

# **FCC Test Report**

Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137

FCC Part 22, 24 / RSS 132, 133

EUT Tablet PC Model: iX104C2
With GSM module Model: MC75
With BT module Model: TM60M665

FCC ID: Q2GIX104-137 IC: 4596A-IX104WBG



Accredited according to ISO/IEC 17025





FCC listed # 101450

IC recognized # 3925

#### CETECOM Inc.

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



## **Table of Contents**

1	C 1	· C	- 4
1	General	Intorm	amon

- 1.1 Notes
- 1.2 Testing laboratory
- 1.3 Details of applicant
- 1.4 Application details
- 1.5 Test item
- 1.6 Test standards
- 2 Technical test
- 2.1 Summary of test results
- 2.2 Test report
- 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. does not assume responsibility for any conclusions and generalisations 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.

# 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 : 2005-06-15

Date of test : 2005-06-15 to 2005-06-21

1.5 Test item

Manufacturer : Applicant
Marketing Name : iX104C2
Model No. : iX104C2

Description : Tablet PC with GSM & BT modules

FCC-ID : Q2GIX104-137 IC ID : 4596A-IX104WBG

Additional information

Frequency: 824.2MHz - 848.8MHz for GSM 850 (covered under this report)

 $1850.2MHz - 1909.8MHz \ for \ PCS \ 1900 \ (covered \ under \ this \ report)$ 

2402MHz - 2480MHz for BT (not covered under this report)

Type of modulation : GMSK

Number of channels : 124 for GSM-850, 299 for PCS-1900

Antenna : Embedded

Power supply : via host Tablet PC

Output power : 22.49dBm (177.42mW) max. ERP measured in GSM-850

26.44dBm (440.55mW) max. EIRP measured in PCS-1900

Extreme temp. Tolerance : Lower: -30°C Upper: +50°C

#### 1.6 Test standards

C

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

The Tablet PC (model# iX104C2) carries pre-certified GSM module model# MC75 with FCC ID: OIPMC75

This test report covers full radiated testing as per FCC 22/24 on Tablet PC with GSM module. All conducted measurements are covered under test report# 4\_Siem\_0504\_GSM\_FCC



## 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:

2005-07-01	EMC & Radio	Lothar Schmidt (Manager)	llumi de
Date	Section	Name	Signature

Responsible for test report and project leader:

2005-07-01	EMC & Radio	Harpreet Sidhu (EMC Engineer)	\
Date	Section	Name	Signature



2.2 Test report

**TEST REPORT** 

Test report no.: EMC\_858FCC22-24\_2005\_GSM\_137



# TEST REPORT REFERENCE

PARAMETER TO BE MEASURED	PARAGRAPH	PAGE
POWER OUTPUT	§ 22.913(a) / § 24.232 (b)	7
EMISSION LIMITS TRANSMITTER	§2.1051 / §24.238	10
RECEIVER RADIATED EMISSIONS	§ 2.1053 / RSS-133	37
CONDUCTED EMISSIONS	§ 15.107/207	43
TEST EQUIPMENT AND ANCILLARIE	ES USED FOR TESTS	44
BLOCK DIAGRAMS		45



#### **POWER OUTPUT**

§ 22.913(a) / § 24.232 (b)

#### **Summary:**

During the process of testing, the EUT was controlled via Rhode & Schwarz Universal Radio Communication tester (CMU 200) to ensure max. Power transmission and proper modulation.

This paragraph contains average output power, peak output power, EIRP & ERP measurements for the EUT. In all cases, the peak output power is within the specified limits.

#### **Method of Measurements:**

The EUT was set up for the max. Output power with pseudo random data modulation.

The power was measured with R&S Spectrum Analyzer ESIB 40 (peak)

These measurements were done at 3 frequencies,

824.2 MHz, 836.6 MHz and 848.8 MHz (bottom, middle and top of operational frequency range) for GSM-850 1850.2 MHz, 1880.0 MHz and 1909.8 MHz (bottom, middle and top of operational frequency range) for PCS-1900



ERP (GSM-850) §22.913(a)

### Limits:

Power Control Level	Burst Peak ERP
5	≤38.45dBm (7W)

# EIRP

Frequency	Power Control Level	Burst Peak	<b>K</b>
(MHz)		(dBm)	
		EIRP	ERP
824.2	5	20.53	18.39
836.6	5	22.63	20.49
848.8	5	24.63	22.49
Measurement uncertainty		±0.5 dB	

ANALYZER SETTINGS: RBW = VBW = 3MHz



EIRP (PCS-1900) §24.232(b)

### Limits:

Power Control Level	Burst Peak EIRP
0	≤33dBm (1W)

### **EIRP**

Frequency	Power Control Level	Burst Peak
(MHz)		(dBm)
		EIRP
1850.2	0	25.78
1880.0	0	26.44
1909.8	0	26.01
Measurement uncertainty	±0.5 dB	

ANALYZER SETTINGS: RBW = VBW = 3MHz



#### **EMISSION LIMITS TRANSMITTER**

§2.1051 / §24.238

#### **Measurement Procedure:**

The following steps outline the procedure used to measure the radiated emissions from the EUT. The site is constructed in accordance with ANSI C63.4 - 2003 requirements and is recognised by the FCC. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the USPCS band.

Additionally testing was done from 9 kHz to 30MHz in order to verify EUT compliance in this freq. range.

#### The final Radiated emission test procedure is as follows:

- a) The test item was placed on a 0. 8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- b) The antenna output was terminated in a 50-ohm load.
- c) A double-ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was determined by the substitution method described for ERP measurements.

#### **Measurement Limit:**

Sec. 24.238 Emission Limits.

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

#### **Measurement Results:**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850 & PCS-1900 bands. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the GSM-850 & PCS-1900 band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.



