

KTL Test Report No.:

9L0482R

Applicant:

Allen Telecom
140 Vista Centre Dr.
Forest, VA 24551

Equipment Under Test:

MR701B

FCC ID:

BCR-RPT-MR701

In Accordance With:

FCC Part 24, Subpart E
Broadband PCS Repeaters

Tested By:

KTL Dallas Inc.
802 N. Kealy
Lewisville, Texas 75057-3136

Authorized By:

Tom Tidwell, RF Group Manager

Date:

December 14, 1999

Total Number of Pages:

75

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EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

Section 1. Summary of Test Results

Manufacturer: Allen Telecom

Model No.: MR701B

Serial No.: 24

General: **All measurements are traceable to national standards.**

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

☐

New Submission

☒

Production Unit

Class II Permissive Change

☐

Pre-Production Unit

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

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".

**NVLAP LAB CODE: 100426-0**

TESTED BY: _____ DATE: _____

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EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

Summary Of Test Data

NAME OF TEST	PARA. NO.	SPEC.	MEAS.	RESULT
RF Power Output	24.232	100W	5 W	Complies
Occupied Bandwidth (CDMA)	24.238	Input/Output	-	Complies
Occupied Bandwidth (GSM)	24.238	Input/Output	-	Complies
Occupied Bandwidth (NADC)	24.238	Input/Output	-	Complies
Spurious Emissions at Antenna Terminals	24.238(a)	-13 dBm	-	Complies
Field Strength of Spurious Emissions	24.238(a)	-13 dBm E.I.R.P.	- 34 dBm	Complies
Frequency Stability	24.235	N/A	N/A	N/A

Footnotes:

(1) Modulation characteristics were not tested since the E.U.T. processes but does not produce a modulated waveform.

(2) Field strength of spurious emission was tested previously with higher output power

Measurement uncertainty for each test configuration is expressed to 95% probability.

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Section 2. General Equipment Specification**

Supply Voltage Input:				
Frequency Bands:	Downlink:	☒	Block A :	1930 – 1945 MHz
		☒	Block D :	1945 – 1950 MHz
		☒	Block B :	1950 – 1965 MHz
		☒	Block E :	1965 – 1970 MHz
		☒	Block F :	1970 – 1975 MHz
		☒	Block C :	1975 – 1990 MHz
Frequency Bands:	Uplink:	☒	Block A :	1850 – 1865 MHz
		☒	Block B :	1865 – 1870 MHz
		☒	Block C :	1870 – 1885 MHz
		☒	Block D :	1885 – 1890 MHz
		☒	Block E :	1890 – 1895 MHz
		☒	Block F :	1895 – 1910 MHz
Type of Modulation and Designator:		CDMA (G7W)	GSM (GXW)	NADC (DXW)
		☒	☒	☒
System Gain:		85 dB		
Output Impedance:		50 ohms		
RF Output (Rated):	Uplink	Single channel:	4	W
		Per channel:	1	W
RF Output (Rated):	Downlink	Per channel:	4	W
		Total:	1	W
Frequency Translation:		F1-F1	F1-F2	N/A
		☒	☐	☐
Band Selection:		Software	Duplexer	Fullband
		☐	☒	☐

Description of Modifications For Class II Permissive Change

This system has previously been approved with a high power amplifier module under FCC Identifier BCR-RPT-MR701. This permissive change is to add the low power option. This simply involves replacing the high power amplifier with a low power amplifier module. This module is marketed to the end-user as a kit. It would be the case that a system previously installed as a high power version may later be configured in the field to operate as a low power version. The system, therefore, was intended to be approved as a low/high power system under one certification, thus eliminating the possibility of incorrectly labeled equipment. There are no other changes to the system except for the addition of the alternate power amplifier.

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FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS

EQUIPMENT: **MR701B**

PROJECT NO.: **9L0482R**

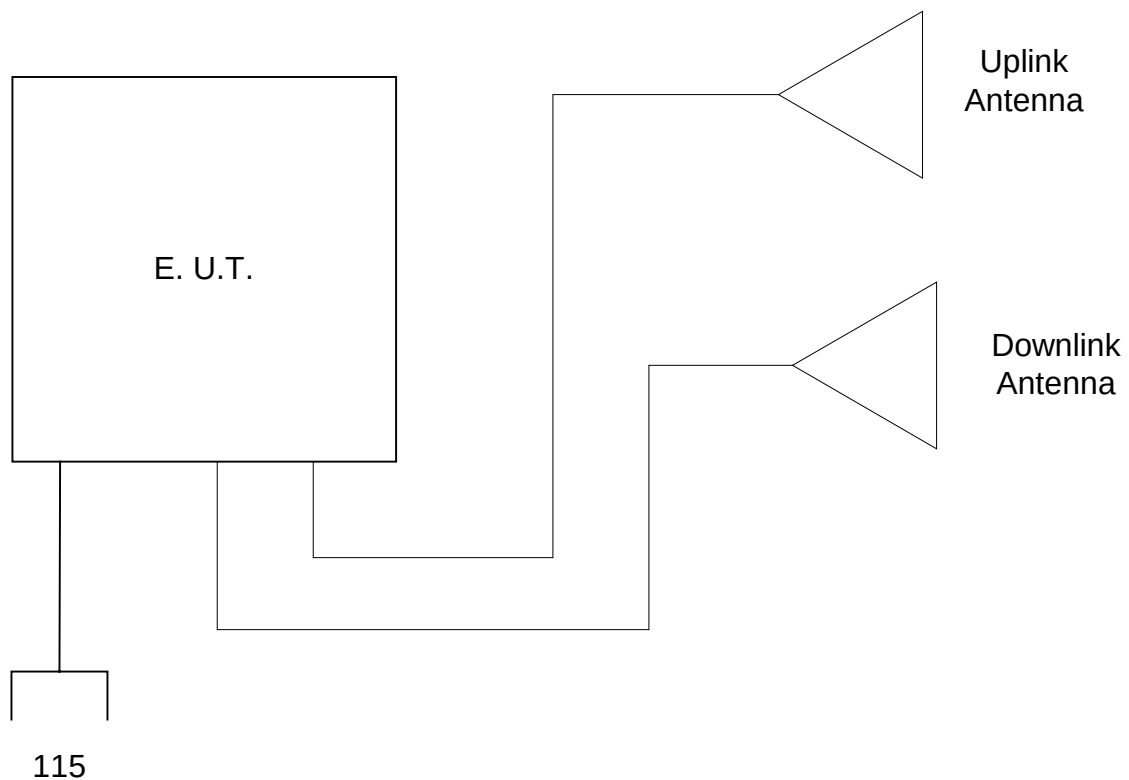
Modifications Made During Testing

None

Description of Operation

The unit is a repeater operating in the PCS Band.

System Diagram



EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

Section 3. RF Power Output

NAME OF TEST: RF Power Output	PARA. NO.: 2.1046
TESTED BY: David Light	DATE:6-7/12/99

Test Results: Complies.**Measurement Data:**

	Modulation Type	Multi-carrier Per Channel Output Power (dBm)	Single Channel Output Power (dBm)
Uplink	CDMA	+29.9	+31.8
Downlink	CDMA	+29.8	+33.2
Uplink	GSM	+30.1	+35.2
Downlink	GSM	+31.5	+37.6
Uplink	NADC	+28.4	+34.3
Downlink	NADC	+26.6	+35.1

Equipment Used: G2736, G3726, G1366, G2632, CF44, CF41, CF39, CF38, CF40, Mini-Circuit attenuator p/n BW-520W2**Measurement Uncertainty:** +/- 1.6 dB**Temperature:** 25°C**Relative Humidity:** 50%

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FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS

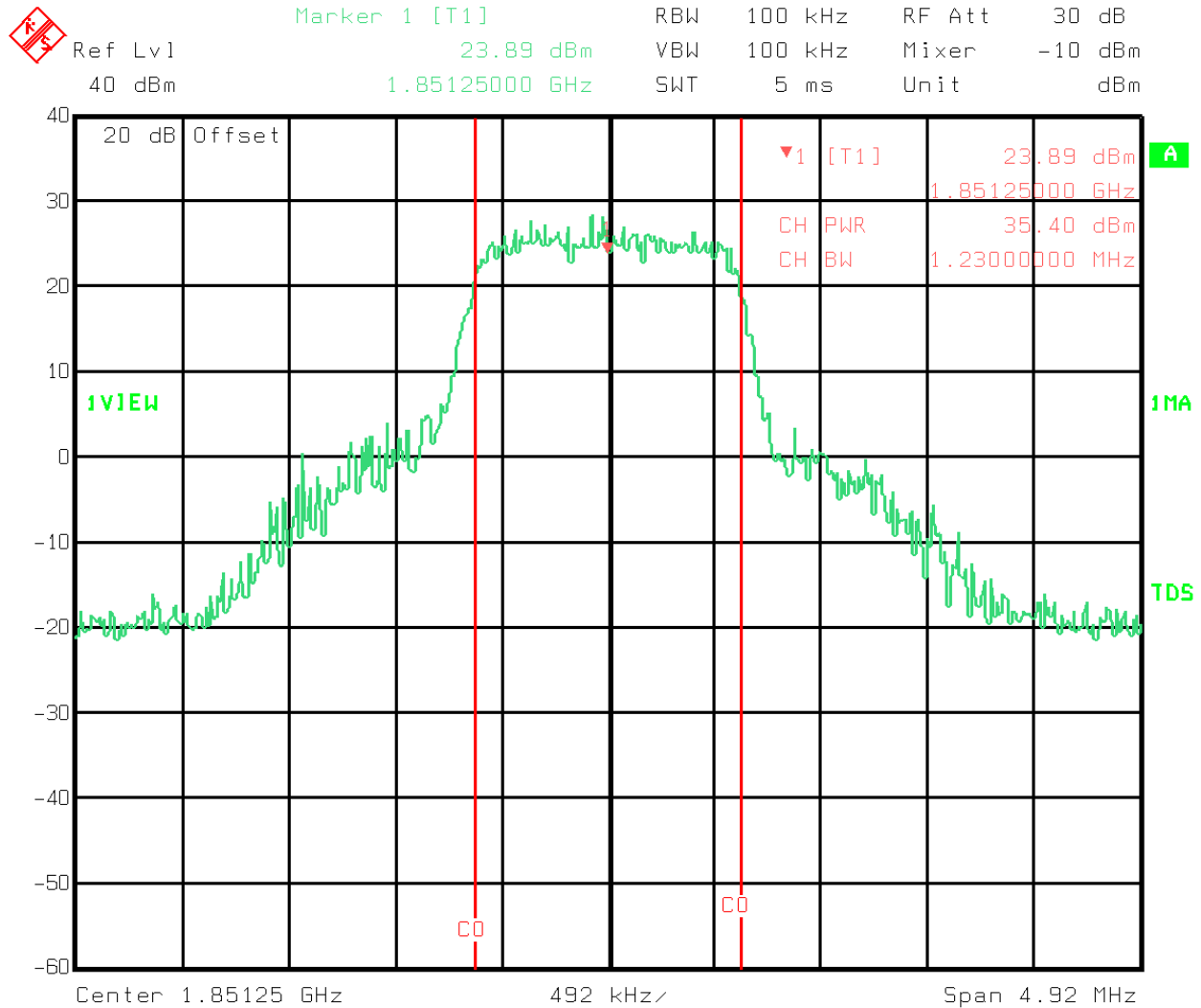
EQUIPMENT: **MR701B**

PROJECT NO.: **9L0482R**

SINGLE CARRIER POWER OUTPUT

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R

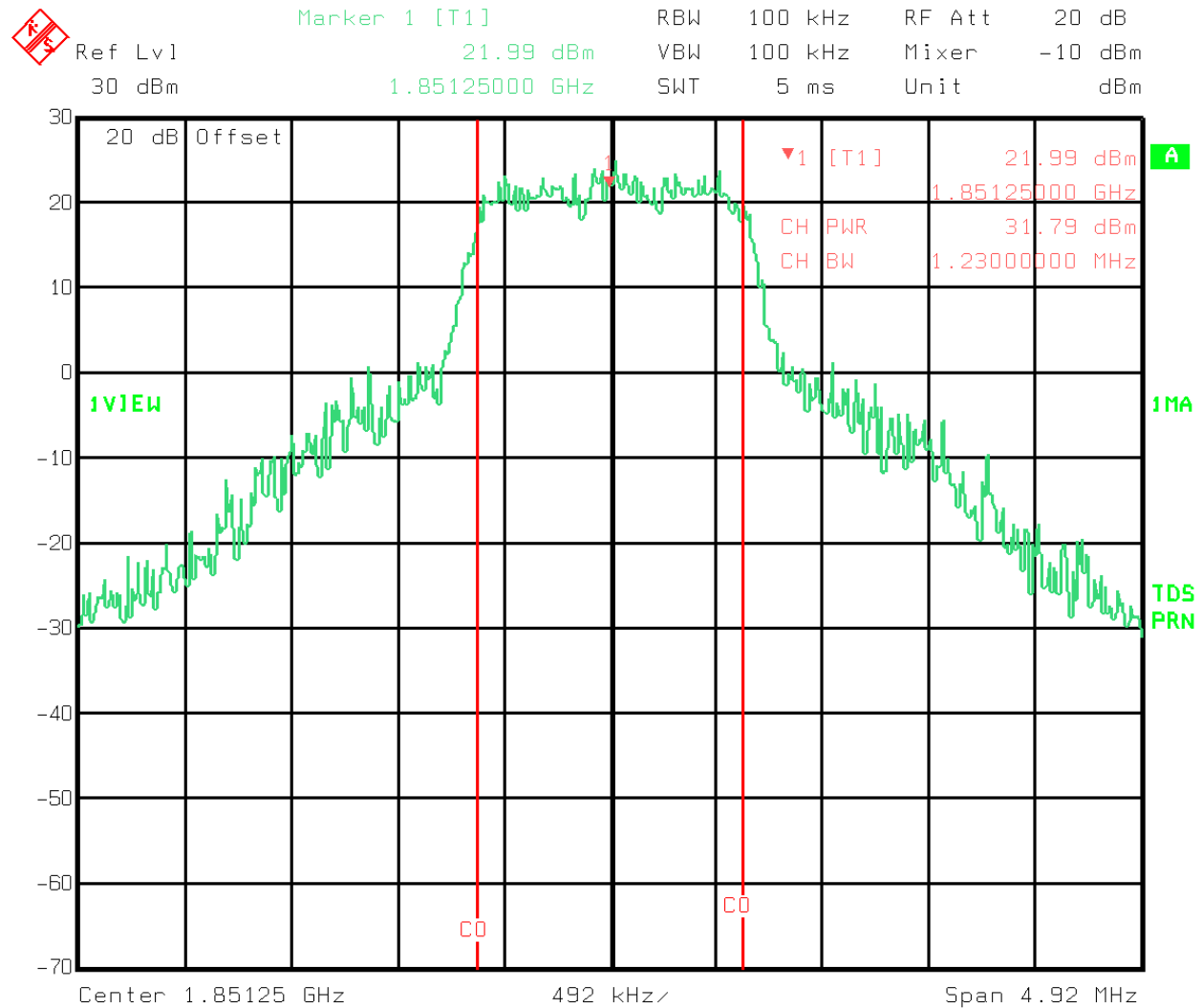


Title: 9L0482R LOW POWER MODULE W/ CDMA MODULE
Comment A: LBECF10.PCX LOWER BAND EDGE CHANNEL POWER - UPLINK - CDMA
Date: 7.DEC.1999 15:58:53

Plot 1

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R



Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE

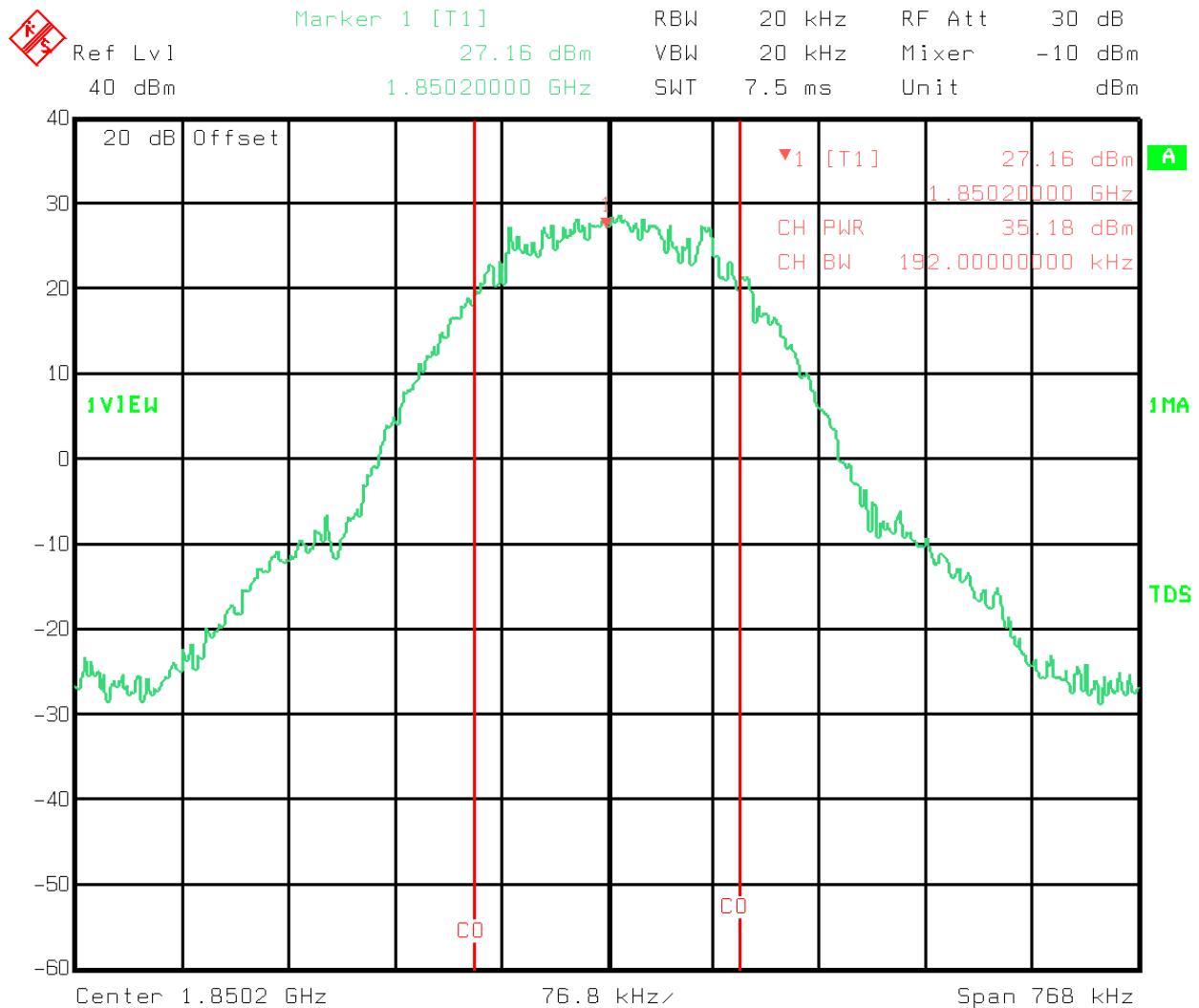
Comment A: LBECPO5.PCX LOWER BAND EDGE CHANNEL POWER - CDMA - UPLINK

Date: 6.DEC.1999 17:34:34

Plot 2

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R

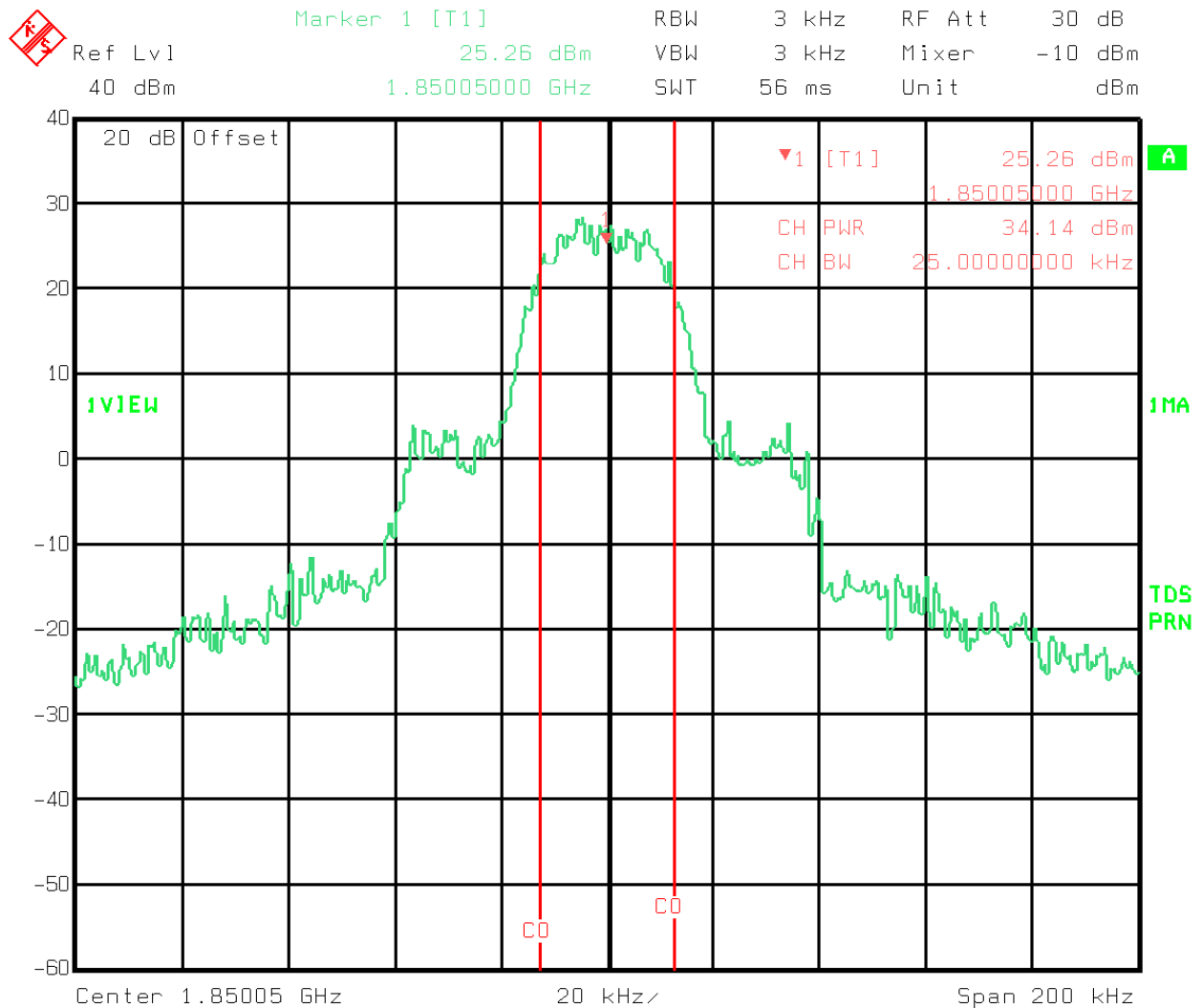


Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: LBECPO1.PCX LOWER BAND EDGE CHANNEL POWER - GSM - UPLINK
Date: 6.DEC.1999 14:51:01

