

FCC Test Report

Test report no.: EMC_448-2003FCC15.247_IX104-11 FCC Part 15.247 for DSSS systems / CANADA RSS-210 (IX104)

FCC ID: Q2GIX104-112



Accredited according to ISO/IEC 17025





FCC listed # 101450

IC recognized # 3925

CETECOM Inc.

411 Dixon Landing Road • Milpitas, CA 95035 • U.S.A.

Phone: + 1 (408) 586 6200 • Fax: + 1 (408) 586 6299 • E-mail: info@cetecomusa.com • http://www.cetecom.com

CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

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



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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: Philip Kim

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@cetecomusa.com

Internet: www.cetecom.com



1.3 Details of applicant

Name : Xplore Technologies

Street : 11675 Jollyville Road, Suite 150

City / Zip Code : Austin, TX 78759

Country : USA

Contact : Douglas L. Fowler

Telephone : 512-336-7797 Tele-fax : 512-336-7791

e-mail : dfowler@xploretech.com

1.4 Application details

Date of receipt of application : 2003-03-24 Date of receipt test item : 2003-03-24

Date of test : 2003-03-24~2003-03-28

1.5 Test item

Manufacturer : Winston Corporation

Street : 21F, 88, Sec. 1, Hsin Tai Wu Rd, Hsichih

City / Zip Code : Taipei Hsien 221 Country : Taiwan, R.O.C.

Marketing Name : iX104 Model No. : iX104

Description : Tablet PC with Wireless LAN

FCC-ID : Q2GIX104-112

Additional information

Frequency: 2412-2462MHz (WLAN)

Type of modulation :

Number of channels :

2400: 11 Channels

Antenna : Internal Power supply : 9-18Vdc

Output power : WLAN = 24.87 dBm

Extreme temp. Tolerance : Lower:-20°C Upper: 60°C

1.6 Test standards: FCC Part 15 §15.247 / CANADA RSS-210



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	

Note: Please refer to test reports AIR-LMC350_LDK102040 and ADDENDUM PAGE 09-25_AIRLMC350_LDK102040 for conducted results, except for conducted peak output power, which is provided in this report for calculation of antenna gain. Otherwise, this report contains only radiated results for Tablet PC with embedded PCMCIA card and antenna.

Test Reports:

Technical responsibility for area of testing:

2003-04-23	EMC & Radio	Lothar Schmidt (Manager)	lelum de
Date	Section	Name	Signature

Responsible for test report and project leader:

2003-04-	EMC &		7/12
03	Radio	Philip Kim(EMC Engineer)	
Date	Section	Name	Signature



3.60 Test report

TEST REPORT

Test report no.: EMC_448-2003FCC15.247_IX104-11 IX104



Issue date: 2003-04-23 Test report no.: EMC_448-2003FCC15.247_IX104-11 Page 6 (39) **TEST REPORT REFERENCE** LIST OF MEASUREMENTS PAGE TEST REPORT REFERENCE 6 ANTENNA GAIN 7 § 15.204 MAXIMUM PEAK OUTPUT POWER § 15.247 (b) (1) 11 **BAND EDGE COMPLIANCE** §15.247 (c) 15 **EMISSION LIMITATIONS** 19 § 15.247 (c) (1) **CONDUCTED EMISSIONS** § 15.107/207 31 RECEIVER SPURIOUS RADIATION § 15.209 32 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS 37 **BLOCK DIAGRAMS** 38



ANTENNA GAIN

§ 15.204

Note: Conduted Power plots are in 3MHz RBW, therefore, we need to add a correction factor with the following equation according to FCC Chapter 3 for 10MHz RBW:

Correction =
$$10 * log (^{RBW}_{need}/^{RBW}_{used})$$

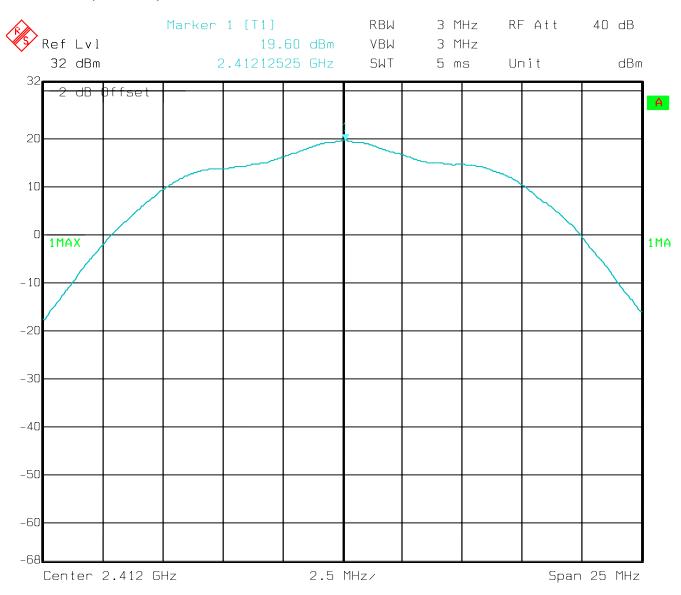
Correction = $10 * log (10MHz/3MHz) = 5.23dB$

	Low channel (2412MHz)	Mid channel (2437MHz)	High channel (2462MHz)
Conducted Power	24.83dBm	24.51dBm	24.87dBm
Radiated Power (EIRP)	23.73dBm	22.55dBm	23.14dBm
Antenna Gain	-1.1dBi	-1.96dBi	-1.73dBi
Average Antenna Gain		-1.6 dBi	

The Antenna gain is given as -1.6dBi and EIRP is calculated from Conducted power.