# **RESULTS OF RADIATED TESTS GSM-850:**

Harmonics	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	1648.4	-41.19	1673.2	-39.13	1697.6	-35.91
3	2472.6	-38.08	2509.8	-37.09	2546.4	-33.88
4	3296.8	-45.16	3346.4	-50.21	3395.2	-53.24
5	4121	-47.30	4183	-55.19	4244	-49.77
6	4945.2	-51.02	5019.6	-50.80	5092.8	-48.99
7	5769.4	-47.34	5856.2	-46.20	5941.6	-42.86
8	6593.6	-37.36	6692.8	-39.05	6790.4	-38.23
9	7417.8	nf	7529.4	-47.94	7639.2	-42.04
10	8242	nf	8366	nf	8488	-47.27

nf: noise floor



### **RADIATED SPURIOUS EMISSIONS (GSM-850)**

Tx @ 836.6MHz: 30MHz - 1GHz

Spurious emission limit -13dBm

Antenna: vertical

SWEEP TABLE: "FCC 22 Spur 30M-1G"

Start Stop Detector Meas. RBW/VBW

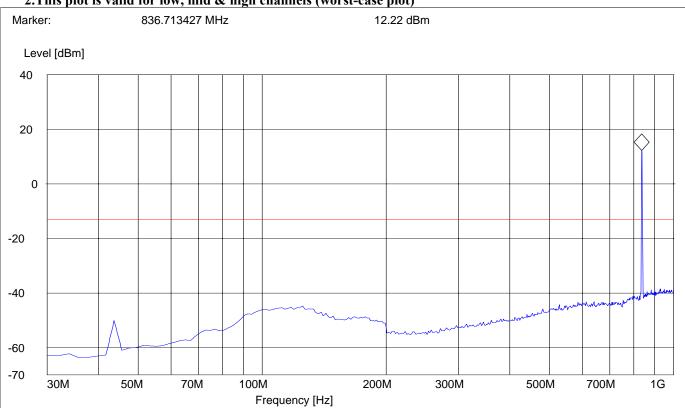
Frequency Frequency Time

30MHz 1GHz Max Peak Coupled 1 MHz

#### Note:

# 1. The peak above the limit line is the carrier freq.

2. This plot is valid for low, mid & high channels (worst-case plot)





### RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 836.6MHz: 30MHz - 1GHz

Spurious emission limit -13dBm

Antenna: horizontal

SWEEP TABLE: "FCC 22 Spur 30M-1G"

Start Stop Detector Meas. RBW/VBW

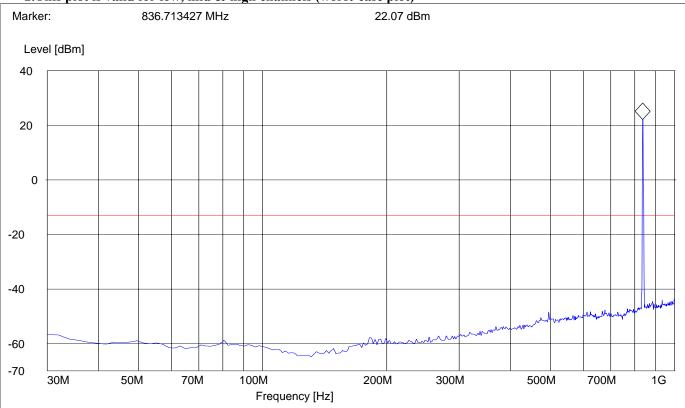
Frequency Frequency Time

30MHz 1GHz Max Peak Coupled 1 MHz

#### Note:

# 1. The peak above the limit line is the carrier freq.

2. This plot is valid for low, mid & high channels (worst-case plot)





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 14 (45)

### RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 1GHz – 1.58GHz

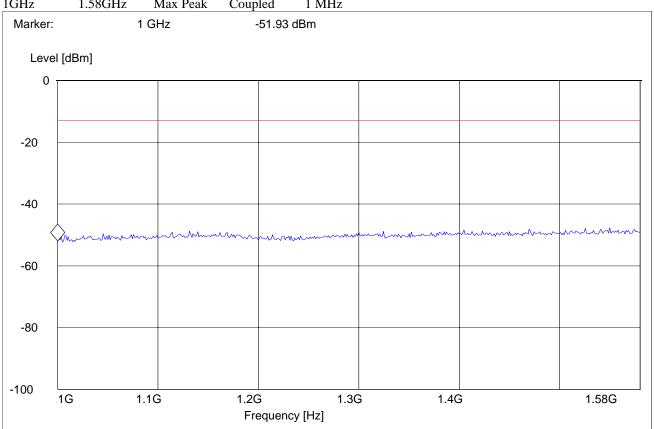
Spurious emission limit -13dBm

SWEEP TABLE: "FCC 22 Spur 1-1.58G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

1GHz 1.58GHz Max Peak Coupled 1 MHz





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 15 (45)

### RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 824.2MHz: 1.58GHz – 3GHz

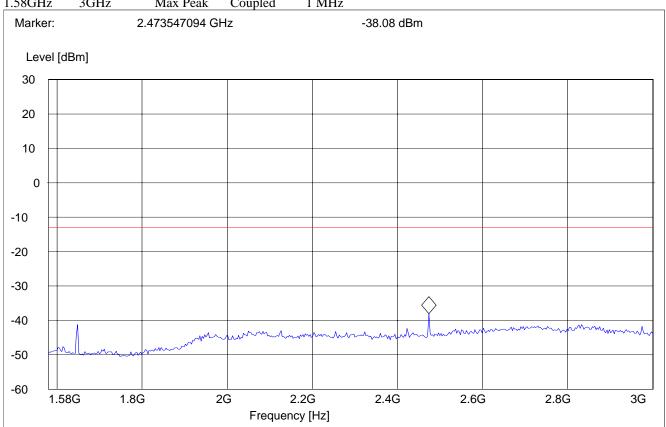
Spurious emission limit -13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

RBW/VBW Start Stop Detector Meas.

