



# 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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Board of Directors: Dr. Harald Ansoerge, Dr. Klaus Matkey, Hans Peter May

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<b>1</b>	<b>General information</b>
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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**

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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**  
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**e-mail** : **[dfowler@xploretech.com](mailto: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")	<b>Passed</b>

**Technical responsibility for area of testing:**

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



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**Date****Section****Name****Signature****Responsible for test report and project leader:**

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



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**Date****Section****Name****Signature**

## **2.2 Test report**

### **TEST REPORT**

**Test report no.: EMC\_678FCC15.247\_2004\_BT+WLAN+GSM**

**TEST REPORT REFERENCE**

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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**

<b>Frequency</b>	<b>Measured values</b>	<b>Remarks</b>
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.**

<b>Transmit at Lowest channel Frequency</b>			
<b>Frequency (MHz)</b>	<b>Level (dB<math>\mu</math>V/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
See plots			
<b>Transmit at Middle channel Frequency</b>			
<b>Frequency (MHz)</b>	<b>Level (dB<math>\mu</math>V/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
See plots			
<b>Transmit at Highest channel Frequency</b>			
<b>Frequency (MHz)</b>	<b>Level (dB<math>\mu</math>V/m)</b>		
	<b>Peak</b>	<b>Quasi-Peak</b>	<b>Average</b>
See plots			

