

Date: ESPOO 31.01.2007Page: 1 (39)Appendices -Number:
No. 1 / 1**80105R2**

Date of handing in: 23.01.2007

Measured by:



Timo Hietala, Test Engineer

Reviewed by:



Jyrki Leino, Manager

SORT OF EQUIPMENT:

WCDMA Base Station RF module

MARKETING NAME:

Nokia Flexi BTS RF module 850MHz

TYPE:

FRCB

MANUFACTURER:

Nokia Corporation

FCC ID:

UAFFRCB-01

CLIENT:

Nokia Corporation

ADDRESS:

P.O.Box 319, FI-90651 OULU, FINLAND

TELEPHONE:

+358 7180 08000

TEST LABORATORY:

NET/IMN Oulu

FCC REG. NO.

411251

REFERENCE:

FCC Part 22, SUBPART H**SUMMARY:**

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

The test results are valid for the tested unit only. Without a written permission of Nemko Oy it is allowed to copy this report as a whole, but not partially.

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1. EUT and Accessory Information

1.1 EUT description

The EUT is a WCDMA Base station RF module 850 MHZ with 1 power amplifiers.

1.2 EUT and accessories

Manufacturer: Nokia
Model: FRCB, s/n: L9065100225
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 22, Subpart H.

<input checked="" type="checkbox"/>	New Submission	<input checked="" type="checkbox"/>	Production Unit
<input type="checkbox"/>	Class II Permissive Change	<input type="checkbox"/>	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**

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This report applies only to the items tested.

Summary of Test Data

NAME OF TEST	SECTION IN CFR 47	SPEC.	RESULT
RF Power Output	22.913 (a), 2.1046	100 W	Complies
99% Occupied Bandwidth	2.1049, (i)	Unspecified	Complies
Spurious Emissions at Antenna Terminals	22.917(a), 2.1051	- 13 dBm	Complies
Field Strength of Spurious Emissions	22.917 (a), 2.1053	- 13 dBm E.I.R.P	Complies
Frequency stability	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:	<input checked="" type="checkbox"/>	Block A : 869 – 880 MHz		
	<input checked="" type="checkbox"/>	Block A : 890 – 891.5 MHz		
	<input checked="" type="checkbox"/>	Block B : 880 – 890 MHz		
	<input checked="" type="checkbox"/>	Block B : 891.5 – 894 MHz		
	<input checked="" type="checkbox"/>	Block A : 824 – 835 MHz		
	Frequency Bands: RX:	<input checked="" type="checkbox"/>	Block A : 845 – 846.5 MHz	
		<input checked="" type="checkbox"/>	Block B : 835 – 845 MHz	
		<input checked="" type="checkbox"/>	Block B : 846.5 – 849 MHz	
Type of Modulation and Designator:		W-CDMA (5M00F9W)	GSM (200KG7W)	NADC 40K0DXW)
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Maximum No. of Carriers:	2		
Output Impedance:	50 ohms.			
RF Output:	Per channel: 40 W or 2x20W.			
Band Selection:	Software	Duplexer	Fullband	
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

System Description

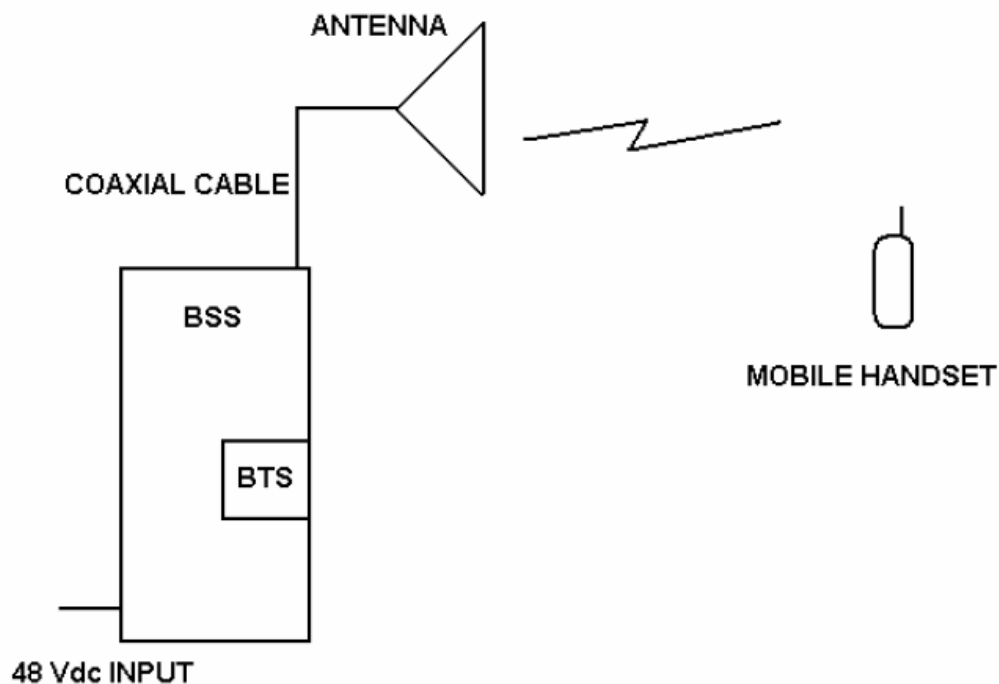
The BTS performs the radio function of the Base Station System (BSS), and is connected to the Radio Network Controller (RNC) via the Iub interface, and to Mobile Stations (MS) via the Air interface (Antenna). The RNC is further connected to Serving GPRS Support Node (SGSN) or it can be connected to the 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 kbps (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 kbps (SF=128) together with 8 HS-PDSCHs at 240 kbps (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 kbps (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 kbps (SF=128) together with 4 HS-PDSCHs at 240 kbps (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.: 22.913(a) & 2.1046
TESTED BY: Timo Hietala	DATE: 24/01/2007

Test Results: Complies.

Measurement Data: Refer to attached plot.

Single carrier

Modulation Type	Frequency (MHz)	Measured Output	
		Power (dBm)	Power (W)
QPSK	871.4	45.52	35.65
QPSK	881.6	45.76	37.67
QPSK	891.6	45.63	36.56
16QAM	871.4	45.51	35.56
16QAM	881.6	45.74	37.50
16QAM	891.6	45.64	36.64

Multi carrier

Modulation Type	Frequency (MHz)	Measured Output		
		Power/carr. (dBm)	Power/carr. (W)	Total power (dBm) / (W)
QPSK	871.4 and 876.4	42.60 / 42.80	18.20 / 19.05	45.71 / 37.25
QPSK	881.6 and 886.4	42.68 / 42.85	18.54 / 19.28	45.78 / 37.81
QPSK	886.4 and 891.6	42.74 / 42.80	18.79 / 19.05	45.78 / 37.85
16QAM	871.4 and 876.4	42.58 / 42.76	18.11 / 18.88	45.68 / 36.99
16QAM	881.6 and 886.4	42.65 / 42.81	18.41 / 19.10	45.74 / 37.51
16QAM	886.4 and 891.6	42.72 / 42.79	18.71 / 19.01	45.77 / 37.72

Equipment used: 1, 2, 4, 7, 8, 9.

Measurement Uncertainty: ± 0.7 dB.

Temperature: 23 °C.

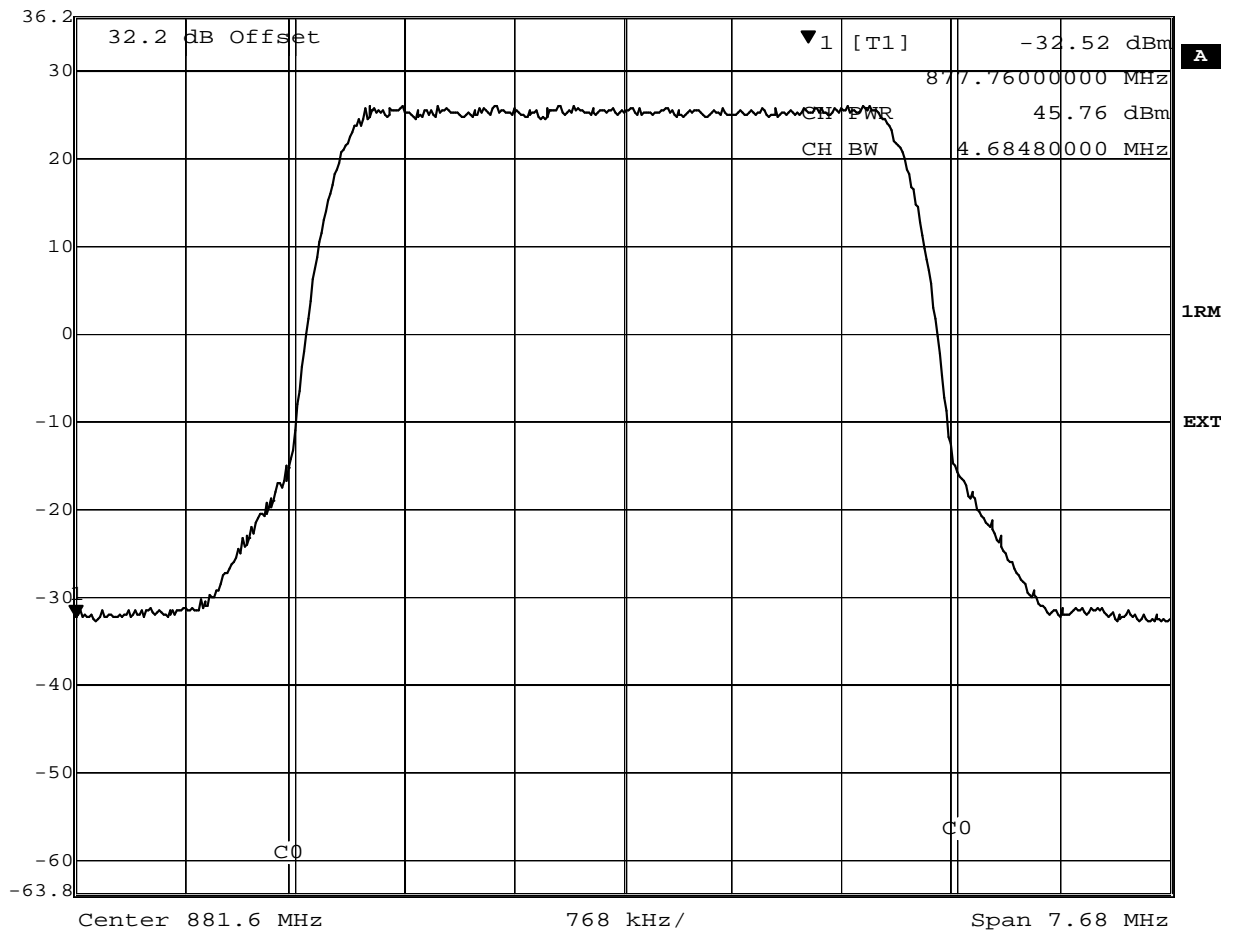
Relative Humidity: 10 %.

Test Data – RF Power Output

Nemko Oy, Finland

Data Plot		RF POWER OUTPUT	
Page 1 of 4			
Job No.: 80106	Date: 24/01/2007	Complete: <input checked="" type="checkbox"/>	Preliminary: <input type="checkbox"/>
Specification: PT22	Temperature (°C): 23		
Tested By: Timo Hietala	Relative Humidity (%): 10		
E.U.T.: WCDMA TRANSMITTER			
Configuration: TX FULL POWER CENTER CHANNEL			
Sample Number: 1			
Location: NET/IMN 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: 7	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: ± 0.7 dB			

Ref Lvl	Marker 1 [T1]	RBW	30 kHz	RF Att	40 dB
36.2 dBm	-32.52 dBm	VBW	300 kHz		
	877.76000000 MHz	SWT	2 s	Unit	dBm