Frequency Frequency Time

1.58GHz 3GHz Max Peak Coupled 1 MHz





### **RADIATED SPURIOUS EMISSIONS (GSM-850)**

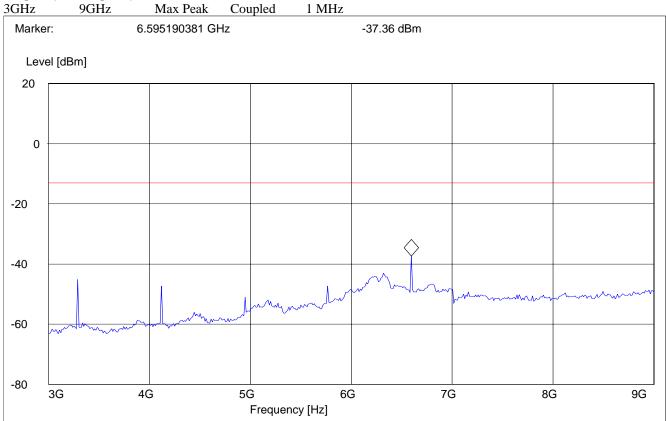
Tx @ 824.2MHz: 3GHz – 9GHz

Spurious emission limit -13dBm

### SWEEP TABLE: "FCC 22 Spur 3-9G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 17 (45)

### RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 836.6MHz: 1GHz – 1.58GHz

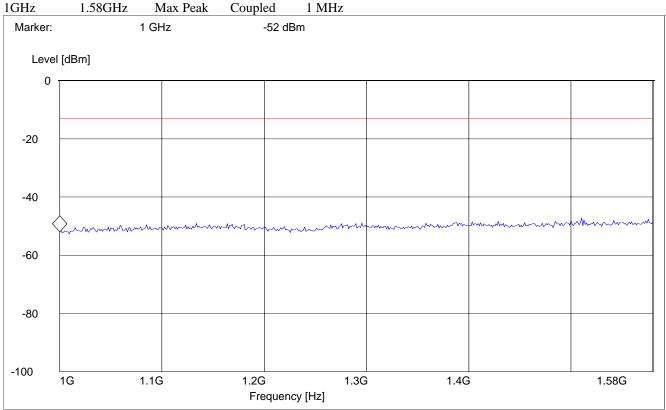
Spurious emission limit -13dBm

#### SWEEP TABLE: "FCC 22 Spur 1-1.58G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

1.58GHz Max Peak Coupled





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 18 (45)

### RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 836.6MHz: 1.58GHz – 3GHz

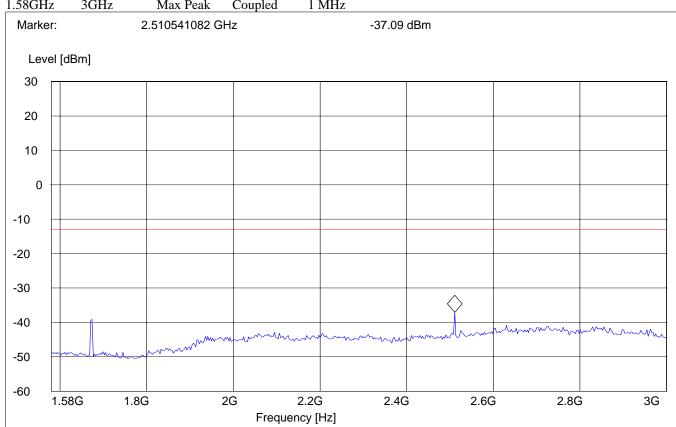
Spurious emission limit -13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

RBW/VBW Start Stop Detector Meas.

Frequency Frequency Time

1.58GHz 3GHz Max Peak Coupled 1 MHz





### **RADIATED SPURIOUS EMISSIONS (GSM-850)**

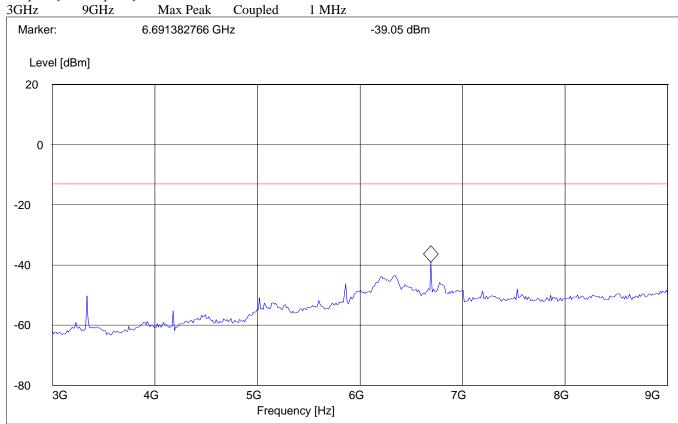
Tx @ 836.6MHz: 3GHz – 9GHz

Spurious emission limit -13dBm

SWEEP TABLE: "FCC 22 Spur 3-9G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 20 (45)

### RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 848.8MHz: 1GHz – 1.58GHz

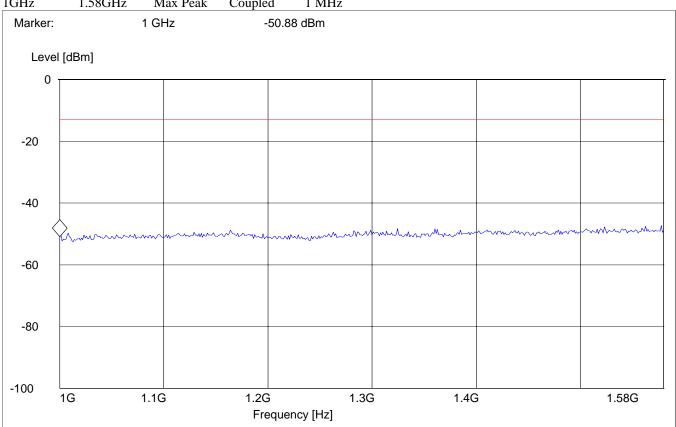
Spurious emission limit -13dBm

SWEEP TABLE: "FCC 22 Spur 1-1.58G"

