REPORT ON THE CERTIFICATION TESTING OF A
IDC LTD
2.4GHz RF MODULE ZB100
WITH RESPECT TO
FCC RULES CFR 47, PART 15.247 SEPT 2007
INTENTIONAL RADIATOR SPECIFICATION

TEST REPORT NO: RU1407/8569

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ISSUE NO: 1

FCC ID: V70ZB100

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IDC LTD
2.4GHz RF MODULE ZB100
WITH RESPECT TO
FCC RULES CFR 47, PART 15.247 SEPT 2007
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 18th – 28th March 2008

TESTED BY: Digitally signed by John Charters DN: CN = John Charters, C = GB, O = TRL Compliance Ltd Reason: I am the author of this document Date: 2008.08.18 09:22:53 +01'00' J CHARTERS

APPROVED BY: Steve Hayes CN = Steve Hayes, C = GB, OU = TRL Compliance Ltd I am approving this document 2008.08.18 14:45:06 +01'00' S HAYES
DIRECTOR EMC

DATE: 6th August 2008

Distribution:

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Notes:

1. Component failure during test — YES [ ] NO [X]

2. If Yes, details of failure:

3. The facilities used for the testing of the product contain in this report are FCC Listed.

4. The contents of the attached applicants declarations and other supplied information are not covered by the scope of this laboratory's UKAS or FCC accreditations' and is provided in good faith.

TRL Compliance
part of TRAC global

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	V70ZB100					
PURPOSE OF TEST:	Certification					
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.247 Sept 2007					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	2.4GHz RF Module ZB100					
ITU: EMISSION CODE:	1M6F1D					
CARRIER EMISSION:	0.00933 Watts eirp					
ANTENNA TYPE:	Monopole Chip Antenna Rod Antenna					
MAXIMUM GAIN ANTENNA:	9 dBi					
FREQUENCY OF OPERATION:	2.4 GHz – 2.4835 GHz					
NUMBER OF CHANNELS:	16					
FREQUENCY GENERATION:	SAW Resonator	[ ]	Crystal	[ ]	Synthesiser	[X]
MODULATION METHOD:	FHSS	[ ]	DSSS	[X]	Other	[ ]
POWER SOURCE(s):	+30Vdc or +3.3Vdc					
TEST DATE(s):	18th – 28th March 2008					
ORDER No(s):	00886					
APPLICANT:	IDC LTD.					
ADDRESS:	Keynes Road Chester Park Alfretron Road Derby DE21 4AS					

TESTED BY: Digitally signed by John Charters DN: CN = John Charters, C = GB, O = TRL Compliance Ltd Reason: I am the author of this document Date: 2008.08.18 09:23:07 +01'00' ---------- J CHARTERS

APPROVED BY: Steve Hayes CN = Steve Hayes, C = GB, OU = TRL Compliance Ltd I am approving this document 2008.08.18 14:45:13 +01'00' ---------- S HAYES
DIRECTOR EMC

TRAC testing regulatory and compliance

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	2.4GHz RF Module ZB100
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.247 SEPT 2007
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	00886
APPLICANT'S CONTACT PERSON(s):	Mr S Barnett
E-mail address:	simonb@idc.gb.com
APPLICANT:	IDC LTD
ADDRESS:	Keynes Road Chester Park Alfretron Road Derby DE21 4AS
TEL:	+44 (0) 01332 604 030
FAX:	+44 (0) 01332 604 031
EUT(s) COUNTRY OF ORIGIN:	United Kingdom
TEST LABORATORY:	TRL Compliance Ltd
UKAS ACCREDITATION No:	0728
TEST DATE(s):	18th – 28th March 2008
TEST REPORT No:	RU1407/8569

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 15.107	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 : Low Power Digital Spread Spectrum Device

3. Temperatures: Ambient (Tnom) 18^{o}C

4. Supply Voltages: Vnom +30Vdc or +3.3Vdc

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

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

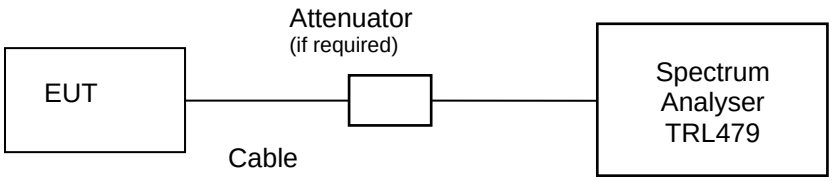
6. Channel spacing: Narrowband [ ]
Wideband [X]

TRANSMITTER TESTS

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

Ambient temperature = 18°C
Relative humidity = 51%
Conditions = Radio Lab
Supply voltage = +30Vdc or +3.3Vdc

Diagram



Frequency MHz	F_{lower}	F_{Higher}	Measured Bandwidth	Limit
2405	2404.192000 MHz	2405.784000 MHz	1.592 MHz	>500kHz
2440	2443.916000 MHz	2440.808000 MHz	1.648 MHz	>500kHz
2480	2479.16000 MHz	2480.816000 MHz	1.648 MHz	>500kHz

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 6dB bandwidth was recorded with the EUT activity transmitting data.
3 The 6dB bandwidth was checked with the EUT operating at 30 Vdc and 3.3 Vdc
4 Results recorded for EUT operating at +30Vdc

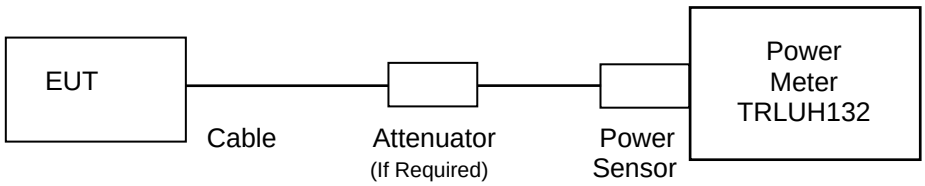
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**

TRANSMITTER TESTS

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

Ambient temperature = 18^{o}C
Relative humidity = 51%
Conditions = Radio Lab
Supply voltage = +30Vdc or +3.3Vdc

Diagram



Frequency MHz	Operating Voltage (dc)	Peak Power dBm	Peak Power Watts	Antenna Gain dBi	Average Power Watts	Limit Watts
2405	3.3	-0.02	0.00099	9	0.00790	0.5
	30	-0.47	0.00089	9	0.00712	
2440	3.3	0.31	0.00107	9	0.00853	0.5
	30	0.30	0.00107	9	0.00851	
2480	3.3	0.70	0.00117	9	0.00933	0.5
	30	0.70	0.00117	9	0.00933	

Notes:
1 Gain of antenna 9dBi, maximum gain antenna supplied by manufacturer. Therefore 1 watt limit reduced by 3dB.
2 For analyser plots see annex H.

Test Method:
1 The EUT was connected to the power meter 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 power meter was recorded and the cable & attenuator losses & Antenna gain were added.

Test equipment used for Peak Power measurement:

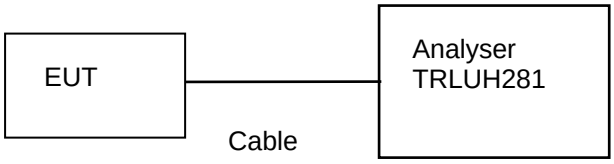
TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
POWER METER	MARCONI	6960B	237036/001	UH132	**X**
POWER SENSOR	MARCONI	6920	1564	UH228	**X**
ATTENUATOR	JFW	50PF-030	N/A	UH301	**X**

TRANSMITTER TESTS

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

Ambient temperature = 14^{o}C
Relative humidity = 48%
Conditions = Radio Lab
Supply voltage = +30Vdc or +3.3Vdc

Diagram



Frequency	Measured Power Spectral Density	Limit
2405	1.83 dBm	+8 dBm / 3kHz
2440	0.32 dBm	+8 dBm / 3kHz
2480	-0.58 dBm	+8 dBm / 3kHz

Notes: 1 For analyser plots see annex E.

Test Method:
1 The resolution bandwidth on the analyser was set to 3kHz and trace set to max hold.
2 The span is set to 3MHz
3 The sweep time is 1000 seconds (Span/3kHz).
4 The analyser level is offset to take the maximum antenna gain of +9dBi & 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	**X**

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – CONDUCTED – Part 15.247(D)

Ambient temperature = 20°C
Relative humidity = 43%
Conditions = Conducted –Radio Lab
Supply voltage = +30Vdc or +3.3Vdc

Bottom Channel

Range Frequency	Emission Frequency (MHz)	Emission Level	Cable loss	Level (dBm)	Limit (dBm)
30MHz – 24GHz	No Significant Emissions Within 20 dB of the limit				-19.6

See spectrum analyser scan plots – Annex H

Middle Channel

Range Frequency	Emission Frequency (MHz)	Emission Level	Cable loss	Level (dBm)	Limit (dBm)
30MHz – 24GHz	No Significant Emissions Within 20 dB of the limit				-19.6

See spectrum analyser scan plots – Annex H

Top Channel

Range Frequency	Emission Frequency (MHz)	Emission Level	Cable loss	Level (dBm)	Limit (dBm)
30MHz – 24GHz	No Significant Emissions Within 20 dB of the limit				-19.6

See spectrum analyser scan plots – Annex H

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.

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.
4 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).
5 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	ANRITSU	MS2665C	MT26089	479	**X**

TRANSMITTER TESTS

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

Ambient temperature = 20^{o}C
Relative humidity = 43%
Conditions = Conducted –Radio Lab
Supply voltage = +30Vdc or +3.3Vdc

Test Result

Channel Frequency	**Emission Frequency (MHz)**	**Emission Level (dBC)**	**Limit (dBC)**
Bottom	2400.000	-39.91	-20
Top	2483.348	-31.70	-20

See spectrum analyser scan plots – Annex J

Measure as compliant see analyser plots

Notes:
1 The EUT was set to modulated carrier with maximum output power.
2 A temporary antenna connector was used to take the measurement.
3 See Annex J for analysers 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
SPECTRUM ANALYSER	ROHDE & SCHWARZ	FSU 46	200034	UH281	**X**

TRANSMITTER TESTS

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

Ambient temperature	=	14^{o}C	3m measurements <1GHz	[X]
Relative humidity	=	47%	3m measurements >1GHz	[X]
Conditions	=	Open Area Test Site (OATS)		
Supply voltage	=	+30Vdc or +3.3Vdc		

Bottom Channel 30MHz -25000MHz

	Emission Freq (MHz)	Meas Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain (dB)	Field Strength (dBµV/m)	Extrap. Factor (dB)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands								Note 5	
88MHz – 216MHz Restricted bands								Note 5	
216MHz – 960MHz Restricted bands								Note 5	
960MHz – 1GHz Restricted bands								Note 5	
1GHz – 25GHz Restricted bands	2260.717 2549.096 4809.667	44.66 45.99 47.33	1.79 2.56 1.70	28.00 28.90 32.73	35.0 35.0 35.7	39.45 42.45 46.06	- - -	93.84 132.58 200.91	500 500 500
30MHz -25GHz								Note 5	

Middle Channel 30MHz -25000MHz

	Emission Freq (MHz)	Meas Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain (dB)	Field Strength (dBµV/m)	Extrap. Factor (dB)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands								Note 5	
88MHz – 216MHz Restricted bands								Note 5	
216MHz – 960MHz Restricted bands								Note 5	
960MHz – 1GHz Restricted bands								Note 5	
1GHz – 25GHz Restricted bands	2311.855 4879.919 7318.396	43.40 44.58 34.45	1.90 1.70 2.30	28.20 32.73 36.00	35.0 35.7 36.2	38.50 43.31 36.55	- - -	84.14 146.38 67.22	500 500 500
30MHz -25GHz								Note 5	

Top Channel 30MHz -25000MHz-

	Emission Freq (MHz)	Meas Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain (dB)	Field Strength (dBµV/m)	Extrap. Factor (dB)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz Restricted bands								Note 5	
88MHz – 216MHz Restricted bands								Note 5	
216MHz – 960MHz Restricted bands								Note 5	
960MHz – 1GHz Restricted bands								Note 5	
1GHz – 25GHz Restricted bands	2287.711 2328.064 2351.855 2543.904 4959.871	42.78 43.73 45.13 40.47 43.75	1.79 1.80 1.80 2.56 2.20	28.00 28.20 28.40 28.90 33.23	35.0 35.0 35.0 35.0 35.6	37.57 38.73 40.33 37.20 43.58	- - - - -	75.59 86.39 103.87 72.44 151.01	500 500 500 500 500
30MHz -25GHz								Note 5	

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 Output power level reduced for operation on top channel.
8. Emissions scans were performed on all antenna types. Worst case results, 9dBi antenna are recorded.

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
HORN ANTENNA	EMCO	3115	9010-3580	138	**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 AMPLIFIER	AGILENT	8449B	3008A01610	572	**X**

TRANSMITTER TESTS

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

Ambient temperature = 18°C
Relative humidity = 48%
Conditions = Radiated OATS
Supply voltage = +4.5Vdc

Test Result

Channel Frequency	Emission Frequency (MHz)	Emission Level	Limit
Bottom	2400.000	-39.43 dBc	-20 dBc
Top	2483.602	426.58 µV/m	500 µV/m

See spectrum analyser scan plots – Annex J

Measure as compliant see analyser plots

Notes:

1 The EUT was set to modulated carrier with maximum output power.
2 See Annex K for analysers plots.
3 Radiated band edge emissions scans were performed on all antenna types. Worst cast results for the 9dBi antenna are recorded.

