Nemko TEST REPORT

Date:	**ESPOO 23.05.2007**	Page:	**1 (40)**
		Appendices	**–**

Number: No. 1 / 1 **86416b**

Date of handing in: 11.05.2007

Measured by:

Timo Hietala, Test Engineer

Reviewed by:

Timo Leismala, Test Manager

SORT OF EQUIPMENT:	**WCDMA Base Station RF module**
MARKETING NAME:	***Nokia Flexi BTS RF module 1900MHz***
TYPE:	***FRFA***
MANUFACTURER:	***Nokia Siemens Networks Oy***
FCC ID:	**VBNFRFA-01**
CLIENT:	**Nokia Siemens Networks Oy**
ADDRESS:	**P.O.Box 319, FI-90651 OULU, FINLAND**
TELEPHONE:	**+358 7180 08000**
TEST LABORATORY:	**Nokia Siemens Networks/Oulu**
FCC REG. NO.	**411251**
REFERENCE:	**FCC Part 24, SUBPART E**

SUMMARY:

In regard to the performed tests the equipment under test fulfils the requirements defined in the test specifications, see page 4 for details

Nemko Oy • P.O.Box 19, FI-02601 Espoo, Finland
Street address: Perkkaantie 11, FI-02600 Espoo
Telephone +358 (0)424 5454 1 • Telefax +358 (0)9 5489 6371

Contents

1. EUT and Accessory Information

1.1 EUT description

The EUT is a WCDMA Base station RF module 1900 MHz with 2 power amplifiers.

1.2 EUT and accessories

Manufacturer:	Nokia Siemens Networks Oy
Model:	FRFA, s/n: L00000000014
Other Units:	System module, FSMB Transmission module, FTIA
General:	All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 24, Subpart E.

☒	New Submission	☒	Production Unit
☐	Class II Permissive Change	☐	Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE. **NONE**

This report applies only to the items tested.

Summary of Test Data

NAME OF TEST	SECTION IN CFR 47	SPEC.	RESULT
RF Power Output	24.232(a), 2.1046	1640 W EIRP	**Complies**
99% Occupied Bandwidth	2.1049 (i)	Unspecified	**Complies**
Spurious Emissions at Antenna Terminals	24.238, 2.1051	- 13 dBm	**Complies**
Field Strength of Spurious Emissions	24.238, 2.1053	- 13 dBm EIRP	**Complies**
Frequency stability	24.235, 2.1055	± 0.05 ppm[1)]	**Complies**

Note [1)] Limit is the manufacturer's specification

Measurement uncertainty is expressed to a confidence level of 95%.

2. General Equipment Specification

Supply Voltage Input:	48 Vdc
Frequency Bands: TX:	☒ Block A : 1930 – 1945 MHz ☒ Block B : 1950 – 1965 MHz ☒ Block C : 1975 – 1990 MHz ☒ Block D : 1945 – 1950 MHz ☒ Block E : 1965 – 1970 MHz ☒ Block F : 1970 – 1975 MHz
Frequency Bands: RX:	☒ Block A : 1850 – 1865 MHz ☒ Block B : 1870– 1885 MHz ☒ Block C : 1895 – 1910 MHz ☒ Block D : 165 – 1870 MHz ☒ Block E : 1885 – 1890 MHz ☒ Block F : 1890 – 1895 MHz
Type of Modulation and Designator:	**W-CDMA (4M00F9W)** ☒ **GSM (200KG7W)** ☐ **NADC 40K0DXW)** ☐
Maximum No. of Carriers:	2
Output Impedance:	50 ohms.
RF Output:	Per channel: 40 W or 2x20W.
Band Selection:	**Software** ☒ **Duplexer** ☐ **Fullband** ☐

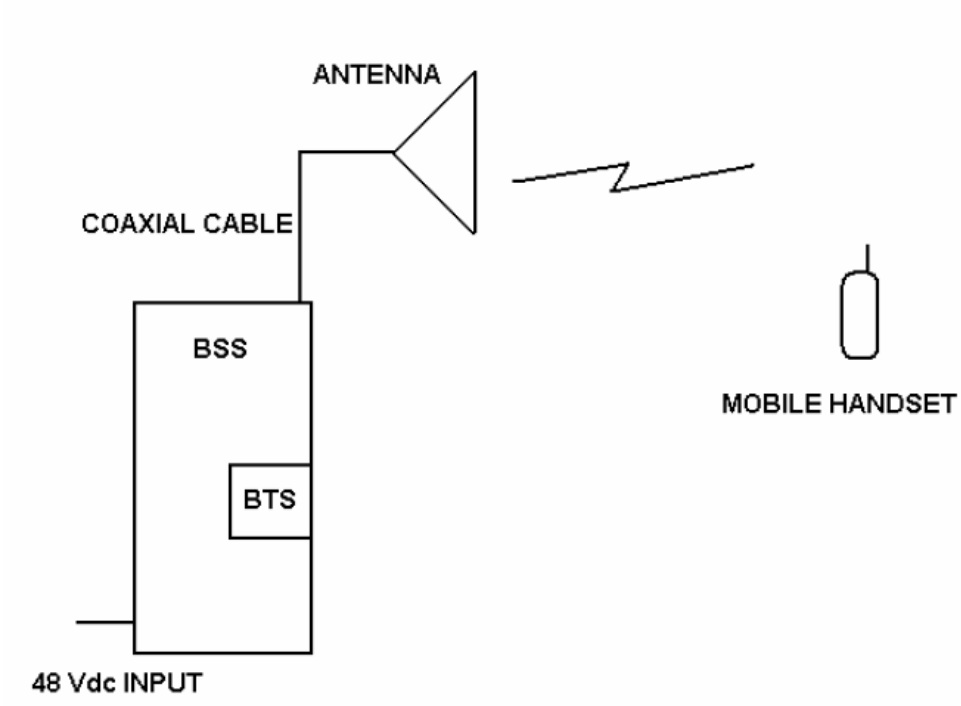
System Description

The BTS performs the radio function of the Base Station System (BSS), and is connected to the Radio Network Controller (RNC) via the Iub interface, and to Mobile Stations (MS) via the Air interface (Antenna). The RNC is further connected to Serving GPRS Support Node (SGSN) or it can be connected to the Mobile Switching Centre (MSC) via IWU (Inter Working Unit).

Setup for testing single carrier: The transmitter was set up according to 3GPP TS 25.141 Test Model 1 and 5 for all tests. Test model 1: 64 DPCHs at 30 ksps (SF=128) distributed randomly across the code space, at random power levels and random timing offsets, were defined to simulate a realistic operating scenario which may have high PAR (Peak-to-Average Ratio). Test model 5: 30 DPCHs at 30 ksps (SF=128) together with 8 HS-PDSCHs at 240 ksps (SF=16). Each DPCH is modulated by QPSK and each HS-PDCH is modulated by 16QAM modulation.

Setup for testing multi carrier:
The transmitter was set up according to 3GPP TS 25.141 Test Model 1 and 5 for all tests. Test model 1: 32 DPCHs at 30 ksps (SF=128) distributed randomly across the code space, at random power levels and random timing offsets, were defined to simulate a realistic operating scenario which may have high PAR (Peak-to-Average Ratio). Test model 5: 14 DPCHs at 30 ksps (SF=128) together with 4 HS-PDSCHs at 240 ksps (SF=16). Each DPCH is modulated by QPSK and each HS-PDCH is modulated by 16QAM modulation.

System Diagram



3. RF Power Output

NAME OF TEST: RF Power Output	PARA.NO.: 24.232(a) & 2.1046
TESTED BY: Timo Hietala	DATE: 11-14/05/2007

Test Results: Complies.

Measurement Data: Refer to attached plot.

Single carrier

		Measured Output Peak Power	
Modulation Type	**Frequency**	**Power**	**Power**
	(MHz)	**(dBm)**	**(W)**
QPSK	1932.4	**45.84**	**38.37**
QPSK	1960.0	**45.96**	**39.45**
QPSK	1987.6	**45.71**	**37.24**
16QAM	1932.4	**45.88**	**38.73**
16QAM	1960.0	**45.97**	**39.54**
16QAM	1987.6	**45.73**	**37.41**

Multi carrier

		Measured Output Peak Power		
Modulation Type	**Frequency**	**Power/carr.**	**Power/carr.**	**Total power**
	(MHz)	**(dBm)**	**(W)**	**(dBm) / (W)**
QPSK	1932.4 and 1937.4	**42.71/42.62**	**18.66/18.28**	**45.67/36.94**
QPSK	1960.0 and 1965.0	**42.77/42.72**	**18.92/18.71**	**45.76/37.63**
QPSK	1982.6 and 1987.6	**42.77/42.53**	**18.92/17.91**	**45.66/36.83**
16QAM	1932.4 and 1937.4	**42.64/42.58**	**18.37/18.11**	**45.66/36.84**
16QAM	1960.0 and 1965.0	**42.94/42.88**	**19.68/19.41**	**45.92/39.09**
16QAM	1982.6 and 1987.6	**42.78/42.57**	**18.97/18.07**	**45.69/37.04**

Equipment used: 1, 2, 4, 8, 9, 14

Measurement Uncertainty: ± 0.7 dB.

Temperature: 23 °C.

Relative Humidity: 20 %.

Test Data – RF Power Output

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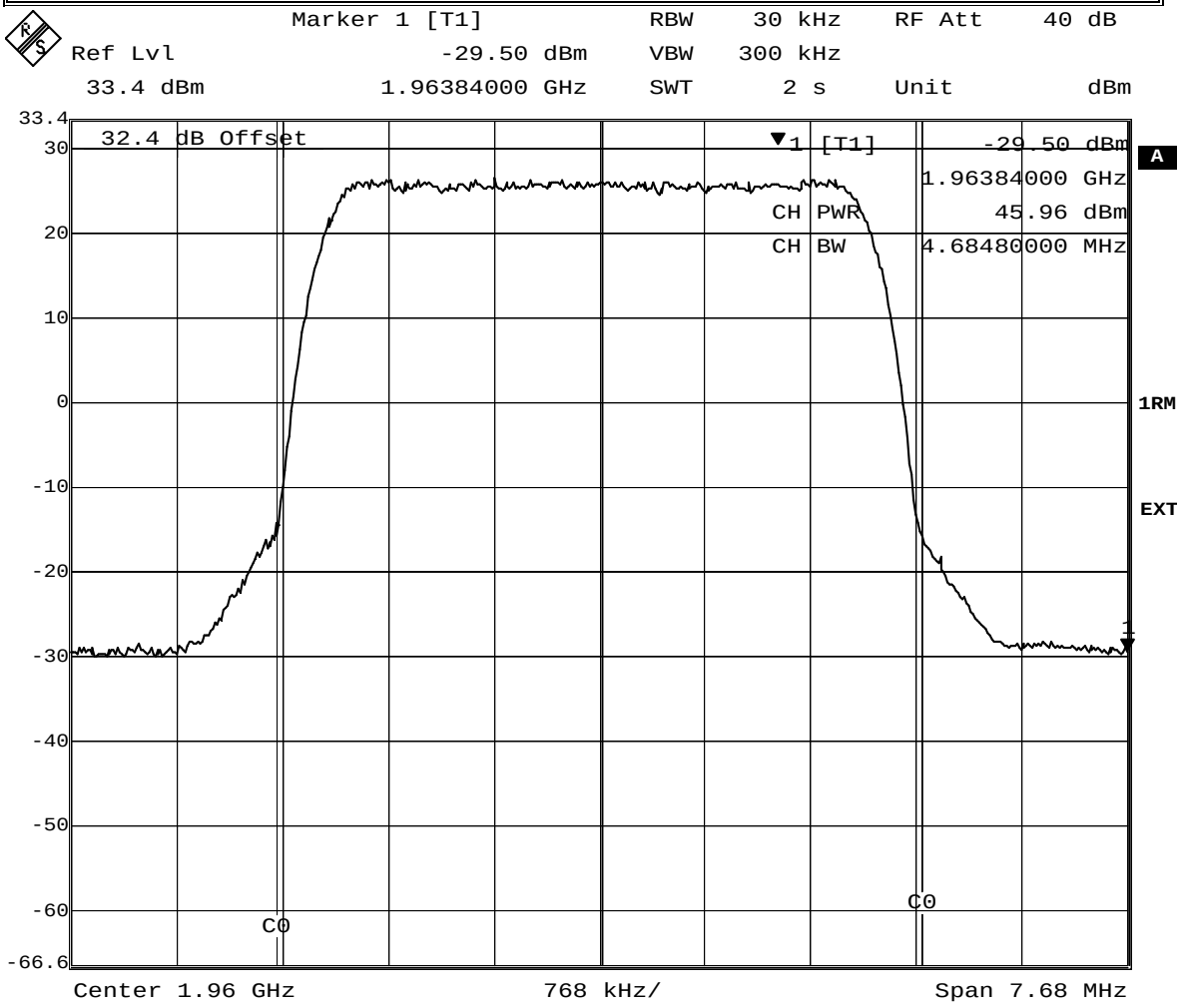
Data Plot — RF POWER OUTPUT

Page 1 of 4				Complete	x
Job No.:	86416	Date:	11/05/2007	Preliminary:	
Specification:	PT24	Temperature (°C):	23		
Tested By:	Timo Hietala	Relative Humidity (%):	20		
E.U.T.:	WCDMA TRANSMITTER				
Configuration:	TX FULL POWER CENTER CHANNEL				
Sample Number:	1				
Location:	NSN Oulu	RBW:	Refer to plots	Measurement	
Detector type:	Rms	VBW:	Refer to plots	Distance:	N/A m

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	
Filter:		Cable #2:	
Receiver:	1	Cable #3:	
Attenuator #1:	14	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty:	± 0.7 dB		