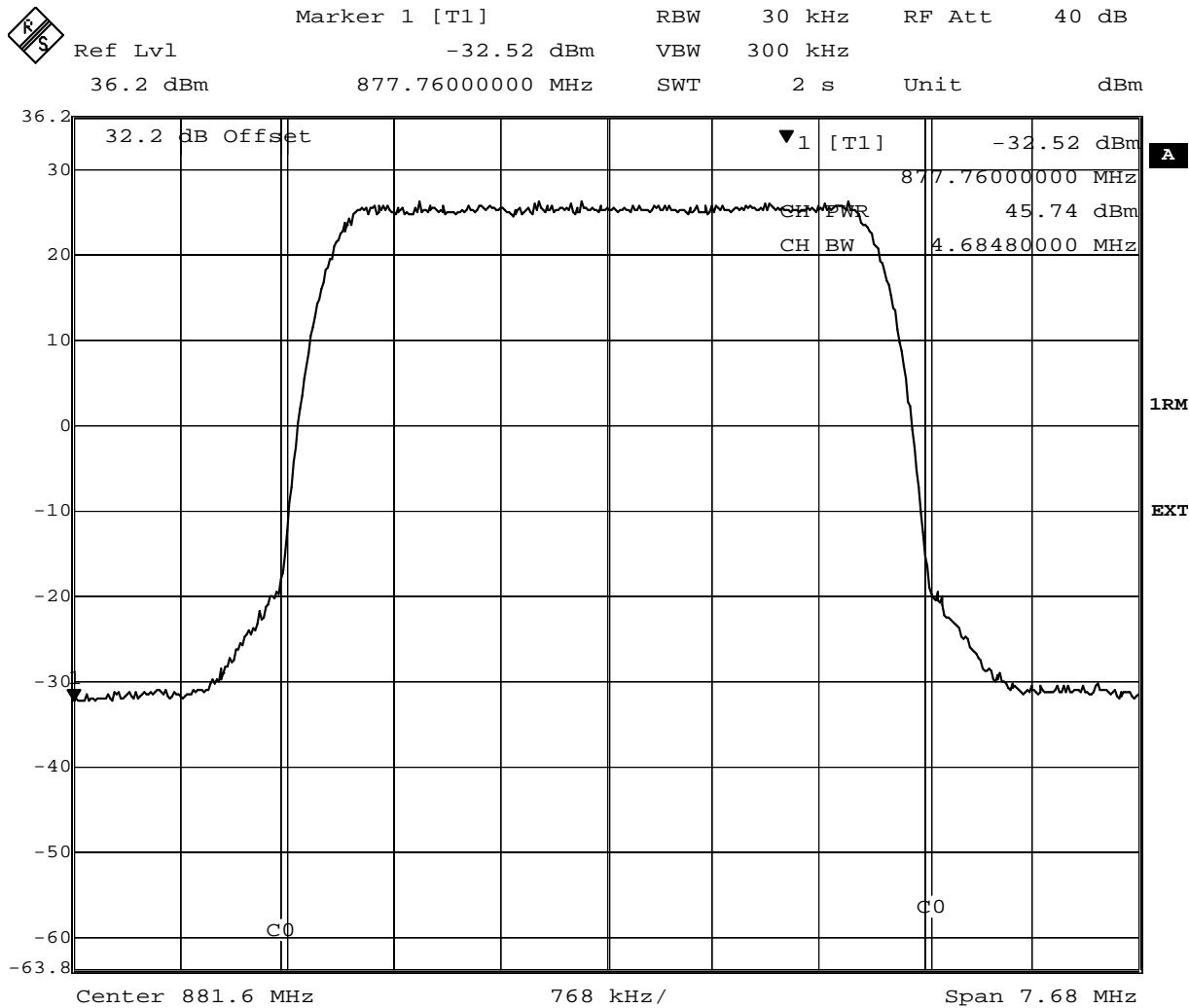


Date: 24.JAN.2007 09:07:46

Notes: QPSK

Nemko Oy, Finland

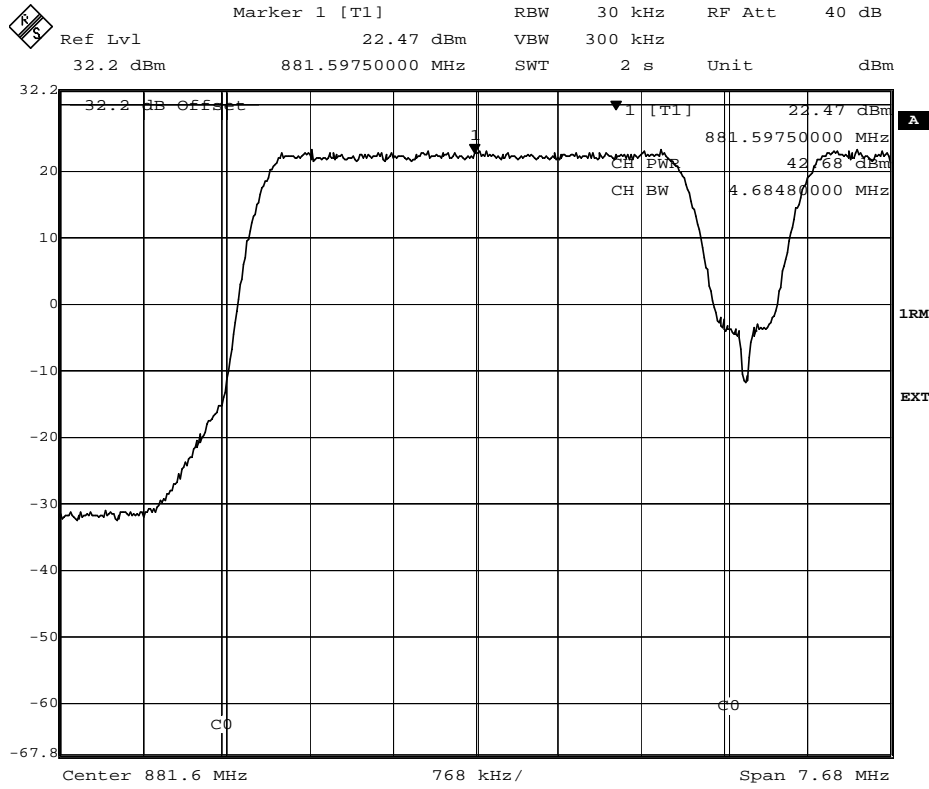
Data Plot		RF POWER OUTPUT	
Page 2 of 4			
Job No.: 80106		Date: 24/01/2007	
Specification: PT22		Temperature (°C): 23	
Tested By: Timo Hietala		Relative Humidity (%): 10	
E.U.T.:	WCDMA TRANSMITTER		
Configuration:	TX FULL POWER CENTER CHANNEL		



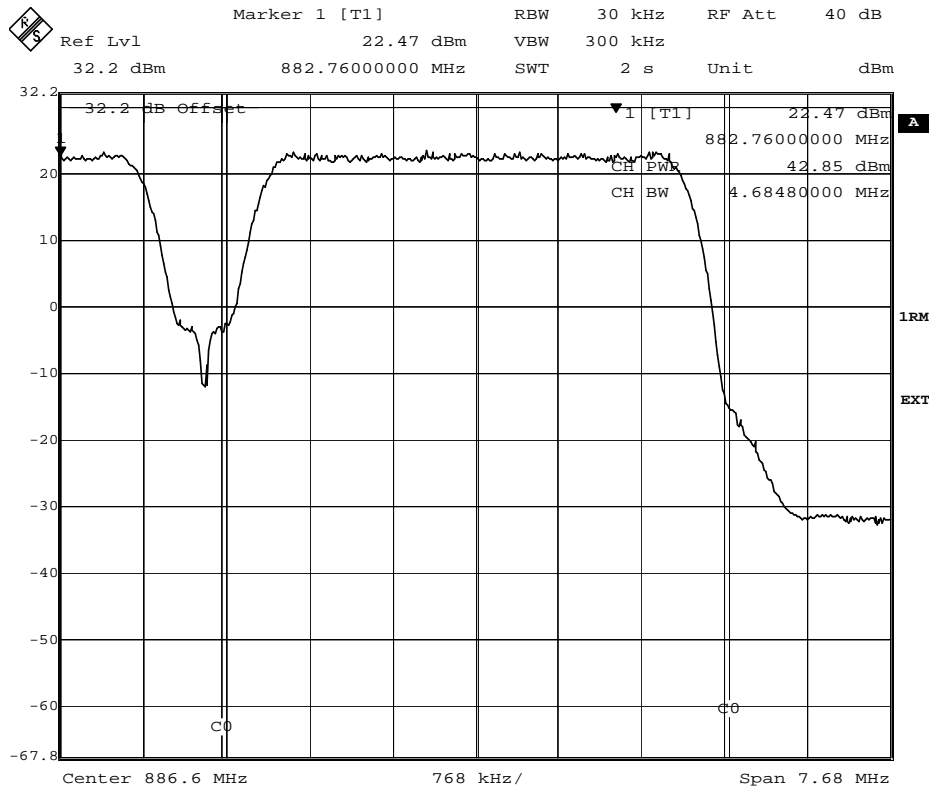
Date: 24.JAN.2007 09:09:21

Notes: 16QAM

Test Data – RF power, multi carrier QPSK



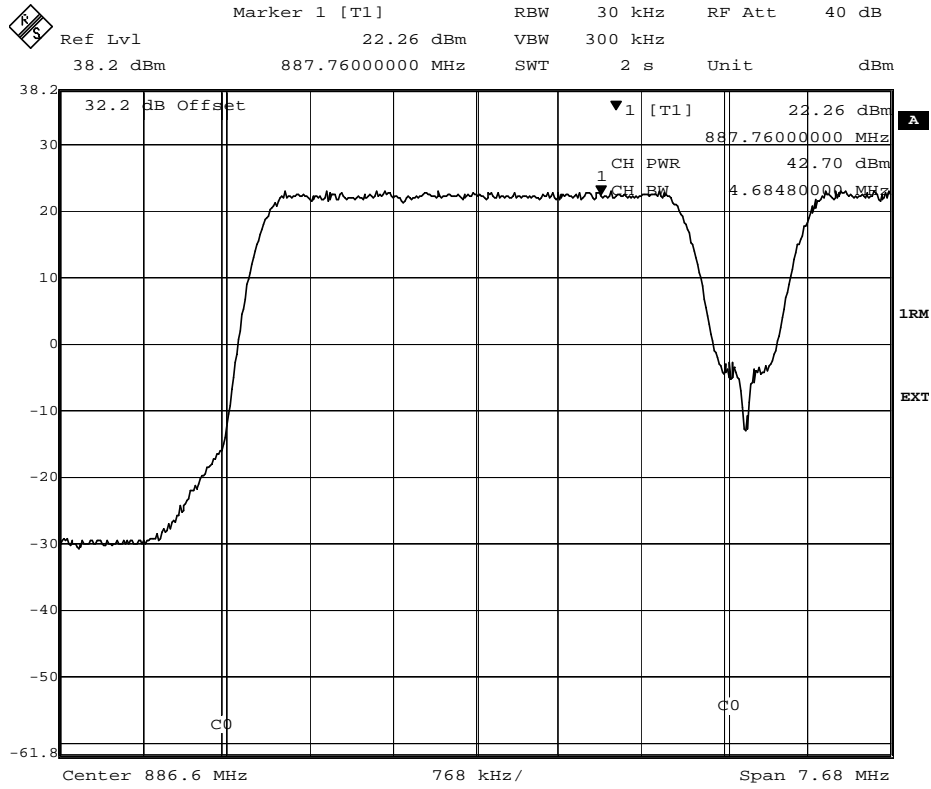
Date: 24.JAN.2007 11:35:53



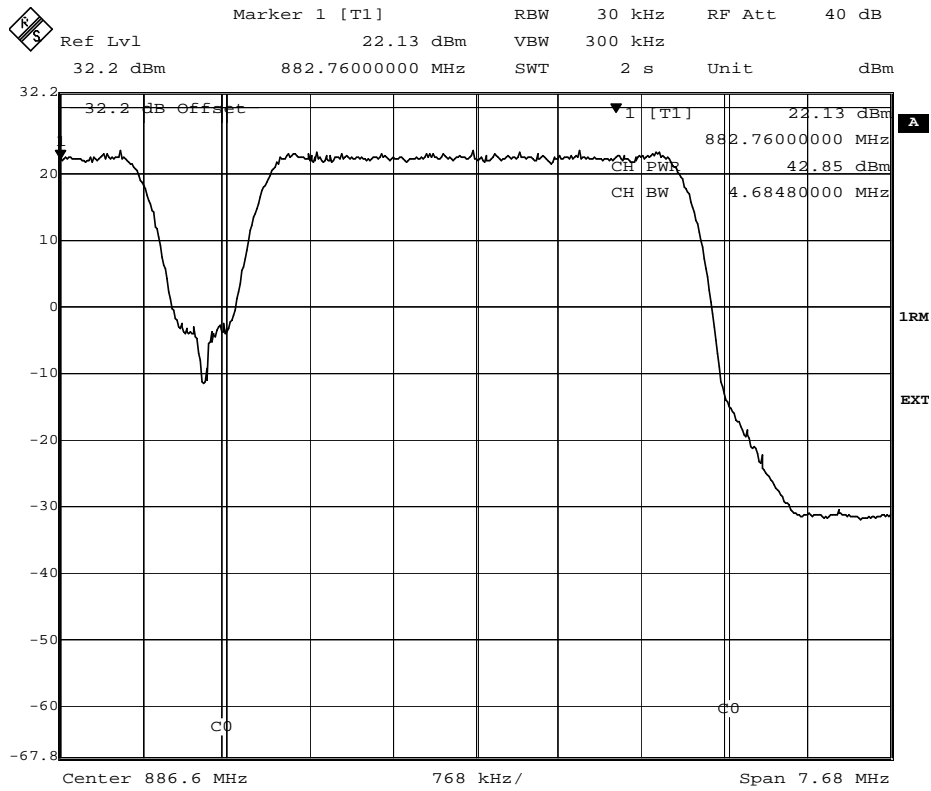
Date: 24.JAN.2007 11:42:04

Notes: 881.6 and 886.6 MHz QPSK

Test Data – RF power, multi carrier 16QAM



Date: 24.JAN.2007 12:48:54



Date: 24.JAN.2007 11:36:26

Notes: 881.6 and 886.6 MHz 16QAM

4. 99% Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth	PARA.NO.: 2.1049, (i)
TESTED BY: Timo Hietala	DATE: 24/01/2007

Test Results: Complies.

Test Data: See attached plot(s).

Modulation Type	Frequency (MHz)	Measured 99% Occupied Bandwidth (MHz)
QPSK	871.4	3.9679
QPSK	881.6	3.9679
QPSK	891.6	3.9679
16QAM	871.4	3.9879
16QAM	881.6	3.9679
16QAM	891.6	3.9879

Equipment used: 1, 2, 4, 7, 8, 9.

**Measurement
Uncertainty:** ± 0.7 dB.

Temperature: 23 °C.

