FCC Test Report

Test report no.: EMC_620FCC15.407_2004

FCC Part 15.407 for UNII Devices / CANADA RSS-210 Issue 5 for LELEAN Devices

EUT: Tablet PC Model: iX104
with WLAN Model: VM4-3B
FCC ID: Q2GIX104-119
IC ID: 4596A-iX104GSM

Deutscher Akkreditierungs Rat DAR

TTI-P-G 081/94-A0

Accredited according to **ISO/IEC 17025**

Bluetooth

Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Testing Laboratory

FCC listed # 101450

IC recognized # 3925

***CETECOM* Inc.**

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM Inc. USA 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 item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

TEST REPORT PREPARED BY:
EMC Engineer: Harpreet Sidhu

1.2 Testing laboratory

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1.3 Details of applicant

Name	**:**	**Xplore Technologies**
Street	**:**	**14000 Summit Road, Suite 900**
City / Zip Code	**:**	**Austin, TX 78728**
Country	**:**	**USA**
Contact	**:**	**Douglas L. Fowler**
Telephone	**:**	**+1 512 336 7797**
Tele-fax	**:**	**+1 512 336 7791**
e-mail	**:**	**dfowler@xploretech.com**

1.4 Application details

Date of receipt test item	:	2004-02-25
Date of test	:	2004-02-25/26

1.5 Test item

EUT Manufacturer	:	Applicant
WLAN Manufacturer	:	Wistron Neweb Corporation
Street	:	No. 10-1, Li-hsin Road I, Science-based Industrial Park
City / Zip Code	:	Hsinchu 300
Country	:	Taiwan, R.O.C
Model No. (EUT)	:	iX104
Model No. (WLAN)	:	VM4-3B
Description	:	802.11a/b wireless LAN mini PCI card in Tablet PC
FCC ID	:	Q2GIX104-119
IC ID	:	4596A-iX104GSM

Additional information

Frequency	:	5180MHz – 5320MHz for 5GHz band 5745MHz – 5805MHz for 5GHz band
Type of modulation	:	DSSS
Number of channels	:	11
Antenna	:	Embedded
Output power	:	0.025W conducted peak power for 5180 - 5320MHz band 0.021W conducted peak power for 5745 – 5805MHz band
Extreme temp. Tolerance	:	-20°C to +60°C

1.6 Test standards: FCC Part 15.407 for UNII Devices / CANADA RSS-210 Issue 5 for LELEAN Devices

NOTE:
The EUT model# iX104 carries pre-certified WLAN module model# VM4-3B with FCC ID: NKRVM43B.
This test report covers full radiated testing as per FCC 15.407 on EUT with WLAN module. All conducted measurements are covered under *test report# RF910819R02*
In addition conducted output power measurements were repeated and found same as in above mentioned test report.
WLAN was tested at different data rates. Test report shows only worst-case test results of all data rates.

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests Performed	
Final Verdict: (Only “passed” if all single measurements are “passed”)	**Passed**

Technical responsibility for area of testing:

Date	Section	Name	Signature
2004-04-21	EMC & Radio	Lothar Schmidt (Manager)	

Responsible for test report and project leader:

Date	Section	Name	Signature
2004-04-21	EMC & Radio	Harpreet Sidhu (EMC Engineer)	

2.2 Test report

TEST REPORT

Test report no.: EMC_620FCC15.407_2004

TEST REPORT REFERENCE

LIST OF MEASUREMENTS		PAGE
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PEAK OUTPUT POWER **§ 15.407 (a)(1)(2)(3)**
(Conducted)
(Data rate – 54Mbps)
54Mbps is found to be worst-case for peak output power.
(This measurement is done as per DA 02-2138)

Test Results

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)				
Frequency (MHz)		5180	5260	5320	5745	5805
T_{nom}(23)°C	V_{nom}	13.22	13.80	13.95	11.59	13.28
Measurement uncertainty		±0.5dBm				

LIMIT **SUBCLAUSE § 15.407 (a)(1)(2)(3)**

Frequency range (GHz)	Conducted Peak Power
5.15 – 5.25	17dBm
5.25 – 5.35	24dBm
5.725 – 5.825	30dBm

MAXIMUM PEAK OUTPUT POWER (RADIATED) **§ 15.407 (a)(1)(2)(3)**

(Data rate – 54Mbps)

54Mbps is found to be worst-case for peak output power.

EIRP:

Test Results

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)				
Frequency (MHz)		5180	5260	5320	5745	5805
T_{nom}(23)°C	V_{nom}	*19.12	*19.7	*19.85	*17.49	*19.18
Measurement uncertainty		±0.5dBm				

*EIRP is calculated based upon 5.9dBi antenna gain

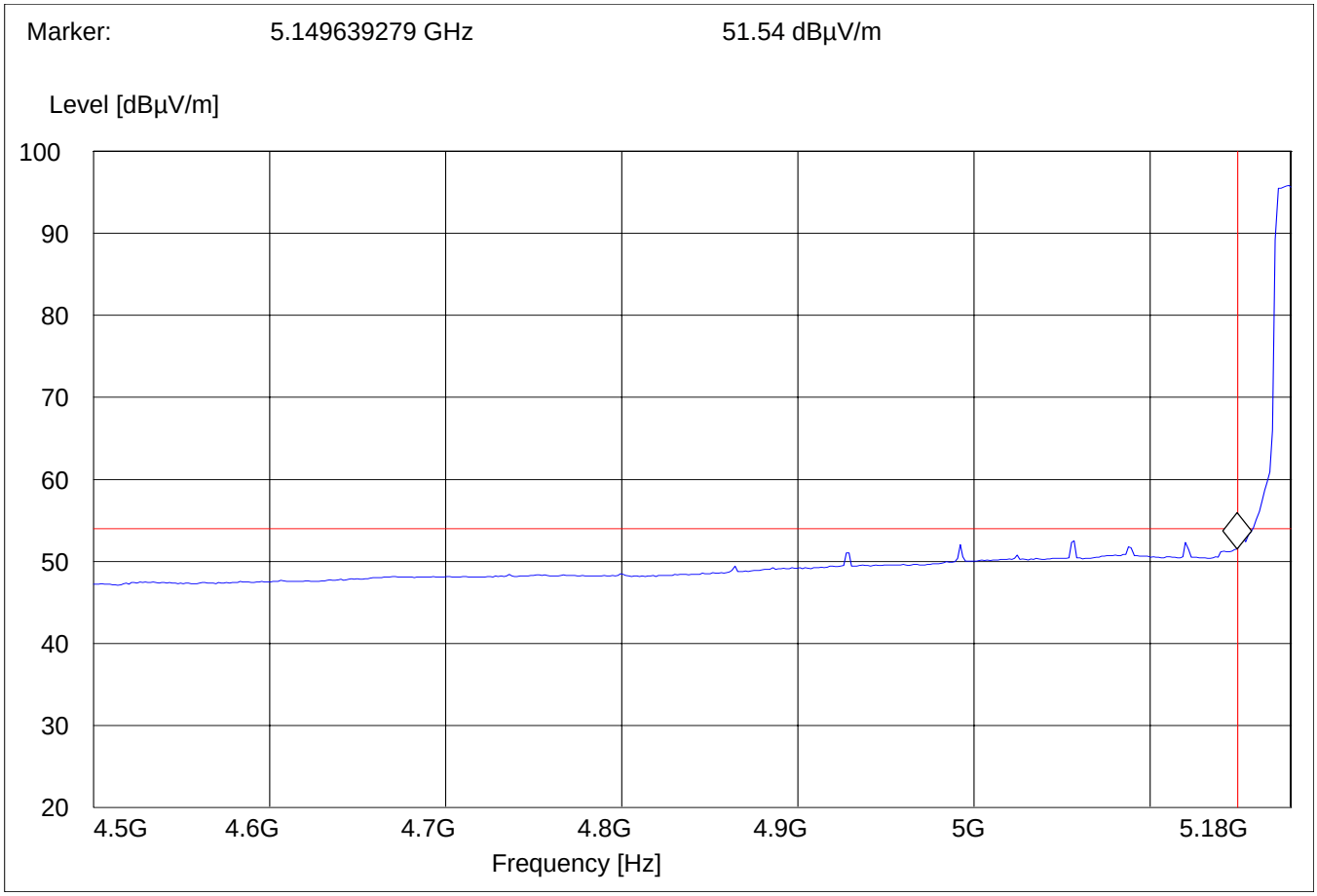
LIMIT **SUBCLAUSE § 15.407 (a)(1)(2)(3)**

Frequency range (GHz)	Conducted Peak Power
5.15 – 5.25	17dBm
5.25 – 5.35	24dBm
5.725 – 5.825	30dBm
If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi	

BAND EDGE COMPLIANCE §15.407 (b)(1)(2)(4)(6)
(Data rate – 54Mbps)
Low frequency section (spurious in the restricted band 4500 – 5150 MHz)
(Average measurement)

Operating condition	:	Tx at 5180MHz
SWEEP TABLE	:	"FCC15.407 LBE_AVG"
Limit Line horizontal	:	54dBµV
Limit Line vertical	:	5150MHz

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
4.5 GHz	5.19 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



BAND EDGE COMPLIANCE §15.407 (b)(1)(2)(4)(6)

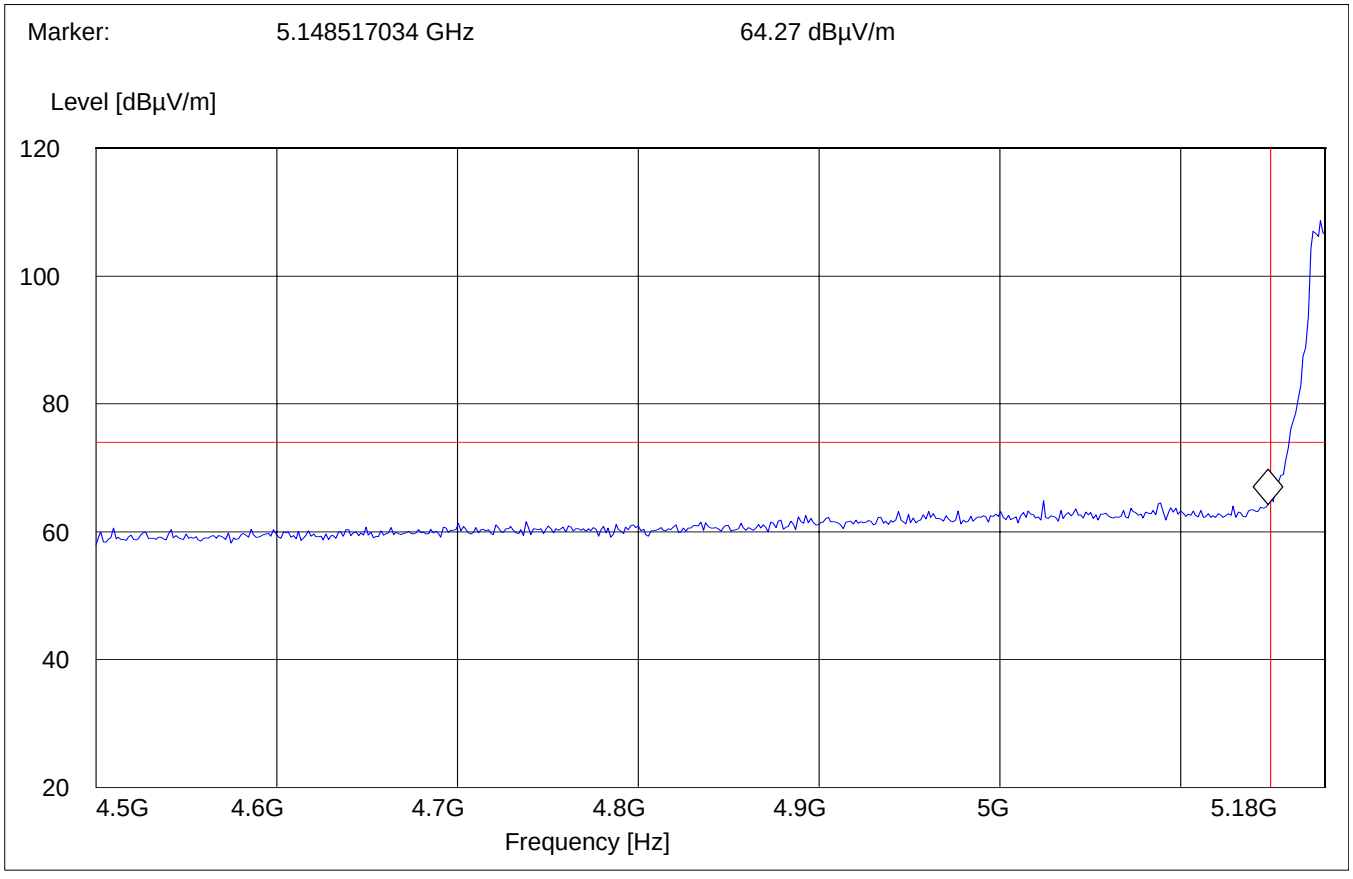
(Data rate – 54Mbps)

Low frequency section (spurious in the restricted band 4500 – 5150 MHz)

(Peak measurement)

Operating condition	:	Tx at 5180MHz
SWEEP TABLE	:	"FCC15.407 LBE_Pk"
Limit Line horizontal	:	74dBµV
Limit Line vertical	:	5150MHz

