

Determination of Processing Gain for CSI Models 4200 and 4210 July 27, 1998

Measurements were made to show the compliance of CSI Models 4200 and 4210 with 47 CFR 15.247(c) which requires a direct sequence spread spectrum transmitter to have a processing gain of at least 10dB.

The model 4200/4210 uses a baseband processor integrated circuit manufactured by Harris Semiconductor Corp., model HFA3824A. In the 4200/4210 the baseband processor is programmed to use a spreading code (PN code) with a length of 15 chips. The code used is a modified Barker code, 1F35. A spectrogram of the transmitter output signal using this PN code is shown in Figure 1. Note: The CSI Models 4200 and 4210 are identical except that the Model 4200 is line powered and the 4210 is battery powered.

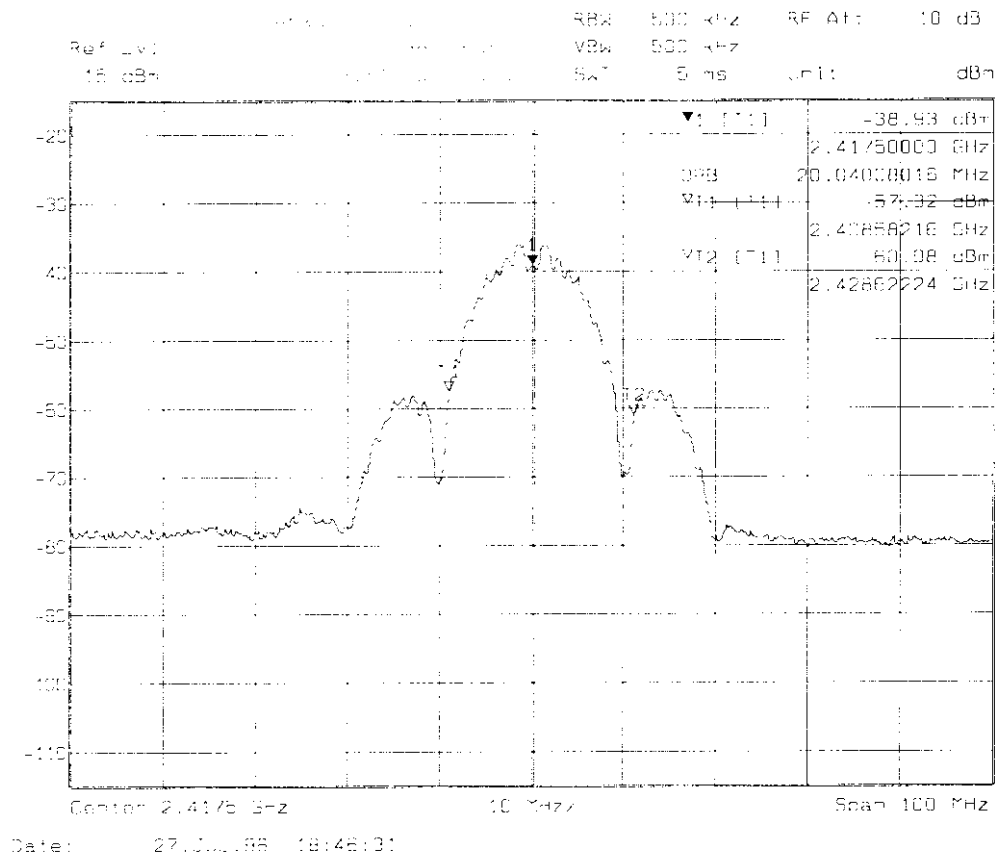


Figure 1 - Spectrum with Spreading Enabled

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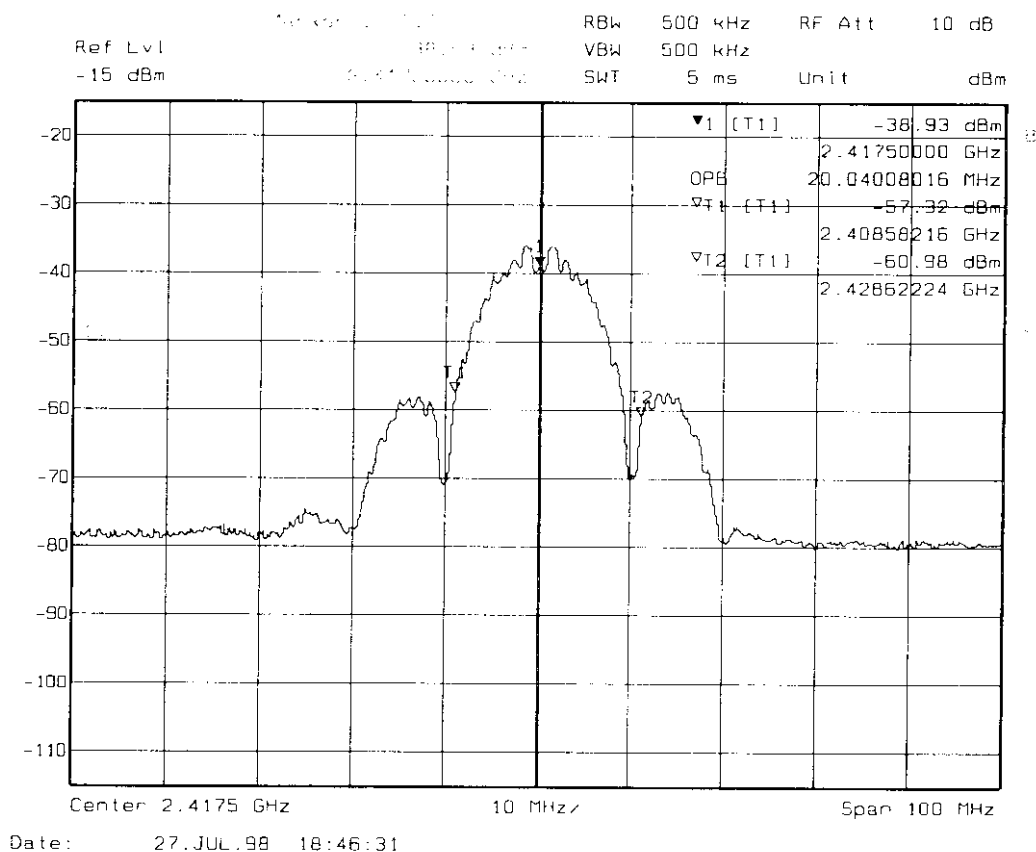


Figure 1 - Spectrum with Spreading Enabled

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The processing gain was measured by comparing two bit-error rate (BER) versus signal strength curves; one with signal spreading enabled and the other with spreading disabled. The HFA3824A allows non-spread spectrum communication by setting the register that contains the spreading code to an all-ones value (7FFF for a 15-chip code).. A spectrogram of the transmitter output signal using this PN code is shown in Figure 2.

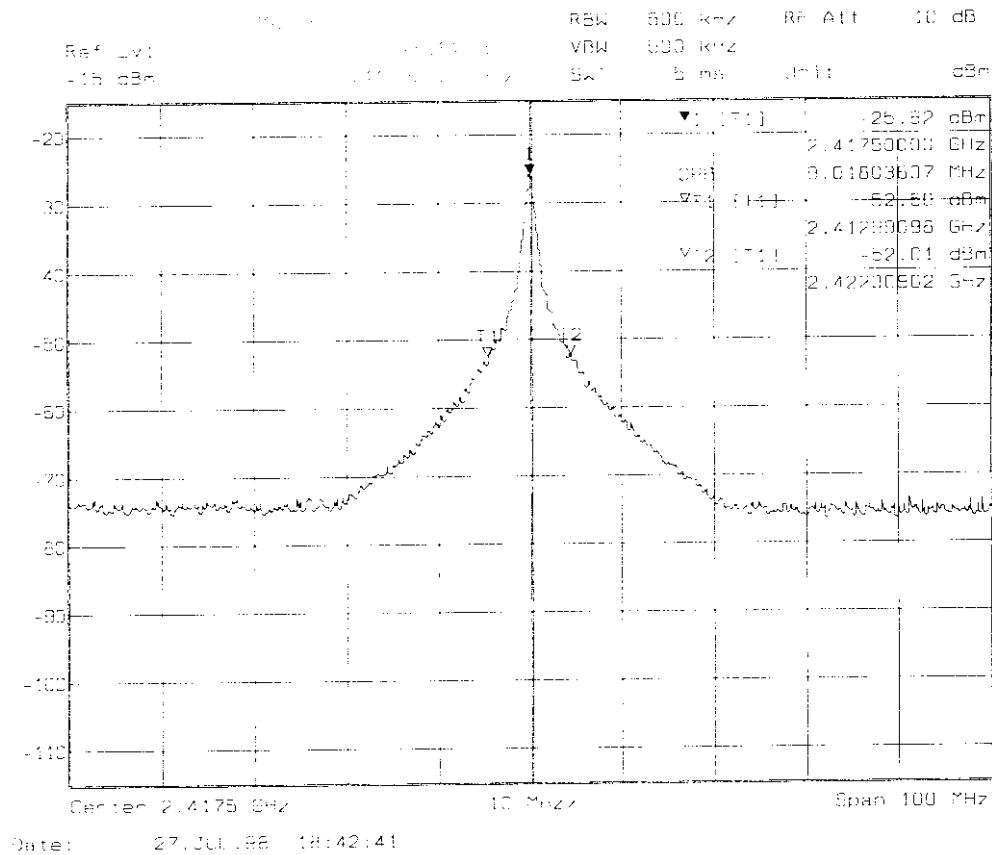


Figure 2 - Spectrum with Spreading Disabled

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The experimental setup used to measure the processing gain is shown in Figure 3.

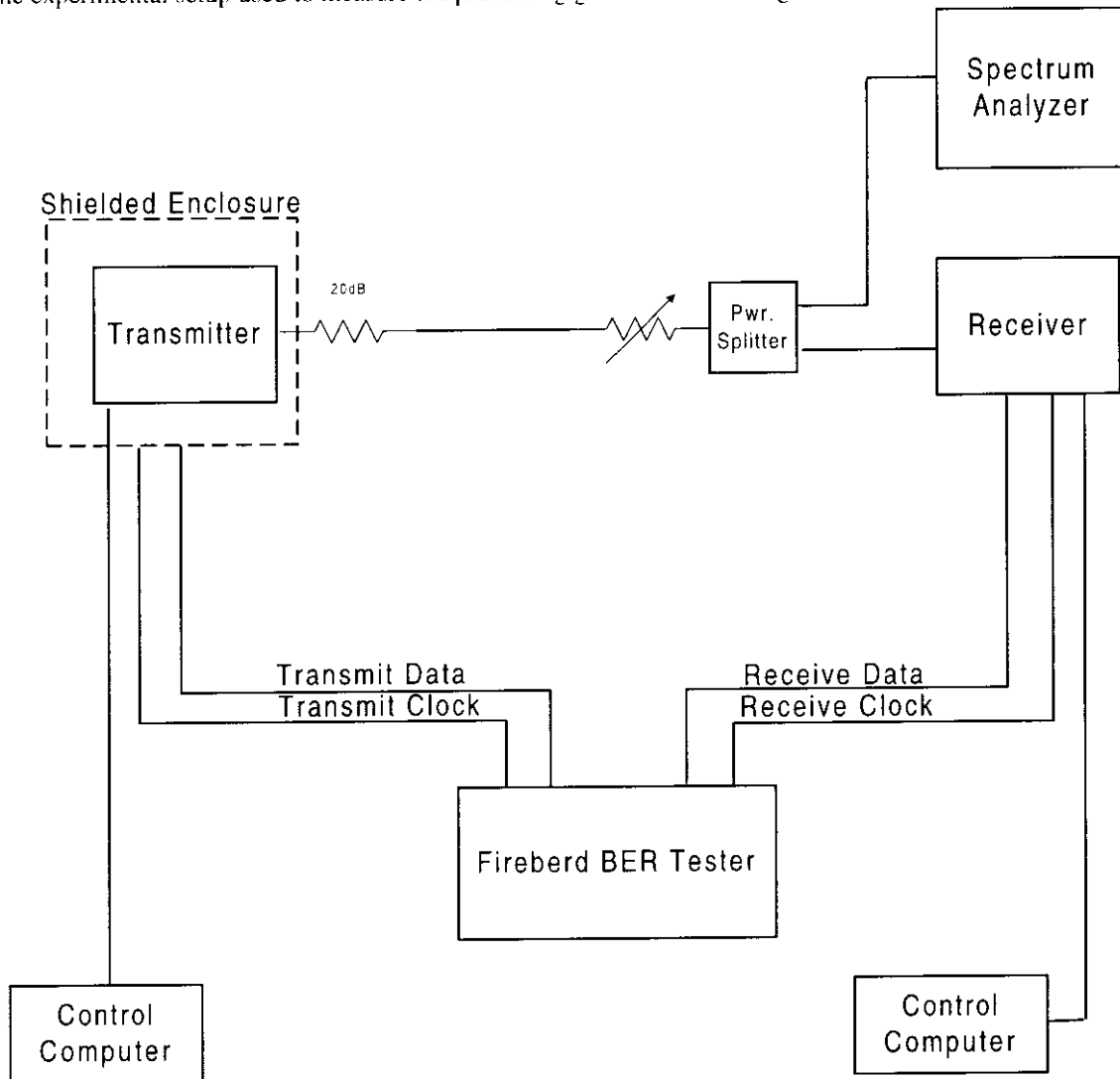


Figure 3 - Experimental Setup

The procedure used to determine the processing gain was as follows:

1. Set the transmitter and receiver to use the normal (1F35) PN code.
2. Set the variable attenuator to 0dB and measure the power delivered to the receiver. This is the reference power level.
3. Set the variable attenuator to the highest attenuation that still allows measurement of BER.
4. Record the BER and attenuator setting for this power level and successively lower attenuation levels until the BER becomes too low to be measured in a reasonable length of time.
5. Set the PN code to 7FFF.
6. Repeat steps 2 through 4 for this code.

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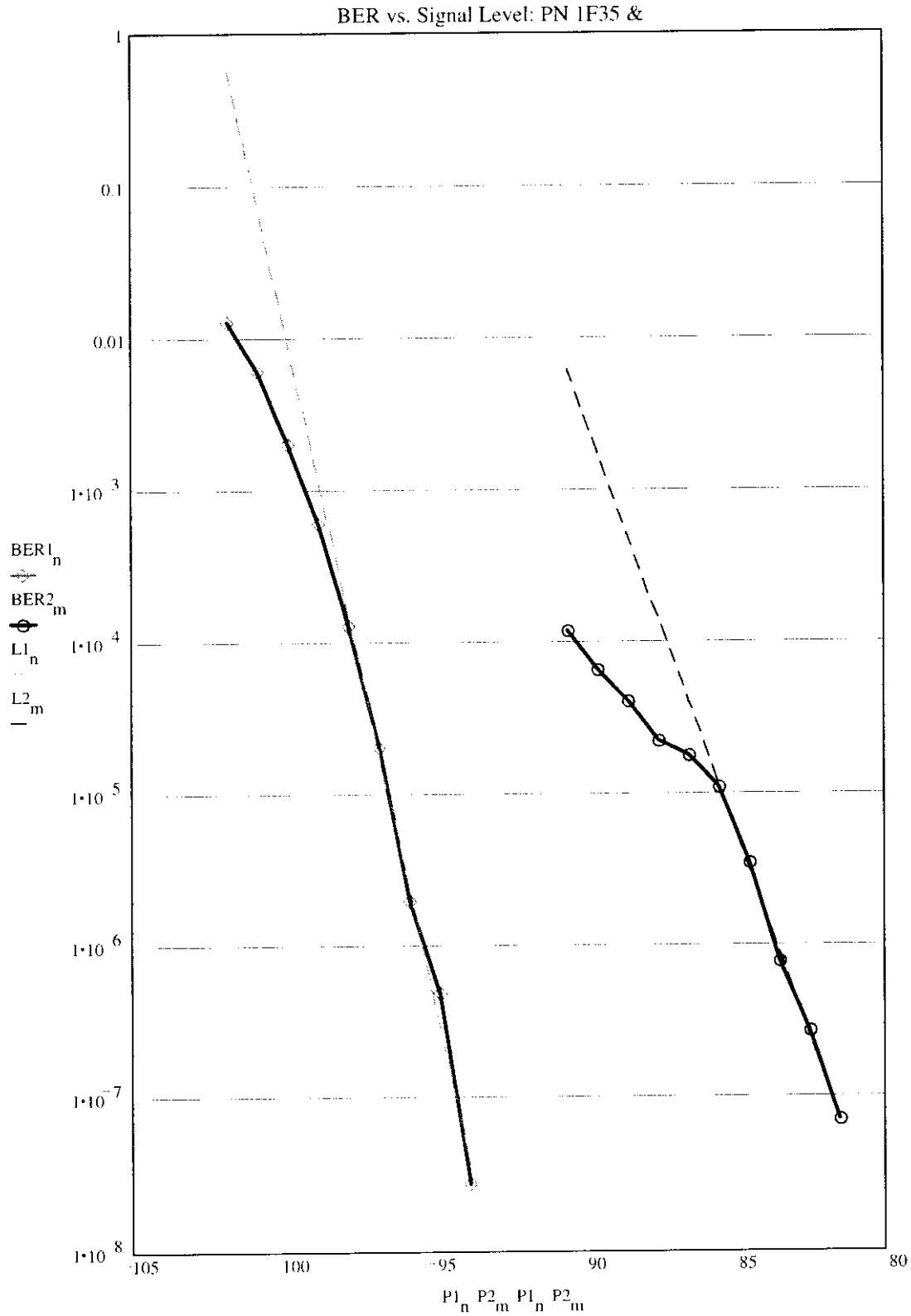


Figure 4 - Plot of Experimental Data

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The results of this are plotted in Figure 3. It is seen that at lower BER values the two curves have approximately the same slope but are separated by more than 10 dB of signal strength.

In order to arrive at a more precise determination of the processing gain a least squares fit of the data represented by the 5 lowest BER points was determined. Using the linear equation thus derived, the signal power necessary for the reference BER (1×10^{-6}) was determined. The results of this yield the following:

Power for reference BER with spreading = -95.394 dBm
Power for reference BER w/o spreading = -83.587 dBm

The processing gain is the difference in these two power levels:

Processing Gain = 11.807 dB

The theoretical processing gain for a 15 chip direct sequence spread spectrum system is given by:

Processing Gain = $10 \times \text{Log}(15) = 11.761 \text{ dB}$

The agreement between the theoretical and measured processing gain is excellent and clearly shows that the Model 4200 complies with 47 CFR 15.247(e).

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EUT and Peripherals

Description	Model No.	Serial No.	FCC ID	Cable Description
EUT Computational Systems Incorporated	4200	None	NL54200 (Pending)	6' U To AC Power
EUT Computational Systems Incorporated	4210	None	NL54200 (Pending)	None
Antenna Cushcraft Corporation	RTN2400SXR	None	None	7"

Table 1A. Peak Radiated Spurious Emissions (Model 4200)
Channel 2- Low

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Peak FCC Limits (uV/m)
4.845	-59.5	34.2	34.7	4.2	404.8	5000.0
7.267	-58.3	34.5	37.1	6.8	801.2	5000.0

Table 1B. Peak Radiated Spurious Emissions (Model 4200)
Channel 3-Mid

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Peak FCC Limits (uV/m)
4.865	-60.1	34.2	34.7	4.2	378.7	5000.0
7.297	-57.5	34.5	37.2	6.8	887.3	5000.0

Table 1C. Peak Radiated Spurious Emissions (Model 4200)
Channel 5-High

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Peak FCC Limits (uV/m)
4.905	-56.3	34.2	34.8	4.2	589.2	5000.0
7.358	-56.9	34.5	37.3	6.8	970.3	5000.0

* Data has been corrected by 1dB for high pass filter loss.

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) = Antilog ((-59.5 - 34.2 + 34.7 + 4.2 + 107)/20) = 404.8
 CONVERSION FROM dBm TO dBuV = 107 dB

Table 1D. Peak Radiated Spurious Emissions (Model 4210)
Channel 2- Low

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Peak FCC Limits (uV/m)
4.845	-54.6	34.2	34.7	4.2	711.6	5000.0
7.268	-58.8	34.5	37.1	6.8	756.6	5000.0

Table 1E. Peak Radiated Spurious Emissions (Model 4210)
Channel 3-Mid

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Peak FCC Limits (uV/m)
4.865	-60.9	34.2	34.7	4.2	345.3	5000.0
7.298	-57.8	34.5	37.2	6.8	857.5	5000.0

Table 1F. Peak Radiated Spurious Emissions (Model 4210)
Channel 5-High

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Peak FCC Limits (uV/m)
4.905	-58.1	34.2	34.8	4.2	478.9	5000.0
7.357	-55.7	34.5	37.3	6.8	1113.7	5000.0

* Data has been corrected by 1dB for high pass filter loss.

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) = Antilog $((-54.6 - 34.2 + 34.7 + 4.2 + 107)/20)$ = 711.6
 CONVERSION FROM dBm TO dBuV = 107 dB

Table 2A. Average Radiated Spurious Emissions (Model 4200)
Channel 2 -Low

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Average FCC Limits (uV/m)
4.845	-68.0	34.2	34.7	4.2	152.1	500.0
7.267	-69.4	34.5	37.1	6.8	283.2	500.0

Table 2B. Average Radiated Spurious Emissions (Model 4200)
Channel 3-Mid

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Average FCC Limits (uV/m)
4.865	-69.5	34.2	34.7	4.2	128.3	500.0
7.297	-69.4	34.5	37.1	6.8	225.5	500.0

Table 2C. Average Radiated Spurious Emissions (Model 4200)
Channel 5-High

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Average FCC Limits (uV/m)
4.905	-61.6	34.2	34.8	4.2	320.1	500.0
7.358	-68.2	34.5	37.3	6.8	264.2	500.0

*Data has been corrected by 1dB for high pass filter loss

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) = Antilog $((-68.0 - 34.2 + 34.7 + 4.2 + 107)/20)$ = 152.1

CONVERSION FROM dBm TO dBuV = 107 dB

Table 2D. Average Radiated Spurious Emissions (Model 4210)
Channel 2 -Low

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Average FCC Limits (uV/m)
4.845	-59.1	34.2	34.7	4.2	423.9	500.0
7.268	-69.7	34.5	37.1	6.8	215.7	500.0

Table 2E. Average Radiated Spurious Emissions (Model 4210)
Channel 3-Mid

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Average FCC Limits (uV/m)
4.865	-71.8	34.2	34.7	4.2	98.5	500.0
7.298	-68.9	34.5	37.1	6.8	238.9	500.0

Table 2F. Average Radiated Spurious Emissions (Model 4210)
Channel 5-High

Freq. (GHz)	Test Data* (dBm)	Amp. Gain (dB)	Antenna Factor (dB)	Cable Loss (dB)	Results (uV/m) 3m	Average FCC Limits (uV/m)
4.905	-67.2	34.2	34.8	4.2	168.0	500.0
7.357	-68.1	34.5	37.3	6.8	267.2	500.0

*Data has been corrected by 1dB for high pass filter loss

SAMPLE CALCULATION:

RESULTS (uV/m @ 3m) = Antilog $((-59.1 - 34.2 + 34.7 + 4.2 + 107)/20)$ = 423.4

CONVERSION FROM dBm TO dBuV = 107 dB

TABLE 3A. CONDUCTED EMISSIONS DATA**CLASS A**

Test Date: August 11, 1998
UST Project: 98-360
Customer: Computational Systems Incorporated
Product: Model 4200

