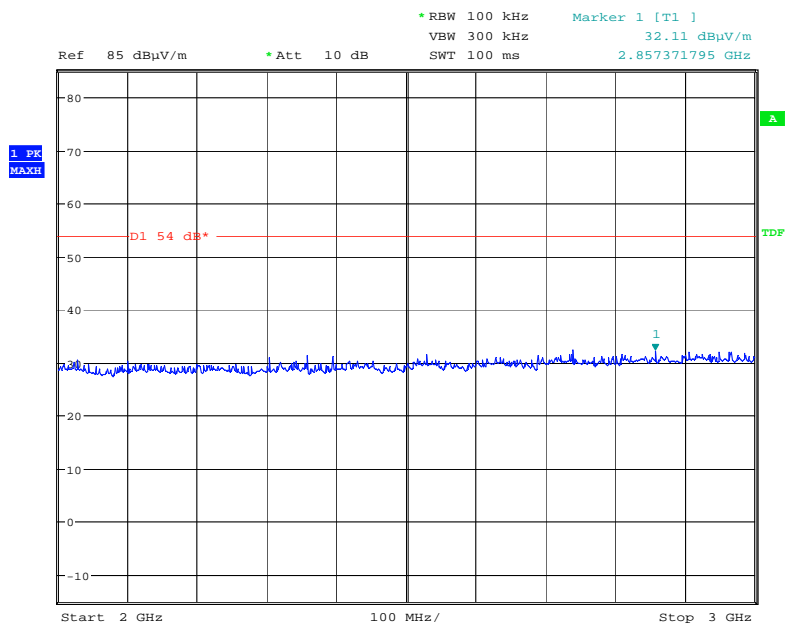
1GHz –2GHz



Date: 3.JUL.2007 17:22:25

Top Channel

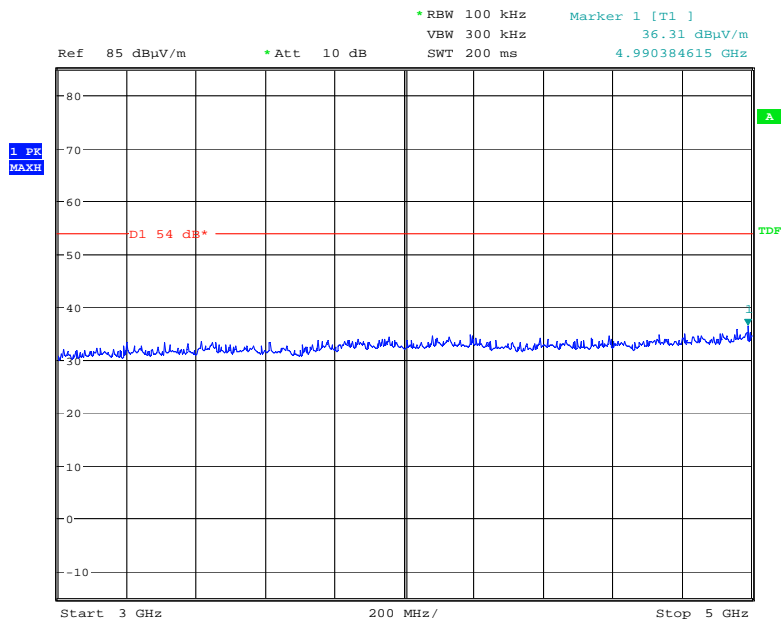
2GHz –3GHz



Date: 3.JUL.2007 17:12:05

Top Channel

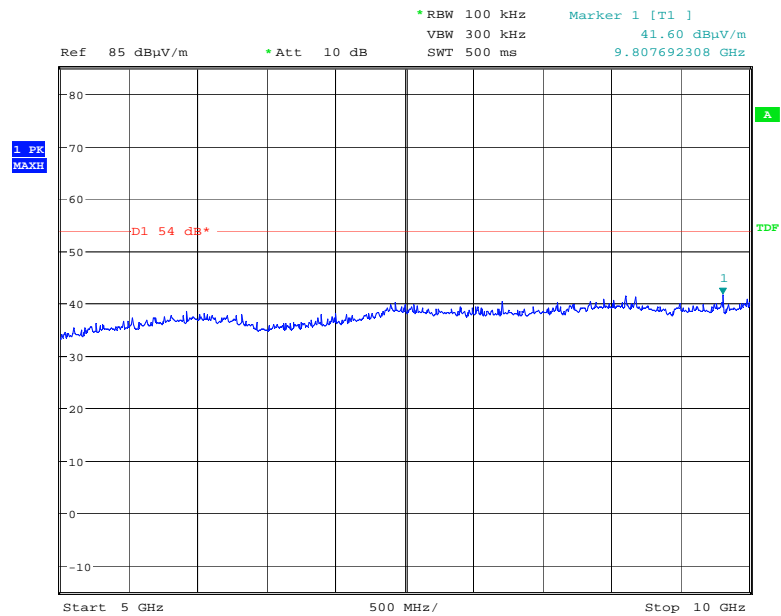
3GHz –5GHz



Date: 3.JUL.2007 17:13:53

Top Channel

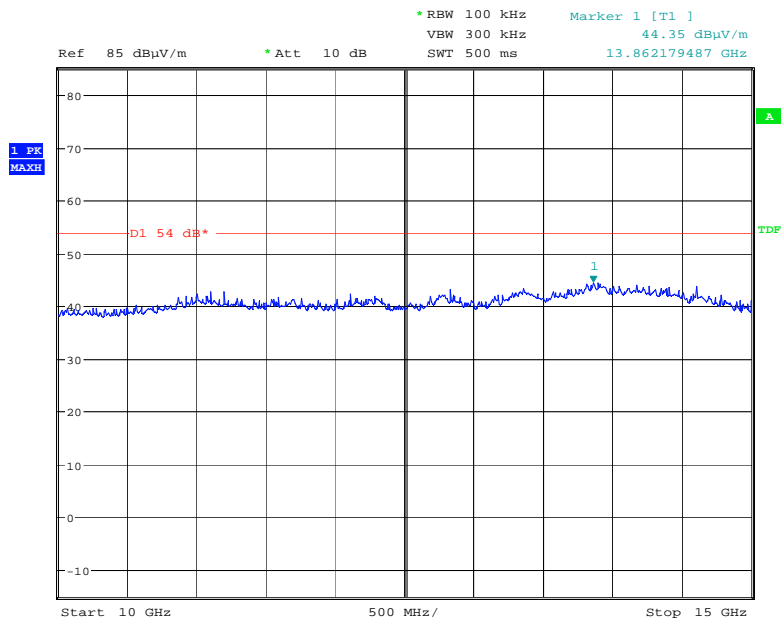
5GHz –10GHz



Date: 3.JUL.2007 17:16:08

Top Channel

