



FCC Test Report

Test report no.: EMC_678FCC15.247_2004_BT+WLAN+GSM

FCC Part 15.247 / CANADA RSS-210

EUT Tablet PC with

BT module Model: TM60M665

WLAN Model: 2200BG

GSM module Model: MC56

IC ID: 4596A-iX104WBG



TTI-P-G 081/94-A0

Accredited according to **ISO/IEC 17025**



**Bluetooth Qualification
Test Facility
(BQTF)**



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

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Country : USA
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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 : 2004-06-21
Date of test : 2004-06-21/22/23/29

1.5 Test item

Manufacturer : Applicant
Model No. : iX104-TM60+2200, iX104-TM60+MC56,
iX104-2200+MC56, iX104-TM60+2200+MC56
Description : [Tablet PC with BT module, WLAN, GSM module](#)
FCC-ID : Q2GIX104-124, Q2GIX104-125,
Q2GIX104-127, Q2GIX104-129
IC ID : 4596A-iX104WBG

Additional information

Test Sample ID : PARIS
Frequency : 2402MHz – 2480MHz for BT
2412MHz – 2462MHz for WLAN
824.2MHz – 848.8MHz for GSM 850,
1850.2MHz – 1909.8MHz for PCS 1900
Type of modulation : FHSS, DSSS & OFDM, GFSK
Antenna : Embedded
Power supply : via host Tablet PC
Extreme temp. Tolerance : -30°C to +50°C

1.6 Test standards: **FCC Part 15 §15.247 (DA00-705) / RSS 210**

SUMMARY OF TEST REPORT

This test report is valid for collocation combination of different radios under following FCC ID's and model #'s

FCC ID: Q2GIX104-124	EUT Model: iX104-TM60+2200	(BT+WLAN)
FCC ID: Q2GIX104-125	EUT Model: iX104-TM60+MC56	(BT+GSM)
FCC ID: Q2GIX104-127	EUT Model: iX104-2200+MC56	(WLAN+GSM)
FCC ID: Q2GIX104-129	EUT Model: iX104-TM60+2200+MC56	(BT+WLAN+GSM)

For ease of testing all radios (BT, WLAN & GSM) were set to transmit at under-mentioned channels. Testing is done against FCC15.247 limits. GSM mode was tested in both 850 & 1900 bands along with BT & WLAN respectively. Test report carries only worst case plots.

<u>Transmitter</u>	<u>Channel Freq.</u>
GSM 850	ch-128 824.2MHz
GSM 1900	ch-661 1880MHz
BT	ch-0 2402MHz
WLAN	ch-11 2462MHz

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:

2004-07-08 EMC & Radio Lothar Schmidt (Manager)

Date

Section

Name

Signature

Responsible for test report and project leader:

2004-07-08 EMC & Radio Harpreet Sidhu (EMC Engineer)

Date

Section

Name

Signature

2.2 Test report

TEST REPORT

Test report no.: EMC_678FCC15.247_2004_BT+WLAN+GSM

TEST REPORT REFERENCE

LIST OF MEASUREMENTS		PAGE
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EMISSION LIMITATIONS
Transmitter (Radiated)

§ 15.247 (c) (1)

LIMITS

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions that fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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 26.5 GHz very short cable connections to the antenna was used to minimize the noise level.
2. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.
3. All measurements are done in peak mode unless specified with plots.

Results for the radiated measurements below 30MHz according § 15.33

Frequency	Measured values	Remarks
9KHz – 30MHz	No emissions found, caused by the EUT	This is valid for all the tested channels

EMISSION LIMITATIONS - Radiated (Transmitter)**§ 15.247 (c) (1)**

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

Transmit at Lowest channel Frequency			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
See plots			
Transmit at Middle channel Frequency			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
See plots			
Transmit at Highest channel Frequency			
Frequency (MHz)	Level (dB μ V/m)		
	Peak	Quasi-Peak	Average
See plots			

EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

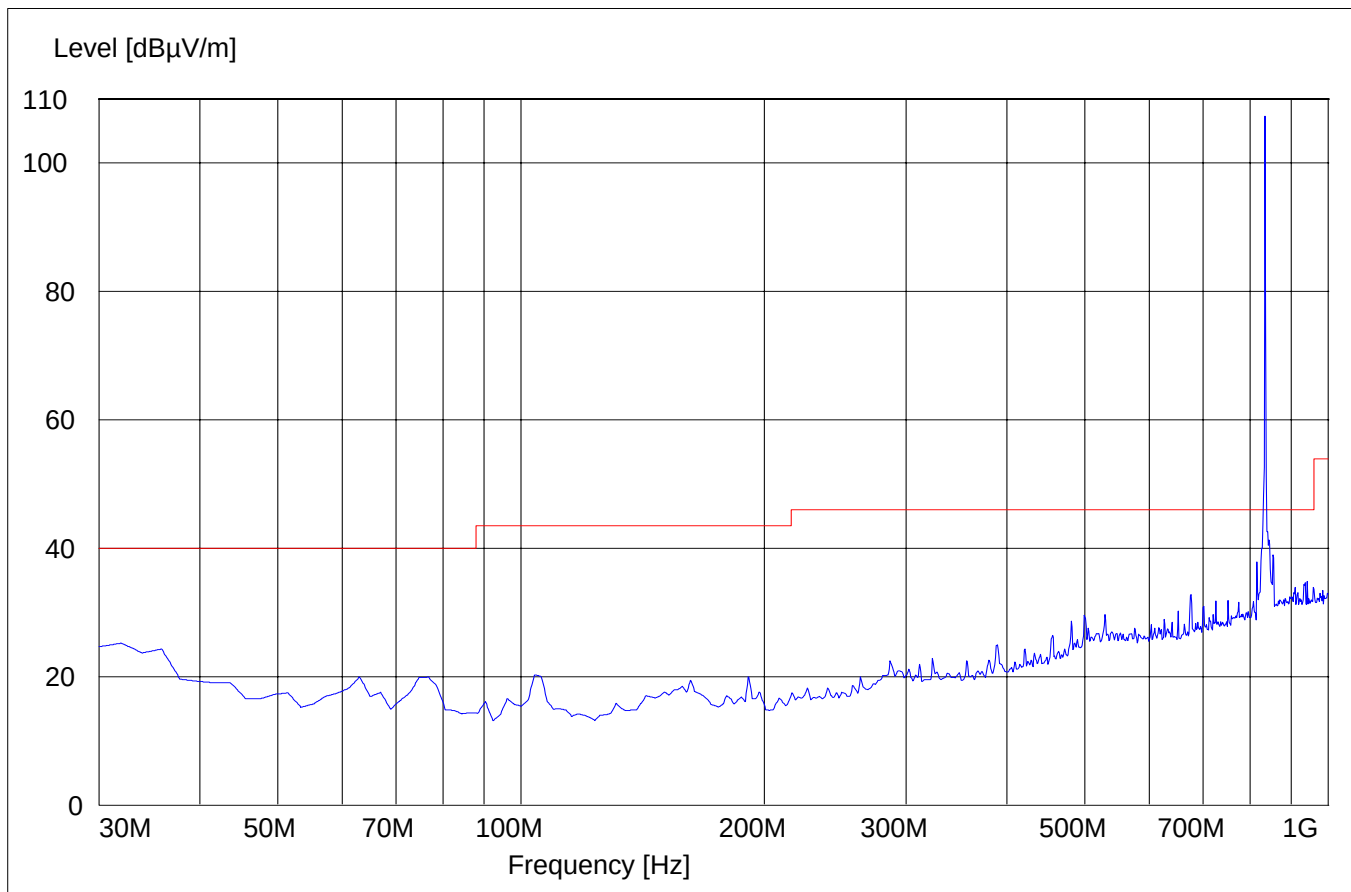
30MHz – 1GHz

Antenna: vertical

GSM850+BT+WLAN

Note: Peak above the limit line is the carrier freq. of GSM 850 @ ch-128

SWEEP TABLE:		"Spuri hi 30-1G"			
Short Description:		30MHz-1GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency		Time	VBW	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

