CETECOM ICT Services GmbH

Radio Satellite Communication
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Recognized by the
Federal Communications Commission and Industry Canada
Anechoic chamber registration No.: 90462 (FCC)
Anechoic chamber registration No.: 3463A-1 (IC)
TCB ID: DE0001

Accredited by the
German Accreditation Council
DAR–Registration Number
DAT–P-176/94-D1

Independent ETSI
compliance test house

Test report No.:		2-4488-01-02/06
Applicant	:	Siemens AG, Siemens VDO Automotive
Type	:	SVDO-BSD
Test standards	:	FCC Part 15.252 (08/2006)
FCC ID	:	KR5SV2007BSD
IC ID	:	

Table of contents

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test.

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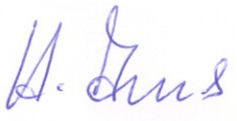
Tester:

Date	Name	Signature
2006-11-20	Manfred Paschwitz	

Technical responsibility for area of testing:

Date	Name	Signature
2006-11-20	Harro Ames	

1.2 Testing laboratory

CETECOM ICT Services GmbH
Untertürkheimerstraße 6–10
D-66117 Saarbrücken
Germany

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Accredited testing laboratory
Accredited by : DA Tech
Listed by : Federal Communications Commission (FCC)
Industry Canada (IC)

Authority	Identification/Registration No.
RegTP	DAT-P-176/94-D1
FCC	90462
IC	3463A-1

Testing location, if different from CETECOM ICT Services GmbH: (Not applicable)

1.3 Details of applicant

Name : SIEMENS AG
SIEMENS VDO Automotive
P.O. Box : 10 09 43
Town : 93055 Regensburg
Country : Germany
Telephone : +49(0) 941 790 0
Fax : +49(0) 941 790 133004

Contact person
Name : Dr. Ing. Martin Kunert
Telephone : +49(0) 941 790 3004
Fax : +49(0) 941 790 133004
e-mail : martin.kunert@siemens.com

1.4 Application details

Date of receipt of application : 2006-10-19
Date of receipt of test item : 2006-10-23
Date of test : 2006-10-23 to 2006-11-10

1.5 Test item (EUT)

Description of EUT	:	24 GHz WIDEBAND VEHICULAR RADAR SYSTEM
System designation	:	Bind spot warning
Type designation	:	SVDO-BSD
Name	:	SIEMENS AG SIEMENS VDO Automotive
P.O. Box	:	10 09 43
Town	:	93055 Regensburg
Country	:	Germany

1.6 Technical data

Frequency range	:	24.250 GHz to 25.100 GHz
Operational frequency of device	:	24.666 500 GHz (BROAD BEAM) and 24.666 000 GHz (TILT BEAM)
EIRP PEP	:	-36.0 dBm Peak
Type of modulation	:	603MF0N (UWB)
Microwave modules	:	TX / RX – Module-integrated Patch antennas
Normal DC power supply	:	12.0 V
Extreme DC power supply	:	10.8 V ... 15.6 V

1.6.1 Operation conditions

Operation

As soon as the equipment is powered up, the sensor starts transmitting. The BROAD BEAM (wide beam) and the TILT BEAM (small beam) antenna are activated alternately with a repetition frequency of 1 MHz and a pulse width of 25 ns. Only one antenna is transmitting at the same time.
Purpose of operation: Automatic distance and speed measurement for blind spot zone monitoring in vehicular applications

1.6.2 Equipment under test

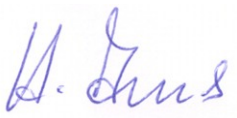
Model	S/N
SVDO-BSD	DV2-341-060825
SVDO-BSD	DV2-342-060825

1.6.3 Test Report Cover Sheet / Performance Test Data

Equipment Model Number:	SVDO-BSD
Certification Number:	
Manufacturer:	SIEMENS AG SIEMENS VDO Automotive P.O. Box 10 09 43 93055 Regensburg Germany
Frequency Range (or fixed frequency):	24.365 GHz – 24.968 GHz
EIRP:	- 36.0 dBm
Occupied Bandwidth (-10.0 dBc):	603.0 MHz
Type of Modulation:	UWB pulsed frequency hopping operation
Emission Designator (TRC-43):	603MF0N
Transmitter Spurious (worst case):	< Limit noise floor
Receiver Spurious (worst case):	Not applicable
Antenna Type:	Patch antennas BROAD BEAM and TILT BEAM

ATTESTATION:
DECLARATION OF COMPLIANCE: I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Signature:



Date: 2006-11-20

Test engineer: Harro Ames

1.7 Test standards

Code of Federal Regulations (CFR 47)
Federal Communications Commission (FCC)

FCC Part 15 Operation of WIDEBAND VEHICULAR RADAR SYSTEMs (08/2006)
Section 15.252
Operation within the bands 23.12 – 29.0 GHz.

Section 15.209
Radiation emission limits, general requirements

Section 15.205
Restricted bands of operation.

2 Technical test

2.1 Summary of test results

[X] No deviations from the technical specification (s) were ascertained in the course of the performed tests.

[ ] The deviations as specified in 2.5 were ascertained in the course of the performed tests.

This test report:

[X] describes the first test

[ ] describes an additional test

[ ] is a verification of documents

[ ] is only valid with the test report no.

2.2 Test environment

The environmental conditions are documented especially for each test.

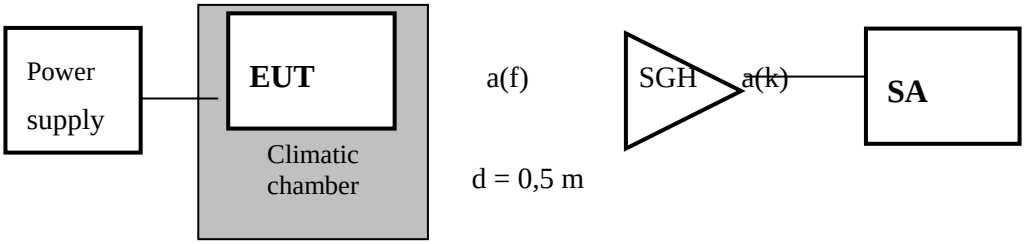
2.3 Measurement and test set-up

The radiated measurements were performed with either a peak detector or an average detector with RMS behavior.

2.4 Test equipment utilized and test set-up

2.4.1 Test set-up for the measurement in the frequency range 12 GHz to 26 GHz

Spurious radiation (EIRP; PEP)



Frequency f (GHz)	Measurement distance (m)	a(sys) [dB]	a(f) [dB]	a(k) [dB]	g [dBi]
12.0 ... 18.0	0.5	34.8	51.6	1.7	18.4
18.0 ... 26.0	0.5	38.2	54.4	2.2	18.4

Calculation of system attenuation = free space attenuation + cable loss – antenna gain

a(sys) = a(f) + a(k) - g

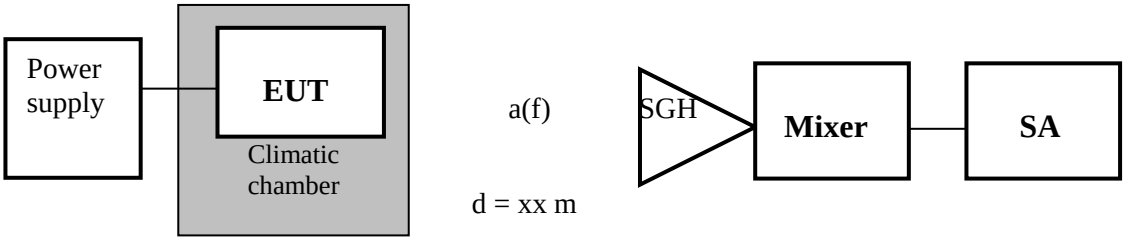
Test equipment	Manufacturer	Type	S/No. – Cetecom No.	Calibration data
Spectrum Analyser	HP	HP 8565E	3738A00773	2005/09
Spectrum Analyser	R&S	FSU	1166.1660.50	2006/10
SGH 12.4 ... 18.0 GHz	narda	638	01005	2005/11
SGH 18 ... 27 GHz	narda	638	01005	2005/11
Power supply	HP	HP 6032A	2848A07227	2005/10
Climatic chamber	Vötsch	VUK 04/500	522/32678	2006/04
RF-cable	HP	5061-5359	P36303	2006/02

Measurement uncertainty

Test parameter	Measurement uncertainty
Input power (DC)	±0.1 V
Temperature	±0.2 °C
Frequency	±0.01 ppm
eirp	±1.0 dB

2.4.2 Test set-up for the measurement in the frequency range 26 GHz to 110 GHz

Spurious radiation (EIRP; PEP) and radiated power density (EIRP; PEP)



Frequency f (GHz)	Measurement distance xx(m)	a(sys) [dB]	a(f) [dB]at lowest freq.	g [dBi]
26.0 ... 40.0	0.25	28.0	49.0	21.0
40.0 ... 60.0	0.25	27.0	52.5	25.5
60.0 ... 90.0	0.125	27.0	50.0	23.0
90.0 ... 140.0	0.125	29.0	53.6	24.6
140.0 … 170.0	0.125	31.0	57.4	26.4
170.0 … 231.0	0.125	34.5	57.1	23.0

Calculation of system attenuation = free space attenuation – antenna gain

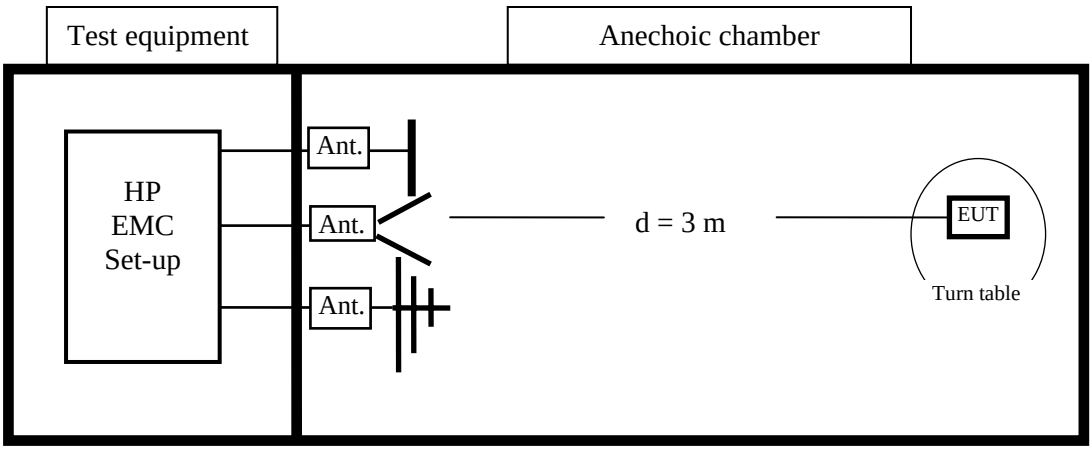
a(sys) = a(f) - g

Test equipment	Manufacturer	Type	S/No. – Cetecom No.	Calibration data
Spectrum Analyser	HP	8565E	3738A00773	2005/09
Spectrum Analyser	R&S	FSU	1166.1660.50	2006/10
SGH 27 40 GHz	Flann	2224	300001976	2005/11
Mixer 27 40 GHz	Tektronix	WM490A	300000493c	2005/11
SGH 40 60 GHz	Flann	2424	300001200g	2005/11
Mixer 40 60 GHz	Tektronix	WM490U	300000298b	2005/11
SGH 50 75 GHz	HP	2524	300001983	2005/11
Mixer 50 75 GHz	HP	11970V	300000081h	2005/11
SGH 60 90 GHz	Thomson	COR 60.90	300000814	2005/11
Mixer 60 90 GHz	Tektronix	WM 780 W	B010127	2005/11
SGH 90 140 GHz	Thomson	COR 90-140	300000181	2005/11
Mixer 90 140 GHz	Tektronix	WM 780 F	B010129	2005/11
SGH 140 170 GHz	Thomson	2924	300001999	2005/11
Mixer 140 170 GHz	Tektronix	WM780 D	B010186	2005/11
SGH 170 231 GHz	Thomson	3024	300002001	2005/11
Mixer 170 231 GHz	Tektronix	WM780 J	B010241	2005/11
Power supply	HP	HP 6032A	2848A07227	2005/10
Climatic chamber	Vötsch	VUK 04/500	522/32678	2006/04
RF-cable	HP	5061-5359	P36303	2006/02

