



**REPORT ON THE CERTIFICATION TESTING OF A
AGD SYSTEMS Ltd
MC-116
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.249 July 2008
INTENTIONAL RADIATOR SPECIFICATION**

TEST REPORT NO: RU1551/9050
COPY NO: 1
ISSUE NO: 1
FCC ID: WH3MC116-24

**REPORT ON THE CERTIFICATION TESTING OF A
AGD SYSTEMS Ltd
MC-116
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.249 July 2008
INTENTIONAL RADIATOR SPECIFICATION**

TRaC
testing regulatory and compliance



TEST DATE: 24th – 25th January 2009

TESTED BY: _____ D WINSTANLEY
APPROVED BY: _____ J CHARTERS
RADIO SECTION
LEADER
DATE: 11th March 2009

Distribution:

- Copy Nos:
1. AGD Systems Ltd
 2. FCC EVALUATION LABORATORIES
 3. TRaC Telecoms & Radio

THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE

The results herein relate only to the sample tested. Full results are contained in the relevant works order file.

CONTENTS

	PAGE		
CERTIFICATE OF CONFORMITY & COMPLIANCE	4		
APPLICANT'S SUMMARY	5		
EQUIPMENT TEST CONDITIONS	6		
TESTS REQUIRED	6		
SYSTEM DESCRIPTION	7		
TEST RESULTS	8 - 10		
			ANNEX
PHOTOGRAPHS			A
PHOTOGRAPH No. 1: Test setup			
PHOTOGRAPH No. 2: Transmitter front view			
PHOTOGRAPH No. 3: Transmitter rear view			
PHOTOGRAPH No. 4: PSU & Data PCB track side			
PHOTOGRAPH No. 5: PSU & Data PCB component side			
PHOTOGRAPH No. 6: RF Module Antenna side			
PHOTOGRAPH No. 7: RF Module Rear side			
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST			B
MEASUREMENT UNCERTAINTY			C
TEST EQUIPMENT CALIBRATION			D
BAND OCCUPANCY PLOT			E
EMISSIONS GRAPH(s)			F
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.			



CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY: WH3MC116-24

PURPOSE OF TEST: Certification

TEST SPECIFICATION: FCC RULES CFR 47, Part 15.249 July 2008

TEST RESULT: Compliant to Specification

EQUIPMENT UNDER TEST: MC-116

ITU: EMISSION CODE: 34k2N0N

EQUIPMENT TYPE: 24GHz Target Simulator

PRODUCT USE: Speed Radar Operation Tester

CARRIER EMISSION: 3.26 mV/m @ 3m

ANTENNA TYPE: Patch Antenna

ALTERNATIVE ANTENNA: Not Applicable

BAND OF OPERATION: 24.00 – 24.25GHz

CHANNEL SPACING: Not Applicable, Wideband

FREQUENCY GENERATION: External Source Crystal Synthesiser

MODULATION METHOD: Amplitude Digital Angle

POWER SOURCE(s): +12Vdc

TEST DATE(s): 24th – 25th February 2009

ORDER No(s): 40758

APPLICANT: AGD Systems Ltd

ADDRESS: White Lion House
Gloucester Road
Staverton
Cheltenham
Gloucester
GL51 0TF

TESTED BY: _____ D WINSTANLEY

APPROVED BY: _____ J CHARTERS
RADIO SECTION
LEADER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT): MC-116

EQUIPMENT TYPE: 24GHz Target Simulator

PURPOSE OF TEST: Certification

TEST SPECIFICATION(s): FCC RULES CFR 47, Part 15.249 July 2008

TEST RESULT: COMPLIANT Yes
No

APPLICANT'S CATEGORY: MANUFACTURER
IMPORTER
DISTRIBUTOR
TEST HOUSE
AGENT

APPLICANT'S ORDER No(s): 40758

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

TEST LABORATORY: TRaC Telecoms & Radio

UKAS ACCREDITATION No: 0728

TEST DATE(s): 24th – 25th February 2009

TEST REPORT No: RU1551/9050

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.	TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
	Intentional Emission Frequency:	15.249(a)	Average	YES
	Intentional Emission Field Strength:	15.249(a)	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:	15.249 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: Speed Radar Operation Tester
- 3. Emission Designator: 34k2N0N
- 4. Duty Cycle: 100%
- 5. Temperatures: Ambient (Tnom) 9°C
- 6. Supply Voltages: Vnom +12Vdc

