



FCC Test Report

Test report no.: EMC_856FCC15.247_2005_Collocation

FCC Part 15.247 / CANADA RSS-210

Model: PCG-4E1L

FCC ID: AK8PCG4E1L

IC: 409B-PCG4E1L



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****CETECOM Inc.****411 Dixon Landing Road, Milpitas, CA-95035, USA****Phone: +1 408 586 6200 Fax: +1 408 586 6299****E-mail: lothar.schmidt@ceteconomusa.com****Internet: www.cetecom.com**

1.3 Details of applicant

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City / Zip Code : Tokyo 141-0001
Country : Japan
Contact : Takumi Ozawa
Telephone : +81-3-5795-8716
Fax : +81-3-5795-8981
e-mail : ozawa@sm.sony.co.jp

1.4 Application details

Date of receipt test item : 2005-02-22
Date of test : 2005-02-22/23/24/25, 2005-03-03

1.5 Test item

Marketing Name : PCG-4E1L
Model No. : PCG-4E1L
Description : [Laptop computer with GSM, WLAN & BT radios.](#)
HW / SW version : FP1 / P1A41
FCC-ID : AK8PCG4E1L
IC ID : 409B-PCG4E1L

Additional information

Test Sample ID : #23
Frequency : 2412 – 2462MHz for WLAN
2402MHz – 2480MHz for BT
824.2MHz – 848.8MHz for GSM 850,
1850.2MHz – 1909.8MHz for PCS 1900
Type of modulation : FHSS, DSSS & OFDM, GFSK
Power supply : via host Tablet PC

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.

- **WLAN & BT**
- **GSM & BT**

***In this case both WLAN and GSM modules can not transmit simultaneously.**

Testing is done against FCC15.247 limits. GSM mode was tested in both 850 & 1900 bands along with BT respectively. Test report carries only worst case plots.

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:

2005-03-21 EMC & Radio Lothar Schmidt (Manager)



Date

Section

Name

Signature

Responsible for test report and project leader:

2005-03-21 EMC & Radio Harpreet Sidhu (EMC Engineer)



Date

Section

Name

Signature

2.2 Test report

TEST REPORT

Test report no.: EMC_856FCC15.247_2005_Collocation

TEST REPORT REFERENCE

LIST OF MEASUREMENTS		PAGE
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Bookmark not defined.		
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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)**

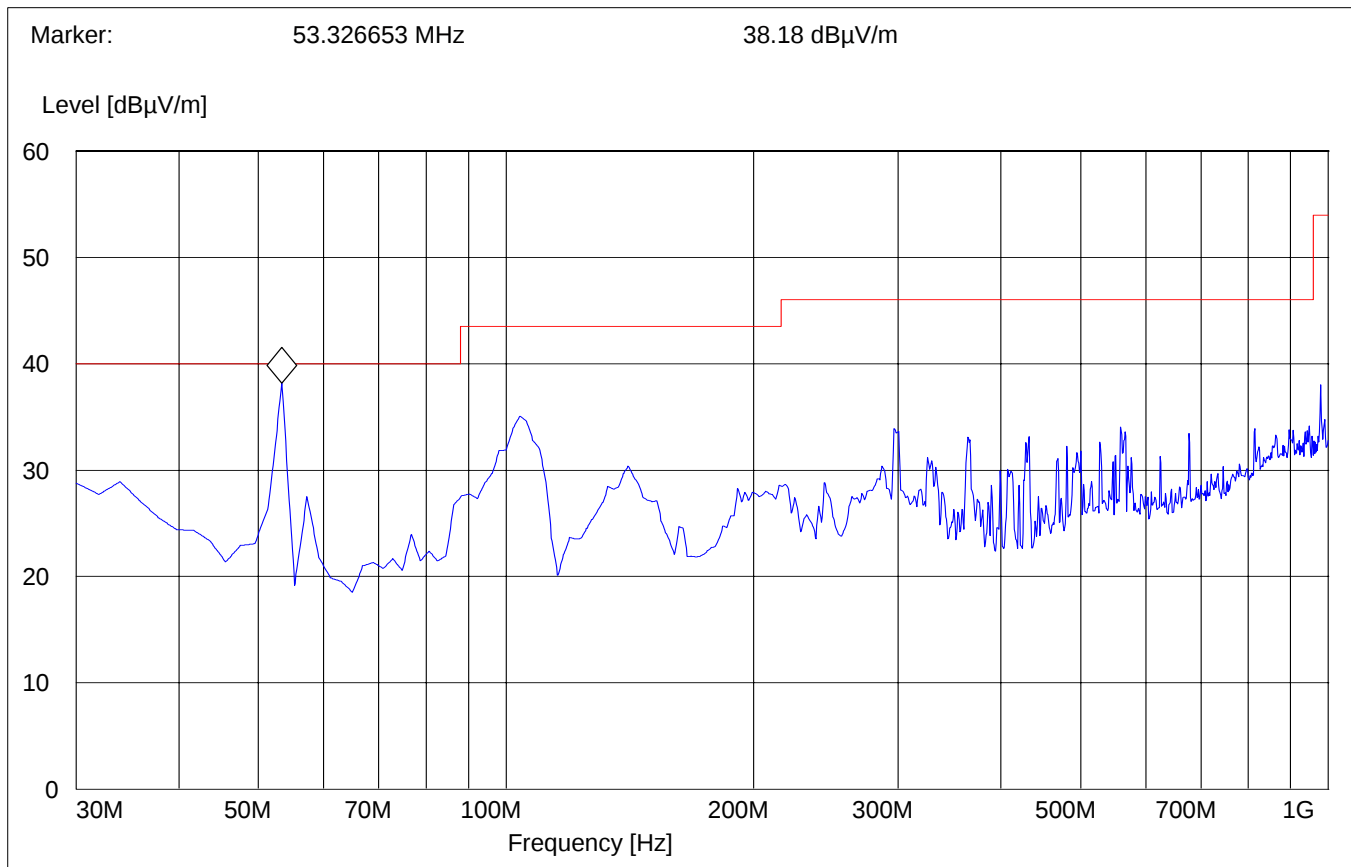
Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

