

REPORT ON THE CERTIFICATION TESTING OF A
AGD SYSTEMS Ltd
AGD340
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.245 September 2007
INTENTIONAL RADIATOR SPECIFICATION





TEST REPORT NO: RU1432/8707

COPY NO: 1

ISSUE NO: 2

FCC ID: WH3AGD340

# REPORT ON THE CERTIFICATION TESTING OF A AGD SYSTEMS Ltd AGD340 WITH RESPECT TO THE FCC RULES CFR 47, PART 15.245 September 2007 INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 28<sup>th</sup> April – 4<sup>th</sup> August 2008

TESTED BY:		D WINSTANLEY
APPROVED I	av.	p.p. J CHARTERS
AFFROVEDI	51	RADIO SECTION LEADER
DATE:	8 <sup>th</sup> September 2008	

Distribution:

Copy Nos: 1. AGD Systems Ltd

2. FCC EVALUATION LABORATORIES

3. TRL Compliance Ltd

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Notes:	Component failure during test		] X]
2.	If Yes, details of failure:		
3.	The facilities used for the testing of the product contain in this re	eport are FCC Listed.	

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.

4.

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FCC IDENTITY:	WH3AGD340				
PURPOSE OF TEST:	Certification				
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.245 September 2007				
TEST RESULT:	Compliant to Specification				
EQUIPMENT UNDER TEST:	AGD340				
ITU: EMISSION CODE:	3M2NON				
EQUIPMENT TYPE:	Portable Non Handheld Radar				
PRODUCT USE:	Enforcement Radar				
CARRIER EMISSION:	727.779 mV/m @ 3m				
ANTENNA TYPE:	Integral				
ALTERNATIVE ANTENNA:	Not Applicable				
BAND OF OPERATION:	24.075 – 24.175 GHz				
CHANNEL SPACING:	Not Applicable, Wideband				
NUMBER OF CHANNELS:	1				
FREQUENCY GENERATION:	SAW Resonator [ ] Crystal [ ] Synthesiser [X]				
MODULATION METHOD:	Amplitude [ ] Digital [X] Angle [ ]				
POWER SOURCE(s):	12Vdc / 24Vac				
TEST DATE(s):	28 <sup>th</sup> April – 4 <sup>th</sup> August 2008				
ORDER No(s):	39327				
APPLICANT:	AGD Systems Ltd				
ADDRESS:	White Lion House Gloucester Road Staverton Cheltenham Gloucester GL51 0TF				
TESTED BY:	D WINSTANLEY				
APPROVED BY:	p.p. J CHARTERS				



RADIO SECTION

LEADER

#### **APPLICANT'S SUMMARY**

**EQUIPMENT UNDER TEST (EUT):** AGD340 **EQUIPMENT TYPE:** Portable Non Handheld Radar PURPOSE OF TEST: Certification TEST SPECIFICATION(s): FCC RULES CFR 47, Part 15.245 September 2007 TEST RESULT: COMPLIANT Yes [X] No APPLICANT'S CATEGORY: MANUFACTURER [X] **IMPORTER** DISTRIBUTOR TEST HOUSE **AGENT** APPLICANT'S ORDER No(s): 39327 APPLICANT'S CONTACT PERSON(s): Mr R Fyfe E-mail address: rob.fyfe@agd-systems.com APPLICANT: AGD Systems Ltd ADDRESS: White Lion House Gloucester Road Staverton Cheltenham Gloucester **GL51 0TF** TEL: +44 (0) 1452 854212 FAX: +44 (0) 1452 854213 EUT(s) COUNTRY OF ORIGIN: United Kingdom TRL Compliance Ltd TEST LABORATORY: **UKAS ACCREDITATION No:** 0728 28<sup>th</sup> April – 4<sup>th</sup> August 2008 TEST DATE(s): TEST REPORT No: RU1432/8707