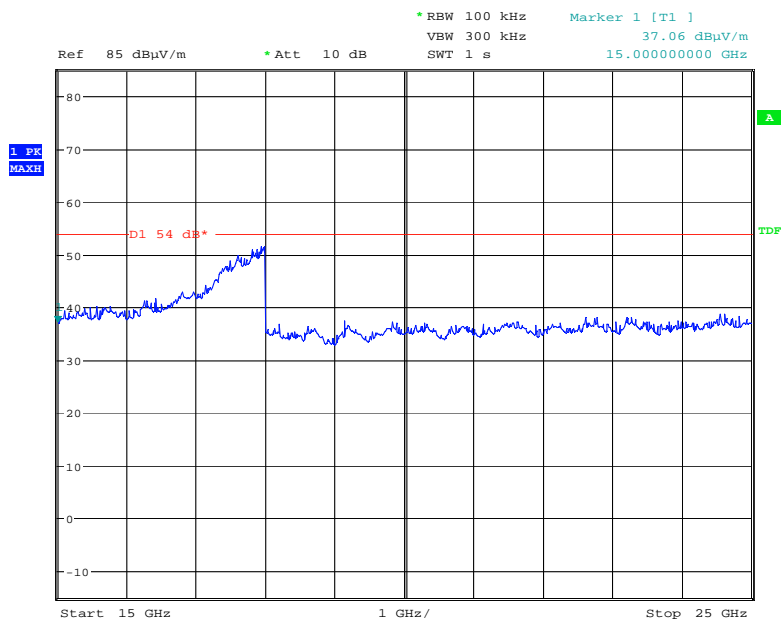
10GHz –15GHz



Date: 3.JUL.2007 17:17:37

Top Channel

15GHz –25GHz



Date: 3.JUL.2007 17:19:08

ANNEX J

POWERLINE CONDUCTION SCAN PLOTS

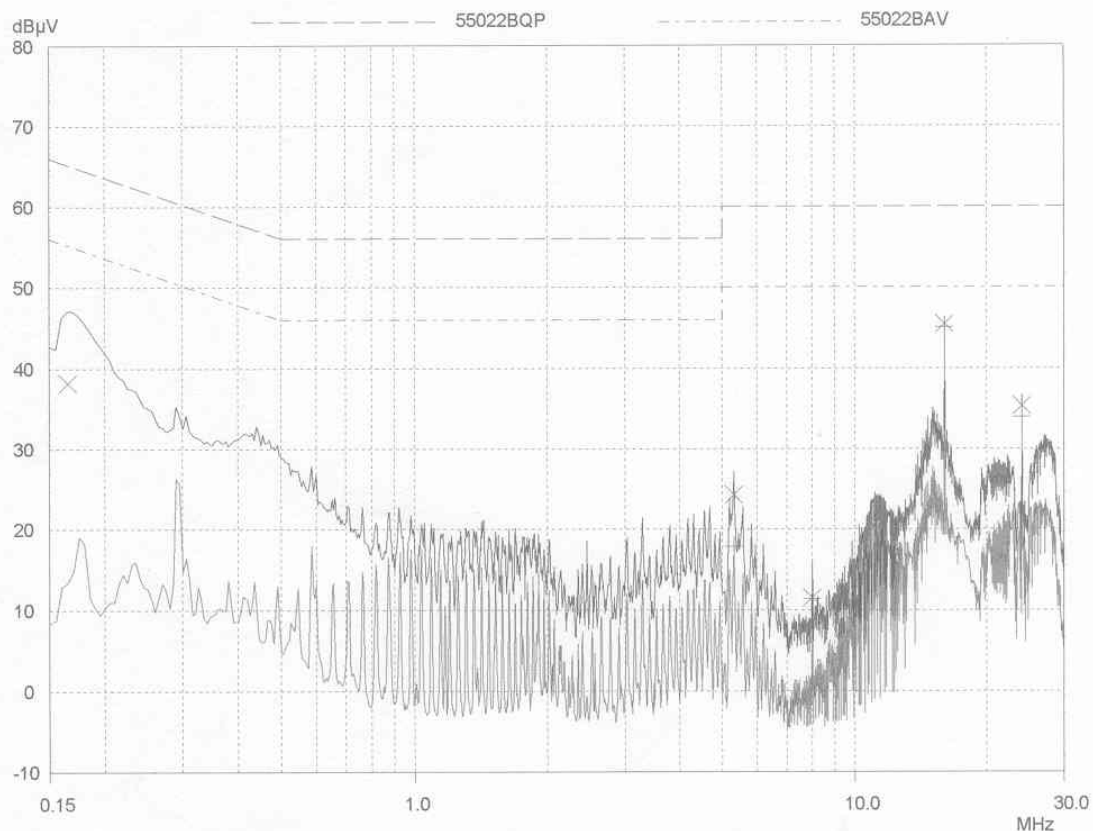
Powerline Conduction

04 Jul 2007 11:29

150kHz - 30MHz

EUT: 2.4GHz Radio Module chip antenna
 Manuf: Mantracourt
 Op Cond: LISN UH195, cable UH21 & Receiver UH03
 Operator: S Hodgkinson
 Test Spec: EN55022 Class B (or Variant)
 Comment: Live Line, 110V, 60Hz
 Unit in Tx mode with modulation, top channel selected.

Scan Settings		(1 Range)			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	10kHz	30MHz	UH21				
Final Measurement:		Detectors:	X QP / + AV					
		Meas Time:	1sec					
		Peaks:	8					
		Acc Margin:	20 dB					