Test parameter	Measurement uncertainty
Input power (DC)	±0.1 V
Temperature	±0.2 °C
Frequency	±0.01 ppm
eirp up to 110 GHz	±1.5 dB
eirp 110 GHz to 325 GHz	±2.5 dB

2.4.3 Test set-up for the measurement in the frequency range up to 12 GHz

Spurious radiation



Test equipment	Manufacturer	Type	S/No. – Cetecom No.	Calibration data
Spectrum analyser	HP	HP 85660B	2478A05306	2006/10
Analyser display	HP	HP 85662A	2816A16541	2006/10
Quasi peak adapter	HP	HP 85650A	2811A01131	2006/10
RF-preselector	HP	HP 85685A	2833A00768	2006/10
Biconical antenna	Emco	3104	3758	2005/03
Log.-per.-antenna	Emco	3146	2304	2005/03
Double ridge horn	Emco	3115	3007	2005/03
Relay switch	R&S	RSU	375 339/002	n.A.
High pass filter	FSY Microwave	HM 985955	001	2005/03
Amplifier	MYTEC	JS42	30003143	2005/03
Power supply	HP	HP 6038A	2848A07027	2005/10
RF-cable	HP	5061-5359	P36303	2006/02

Measurement uncertainties

Test parameter	Uncertainty
Input power (DC)	±0.1 V
Temperature	±0.2 °C
Frequency	±0.01 ppm
RF-power	±1.5 dB

2.5 Test results

2.5.1 Summary list of all performed test cases

Test specification	Test case	Pass	Fail	Not applicable
§ 15.252(a)(1)(2)(3)	Occupied bandwidth (-10 dB)	X		
§ 15.252(b)(2)	Output power radiated and spurious emissions above 960 MHz	X		
§ 15.252(b)(3)	Special requirements	X		
§ 15.252(b)(4)	Peak level limit	X		
§ 15.252(b)(5)	Spurious emissions below 960 MHz	X		

Verification of EUT:

[X] EUT is in accordance with the technical description

[ ] EUT is not in accordance with the technical description

[X] The equipment is compliant to FCC requirement

2.5.2 Remarks on methods of measurements

The Radar head is positioned in a non-conductive fixture and can be rotated and tilted in all angles.

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 110 GHz in a semi-anechoic and chamber, a fully-anechoic chamber and in our lab. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2003 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test set–ups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.

The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths (RBW) over various frequency ranges are set according to requirement ANSI C63-4-2003 clause 4.2.

1. Measurements of field strength and power density at spurious frequencies

Spurious frequencies are produced by transmitter and receiver when the EUT is active. According to FCC requirements 15.209 and 15.252, spurious emissions have to be investigated as maximum field strength values in the frequency range from 9 kHz to 960 MHz, and as maximum power in the frequency range > 960 MHz up to 110 GHz. Where possible, the measurement distance shall be 3 m.

In the low frequency range (9 kHz to 30 MHz), the receiving antenna is an active loop antenna which is positioned at 3 m distance in a shielded, anechoic chamber (see page 8). In case of required measuring distances > 3 m, a distance correction factor is used to calculate the received field strength.

Spurious field strength measurements in the frequency range 30 MHz to 1 GHz are carried out in a shielded semi-anechoic test chamber. The measurement distance is 3 m.

In the frequency range 1 GHz to 110 GHz, spurious field strength measurements are performed in a shielded fully anechoic chamber with rectangular SGHs. The measurement distances are indicated underneath each plot, and a calculation for power is added, where all relevant factors like cable losses, antenna factors, etc are taken into account.

2.5.3 Test results in details

Equipment under test (EUT): WIDEBAND VEHICULAR RADAR SYSTEM
Ambient temperature: 23 °C
Relative humidity: 35 %

TRANSMITTER PARAMETERS SECTION 15.252

OCCUPIED BANDWIDTH SECTION 15.252 (a)(1)(2)(3)
SECTION 15.252 (b)(4)

Frequency over temperature

Occupied frequency range:

TEST CONDITIONS T = -20° TO +55°C 12V DC	OCCUPIED BANDWIDTH combined TILT and BROAD antenna	
EUT operating:	Frequency f [GHz]	See plot
T = -20°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	
T = -10°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	
T = 0°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	
T = +10°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	
T = +20°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	18 / 19 / 20 / 21
T = +30°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	
T = +40°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	
T = +50°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	
T = +55°	24.666 (± 301 MHz in the band 23.12 GHz to 29.0 GHz)	

REFERENCE OF TEST EQUIPMENT USED: see test set-up on page 9

LIMITS: SECTION 15.252

The -10dBc bandwidth shall be located within 23.12 – 29.0 GHz, excluding 23.6 – 24.0 GHz.
The OBW shall be greater 10 MHz.
The highest peak shall be greater than 24.075 GHz.

Verdict:	Occupied bandwidth limits are kept

Equipment under test (EUT): WIDEBAND VEHICULAR RADAR SYSTEM
Ambient temperature: 23 °C
Relative humidity: 35 %

TRANSMITTER PARAMETERS SECTION 15.252

FUNDAMENTAL FREQUENCY AND POWER SECTION 15.252 (b)(2)

23.120 GHz to 29.000 GHz

Antenna assembly: Patch antenna

TEST CONDITIONS T = 23.0 ° C	TRANSMITTER POWER	
EUT operating: TX on and RX on	Frequency f [GHz]	See plot
U DC = 10.0 V	24.666 500 24.666 000	
U DC = 11.0 V	24.666 500 24.666 000	
U DC = 12.0 V	24.666 500 24.666 000	1 2
U DC = 13.0 V	24.666 500 24.666 000	
U DC = 14.0 V	24.666 500 24.666 000	
U DC = 15.0 V	24.666 500 24.666 000	
U DC = 16.0 V	24.666 500 24.666 000	

EFERENCE OF TEST EQUIPMENT USED: see test set-up on page 9

LIMITS: SECTION 15.252

Frequency range [GHz] vehicle in motion	Peak EIRP
23.120 to 29.000	- 34.0 dBm / MHz

Verdict:	Power EIRP limit is kept

Equipment under test (EUT): WIDEBAND VEHICULAR RADAR SYSTEM
Ambient temperature: 23 °C
Relative humidity: 35 %

SPURIOUS EMISSIONS

SECTION 15.252 (b)(2)
SECTION 15.252 (b)(3)
SECTION 15.252 (b)(5)

In the frequency range 9.0 kHz to 12.0 GHz

Antenna assembly: Patch antenna

TEST CONDITIONS	TRANSMITTER SPURIOUS FIELD STRENGTH			
Frequency range	Spurious frequencies [MHz]	S A e [dBµV/m]	E [µV/m]	See plot
0.009 MHz – 30.000 MHz horizontal and vertical plane	Noise	< limit	< limit	3
30.0 MHz – 960.0 MHz horizontal and vertical plane	Noise	< limit	< limit	4
960.0 MHz – 1610.0 MHz horizontal and vertical plane	Noise	< limit	< limit	5
1164 .0 MHz – 1240.0 MHz horizontal and vertical plane	Noise	< limit	< limit	6
1559.0 MHz – 1610.0 MHz horizontal and vertical plane	Noise	< limit	< limit	7
1.610 GHz – 12.0 GHz horizontal and vertical plane	Noise	< limit	< limit	8

REFERENCE OF TEST EQUIPMENT USED: see test set-up on pages 11

LIMITS: SECTION 15.252 / 15.205 / 15.209

Frequency range [MHz]	Measurement distance [m]	Field strength e [dBµV/m] @ 3 m	Field strength E [µV/m]
0.009 – 0.490	300	88.5 ... 53.8	2400/F(kHz)
0.490 – 1.705	30	53.8 ... 43.0	24000/F(kHz)
1.705 – 30.0	30	49.5	30
30.0 – 88.0	3	40.0	100
88.0 – 216.0	3	43.5	150
216.0 – 960.0	3	46.0	200
	EIRP (RMS - AVERAGE)		
960.0 – 1610.0	-75.3 dBm		
1164.0 – 1240.0	-85.3 dBm		
1559.0 – 1610.0	-85.3 dBm		
1610.0 – 23.120 000	-61.3 dBm		

Verdict: Limits are kept

Equipment under test (EUT): WIDEBAND VEHICULAR RADAR SYSTEM
Ambient temperature: 23 °C
Relative humidity: 35 %

TRANSMITTER PARAMETERS SECTION 15.252

SPURIOUS EMISSIONS SECTION 15.252 (b)(5)
In the frequency range 12.0 GHz to 40.0 GHz

Antenna assembly: Patch antenna

TEST CONDITIONS	TRANSMITTER SPURIOUS EMISSIONS		
Frequency range [GHz]	Spurious frequencies [MHz]	EIRP [dBm]	See plot
12.00 – 18.00 (h + v) horizontal and vertical plane	Noise	< limit	9
18.00 – 23.12 (h + v) horizontal and vertical plane	Noise	< limit	10
23.12 – 23.60 (h + v) horizontal and vertical plane	Noise	< limit	11
23.60 – 24.00 (h + v) horizontal and vertical plane	Noise	< limit	12
24.00 – 29.00 (h + v) horizontal and vertical plane	Noise	< limit	13
29.00 – 40.00 (h + v) horizontal and vertical plane	Noise	< limit	14

REFERENCE OF TEST EQUIPMENT USED: see test set-up on page 9, 10

LIMITS: SECTION 15.252 (b)(2)

Frequency range (MHz)	EIRP (RMS - AVERAGE)
1610.0 MHz – 23.120 GHz	-61.3 dBm
23.120 GHz – 23.600 GHz	-41.3 dBm
23.600 GHz – 24.000 GHz	-61.3 dBm
24.000 GHz – 29.000 GHz	-41.3 dBm
Above 29.00 GHz	-61.3 dBm

Verdict:	Limits are kept

Equipment under test (EUT): WIDEBAND VEHICULAR RADAR SYSTEM
Ambient temperature: 23 °C
Relative humidity: 35 %

TRANSMITTER PARAMETERS SECTION 15.252

SPURIOUS EMISSIONS SECTION 15.252 (b)(2)
In the frequency range 40.0 GHz to 110.0 GHz

Antenna assembly: Patch antenna

TEST CONDITIONS	TRANSMITTER SPURIOUS EMISSIONS		
Frequency range [GHz]	Spurious frequencies [MHz]	EIRP [dBm]	See plot
40.0 – 60.0 (h + v) horizontal and vertical plane	Noise	< limit	15
50.0 – 75.0 (h + v) horizontal and vertical plane	Noise	< limit	16
75.0 – 110.0 (h + v) horizontal and vertical plane	Noise	< limit	17