Start Stop Detector Meas. RBW/VBW

Frequency FrequencyTime

1GHz 1.58GHz Max Peak Coupled 1 MHz





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 21 (45)

### RADIATED SPURIOUS EMISSIONS (GSM-850)

Tx @ 848.8MHz: 1.58GHz – 3GHz

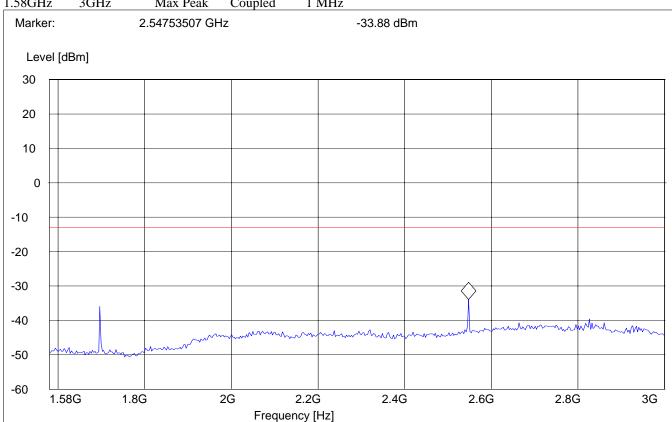
Spurious emission limit -13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

RBW/VBW Start Stop Detector Meas.

Frequency Frequency Time

1.58GHz 3GHz Max Peak Coupled 1 MHz





### **RADIATED SPURIOUS EMISSIONS (GSM-850)**

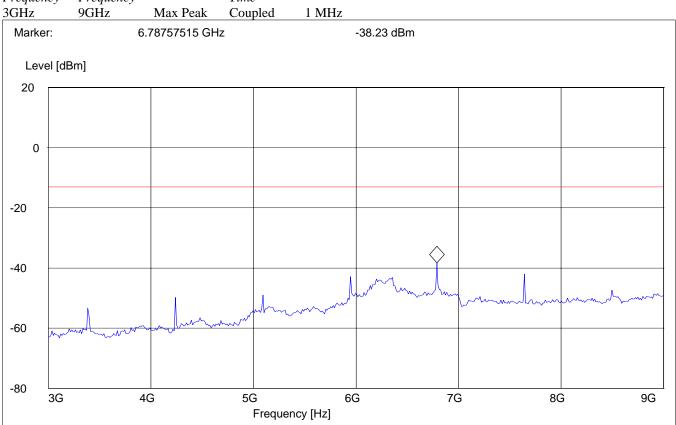
Tx @ 848.8MHz: 3GHz – 9GHz

Spurious emission limit -13dBm

SWEEP TABLE: "FCC 22 Spur 3-9G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time





# **RESULTS OF RADIATED TESTS PCS-1900:**

Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	3700.4	-31.10	3760	-28.13	3819.6	-28.84
3	5550.6	-39.89	5640	-37.74	5729.4	-35.71
4	7400.8	-45.40	7520	-43.76	7639.2	-45.86
5	9251	-36.87	9400	-37.09	9549	-39.54
6	11101.2	nf	11280	nf	11458.8	nf
7	12951.4	nf	13160	nf	13368.6	nf
8	14801.6	nf	15040	nf	15278.4	nf
9	16651.8	nf	16920	nf	17188.2	nf
10	18502	nf	18800	nf	19098	nf



#### **RADIATED SPURIOUS EMISSIONS**

Tx @ 1850.2MHz: 30MHz - 1GHz

Spurious emission limit -13dBm

Antenna: vertical

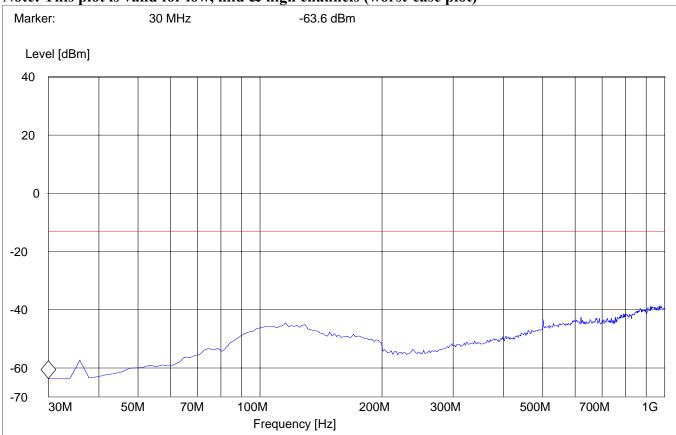
SWEEP TABLE: "FCC 24 Spur 30M-1G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

30MHz 1GHz Max Peak Coupled 1 MHz

Note: This plot is valid for low, mid & high channels (worst-case plot)





#### **RADIATED SPURIOUS EMISSIONS**

Tx @ 1850.2MHz: 30MHz - 1GHz

Spurious emission limit –13dBm

Antenna: horizontal

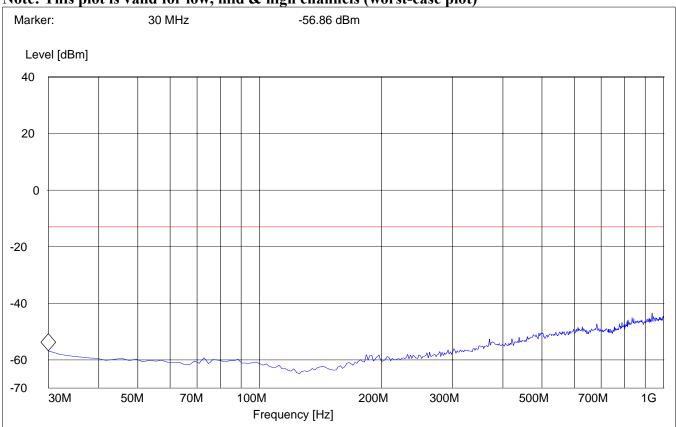
SWEEP TABLE: "FCC 24 Spur 30M-1G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