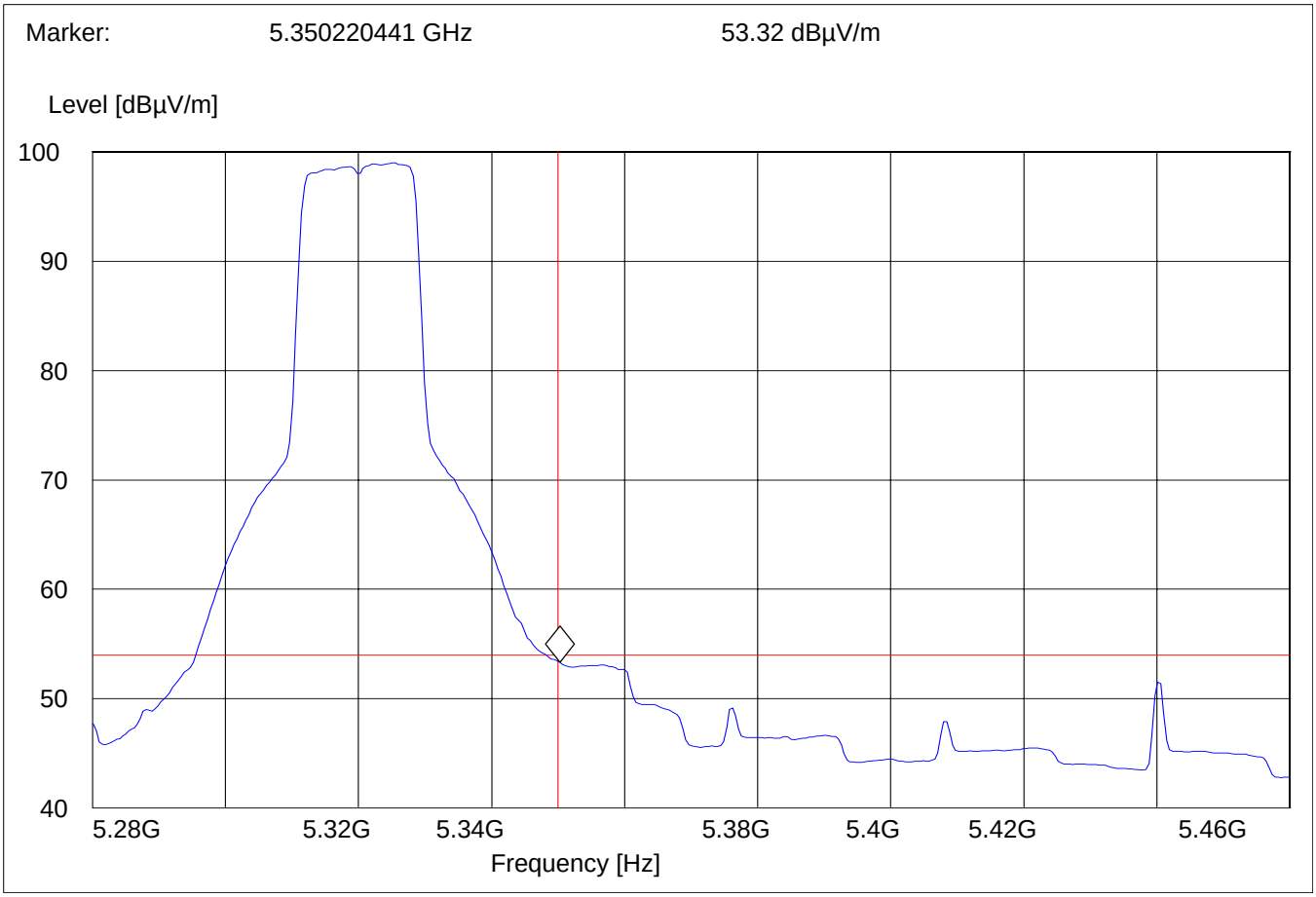
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
4.5 GHz	5.18 GHz	MaxPeak	Coupled	1MHz	1MHz	#326 horn (dBi)



BAND EDGE COMPLIANCE §15.407 (b)(1)(2)(4)(6)
(Data rate – 54Mbps)
High frequency section (spurious in the restricted band 5350 – 5460 MHz)
(Average measurement)

Operating condition	:	Tx at 5320MHz
SWEEP TABLE	:	"FCC15.407 HBE_AVG"
Limit Line horizontal	:	54dBµV
Limit Line vertical	:	5350MHz

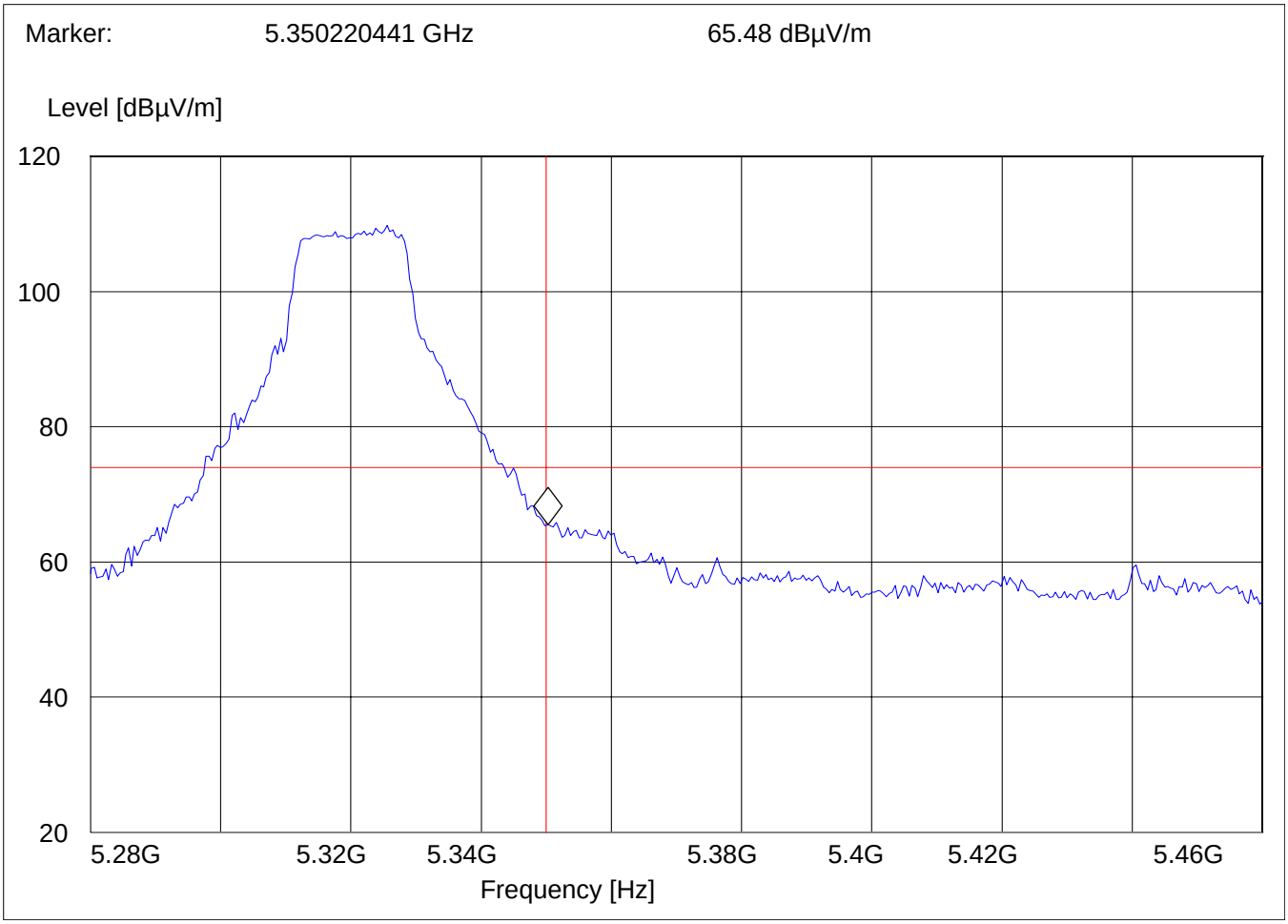
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
5.28 GHz	5.46 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



BAND EDGE COMPLIANCE §15.407 (b)(1)(2)(4)(6)
(Data rate – 54Mbps)
High frequency section (spurious in the restricted band 5350 – 5460 MHz)
(Peak measurement)

Operating condition	:	Tx at 5320MHz
SWEEP TABLE	:	"FCC15.407 HBE_Pk"
Limit Line horizontal	:	74dBµV
Limit Line vertical	:	5350MHz

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
5.28 GHz	5.46 GHz	MaxPeak	Coupled	1 MHz	1MHz	#326 horn (dBi)



EMISSION LIMITATIONS **§ 15.407 (b)(1)(2)(4)(6)**
Transmitter (Radiated)
(Data rate – 54Mbps)

Limits **§ 15.209 / § 15.407**

Freq. (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
0.009-0.490	2400/F (kHz)	
0.490-1.750	24000/F (kHz)	
1.705-30.0	30	29.54
30-88	100	40.00
88-216	150	43.52
216-960	200	46.02
Above 960*	500	53.97
1000-40000**	2013.8	66.08

***) Limit in restricted bands**
****) Limit outside restricted bands**

NOTE:
1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 40 GHz very short cable connections to the antenna was used to minimize the noise level.

2. All measurements are done in peak mode unless specified with the plots.

Transmit at Lowest channel Frequency 5180MHz			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
10350.70	66.12		52.37
15547.09	47.66		34.53

Transmit at Middle channel Frequency 5260MHz			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
10505.10	64.62		50.85
15795.59	48.31		36.07

Transmit at Highest channel Frequency 5320MHz			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
10637.27	58.94		48.37
15971.94	45.98		35.22

Transmit at Lowest channel Frequency 5745MHz			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
11496.99	61.21		48.68

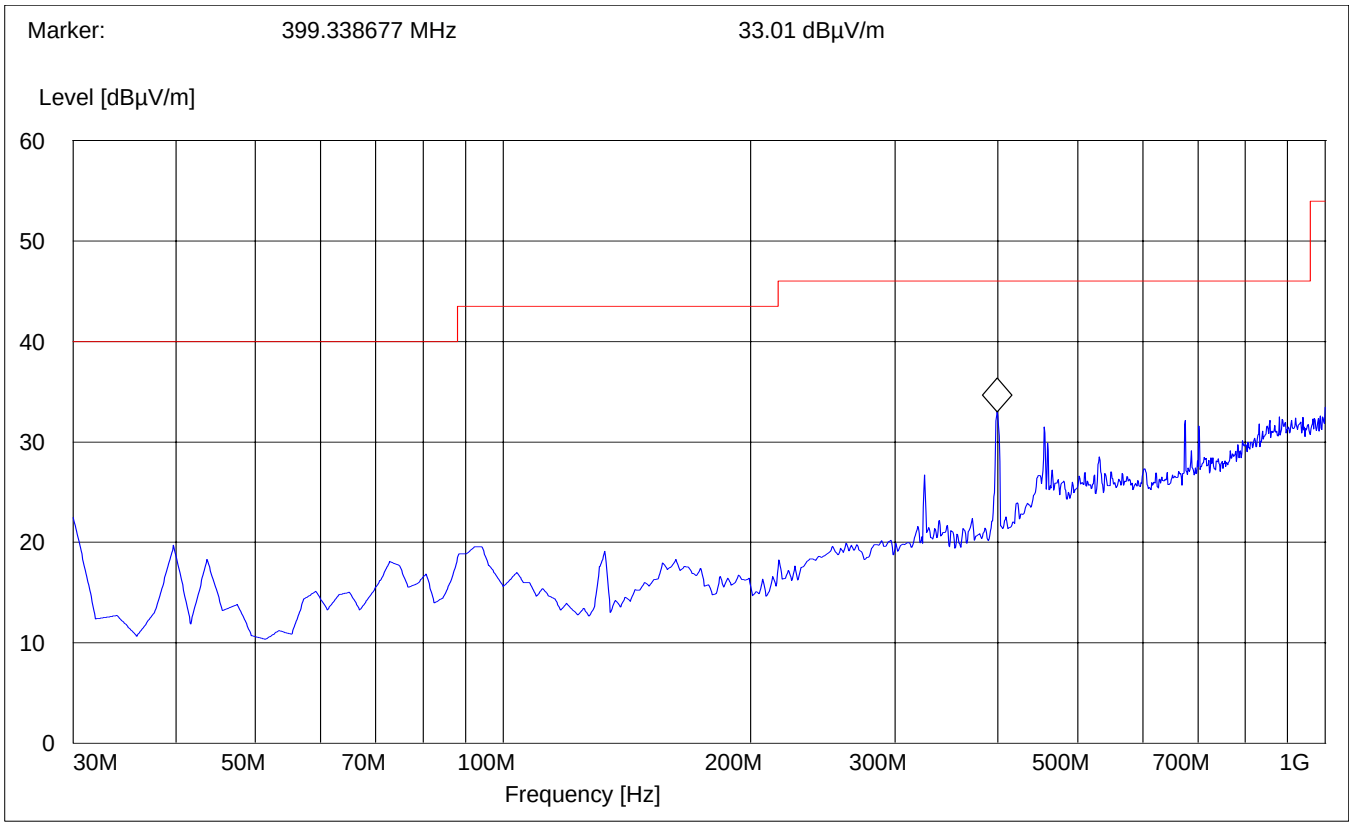
Transmit at Middle channel Frequency 5805MHz			
Frequency (MHz)	**Level (dBµV/m)**		
	Peak	**Quasi-Peak**	**Average**
11607.21	61.39		51.64
17426.85	52.27		40.52

EMISSION LIMITATIONS - Radiated (Transmitter) **§ 15.407 (b)(1)(3)(2)(4)(6)**
Channel (5180MHz): 30MHz – 1GHz
(Data rate – 54Mbps)
Antenna: **Vertical**

Note: This plot is valid for all channels (worst-case plot)

SWEEP TABLE: "FCC 15.407 30-1G_V"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(1)(3)(2)(4)(6)

