TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Partial Test of: Zinwave Ltd
Zinwave DAS 2765

To: FCC Part 22: 2006 (Subpart H) and
FCC Part 24: 2006 (Subpart E)

Test Report Serial No:
RFI/RPTE2/RP48954JD20A

Supersedes Test Report Serial No:
RFI/RPTE1/RP48954JD20A

This Test Report Is Issued Under The Authority Of **Michael Derby, Wireless Group Leader Radio Performance:** 	
Tested By: Jamie Huckerby 	**Checked By: Tony Henriques** **pp.** 
Report Copy No: PDF01	
Issue Date: 12 April 2007	**Test Dates: 15 March 2007 to 26 March 2007**

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Test of: Zinwave Ltd
Zinwave DAS 2765
To: FCC Part 22: 2006 (Subpart H) and FCC Part 24: 2006 (Subpart E)

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Test of: **Zinwave Ltd**
Zinwave DAS 2765
To: **FCC Part 22: 2006 (Subpart H) and FCC Part 24: 2006 (Subpart E)**

1. Client Information

Company Name:	Zinwave Ltd
Address:	Harston Mill Harston Cambridge CB2 5GG
Contact Name:	Mr A Bell

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification of Equipment Under Test (EUT)

Description:	Hub Unit (HU)
Brand Name:	Zinwave
Model Name or Number:	2700
Serial Number:	0005256380
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

Description:	Antenna Unit (AU)
Brand Name:	Zinwave
Model Name or Number:	2765
Serial Number:	165
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

Description:	Antenna Unit (AU)
Brand Name:	Zinwave
Model Name or Number:	2765
Serial Number:	0702007
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

Description:	Antenna Unit (AU)
Brand Name:	Zinwave
Model Name or Number:	2765
Serial Number:	06120001
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

Test of: **Zinwave Ltd**
Zinwave DAS 2765
To: **FCC Part 22: 2006 (Subpart H) and FCC Part 24: 2006 (Subpart E)**

Identification of Equipment Under Test (EUT) (Continued)

Description:	Antenna Unit (AU)
Brand Name:	Zinwave
Model Name or Number:	2765
Serial Number:	07020005
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

Description:	Antenna Unit (AU)
Brand Name:	Zinwave
Model Name or Number:	2765
Serial Number:	07020004
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

Description:	Antenna Unit (AU)
Brand Name:	Zinwave
Model Name or Number:	2765
Serial Number:	07020001
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

Description:	Antenna Unit (AU)
Brand Name:	Zinwave
Model Name or Number:	2765
Serial Number:	07020003
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

Identification of Equipment Under Test (EUT) (Continued)

Description:	Antenna Unit (AU)
Brand Name:	Zinwave
Model Name or Number:	2765
Serial Number:	07020006
FCC ID Number:	UPO2765
Country of Manufacture:	England
Date of Receipt:	23 March 2007

2.2. Description of EUT

The equipment under test is a broadband Distributed Antenna System operating from 370 MHz to 2.5 GHz. The system utilises multiple technologies including iDEN, CDMA2000, GSM 850 & 1900.

All of the above technology options were connected and operating during the test. The results of this test report refer only to the measurements made in the GSM/CDMA2000 850 & 1900 MHz band.

2.3. Modifications Incorporated in EUT

During the course of testing the EUT was not modified.

2.4. Additional Information Related to Testing

Power Supply Requirement:	Nominal 110 V, 60 Hz AC Mains Supply
Intended Operating Environment:	Residential, commercial, light & heavy industry
Equipment Category:	"Distributed Antenna System" (DAS)
Type of Unit:	Base Station (Fixed use)

FCC Part 22

GSM 850 Transmit Frequency Range:	869.2 MHz to 893.8 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	128	869.2
	Middle	190	881.6
	Top	251	893.8
CDMA2000 Transmit Frequency Range:	869.70 MHz to 893.31 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	-	869.70
	Middle	-	881.51
	Top	-	893.31
Maximum Peak Power Output (ERP)	18.5 dBm (Measured) GSM 850 24.3 dBm (Measured) CDMA2000		
Average Power Output (Conducted)	12.0 dBm (Measured)		
Antenna Gain	8.0 dBi		

FCC Part 24

GSM 1900 Transmit Frequency Range:	1930.2 MHz to 1989.8 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	512	1930.2
	Middle	661	1960.0
	Top	810	1989.8
CDMA2000 Transmit Frequency Range:	1931.25 MHz to 1988.75 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	-	1931.25
	Middle	-	1960.00
	Top	-	1988.75
Maximum Peak Power Output (EIRP)	20.5 dBm (Measured) GSM 1900 26.5 dBm (Measured) CDMA2000		
Average Power Output (Conducted)	12.0 dBm (Measured)		
Antenna Gain	8.0 dBi		

2.5. Port Identification

Port	Description
1	4 x Input Ports (HU)
2	4 x Output Ports (HU)
3	Ethernet Port (HU)
4	Serial Port (HU)
5	AC Mains (HU)
6	8 x Fibre Optic 1/0 Ports (AU)
7	8 x Output Ports (AU)
8	8 x Input Ports (AU)
9	POE Mains (AU)

2.6. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Laptop
Brand Name:	Dell
Model Name or Number:	Inspiron 1300
Serial Number:	CN-0RJ272-70166-67M-06MU
Cable Length and Type:	CAT 5 2m
Connected to Port:	Ethernet Port

Test of: **Zinwave Ltd**
Zinwave DAS 2765
To: **FCC Part 22: 2006 (Subpart H) and FCC Part 24: 2006 (Subpart E)**

3. Test Specification, Methods and Procedures

Reference:	FCC Part 22: 2006 Subpart H (Cellular Radiotelephone Service)
Title:	Code of Federal Regulations, Part 22 (47CFR22) Personal Communication Services.

Reference:	FCC Part 24: 2006 Subpart E (Broadband PCS)
Title:	Code of Federal Regulations, Part 24 (47CFR24) Personal Communication Services.

3.1. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003
Land Mobile Communications Equipment, Measurements and performance Standards

ANSI C63.2 (1987)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)
Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

3.2. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the methods & procedures Section above. Appendix 1 contains a list of the test equipment used.

4. Deviations from the Test Specification

As the system is a broadband amplifier covering multiple bands, the system for spurious emissions was only tested on the middle channel. For radiated spurious emissions the system was only tested fully loaded.

5. Operation of the EUT during Testing

5.1. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

Operating at maximum output power with all gain settings set to maximum.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration unless otherwise stated:

The equipment was set at maximum gain and the input signal was adjusted to give maximum nominal output power. The equipment was set to 1x2 (1 input on the HU through to 2 outputs on 2 AU) for testing to FCC Part 22/24.

Additionally, the fully loaded system spurious emissions was tested on the following configuration:
1 – Conducted Emissions, set to maximum gain on a 4x8 configuration with 4 different technology types
2 – Conducted Emissions, set to maximum gain on a 4x8 configuration with the 3 inputs having different, either GSM/CDMA2000 850 or GSM/CDMA2000 1900 channels
3 – Radiated, set to maximum gain on a 4x8 configuration with 4 different technology types

6. Summary of Test Results

FCC Part 22

Range of Measurements	Specification Reference	Port Type	Compliancy Status
AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.107 / 15.207	AC Mains Input	Complied
Transmitter Carrier Output Power	C.F.R. 47 FCC Part 2: 2004 Section 2.1046 / 90.219	Antenna Terminals	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 22: 2004 Section 22.355 / 2.1055	Antenna Terminals	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 22: 2004 Section 22.355 / 2.1055	Antenna Terminals	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 22: 2004 Section 22.917 / 2.1049	Antenna Terminals	Complied
Transmitter Out of Band Conducted Emissions	C.F.R. 47 FCC Part 22: 2004 Section 2.1051 / 22.917	Antenna Terminals	Complied
Transmitter Band Edge Conducted Emissions	C.F.R. 47 FCC Part 22: 2004 Section 2.1051 / 22.917	Antenna Terminals	Complied
Transmitter Out of Band Radiated Emissions	C.F.R. 47 FCC Part 22: 2004 Section 2.1053 / 22.917	Enclosure	Complied
Intermodulation	C.F.R 47 FCC Part 22: 2004 Section 22.917 / 2.1053	Antenna Terminals	Complied
Out-of-Band Rejection	For reference purposes	Antenna Terminals	Complied

Summary of Test Results (Continued)

FCC Part 24

Range of Measurements	Specification Reference	Port Type	Compliancy Status
AC Conducted Spurious Emissions (150 kHz to 30 MHz)	C.F.R. 47 FCC Part 15: 2004 Section 15.107 / 15.207	AC Mains Input	Complied
Transmitter Carrier Output Power	C.F.R. 47 FCC Part 2: 2004 Section 2.1046 / 90.219	Antenna Terminals	Complied
Transmitter Frequency Stability (Temperature Variation)	C.F.R. 47 FCC Part 24: 2004 Section 24.235 / 2.1055	*Antenna Terminals	Complied
Transmitter Frequency Stability (Voltage Variation)	C.F.R. 47 FCC Part 24: 2004 Section 24.235 / 2.1055	*Antenna Terminals	Complied
Transmitter Occupied Bandwidth	C.F.R. 47 FCC Part 24: 2004 Section 24.238 / 2.1049	*Antenna Terminals	Complied
Transmitter Out of Band Conducted Emissions	C.F.R. 47 FCC Part 24: 2004 Section 2.1051 / 24.238	*Antenna Terminals	Complied
Transmitter Band Edge Conducted Emissions	C.F.R. 47 FCC Part 24: 2004 Section 2.1051 / 24.238	*Antenna Terminals	Complied
Transmitter Out of Band Radiated Emissions	C.F.R. 47 FCC Part 24: 2004 Section 2.1053 / 24.238	Enclosure	Complied
Intermodulation	C.F.R 47 FCC Part 22: 2004 Section 24.238 / 2.1053	Antenna Terminals	Complied
Out-of-Band Rejection	For reference purposes	Antenna Terminals	Complied

6.1. Location of Tests

All the measurements described in this report were performed at the premises of
RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ

FCC Site Registration Number: 90895

IC Site Registration Number: 3485

7. Measurements, Examinations and Derived Results

7.1. General Comments

This Section contains test results only.

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

7.2. Test Results – FCC Part 22

7.2.1. Transmitter Mode AC Conducted Spurious Emissions: Section 15.207 - Hub Unit (HU)

The EUT was configured as for AC conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels present on the ac mains line of the EUT.

Results:

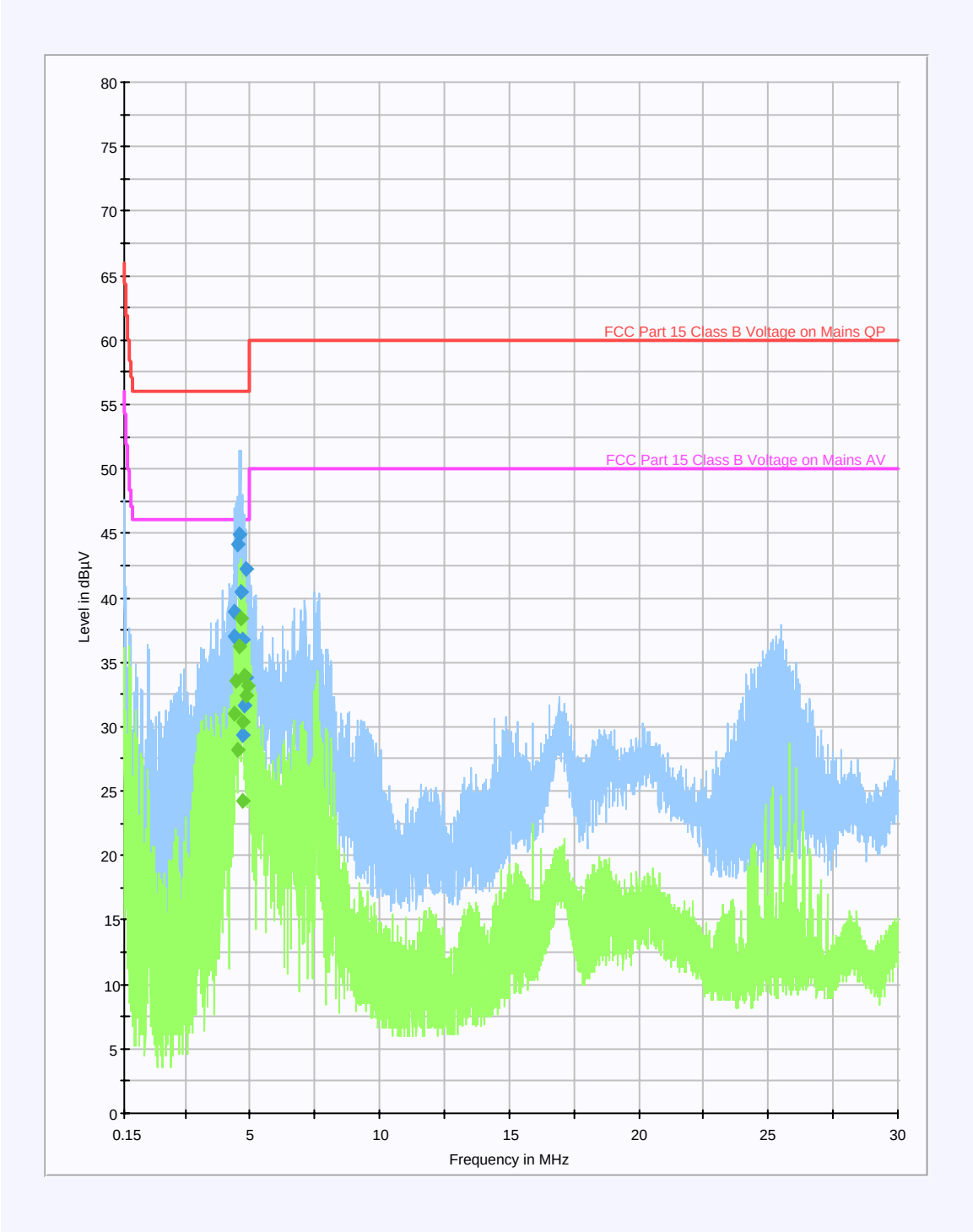
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
4.366000	Live	37.0	56.0	19.0	Complied
4.426000	Live	38.9	56.0	17.1	Complied
4.518000	Live	44.1	56.0	11.9	Complied
4.570000	Live	44.9	56.0	11.1	Complied
4.626000	Live	40.4	56.0	15.6	Complied
4.690000	Neutral	36.8	56.0	19.2	Complied
4.742000	Live	29.3	56.0	26.7	Complied
4.794000	Live	31.6	56.0	24.4	Complied
4.822000	Live	42.2	56.0	13.8	Complied
4.846000	Live	33.8	56.0	22.2	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
4.422000	Live	31.0	46.0	15.0	Complied
4.486000	Live	33.5	46.0	12.5	Complied
4.538000	Neutral	28.2	46.0	17.8	Complied
4.570000	Neutral	36.3	46.0	9.7	Complied
4.622000	Neutral	38.5	46.0	7.5	Complied
4.686000	Live	30.3	46.0	15.7	Complied
4.738000	Neutral	24.2	46.0	21.8	Complied
4.770000	Neutral	33.9	46.0	12.1	Complied
4.826000	Live	32.4	46.0	13.6	Complied
4.886000	Live	33.2	46.0	12.8	Complied

Transmitter Mode AC Conducted Spurious Emissions: Section 15.207 (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.2.2. Transmitter Mode AC Conducted Spurious Emissions: Section 15.207 - Antenna Unit (AU)

The EUT was configured as for AC conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels present on the ac mains line of the EUT.

Results:

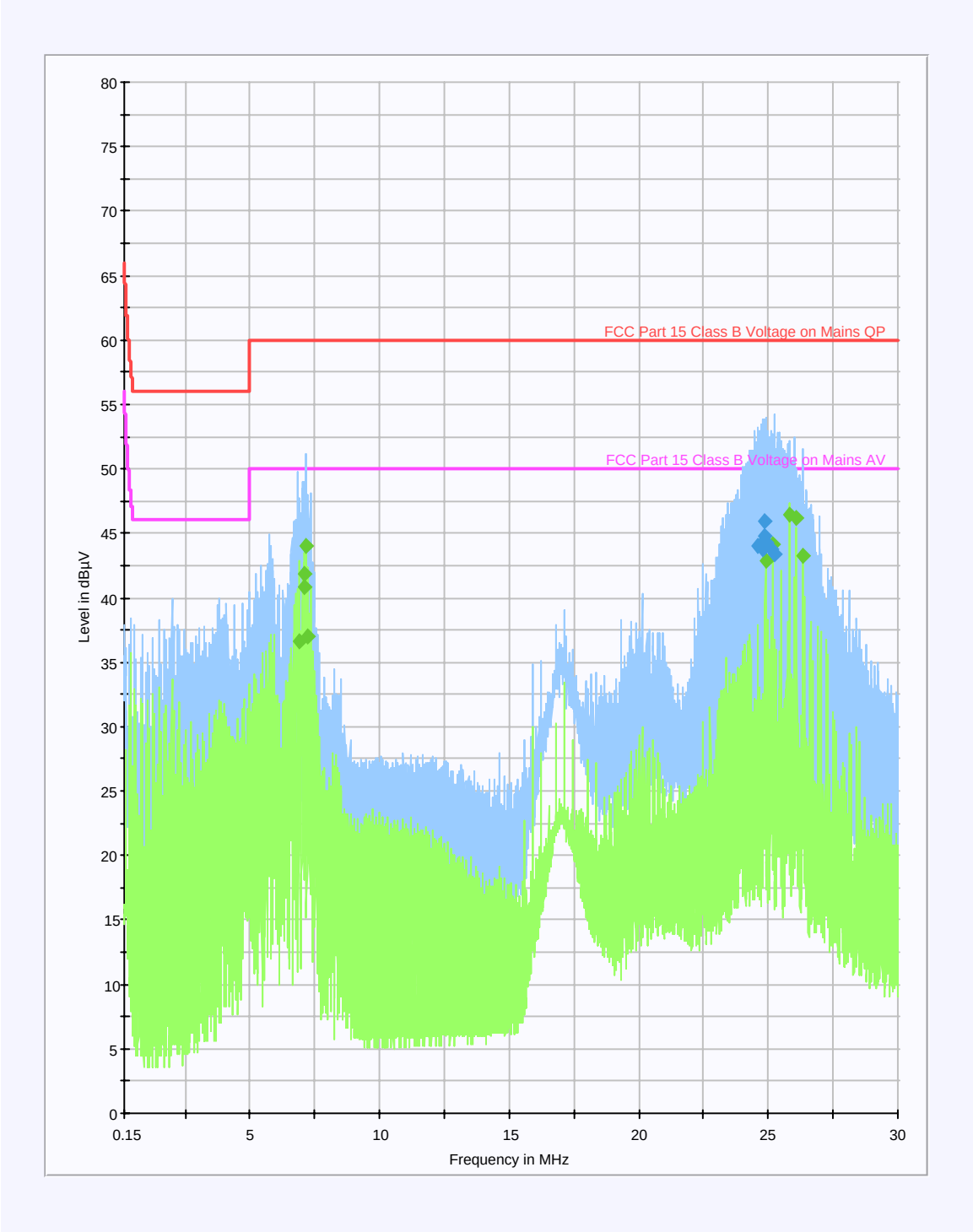
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
6.910000	Live	36.6	50.0	13.4	Complied
7.082000	Live	41.8	50.0	8.2	Complied
7.130000	Neutral	40.9	50.0	9.1	Complied
7.150000	Neutral	44.0	50.0	6.0	Complied
7.254000	Neutral	37.0	50.0	13.0	Complied
24.886000	Live	42.8	50.0	7.2	Complied
25.190000	Live	44.2	50.0	5.8	Complied
25.798000	Live	46.5	50.0	3.5	Complied
26.098000	Live	46.1	50.0	3.9	Complied
26.326000	Live	43.2	50.0	6.8	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
24.582000	Live	44.0	60.0	16.0	Complied
24.718000	Live	44.1	60.0	15.9	Complied
24.742000	Neutral	44.1	60.0	15.9	Complied
24.794000	Neutral	43.7	60.0	16.3	Complied
24.850000	Live	44.8	60.0	15.2	Complied
24.882000	Live	45.9	60.0	14.1	Complied
24.902000	Live	44.2	60.0	15.8	Complied
24.938000	Live	44.1	60.0	15.9	Complied
25.122000	Live	43.7	60.0	16.3	Complied
25.234000	Live	43.4	60.0	16.6	Complied

Transmitter Mode AC Conducted Spurious Emissions: Section 15.207 (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.2.3. Transmitter Carrier Output Power: Section 2.1046 / 90.219

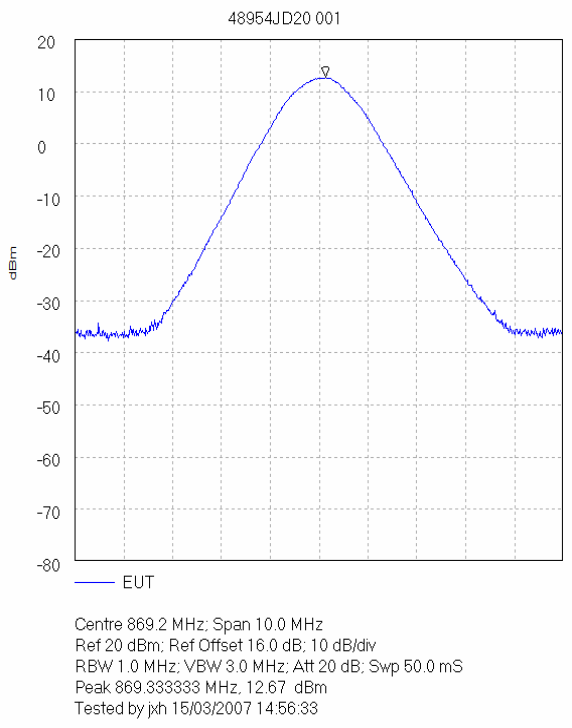
Results: GSM 850

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Stated Antenna Gain (dB)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	869.2	12.7	5.8	18.5	37.0	18.5	Complied
Middle	881.6	12.5	5.8	18.3	37.0	18.7	Complied
Top	893.8	12.5	5.8	18.3	37.0	18.7	Complied

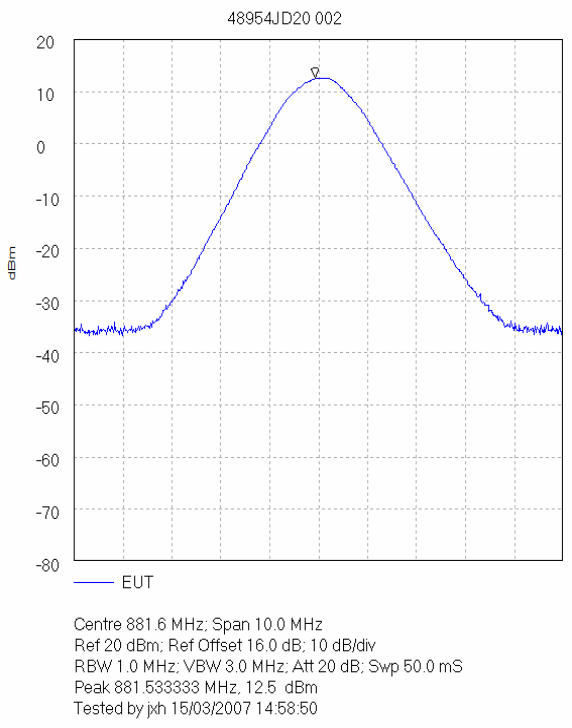
Note(s):

1. The limit has been taken from FCC Part 90.219 for Class A Boosters

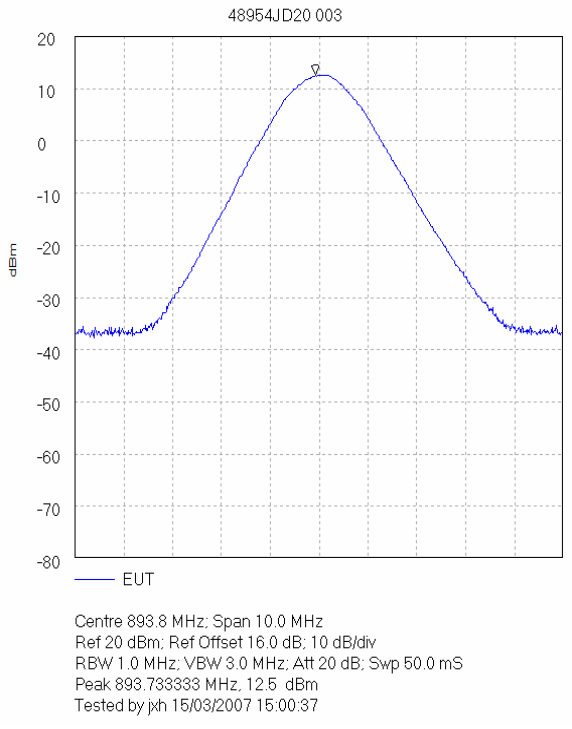
7.2.3.1. Transmitter Carrier Output Power: Section 2.1046 / 90.219 (Continued)



Centre 869.2 MHz; Span 10.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 869.333333 MHz, 12.67 dBm
Tested by jxh 15/03/2007 14:56:33



Centre 881.6 MHz; Span 10.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 881.533333 MHz, 12.5 dBm
Tested by jxh 15/03/2007 14:58:50



Centre 893.8 MHz; Span 10.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 893.733333 MHz, 12.5 dBm
Tested by jxh 15/03/2007 15:00:37

7.2.4. Transmitter Carrier Output Power: Section 2.1046 / 90.219 (Continued)

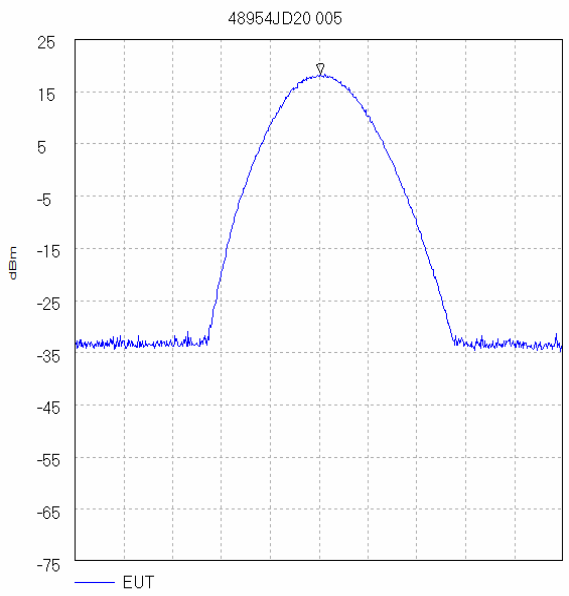
Results: CDMA2000

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Stated Antenna Gain (dB)	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	869.70	18.3	5.8	24.1	37.0	12.9	Complied
Middle	881.52	18.3	5.8	24.1	37.0	12.9	Complied
Top	893.31	18.5	5.8	24.3	37.0	12.7	Complied

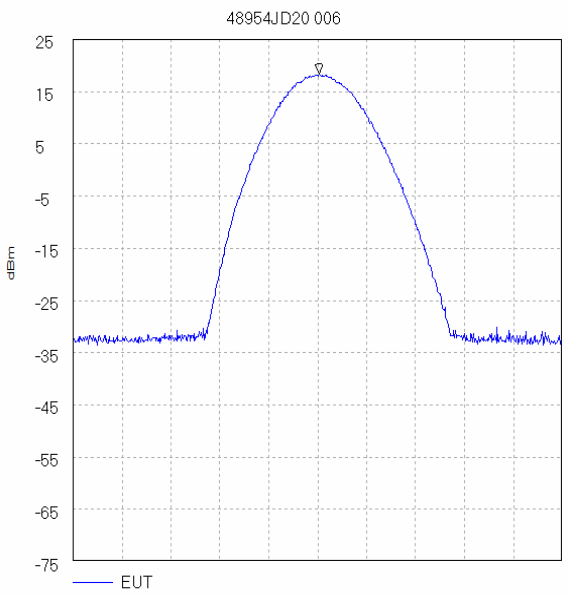
Note(s):

1. The limit has been taken from FCC Part 90.219 for Class A Boosters

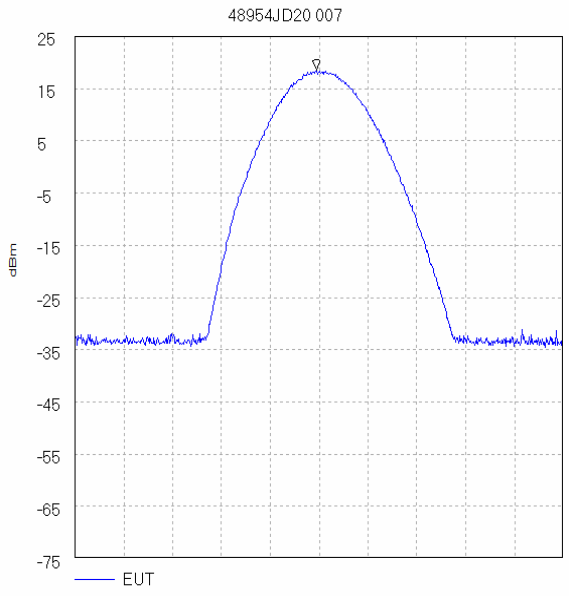
7.2.4.1. Transmitter Carrier Output Power: Section 2.1046 / 90.219 (Continued)



Centre 869.7 MHz; Span 20.0 MHz
Ref 25 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 869.766667 MHz, 18.33 dBm
Tested by jxh 15/03/2007 15:05:00



Centre 881.52 MHz; Span 20.0 MHz
Ref 25 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 881.586667 MHz, 18.33 dBm
Tested by jxh 15/03/2007 15:06:59



Centre 893.31 MHz; Span 20.0 MHz
Ref 25 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 893.21 MHz, 18.5 dBm
Tested by jxh 15/03/2007 15:07:43

7.2.5. Transmitter Frequency Stability (Temperature Variation): Section 22.355 / 2.1055

Results: GSM 850

Bottom Channel (869.2 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	869.200170	170	0.20	1.5	1.3	Complied
-20	869.200000	0	0.0	1.5	1.5	Complied
-10	869.200001	1	0.0	1.5	1.5	Complied
0	869.200000	0	0.0	1.5	1.5	Complied
10	869.200001	1	0.0	1.5	1.5	Complied
20	869.200000	0	0.0	1.5	1.5	Complied
30	869.200000	0	0.0	1.5	1.5	Complied
40	869.200000	0	0.0	1.5	1.5	Complied
50	869.200000	0	0.0	1.5	1.5	Complied

Top Channel (893.8 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	893.800170	170	0.19	1.5	1.31	Complied
-20	893.800001	1	0.0	1.5	1.5	Complied
-10	893.800000	0	0.0	1.5	1.5	Complied
0	893.800000	0	0.0	1.5	1.5	Complied
10	893.800000	0	0.0	1.5	1.5	Complied
20	893.800000	0	0.0	1.5	1.5	Complied
30	893.800000	0	0.0	1.5	1.5	Complied
40	893.800000	0	0.0	1.5	1.5	Complied
50	893.800000	0	0.0	1.5	1.5	Complied

7.2.6. Transmitter Frequency Stability (Voltage Variation): Section 22.355 / 2.1053

Results: GSM 850

Bottom Channel (869.2 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
99.0	869.200001	0	0.0	1.5	1.5	Complied
121.0	869.200000	0	0.0	1.5	1.5	Complied

Top Channel (893.8 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
99.0	893.800001	0	0.0	1.5	1.5	Complied
121.0	893.800001	0	0.0	1.5	1.5	Complied

7.2.7. Transmitter Frequency Stability (Temperature Variation): Section 22.355 / 2.1055

Results: CDMA2000

Bottom Channel (869.70 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	869.700170	170	0.20	1.5	1.3	Complied
-20	896.700001	1	0.0	1.5	1.5	Complied
-10	869.700000	0	0.0	1.5	1.5	Complied
0	896.700001	1	0.0	1.5	1.5	Complied
10	896.700001	1	0.0	1.5	1.5	Complied
20	896.700001	1	0.0	1.5	1.5	Complied
30	869.700000	0	0.0	1.5	1.5	Complied
40	896.700001	1	0.0	1.5	1.5	Complied
50	896.700001	1	0.0	1.5	1.5	Complied

Top Channel (893.31 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	893.310170	170	0.19	1.5	1.31	Complied
-20	893.310001	1	0.0	1.5	1.5	Complied
-10	893.310001	1	0.0	1.5	1.5	Complied
0	893.310001	1	0.0	1.5	1.5	Complied
10	893.310001	1	0.0	1.5	1.5	Complied
20	893.310000	0	0.0	1.5	1.5	Complied
30	893.310000	0	0.0	1.5	1.5	Complied
40	893.310000	0	0.0	1.5	1.5	Complied
50	893.310000	0	0.0	1.5	1.5	Complied

7.2.8. Transmitter Frequency Stability (Voltage Variation): Section 22.355 / 2.1053

Results: CDMA2000

Bottom Channel (869.70 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
99.0	869.700000	0	0.0	1.5	1.5	Complied
121.0	869.700000	0	0.0	1.5	1.5	Complied

Top Channel (893.31 MHz)

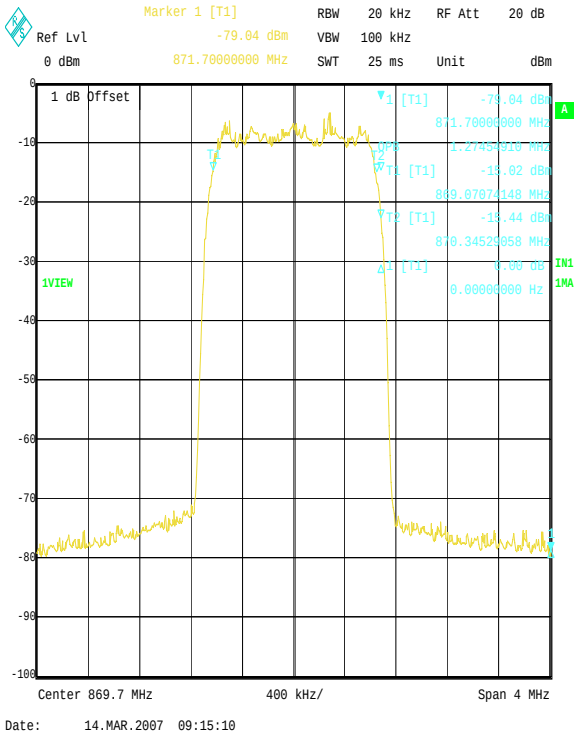
Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
99.0	893.310000	0	0.0	1.5	1.5	Complied
121.0	893.310001	0	0.0	1.5	1.5	Complied

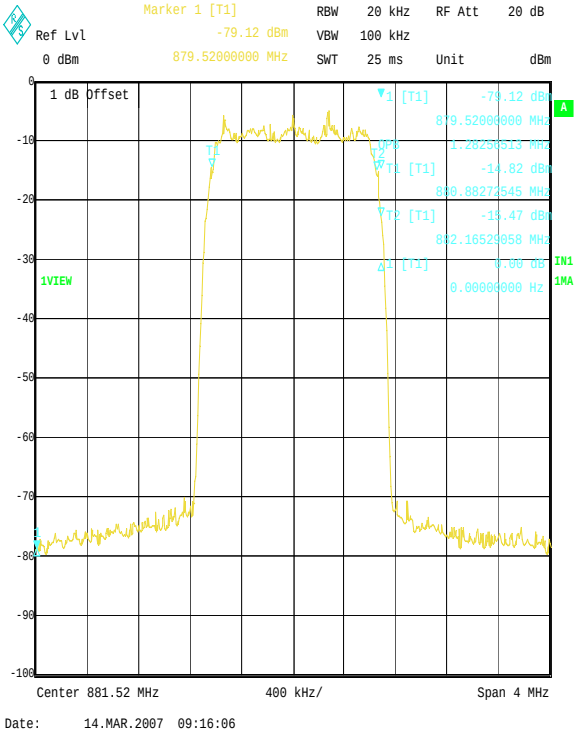
7.2.9. Transmitter Occupied Bandwidth: Section 22.917 / 2.1049

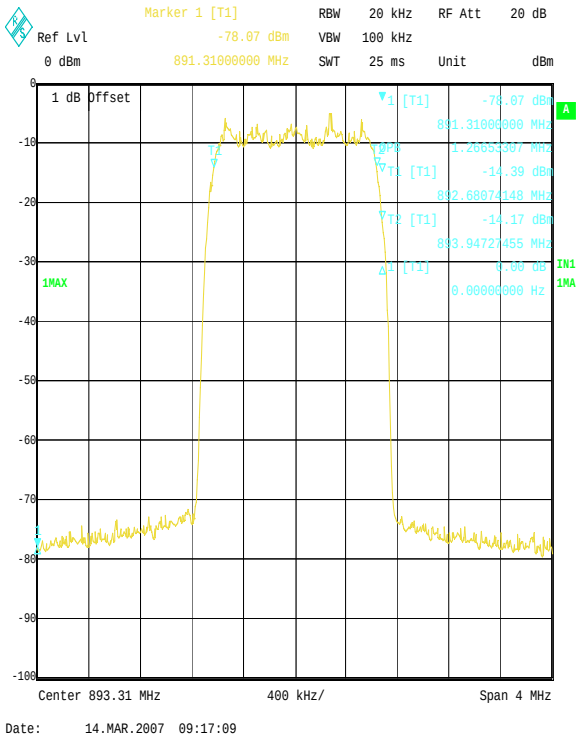
Results: GSM 850

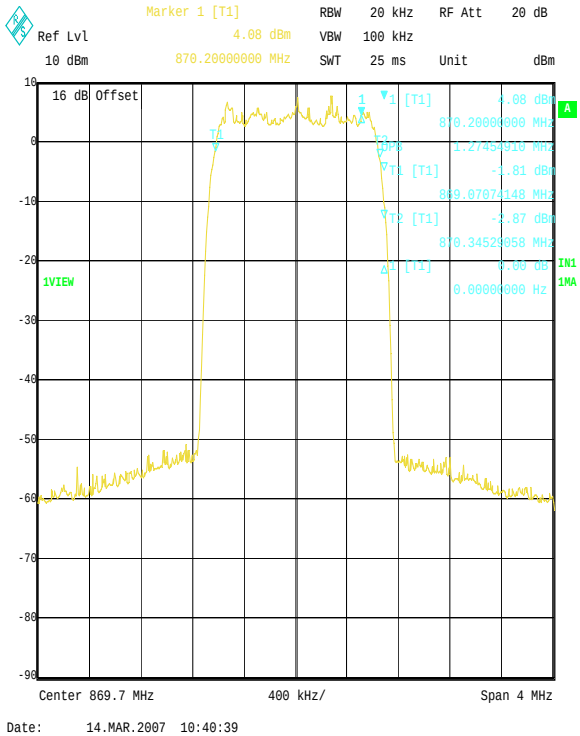
Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth Before EUT (kHz)	Occupied Bandwidth Through EUT (kHz)	Result
Bottom	869.2	3.0	10.0	246.493	244.489	Complied
Middle	881.6	3.0	10.0	246.493	246.493	Complied
Top	893.8	3.0	10.0	244.489	244.489	Complied