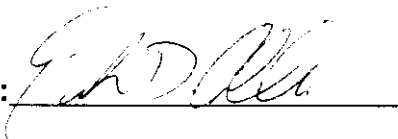
Worse Case Mode = Receive

Frequency (MHz)	Test Data (dBm)		RESULTS (uV)		FCC Limits (uV)
	Phase	Neutral	Phase	Neutral	
0.7	-61.0	-62.0	199.5	177.8	1000
1.0	-63.0	-64.0	158.5	141.3	1000
2.3	-61.0	-63.0	199.5	158.5	3000
3.9	-61.0	-62.0	199.5	177.8	3000
5.4	-63.0	-64.0	158.5	141.3	3000
30.0	-63.0	-62.0	158.5	177.8	3000

SAMPLE CALCULATIONS:

RESULTS uV = ANTILOG $((-61.0 + 107)/20) = 199.5$
 CONVERSION FROM dBm TO dBuV = 107 dB

Tested By:



Name: Erik Collins

TABLE 3B. CONDUCTED EMISSIONS DATA**CLASS A**

Test Date: August 11, 1998
UST Project: 98-360
Customer: Computational Systems Incorporated
Product: Model 4210

Worse Case Mode = Receive

Frequency (MHz)	Test Data (dBm)		RESULTS (uV)		FCC Limits (uV)
	Phase	Neutral	Phase	Neutral	
NOT APPLICABLE UNIT IS BATTERY POWERED					

SAMPLE CALCULATIONS:

RESULTS uV = ANTILOG
CONVERSION FROM dBm TO dBuV = 107 dB

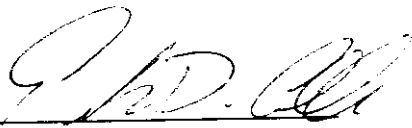
Tested By:  **Name:** Erik Collins

TABLE 4. RADIATED EMISSIONS DATA**CLASS A**

Test Date: July 26, 1998
UST Project: 98-360
Customer: Computational Systems Incorporated
Product: Model 4200 and 4210

Frequency (MHz)	Test Data @10m	Antenna Factor + Cable Attenuation	Results (uV/m) @10m	FCC Limits (uV/m) @ 10m
240.0	-88.0	14.7	48.2	210.0
260.0	-93.0	15.7	30.4	210.0
280.0	-95.0	16.7	27.4	210.0
300.0	-94.0	17.7	34.3	210.0
320.0	-96.0	18.0	28.2	210.0
340.0	-95.0	18.4	33.1	210.0

NOTE: Since there was no significant difference between the radiated emissions for Model 4200 and 4210 , only 1 table has been included.

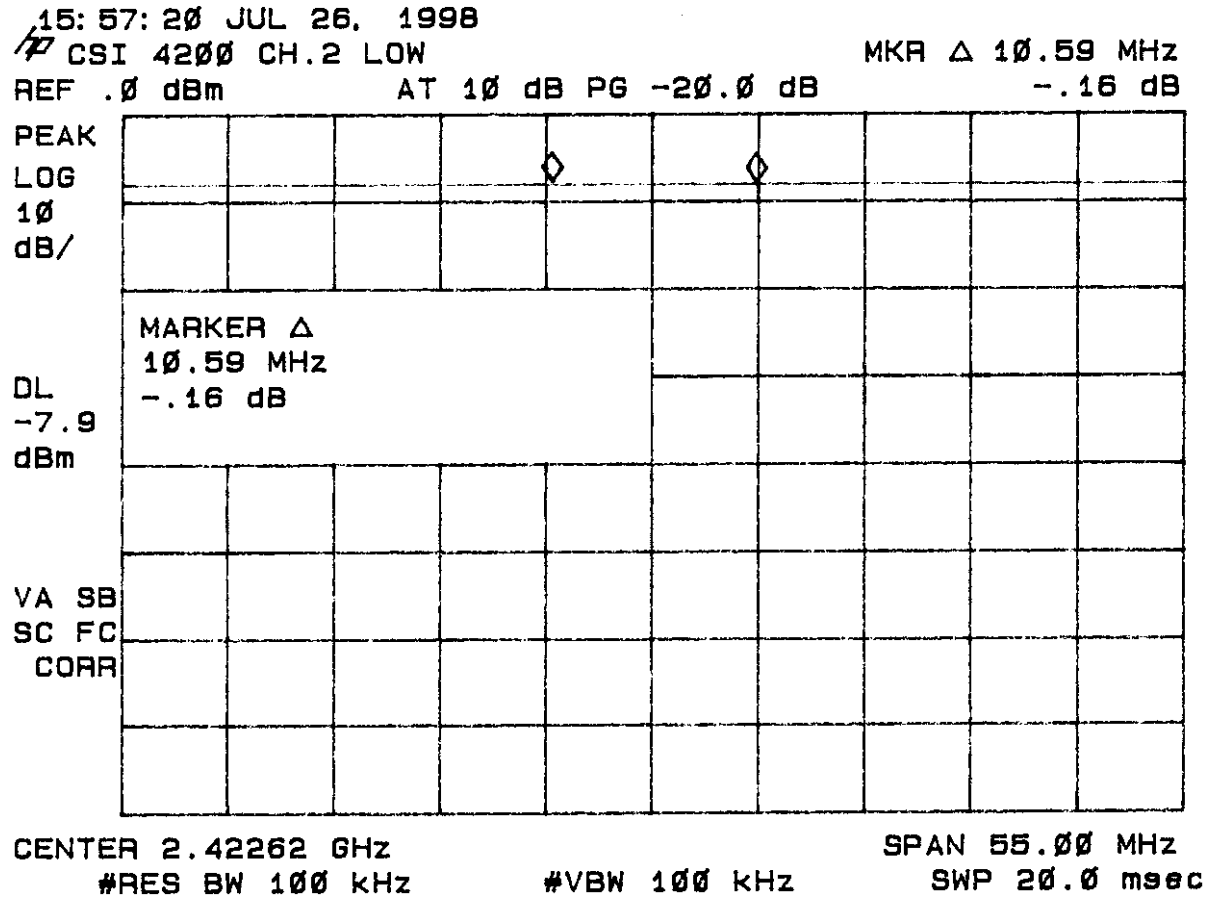
SAMPLE CALCULATIONS:

RESULTS uV/m @ 10m = $\text{Antilog} ((-88.0 + 14.7 + 107)/20) = 48.2$
 CONVERSION FROM dBm TO dBuV = 107 dB

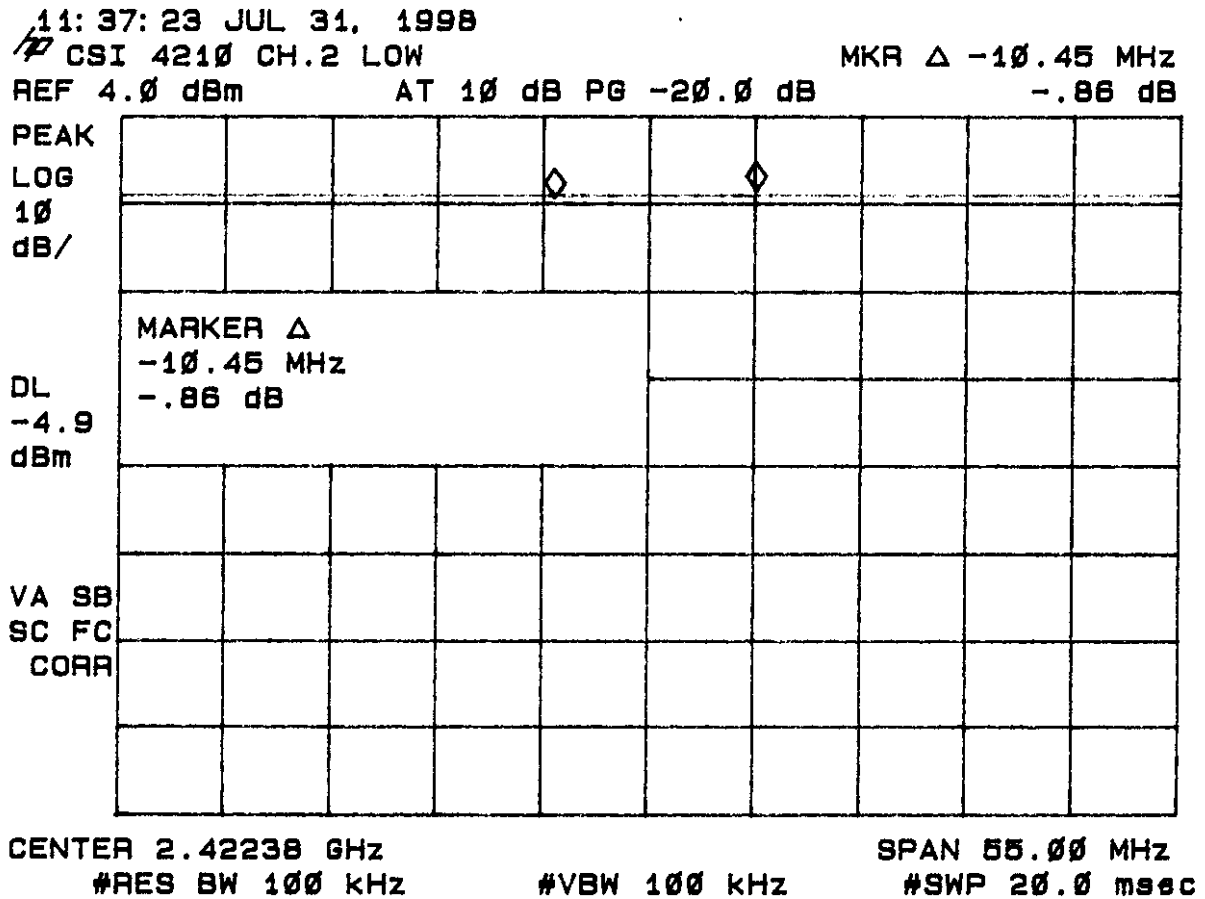
Tested By:

Name:**Erik Collins**

Model 4200
Figure 1A. 6 dB Bandwidth 15.247(a)(2) (Low)