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

- 7. Equipment Category:
 - Single channel
 - Two channel
 - Multi-channel
- 8. Channel spacing:
 - Narrowband
 - Wideband

SYSTEM DESCRIPTION

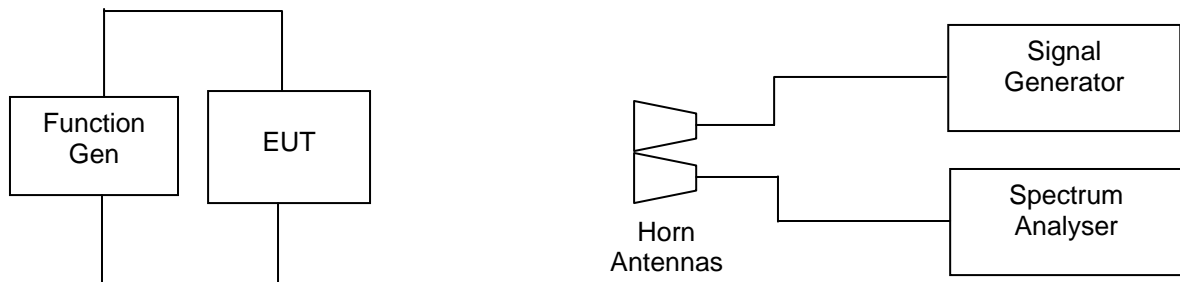
The AGD MC-116 is a 24GHz target simulator for testing the calibration status of AGD radars. The MC-116 receives the signal from the radar under test (RUT), modulates the received signal to represent the speed represented on the MC-116 and then retransmits the modulated signal. The retransmitted signal simulates the returned signal from a target. The device operates at a distance of 1 – 2 meters from the RUT and the returned signal field strength from the MC-116 is relative to the strength of the received signal from the RUT.

AGD Systems declare that the AGD MC-116 will only be used in conjunction with approved AGD radars operating at a level of 100mW or less.

The MC-116 will not transmit without the presence of an input signal from an external source (RUT).

The basic operation of the unit is to receive a signal from the RUT and retransmit a modulated signal to simulate a target at a set speed. The speed is determined by the frequency from the function generator(s).

The test setup is as below:



The signal generator is to replicate the test radar signal and the spectrum analyser to measure the deviated signal returned from the EUT. The function generator is set to 12471Hz the highest frequency used in the test system. The deviated signal relates to a speed of 299.9 km/hr. The Test radar signal is setup to produce a level of 100mW at the antenna output.

The LF Signal is as follows:

Amplitude	100mv pk – pk
Signal Type	Sine Wave
Phase between I/p Signals	90 ⁰
Frequency	12471 Hz (relates to 299.9 km/hr)

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	9°C(<1GHz)	3m measurements <1GHz	[X]
Relative humidity	=	78% (<1GHz),	1m measurements <26.5GHz	[X]
Conditions	=	Open Area Test Site (OATS)	0.3m measurements <100GHz	[X]
Supply voltage	=	+12Vdc	3m extrapolated from 1m	[X]
			3m extrapolated from 0.3m	[X]

	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)	
	0.009MHz - 0.49MHz							Note 9	
	0.49MHz - 1.705MHz							Note 9	
	1.705MHz - 30MHz							Note 9	
	30MHz - 88MHz							Note 9	
	88MHz - 216MHz							Note 9	
	216MHz - 960MHz							Note 9	
	960MHz - 1GHz							Note 9	
	1GHz - 100GHz							Note 9	
Limits	Restricted Bands 15.205								
		0.009 MHz to 0.49 MHz		2400/f(kHz) μV/m @ 300m					
		0.49 MHz to 1.705 MHz		24000/f(kHz) μV/m @ 30m					
		1.705MHz to 30MHz		30μV/m @ 30m					
		30MHz to 88MHz		100μV/m @ 3m					
		88MHz to 216MHz		150μV/m @ 3m					
		216MHz to 960MHz		200μV/m @ 3m					
		960MHz to 1GHz		500μV/m @ 3m					
		1GHz to 100GHz		500μV/m @ 3m					
		Un-restricted Bands & Harmonics							
		Harmonics		2500μV/m @ 3m					
		All other Emissions		50 dBc or 15.209 Whichever is lesser attenuation @ 3m					