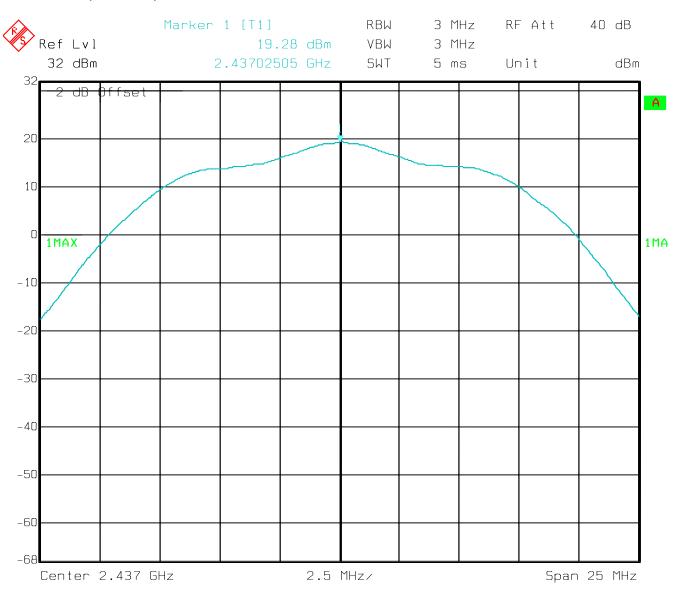
Conducted Peak Power Low Channel (2412MHz)



Date: 26.MAR.2003 11:22:31



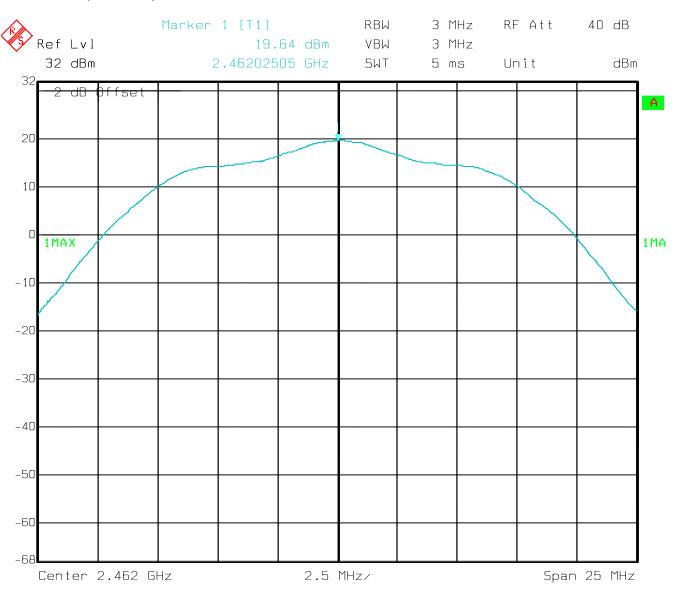
Conducted Peak Power Low Channel (2437MHz)



Date: 26.MAR.2003 11:27:27



Conducted Peak Power Low Channel (2462MHz)



Date: 26.MAR.2003 11:28:46



MAXIMUM PEAK OUTPUT POWER

§ 15.247 (b) (1)

(RADIATED)

EIRP:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T _{nom} (23)°C	V _{nom} (5.0) VDC	23.73dBm	22.55dBm	23.14dBm
Measurement uncertainty			±0.5dBm	

RBW/VBW: 10MHz

LIMIT

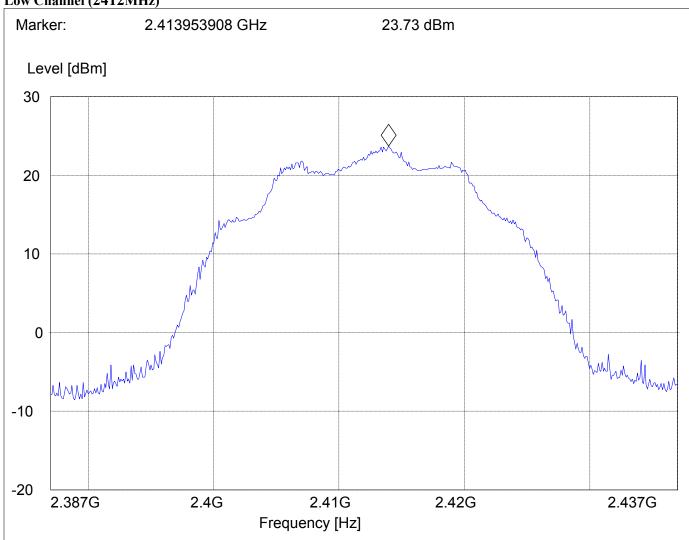
SUBCLAUSE § 15.247 (b) (1)

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt / 30dBm



EIRP Measurement

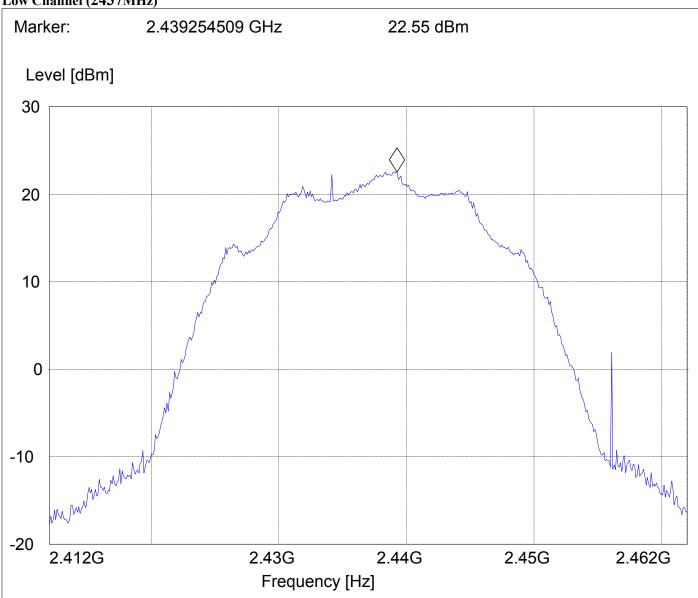
Low Channel (2412MHz)