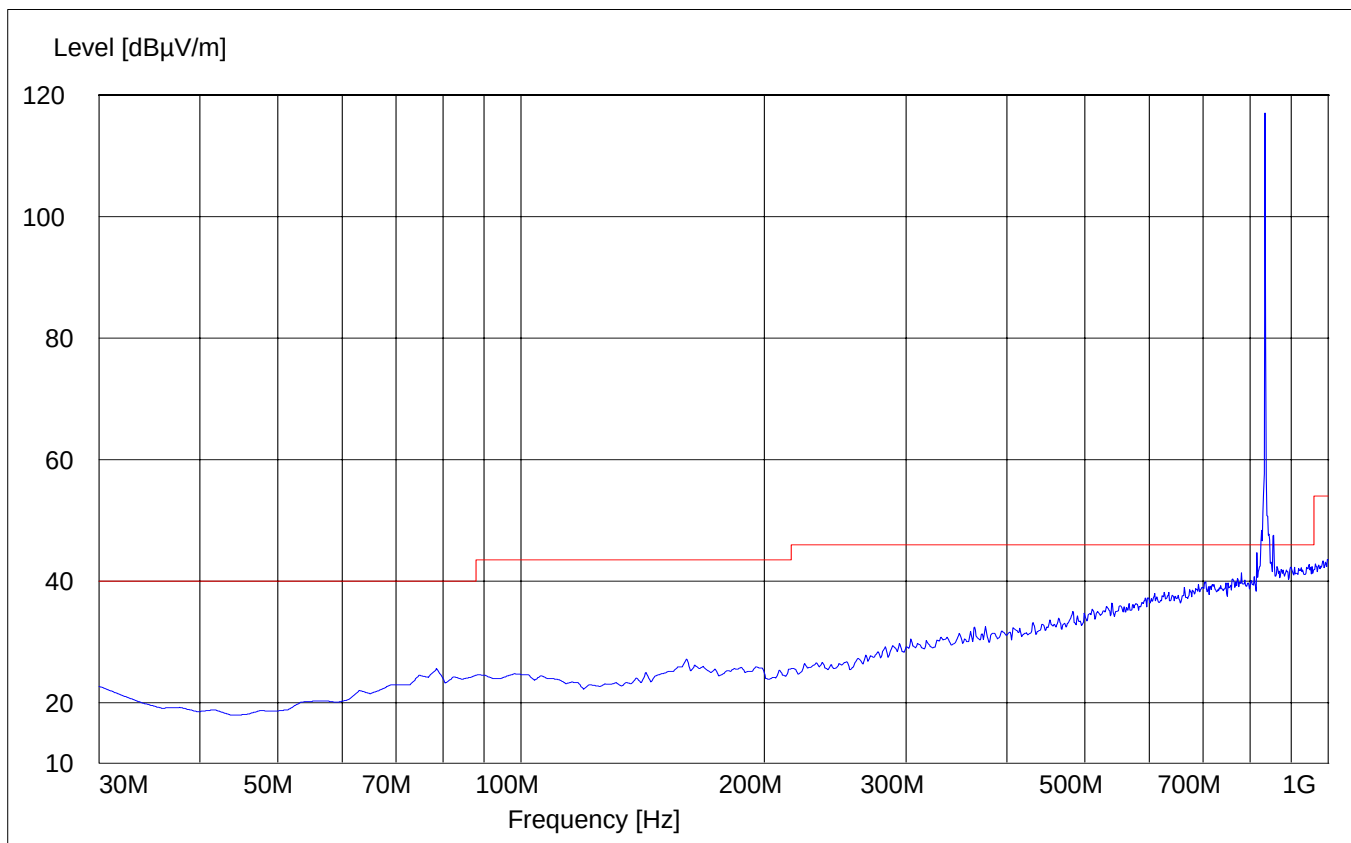
30MHz – 1GHz

Antenna: horizontal

GSM850+BT+WLAN

Note: Peak above the limit line is the carrier freq. of GSM 850 @ ch-128

SWEEP TABLE:		"Spuri hi 30-1G"			
Short Description:		30MHz-1GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency		Time	VBW	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186