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 (d)****30MHz – 1GHz****Antenna: vertical**

**This plot is valid for Collocation of both GSM & BT and WLAN & BT combinations.
(Worst-case plot)**

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 (d)

30MHz – 1GHz

Antenna: horizontal

This plot is valid for Collocation of both GSM & BT and WLAN & BT combinations.

(Worst-case plot)

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

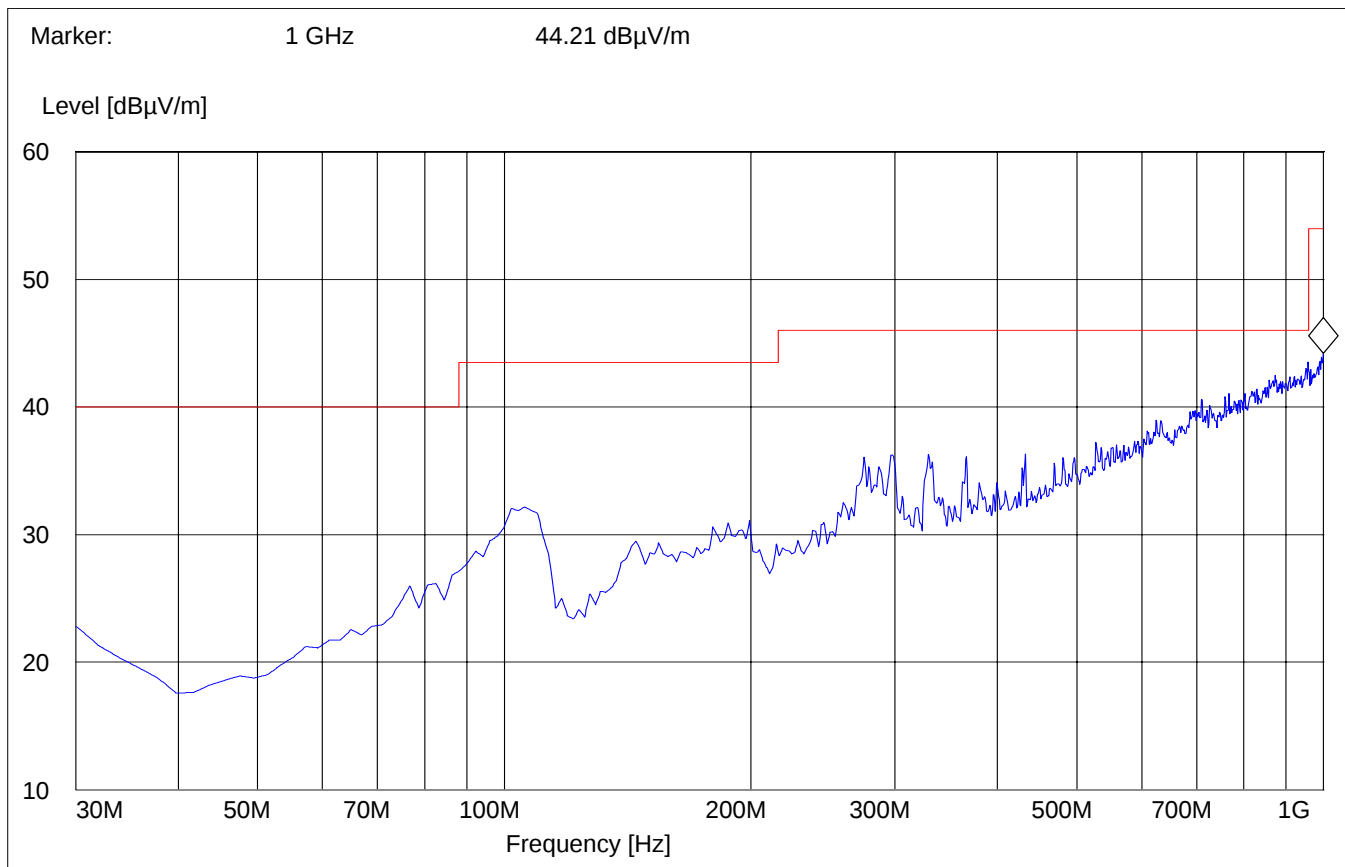
MaxPeak

Coupled

100 kHz

3141-#1186

Operating Mode: TX @ 1909.8 MHz (GSM) AND TX @ 2402 MHz (BLUETOOTH)



EMISSION LIMITATIONS - Radiated (Transmitter)

1GHz – 3GHz

§ 15.247 (d)

GSM1900+BT

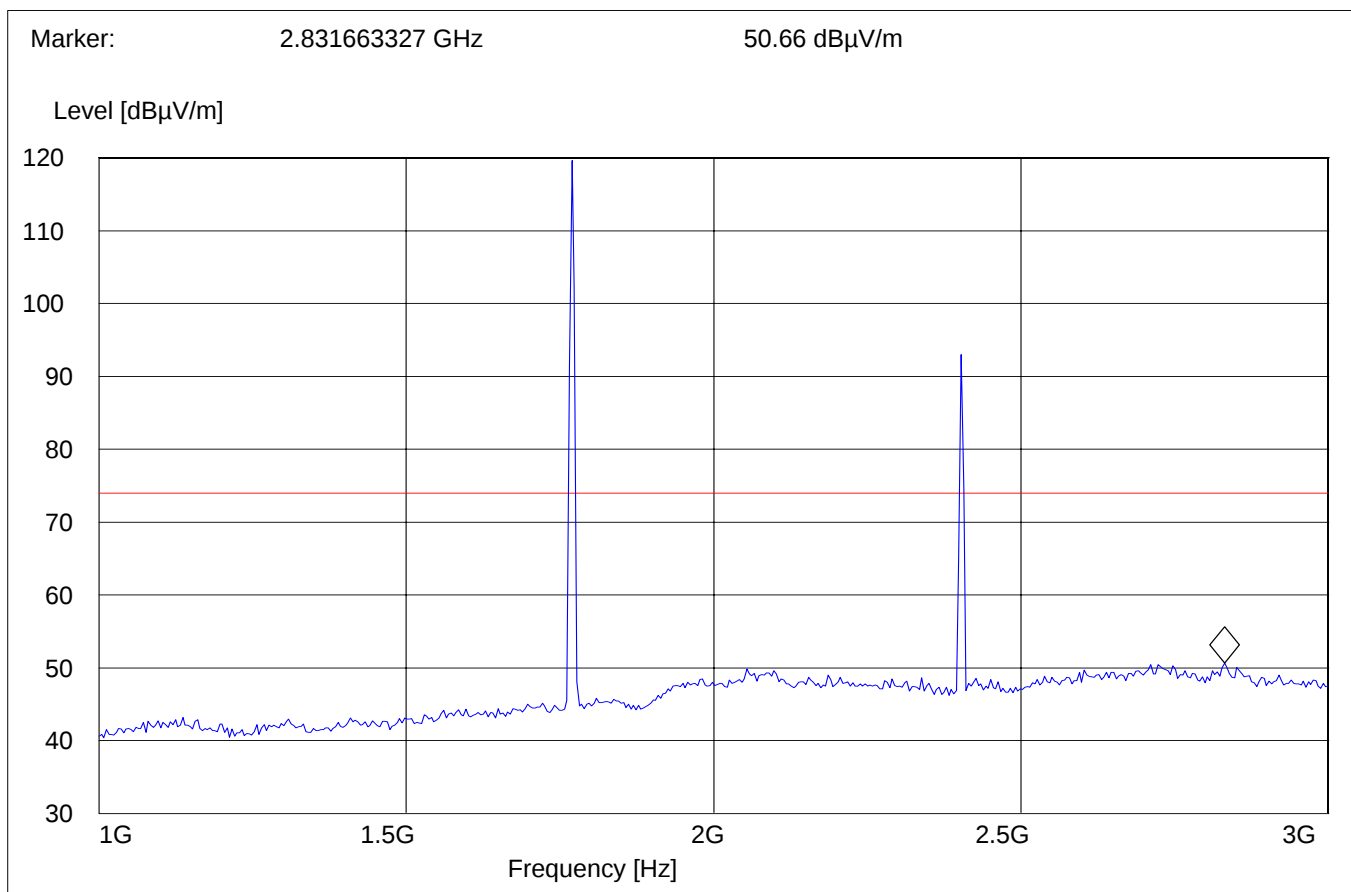
Note: Peaks above the limit line are GSM & BT carrier freq.'s respectively.