30MHz 1GHz Max Peak Coupled 1 MHz

Note: This plot is valid for low, mid & high channels (worst-case plot)





#### **RADIATED SPURIOUS EMISSIONS**

Tx @ 1850.2MHz: 1GHz – 3GHz

Spurious emission limit -13dBm

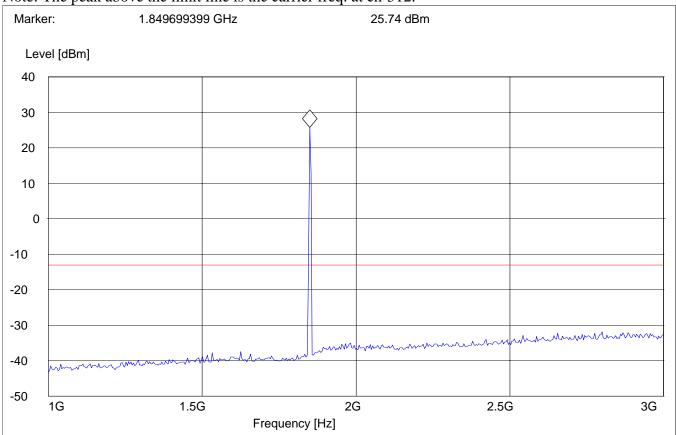
SWEEP TABLE: "FCC Spuri 1-3G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

1GHz 3GHz Max Peak Coupled 1 MHz

Note: The peak above the limit line is the carrier freq. at ch-512.





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 27 (45)

### RADIATED SPURIOUS EMISSIONS

Tx @ 1850.2MHz: 3GHz – 18GHz

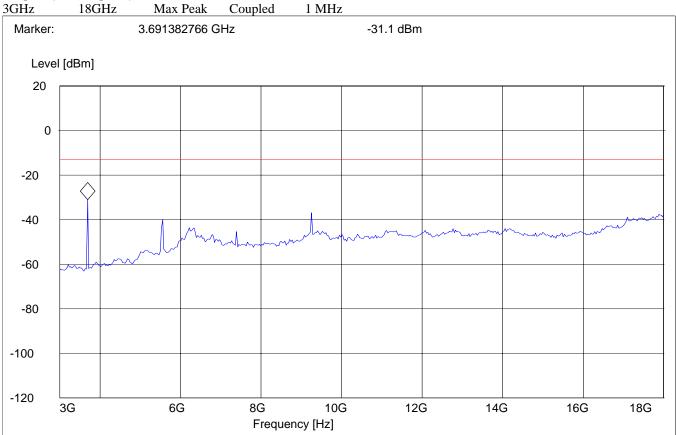
Spurious emission limit -13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

Start Stop Detector RBW/VBW Meas.

Frequency Frequency Time

18GHz Max Peak





#### **RADIATED SPURIOUS EMISSIONS**

Tx @ 1880MHz: 1GHz – 3GHz Spurious emission limit –13dBm

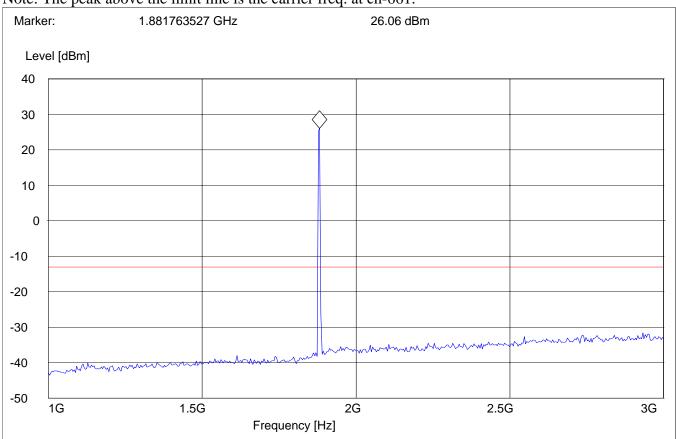
SWEEP TABLE: "FCC Spuri 1-3G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

1GHz 3GHz Max Peak Coupled 1 MHz

Note: The peak above the limit line is the carrier freq. at ch-661.





#### **RADIATED SPURIOUS EMISSIONS**

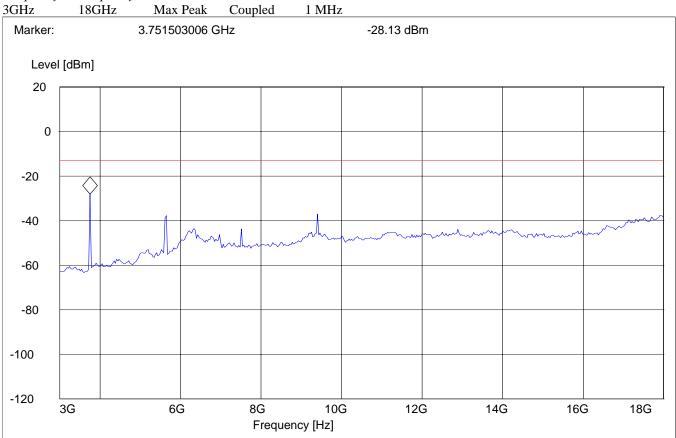
Tx @ 1880MHz: 3GHz - 18GHz

Spurious emission limit -13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time