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

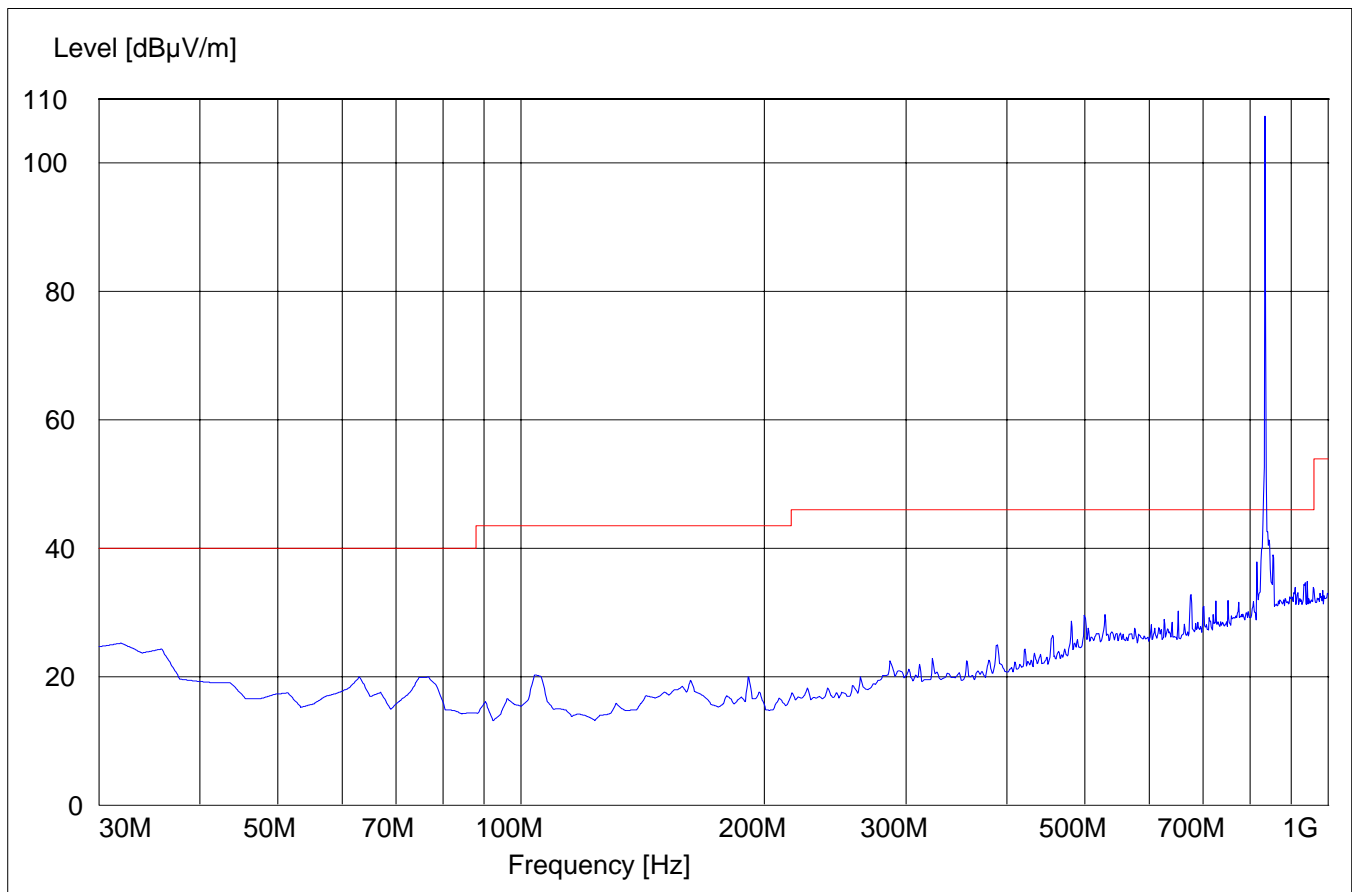
**30MHz – 1GHz**

**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)**

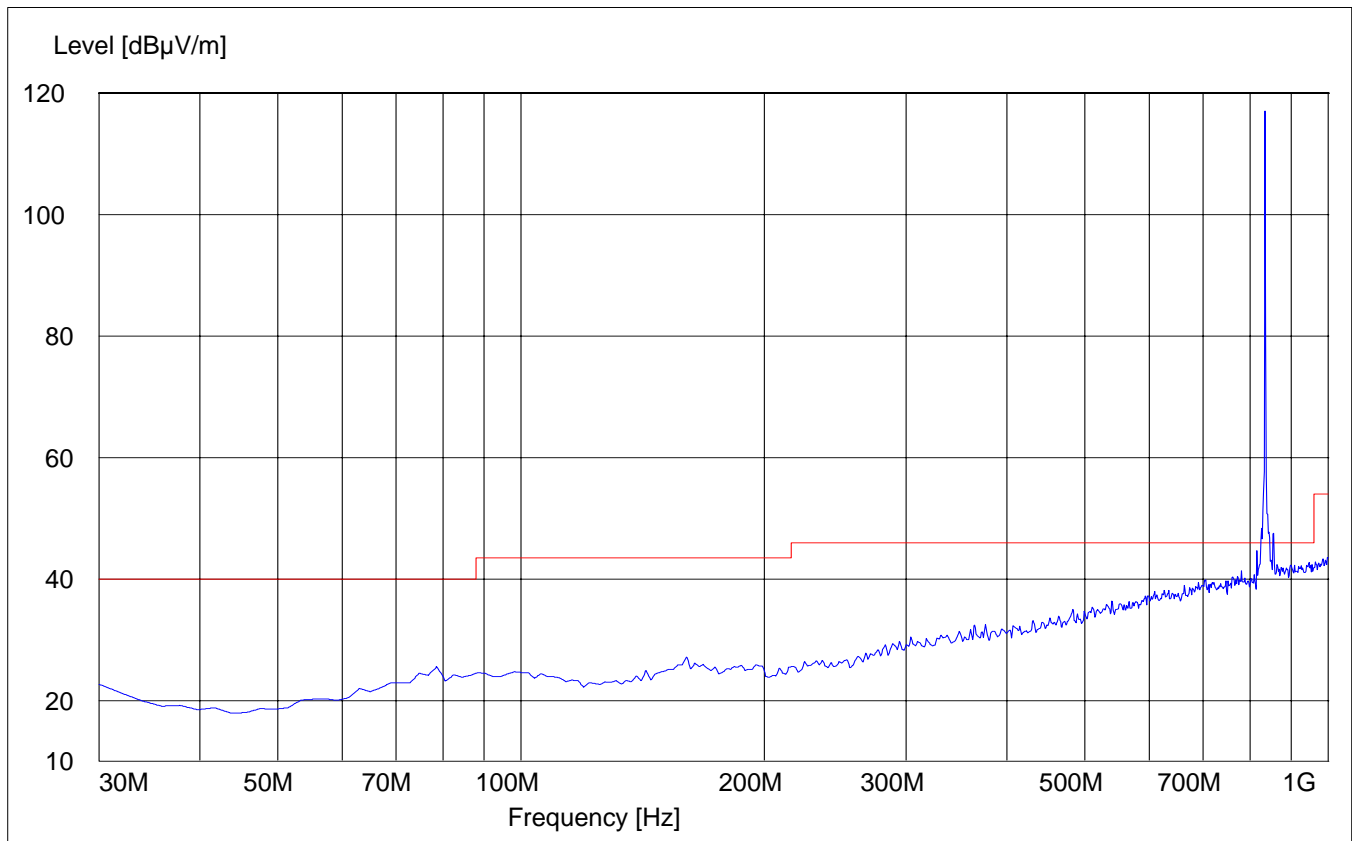
**30MHz – 1GHz**

**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



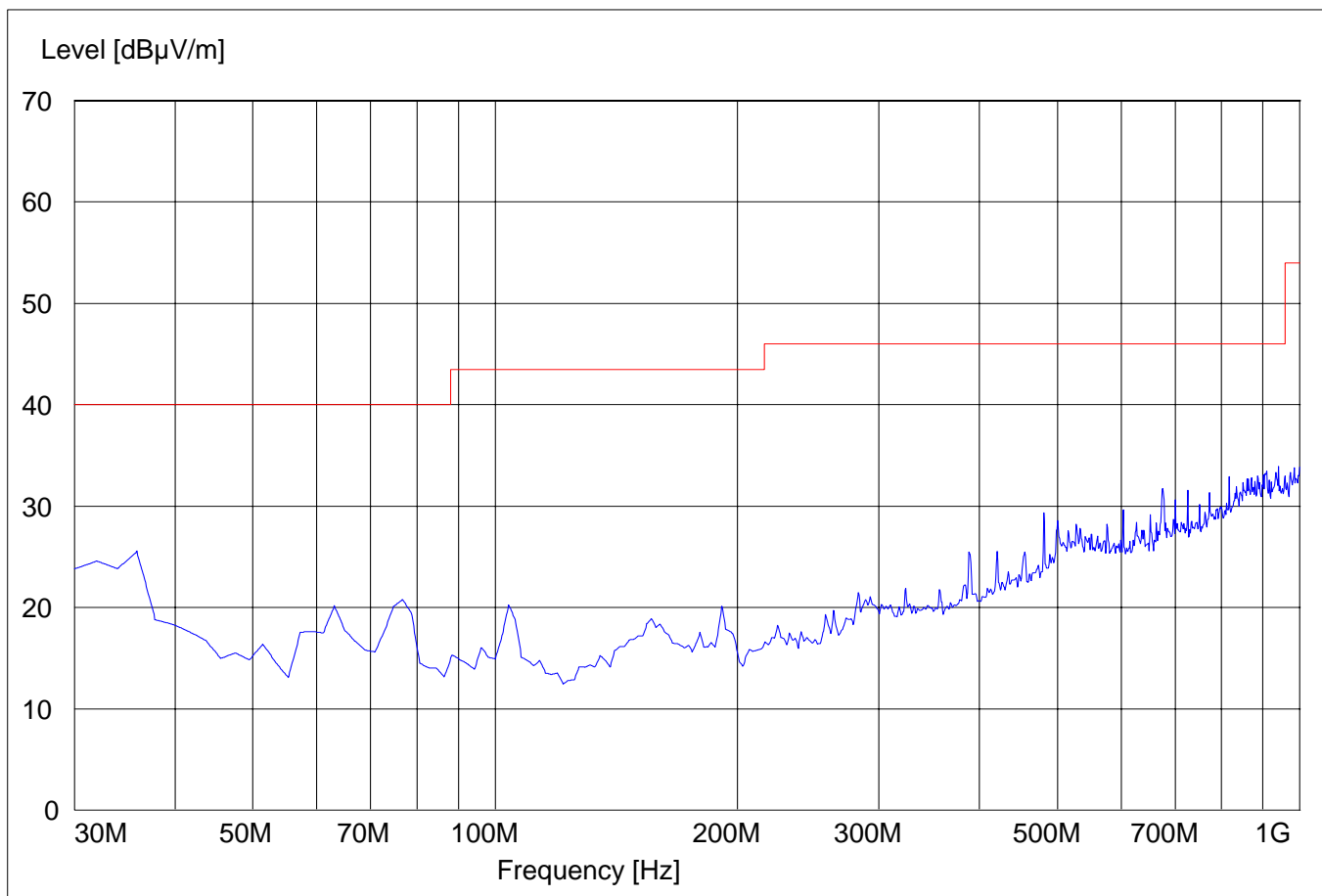
**EMISSION LIMITATIONS - Radiated (Transmitter)**

§ 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. Time	RBW	VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz		3141-#1186