EIRP Measurement

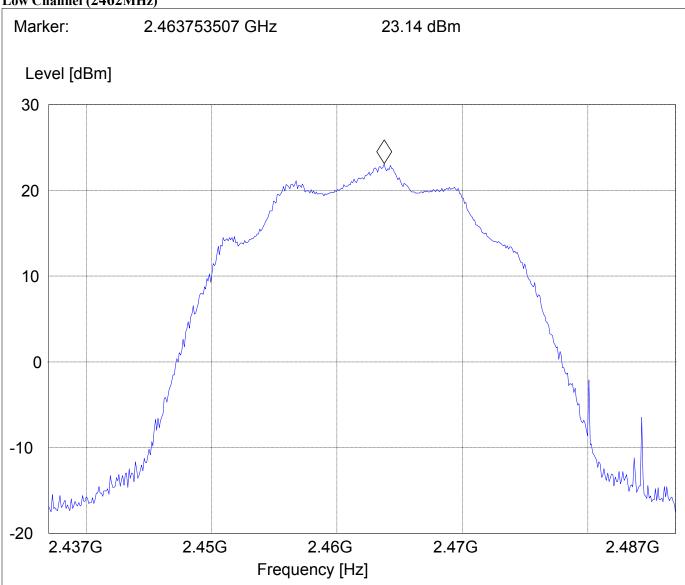
Low Channel (2437MHz)





EIRP Measurement

Low Channel (2462MHz)





BAND EDGE COMPLIANCE

§15.247 (c)

Low frequency section (spurious in the restricted band 2310 – 2390 MHz)

(Average measurement)

Operating condition : Tx at 2412MHz

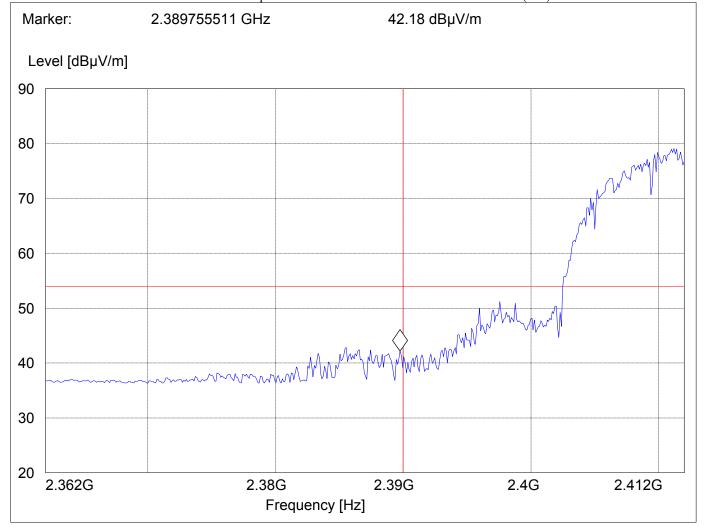
SWEEP TABLE : "FCC15.247 LBE_AVG"

Limit Line : $54dB\mu V$

Start Stop Detector Meas. RBW VBW Transducer

Frequency Frequency Time Bandw.

2.31 GHz 2.412 GHz MaxPeak Coupled 1 MHz 10Hz #326 horn (dBi)





BAND EDGE COMPLIANCE

§15.247 (c)

Low frequency section (spurious in the restricted band 2310 - 2390 MHz) (Peak measurement)

Operating condition : Tx at 2412MHz

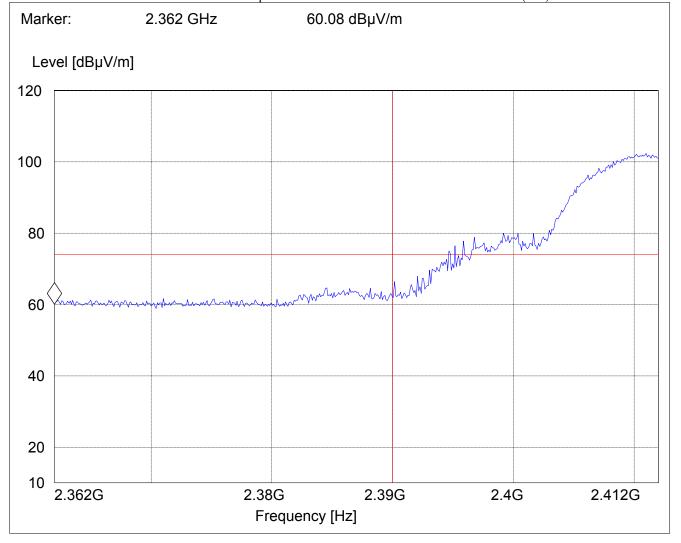
SWEEP TABLE : "FCC15.247 LBE_Pk"

Limit Line : $74dB\mu V$

Start Stop Detector Meas. RBW VBW Transducer

Frequency Frequency Time Bandw.