- Notes:**
- 1 Results quoted are extrapolated as indicated
 - 2 Emissions were searched to: (x) 1000MHz inclusive, as per Part 15.33a
 - 3 Extrapolation factors as per Part 15.31f
 - 4 Measurements >1GHz @ 1m or less as per Part 15.31f(1)
 - 5 Receiver detector <1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
 - 6 Receiver detector >1GHz = Average, 1MHz resolution bandwidth, peak hold for plots
 - 7 New batteries used for battery-powered products.
 - 8 See Annex F for Emissions Graph(s)
 - 9 Only Emissions Within 20dB of the limit are recorded
 - 10 EUT tested with 100mW simulated radar test signal

- 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 Transmitter Spurious Emissions – Radiated – Part 15.209 tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/SUPPLIER	MODEL No	SERIAL No	TRL No	EQUIPMENT USED
HORN ANTENNA	EMCO	3115	9010 - 3580	138	X
HORN ANTENNA	FLANN	24240-20	124	265A	X
HORN ANTENNA	FLANN	20240-20	322	300	X
PRE AMPLIFIER	AGILENT	8449B	3008A016	572	X
SPECTRUM ANALYSER	HP	8563A	3133A00894	654	X
RECEIVER	R & S	ESVS 10	841431/014	UH186	X
BILOG ANTENNA	CHASE	CBL6112B	2803	UH93	X
SPECTRUM ANALYSER	R & S	FSU	200034	UH281	X
HARMONIC MIXER 33 -50 GHz	AGILENT	11970Q	MY30030406	UH365	X
HARMONIC MIXER 50 – 75 GHz	AGILENT	11970V	MY30030198	UH366	X
HARMONIC MIXER 75 – 110 GHz	AGILENT	11970W	MY25210349	UH367	X
HORN ANTENNA	FLANN	23240-20	83	263A	X
HORN ANTENNA	FLANN	25240-20	N/A	N/A	X
HORN ANTENNA	FLANN	27240-20	N/A	N/A	X

Note. Cable used during testing are not necessarily listed in the above list.

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.249 July 2008

Ambient temperature	=	9°C(<1GHz),	1m measurements @ fc	[X]
Relative humidity	=	78%(<1GHz),	10m measurements @ fc	[]
Conditions	=	Semi-Anechoic Chamber	30m measurements @ fc	[]
Supply voltage	=	+12Vdc	3m extrapolated from 1m	[]
Channel number	=	1	30m extrapolated from 10m	[]

RTS FREQ (GHz)	RETURNED SIGNAL FREQ. (GHz)	MEAS READING (dBμV)	CABLE LOSS (dB)	ANT FACTOR (dB/m)	PRE AMP (dB)	FIELD ST'GH (dBμV/m)	EXTRAP FACTOR (dB)	FIELD ST'GH (mV/m)
24.125	24.12498753	71.36	4.70	37.50	33.75	79.81	9.54	3.26
24.125	24.12501247	71.33	4.70	37.50	33.75	79.78	9.54	3.25
Limit value @ fc				250 (mV/m)				
Band occupancy @ -20 dBc (Note 6)				f lower		f higher		
				24.1249791 GHz		24.1250133 GHz		

See spectrum analyser plot – Annex E

- Notes:**
- 1 Results quoted are extrapolated as indicated
 - 2 Receiver detector @ fc = Average 3kHz bandwidth
 - 3 Returned signal from EUT @ 12471 Hz offset from Fc
 - 4 When battery powered the EUT was powered with new batteries
 - 5 EUT tested with 100mW simulated radar test signal (RTS)
 - 6 Band occupancy measured in 3kHz bandwidth

- Test Method:**
- 1 As per Radio – Noise Emissions, ANSI C63.4: 2003
 - 2 Measuring distances 1m
 - 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 Transmitter Intentional Emission – Radiated – Part 15.249 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	X

Note. Cable used during testing are not necessarily listed.