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# **EQUIPMENT TEST / EXAMINATIONS REQUIRED**

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.245(b)	Average	YES
	Intentional Emission Field Strength:	15.245(b)	Average	YES
	Intentional Emission Band Occupancy:	15.215 (c)	Peak	YES
	Intentional Emission ERP (mW):	N/A	-	NO
	Spurious Emissions – Conducted:	15.207	Quasi Peak Average	YES
	Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	YES
	Spurious Emissions – Radiated >1000MHz:	15.245 15.209	Average	YES
	Maximum Frequency of Search:	15.33	-	YES
	Antenna Arrangements Integral:	15.203	-	YES
	Antenna Arrangements External Connector:	15.204	-	YES
	Restricted Bands	15.205	-	YES
	Extrapolation Factor	15.31(f)	-	YES

2.	Product Use:	Enforcement Radar	
3.	Emission Designator:	3M2NON	
4.	Duty Cycle:		100%
5.	Temperatures:	Ambient (Tnom)	20°C
6.	Supply Voltages:	Vnom	+12Vdc
	Note: Vnom voltages are as stated above unless other	wise shown on the test re	eport page
7.	Equipment Category:	Single channel Two channel Multi-channel	[X] [ ] [ ]
8.	Channel spacing:	Narrowband Wideband	[ ] [X]

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#### TRANSMITTER TESTS

# TRANSMITTER SPURIOUS EMISSIONS - RADIATED - PART 15.209

Bottom Channel	FREQ. (MHz)	MEAS Rx (dBμV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBµV/m)	EXTRAP FACT (dB)	FIELD ST'GH (µV/m)	LIMIT (µV/m)
0.009MHz - 0.49MHz									Note 9
0.49MHz - 1.705MHz									Note 9
1.705MHz - 30MHz									Note 9
30MHz - 88MHz	62.5	18.72	1.18	5.1	-	25.0	-	17.78	100
88MHz - 216MHz									Note 9
216MHz - 960MHz	262.10 343.70 355.85 429.25 442.37 445.45 537.10 560.35 573.00 576.50 589.85 663.60	15.65 23.78 26.69 19.40 20.15 17.85 10.17 14.81 10.34 11.51 16.19 10.32	2.20 2.47 2.51 2.80 2.80 2.80 3.13 3.23 3.26 3.29 3.31 3.53	13.15 14.35 14.40 16.60 16.75 16.85 19.20 20.16 19.90 19.80 19.70 20.35		31.0 40.6 43.6 38.8 39.7 37.5 32.5 38.2 33.5 34.6 39.2 34.2	-	35.48 107.15 151.35 87.09 96.60 74.98 42.17 81.28 47.31 53.70 91.20 51.28	200 200 200 200 200 200 200 200 200 200
960MHz - 1GHz									Note 9
1GHz - 100GHz									Note 9
	•			Restrict	ed Bands	15.205		•	•
	0.009	MHz to 0.4	9 MHz		2400/f(	kHz) µV/m	@ 300m		
	0.49 M	Hz to 1.70	5 MHz		24000/f(	kHz) μV/m	@ 30m		
	1.705	MHz to 30	MHz			30μV/m	@ 30m		
	30M	1Hz to 88N	lHz			100µV/m	@ 3m		
	88M	Hz to 216N	ЛНz			150µV/m	@ 3m		
Limits	216N	1Hz to 960	MHz			200µV/m	@ 3m		
	960	MHz to 1G	iHz			500µV/m	@ 3m		
	1Gł	Hz to 100G	Hz			500µV/m	@ 3m		
			U	In-restricte	d Bands 8	& Harmonics	}		
		onics <17.7 estricted Ba				2500µV/m	@ 3m		
		nics > 17.				2500µV/m	@ 3m		
	All of	ther Emiss	ions			50 dBc	@ 3m		

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Results quoted are extrapolated as indicated Notes:

- Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a 2
- Extrapolation factor 9.5dB from 1m to 3m, as per Part 15.31f
- Measurements >1GHz @ 1m as per Part 15.31f(1)
- Receiver detector >1GHz = CISPR, Quasi-Peak, 120kHz bandwidth 5
- Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth New batteries used for battery powered products.
- 7
- 8 See Annex F for Emissions Graph(s)
- Only Emissions Within 20dB of the limit are recorded

Test Method:

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

Maximum results recorded.