Plot 3

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R

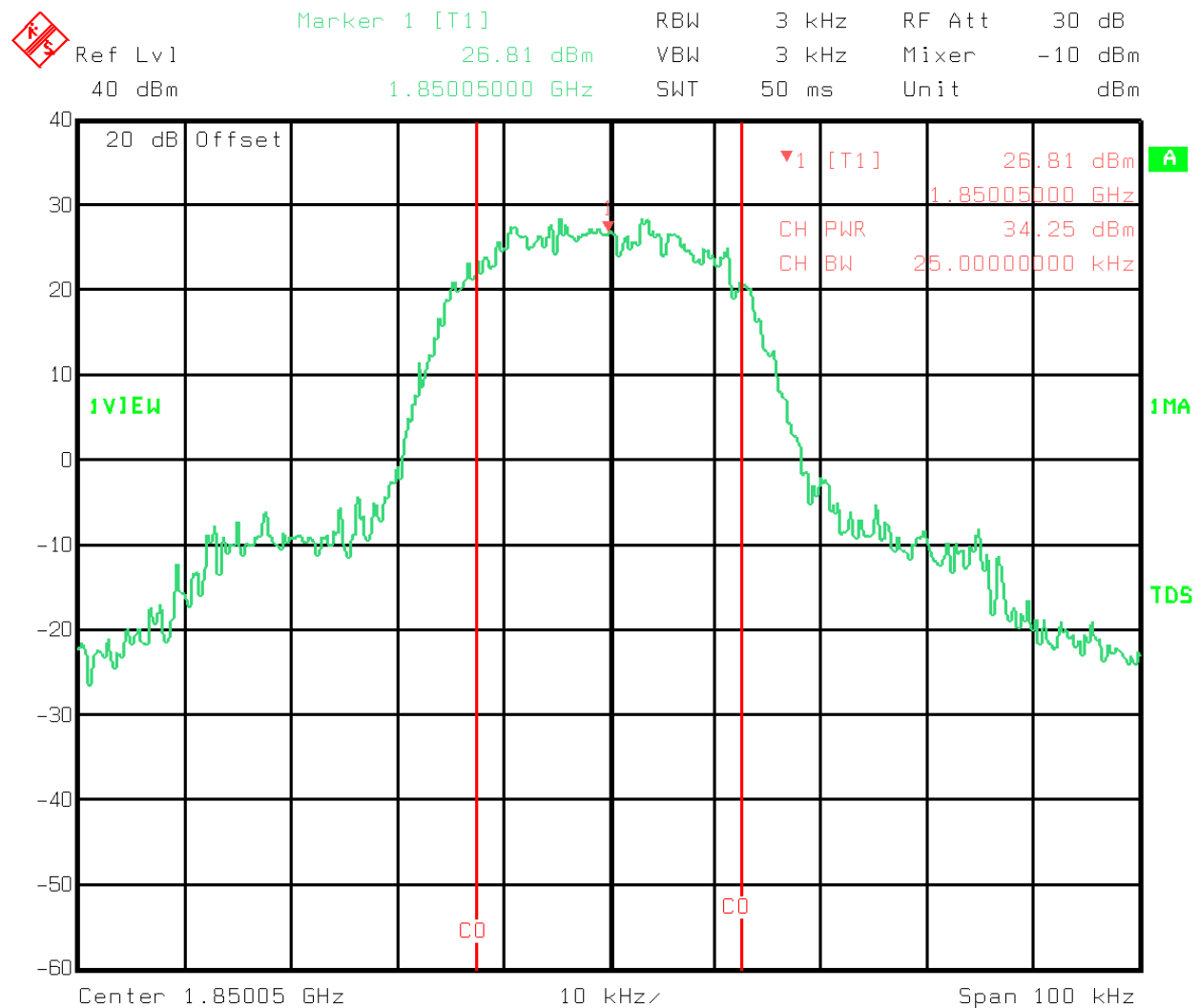


Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: LBECPO3.PCX LOWER BAND EDGE CHANNEL POWER - TDMA - UPLINK
Date: 6.DEC.1999 14:59:31

Plot 4

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R

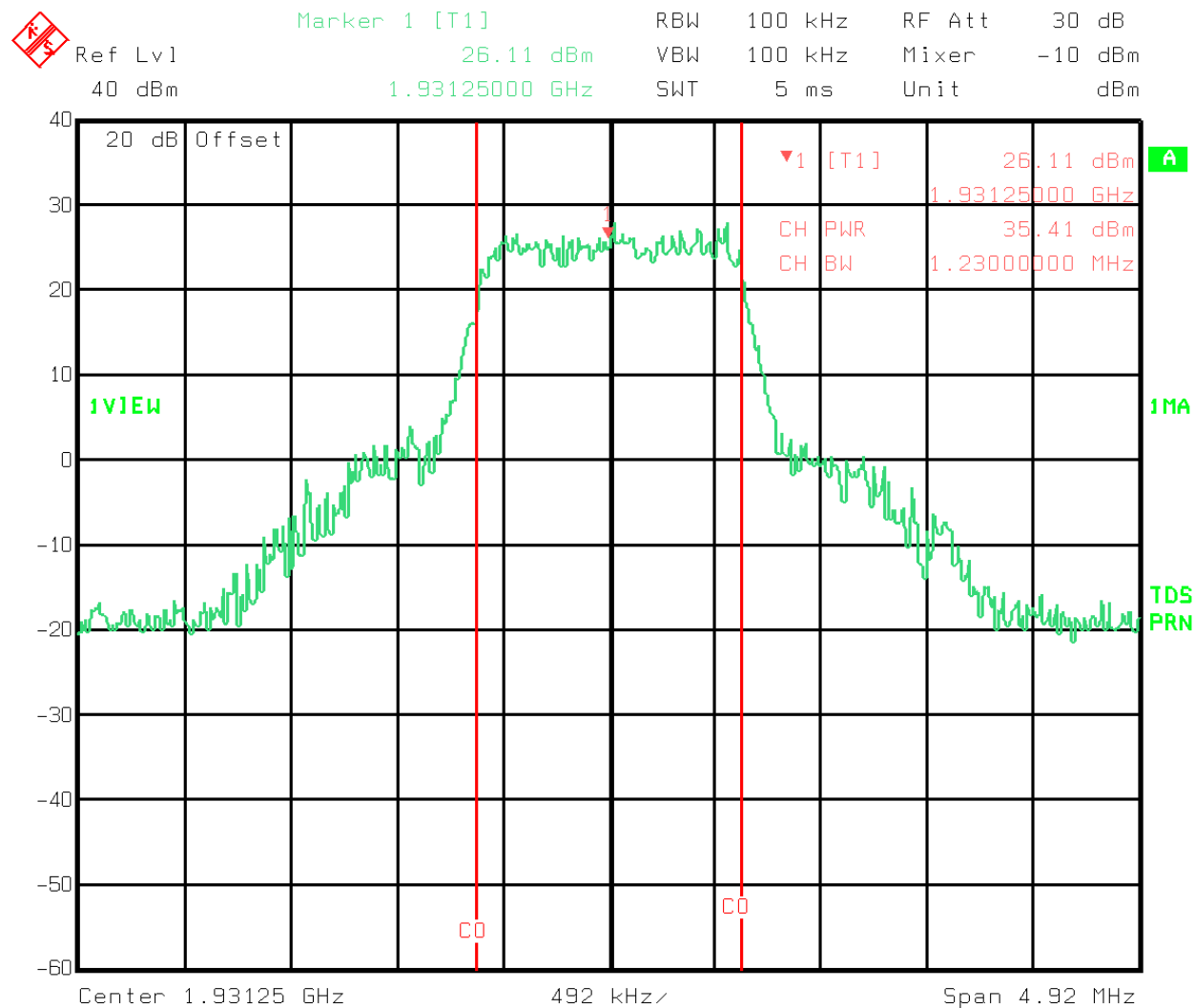


Title: 9L0482R LOW POWER MODULE W/ TDMA MODULE
Comment A: LBECPO7.PCX LOWER BAND EDGE CHANNEL POWER - UPLINK - TDMA
Date: 7.DEC.1999 15:27:50

Plot 5

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R

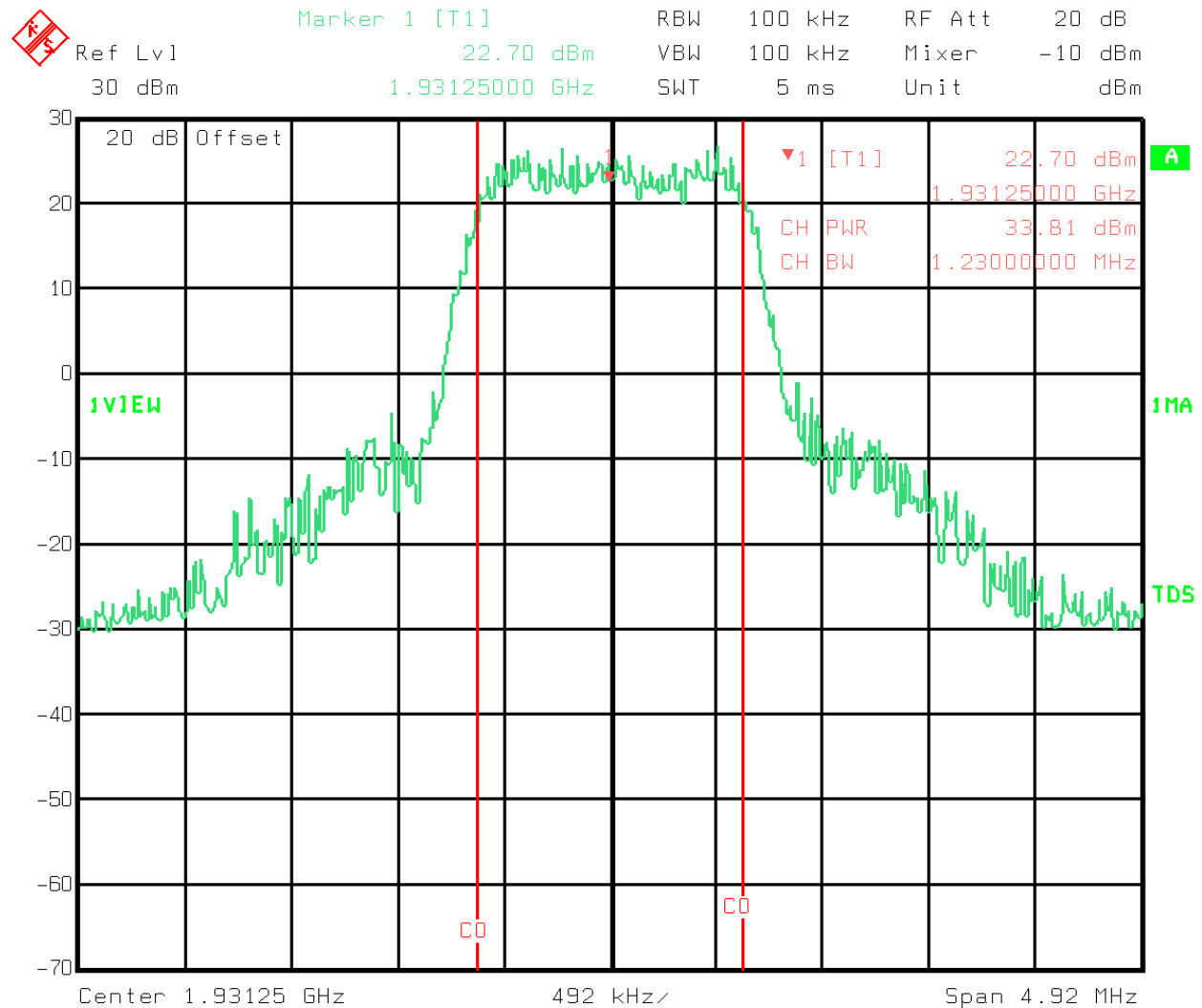


Title: 9L0482R LOW POWER MODULE W/ CDMA MODULE

Comment A: LBECPO9.PCX LOWER BAND EDGE CHANNEL POWER- DOWNLINK - CDMA

Date: 7.DEC.1999 15:48:34

Plot 6

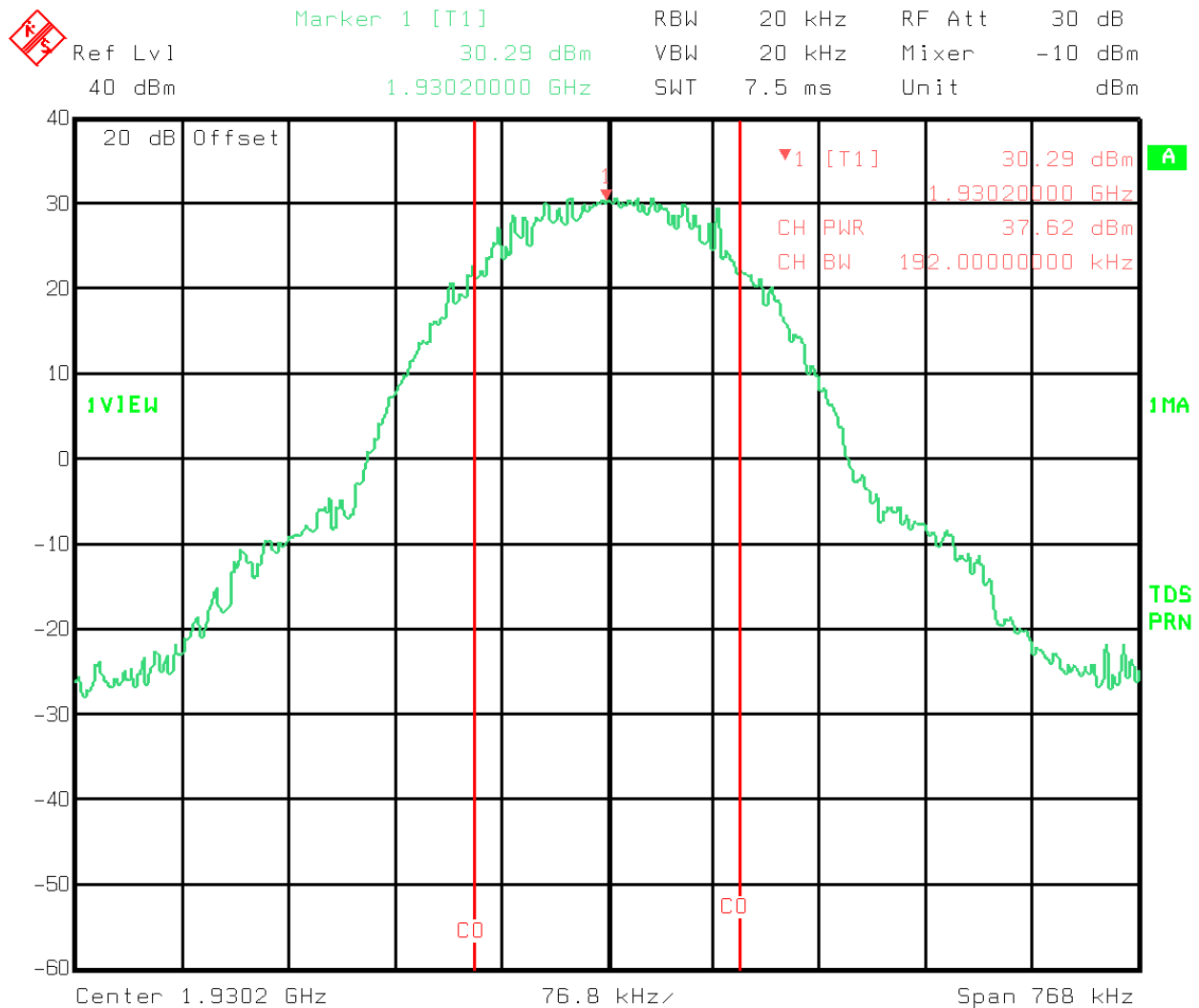
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: LBECPO5.PCX LOWER BAND EDGE CHANNEL POWER - CDMA - DOWNLINK
Date: 6.DEC.1999 17:42:48

Plot 7

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R

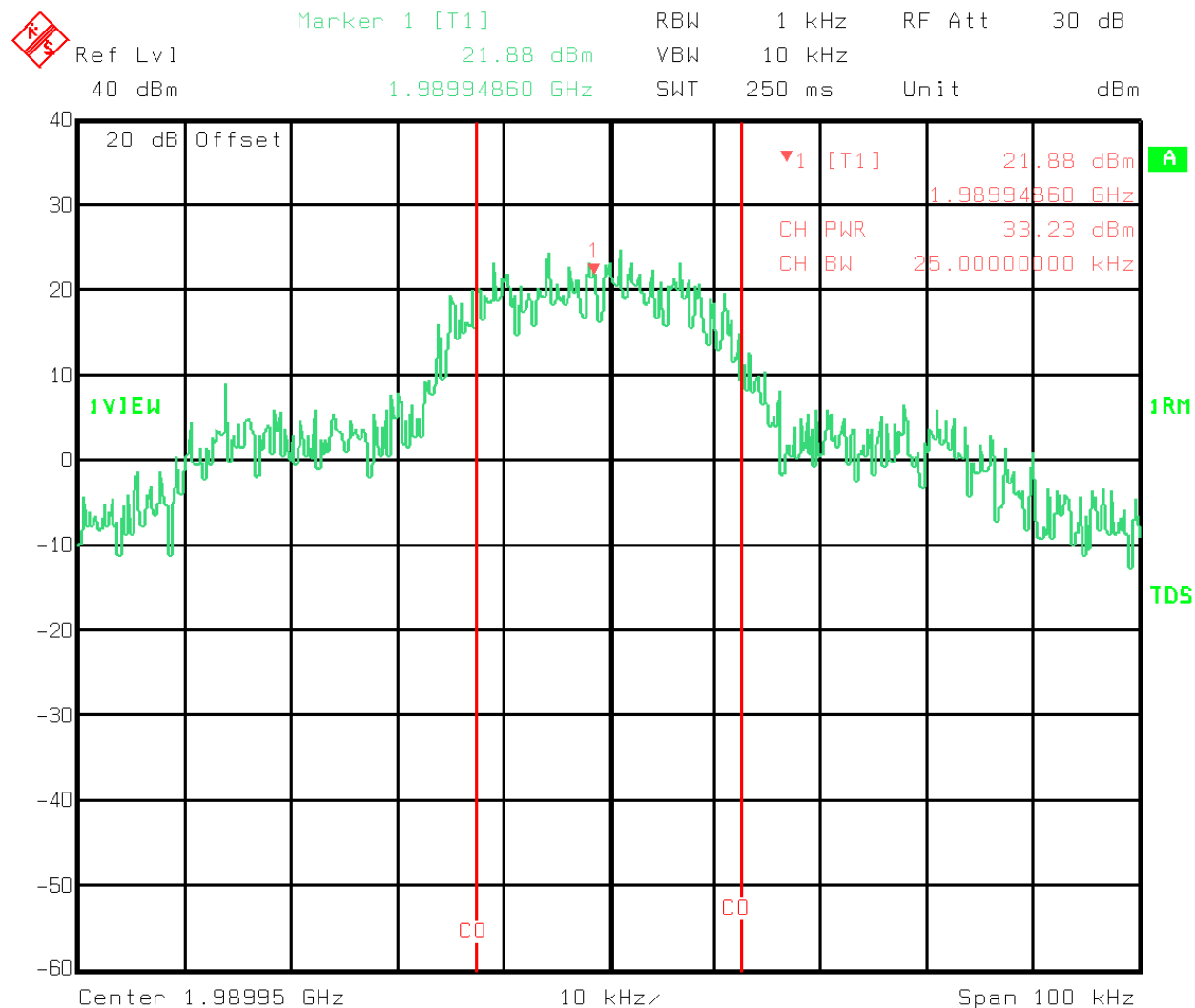


Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: LBECPO2.PCX LOWER BAND EDGE CHANNEL POWER - GSM - DOWNLINK
Date: 6.DEC.1999 14:48:48

Plot 8

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R

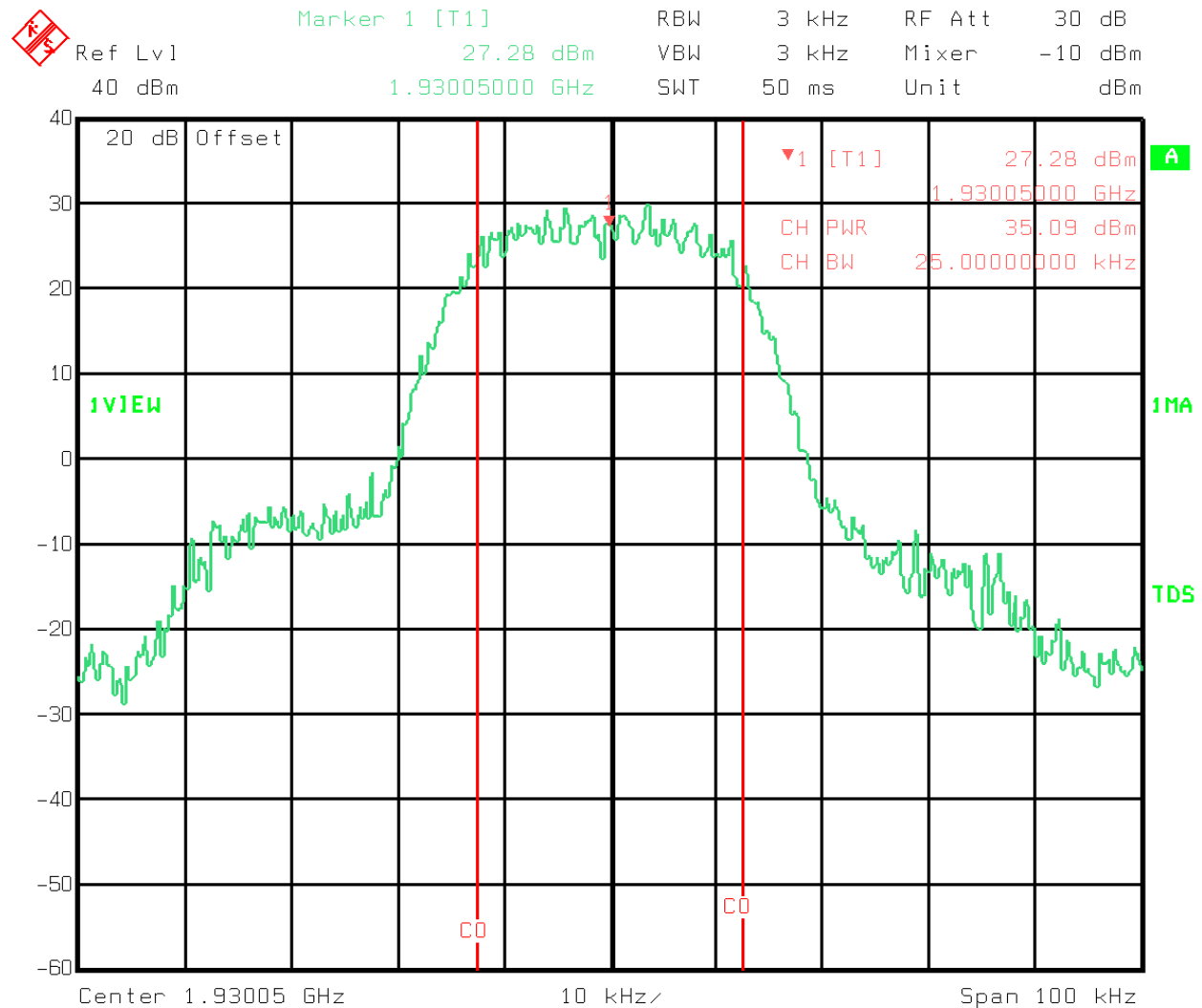


Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-TDMA
Comment A: CP03.PCX CHANNEL POWER
CHANNEL 1199
Date: 18.NOV.1999 8:56:14

Plot 9

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R



Title: 9L0482R LOW POWER MODULE W/ TDMA MODULE
Comment A: LBECPO8.PCX LOWER BAND EDGE CHANNEL POWER - DOWNLINK - TDMA
Date: 7.DEC.1999 15:33:44

Plot 10

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FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS