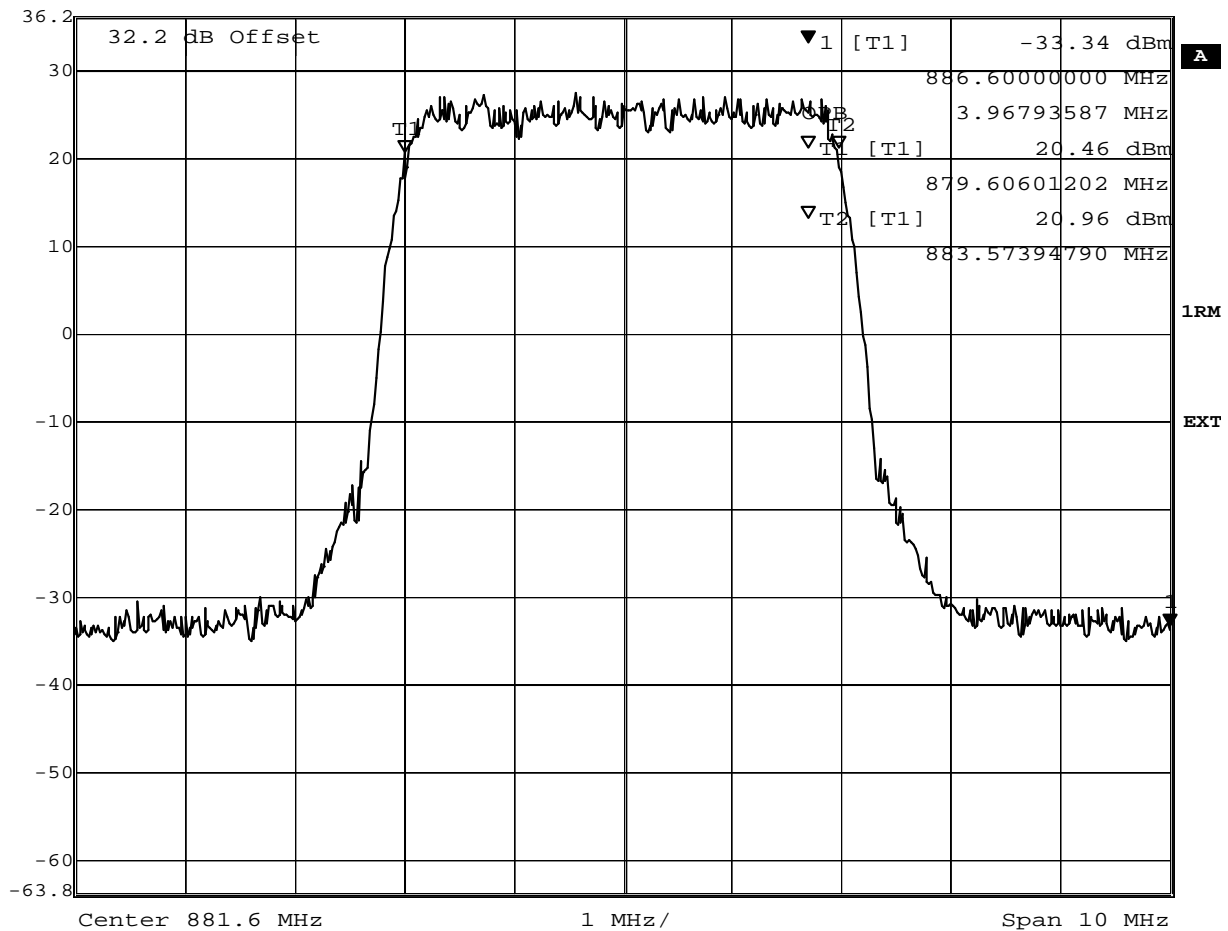
**Relative
Humidity:** 10 %.

Test Data – 99% Occupied Bandwidth

Nemko Oy, Finland

Data Plot		99% Occupied Bandwidth	
Page 1 of 2			
Job No.: 80106	Date: 24/01/2007	Complete: <input checked="" type="checkbox"/>	Preliminary: <input type="checkbox"/>
Specification: PT22	Temperature (°C): 23		
Tested By: Timo Hietala	Relative Humidity (%): 10		
E.U.T.: WCDMA TRANSMITTER			
Configuration: TX FULL POWER CENTER CHANNEL			
Sample Number: 1			
Location: NET/IMN 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: 7	Cable #4: _____		
Attenuator #2: _____	Mixer: _____		
Additional equipment used: _____			
Measurement Uncertainty: ± 0.7 dB			

	Marker 1 [T1]	RBW 30 kHz	RF Att 40 dB
Ref Lvl	-33.34 dBm	VBW 300 kHz	
36.2 dBm	886.6000000 MHz	SWT 200 ms	Unit dBm

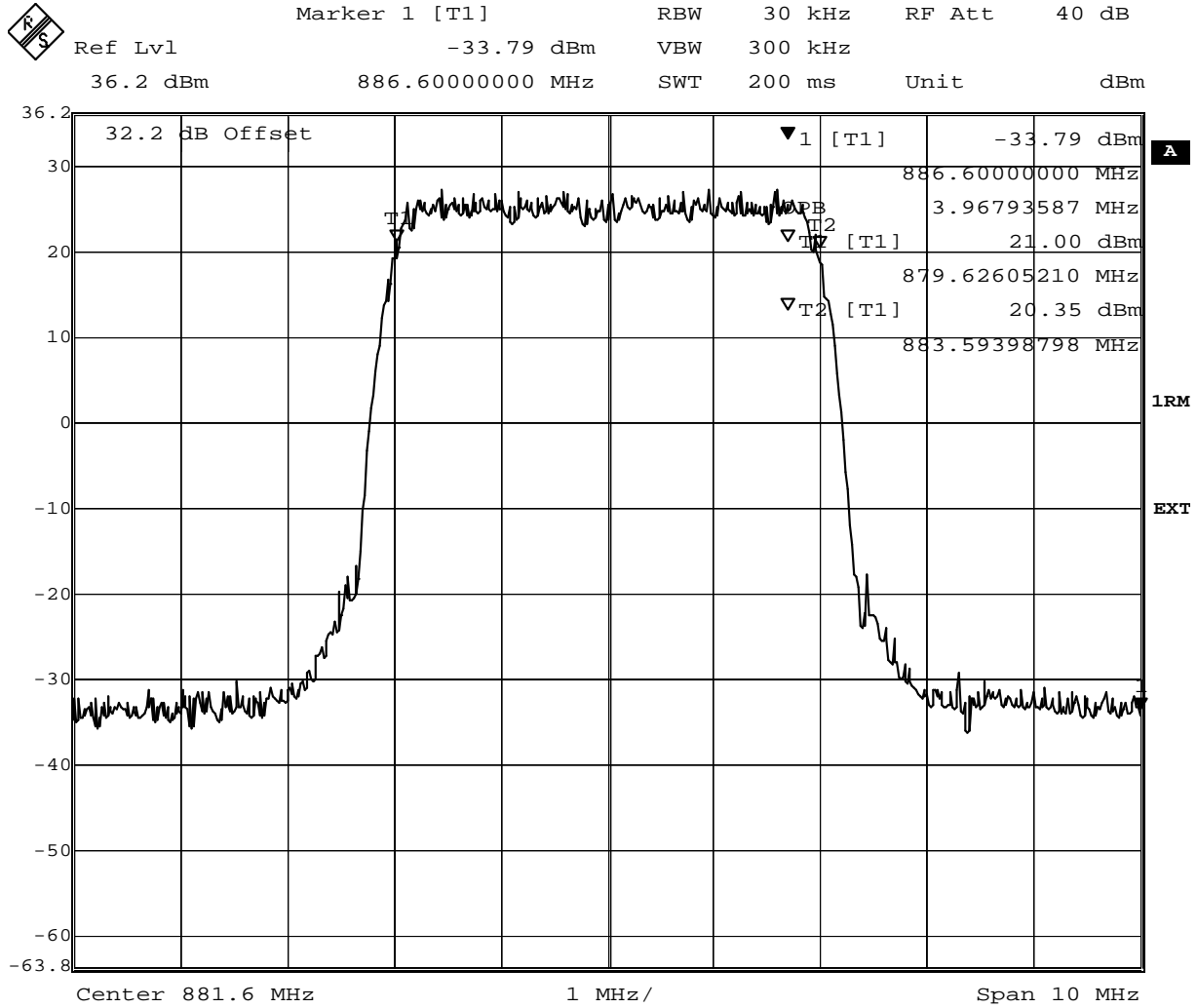


Date: 24.JAN.2007 09:36:40

Notes: QPSK

Nemko Oy, Finland

Data Plot		99% Occupied Bandwidth	
Page 2 of 2			
Job No.:	80106	Date:	24/01/2007
Specification:	PT22	Temperature (°C):	23
Tested By:	Timo Hietala	Relative Humidity (%):	10
E.U.T.:	WCDMA TRANSMITTER		
Configuration:	TX FULL POWER CENTER CHANNEL		



Date: 24.JAN.2007 09:39:50

Notes: **16QAM**

5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals	PARA.NO.: 22.917(a), 2.1051
TESTED BY: Timo Hietala	DATE: 24/01/2007

Test Results: Complies.

Test Data: See attached plots.

Single carrier

Frequency (MHz)	Modulation	Spurious Emission (dBm) rms det.
All	QPSK	More than 20 dB below limit -13 dBm
All	16QAM	More than 20 dB below limit -13 dBm

Multi carrier

Frequency (MHz)	Modulation	Spurious Emission (dBm) rms det.
All	QPSK	More than 20 dB below limit -13 dBm
All	16QAM	More than 20 dB below limit -13 dBm

Lower Band Edge, Single carrier

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
869.000	QPSK	-15.06
869.000	16QAM	-17.74

Upper Band Edge, Single carrier

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
894.008	QPSK	-15.23
894.024	16QAM	-18.78

Lower Band Edge, Multi carrier

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
869.000	QPSK	-14.26
869.000	16QAM	-15.38

Upper Band Edge, Multi carrier

Frequency (MHz)	Modulation	Peak Emission Level (dBm) rms det.
894.008	QPSK	-14.96
894.008	16QAM	-16.08

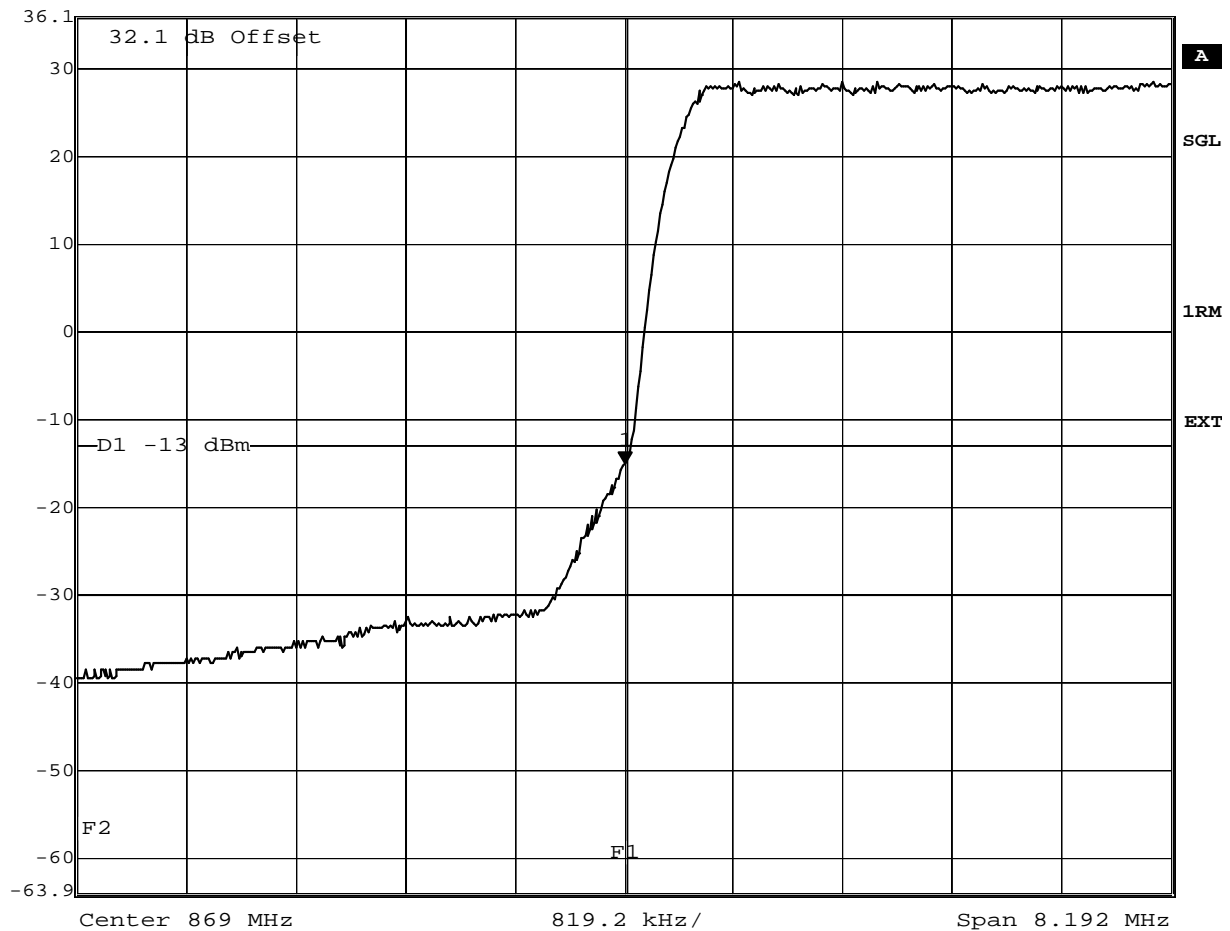
Equipment used: 1, 2, 3, 4, 7, 8, 9, 12, 13, 14**Measurement
Uncertainty:** ± 0.7 dB.**Temperature:** 23 °C.**Relative
Humidity:** 10 %.