**EMISSION LIMITATIONS - Radiated (Transmitter)**

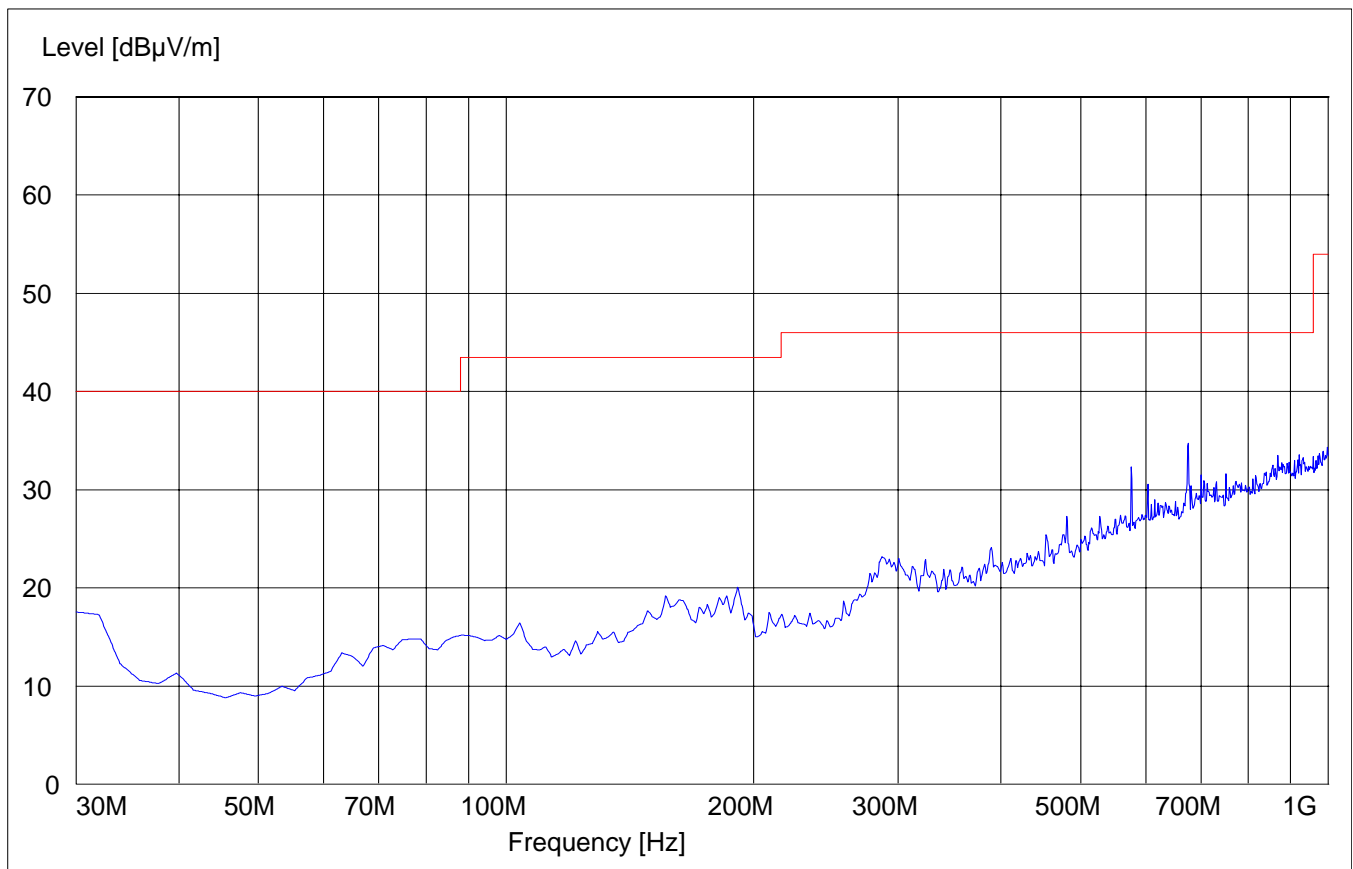
**§ 15.247 (c) (1)**

**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



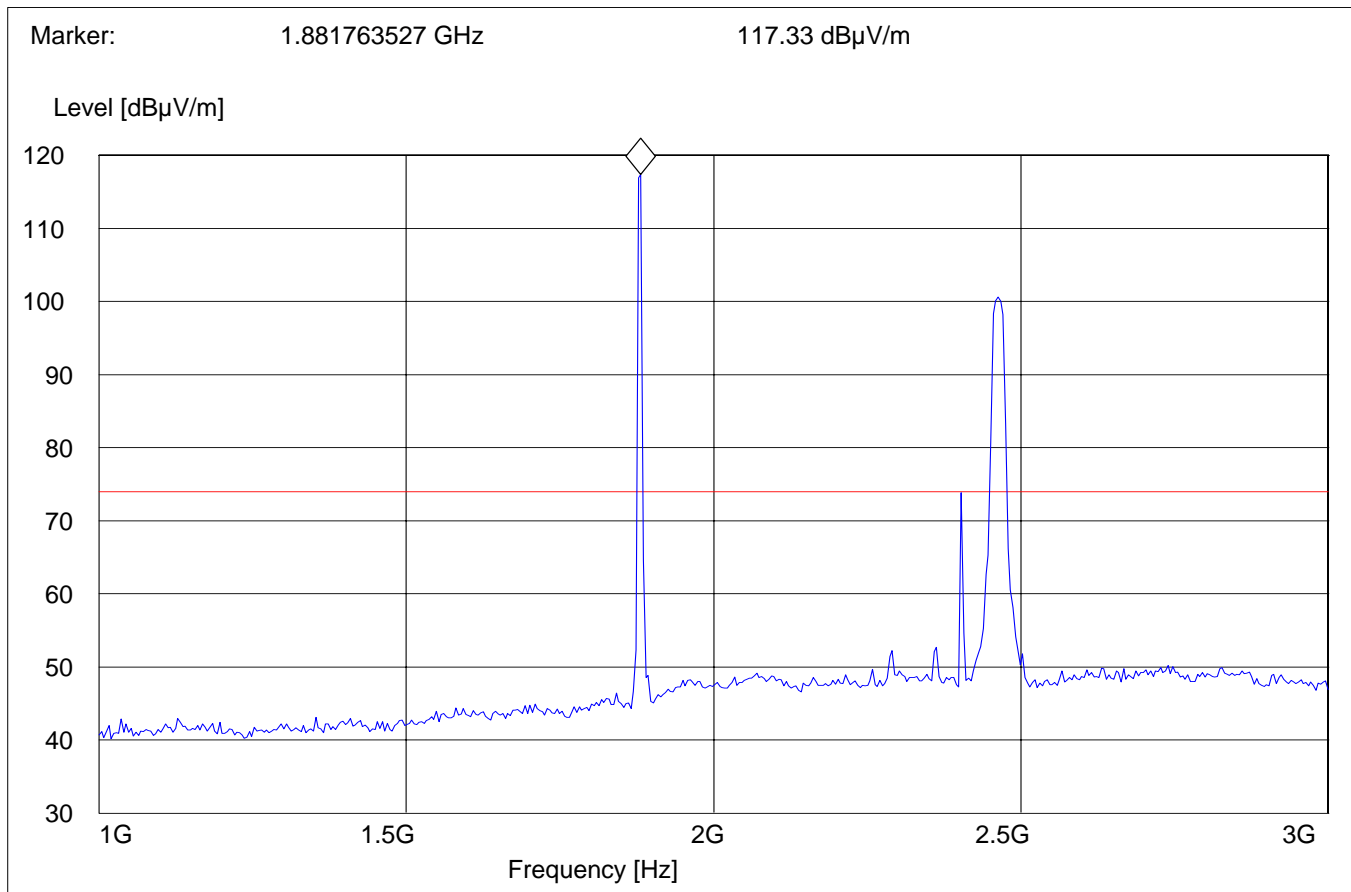
**EMISSION LIMITATIONS - Radiated (Transmitter)**  
**1GHz – 3GHz**