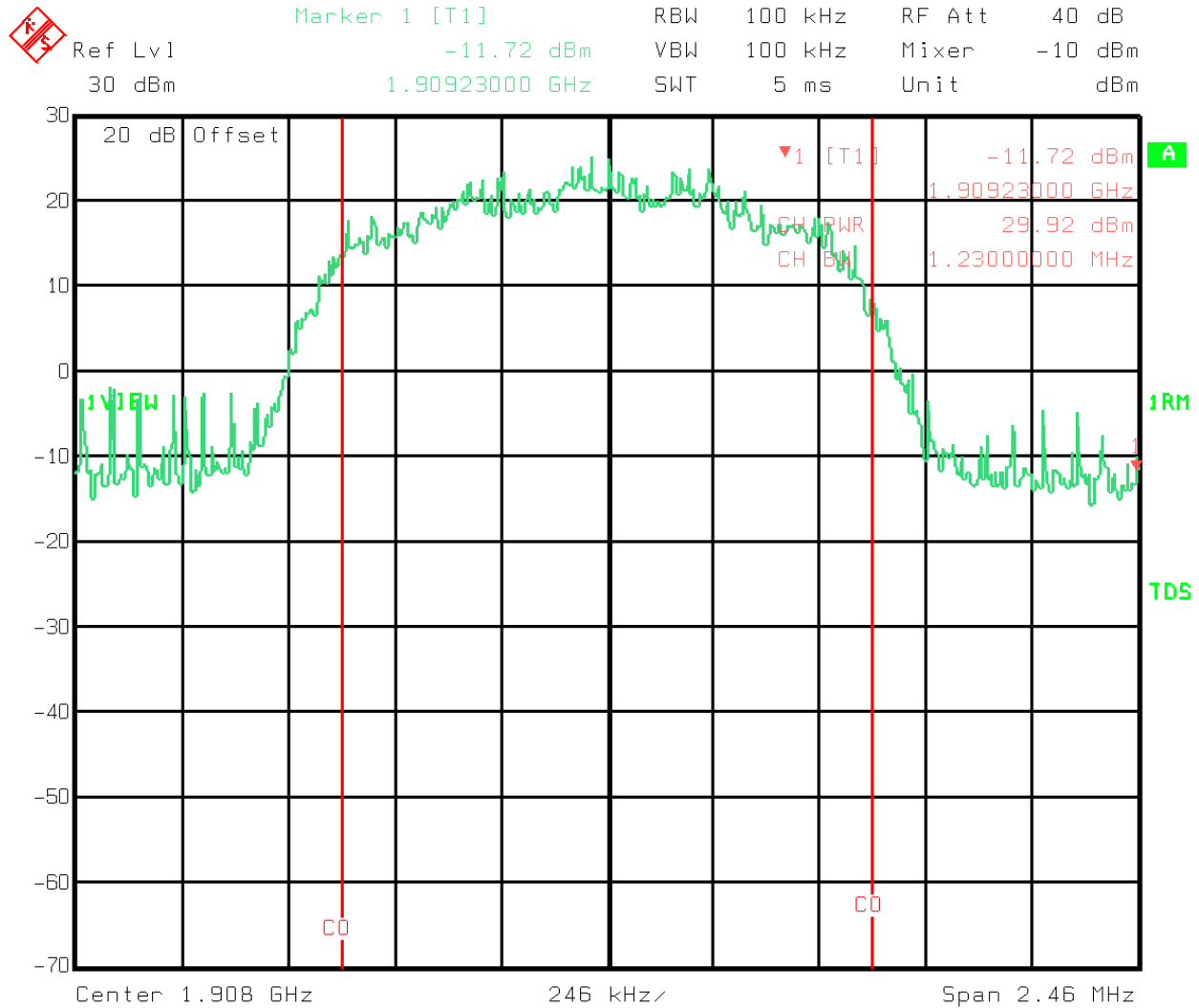
EQUIPMENT: **MR701B**

PROJECT NO.: **9L0482R**

MULTI-CARRIER POWER OUTPUT

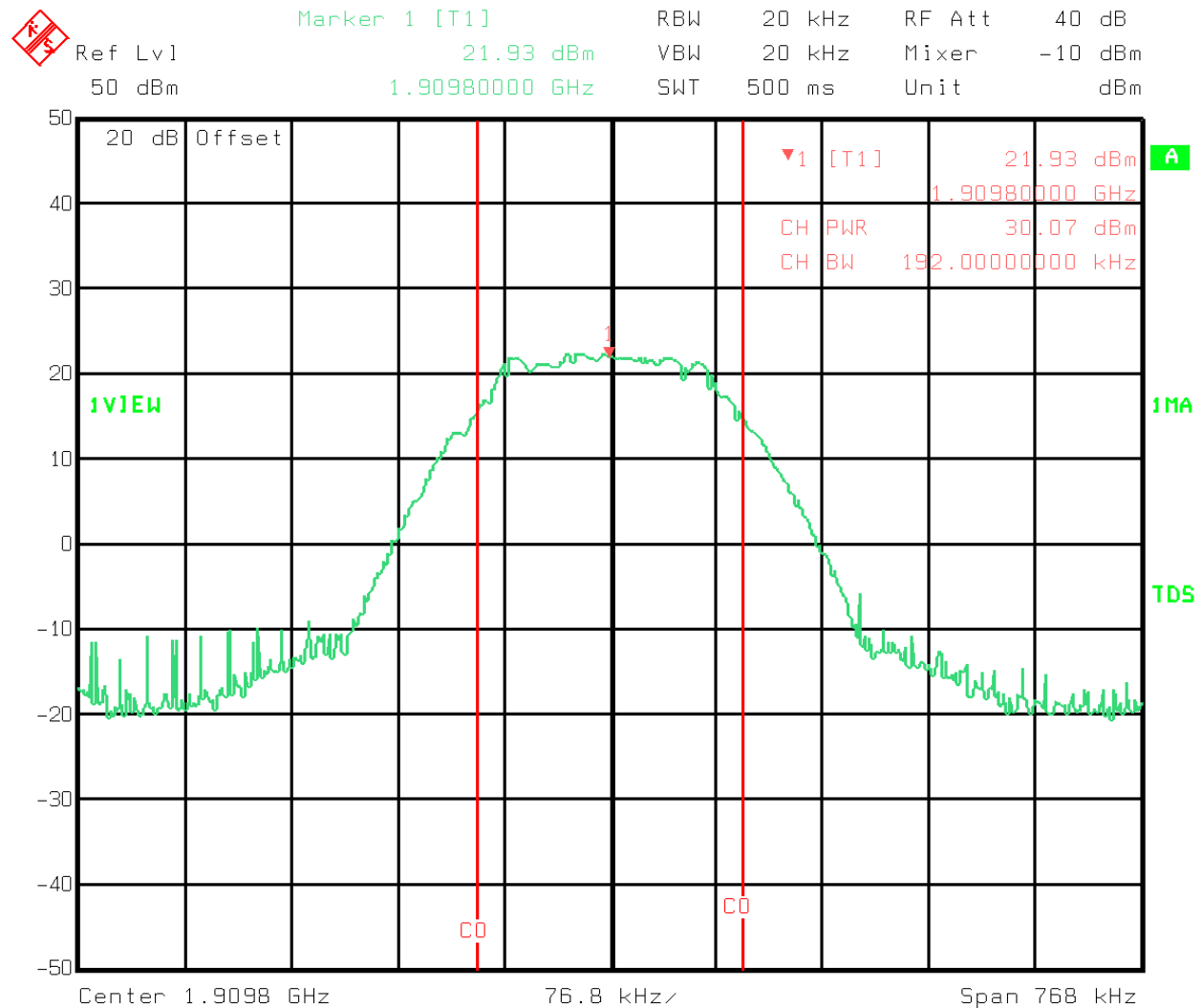
EQUIPMENT: MR701B

PROJECT NO.: 9L0482R



Title: 9L0482R LOW POWER MODULE W/ VARIABLE BW MODULE (CDMA)
Comment A: IMCP01.PCX
(UPLINK)
Date: 17.NOV.1999 12:52:26

Plot 11

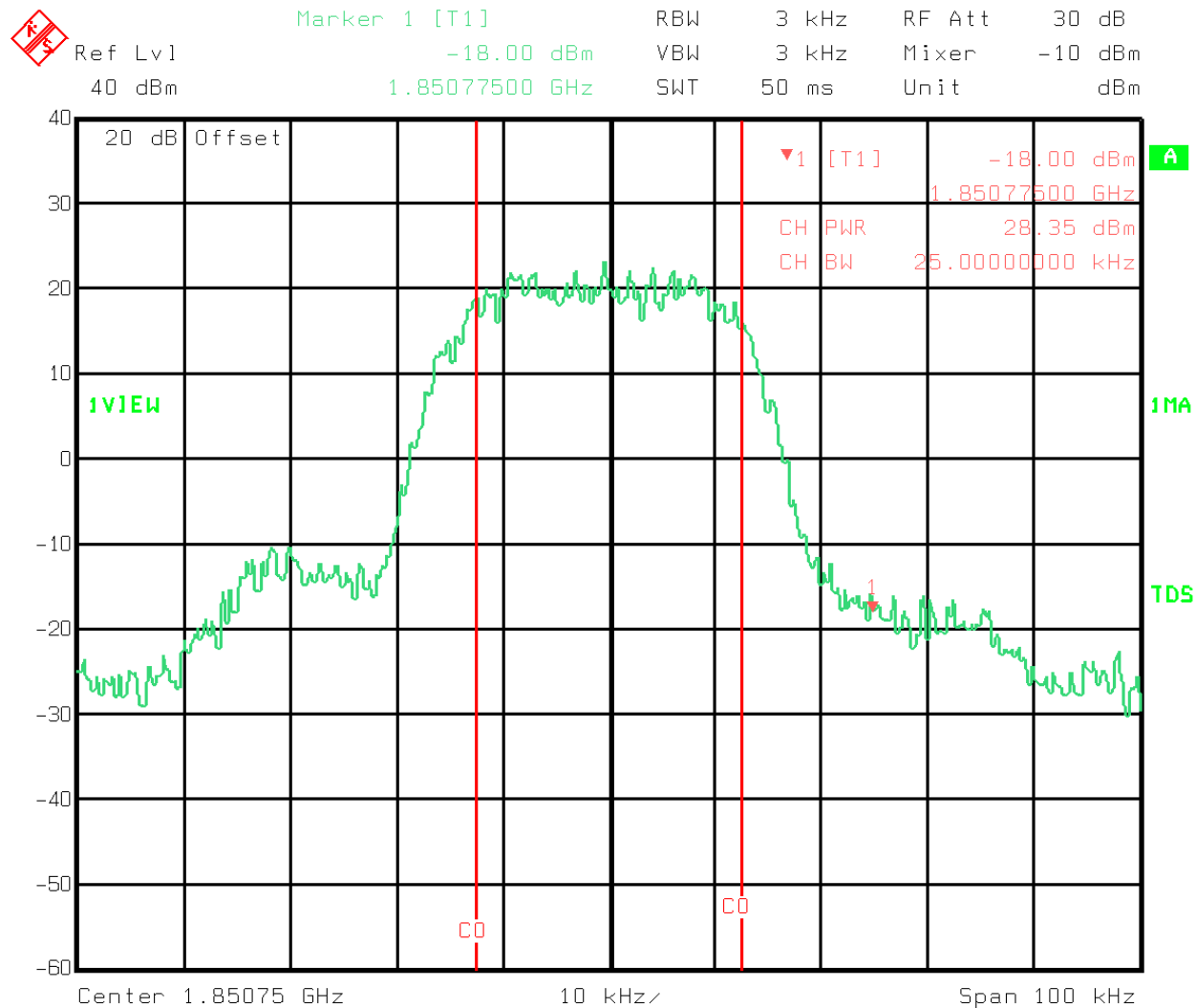
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: IMCP05.PCX INTERMODULATION CHANNEL POWER - UPLINK - GSM
Date: 6.DEC.1999 10:05:40

Plot 12

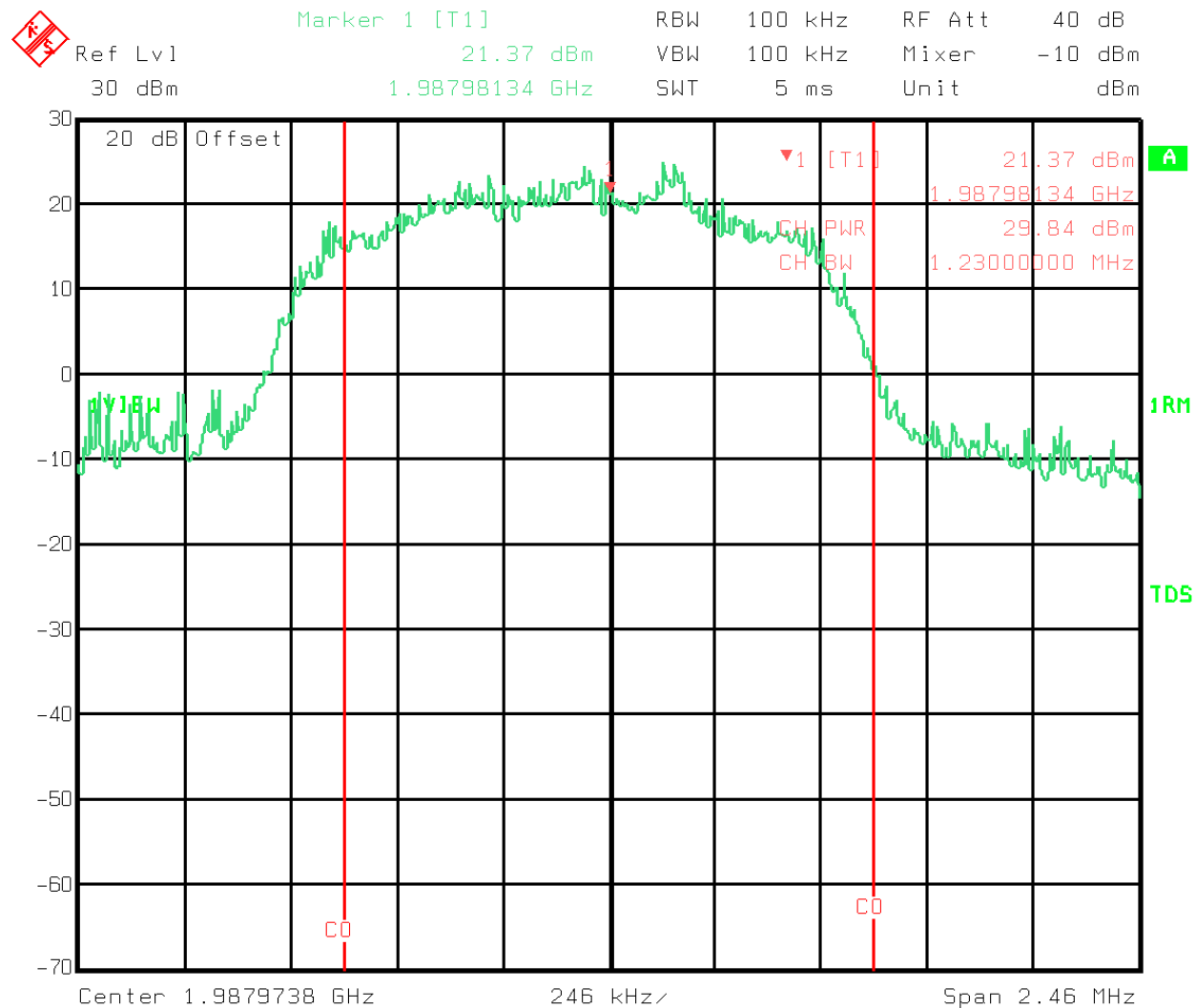
EQUIPMENT: MR701B

PROJECT NO.: 9L0482R



Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: IMCP10.PCX INTERMODULATION CHANNEL POWER - TDMA - UPLINK
Date: 6.DEC.1999 16:57:53

Plot 13

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

Title: 9L0482R LOW POWER MODULE W/ VARIABLE BW MODULE (CDMA)

Comment A: IMCP02.PCX

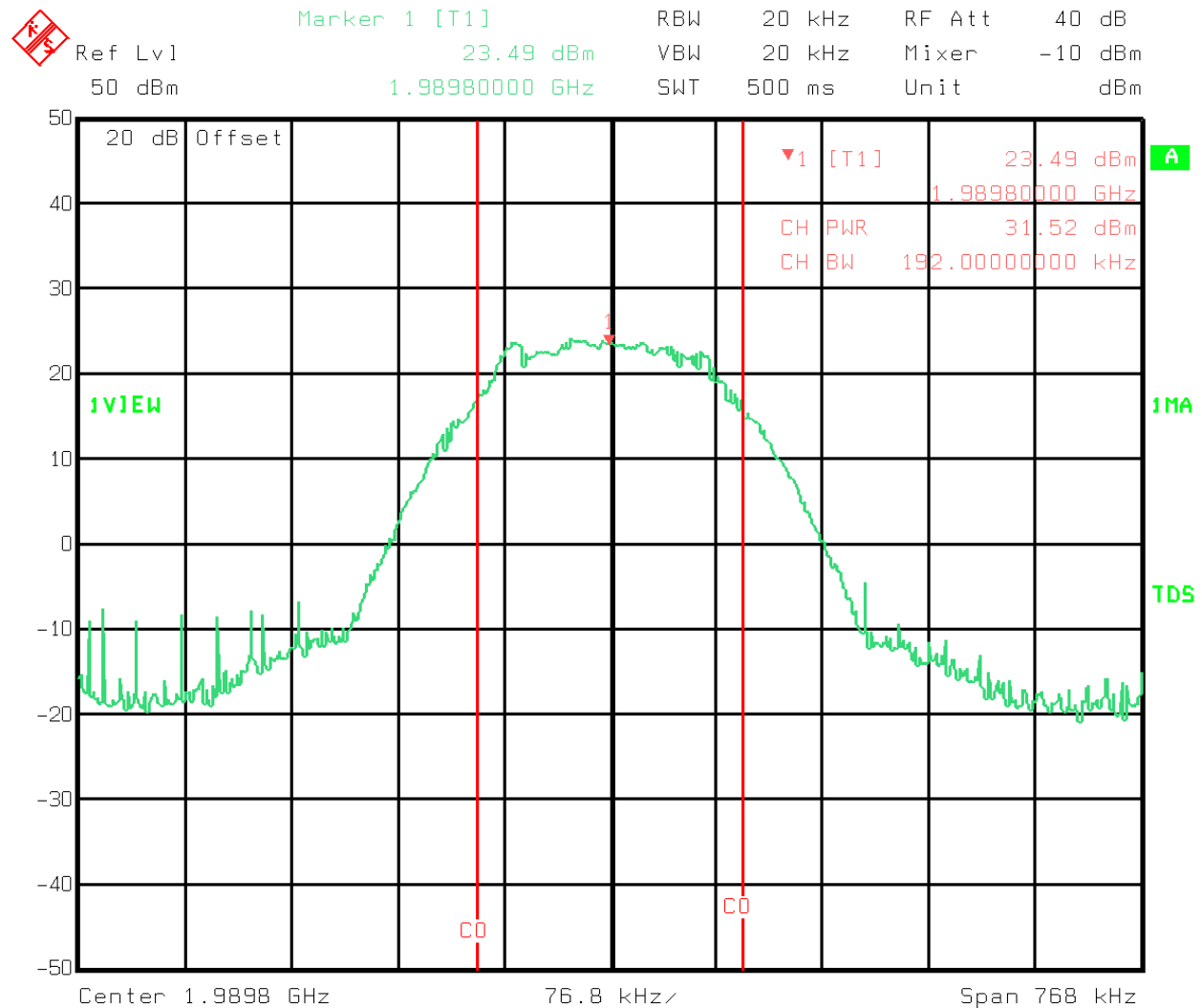
(DOWNLINK)

Date: 17.NOV.1999 13:05:50

Plot 14

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R

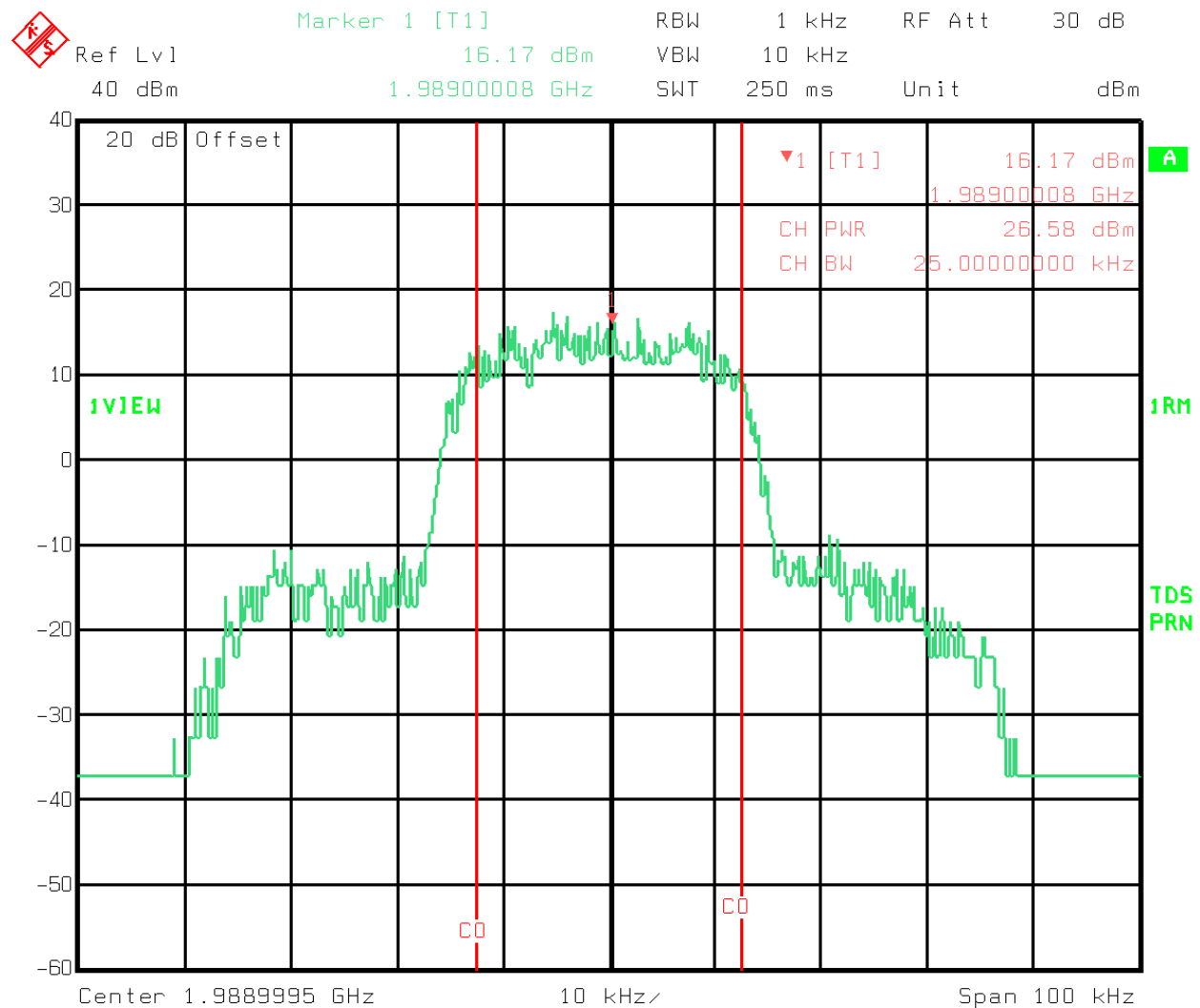


Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: IMCP06.PCX INTERMODULATION CHANNEL POWER - DOWNLINK - GSM
Date: 6.DEC.1999 10:20:48

Plot 15

EQUIPMENT: MR701B

PROJECT NO.: 9L0482R



Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-TDMA
Comment A: IMCP03.PCX INTERMODULATION CHANNEL POWER
Date: 18.NOV.1999 13:04:55

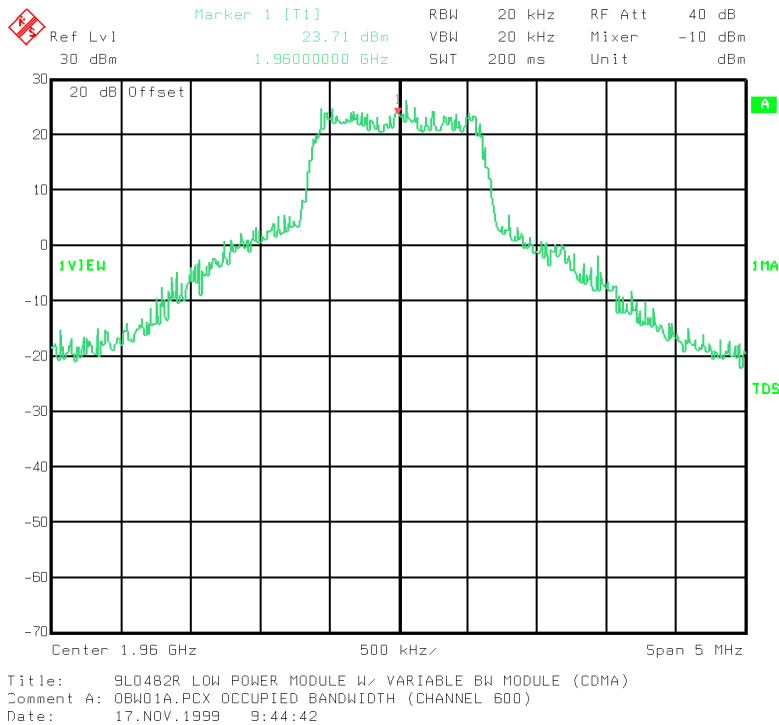
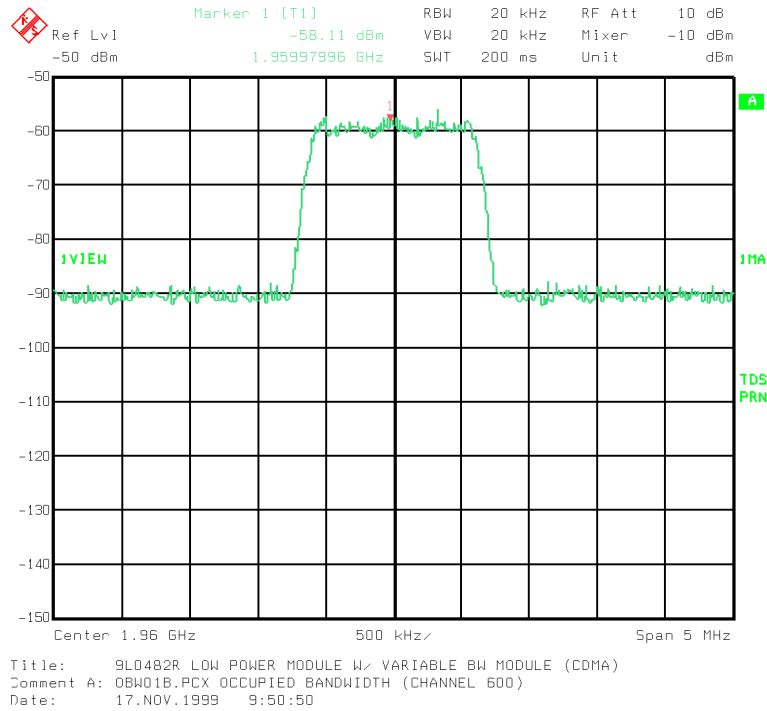
Plot 16