2.31 GHz 2.412 GHz MaxPeak Coupled 1 MHz 1MHz #326 horn (dBi)





BAND EDGE COMPLIANCE

§15.247 (c)

High frequency section (spurious in the restricted band 2483.5 – 2500 MHz) (Average measurement)

Operating condition : Tx at 2472MHz

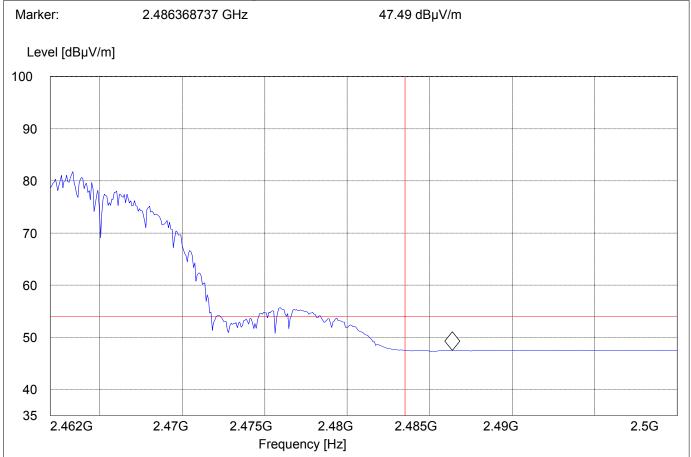
SWEEP TABLE : "FCC15.247 HBE_AVG"

Limit Line : $54dB\mu V$

Start Stop Detector Meas. RBW VBW Transducer

Frequency Frequency Time Bandw.

2.462 GHz 2.5 GHz MaxPeak Coupled 1 MHz 10Hz #326 horn (dBi)





BAND EDGE COMPLIANCE

§15.247 (c)

High frequency section (spurious in the restricted band 2483.5 – 2500 MHz) (Peak measurement)

Operating condition : Tx at 2472MHz

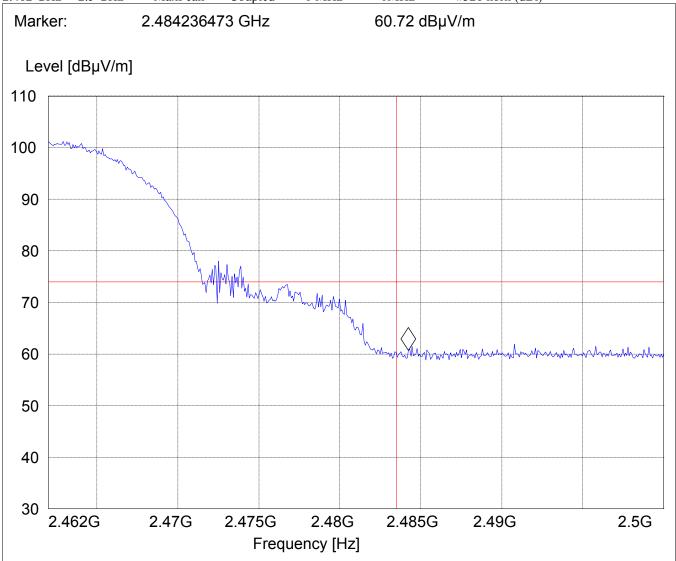
SWEEP TABLE : "FCC15.247 HBE_PK"

Limit Line : $74dB\mu V$

Start Stop Detector Meas. RBW VBW Transducer

Frequency Frequency Time Bandw.

2.462 GHz 2.5 GHz MaxPeak Coupled 1 MHz 1MHz #326 horn (dBi)





EMISSION LIMITATIONS

§ 15.247 (c) (1)

Transmitter (Radiated)

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, which 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 18 and 25 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 the 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.

Transmi	t at Lowest channe	el Frequency 2402MI	Hz	
Frequency (MHz)		Level (dBμV/m)		
	Peak	Quasi-Peak	Average	
	NF	NF	NF	
	NF	NF	NF	
	NF	NF	NF	
	NF	NF	NF	
Transmit	t at Middle channe	el Frequency 2440MI	Hz	
Frequency (MHz)		Level (dBμV/m)		
	Peak	Quasi-Peak	Average	
	NF	NF	NF	
	NF	NF	NF	
	NF	NF	NF	
	NF	NF	NF	
Transmit	at Highest channe	el Frequency 2480M	Hz	
Frequency (MHz)		Level (dBµV/m)		
	Peak	Quasi-Peak	Average	
	NF	NF	NF	
	NF	NF	NF	
	NF	NF	NF	
	NF	NF	NF	

Note: NF = No Significant Peak found.



EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

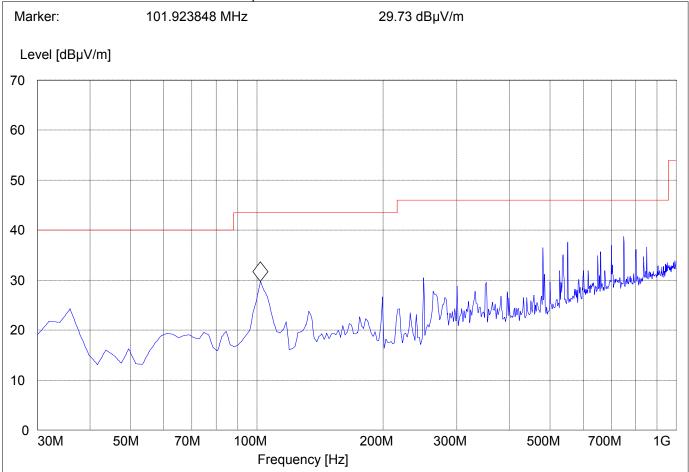
Lowest Channel (2412MHz): 30MHz – 1GHz

SWEEP TABLE: "BT Spuri hi 30-1G" Short Description: Bluetooth 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)

Lowest Channel(2412MHz): 1GHz – 3GHz

NOTE: The peak above the limit is the carrier frequency. Marked frequency is the carrier of the GPRS.