§ 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)

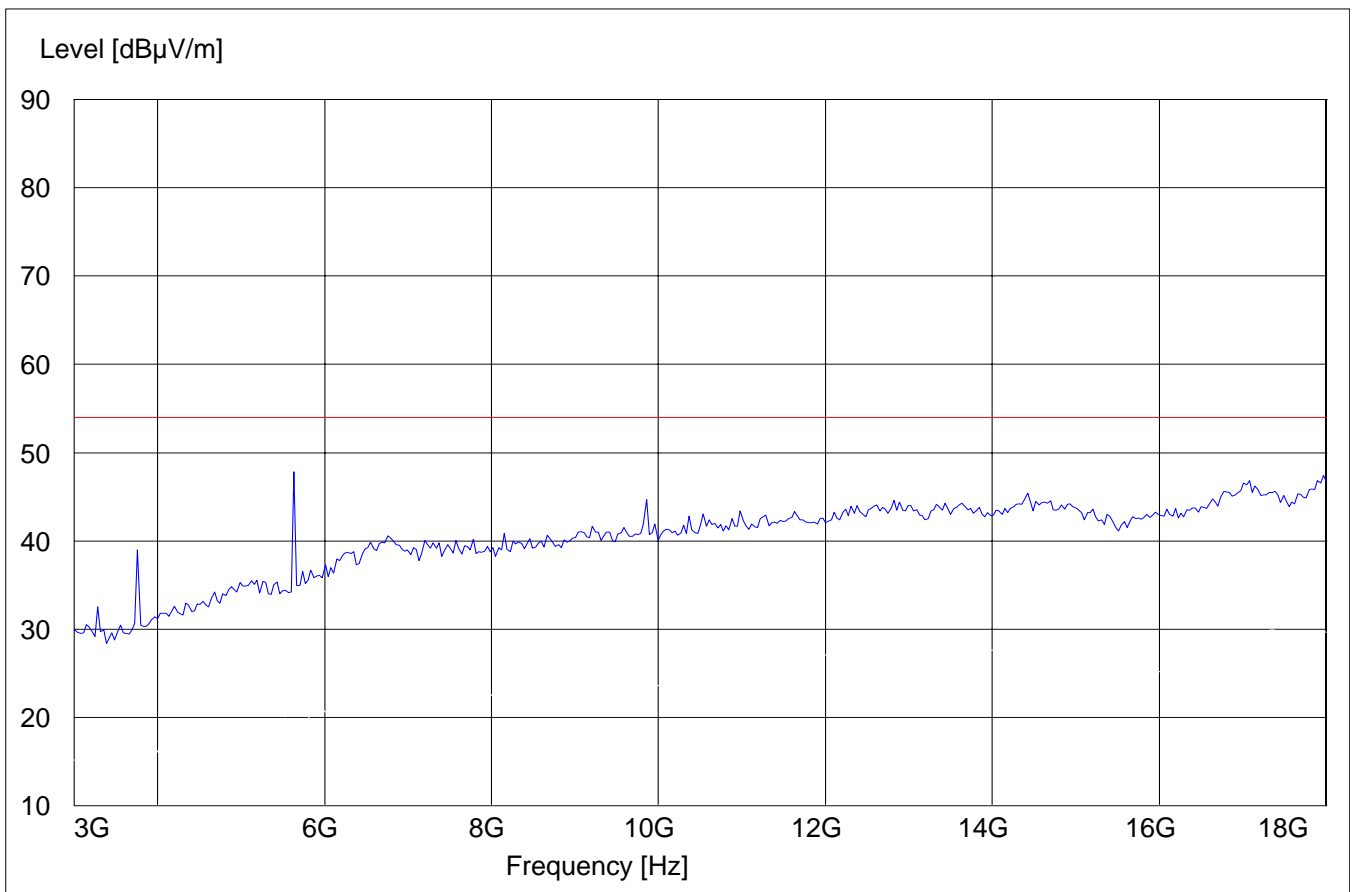


**EMISSION LIMITATIONS - Radiated (Transmitter)**  
**3GHz – 18GHz**

§ 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)