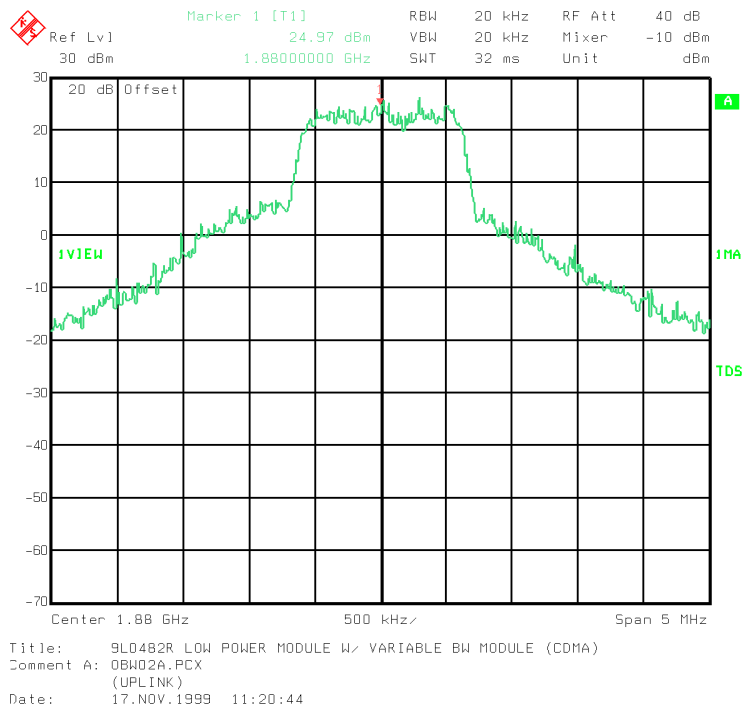
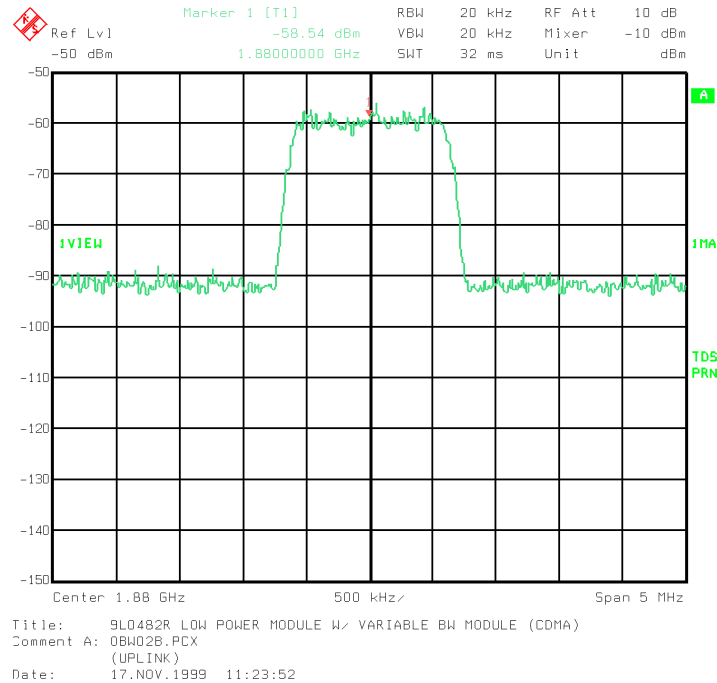
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

Section 4. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth (CDMA)	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 11/17/99

Test Results: Complies.**Test Data:** See attached plot(s).**Equipment Used:** G2736, G3726, G1366, G2632, CF44, CF41, CF39, CF38, CF40. Mini-Circuits 20 dB attenuator p/s S20W2**Temperature:** 25°C**Relative Humidity:** 50%

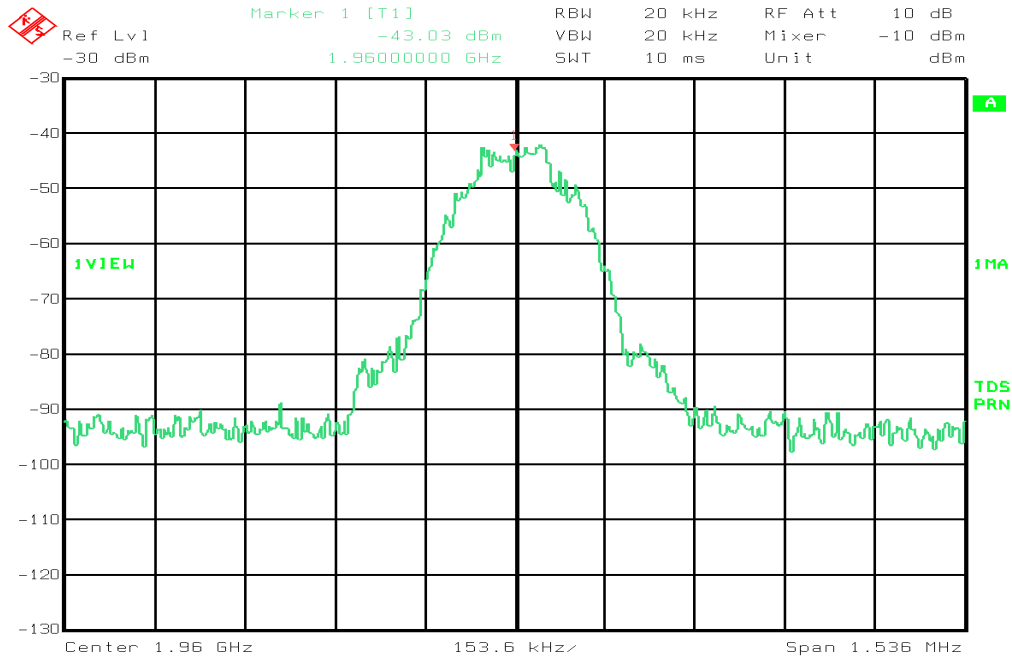
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Occupied Bandwidth – CDMA Downlink**

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Occupied Bandwidth – CDMA Uplink**

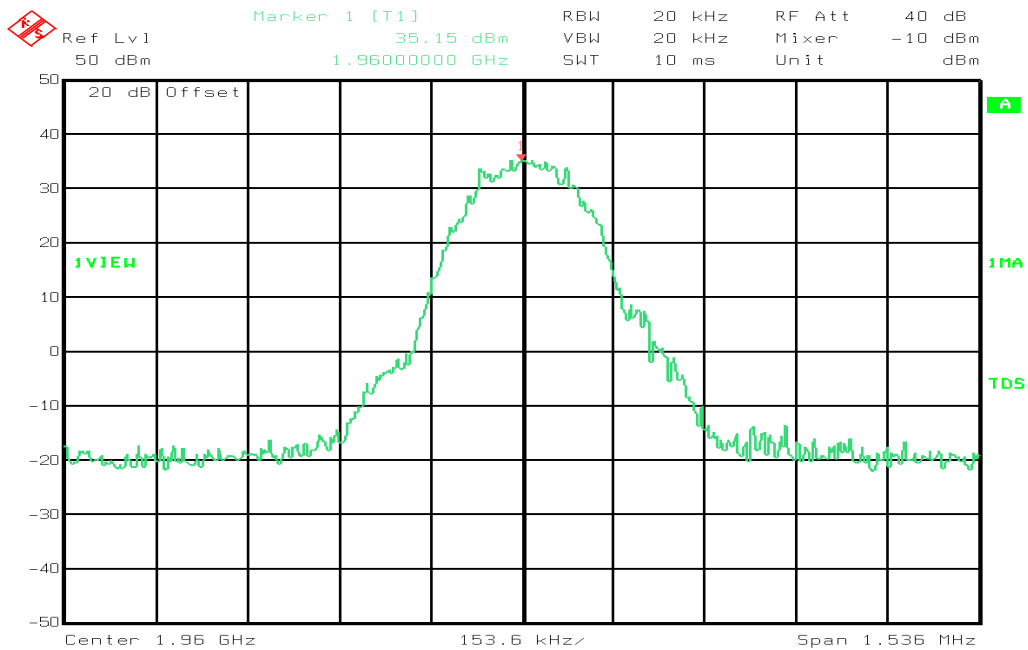
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

NAME OF TEST: Occupied Bandwidth (GSM)	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 11/18/99

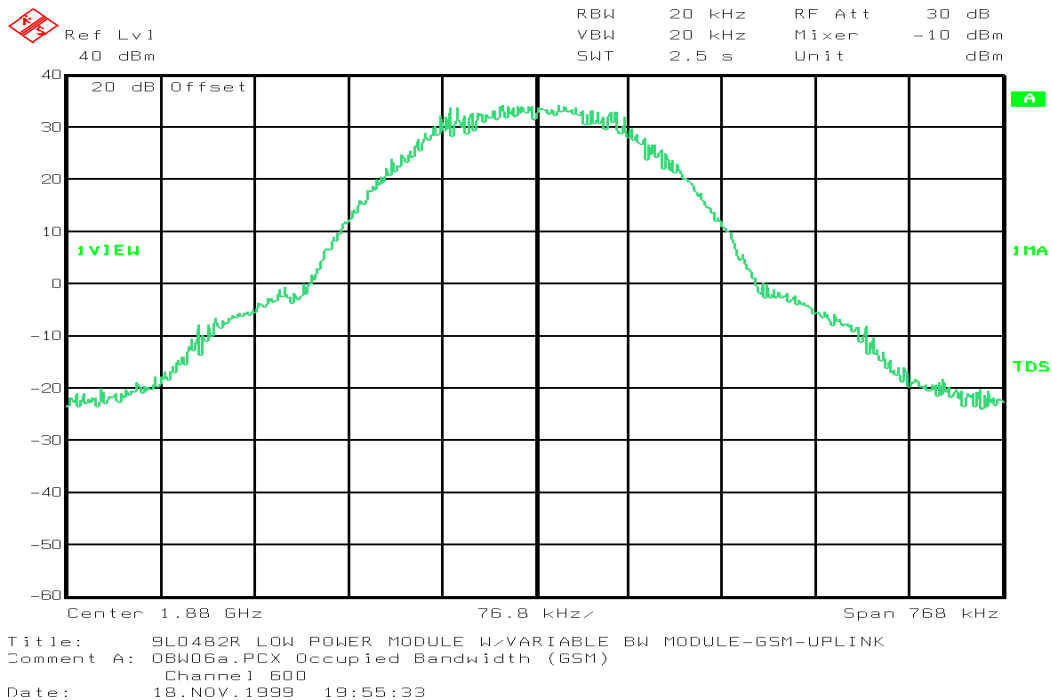
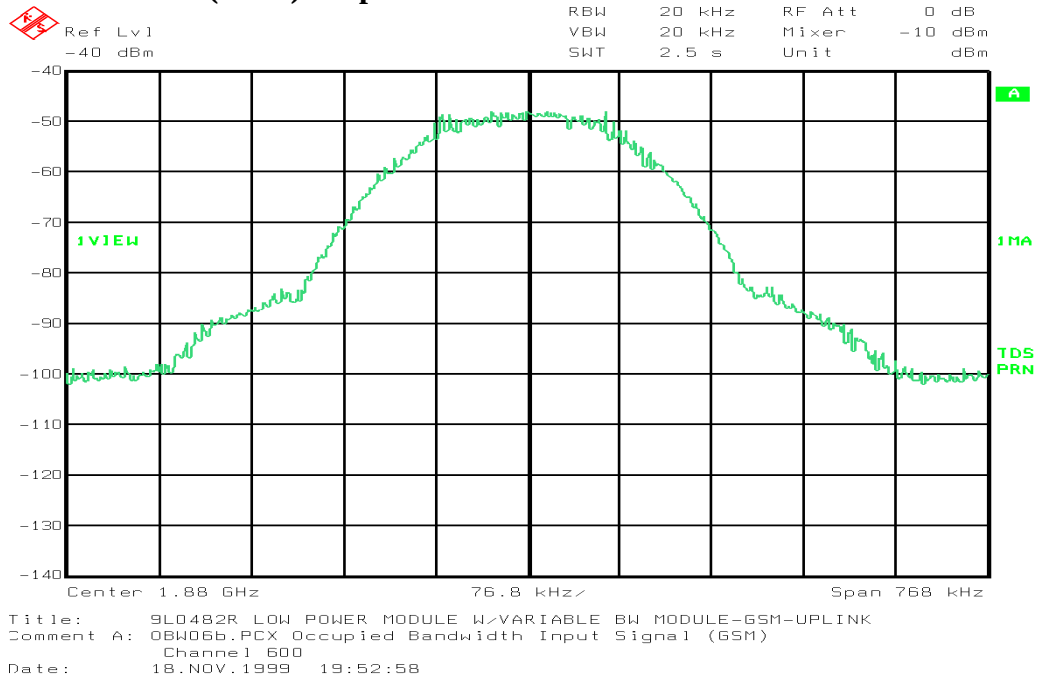
Test Results: Complies.**Test Data:** See attached plot(s).**Equipment Used:** G2736, G3726, G1366, G2632, CF44, CF41, CF39, CF38, CF40. Mini-Circuits 20 dB attenuator p/n S20W2**Temperature:** 25°C**Relative Humidity:** 50%

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Occupied Bandwidth (GSM) - Downlink**

Title: 9L0482R LOW PWR MODULE W/VAR. BW MODULE - GSM - DOWNLINK
Comment A: 0BW07B.PCX OCCUPIED BANDWIDTH - CHANNEL 600
Date: 19.NOV.1999 9:31:19



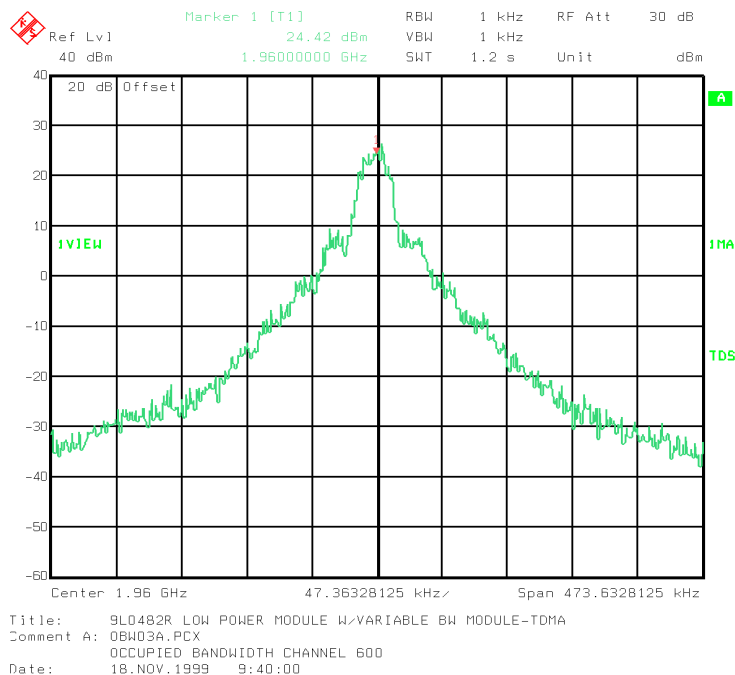
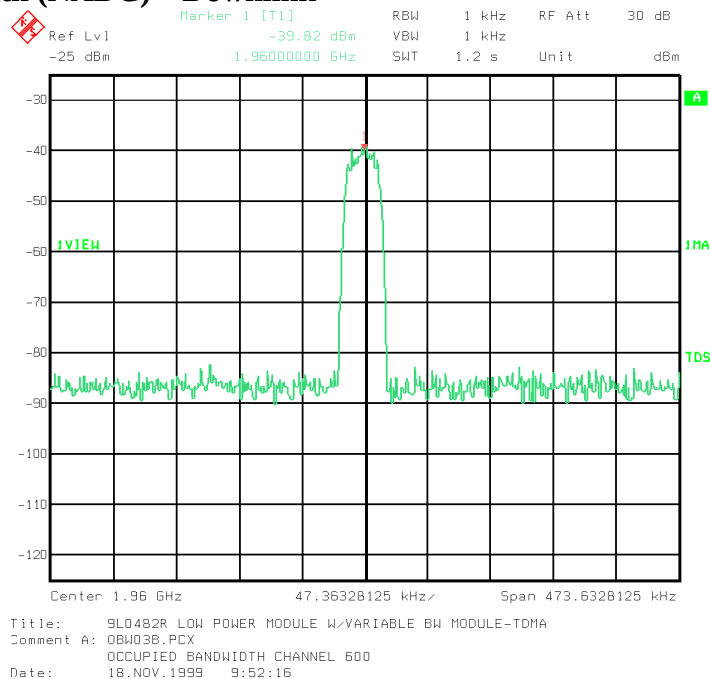
Title: 9L0482R LOW PWR MODULE W/VAR. BW MODULE - GSM - DOWNLINK
Comment A: 0BW07A.PCX OCCUPIED BANDWIDTH - CHANNEL 600
Date: 19.NOV.1999 9:28:08

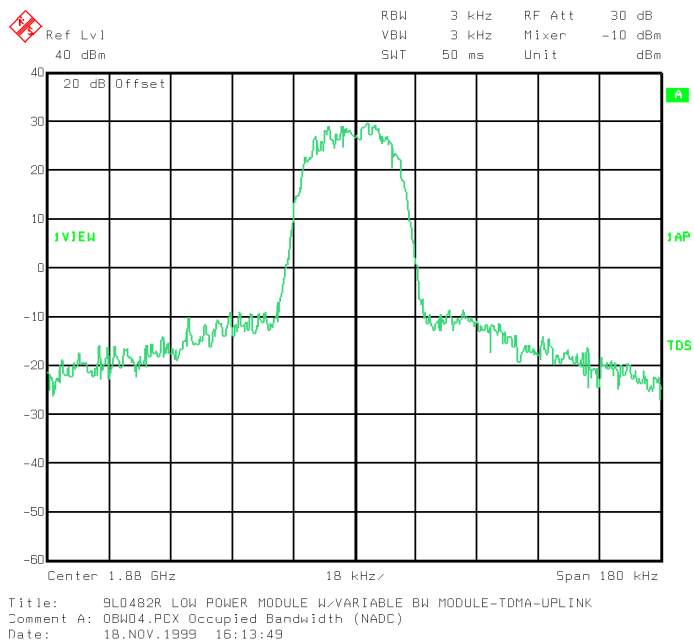
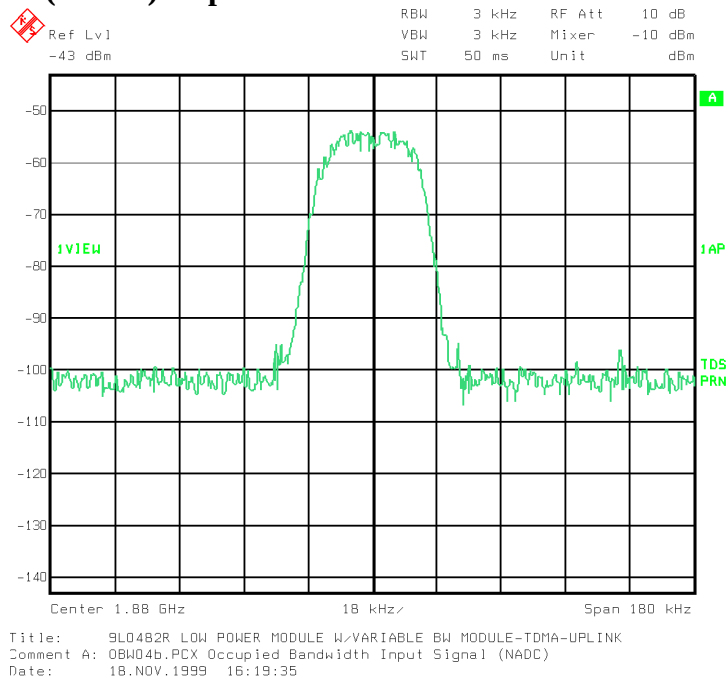
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Occupied Bandwidth (GSM) - Uplink**

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

NAME OF TEST: Occupied Bandwidth (NADC)	PARA. NO.: 2.1049
TESTED BY: David Light	DATE: 11/18/99

Test Results: Complies.**Test Data:** See attached plot(s).**Equipment Used:** G2736, G3726, G1366, G2632, CF44, CF41, CF39, CF38, CF40. Mini-circuits 20dB attenuator p/n S20W2**Temperature:** 25°C**Relative Humidity:** 50%

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Occupied Bandwidth (NADC) – Downlink**

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Occupied Bandwidth (NADC) - Uplink**

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

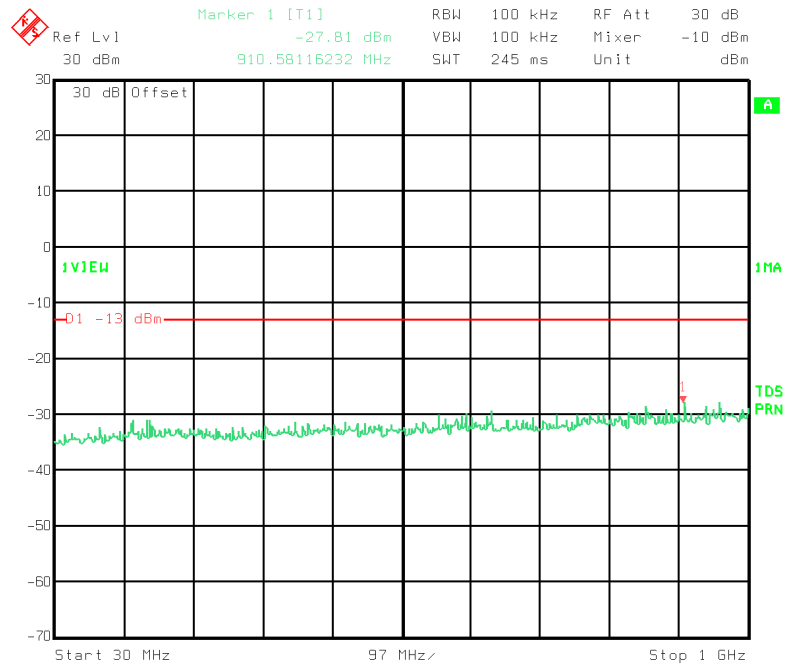
Section 5. Spurious Emissions at Antenna Terminals

NAME OF TEST: Spurious Emissions @ Antenna Terminals PARA. NO.: 2.1051

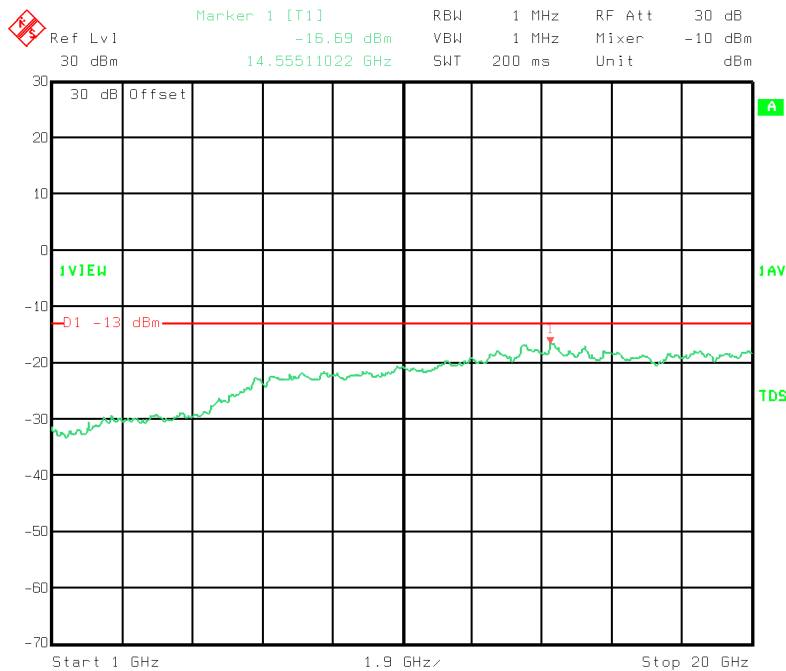
TESTED BY: David Light

DATE: 11/19/99

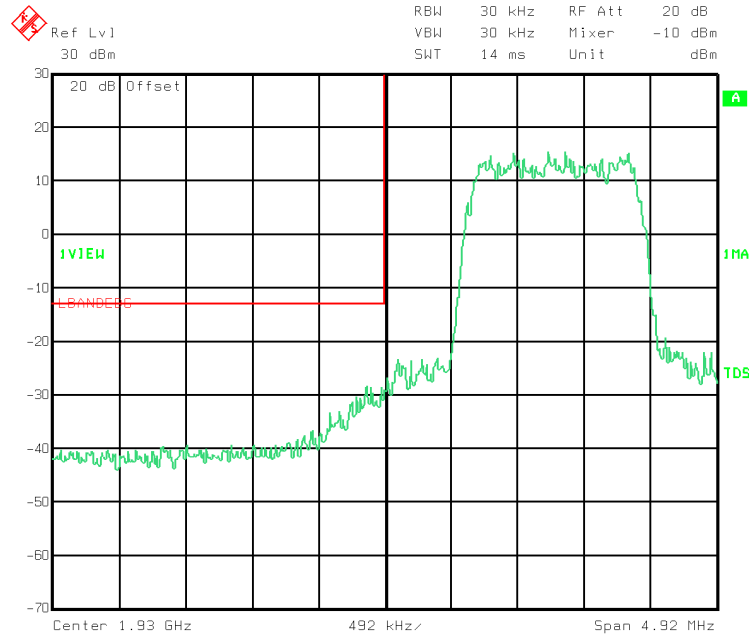
Test Results: Complies.**Test Data:** See attached plot(s).**Equipment Used:** G2736, G3726, G1366, G2632, CF44, CF41, CF40, CF39, CF38, G2735, G1711, G1017. Mini-Circuit attenuator p/n S20W2**Measurement Uncertainty:** +/- 1.6 dB**Temperature:** 25°C**Relative Humidity:** 50%