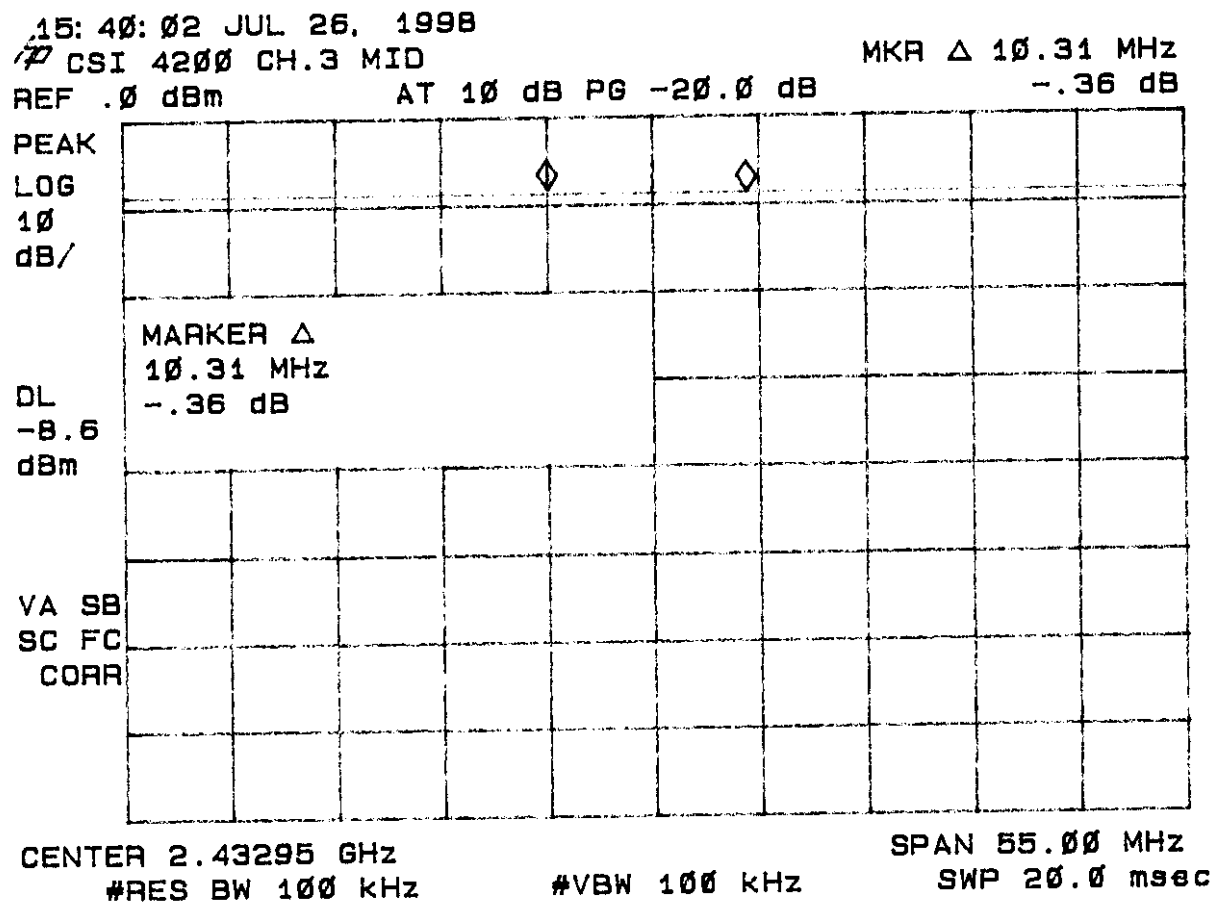


Model 4210
Figure 1B. 6 dB Bandwidth 15.247(a)(2) (Low)



Model 4200

Figure 1C. 6 dB Bandwidth 15.247(a)(2) (Mid)



Model 4210
Figure 1D. 6 dB Bandwidth 15.247(a)(2) (Mid)