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

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010 - 3580	138	х
HORN ANTENNA	FLANN	24240-20	124	265A	x
HORN ANTENNA	FLANN	20240-20	322	300	х
PRE AMPLIFIER	AGILENT	8449B	3008A016	572	х
SPECTRUM ANALYSER	HP	8563A	3133A00894	654	х
RECEIVER	R&S	ESVS 10	841431/014	UH186	х
BILOG ANTENNA	YORK	CBL611/A	1618	UH191	х
SPECTRUM ANALYSER	R&S	FSU	200034	UH281	х
HARMONIC MIXER 33 -50 GHz	AGILENT	11970Q	MY30030406	UH365	х
HARMONIC MIXER 50 – 75 GHz	AGILENT	11970V	MY30030198	UH366	х
HARMONIC MIXER 75 – 110 GHz	AGILENT	11970W	MY25210349	UH367	x
HORN ANTENNA	FLANN	23240-20	83	264A	х
HORN ANTENNA	FLANN	25240-20	N/A	N/A	х
HORN ANTENNA	FLANN	27240-20	N/A	N/A	х

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#### TRANSMITTER TESTS

#### TRANSMITTER INTENTIONAL EMISSION - RADIATED - Part 15.245 September 2007

=	20°C(<1GHz),	3m measurements @ fc	[X]
=	61%(<1GHz),	10m measurements @ fc	[]
=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
=	+12Vdc	30m extrapolated from 3m	[ ]
=	1	30m extrapolated from 10m	[ ]
	= = =	= 20°C(<1GHz), = 61%(<1GHz), = Open Area Test Site (OATS) = +12Vdc = 1	= 61%(<1GHz), 10m measurements @ fc = Open Area Test Site (OATS) 30m measurements @ fc = +12Vdc 30m extrapolated from 3m

FREQ. (GHz)	MEASUREMENT Rx. READING (dBμV)	CABLE LOSS (dB)	ANT FACTOR (dB/m)	PRE AMP (dB)	FIELD STRENGTH (dBµV/m)	FIELD STRENGTH (mV/m)
24.09753	41.14	4.7	37.5	33.9	117.24	727.779
	Limit value @ fc	2500 (mV/m)				
			f lower f higher			igher
Band occupancy @ -20 dBc			24.09	50381 GHz	24.0982	2500 GHz

See spectrum analyser plot - Annex E

Notes: 1 Results quoted are extrapolated as indicated

2 Receiver detector @ fc = Average 1MHz bandwidth

3 When battery powered the EUT was powered with new batteries

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

2 Measuring distances 3m

3 EUT 0.8 metre above ground plane

Emissions maximised by rotation of EUT, on an automatic turntable. Raising and lowering the receiver antenna between 1m & 4m. Horizontal and vertical polarisations, of the receive antenna.

EUT orientation in three orthagonal planes.

Maximum results recorded

The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.245 September 2007 tests is shown below:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
HORN ANTENNA	FLANN	20240-20	322	300	x
PRE AMPLIFIER	AGILENT	8449B	3008A016	572	x
SPECTRUM ANALYSER	R&S	FSU	200034	UH281	х