Channel (5180MHz): 30MHz – 1GHz

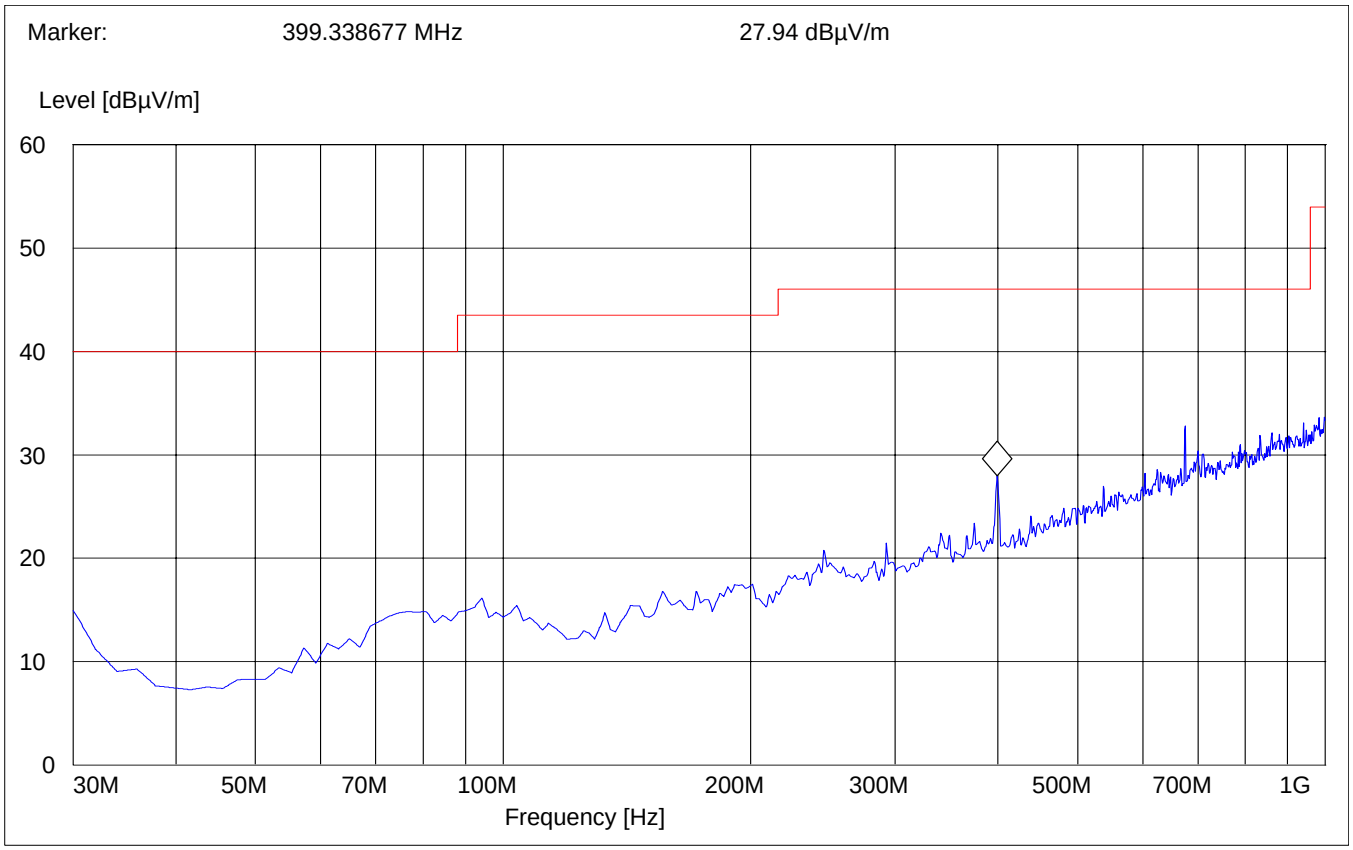
(Data rate – 54Mbps)

Antenna: Horizontal

Note: This plot is valid for all channels (worst-case plot)

SWEEP TABLE: "FCC 15.407 30-1G_H"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(1)(2)(4)(6)

Channel (5180MHz): 1GHz – 7GHz

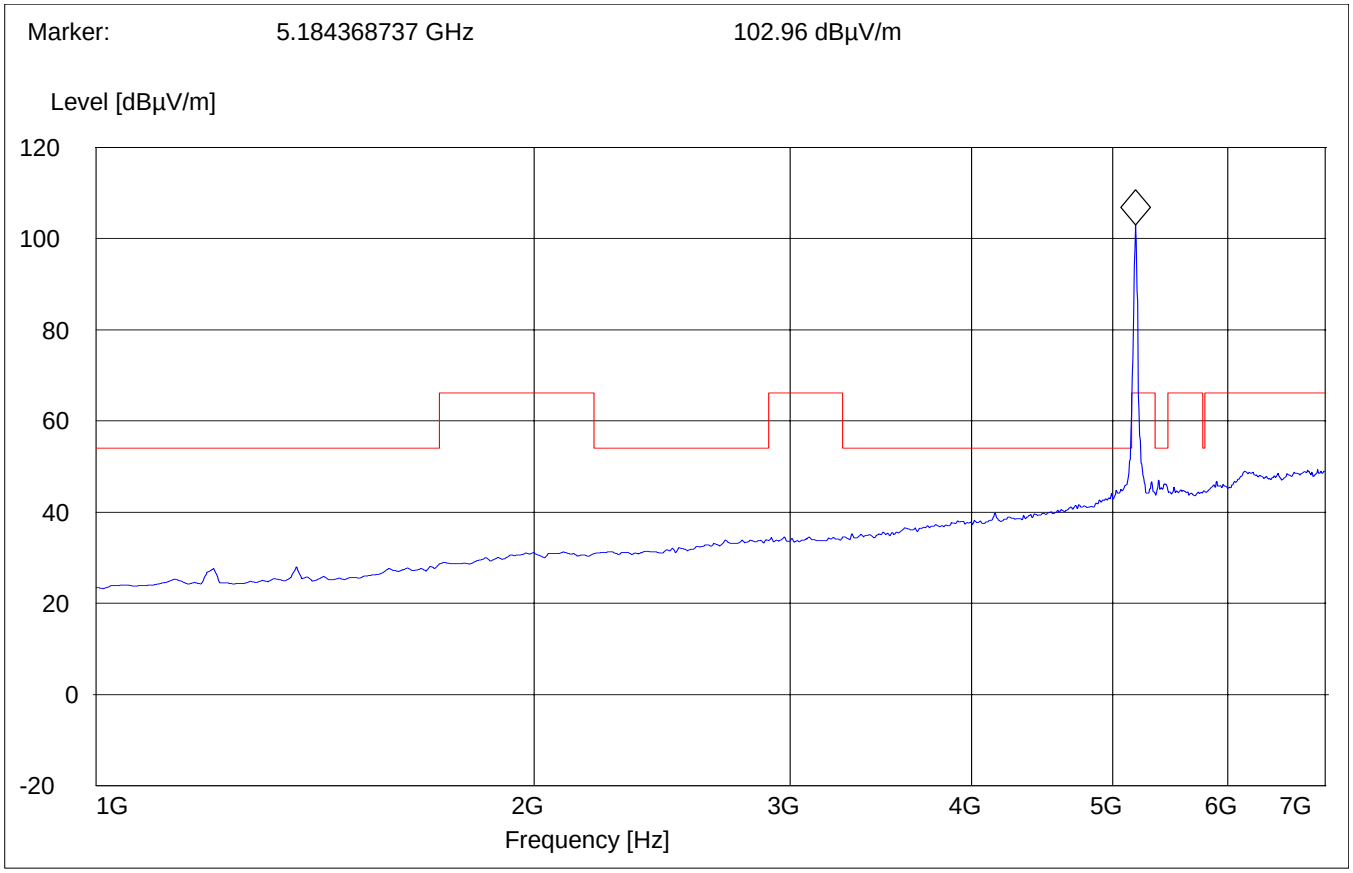
(Average)

(Data rate – 54Mbps)

Note: The peak above the limit line is the carrier freq.

SWEEP TABLE: "FCC 15.407 1-7G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
1GHz	7.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(1)(2)(4)(6)

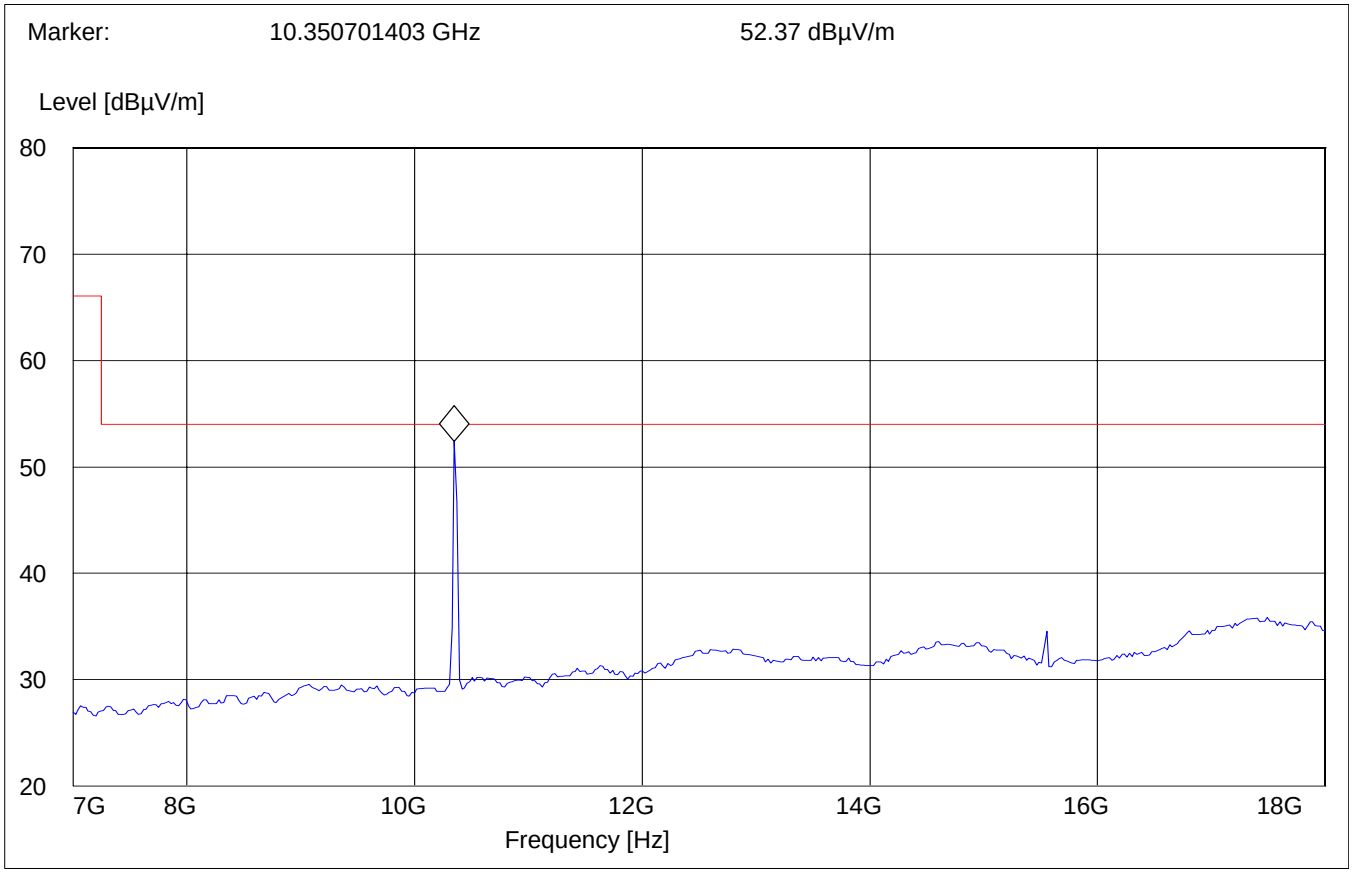
Channel (5180MHz): 7GHz – 18GHz

(Average)

(Data rate – 54Mbps)

SWEEP TABLE: "FCC 15.407 7-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
7GHz	18.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(1)(2)(4)(6)