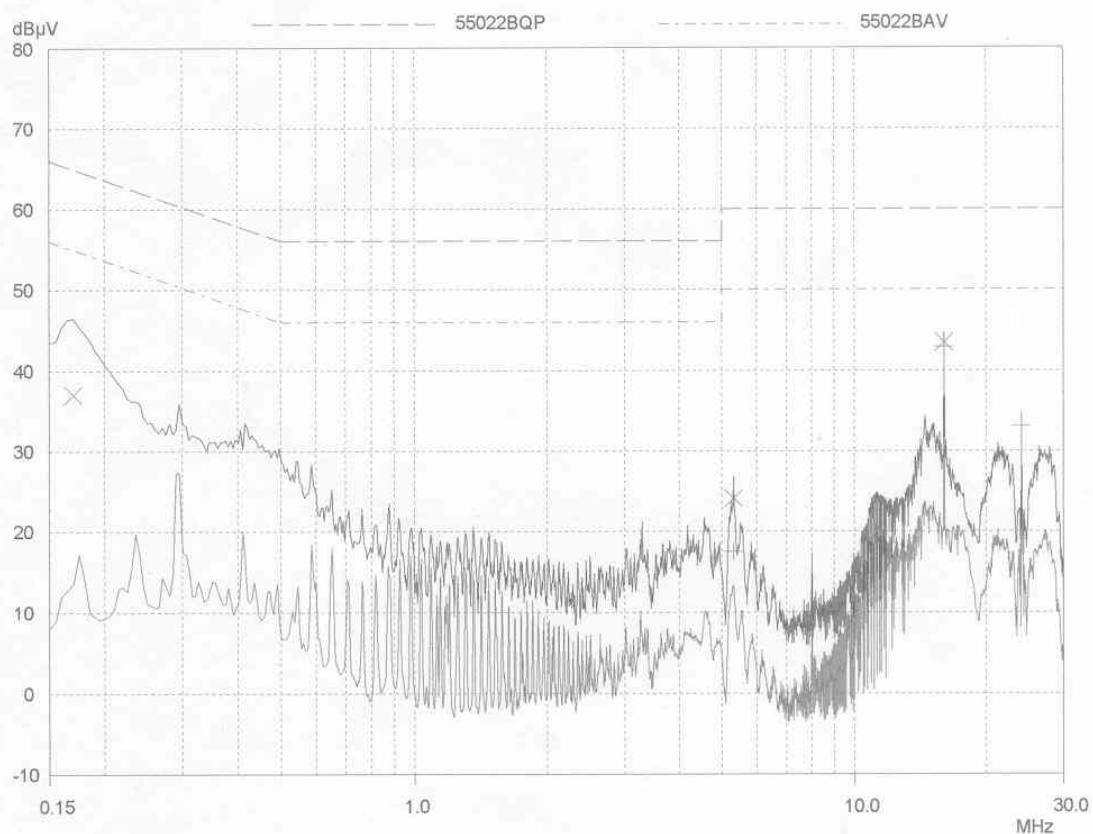
Powerline Conduction

04 Jul 2007 12:39

150kHz - 30MHz

EUT: 2.4GHz Radio Module chip antenna
 Manuf: Mantracourt
 Op Cond: LISN UH195, cable UH21 & Receiver UH03
 Operator: S Hodgkinson
 Test Spec: EN55022 Class B (or Variant)
 Comment: Live Line, 110V, 60Hz
 Unit in Rx mode , bottom channel selected.

Scan Settings		(1 Range)			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	10kHz	30MHz	UH21				
Final Measurement:		Detectors:	X QP / + AV					
		Meas Time:	1sec					
		Peaks:	8					
		Acc Margin:	20 dB					



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ANNEX K

TEST EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH003	Receiver	R&S	24/07/2007	12	24/07/2008
UH004	Receiver	R&S	11/10/2006	12	11/10/2007
UH06/07	IC OATS Submission	TRL	01/06/2007	24	01/06/2009
UH041	Multimeter	AVOmeter	04/01/2007	12	04/01/2008
UH093	Antenna	Chase	21/05/2007	24	21/05/2009
UH132	Power meter	Marconi	10/01/2007	12	10/01/2008
UH162	ERP Cable Cal	TRL	02/01/2007	12	02/01/2008
UH186	Receiver	R&S	22/05/2007	12	22/05/2007
UH195	LISN	R&S	09/01/2007	12	09/01/2008
UH228	Power Sensor	Marconi	15/01/2007	12	15/01/2008
UH253	1m Cable N type	TRL	07/12/2006	12	07/12/2007
UH254	1m Cable N type	TRL	07/12/2006	12	07/12/2007
UH265	Notch filer	Telonic	11/01/2006	24	11/01/2008
UH269	1m Cable N type	TRL	07/12/2006	12	07/12/2007
UH270	1m Cable N type	TRL	07/12/2006	12	07/12/2007
UH271	1.5m Cable N type	TRL	07/12/2006	12	07/12/2007
UH272	1.5m Cable N type	TRL	07/12/2006	12	07/12/2007
UH273	2m Cable N type	TRL	07/12/2006	12	07/12/2007
UH274	2m Cable N type	TRL	07/12/2006	12	07/12/2007
UH281	Spectrum Analyser	R&S	24/07/2006	12	24/07/2007
L005	CMTA	R&S	10/01/2007	12	10/01/2008
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	01/03/2007	12	01/03/2008
L426	Temperature Indicator	Fluke	09/01/2007	12	09/01/2008
L479	Analyser	Anritsu	09/01/2007	12	09/01/2008
L572	Pre Amplifier	Agilent	01/06/2007	12	01/06/2008
N/A	Attenuator	JFW	Calibrate in use		