Test Data – Spurious Emissions

Nemko Oy, Finland

Data Plot		Spurious Emissions at Antenna Terminals		Complete <u> x </u>
Page 1 of 12	Job No.: 80106	Date: 24/01/2007	Preliminary: _____	
Specification: PT22	Temperature (°C): 23			
Tested By: Timo Hietala	Relative Humidity (%): 10			
E.U.T.: WCDMA TRANSMITTER				
Configuration: TX FULL POWER LOWEST CHANNEL				
Sample Number: 1				
Location: NET/IMN 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: 7	Cable #4: _____			
Attenuator #2: _____	Mixer: _____			
Additional equipment used: _____				
Measurement Uncertainty: ± 0.7 dB				

	Marker 1 [T1]	RBW	50 kHz	RF Att	25 dB
	Ref Lvl	-15.06 dBm	VBW	50 kHz	
	36.1 dBm	869.0000000 MHz	SWT	2 s	Unit dBm



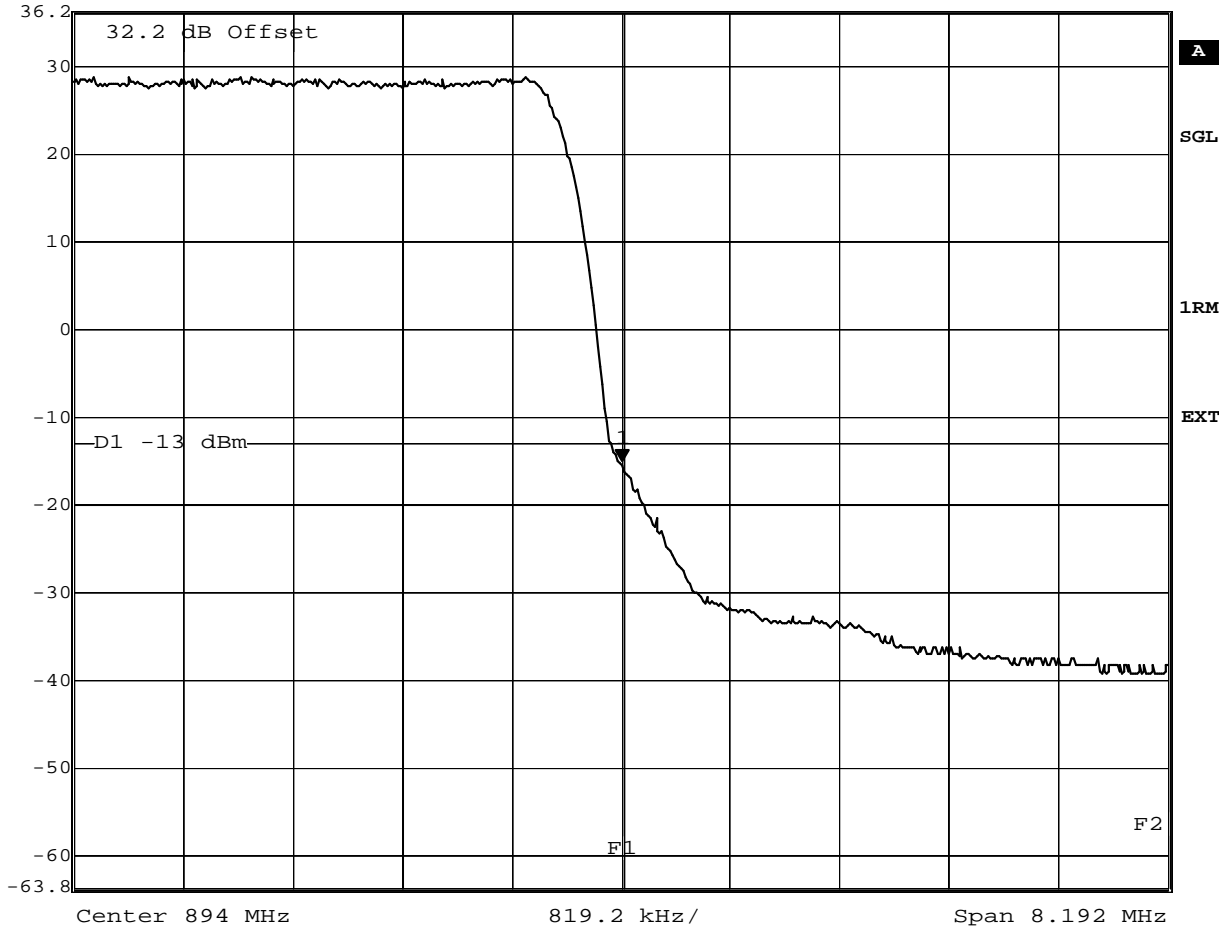
Date: 24.JAN.2007 09:45:25

Notes: Tx 871.4 MHz, QPSK , LOWER BANDEDGE

Test Data – Spurious Emissions



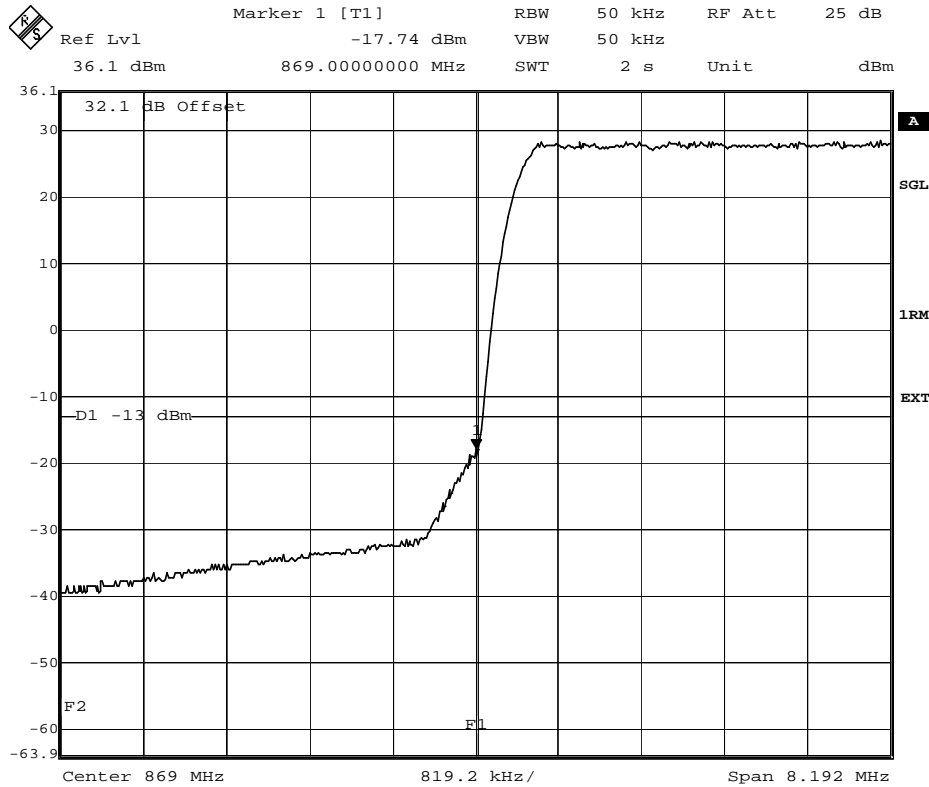
Ref Lvl	Marker 1 [T1]	RBW	50 kHz	RF Att	25 dB
36.2 dBm	-15.23 dBm	VBW	50 kHz		
	894.00820842 MHz	SWT	2 s	Unit	dBm



Date: 24.JAN.2007 09:50:26

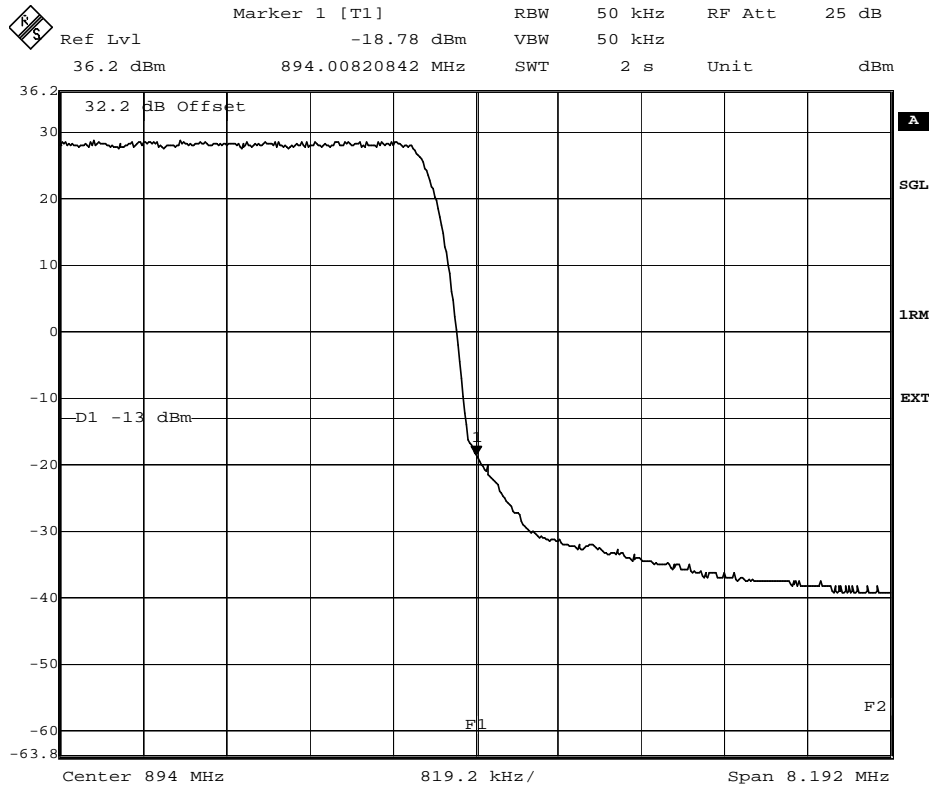
Notes: Tx 891.6 MHz, QPSK, UPPER BANDEDGE

Test Data – Spurious Emissions



Date: 24.JAN.2007 09:46:20

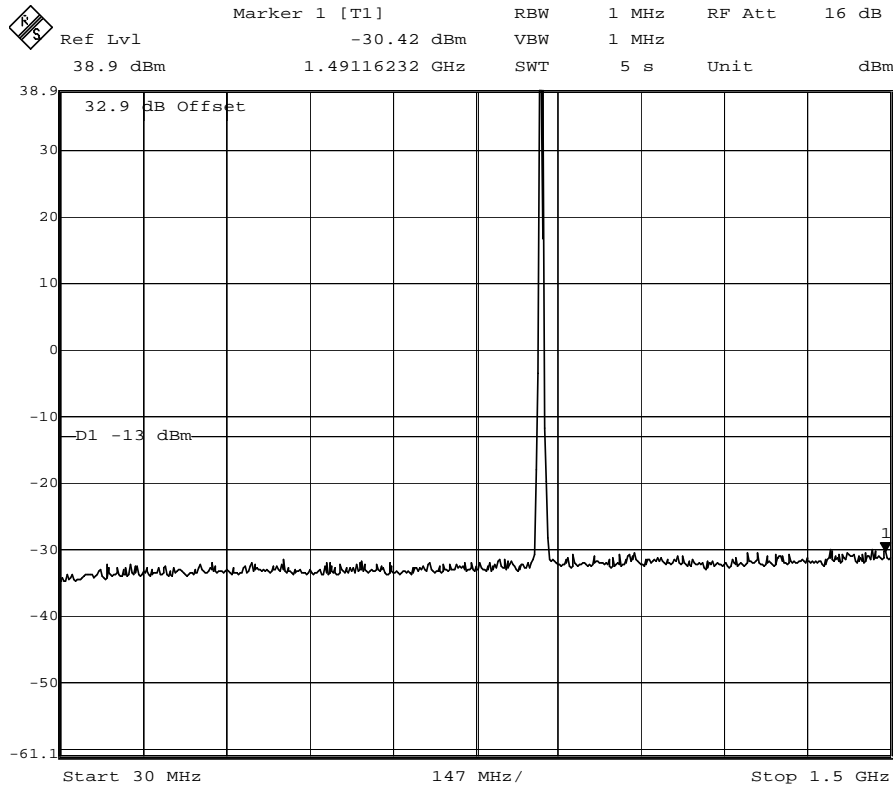
Notes: Tx 871.4 MHz, 16QAM, LOWER BANDEDGE



Date: 24.JAN.2007 09:49:51

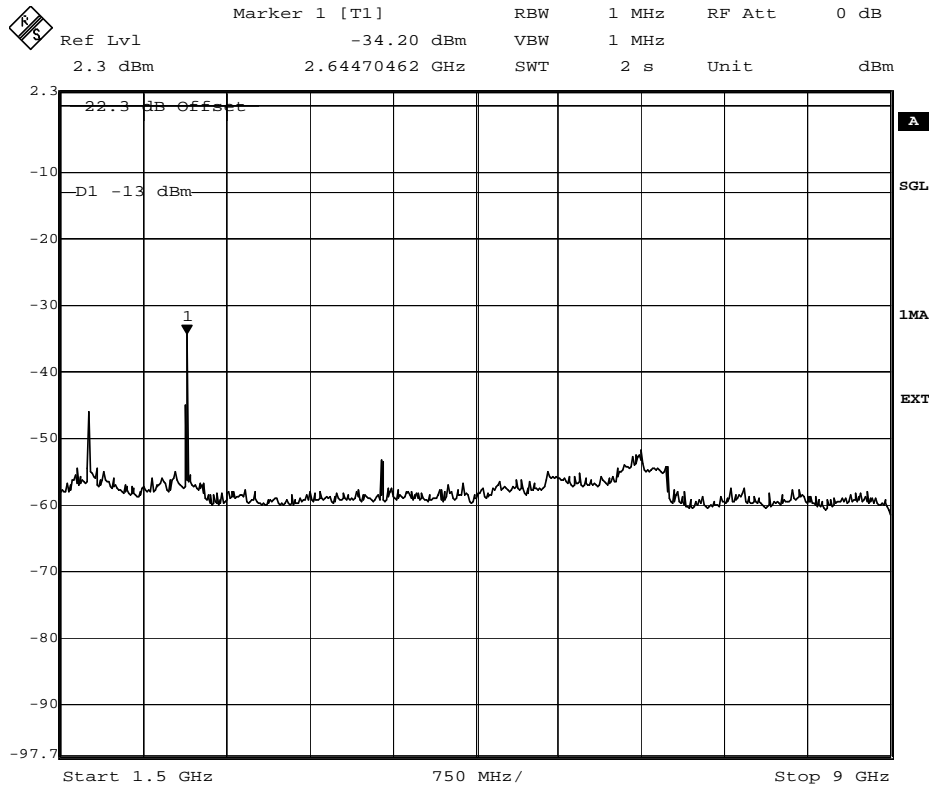
Notes: Tx 891.6 MHz, 16QAM, UPPER BANDEDGE