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – CDMA Downlink**

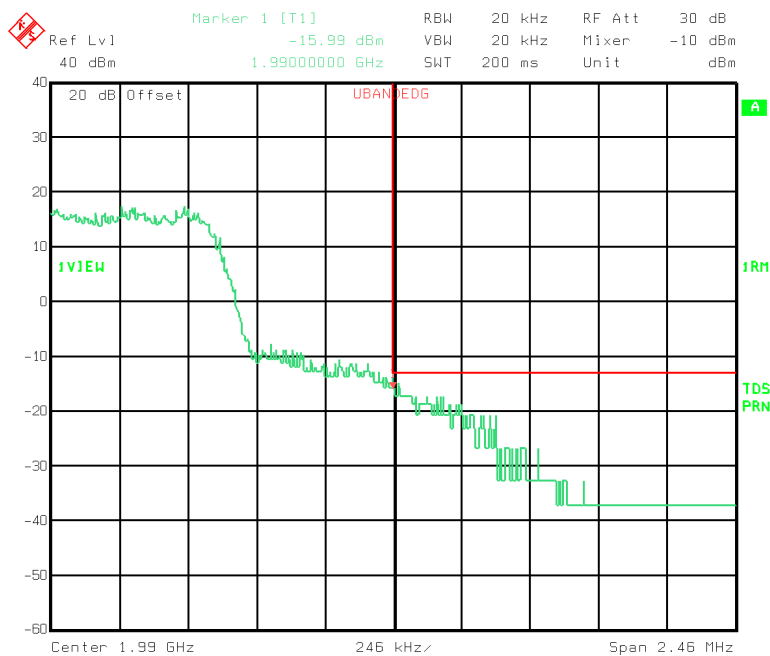
Title: 9L0482R LOW POWER MODULE W/ VARIABLE BW MODULE (CDMA)
Comment A: APSE02B.PCX ANTENNA PORT SPURIOUS EMISSIONS
(DOWNLINK) FUNDAMENTAL NOTCHED
Date: 17.NOV.1999 11:12:28



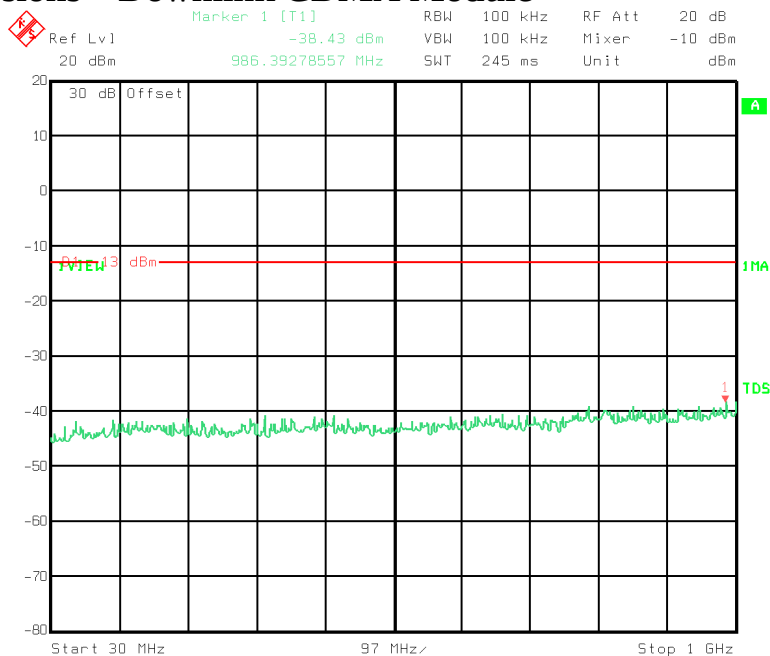
Title: 9L0482R LOW POWER MODULE W/ VARIABLE BW MODULE (CDMA)
Comment A: APSE02A.PCX ANTENNA PORT SPURIOUS EMISSIONS
FUNDAMENTAL NOTCHED
Date: 17.NOV.1999 8:52:55

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Band Edge Spurious Emissions – CDMA Downlink**

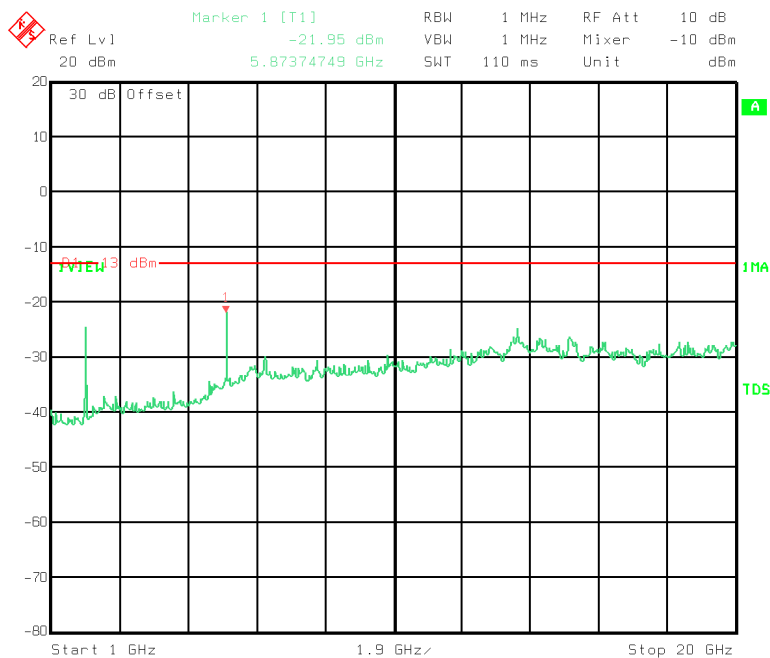
Title: 9L0482R LOW POWER MODULE W/ VARIABLE BW MODULE
Comment A: LBE06.PCX LOWER BAND EDGE - CDMA - DOWNLINK
Date: 6.DEC.1999 17:44:12



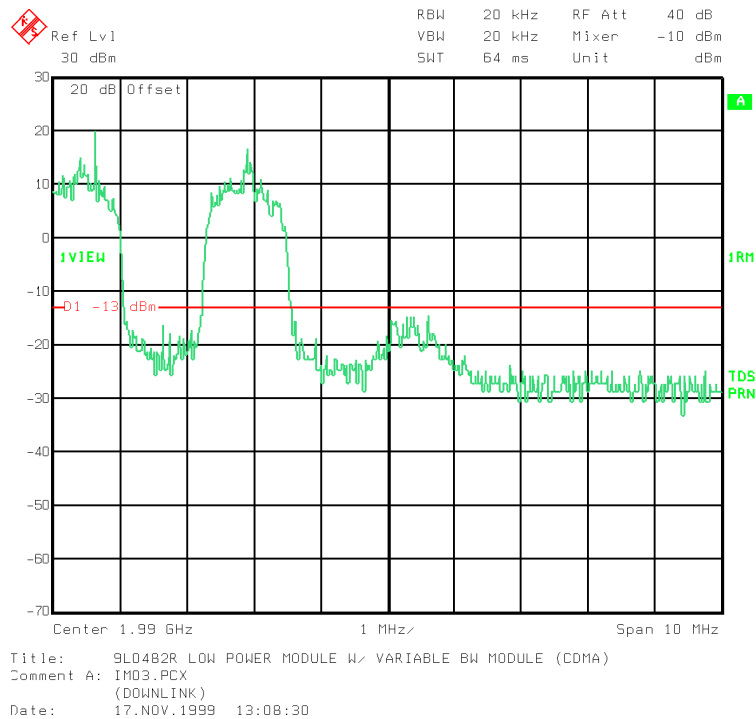
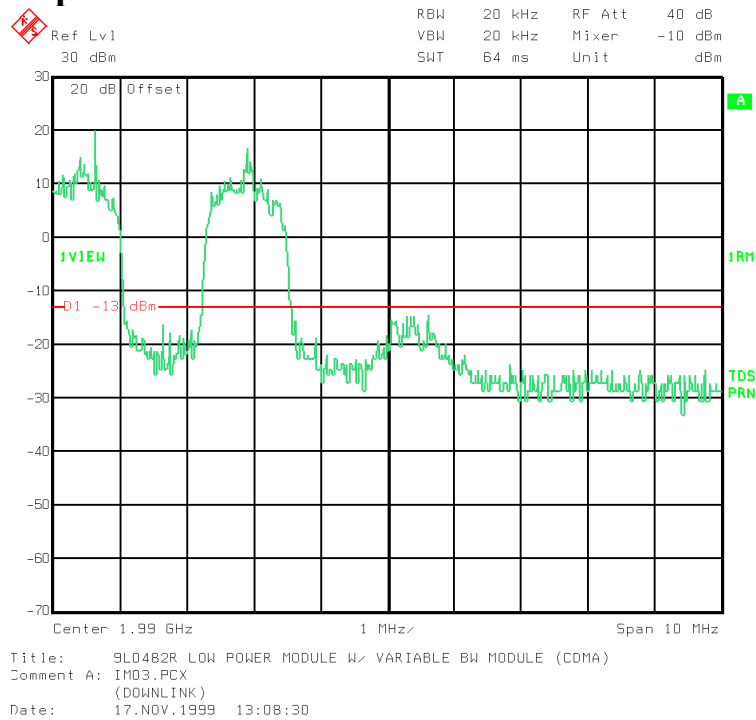
Title: 9L0482R LOW POWER MODULE W/ VARIABLE BW MODULE (CDMA)
Comment A: UBE01.PCX UPPER BAND EDGE (CHANNEL 1175)
Date: 17.NOV.1999 8:43:51

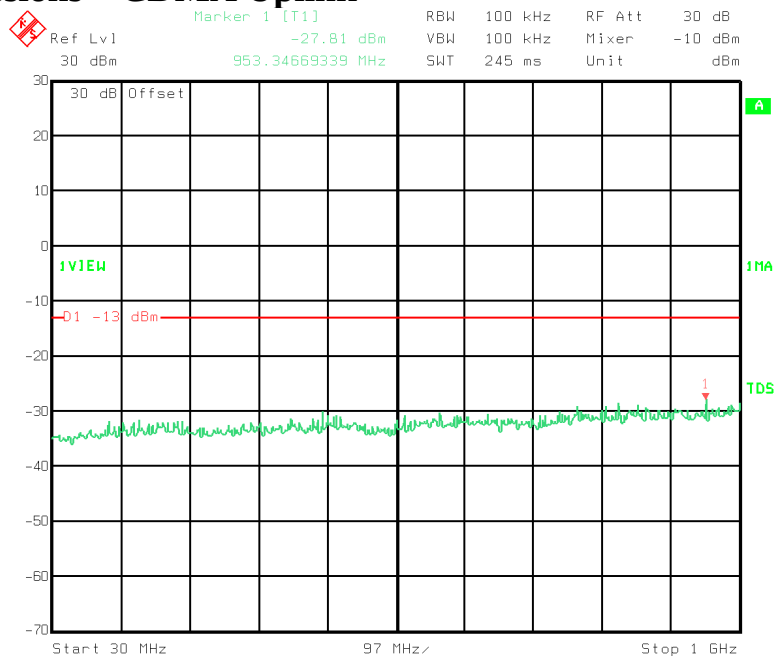
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – Downlink CDMA Module**

Title: 9L0482R LOW PWR MODULE W/ CDMA MODULE - CDMA - DOWNLINK
Comment A: APSE08B.PCX ANTENNA PORT SPURIOUS - CDMA
FUNDAMENTAL (CHANNEL 600) NOTCHED
Date: 19.NOV.1999 14:34:59

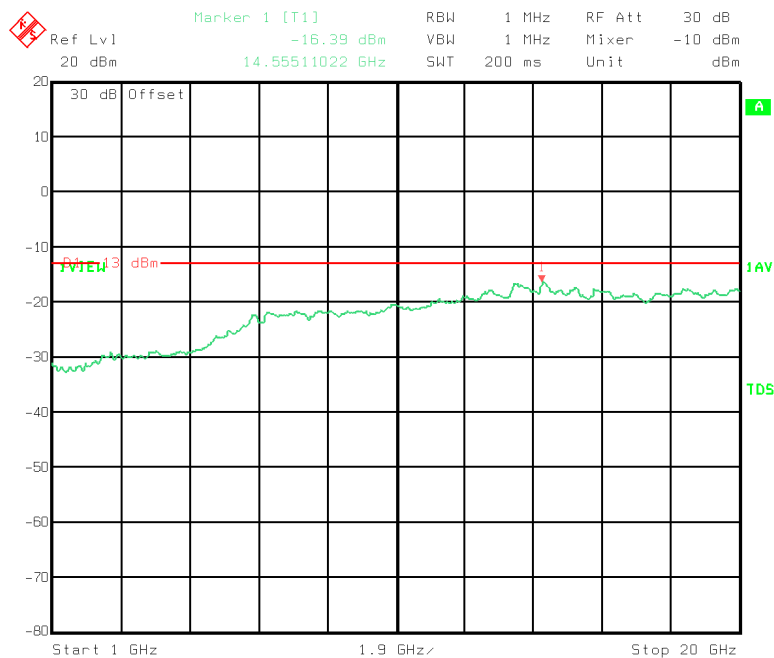


Title: 9L0482R LOW PWR MODULE W/ CDMA MODULE - CDMA - DOWNLINK
Comment A: APSE08A.PCX ANTENNA PORT SPURIOUS - CDMA
FUNDAMENTAL (CHANNEL 600) NOTCHED
Date: 19.NOV.1999 14:39:00

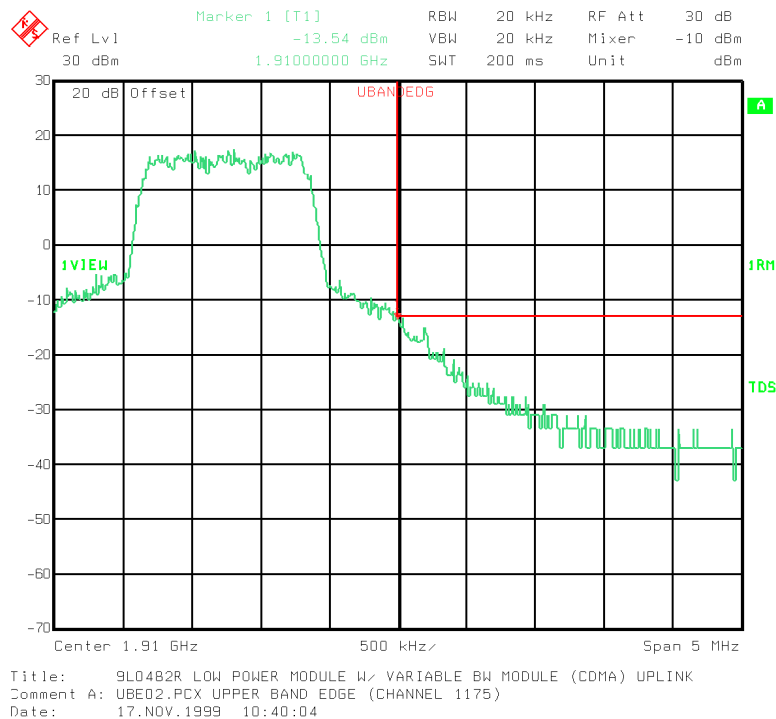
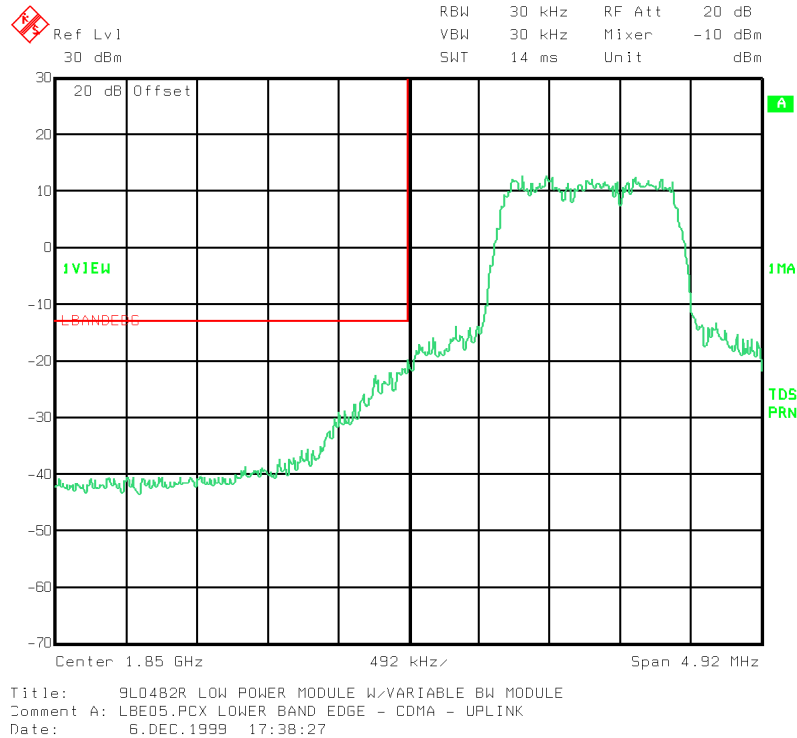
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Intermodulation Spurious Emissions – CDMA Downlink**

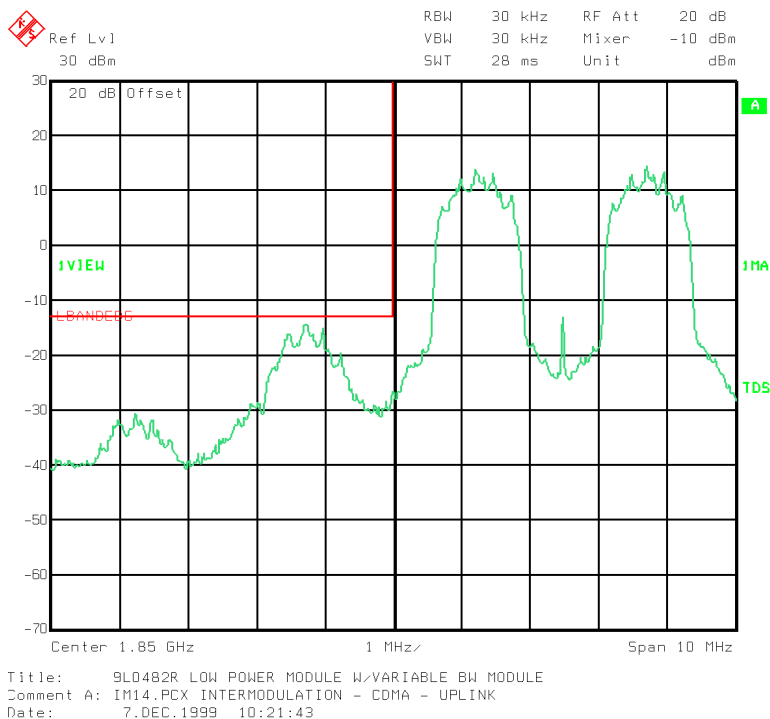
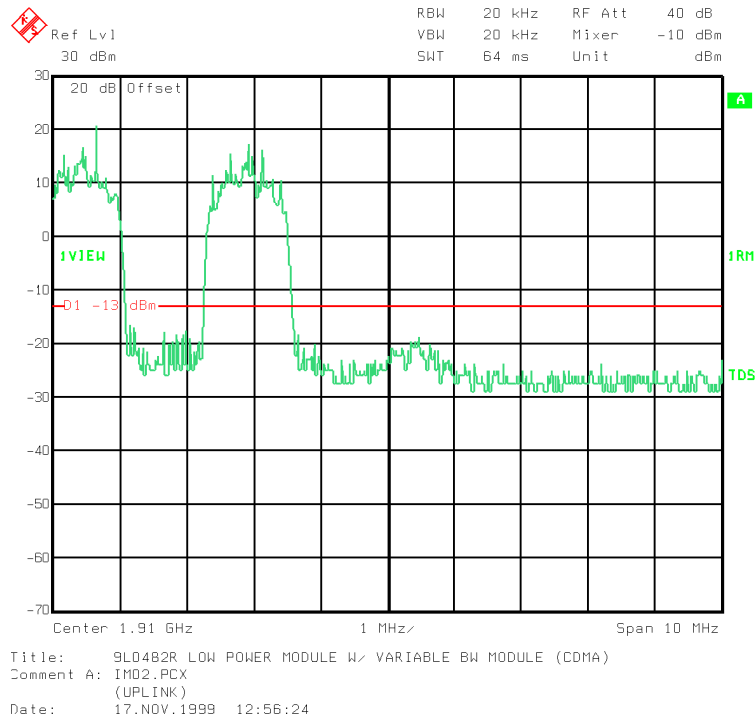
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – CDMA Uplink**

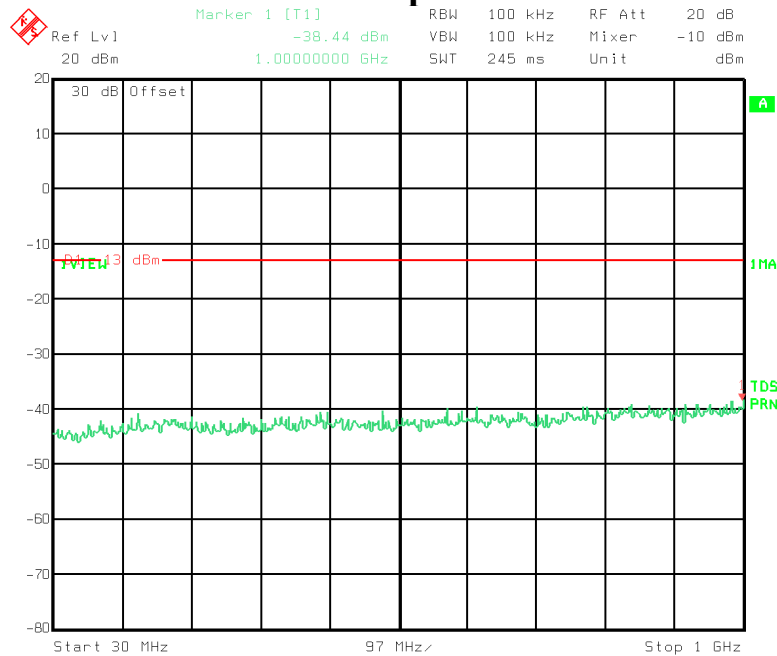
Title: 9L0482R LOW POWER MODULE W/ VARIABLE BW MODULE (CDMA)
Comment A: APSE03B.PCX ANTENNA PORT SPURIOUS EMISSIONS
(UPLINK) FUNDAMENTAL NOTCHED
Date: 17.NOV.1999 11:06:23



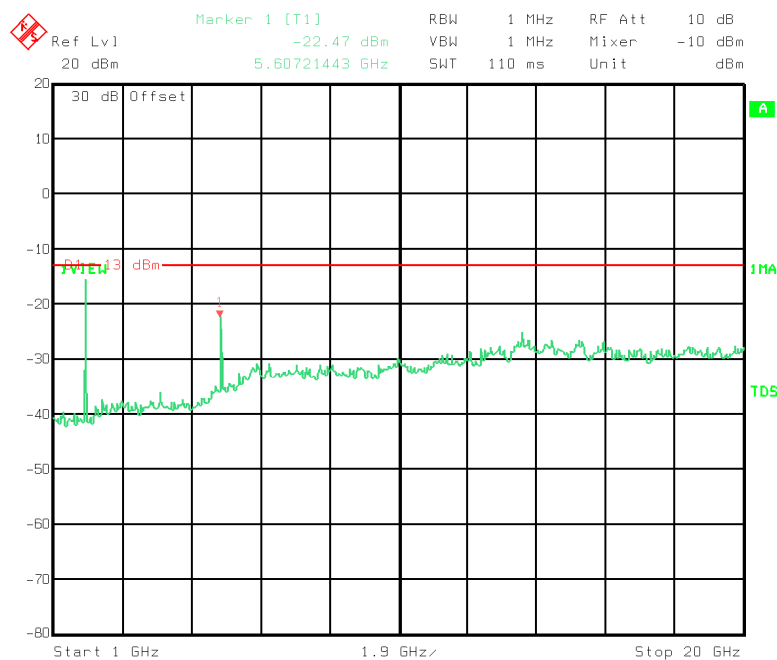
Title: 9L0482R LOW POWER MODULE W/ VARIABLE BW MODULE (CDMA)
Comment A: APSE03A.PCX ANTENNA PORT SPURIOUS EMISSIONS
(UPLINK) FUNDAMENTAL NOTCHED
Date: 17.NOV.1999 10:52:31

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Band Edge Spurious Emissions – CDMA Uplink**