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)

Operating Mode: TX @ 1909.8MHz (GSM) AND TX @ 2402 MHz (BLUETOOTH)



EMISSION LIMITATIONS - Radiated (Transmitter)

3GHz – 18GHz

§ 15.247 (d)

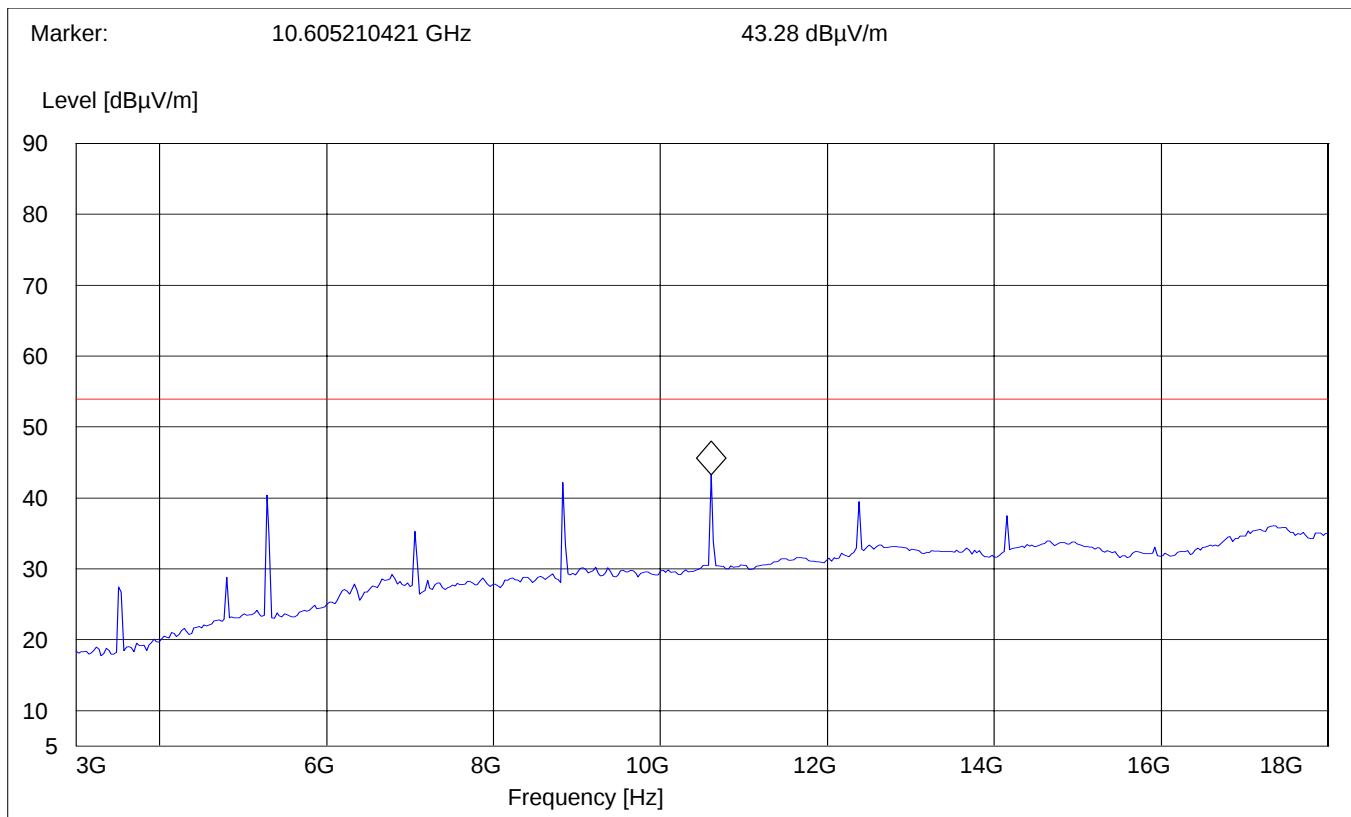
GSM1900+BT

(Average measurement)

SWEEP TABLE: "Spuri hi 3-18G"