REFERENCE OF TEST EQUIPMENT USED: see test set-up on page 10

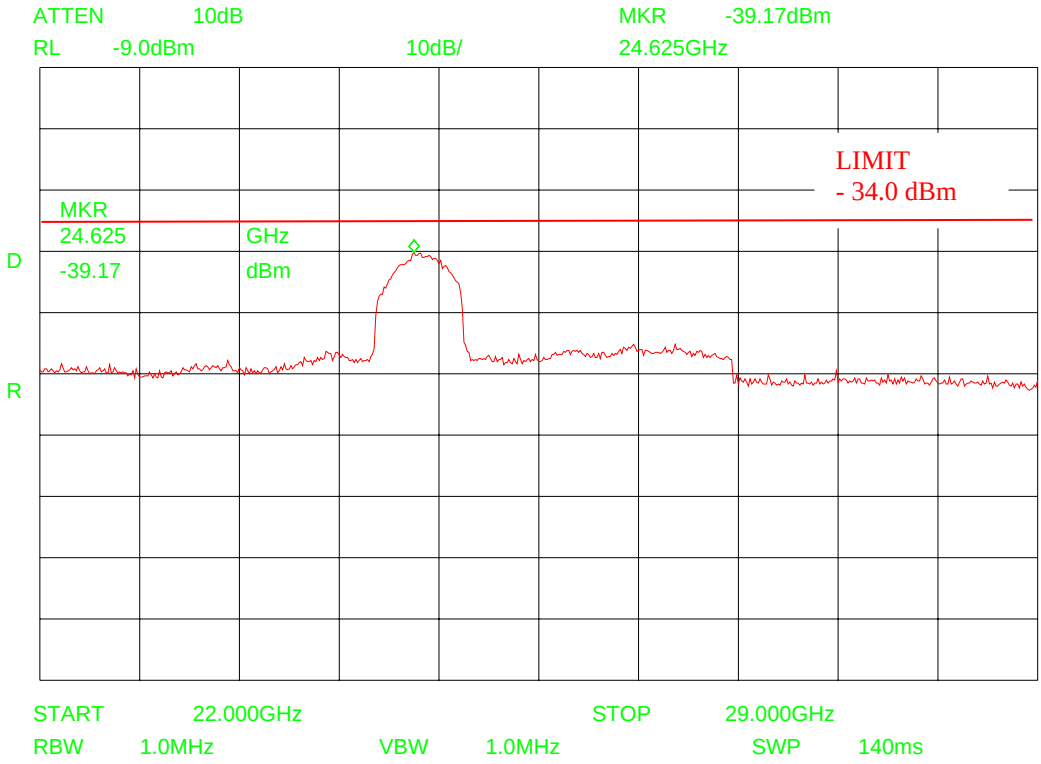
LIMITS: SECTION 15.252

Frequency range (MHz)	EIRP (RMS - AVERAGE)
40.0 GHz – 110.0 GHz	-61.3 dBm

Verdict:	Limits are kept

3 Plots, graphs and data sheets

Plot 1



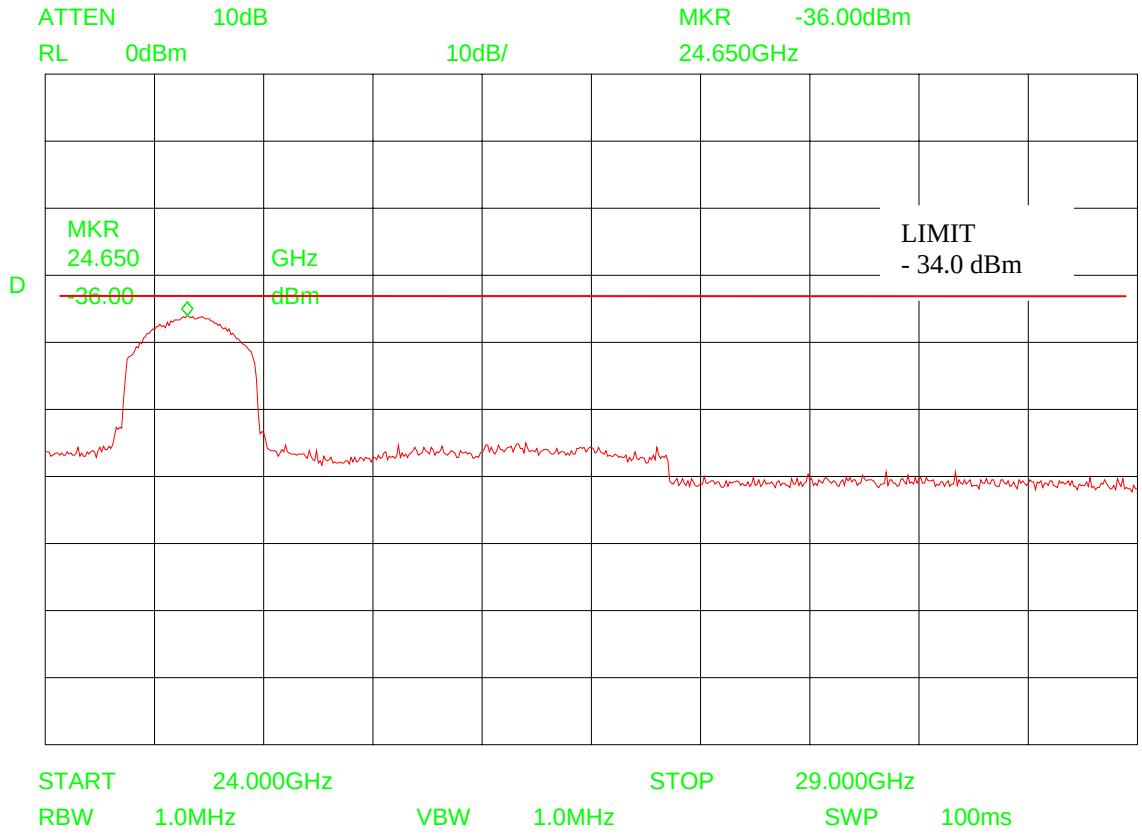
This is a peak measurement with 1 MHz RBW/VBW according to FCC15.252 (b)(4)

$P_{Analyzer}$	=	- 39.1 dBm / peak				
Distance	=	0.25 cm				
A_{Sys}	=	$A_{Free\ spacing}$	-	$A_{Cable\ and\ Amplifier}$	-	A_{Gain}
A_{Sys}	=	48.0 dB	-	27.0 dB	-	20.0 dBi
A_{Sys}	=	1.0 dB				
P_{EIRP}	=	$P_{Analyzer}$	+	A_{Sys}		
P_{EIRP}	=	- 38.1 dBm	BROAD BEAM			
Limit	=	- 34.0 dBm	(20 log (RBW/50))			

The highest output is in every case greater than 24.075 GHz, see FCC 15.252 (a)(3)

Verdict:	pass

Plot 2



This is a peak measurement with 1 MHz RBW/VBW according to FCC15.252 (b)(4)

$P_{Analyzer}$	=	- 36.0 dBm / peak				
Distance	=	0.25 cm				
A_{Sys}	=	$A_{Free\ spacing}$	-	$A_{Cable\ and\ Amplifier}$	-	A_{Gain}
A_{Sys}	=	48.0 dB	-	27.0 dB	-	20.0 dBi
A_{Sys}	=	1.0 dB				
P_{EIRP}	=	$P_{Analyzer}$	+	A_{Sys}		
P_{EIRP}	=	- 35.0 dBm	TILT BEAM			
Limit	=	- 34.0 dBm	(20 log (RBW/50))			

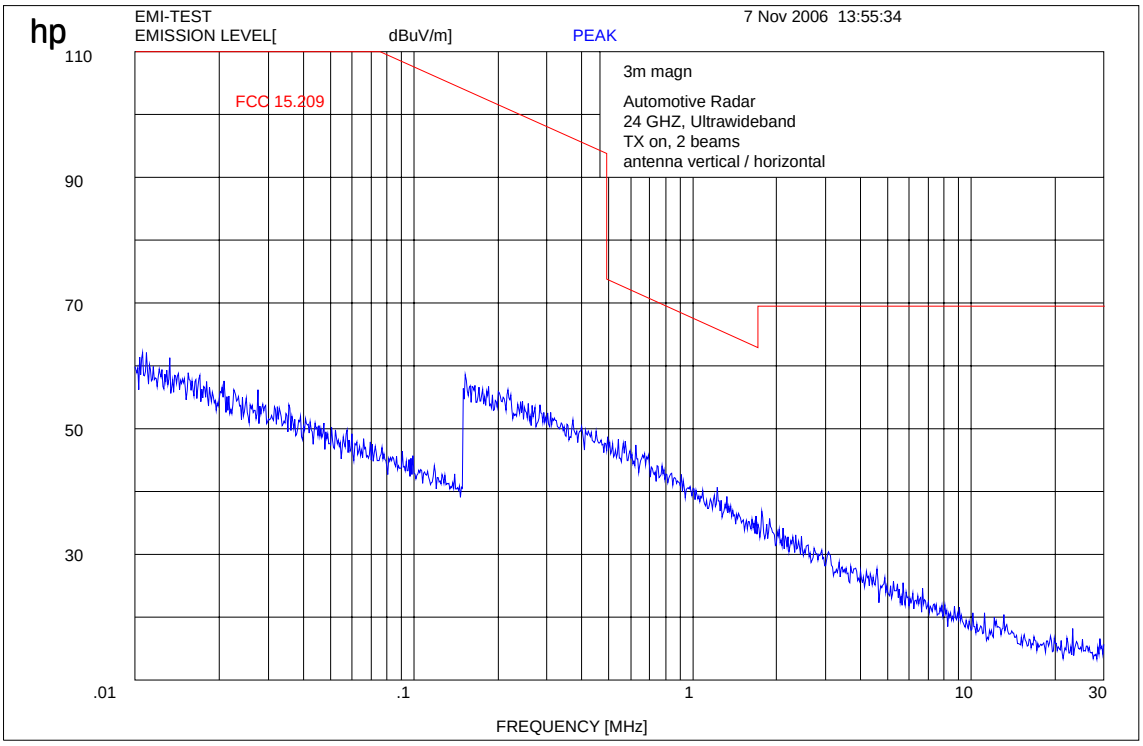
The highest output is in every case greater than 24.075 GHz, see FCC 15.252 (a)(3)

Verdict:	pass

RADIATED MEASUREMENTS (valid for both antenna beams)