7.2.9.1. Transmitter Occupied Bandwidth: Section 22.917 / 2.1049 (Continued)

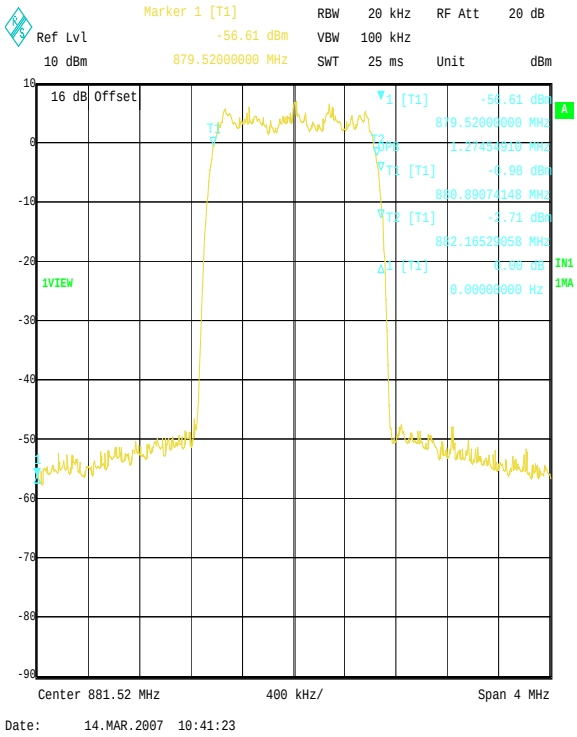


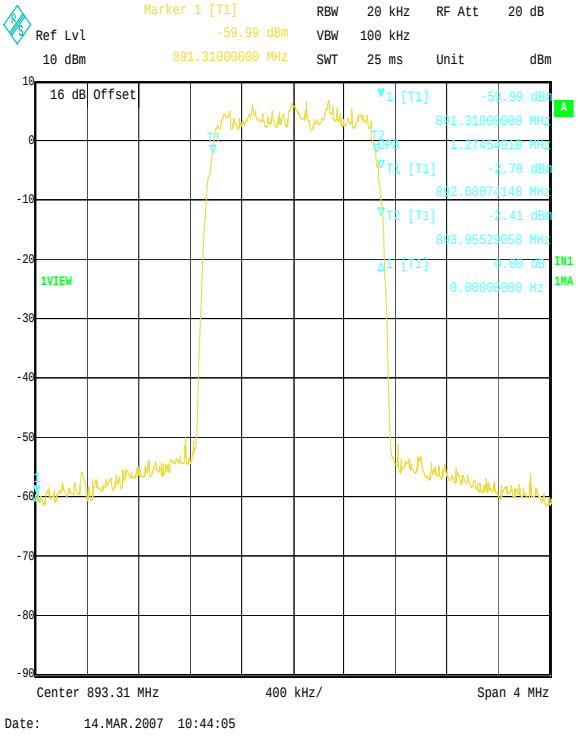






7.2.9.2. Transmitter Occupied Bandwidth: Section 22.917 / 2.1049 (Continued)





7.2.10. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051

Results: Fully Loaded (1xiDEN, 1xGSM850, 1xGSM1900, 1xCDMA2000 1900)

Frequency (GHz)	Peak Emission Level (dBm)	Bandwidth (kHz)	Limit (dBm)	Margin (dB)	Result
1.173	-29.3	1000	-13.0	16.3	Complied
3.920	-32.5	1000	-13.0	19.5	Complied
15.283	-42.0	1000	-13.0	29.0	Complied
24.110	-37.8	1000	-13.0	24.8	Complied

Results: GSM 850 Only (3xGSM Signals – 869.2 MHz, 881.6 MHz, 893.8 MHz)

Frequency (GHz)	Peak Emission Level (dBm)	Bandwidth (kHz)	Limit (dBm)	Margin (dB)	Result
0.6163	-43.3	100	-13.0	30.3	Complied
0.857	-43.0	100	-13.0	30.0	Complied
0.9062	-44.7	100	-13.0	31.7	Complied
1.787	-29.8	1000	-13.0	16.8	Complied
8.850	-45.0	1000	-13.0	32.0	Complied
13.617	-42.8	1000	-13.0	29.8	Complied
17.558	-42.0	1000	-13.0	29.0	Complied
24.060	-36.8	1000	-13.0	23.8	Complied

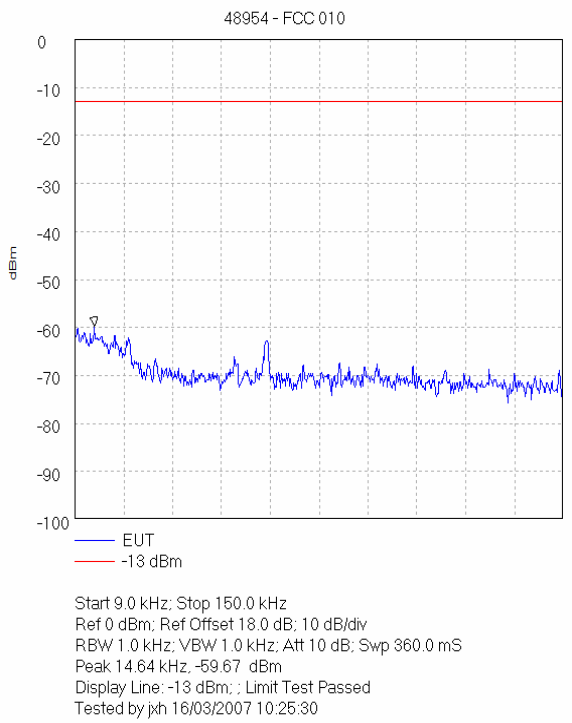
Results: CDMA2000 Only (3xCDMA2000 Signals – 869.7 MHz, 881.51 MHz, 893.31 MHz)

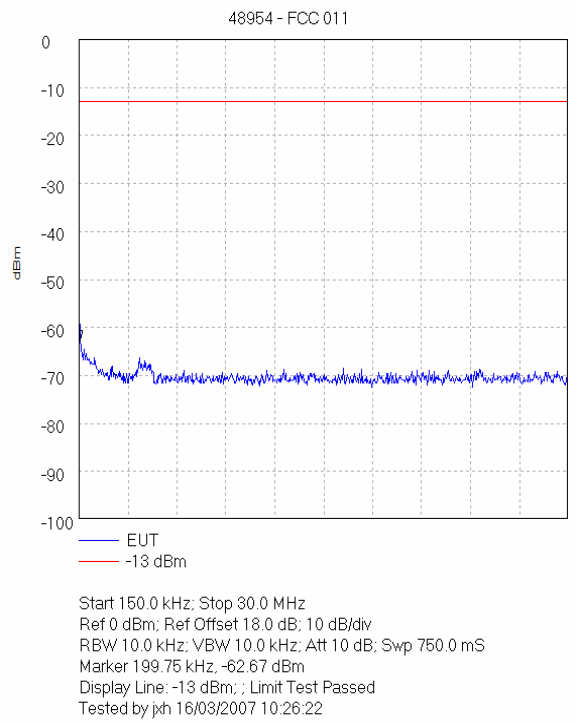
Frequency (GHz)	Peak Emission Level (dBm)	Bandwidth (kHz)	Limit (dBm)	Margin (dB)	Result
0.6177	-43.8	100	-13.0	30.8	Complied
0.8859	-43.7	100	-13.0	30.7	Complied
0.9903	-41.7	100	-13.0	28.7	Complied
1.753	-30.7	1000	-13.0	17.7	Complied
7.283	-45.2	1000	-13.0	32.2	Complied
13.858	-43.0	1000	-13.0	30.0	Complied
17.525	-41.8	1000	-13.0	28.8	Complied
24.030	-37.0	1000	-13.0	24.0	Complied

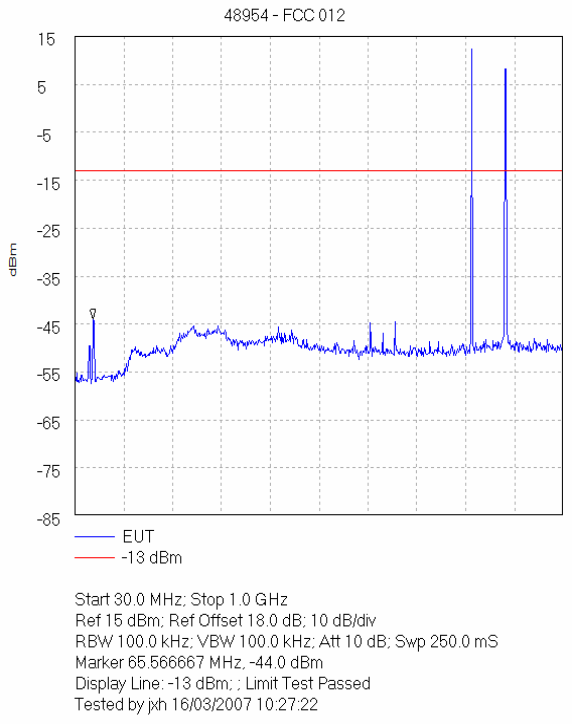
Note(s):

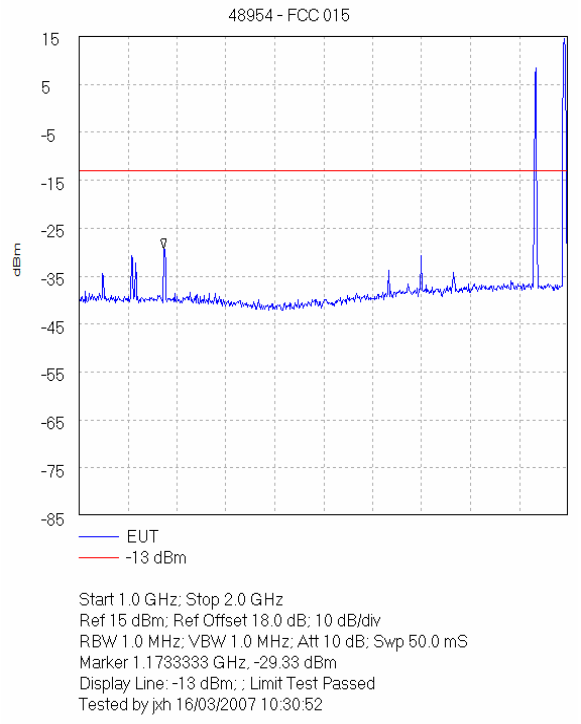
2. *Carriers identified on fully loaded (815.5 MHz, 881.6 MHz, 1930.2 MHz & 1988.75 MHz), GSM 850 only (869.2 MHz, 881.6 MHz, 893.8 MHz) and CDMA2000 (869.7 MHz, 881.52 MHz, 893.31 MHz) can be disregarded from the measurements as they are wanted signals.*
   All other measurements were at least 20dB below the limit.

7.2.10.1. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - Fully Loaded





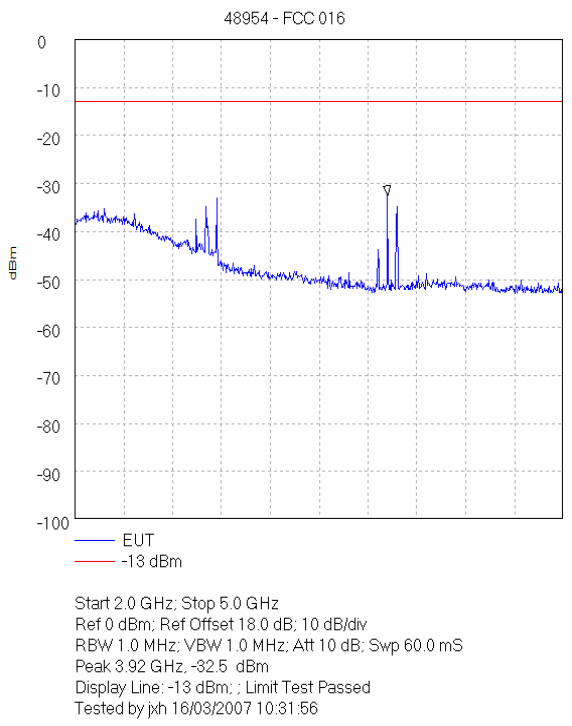




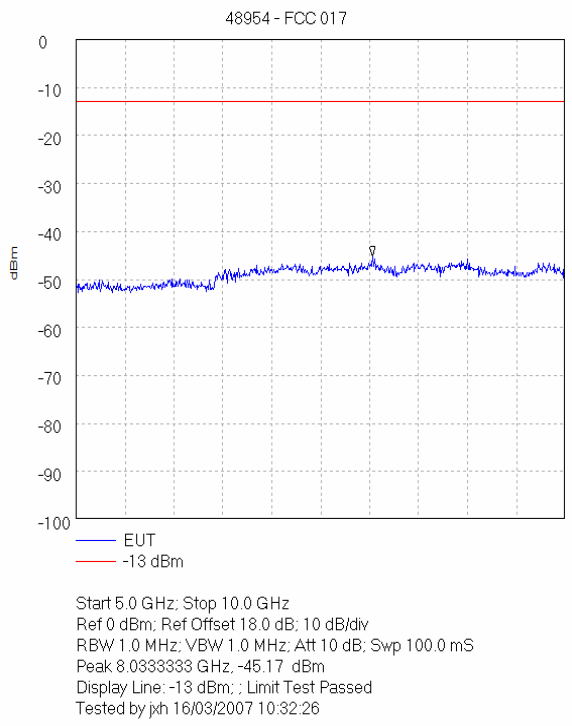
Carriers identified are exempt from measurements

Carriers identified are exempt from measurements

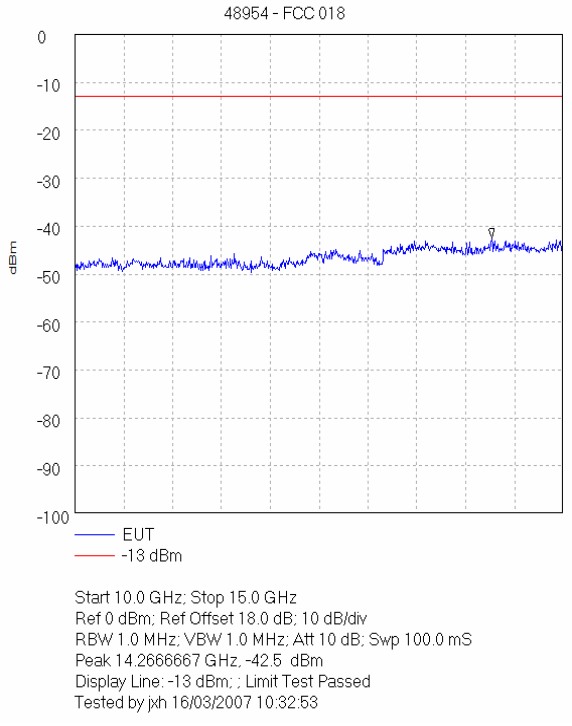
7.2.10.2. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - Fully Loaded



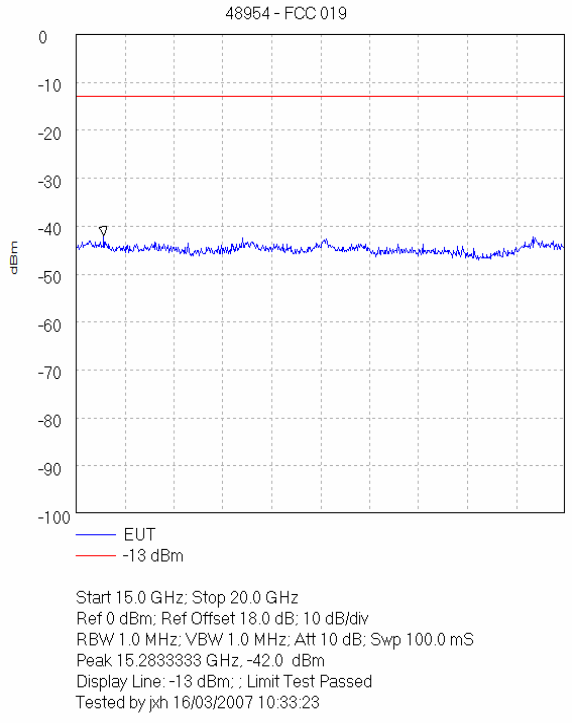
Start 2.0 GHz; Stop 5.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 60.0 mS
Peak 3.92 GHz, -32.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 10:31:56



Start 5.0 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 8.0333333 GHz, -45.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 10:32:26

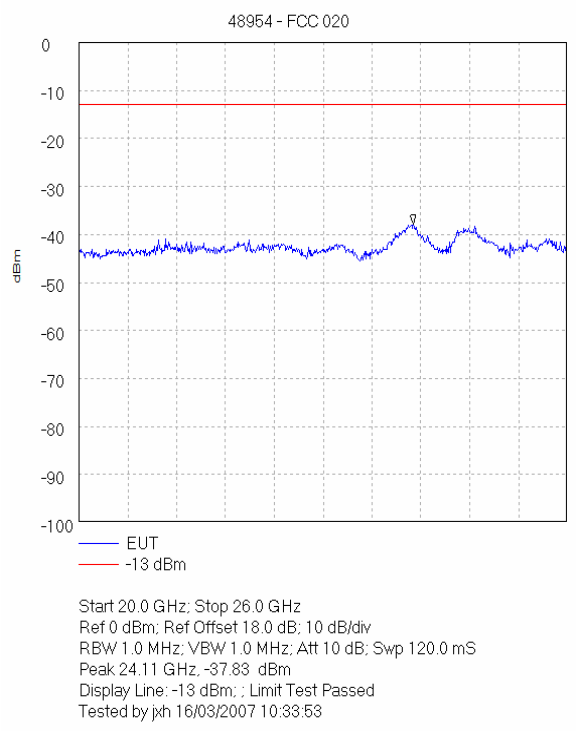


Start 10.0 GHz; Stop 15.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 14.2666667 GHz, -42.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 10:32:53

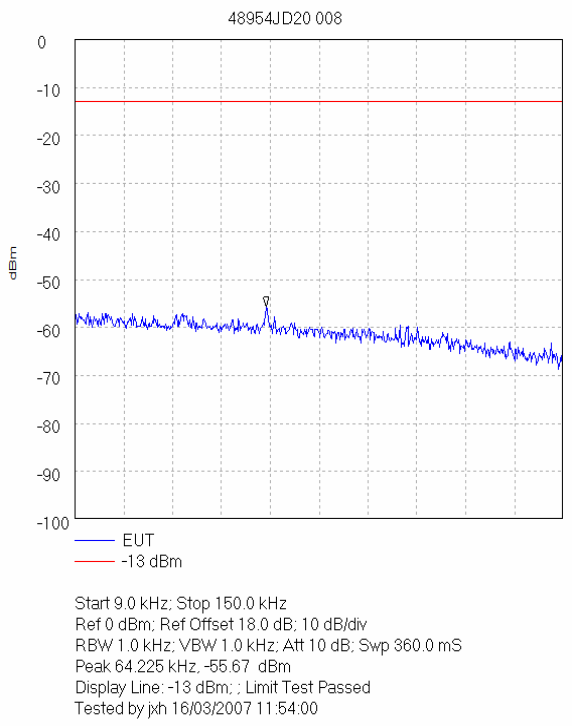


Start 15.0 GHz; Stop 20.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 15.2833333 GHz, -42.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 10:33:23

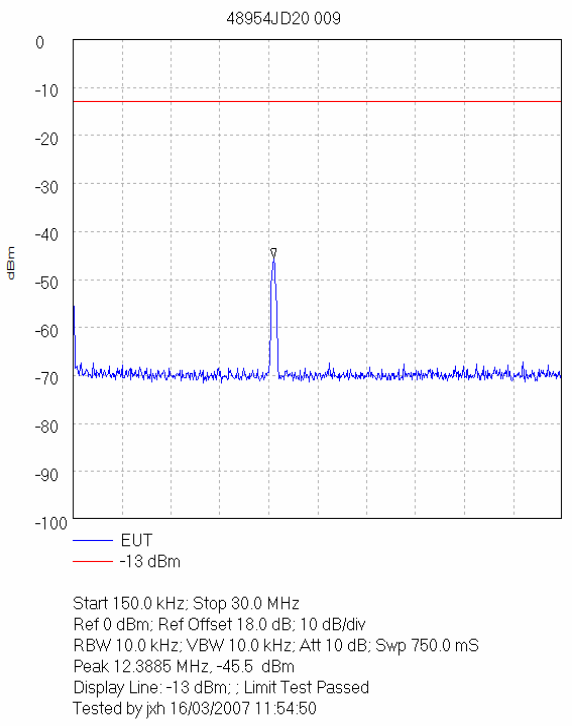
7.2.10.3. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - Fully Loaded



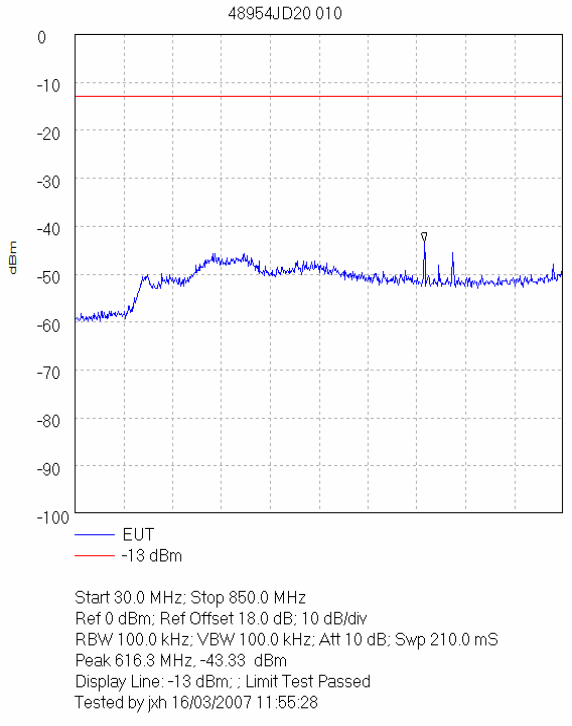
7.2.10.4. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - GSM 850 Only



Start 9.0 kHz; Stop 150.0 kHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 kHz; VBW 1.0 kHz; Att 10 dB; Swp 360.0 mS
Peak 64.225 kHz, -55.67 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 11:54:00

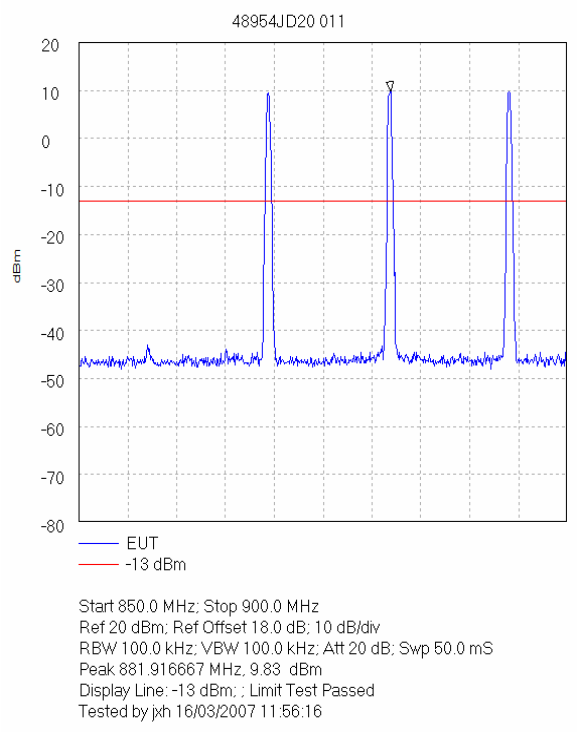


Start 150.0 kHz; Stop 30.0 MHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 10.0 kHz; Att 10 dB; Swp 750.0 mS
Peak 12.3885 MHz, -45.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 11:54:50

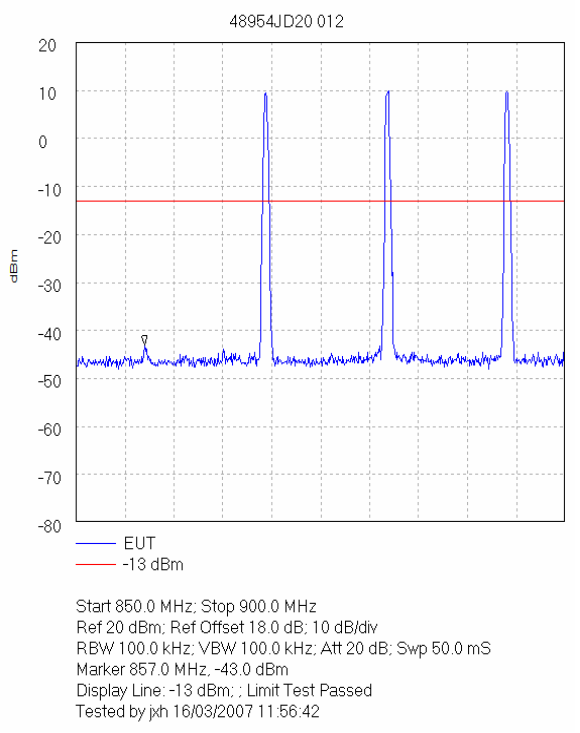


Start 30.0 MHz; Stop 850.0 MHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 210.0 mS
Peak 616.3 MHz, -43.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 11:55:28

7.2.10.5. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - GSM 850 Only

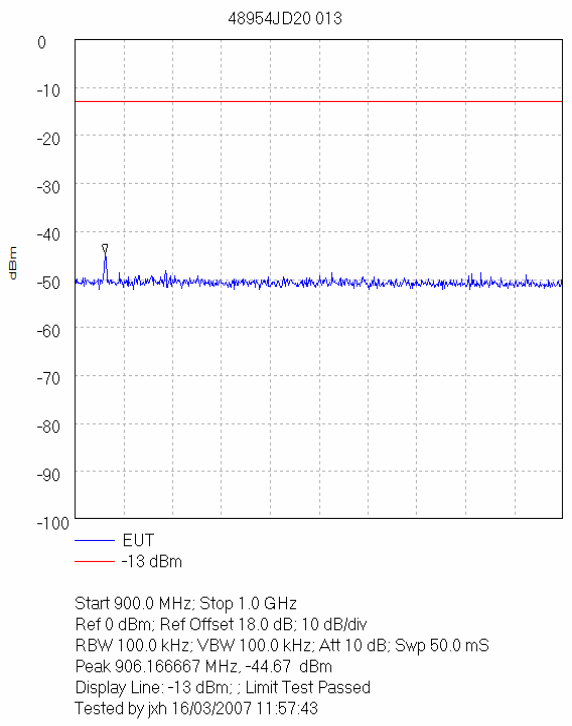


Carriers identified are exempt from measurements

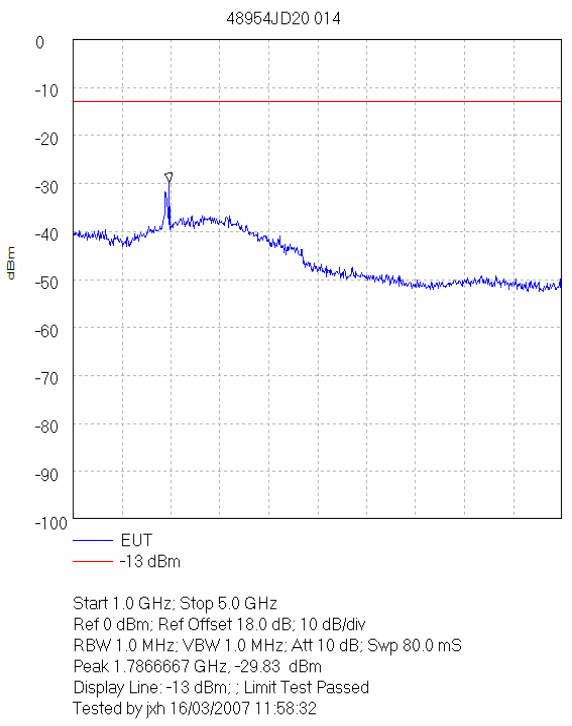


Carriers identified are exempt from measurements

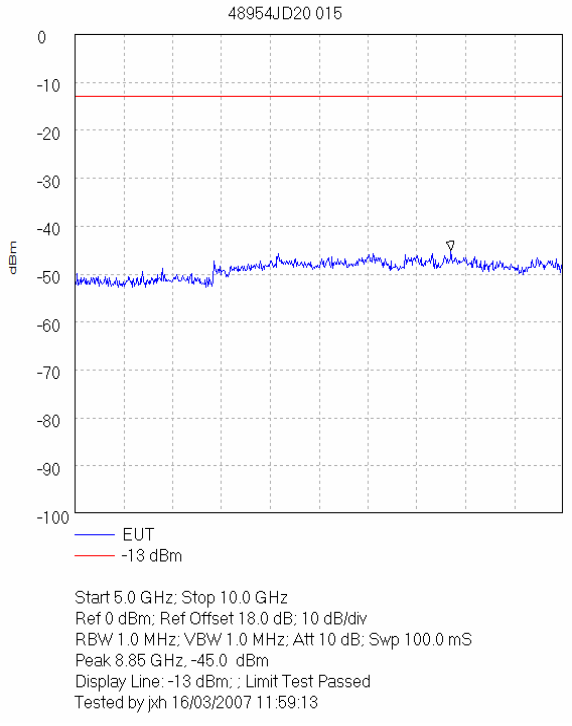
7.2.10.6. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - GSM 850 Only



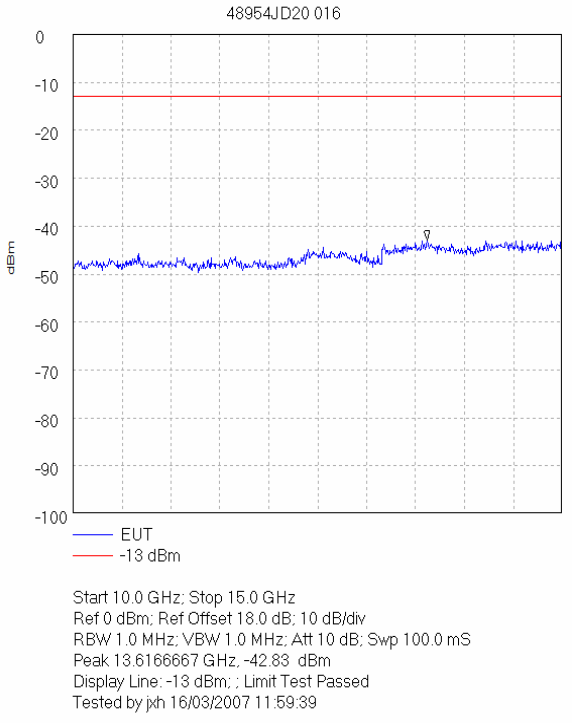
Start 900.0 MHz; Stop 1.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 50.0 mS
Peak 906.166667 MHz, -44.67 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 11:57:43



Start 1.0 GHz; Stop 5.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 80.0 mS
Peak 1.7866667 GHz, -29.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 11:58:32

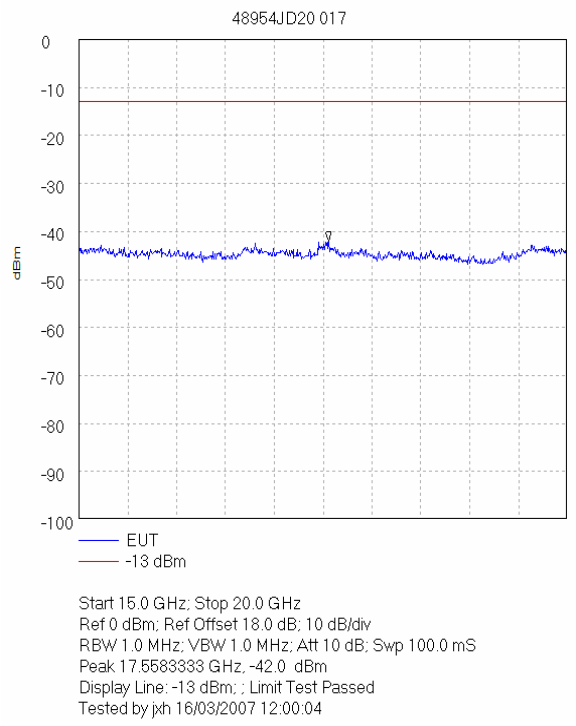


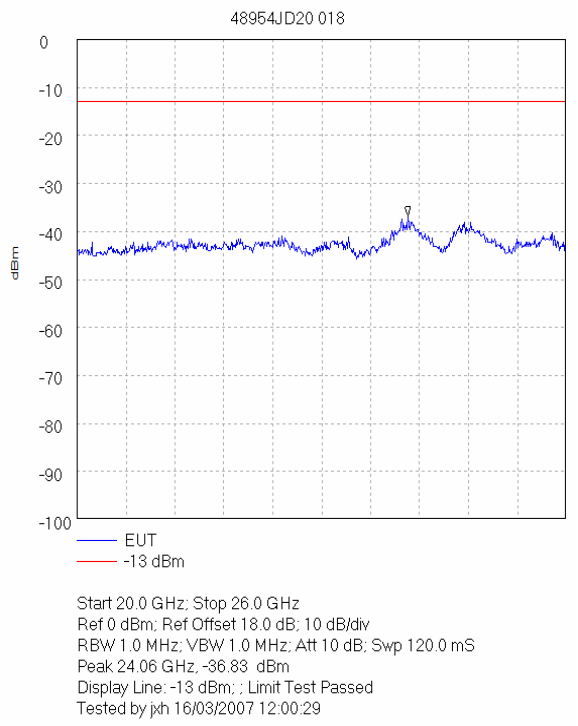
Start 5.0 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 8.85 GHz, -45.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 11:59:13



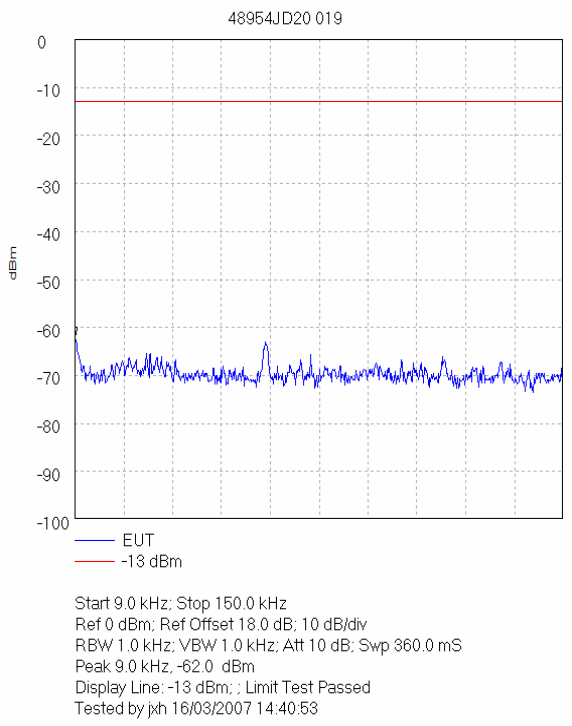
Start 10.0 GHz; Stop 15.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 13.6166667 GHz, -42.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 11:59:39

7.2.10.7. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - GSM 850 Only

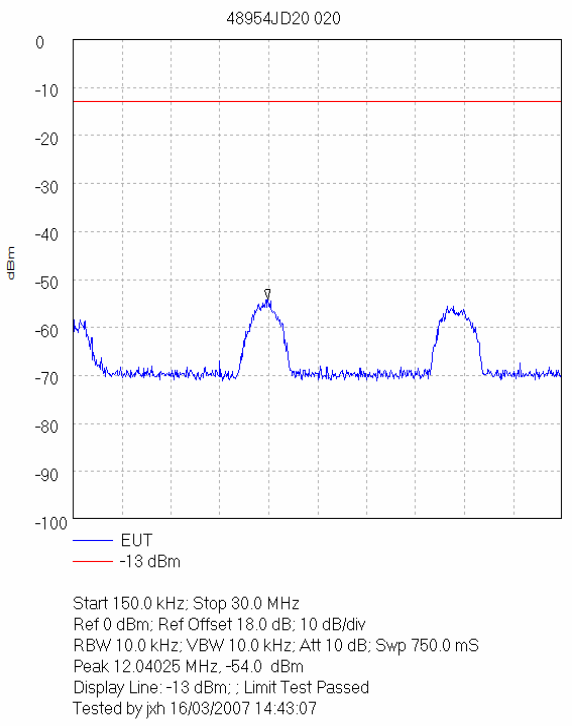




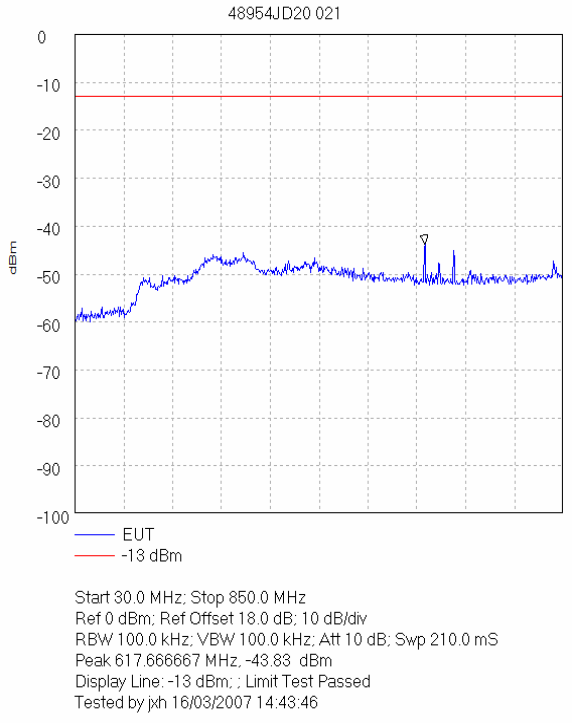
7.2.10.8. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - CDMA2000 Only



Start 9.0 kHz; Stop 150.0 kHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 kHz; VBW 1.0 kHz; Att 10 dB; Swp 360.0 mS
Peak 9.0 kHz, -62.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 14:40:53

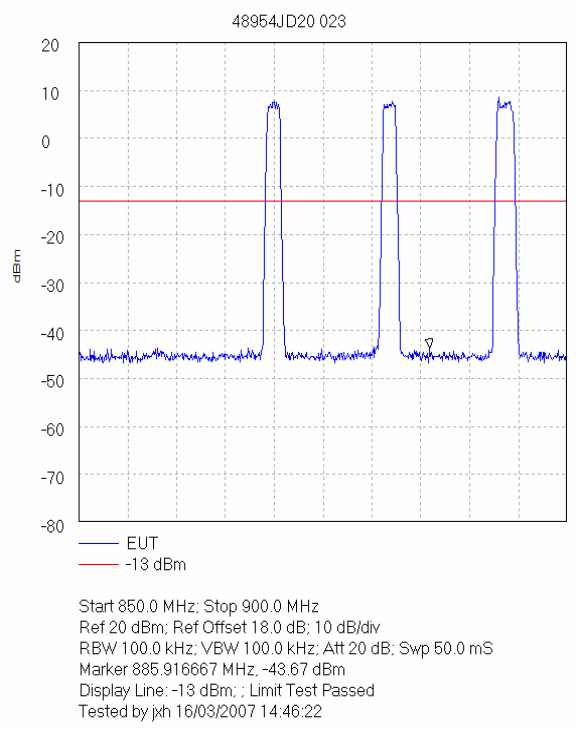


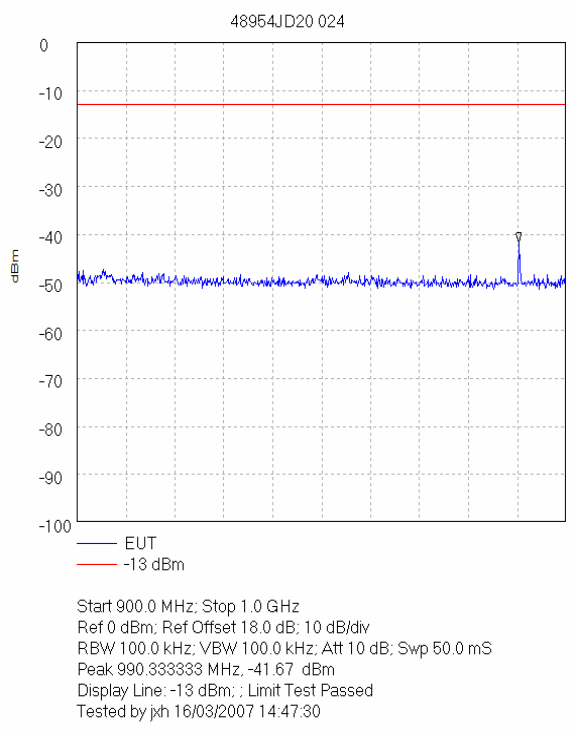
Start 150.0 kHz; Stop 30.0 MHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 10.0 kHz; Att 10 dB; Swp 750.0 mS
Peak 12.04025 MHz, -54.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 14:43:07