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^{o}C
Relative humidity = 48%
Conditions = Powerline Laboratory
Supply voltage = +4.5Vdc

SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
0.785	27.04	Average	Neutral	46.00

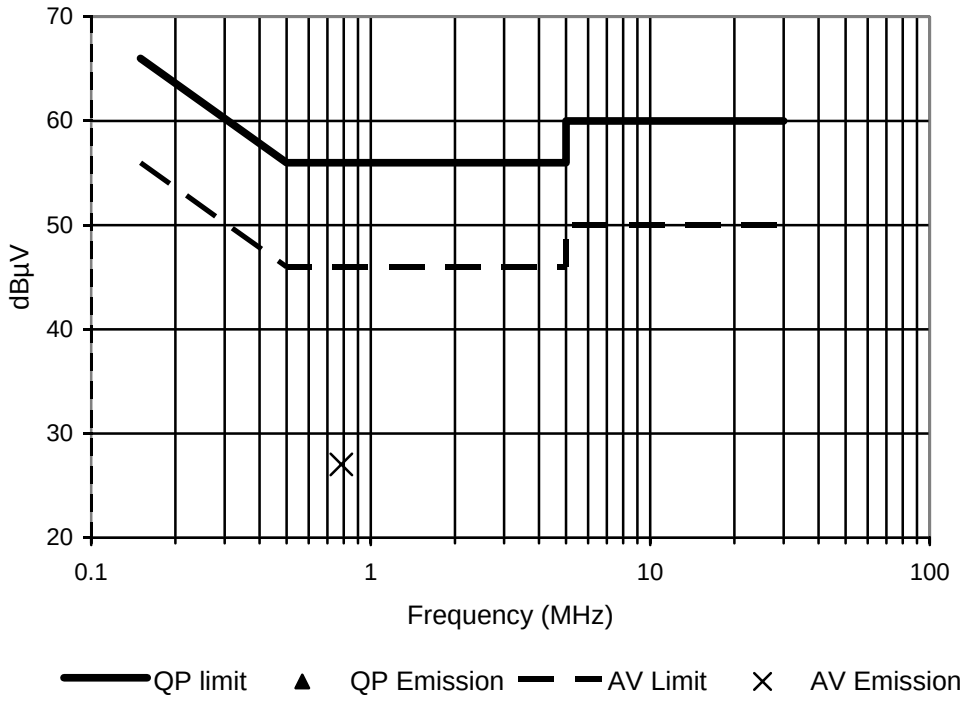
Notes: 1 See attached plot annex L

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	863906/018	UH05	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	841429/012	UH187	
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 = 19°C
Relative humidity = 53%
Conditions = Radiated OATS
Supply voltage = +3.3Vdc

	Emission Freq (MHz)	Meas Rx. (dBuV)	Cable loss (dB)	Ant. Factor (dB/m)	Pre Amp Gain (dB)	Field Strength (dBµV/m)	Extrap. Factor (dB)	Result (µV/m)	Limit (µV/m)
30MHz – 88MHz								Note 5	
88MHz – 216MHz	128.0	25.85	1.55	11.50	-	38.9	-	88.10	150
	160.0	29.93	1.74	9.43	-	41.1	-	113.50	150
	192.0	20.65	1.90	8.55	-	31.1	-	35.89	150
216MHz – 960MHz	224.0	29.34	2.06	8.90	-	40.3	-	103.51	200
	240.0	15.16	2.10	10.84	-	28.1	-	25.41	200
	256.0	25.45	2.15	12.50	-	40.1	-	101.16	200
	272.0	12.42	2.20	12.48	-	27.1	-	22.64	200
	288.0	16.21	2.24	12.65	-	31.1	-	35.89	200
	320.0	19.49	2.42	13.61	-	33.1	-	45.18	200
	336.0	11.70	2.40	14.00	-	28.1	-	25.41	200
	416.0	12.01	2.74	16.45	-	31.2	-	36.31	200
	512.0	10.60	3.10	17.50	-	31.2	-	36.31	200
960MHz – 1GHz								Note 5	
1GHz – 25GHz								Note 5	

Notes:
1 During the scans the unit was operated in the following modes:
Unit operating on lowest channel
Unit operating on highest channel
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 initially performed at 3 metres.
5 Only emissions with in 20dB of limit are recorded.
6 Peak emissions recorded >1GHz, peak emissions meet the average limit.

Test Method:
1 As per section 15.24.
2 Measuring distances as Notes 3 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 >30MHz.
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes. Maximum results recorded.

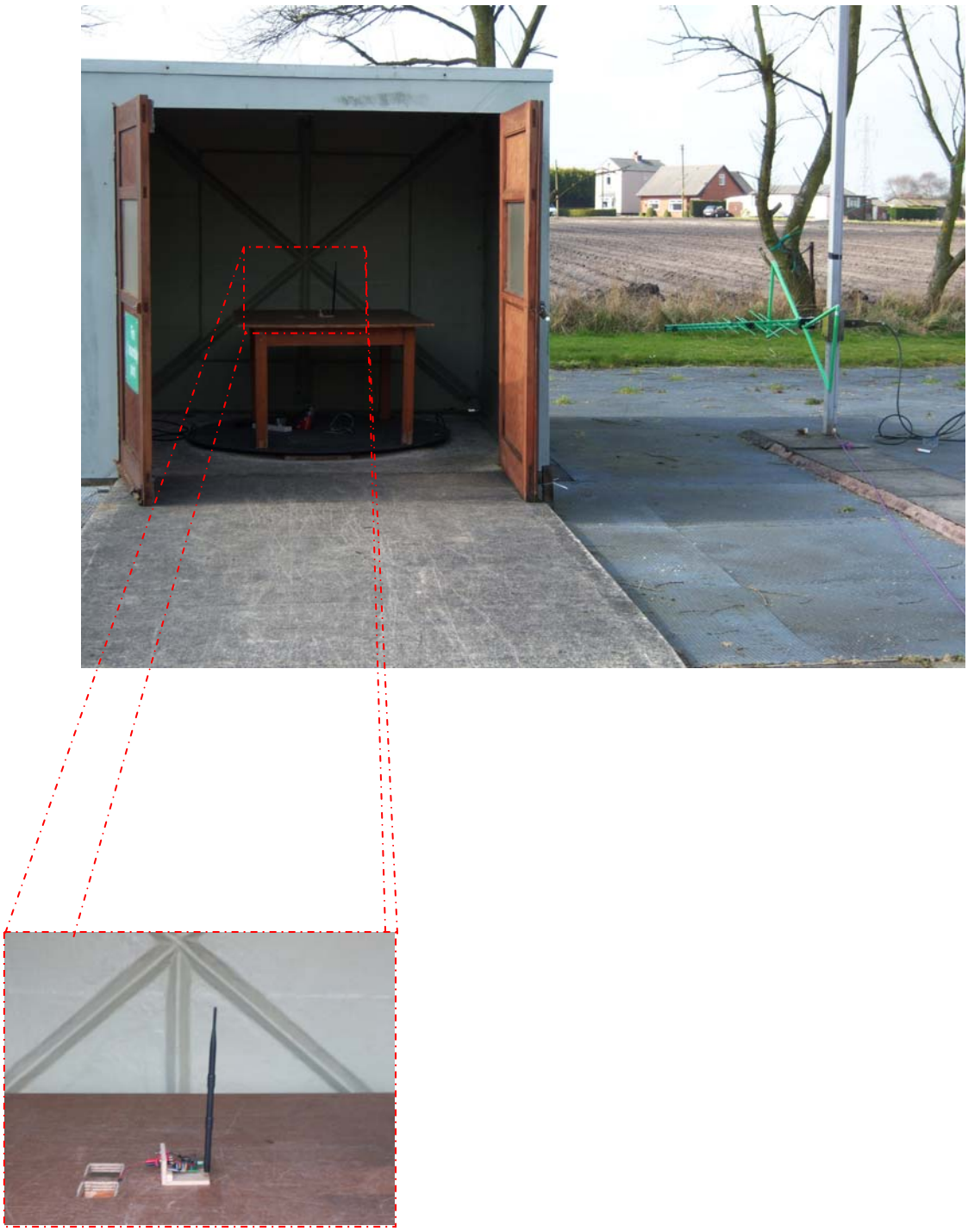
The test equipment used for the tests is shown over leaf:

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

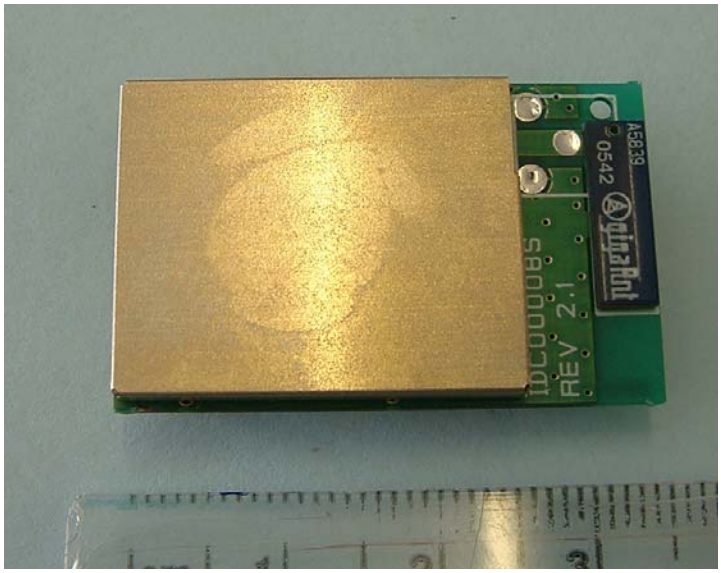
ANNEX A

PHOTOGRAPHS

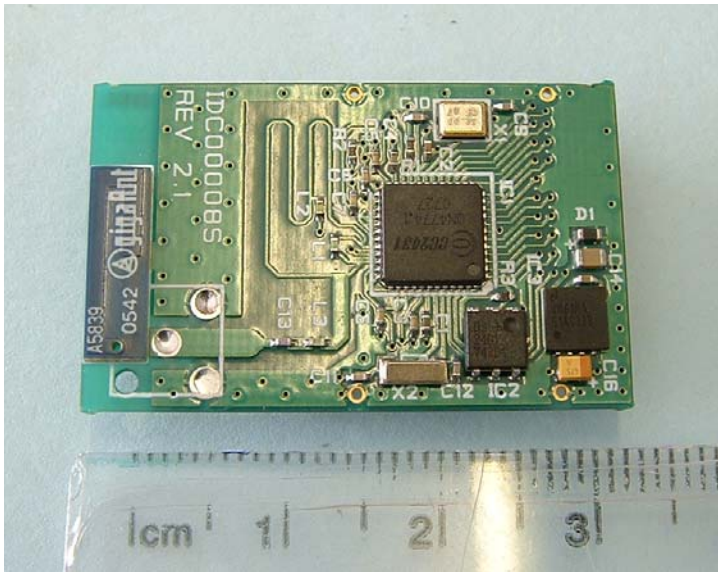
PHOTOGRAPH No. 1 **TEST SETUP**



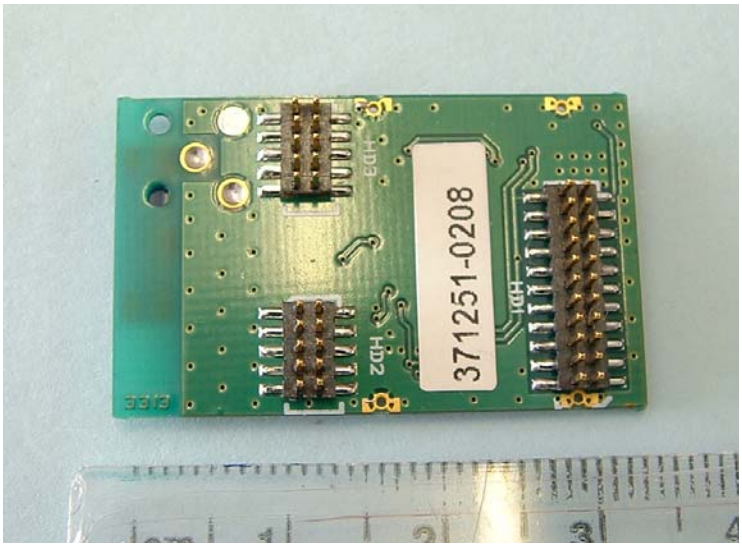
PHOTOGRAPH No. 2 **OVERVIEW CHIP ANTENNA**



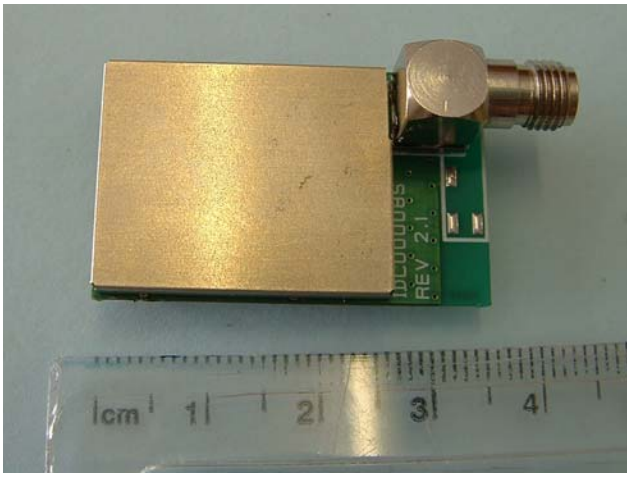
PHOTOGRAPH No. 3 **TOP OF CHIP ANTENNA PCB CAN REMOVED**



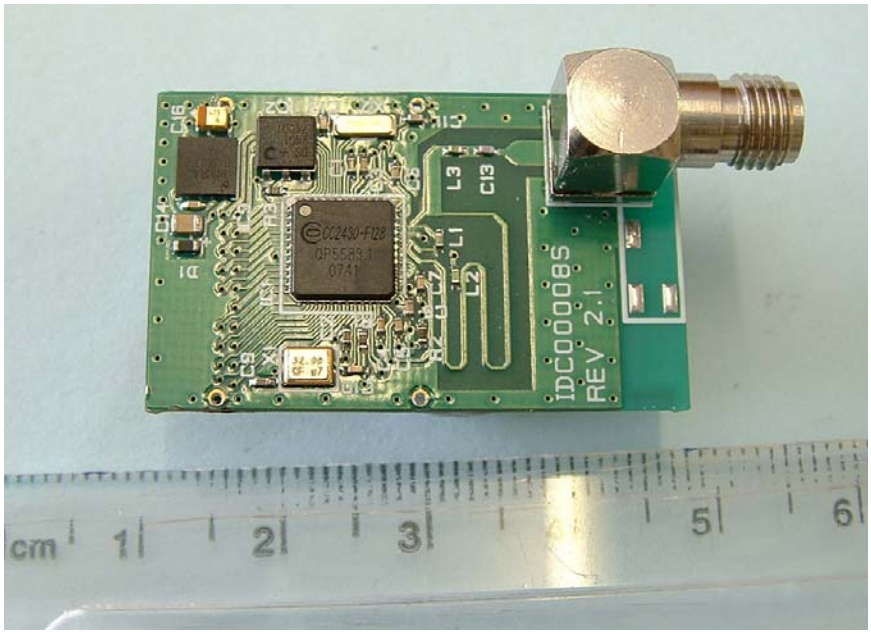
PHOTOGRAPH No. 4 **BOTTOM OF CHIP ANTENNA PCB**