Plot 3

Radiated emissions 9 kHz to 30 MHz

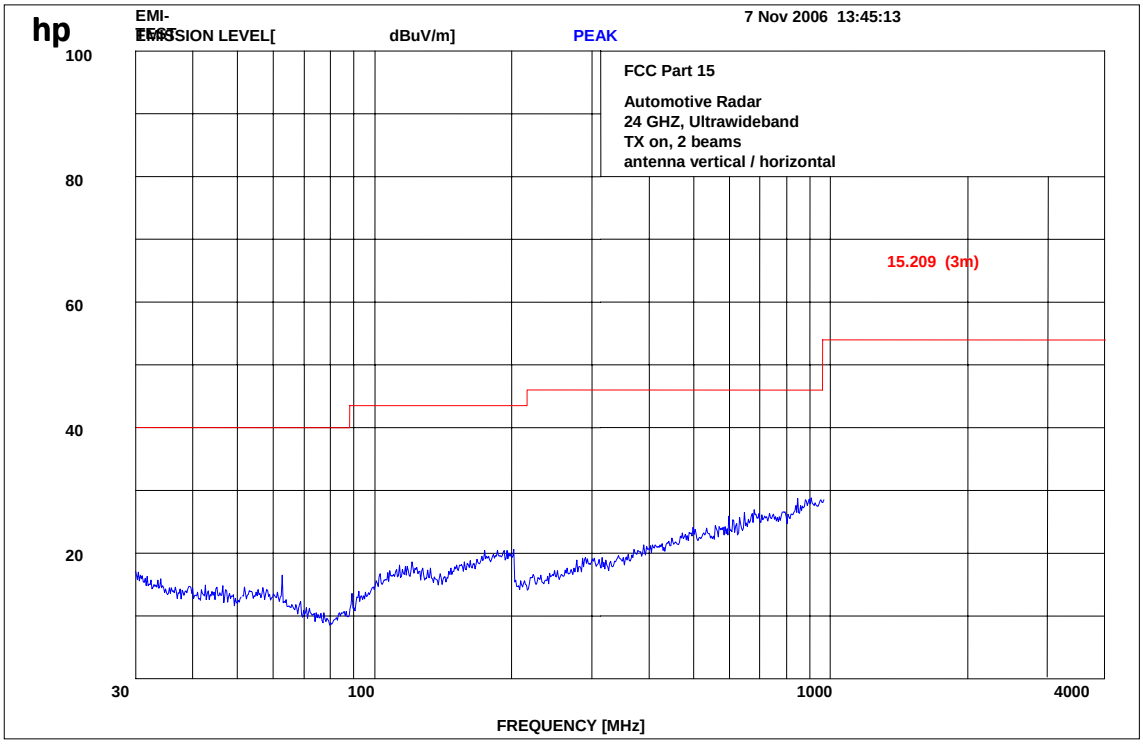


RBW/VBW: 200 Hz up to 150 kHz,
9 kHz up to 30 MHz,
120 kHz up to 1 GHz

Verdict:	pass

Plot 4

Radiated emissions 30 MHz to 960 MHz

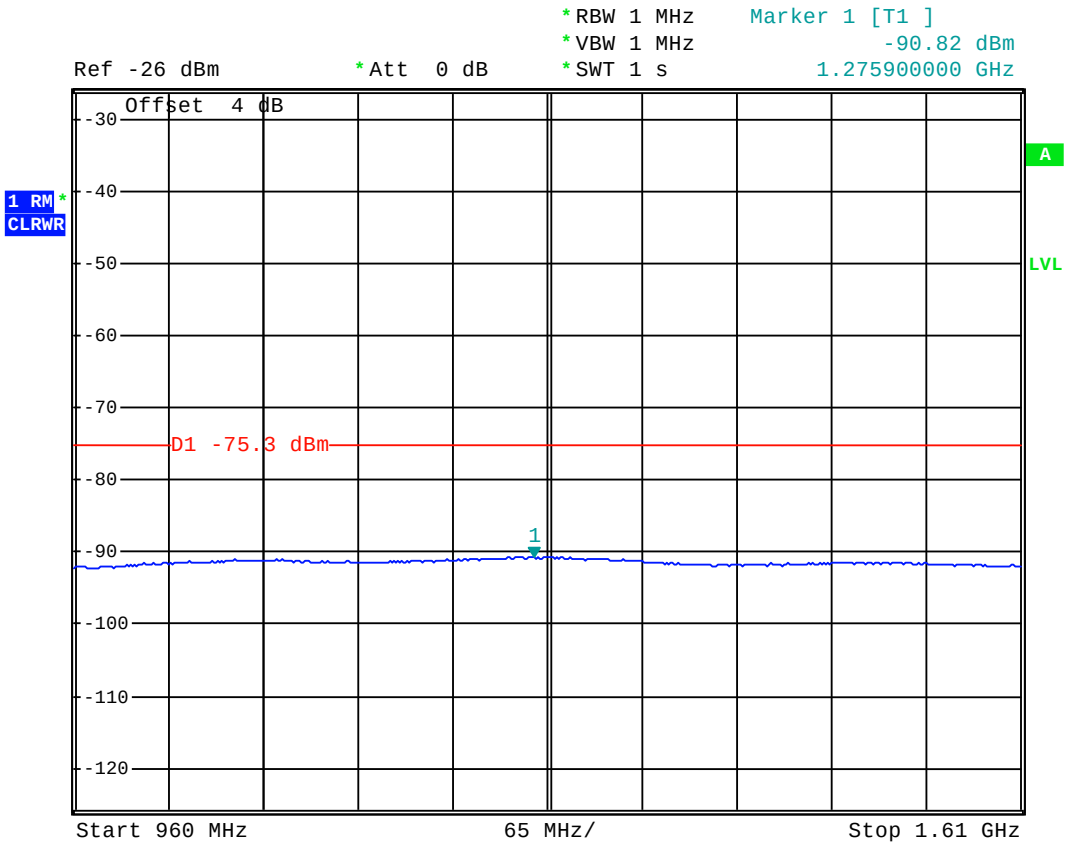


RBW/VBW: 200 Hz up to 150 kHz,
9 kHz up to 30 MHz,
120 kHz up to 960 MHz,

Verdict:	pass

Plot 5

Radiated emissions 960.0 MHz to 1610.0 MHz (RMS)

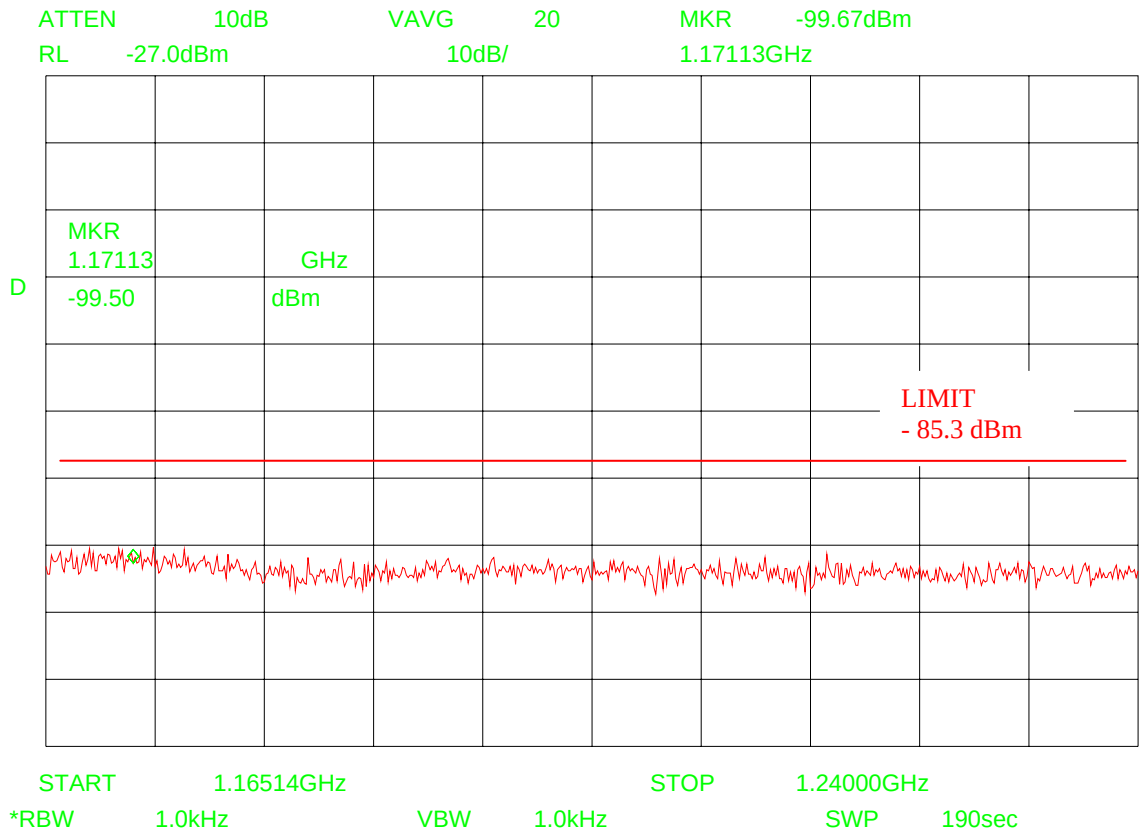


$P_{Analyser}$	=	- 90.8 dBm (The $A_{Freespacing}$, the A_{Gain} and $P_{Cable\ and\ Amplifier}$ is calculated in the analyser reading)
$P_{Spurious\ Emission}$	=	- 90.8 dBm
Limit	=	- 75.3 dBm
Distance	=	1.0 m
$A_{Free\ spacing}$	=	32.5 dB
A_{Gain}	=	6.0 dBi
$A_{Cable\ and\ Amplifier}$	=	29.0 dB

Verdict:	pass

Plot 6

Radiated emissions 1164.0 MHz to 1240.0 MHz FCC 15.252 (b)(3)

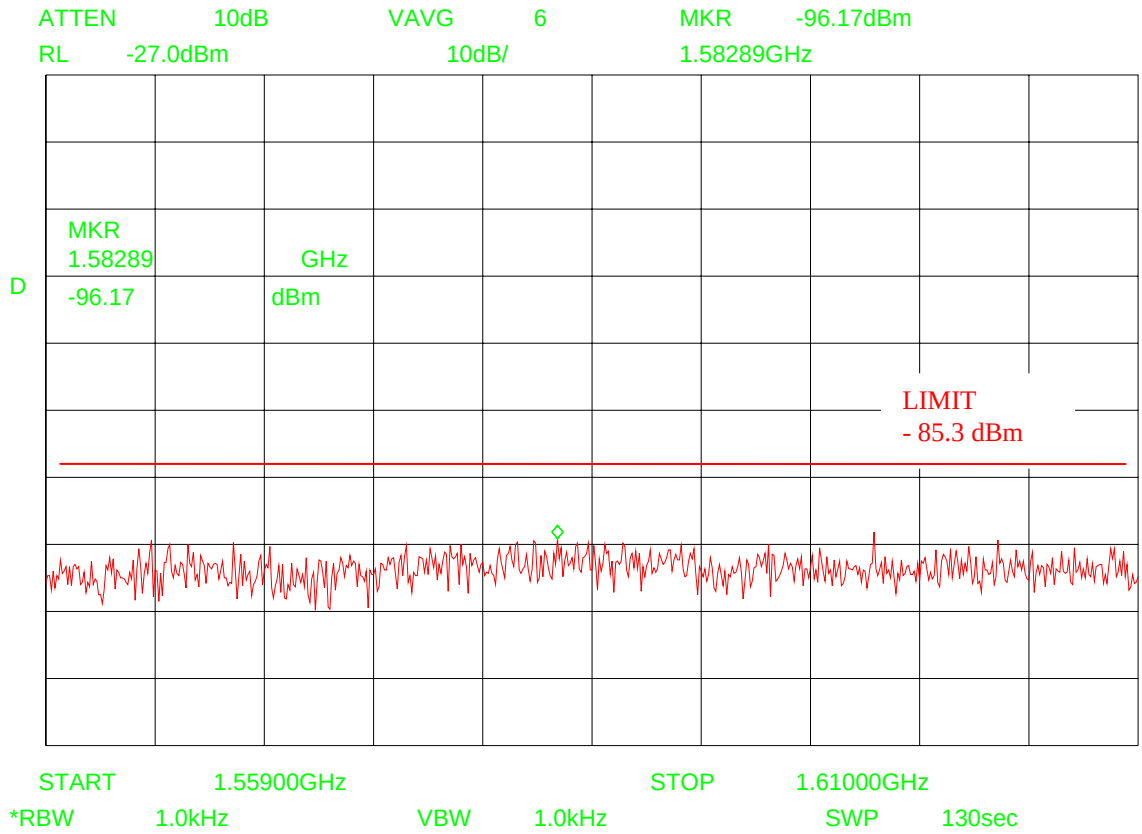


RBW/VBW: 1.0 kHz
Detector mode: RMS / AVAG

Verdict:	pass

Plot 7

Radiated emissions 1559.0 MHz to 1610.0 MHz FCC 15.252 (b)(3)