ANNEX A
PHOTOGRAPHS

PHOTOGRAPH No. 1

TEST SETUP



PHOTOGRAPH No. 2

TRANSMITTER FRONT VIEW



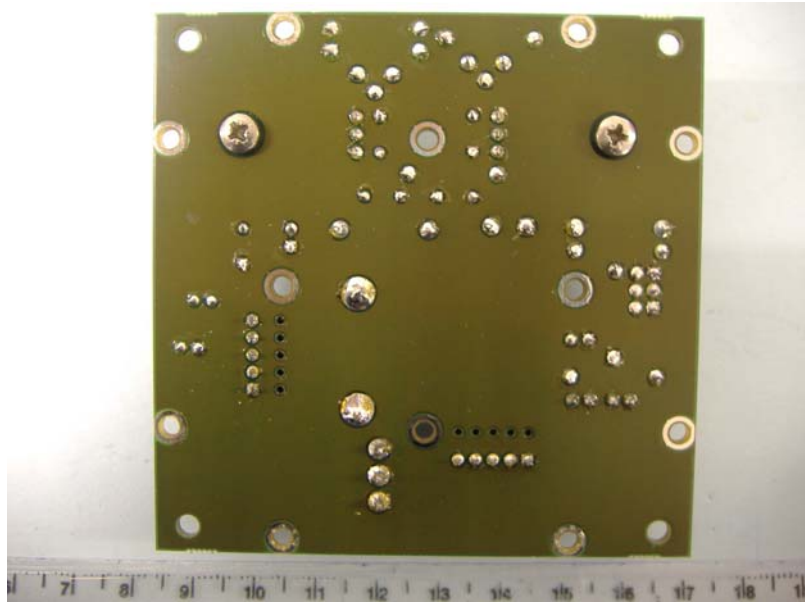
PHOTOGRAPH No. 3

TRANSMITTER REAR VIEW



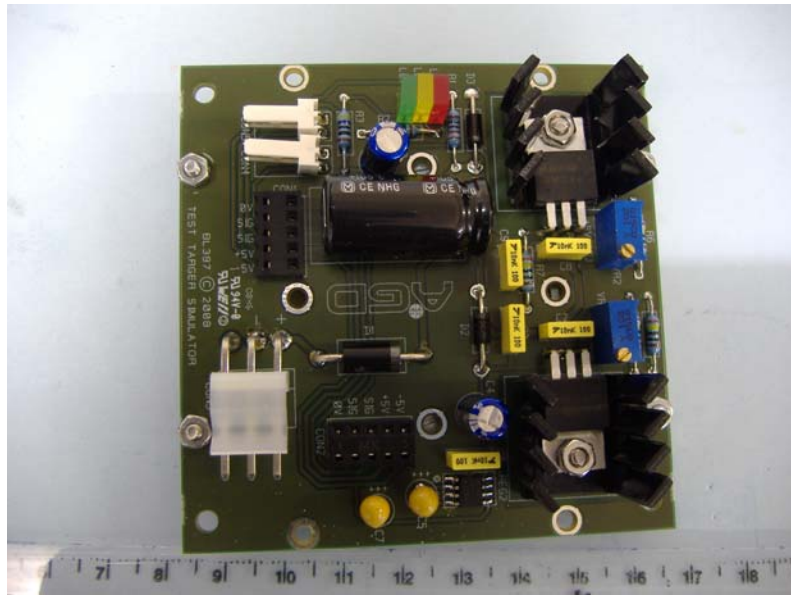
PHOTOGRAPH No. 4

PSU & DATA PCB TRACK SIDE



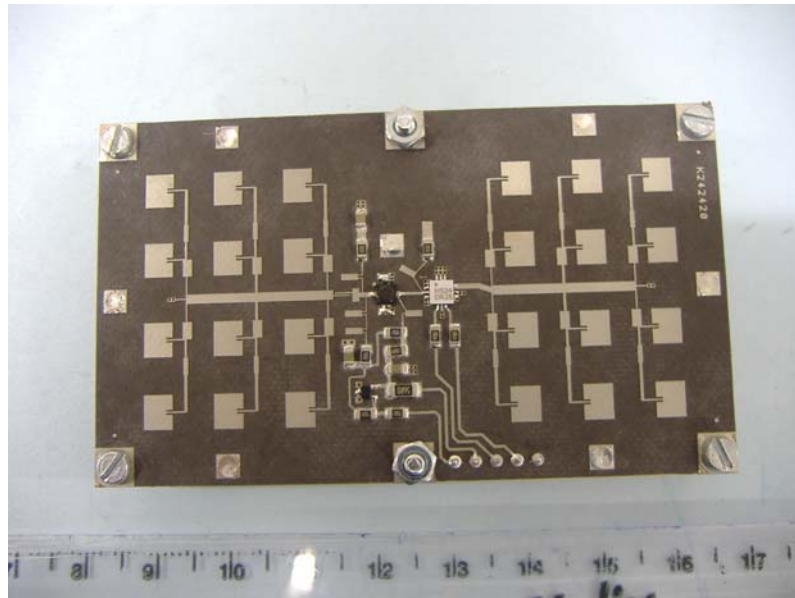
PHOTOGRAPH No. 5

PSU & DATA PCB COMPONENT SIDE



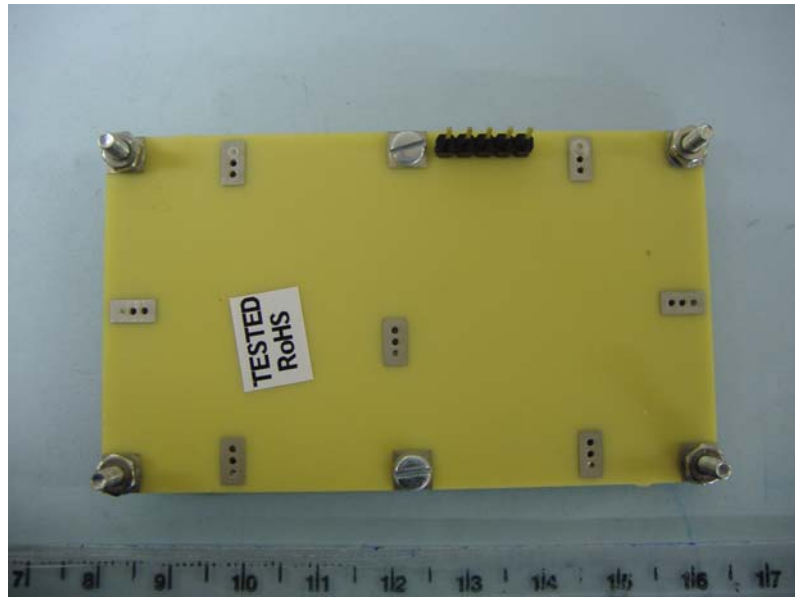
PHOTOGRAPH No. 6

RF MODULE ANTENNA SIDE



PHOTOGRAPH No. 7

RF MODULE REAR SIDE



ANNEX B
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

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

ANNEX C
MEASUREMENT UNCERTAINTY

Radio Testing – General Uncertainty Schedule

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95% confidence where no required test level exists.

[1] Adjacent Channel Power

Uncertainty in test result = **1.86dB**

[2] Carrier Power

Uncertainty in test result (Equipment - TRLUH120) = **2.18dB**

Uncertainty in test result (Equipment – TRL05) = **1.08dB**

Uncertainty in test result (Equipment – TRL479) = **2.48dB**

[3] Effective Radiated Power

Uncertainty in test result = **4.71dB**

[4] Spurious Emissions

Uncertainty in test result = **4.75dB**

[5] Maximum frequency error

Uncertainty in test result (Equipment - TRLUH120) = **119ppm**

Uncertainty in test result (Equipment – TRL05) = **0.113ppm**

Uncertainty in test result (Equipment – TRL479) = **0.265ppm**

[6] Radiated Emissions, field strength OATS 14kHz-18GHz Electric Field

Uncertainty in test result (14kHz – 30MHz) = **4.8dB**, Uncertainty in test result (30MHz – 1GHz) = **4.6dB**,