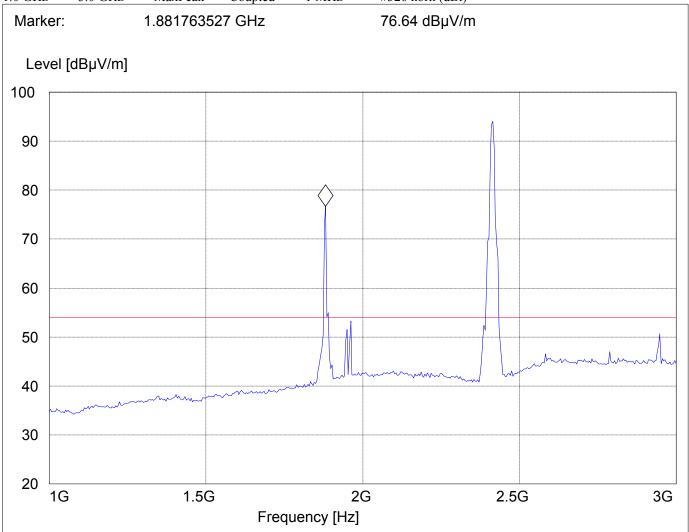
SWEEP TABLE: "BT Spuri hi 1-8G"

Short Description: Bluetooth Spurious 1-8 GHz

Start Stop Detector Meas. RBW Transducer

Frequency Frequency Time Bandw. VBW

1.0 GHz 3.0 GHz MaxPeak Coupled 1 MHz #326 horn (dBi)





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EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

Lowest Channel(2412MHz): 3GHz – 18GHz

NOTE: The peak above the limit is the carrier frequency.

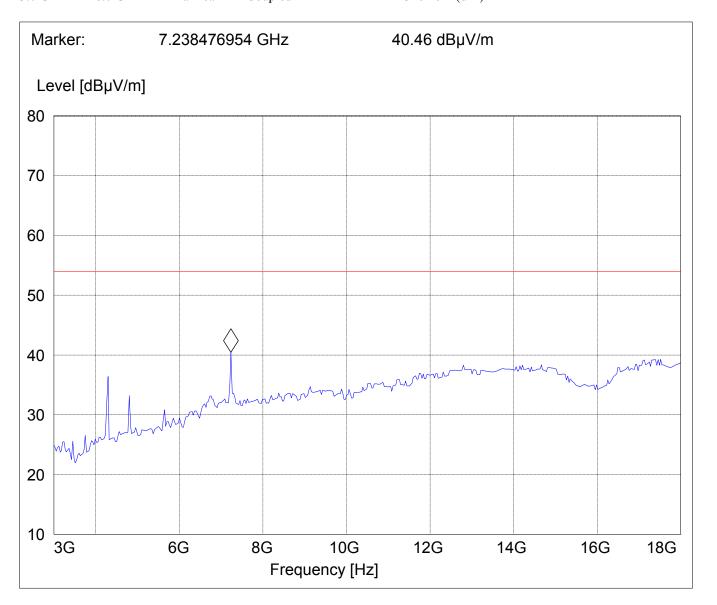
SWEEP TABLE: "BT Spuri hi 1-8G"

Bluetooth Spurious 1-8 GHz Short Description:

Start Stop Detector Meas. RBW Transducer

Frequency Frequency Time Bandw. **VBW**

3.0 GHz 8.0 GHz MaxPeak Coupled 1 MHz #326 horn (dBi)





EMISSION LIMITATIONS - Radiated (Transmitter) Middle Channel(2437MHz): 30MHz – 1GHz

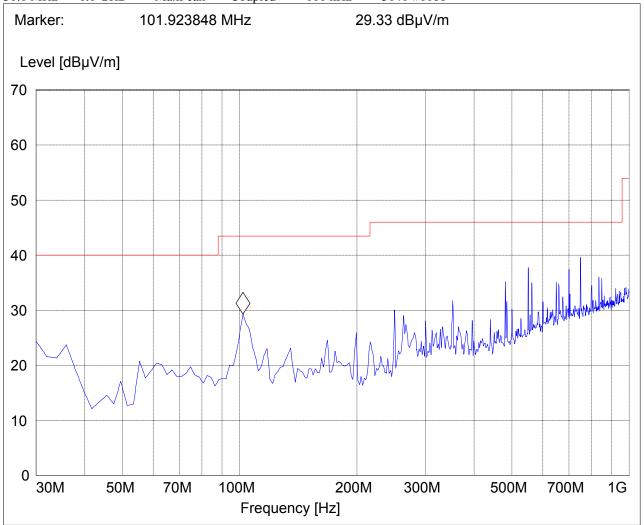
§ 15.247 (c) (1)

SWEEP TABLE: "BT Spuri hi 30-1G"
Short Description: Bluetooth 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)

Middle Channel(2437MHz): 1GHz – 3GHz

NOTE: The peak above the limit is the carrier frequency. And other peak is frequency of GPRS.

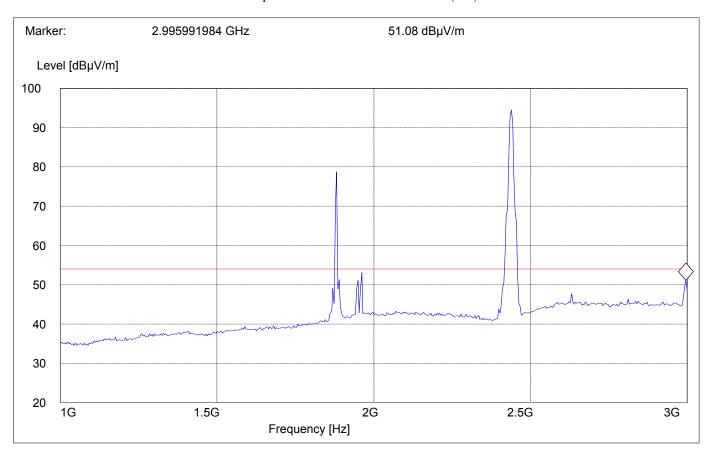
SWEEP TABLE: "BT Spuri hi 1-8G"

Short Description: Bluetooth Spurious 1-8GHz

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)

§ 15.247 (c) (1)

Middle Channel(2437MHz): 3GHz – 18GHz

NOTE: The peak above the limit is the carrier frequency.