14:54:42 AUG 01, 1998

CSI 4210 CH.3 MID

MKR Δ 10.18 MHz

REF 1.0 dBm

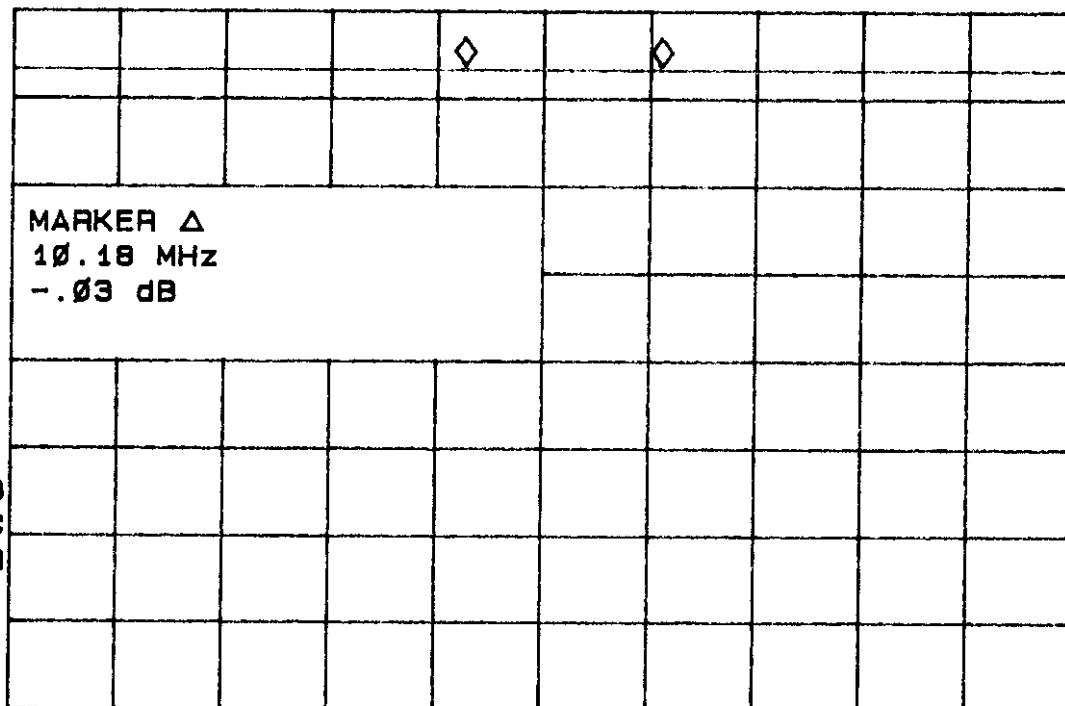
AT 10 dB PG -20.0 dB

-.03 dB

PEAK
LOG
10
dB/

DL
-5.7
dBm

VA SB
SC FC
CORR



CENTER 2.43163 GHz

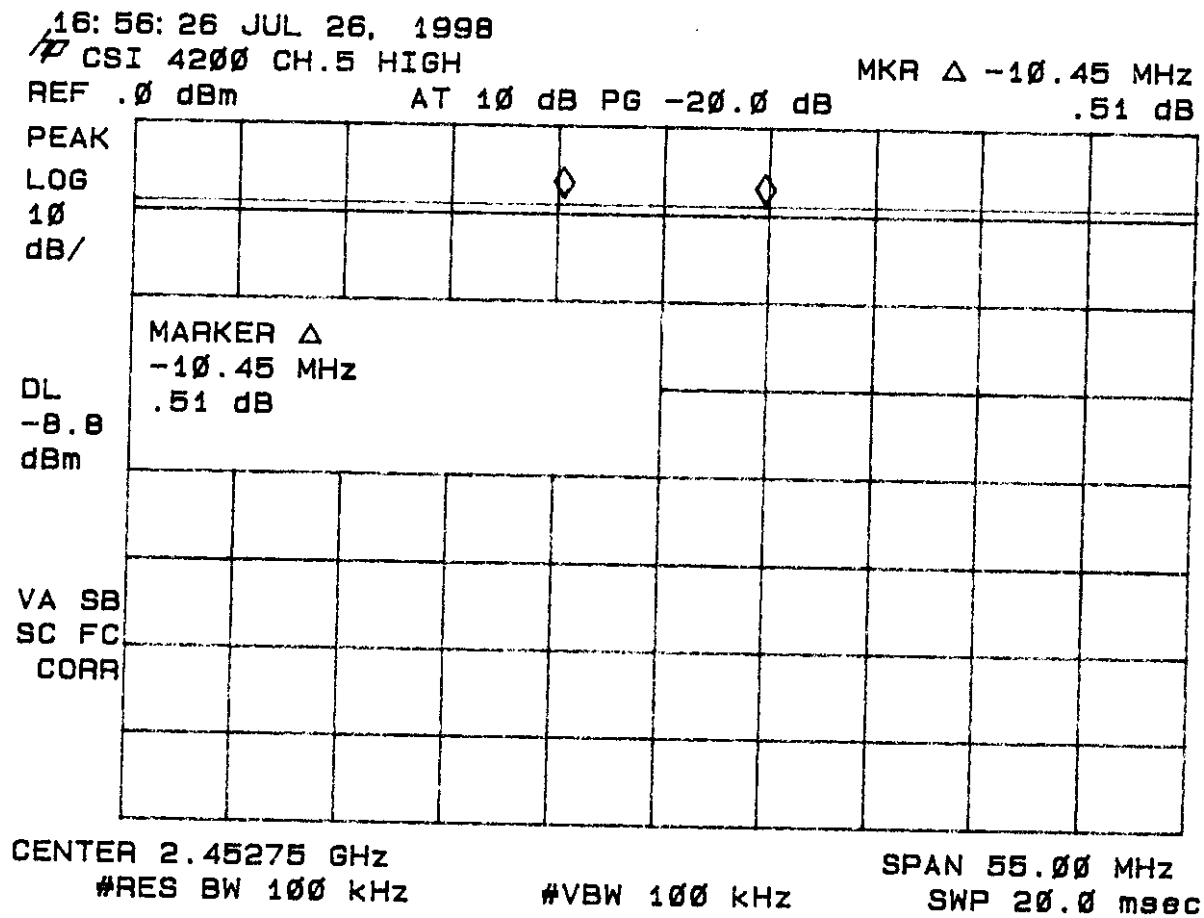
#RES BW 100 kHz

#VBW 100 kHz

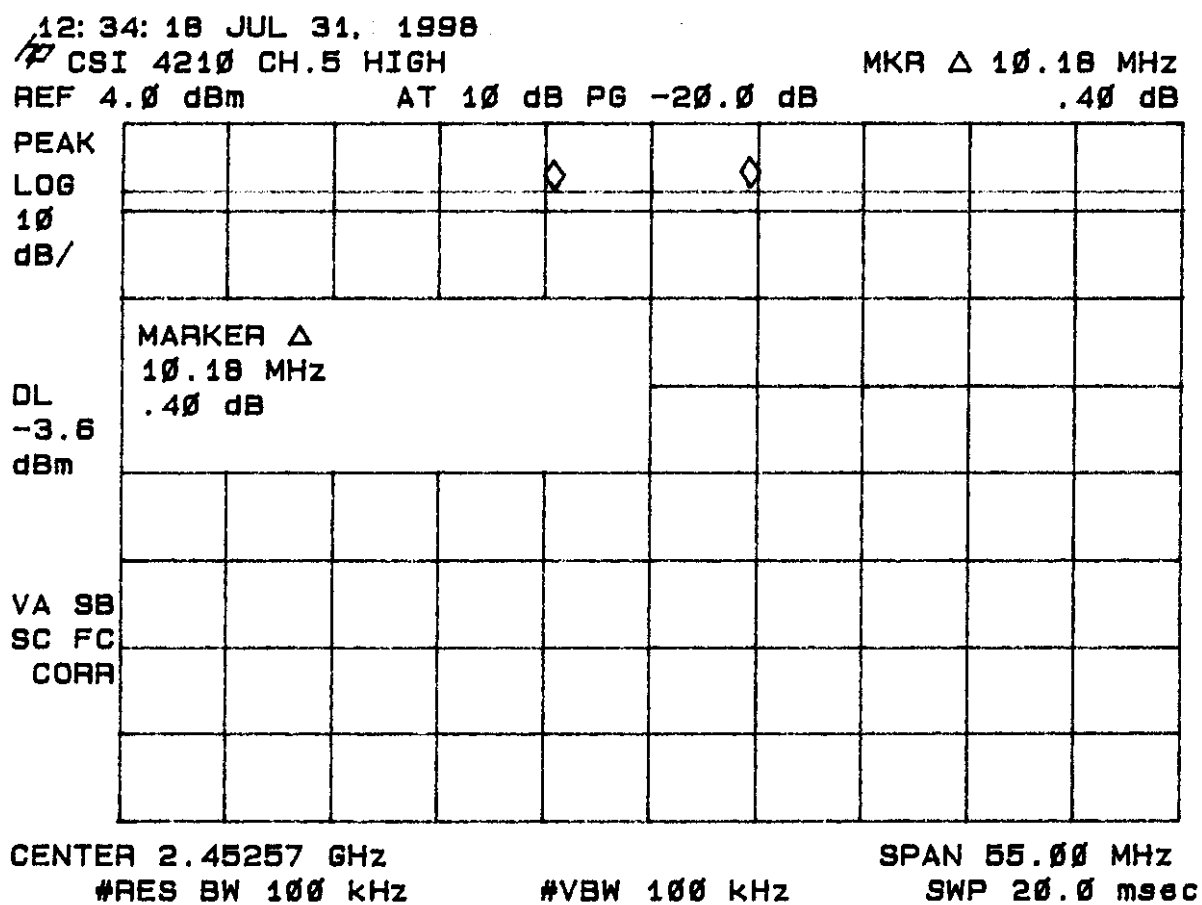
SPAN 55.00 MHz

SWP 20.0 msec

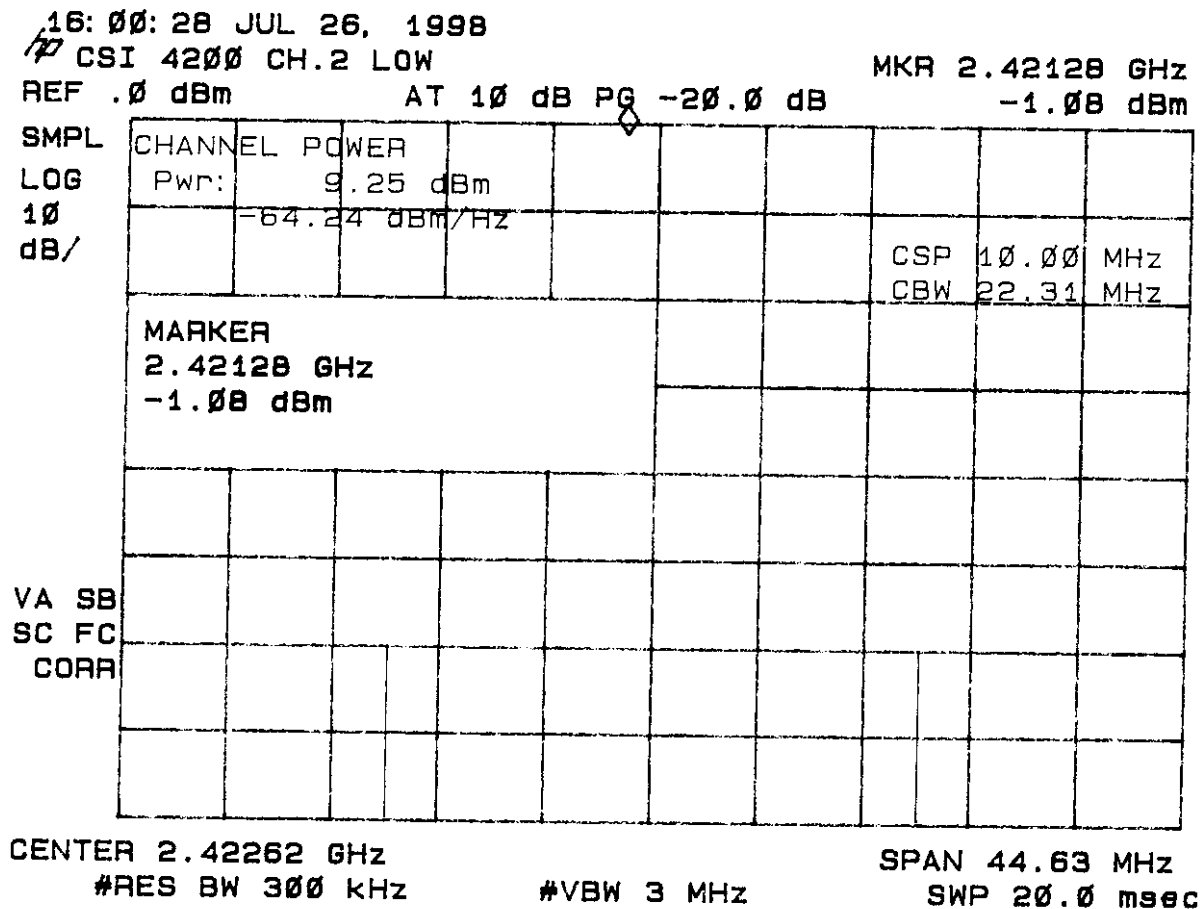
Model 4200
Figure 1E. 6 dB Bandwidth 15.247(a)(2) (High)



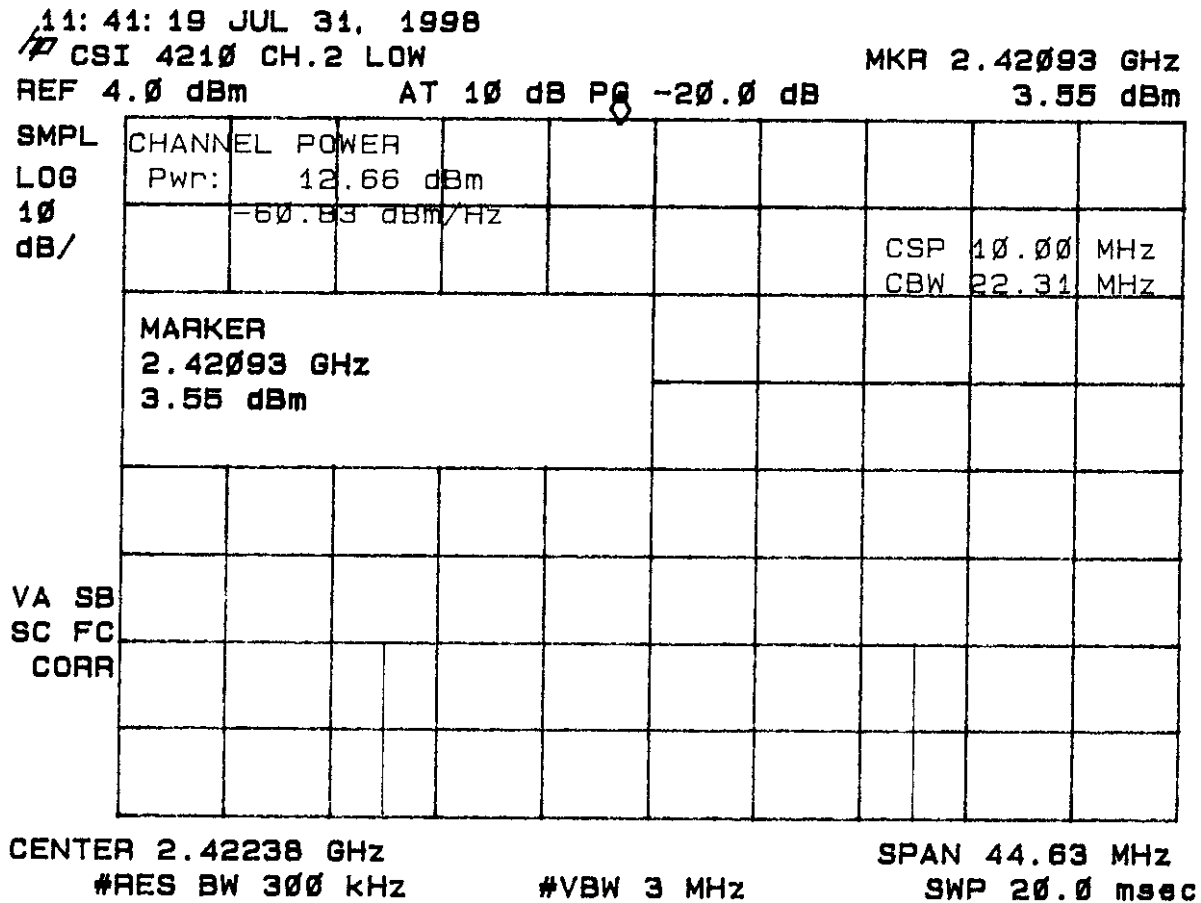
Model 4210
Figure 1F. 6 dB Bandwidth 15.247(a)(2) (High)



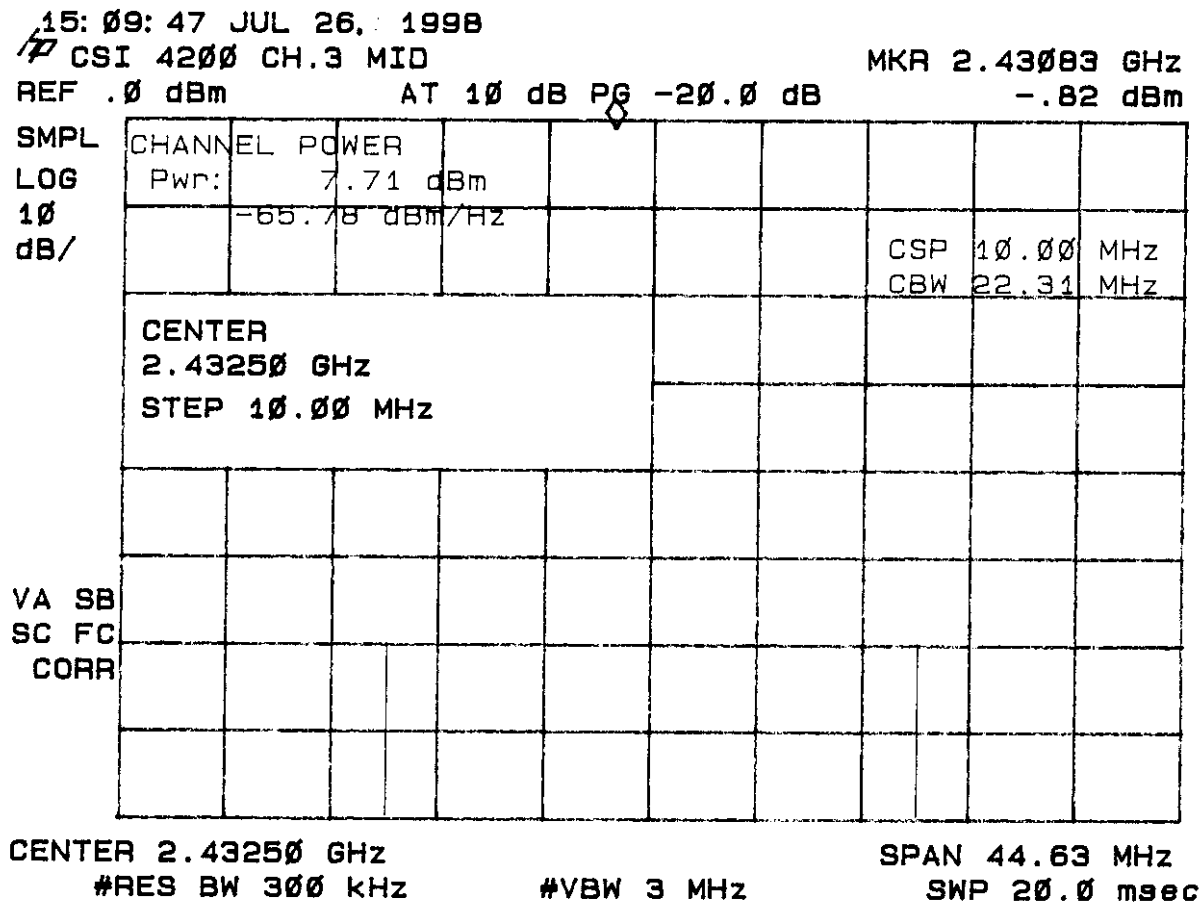
Model 4200
Figure 2A. Peak Power 15.247(b) (Low)



Model 4210
Figure 2B. Peak Power 15.247(b) (Low)



Model 4200
Figure 3A. Peak Power 15.247(b) (Mid)



Model 4210
Figure 3B. Peak Power 15.247(b) (Mid)

14:58:11 AUG 01, 1998

CSI 4210 CH.3 MID

MKR 2.43419 GHz

REF 1.0 dBm

AT 10 dB PG -20.0 dB

1.14 dBm

SMPL

LOG

10

dB/

CHANNEL POWER									
Pwr:	10.08 dBm								
	-63.41 dBm/Hz								
						CSP	10.00 MHz		
						CBW	22.31 MHz		
CENTER									
2.43252 GHz									
STEP 10.00 MHz									
VA SB									
SC FC									
CORR									