#### **RADIATED SPURIOUS EMISSIONS**

Tx @ 1909.8MHz: 1GHz – 3GHz

Spurious emission limit –13dBm

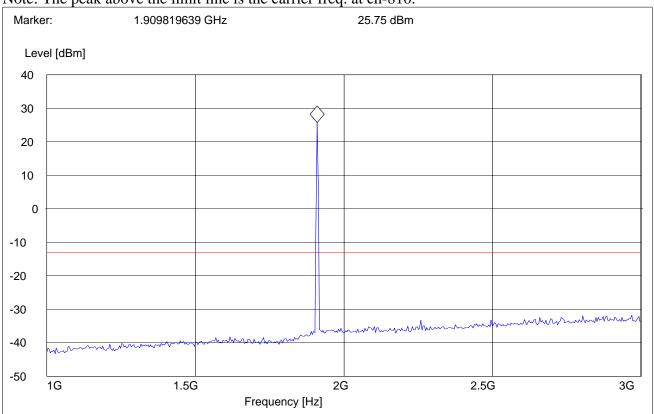
SWEEP TABLE: "FCC Spuri 1-3G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

1GHz 3GHz Max Peak Coupled 1 MHz

Note: The peak above the limit line is the carrier freq. at ch-810.





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 31 (45)

#### **RADIATED SPURIOUS EMISSIONS**

Tx @ 1909.8MHz: 3GHz – 18GHz

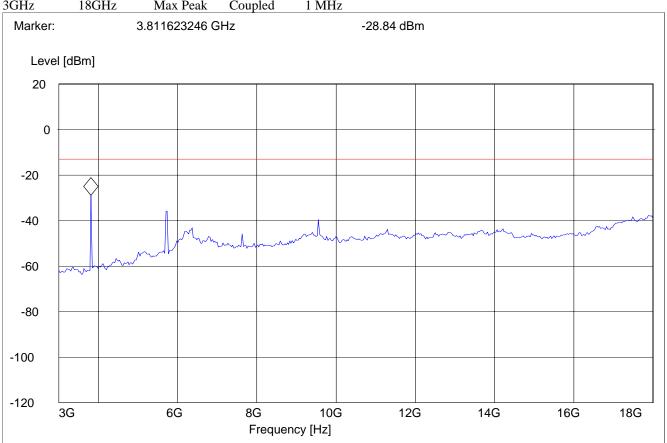
Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

Detector Meas. RBW/VBW Start Stop

Frequency Frequency Time

3GHz 18GHz Max Peak Coupled 1 MHz





## RADIATED SPURIOUS EMISSIONS

18GHz – 19.1GHz

Spurious emission limit -13dBm

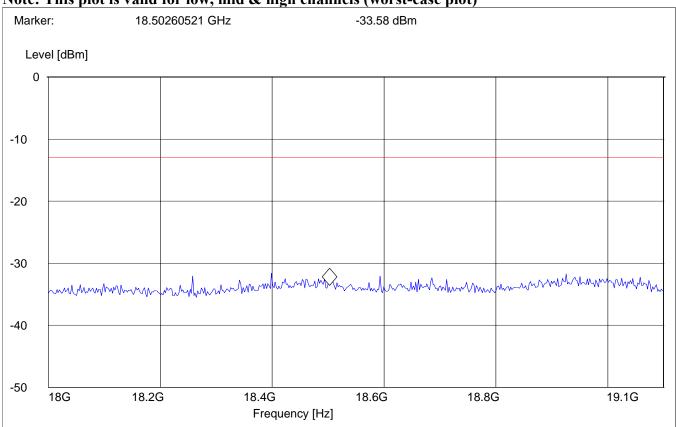
SWEEP TABLE: "FCC 24 spuri 18-19.1G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

18GHz 19.1GHz Max Peak Coupled 1 MHz

Note: This plot is valid for low, mid & high channels (worst-case plot)





## RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 850/1900)

Idle mode spurious was conducted for both GSM 850 & 1900 bands, only worst case plots are submitted in the test report.

Antenna: vertical

EUT in Idle Mode: 30MHz - 1GHz

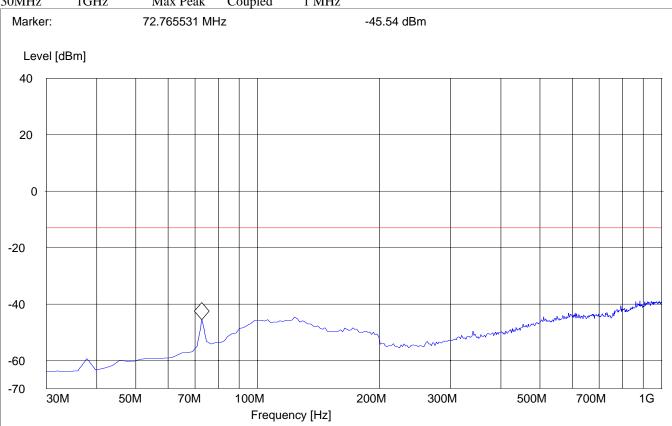
Spurious emission limit -13dBm

Note: This plot is valid for both polarities (worst-case plot)

SWEEP TABLE: "FCC 24 Spur 30M-1G"

Start Stop Detector Meas. RBW/VBW Frequency Frequency Time

30MHz 1GHz Max Peak Coupled 1 MHz





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 34 (45)

## RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 850/1900)

**EUT in Idle Mode: 1GHz – 3GHz** 

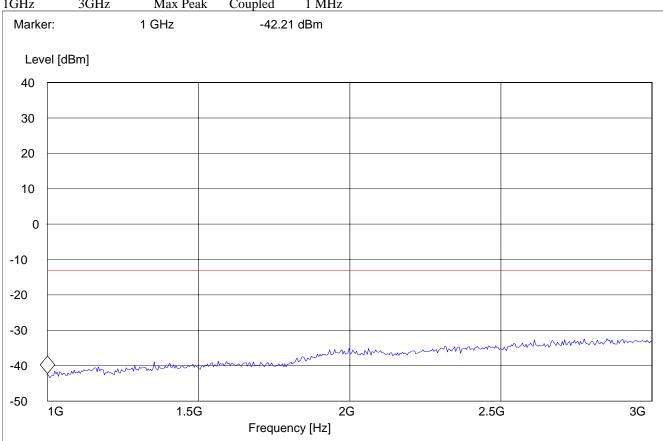
Spurious emission limit -13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

RBW/VBWStart Stop Detector Meas.