Date: 11.MAY.2007 12:21:40

Notes: QPSK

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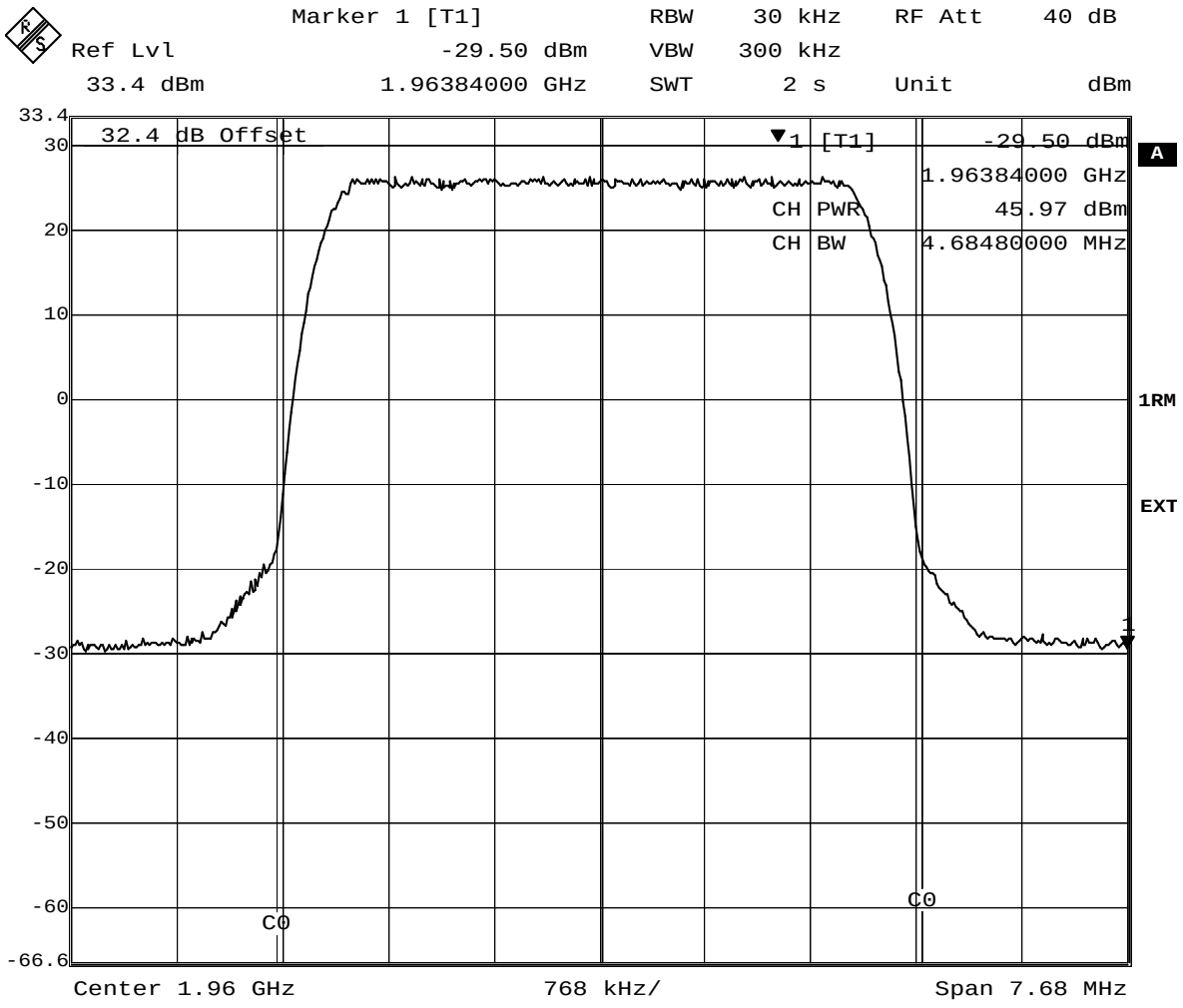
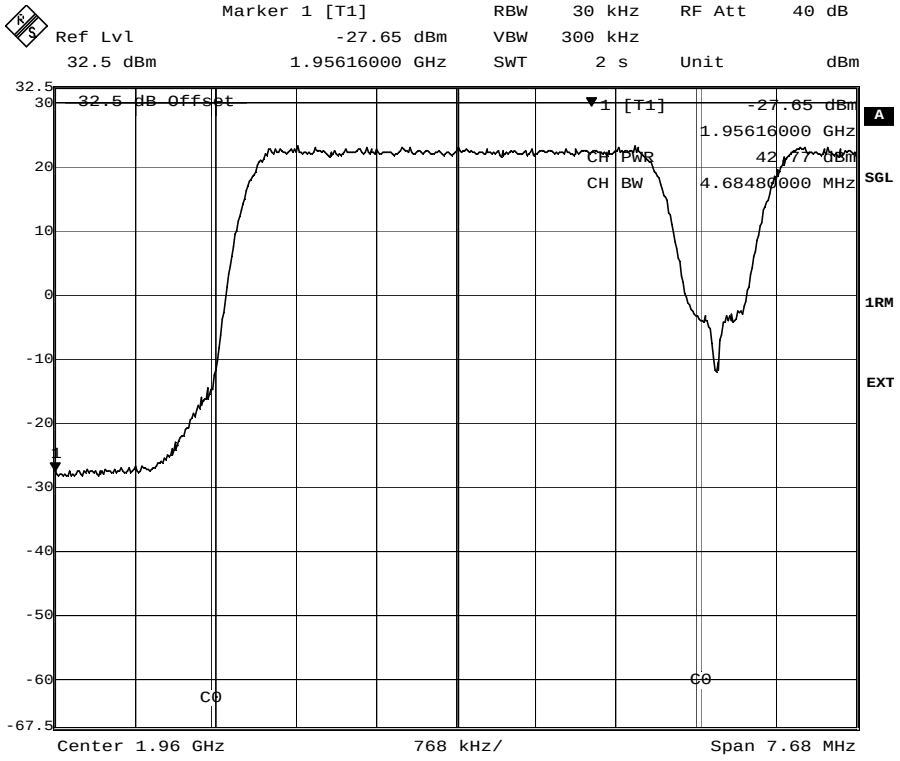
Data Plot		**RF POWER OUTPUT**	
Page 2 of 4			
Job No.:	86416	Date:	11/05/2007
Specification:	PT24	Temperature (°C):	23
Tested By:	Timo Hietala	Relative Humidity (%):	20
E.U.T.:	WCDMA TRANSMITTER		
Configuration:	TX FULL POWER CENTER CHANNEL		



Notes: **16QAM**

Test Data – RF power, multi carrier QPSK



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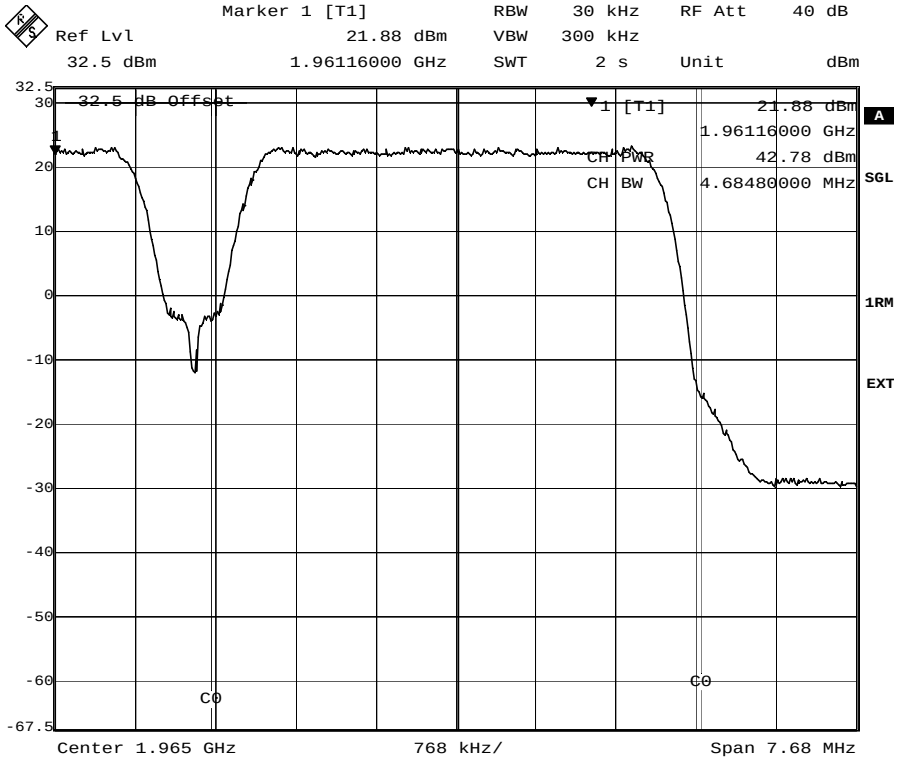
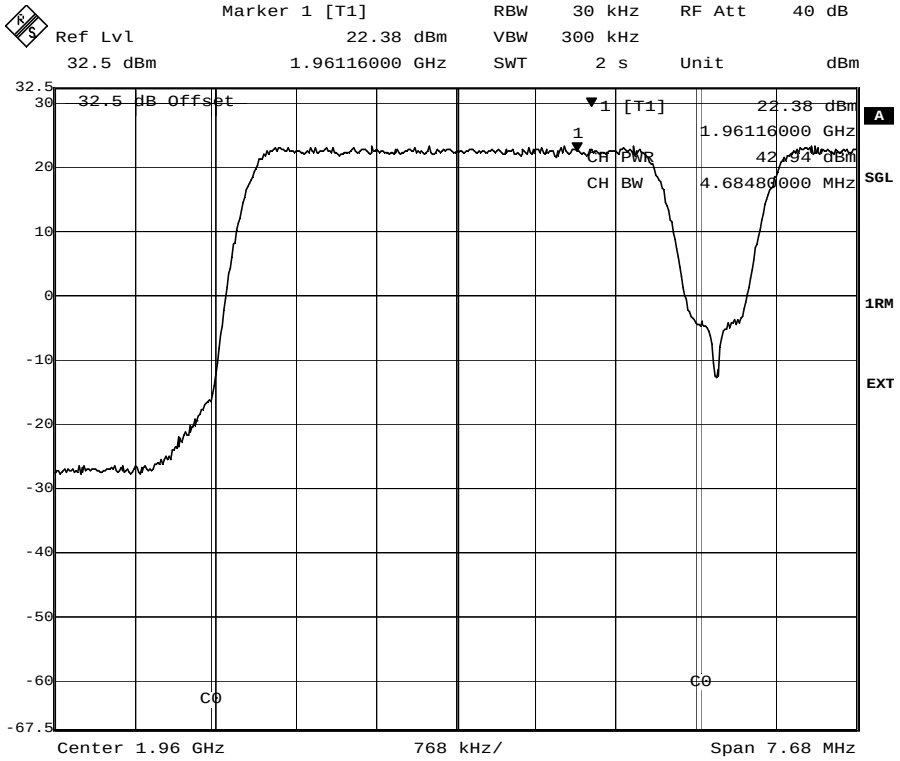


Date: 14.MAY.2007 13:31:55

Notes: 1960.0 and 1965.0 MHz QPSK

Test Data – RF power, multi carrier 16QAM



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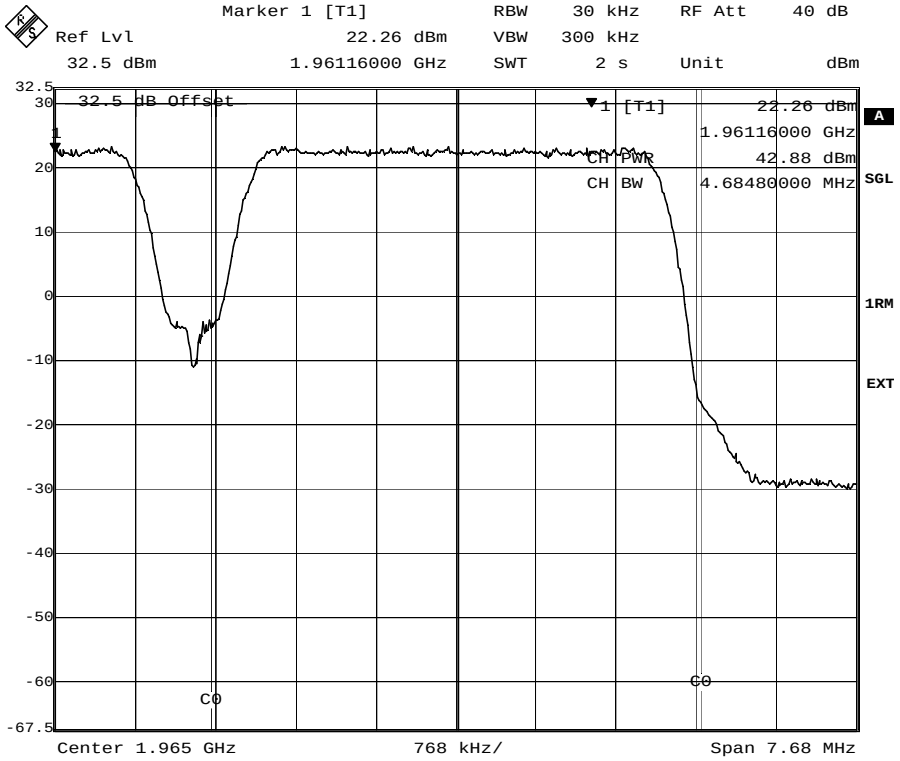

Date: 14.MAY.2007 13:34:00

Notes: 1960.0 and 1965.0 MHz 16QAM

4. 99% Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA.NO.: 2.1049(i)
TESTED BY: Timo Hietala	DATE: 14/05/2007

Test Results: Complies.

Test Data: See attached plot(s).

Modulation Type	Frequency (MHz)	Measured 99% Occupied Bandwidth (MHz)
QPSK	1932.4	**3.9679**
QPSK	1960.0	**3.9679**
QPSK	1987.6	**3.9879**
16QAM	1932.4	**3.9879**
16QAM	1960.0	**3.9679**
16QAM	1987.6	**3.9679**

Equipment used: 1, 2, 4, 8, 9, 14

Measurement Uncertainty: ± 0.7 dB.

Temperature: 23 °C.

Relative Humidity: 20 %.