Channel (5260MHz): 1GHz – 7GHz

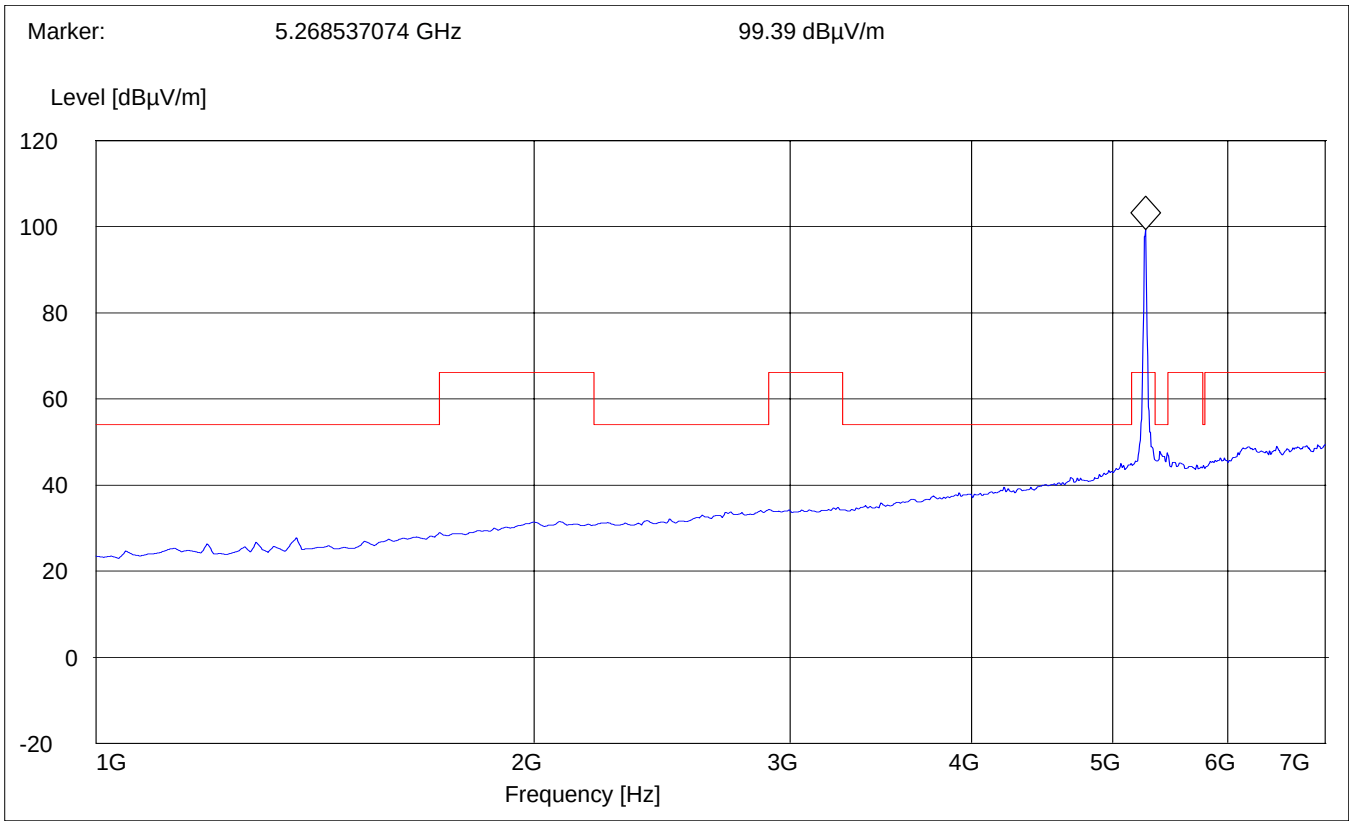
(Average)

(Data rate – 54Mbps)

Note: The peak above the limit line is the carrier freq.

SWEEP TABLE: "FCC 15.407 1-7G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
1GHz	7.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn



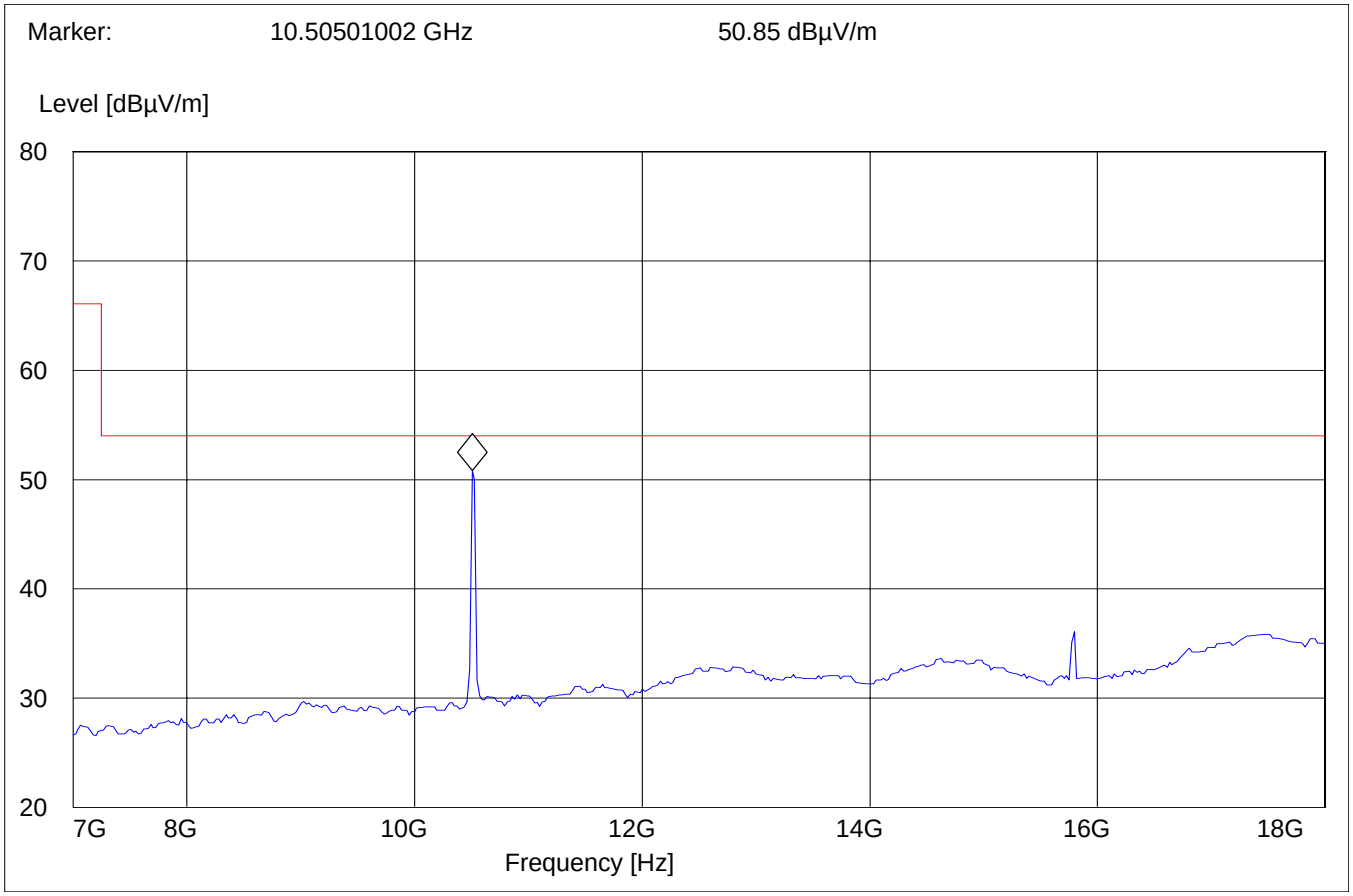
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(1)(2)(4)(6)

Channel (5260MHz): 7GHz – 18GHz

(Average)

(Data rate – 54Mbps)

SWEEP TABLE:		"FCC 15.407 7-18G"				
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
7GHz	18.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn

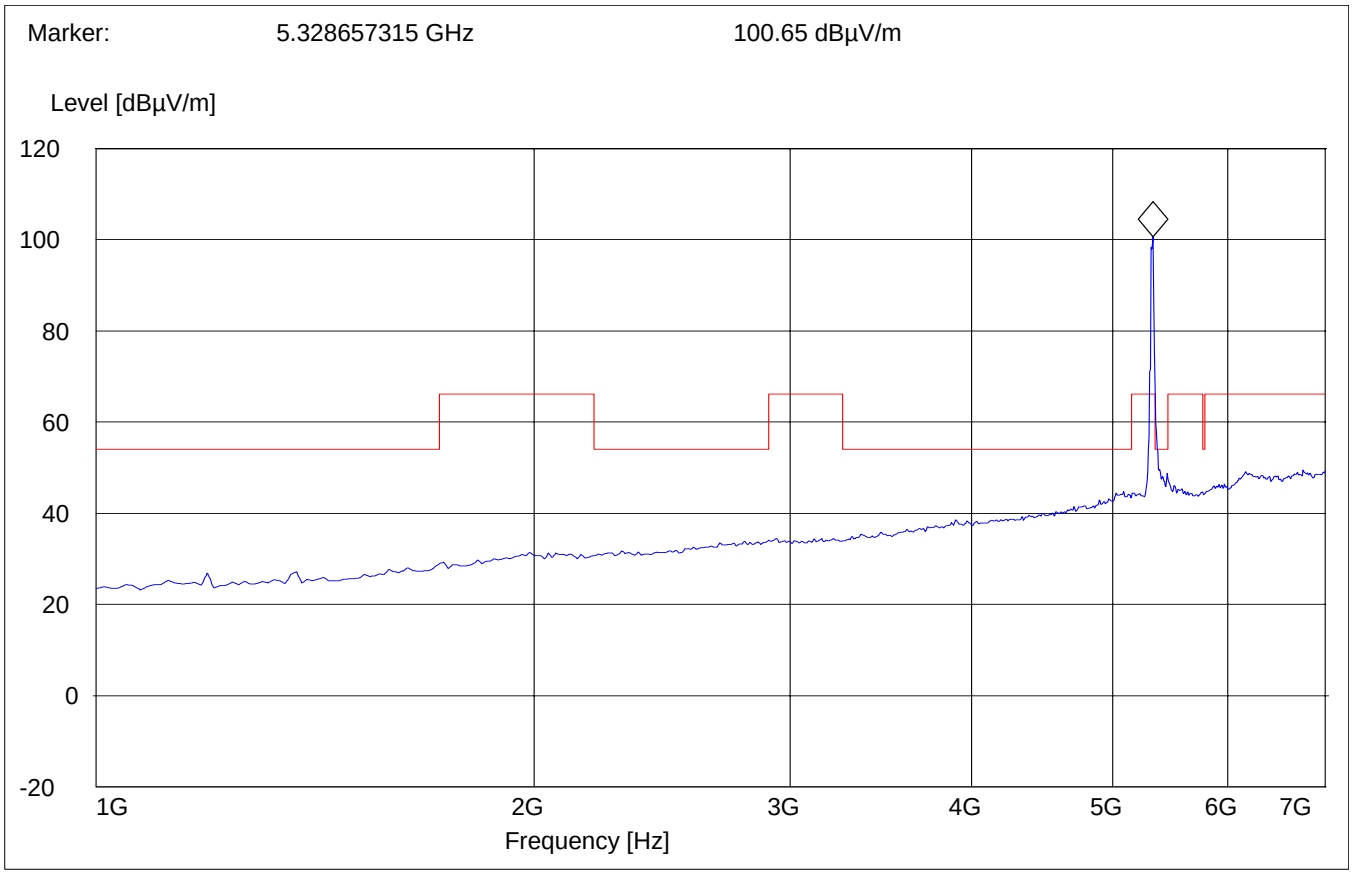


EMISSION LIMITATIONS - Radiated (Transmitter) **§ 15.407 (b)(1)(2)(4)(6)**
Channel (5320MHz): 1GHz – 7GHz
(Data rate – 54Mbps)
(Average)

Note: The peak above the limit line is the carrier freq.

SWEEP TABLE: "FCC 15.407 1-7G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
1GHz	7.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn



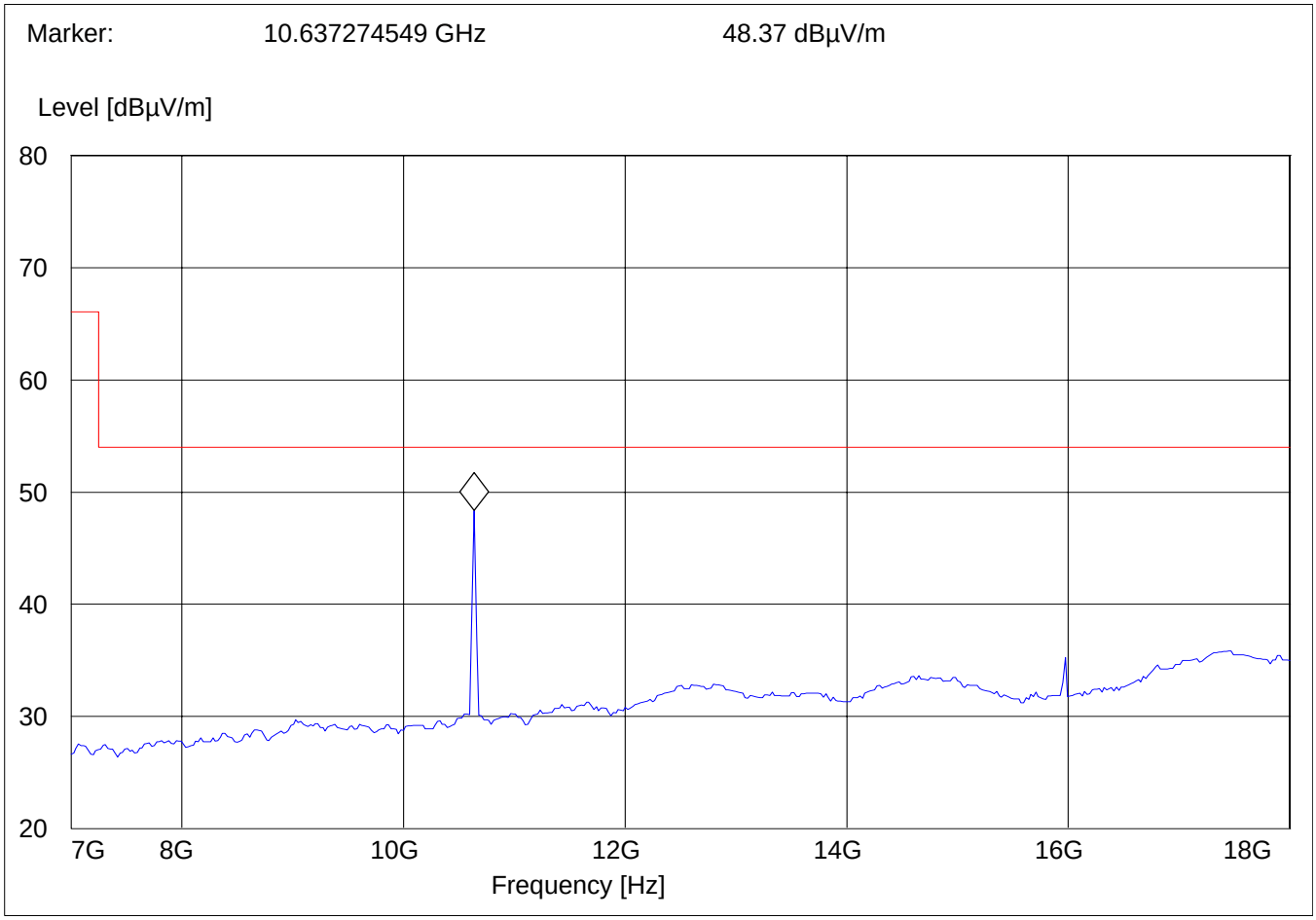
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(1)(2)(4)(6)