CENTER 2.43252 GHz

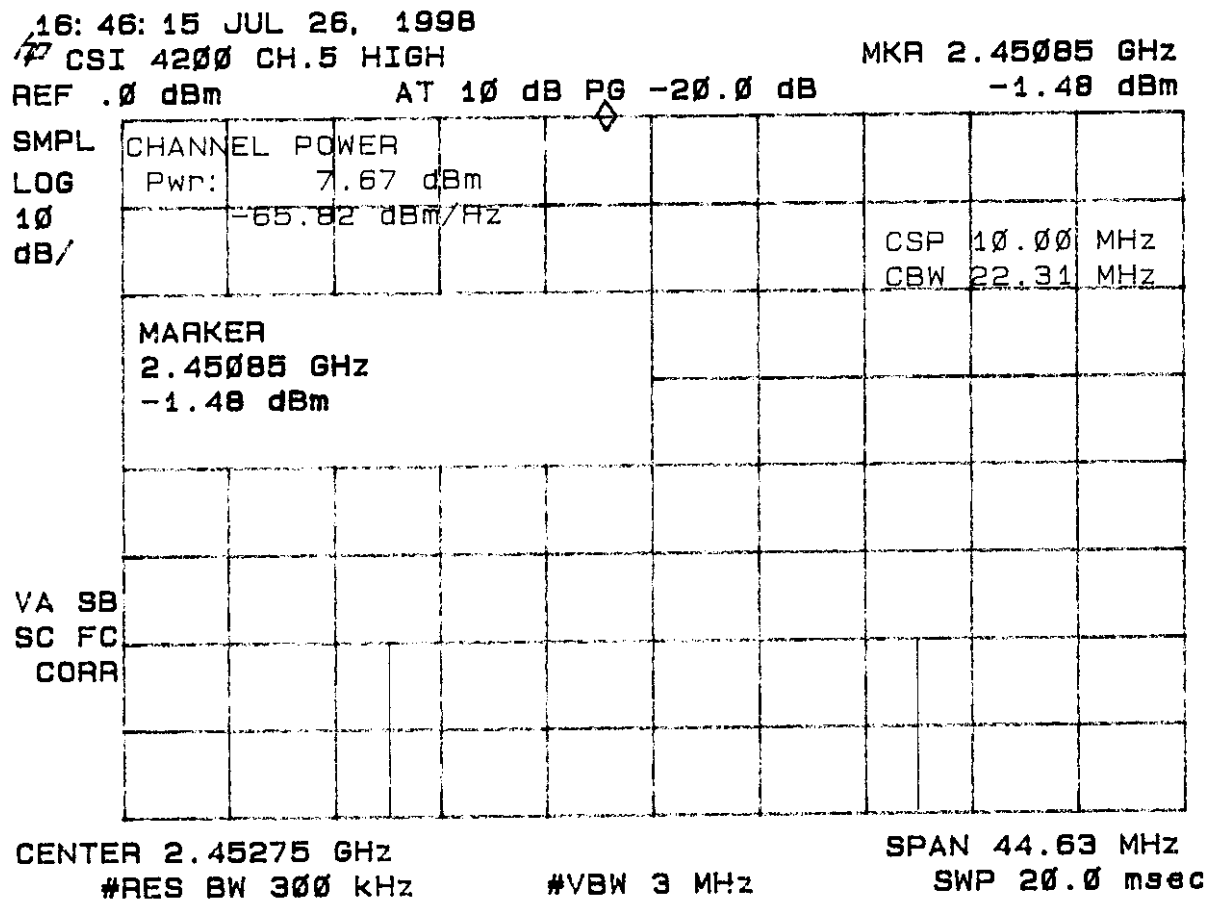
#RES BW 300 kHz

#VBW 3 MHz

SPAN 44.63 MHz

SWP 20.0 msec

Model 4200
Figure 4A. Peak Power 15.247(b) (High)



Model 4210
Figure 4B. Peak Power 15.247(b) (High)

12:37:05 JUL 31, 1998

CSI 4210 CH.5 HIGH

MKR 2.45089 GHz

REF 4.0 dBm

AT 10 dB PG -20.0 dB

3.07 dBm

SMPL

LOG

10

dB/

CHANNEL POWER									
Pwr:	12.28	dBm							
	-61.21	dBm/Hz							
						CSP	10.00	MHz	
						CBW	22.31	MHz	
MARKER 2.45089 GHz 3.07 dBm									
VA SB									
SC FC									
CORR									

CENTER 2.45257 GHz

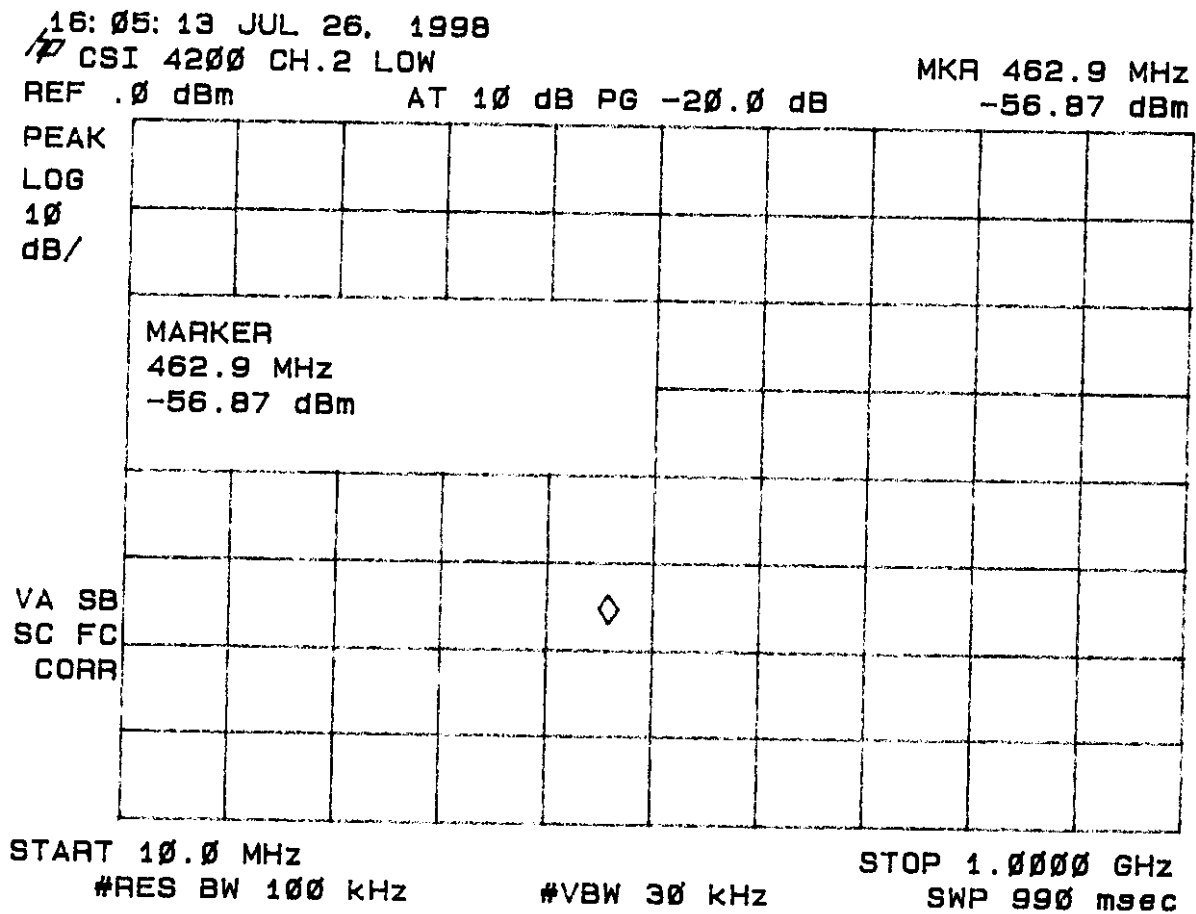
#RES BW 300 kHz

#VBW 3 MHz

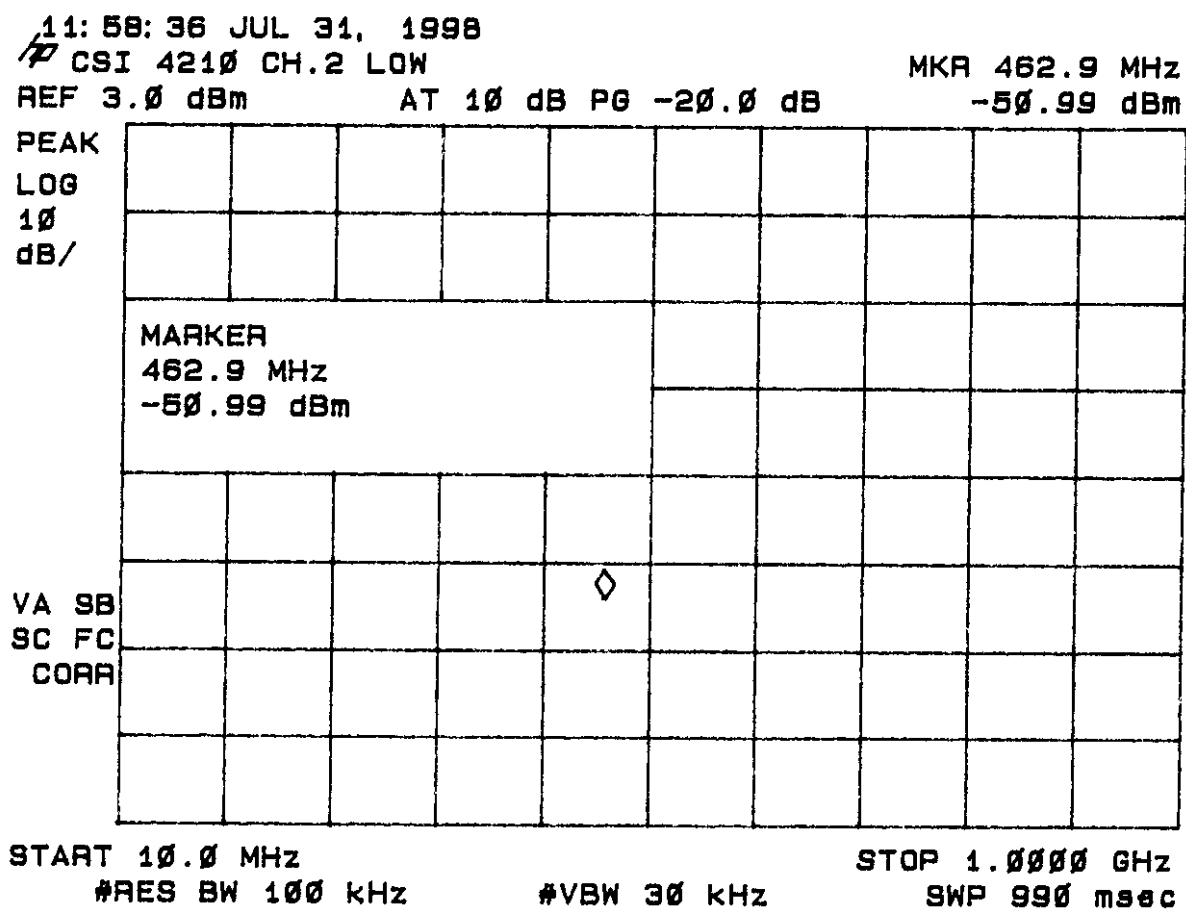
SPAN 44.63 MHz

SWP 20.0 msec

Model 4200
Figure 5A. Conducted Spurious Emission 15.247(c) (Low)