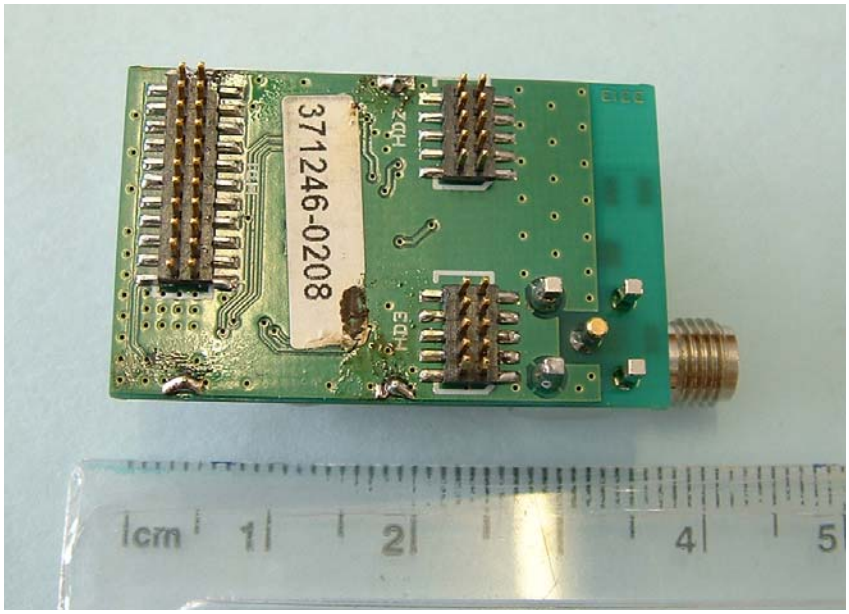
PHOTOGRAPH No. 5 **OVERVIEW ANTENNA CONNECTOR**



PHOTOGRAPH No. 6**TOP OF ANTENNA CONNECTOR PCB CAN REMOVED**



PHOTOGRAPH No. 7 **BOTTOM OF ANTENNA CONNECTOR PCB**



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

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH06/07	IC OATS Submission	TRL	01/06/07	24	01/06/09
UH06/07	NSA Calibration	TRL	17/12/07	12	17/12/08
UH006	3m Range ERP CAL	TRL	08/12/06	12	08/12/07
UH028	Log Periodic Ant	Schwarbeck	30/05/07	24	30/05/09
UH029	Bicone Antenna	Schwarbeck	06/05/07	24	06/05/09
UH041	Multimeter	AVOmeter	15/01/08	12	15/01/09
UH122	Oscilloscope	Tektronix	10/12/07	24	10/12/09
UH132	Power meter	Marconi	15/01/08	12	15/01/09
UH162	ERP Cable Cal	TRL	21/12/07	12	21/12/08
UH228	Power Sensor	Marconi	16/01/08	12	16/01/09
UH253	1m Cable N type	TRL	30/01/08	12	30/01/09
UH254	1m Cable N type	TRL	30/01/08	12	30/01/09
UH269	1m Cable N type	TRL	30/01/08	12	30/01/09
UH270	1m Cable N type	TRL	30/01/08	12	30/01/09
UH271	1.5m Cable N type	TRL	30/01/08	12	30/01/09
UH272	1.5m Cable N type	TRL	30/01/08	12	30/01/09
UH273	2m Cable N type	TRL	30/01/08	12	30/01/09
UH274	2m Cable N type	TRL	30/01/08	12	30/01/09
UH281	Spectrum Analyser	R&S	24/10/07	12	24/10/08
UH330	K type transition	Maury M'wave	13/06/08	24	13/06/10
UH340	Signal Generator	HP	06/05/08	12	06/05/09
UH365	Harmonic Mixer	Agilent	16/07/08	24	16/07/10
UH366	Harmonic Mixer	Agilent	21/07/08	24	21/07/10
UH367	Harmonic Mixer	Agilent	02/07/08	24	02/07/10
L005	CMTA	R&S	30/10/07	12	30/10/08
L007	Loop Antenna	R&S	22/05/07	24	22/05/09
L138	1-18GHz Horn	EMCO	23/05/07	24	23/05/09
L139	1-18GHz Horn	EMCO	23/05/07	24	23/05/09
L176	Signal Generator	Marconi	06/05/08	12	06/05/09
L193	Bicone Antenna	Chase	06/05/08	24	06/05/10
L203	Log Periodic Ant	Chase	06/05/08	24	06/05/10
L263/A	Horn 18-26GHz	Flann	13/06/08	24	13/06/10
L300	Horn 18-26GHz	Flann	12/06/08	24	12/06/10
L309	SMA Transition		13/06/08	24	13/06/10
L343	CCIR Noise Filter	TRL	20/09/06	12	20/09/07
L426	Temperature Indicator	Fluke	22/01/08	12	22/01/09
L479	Analyser	Anritsu	11/12/07	12	11/12/08

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%**

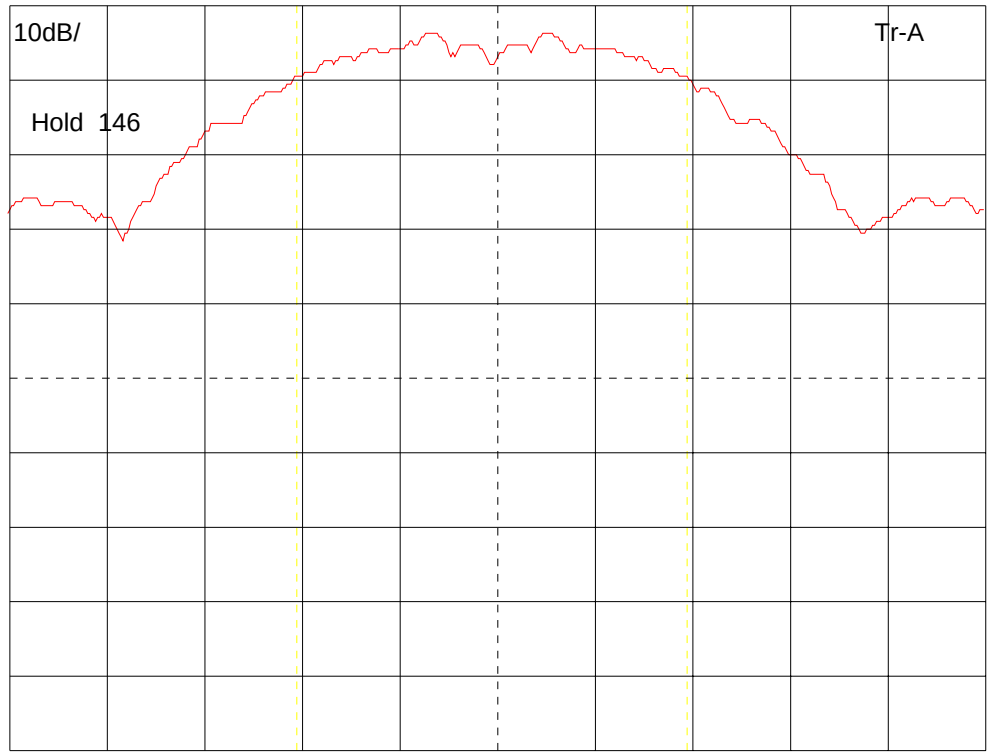
ANNEX E

6dB BANDWIDTH

OccBW:1.592 MHz

CTR:2.404980 GHz RB 100kHz# AT 10dB# Band auto

RLV: 21.06dBm# VB 100kHz# ST 500ms#



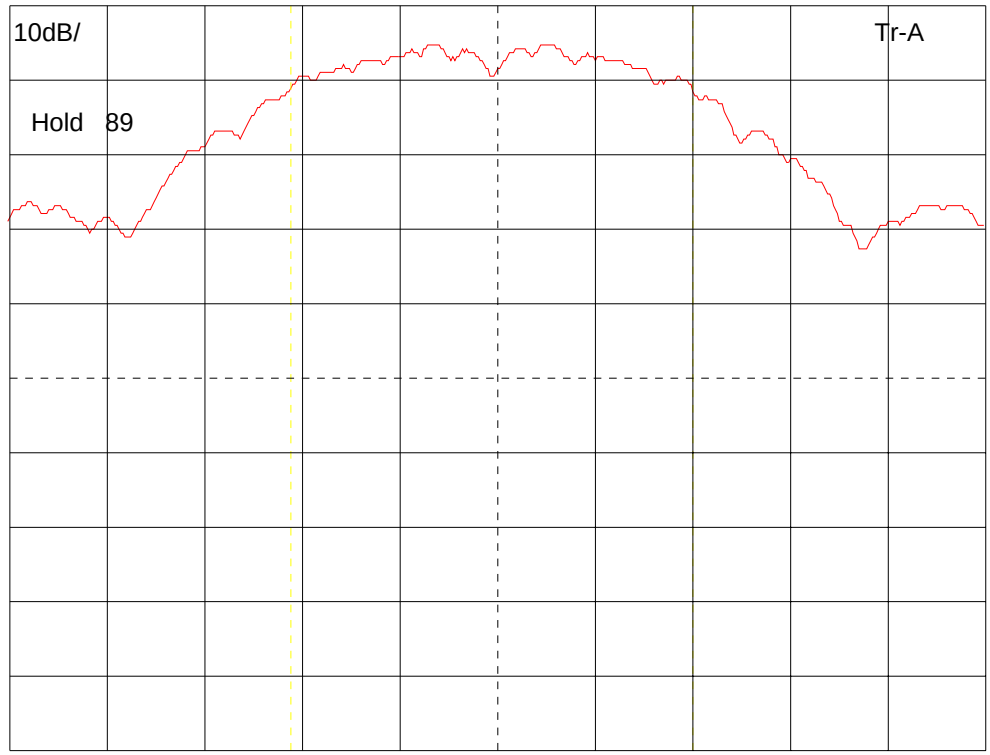
CF:2.405000GHz Span:4.00MHz

Bottom Channel

OccBW:1.648 MHz

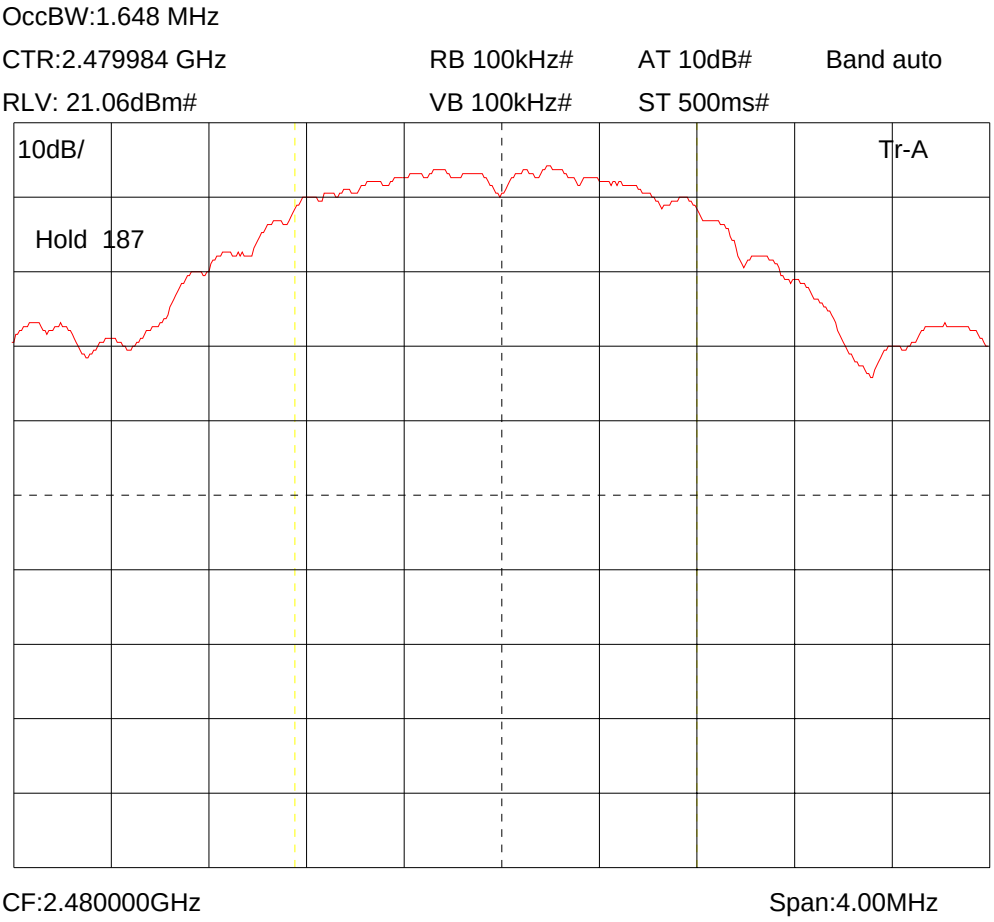
CTR:2.439984 GHz RB 100kHz# AT 10dB# Band auto

RLV: 21.06dBm# VB 100kHz# ST 500ms#



CF:2.440000GHz Span:4.00MHz

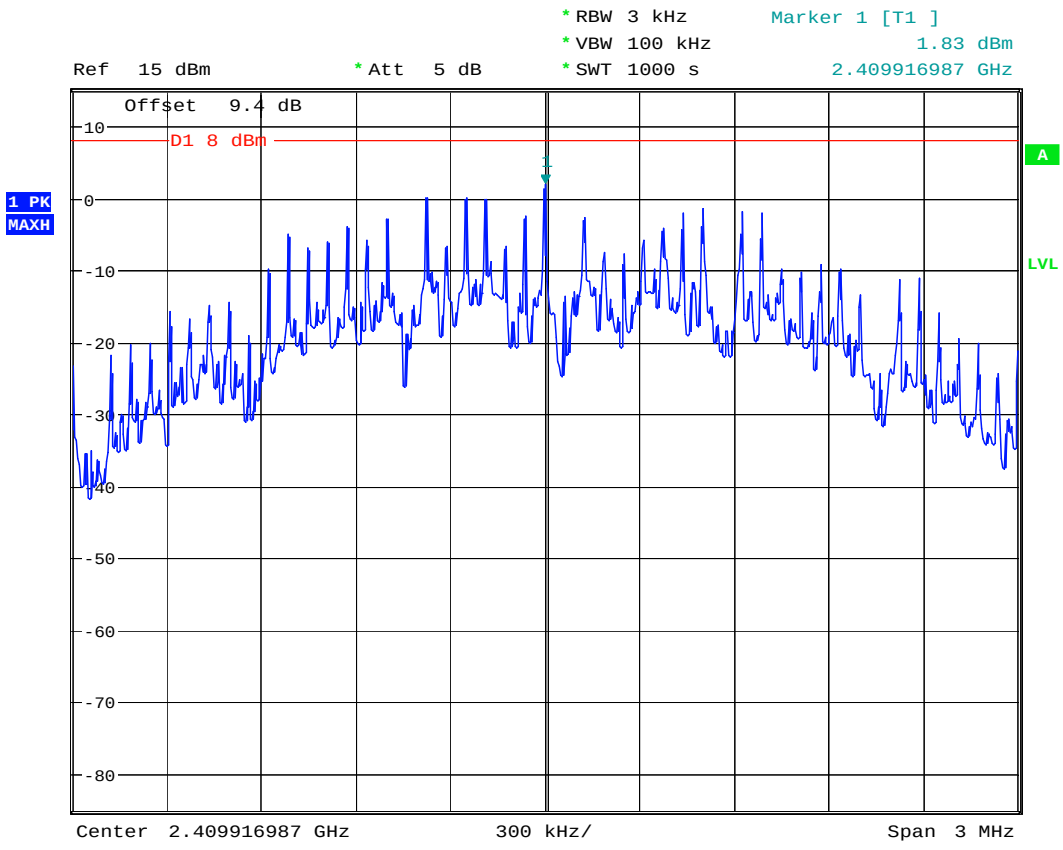
Middle Channel


OccBW:1.648 MHz
CTR:2.479984 GHz
RB 100kHz#
AT 10dB#
Band auto
RLV: 21.06dBm#
VB 100kHz#
ST 500ms#
10dB/
Tr-A
Hold 187
CF:2.480000GHz
Span:4.00MHz