Uncertainty in test result (1GHz-18GHz) = **4.7dB**

[7] Frequency deviation

Uncertainty in test result = **3.2%**

[8] Magnetic Field Emissions

Uncertainty in test result = **2.3dB**

[9] Conducted Spurious

Uncertainty in test result (Equipment TRL479) Up to 8.1GHz = **3.31dB**

Uncertainty in test result (Equipment TRL479) 8.1GHz – 15.3GHz = **4.43dB**

Uncertainty in test result (Equipment TRL479) 15.3GHz – 21GHz = **5.34dB**

Uncertainty in test result (Equipment TRLUH120) Up to 26GHz = **3.14dB**

[10] Channel Bandwidth

Uncertainty in test result = **15.5%**

[11] Amplitude and Time Measurement – Oscilloscope

Uncertainty in overall test level = **2.1dB**, Uncertainty in time measurement = **0.59%**, Uncertainty in Amplitude measurement = **0.82%**

[11] Power Line Conduction

Uncertainty in test result = **3.4dB**

[12] Spectrum Mask Measurements

Uncertainty in test result = **2.59% (frequency)**
Uncertainty in test result = **1.32dB (amplitude)**

[13] Adjacent Sub Band Selectivity

Uncertainty in test result = **1.24dB**

[14] Receiver Blocking – Listen Mode, Radiated

Uncertainty in test result = **3.42dB**

[15] Receiver Blocking – Talk Mode, Radiated

Uncertainty in test result = **3.36dB**

[16] Receiver Blocking – Talk Mode, Conducted

Uncertainty in test result = **1.24dB**

[17] Receiver Threshold

Uncertainty in test result = **3.23dB**

[18] Transmission Time Measurement

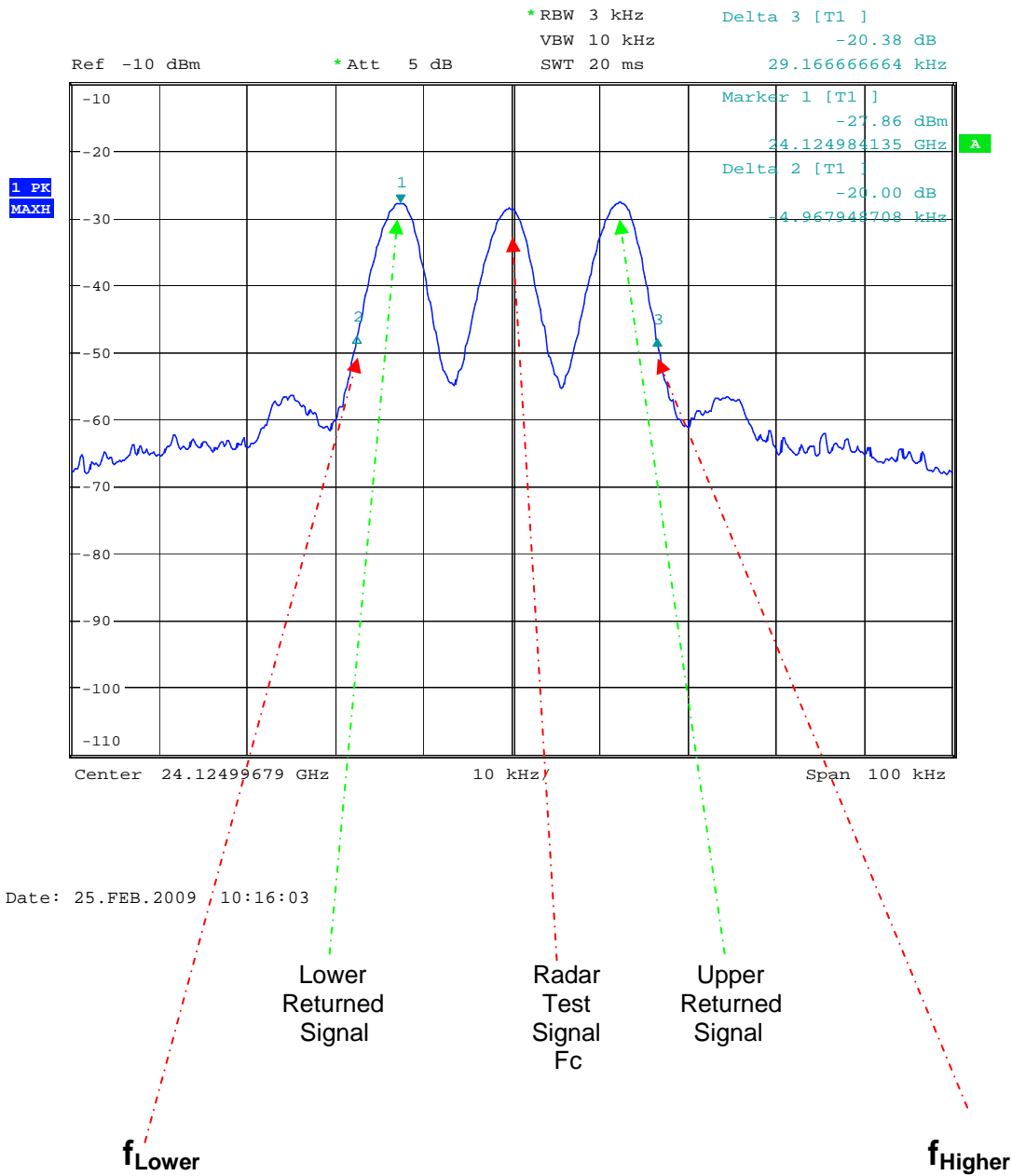
Uncertainty in test result = **7.98%**

ANNEX D
TEST EQUIPMENT CALIBRATION