Test Data – 99% Occupied Bandwidth

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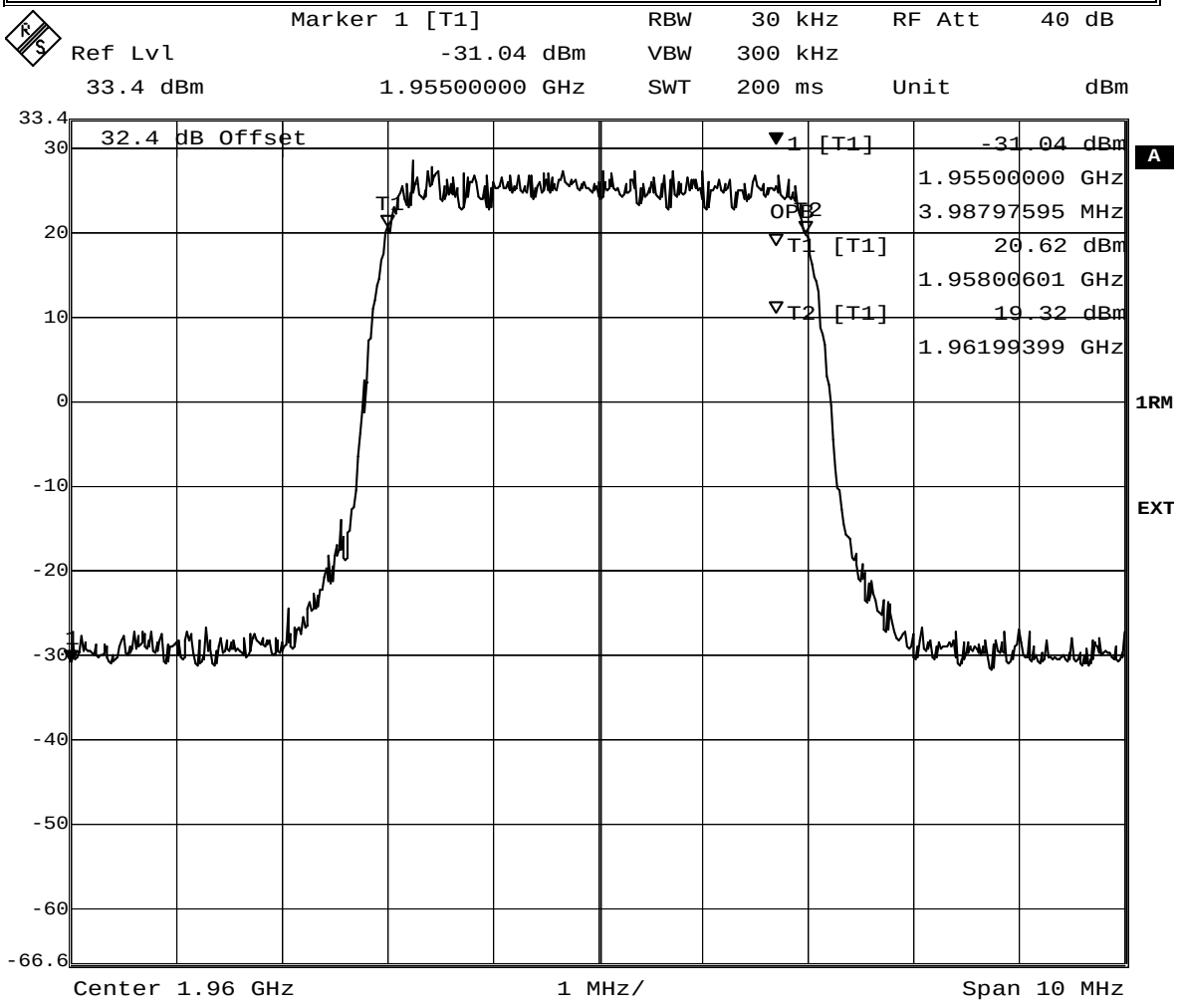
Data Plot — 99% Occupied Bandwidth

Page 1 of 2				Complete	x
Job No.:	86416	Date:	14/05/2007	Preliminary:	
Specification:	PT24	Temperature (°C):	23		
Tested By:	Timo Hietala	Relative Humidity (%):	20		
E.U.T.:	WCDMA TRANSMITTER				
Configuration:	TX FULL POWER CENTER CHANNEL				
Sample Number:	1				
Location:	NSN Oulu	RBW:	Refer to plots	Measurement	
Detector type:	Rms	VBW:	Refer to plots	Distance:	N/A m

Test Equipment Used

Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	
Filter:		Cable #2:	
Receiver:	1	Cable #3:	
Attenuator #1:	14	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:			
Measurement Uncertainty:	± 0.7 dB		



Notes: QPSK

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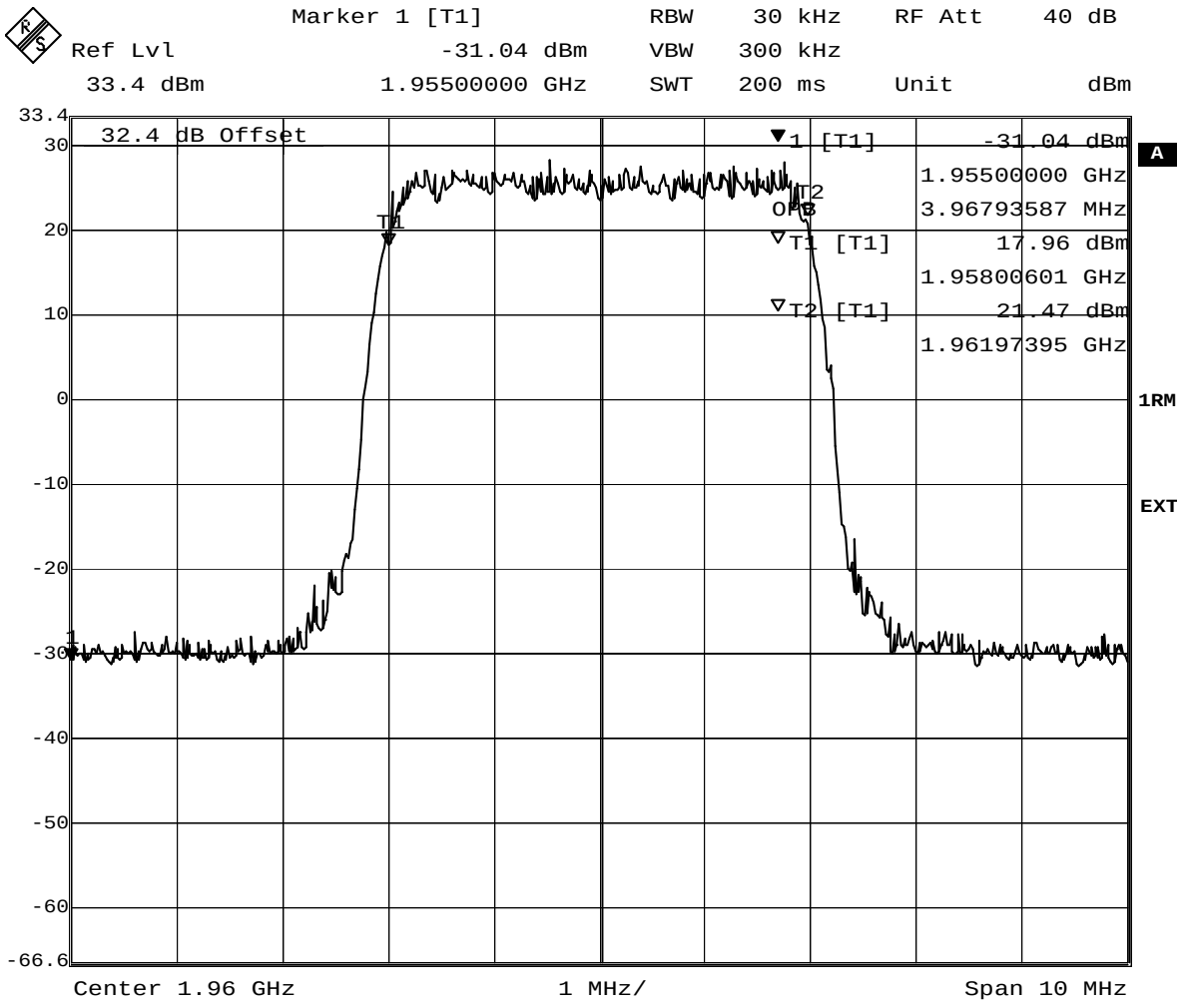
Data Plot		**99% Occupied Bandwidth**	
Page 2 of 2			
Job No.:	86416	Date:	14/05/2007
Specification:	PT24	Temperature (°C):	23
Tested By:	Timo Hietala	Relative Humidity (%):	20
E.U.T.:	WCDMA TRANSMITTER		
Configuration:	TX FULL POWER CENTER CHANNEL		



Notes: **16QAM**

5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA.NO.: 24.238(a), 2.1051
TESTED BY: Timo Hietala	DATE: 14/05/2007

Test Results: Complies.

Test Data: See attached plots.

Single carrier

Frequency (MHz)	Modulation	Spurious Emission (dBm) rms det.
928.7	**QPSK**	**-29.51**
5861.8	**QPSK**	**-32.55**
928.7	**16QAM**	**-29.75**
5861.8	**16QAM**	**-34.19**

Multi carrier

Frequency (MHz)	Modulation	Spurious Emission (dBm) rms det.
936.6	**QPSK**	**-33.47**
5861.8	**QPSK**	**-27.14**
936.6	**16QAM**	**-33.24**
5861.8	**16QAM**	**-27.52**

Lower Band Edge, Single carrier

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
1929.9	**QPSK**	**-14.86**
1930.0	**16QAM**	**-17.11**

Upper Band Edge, Single carrier

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
1990.0	**QPSK**	**-14.91**
1990.0	**16QAM**	**-18.43**

Lower Band Edge, Multi carrier

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
1930.0	**QPSK**	**-13.67**
1930.0	**16QAM**	**-15.43**

Upper Band Edge, Multi carrier

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
1990.0	**QPSK**	**-14.06**
1990.0	**16QAM**	**-16.75**

Lower Band Edge, Multi carrier 3rd order IM

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
1927.4	**QPSK**	**-13.4**[1)]
1927.4	**16QAM**	**-15.1**[1)]

Upper Band Edge, Multi carrier 3rd order IM

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
1992.6	**QPSK**	**-21.9**[1)]
1992.6	**16QAM**	**-22.4**[1)]

In Band, Multi carrier 3rd order IM[1)]

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
1955.0	**QPSK**	**-14.4**[2)]
1955.0	**16QAM**	**-14.4**[2)]
1970.0	**QPSK**	**-19.0**[2)]
1970.0	**16QAM**	**-19.0**[2)]

Notes:[1)] **Measurement band integration 10dB (100kHz to 1MHz) has been used.**
[2)] **Measurement band integration 13dB (50kHz to 1MHz) has been used.**

Equipment used: 1, 2, 3, 4, 8, 9, 12, 13, 14

Measurement Uncertainty: ± 0.7 dB.

Temperature: 23 °C.

Relative Humidity: 20 %.

Test Data – Spurious Emissions

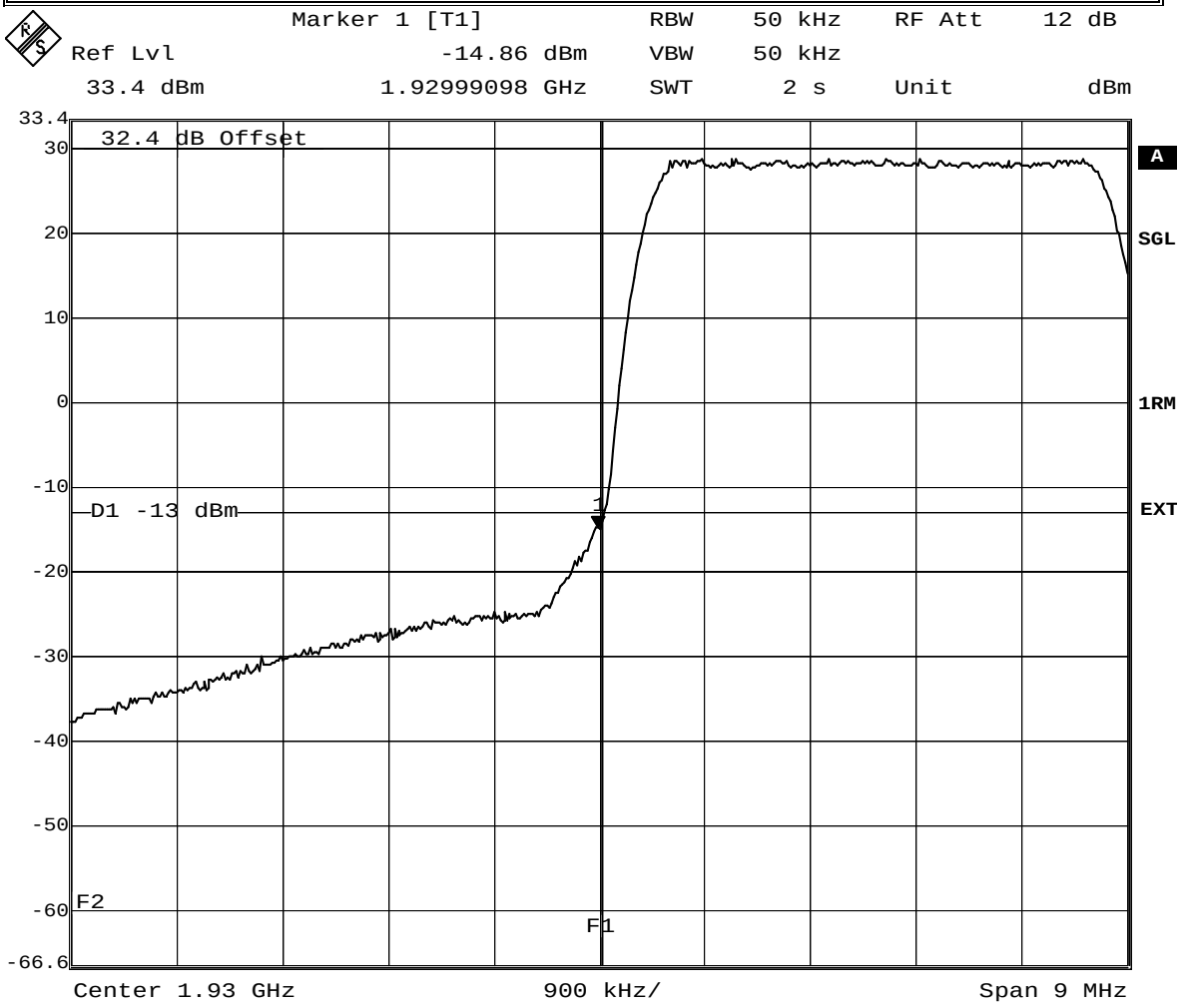
Nemko Oy, Finland

Data Plot — Spurious Emissions at Antenna Terminals

Page 1 of 12				Complete	x
Job No.:	86416	Date:	14/05/2007	Preliminary:	
Specification:	PT24	Temperature (℃):	23		
Tested By:	Timo Hietala	Relative Humidity (%):	20		
E.U.T.:	WCDMA TRANSMITTER				
Configuration:	TX FULL POWER LOWEST CHANNEL				
Sample Number:	1				
Location:	NSN Oulu	RBW:	Refer to plots	Measurement	
Detector type:	Rms	VBW:	Refer to plots	Distance:	N/A m