Top Channel

ANNEX F

POWER SPECTRAL DENSITY



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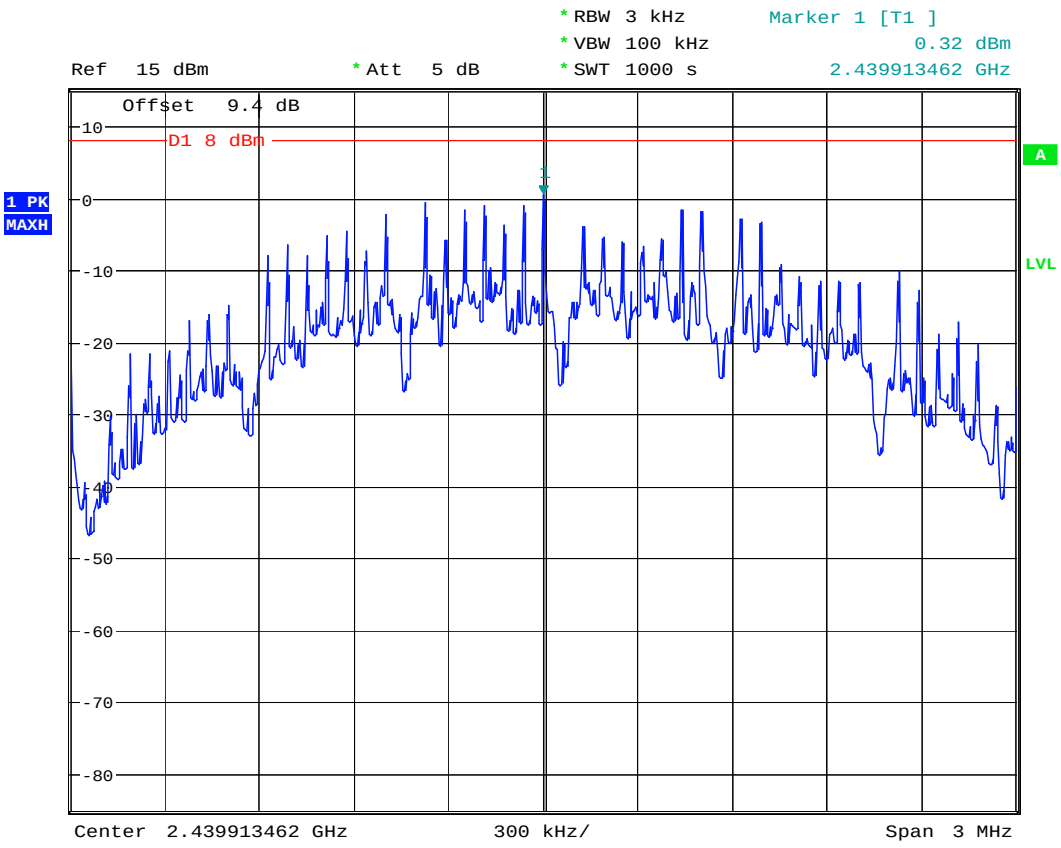

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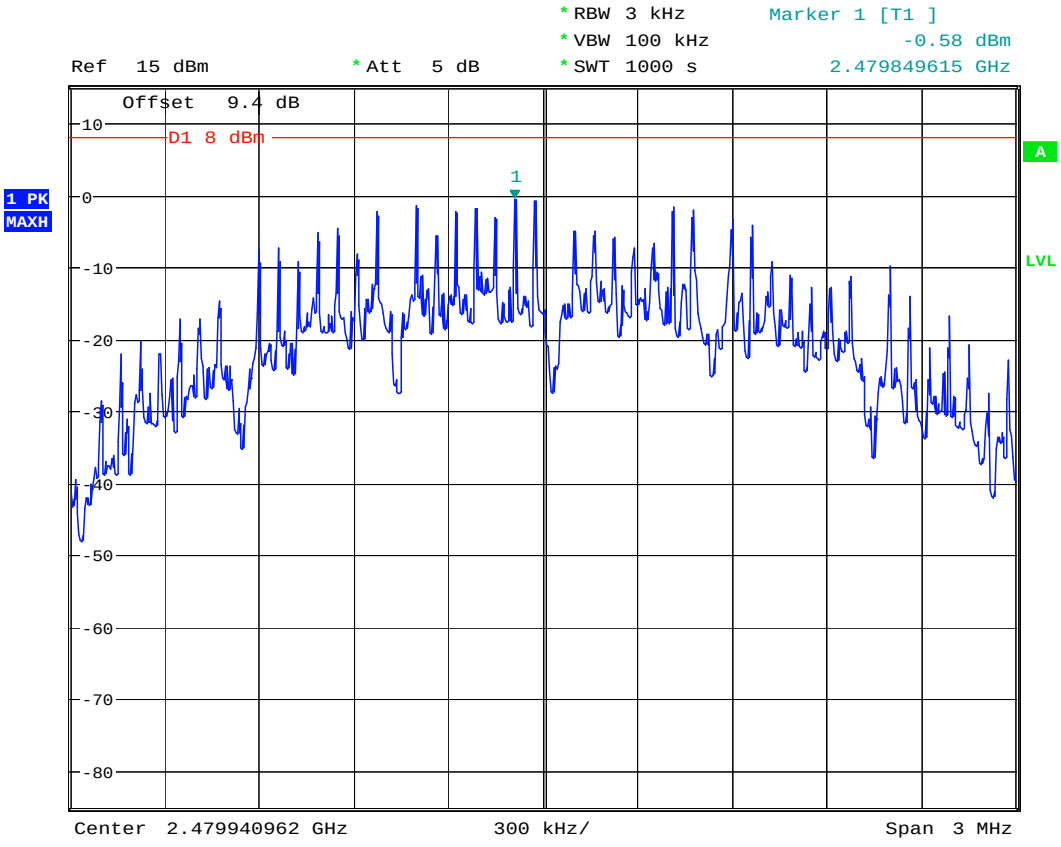
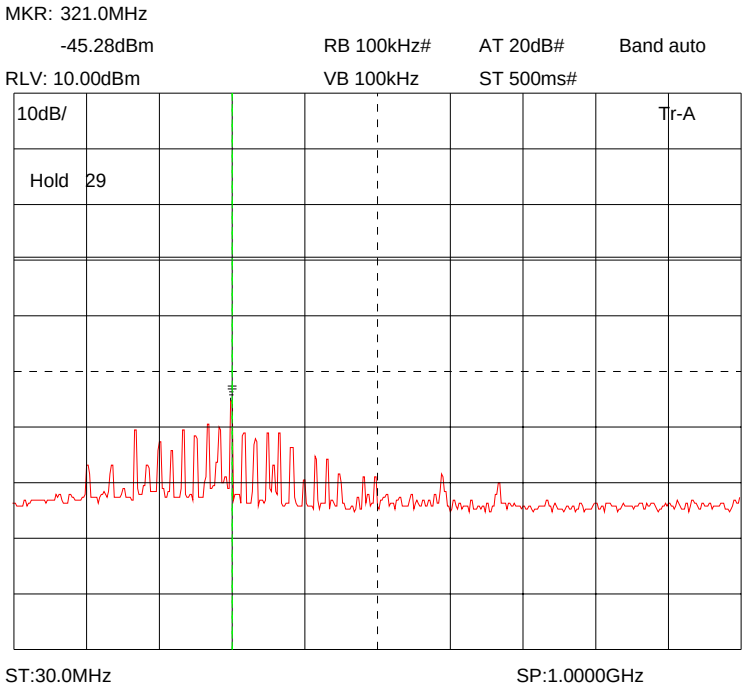