Short Description: Spurious 3-18 GHz

Start	Stop	Detector	Meas.	RBW	VBW	Transducer
Frequency	Frequency	Time	Bandw.			
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)

Operating Mode: TX @ 1909.8MHz (GSM) AND TX @ 2402 MHz (BLUETOOTH)


EMISSION LIMITATIONS - Radiated (Transmitter)

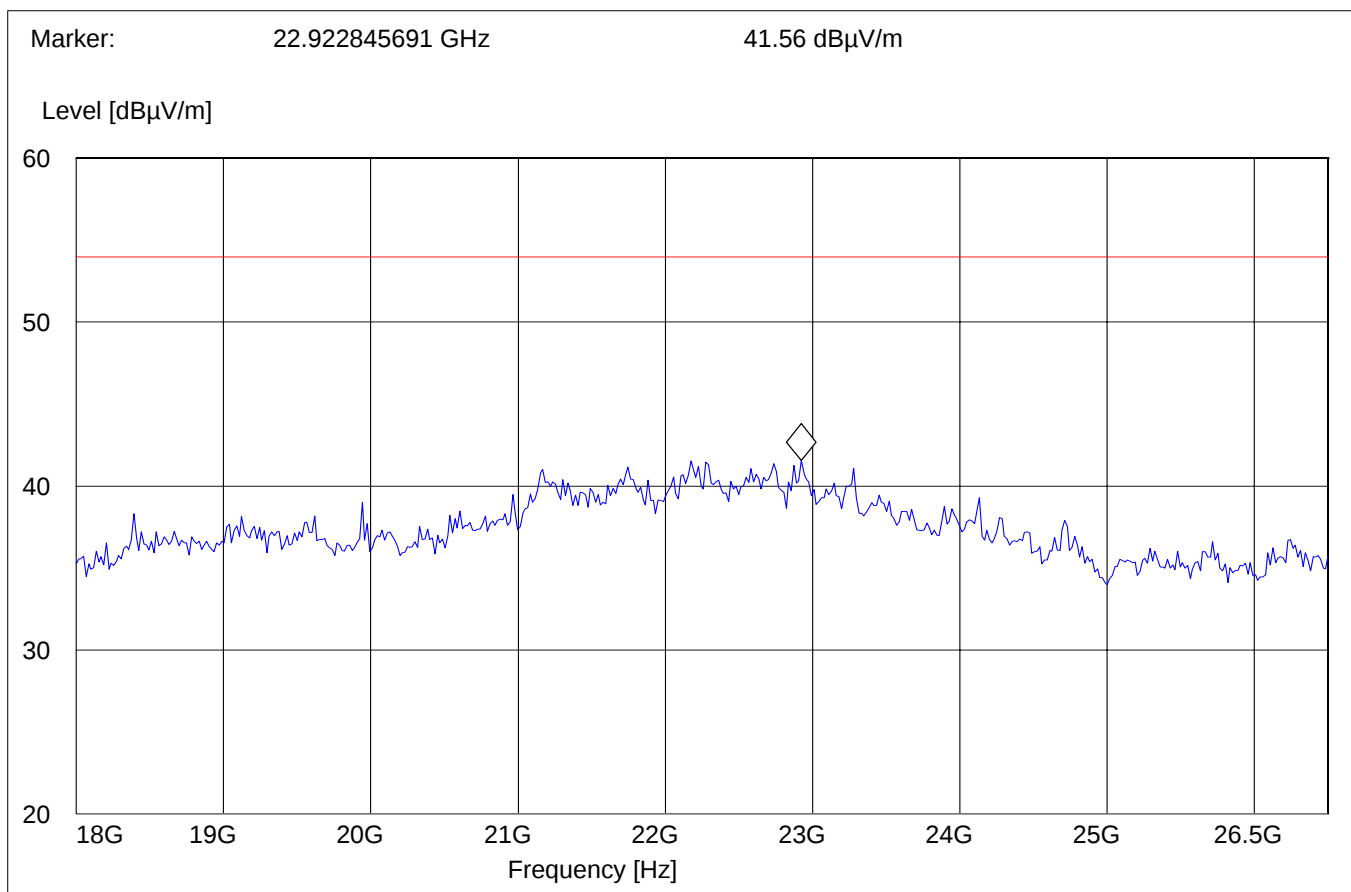
§ 15.247 (d)