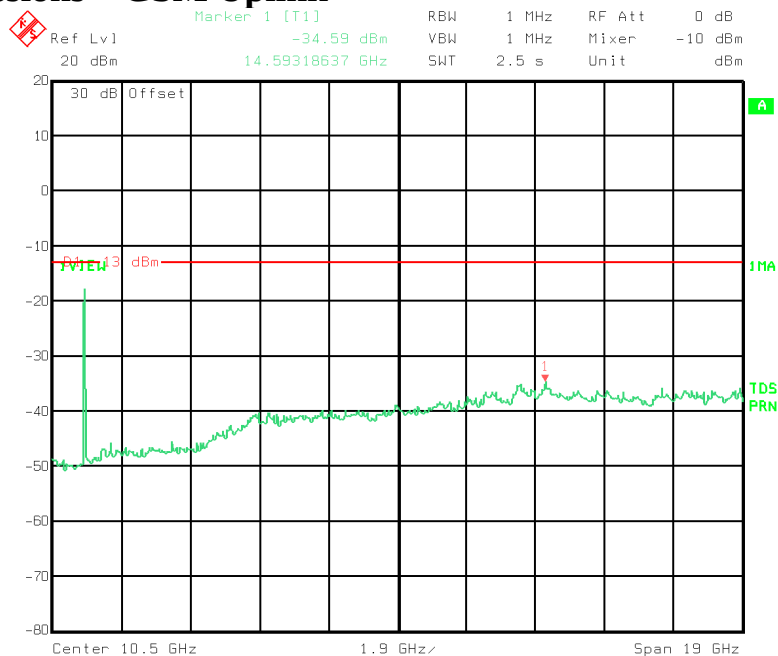
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Intermodulation Spurious Emissions – CDMA Uplink**

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – CDMA Module Uplink**

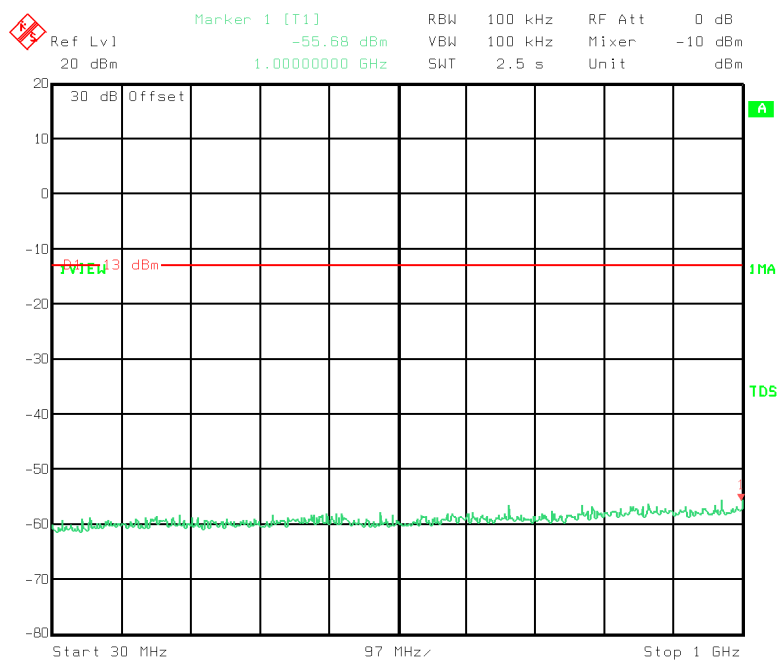
Title: 9L0482R LOW PWR MODULE W/ CDMA MODULE - CDMA - UPLINK
Comment A: APSE09B.PCX ANTENNA PORT SPURIOUS - CDMA
FUNDAMENTAL (CHANNEL 600) NOTCHED
Date: 19.NOV.1999 14:47:29



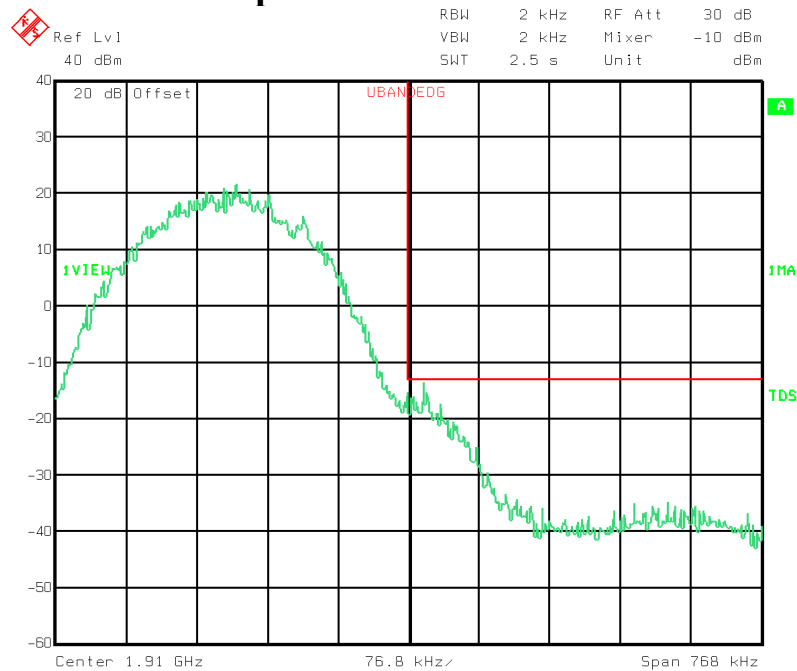
Title: 9L0482R LOW PWR MODULE W/ CDMA MODULE - CDMA - UPLINK
Comment A: APSE09A.PCX ANTENNA PORT SPURIOUS - CDMA
FUNDAMENTAL (CHANNEL 600) NOTCHED
Date: 19.NOV.1999 14:45:55

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – GSM Uplink**

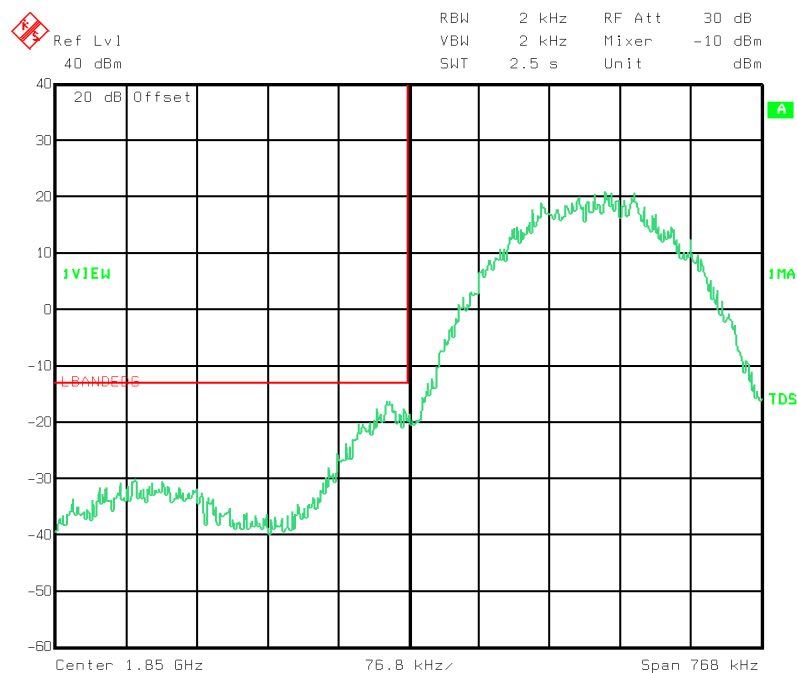
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-GSM-UPLINK
Comment A: AP5E06a.PCX Antenna Port Spurious Emissions (GSM)
Channel 600
Date: 18.NOV.1999 20:02:42



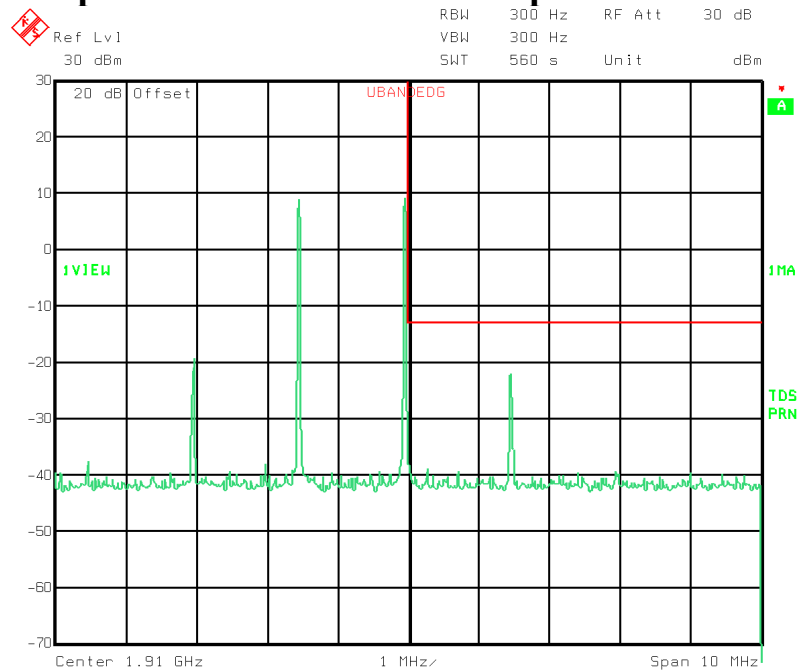
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-GSM-UPLINK
Comment A: AP5E06b.PCX Antenna Port Spurious Emissions (GSM)
Channel 600
Date: 18.NOV.1999 20:04:52

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – GSM Uplink**

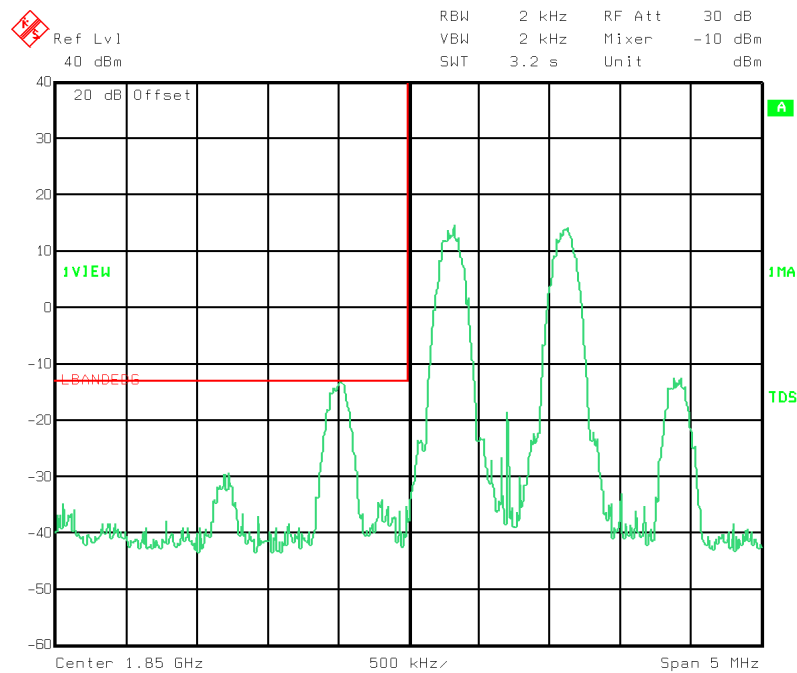
Title: 9L0482R LOW POWER MODULE W/ CDMA MODULE
Comment A: UBE12.PCX UPPER BAND EDGE - UPLINK - GSM
Date: 7.DEC.1999 17:09:55



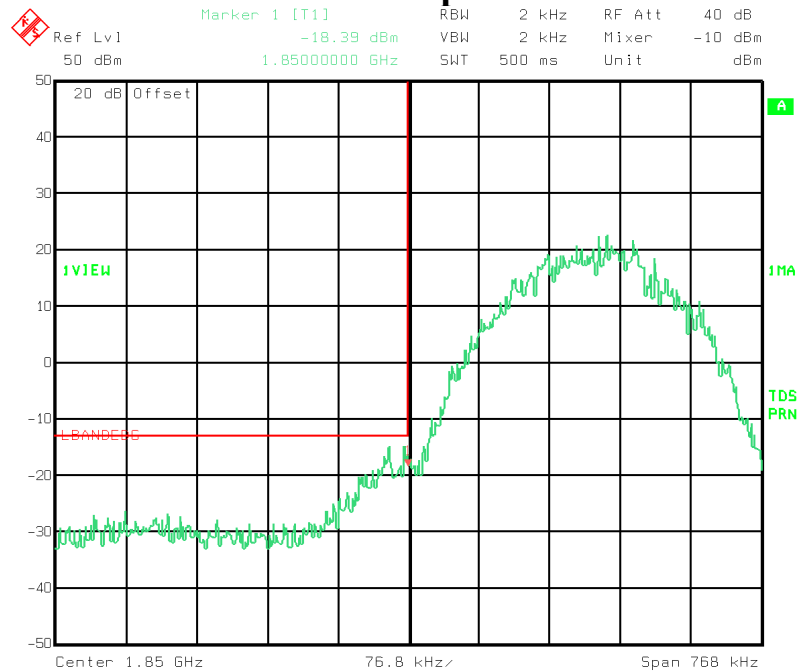
Title: 9L0482R LOW POWER MODULE W/ CDMA MODULE
Comment A: LBE11.PCX LOWER BAND EDGE - UPLINK - GSM
Date: 7.DEC.1999 16:06:24

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Intermodulation Spurious Emissions – GSM Uplink**

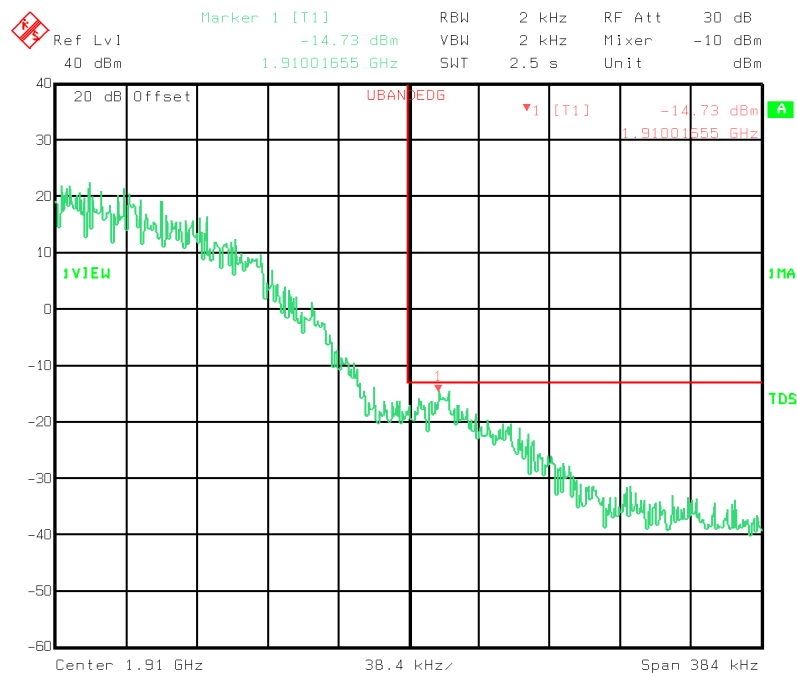
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: IM06.PCX INTERMODULATION - UPLINK
Date: 3.DEC.1999 15:26:49



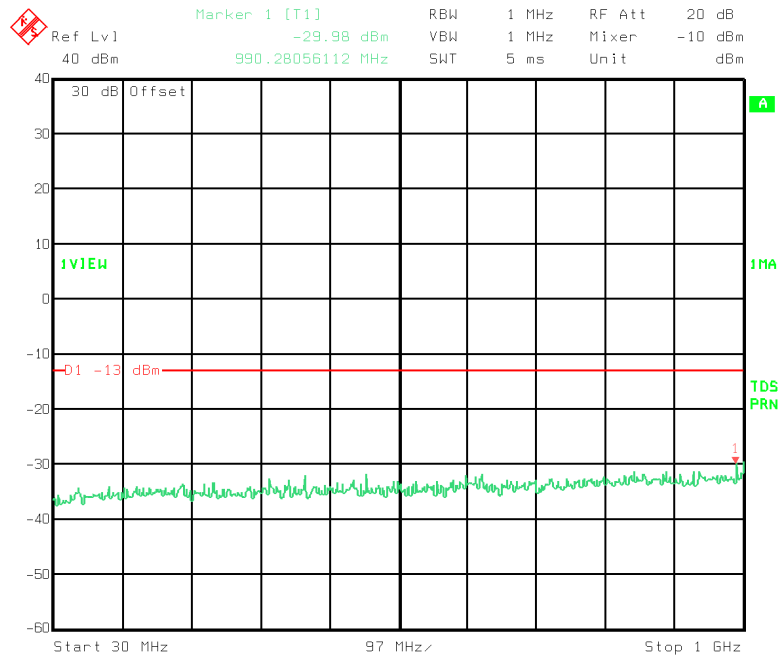
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: IM10.PCX INTERMODULATION - GSM - UPLINK
Date: 6.DEC.1999 17:05:06

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Band Edge Spurious Emissions – GSM Uplink**

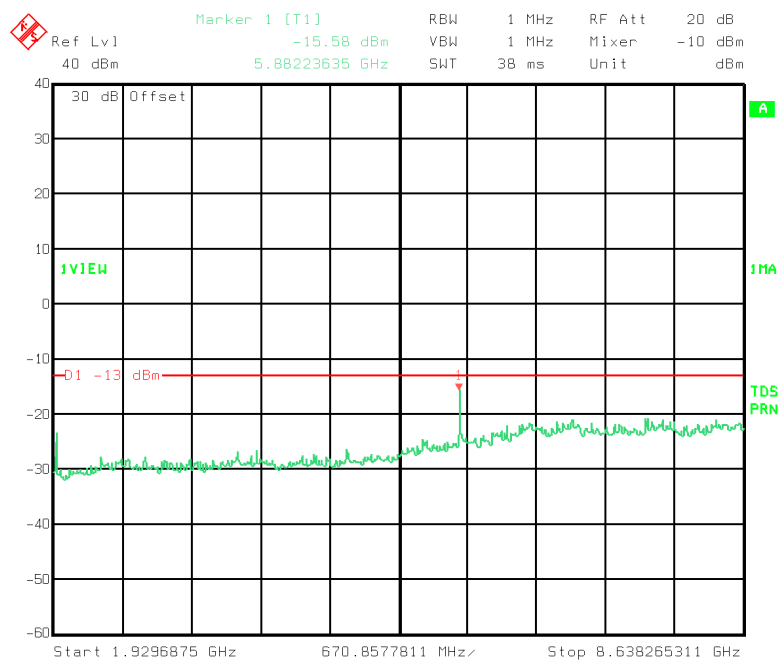
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: LBED1.PCX LOWER BAND EDGE - GSM - UPLINK
Date: 6.DEC.1999 12:05:33



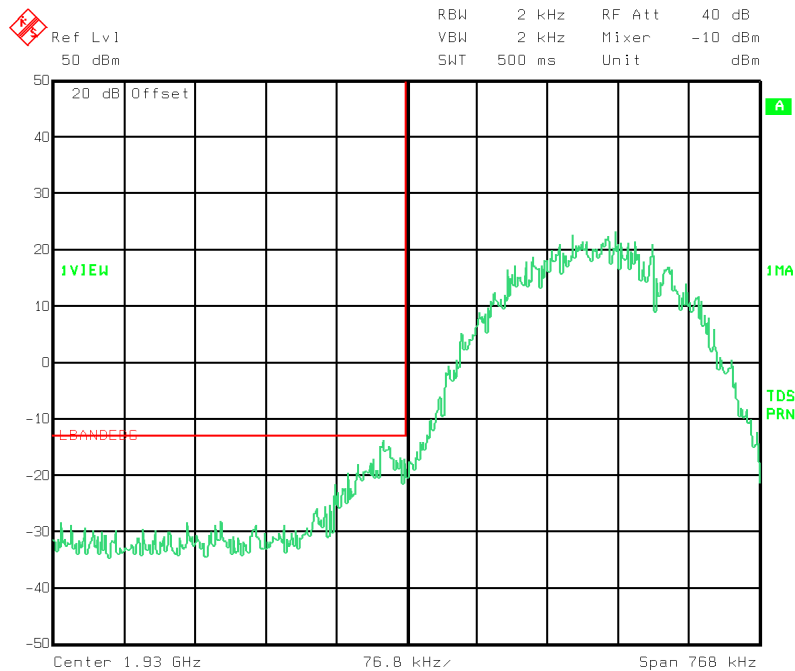
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-GSM-UPLINK
Comment A: UBE05.PCX Upper Band Edge (GSM)
Date: 18.NOV.1999 19:27:48

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – GSM Downlink**

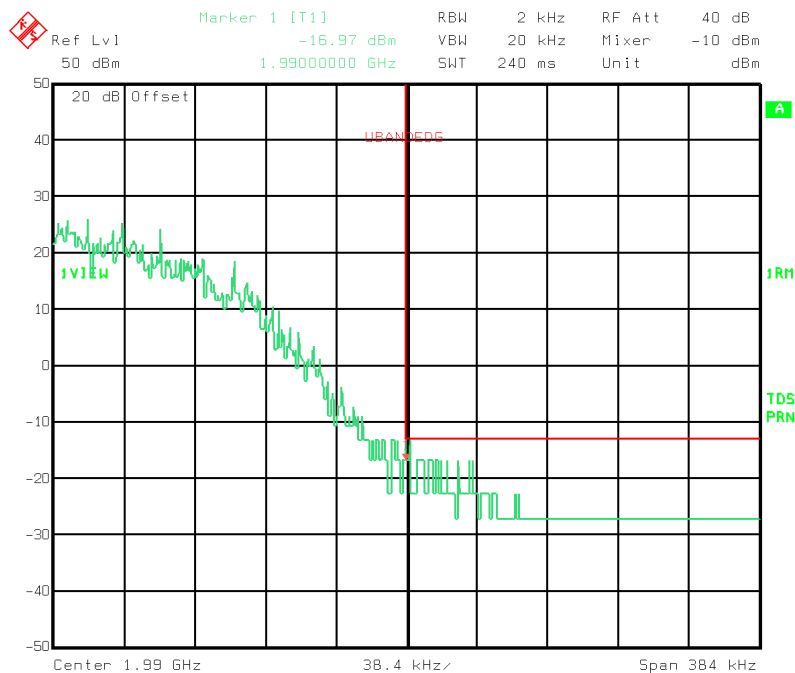
Title: 9L0482R LOW PWR MODULE W/VAR. BW MODULE - GSM - DOWNLINK
Comment A: AP5E07B.PCX ANTENNA PORT SPURIOUS EMISSIONS
CHANNEL 600 NOTCHED
Date: 19.NOV.1999 10:08:27



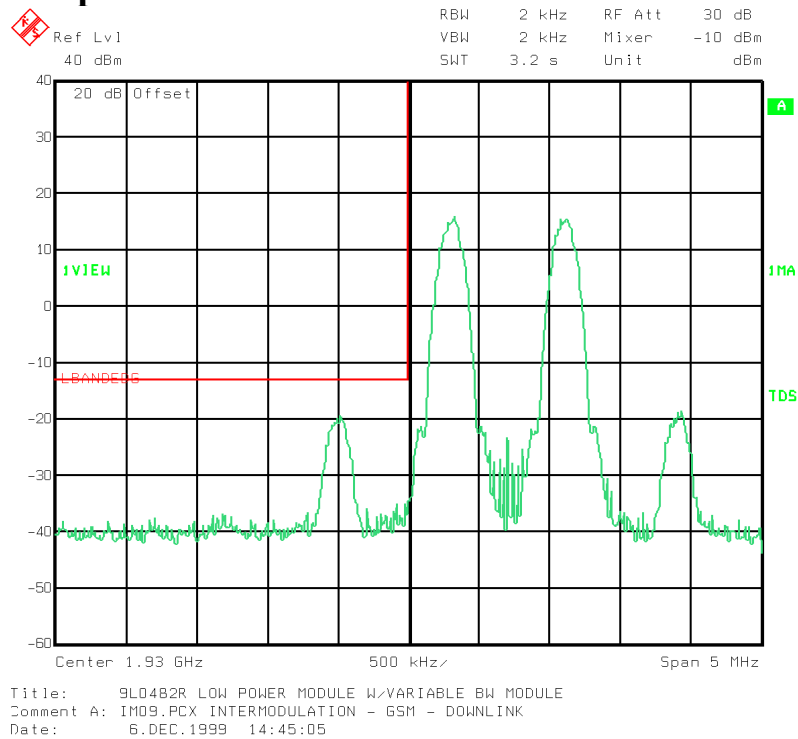
Title: 9L0482R LOW PWR MODULE W/VAR. BW MODULE - GSM - DOWNLINK
Comment A: AP5E07A.PCX ANTENNA PORT SPURIOUS EMISSIONS
CHANNEL 600 NOTCHED
Date: 19.NOV.1999 10:20:44