Date: 1.MAY.2008 15:03:02

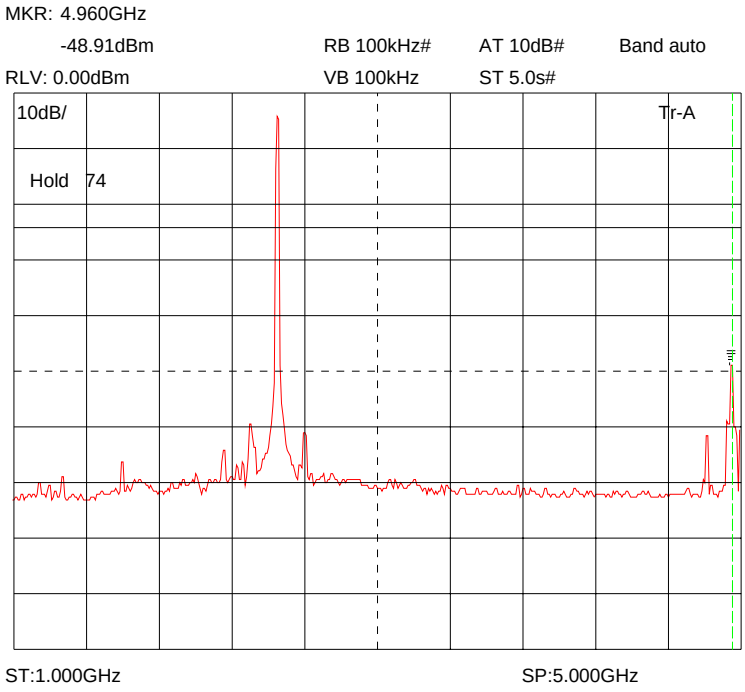
ANNEX G

CONDUCTED SPURIOUS EMISSIONS

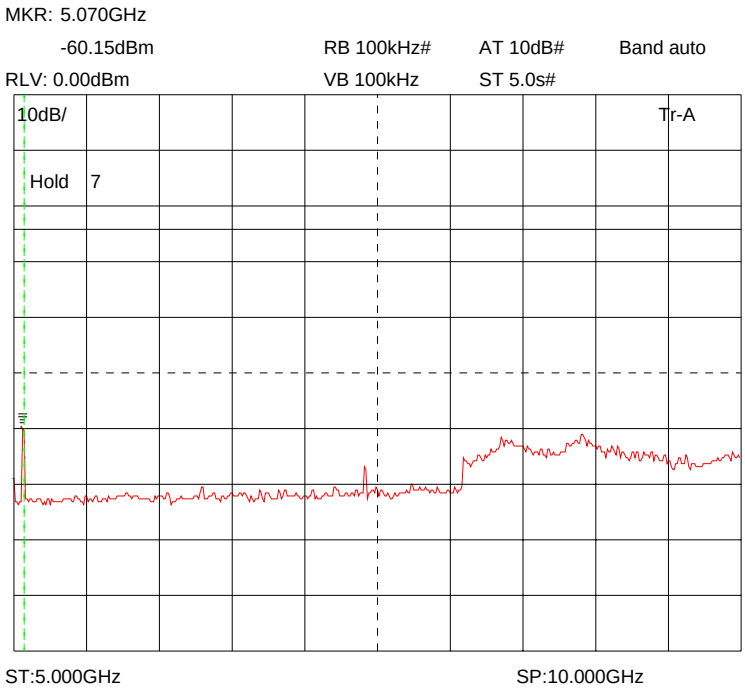
Conducted Spurious 30 MHz – 1 GHz



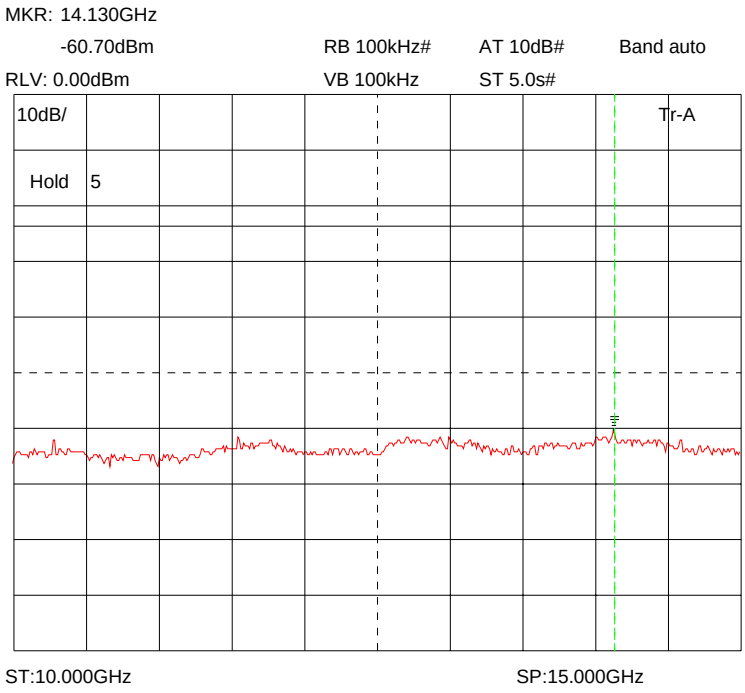
Conducted Spurious 1 GHz – 5 GHz



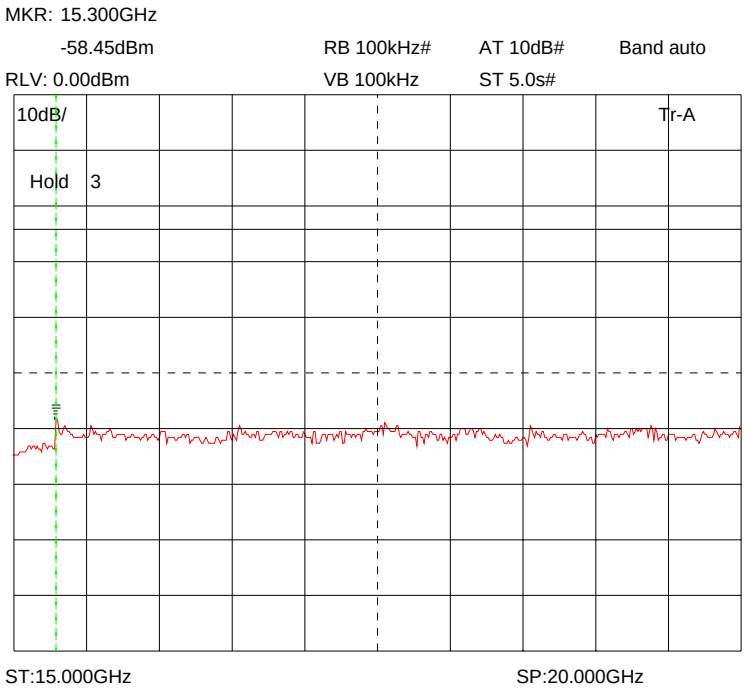
Conducted Spurious **5 GHz – 10 GHz**



Conducted Spurious **10 GHz – 15 GHz**



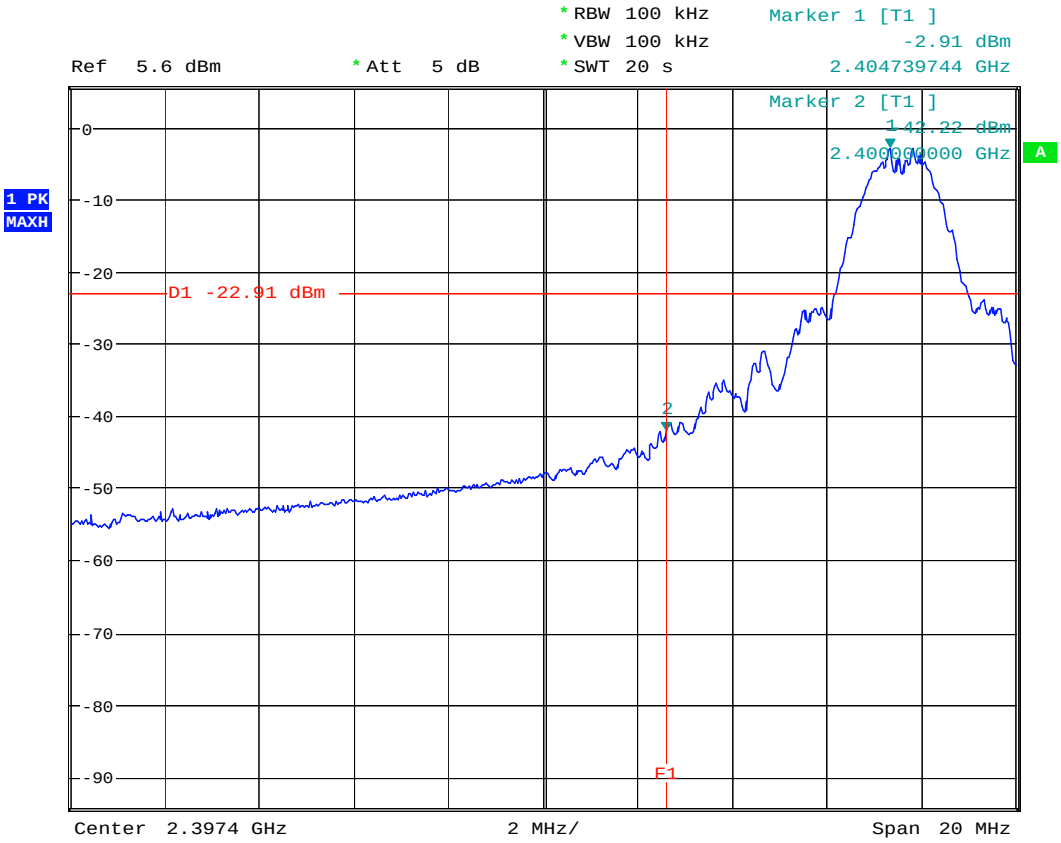
Conducted Spurious **15 GHz – 20 GHz**



Conducted Spurious **20 GHz – 25 GHz**

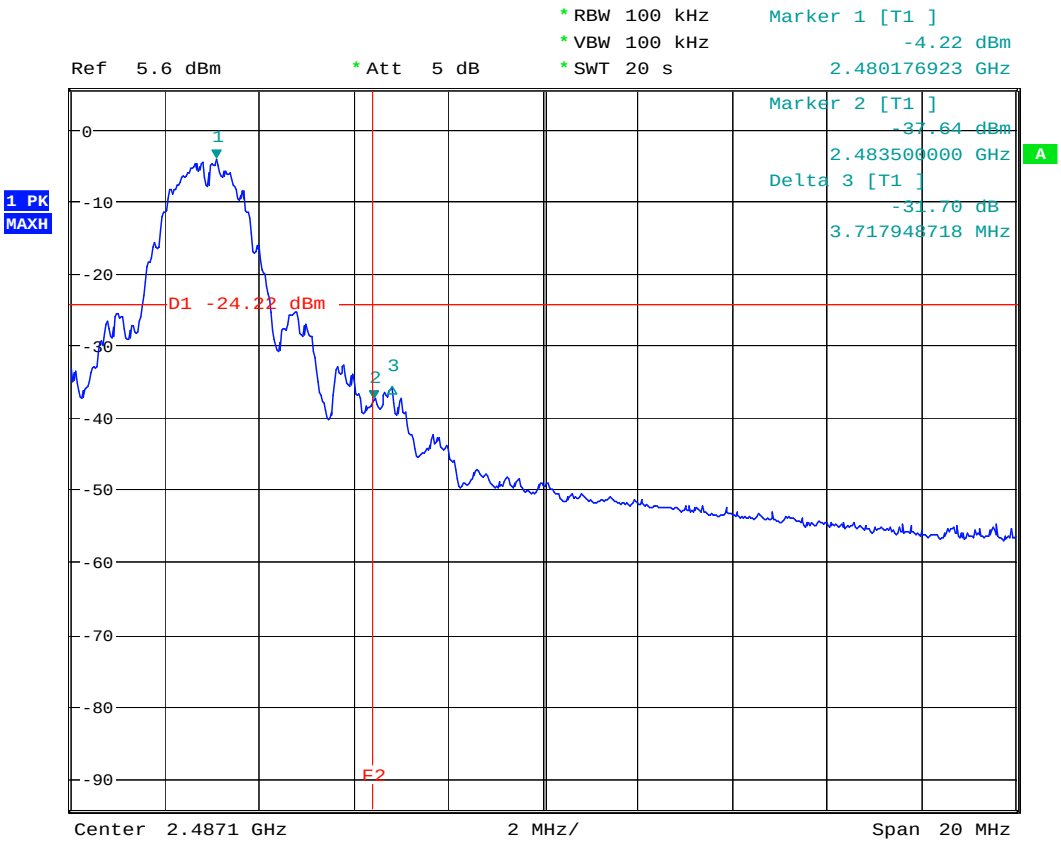
ANNEX H

CONDUCTED BANDEDGE COMPLIANCE



Date: 1.MAY.2008 15:07:55

Lower bandedge limit -20dBc



Date: 1.MAY.2008 15:09:06

Upper bandedge limit -20dBc

ANNEX I

INTENTIONAL RADIATED EMISSIONS

TRL Compliance Ltd

28 Mar 2008 07:55

E-Field Radiation (30MHz-1GHz)

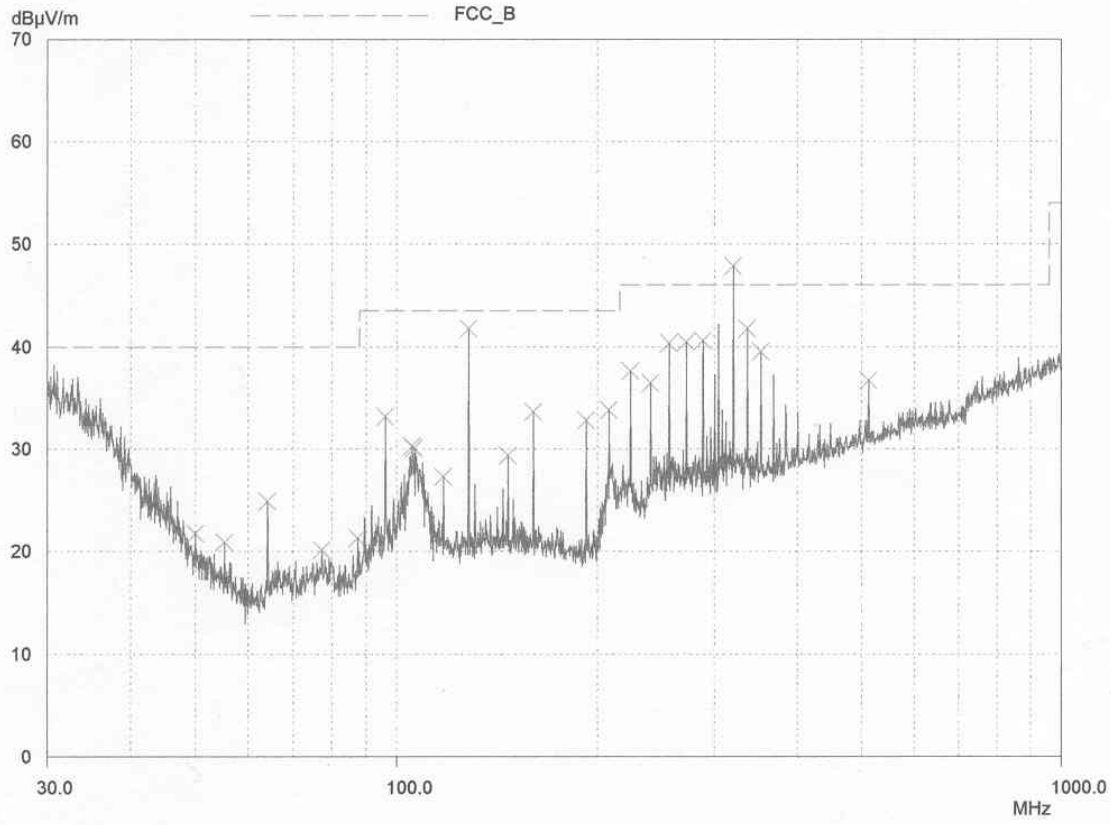
EUT:	2.4GHz module
Manuf:	IDC
Op Cond:	3m Indoor Prescan
Operator:	J Charters
Test Spec:	FCC CFR47 Part 15.109
Comment:	Vertical bottom channel tx high gain ant

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

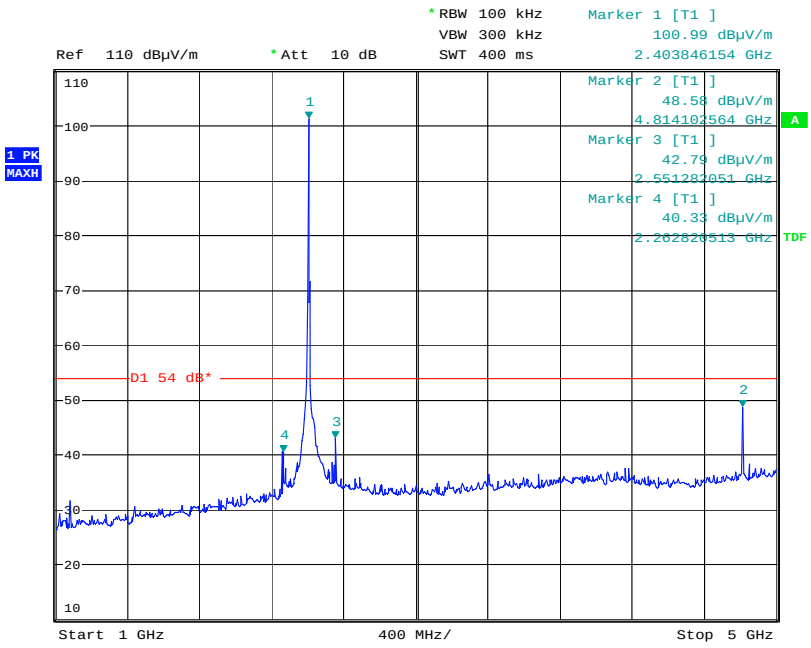
Transducer	No.	Start	Stop	Name
1	21	30MHz	1000MHz	UH72
	22	30MHz	1000MHz	UH93

Prescan Measurement:		
	Detector:	X PK
	Meas Time:	see scan settings
	Subranges:	50
	Acc Margin:	20 dB