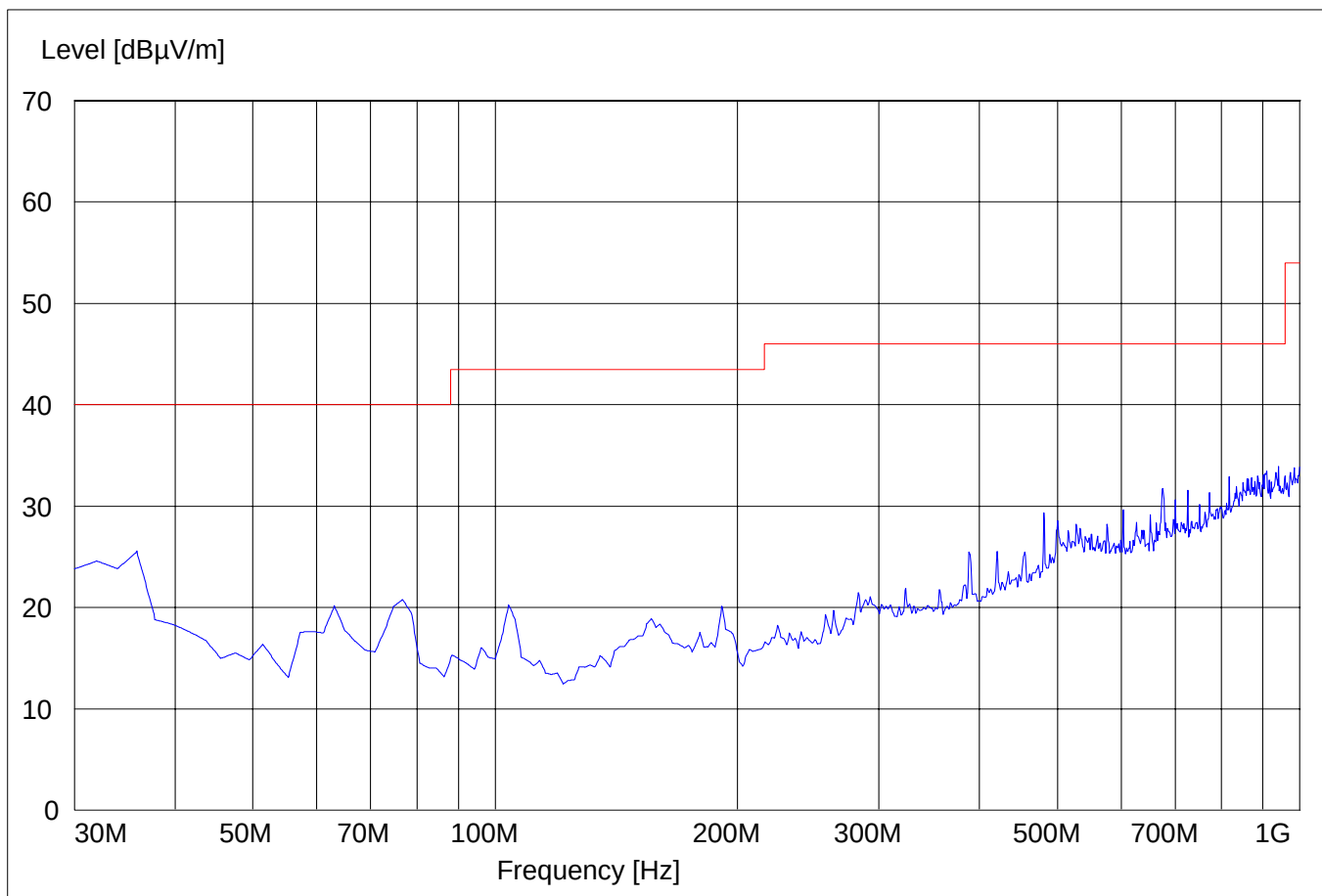


EMISSION LIMITATIONS - Radiated (Transmitter)**§ 15.247 (c) (1)****30MHz – 1GHz****Antenna: vertical****GSM1900+BT+WLAN**

SWEEP TABLE: "Spuri hi 30-1G"

Short Description: 30MHz-1GHz

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

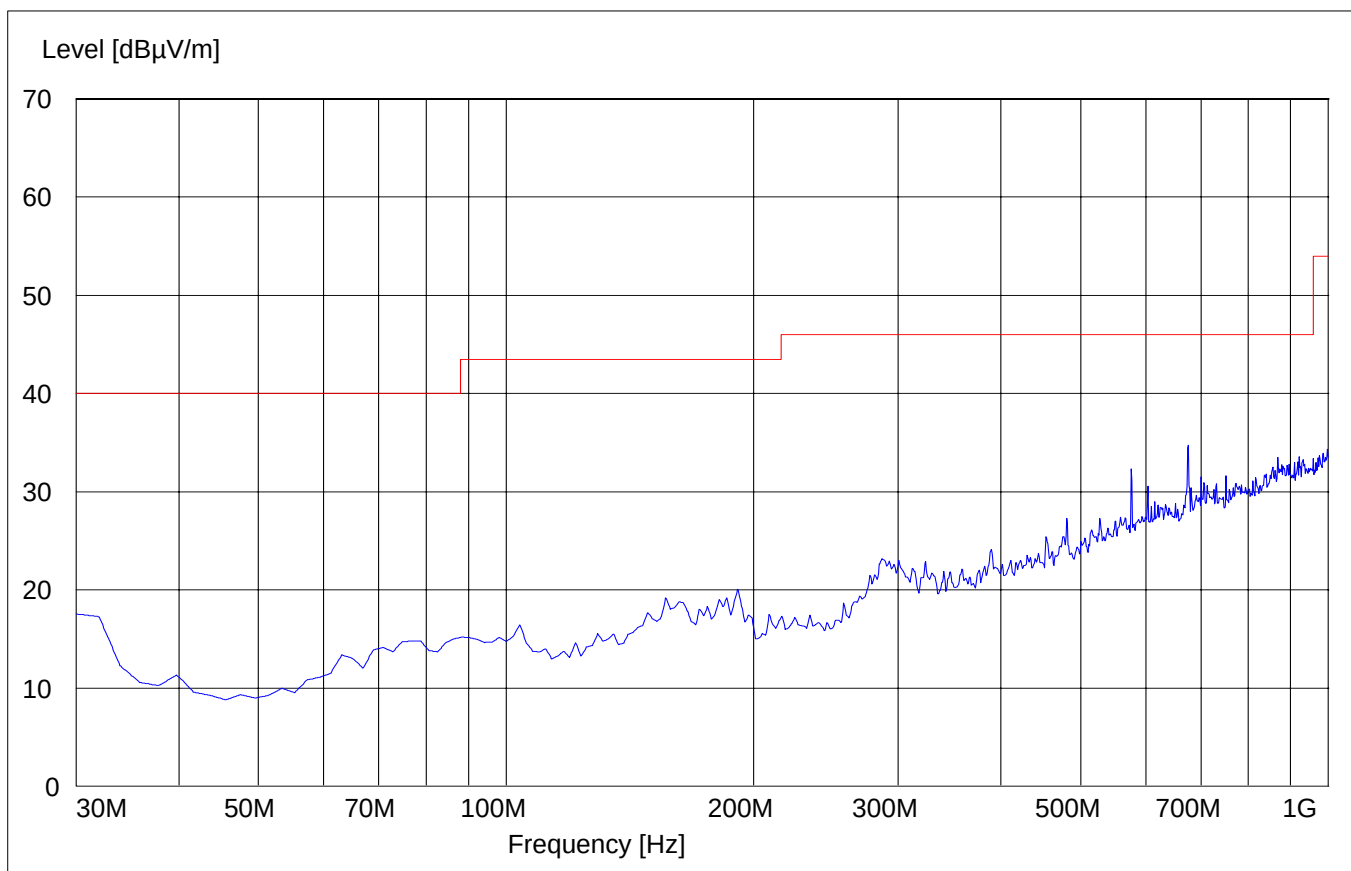


EMISSION LIMITATIONS - Radiated (Transmitter)**§ 15.247 (c) (1)****30MHz – 1GHz****Antenna: horizontal****GSM1900+BT+WLAN**

SWEEP TABLE: "Spuri hi 30-1G"