Test Data – Spurious Emissions



Date: 24.JAN.2007 09:53:23

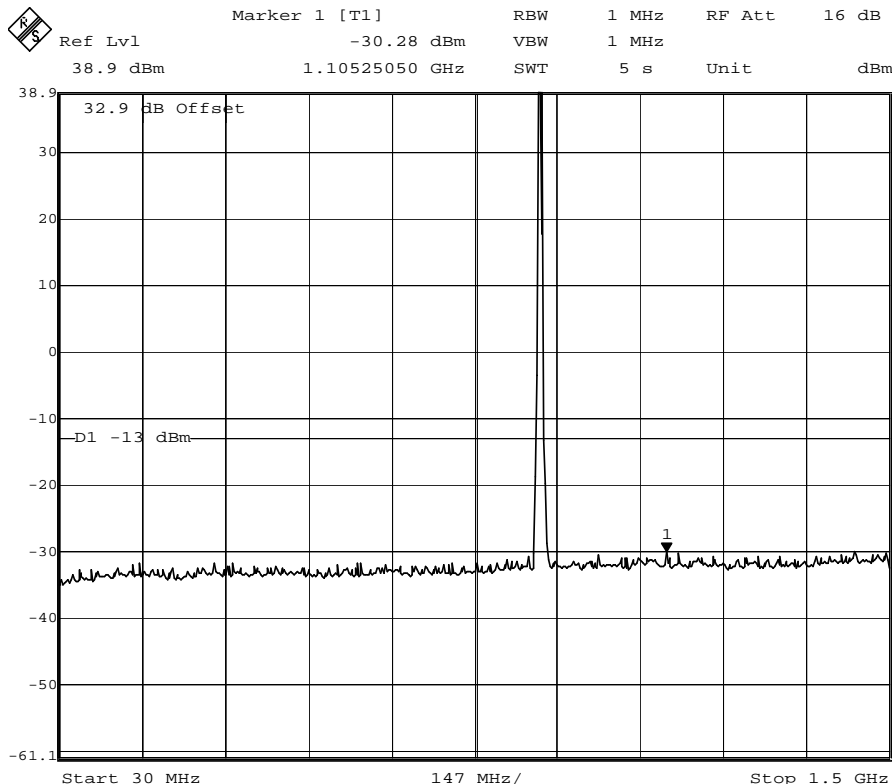
Notes: Tx 881.6 MHz QPSK



Date: 24.JAN.2007 11:00:57

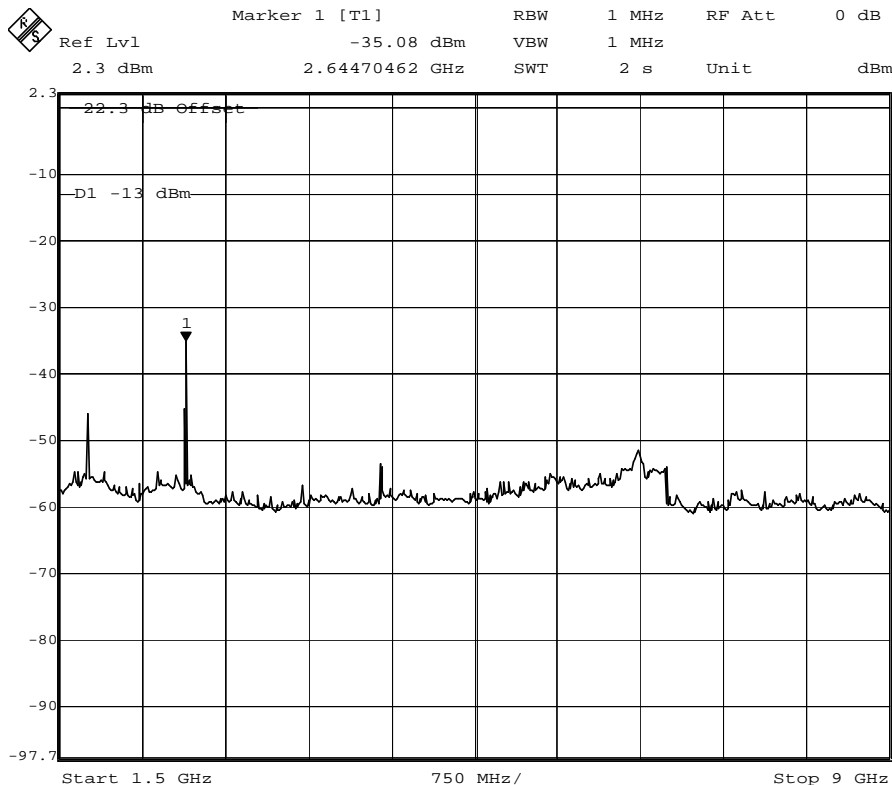
Notes: Tx 881.6 MHz QPSK

Test Data – Spurious Emissions



Date: 24.JAN.2007 09:54:35

Notes: Tx 881.6 MHz 16QAM

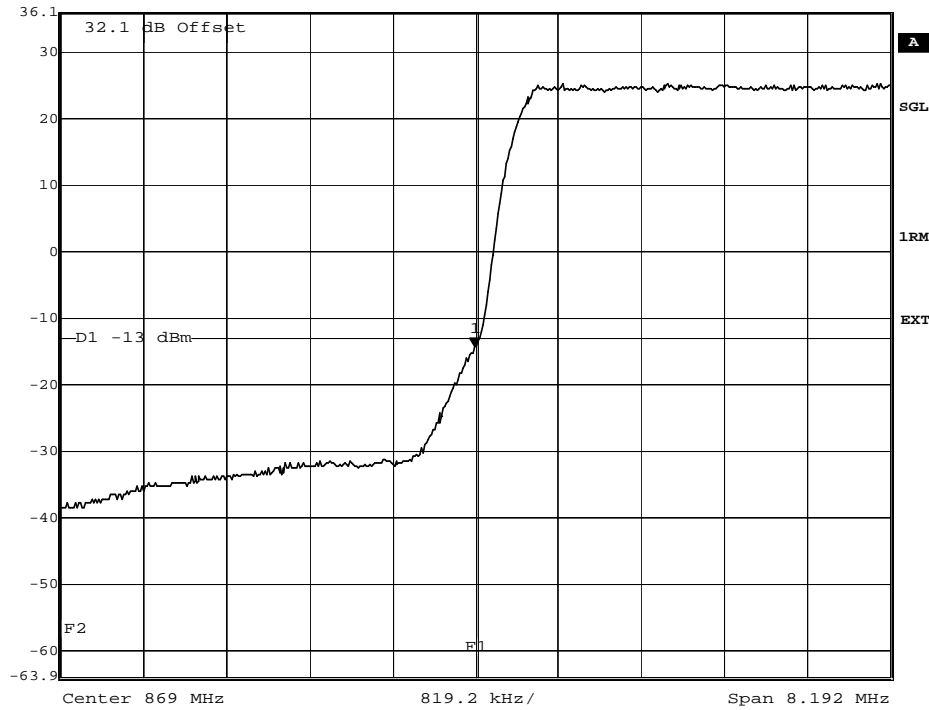


Date: 24.JAN.2007 10:58:44

Notes: Tx 881.6 MHz 16QAM

Test Data – Spurious Emissions, multi carrier

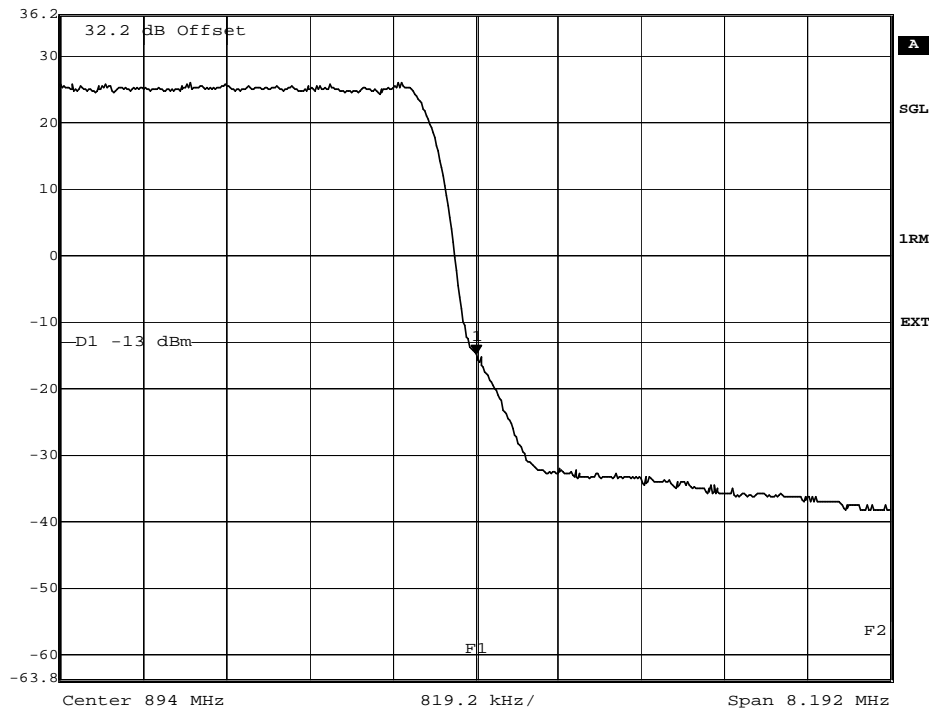
Marker 1 [T1] RBW 50 kHz RF Att 25 dB
 Ref Lvl -14.26 dBm VBW 50 kHz
 36.1 dBm 868.99179158 MHz SWT 2 s Unit dBm



Date: 24.JAN.2007 13:05:17

Notes: Tx 871.4 and 876.4 MHz, QPSK , LOWER BANDEDGE


Marker 1 [T1] RBW 50 kHz RF Att 25 dB
 Ref Lvl -14.96 dBm VBW 50 kHz
 36.2 dBm 894.00820842 MHz SWT 2 s Unit dBm

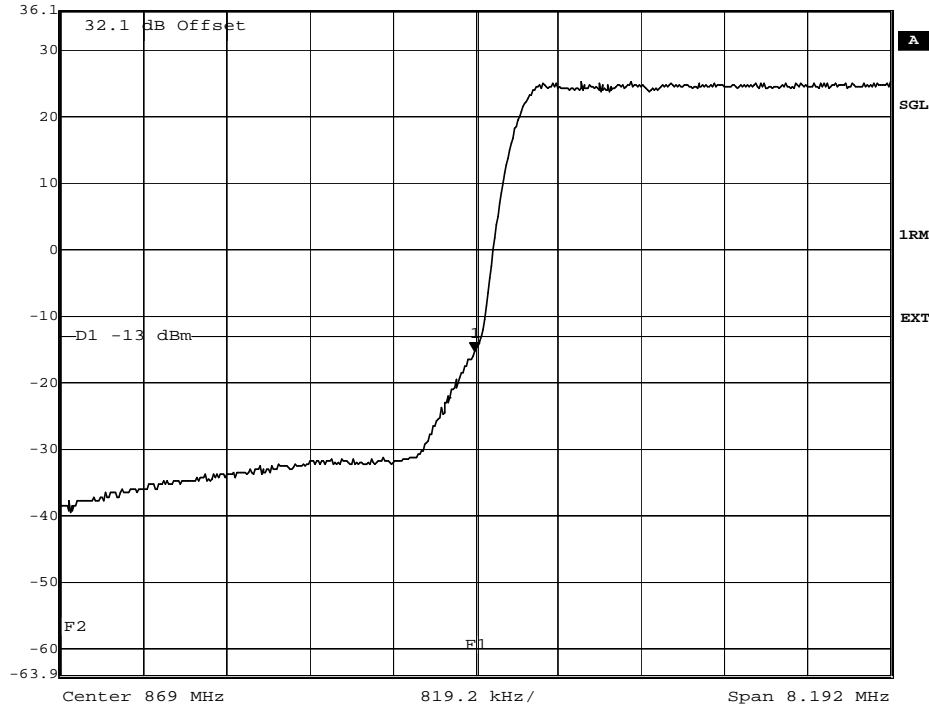


Date: 24.JAN.2007 13:15:32

Notes: Tx 886.6 and 891.6 MHz, QPSK , UPPER BANDEDGE


Test Data – Spurious Emissions, multi carrier

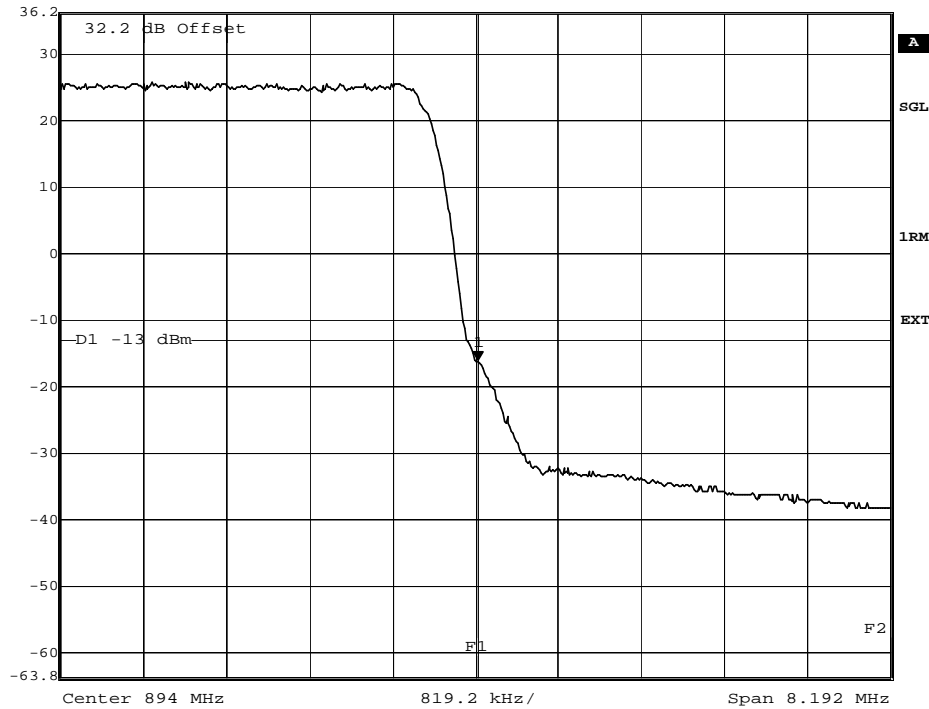
	Marker 1 [T1]	RBW	50 kHz	RF Att	25 dB
	Ref Lvl	-15.38 dBm	VBW	50 kHz	
	36.1 dBm	868.99179158 MHz	SWT	2 s	Unit dBm