Start 30.0 MHz; Stop 850.0 MHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 210.0 mS
Peak 617.666667 MHz, -43.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 14:43:46

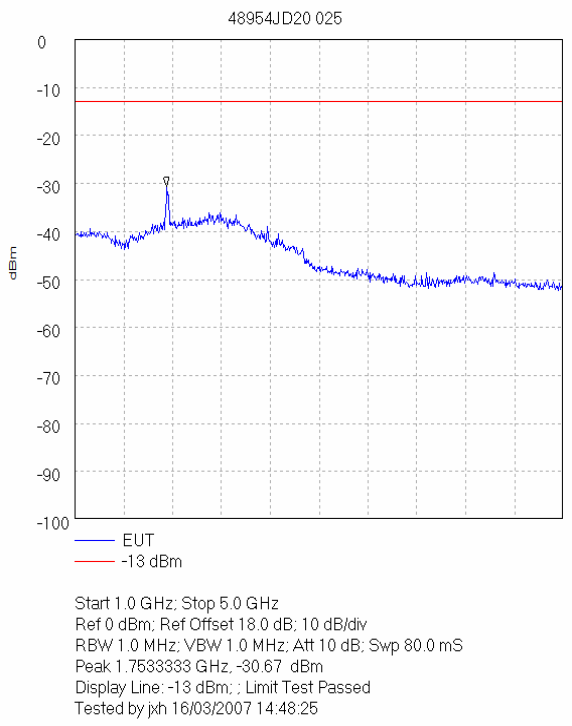
7.2.10.9. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - CDMA2000 Only



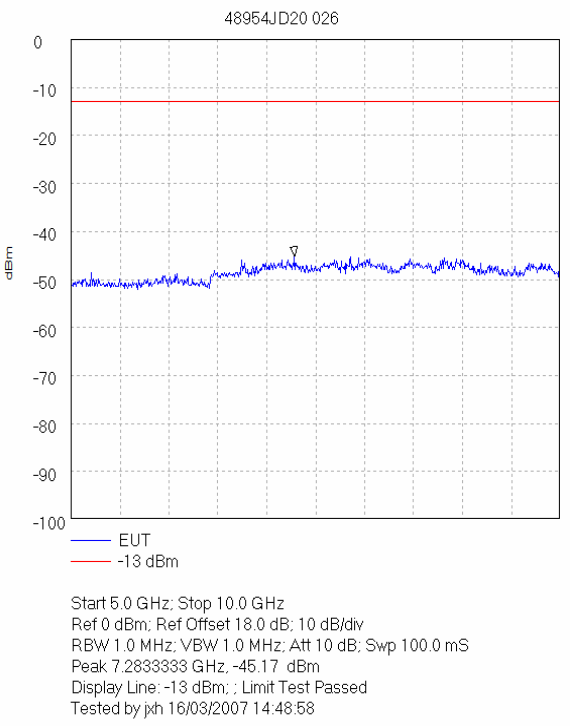


Carriers identified are exempt from measurements

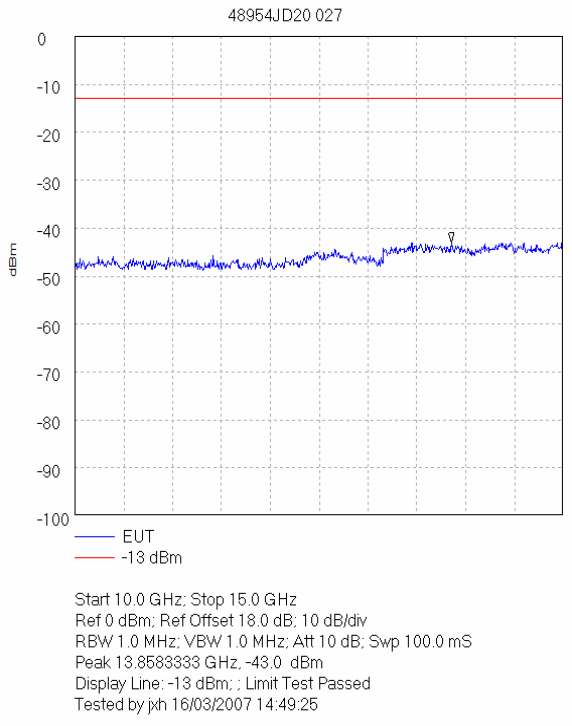
7.2.10.10. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - CDMA2000 Only



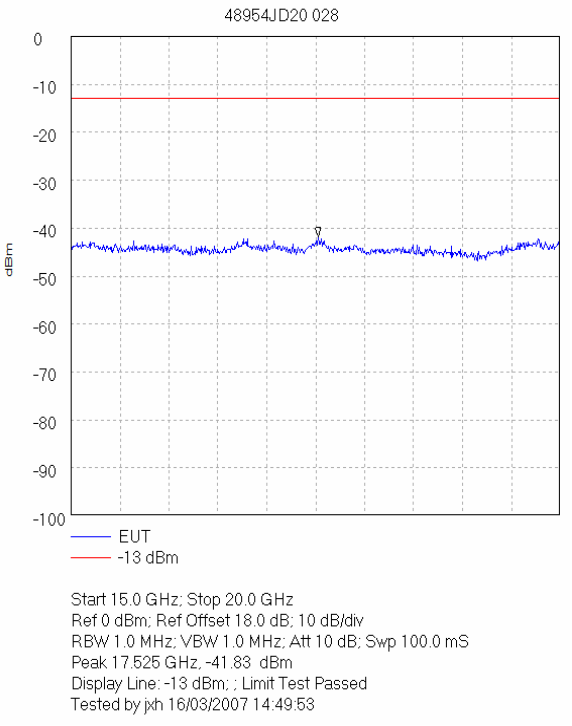
Start 1.0 GHz; Stop 5.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 80.0 mS
Peak 1.7533333 GHz, -30.67 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 14:48:25



Start 5.0 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 7.2833333 GHz, -45.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 14:48:58

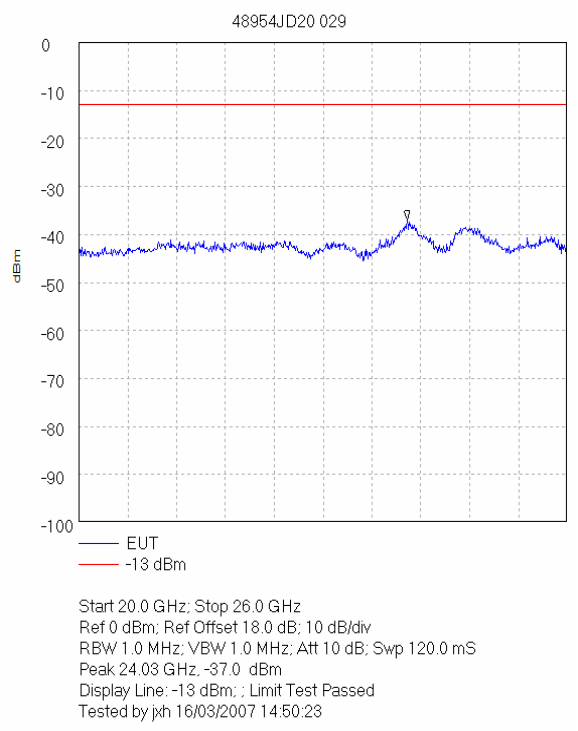


Start 10.0 GHz; Stop 15.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 13.8583333 GHz, -43.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 14:49:25



Start 15.0 GHz; Stop 20.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 17.525 GHz, -41.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 14:49:53

7.2.10.11. Transmitter Conducted Emissions (Out of Band): Section 90.210 / 2.1051 (Continued) - CDMA2000 Only



7.2.11. Transmitter Conducted Emissions at Band Edges: Section 2.1053 / 22.917

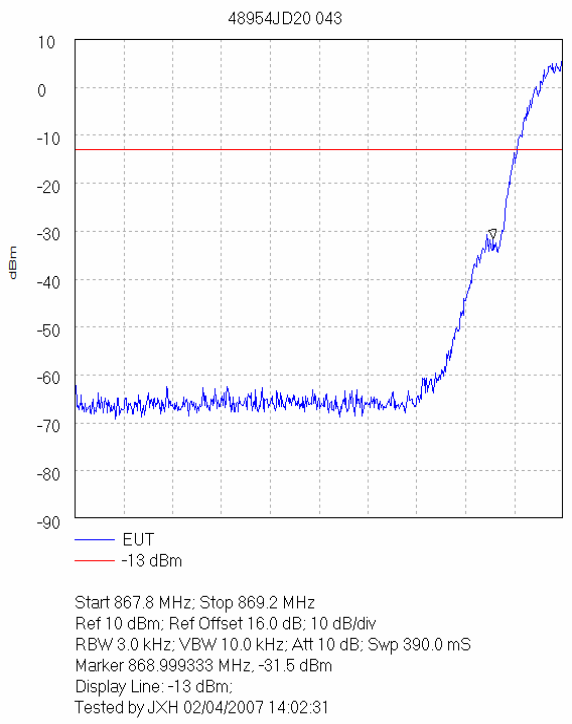
Results: GSM 850

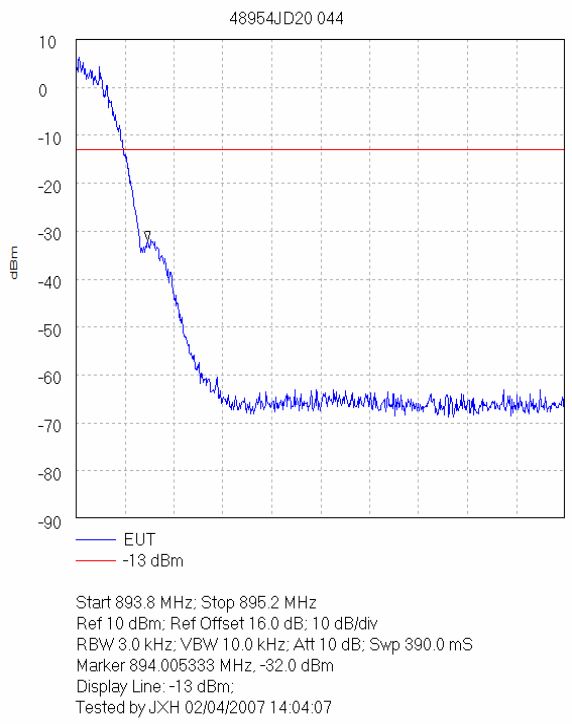
Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
869	-31.5	-13.0	18.5	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
894	-32.0	-13.0	19.0	Complied





7.2.12. Transmitter Conducted Emissions at Band Edges: Section 2.1053 / 22.917 (Continued)

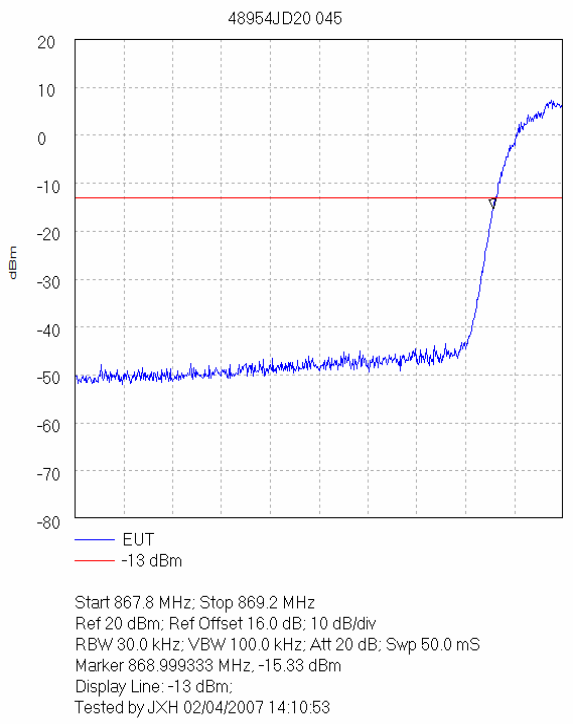
Results: CDMA2000

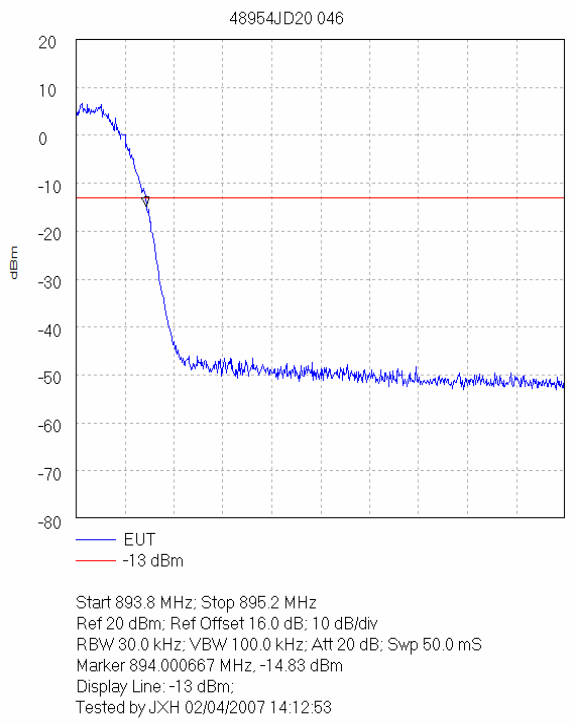
Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
869	-15.3	-13.0	2.3	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
894	-14.8	-13.0	1.8	Complied





7.2.13. Transmitter Out of Band Radiated Emissions: Section 2.1053 / 22.917

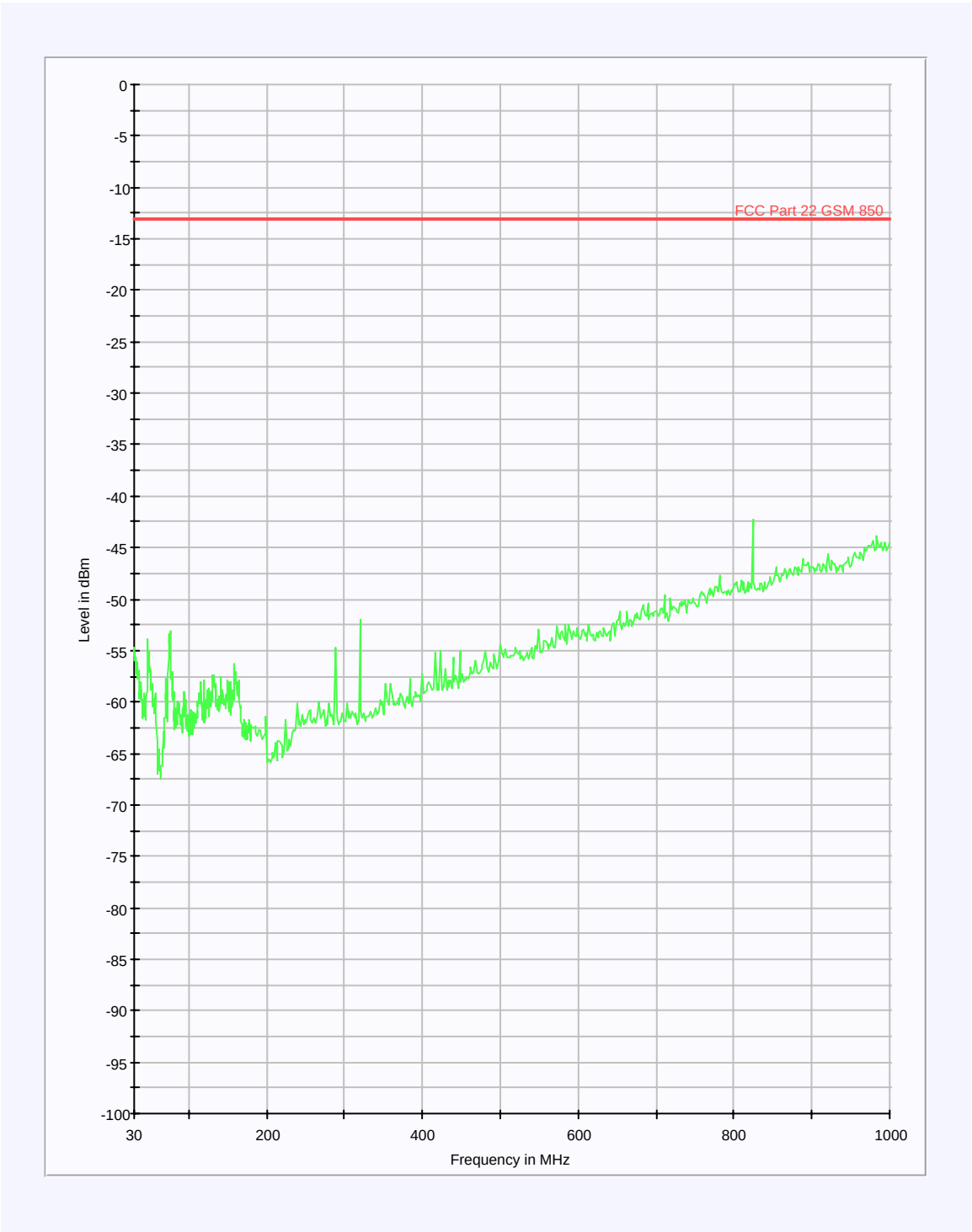
Results: Fully Loaded

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
17842.0	-41.0	-13.0	-28.0	Complied
25792.0	-45.2	-13.0	-32.2	Complied

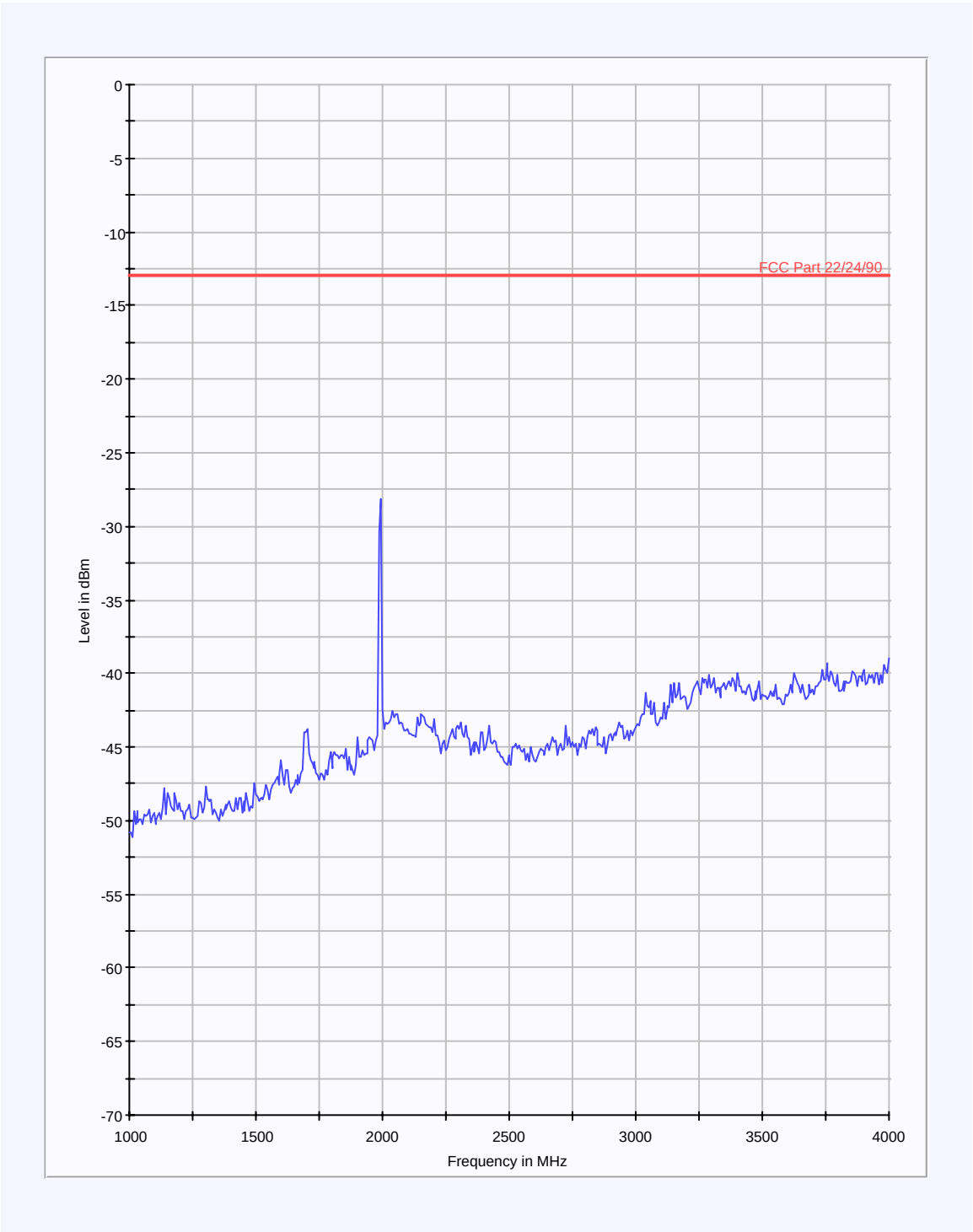
Note(s):

1. All other emissions were at least 20dB below the limit.

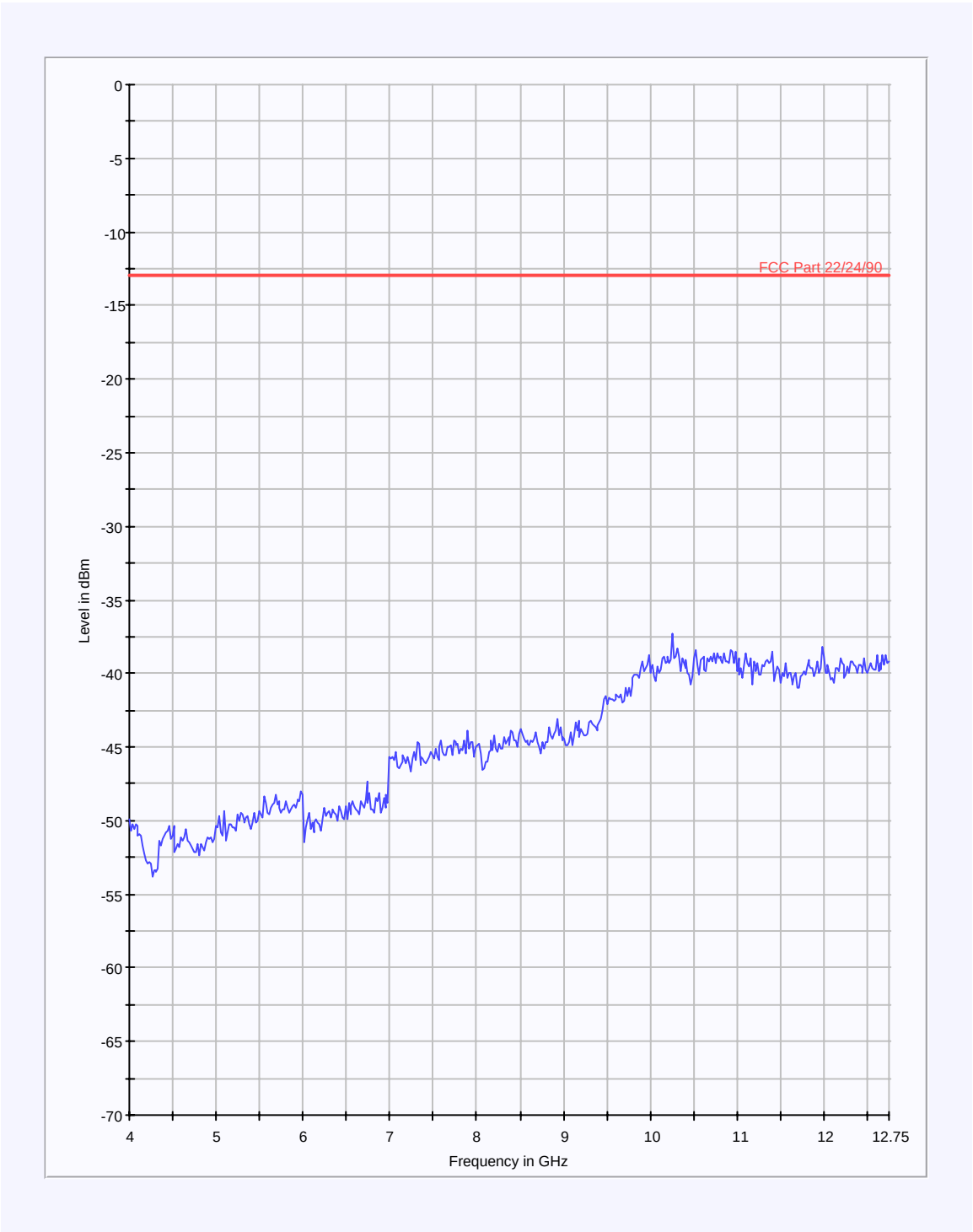
7.2.13.1. Transmitter Out of Band Radiated Emissions: Section 2.1053 / 22.917 (Continued)



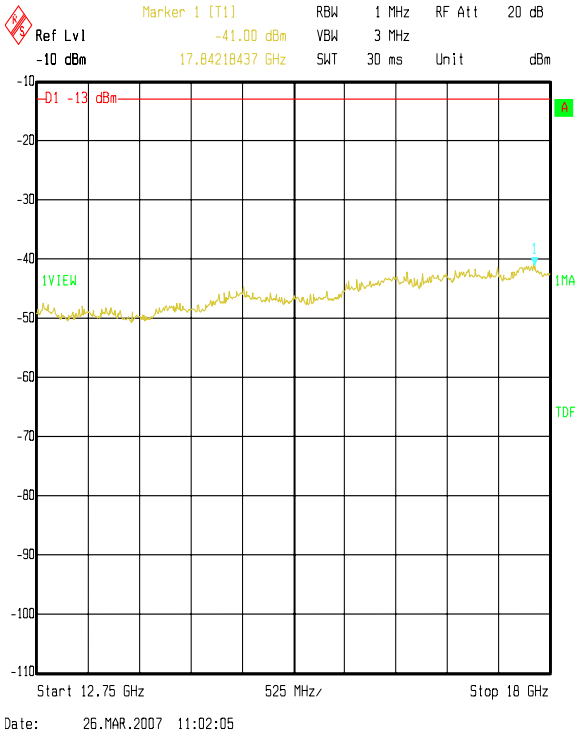
7.2.13.2. Transmitter Out of Band Radiated Emissions: Section 2.1053 / 22.917 (Continued)

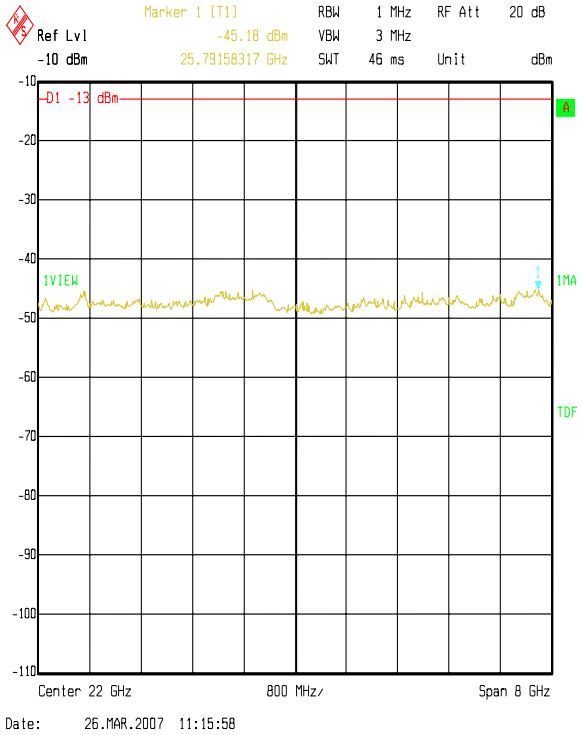


7.2.13.3. Transmitter Out of Band Radiated Emissions: Section 2.1053 / 22.917 (Continued)



7.2.13.4. Transmitter Out of Band Radiated Emissions: Section 2.1053 / 22.917 (Continued)





7.2.14. Intermodulation: Section 22.917 / 2.1053

Results:

Fully Loaded

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
665.35	-42.3	-13.0	29.3	Complied
1790.0	-24.5	-13.0	11.5	Complied
2148.0	-32.2	-13.0	19.2	Complied
3980.0	-31.2	-13.0	18.2	Complied
4430.0	-34.5	-13.0	21.5	Complied
5435.0	-36.8	-13.0	23.8	Complied

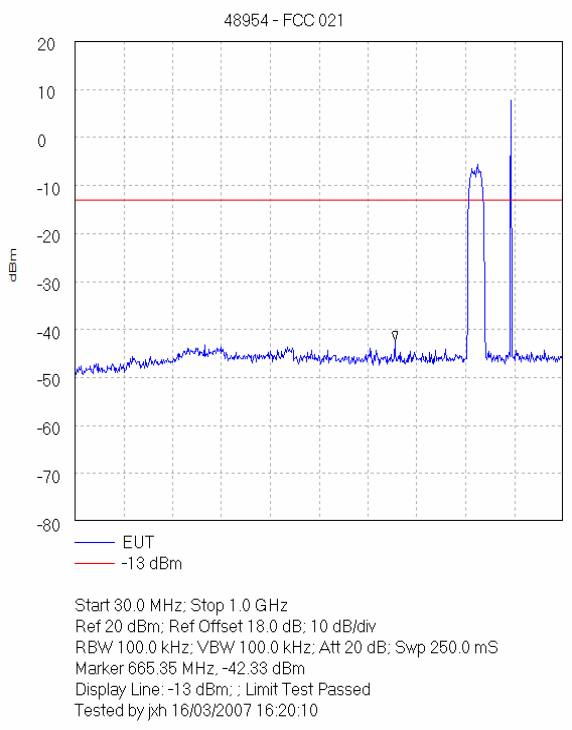
GSM850 – 3 Signals

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
665.5	-42.0	-13.0	29.0	Complied
876.167	-43.2	-13.0	30.2	Complied
949.667	-47.8	-13.0	34.8	Complied
1792.0	-28.8	-13.0	15.8	Complied
2080.0	-35.5	-13.0	22.5	Complied
3013.0	-45.8	-13.0	32.8	Complied

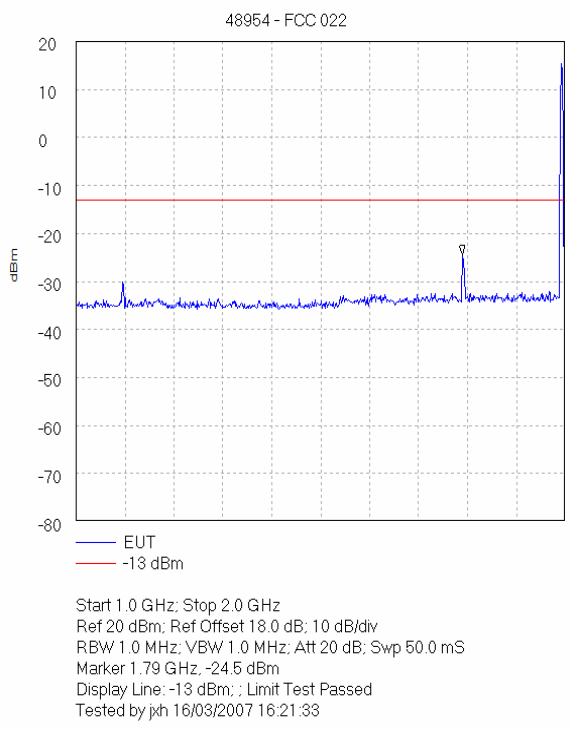
CDMA2000 – 3 Signals

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
616.3	-44.3	-13.0	31.3	Complied
850.833	-47.7	-13.0	34.7	Complied
990.333	-41.8	-13.0	28.8	Complied
1790.0	-23.3	-13.0	10.3	Complied
2448.0	-34.2	-13.0	21.2	Complied
3040.0	-46.0	-13.0	33.0	Complied

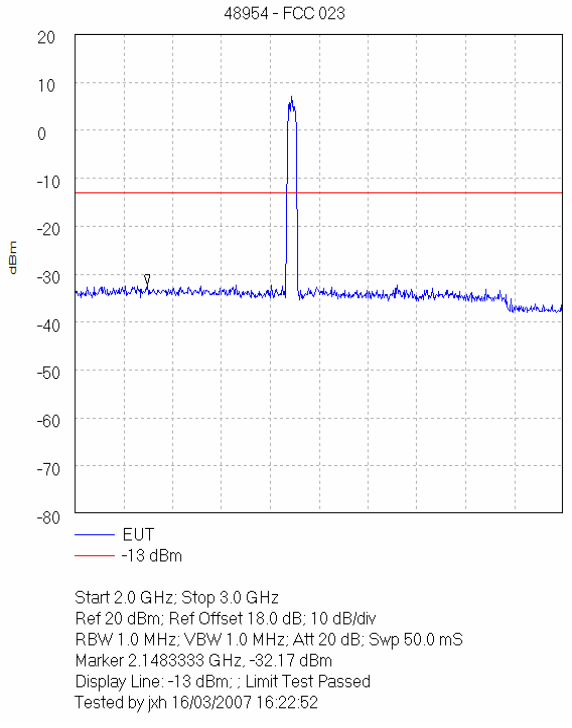
7.2.14.1. Intermodulation: Section 22.917 / 2.1053 (Continued) - Fully Loaded

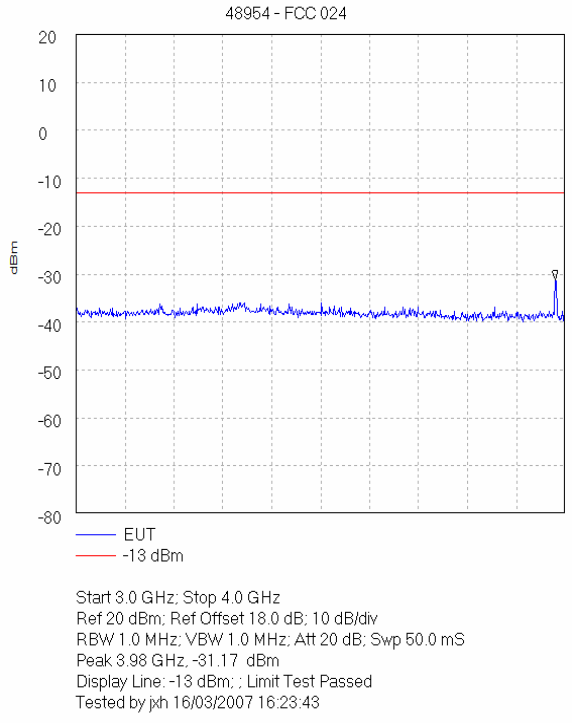


Carriers identified are exempt from measurements



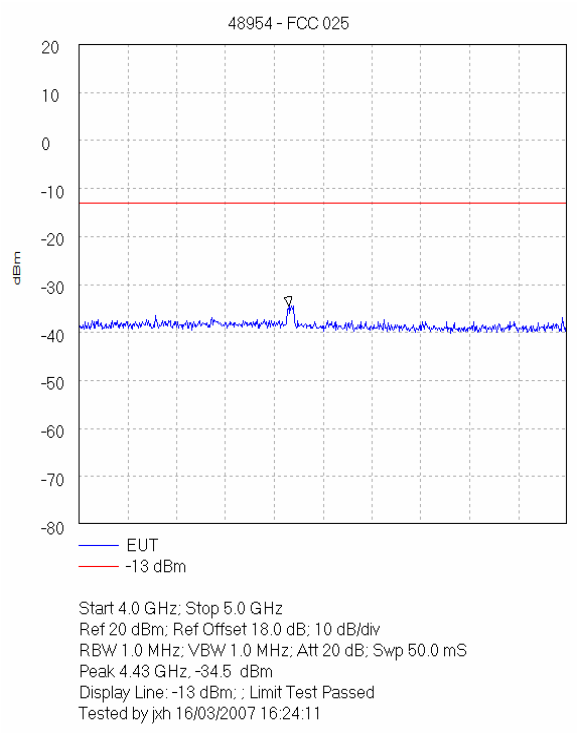
Carriers identified are exempt from measurements

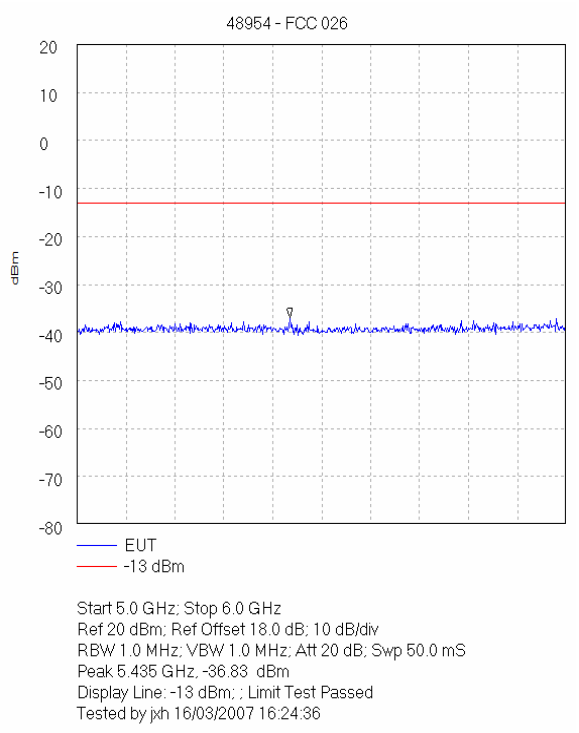




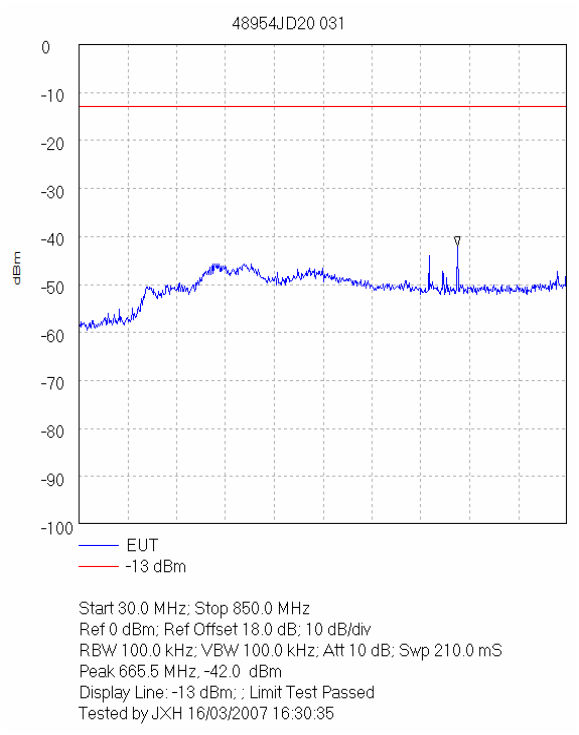
Carriers identified are exempt from measurements

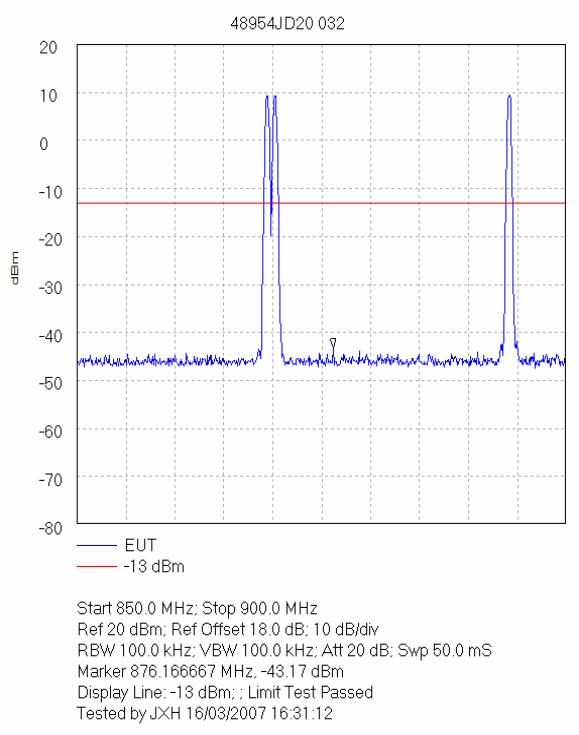
7.2.14.2. Intermodulation: Section 22.917 / 2.1053 (Continued) - Fully Loaded