Short Description: 30MHz-1GHz

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



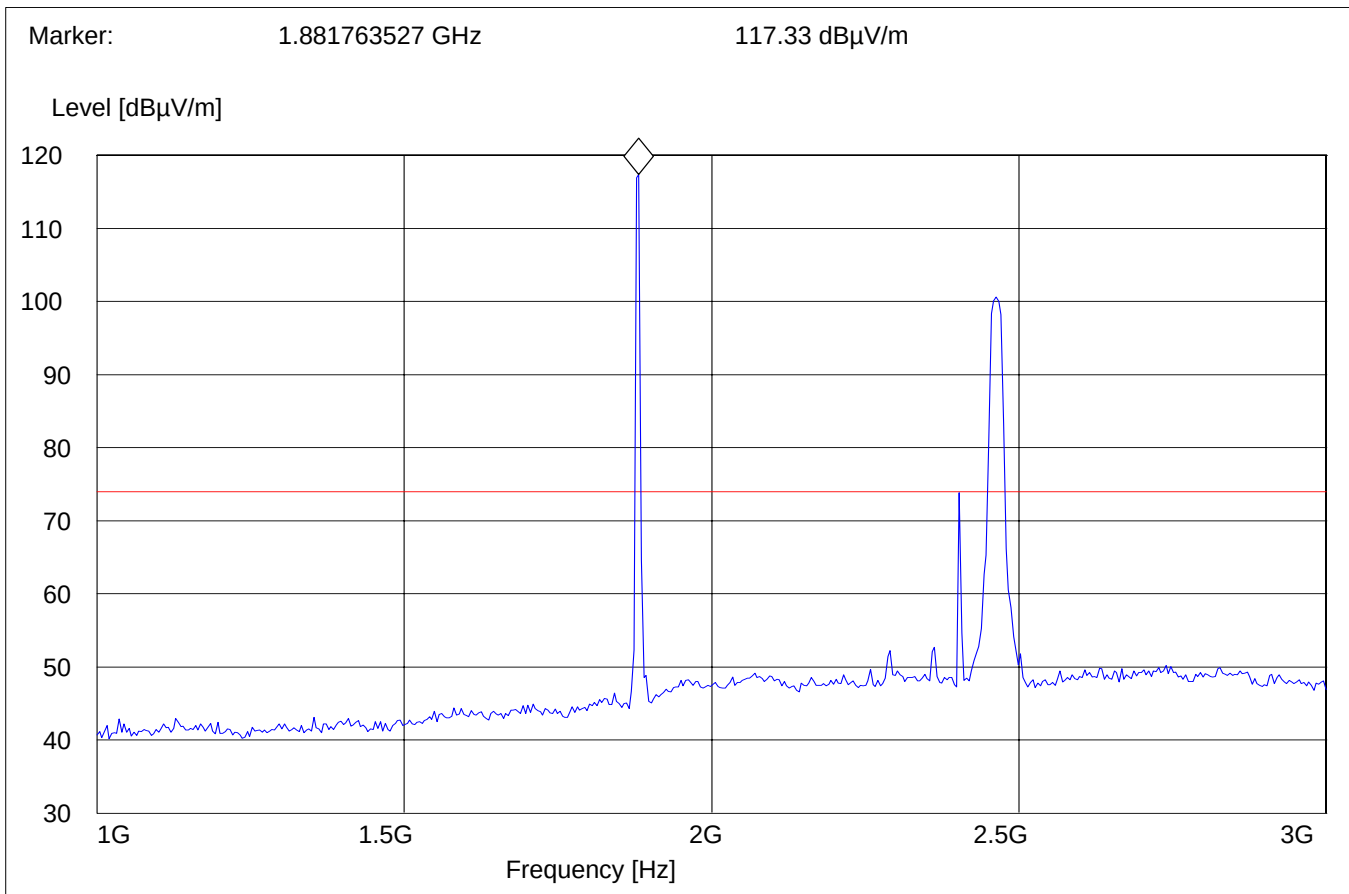
EMISSION LIMITATIONS - Radiated (Transmitter)
1GHz – 3GHz

§ 15.247 (c) (1)

GSM1900+BT+WLAN

NOTE: The marked peak is GSM 1900 carrier freq. @ 1880MHz and other two lower and higher peaks above the limit line are BT @ 2402MHz & WLAN @ 2462MHz respectively.

SWEEP TABLE:		"Spuri hi 1-3G"			
Short Description:		1-3GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



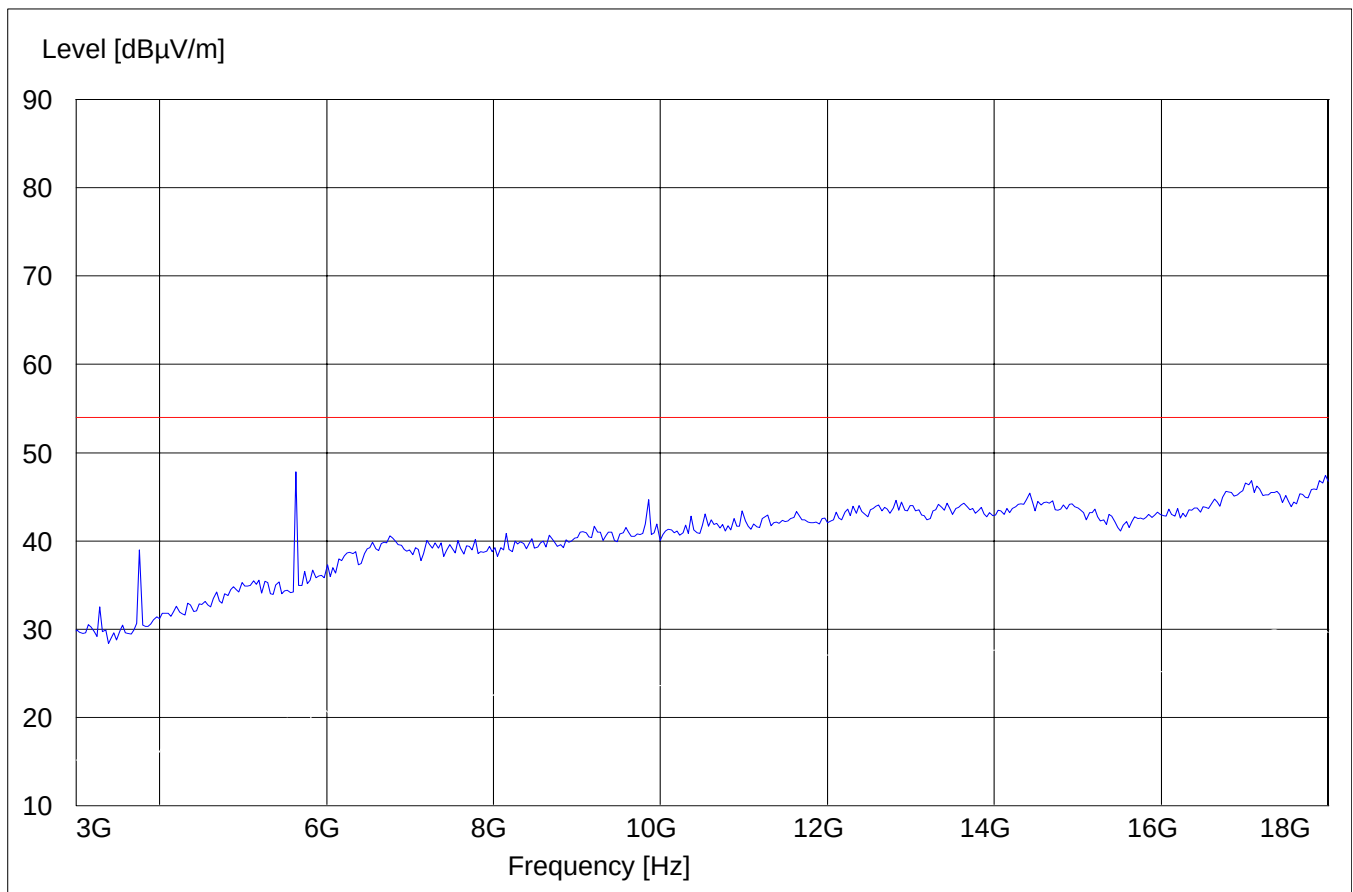
EMISSION LIMITATIONS - Radiated (Transmitter)
3GHz – 18GHz

§ 15.247 (c) (1)