Channel (5320MHz): 7GHz – 18GHz

(Average)

(Data rate – 54Mbps)

SWEEP TABLE:		"FCC 15.407 7-18G"				
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
7GHz	18.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(3)(4)(6)

Channel (5745MHz): 1GHz – 7GHz

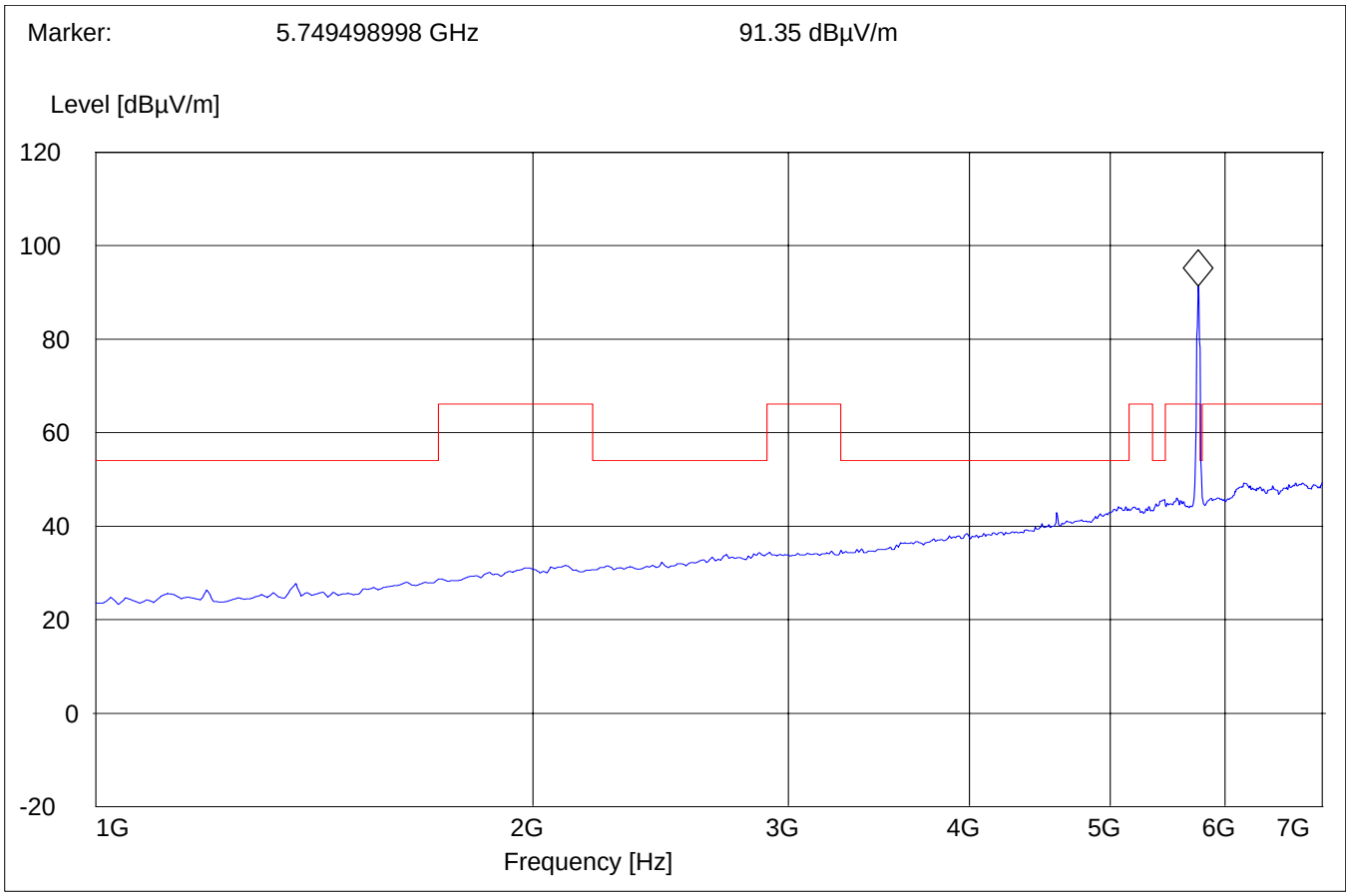
(Data rate – 54Mbps)

(Average)

Note: The peak above the limit line is the carrier freq.

SWEEP TABLE: "FCC 15.407 1-7G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
1GHz	7.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn



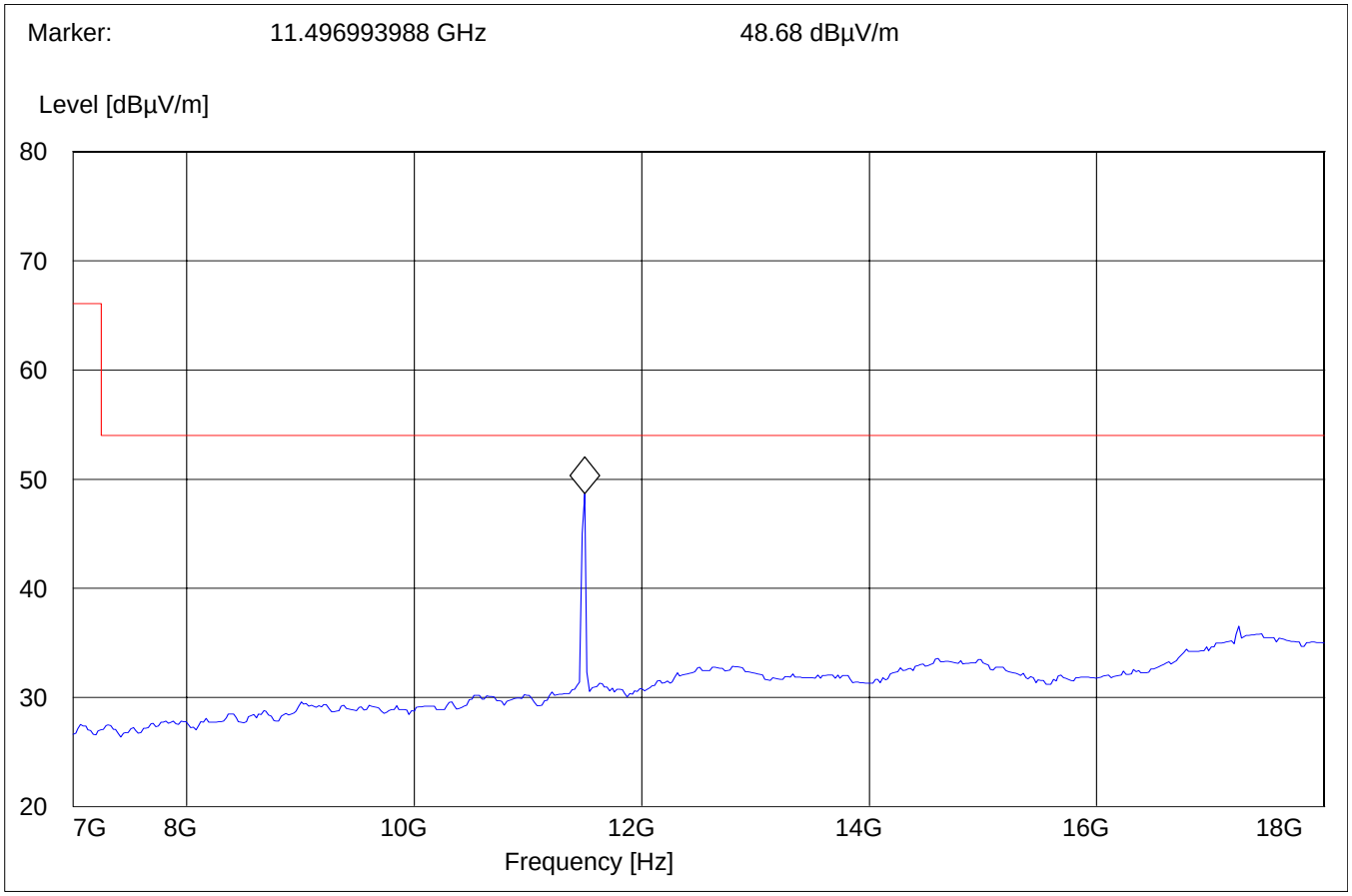
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(3)(4)(6)

Channel (5745MHz): 7GHz – 18GHz

(Average)

(Data rate – 54Mbps)

SWEEP TABLE:		"FCC 15.407 7-18G"				
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
7GHz	18.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn



EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(3)(4)(6)

Channel (5805MHz): 1GHz – 7GHz

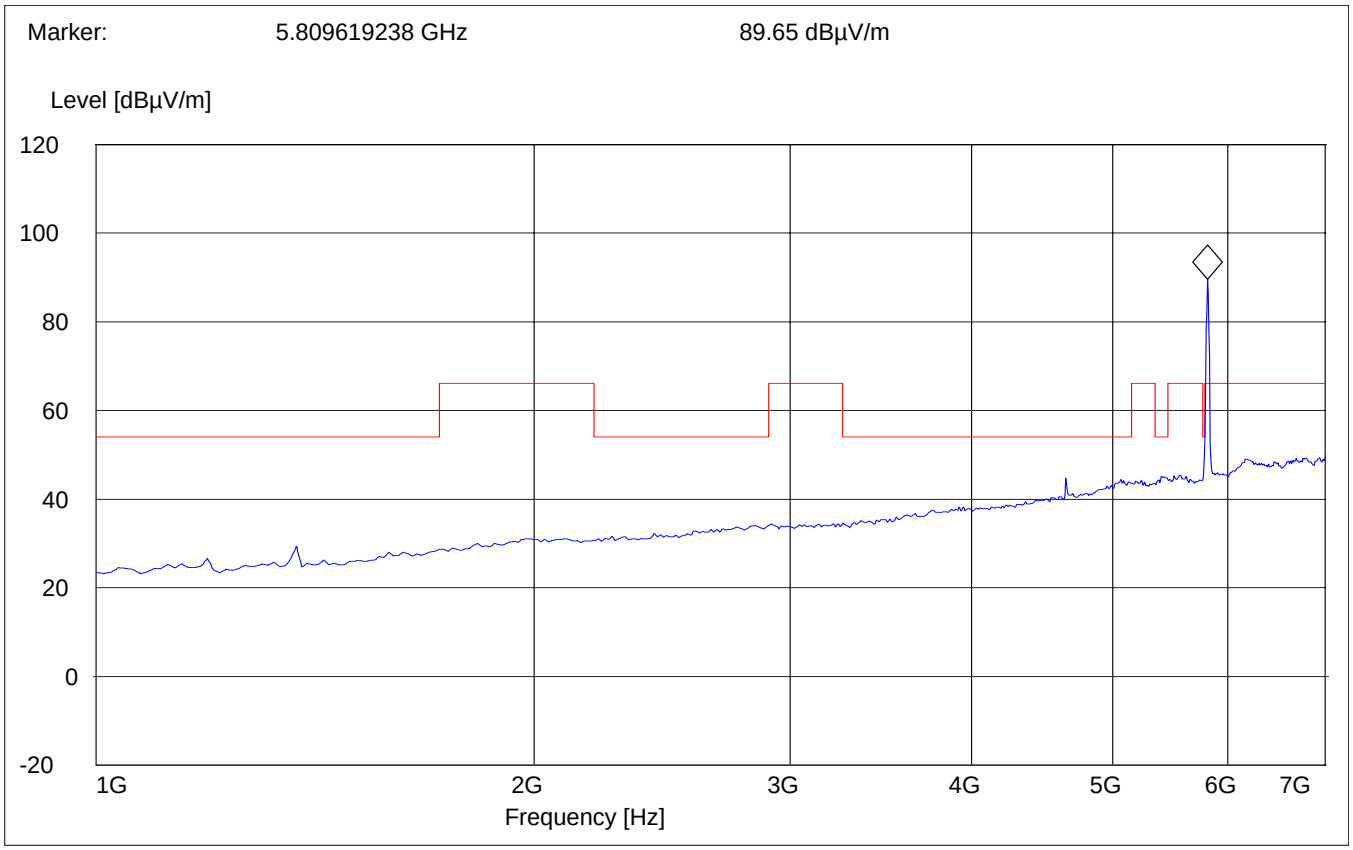
(Data rate – 54Mbps)

(Average)

Note: The peak above the limit line is the carrier freq.