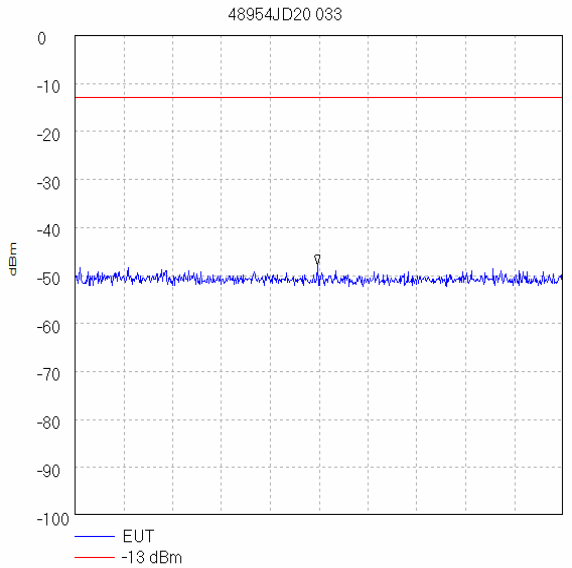
7.2.14.3. Intermodulation: Section 22.917 / 2.1053 (Continued) - GSM 850 Only



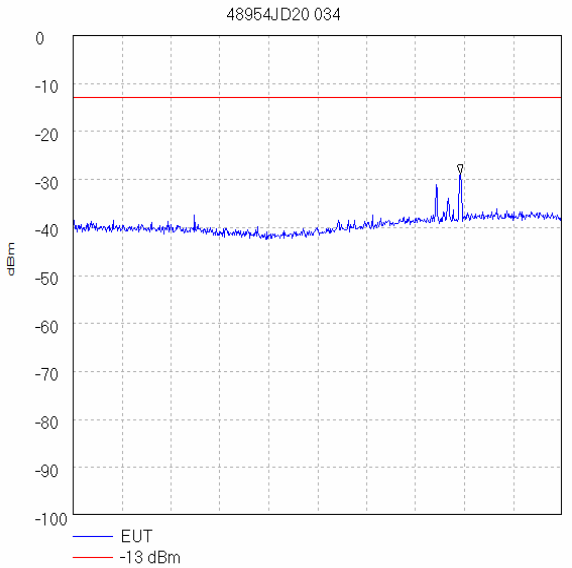


Carriers identified are exempt from measurements

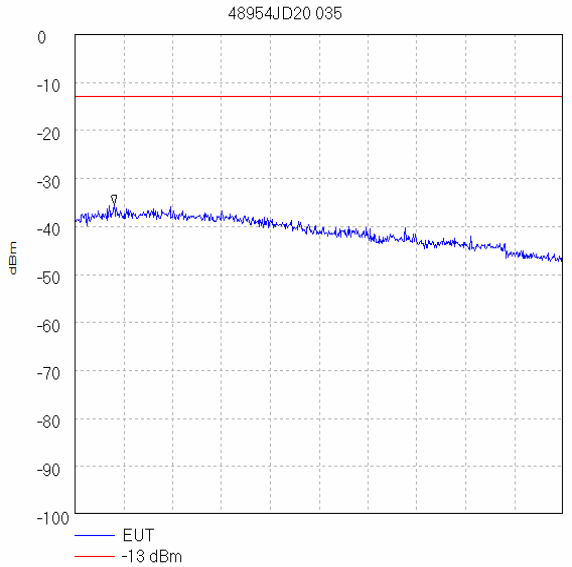
7.2.14.4. Intermodulation: Section 22.917 / 2.1053 (Continued) - GSM 850 Only



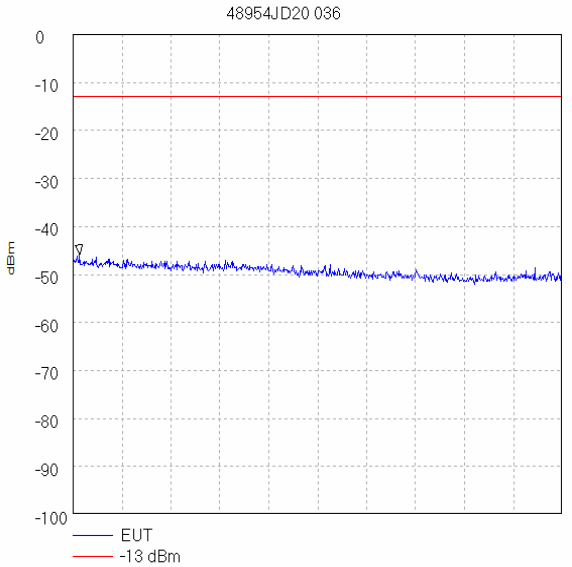
Start 900.0 MHz; Stop 1.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 50.0 mS
Peak 949.666667 MHz, -47.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 16:32:07



Start 1.0 GHz; Stop 2.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 1.7916667 GHz, -28.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 16:33:07

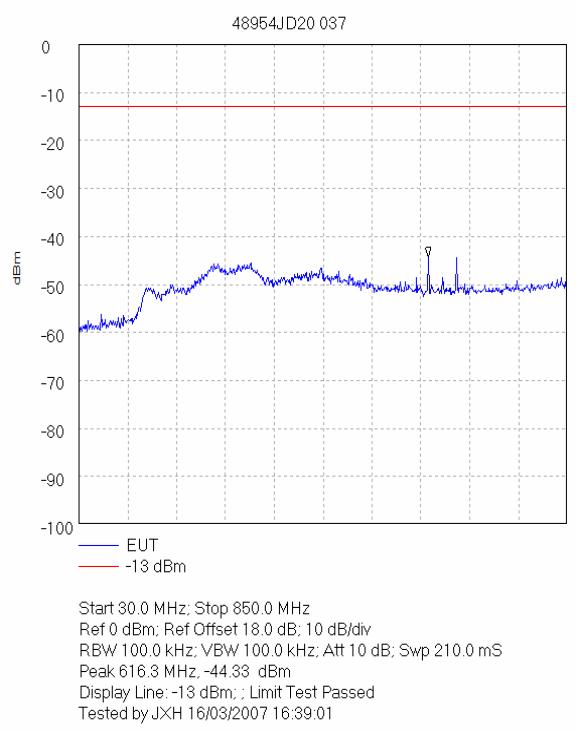


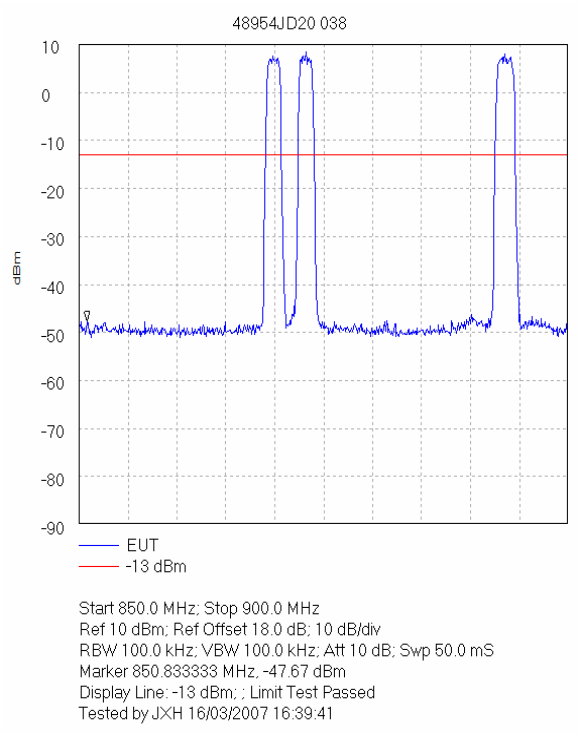
Start 2.0 GHz; Stop 3.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 2.08 GHz, -35.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 16:33:46



Start 3.0 GHz; Stop 4.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 3.0133333 GHz, -45.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 16:34:15

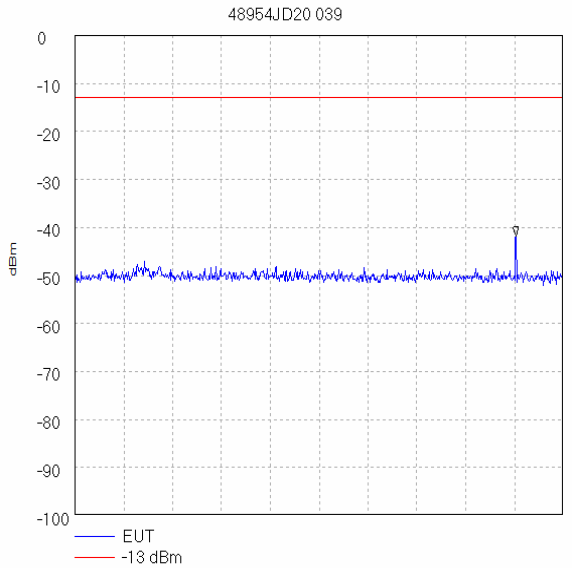
7.2.14.5. Intermodulation: Section 22.917 / 2.1053 (Continued) – CDMA2000 Only



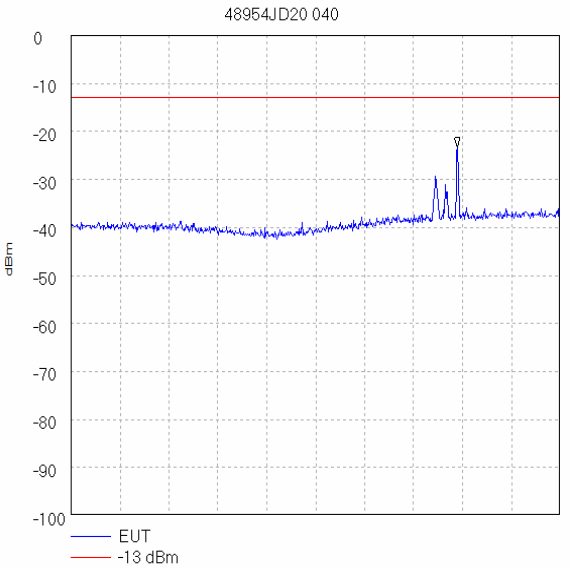


Carriers identified are exempt from measurements

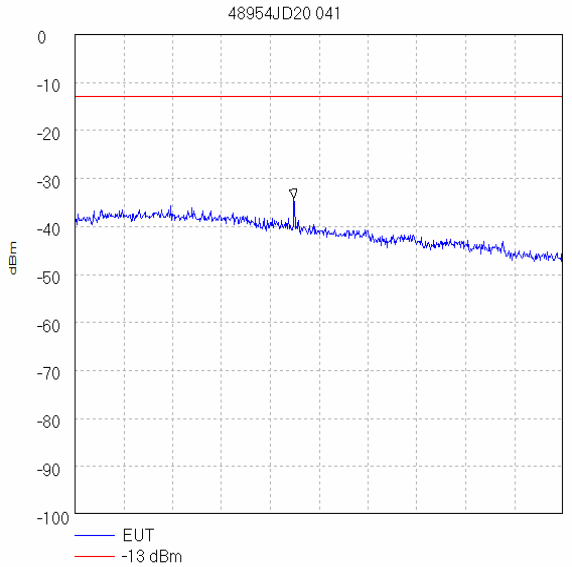
7.2.14.6. Intermodulation: Section 22.917 / 2.1053 (Continued) – CDMA2000 Only



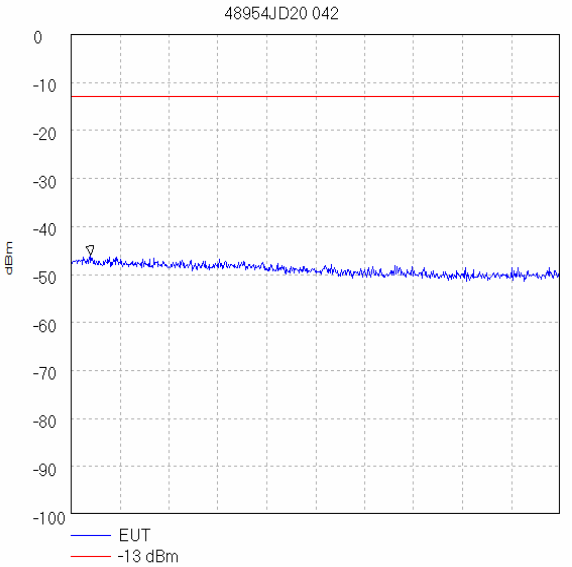
Start 900.0 MHz; Stop 1.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 50.0 mS
Peak 990.333333 MHz, -41.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 16:40:46



Start 1.0 GHz; Stop 2.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 1.79 GHz, -23.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 16:42:16

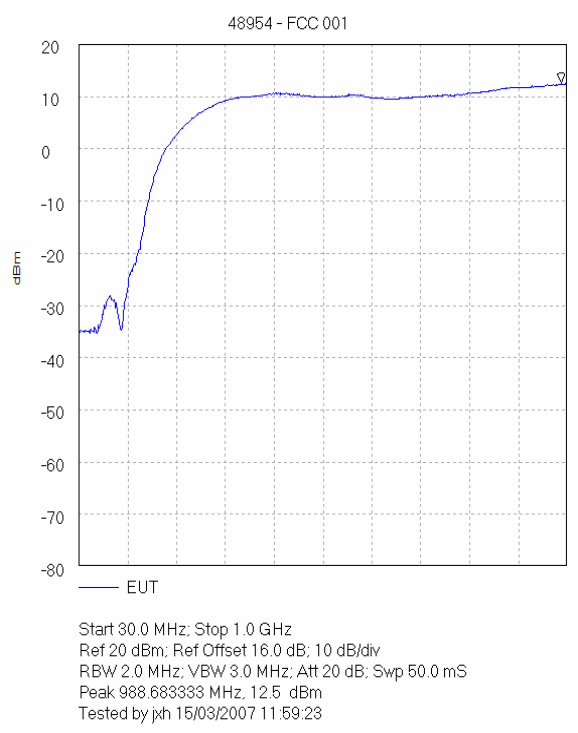


Start 2.0 GHz; Stop 3.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 2.4483333 GHz, -34.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 16:42:49

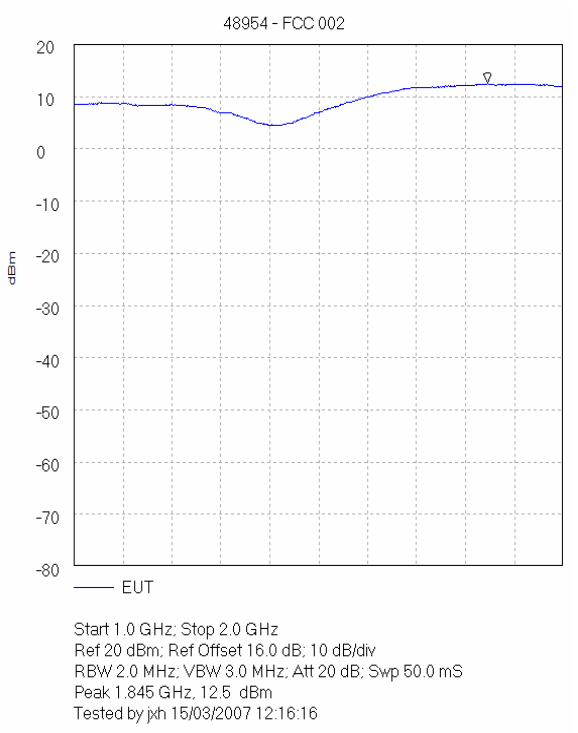


Start 3.0 GHz; Stop 4.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 3.04 GHz, -46.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 16:43:17

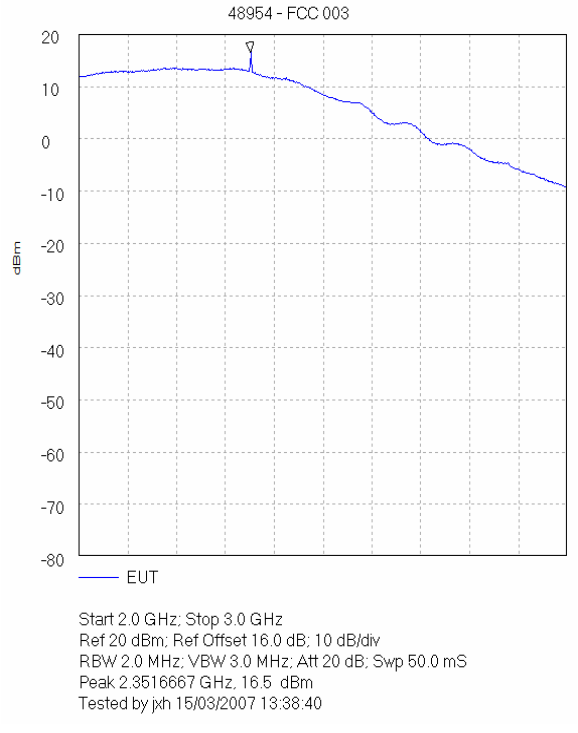
7.2.14.7. Out-of-Band Rejection



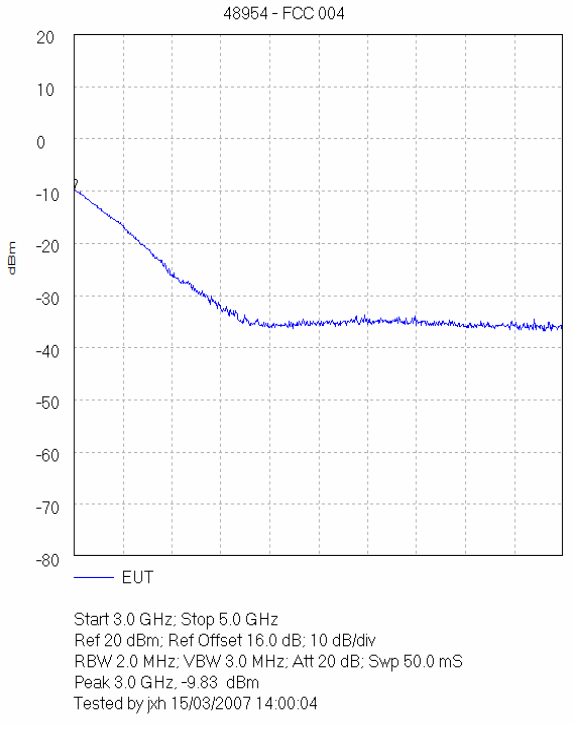
Start 30.0 MHz; Stop 1.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 988.683333 MHz, 12.5 dBm
Tested by jxh 15/03/2007 11:59:23



Start 1.0 GHz; Stop 2.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.845 GHz, 12.5 dBm
Tested by jxh 15/03/2007 12:16:16

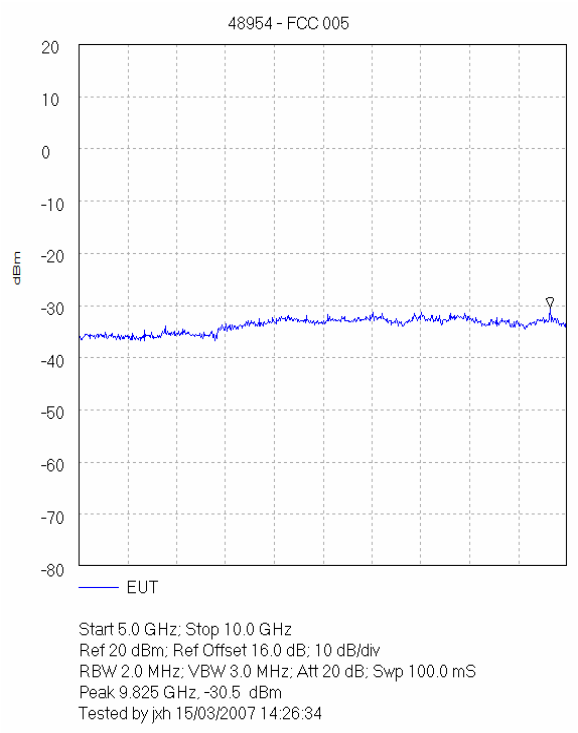


Start 2.0 GHz; Stop 3.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 2.3516667 GHz, 16.5 dBm
Tested by jxh 15/03/2007 13:38:40

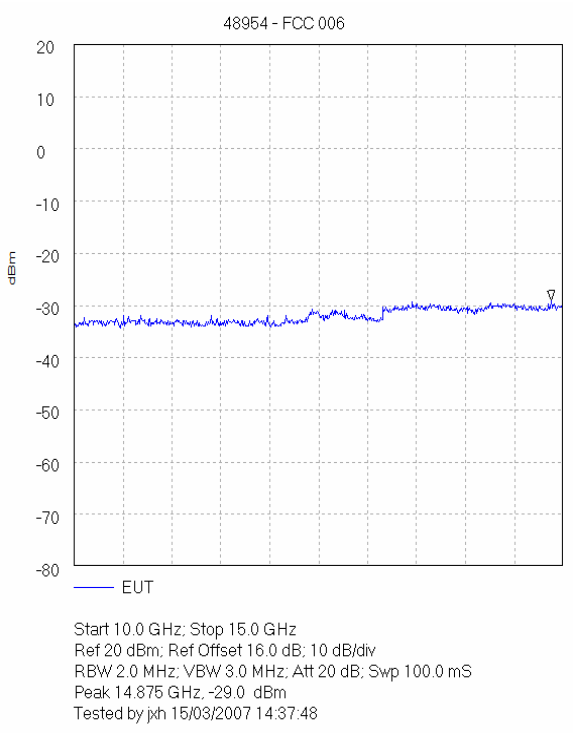


Start 3.0 GHz; Stop 5.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 3.0 GHz, -9.83 dBm
Tested by jxh 15/03/2007 14:00:04

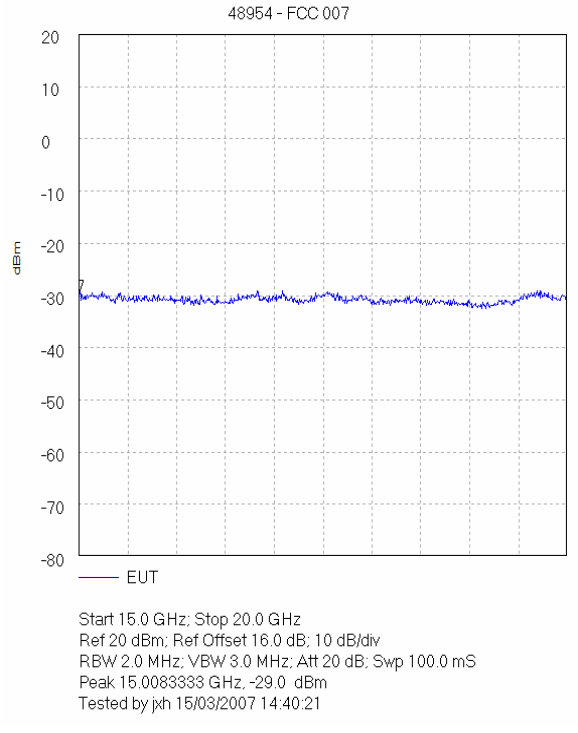
7.2.14.8. Out-of-Band Rejection (Continued)



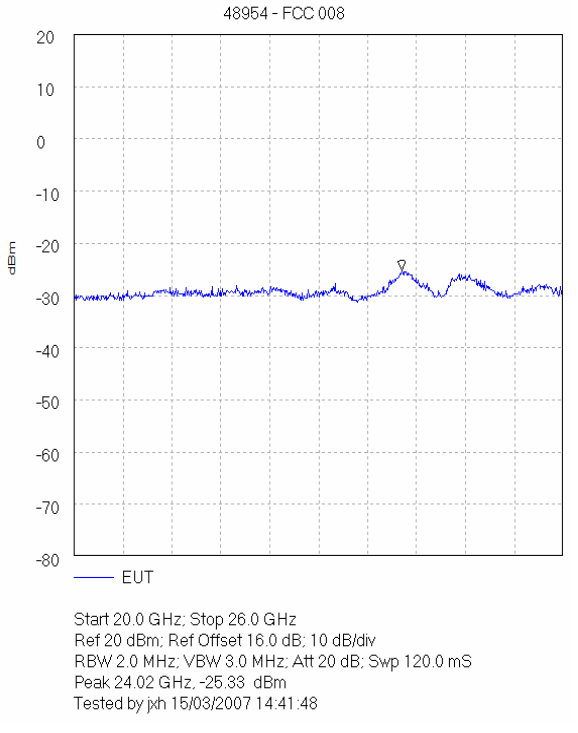
Start 5.0 GHz; Stop 10.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 100.0 mS
Peak 9.825 GHz, -30.5 dBm
Tested by jxh 15/03/2007 14:26:34



Start 10.0 GHz; Stop 15.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 100.0 mS
Peak 14.875 GHz, -29.0 dBm
Tested by jxh 15/03/2007 14:37:48



Start 15.0 GHz; Stop 20.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 100.0 mS
Peak 15.0083333 GHz, -29.0 dBm
Tested by jxh 15/03/2007 14:40:21



Start 20.0 GHz; Stop 26.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 120.0 mS
Peak 24.02 GHz, -25.33 dBm
Tested by jxh 15/03/2007 14:41:48

7.3. Test Results – FCC Part 24

7.3.1. Transmitter Mode AC Conducted Spurious Emissions: Section 15.207 - Hub Unit (HU)

The EUT was configured as for AC conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels present on the ac mains line of the EUT.

Results:

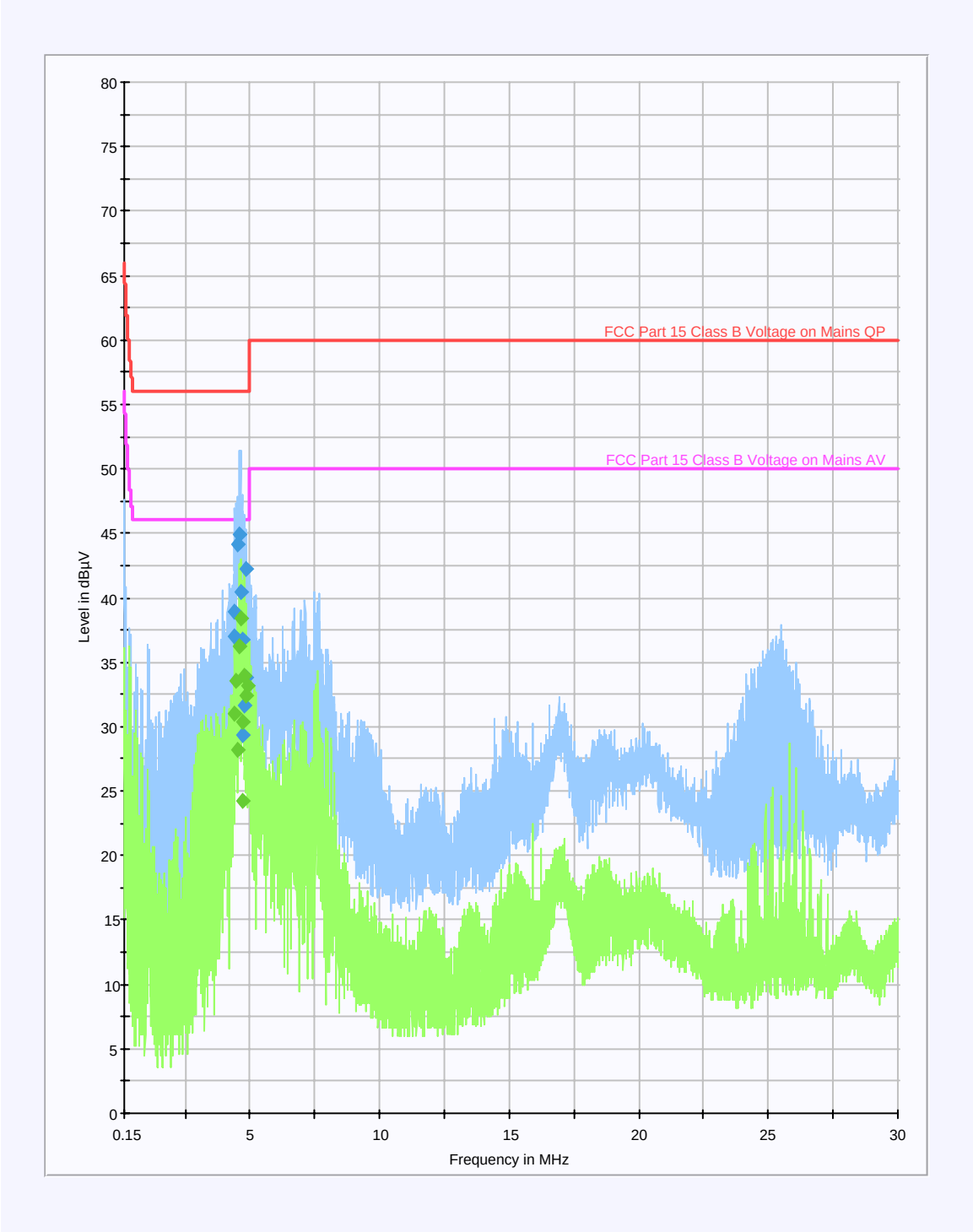
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
4.366000	Live	37.0	56.0	19.0	Complied
4.426000	Live	38.9	56.0	17.1	Complied
4.518000	Live	44.1	56.0	11.9	Complied
4.570000	Live	44.9	56.0	11.1	Complied
4.626000	Live	40.4	56.0	15.6	Complied
4.690000	Neutral	36.8	56.0	19.2	Complied
4.742000	Live	29.3	56.0	26.7	Complied
4.794000	Live	31.6	56.0	24.4	Complied
4.822000	Live	42.2	56.0	13.8	Complied
4.846000	Live	33.8	56.0	22.2	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
4.422000	Live	31.0	46.0	15.0	Complied
4.486000	Live	33.5	46.0	12.5	Complied
4.538000	Neutral	28.2	46.0	17.8	Complied
4.570000	Neutral	36.3	46.0	9.7	Complied
4.622000	Neutral	38.5	46.0	7.5	Complied
4.686000	Live	30.3	46.0	15.7	Complied
4.738000	Neutral	24.2	46.0	21.8	Complied
4.770000	Neutral	33.9	46.0	12.1	Complied
4.826000	Live	32.4	46.0	13.6	Complied
4.886000	Live	33.2	46.0	12.8	Complied

Transmitter Mode AC Conducted Spurious Emissions: Section 15.207 (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.3.2. Transmitter Mode AC Conducted Spurious Emissions: Section 15.207 - Antenna Unit (AU)

The EUT was configured as for AC conducted emission measurements as described in section 9 of this report.

Tests were performed to identify the maximum emission levels present on the ac mains line of the EUT.

Results:

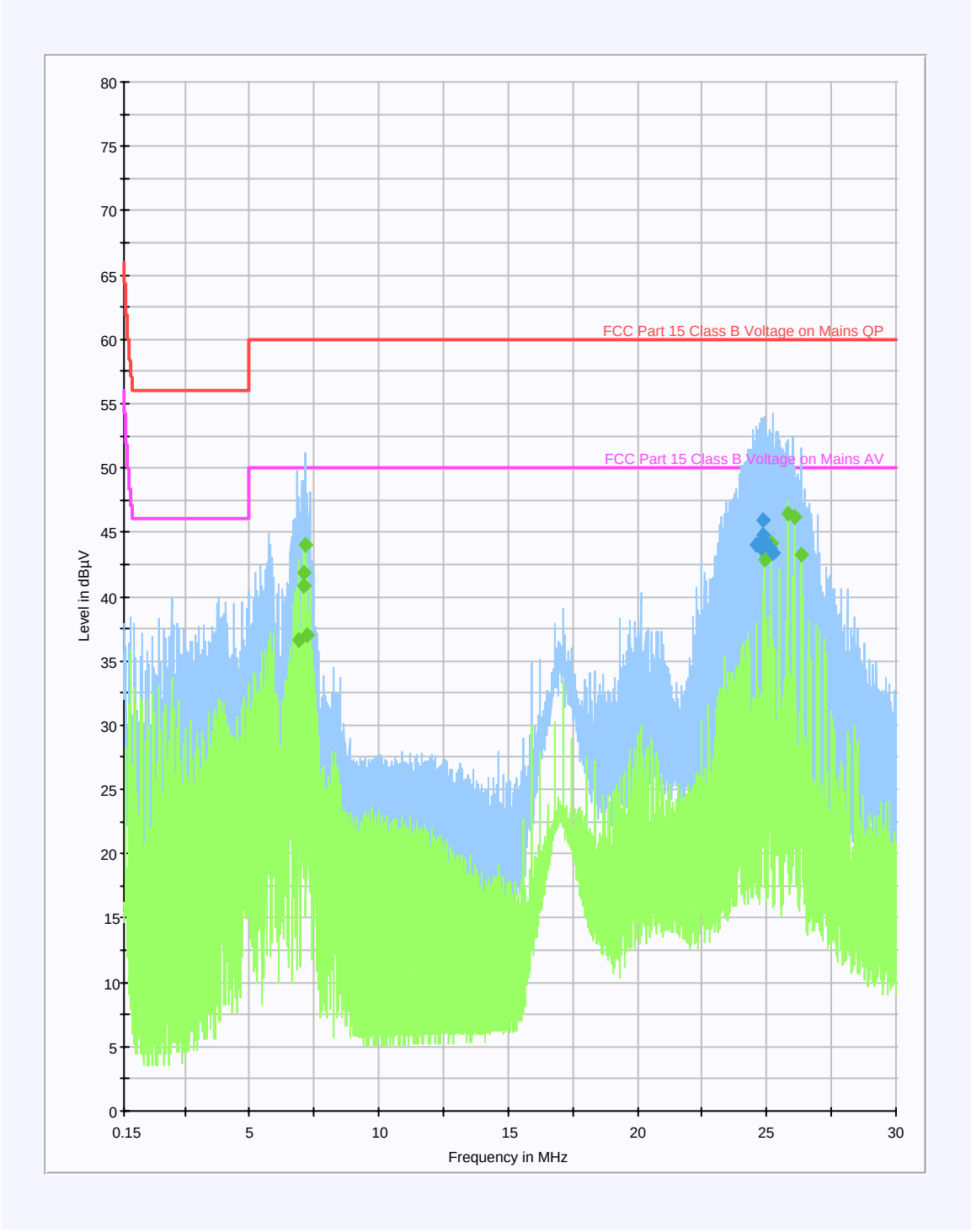
Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
6.910000	Live	36.6	50.0	13.4	Complied
7.082000	Live	41.8	50.0	8.2	Complied
7.130000	Neutral	40.9	50.0	9.1	Complied
7.150000	Neutral	44.0	50.0	6.0	Complied
7.254000	Neutral	37.0	50.0	13.0	Complied
24.886000	Live	42.8	50.0	7.2	Complied
25.190000	Live	44.2	50.0	5.8	Complied
25.798000	Live	46.5	50.0	3.5	Complied
26.098000	Live	46.1	50.0	3.9	Complied
26.326000	Live	43.2	50.0	6.8	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Level (dBμV)	Limit (dBμV)	Margin (dB)	Result
24.582000	Live	44.0	60.0	16.0	Complied
24.718000	Live	44.1	60.0	15.9	Complied
24.742000	Neutral	44.1	60.0	15.9	Complied
24.794000	Neutral	43.7	60.0	16.3	Complied
24.850000	Live	44.8	60.0	15.2	Complied
24.882000	Live	45.9	60.0	14.1	Complied
24.902000	Live	44.2	60.0	15.8	Complied
24.938000	Live	44.1	60.0	15.9	Complied
25.122000	Live	43.7	60.0	16.3	Complied
25.234000	Live	43.4	60.0	16.6	Complied

Transmitter Mode AC Conducted Spurious Emissions: Section 15.207 (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.3.3. Transmitter Carrier Output Power: Section 2.1046 / 90.219

Results: GSM 1900

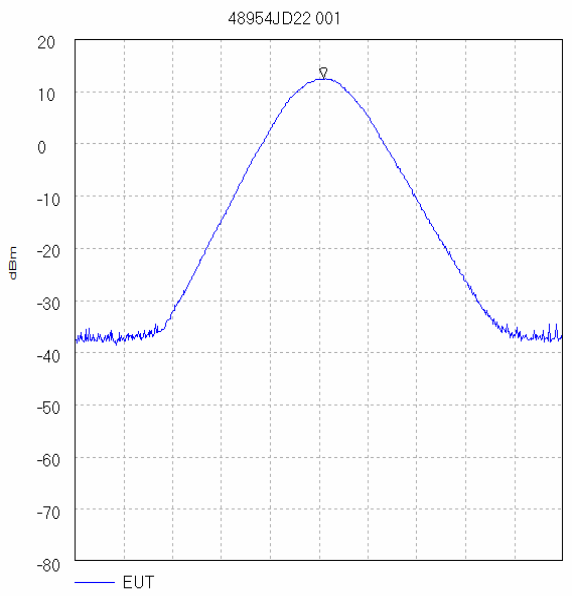
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Stated Antenna Gain (dB)	EIRP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	1930.2	12.5	8.0	20.5	37.0	16.5	Complied
Middle	1960.0	12.3	8.0	20.3	37.0	16.7	Complied
Top	1989.8	12.5	8.0	20.5	37.0	16.5	Complied

Note(s):

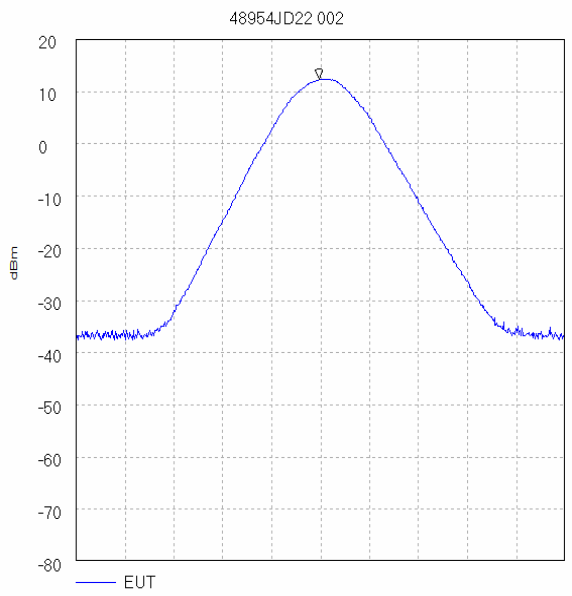
1. *The limit has been taken from FCC Part 90.219 for Class A Boosters*

2. *The limit in part 90.219 is expressed as ERP and the Output Power for a GSM 1900 device is expressed in EIRP. An approximate conversion equation is expressed below, demonstrating that the EUT still complies with the limit.*
   EIRP = ERP + 2.2 dB

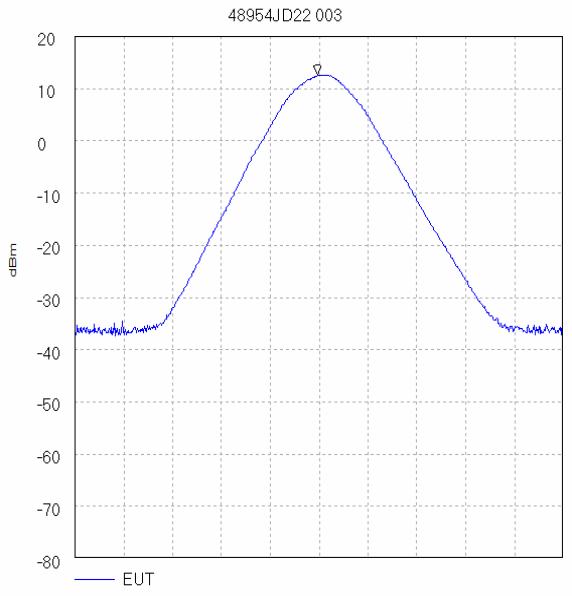
7.3.3.1. Transmitter Carrier Output Power: Section 2.1046 / 90.219 (Continued)