GSM1900+BT+WLAN

SWEEP TABLE: "Spuri hi 3-18G"
Short Description: Spurious 3-18 GHz

Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



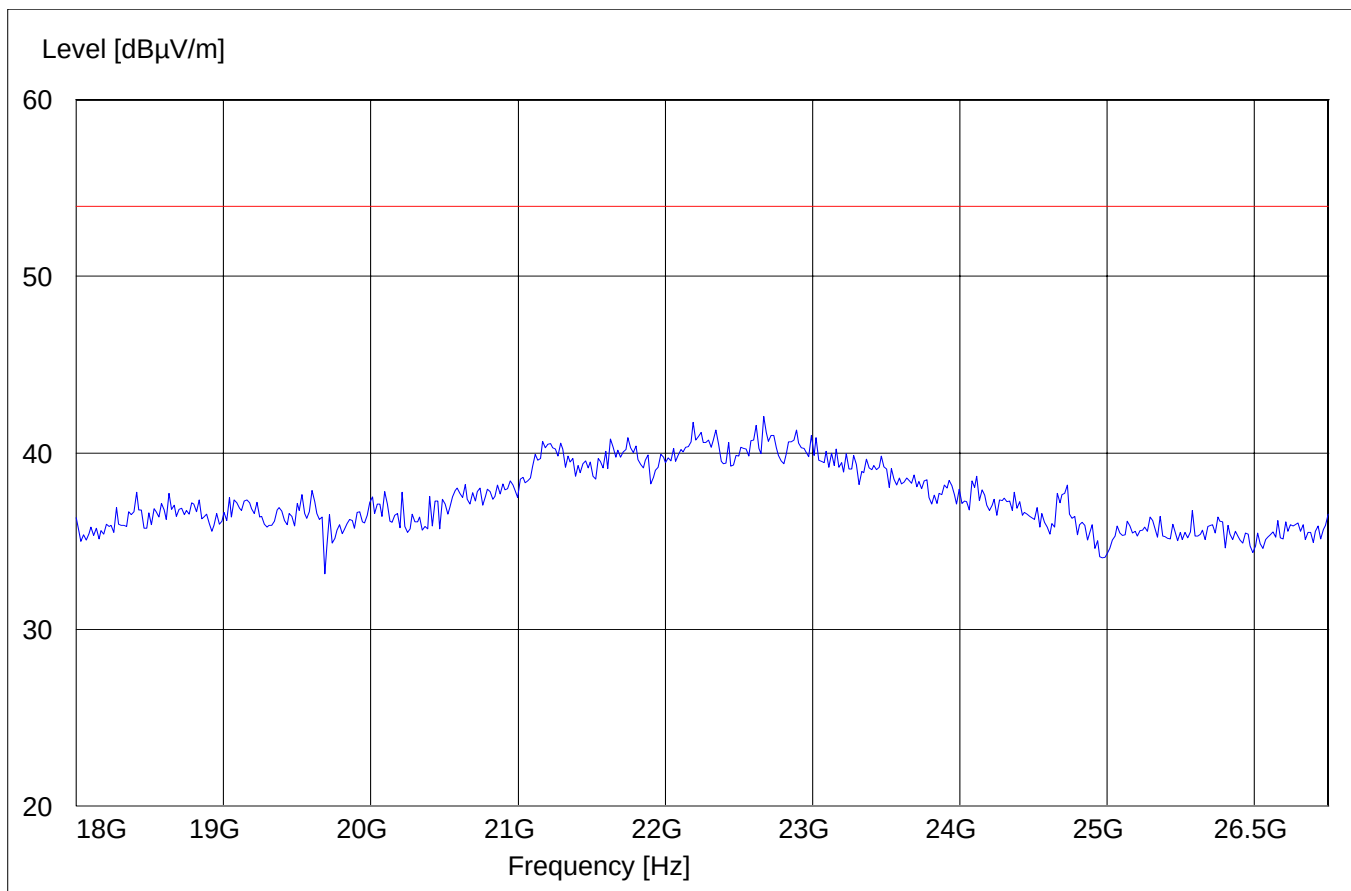
EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

18GHz – 26.5GHz

GSM1900+BT+WLAN

SWEEP TABLE:		"Spuri hi 18-26.5G"			
Short Description:		Spurious 18-26.5GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
18 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	#141 horn (dBi)



CONDUCTED EMISSIONS
GSM1900+BT+WLAN

§ 15.107/207

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

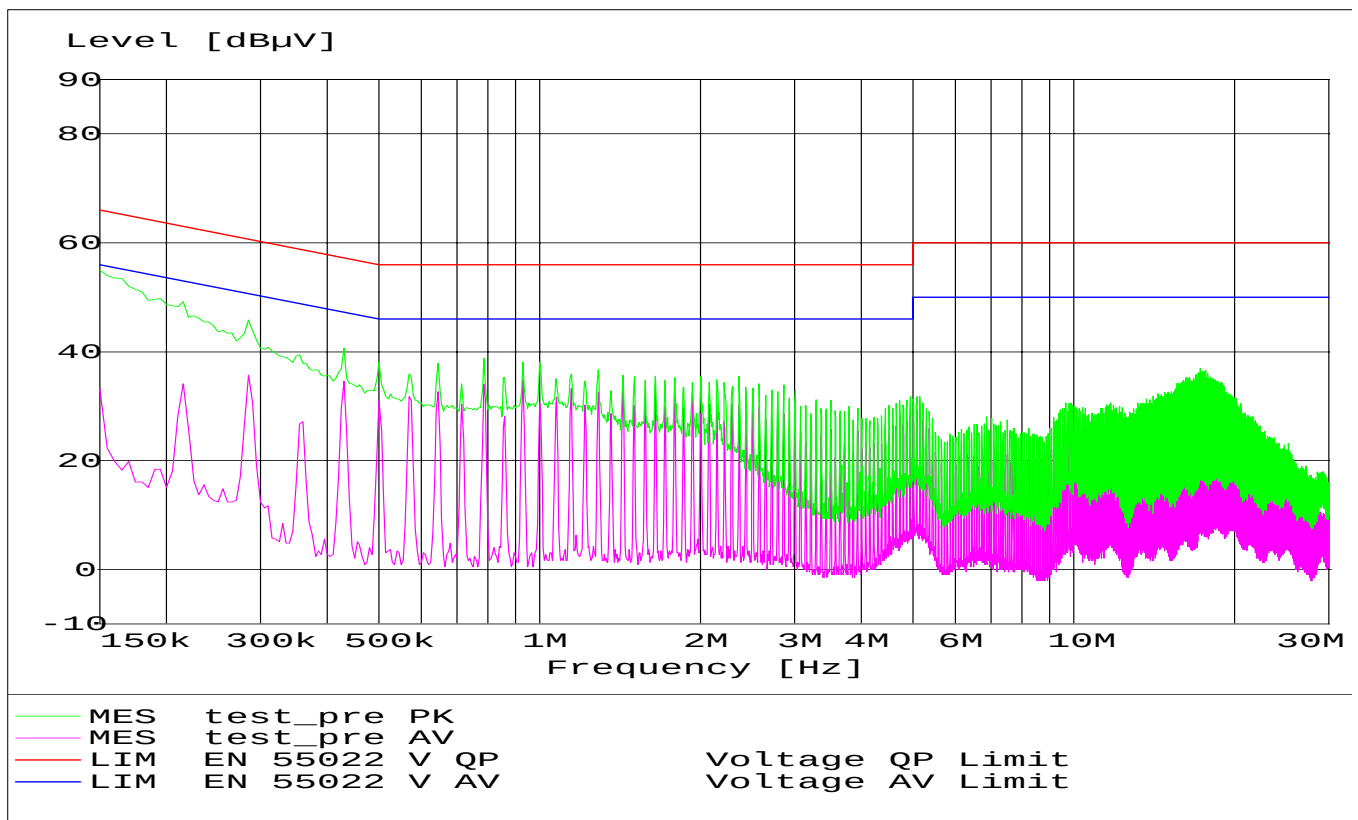
Limit

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 ($\mu\text{V/m}$)	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