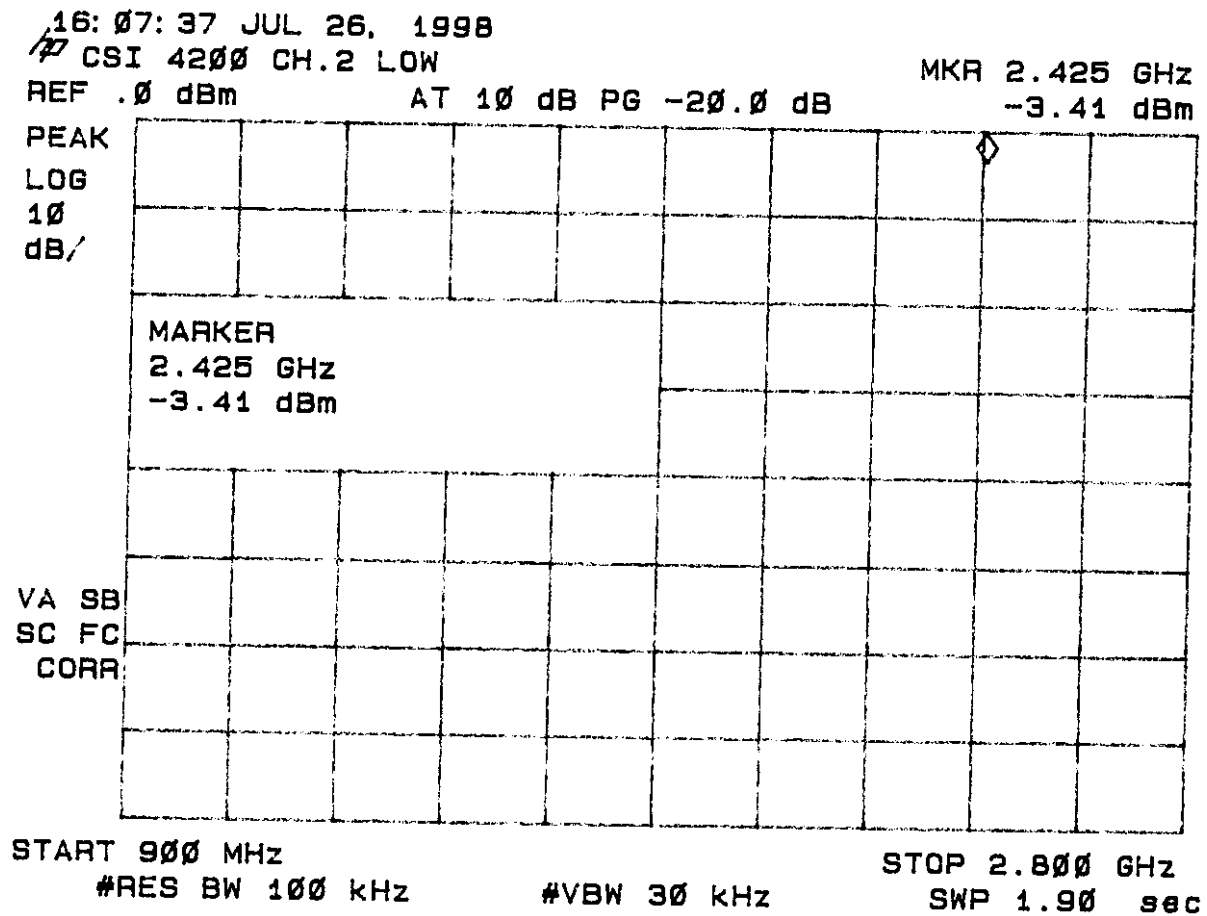


Model 4210
Figure 5B. Conducted Spurious Emission 15.247(c) (Low)

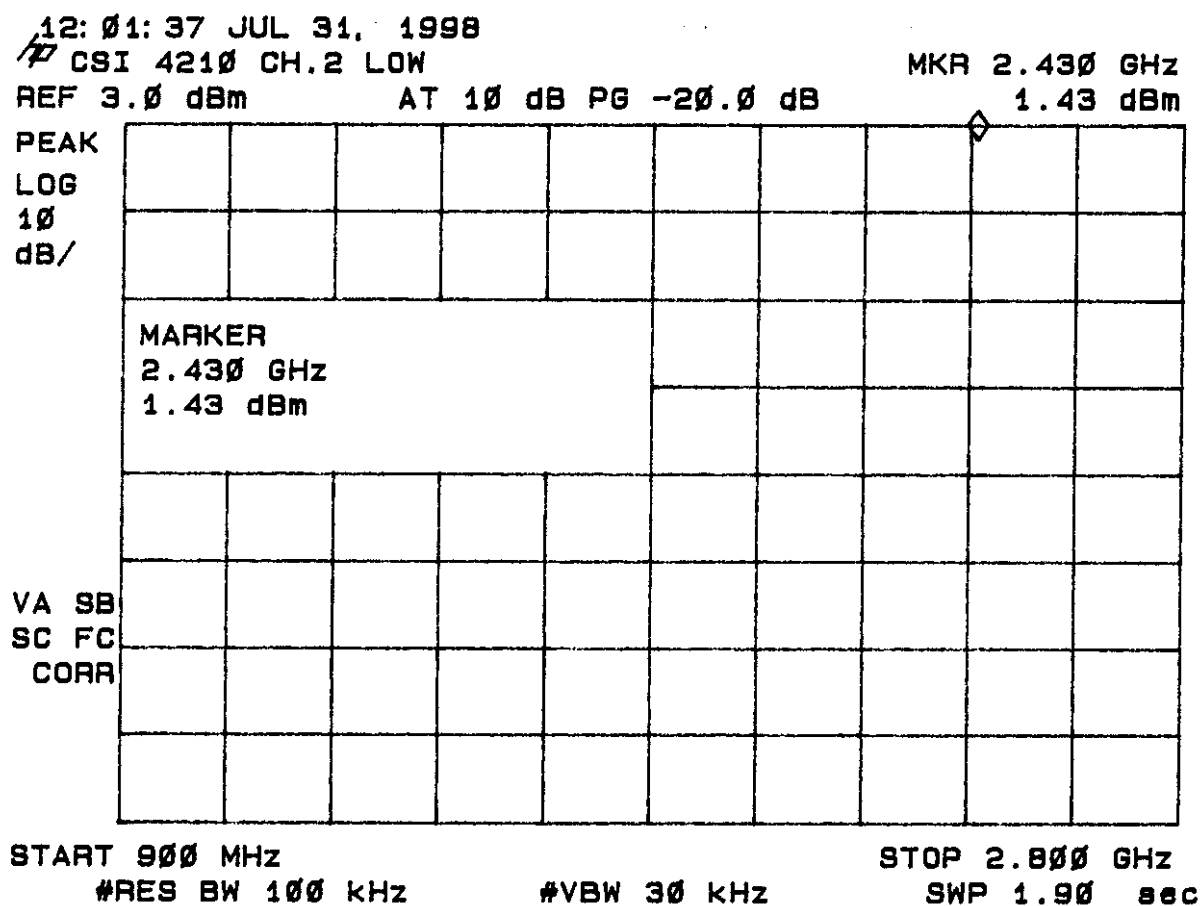


Model 4200

Figure 6A. Conducted Spurious Emission 15.247(c) (Low)

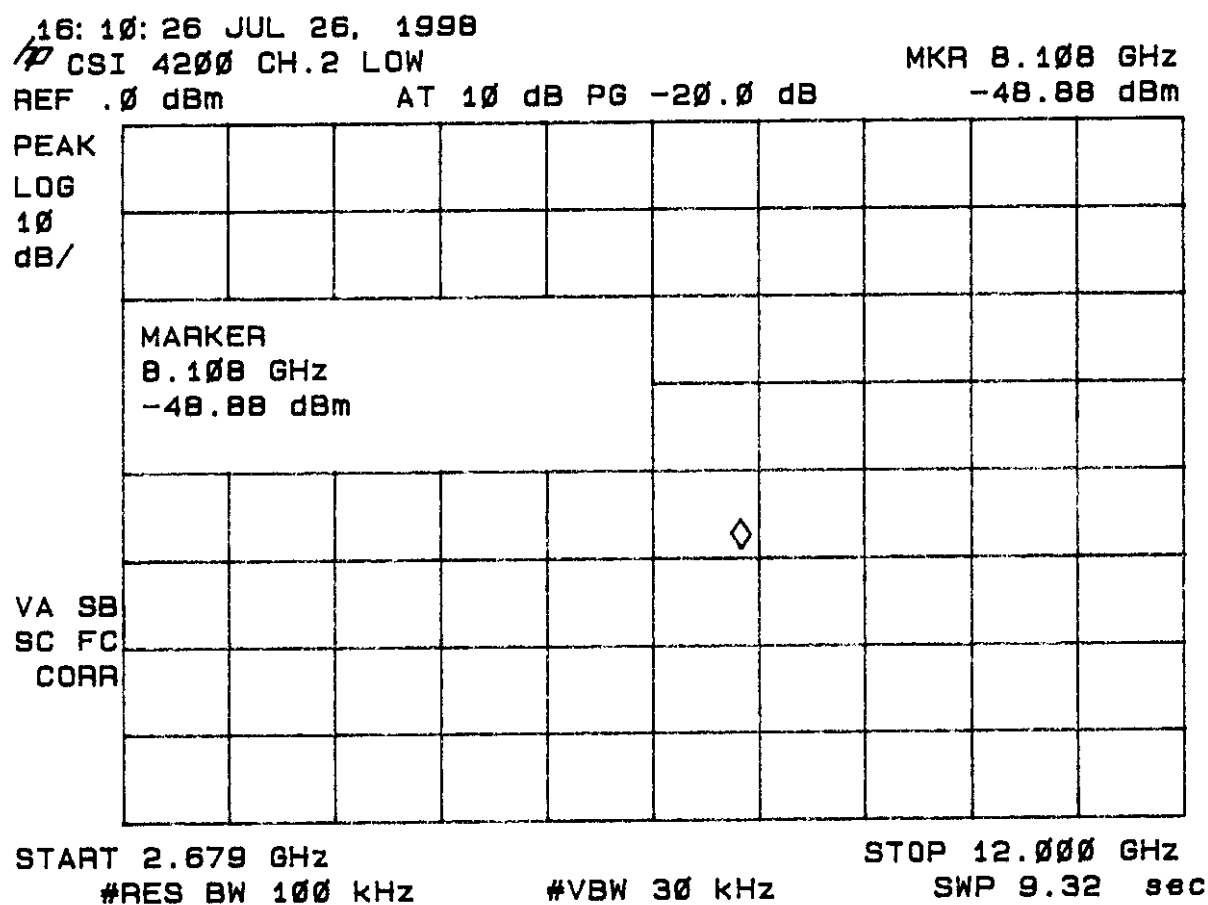


Model 4210
Figure 6B. Conducted Spurious Emission 15.247(c) (Low)