SWEEP TABLE: "FCC 15.407 1-7G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
1GHz	7.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn



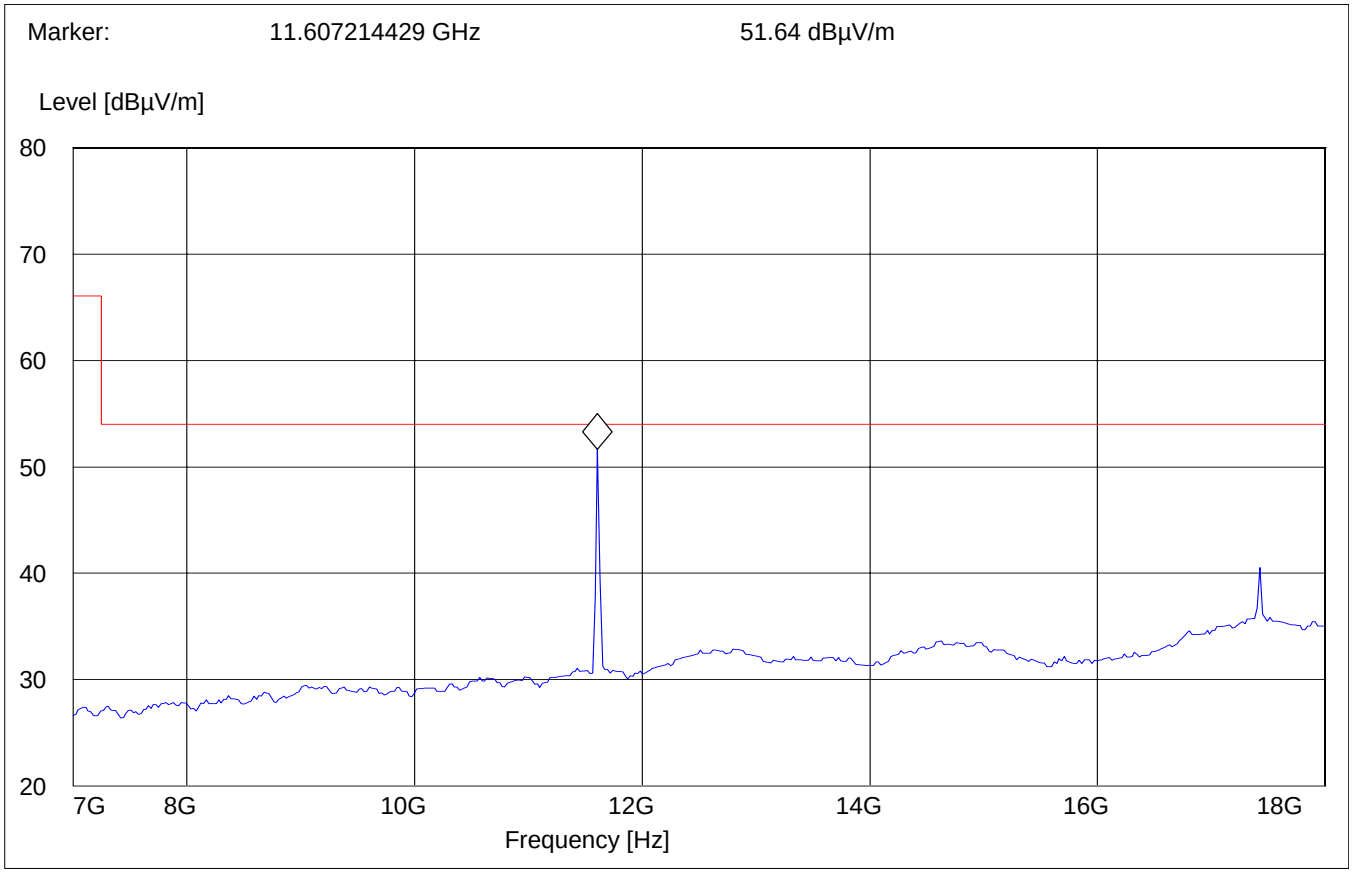
EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(3)(4)(6)

Channel (5805MHz): 7GHz – 18GHz

(Average)

(Data rate – 54Mbps)

SWEEP TABLE:		"FCC 15.407 7-18G"				
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW	Transducer
7GHz	18.0 GHz	MaxPeak	Coupled	1MHz	10Hz	326 horn

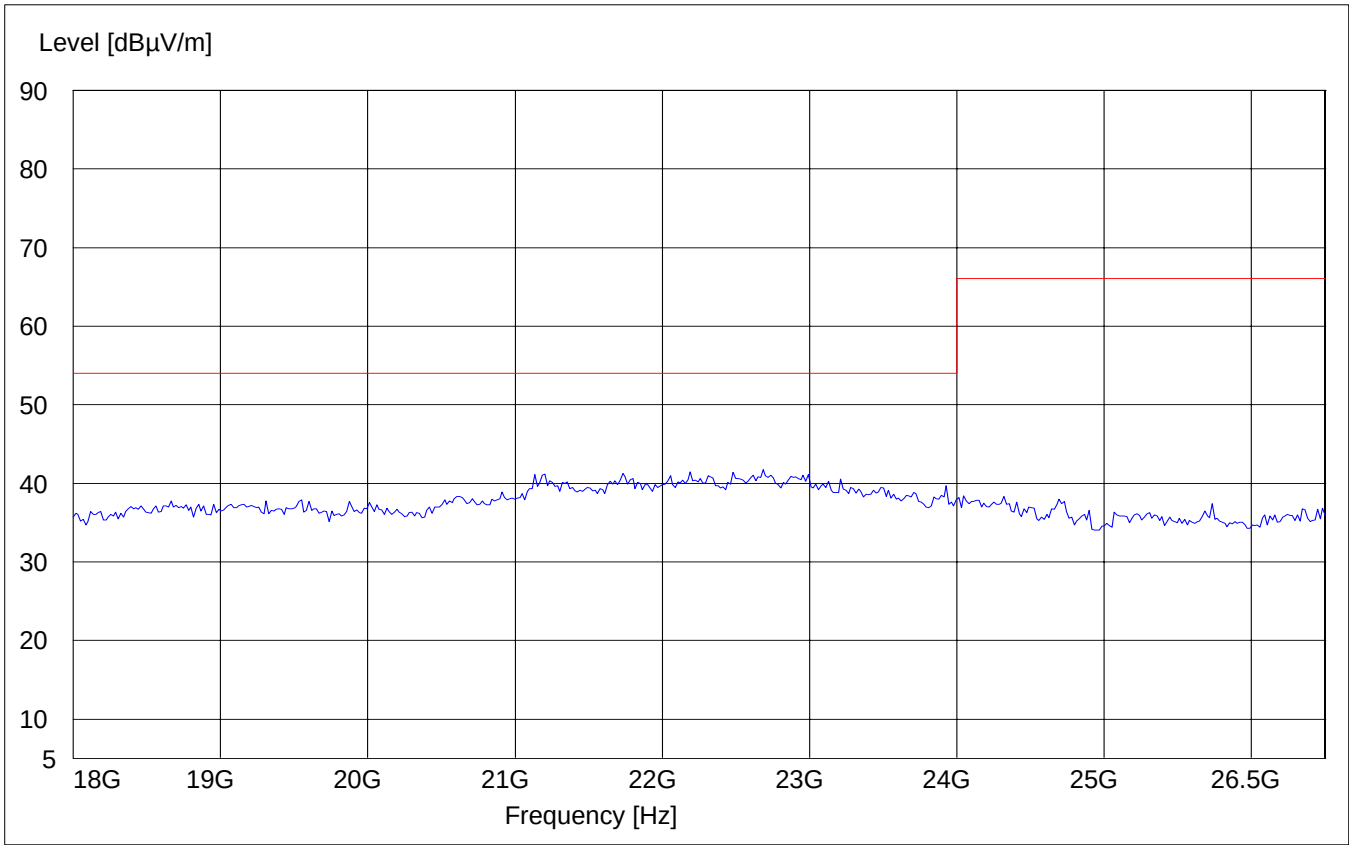


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(1)(2)(4)(6)
18GHz – 26.5GHz
(Data rate – 54Mbps)

Note: This plot is valid for all channels (worst-case plot)

SWEEP TABLE: "FCC 15.407 18-26.5G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
18GHz	26.5 GHz	MaxPeak	Coupled	1MHz	3160-09 horn

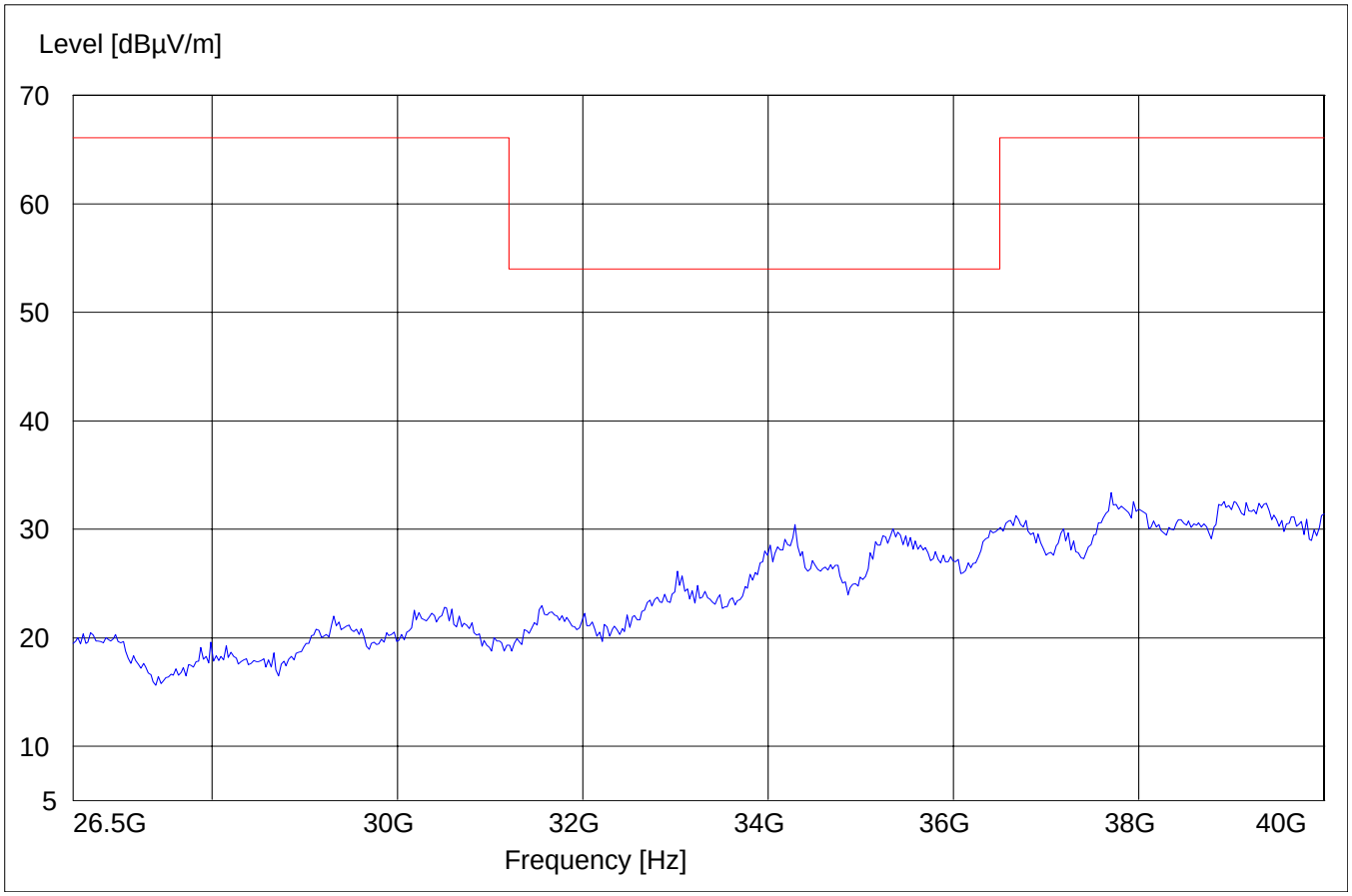


EMISSION LIMITATIONS - Radiated (Transmitter) § 15.407 (b)(1)(2)(4)(6)
26.5GHz – 40GHz
(Data rate – 54Mbps)

Note: This plot is valid for all channels (worst-case plot)

SWEEP TABLE: "FCC 15.407 26.5-40G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
26.5GHz	40 GHz	MaxPeak	Coupled	1MHz	3160-10 horn



CONDUCTED EMISSIONS § 15.107/207

Measured with AC/DC power adapter

SWEEP TABLE: "55022 cond"

Short Description: EN 55022 for 150KHz-30MHz

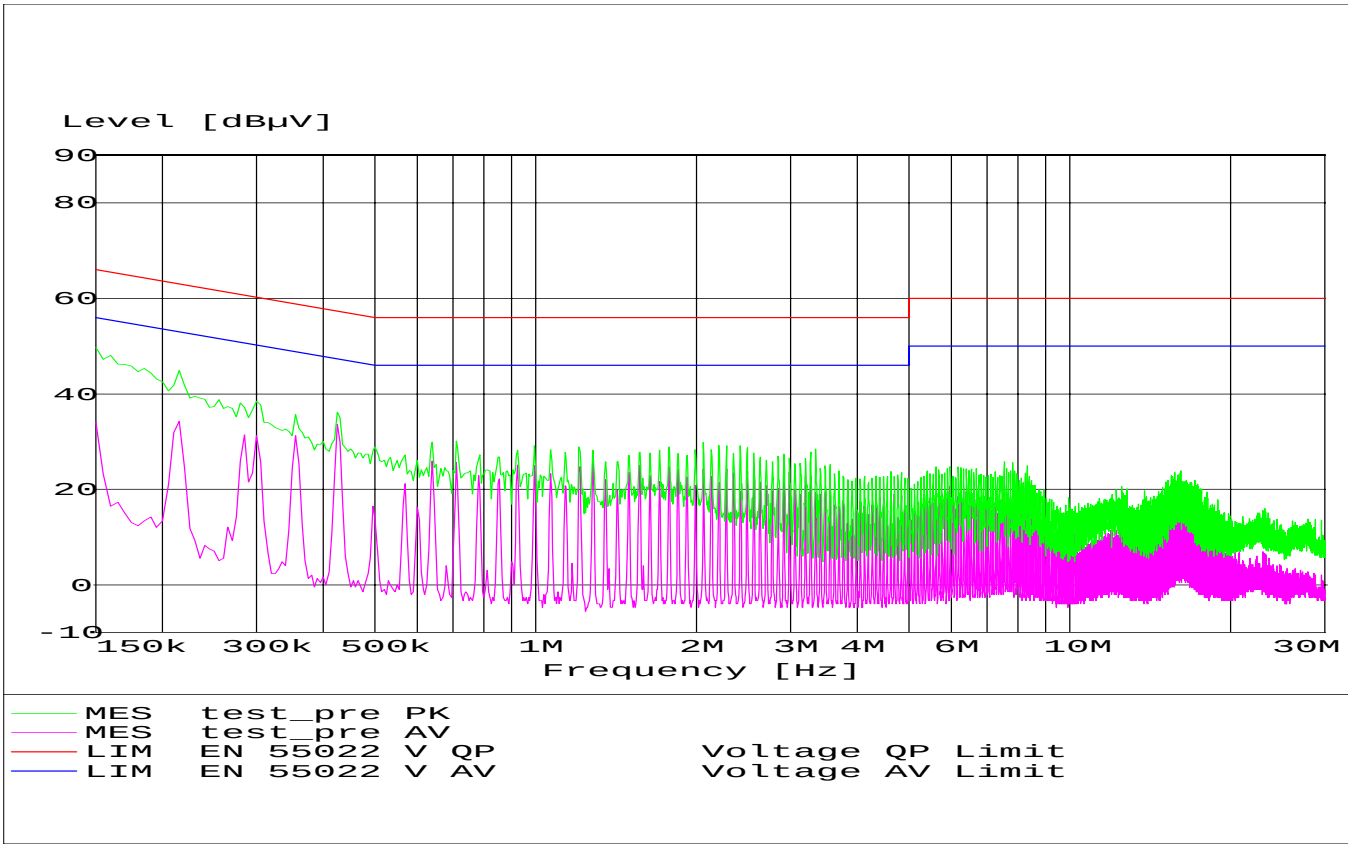
Start Frequency	Stop Frequency	Detector	Meas Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	MaxPeak	Coupled	10 kHz	None

Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)

Limit

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz



RECEIVER SPURIOUS RADIATION § 15.209

Limits

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

NOTE:
The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 40 GHz very short cable connections to the antenna was used to minimize the noise level.

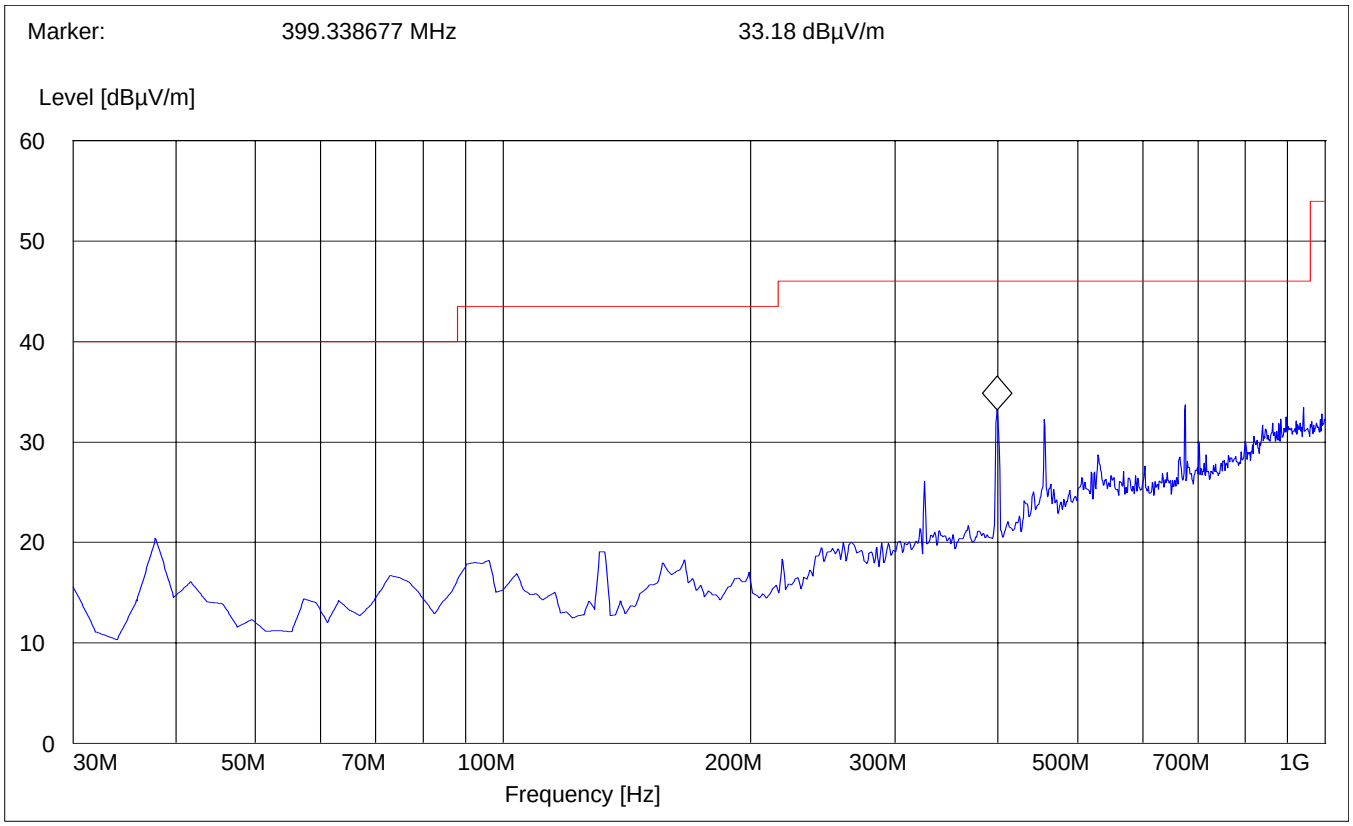
RECEIVER SPURIOUS RADIATION § 15.209

30MHz – 1GHz

Antenna: **Vertical**

SWEEP TABLE: "WLAN Spuri hi 30-1G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186

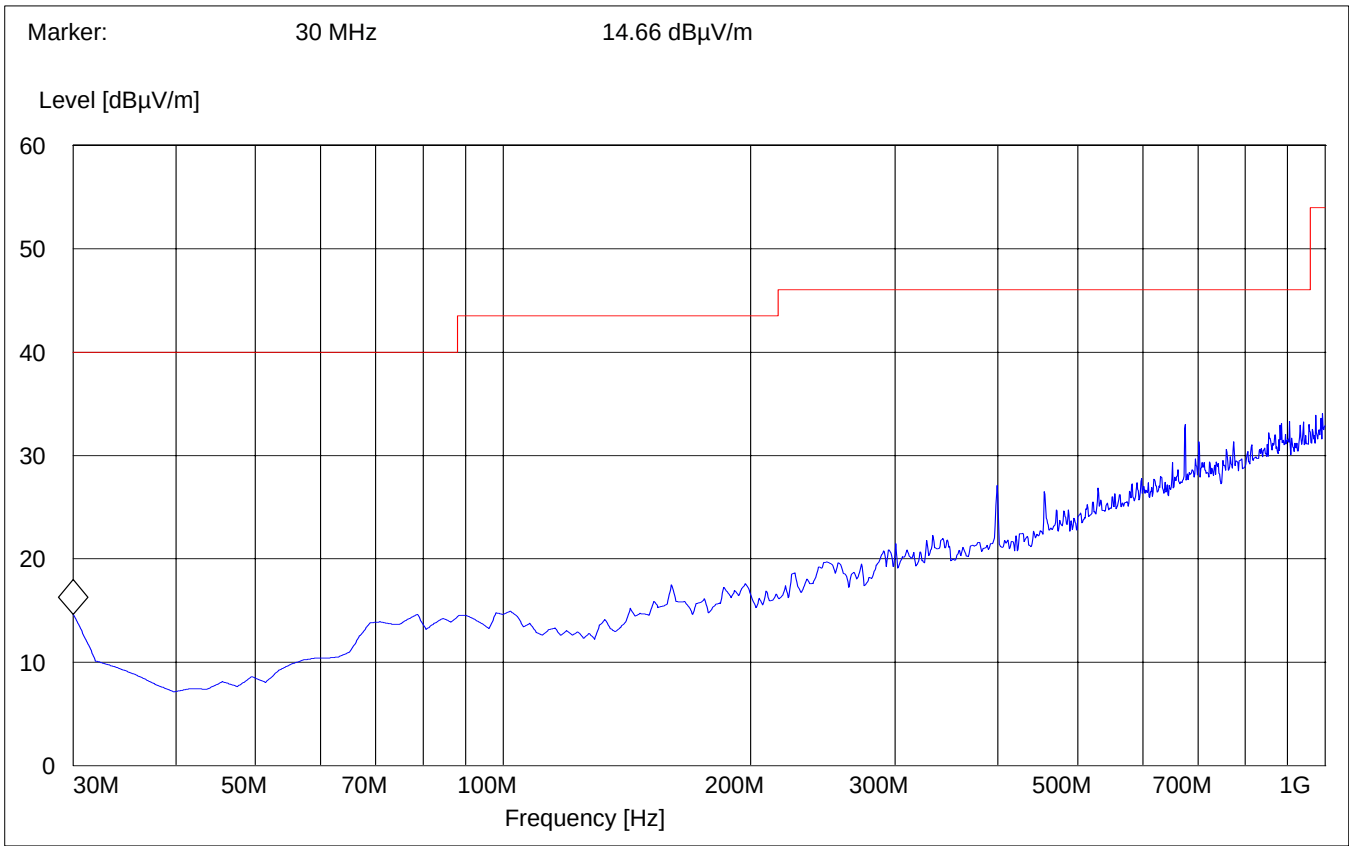


RECEIVER SPURIOUS RADIATION § 15.209
30MHz – 1GHz

Antenna: **Horizontal**

SWEEP TABLE: "WLAN Spuri hi 30-1G"

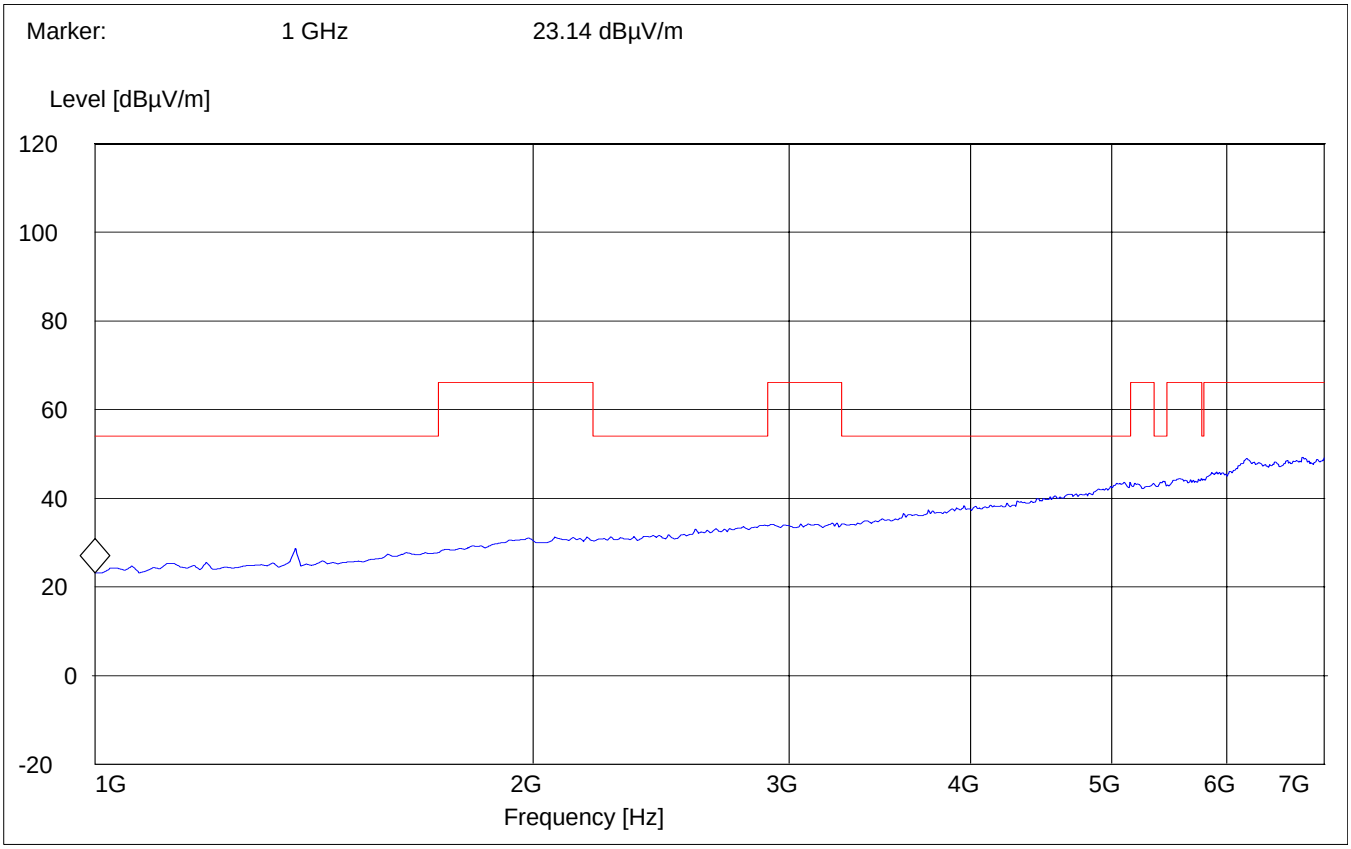
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



RECEIVER SPURIOUS RADIATION § 15.209
1GHz – 7GHz

SWEEP TABLE: "WLAN Spuri hi 1-7G"