Frequency Frequency Time

1GHz 3GHz Max Peak Coupled 1 MHz





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 35 (45)

# RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 850/1900)

**EUT in Idle Mode: 3GHz – 18GHz** 

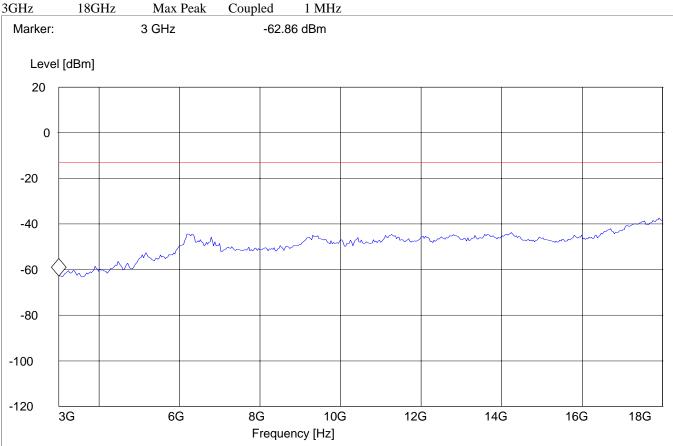
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 24 spuri 3-18G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

18GHz Max Peak





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 36 (45)

## RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 850/1900)

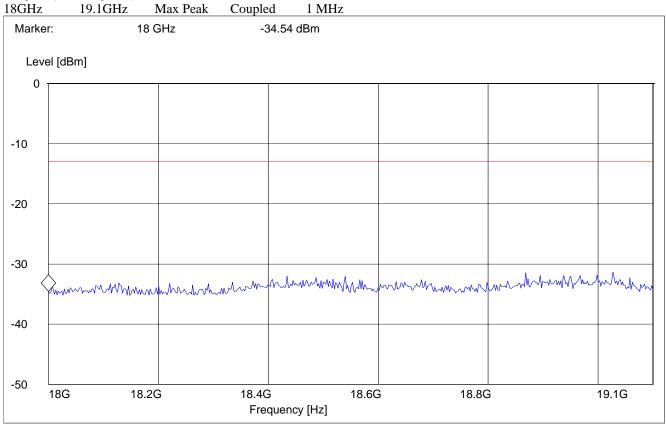
**EUT in Idle Mode: 18GHz – 19.1GHz** 

Spurious emission limit -13dBm

#### SWEEP TABLE: "FCC 24 spuri 18-19.1G"

Stop RBW/VBWStart Detector Meas.

Frequency Frequency Time





#### RECEIVER RADIATED EMISSIONS

§ 2.1053 / RSS-133

#### **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 3GHz and 26.5GHz very short cable connections to the antenna was used to minimize the noise level.
- 2. Receiver radiated emissions were done on both 850/1900 bands, but only worst-case plots are submitted in the test reports.

Limits

**SUBCLAUSE § 15.209** 

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



Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 38 (45)

## RECEIVER RADIATED EMISSIONS **EUT in Idle Mode: 30MHz – 1GHz**

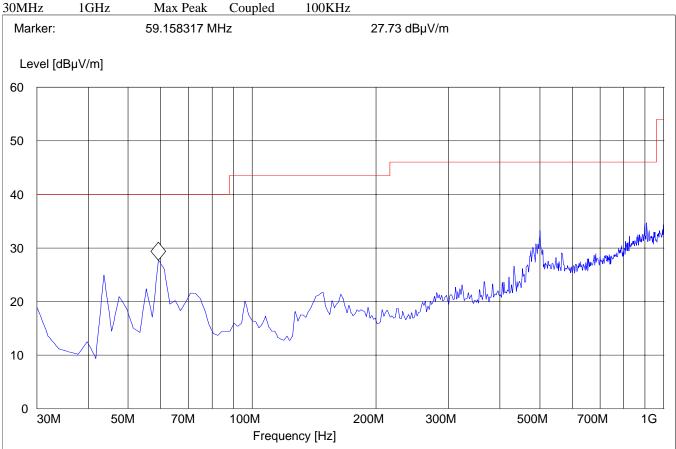
**Antenna: vertical** 

SWEEP TABLE: "FCC 15 Spur 30M-1G"

RBW/VBW Start Stop Detector Meas.

Frequency Frequency Time

30MHz 1GHz Max Peak





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 39 (45)

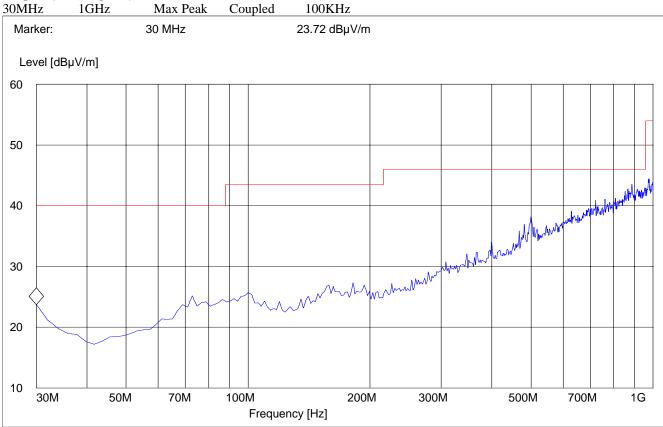
## RECEIVER RADIATED EMISSIONS **EUT in Idle Mode: 30MHz – 1GHz**

Antenna: horizontal

SWEEP TABLE: "FCC 15 Spur 30M-1G"

RBW/VBW Start Stop Detector Meas.