Centre 1.9302 GHz; Span 10.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.9303 GHz, 12.5 dBm
Tested by JXH 15/03/2007 15:41:04



Centre 1.96 GHz; Span 10.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.9599667 GHz, 12.33 dBm
Tested by JXH 15/03/2007 15:43:47



Centre 1.9898 GHz; Span 10.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.9897667 GHz, 12.5 dBm
Tested by JXH 15/03/2007 15:45:36

7.3.4. Transmitter Carrier Output Power: Section 2.1046 / 90.219 (Continued)

Results: CDMA2000

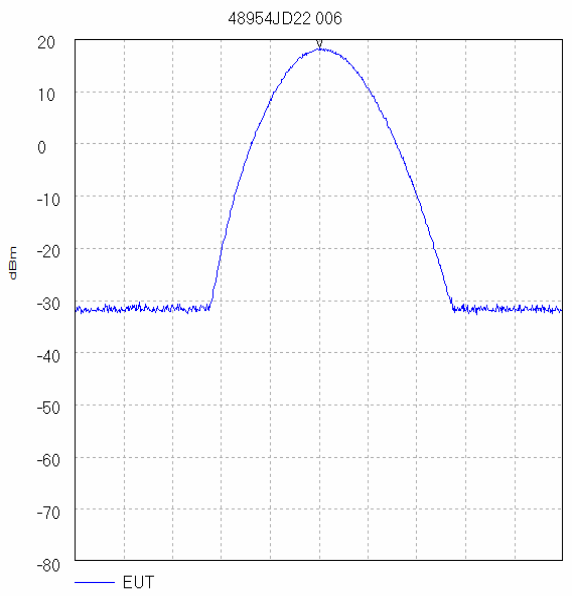
Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Stated Antenna Gain (dB)	EIRP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	1931.250	18.5	8.0	26.5	37.0	10.5	Complied
Middle	1960.000	18.2	8.0	26.3	37.0	10.7	Complied
Top	1988.750	18.5	8.0	26.5	37.0	10.5	Complied

Note(s):

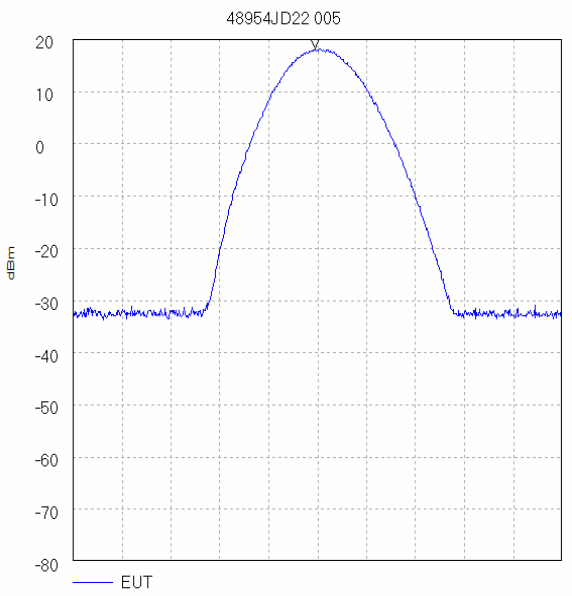
1. *The limit has been taken from FCC Part 90.219 for Class A Boosters*

2. *The limit in part 90.219 is expressed as ERP and the Output Power for a GSM 1900 device is expressed in EIRP. An approximate conversion equation is expressed below, demonstrating that the EUT still complies with the limit.*
   EIRP = ERP + 2.2 dB

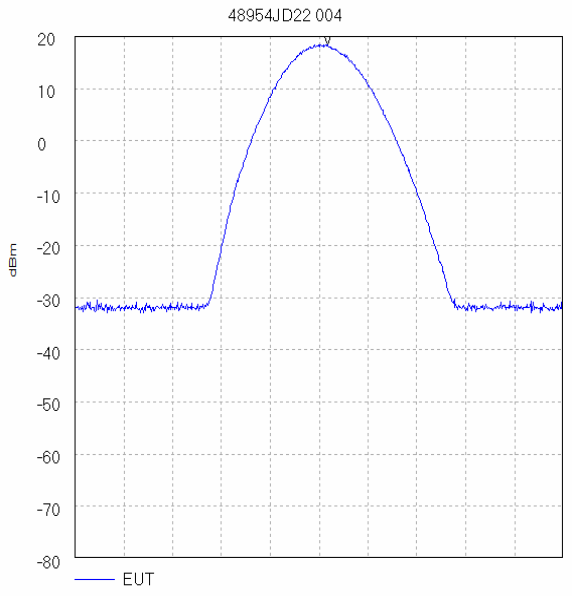
7.3.4.1. Transmitter Carrier Output Power: Section 2.1046 / 90.219 (Continued)



Centre 1.93125 GHz; Span 20.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.9312833 GHz, 18.5 dBm
Tested by JXH 15/03/2007 15:52:28



Centre 1.96 GHz; Span 20.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.9599 GHz, 18.17 dBm
Tested by JXH 15/03/2007 15:50:32



Centre 1.98875 GHz; Span 20.0 MHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.9890833 GHz, 18.5 dBm
Tested by JXH 15/03/2007 15:48:39

7.3.5. Transmitter Frequency Stability (Temperature Variation): Section 24.235 / 2.1055

Results: GSM 1900

Bottom Channel (1930.2 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	170	1930.200170	1930.0	0.200170	Complied
-20	1	1930.200001	1930.0	0.200001	Complied
-10	1	1930.200001	1930.0	0.200001	Complied
0	1	1930.200001	1930.0	0.200001	Complied
10	1	1930.200001	1930.0	0.200001	Complied
20	1	1930.200001	1930.0	0.200001	Complied
30	1	1930.200001	1930.0	0.200001	Complied
40	1	1930.200001	1930.0	0.200001	Complied
50	1	1930.200001	1930.0	0.200001	Complied

Top Channel (1989.8 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	170	1989.800170	1990.0	0.19983	Complied
-20	1	1989.800001	1990.0	0.199999	Complied
-10	0	1989.8	1990.0	0.2	Complied
0	0	1989.8	1990.0	0.2	Complied
10	0	1989.8	1990.0	0.2	Complied
20	0	1989.8	1990.0	0.2	Complied
30	1	1989.800001	1990.0	0.199999	Complied
40	1	1989.800001	1990.0	0.199999	Complied
50	0	1989.8	1990.0	0.2	Complied

7.3.6. Transmitter Frequency Stability (Voltage Variation): Section 24.235 / 2.1055

Results: GSM 1900

Bottom Channel (1930.2 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
99.0	0	1930.200000	1930.0	0.2	Complied
121.0	0	1930.20000	193.0	0.2	Complied

Top Channel (1989.8 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
99.0	1	1989.800001	1990.0	0.199999	Complied
121.0	0	1989.800000	1990.0	0.2	Complied

7.3.7. Transmitter Frequency Stability (Temperature Variation): Section 24.235 / 2.1055 (Continued)

Results: CDMA2000

Bottom Channel (1931.25 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	170	1931.250170	1930.0	1.25017	Complied
-20	0	1931.250000	1930.0	1.25	Complied
-10	0	1931.250000	1930.0	1.25	Complied
0	0	1931.250000	1930.0	1.25	Complied
10	0	1931.250000	1930.0	1.25	Complied
20	0	1931.250000	1930.0	1.25	Complied
30	0	1931.250000	1930.0	1.25	Complied
40	0	1931.250000	1930.0	1.25	Complied
50	0	1931.250000	1930.0	1.25	Complied

Top Channel (1988.75 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	170	1988.750170	1990.0	1.24983	Complied
-20	1	1988.750001	1990.0	1.249999	Complied
-10	1	1988.750001	1990.0	1.249999	Complied
0	1	1988.750001	1990.0	1.249999	Complied
10	1	1988.750001	1990.0	1.249999	Complied
20	1	1988.750001	1990.0	1.249999	Complied
30	1	1988.750001	1990.0	1.249999	Complied
40	0	1988.750000	1990.0	1.25	Complied
50	0	1988.750000	1990.0	1.25	Complied

7.3.8. Transmitter Frequency Stability (Voltage Variation): Section 24.235 / 2.1055

Results: CDMA2000

Bottom Channel (1931.25 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
99.0	0	1931.250000	1930.0	1.25	Complied
121.0	1	1931.250001	1930.0	1.2500001	Complied

Top Channel (1988.75 MHz)

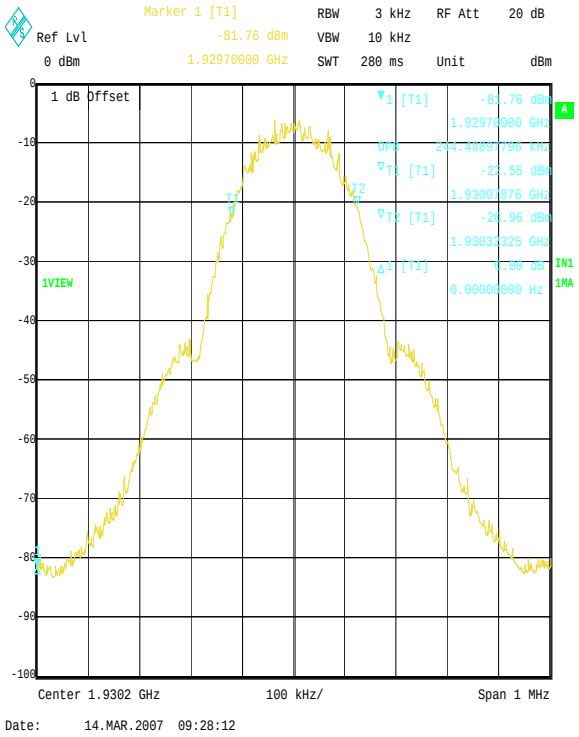
Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
99.0	1	1988.750001	1990.0	1.249999	Complied
121.0	1	1988.750001	199.0	1.249999	Complied

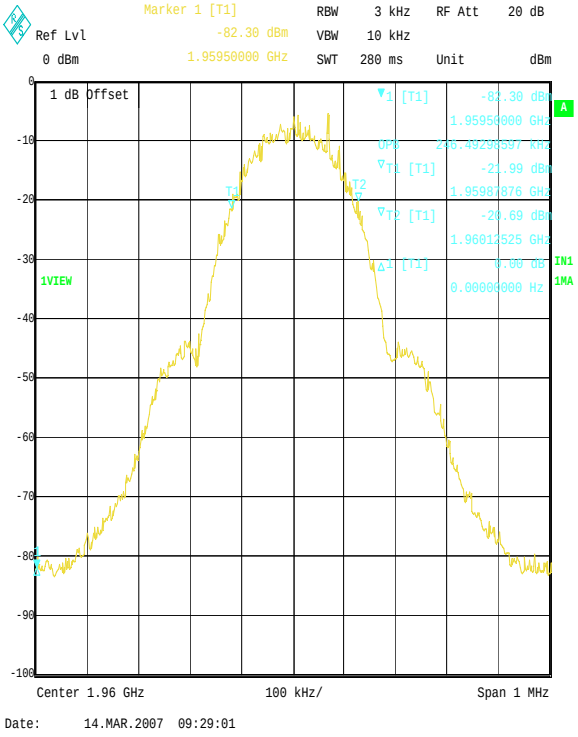
7.3.9. Transmitter Occupied Bandwidth: Section 24.238 / 2.1049

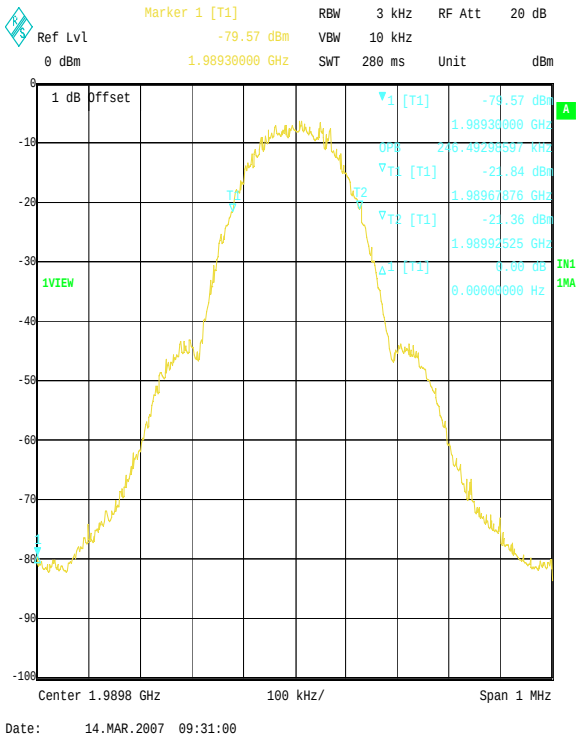
Results: GSM 1900

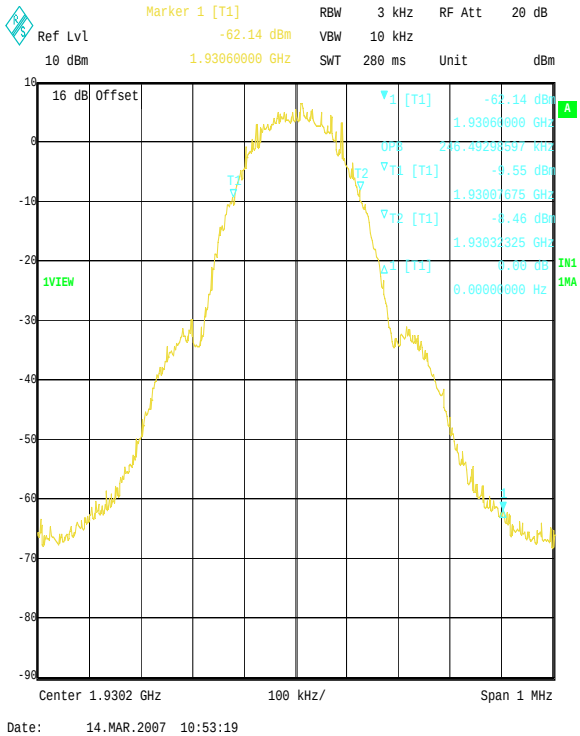
Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth Before EUT (kHz)	Occupied Bandwidth Through EUT (kHz)	Result
Bottom	1930.2	3.0	10.0	244.489	246.493	Complied
Middle	1960.0	3.0	10.0	246.493	242.485	Complied
Top	1989.8	3.0	10.0	246.493	244.489	Complied

7.3.9.1. Transmitter Occupied Bandwidth: Section 24.238 / 2.1049 (Continued)

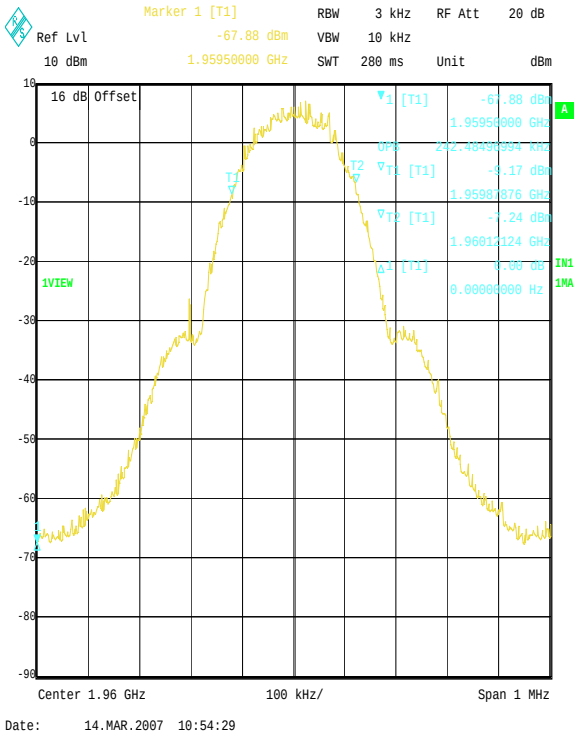


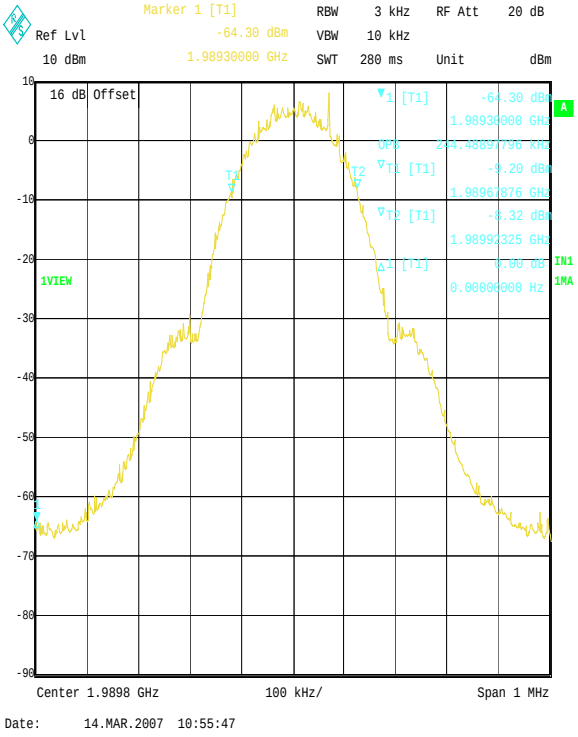






7.3.9.2. Transmitter Occupied Bandwidth: Section 24.238 / 2.1049 (Continued)



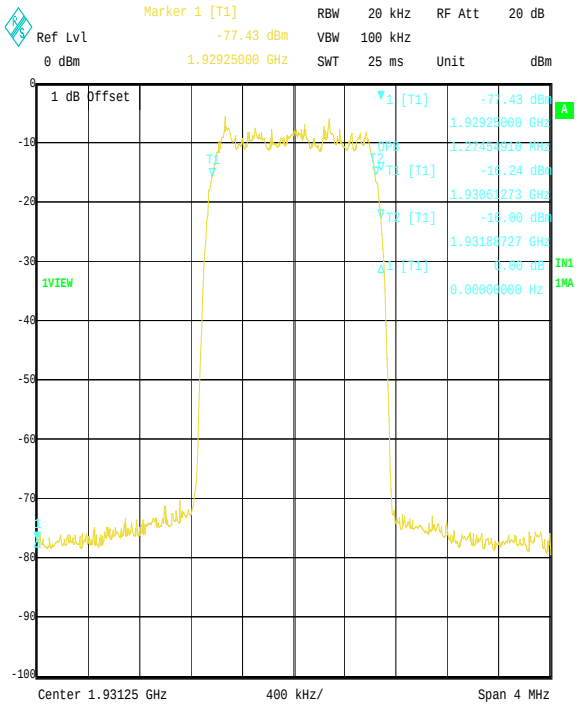


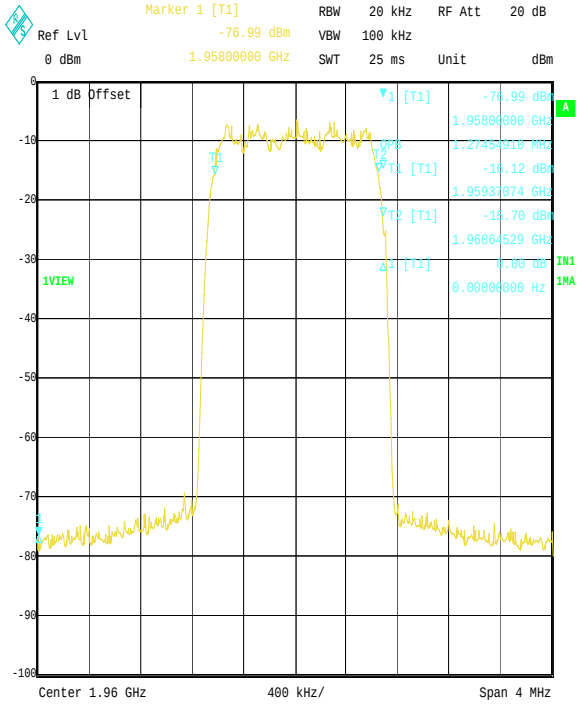
7.3.10. Transmitter Occupied Bandwidth: Section 24.238 / 2.1049

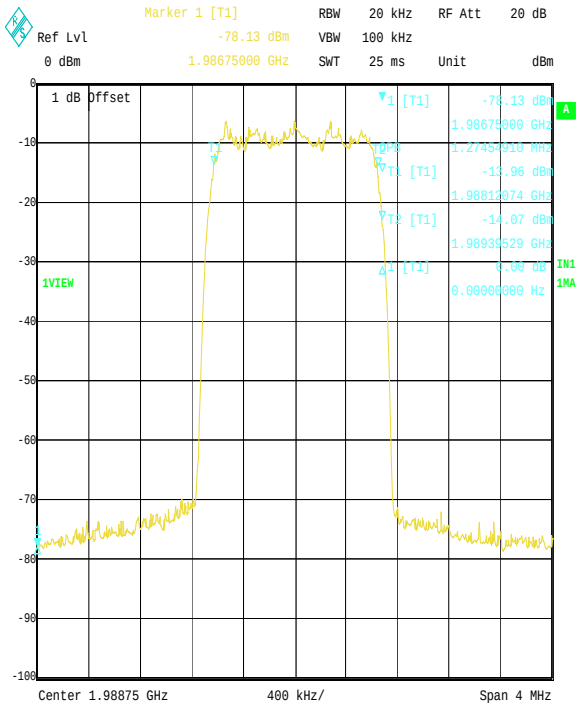
Results: CDMA2000

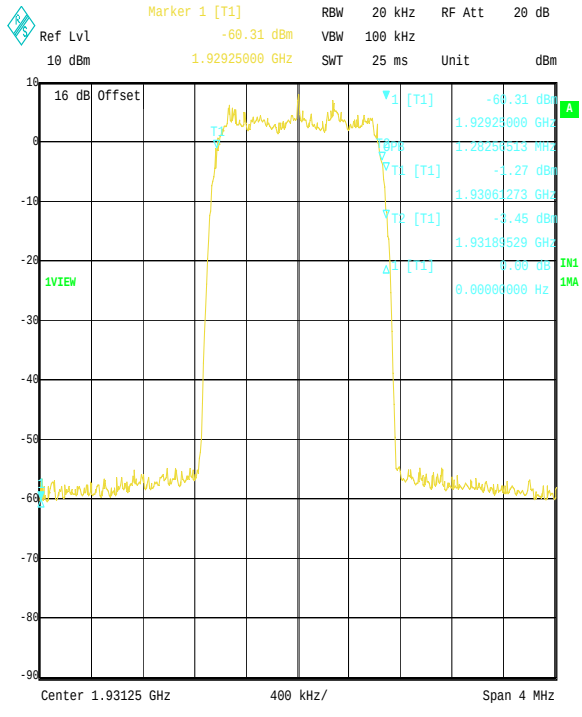
Channel	Frequency (MHz)	RBW (kHz)	VBW (kHz)	Occupied Bandwidth Before EUT (MHz)	Occupied Bandwidth Through EUT (MHz)	Result
Bottom	1931.25	20.0	100.0	1.2746	1.2826	Complied
Middle	1960.00	20.0	100.0	1.2746	1.2746	Complied
Top	1988.75	20.0	100.0	1.2746	1.2746	Complied

7.3.10.1. Transmitter Occupied Bandwidth: Section 24.238 / 2.1049 (Continued)

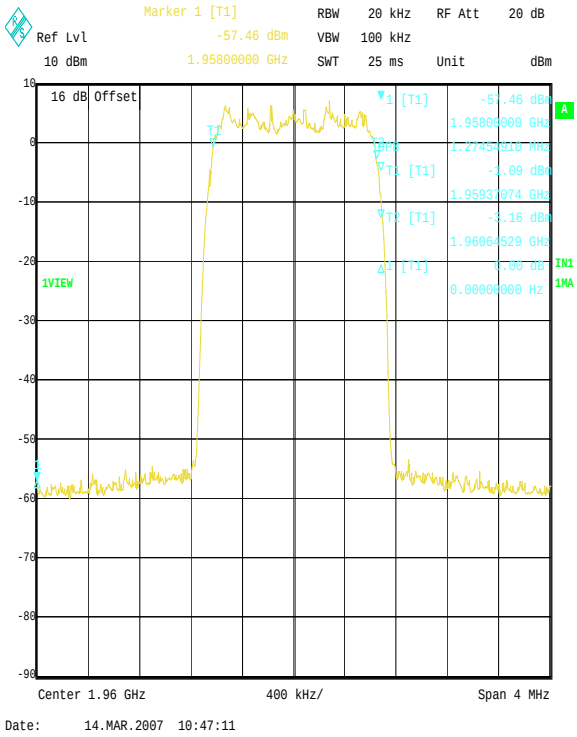


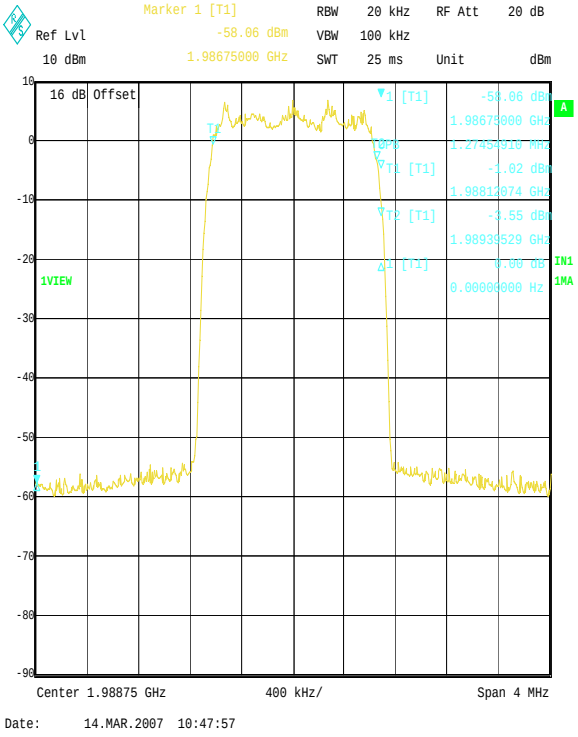






7.3.10.2. Transmitter Occupied Bandwidth: Section 24.238 / 2.1049 (Continued)





7.3.11. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238

Results: Fully Loaded (1xiDEN, 1xGSM850, 1xGSM1900, 1xCDMA2000 1900)

Frequency (GHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1.173	-29.3	-13.0	16.3	Complied
3.920	-32.5	-13.0	19.5	Complied
15.283	-42.0	-13.0	29.0	Complied
24.110	-37.8	-13.0	24.8	Complied

Results: GSM 1900 Only (3xGSM Signals – 1930.2 MHz, 1960.0 MHz, 1989.8 MHz)

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1801.0	-35.8	-13.0	22.8	Complied
1901.0	-31.8	-13.0	18.8	Complied
3920.0	-33.8	-13.0	20.8	Complied
8950.0	-44.5	-13.0	31.5	Complied
14750.0	-42.7	-13.0	29.7	Complied
15267.0	-42.2	-13.0	29.2	Complied
24030.0	-37.8	-13.0	24.8	Complied

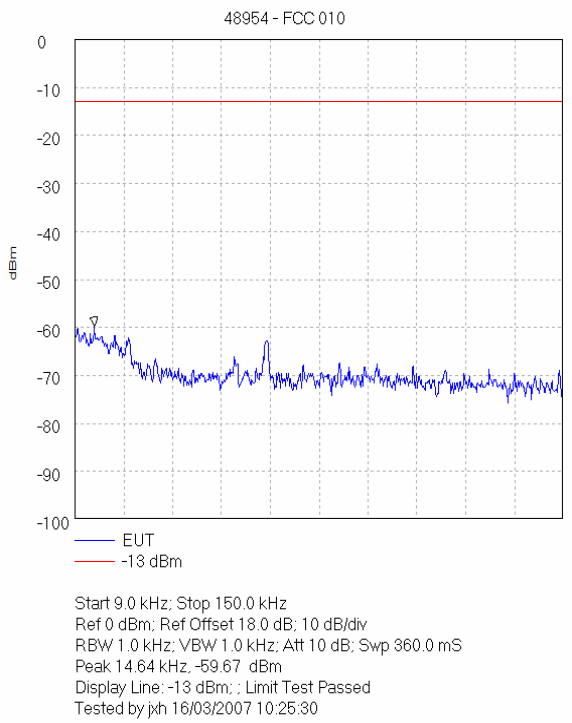
Results: CDMA2000 Only (3xGSM Signals – 1931.25 MHz, 1960.0 MHz, 1988.75 MHz)

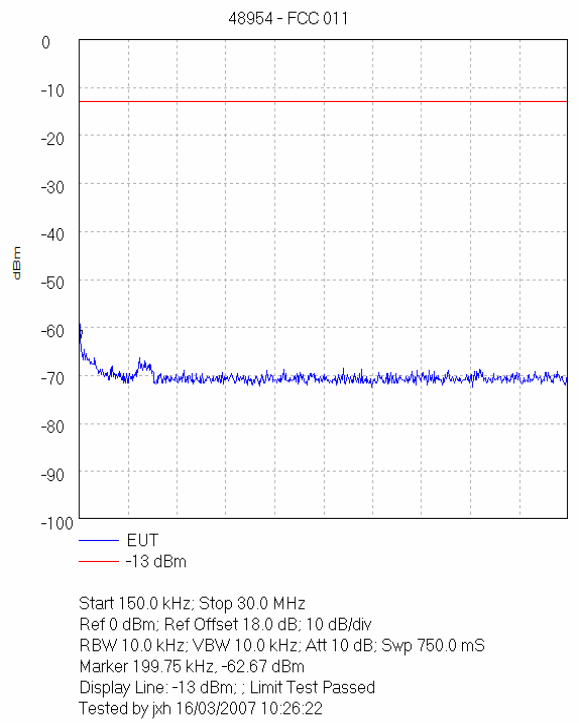
Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1876.0	-36.0	-13.0	23.0	Complied
1943.0	-31.7	-13.0	18.7	Complied
3920.0	-28.7	-13.0	15.7	Complied
8425.0	-45.3	-13.0	32.3	Complied
13667.0	-42.7	-13.0	29.7	Complied
18325.0	-41.8	-13.0	28.8	Complied
24040.0	-37.3	-13.0	24.3	Complied

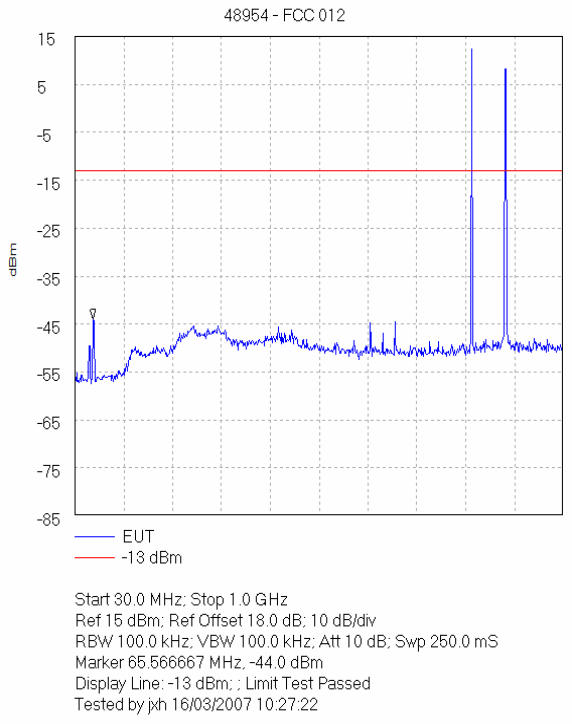
Note(s):

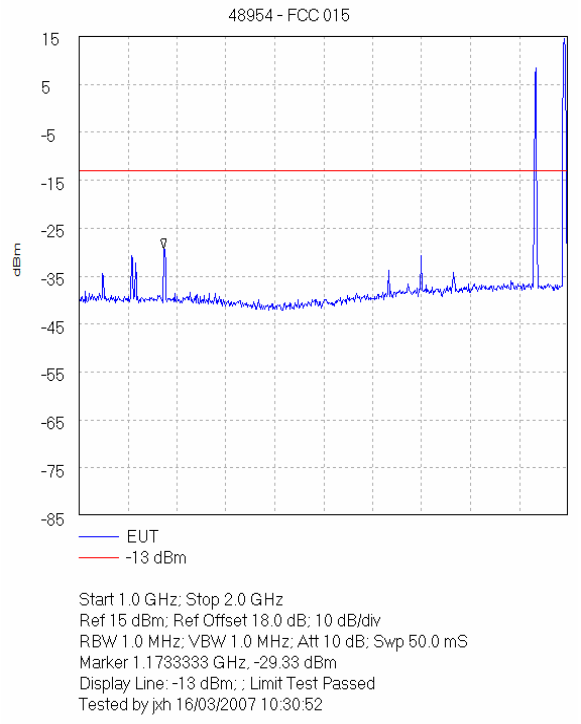
1. *Carriers identified on fully loaded (815.5 MHz, 881.6 MHz, 1930.2 MHz & 1988.75 MHz), GSM 850 only (1930.2 MHz, 1960.0 MHz, 1989.8 MHz) and CDMA2000 (1931.25 MHz, 1960.0 MHz, 1988.75 MHz) can be disregarded from the measurements as they are wanted signals. All other measurements were at least 20dB below the limit.*

7.3.11.1. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - Fully Loaded





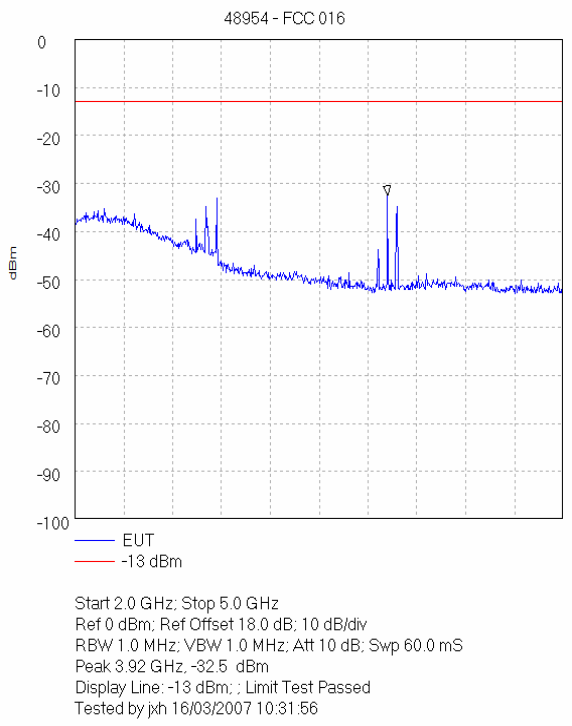




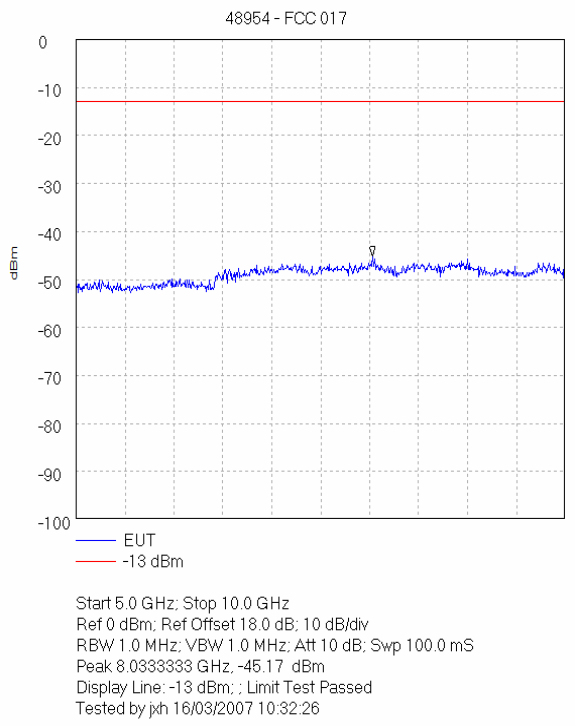
Carriers identified are exempt from measurements

Carriers identified are exempt from measurements

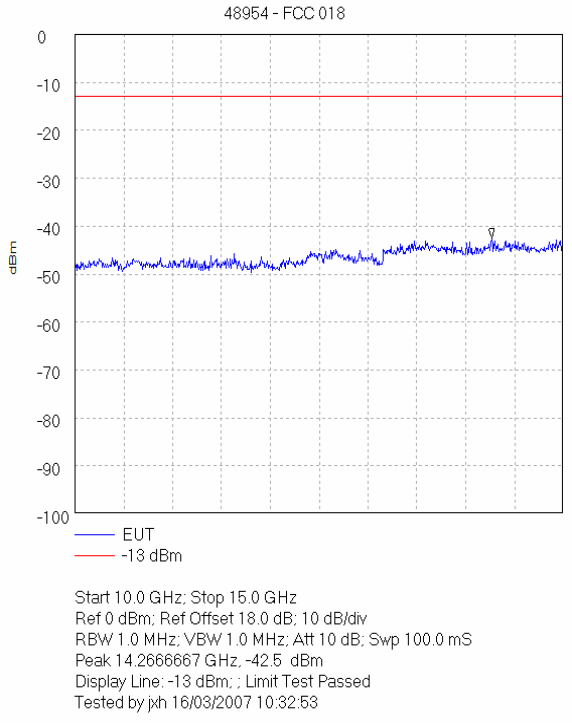
7.3.11.2. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - Fully Loaded



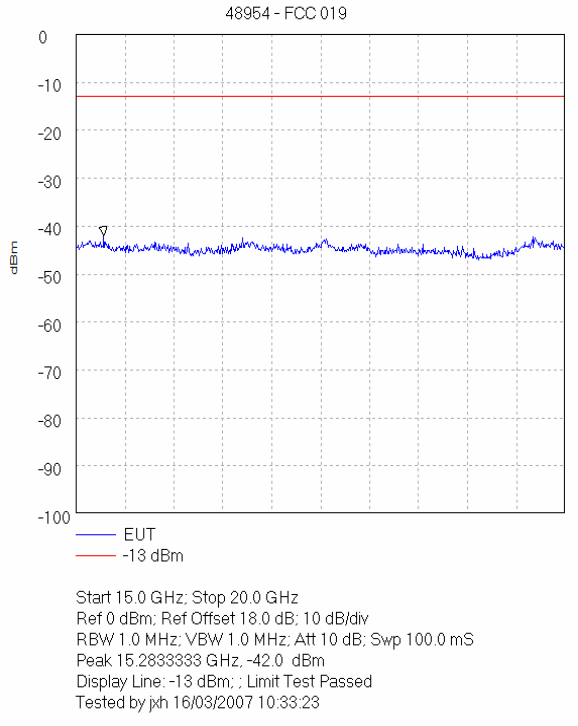
Start 2.0 GHz; Stop 5.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 60.0 mS
Peak 3.92 GHz, -32.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 10:31:56



Start 5.0 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 8.0333333 GHz, -45.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 10:32:26