Date: 24.JAN.2007 13:06:28

Notes: Tx 871.4 and 876.4 MHz, 16QAM , LOWER BANDEDGE


	Marker 1 [T1]	RBW	50 kHz	RF Att	25 dB
	Ref Lvl	-16.08 dBm	VBW	50 kHz	
	36.2 dBm	894.02462525 MHz	SWT	2 s	Unit dBm

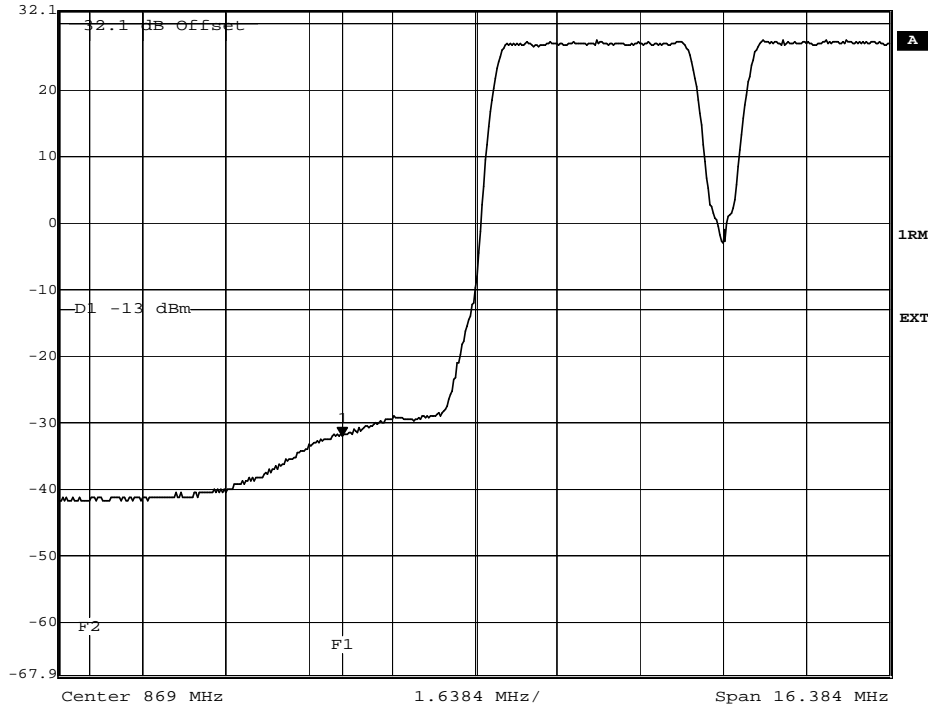


Date: 24.JAN.2007 13:16:33

Notes: Tx 886.6 and 891.6 MHz, 16QAM , UPPER BANDEDGE


Test Data – Spurious Emissions, multi carrier

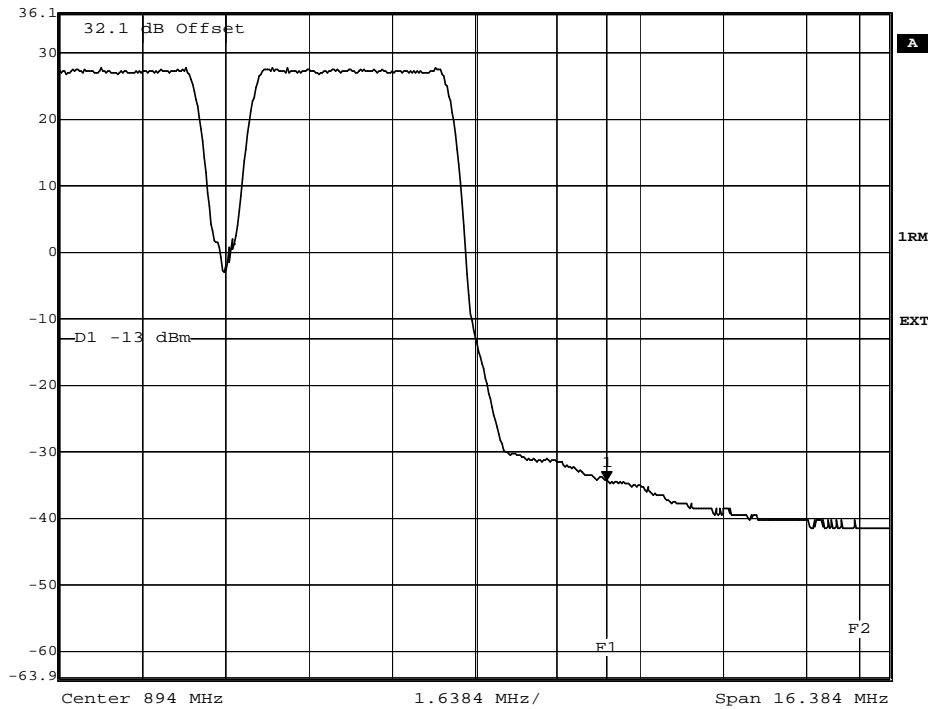
	Marker 1 [T1]	RBW	100 kHz	RF Att	25 dB
	Ref Lvl	-32.10 dBm	VBW	100 kHz	
	32.1 dBm	866.4000000 MHz	SWT	2 s	Unit dBm



Date: 26.JAN.2007 08:25:33

Notes: Tx 871.4 and 876.4 MHz, QPSK, LOWER BANDEDGE 3rd order IM


	Marker 1 [T1]	RBW	100 kHz	RF Att	25 dB
	Ref Lvl	-34.36 dBm	VBW	100 kHz	
	36.1 dBm	896.6000000 MHz	SWT	2 s	Unit dBm

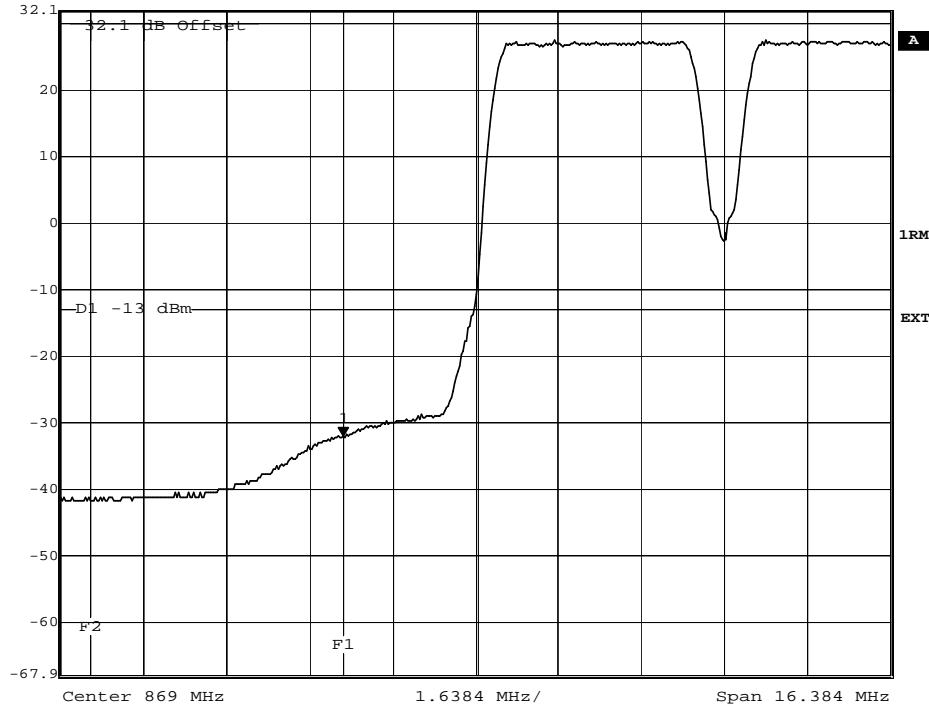


Date: 26.JAN.2007 08:29:33

Notes: Tx 886.6 and 891.6 MHz, QPSK, UPPER BANDEDGE 3rd order IM


Test Data – Spurious Emissions, multi carrier

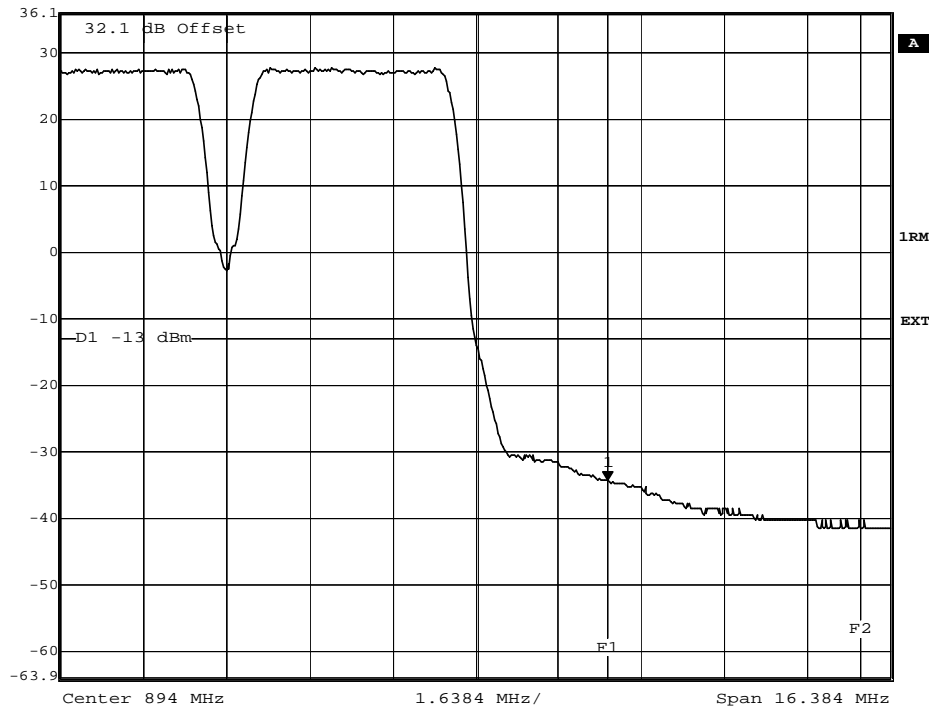
	Marker 1 [T1]	RBW	100 kHz	RF Att	25 dB
	Ref Lvl	-32.10 dBm	VBW	100 kHz	
	32.1 dBm	866.4000000 MHz	SWT	2 s	Unit dBm



Date: 26.JAN.2007 08:26:35

Notes: Tx 871.4 and 876.4 MHz, 16QAM , LOWER BANDEDGE 3rd order IM

	Marker 1 [T1]	RBW	100 kHz	RF Att	25 dB
	Ref Lvl	-34.36 dBm	VBW	100 kHz	
	36.1 dBm	896.6000000 MHz	SWT	2 s	Unit dBm