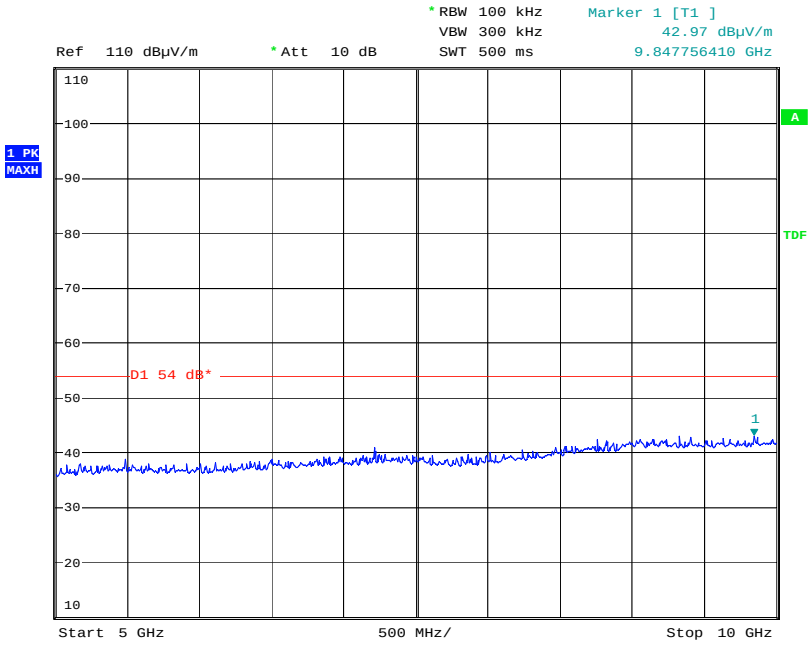
PAGE 1

Bottom Channel **1 GHz – 5 GHz**



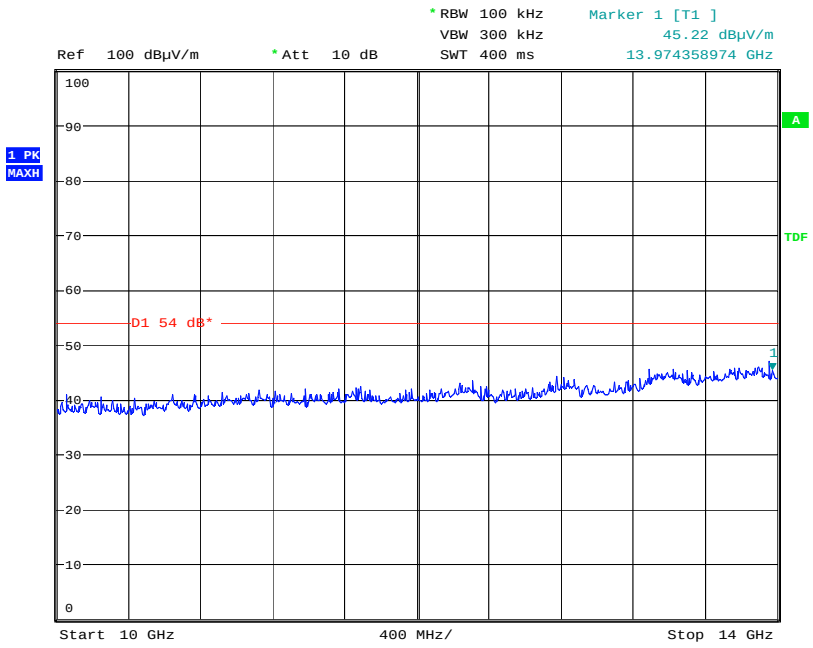
Date: 2.MAY.2008 09:46:30

Bottom Channel **5 GHz – 10 GHz**



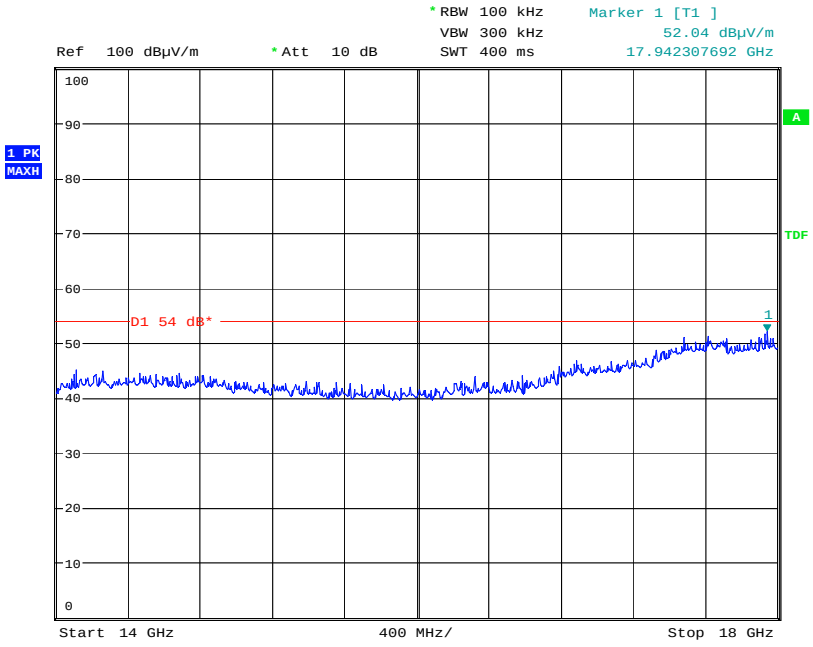
Date: 2.MAY.2008 09:49:07

Bottom Channel 10 GHz – 14 GHz



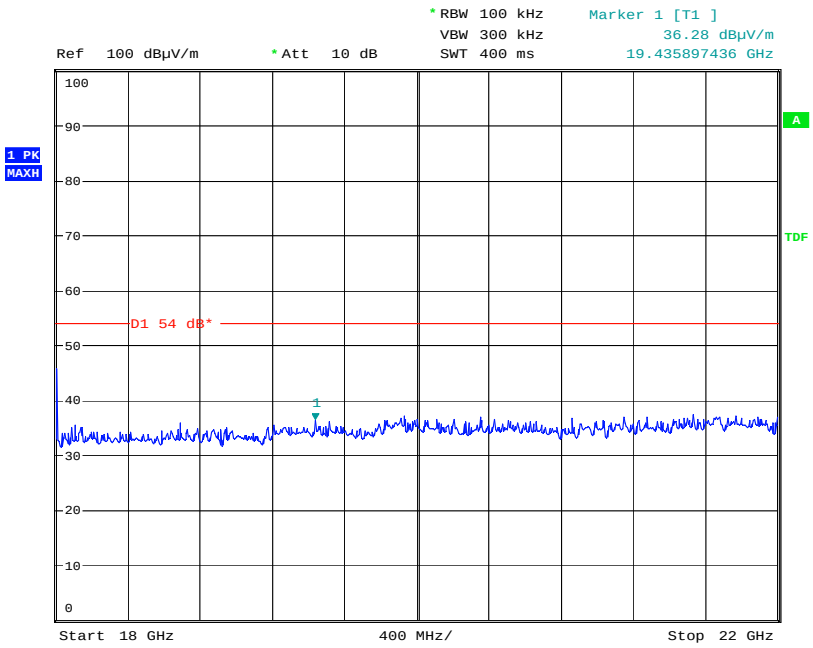
Date: 2.MAY.2008 10:07:07

Bottom Channel 14 GHz – 18 GHz



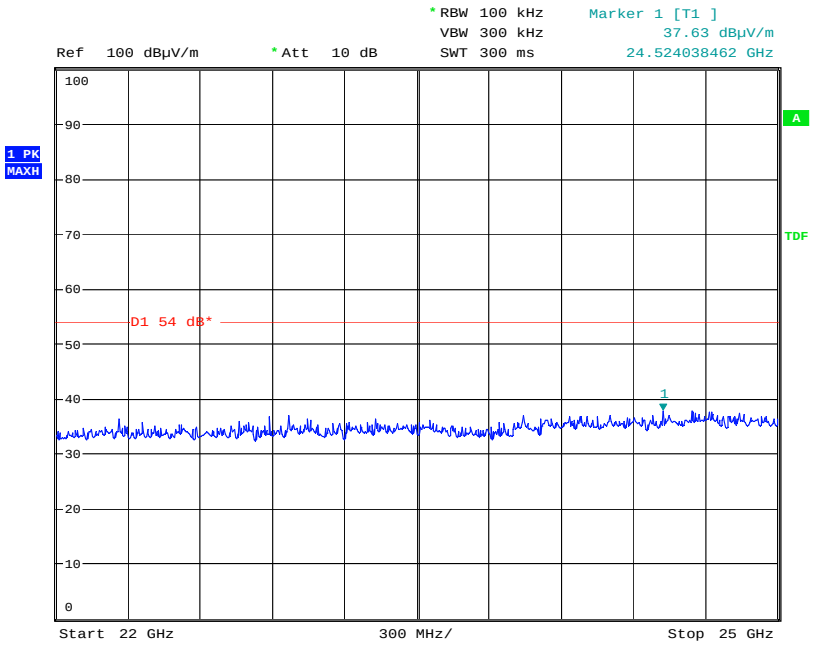
Date: 2.MAY.2008 09:50:26

Bottom Channel 18 GHz – 22 GHz



Date: 2.MAY.2008 09:50:47

Bottom Channel 22 GHz – 25 GHz



Date: 2.MAY.2008 09:51:01

Top Channel **30 MHz – 1 GHz**

TRL Compliance Ltd

28 Mar 2008 07:46

E-Field Radiation (30MHz-1GHz)

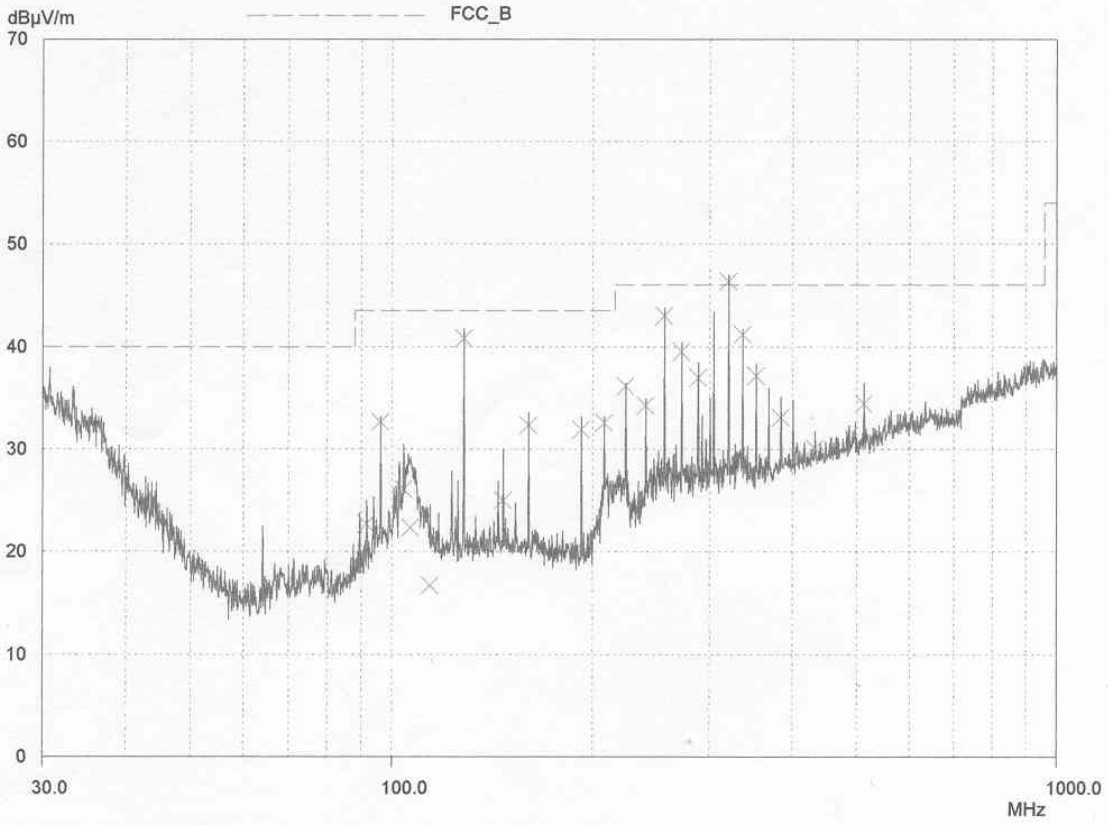
EUT:	2.4GHz module
Manuf:	IDC
Op Cond:	3m Indoor Prescan
Operator:	J Charters
Test Spec:	FCC CFR47 Part 15.109
Comment:	Vertical top channel tx high gain ant

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

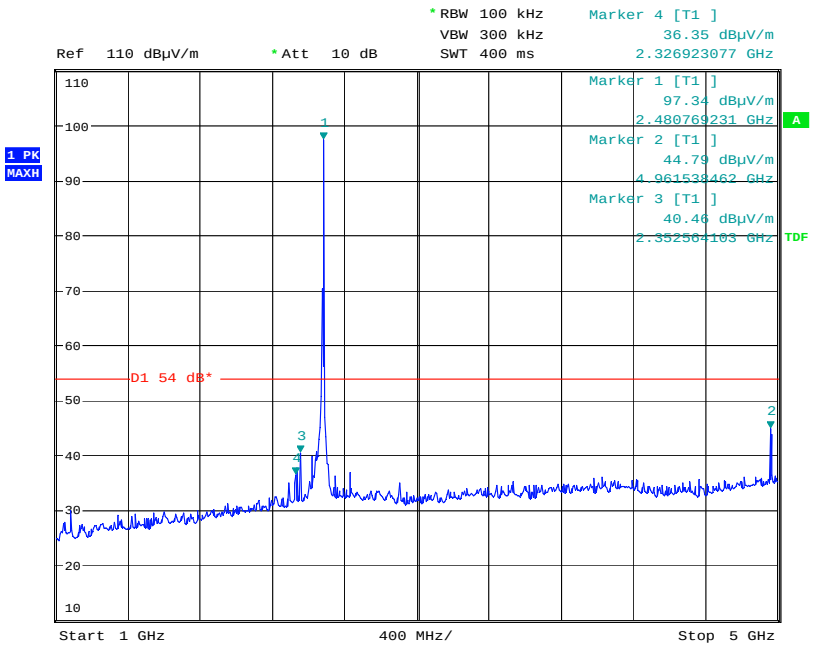
Final Measurement: Detector: X QP
Meas Time: 2sec
Subranges: 50
Acc Margin: 20 dB