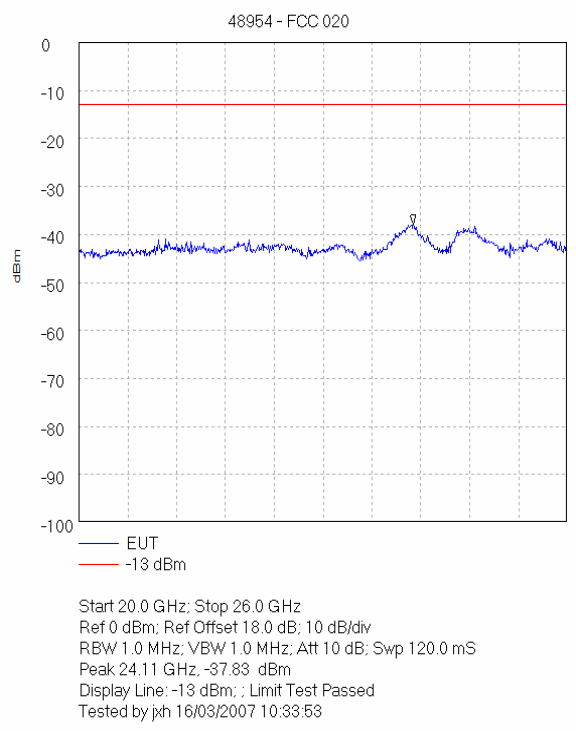


Start 10.0 GHz; Stop 15.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 14.2666667 GHz, -42.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 10:32:53

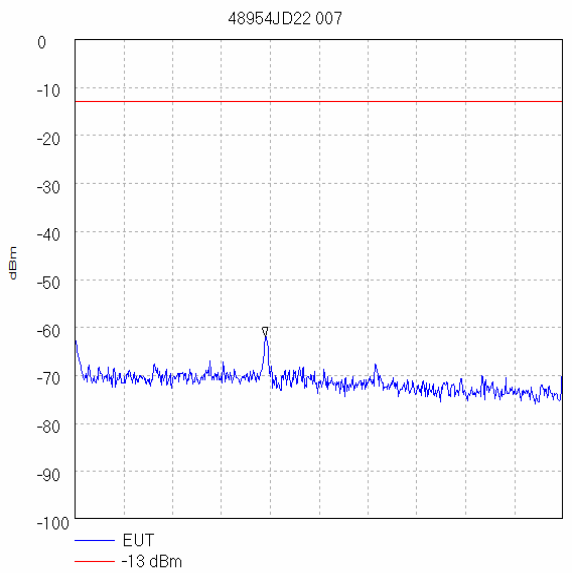


Start 15.0 GHz; Stop 20.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 15.2833333 GHz, -42.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 10:33:23

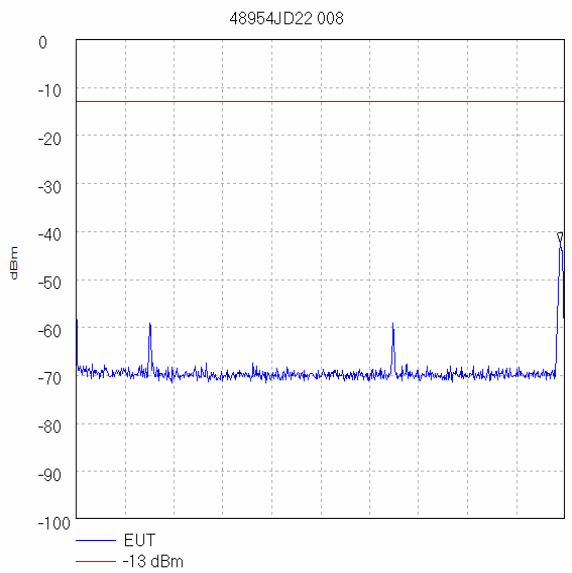
7.3.11.3. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - Fully Loaded



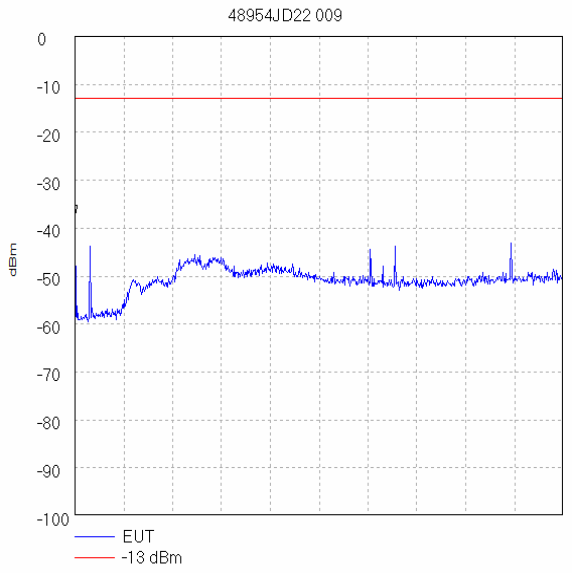
7.3.11.4. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - GSM 1900 Only



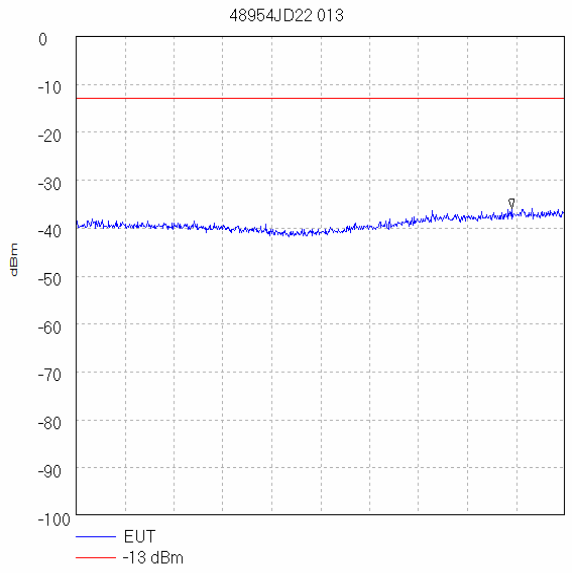
Start 9.0 kHz; Stop 150.0 kHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 kHz; VBW 1.0 kHz; Att 10 dB; Swp 360.0 mS
Peak 63.99 kHz, -62.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 14:56:51



Start 150.0 kHz; Stop 30.0 MHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 10.0 kHz; Att 10 dB; Swp 750.0 mS
Peak 29.7015 MHz, -42.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 14:58:22

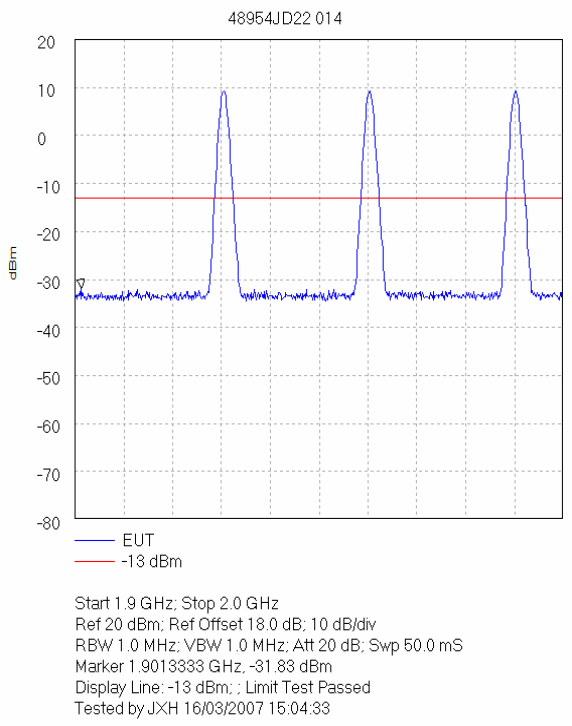


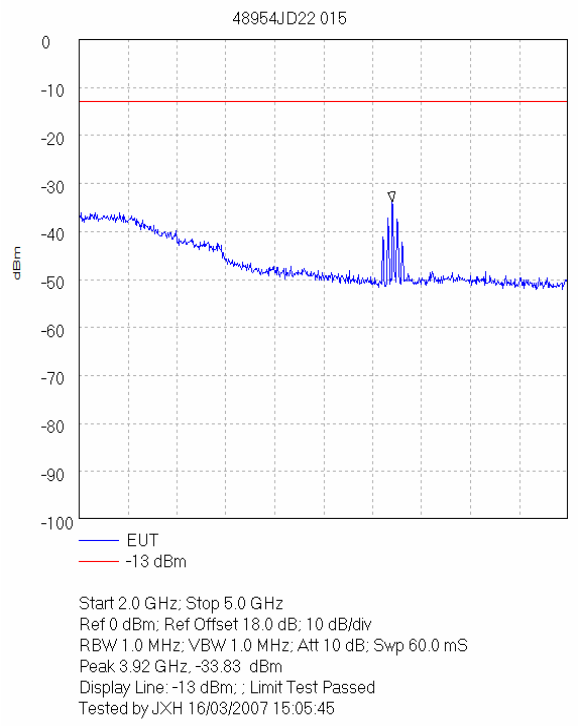
Start 30.0 MHz; Stop 1.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 30.0 MHz, -37.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 14:58:57



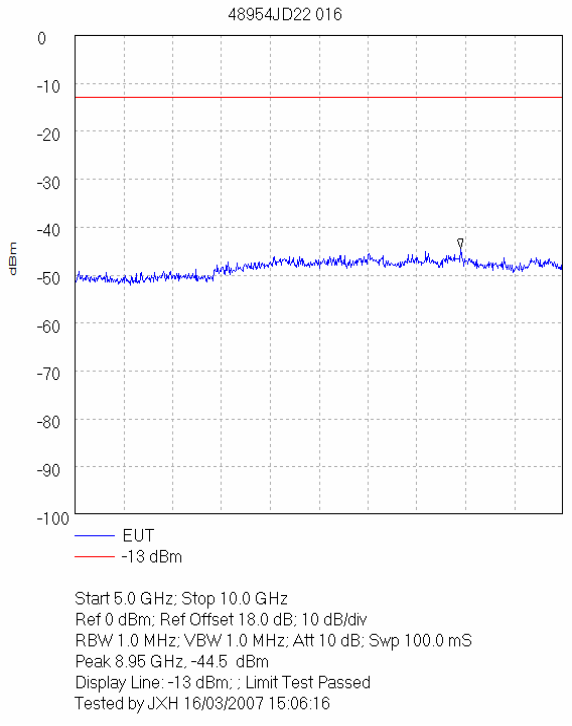
Start 1.0 GHz; Stop 1.9 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 1.801 GHz, -35.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:03:40

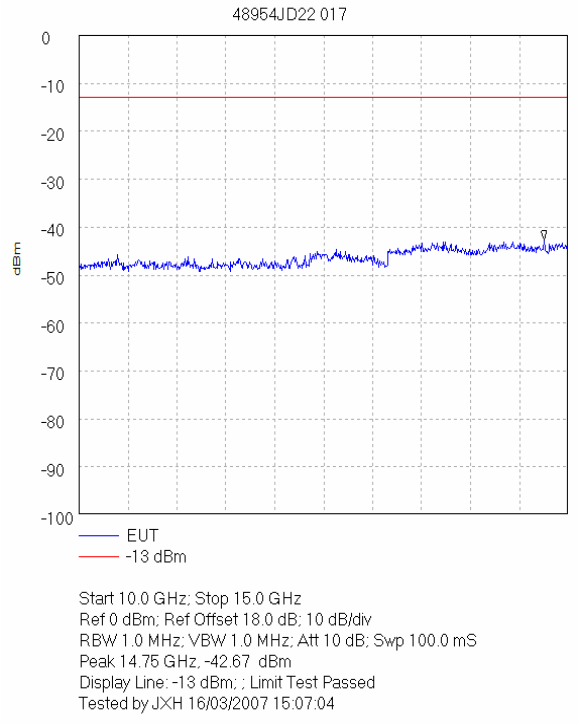
7.3.11.5. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - GSM 1900 Only



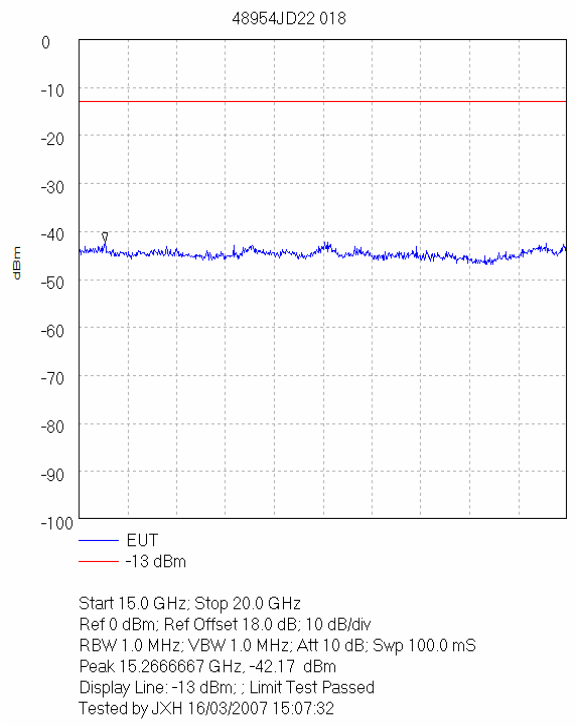


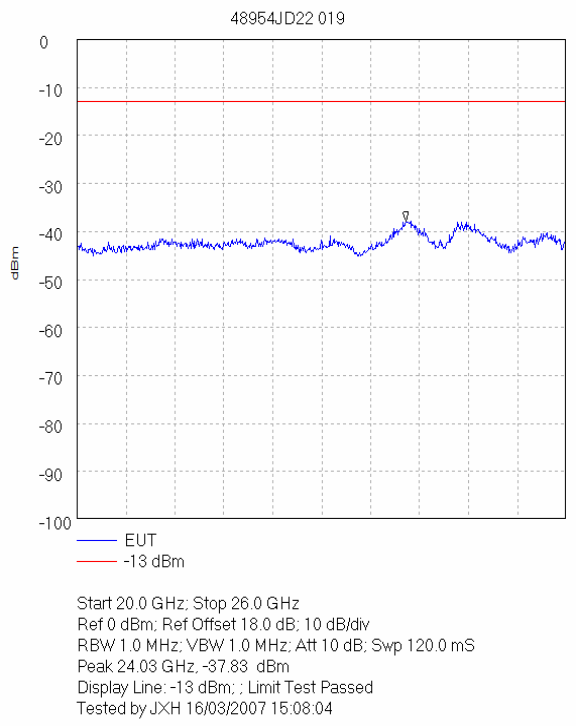
Carriers identified are exempt from measurements



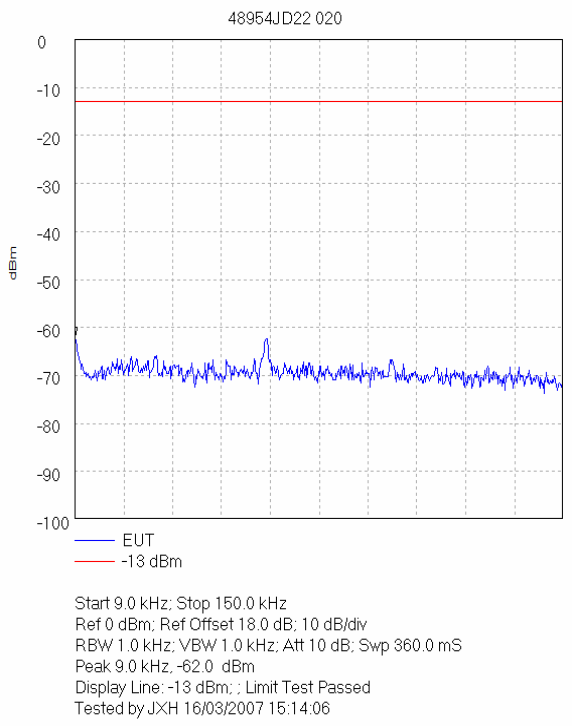


7.3.11.6. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - GSM 1900 Only

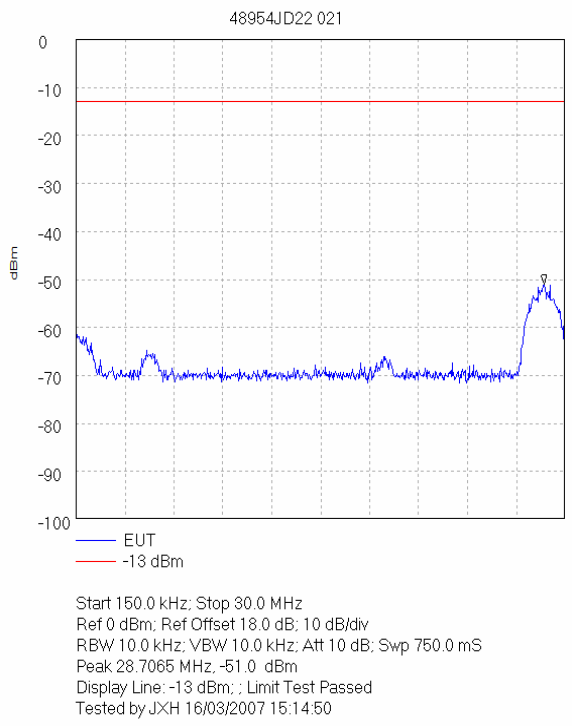




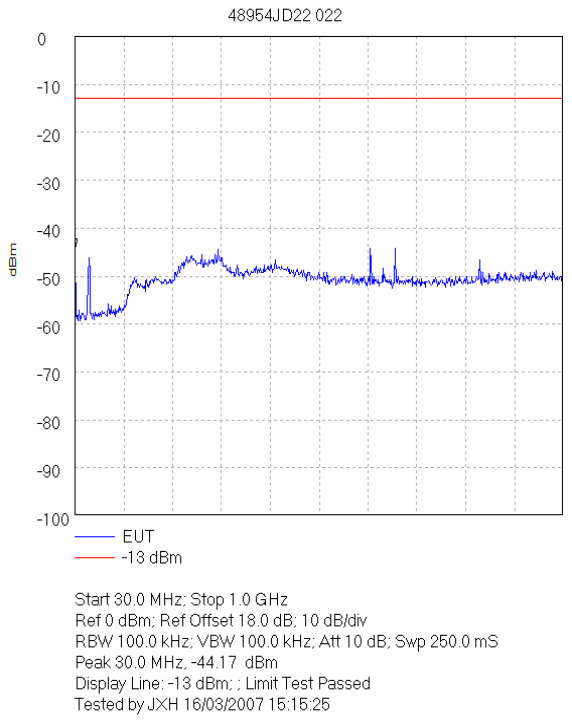
7.3.11.7. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - CDMA2000 Only



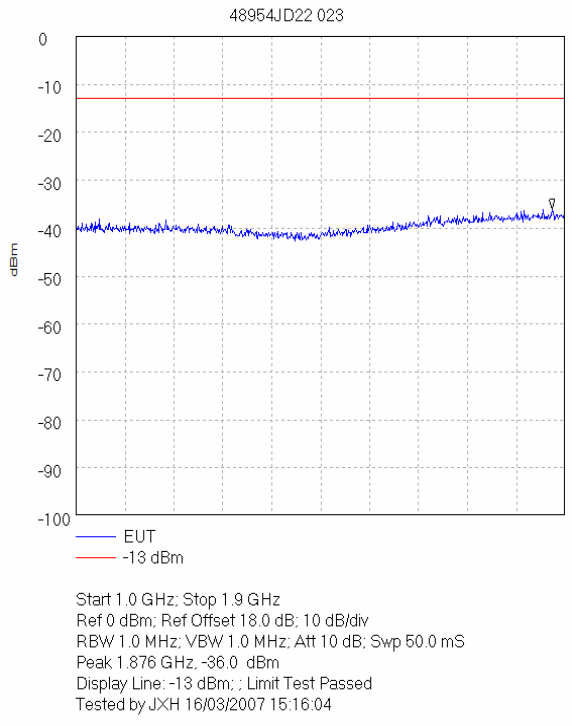
Start 9.0 kHz; Stop 150.0 kHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 kHz; VBW 1.0 kHz; Att 10 dB; Swp 360.0 mS
Peak 9.0 kHz, -62.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:14:06



Start 150.0 kHz; Stop 30.0 MHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 10.0 kHz; VBW 10.0 kHz; Att 10 dB; Swp 750.0 mS
Peak 28.7065 MHz, -51.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:14:50

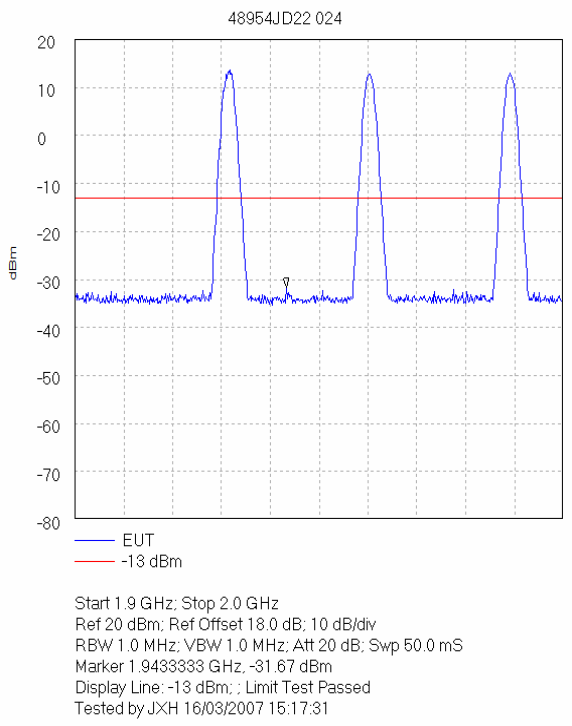


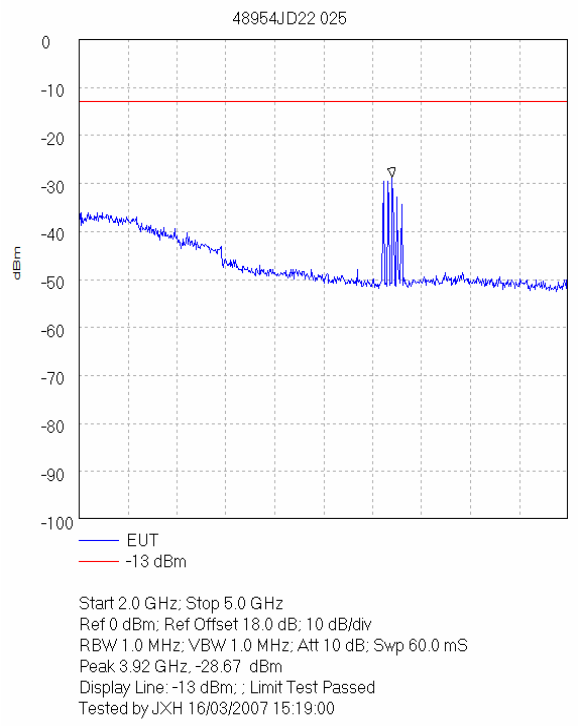
Start 30.0 MHz; Stop 1.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 30.0 MHz, -44.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:15:25



Start 1.0 GHz; Stop 1.9 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 1.876 GHz, -36.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:16:04

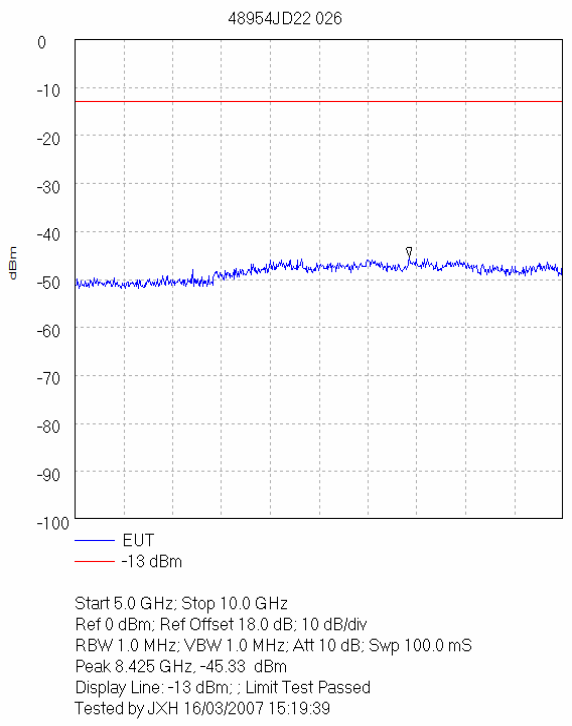
7.3.11.8. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - CDMA2000 Only



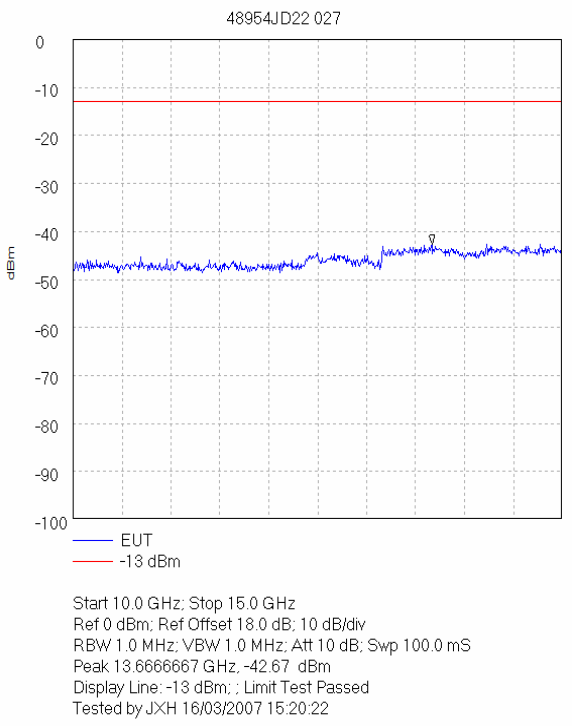


Carriers identified are exempt from measurements

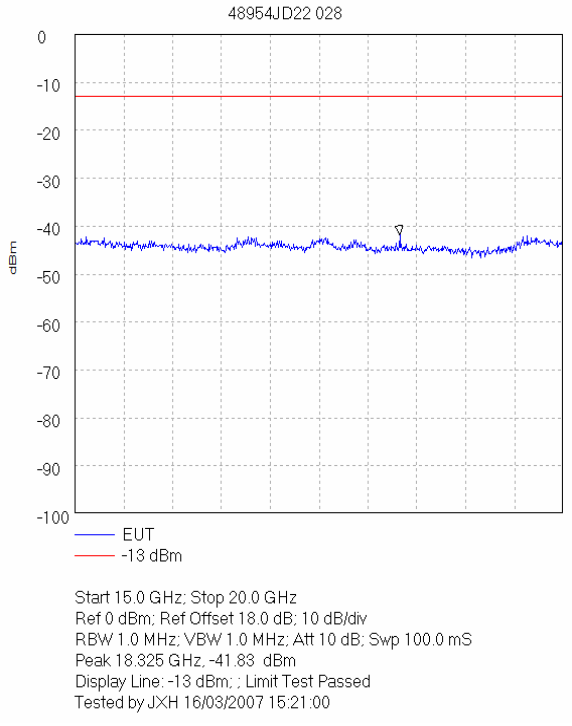
7.3.11.9. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued) - CDMA2000 Only



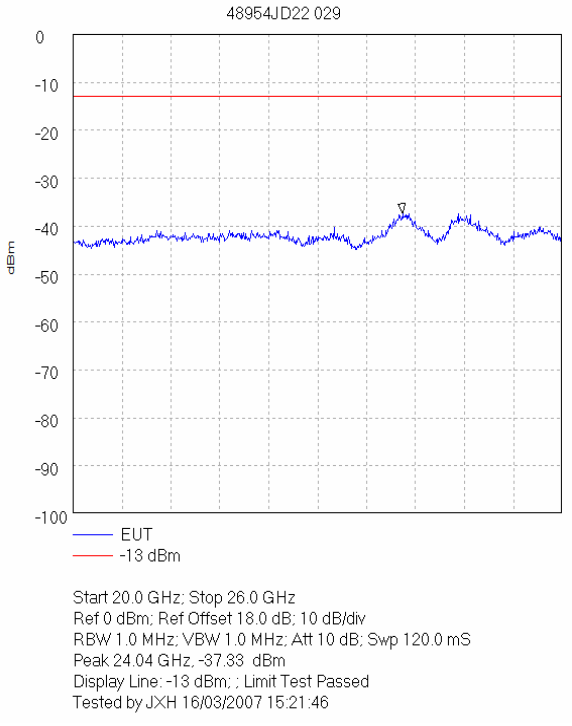
Start 5.0 GHz; Stop 10.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 8.425 GHz, -45.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:19:39



Start 10.0 GHz; Stop 15.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 13.6666667 GHz, -42.67 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:20:22



Start 15.0 GHz; Stop 20.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 100.0 mS
Peak 18.325 GHz, -41.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:21:00



Start 20.0 GHz; Stop 26.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 120.0 mS
Peak 24.04 GHz, -37.33 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by JXH 16/03/2007 15:21:46

7.3.12. Transmitter Conducted Emissions (Out of Band): Section 2.1051 / 24.238 (Continued)

Results: GSM 1900

Integrated Power Over 1 MHz Strip Band: 1927 to 1928 MHz

2nd 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	25.1	6	46.8
2	22.4	7	44.7
3	15.1	8	47.9
4	17.8	9	20.0
5	23.4	10	15.1
Total Peak Power:	278.3 nW/MHz		

Integrated Power Over 1 MHz Strip Band: 1928 to 1929 MHz

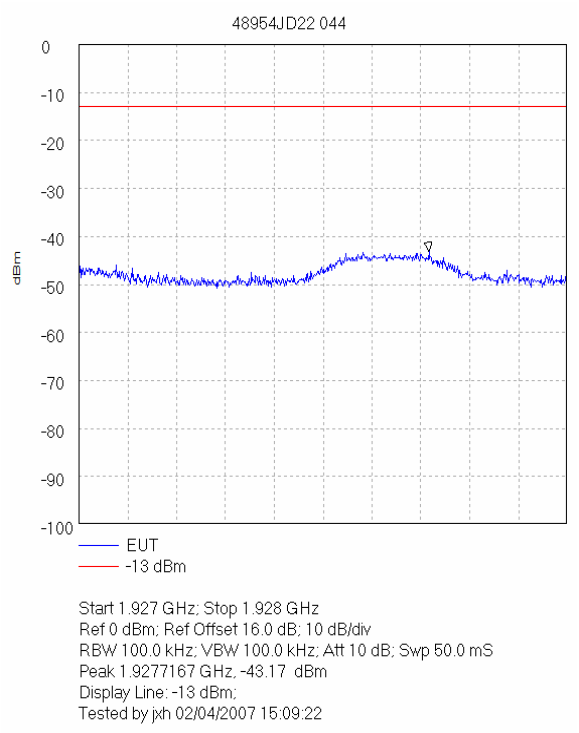
1st 1 MHz block immediately outside adjacent frequency block

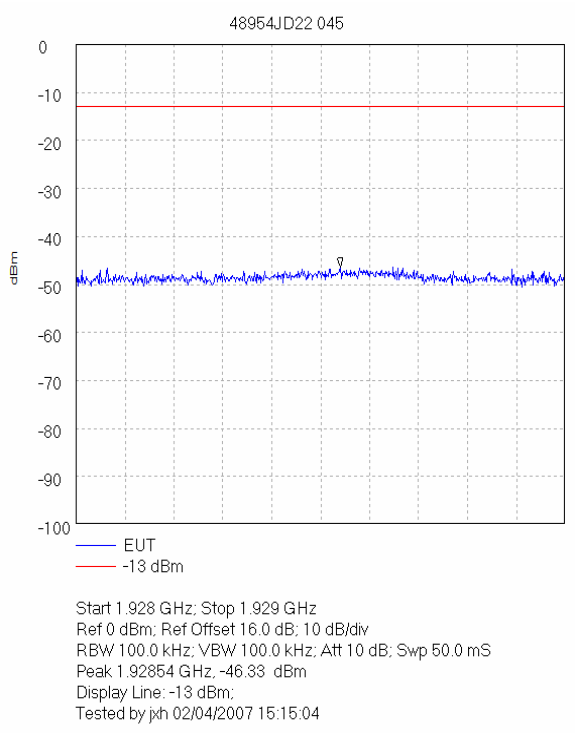
100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	21.4	6	23.4
2	17.8	7	23.4
3	19.1	8	19.1
4	19.1	9	20.9
5	20.9	10	18.6
Total Peak Power:	203.6 nW/MHz		

Results:

Band (MHz)	Peak Power (nW/MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Status
1927 to 1928	47.9	-35.6	-13.0	-22.6	Complied
1928 to 1929	23.4	-36.9	-13.0	-23.9	Complied

Transmitter Conducted Emissions at Band Edges: Section 2.1051 / 24.238 (Continued)





7.3.13. Transmitter Conducted Emissions at Band Edges: Section 2.1051 / 24.238 (Continued)

Results: GSM 1900

Integrated Power Over 1 MHz Strip Band: 1991 to 1992 MHz

1st 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	12.6	6	15.9
2	12.6	7	12.6
3	13.5	8	11.5
4	12.0	9	13.5
5	15.9	10	15.9
Total Peak Power:	136.1 nW/MHz		

Integrated Power Over 1 MHz Strip Band: 1992 to 1993 MHz

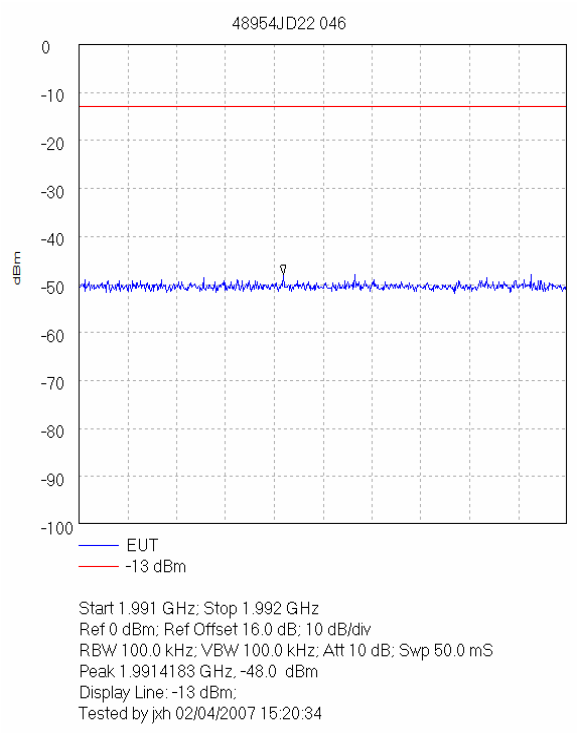
2nd 1 MHz block immediately outside adjacent frequency block

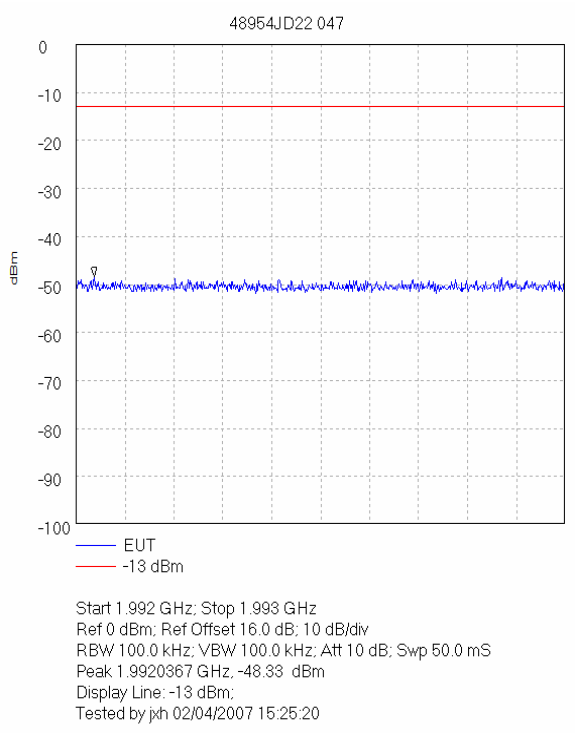
100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	14.8	6	11.7
2	10.7	7	12.6
3	12.6	8	12.6
4	12.6	9	13.5
5	12.6	10	12.0
Total Peak Power:	125.7 nW/MHz		

Results:

Band (MHz)	Peak Power (nW/MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Status
1991 to 1992	15.9	-38.7	-13.0	25.7	Complied
1992 to 1993	14.8	-39.0	-13.0	26.0	Complied

Transmitter Conducted Emissions at Band Edges: Section 2.1051 / 24.238 (Continued)





7.3.14. Transmitter Conducted Emissions at Band Edges: Section 2.1051 / 24.238

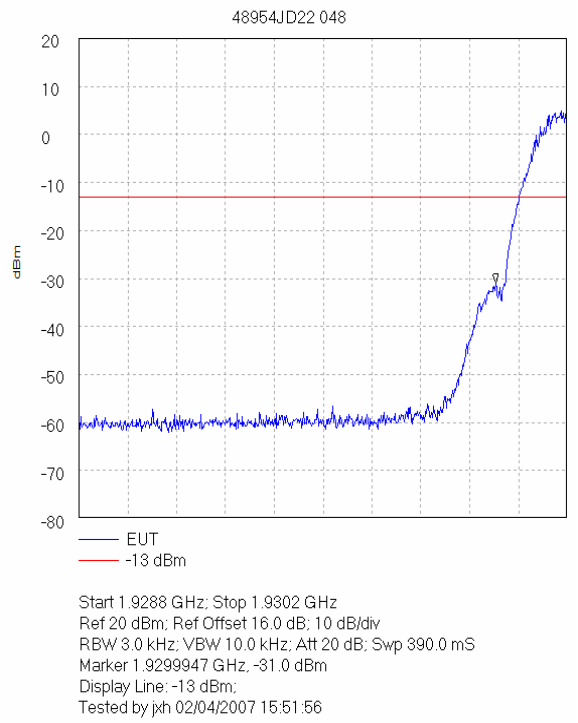
Results: GSM 1900

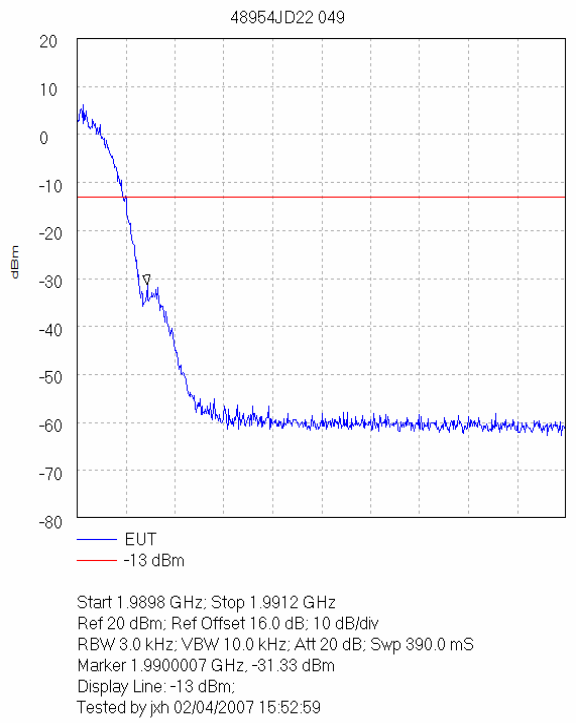
Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1929.995	-31.0	-13.0	18.0	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1990.001	-31.3	-13.0	18.3	Complied





7.3.15. Transmitter Out of Band Conducted Emissions: Section 2.1051 / 24.238 (Continued)

Results: CDMA2000

Integrated Power Over 1 MHz Strip Band: 1927 to 1928 MHz

2nd 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	12.0	6	13.5
2	15.1	7	15.1
3	13.2	8	15.1
4	13.2	9	14.1
5	14.1	10	15.1
Total Peak Power:	140.7 nW/MHz		