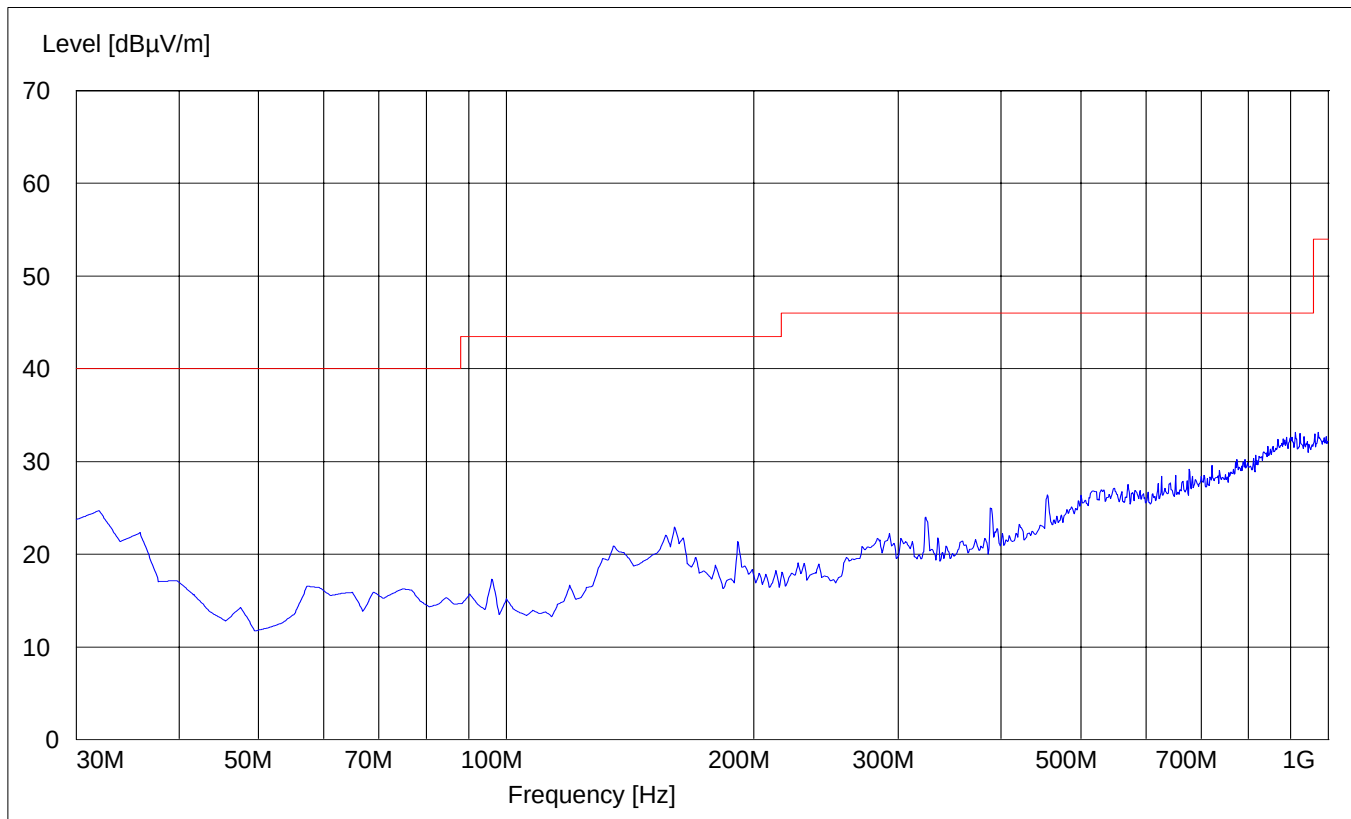
NOTE:

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 26.5 GHz very short cable connections to the antenna was used to minimize the noise level.
2. All radios (BT, WLAN & GSM) are set to idle/receive mode.
3. All measurements are done in peak mode unless specified with the plots.

RECEIVER SPURIOUS RADIATION**§ 15.209****30MHz – 1GHz****Antenna: vertical**

SWEEP TABLE: "Spuri hi 30-1G"
Short Description: 30MHz-1GHz

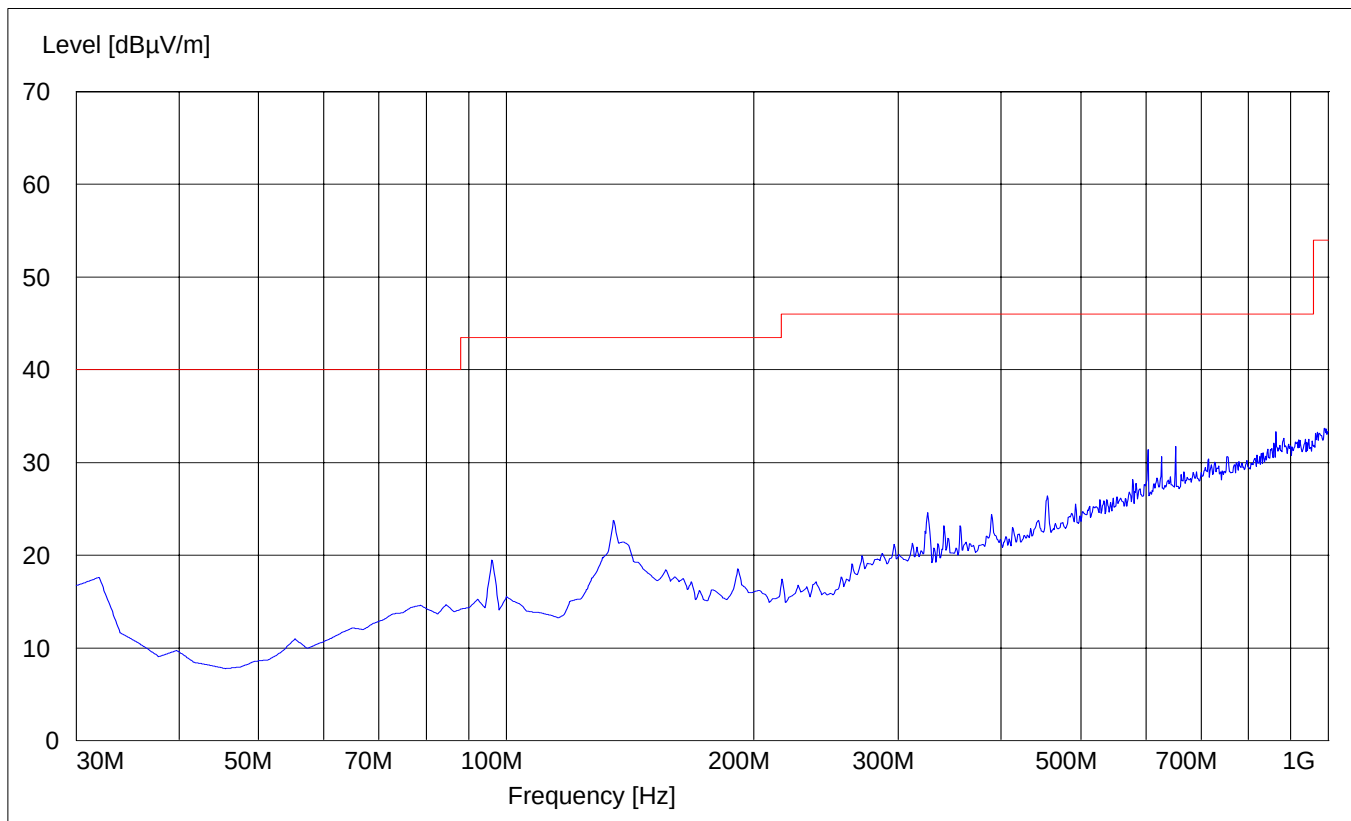
Start	Stop	Detector	Meas. Time	RBW	VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz		3141-#1186