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#### TRANSMITTER TESTS

### TRANSMITTER CONDUCTED EMISSIONS - AC POWER LINE Part 15.207

Ambient temperature = 24(<1GHz), Relative humidity = 65%Hz),

Conditions = Power Line Laboratory

Supply voltage = 110V AC Supply Frequency = 60Hz

#### SIGNIFICANT EMISSIONS

FREQUENCY (MHz)	MEASUREMENT RECEIVER READING (dBµV)	DETECTOR	CONDUCTOR (L or N)	LIMIT (dBµV)
0.165	56.10	Quasi Peak	Live	65.21
0.190	52.11	Quasi Peak	Live	64.04
0.240	33.39	Average	Live	52.10
0.275	33.50	Average	Neutral	50.97
0.325	32.72	Average	Neutral	49.58
0.425	33.72	Average	Neutral	47.35
0.510	36.13	Quasi Peak	Live	56.00
0.525	34.60	Average	Neutral	46.00
0.625	35.69	Average	Neutral	46.00
0.775	37.81	Average	Neutral	46.00
0.980	45.55	Average	Neutral	46.00
1.025	41.54	Average	Neutral	46.00
1.250	34.31	Average	Neutral	46.00
1.580	28.40	Average	Neutral	46.00
4.355	28.47	Average	Live	46.00
8.370	30.99	Average	Neutral	46.00
8.520	32.76	Average	Neutral	46.00

Notes: 1 See attached plot annex G

2 110Vac Setpped Down to 24Vac through a transformer.

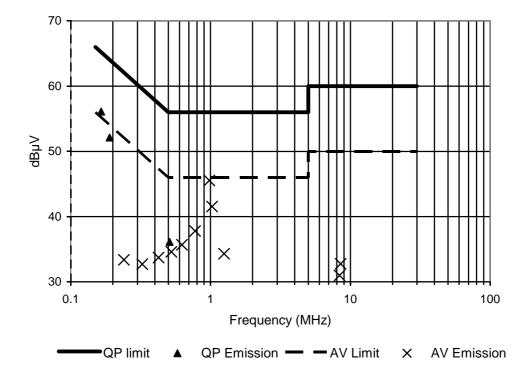
**Test Method**: 1 As per Radio – Noise Emissions, ANSI C63.4: 2003

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	841429/012	UH187	x
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	8407 31/015	UH195	х

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# **POWER LINE CONDUCTION EMISSIONS**



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# ANNEX A PHOTOGRAPHS

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# **TEST SETUP**



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# TRANSMITTER FRONT VIEW



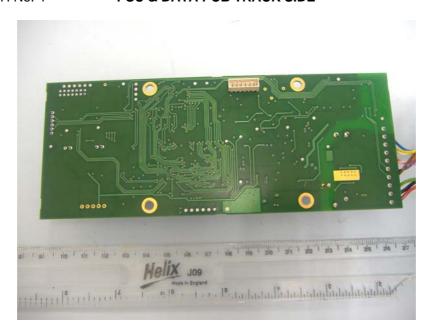
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# TRANSMITTER REAR VIEW



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# **PSU & DATA PCB TRACK SIDE**



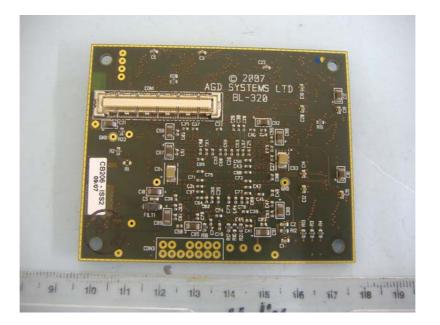
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# PHOTOGRAPH No. 5 PSU & DATA PCB COMPONENT SIDE