18GHz – 26.5GHz

**This plot is valid for Collocation of both GSM & BT and WLAN & BT combinations.
(Worst-case plot)**

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)

Operating Mode: TX @ 1909.8MHz (GSM) AND TX @ 2402 MHz (BLUETOOTH)



EMISSION LIMITATIONS - Radiated (Transmitter)

1GHz – 3GHz

§ 15.247 (d)

WLAN+BT

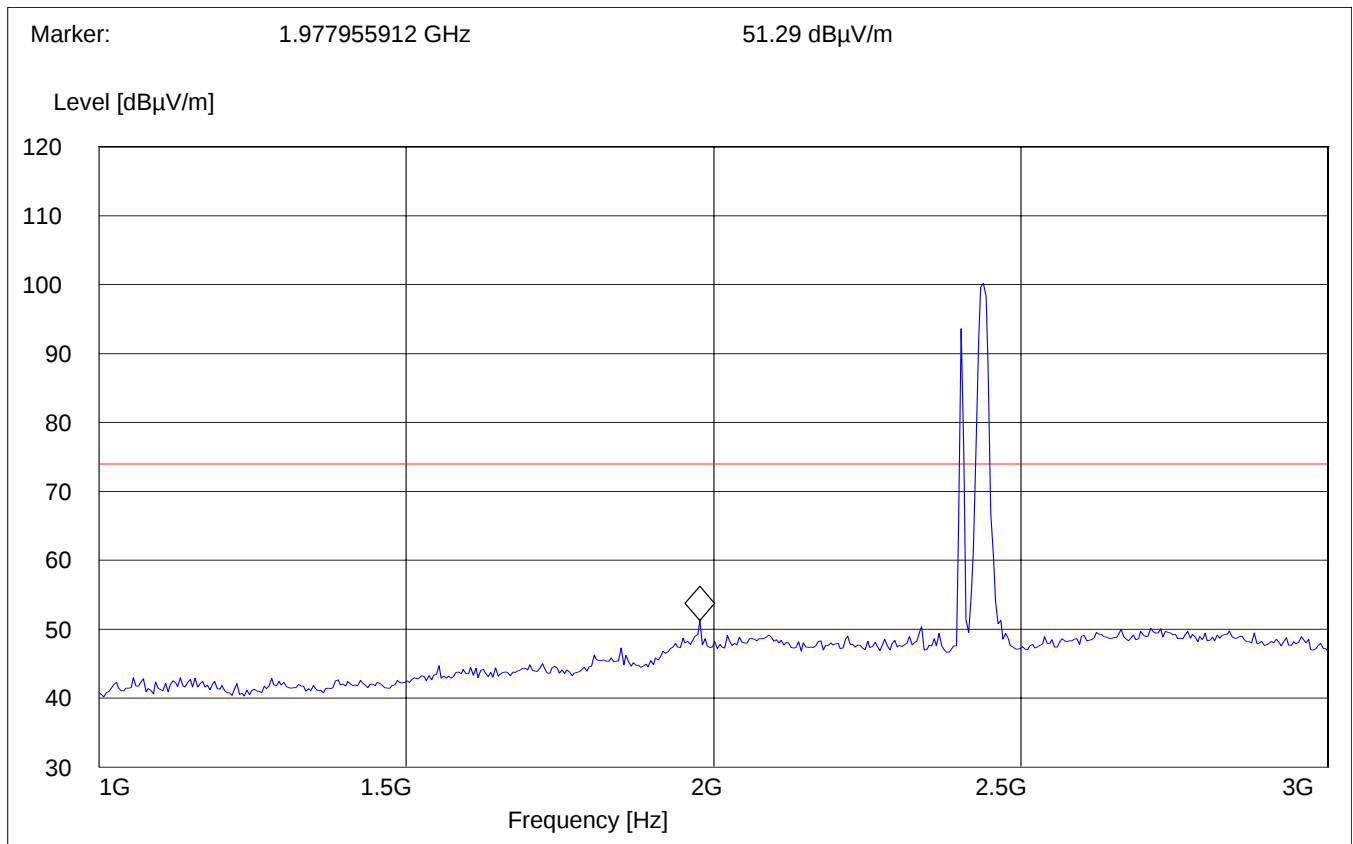
Note: Peaks above the limit line are BT & WLAN carrier freq.'s respectively.