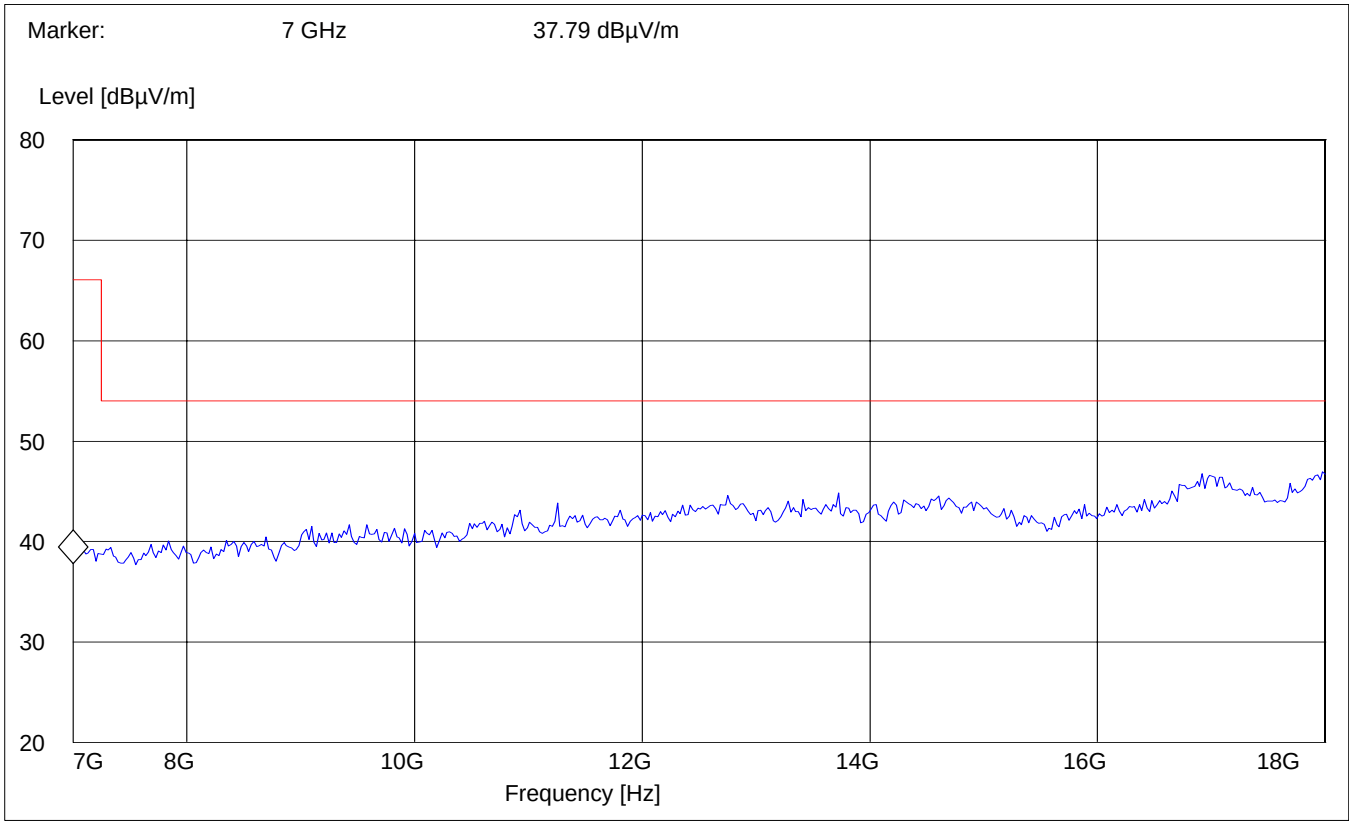
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
1.0 GHz	7.0 GHz	MaxPeak	Coupled	1 MHz	1MHz	#326 horn (dBi)



RECEIVER SPURIOUS RADIATION § 15.209
7GHz – 18GHz

SWEEP TABLE: "WLAN Spuri hi 7-18G"

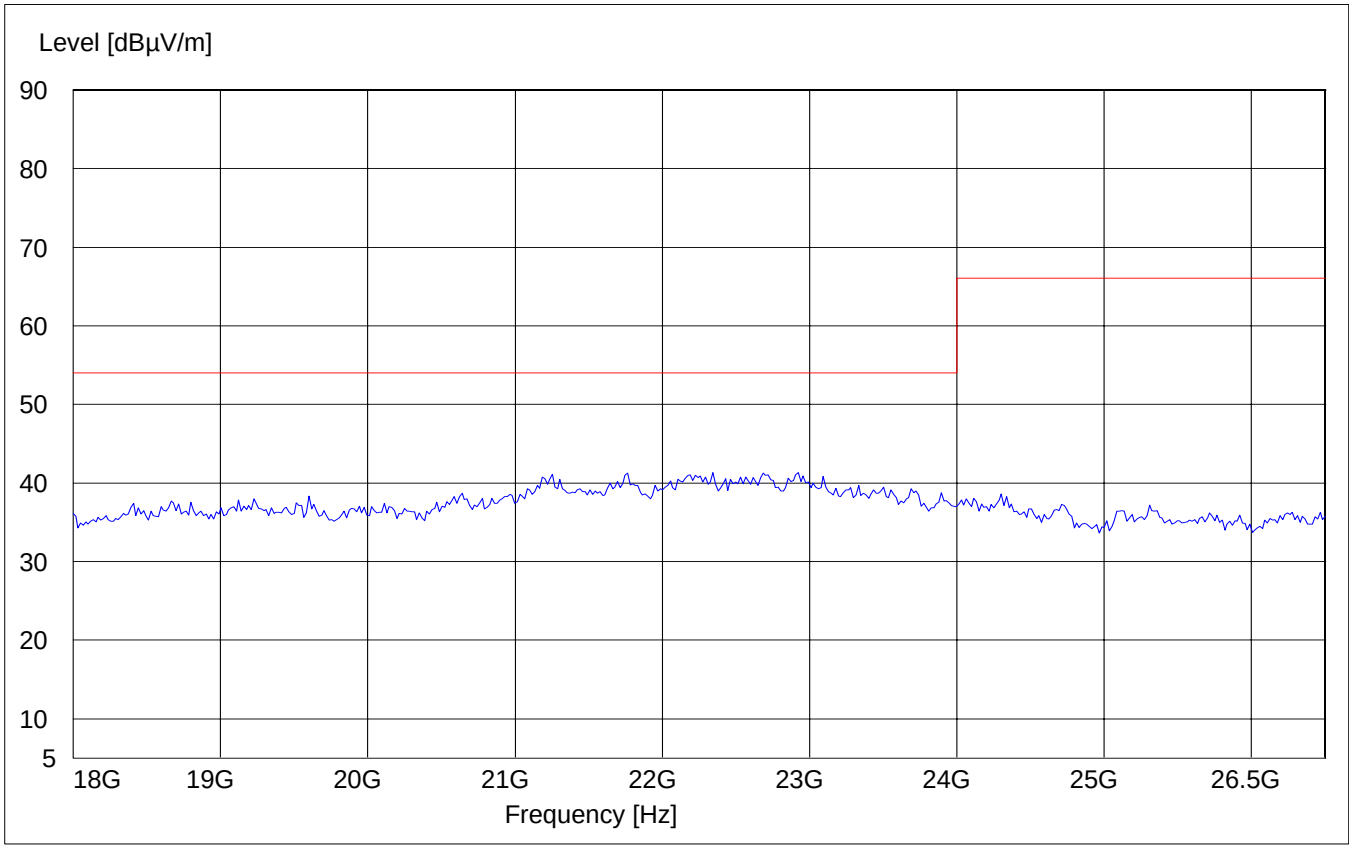
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
7.0 GHz	18 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



RECEIVER SPURIOUS RADIATION § 15.209
18GHz – 26.5GHz

SWEEP TABLE: "WLAN Spuri hi 18-26.5G"

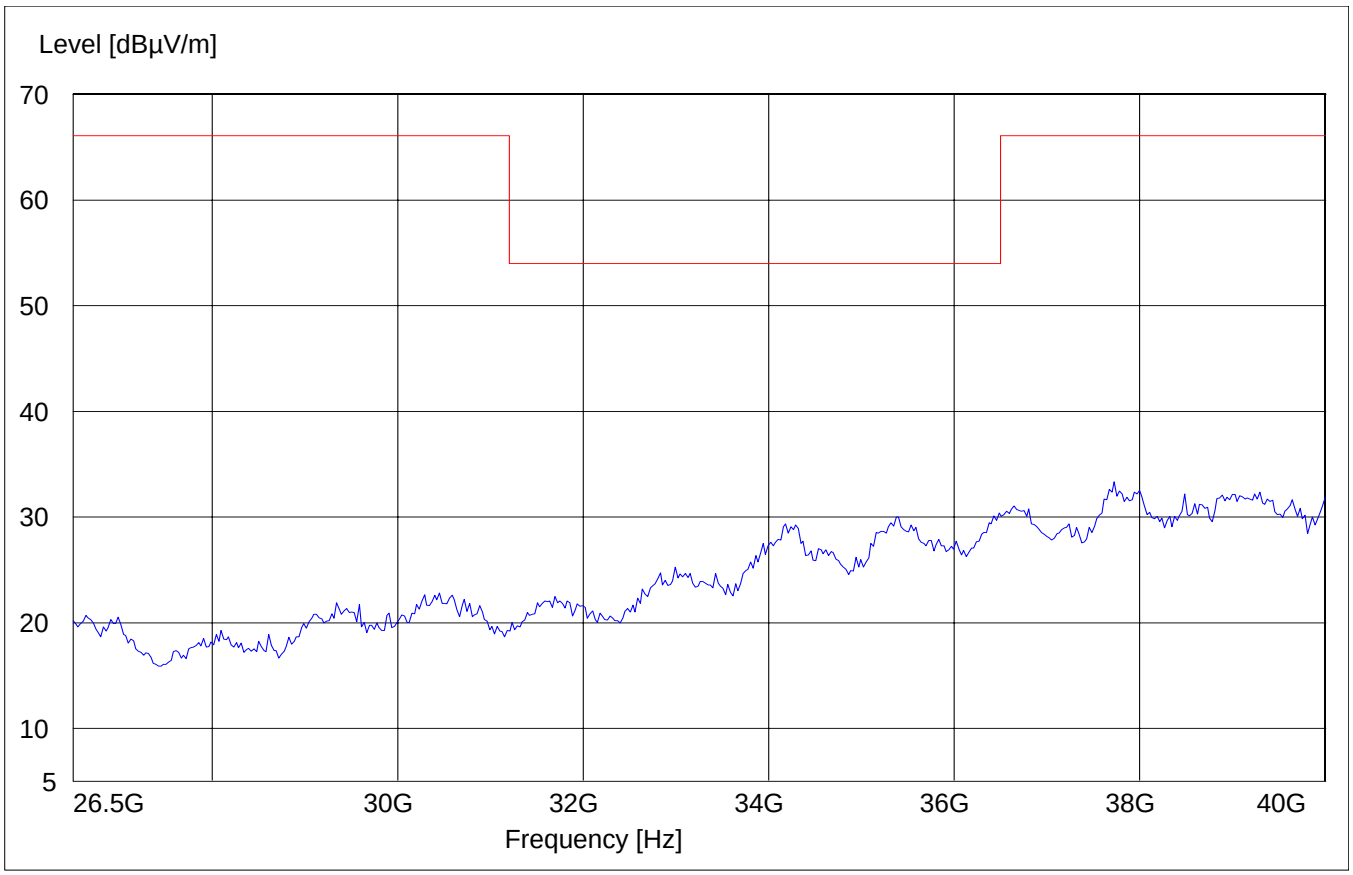
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
18 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	#141 horn (dBi)



RECEIVER SPURIOUS RADIATION § 15.209
26.5GHz – 40GHz

SWEEP TABLE: "WLAN Spuri hi 26.5-40G"

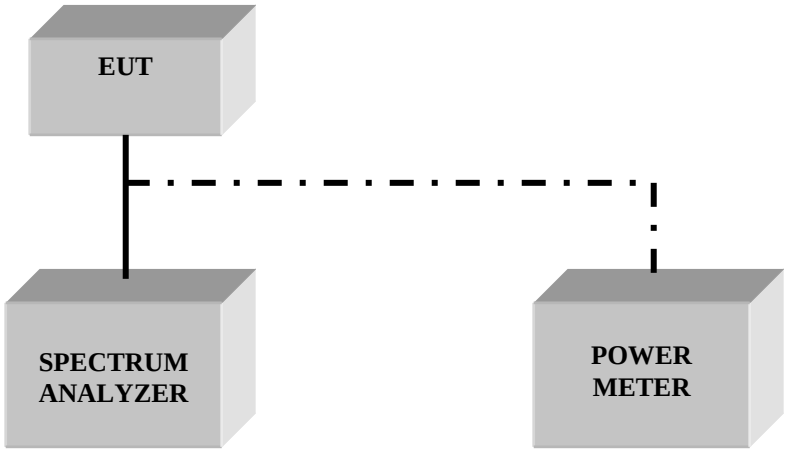
Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW VBW	Transducer
26.5 GHz	40 GHz	MaxPeak	Coupled	1 MHz	3160-10 horn



TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
03	Biconilog Antenna	3141	EMCO	0005-1186
04	Horn Antenna (700M-18GHz)	SAS-200/571	AH Systems	325
05	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240
06	Horn Antenna (26.5-40GHz)	3160-10	EMCO	1156
07	2-3GHz Band reject filter	BRM50701	Microtronics	6
08	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
09	Pre-Amplifier	TS-ANA	Rohde & Schwarz	--
10	Pre-Amplifier	JS4-00102600	Miteq	00616

BLOCK DIAGRAMS
Conducted Testing



Radiated Testing