Test Equipment Used

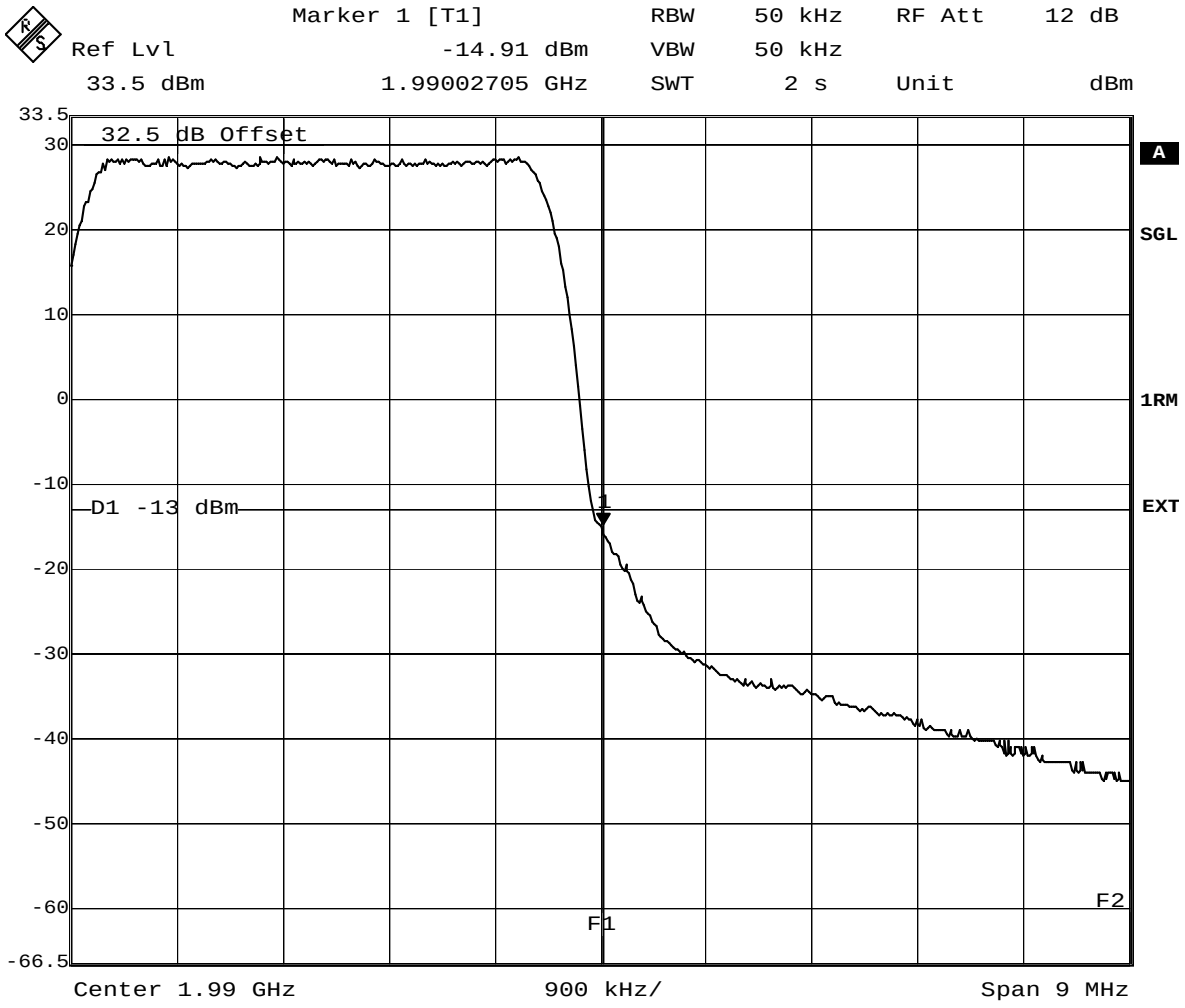
Antenna:		Directional Coupler:	
Pre-Amp:		Cable #1:	
Filter:		Cable #2:	
Receiver:	1	Cable #3:	
Attenuator #1:	14	Cable #4:	
Attenuator #2:	13	Mixer:	
Additional equipment used:	12		
Measurement Uncertainty:	± 0.7 dB		



Date: 14.MAY.2007 08:38:40

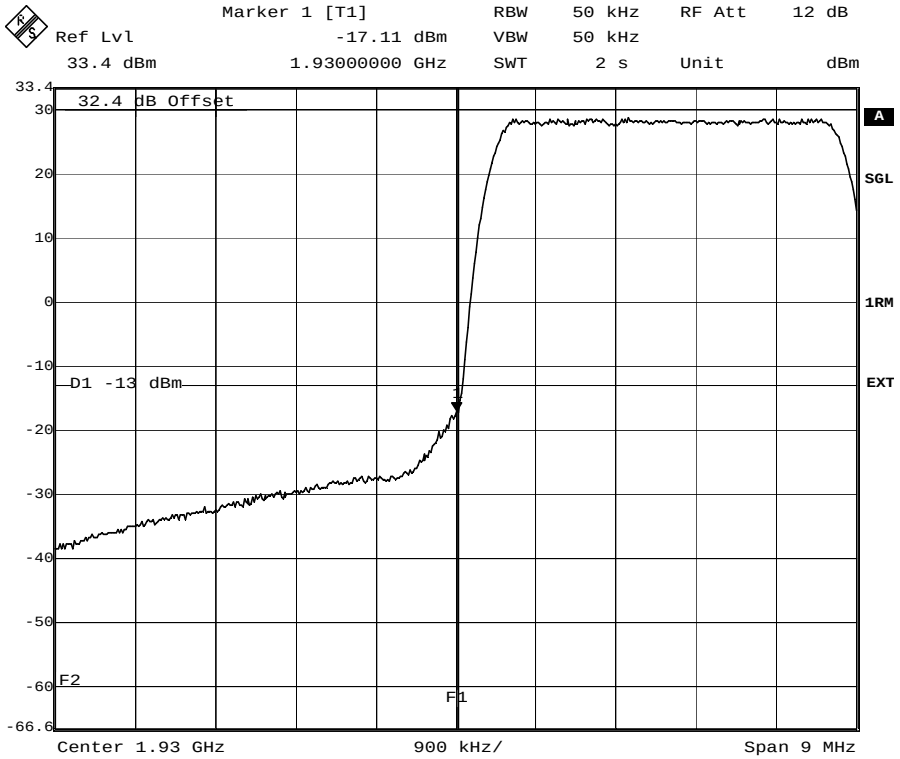
Notes: Tx 1932.4 MHz, QPSK , LOWER BANDEDGE

Test Data – Spurious Emissions

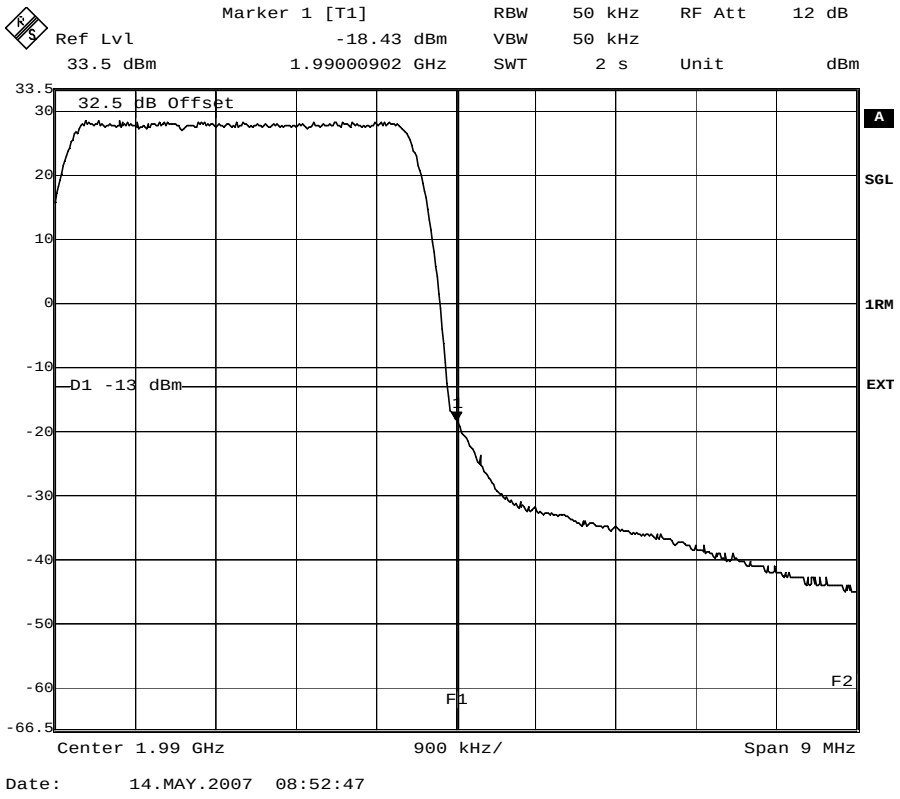


Notes: Tx 1987.6 MHz, QPSK, UPPER BANDEDGE

Test Data – Spurious Emissions

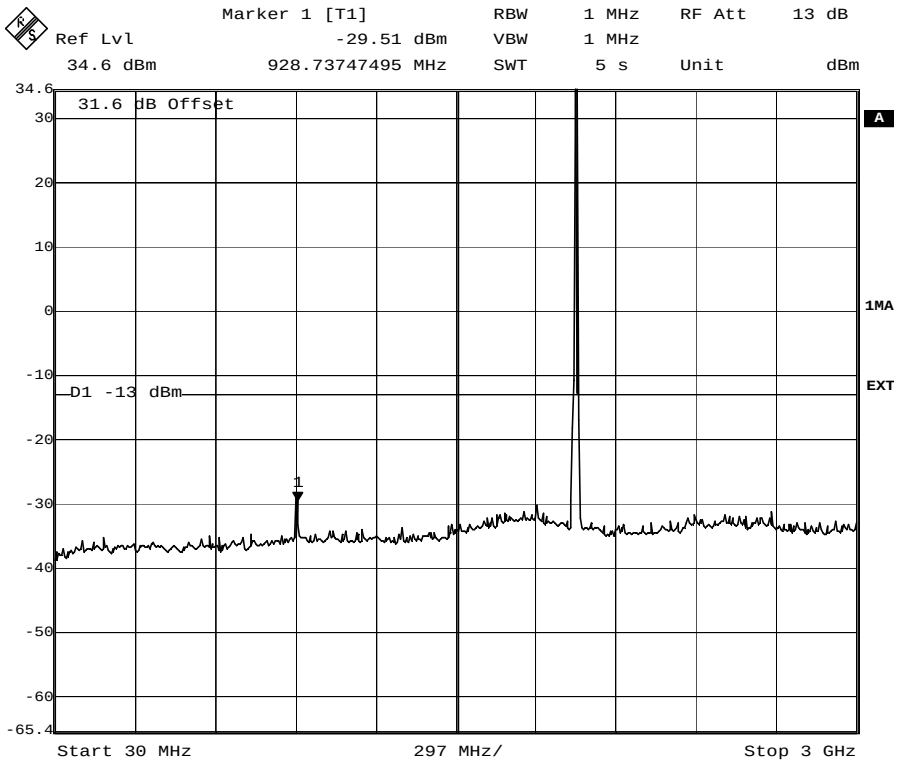


Notes: Tx 1932.4 MHz, 16QAM, LOWER BANDEDGE



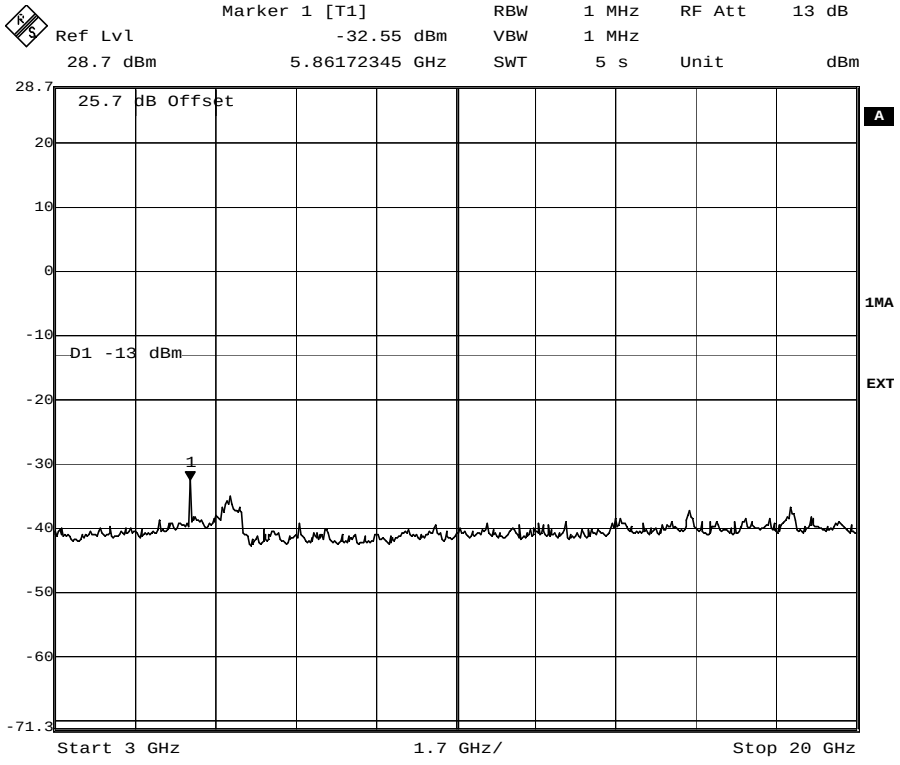
Notes: Tx 1987.6 MHz, 16QAM, UPPER BANDEDGE