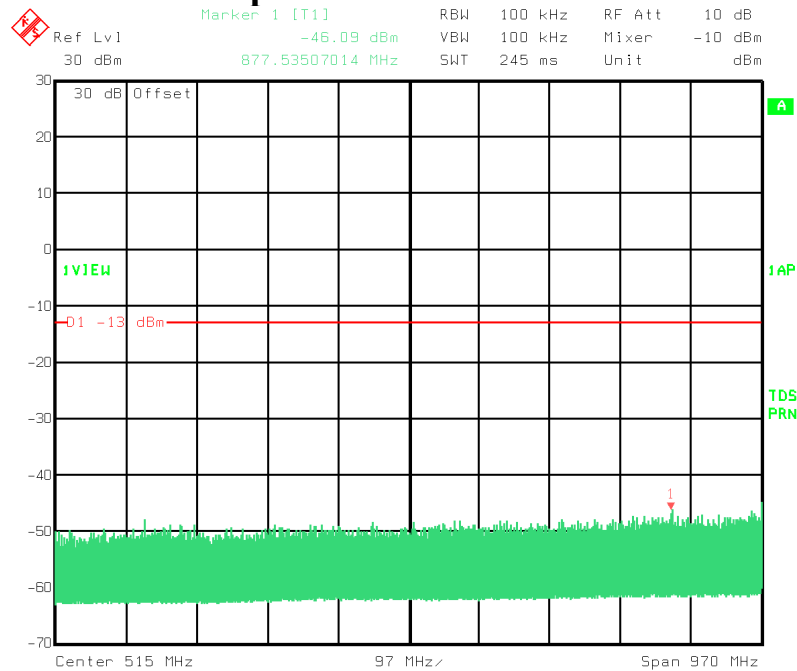
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Band Edge Spurious Emissions – GSM Downlink**

Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: LBED02.PCX LOWER BAND EDGE - GSM - DOWNLINK
Date: 6.DEC.1999 12:25:17

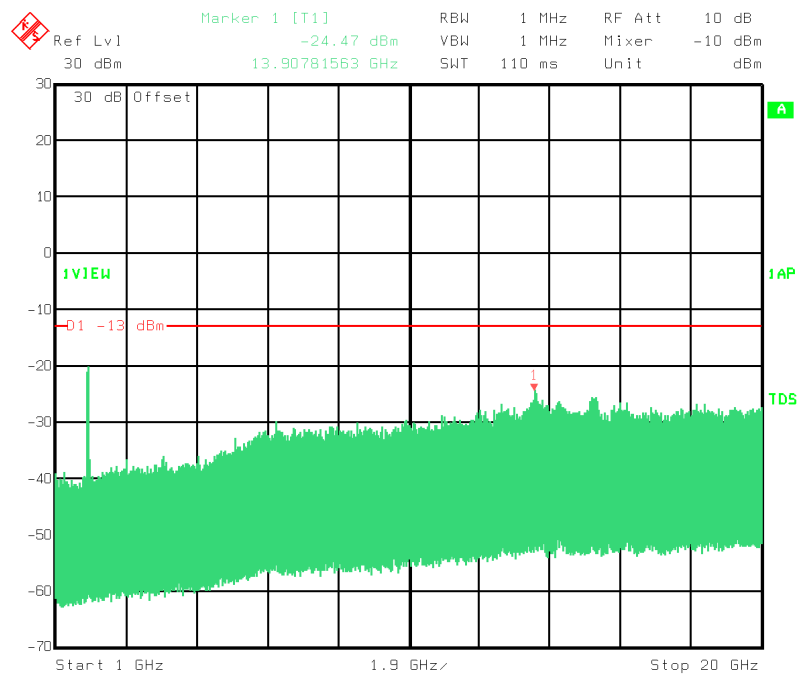


Title: 9L0482R LOW PWR MODULE W/VAR. BW MODULE - GSM - DOWNLINK
Comment A: UBED06.PCX UPPER BAND EDGE
Date: 19.NOV.1999 9:15:23

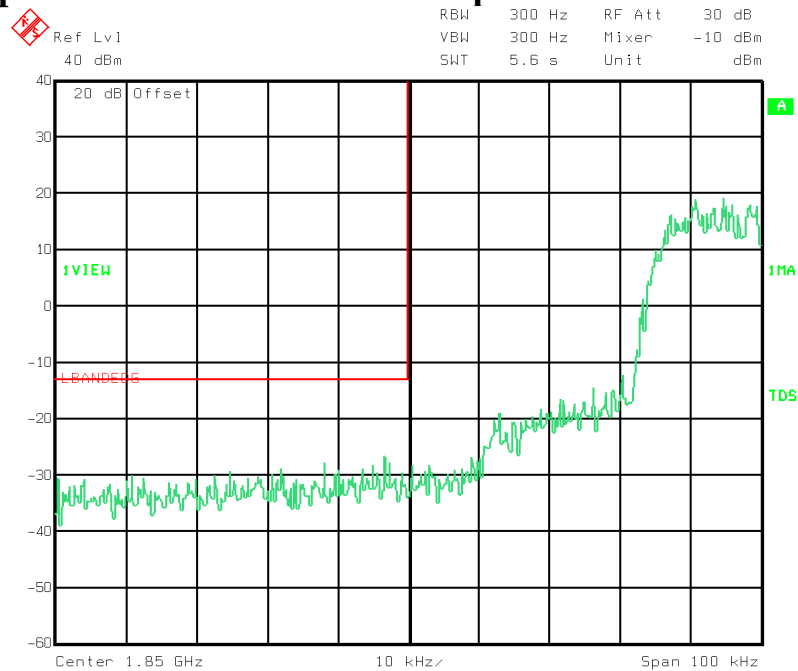
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Intermodulation Spurious Emissions – GSM Downlink**

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions NADC Uplink**

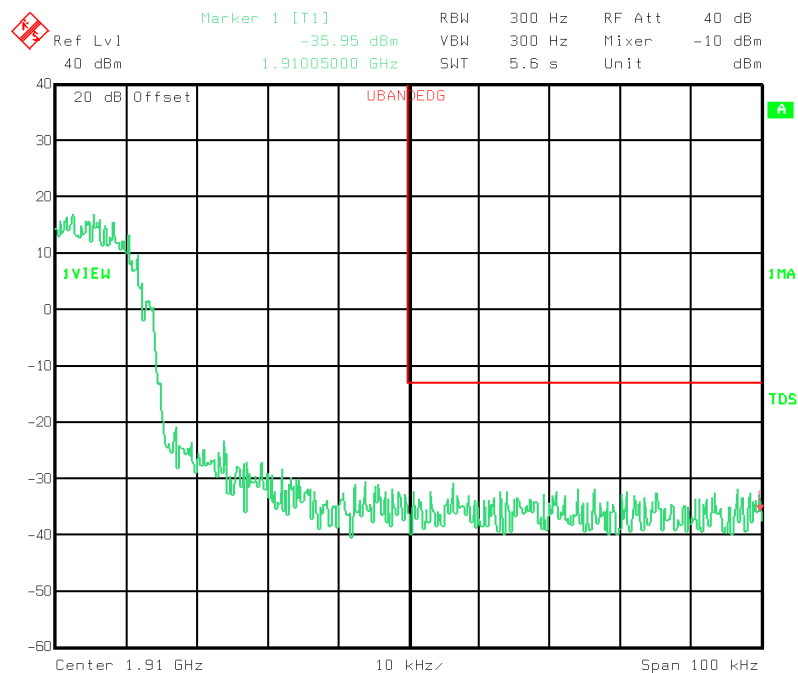
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-TDMA-UPLINK
Comment A: AP5E05b.PCX Antenna Port Spurious Emissions (NADC)
Date: 18.NOV.1999 16:49:51



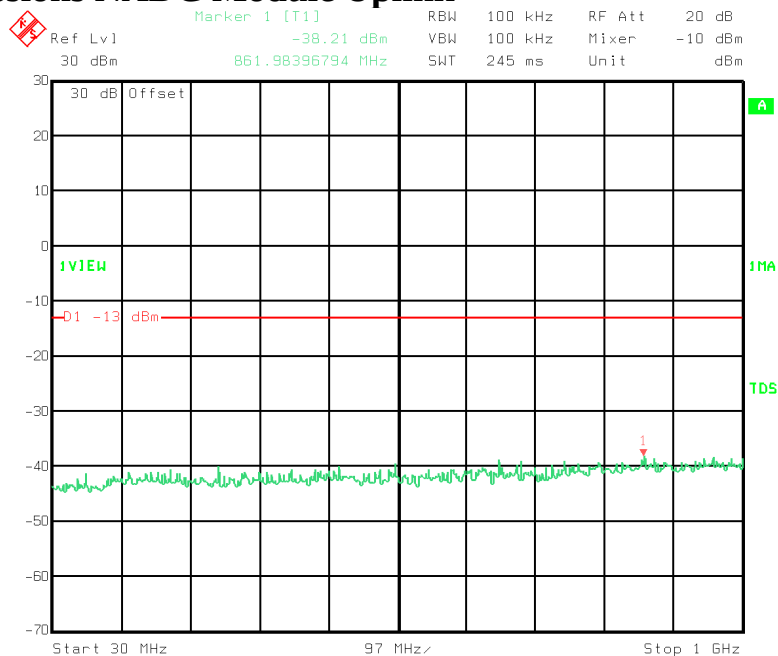
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-TDMA-UPLINK
Comment A: AP5E05a.PCX Antenna Port Spurious Emissions (NADC)
Date: 18.NOV.1999 16:51:27

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Band Edge Spurious Emissions – NADC Uplink**

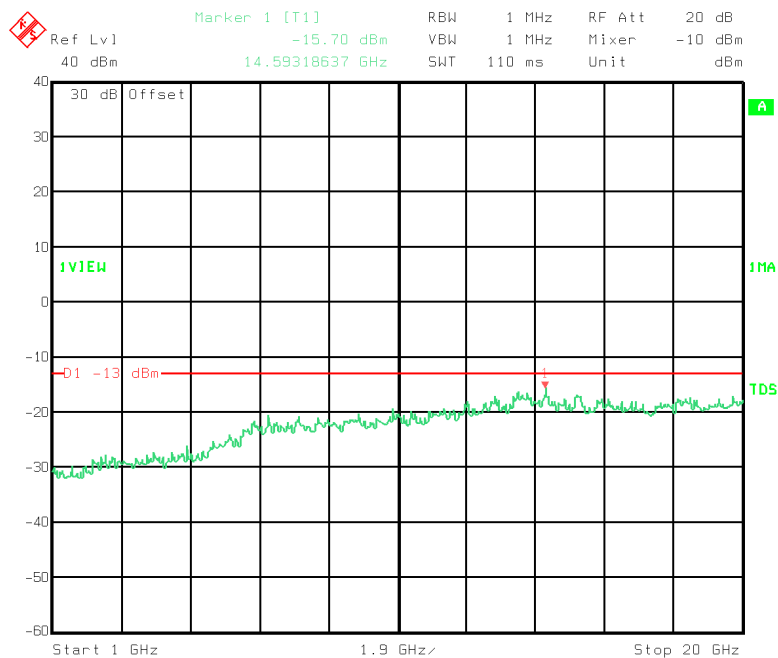
Title: 9L0482R LOW POWER MODULE W/ TDMA MODULE
Comment A: LBED07.PCX LOWER BAND EDGE - UPLINK - TDMA
Date: 7.DEC.1999 15:29:15



Title: 9L0482R LOW PWR MODULE W/ TDMA MODULE - TDMA - UPLINK
Comment A: UBE10.PCX UPPER BAND EDGE
Date: 22.NOV.1999 10:26:54

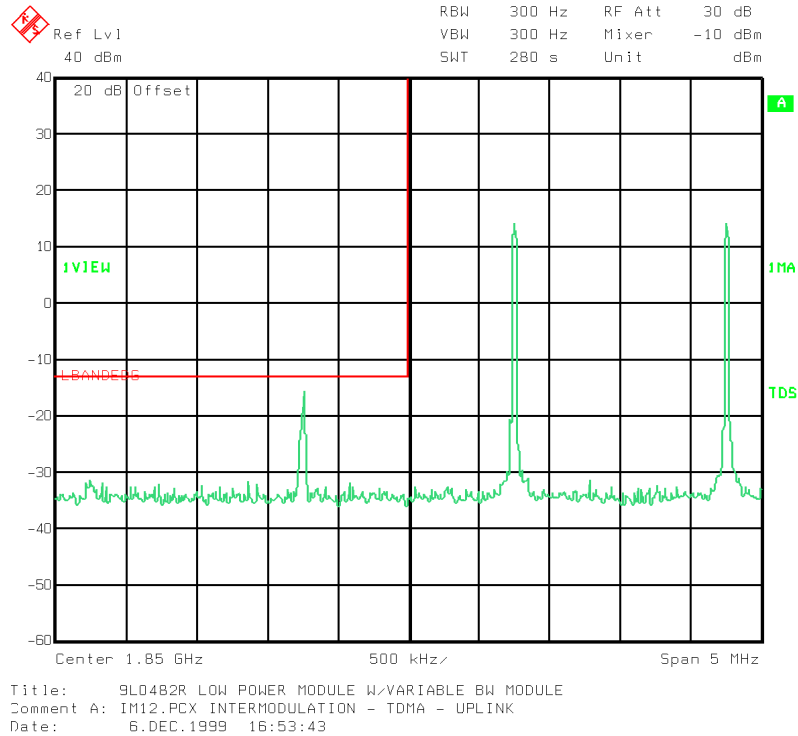
EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions NADC Module Uplink**

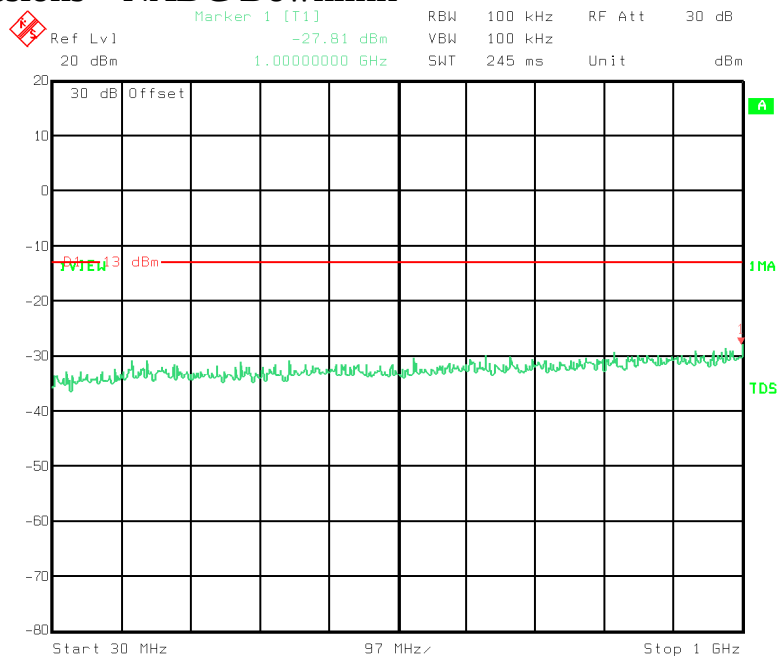
Title: 9L0482R LOW PWR MODULE W/ TDMA MODULE - TDMA - UPLINK
Comment A: APSE11B.PCX ANTENNA PORT SPURIOUS EMISSIONS
CHANNEL 600 NOTCHED
Date: 22.NOV.1999 10:48:59



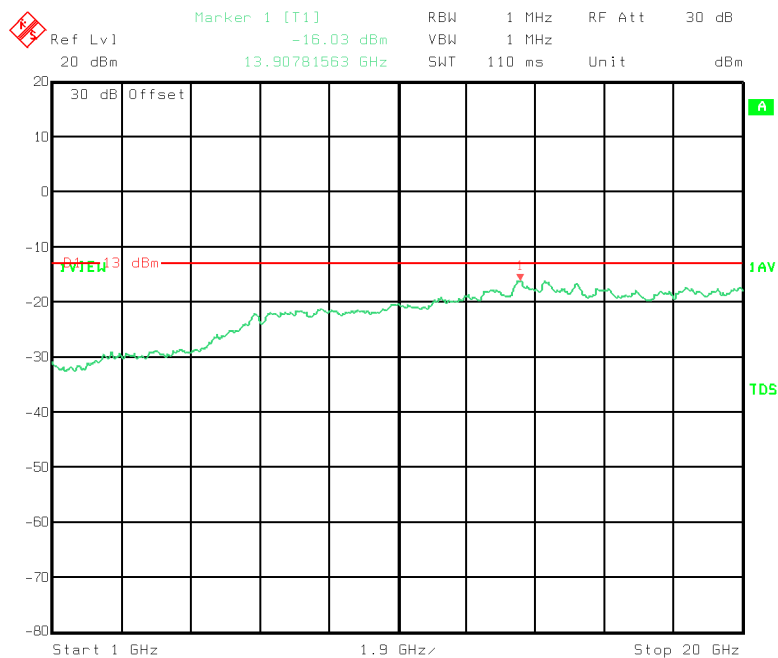
Title: 9L0482R LOW PWR MODULE W/ TDMA MODULE - TDMA - UPLINK
Comment A: APSE11A.PCX ANTENNA PORT SPURIOUS EMISSIONS
CHANNEL 600 NOTCHED
Date: 22.NOV.1999 10:47:46

Intermodulation Spurious Emissions – NADC Uplink

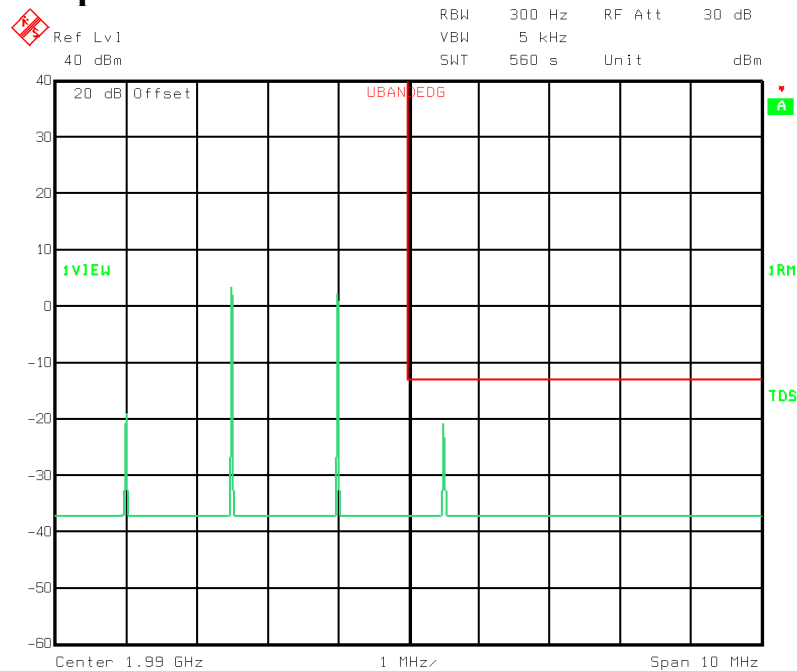


EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – NADC Downlink**

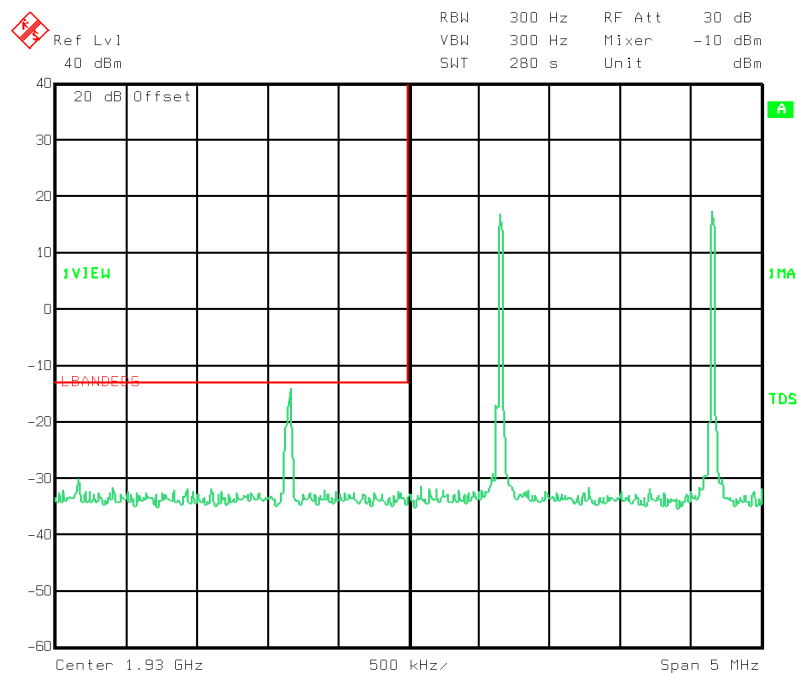
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-TDMA
Comment A: AP5E04B.PCX ANTENNA PORT SPURIOUS EMISSIONS
CHANNEL 1199 (FUNDAMENTAL) NOTCHED
Date: 18.NOV.1999 9:13:03



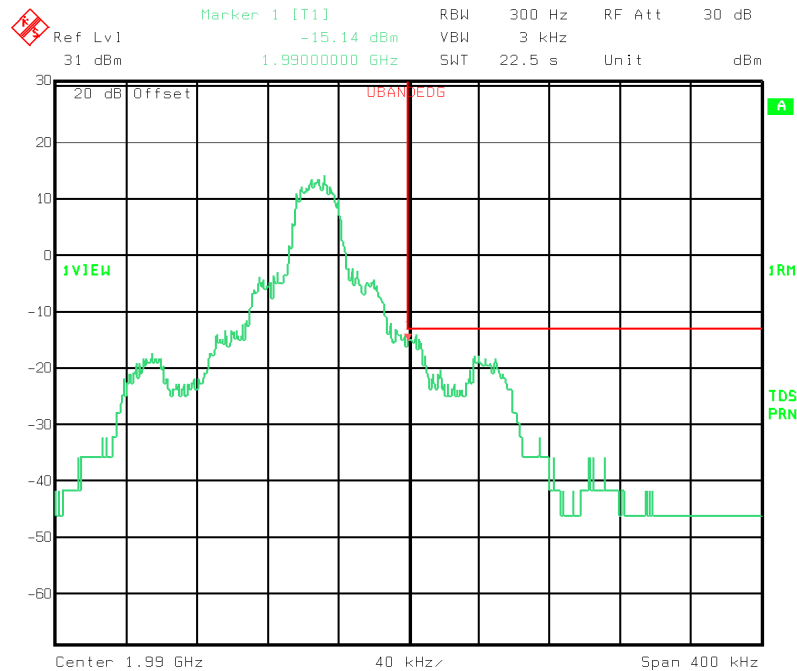
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-TDMA
Comment A: AP5E04A.PCX ANTENNA PORT SPURIOUS EMISSIONS
CHANNEL 1199 (FUNDAMENTAL) NOTCHED
Date: 18.NOV.1999 9:09:42

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Intermodulation Spurious Emissions – NADC Downlink**

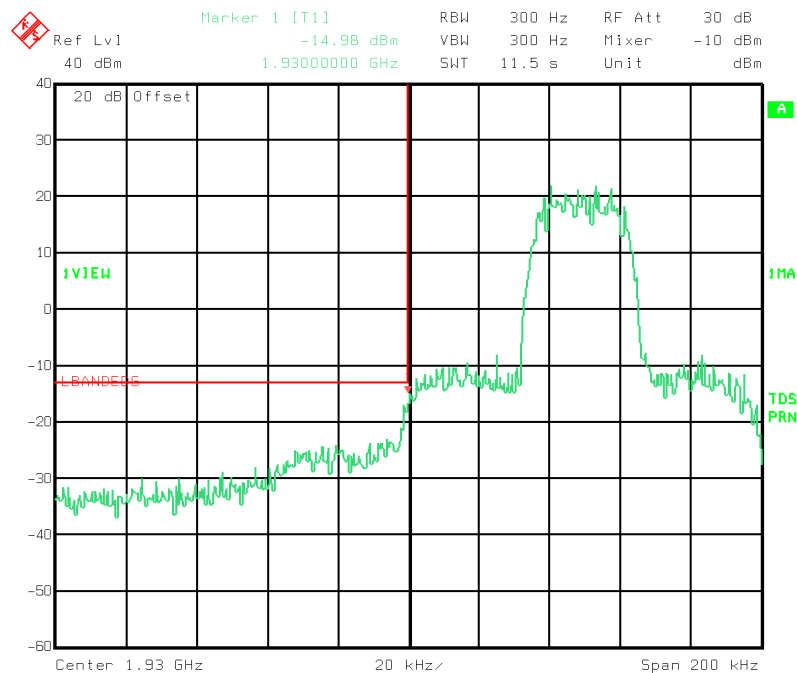
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-TDMA
Comment A: IM05.PCX INTERMODULATION
Date: 18.NOV.1999 13:22:04