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# **DSP PCB TRACK SIDE**



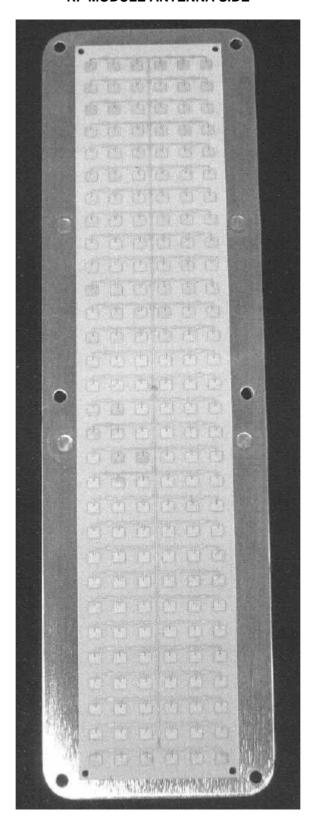
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# DSP PCB COMPONENT SIDE



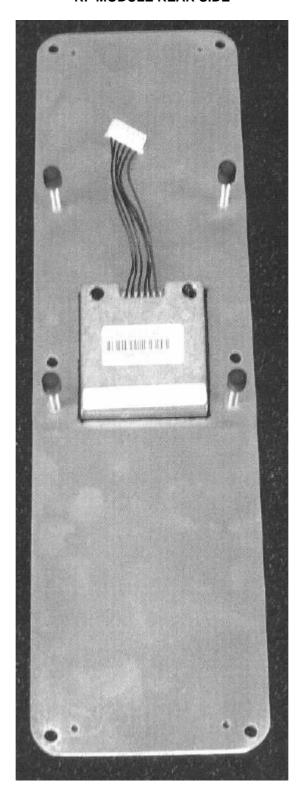
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# **RF MODULE ANTENNA SIDE**



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# **RF MODULE REAR SIDE**



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# ANNEX B APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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# APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

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# ANNEX C MEASUREMENT UNCERTAINTY