Test Data – Spurious Emissions



Date: 14.MAY.2007 09:04:58

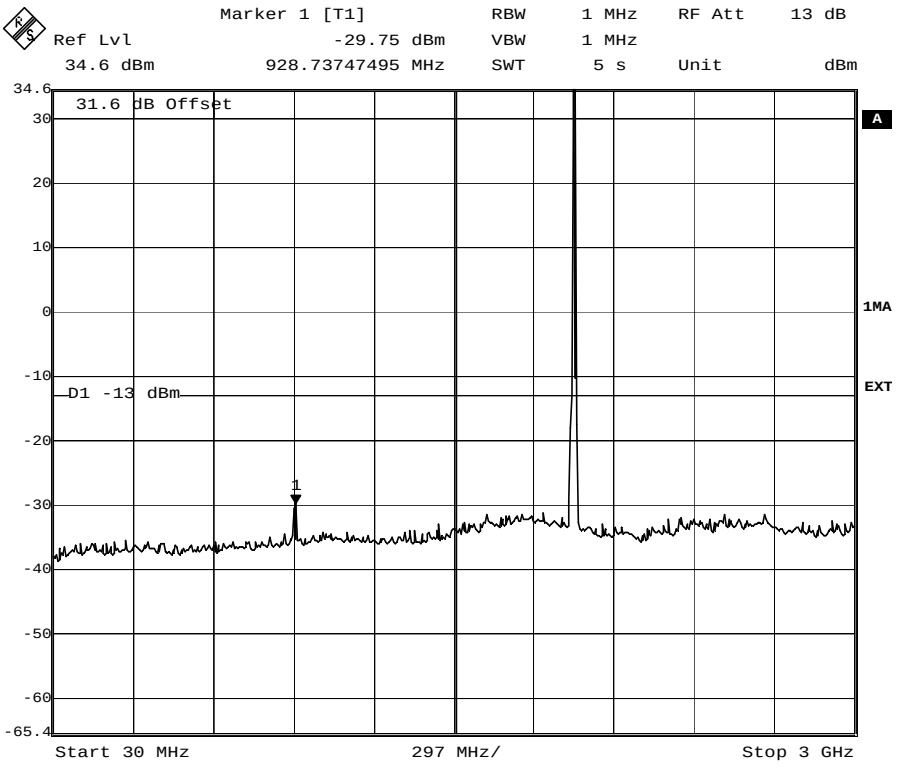
Notes: Tx 1960.0 MHz QPSK



Date: 14.MAY.2007 09:19:59

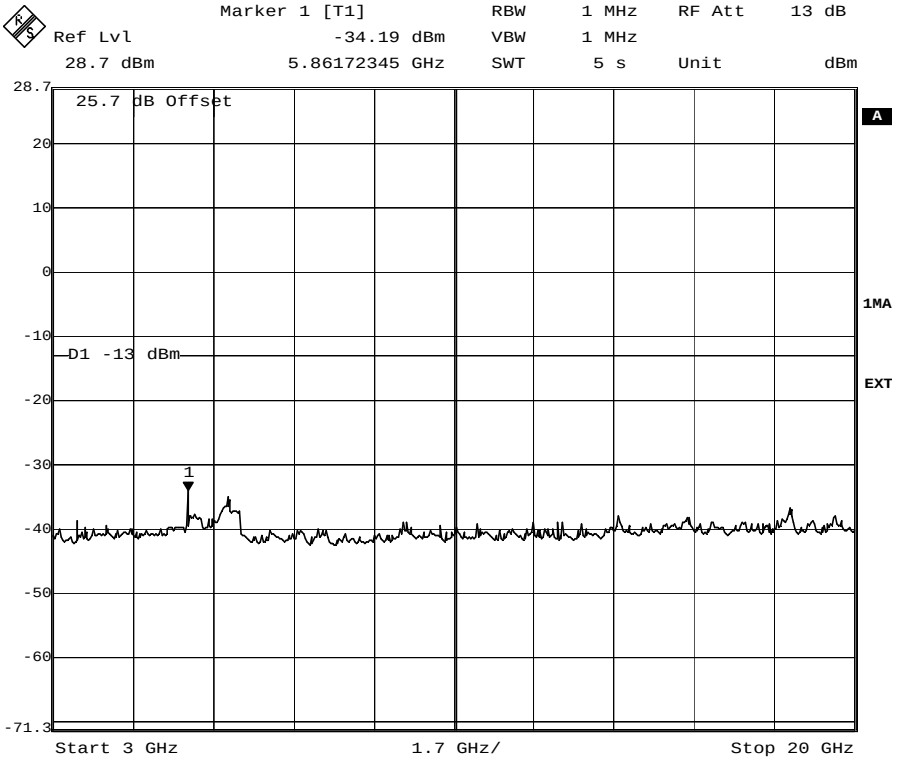
Notes: Tx 1960.0 MHz QPSK

Test Data – Spurious Emissions



Date: 14.MAY.2007 09:09:15

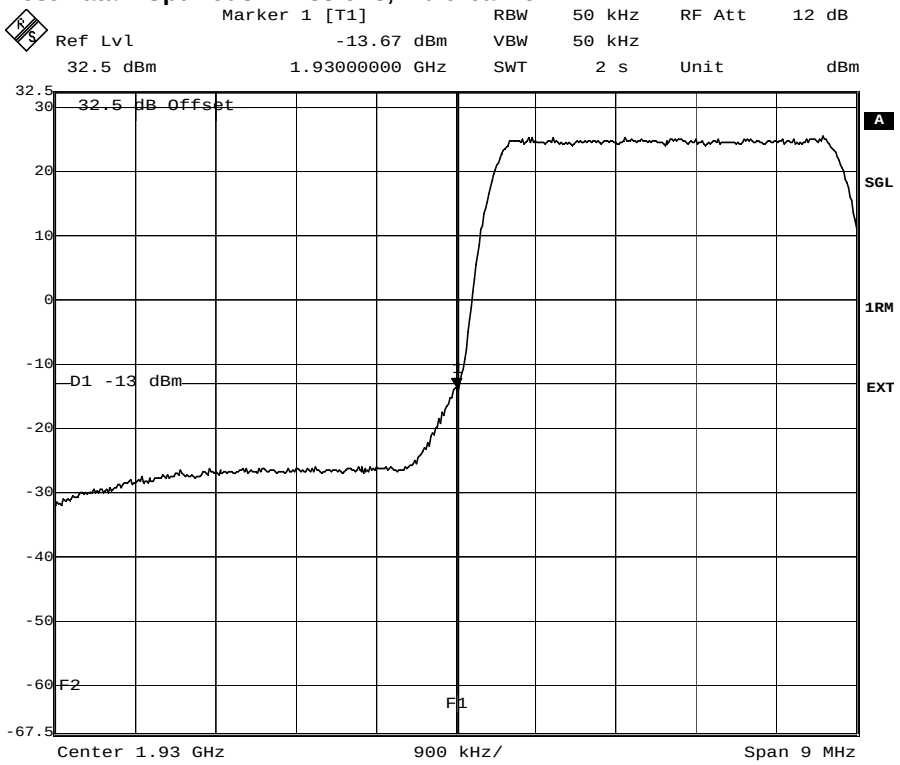
Notes: Tx 1960.0 MHz 16QAM



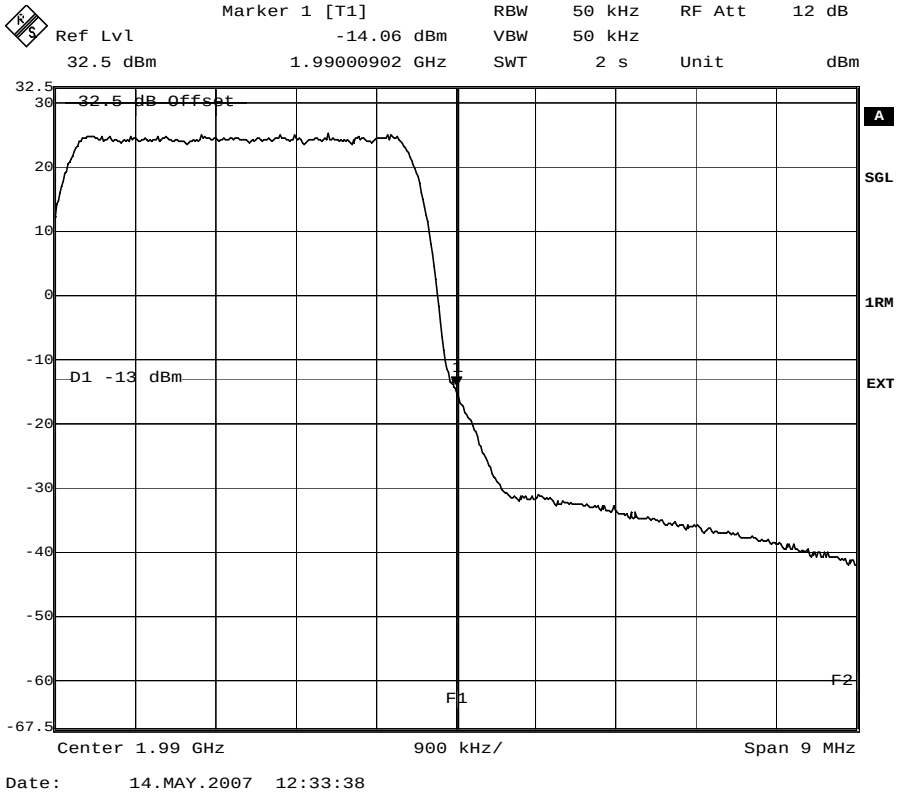
Date: 14.MAY.2007 09:23:43

Notes: Tx 1960.0 MHz 16QAM

Test Data – Spurious Emissions, multi carrier

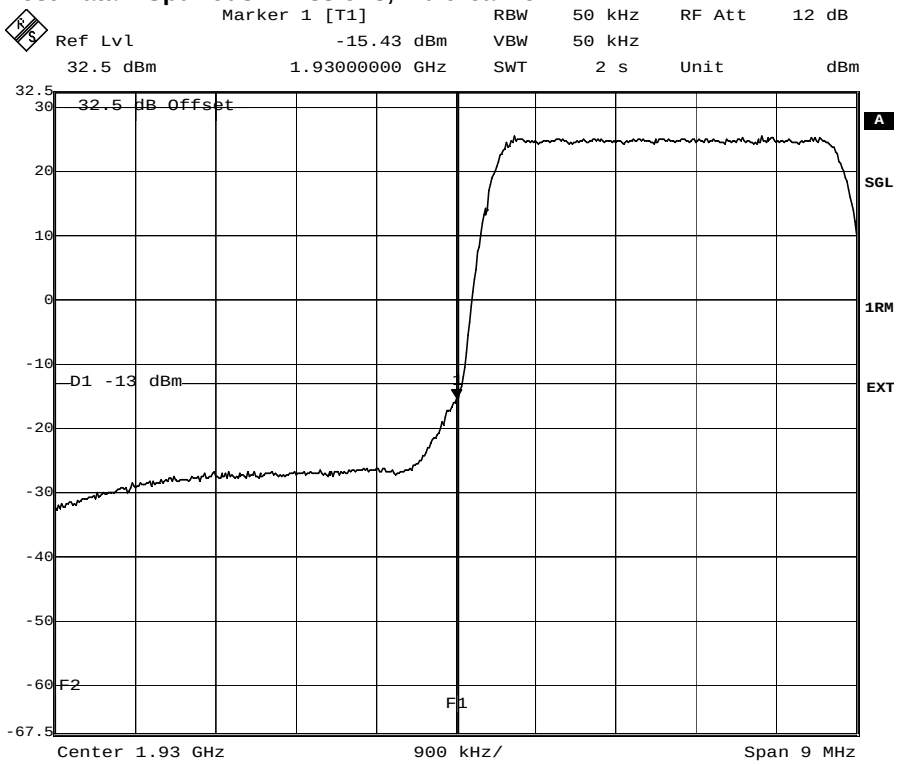


Notes: Tx 1932.4 and 1937.4 MHz, QPSK , LOWER BANDEDGE



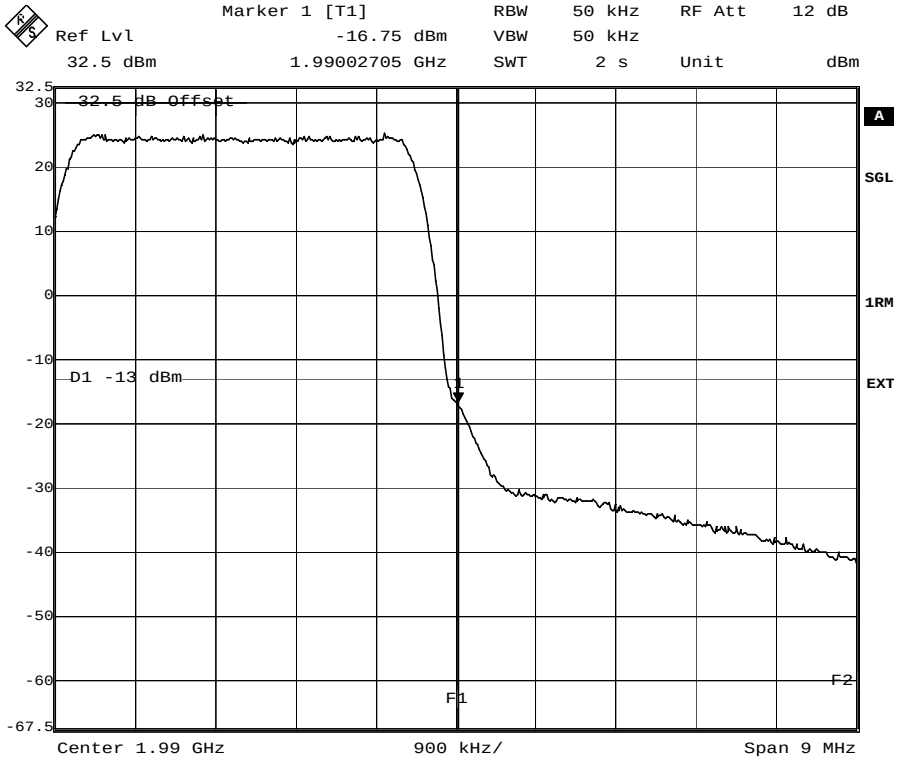
Notes: Tx 1982.6 and 1987.6 MHz, QPSK , UPPER BANDEDGE

Test Data – Spurious Emissions, multi carrier



Date: 14.MAY.2007 12:29:18

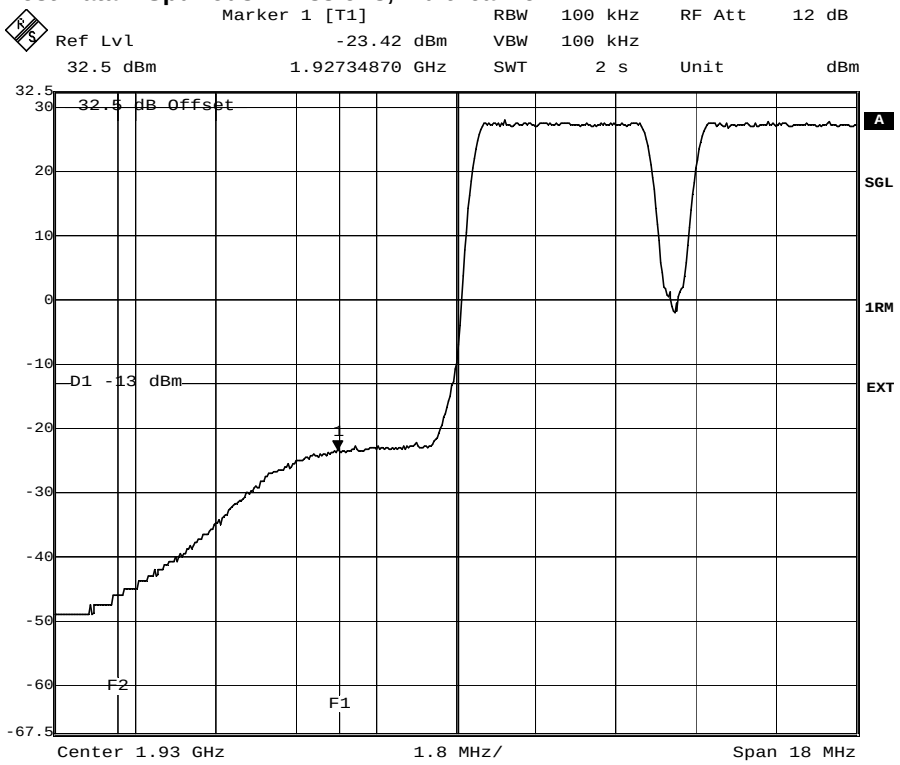
Notes: Tx 1932.4 and 1937.4 MHz, 16QAM , LOWER BANDEDGE