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)

Operating Mode: TX @ 2412MHz (WLAN) AND TX @ 2402 MHz (BLUETOOTH)



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

§ 15.247 (d)

WLAN+BT

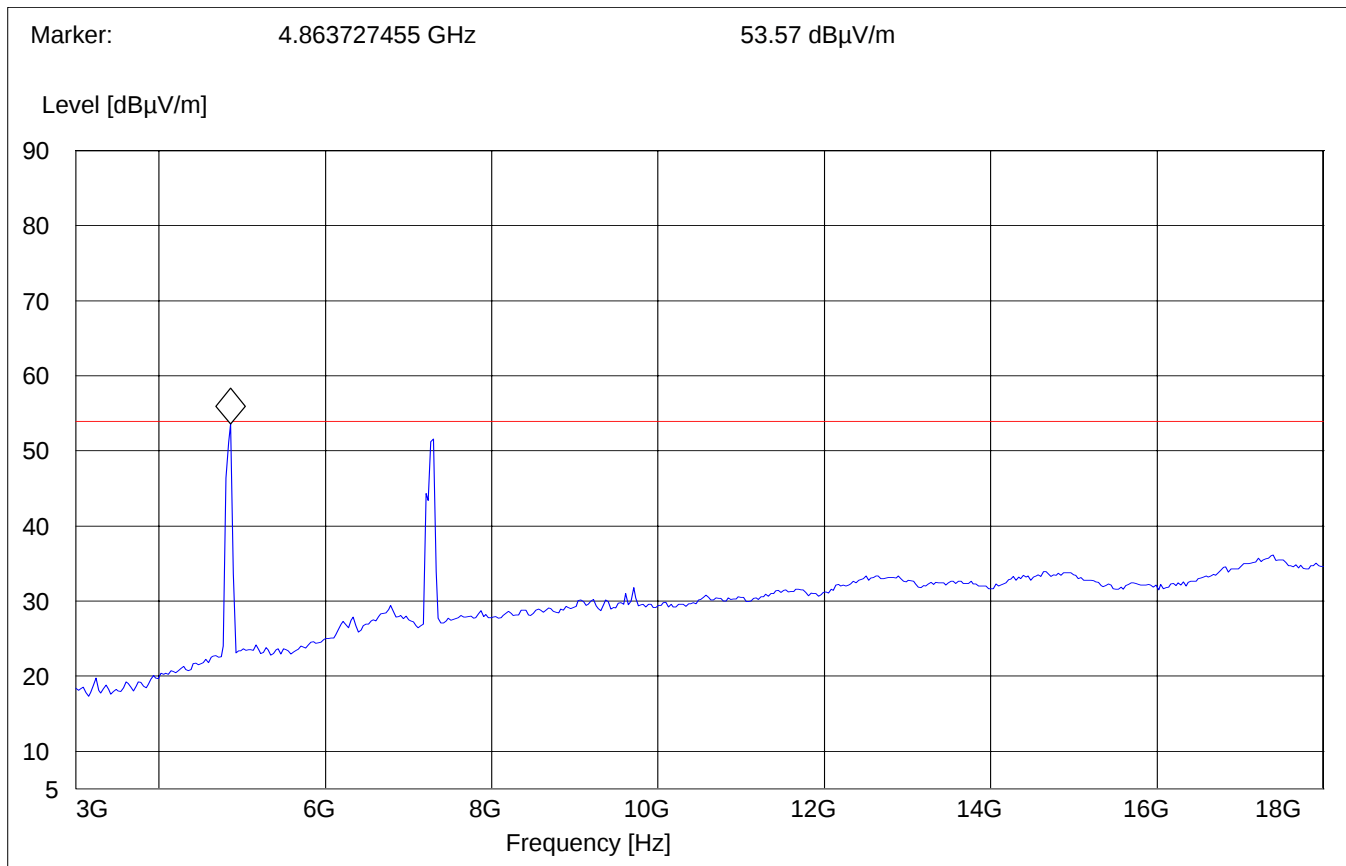
(Average measurement)