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#### 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 8.1 \text{GHz} = 3.31 \text{dB} Uncertainty in test result (Equipment TRL479) 8.1 \text{GHz} - 15.3 \text{GHz} = 4.43 \text{dB} Uncertainty in test result (Equipment TRL479) 15.3 \text{GHz} - 21 \text{GHz} = 5.34 \text{dB} Uncertainty in test result (Equipment TRLUH120) Up to 26 \text{GHz} = 3.14 \text{dB}
```

#### [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

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#### [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%

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# ANNEX D TEST EQUIPMENT CALIBRATION

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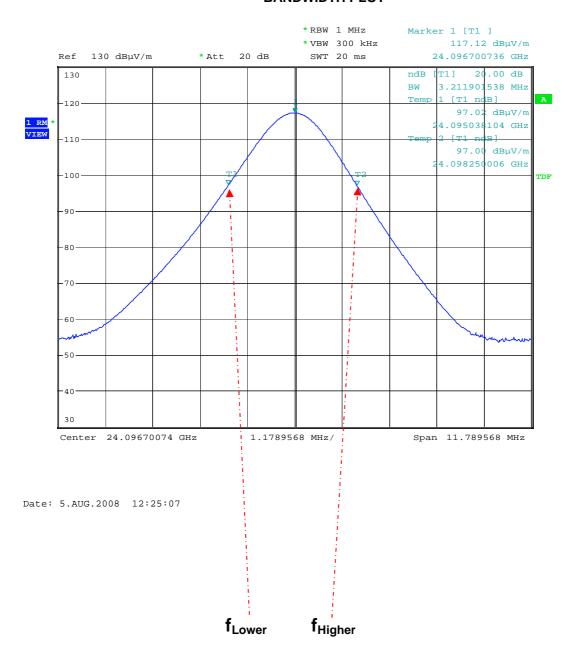
TRL	Equipment		Last Cal	Calibration	Due For
Number	Туре	Manufacturer	Calibration	Period	Calibration
UH003	Receiver	R&S	05/12/2007	12	05/12/2008
UH028	Log Periodic Ant	Schwarbeck	30/05/2007	24	30/05/2009
UH029	Bicone Antenna	Schwarbeck	22/05/2007	24	22/05/2009
UH041	Multimeter	AVOmeter	15/01/2008	12	15/01/2009
UH191	Bilog Antenna	York	11/08/2006	24	11/08/2008
UH195	LISN	R&S	04/01/2008	12	04/01/2009
UH253	1m Cable N type	TRL	30/01/2008	12	30/01/2009
UH254	1m Cable N type	TRL	30/01/2008	12	30/01/2009
UH269	1m Cable N type	TRL	30/01/2008	12	30/01/2009
UH270	1m Cable N type	TRL	30/01/2008	12	30/01/2009
UH271	1.5m Cable N type	TRL	30/01/2008	12	30/01/2009
UH272	1.5m Cable N type	TRL	30/01/2008	12	30/01/2009
UH273	2m Cable N type	TRL	30/01/2008	12	30/01/2009
UH274	2m Cable N type	TRL	30/01/2008	12	30/01/2009
UH281	Spectrum Analyser	R&S	24/10/2007	12	24/10/2008
UH340	Signal Generator	HP	06/05/2008	12	06/05/2009
UH365	Harmonic Mixer	Agilent	16/07/2008	24	16/07/2010
UH366	Harmonic Mixer	Agilent	21/07/2008	24	21/07/2010
UH367	Harmonic Mixer	Agilent	02/07/2008	24	02/07/2010