Frequency Frequency Time





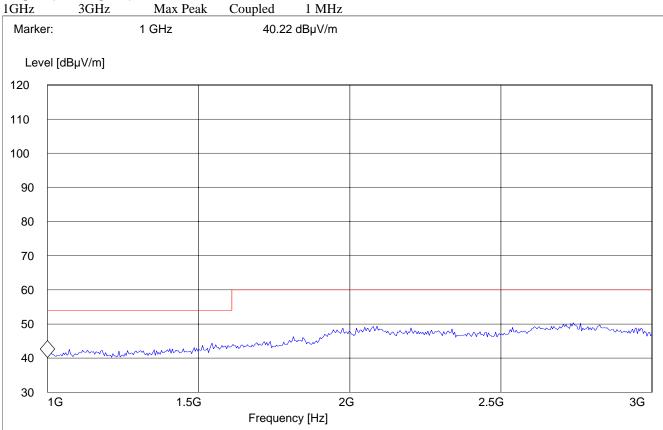
## RECEIVER RADIATED EMISSIONS EUT in Idle Mode: 1GHz – 3GHz

Note: marked peak is downlink from the base station

SWEEP TABLE: "FCC 15 Spuri 1-3G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time





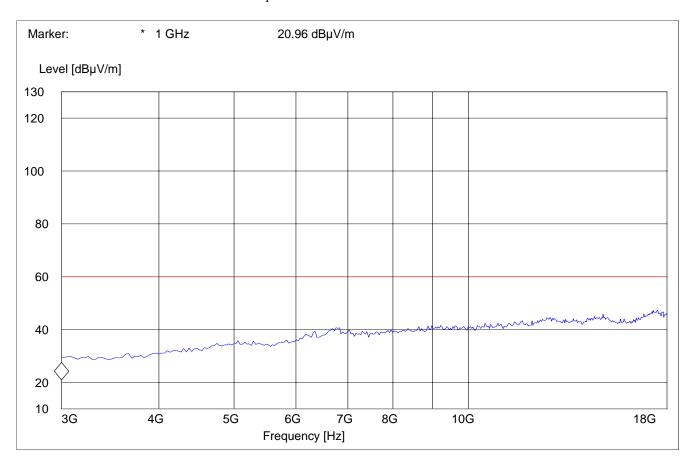
# **RECEIVER RADIATED EMISSIONS EUT in Idle Mode: 3GHz – 18GHz**

SWEEP TABLE: "FCC 15 spuri 3-18G"

Start Stop Detector Meas. RBW/VBW

Frequency Frequency Time

3GHz 18GHz Max Peak Coupled 1 MHz





Test report no.: EMC\_958FCC22-24\_2005\_GSM\_137 Issue date: 2005-07-01 Page 42 (45)

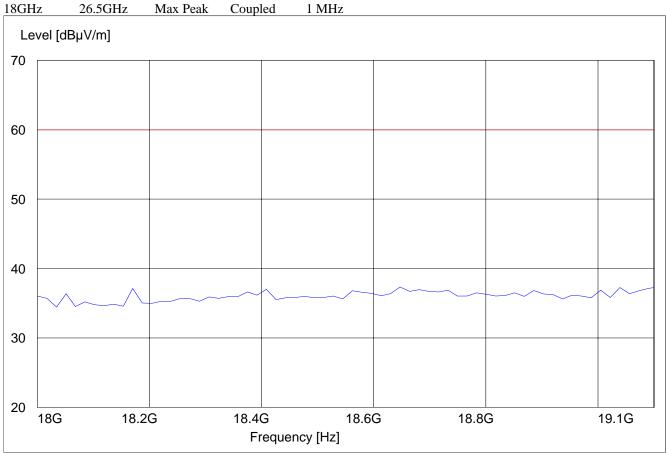
## RECEIVER RADIATED EMISSIONS **EUT in Idle Mode: 18GHz – 26.5GHz**

SWEEP TABLE: "FCC 15 spuri 18-26.5G"

RBW/VBW Start Stop DetectorMeas.

Frequency Frequency Time

18GHz 26.5GHz Max Peak Coupled





#### **CONDUCTED EMISSIONS**

§ 15.107/207

Measured with AC/DC power adapter plugged in LISN

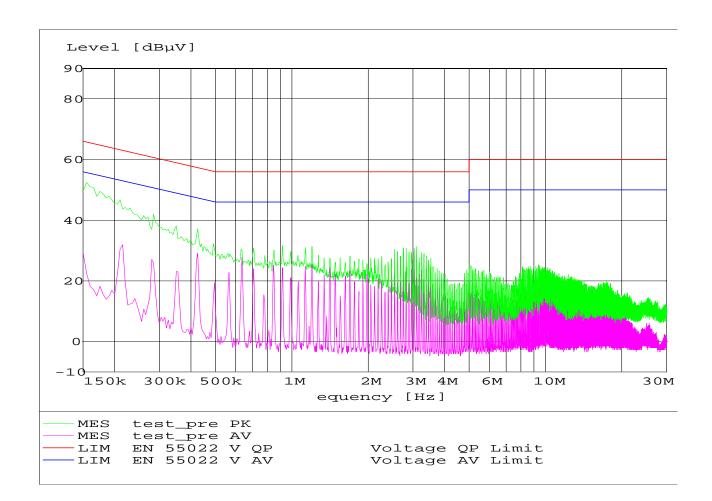
Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)

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.	Cal. Due
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2006
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010	May 2006
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2006
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.	May 2006
				02	
05	Biconilog Antenna	3141	EMCO	0005-1186	May 2006
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	May 2006
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	May 2006
08	Power Splitter	11667B	Hewlett Packard	645348	n/a
09	Climatic Chamber	VT4004	Voltsch	G1115	n/a
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a
12	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2006
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2006
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2006
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2006



# **BLOCK DIAGRAMS Radiated Testing**

#### ANECHOIC CHAMBER