RECEIVER SPURIOUS RADIATION**§ 15.209****30MHz – 1GHz****Antenna: Horizontal**

SWEEP TABLE: " Spuri hi 30-1G"
Short Description: 30MHz-1GHz

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



RECEIVER SPURIOUS RADIATION 1GHz – 3GHz

§ 15.209

SWEEP TABLE:

" Spuri hi 1-3G"

Short Description:

Spurious 1-3GHz

Start Stop

Detector

Meas.

RBW

Transducer

Frequency Frequency

Time

Bandw.

VBW

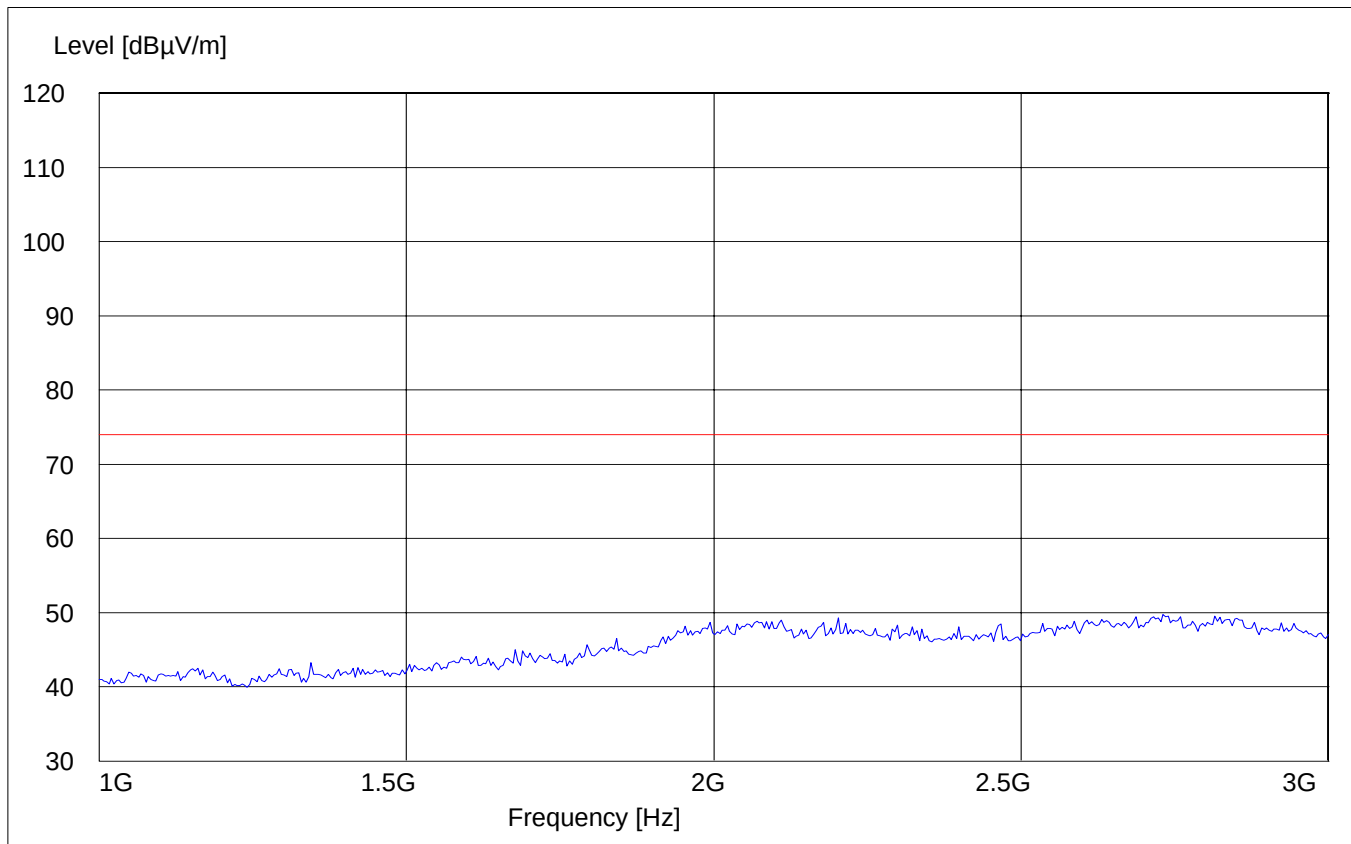
1.0 GHz 3.0 GHz

MaxPeak

Coupled

1 MHz

#326 horn (dBi)



RECEIVER SPURIOUS RADIATION 3GHz – 18GHz

§ 15.209

SWEEP TABLE:

" Spuri hi 3-18G"

Short Description:

Spurious 3-18 GHz

Start Stop

Detector

Meas.

RBW

Transducer

Frequency Frequency

Time

Bandw.