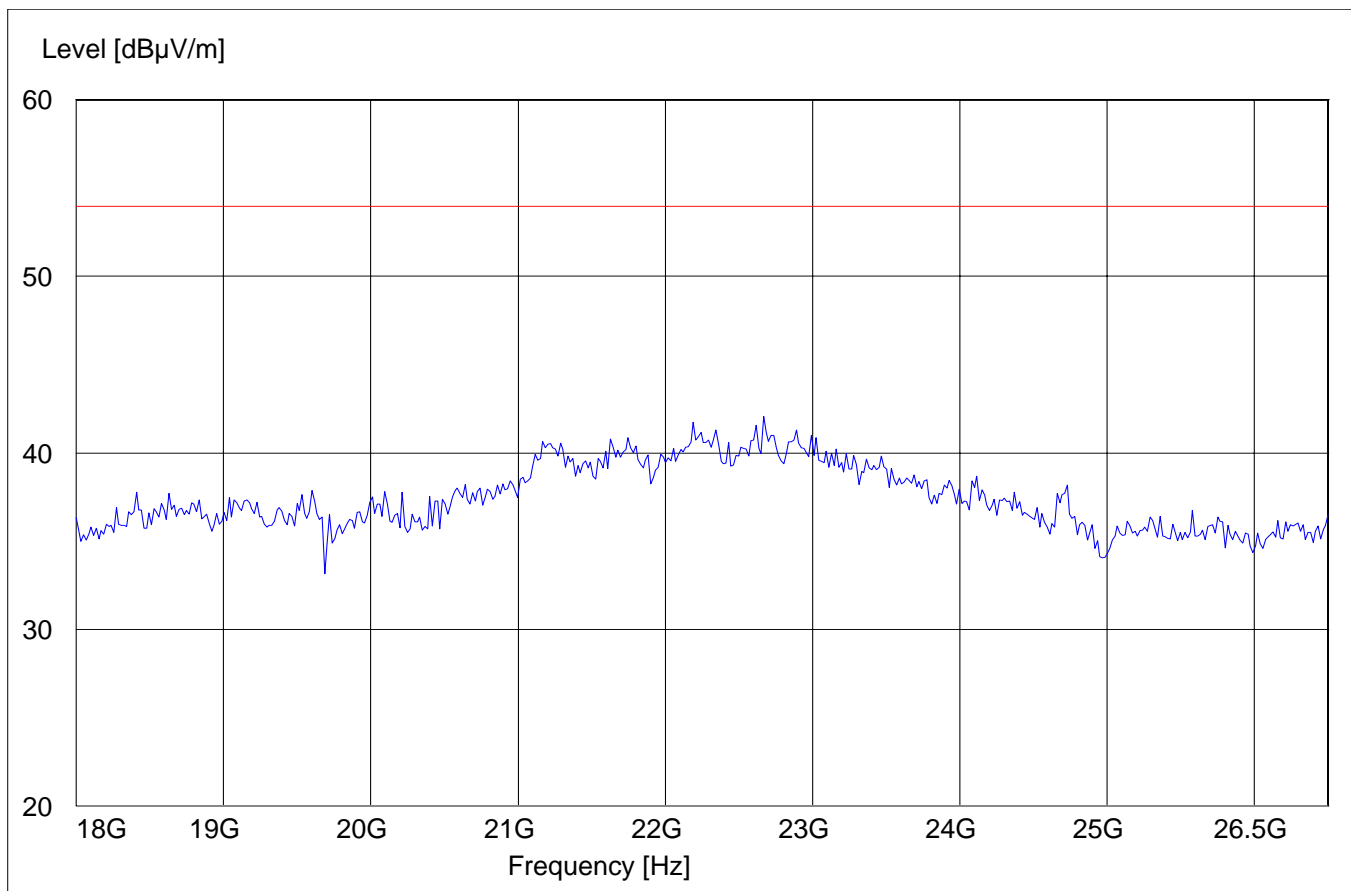


**EMISSION LIMITATIONS - Radiated (Transmitter)**

§ 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

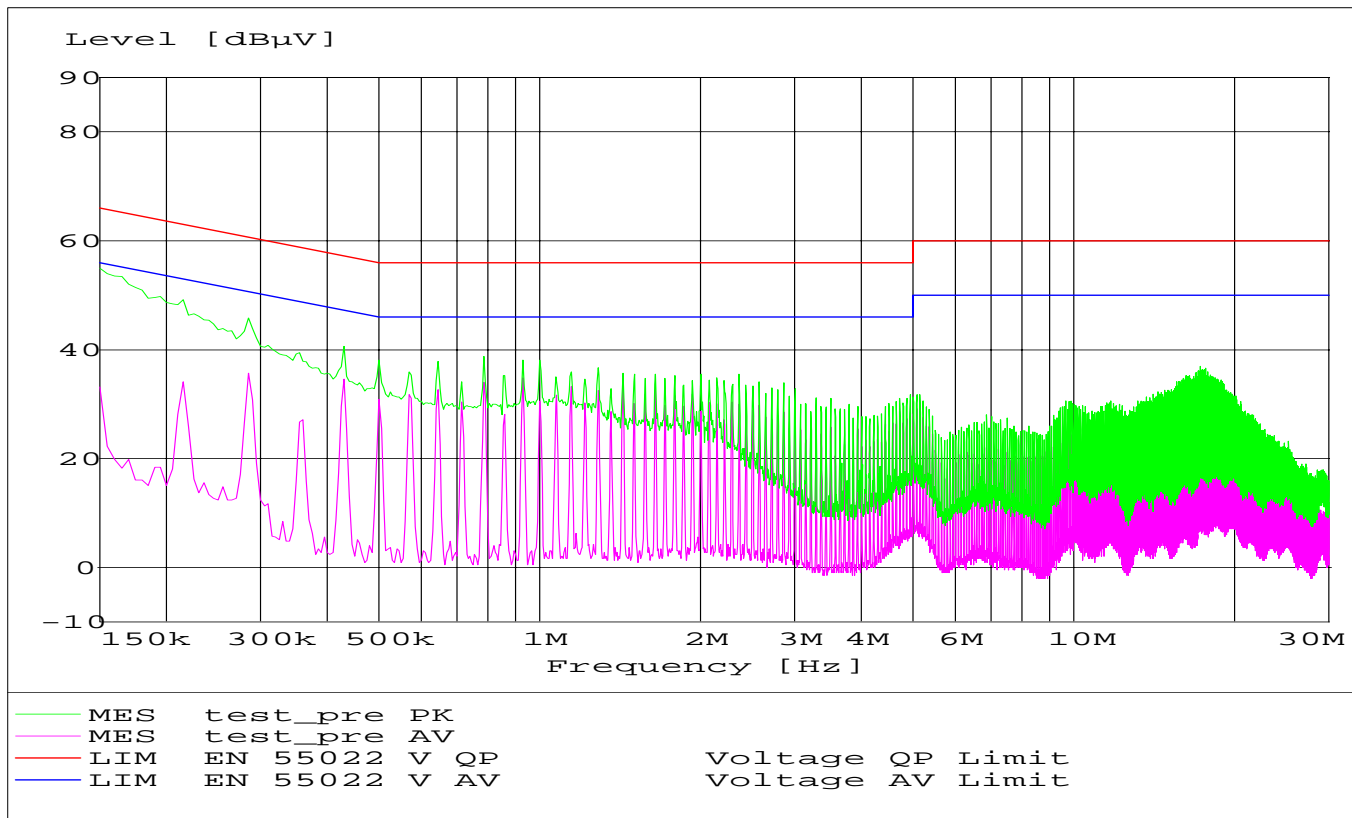
Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)