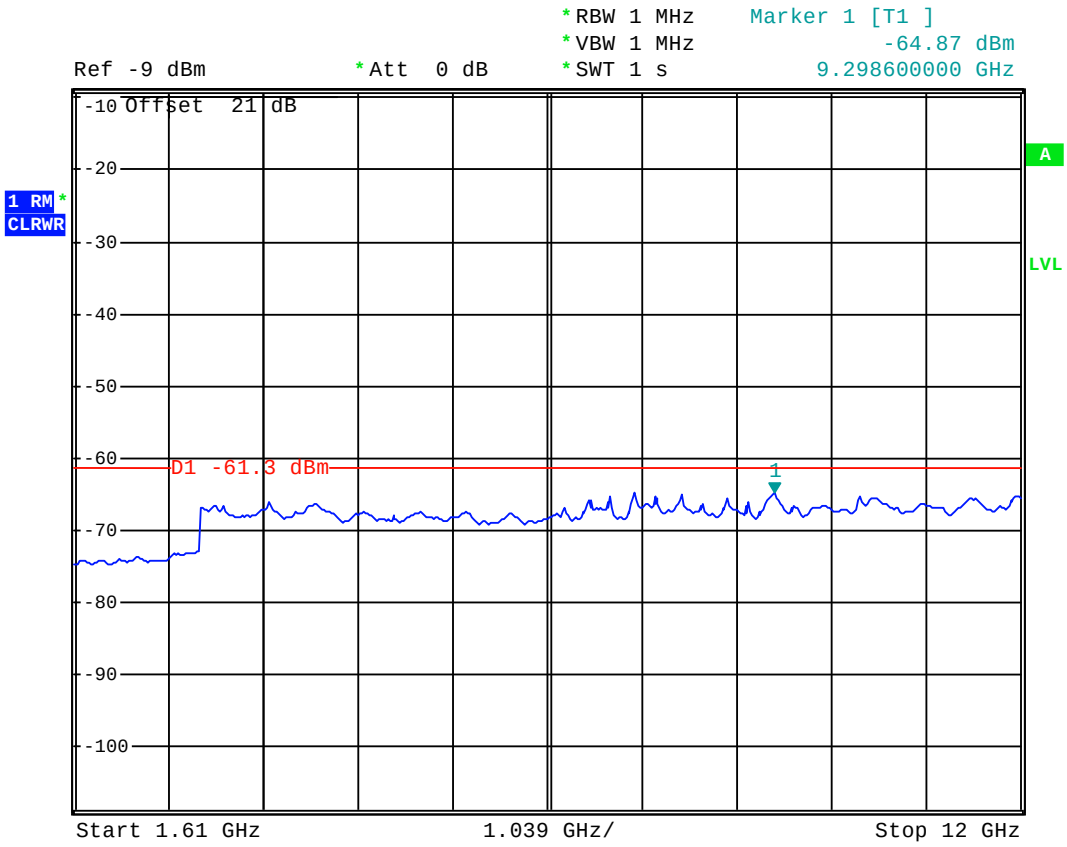


RBW/VBW: 1.0 kHz
Detector mode: RMS / AVAG

Verdict:	pass

Plot 8

Radiated emissions 1.610 GHz to 12.0 GHz (RMS)



$P_{Analyser}$ = - 64.8 dBm (The $A_{Freespacing}$, the A_{Gain} and $P_{Cable\ and\ Amplifier}$ is calculated in the analyser reading)

$P_{Spurious\ Emission}$ = - 64.8 dBm

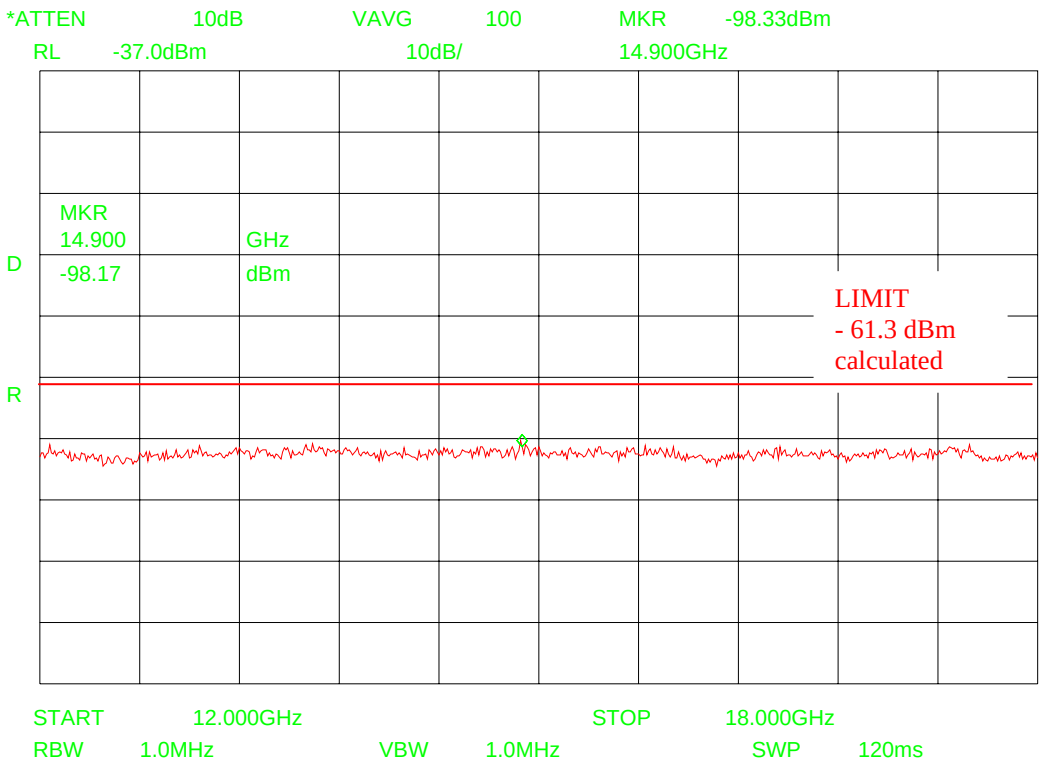
Limit = - 61.3 dBm

Distance = 1.0 m
$A_{Free\ spacing}$ = 46.5 dB
A_{Gain} = 10.5 dBi
$A_{Cable\ and\ Amplifier}$ = 29.0 dB

Verdict:	pass

Plot 9

Radiated emissions 12.0 GHz to 18.0 GHz



$P_{Analyser}$ = - 98.1 dBm (The $A_{Freespacing}$ and the A_{Gain} is calculated in the analyser reading)

$P_{Spurious\ Emission}$ = $P_{Analyser}$ + $P_{Cable\ and\ Amplifier}$

$P_{Spurious\ Emission}$ = - 70.1 dBm

Limit = - 61.3 dBm

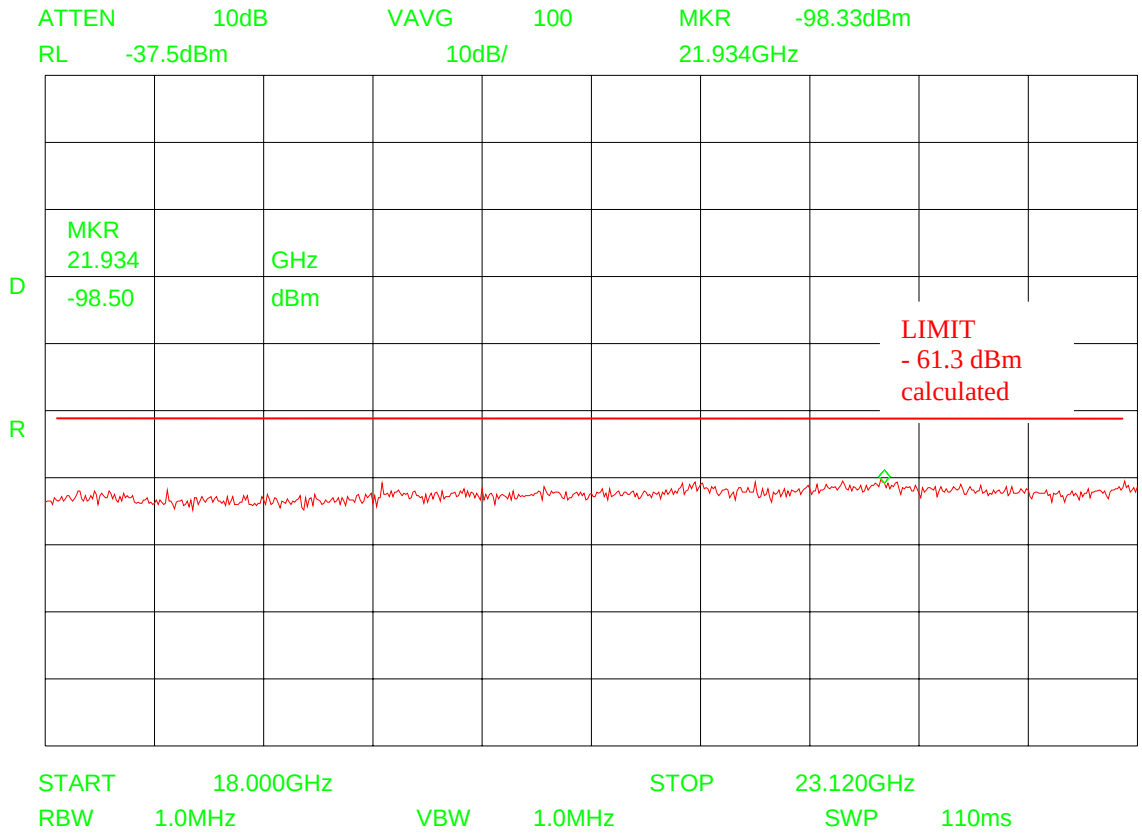
Distance = 0.50 cm
$A_{Free\ spacing}$ = 49.0 dB
A_{Gain} = 16.0 dBi
$A_{Cable\ and\ Amplifier}$ = 28.0 dB

Detector mode: RMS / AVAG

Verdict:	pass

Plot 10

Radiated emissions 18.0 GHz to 23.12 GHz



$P_{Analyser}$ = - 98.5 dBm (The $A_{Freespacing}$ and the A_{Gain} is calculated in the analyser reading)

$P_{Spurious\ Emission}$ = $P_{Analyser}$ + $P_{Cable\ and\ Amplifier}$

$P_{Spurious\ Emission}$ = - 70.5 dBm

Limit = - 61.3 dBm

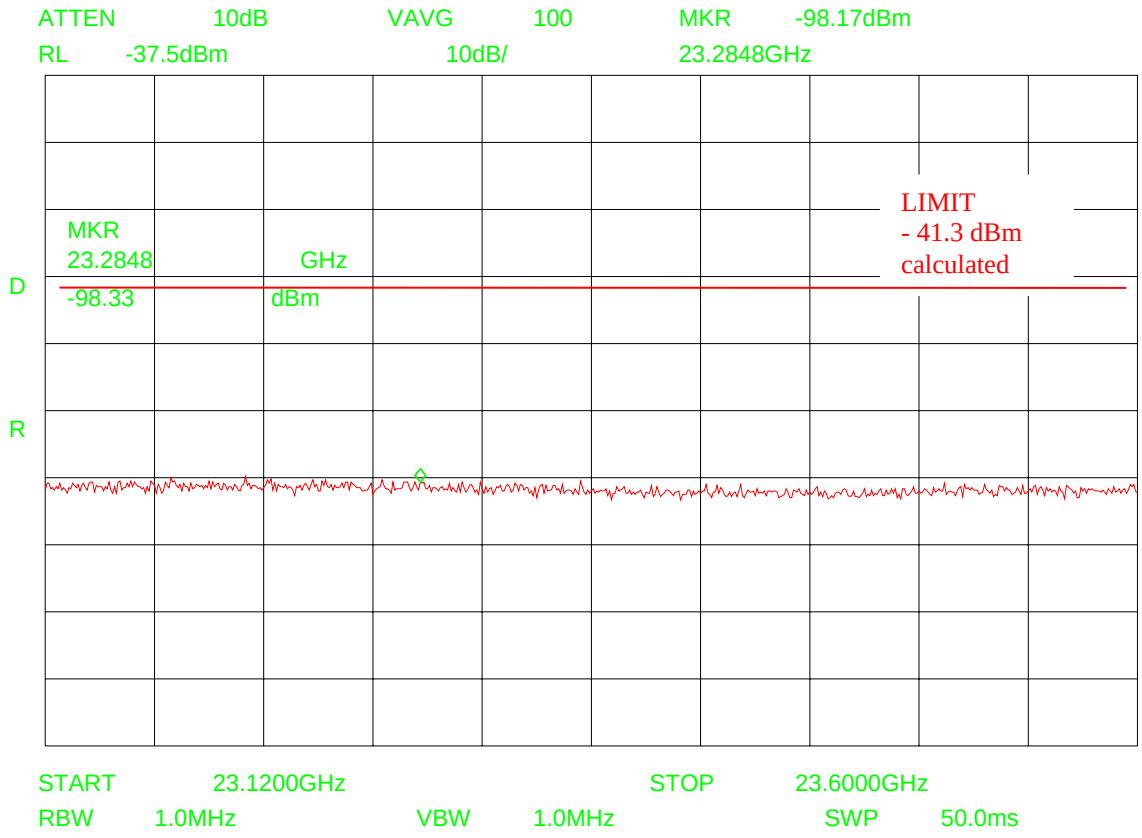
Distance = 0.50 cm
$A_{Free\ spacing}$ = 53.0 dB
A_{Gain} = 16.0 dBi
$A_{Cable\ and\ Amplifier}$ = 28.0 dB