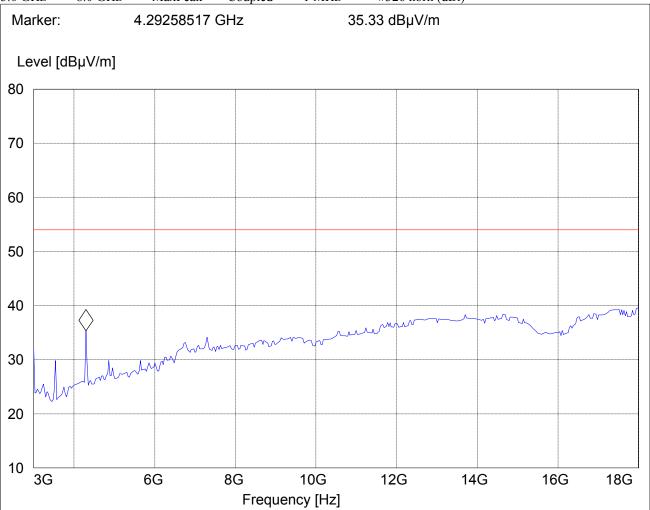
SWEEP TABLE: "BT Spuri hi 1-8G"

Short Description: Bluetooth Spurious 1-8GHz

Start Stop Detector Meas. RBW Transducer

Frequency Frequency Time Bandw. VBW

3.0 GHz 8.0 GHz MaxPeak Coupled 1 MHz #326 horn (dBi)





EMISSION LIMITATIONS - Radiated (Transmitter)

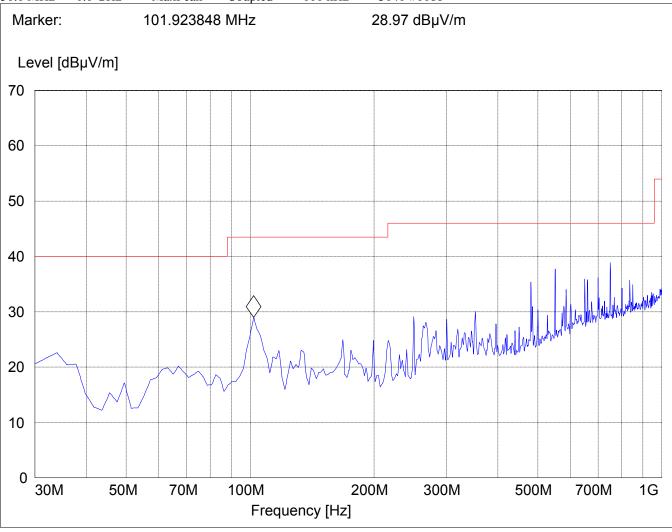
§ 15.247 (c) (1)

Highest Channel(2462MHz): 30MHz - 1GHz

SWEEP TABLE: "BT Spuri hi 30-1G"
Short Description: Bluetooth 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)

Highest Channel(2462MHz): 1GHz – 3GHz

NOTE: The peak above the limit is the carrier frequency. Marked frequency is the carrier of GPRS.

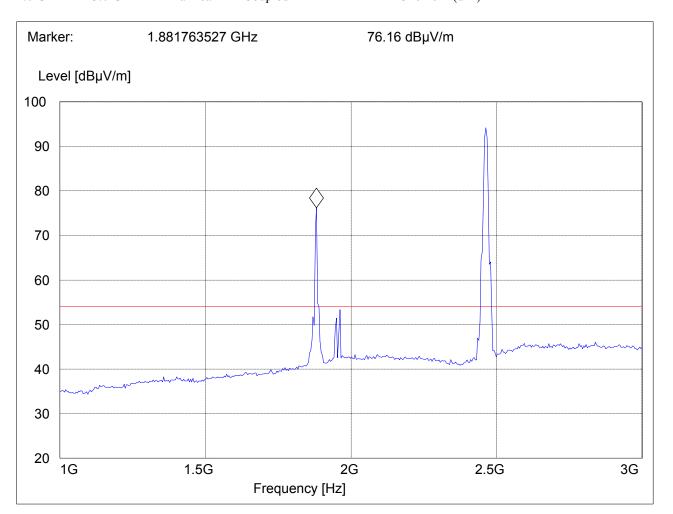
SWEEP TABLE: "BT Spuri hi 1-8G"

Short Description: Bluetooth Spurious 1-8GHz

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)

§ 15.247 (c) (1)

Highest Channel(2462MHz): 3GHz – 18GHz

NOTE: The peak above the limit is the carrier frequency.