**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**

<b>Frequency (MHz)</b>	<b>Field strength (<math>\mu\text{V/m}</math>)</b>	<b>Measurement distance (m)</b>
<b>0.009 - 0.490</b>	<b>2400/F(kHz)</b>	<b>300</b>
<b>0.490 - 1.705</b>	<b>24000/F(kHz)</b>	<b>30</b>
<b>1.705 - 30.0</b>	<b>30</b>	<b>30</b>
<b>30 - 88</b>	<b>100</b>	<b>3</b>
<b>88 - 216</b>	<b>150</b>	<b>3</b>
<b>216 - 960</b>	<b>200</b>	<b>3</b>
<b>above 960</b>	<b>500</b>	<b>3</b>

**NOTE:**

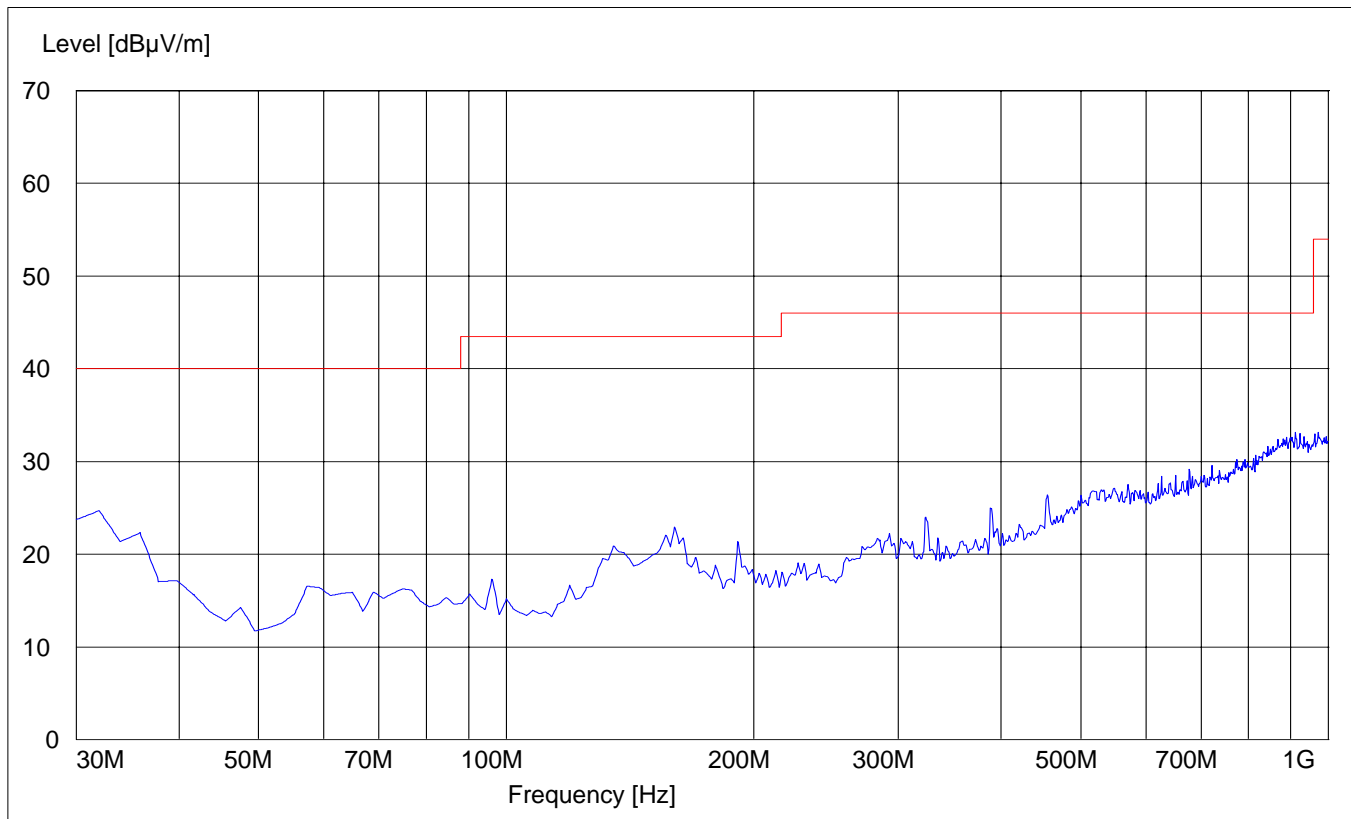
1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 26.5 GHz very short cable connections to the antenna was used to minimize the noise 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	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