Date: 14.MAY.2007 12:35:49

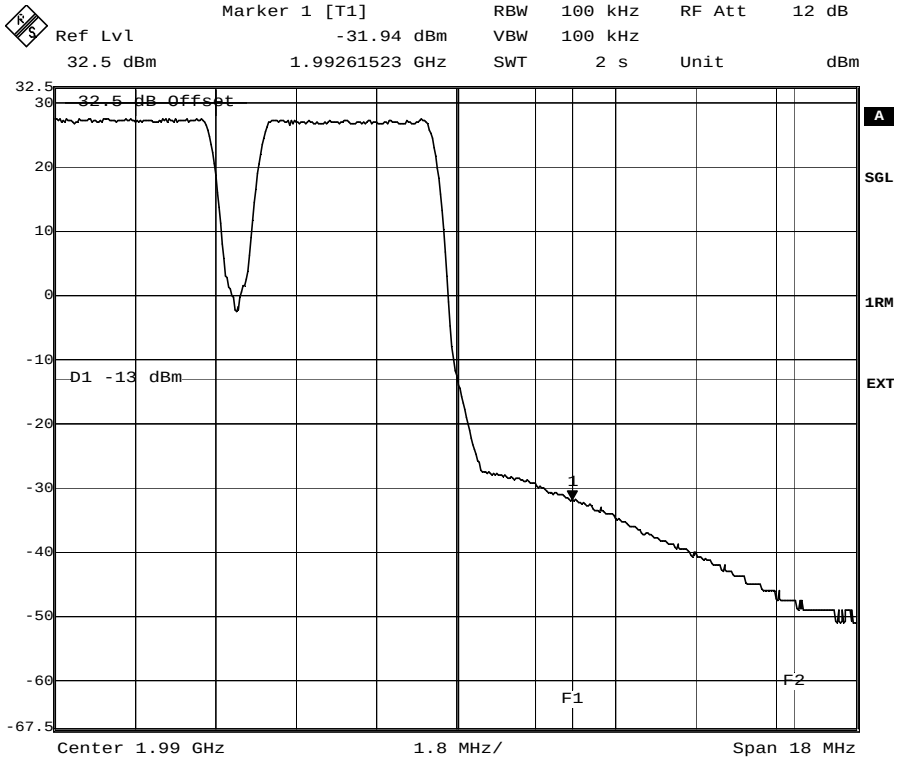
Notes: Tx 1982.6 and 1987.6 MHz, 16QAM , UPPER BANDEDGE

Test Data – Spurious Emissions, multi carrier



Date: 14.MAY.2007 12:25:46

Notes: Tx 1932.4 and 1937.4 MHz, QPSK , 3rd order IM LOWER BANDEDGE

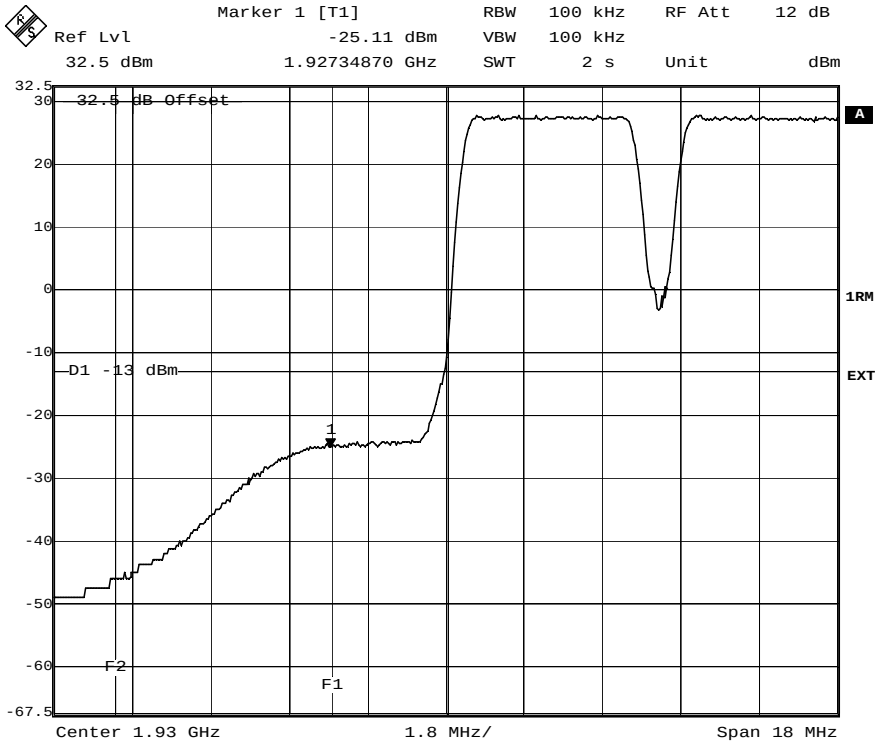


Date: 14.MAY.2007 12:39:48

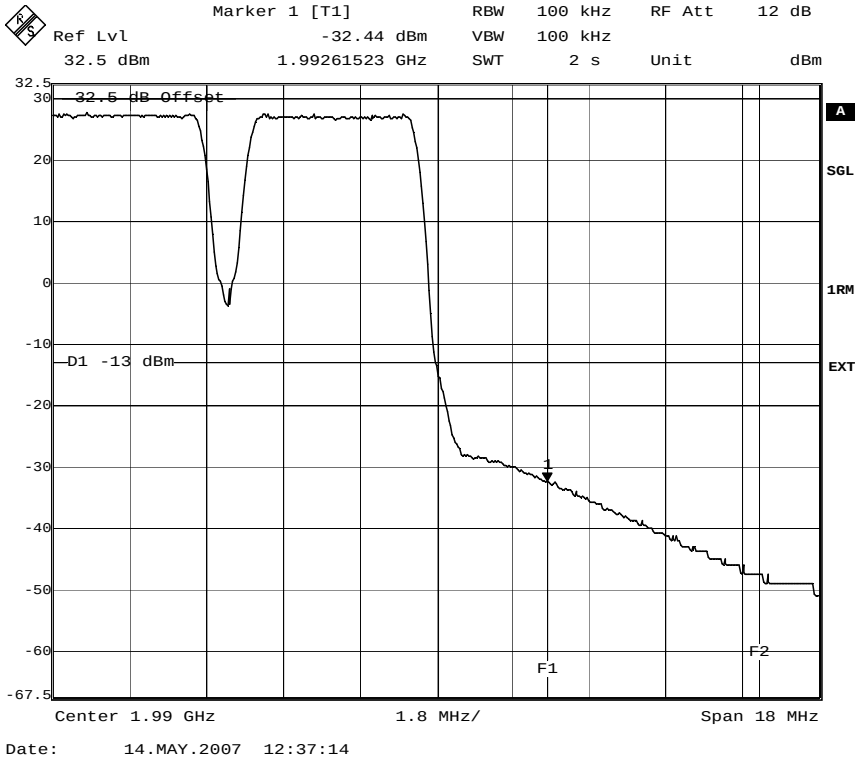
Notes: Tx 1982.6 and 1987.6 MHz, QPSK , 3rd order IM UPPER BANDEDGE

Measurement band integration 10dB (from 100kHz to 1MHz)

Test Data – Spurious Emissions, multi carrier



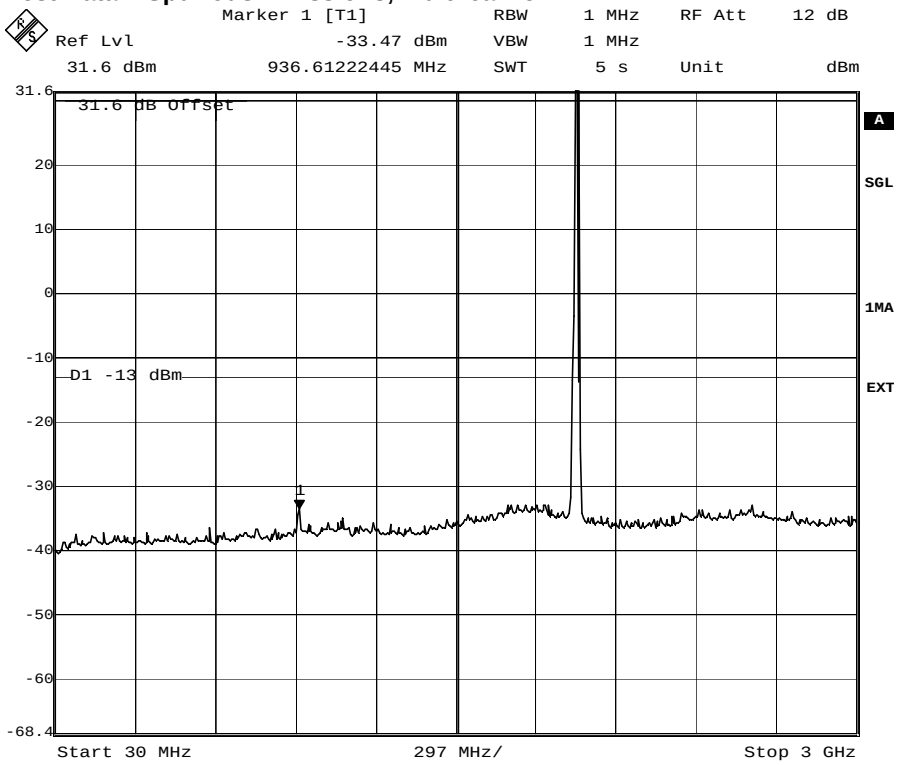
Notes: Tx 1932.4 and 1937.4 MHz, 16QAM , 3rd order IM LOWER BANDEDGE



Notes: Tx 1982.6 and 1987.6 MHz, 16QAM , 3rd order IM UPPER BANDEDGE

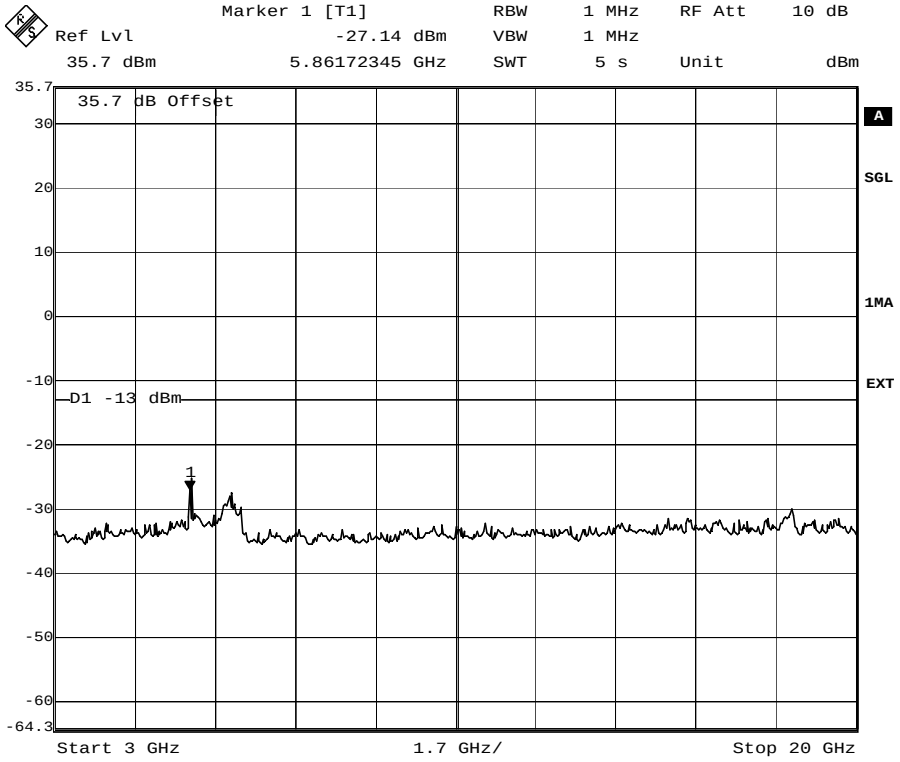
Measurement band integration 10dB (from 100kHz to 1MHz)