Detector mode: RMS / AVAG

Verdict:	pass

Plot 11

Radiated emissions 23.12 GHz to 23.60 GHz



$P_{Analyser}$ = - 98.3 dBm (The $A_{Freespacing}$ and the A_{Gain} is calculated in the analyser reading)

$P_{Spurious\ Emission}$ = $P_{Analyser}$ + $P_{Cable\ and\ Amplifier}$

$P_{Spurious\ Emission}$ = - 70.3 dBm

Limit = - 41.3 dBm

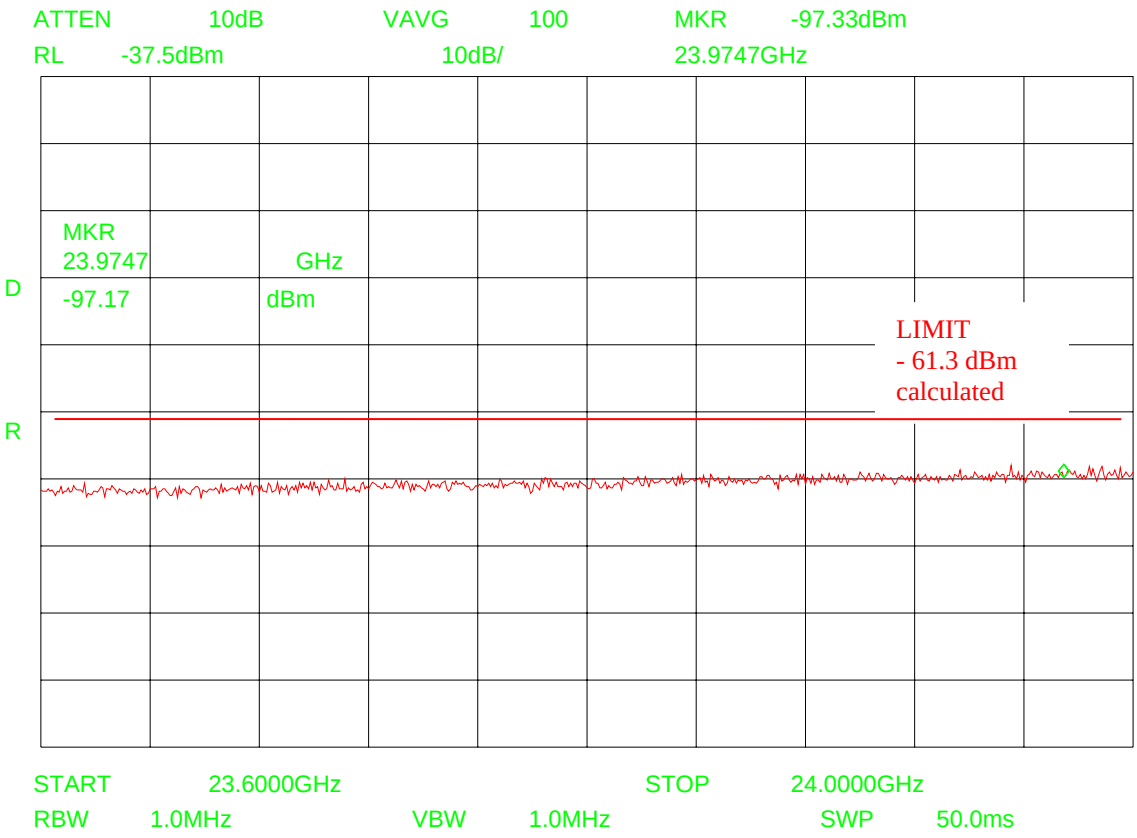
Distance = 0.50 cm
$A_{Free\ spacing}$ = 53.0 dB
A_{Gain} = 16.0 dBi
$A_{Cable\ and\ Amplifier}$ = 28.0 dB

Detector mode: RMS / AVAG

Verdict:	pass

Plot 12

Radiated emissions 23.60 GHz to 24.00 GHz



$P_{Analyser}$ = - 97.1 dBm (The $A_{Freespacing}$ and the A_{Gain} is calculated in the analyser reading)

$P_{Spurious\ Emission}$ = $P_{Analyser}$ + $P_{Cable\ and\ Amplifier}$

$P_{Spurious\ Emission}$ = - 69.1 dBm

Limit = - 61.3 dBm

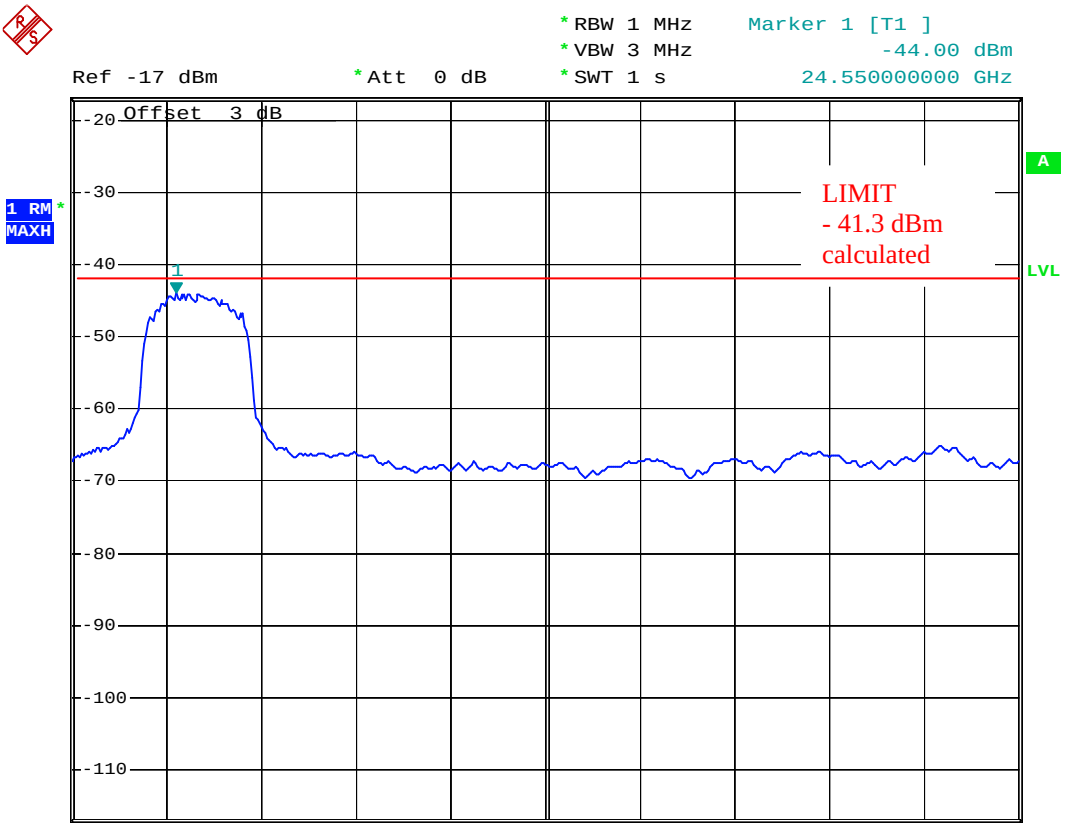
Distance = 0.50 cm
$A_{Free\ spacing}$ = 53.0 dB
A_{Gain} = 16.0 dBi
$A_{Cable\ and\ Amplifier}$ = 28.0 dB

Detector mode: RMS / AVAG

Verdict:	pass

Plot 13

Radiated emissions 24.0 GHz to 29.0 GHz



Date: 21.NOV.2006 11:13:35

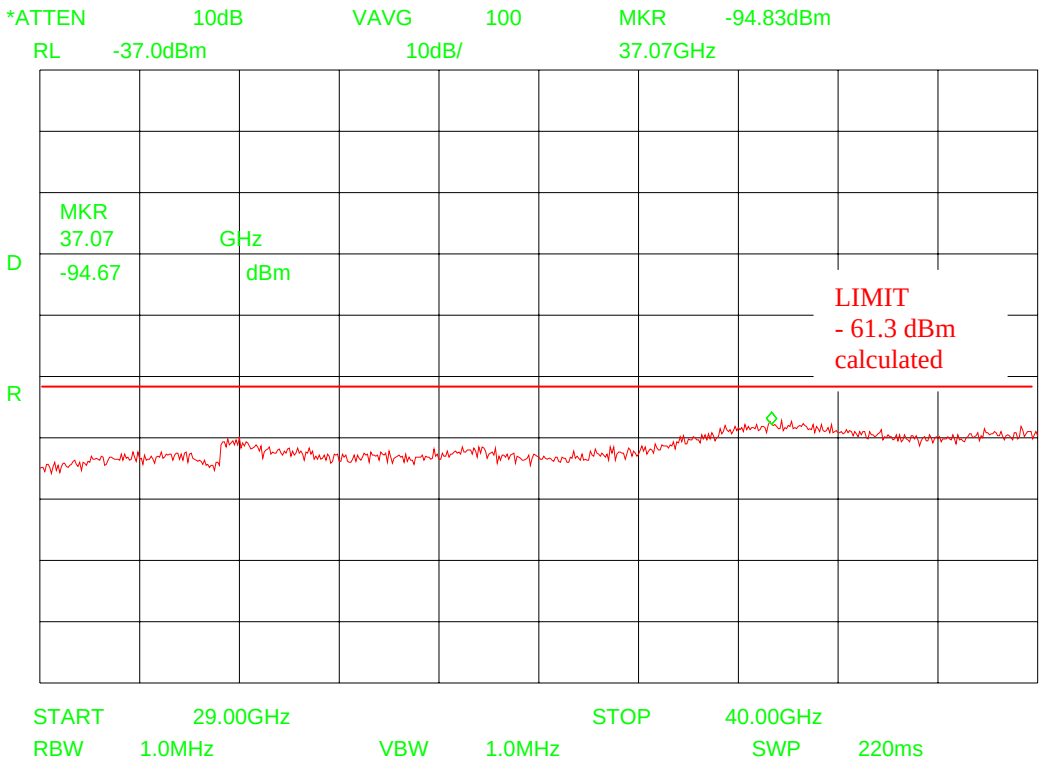
Start : 24.0 GHz, Stop: 29.0 GHz, Center Freq: 26.5 GHz, Number of Measuring Points: 5001
regarding the requirements of FCC15.252 (c) (1)

$P_{Analyser}$	=	- 44.0 dBm	(The $A_{Freespacing}$, $A_{Cable\ and\ Amplifier}$ and the A_{Gain} is calculated in the analyser reading)
Limit	=	- 41.3 dBm / MHz	
Distance	=	0.50 cm	
$A_{Free\ spacing}$	=	54.0 dB	
A_{Gain}	=	16.0 dBi	
$A_{Cable\ and\ Amplifier}$	=	28.0 dB	

Verdict:	pass

Plot 14

Radiated emissions 29.0 GHz to 40.0 GHz



$P_{Analyser}$ = - 94.6 dBm (The $A_{Freespacing}$ and the A_{Gain} is calculated in the analyser reading)