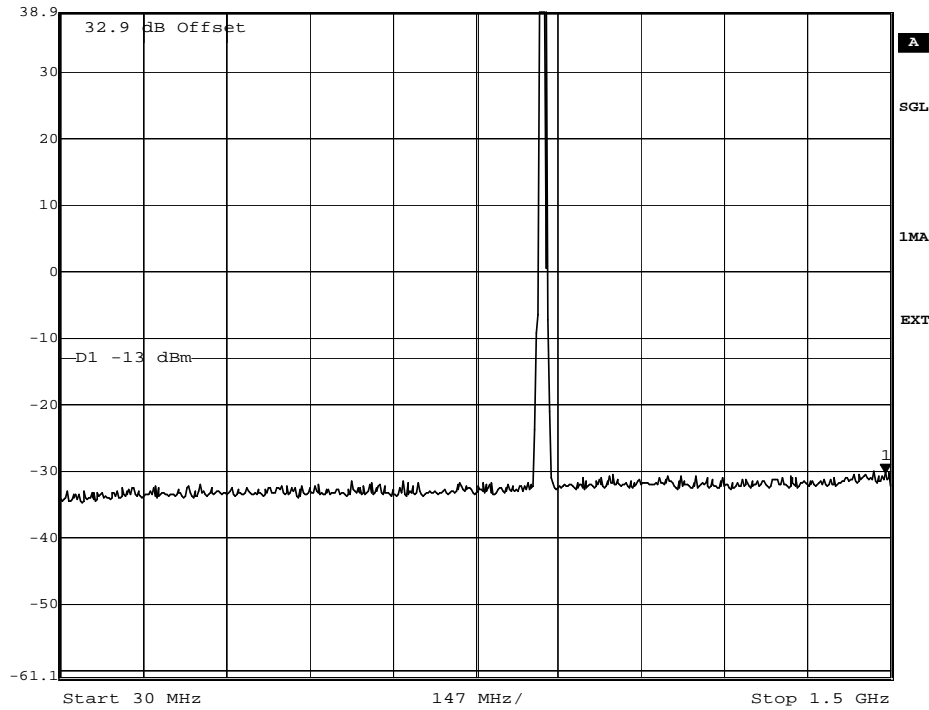


Date: 26.JAN.2007 08:30:43

Notes: Tx 886.6 and 891.6 MHz, 16QAM , UPPER BANDEDGE 3rd order IM

Test Data – Spurious Emissions, multi carrier

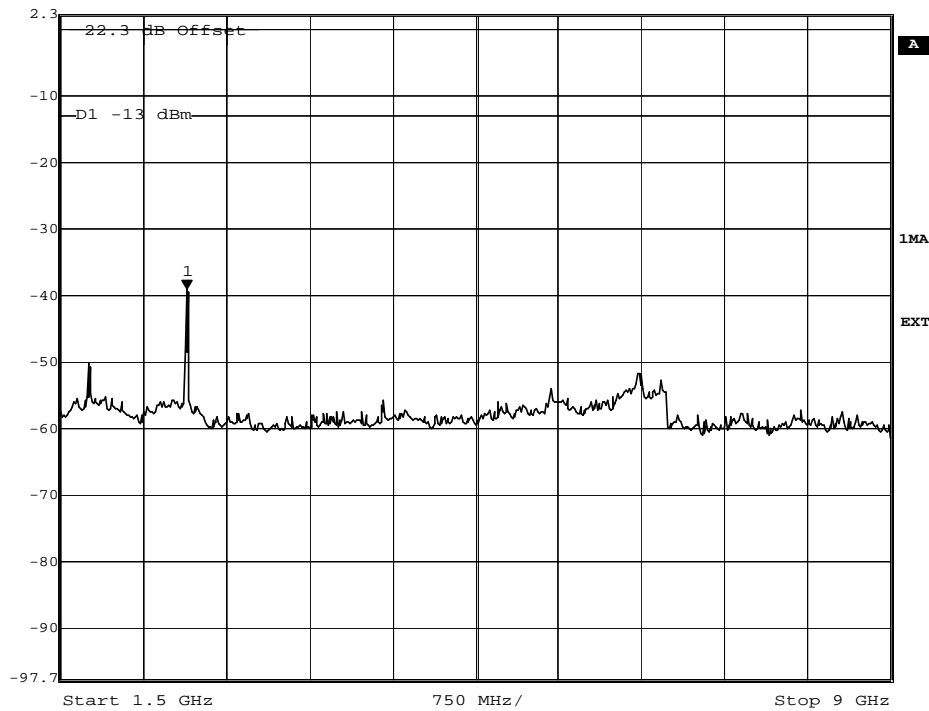
Marker 1 [T1] RBW 1 MHz RF Att 16 dB
Ref Lvl -30.37 dBm VBW 1 MHz
38.9 dBm 1.49116232 GHz SWT 5 s Unit dBm



Date: 24.JAN.2007 11:57:00

Notes: Tx 881.6 and 886.6 MHz, QPSK

Marker 1 [T1] RBW 1 MHz RF Att 0 dB
Ref Lvl -39.09 dBm VBW 1 MHz
2.3 dBm 2.64470462 GHz SWT 2 s Unit dBm

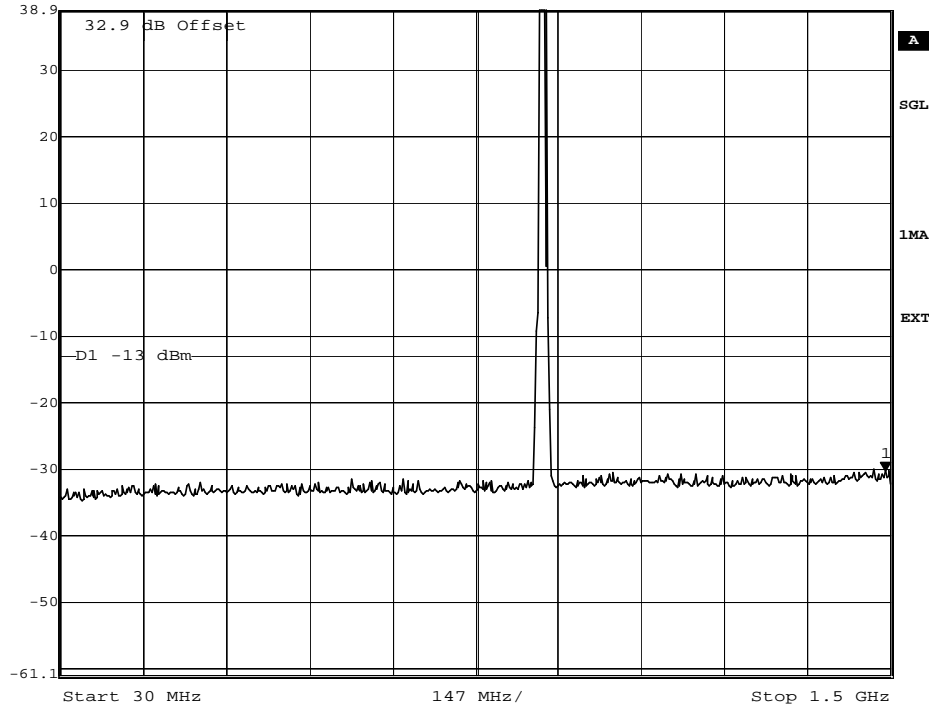


Date: 24.JAN.2007 11:31:04

Notes: Tx 881.6 and 886.6 MHz, QPSK

Test Data – Spurious Emissions, multi carrier

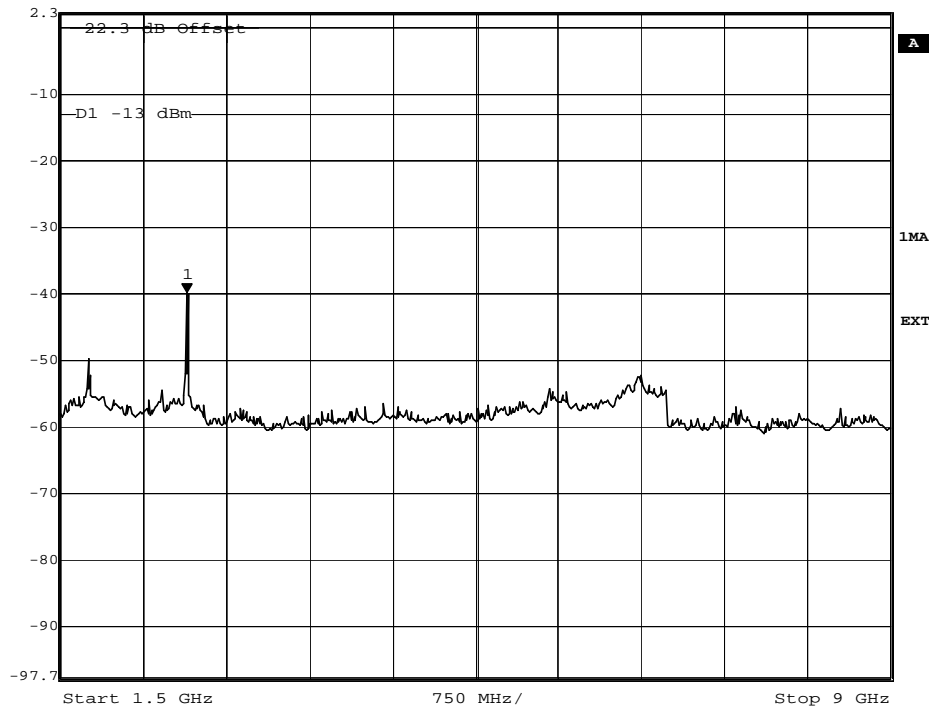
	Marker 1 [T1]	RBW	1 MHz	RF Att	16 dB
Ref Lvl	-30.37 dBm	VBW	1 MHz		
38.9 dBm	1.49116232 GHz	SWT	5 s	Unit	dBm



Date: 24.JAN.2007 11:57:00

Notes: Tx 881.6 and 886.6 MHz, 16QAM

	Marker 1 [T1]	RBW	1 MHz	RF Att	0 dB
Ref Lvl	-39.85 dBm	VBW	1 MHz		
2.3 dBm	2.64470462 GHz	SWT	2 s	Unit	dBm

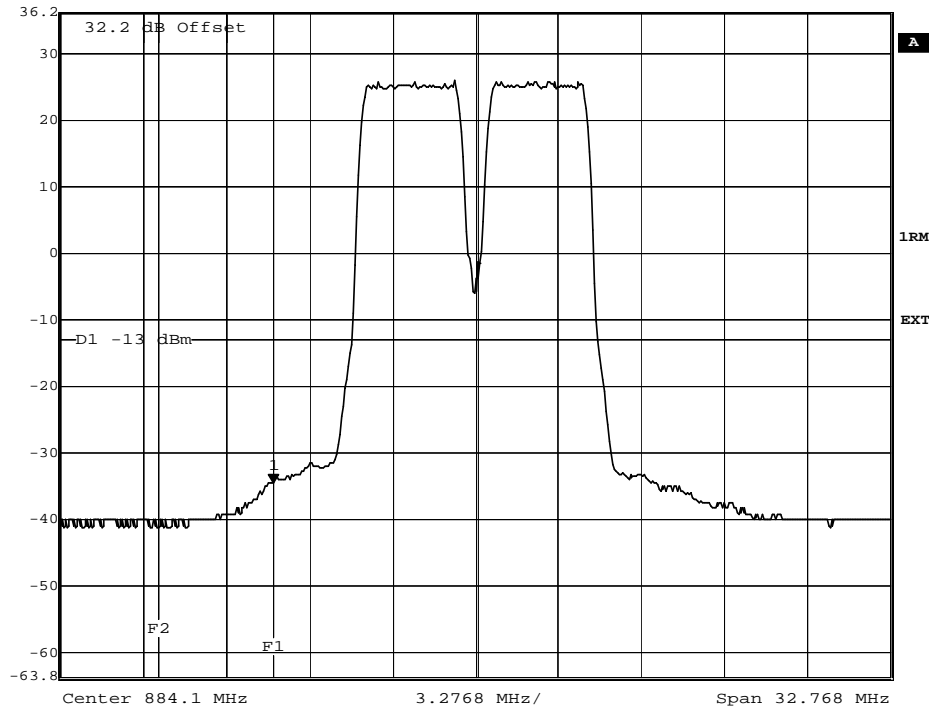


Date: 24.JAN.2007 11:32:18

Notes: Tx 881.6 and 886.6 MHz, 16QAM

Test Data – Spurious Emissions, multi carrier

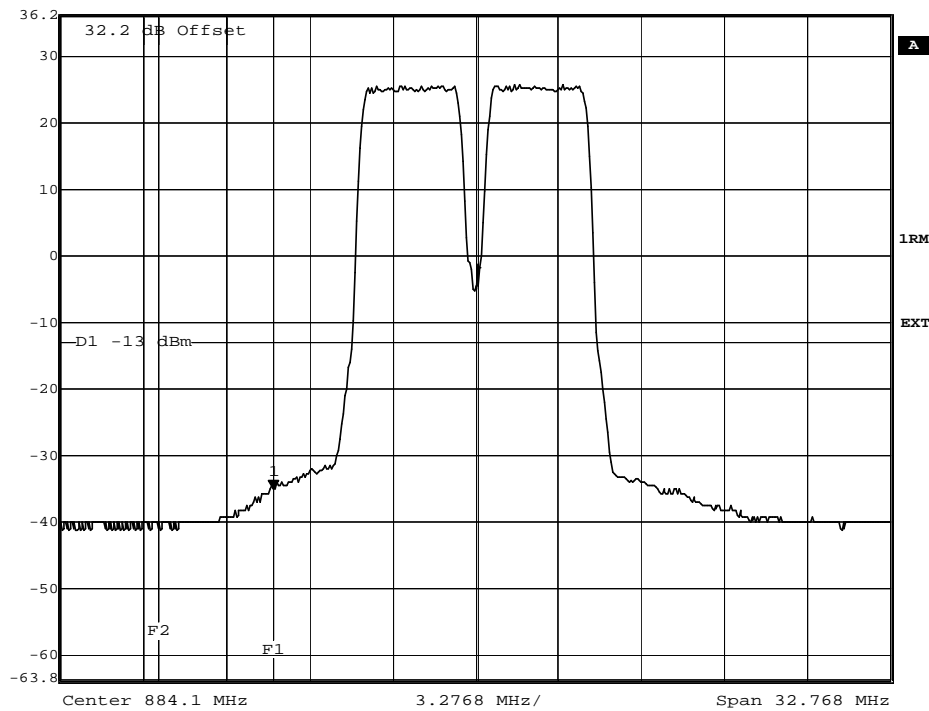
	Marker 1 [T1]	RBW	50 kHz	RF Att	25 dB
	Ref Lvl	-34.76 dBm	VBW	50 kHz	
	36.2 dBm	876.1000000 MHz	SWT	2 s	Unit dBm



Date: 24.JAN.2007 11:51:33

Notes: Tx 881.6 and 886.6 MHz, QPSK 3rd order IM inband

	Marker 1 [T1]	RBW	50 kHz	RF Att	25 dB
	Ref Lvl	-35.28 dBm	VBW	50 kHz	
	36.2 dBm	876.1000000 MHz	SWT	2 s	Unit dBm



Date: 24.JAN.2007 11:52:24

Notes: Tx 881.6 and 886.6 MHz, 16QAM 3rd order IM inband

6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA.NO.: 22.917(a), 2.1053
TESTED BY: Timo Hietala	DATE: 26/01/2007

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:** 10 %.