TRL Number	Equipment Type	Manufacturer	Last Cal Calibration	Calibration Period	Due For Calibration
UH06/07	IC OATS Submission	TRL	01/06/2007	24	01/06/2009
UH028	Log Periodic Ant	Schwarbeck	30/05/2007	24	30/05/2009
UH029	Bicone Antenna	Schwarbeck	06/05/2007	24	06/05/2009
UH041	Multimeter	AVOmeter	21/01/2009	12	21/01/2010
UH093	Bilog Antenna	Chase	21/05/2007	24	21/05/2009
UH122	Oscilloscope	Tektronix	10/12/2007	24	10/12/2009
UH132	Power meter	Marconi	21/01/2009	12	21/01/2010
UH186	Receiver	R&S	19/12/2008	24	19/12/2010
UH228	Power Sensor	Marconi	22/01/2009	12	22/01/2010
UH281	Spectrum Analyser	R&S	28/10/2008	12	28/10/2009
UH330	K type transition	Maury M'wave	13/06/2008	24	13/06/2010
UH340	Signal Generator	HP	06/05/2008	12	06/05/2009
UH365	Harmonic Mixer	Agilent	16/07/2008	24	16/07/2010
UH366	Harmonic Mixer	Agilent	21/07/2008	24	21/07/2010
UH367	Harmonic Mixer	Agilent	02/07/2008	24	02/07/2010
L005	CMTA	R&S	29/10/2008	12	29/10/2009
L007	Loop Antenna	R&S	22/05/2007	24	22/05/2009
L138	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L139	1-18GHz Horn	EMCO	23/05/2007	24	23/05/2009
L176	Signal Generator	Marconi	06/05/2008	12	06/05/2009
L193	Bicone Antenna	Chase	06/05/2008	24	06/05/2010
L203	Log Periodic Ant	Chase	06/05/2008	24	06/05/2010
L263/A	Horn 18-26GHz	Flann	13/06/2008	24	13/06/2010
L300	Horn 18-26GHz	Flann	12/06/2008	24	12/06/2010
L309	SMA Transition		13/06/2008	24	13/06/2010
L426	Temperature Indicator	Fluke	21/01/2009	12	21/01/2010
L479	Analyser	Anritsu	22/09/2008	12	22/09/2009
L572	Pre Amp	Agilent	04/07/2008	12	04/07/2009
L654	Spectrum Analyser	HP	01/07/2008	12	01/07/2009