Integrated Power Over 1 MHz Strip Band: 1928 to 1929 MHz

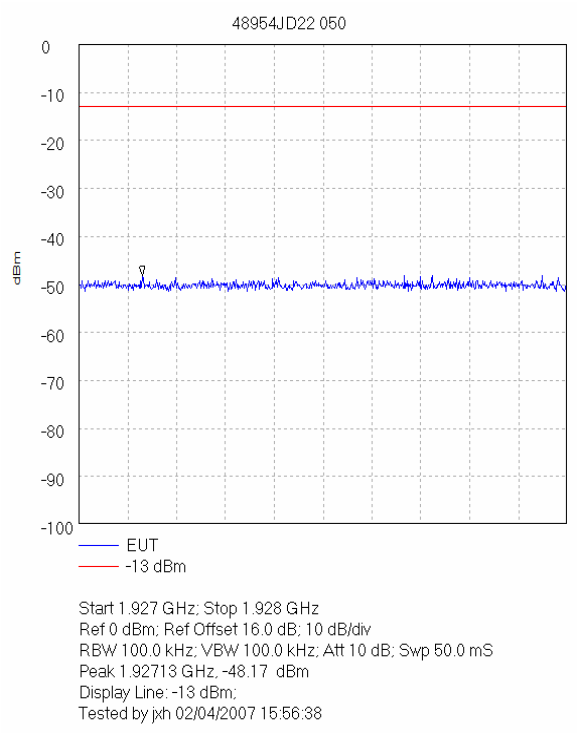
1st 1 MHz block immediately outside adjacent frequency block

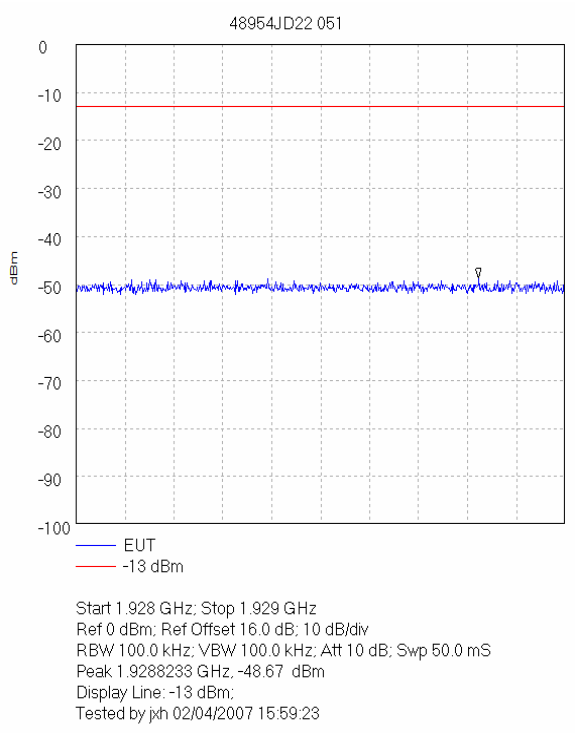
100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	11.2	6	10.5
2	12.6	7	11.2
3	11.8	8	11.8
4	13.2	9	13.5
5	11.2	10	12.0
Total Peak Power:	118.9 nW/MHz		

Results:

Band (MHz)	Peak Power (nW/MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Status
1927 to 1928	15.1	-38.5	-13.0	18.5	Complied
1928 to 1929	13.5	-39.3	-13.0	19.3	Complied

Transmitter Out of Band Conducted Emissions: Section 2.1051 / 24.238 (Continued)





7.3.16. Transmitter Out of Band Conducted Emissions: Section 2.1051 / 24.238 (Continued)

Results: CDMA2000

Integrated Power Over 1 MHz Strip Band: 1991 to 1992 MHz

1st 1 MHz block immediately outside adjacent frequency block

100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	26.3	6	19.1
2	25.1	7	19.1
3	18.6	8	21.4
4	24.0	9	22.4
5	20.0	10	23.4
Total Peak Power:	219.3 nW/MHz		

Integrated Power Over 1 MHz Strip Band: 1992 to 1993 MHz

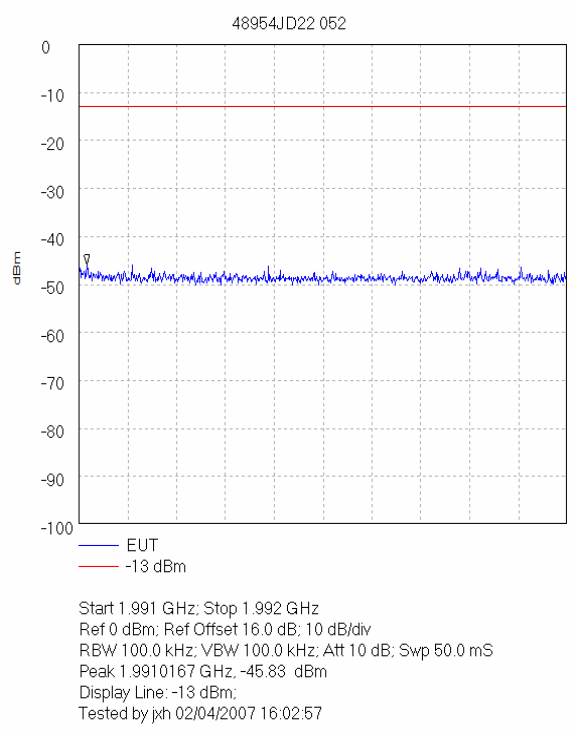
2nd 1 MHz block immediately outside adjacent frequency block

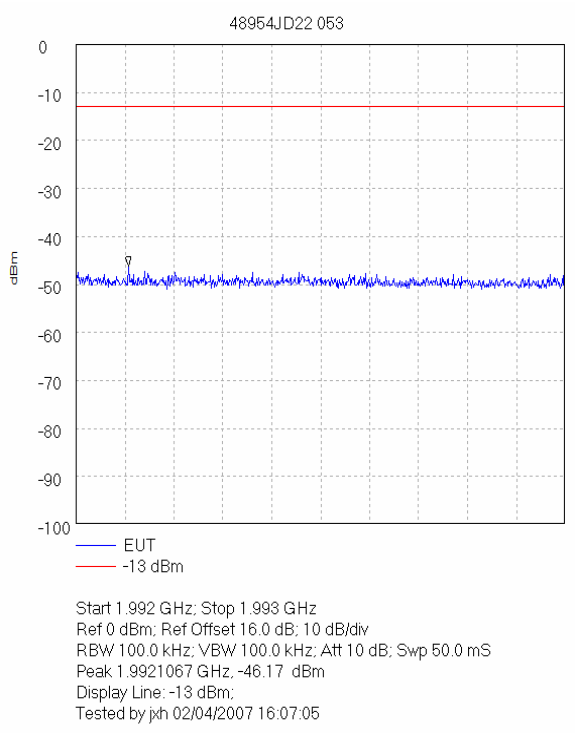
100 kHz Strip Number	Peak Power (nW/100 kHz)	100 kHz Strip Number	Peak Power (nW/100 kHz)
1	17.8	6	17.0
2	24.0	7	14.8
3	17.8	8	15.9
4	17.8	9	13.2
5	16.6	10	16.6
Total Peak Power:	171.3 nW/MHz		

Results:

Band (MHz)	Peak Power (nW/MHz)	Peak Power (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)	Status
1991 to 1992	26.3	-36.6	-13.0	23.6	Complied
1992 to 1993	24.0	-37.6	-13.0	24.6	Complied

Transmitter Out of Band Conducted Emissions: Section 2.1051 / 24.238 (Continued)





7.3.17. Transmitter Conducted Emissions at Band Edges: Section 2.1051 / 24.238 (Continued)

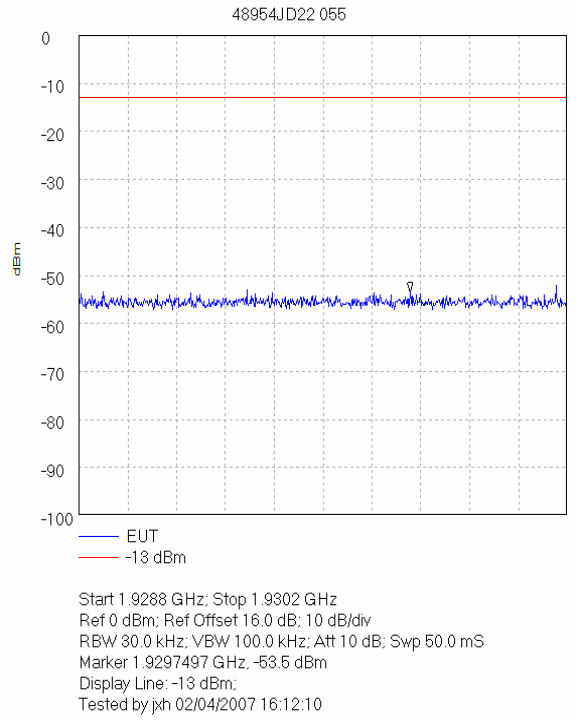
Results: CDMA2000

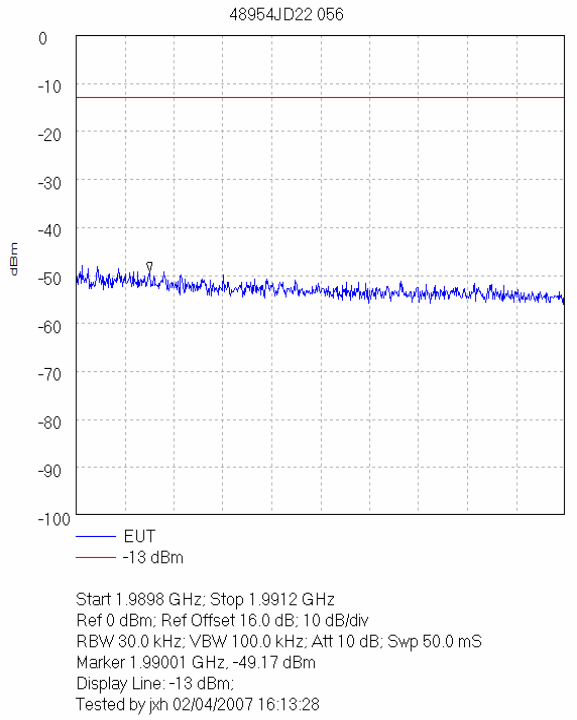
Bottom Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1929.750	-53.5	-13.0	40.5	Complied

Top Band Edge

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1990.010	-49.2	-13.0	36.2	Complied





7.3.18. Transmitter Out of Band Radiated Emissions: Section 2.1053 / 24.238 (Continued)

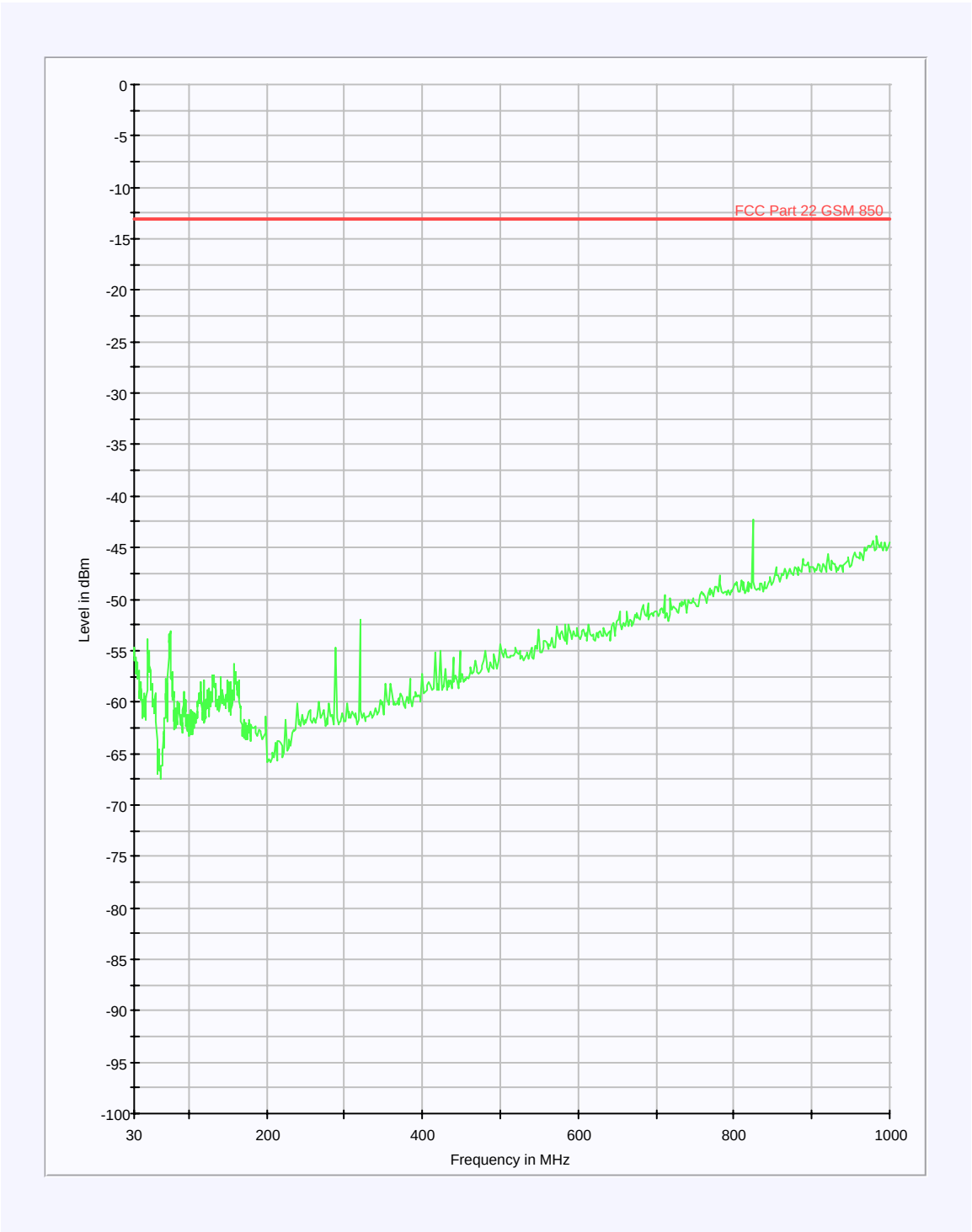
Results: Fully Loaded

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
17842.0	-41.0	-13.0	-28.0	Complied
25792.0	-45.2	-13.0	-32.2	Complied

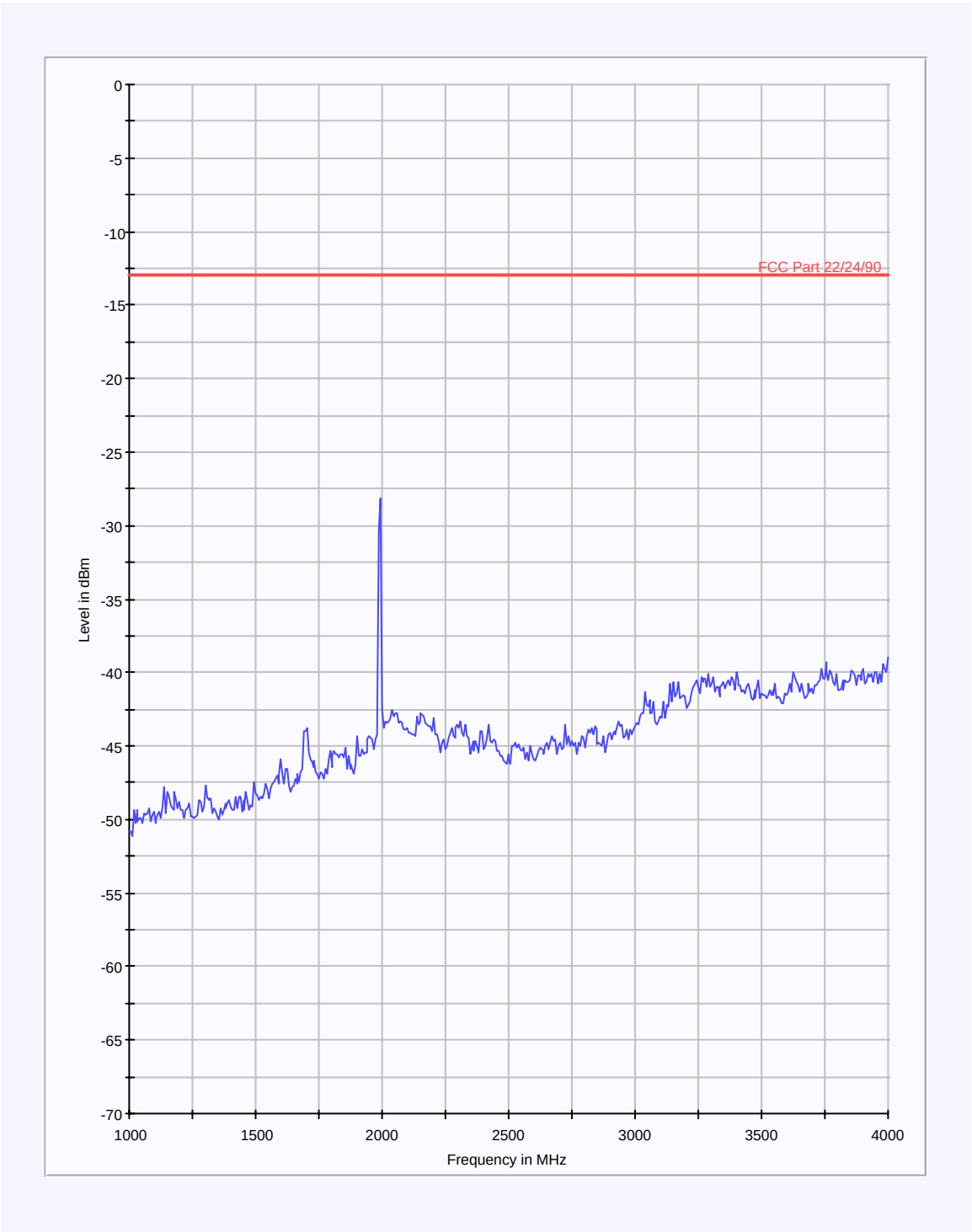
Note(s):

1. All other emissions were at least 20dB below the limit.

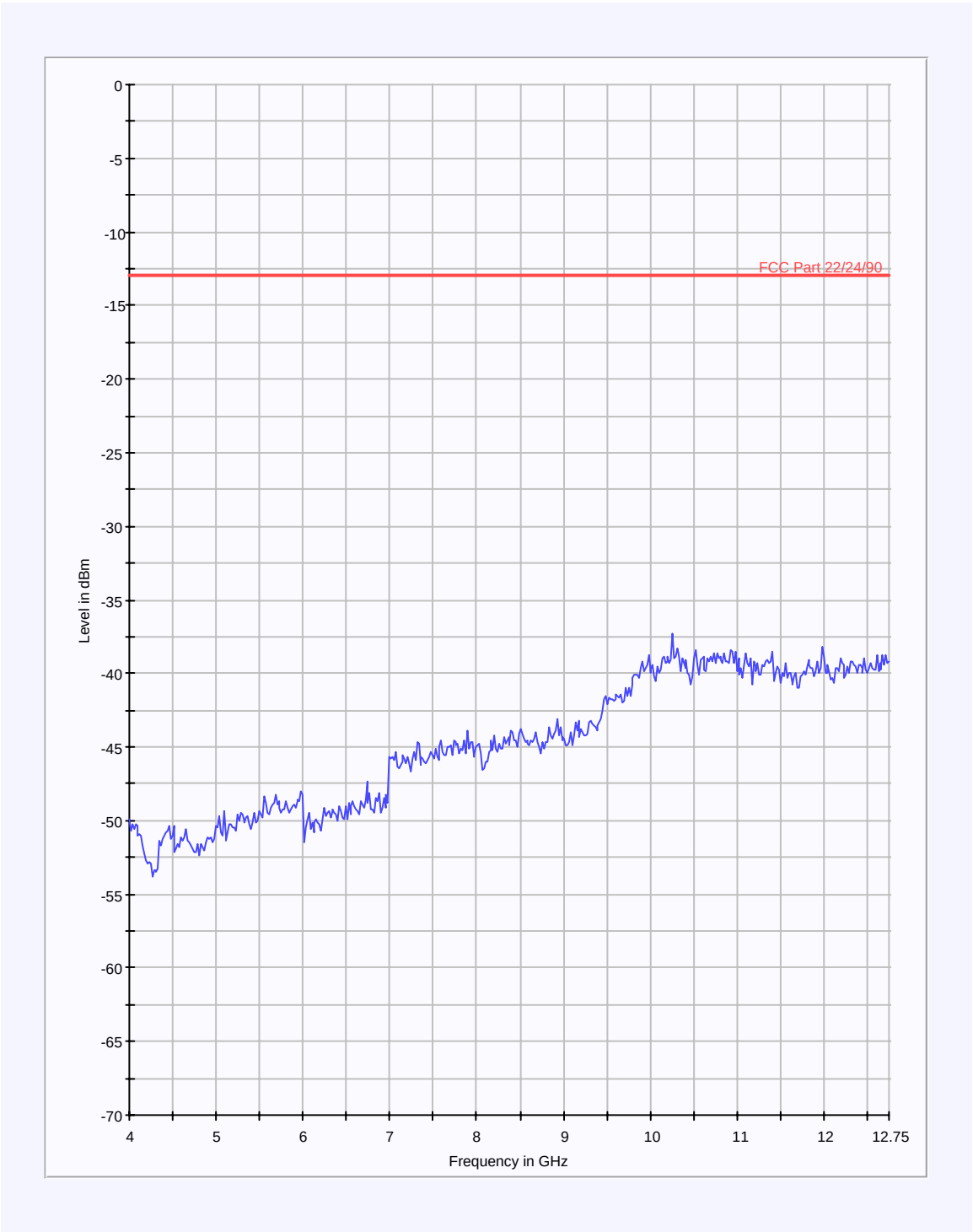
Transmitter Out of Band Radiated Emissions: Section 2.1053 / 24.238 (Continued)



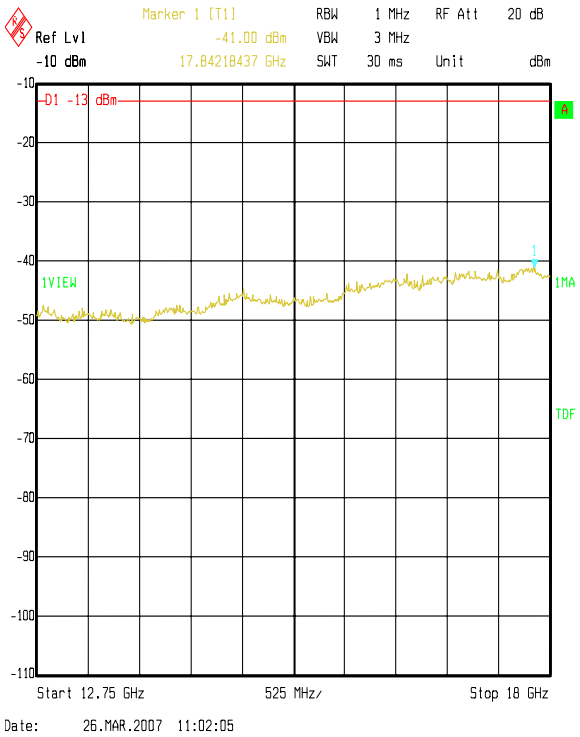
Transmitter Out of Band Radiated Emissions: Section 2.1053 / 24.238 (Continued)

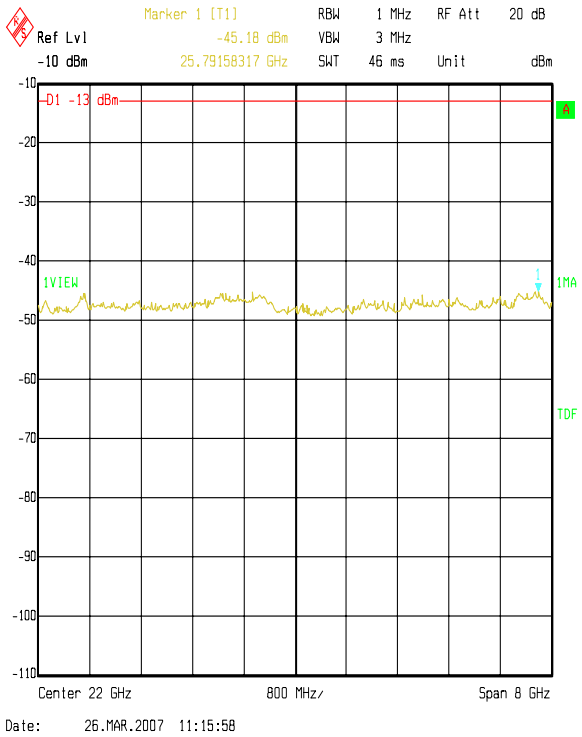


Transmitter Out of Band Radiated Emissions: Section 2.1053 / 24.238 (Continued)



Transmitter Out of Band Radiated Emissions: Section 2.1053 / 24.238 (Continued)





7.3.19. Intermodulation: Section 24.238 / 2.1053

Results:

Fully Loaded

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
665.35	-42.3	-13.0	29.3	Complied
1790.0	-24.5	-13.0	11.5	Complied
2148.0	-32.2	-13.0	19.2	Complied
3980.0	-31.2	-13.0	18.2	Complied
4430.0	-34.5	-13.0	21.5	Complied
5435.0	-36.8	-13.0	23.8	Complied

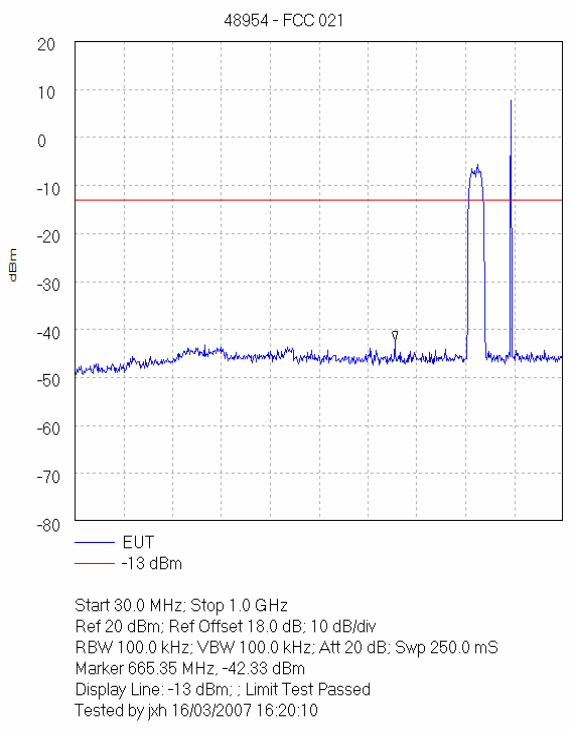
GSM850 – 3 Signals

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
59.1	-43.2	-13.0	30.2	Complied
1888.0	-36.5	-13.0	23.5	Complied
1965.0	-31.7	-13.0	18.7	Complied
2175.0	-35.7	-13.0	22.7	Complied
3867.0	-35.8	-13.0	22.8	Complied
4152.0	-48.0	-13.0	35.0	Complied
5953.0	-48.7	-13.0	35.7	Complied

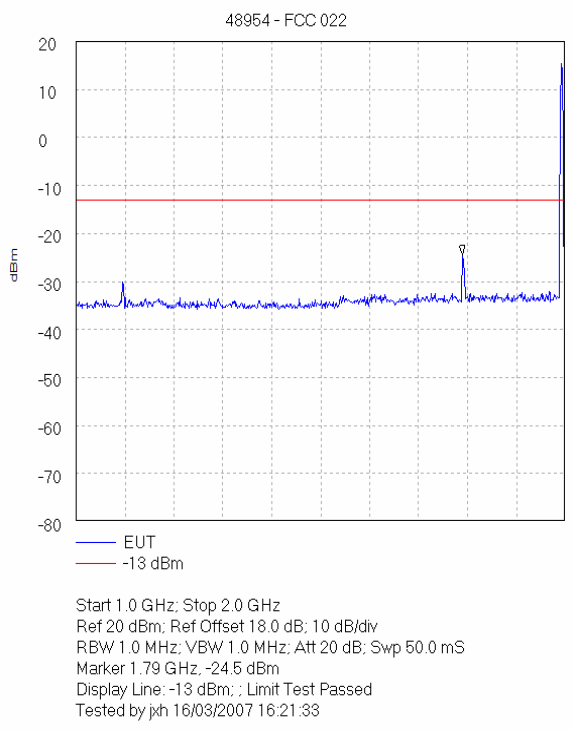
CDMA2000 – 3 Signals

Frequency (MHz)	Peak Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
57.483	-36.0	-13.0	23.0	Complied
1827.0	-36.2	-13.0	23.2	Complied
1942.0	-32.2	-13.0	19.2	Complied
2120.0	-35.2	-13.0	22.2	Complied
3923.0	-30.5	-13.0	17.5	Complied
4607.0	-48.0	-13.0	35.0	Complied
5782.0	-48.8	-13.0	35.8	Complied

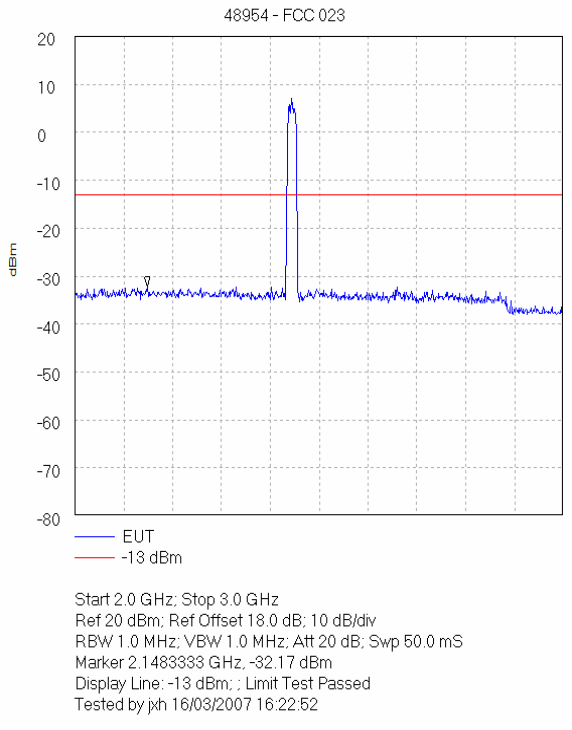
7.3.19.1. Intermodulation: Section 24.238 / 2.1053 (Continued) - Fully Loaded

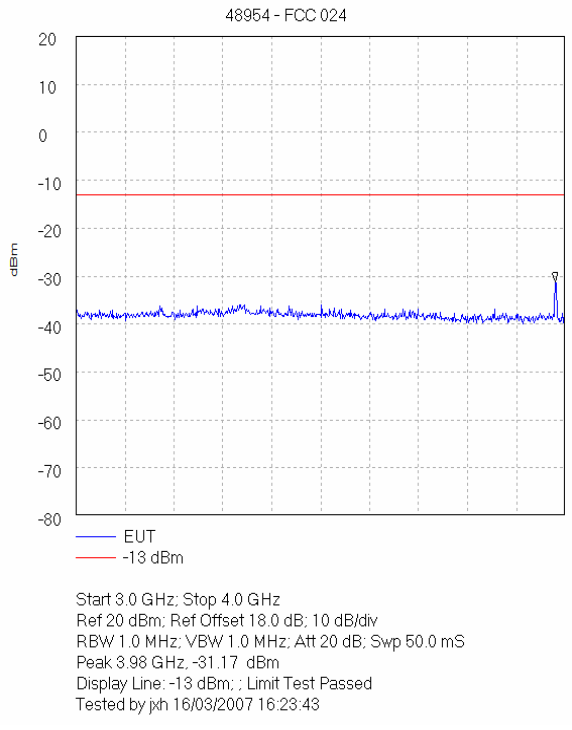


Carriers identified are exempt from measurements



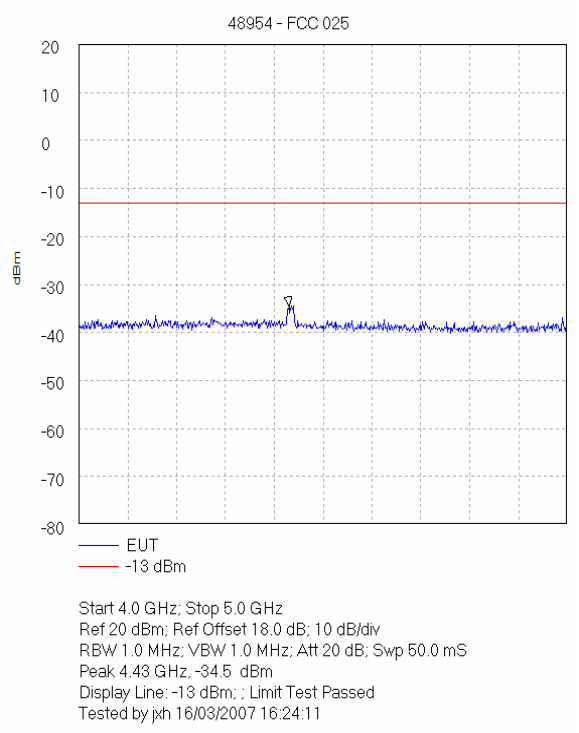
Carriers identified are exempt from measurements

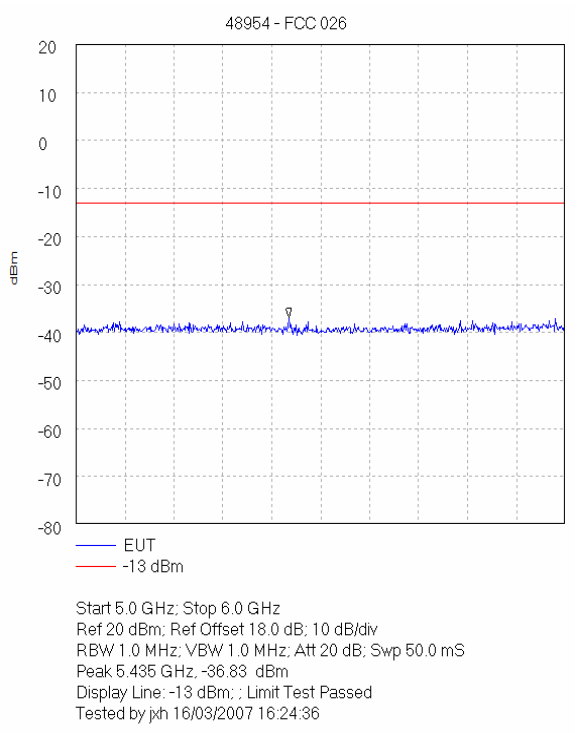




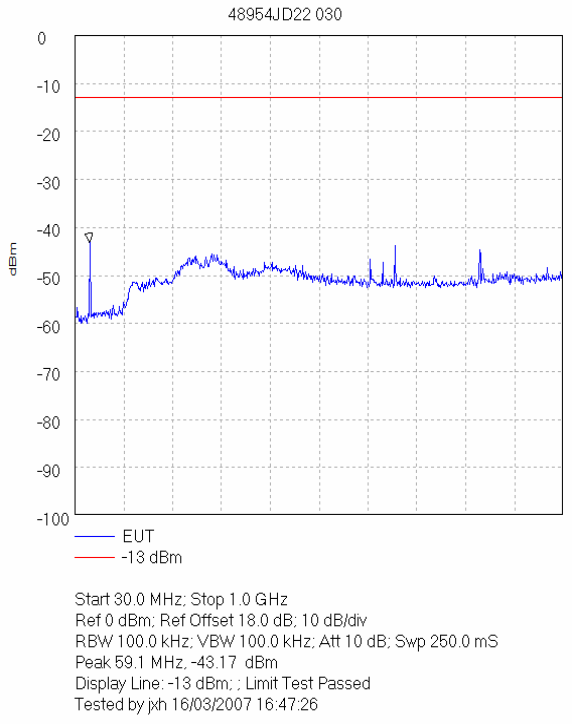
Carriers identified are exempt from measurements

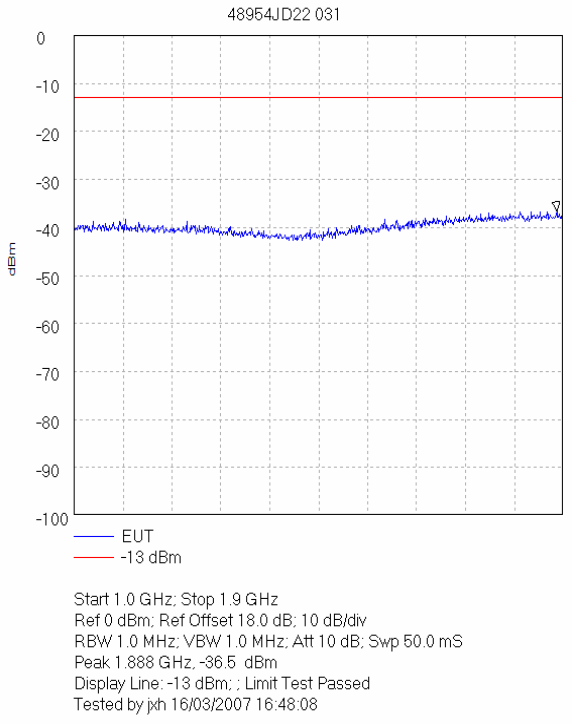
7.3.19.2. Intermodulation: Section 24.238 / 2.1053 (Continued) - Fully Loaded