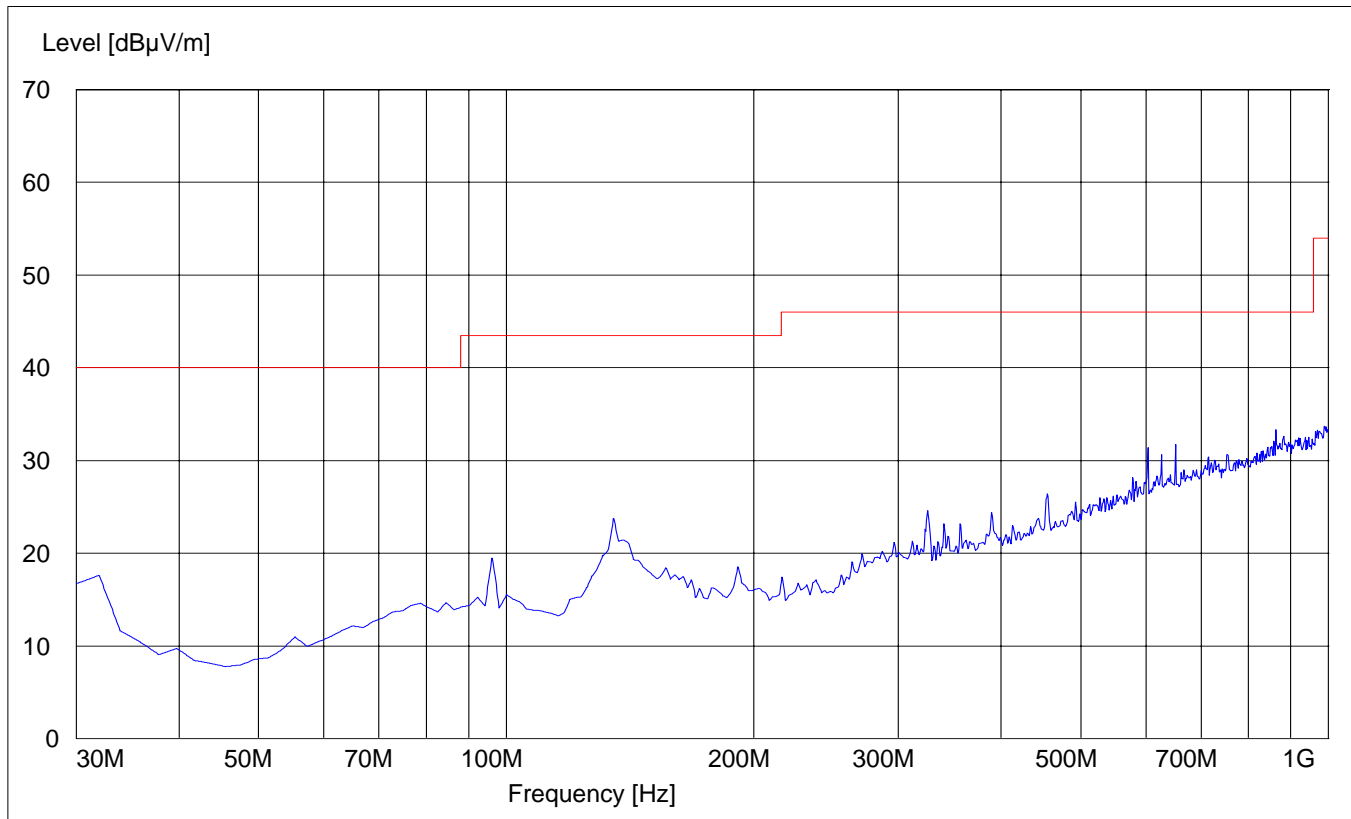
**RECEIVER SPURIOUS RADIATION**

§ 15.209

**30MHz – 1GHz****Antenna: Horizontal**

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

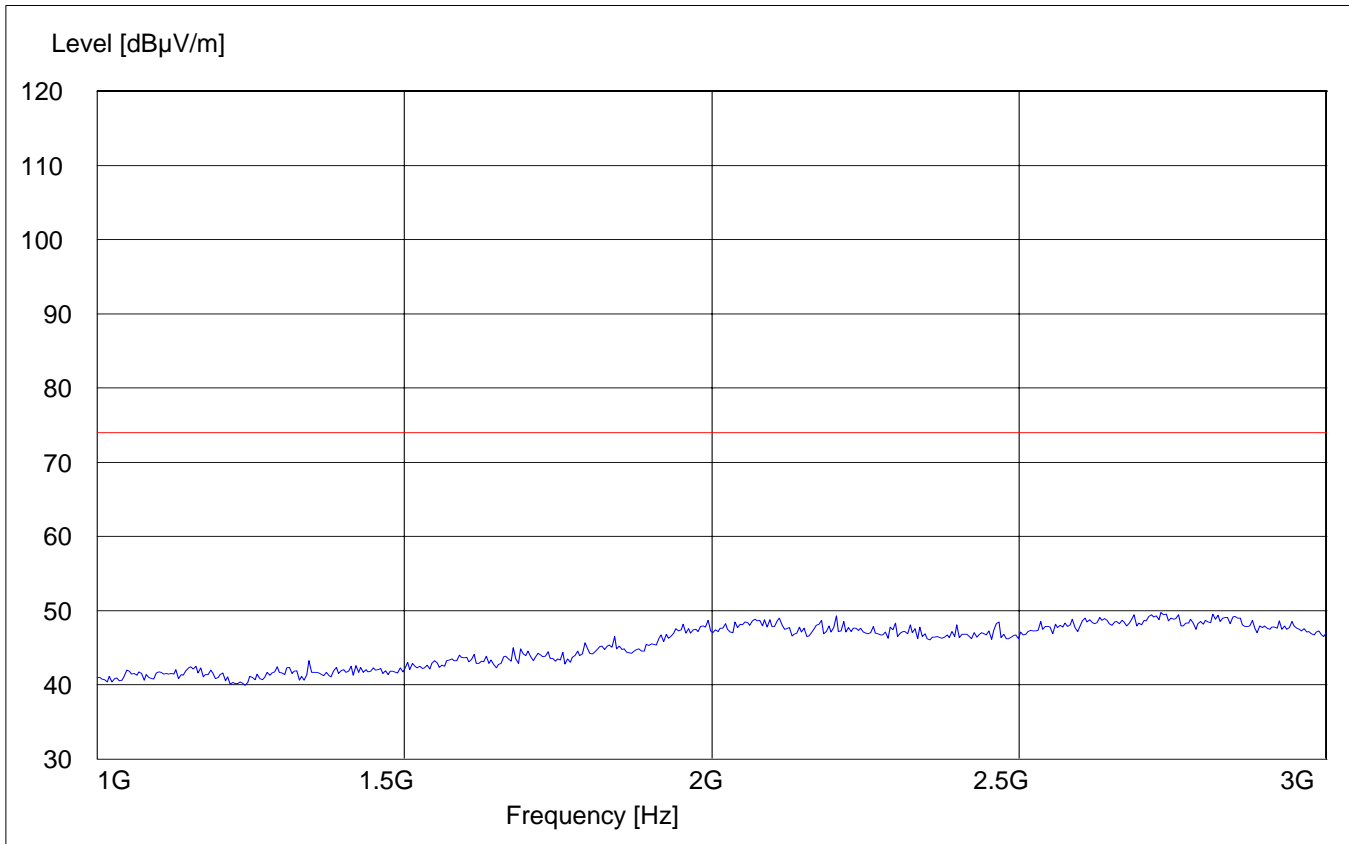
Start	Stop	Detector	Meas. Time	RBW	VBW	Transducer
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz		3141-#1186