L005	CMTA	R&S	30/10/2007	12	30/10/2008
L007	Loop Antenna	R&S	22/05/2007	24	22/05/2009
L138	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L139	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L176	Signal Generator	Marconi	01/03/2007	12	01/03/2008
L193	Bicone Antenna	Chase	06/05/2008	24	06/05/2010
L203	Log Periodic Ant	Chase	06/05/2008	24	06/05/2010
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		Calibrate in use	
L654	Spectrum Analyser	HP	01/07/2008	12	01/07/2009

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# ANNEX E BANDWIDTH PLOT

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#### **BANDWIDTH PLOT**

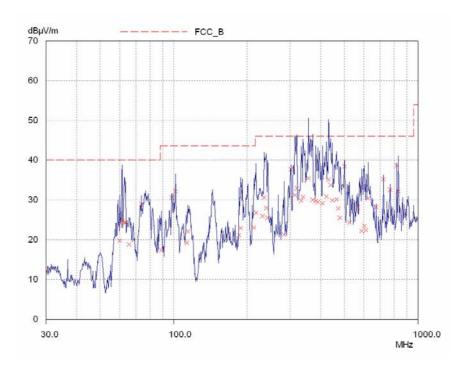


 $\begin{array}{lll} f_{Lower} & = & 24.0950381 \text{ GHz} \\ f_{Higher} & = & 24.0982500 \text{ GHz} \\ Occupied Bandwidth & = & 3.21190 \text{ MHz} \end{array}$ 

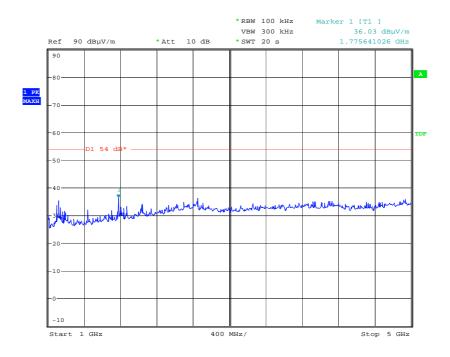
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# ANNEX F EMISSIONS GRAPH(s)

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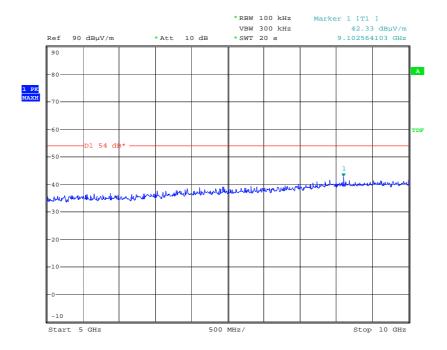
30 MHz - 1GHz



Date: 29.APR.2008 09:59:40

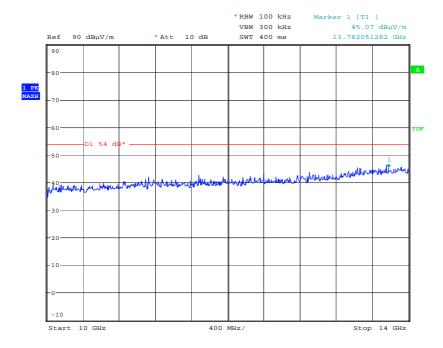
1GHz – 5 GHz

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Date: 29.APR.2008 09:54:28

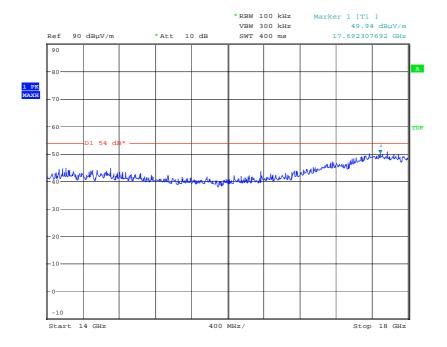
5GHz - 10GHz



Date: 29.APR.2008 09:55:07

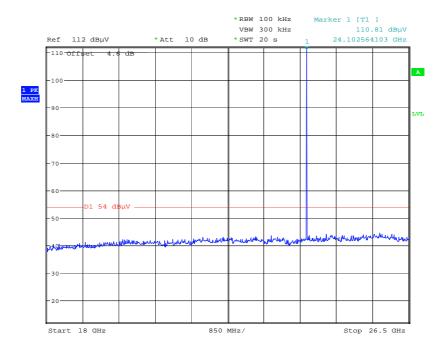
10GHz - 14GHz

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Date: 29.APR.2008 09:55:38

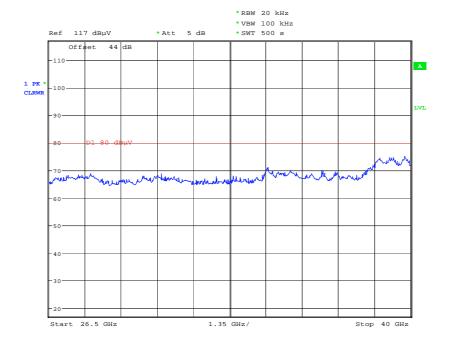
14GHz - 18GHz



Date: 29.APR.2008 10:09:57

18 GHz - 26.5GHz

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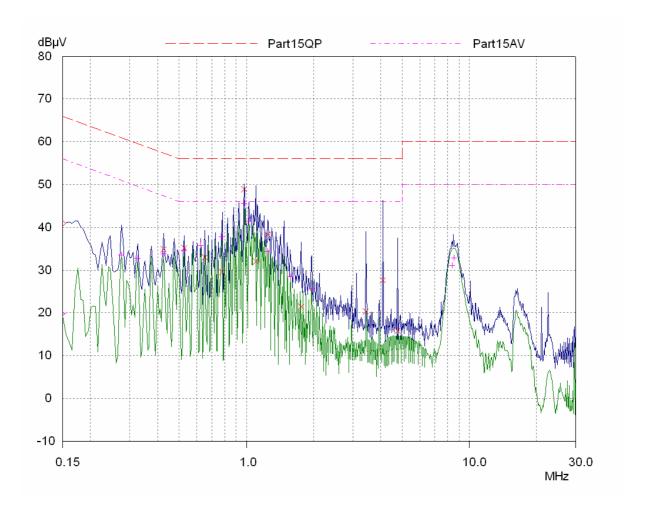


Date: 29.APR.2008 11:39:00

26.5GHz - 40GHz

# ANNEX G AC POWERLINE CONDUCTION GRAPH(s)

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