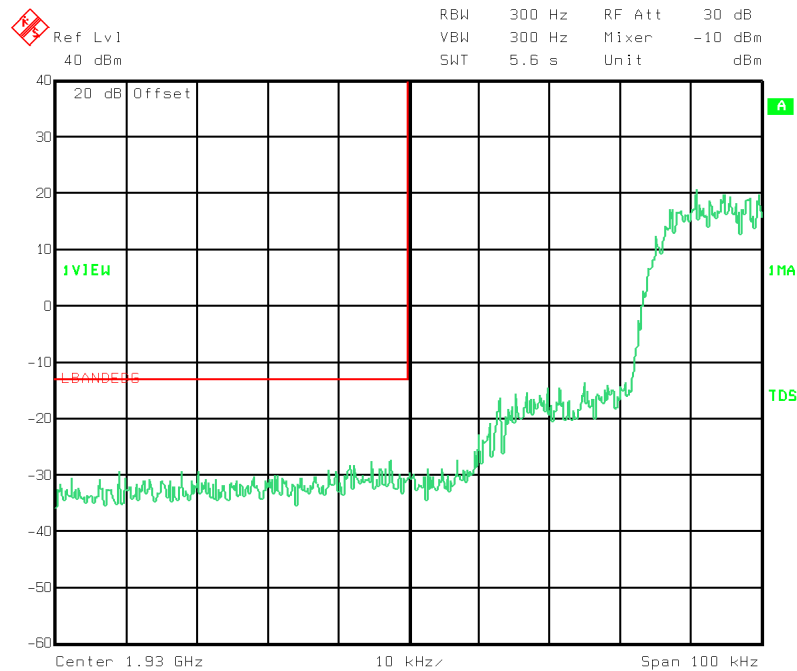
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: IM11.PCX INTERMODULATION- TDMA - DOWNLINK
Date: 6.DEC.1999 15:35:22

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Band Edge Spurious Emissions – NADC Downlink**

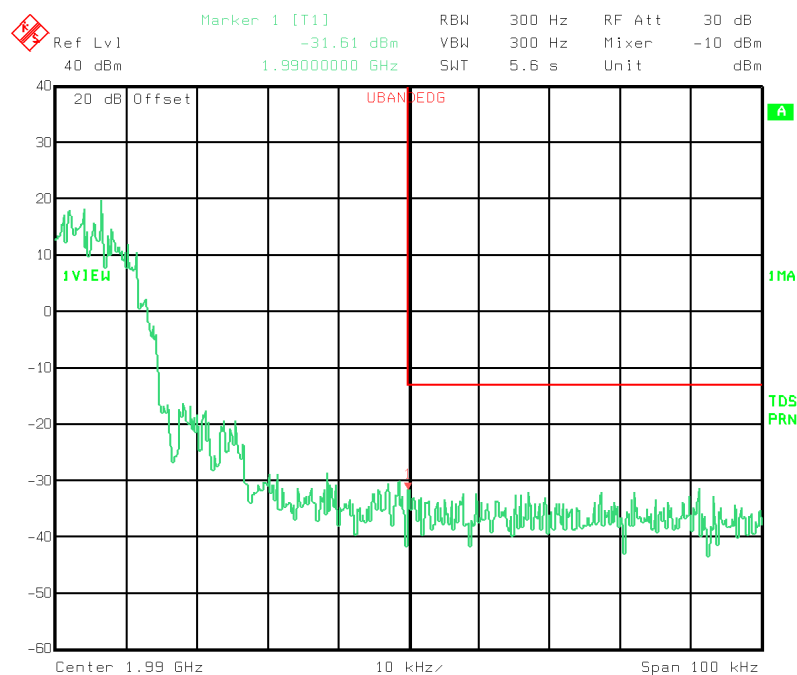
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE-TDMA
Comment A: UBEO3.PCX UPPER BAND EDGE
Date: 18.NOV.1999 8:45:24



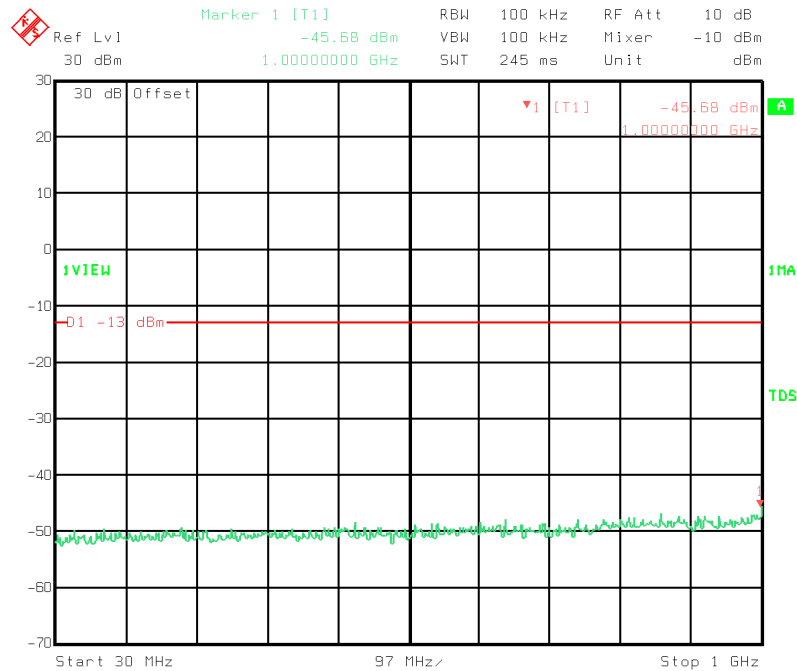
Title: 9L0482R LOW POWER MODULE W/VARIABLE BW MODULE
Comment A: LBEO4.PCX LOWER BAND EDGE - TDMA - DOWNLINK
Date: 6.DEC.1999 15:04:08

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Band Edge Spurious Emissions – NADC Module Downlink**

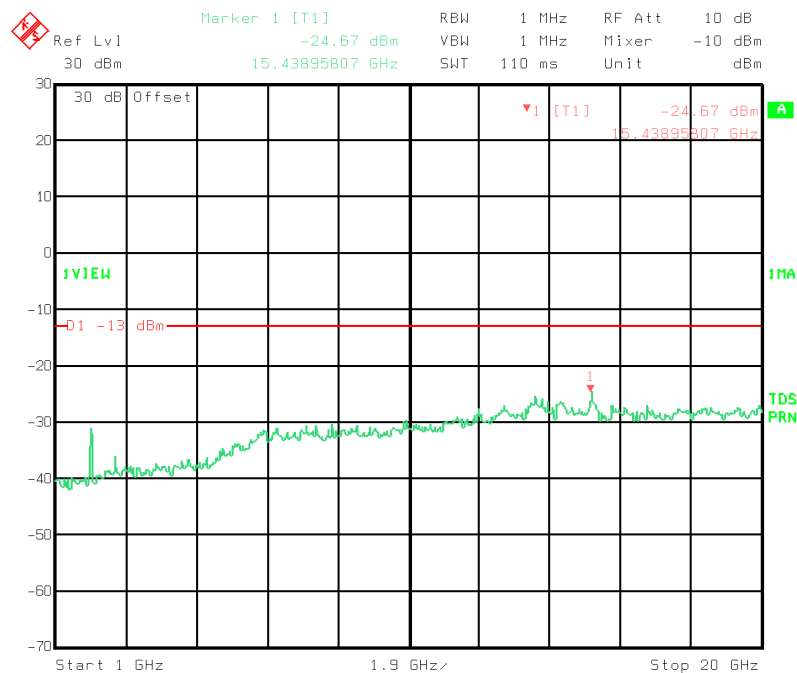
Title: 9L0482R LOW POWER MODULE W/ TDMA MODULE
Comment A: LBE08.PCX LOWER BAND EDGE - DOWNLINK - TDMA
Date: 7.DEC.1999 15:35:08



Title: 9L0482R LOW PWR MODULE W/ TDMA MODULE - TDMA - DOWNLINK
Comment A: UBE09.PCX UPPER BAND EDGE
Date: 22.NOV.1999 10:06:13

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Spurious Emissions – NADC Module Downlink**

Title: 9L0482R LOW PWR MODULE W/ TDMA MODULE - TDMA - DOWNLINK
Comment A: AP5E10a.PCX Antenna Port Spurious Emissions (Channel 600)
Date: 19.NOV.1999 18:00:26



Title: 9L0482R LOW PWR MODULE W/ TDMA MODULE - TDMA - DOWNLINK
Comment A: AP5E10b.PCX Antenna Port Spurious Emissions (Channel 600)
Date: 19.NOV.1999 17:54:41

EQUIPMENT: **MR701B**

PROJECT NO.: **9L0482R**

Section 6. Field Strength of Spurious

NAME OF TEST: Field Strength of Spurious Emissions	PARA. NO.: 2.1051
TESTED BY: Kevin Carr	DATE: 08/19/99

Test Results: Complies.

Test Data: See attached table. - Data from KTL Ottawa report 9R01401

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Microwave Radiated Emissions Data**Complete ☒ Preliminary ☐ Page 1 of 1Client: Allen Telecom Test #: MR1401D.FCC W.O.#: 9R01401EUT: MR701 S/N: N/ATechnician: Kevin Carr Specification: FCC Part 24 Lab: A Date: 8/19/99Configuration: High Power amplifier configuration, Maximum Output into 50 ohm loadBandwidth: 1 MHz Video Bandwidth: 1 MHz Antenna Distance 3 m Detector:

EUT Power: ☒ 115 V.A.C. ☒ 60 Hz ☒ Peak
☐ 208 V.A.C. ☐ 50 Hz ☐ Average
☐ 230 V.A.C.
☐ Other ☒ 1 Phase ☐ 3 Phase

Freq. (GHz)	Meter Reading (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	RF Gain (dB)	Corrected Reading (dBuV/m)	Spec. Limit (dBuV/m)	Pol.	Comments:
3.894	55.3	36		42.5	48.8	82.3	V	
3.895	53.5	36		42.5	47	82.3	H	
5.843	57.3	41.7		41.7	57.3	82.3	V	
5.842	55.3	41.7		41.7	55.3	82.3	H	
7.790	56.8	45.5		41.0	61.3	82.3	V	
7.790	55.5	45.5		41.0	60	82.3	H	
9.739	41.3	51.5		44.4	48.4	82.3	V	
9.738	40.1	51.5		44.4	47.2	82.3	H	
11.686	41.6	54.2		43.7	52.1	82.3	V	
11.685	39.8	54.2		43.7	50.3	82.3	H	
3.735	48.0	35.7		42.4	41.3	82.3	V	
3.735	48.8	35.7		42.4	42.1	82.3	H	
5.603	50.0	40.5		43.1	47.4	82.3	V	
7.470	47.3	44.8		42	50.1	82.3	V	
9.338	45.6	50.8		43.4	53	82.3	H	
11.205	46.0	53.8		43.5	56.3	82.3	H	

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

Section 7. Frequency Stability

NAME OF TEST: Frequency Stability	PARA. NO.: 2.1055
TESTED BY:	DATE:

Test Results: N/A**Measurement Data:** See attached table.Standard Test Frequency: MHz
Standard Test Voltage:

Not Applicable

Equipment Used:**Measurement Uncertainty:** +/- 1.6 dB**Lab Temperature:** °C**Relative Humidity:** %

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R****Section 8. Test Equipment List**

<u>KTL ID</u>	<u>Description</u>	<u>Manufacturer Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
CF38	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
CF39	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
CF40	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
CF41	CABLE 2m	Astrolab 32027-2-29094-72TC	N/A	08/31/99
CF44	CABLE, 4M	STORM PR90-010-144	N/A	10/15/99
G1017	ATTENUATOR	NARDA 776B-20	NONE	09/30/99
G1018	ATTENUATOR	NARDA 776B-10	NONE	09/30/99
G1366	50 OHM LOAD	NARDA 27470	254	02/25/99
G1711	TUNABLE NOTCH FILTER	K&L 3TNF-1000/2000-N/N	144	CBU
G2632	SPECTRUM ANALYZER	ROHDE & SCHWARZ FSEK30	830844/006	06/14/99
G2735	I/Q MODULATION GENERATOR	ROHDE & SCHWARZ AMIQ	830848/005	05/26/99
G2736	SIGNAL GENERATOR	ROHDE & SCHWARZ SMIQ 03	DE22081	05/03/99
G3726	DUAL DIRECTIONAL COUPLER	NARDA 3022	73393	05/19/99
S20w2	Mini-Circuits 20 dB attenuator	S20W2		CBU

Calibration interval on all items is typically 12 months from the calibration date shown. Where relevant, measuring equipment is subjected to in-service checks between testing. Should any measurement equipment be utilized beyond its scheduled calibration date, the measuring equipment is subjected to in-service checks prior to use. KTL shall notify clients promptly, in writing, of identification of defective measuring equipment that casts doubt on the validity of results given in this report.

LEGEND:

CNR CALIBRATION NOT REQUIRED
N/A NOT APPLICABLE
CBU CALIBRATED BEFORE USE

KTL Dallas

FCC PART 24, SUBPART E
BROADBAND PCS REPEATERS

EQUIPMENT: **MR701B**

PROJECT NO.: **9L0482R**

ANNEX A - TEST DETAILS

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

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

Minimum Standard: Para. No.24.232. Base stations are limited to 1640 watts peak E.I.R.P. with an antenna height up to 300 meters HAAT. In no case may the peak output power of a base station transmitter exceed 100 watts.

Method Of Measurement:Detachable Antenna:

The peak power at antenna terminals is measured using an in-line peak power meter. Power output is measured with the maximum rated input level.

Integral Antenna:

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation $GP/4\pi R^2 = E^2/120\pi$ and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,

P = the equivalent isotropic radiated power in watts

E = the maximum measured field strength in V/m

R = the measurement range (3 meters)

G = the numeric gain of the transmit antenna in relation to an isotropic radiator

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

NAME OF TEST: Occupied Bandwidth**PARA. NO.: 2.1047**

Minimum Standard: Para. No. 24.238(b). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB.

Method Of Measurement:CDMA

Spectrum analyzer settings:

RBW: 30 kHz

VBW: $\geq$ RBW

Span: 5 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

GSM

RBW: 3 kHz

VBW: $\geq$ RBW

Span: 2 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

NADC

RBW: 1 kHz

VBW: $\geq$ RBW

Span: 1 MHz

Sweep: Auto

Mask: Set markers to -26 dB from peak of CW.

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

NAME OF TEST: Spurious Emission at Antenna Terminals	PARA. NO.: 2.1051
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Minimum Standard: Para. No.24.238(a). On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power by at least $43 + 10 \log (P)$ dB.

Method Of Measurement:

Spectrum analyzer settings:

CDMA

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 30 kHz (< 1 MHz from Band Edge)
VBW: $\geq$ RBW
Sweep: Auto
Video Avg: 6 Sweeps

GSM

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
VBW: $\geq$ RBW
Sweep: Auto
Video Avg: Disabled

NADC

RBW: 1 MHz (> 1 MHz from Band Edge)
RBW: 3 kHz (< 1 MHz from Band Edge)
VBW: $\geq$ RBW
Sweep: Auto
Video Avg: Disabled

To demonstrate compliance at band edges the frequency of the input signal is set to the lowest and highest assigned channel and the center frequency of the spectrum analyzer is set to the upper and lower edges of the appropriate frequency block.

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

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

Calculation Of Field Strength Limit

An example of attenuation requirement of $43 + 10 \log P$ is equivalent to -13 dBm (5×10^{-5} Watts) at the antenna terminal. We determine the field strength limit by using the plane wave relation.

$$GP/4\pi R^2 = E^2/120\pi$$

For emissions ≤ 1 GHz:

$G = 1.64$ (Dipole Gain)

$P = 10^{-5}$ Watts (Maximum spurious output power)

$R = 3\text{m}$ (Measurement Distance)

$$E = \frac{\sqrt{30GP}}{R}$$

$$E = \frac{\sqrt{30 \times 1.64 \times 5 \times 10^{-5}}}{3} = 0.016533 \text{ V / m} = 84.4 \text{ dB}\mu\text{V / m}$$

For emissions > 1 GHz:

$G = 1$ (Isotropic Gain)

$P = 1 \times 10^{-5}$ Watts (Maximum spurious output power)

$R = 3\text{m}$ (Measurement Distance)

$$E = 84.4 - 20 \log \sqrt{1.64} = 82.3 \text{ dB}\mu\text{V / m} @ 3\text{m}$$

EQUIPMENT: **MR701B**PROJECT NO.: **9L0482R**

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

Minimum Standard: Para. No. 24.235. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Method Of Measurement:Frequency Stability With Voltage Variation

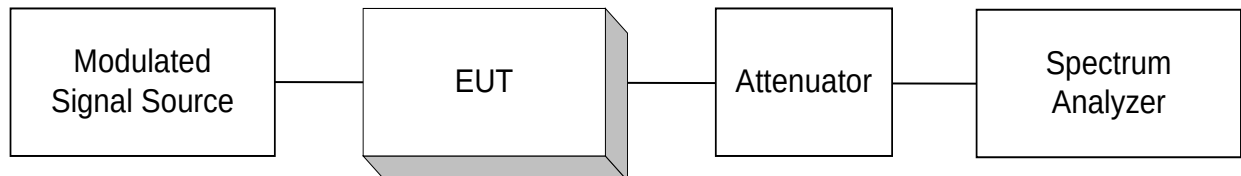
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10 MHz ref, in of the signal generator. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation

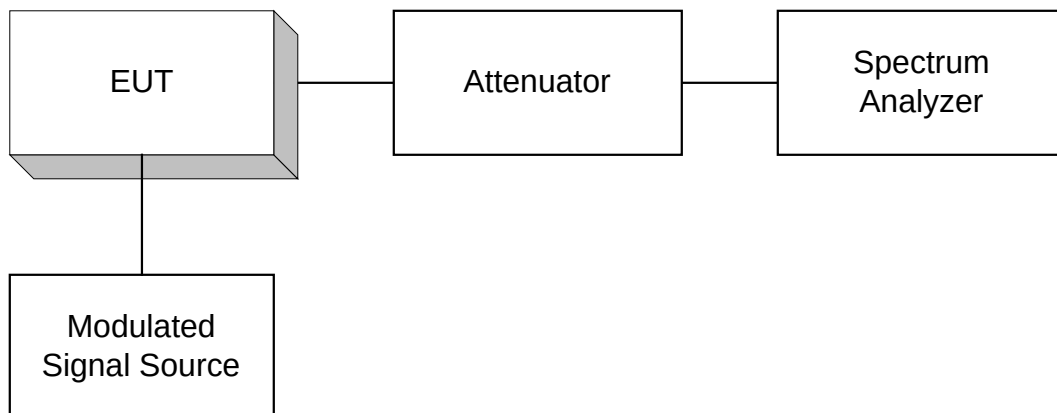
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C. The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

ANNEX B - TEST DIAGRAMS

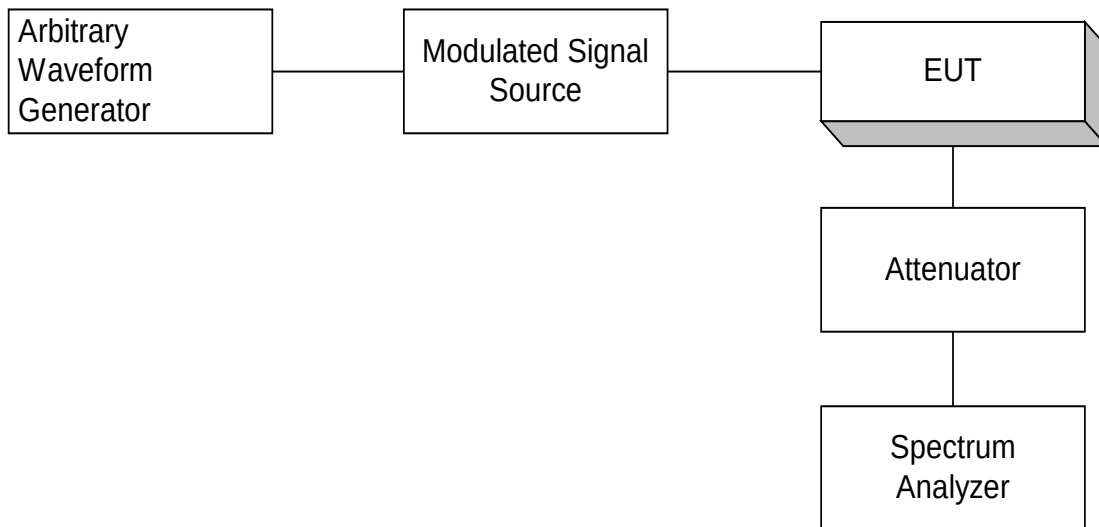
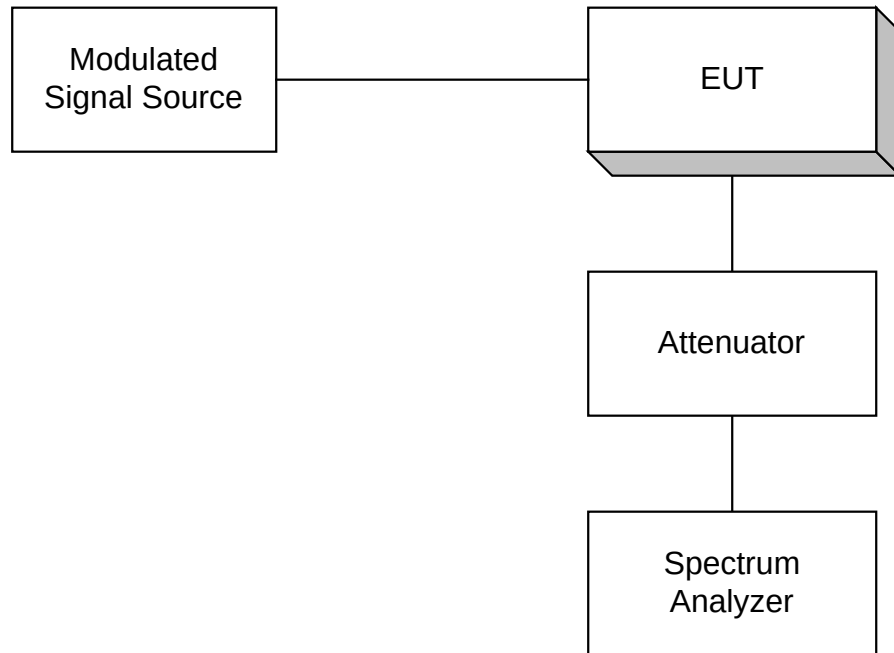
Para. No. 2.985 - R.F. Power Output



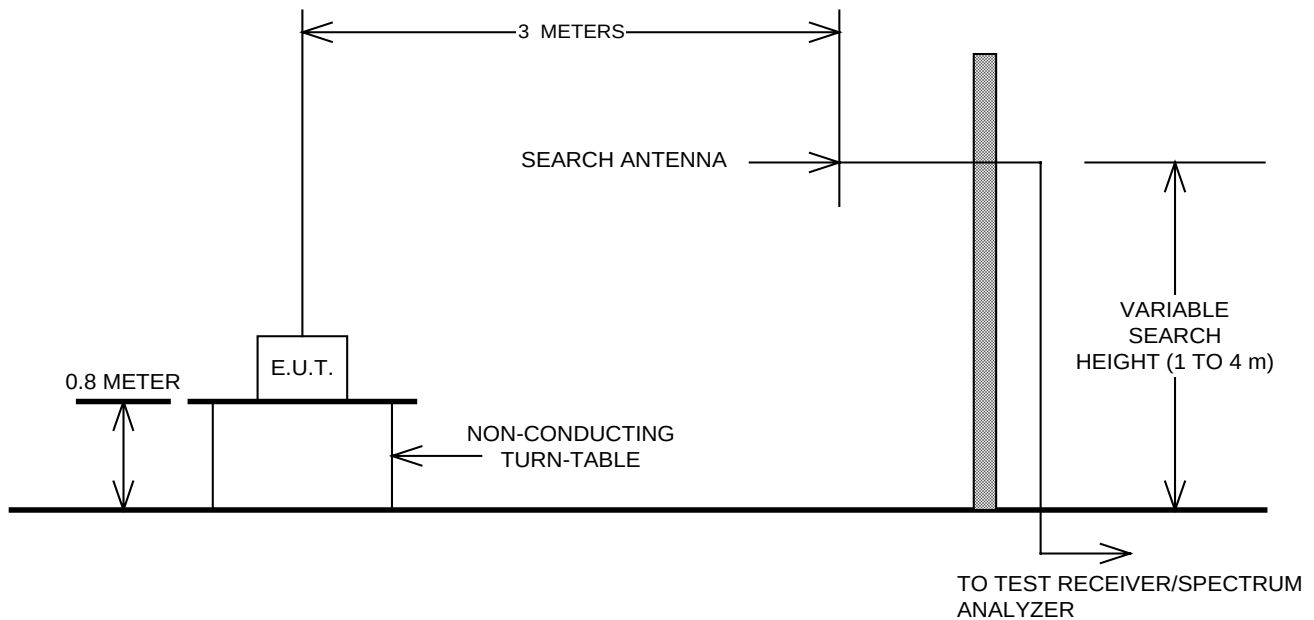
Para. No. 2.989 - Occupied Bandwidth



Para. No. 2.991 Spurious Emissions at Antenna Terminals



Para. No. 2.993 - Field Strength of Spurious Radiation



Para. No. 2.995 - Frequency Stability