Test Data – Spurious Emissions, multi carrier



Date: 14.MAY.2007 14:03:41

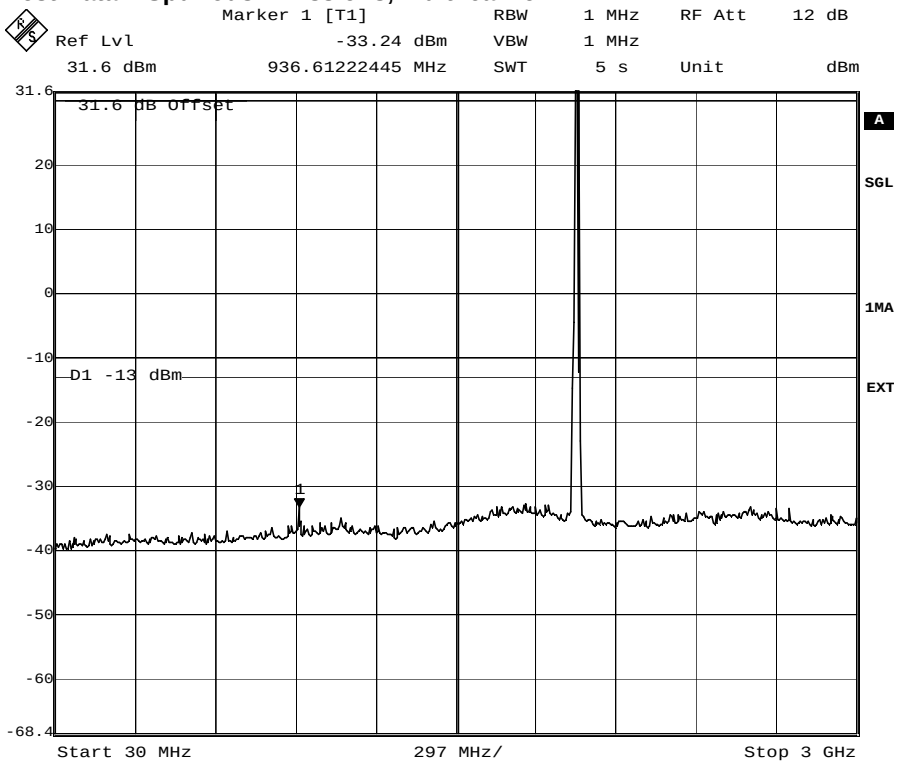
Notes: Tx 1960.0 and 1965.0 MHz, QPSK



Date: 14.MAY.2007 14:28:54

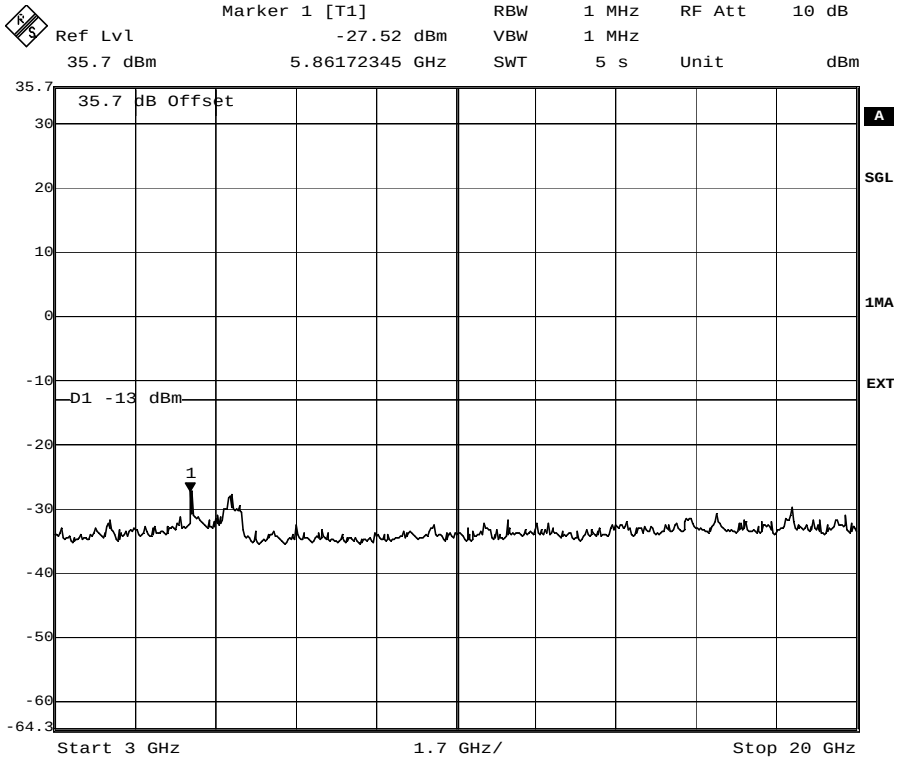
Notes: Tx 1960.0 and 1965.0 MHz, QPSK

Test Data – Spurious Emissions, multi carrier



Date: 14.MAY.2007 14:06:53

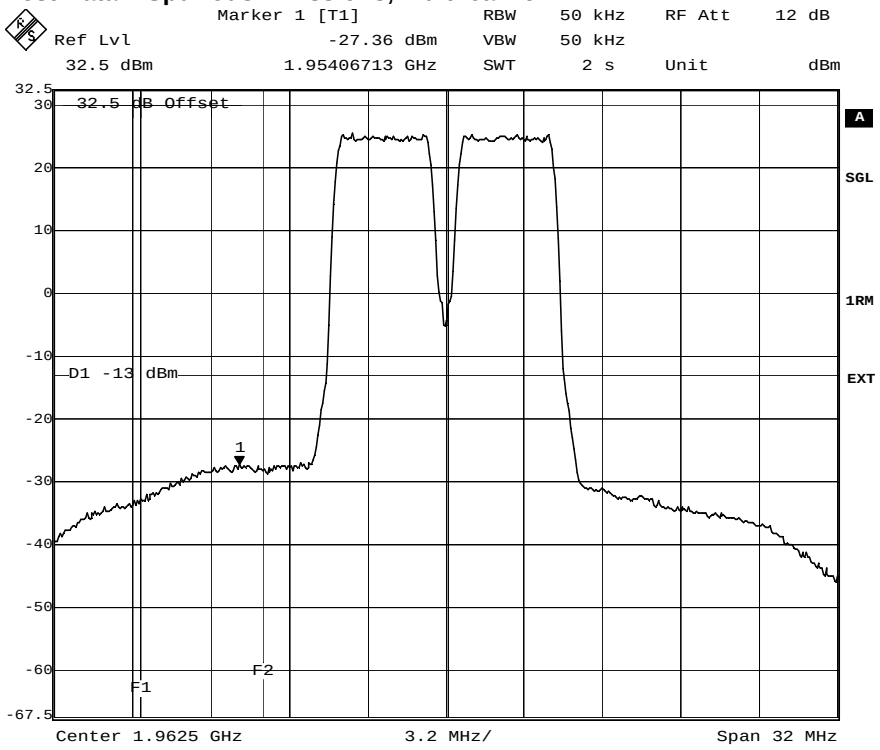
Notes: Tx 1960.0 and 1965.0 MHz, 16QAM



Date: 14.MAY.2007 14:30:26

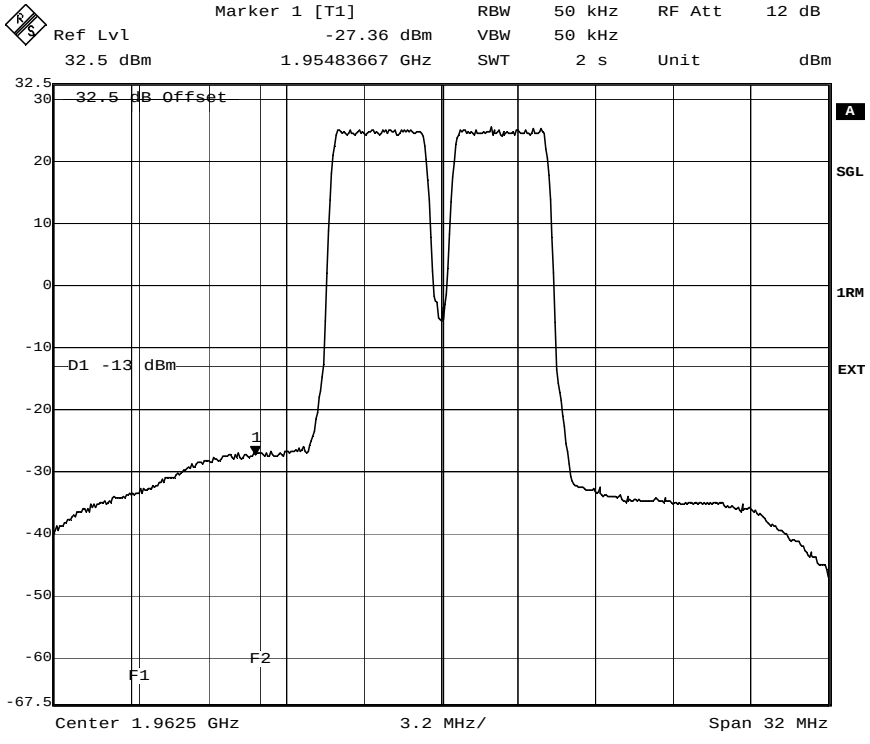
Notes: Tx 1960.0 and 1965.0 MHz, 16QAM

Test Data – Spurious Emissions, multi carrier



Date: 14.MAY.2007 13:43:58

Notes: Tx 1960.0 and 1965.0 MHz, QPSK 3rd order IM inband



Date: 14.MAY.2007 13:41:24

Notes: Tx 1960.0 and 1965.0 MHz, 16QAM 3rd order IM inband

Measurement band integration 13dB (from 50kHz to 1MHz)

6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA.NO.: 24.238(a), 2.1053
TESTED BY: Timo Hietala	DATE: 15/05/2007

Test Results: Complies.

Test Data: See attached table.

Frequency (MHz)	Spurious Emission EIRP (dBm) ave
All	More than 20 dB below limit -13 dBm

Equipment used: 15, 16, 17, 18, 19, 23, 24, 25, 26

Measurement Uncertainty: ± 5.2 dB.

Temperature: 23 °C.

Relative Humidity: 20 %.

NOTE:

The spectrum was searched from 30 MHz to the 10th harmonic of the carrier.

Test Data – Radiated Emissions

Nemko Oy, Finland

Data Plot — Radiated Emissions Substitution Method

Page 1 of 1 — Complete x

Job No.:	86416	Date:	15/05/2007	Preliminary:	
Specification:	PT24	Temperature (℃):	23		
Tested By:	Timo Hietala	Relative Humidity (%):	20		
E.U.T.:	WCDMA TRANSMITTER				
Configuration:	TX FULL POWER				
Sample Number:	1				
Location:	NSN Oulu	RBW:	1 MHz	Measurement	
Detector type:	Ave	VBW:	1 MHz	Distance:	3 m

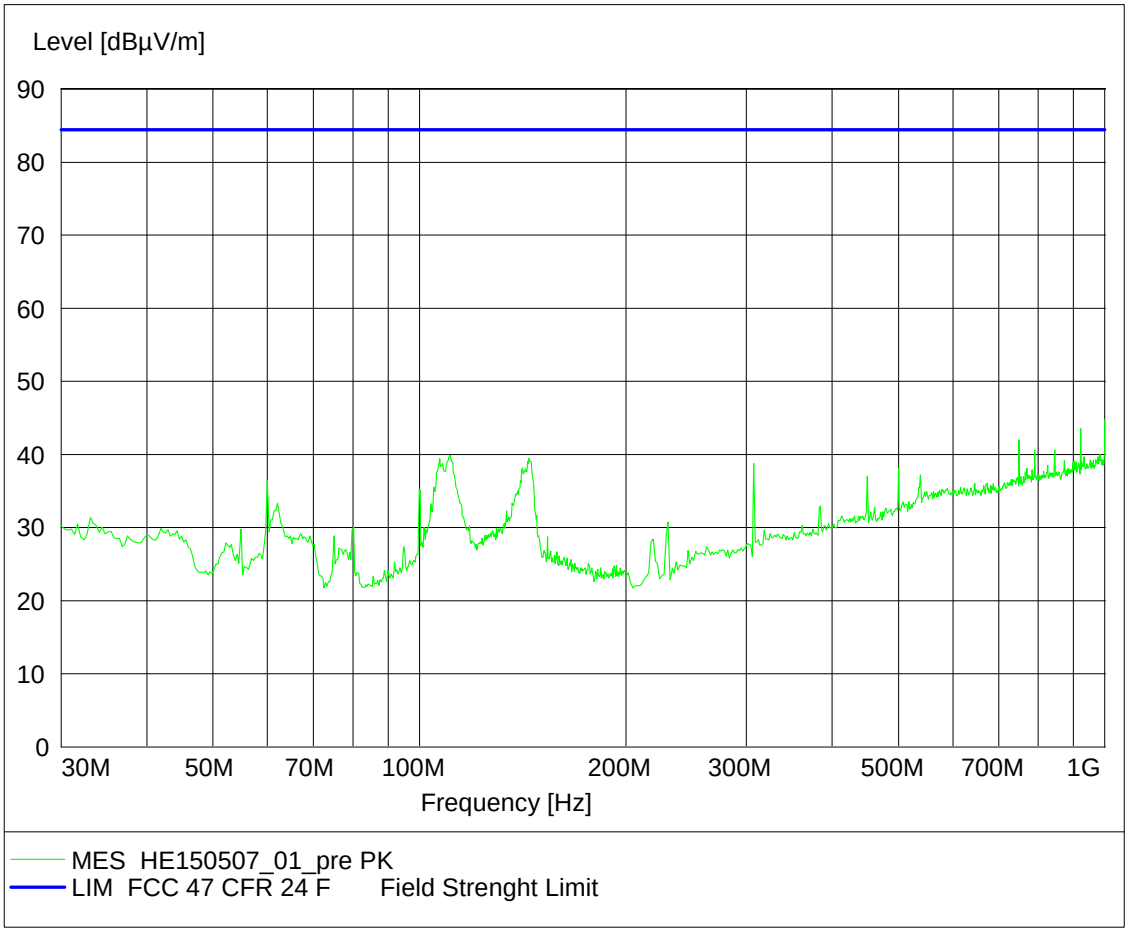
Test Equipment Used

Antenna:	17 and 18	Directional Coupler:	
Pre-Amp:	24	Cable #1:	
Filter:		Cable #2:	
Receiver:	16	Cable #3:	
Attenuator #1:	-	Cable #4:	
Attenuator #2:		Mixer:	
Additional equipment used:	19,23,25 and 26		
Measurement Uncertainty:	± 5.2 dB		

Frequency (MHz)	Meter Reading (dBm)	Correction Factor (dB)	Gen. Level (dBm)	Substitution Antenna Gain (dBi)	EIRP (dBm)	EIRP (µW)	Polarity	Comments

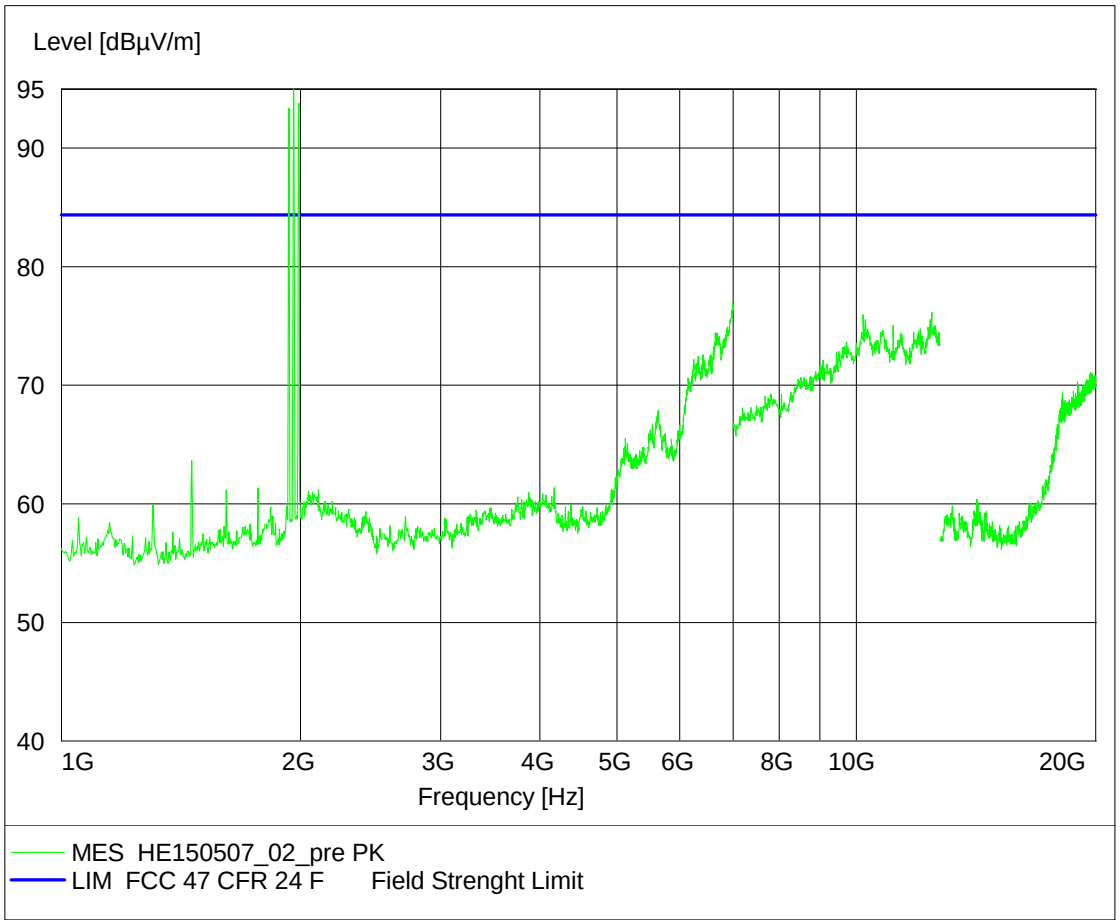
Notes: Pre measurement in stack installation FRFA Tx 1932.4 and 1960.0 MHz together with FRFB Tx 1987.6 MHz, transmitters full power terminated 50Ω

Test Data – Radiated Emissions 30 MHz - 1 GHz



Notes: Limit line (84.4 dBuV/m) is converted from substitution limit (–13 dBm) to unit dBuV/m in 3 meter measurement distance

Test Data – Radiated Emissions 1 GHz – 20 GHz



Notes: Limit line (84.4 dBuV/m) is converted from substitution limit (–13 dBm) to unit dBuV/m in 3 meter measurement distance

7. Frequency stability

NAME OF TEST: Frequency stability	PARA.NO.: 2.1055
TESTED BY: Timo Hietala	DATE: 16/05/2007

Test Results: Complies.