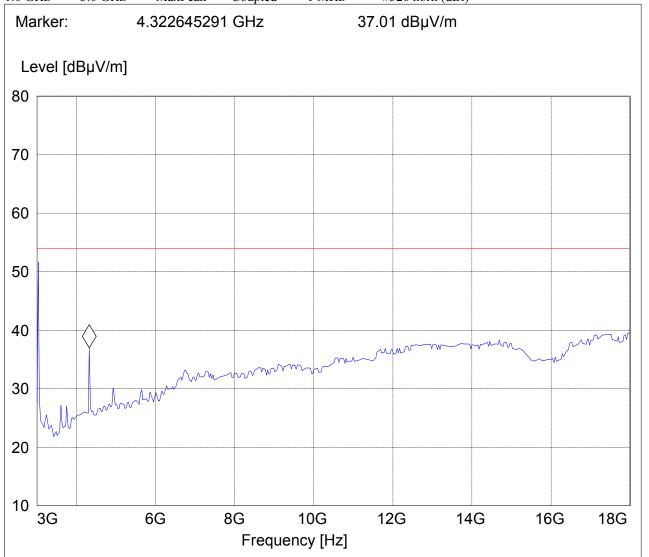
SWEEP TABLE: "BT Spuri hi 1-8G"

Short Description: Bluetooth Spurious 1-8GHz

Start Stop Detector Meas. RBW Transducer

Frequency Frequency Time Bandw. VBW

1.0 GHz 3.0 GHz MaxPeak Coupled 1 MHz #326 horn (dBi)





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EMISSION LIMITATIONS - Radiated (Transmitter)

§ 15.247 (c) (1)

Transducer

18GHz - 25GHz

(This plot is valid for all three channels)

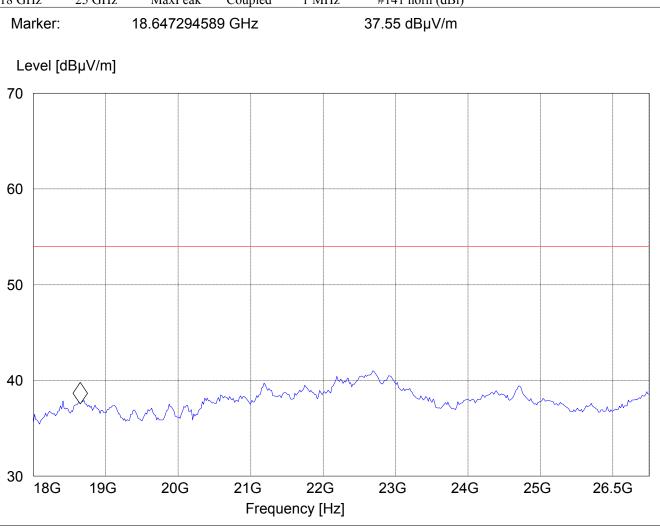
"BT Spuri hi 18-25G" SWEEP TABLE:

Bluetooth Spurious 18-25GHz

Short Description: Meas. Detector RBW Start Stop

Frequency Frequency Time Bandw. VBW

18 GHz 25 GHz Coupled 1 MHz #141 horn (dBi) MaxPeak





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CONDUCTED EMISSIONS

§ 15.107/207

Measured with AC/DC power adapter

SWEEP TABLE: "55022 cond"

Short Description: EN 55022 for 150KHz-30MHz

Start Stop Detector Meas Transducer

Frequency Time Frequency Bandw.

150.0 kHz 30.0 MHz Coupled None MaxPeak 10 kHz

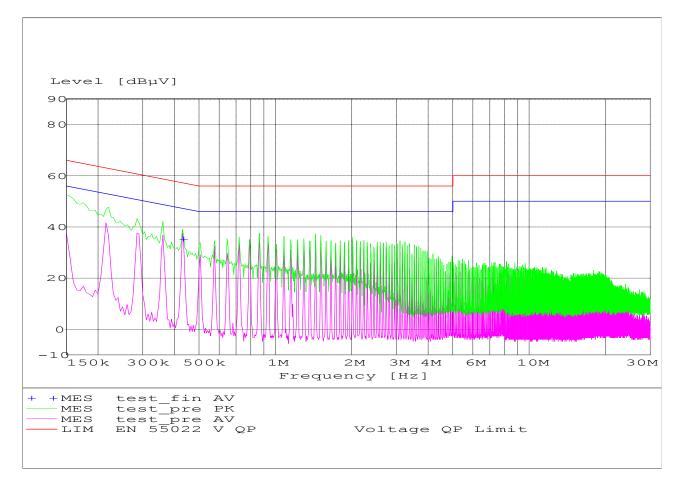
Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)

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







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 forthe relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.



RECEIVER SPURIOUS RADIATION

§ 15.209

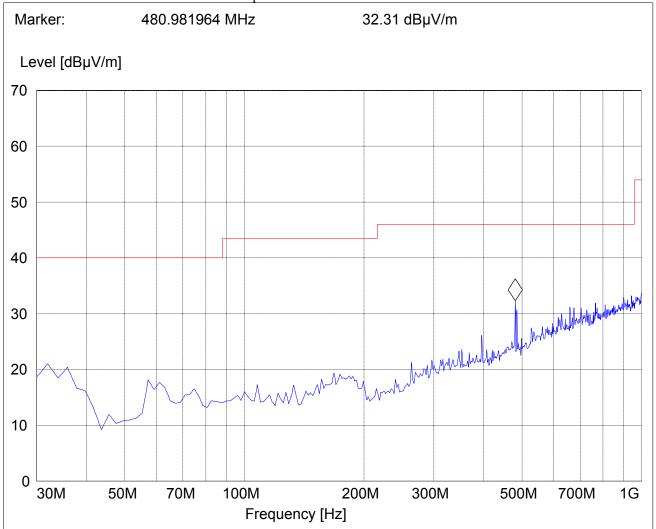
30MHz – 1GHz

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

Start Stop Detector Meas. RBW Transducer

Frequency Frequency Time VBW

30.0 MHz 1.0 GHz MaxPeak Coupled 100 kHz 3141-#1186





RECEIVER SPURIOUS RADIATION

§ 15.209

1GHz - 3GHz

Note: Marked frequency is the carrier and other peak above the limit is the carrier of GPRS.