PAGE 1

Top Channel

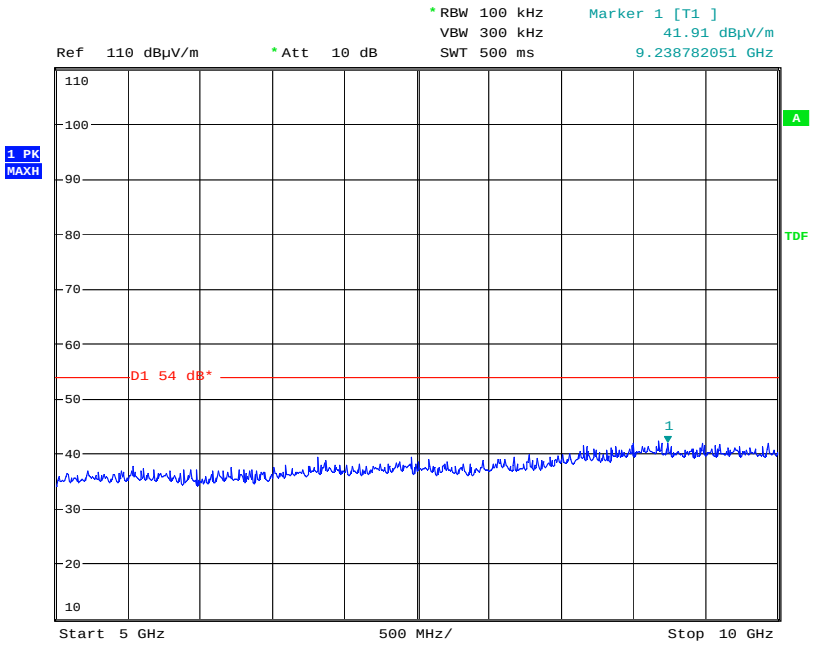
1 GHz – 5 GHz



Date: 2.MAY.2008 11:09:54

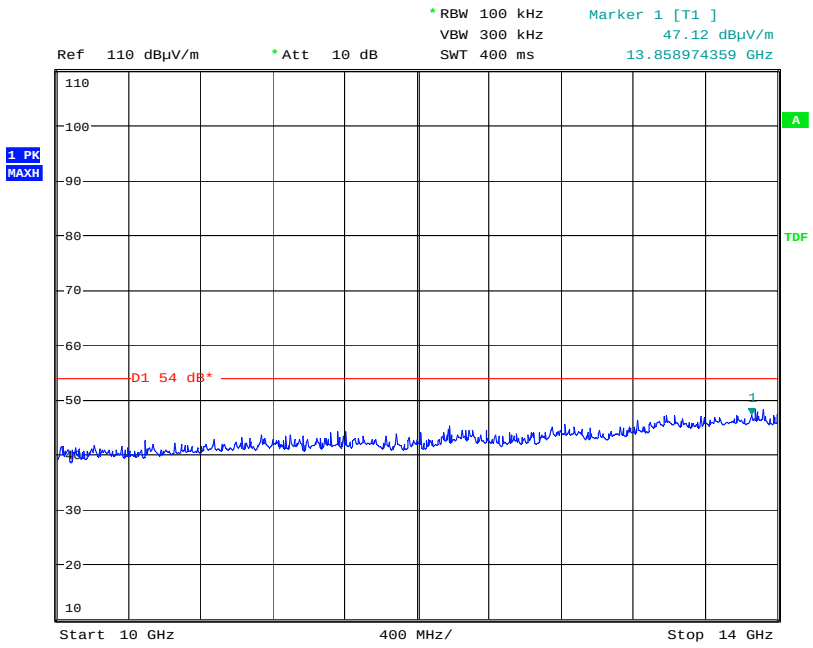
Top Channel

5 GHz – 10 GHz



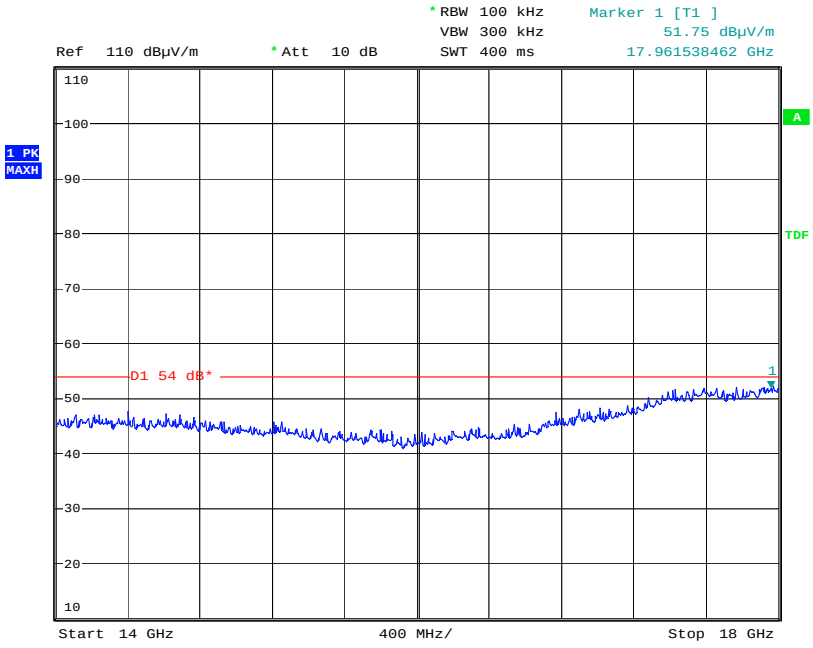
Date: 2.MAY.2008 11:10:11

Top Channel 10 GHz – 14 GHz



Date: 2.MAY.2008 11:10:35

Top Channel 14 GHz – 18 GHz



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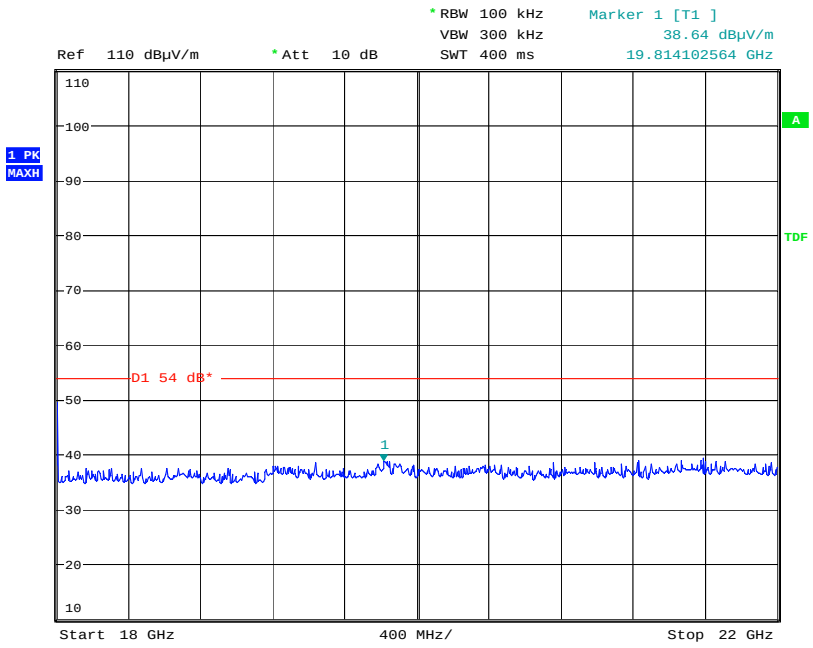
Top Channel

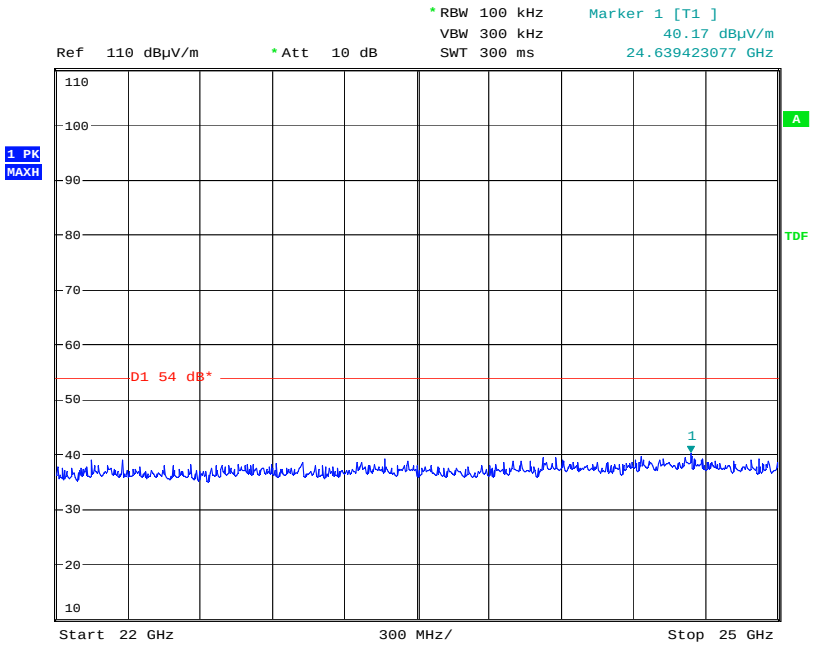
18 GHz – 22 GHz



Date: 2.MAY.2008 11:11:13

Top Channel

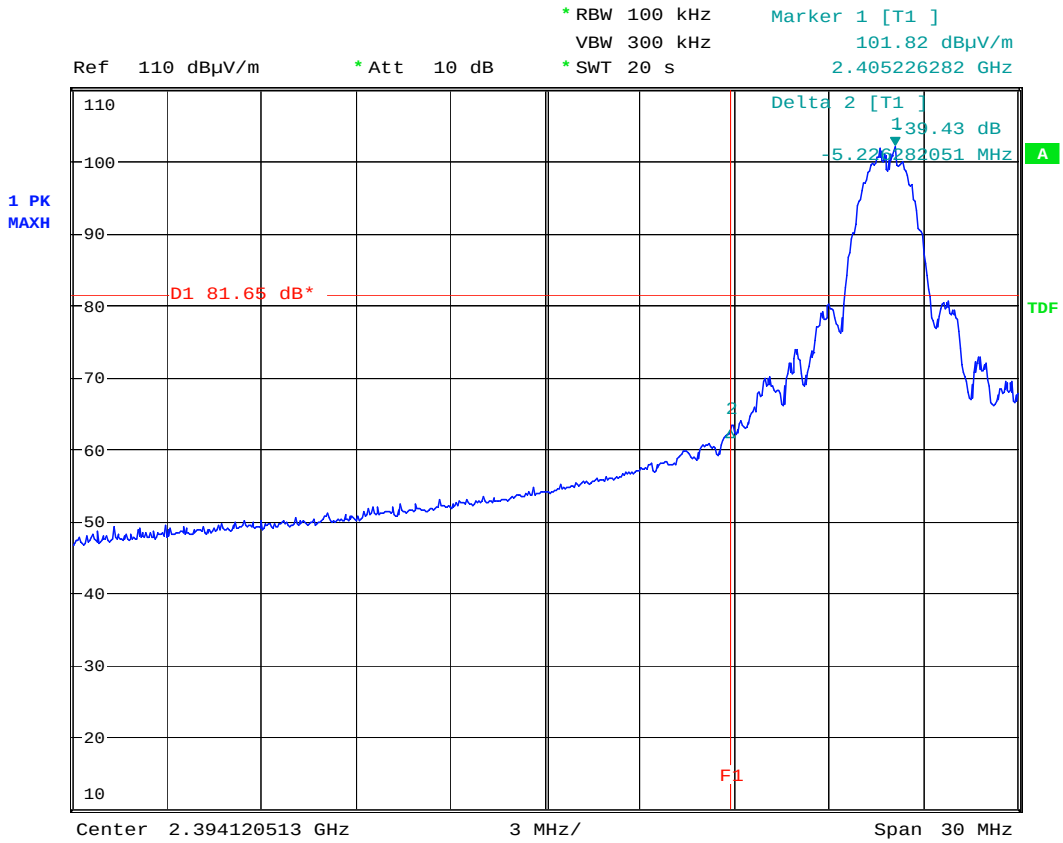
22 GHz – 25 GHz



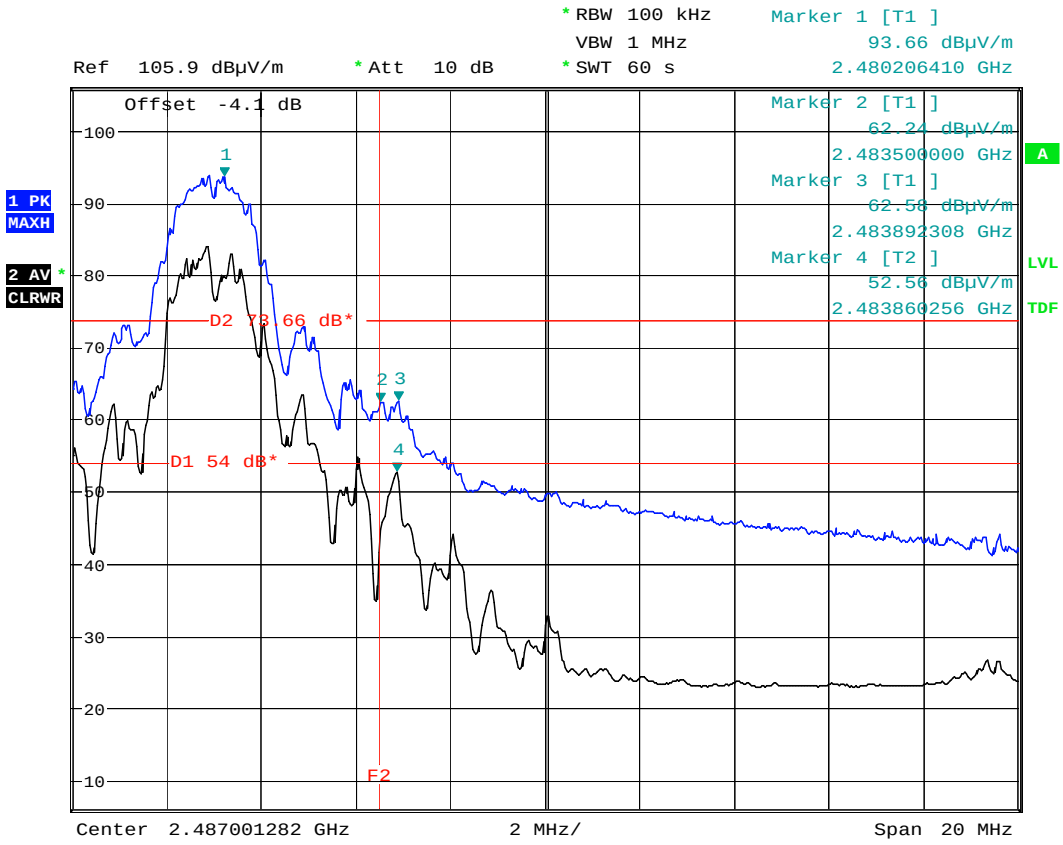
Date: 2.MAY.2008 11:11:29

ANNEX J

RADIATED BANDEDGE COMPLIANCE



Date: 2.MAY.2008 10:04:11



Date: 2.MAY.2008 11:03:45

ANNEX K

POWER LINE CONDUCTION

Powerline Conduction

27 Mar 2008 14:37

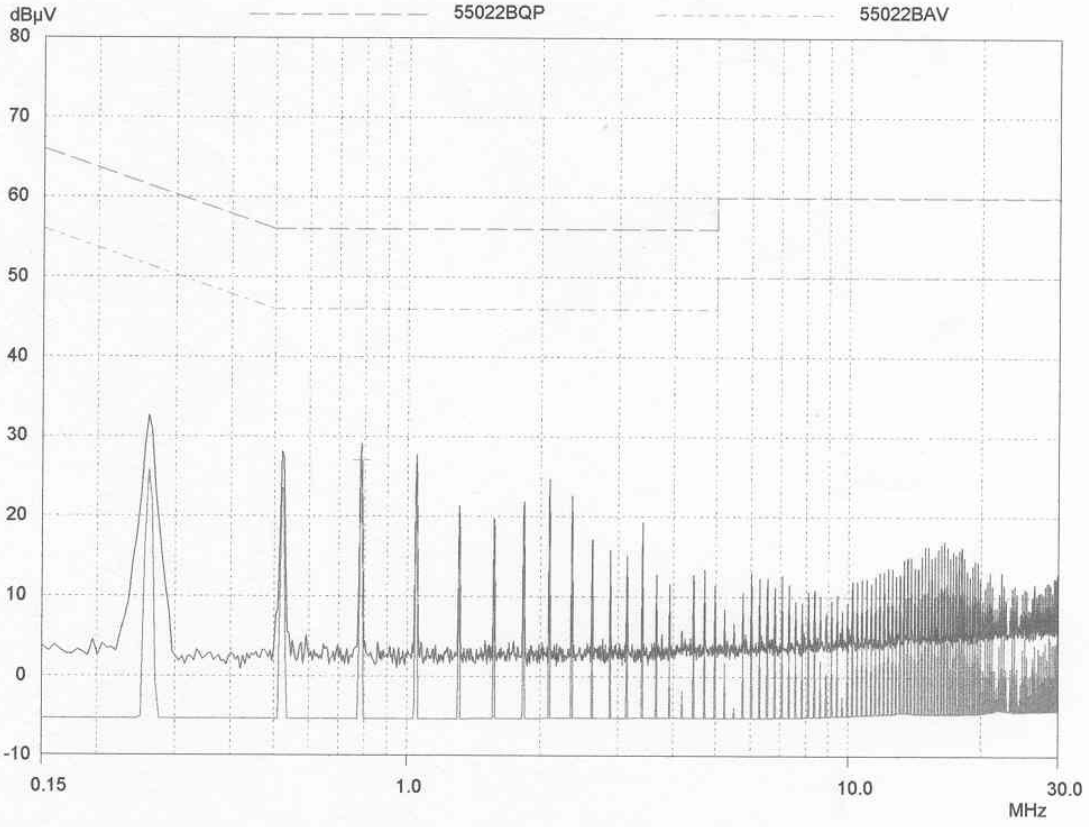
150kHz - 30MHz

EUT:	AGD505
Manuf:	IDC
Op Cond:	LISN UH195, cable UH21 & Receiver UH187
Operator:	J Charters
Test Spec:	EN55022 Class B (or Variant)
Comment:	Neutral Line, 110V, 60Hz
Result File:	pl2.dat : Neutral line
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	10kHz	30MHz	UH21
	2	150kHz	30MHz	UH195