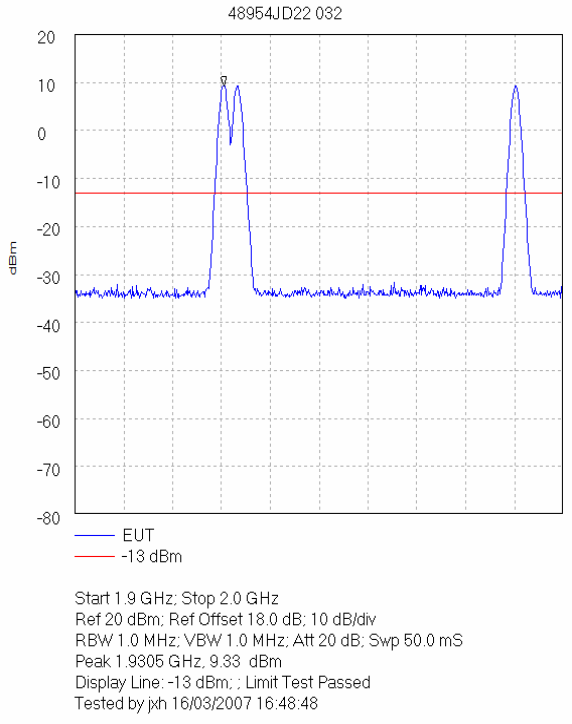


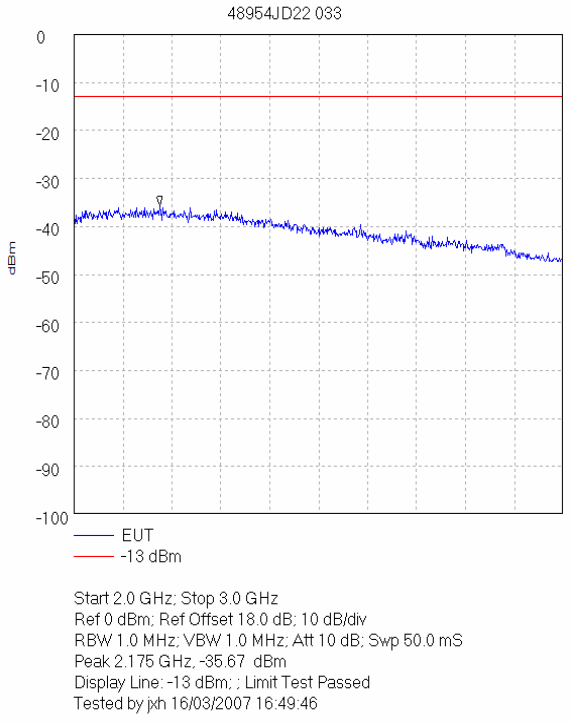


7.3.19.3. Intermodulation: Section 24.238 / 2.1053 (Continued) - GSM 1900 Only



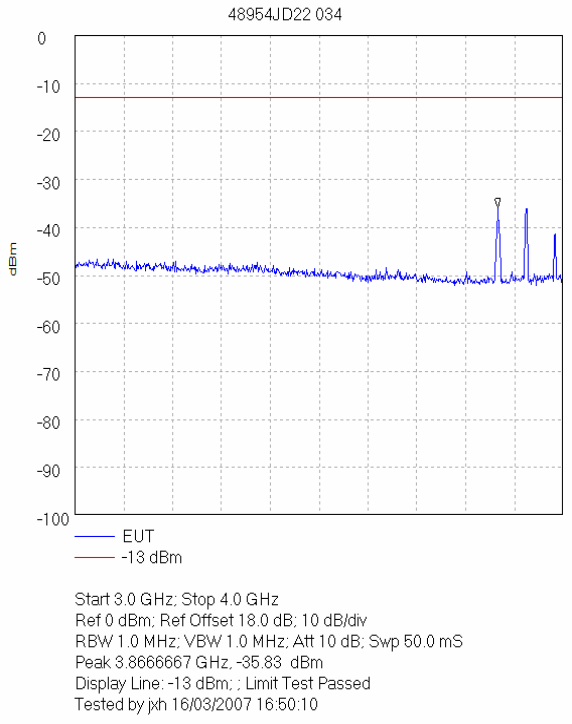




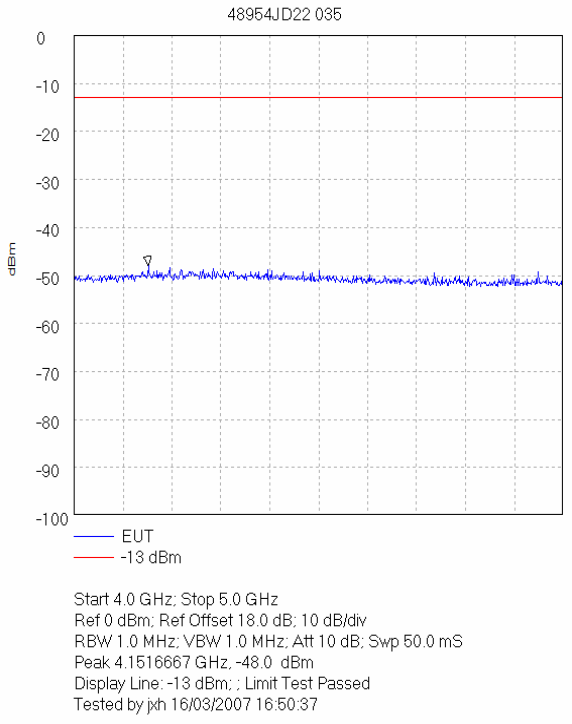


Carriers identified are exempt from measurements

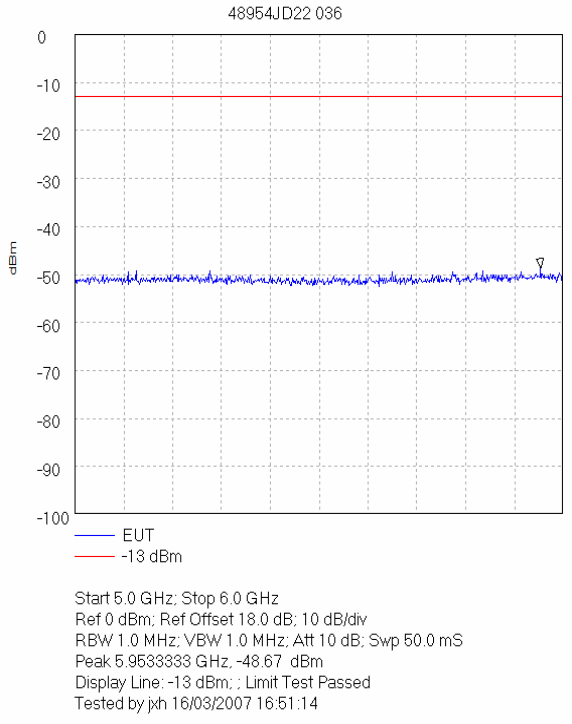
7.3.19.4. Intermodulation: Section 24.238 / 2.1053 (Continued) - GSM 1900 Only



Start 3.0 GHz; Stop 4.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 3.8666667 GHz, -35.83 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 16:50:10

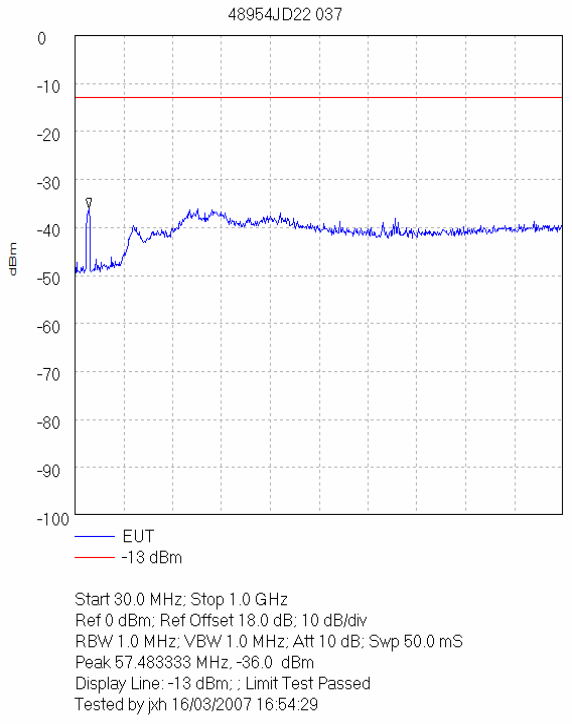


Start 4.0 GHz; Stop 5.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 4.1516667 GHz, -48.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 16:50:37

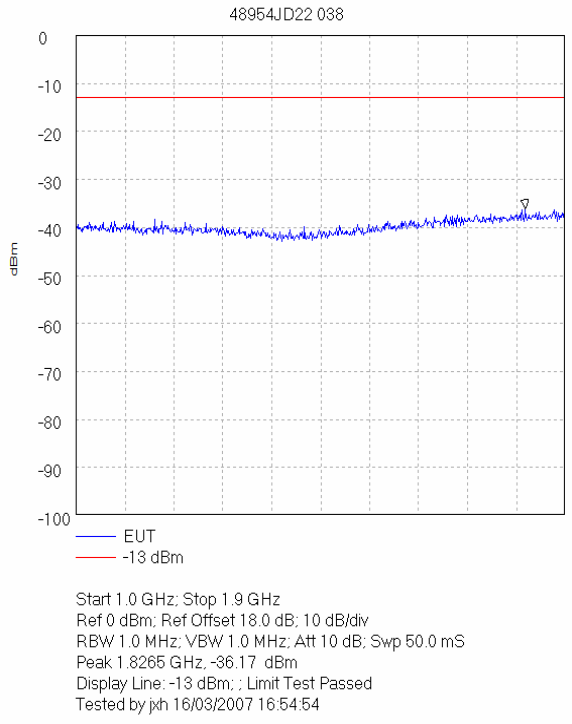


Start 5.0 GHz; Stop 6.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 5.9533333 GHz, -48.67 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 16:51:14

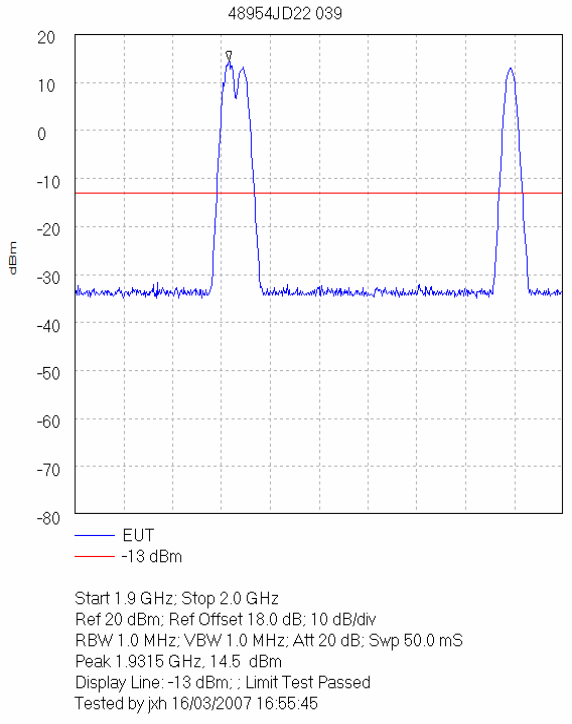
7.3.19.5. Intermodulation: Section 24.238 / 2.1053 (Continued) – CDMA2000 Only



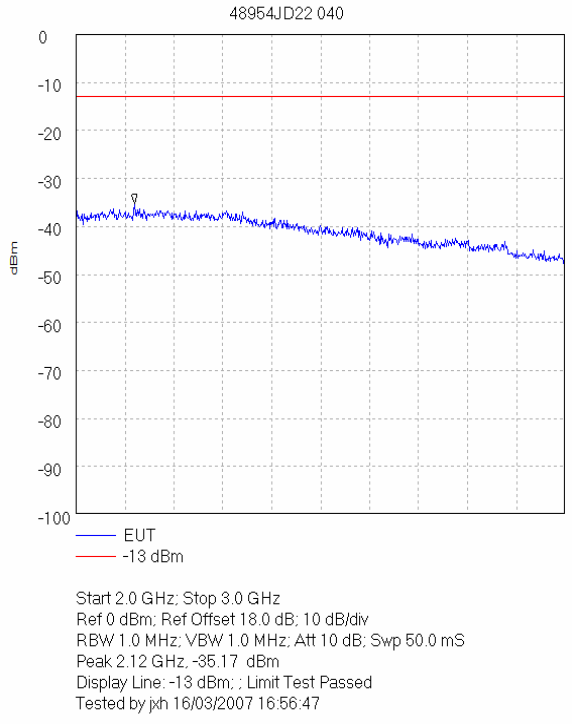
Start 30.0 MHz; Stop 1.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 57.483333 MHz, -36.0 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 16:54:29



Start 1.0 GHz; Stop 1.9 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 1.8265 GHz, -36.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 16:54:54



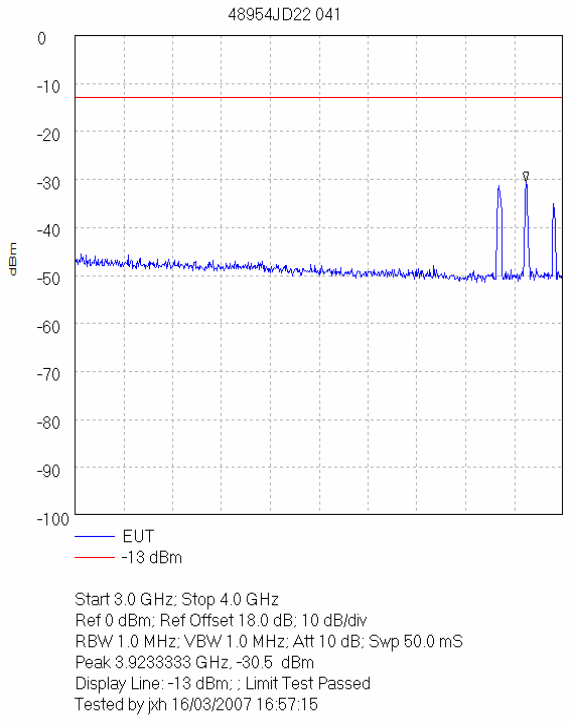
Start 1.9 GHz; Stop 2.0 GHz
Ref 20 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.9315 GHz, 14.5 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 16:55:45

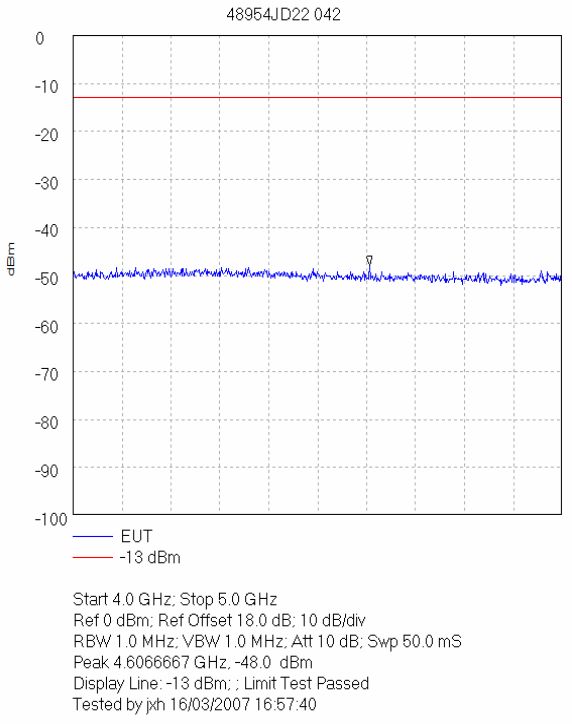


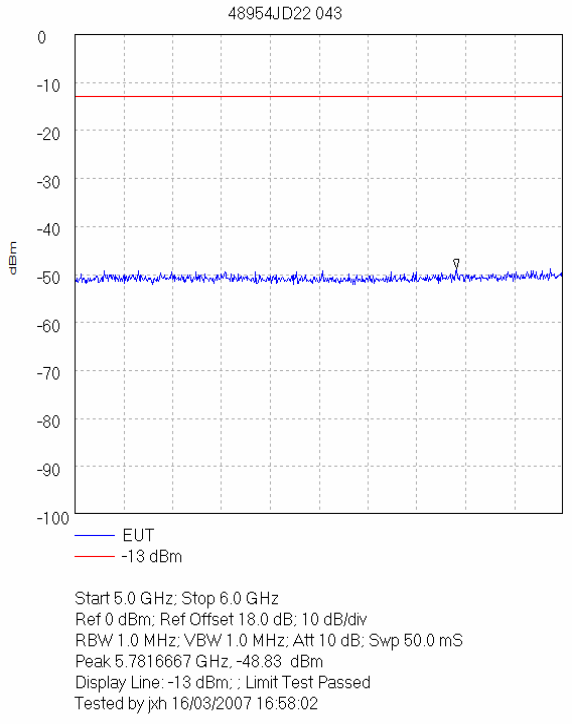
Start 2.0 GHz; Stop 3.0 GHz
Ref 0 dBm; Ref Offset 18.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 2.12 GHz, -35.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by jxh 16/03/2007 16:56:47

Carriers identified are exempt from measurements

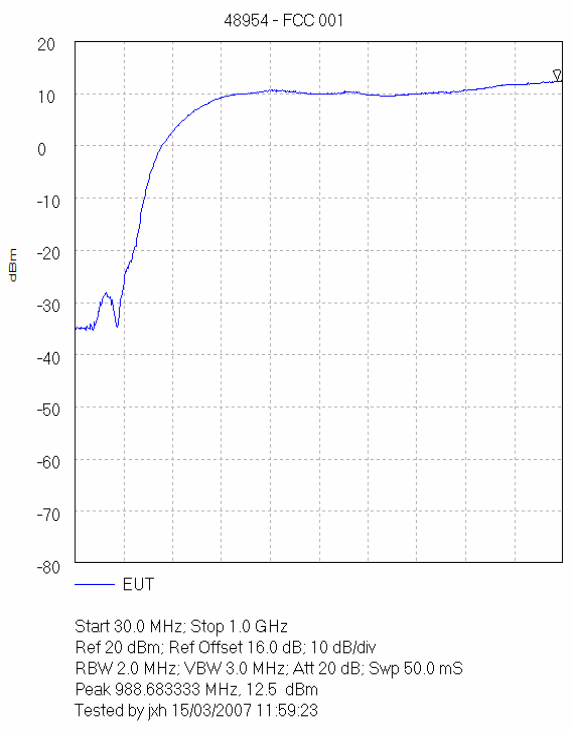
7.3.19.6. Intermodulation: Section 24.238 / 2.1053 (Continued) – CDMA2000 Only



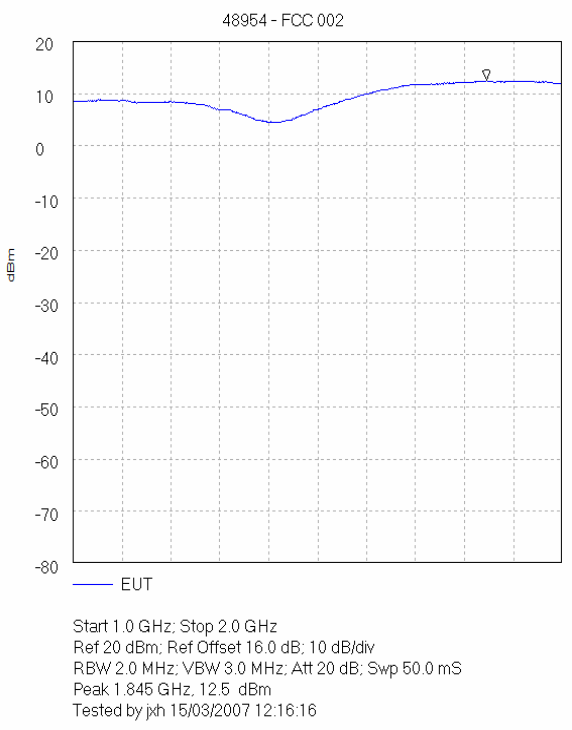




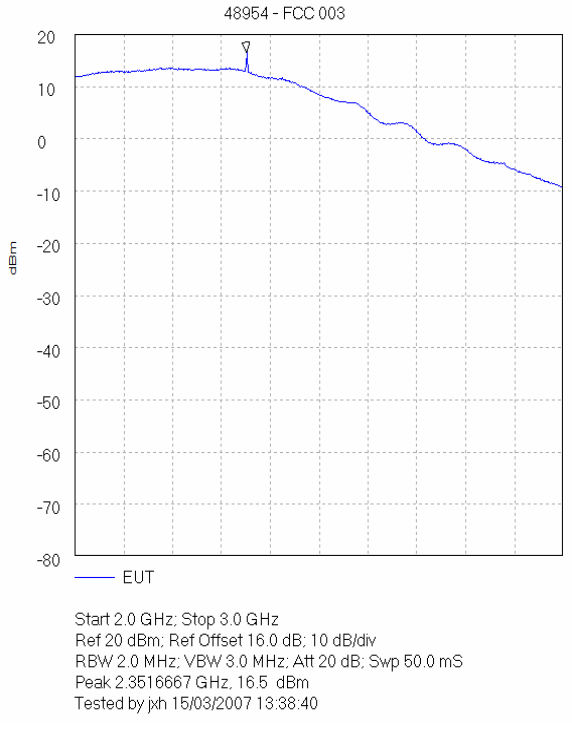
7.3.19.7. Out-of-Band Rejection



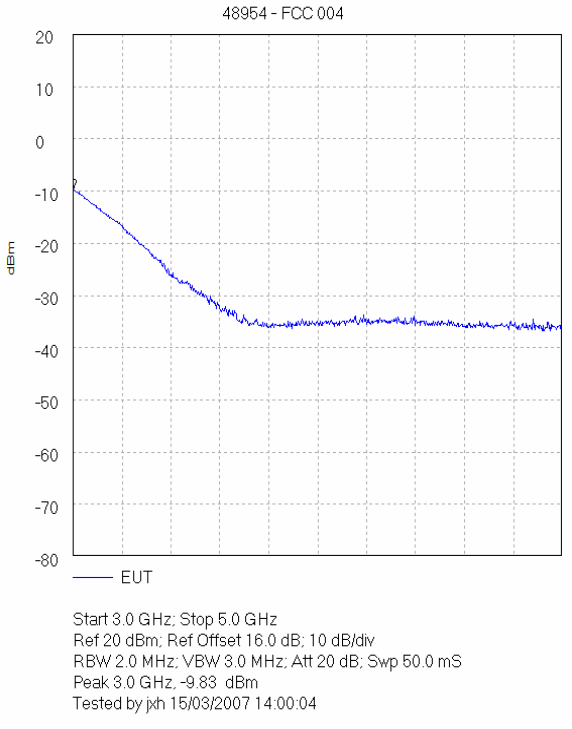
Start 30.0 MHz; Stop 1.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 988.683333 MHz, 12.5 dBm
Tested by jxh 15/03/2007 11:59:23



Start 1.0 GHz; Stop 2.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 1.845 GHz, 12.5 dBm
Tested by jxh 15/03/2007 12:16:16

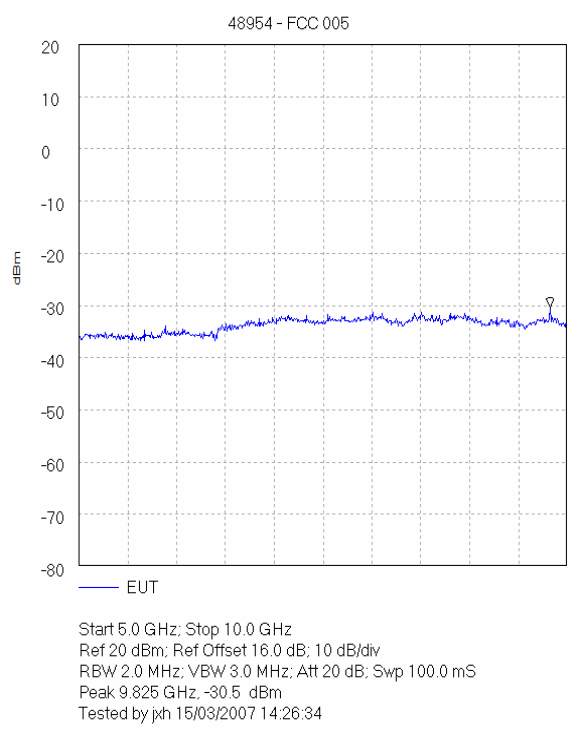


Start 2.0 GHz; Stop 3.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 2.3516667 GHz, 16.5 dBm
Tested by jxh 15/03/2007 13:38:40

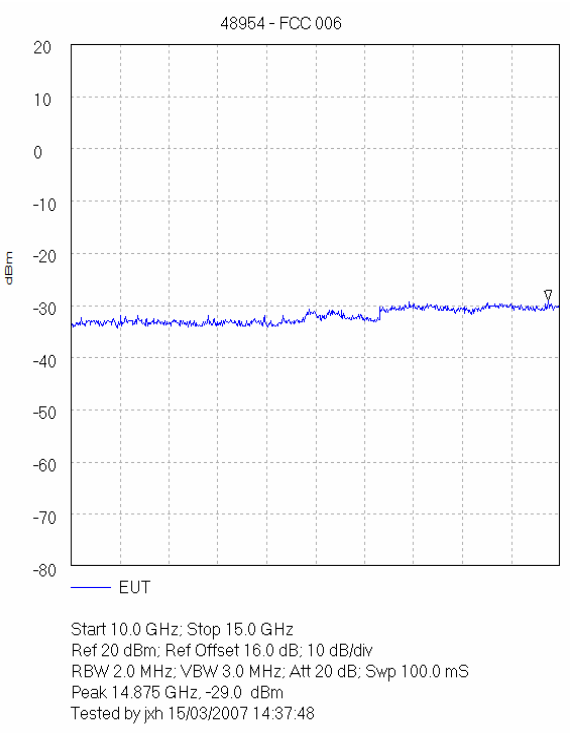


Start 3.0 GHz; Stop 5.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 50.0 mS
Peak 3.0 GHz, -9.83 dBm
Tested by jxh 15/03/2007 14:00:04

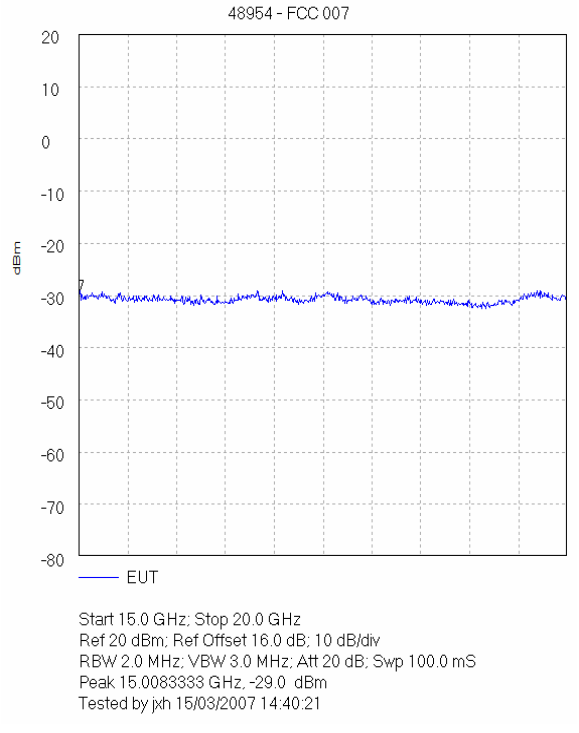
7.3.19.8. Out-of-Band Rejection (Continued)



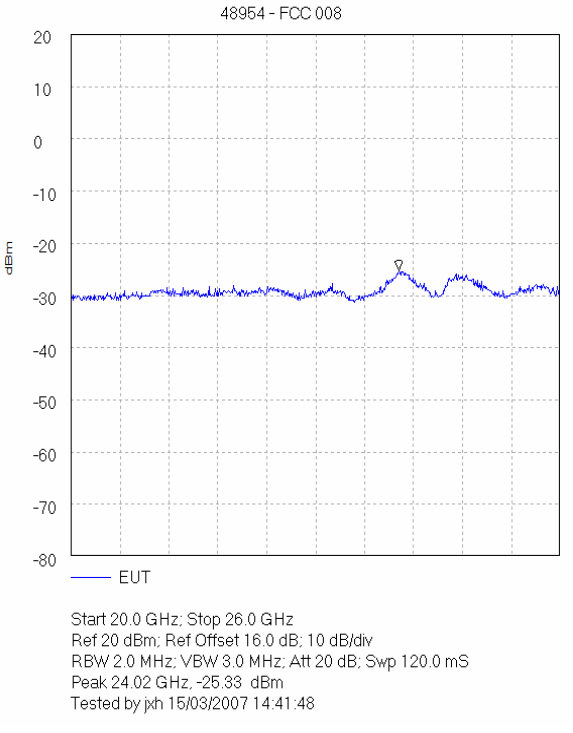
Start 5.0 GHz; Stop 10.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 100.0 mS
Peak 9.825 GHz, -30.5 dBm
Tested by jxh 15/03/2007 14:26:34



Start 10.0 GHz; Stop 15.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 100.0 mS
Peak 14.875 GHz, -29.0 dBm
Tested by jxh 15/03/2007 14:37:48



Start 15.0 GHz; Stop 20.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 100.0 mS
Peak 15.0083333 GHz, -29.0 dBm
Tested by jxh 15/03/2007 14:40:21



Start 20.0 GHz; Stop 26.0 GHz
Ref 20 dBm; Ref Offset 16.0 dB; 10 dB/div
RBW 2.0 MHz; VBW 3.0 MHz; Att 20 dB; Swp 120.0 mS
Peak 24.02 GHz, -25.33 dBm
Tested by jxh 15/03/2007 14:41:48

8. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	+/- 3.25 dB
Carrier Output Power	Not applicable	95%	+/- 0.46 dB
Conducted Emissions	9 kHz to 26 GHz	95%	+/- 1.2 dB
Conducted Emissions Antenna Port	30 MHz to 40 GHz	95%	+/- 1.2 dB
Frequency Stability	Not applicable	95%	+/- 0.121 ppm
Minimum Bandwidth	Not applicable	95%	+/- 0.12 %
Occupied Bandwidth	824 to 849 MHz	95%	+/- 0.12 %
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 26 GHz	95%	+/- 2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

9. Measurement Methods

Conducted Output Power

The EUT was connected to a spectrum analyser and to a GSM test set via suitable cables, RF attenuators and combiners.

The connection was made to the EUT either via an antenna port or by antenna terminals made available by the client.

The total loss of the cables, attenuators and combiner were measured and entered as a reference level offset into the measuring receiver to correct for the losses.

The EUT was set to the required channel and the transmitter set to operate at full power.

A marker was set to the maximum indicated peak and the conducted power was recorded.

This test was performed on the bottom, middle and top channels.

The test equipment settings for conducted antenna port measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Max Hold
Bandwidth:	≥ Emission Bandwidth
Amplitude Range:	100 dB
Step Size:	Continuous sweep
Sweep Time:	Coupled

9.1. Effective Radiated Power (ERP)

ERP measurements were performed in accordance with the standard, against appropriate limits.

The ERP was measured with the EUT arranged on a non-conducting turntable on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4. The transmitter was fitted with an integral antenna; as such all radiated tests were performed with the unit operating into the integral antenna.

The level of the ERP was measured using a spectrum analyser.

The test antenna was positioned in the horizontal plane. The EUT was oriented in the X plane. The test antenna was then raised and lowered until a maximum peak was observed. The turntable was then rotated through 360 degrees and the maximum peak reading obtained. The height search was then repeated to take into consideration the new angular position of the turntable. The maximum reading observed was then recorded. This procedure was then repeated with the EUT oriented in the Y and Z planes. The highest reading taken in all 3 planes was recorded. The entire procedure was then repeated with the test antenna set in the vertical polarity.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For ERP measurements a dipole antenna was used. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The ERP was calculated as:-

ERP = Signal Generator Level - Cable Loss + Antenna Gain

Effective Radiated Power (ERP) (Continued)

Circumstances where the signal generator could not produce the desired power substitution was performed with the signal generator set to 0 dBm. The radiated signal was maximised as previously described. The level indicated on the measuring receiver was noted. The delta between this level and the maximum level for the EUT was calculated and also noted. The ERP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated ERP to obtain the substituted EUT ERP.

Delta (dB) = EUT – SG

Where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual ERP is calculated as:

ERP SG= Signal Generator Level - Cable Loss + Antenna Gain

The EUT ERP is calculated as:

ERP EUT = ERP SG + Delta.

The test equipment settings for ERP measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	≥ Emission Bandwidth
Amplitude Range:	100 dB
Sweep Time:	Coupled

9.2. Effective Isotropic Radiated Power (EIRP)

EIRP measurements were performed in accordance with the standard, against appropriate limits.

The EIRP was measured with the EUT arranged on a non-conducting turn table on a standard test site compliant with ANSI C63.4 – 2001 Clause 5.4. The transmitter was fitted with an integral antenna; therefore all radiated tests were performed with the unit operating into the integral antenna.

The level of the EIRP was measured using a spectrum analyser.

The test antenna was positioned in the horizontal plane. The EUT was oriented in the X plane. The test antenna was then raised and lowered until a maximum peak was observed. The turntable was then rotated through 360 degrees and the maximum peak reading obtained. The height search was then repeated to take into consideration the new angular position of the turntable. The maximum reading observed was then recorded. This procedure was then repeated with the EUT oriented in the Y and Z planes. The highest reading taken in all 3 planes was recorded. The entire procedure was then repeated with the test antenna set in the vertical polarity.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For EIRP measurements a Horn antenna whose gain was based on an isotropic antenna was used, ERP measurements were done using a dipole. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The EIRP was calculated as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain

All measurements were performed using broadband Horn antennas.

Effective Isotropic Radiated Power (EIRP) (Continued)

Circumstances where the signal generator could not produce the desired power substitution was performed with the signal generator set to 0 dBm. The radiated signal was maximised as previously described. The level indicated on the measuring receiver was noted. The delta between this level and the maximum level for the EUT was calculated and also noted. The EIRP of the signal generator was calculated using the above formulae. The recorded delta was added to the calculated EIRP to obtain the substituted EUT EIRP.

Delta (dB) = EUT – SG

where :

EUT = spectrum analyser indicated EUT raw level

SG = spectrum analyser indicated signal generator raw level

The signal generator actual EIRP is calculated as:

EIRP SG= Signal Generator Level - Cable Loss + Antenna Gain

The EUT EIRP is calculated as:

EIRP EUT = EIRP SG + Delta.

The test equipment settings for EIRP measurements were as follows:

Receiver Function	Setting
Detector Type:	Peak
Mode:	Not applicable
Bandwidth:	1 MHz
Amplitude Range:	100 dB
Sweep Time:	Coupled

9.3. FCC Part 2.1055: Frequency Stability

The EUT was situated within an environmental test chamber and connected directly to the GSM test set via an access port.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -30 to 50 ºC.

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage (for hand carried battery operated equipment) or by varying the primary supply voltage from 85% to 115% of the nominal value for all other equipment types.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions.

Measurements were made on the top and bottom channels.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

The frequency error measured was converted to an error in ppm using the following formula as defined by TIA_EIA_603A :-

$$\text{ppm error} = \left(\frac{MCF_{MHz}}{ACF_{MHz}} - 1\right) * 10^6$$

where MCF_{MHz} is the measured carrier frequency in MHz
ACF_{MHz} is the assigned carrier frequency in MHz

The measured ppm had to be less then the relevant limits in order to comply.

9.4. Frequency Stability

The EUT was situated within an environmental test chamber and connected directly to the GSM test set via an access port.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -30 to 50 ºC.

Measurements were also performed at voltage extremes between the declared nominal supply voltage and at the declared endpoint voltage (for hand carried battery operated equipment) or by varying the primary supply voltage from 85% to 115% of the nominal value for all other equipment types.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions and ensure they remained within specified operating parameters.

Measurements were made on the top and bottom channels.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

Once the environmental chamber had reached thermal equilibrium, the nominal frequency of the EUT was measured and recorded. The recorded frequency was compared to the applicants declared operating frequency band edges.

In order to show compliance, the measured frequency must remain within the declared frequency band.

The reported data shows the nominal frequency drift and its margin from the band edge. If this margin is positive, the result is compliant. If it goes negative, the result is a non-compliance. There is also a frequency graph presented offering the frequency variation around nominal frequency.

9.5. Occupied Bandwidth

The EUT was connected to a spectrum analyser enabled with an occupied bandwidth function and a GSM test set via a bi-directional coupler to its antenna port.

Measurements were performed to determine the occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured from the fundamental emission at the bottom, middle and top channels.

As the EUT is a PCS phone, no modulation input port was available. A call was thus set up using the PCS/GSM simulator and using normal modulation. The Occupied Bandwidth was measured in this configuration.

The occupied bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz FSEB or ESIB spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the spectrum analyser user manual for this measurement, i.e., RBW $\geq$ 1% of occupied bandwidth. A value of 3 kHz was used.

9.6. Transmitter Conducted Emissions Measurements:

Spurious emission measurements at the antenna port were performed from the lowest declared frequency to 10 times the highest EUT fundamental frequency.

A measuring receiver was connected to the antenna port of the EUT via a suitable cable and RF attenuator. The total loss of both the cable and the attenuator were measured and entered as a reference level offset into the measuring receiver to correct for the losses.

The limit in the standard states that emissions shall be attenuated by at least 43+10 log (P) dB below the transmitter power (P), where (P) is the maximum measured fundamental power for the channel under test. This limit always reduces to -13 dBm therefore, the limit line presented on the accompanying plots is set to -13 dBm.

The frequency band described above was investigated with the transmitter operating at full power on the top, bottom and middle channels. Any spurious observed were then recorded and compared to the -13 dBm limit. The requirement is for the emission to be less than -13 dBm. The margin between emission and limit is recorded and should always be positive to indicate compliance.

It should be noted that FCC Part 22.917 states that the 1st MHz band immediately adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. This bandwidth was found to be 3 kHz

The test equipment settings for conducted antenna port measurements were as follows:

Receiver Function	Settings
Detector Type:	Peak
Mode:	Max Hold
Bandwidth:	100 kHz >1 GHz
Bandwidth:	10 kHz <1 GHz
Amplitude Range:	100 dB
Step Size:	Continuous sweep
Sweep Time:	Coupled

The resolution bandwidth used for measurements in the 1 MHz blocks either side of the declared operating frequency block were set as described in the procedure above.

9.7. AC Mains Conducted Emissions

AC mains conducted emission measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane. The EUT was powered with 115V 60 Hz AC mains supplied via a line impedance stabilisation network (LISN).

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The test equipment settings for conducted emissions measurements were as follows:

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz	9 kHz
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

9.8. Transmitter Radiated Emissions

Radiated emission measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 10 times the highest fundamental frequency. The scans were performed within a screened chamber in order to identify frequencies on which the EUT was generating spurious. This procedure identified the frequencies from the EUT, which required further examination. Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. A limit line was set to the specification limit by characterising the screen room using a known signal source set at exactly the same location as the EUT. The signal source was derived from either a horn antenna or a dipole dependant on the frequency band under investigation. Any levels within 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and measuring receiver with a peak detector was used for final measurements at each frequency recorded in the screen room.

The levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the vertical polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the horizontal polarisation.

Once the final amplitude (maximised) had been obtained, the EUT was substituted with a substitution antenna. For EIRP measurements a horn antenna whose gain was based on an isotropic antenna was used, ERP measurements were done using a dipole. The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was matched into a signal generator using a 6 dB or greater attenuator. The signal generator was tuned to the EUT's frequency under test.

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the maximum recorded EUT level was observed. The signal generator level was noted. This procedure was repeated with both test antenna and substitution antenna vertically polarised. The radiated power was calculated as:-

EIRP/ERP = Signal Generator Level - Cable Loss + Antenna Gain

Transmitter Radiated Emissions (Continued)

The limit in the standard states that emissions shall be attenuated by at least 43+10 log (P) dB below the transmitter power (P), where (P) is the maximum measured fundamental power for the channel under test. This limit always reduces to -13dBm therefore, the limit line presented on the accompanying plots is set to -13dBm.

Any spurious measured were then compared to the -13dBm limit. The requirement is for the emission to be less than -13dBm. The margin between emission and limit is recorded and should always be positive to indicate compliance.

It should be noted that FCC Part 22.917 states that the 1st MHz band immediately adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth. This bandwidth was found by calculating 1% of the bandwidth measured in the transmitter occupied bandwidth section of this report. The next largest available bandwidth above this calculated figure was, therefore, used i.e. 3 kHz.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
A028	Horn Antenna	Eaton	91888-2	304	08 Jun 2006	36
A031	Horn Antenna	Eaton	91889-2	557	08 Jun 2006	36
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002	27 Mar 2006	12
A1227	Pre Amp	Agilent	8449B	3008A01566	30 Aug 2006	12
A1534	Preamplifier	Hewlett Packard	8449B OPT H02	3008A00405	Cal Before Use	N/A
A1536	Variable Attenuator	Hewlett Packard	9494B & 9496B	3308A30801 & 3308A19649	Cal Before Use	N/A
A1738	Attenuator	Atlantic Microwave	BBS40-10	R1379	05 May 2006	12
A1747	Attenuator	Atlantic Microwave	BBS40-06	R7016	26 May 2006	12
A1818	Antenna	EMCO	3115	00075692	3 Nov 2006	12
A1829	Pulse Limiter	Rhode & Schwarz	ESH3-Z2	100671	8 Jan 2007	12
A253	Horn Antenna	Flann Microwave	12240-20	128	17 Nov 2006	36
A254	Horn Antenna	Flann Microwave	14240-20	139	17 Nov 2006	36
A255	Horn Antenna	Flann Microwave	16240-20	519	17 Nov 2006	36
A256	Horn Antenna	Flann Microwave	18240-20	400	17 Nov 2006	36
A436	Horn Antenna	Flann	20240-20	330	24 Apr 2006	36
M023	Test Receiver	Rohde & Schwarz	ESVP	872 991/027	10 Apr 2006	12
M1009	RF Power Meter	Hewlett Packard	437B	3125U13706	30 Oct 2006	12
M1175	Power Sensor	HP	8485A	2942A10299	03 Nov 2006	12
M1242	Spectrum Analyser	Rohde & Schwarz	FSEM30	845986_022	08 Sep 2006	12
M1253	Spectrum Analyser	HP	8564E	3442A00262	30 Oct 2006	12
M1273	Test Receiver	Rhode & Schwarz	ESIB 26	100275	20 Feb 2007	12
M1379	Test Receiver	Rhode & Schwarz	ESIB7	100330	3 July 2006	12
S201	3m OATS	RFI	1	None	18 July 2006	12
S202	3m OATS	RFI	2	None	17 Nov 2006	12

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.