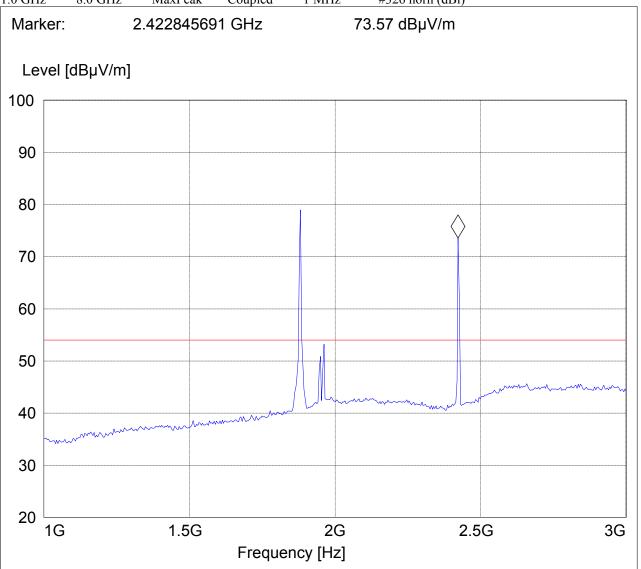
SWEEP TABLE: "BT Spuri hi 1-8G"

Short Description: Bluetooth Spurious 1-8 GHz

Start Stop Detector Meas. RBW Transducer

Frequency Frequency Time Bandw. VBW

1.0 GHz 8.0 GHz MaxPeak Coupled 1 MHz #326 horn (dBi)





RECEIVER SPURIOUS RADIATION

§ 15.209

3GHz – 18GHz

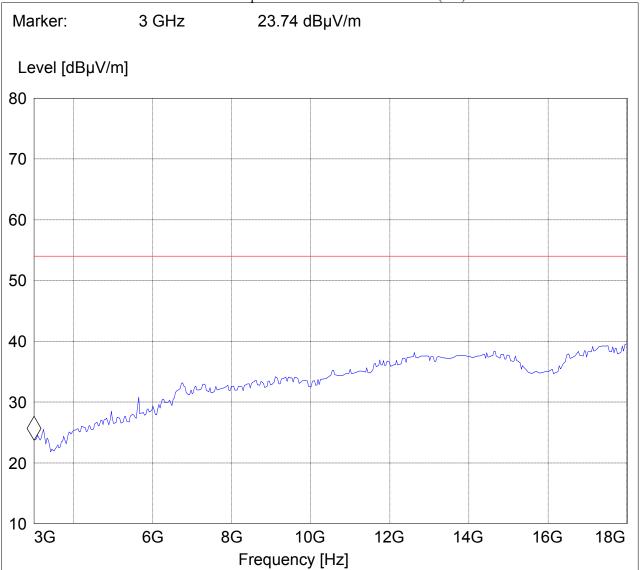
SWEEP TABLE: "BT Spuri hi 8-18G"

Short Description: Bluetooth Spurious 8-18GHz

Start Stop Detector Meas. RBW Transducer

Frequency Frequency Time Bandw. VBW

8.0 GHz 18 GHz MaxPeak Coupled 1 MHz #326 horn (dBi)





RECEIVER SPURIOUS RADIATION

§ 15.209

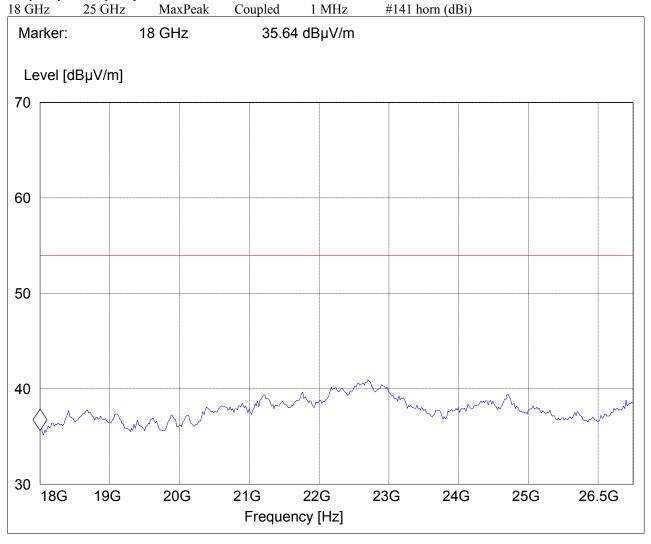
18GHz - 25GHz

SWEEP TABLE: "BT Spuri hi 18-25G"

Short Description: Bluetooth Spurious 18-25GHz

Start Stop Detector Meas. RBW Transducer

Frequency Frequency Time Bandw. VBW





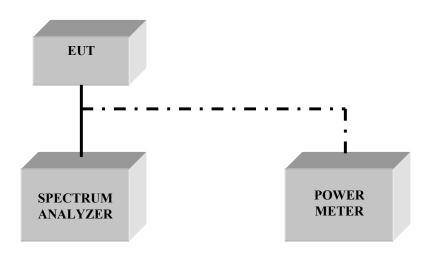
TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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	Signal Generator	SMY02	Rohde & Schwarz	836878/011
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
05	Power Amlifier	250W1000	Amplifier Research	300031
06	Biconilog Antenna	3141	EMCO	0005-1186
07	Horn Antenna	SAS-200/571	AH Systems	325
08	Power Splitter	11667B	Hewlett Packard	645348
09	Climatic Chamber	VT4004	Votch	G1115
10	Pre-Amplifier	JS4-00102600	Miteq	00616
11	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807
12	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008



BLOCK DIAGRAMS

Conducted Testing





Radiated Testing

ANECHOIC CHAMBER