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



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ANNEX L

UNINTENTIONAL RADIATED EMISSIONS

30 MHz – 1 GHz

TRL Compliance Ltd

28 Mar 2008 08:03

E-Field Radiation (30MHz-1GHz)

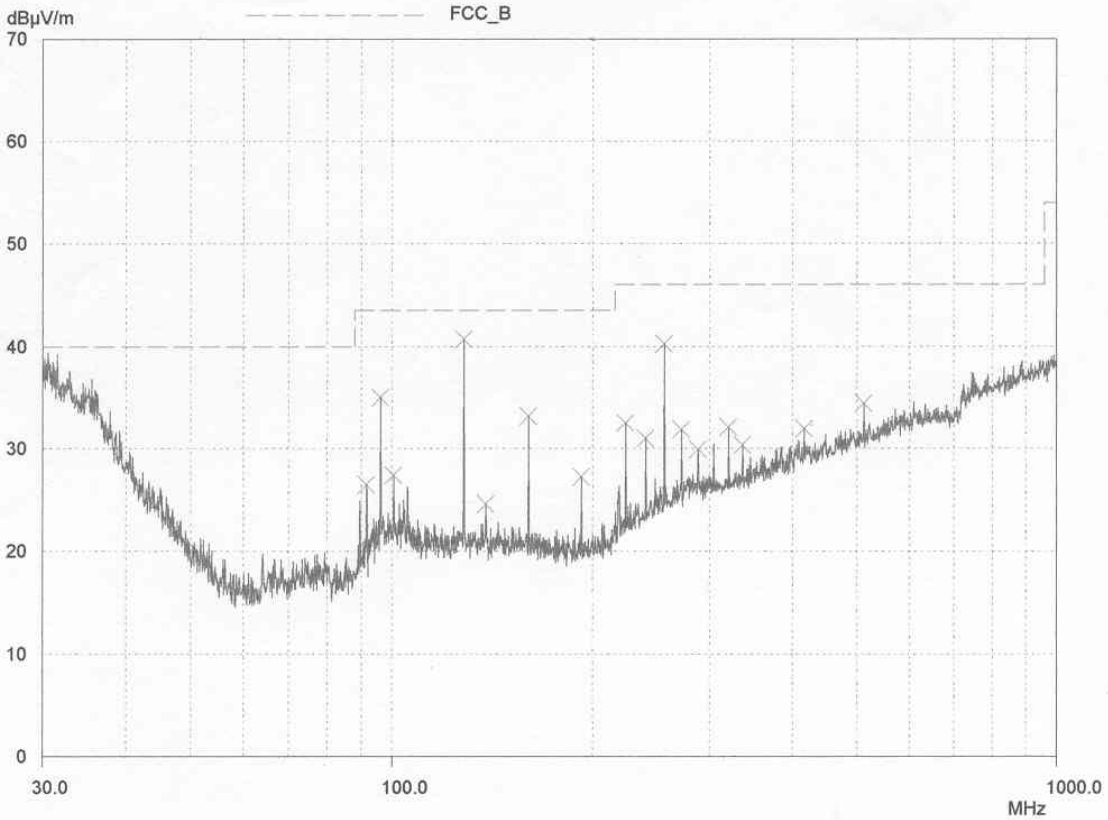
EUT:	2.4GHz module
Manuf:	IDC
Op Cond:	3m Indoor Prescan
Operator:	J Charters
Test Spec:	FCC CFR47 Part 15.109
Comment:	Vertical bottom channel RX high gain ant

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

Prescan Measurement:		
	Detector:	X PK
	Meas Time:	see scan settings
	Subranges:	50
	Acc Margin:	20 dB



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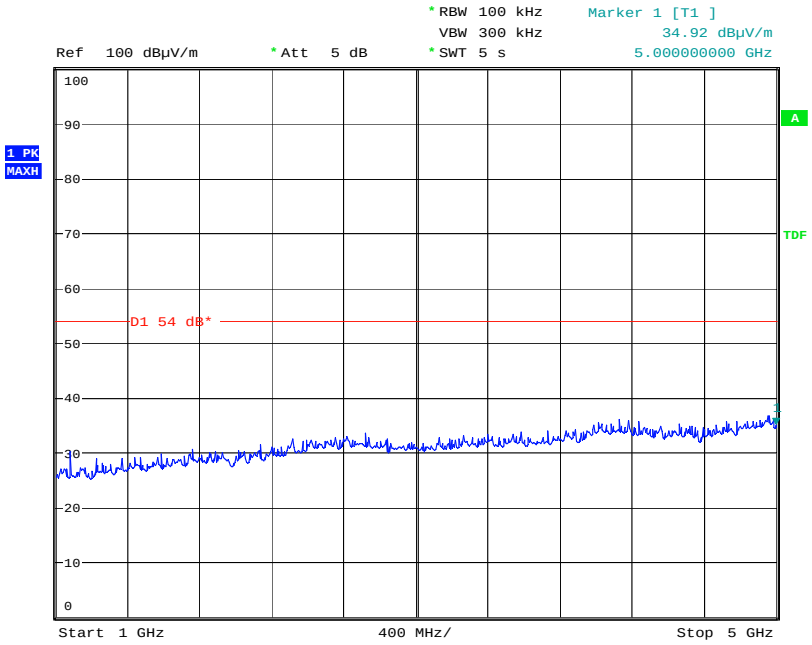
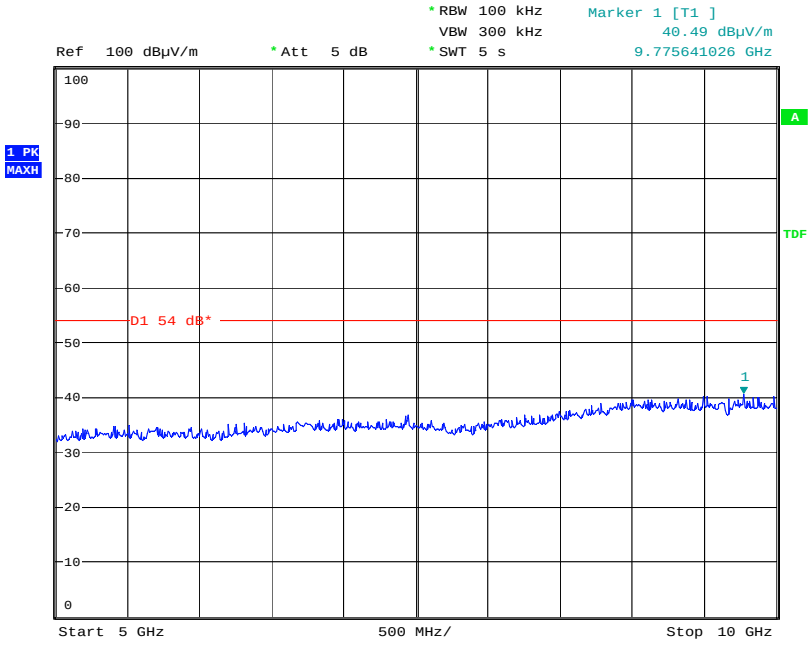
1 GHz – 5 GHz



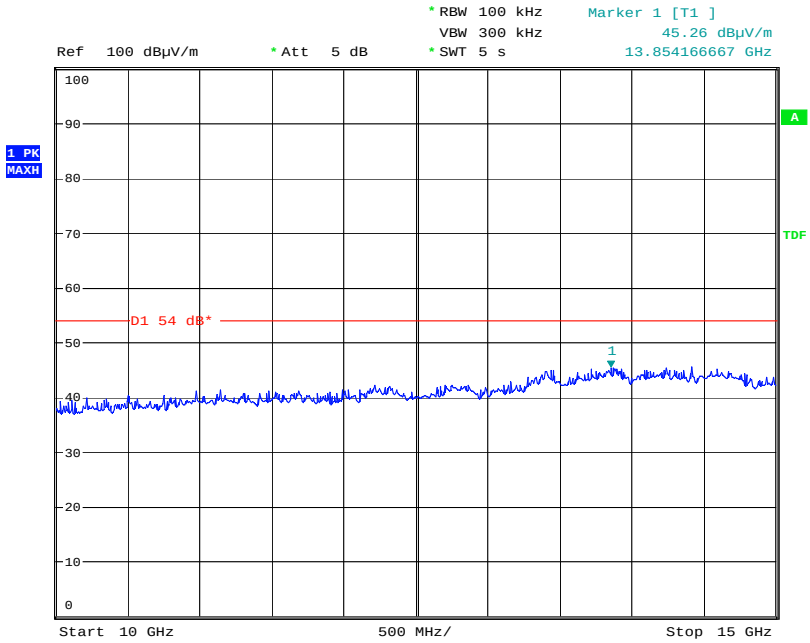
Date: 2.MAY.2008 11:23:07

5 GHz – 10 GHz



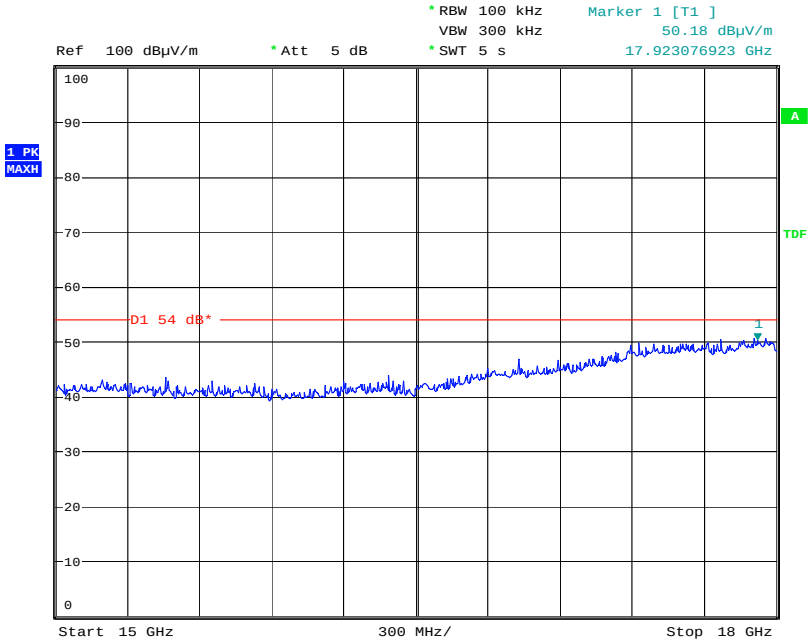
Date: 2.MAY.2008 11:23:26

10 GHz – 15 GHz



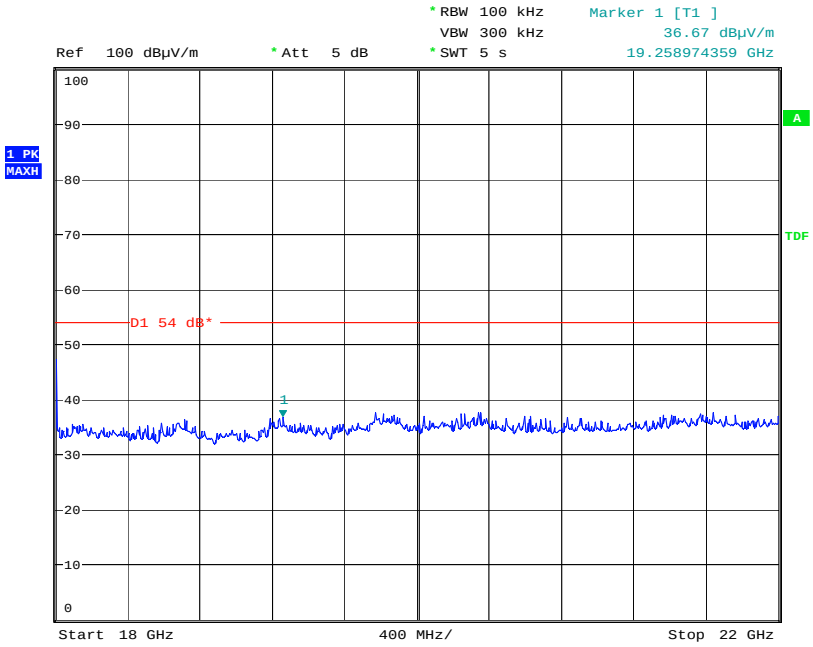
Date: 2.MAY.2008 11:23:47

15 GHz – 18 GHz



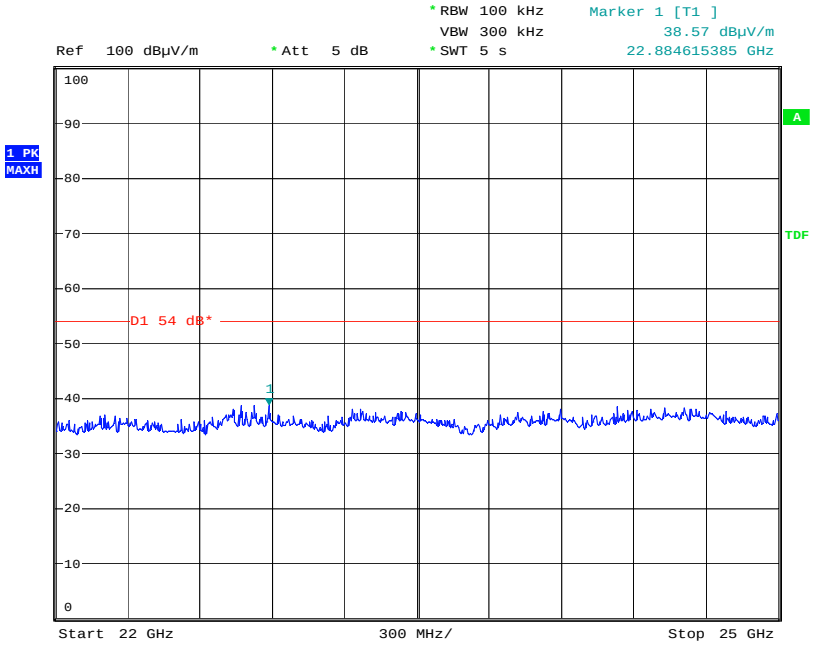
Date: 2.MAY.2008 11:24:07

18 GHz – 22 GHz



Date: 2.MAY.2008 11:24:26

22 GHz – 25 GHz



Date: 2.MAY.2008 11:24:42