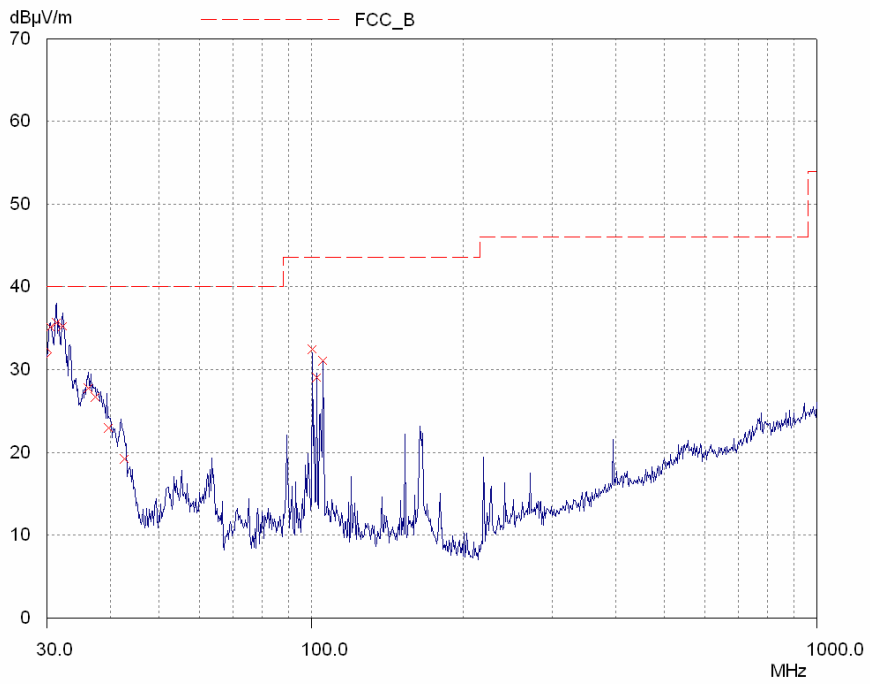
ANNEX E
BANDWIDTH PLOT

BANDWIDTH PLOT

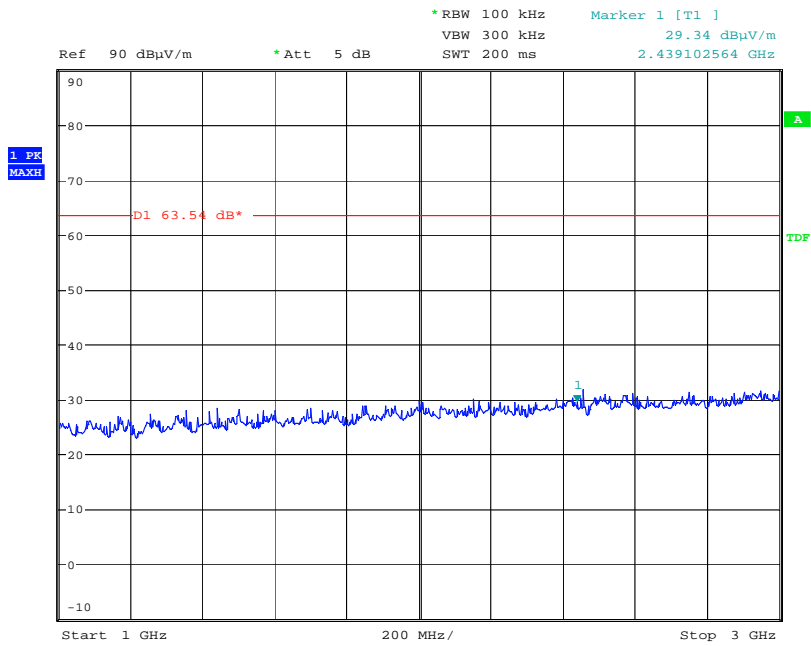


f_{Lower} = 24.1249791 GHz
 f_{Higher} = 24.1250133 GHz
 Occupied Bandwidth = 34.2 kHz

ANNEX F
EMISSIONS GRAPH(s)



30 MHz – 1GHz



Date: 24.FEB.2009 14:15:13

1GHz – 3GHz