$P_{Spurious\ Emission}$ = $P_{Analyser}$ + $P_{Cable\ and\ Amplifier}$

$P_{Spurious\ Emission}$ = - 68.6 dBm

Limit = - 61.3 dBm

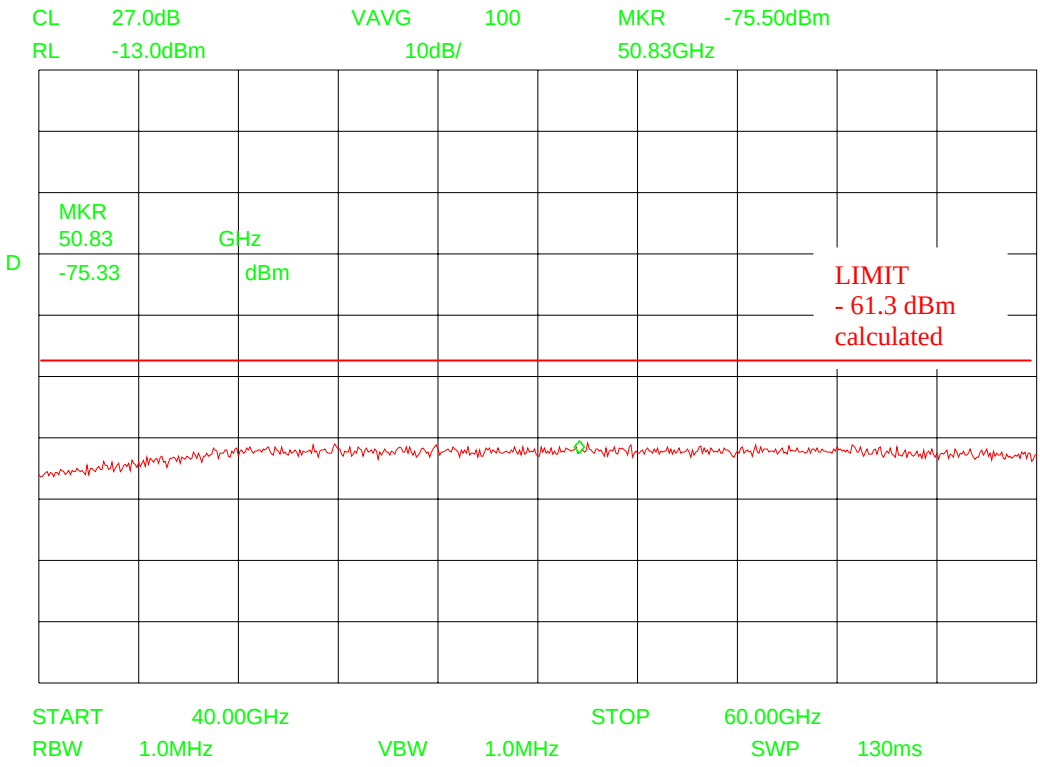
Distance = 0.25 cm
$A_{Free\ spacing}$ = 51.0 dB
A_{Gain} = 16.0 dBi
$A_{Cable\ and\ Amplifier}$ = 26.0 dB

Detector mode: RMS / AVAG

Verdict:	pass

Plot 15

Radiated emissions 40.0 GHz to 60.0 GHz



Tested with external Mixer

$P_{Spurious}$ = - 75.3 dBm (The system attenuation A_{Sys} is calculated in the analyser reading)

Limit = - 61.3 dBm

Distance = 0.25 cm

A_{Sys} = $A_{Free\ spacing}$ - A_{Gain}

A_{Sys} = 54.0 dB - 20.0 dBi

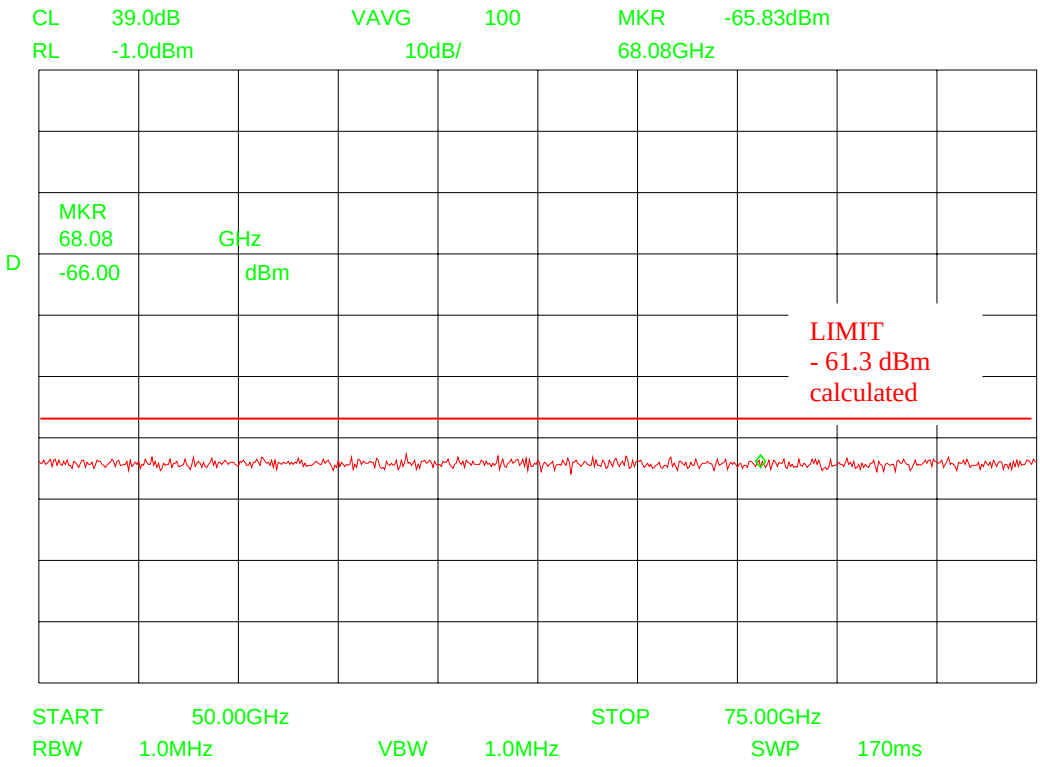
A_{Sys} = 34.0 dB

Detector mode: RMS / AVAG

Verdict:	pass

Plot 16

Radiated emissions 50.0 GHz to 75.0 GHz



Tested with external Mixer

$P_{Spurious}$ = - 66.0 dBm (The system attenuation A_{Sys} is calculated in the analyser reading)

Limit = - 61.3 dBm

Distance = 0.25 cm

A_{Sys} = $A_{Free\ spacing}$ - A_{Gain}

A_{Sys} = 57.0 dB - 25.0 dBi

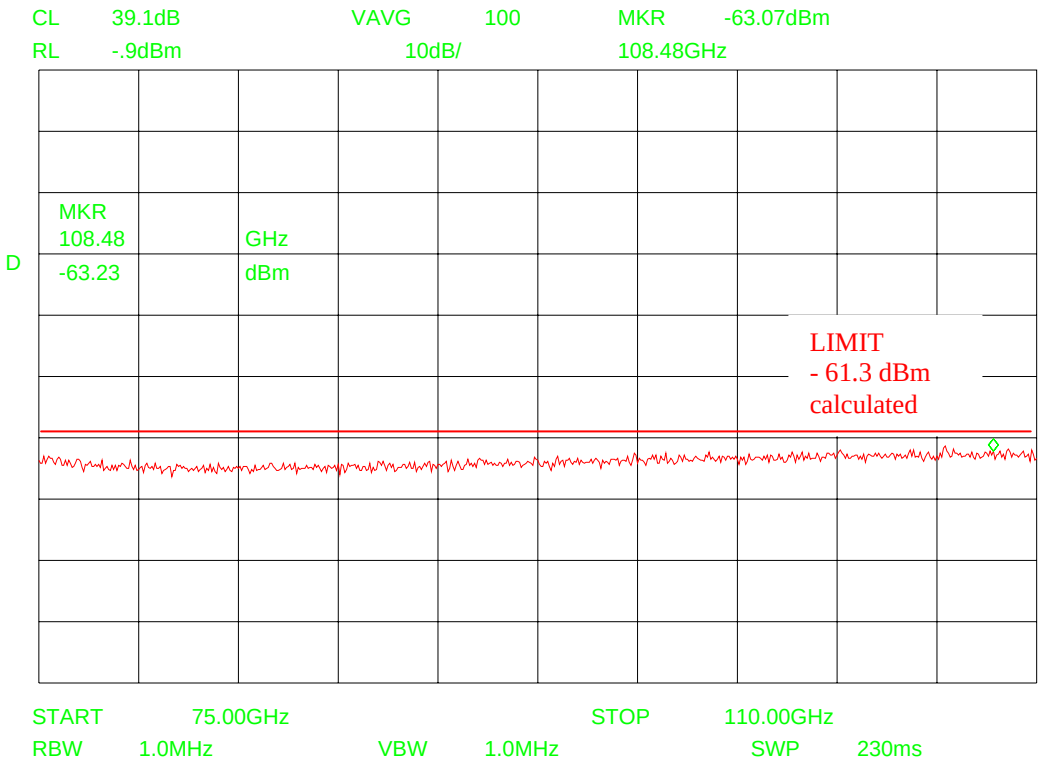
A_{Sys} = 32.0 dB

Detector mode: RMS / AVAG

Verdict:	pass

Plot 17

Radiated emissions 75.0 GHz to 110.0 GHz



Tested with external Mixer

$P_{Spurious}$ = - 63.2 dBm (The system attenuation A_{Sys} is calculated in the analyser reading)