Standard Test Frequency: 1960.0 MHz.

Standard Test Voltage: 48 V DC.

Equipment used: 1, 5, 6, 8, 9, 14

EUT: WCDMA TRANSMITTER.

Configuration: TX FULL POWER MIDDLE CHANNEL.

Measurement Data: **Frequency stability with voltage variation.**

Test Condition			QPSK	QPSK	16QAM	16QAM
Voltage (V DC)	Temp (℃)	Rated (Hz/ppm)	Deviation (Hz)	Deviation (ppm)	Deviation (Hz)	Deviation (ppm)
48.0	20	98 / 0.05	26.4	0.0135	24.8	0.0127
55.2	20	98 / 0.05	20.5	0.0105	21.0	0.0107
40.8	20	98 / 0.05	19.5	0.0099	23.2	0.0118

Measurement Uncertainty: ± 0.001 ppm (± 2.0 Hz).

Relative Humidity: 20 %.

NAME OF TEST: Frequency stability	PARA.NO.: 2.1055
TESTED BY: Timo Hietala	DATE: 16/05/2007

Test Results: Complies.

Standard Test Frequency: 1960.0 MHz.

Standard Test Voltage: 48 V DC.

Equipment used: 1, 5, 6, 8, 9, 14

EUT: WCDMA TRANSMITTER.

Configuration: TX FULL POWER MIDDLE CHANNEL.

Measurement Data: **Frequency stability with temperature variation.**

Test Condition			QPSK	QPSK	16QAM	16QAM
Voltage (V DC)	Temp (℃)	Rated (Hz/ppm)	Deviation (Hz)	Deviation (ppm)	Deviation (Hz)	Deviation (ppm)
48.0	50	98 / 0.05	-15.9	-0.0081	-19.9	-0.0101
48.0	40	98 / 0.05	-9.7	-0.0049	-7.1	-0.0036
48.0	30	98 / 0.05	8.6	0.0044	7.0	0.0036
48.0	10	98 / 0.05	26.7	0.0136	30.0	0.0153
48.0	0	98 / 0.05	36.7	0.0187	34.2	0.0174
48.0	-10	98 / 0.05	39.4	0.0201	32.1	0.0164
48.0	-20	98 / 0.05	40.6	0.0207	35.5	0.0181
48.0	-30	98 / 0.05	33.2	0.0169	31.9	0.0163

Measurement Uncertainty: ± 0.001 ppm (± 2.0 Hz).

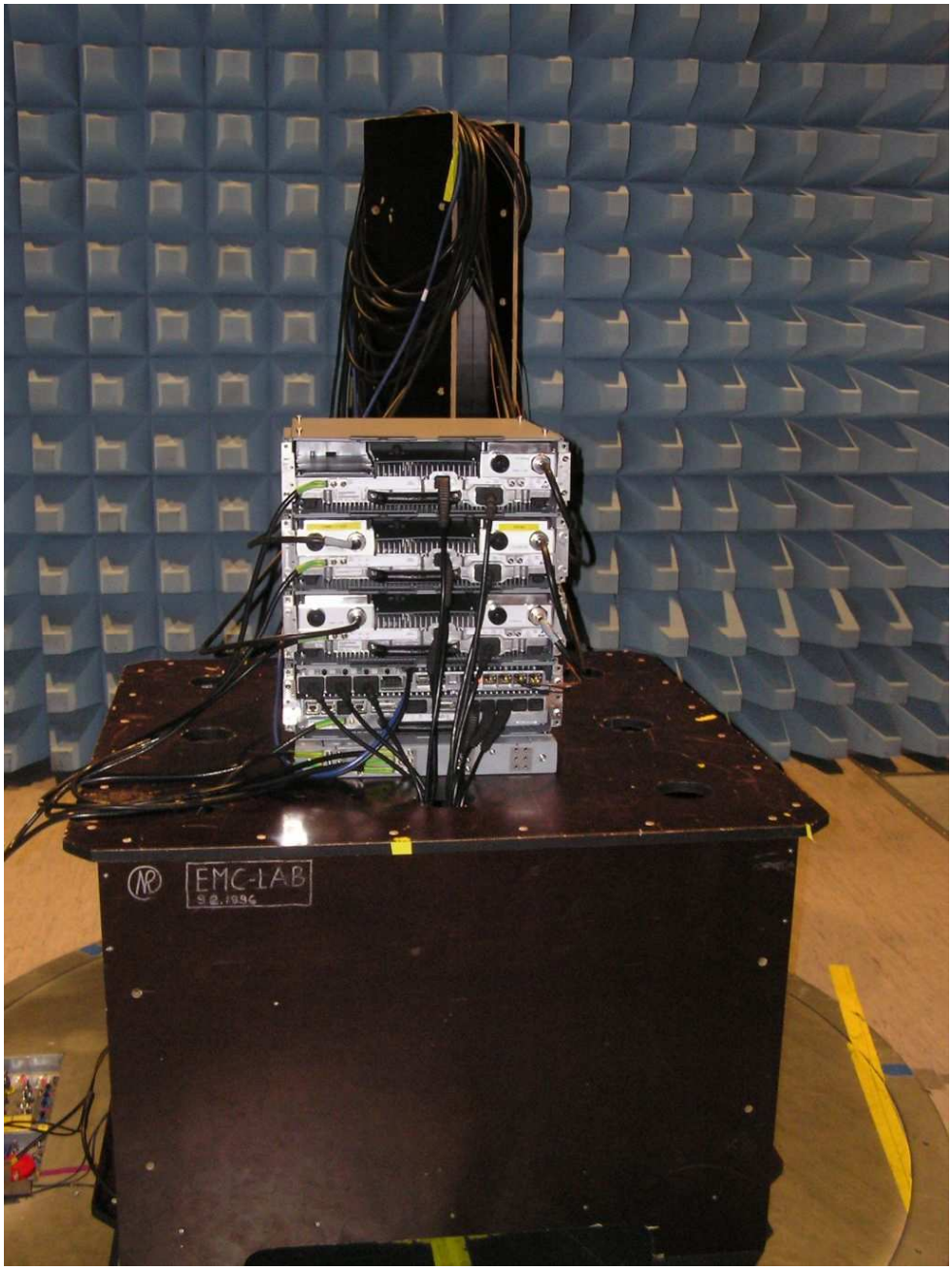
Relative Humidity: 20 %.

8. List of test equipment

Each active test equipment is calibrated annually.

Nr.	Equipment	Name of equipment	Serial number
1	Signal analyzer	Rohde & Schwarz:FSIQ26	836702/020
2	Network analyzer	Hewlett-Packard:HP8753E	US38431868
3	Network analyzer	Hewlett-Packard:HP8720ES	US39172107
4	Calibration kit	Hewlett-Packard:HP85032B	2919A04843
5	Enviromental chamber	Weiss technick	59226012320010
6	Frequency standard	Datum 8040	23006282
7	Interface Unit	Orbis TX SSU2100A	SSU-0346-999
8	DC power	Sörensen	9950C0085
9	Temperature/humidity meter	VAISALA HMI 31	P3730008
10	Signal analyzer	Rohde & Schwarz:FSIQ26	833370/009
11	Frequency standard	Datum 8040	0030007339
12	High Pass filter	Reactel 9HSX-3/20-S11	0531
13	Attenuator	MCE/Weinschel 67-20-33	BM0633
14	Attenuator	Narda FSCM 99899	08275
15	Semianechoic chamber	Siemens Matsushita 9m × 5m × 6m (room 0039)	Product No S&M B83317- C6019-T232
16	EMI Test Receiver	R&S ESIB 26	100335
17	Horn Antenna	Emco 3115	00075697
18	Bilog Antenna	Chase CBL6112B	2694
19	Horn Antenna	Emco 3115	0102A06346
20	Biconical Antenna	R&S HK116	836891/009
21	Dipole VHF	Mess-Elektronik VHA9103	
22	Dipole UHF	Mess-Elektronik UHA9105	
23	Signal Generator	R&S SMR 20	1715
24	Amplifier	Miteq AFSX4	791117
25	Antenna Mast	Deisel HD240	2401323194
26	Mast Controller	Deisel HD100	1001331

9. Photographs of Test Setup



10. ANNEX A, TEST DETAILS

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046

Minimum Standard: Para. No. 24.232(a). Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT.

Method Of Measurement:

CDMA Per ANSI/J-STD-014
TDMA Per ANSI/J-STD-010

Detachable Antenna:
The peak power at antenna terminals is measured using an in-line peak power meter or a spectrum analyzer.

NAME OF TEST: Occupied Bandwidth	PARA. NO.: 2.1049

Minimum Standard: Para. No. 2.1049. The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the emitted power.

Method Of Measurement:

The 99% occupied bandwidth of the carrier emission is measured using a spectrum analyzer with Resolution Bandwidth set to 1% of the necessary bandwidth of the transmitted carrier.

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.1051

Minimum Standard: Para. No. 24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

Method Of Measurement:

Spectrum analyzer settings:
RBW: 1 MHz
VBW: 1 MHz
Within 1 MHz of the upper and lower edges of the assigned band of operation the resolution bandwidth is lowered to 1 % of the 26 dB occupied bandwidth of the transmitted carrier. A pre–measurement was performed with the max peak detector and spurious emissions closer than 20 dB to the limit was measured with rms detector.

NAME OF TEST: Field Strength of Spurious Radiation	PARA. NO.: 2.1053

Minimum Standard: Para. No. 24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least 43 + 10 log (P) dB.

Test Method:
TIA/EIA-603-C-2004, Section 2.2.12
The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable. During the test in the frequency range 30-22000 MHz the distance from the EUT to the measuring antenna was 3 m. In order to find the maximum levels of the disturbance radiation the angle of the turntable, the height of the measuring antenna were varied during the tests. The test was performed with the measuring antenna being both in horizontal and vertical polarizations.

Vertical and horizontal polarizations in the frequency range 30 – 20000 MHz was first measured by using the peak detector. During the peak detector scan the turntable was rotated from 0° to 360° with 30° step with the antenna heights 1.0 m and 2.5 m.

The limit of -13 dBm has been calculated to correspond 84.4 dB(µV/m).
Spurious emissions closer than 20 dB to the limit was measured with average detector.

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The EUT was replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator $G_{Antenna[dBi]}$. This antenna was fed with a signal at the spurious frequency $P_{Gen[dBm]}$. The level of the signal was adjusted to repeat the previously measured level. The resulting EIRP is the signal level fed to the reference antenna corrected for gain referenced to an isotropic.
The formula below was used to calculate the EIRP of the EUT.

$$P_{EIRP[dbm]} = P_{Gen[dBm]} - L_{Cable[dB]} + G_{Antenna[dBi]}$$

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055

Minimum Standard: The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Method Of Measurement:
Frequency Stability With Voltage Variation

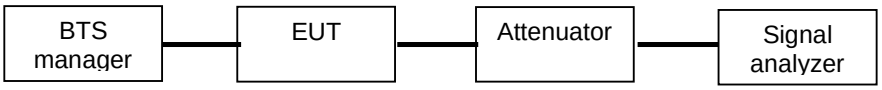
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency error is measure. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

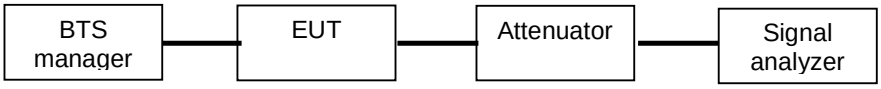
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency error is measured.

11. ANNEX B, TEST DIAGRAMS

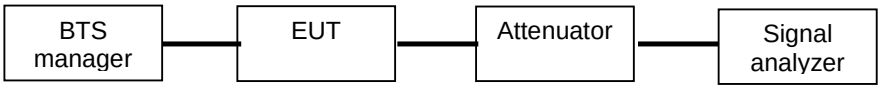
RF Power Output PARA. NO.: 2.1046



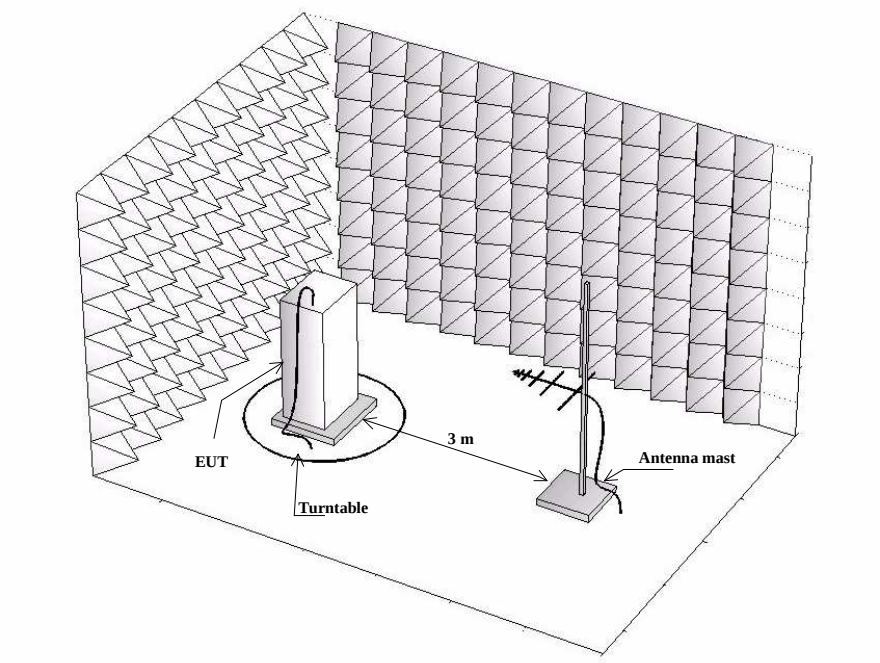
Occupied Bandwidth PARA. NO.: 2.1049



Spurious Emission at Antenna Terminals PARA. NO.: 2.1051

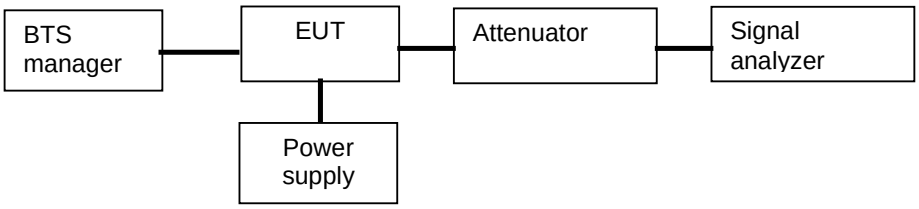


Field Strength of Spurious Radiation PARA. NO.: 2.1053



Frequency Stability PARA. NO.: 2.1055

Frequency Stability With Voltage Variation



Frequency Stability With Temperature Variation