SWEEP TABLE: "Spuri hi 3-18G"

Short Description: Spurious 3-18 GHz

Start	Stop	Detector	Meas.	RBW	VBW	Transducer
Frequency	Frequency	Time	Bandw.			
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)

Operating Mode: TX @ 2412MHz (WLAN) AND TX @ 2402 MHz (BLUETOOTH)



CONDUCTED EMISSIONS

§ 15.107/207

This plot is valid for Collocation of both GSM & BT and WLAN & BT combinations.
(Worst-case plot)

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

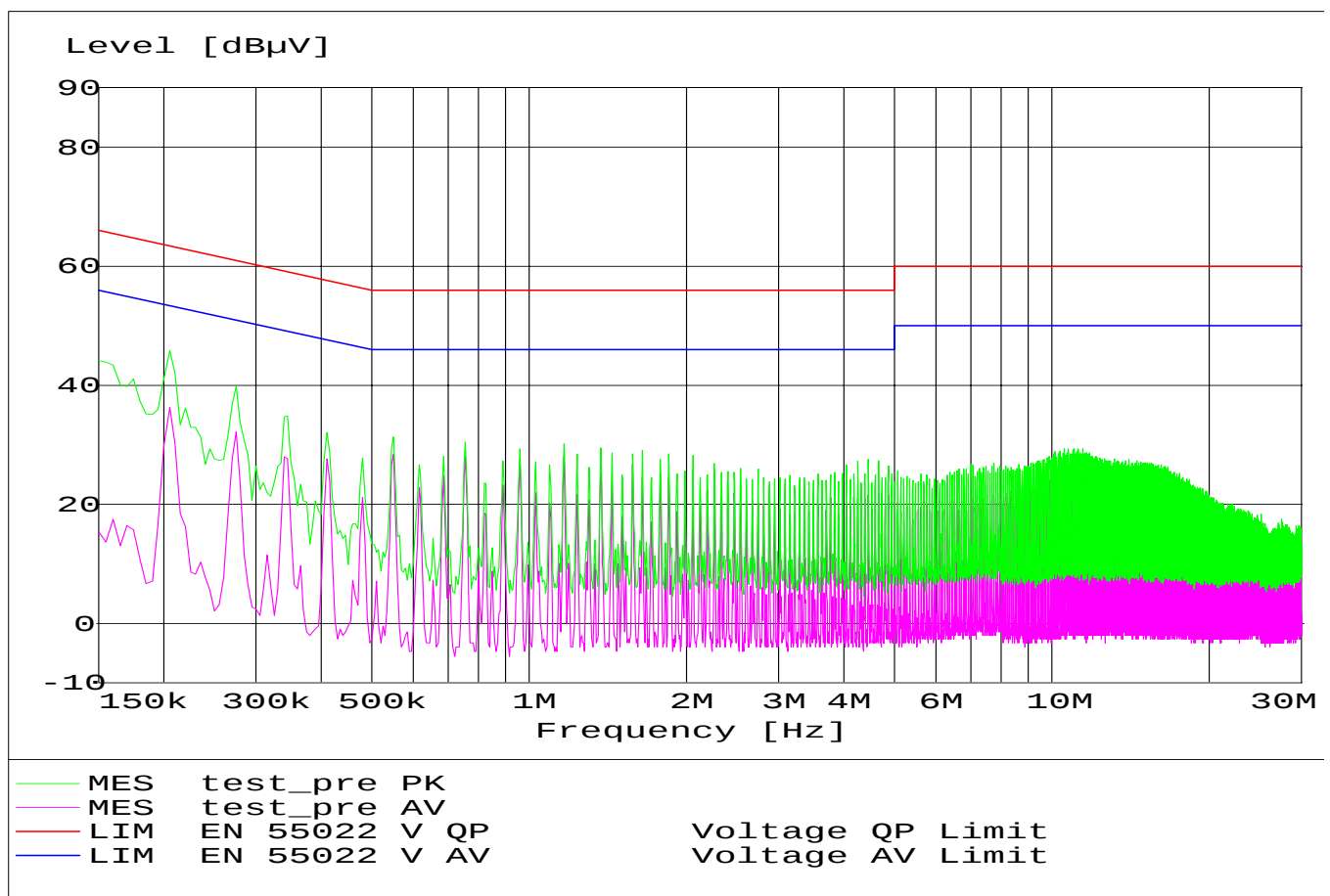
Limit

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



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**