Limit = - 61.3 dBm

Distance = 0.25 cm

A_{Sys} = $A_{Free\ spacing}$ - A_{Gain}

A_{Sys} = 61.0 dB - 24.0 dBi

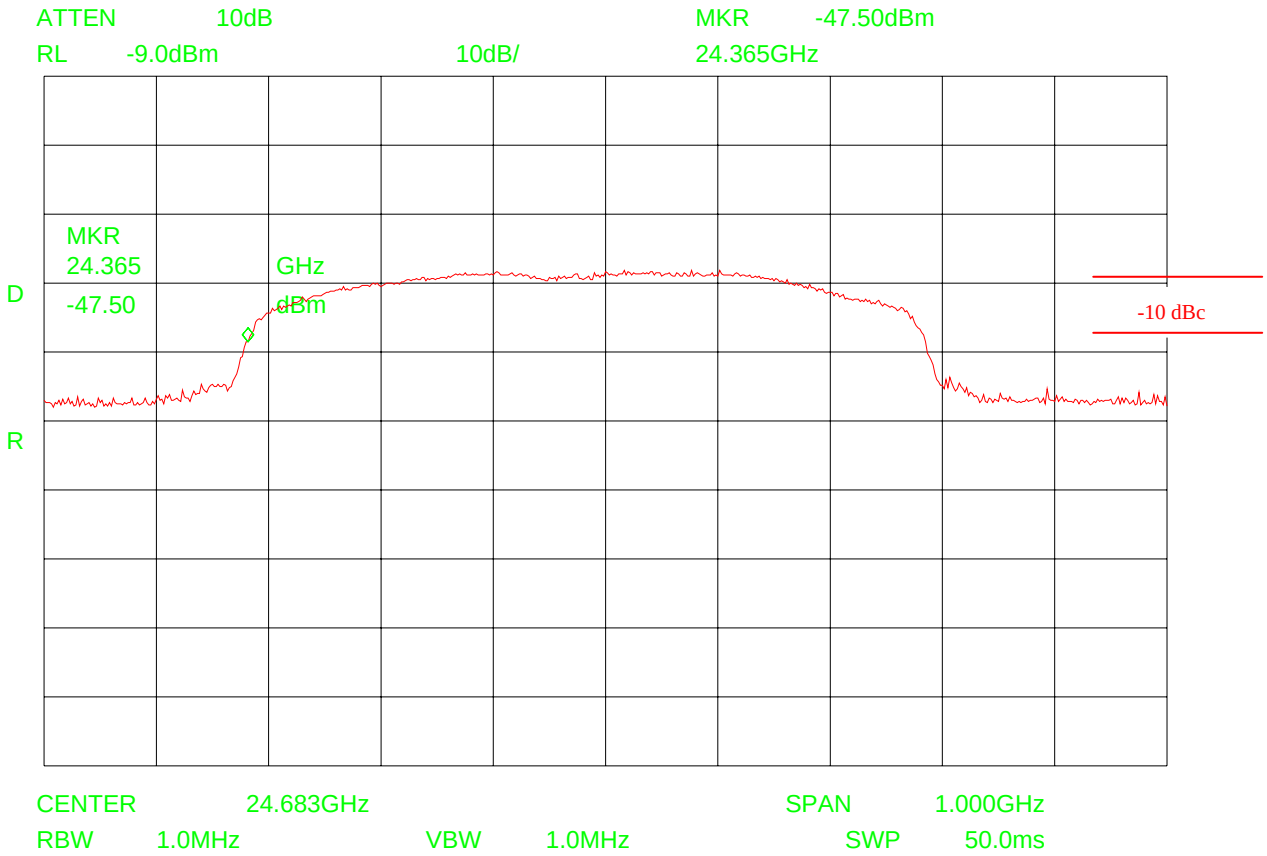
A_{Sys} = 37.0 dB

Detector mode: RMS / AVAG

Verdict:	pass

Plot **18**

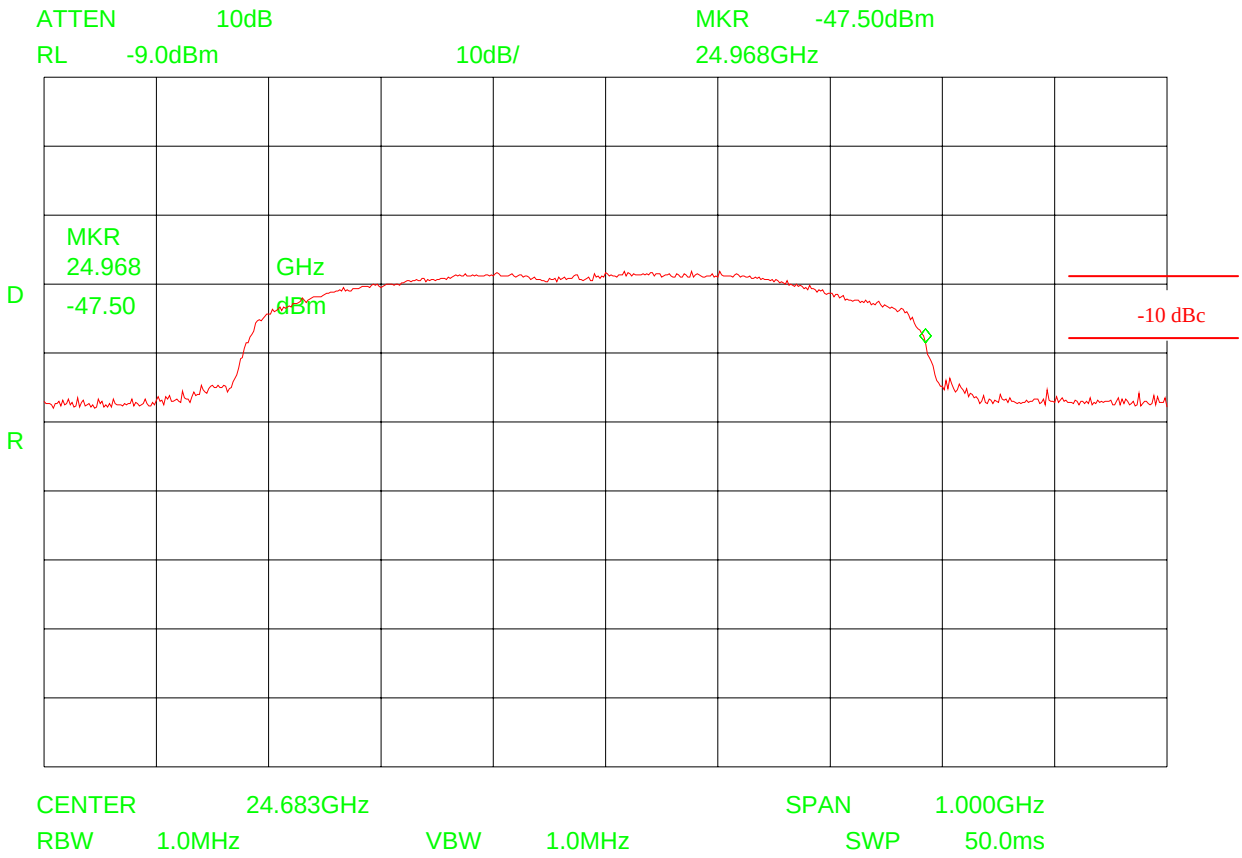
UWB Bandwidth BROAD BEAM



Low Frequency (F_L) = 24.365 GHz (-10 dBc)

Plot **19**

UWB Bandwidth BROAD BEAM



High Frequency (F_H)	=	24.968 GHz (-10 dBc)
Calculation center frequency	=	$(F_H + F_L) / 2$
Center frequency	=	24.666 500 GHz
Calculation UWB Bandwidth	=	$(F_H - F_L)$
UWB Bandwidth	=	603.00 MHz

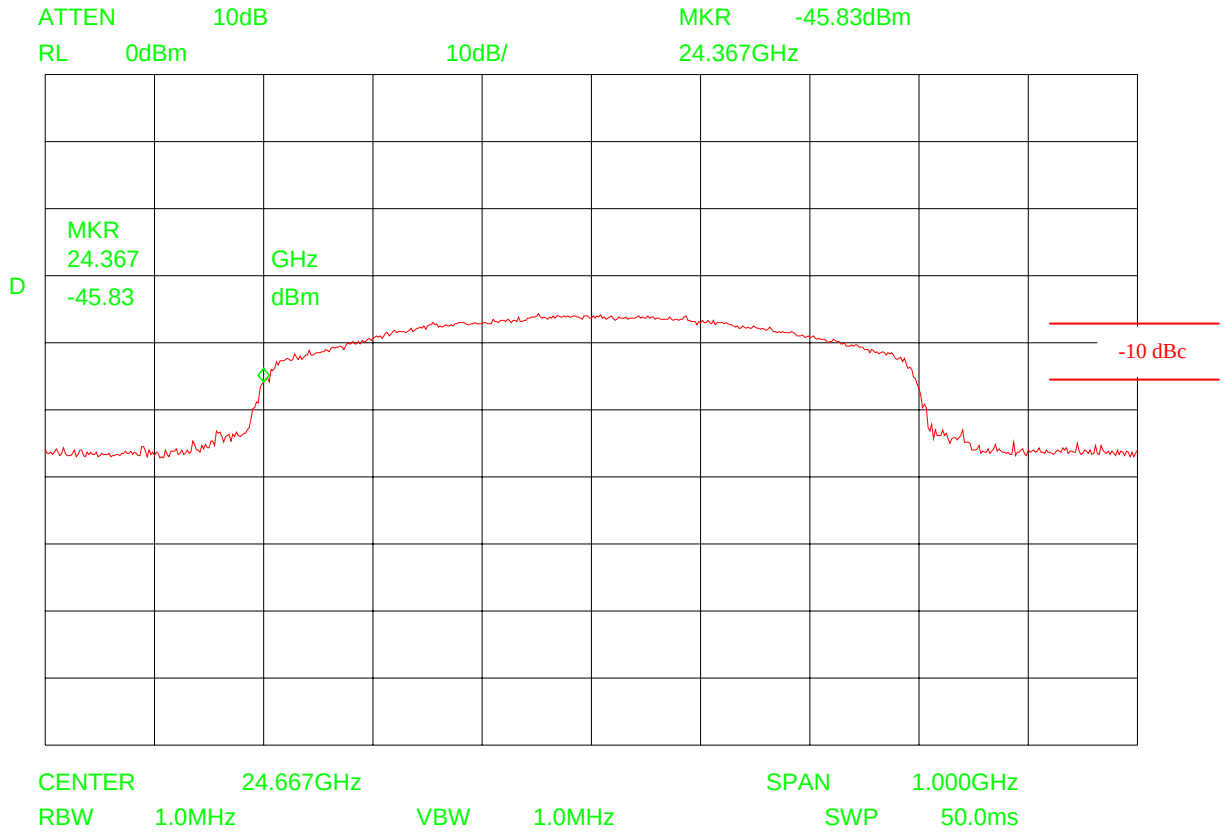
The occupied BW is calculated (see above) and > 10 MHz, see FCC15.252 (a)(2)
(within 23.12-29.0 GHz, exclusive 23.6-24.0 GHz) , see FCC15.252 (a)(1)

The highest output is in every case greater than 24.075 GHz, see FCC 15.252 (a)(3)

Verdict:	pass

Plot **20**

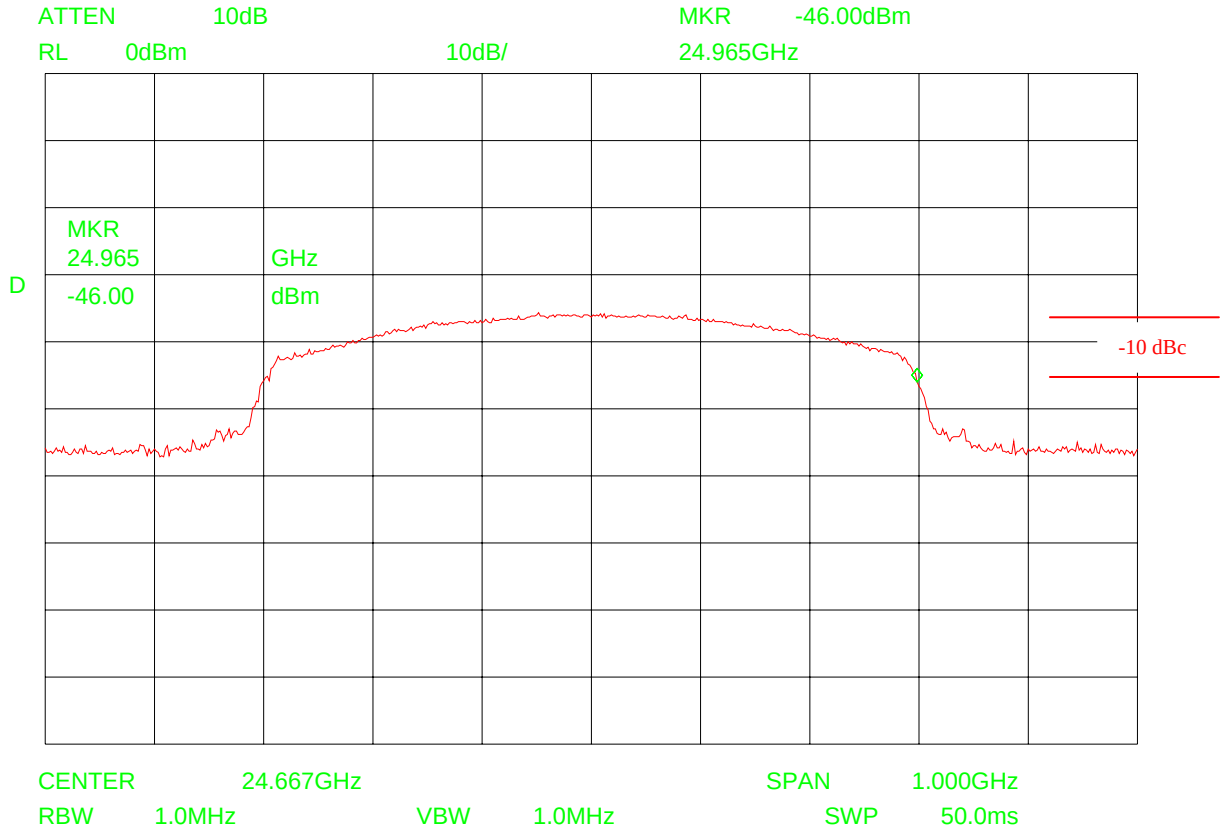
UWB Bandwidth TILT BEAM



Low Frequency (F_L) = 24.367 GHz (-10 dBc)

Plot **21**

UWB Bandwidth TILT BEAM



High Frequency (F_H)	=	24.965 GHz (-10 dBc)
Calculation center frequency	=	$(F_H + F_L) / 2$
Center frequency	=	24.666 000 GHz
Calculation UWB Bandwidth	=	$(F_H - F_L)$
UWB Bandwidth	=	598.00 MHz

The occupied BW is calculated (see above) and > 10 MHz, see FCC15.252 (a)(2) (within 23.12-29.0 GHz, exclusive 23.6-24.0 GHz) , see FCC15.252 (a)(1)

The highest output is in every case greater than 24.075 GHz, see FCC 15.252 (a)(3)

Verdict:	pass