VBW

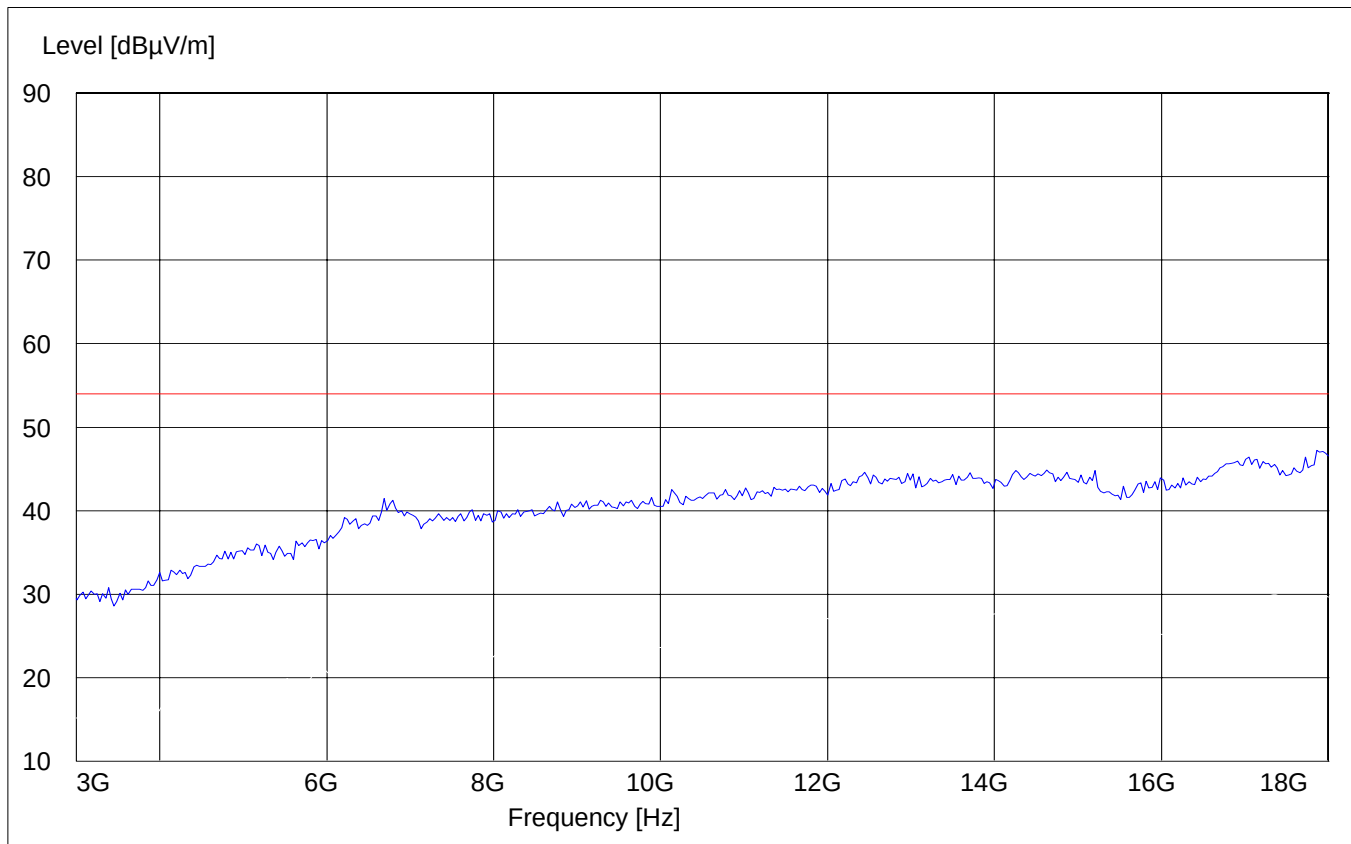
3.0 GHz 18.0 GHz

MaxPeak

Coupled

1 MHz

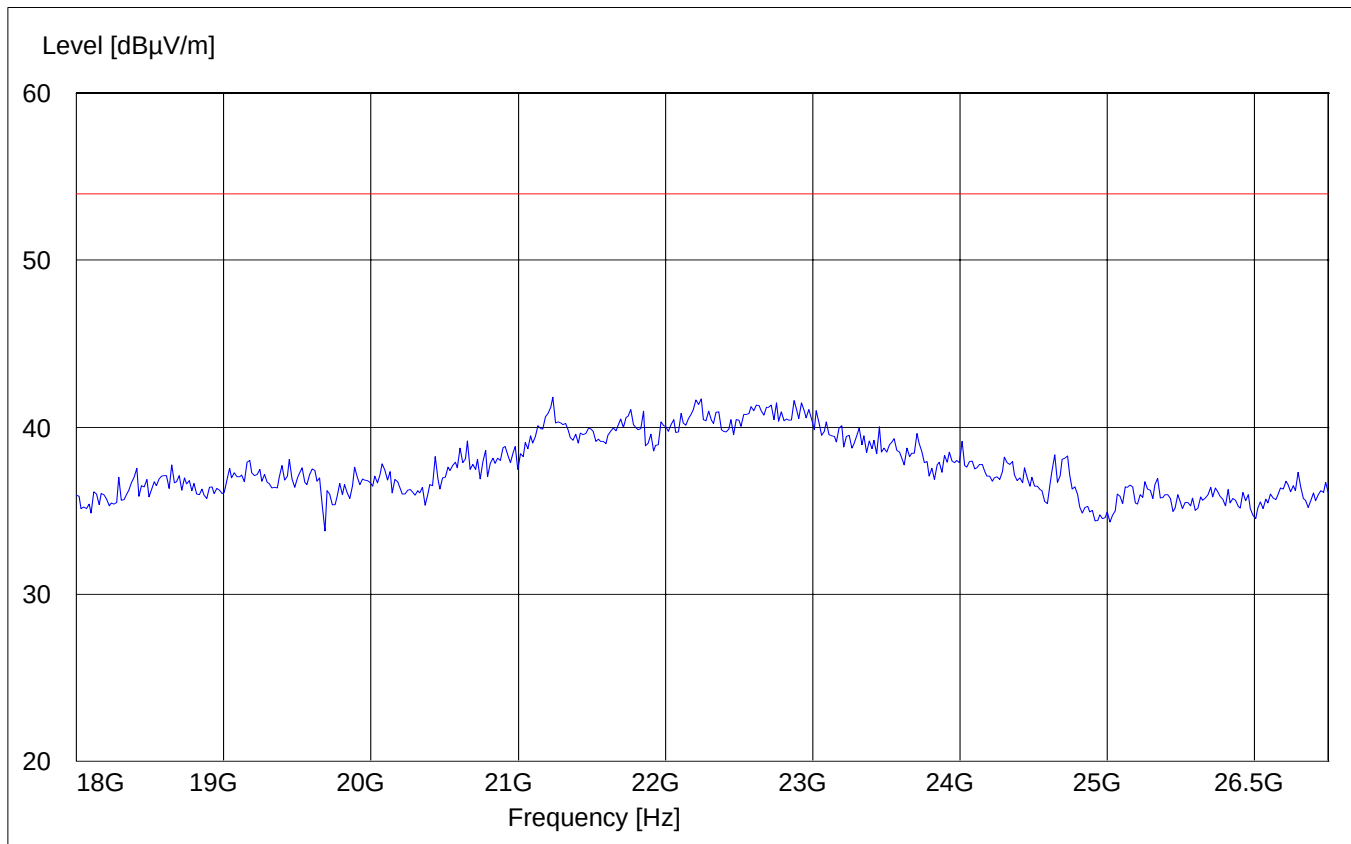
#326 horn (dBi)



RECEIVER SPURIOUS RADIATION
18GHz – 26.5GHz

§ 15.209

SWEEP TABLE:		" Spuri hi 18-26.5G"			
Short Description:		Spurious 18-26.5GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
18.0 GHz	26.5 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



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	2-3GHz Band reject filter	BRM50701	Microtronics	6
07	Pre-Amplifier	TS-ANA	Rohde & Schwarz	--
08	Pre-Amplifier	JS4-00102600	Miteq	00616

BLOCK DIAGRAMS**Radiated Testing****ANECHOIC CHAMBER**