**RECEIVER SPURIOUS RADIATION**  
**1GHz – 3GHz**

§ 15.209

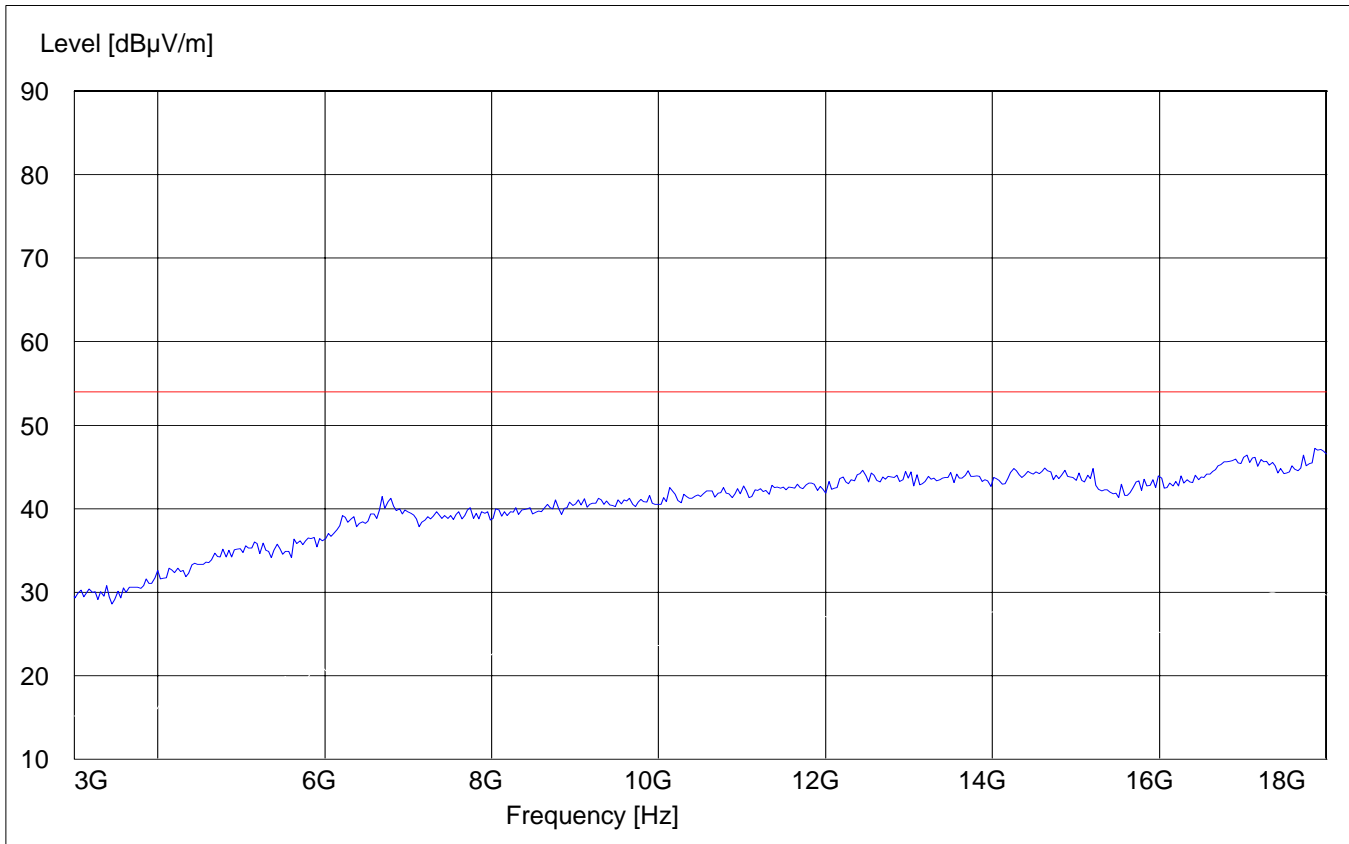
SWEEP TABLE:		" Spuri hi 1-3G"			
Short Description:		Spurious 1-3GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



**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)

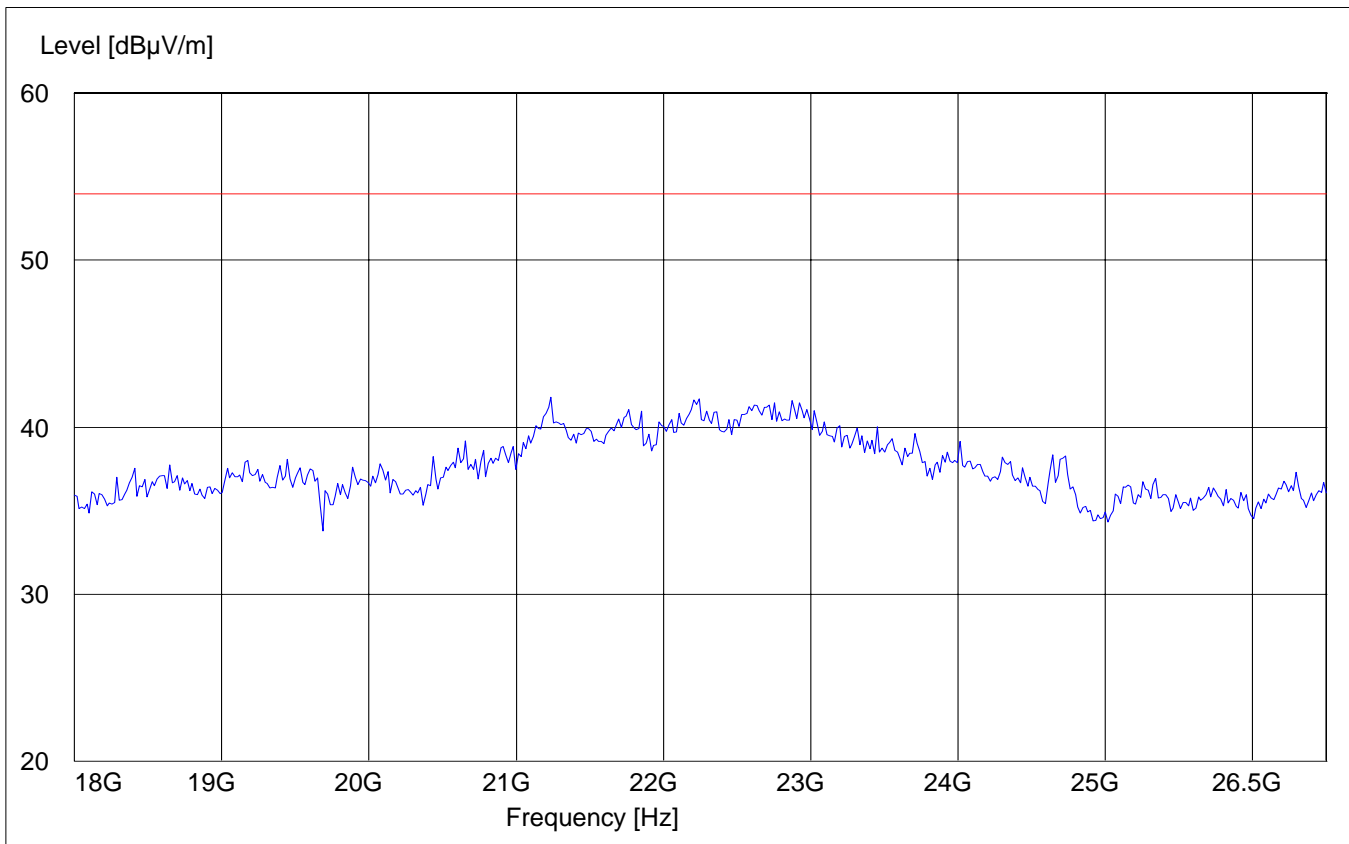


**RECEIVER SPURIOUS RADIATION  
18GHz – 26.5GHz**

§ 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**