NOTE: _____

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

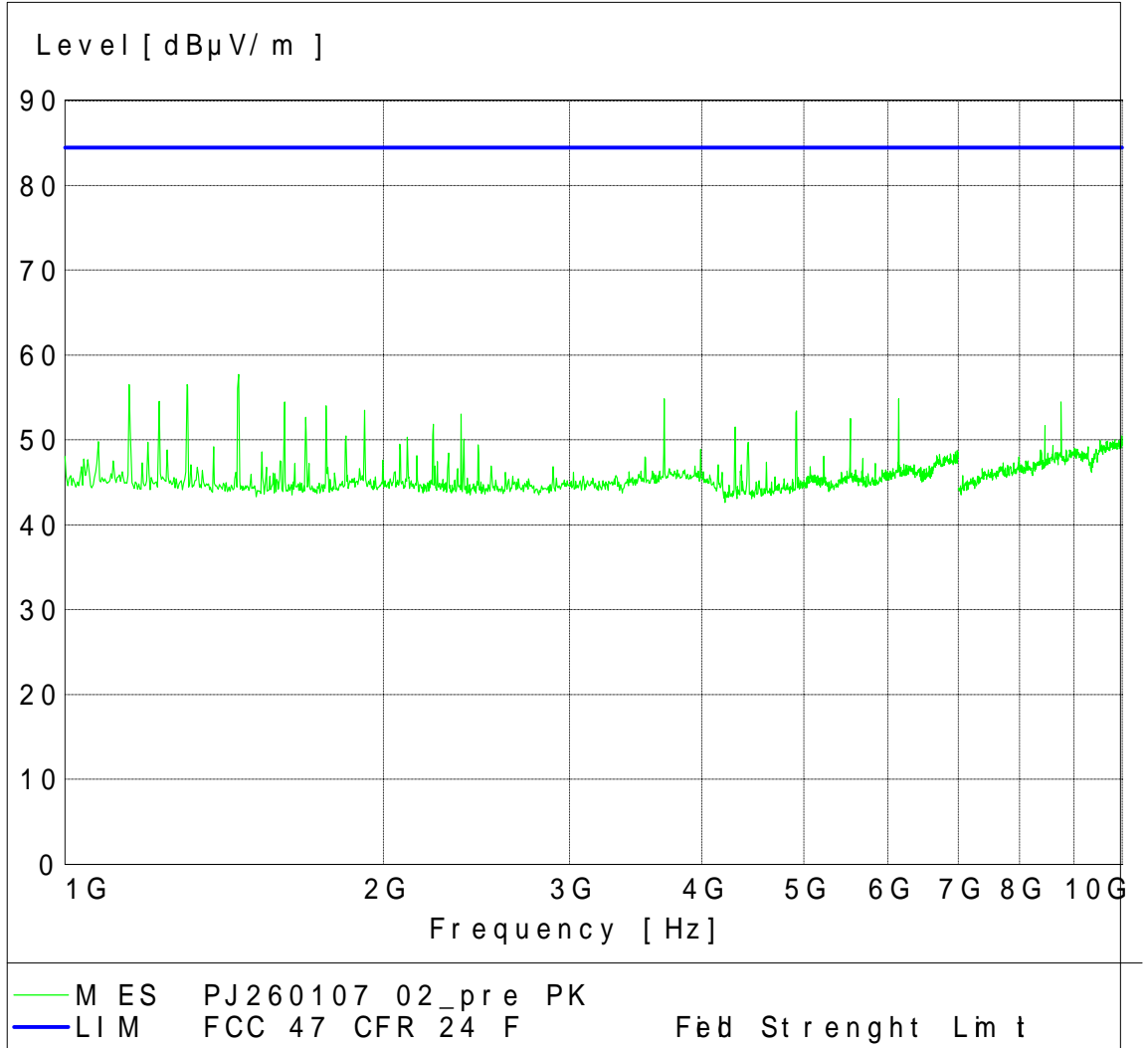
Test Data – Radiated Emissions

Nemko Oy, Finland

<u>Data Plot</u>	<u>Radiated Emissions Substitution Method</u>							
Page 1 of 1					Complete	<u> x </u>		
Job No.: 80106	Date: <u>26/01/2007</u>		Preliminary:					
Specification: PT22	Temperature (°C): <u>23</u>							
Tested By: Timo Hietala	Relative Humidity (%): <u>10</u>							
E.U.T.: WCDMA TRANSMITTER								
Configuration: TX FULL POWER								
Sample Number: <u>1</u>								
Location: <u>NET/IMN Oulu</u>	RBW: <u>1 MHz</u>	Measurement						
Detector type: <u>Ave</u>	VBW: <u>1 MHz</u>	Distance: <u>3</u> m						
<u>Test Equipment Used</u>								
Antenna: <u>17 and 18</u>	Directional Coupler:							
Pre-Amp: <u>24</u>	Cable #1: _____							
Filter: _____	Cable #2: _____							
Receiver: <u>16</u>	Cable #3: _____							
Attenuator #1: <u>-</u>	Cable #4: _____							
Attenuator #2: _____	Mixer: _____							
Additional equipment used: <u>19,23,25 and 26</u>								
Measurement Uncertainty: <u>± 5.2 dB</u>								
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 FRCB Tx 881.6 MHz together with FRCA Tx 871.4 and 891.6 MHz. transmitters full power terminated 50Ω

Test Data – Radiated Emissions 1 GHz -10 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: 25/01/2007

Test Results: Complies.

Standard Test Frequency: 881.6 MHz.

Standard Test Voltage: 48 V DC.

Equipment used: 1, 5, 6, 7, 8, 9.

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 (°C)	Rated (Hz/ppm)	Deviation (Hz)	Deviation (ppm)	Deviation (Hz)	Deviation (ppm)
48.0	20	44 / 0.05	-4	-0.0047	-8	-0.0089
55.2	20	44 / 0.05	-11	-0.0123	-7	-0.0079
40.8	20	44 / 0.05	-7	-0.0077	-7	-0.0082

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

Relative Humidity: 9 %.

NAME OF TEST: Frequency stability	PARA.NO.: 2.1055
TESTED BY: Timo Hietala	DATE: 25/01/2007

Test Results: Complies.

Standard Test Frequency: 881.6 MHz.

Standard Test Voltage: 48 V DC.

Equipment used: 1, 5, 6, 7, 8, 9.

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 (°C)	Rated (Hz/ppm)	Deviation (Hz)	Deviation (ppm)	Deviation (Hz)	Deviation (ppm)
48.0	50	44 / 0.05	-16	-0.0177	-15	-0.0173
48.0	40	44 / 0.05	-14	-0.0157	-9	-0.0107
48.0	30	44 / 0.05	-9	-0.0105	-9	-0.0100
48.0	10	44 / 0.05	-9	-0.0097	-7	-0.0085
48.0	0	44 / 0.05	-14	-0.0161	-8	-0.0095
48.0	-10	44 / 0.05	-8	-0.0091	-8	-0.0091
48.0	-20	44 / 0.05	-9	-0.0098	-11	-0.0121
48.0	-30	44 / 0.05	-10	-0.0115	-5	-0.0060

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

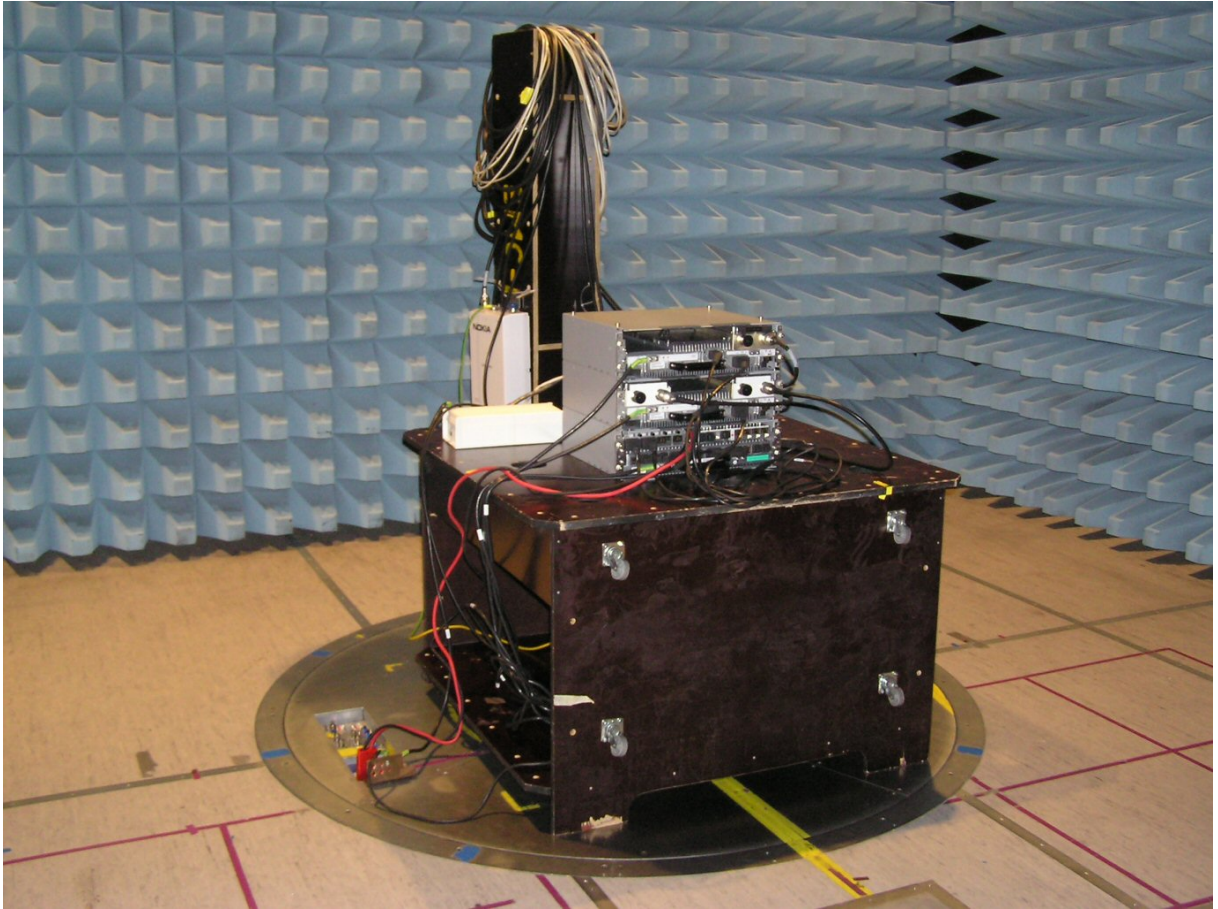
Relative Humidity: 9 %.

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	0041005473
12	High Pass filter	RLC Electronics F-100-1500-5-R	9516
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	LogPer Antenna	R&S HL025	349048/002 (1-26 GHz)
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
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Minimum Standard: Para. No. 22.913(a). In general, the effective radiated power (ERP) of base transmitters must not exceed 500 Watts.

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. 22.917(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. 22.917(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 – 22000 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(μ V/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

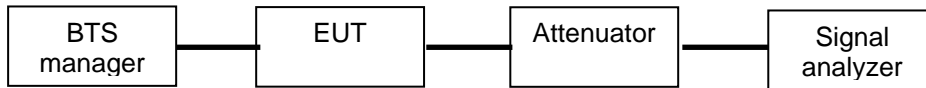
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency error is measure. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

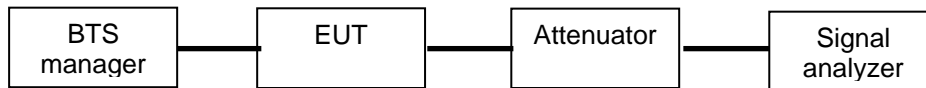
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency error is measured.

11. ANNEX B, TEST DIAGRAMS

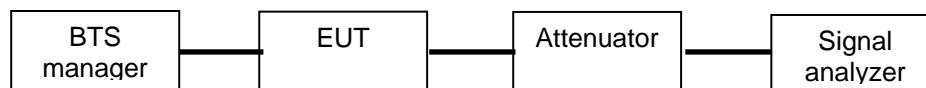
RF Power Output PARA. NO.: 2.1046



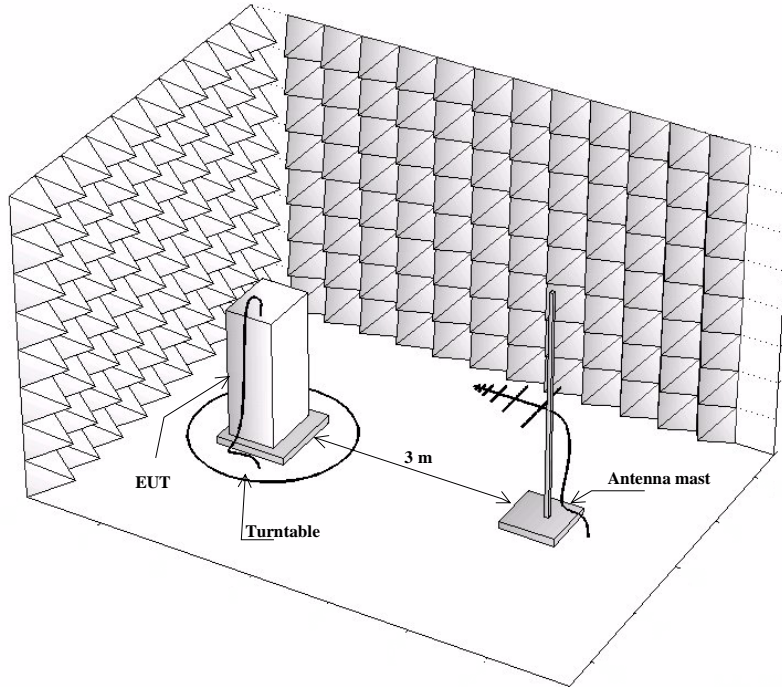
Occupied Bandwidth PARA. NO.: 2.1049



Spurious Emission at Antenna Terminals PARA. NO.: 2.1051

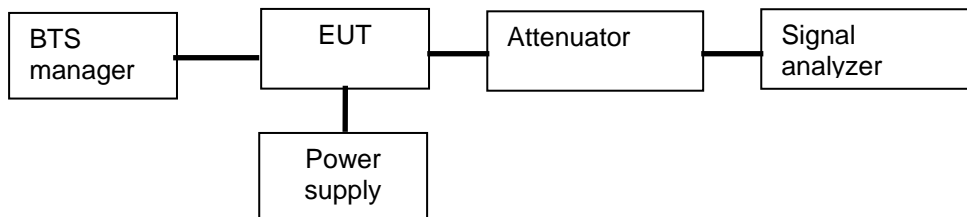


Field Strength of Spurious Radiation PARA. NO.: 2.1053



Frequency Stability PARA. NO.: 2.1055

Frequency Stability With Voltage Variation



Frequency Stability With Temperature Variation