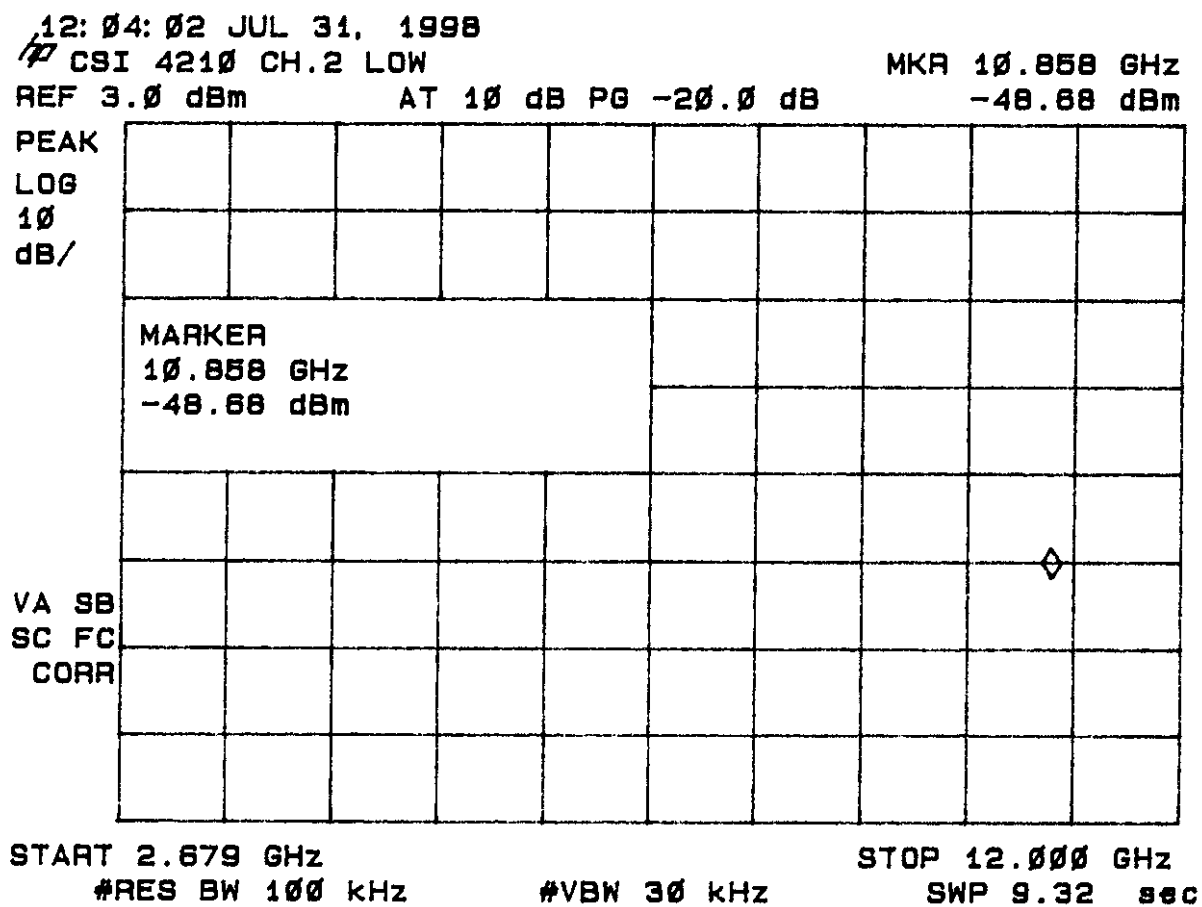
Model 4200

Figure 7A. Conducted Spurious Emission 15.247(c) (Low)



Model 4210

Figure 7B. Conducted Spurious Emission 15.247(c) (Low)



Model 4200

Figure 8A. Conducted Spurious Emission 15.247(c) (Low)

16:16:49 JUL 26, 1998

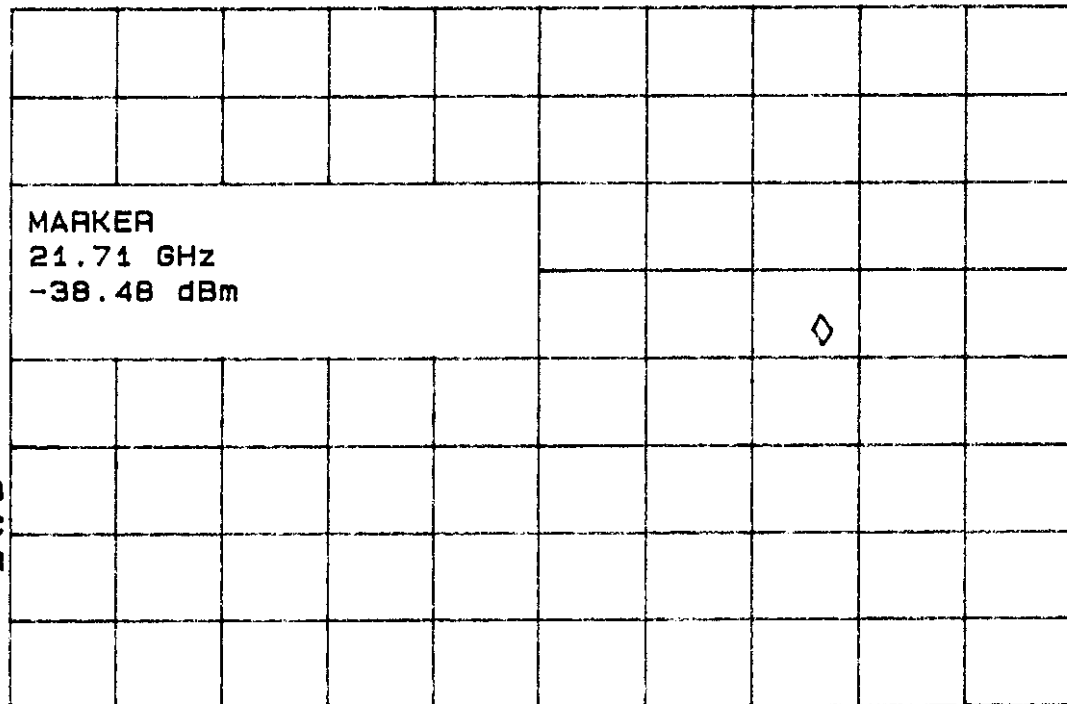
CSI 4200 CH.2 LOW

MKA 21.71 GHz

REF .0 dBm

AT 10 dB PG -20.0 dB

-38.48 dBm

PEAK
LOG
10
dB/VA SB
SC FC
CORR

START 11.00 GHz

#RES BW 100 kHz

#VBW 30 kHz

STOP 25.00 GHz

SWP 14.0 sec

```

12:06:26 JUL 31, 1998
CSI 4210 CH.2 LOW
REF 3.0 dBm AT 10 dB PG -20.0 dB
MKR 24.06 GHz
-38.66 dBm
PEAK
LOG
10
dB/
MARKER
24.06 GHz
-38.66 dBm
VA SB
SC FC
CORR
START 11.00 GHz
#RES BW 100 KHz
STOP 25.00 GHz
SWP 14.0 sec

```


Model 4210

Figure 9B. Conducted Spurious Emission 15.247(c) (Mid)

15:05:20 AUG 01, 1998

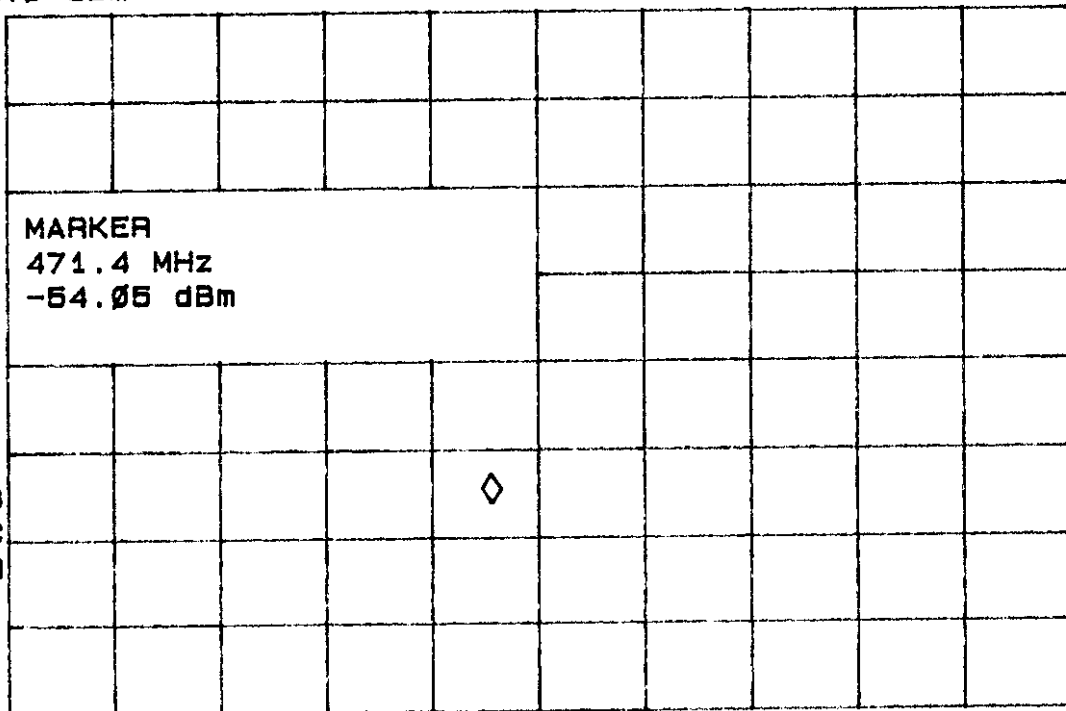
CSI 4210 CH.3 MID

MKR 471.4 MHz

REF 2.0 dBm

AT 10 dB PG -20.0 dB

-54.05 dBm

PEAK
LOG
10
dB/VA SB
SC FC
CORR

START 30.0 MHz

#RES BW 100 kHz

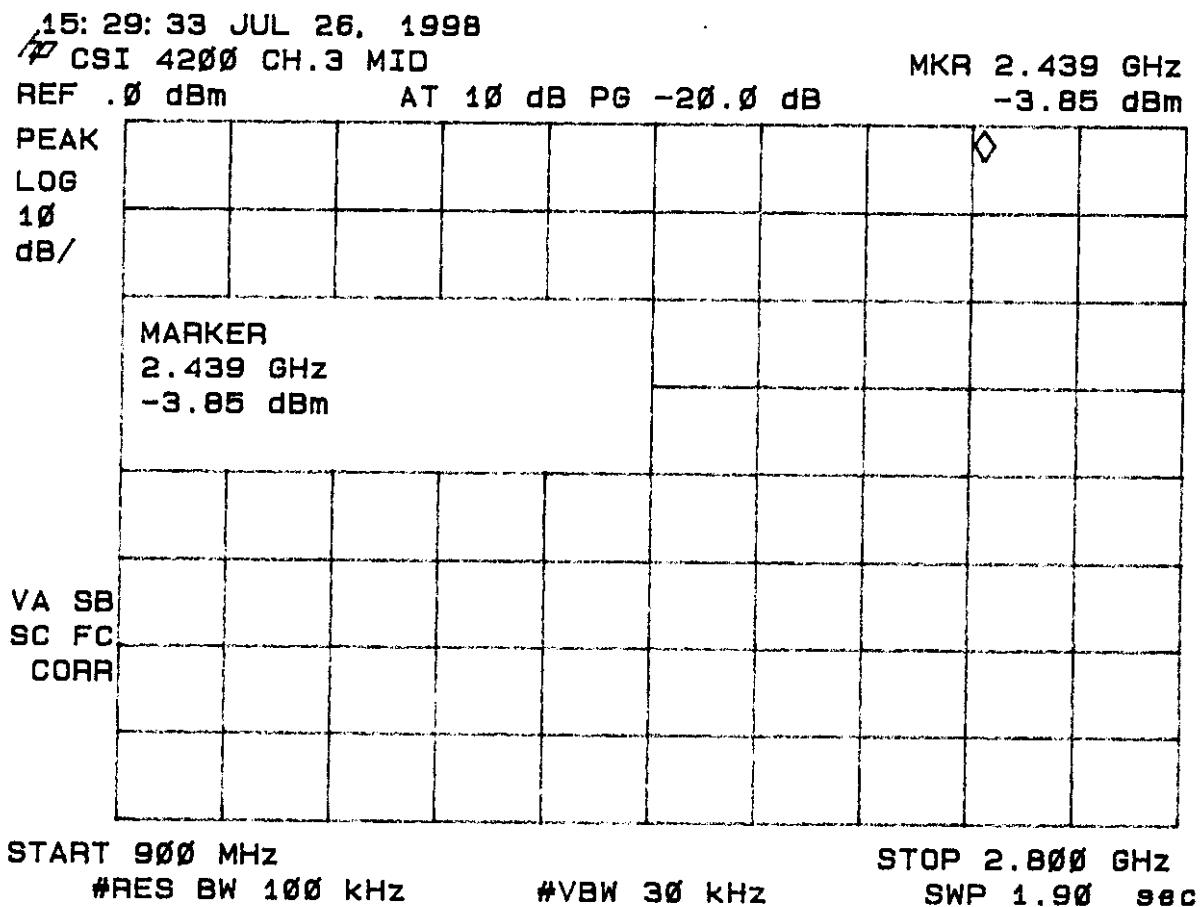
#VBW 30 kHz

STOP 1.0000 GHz

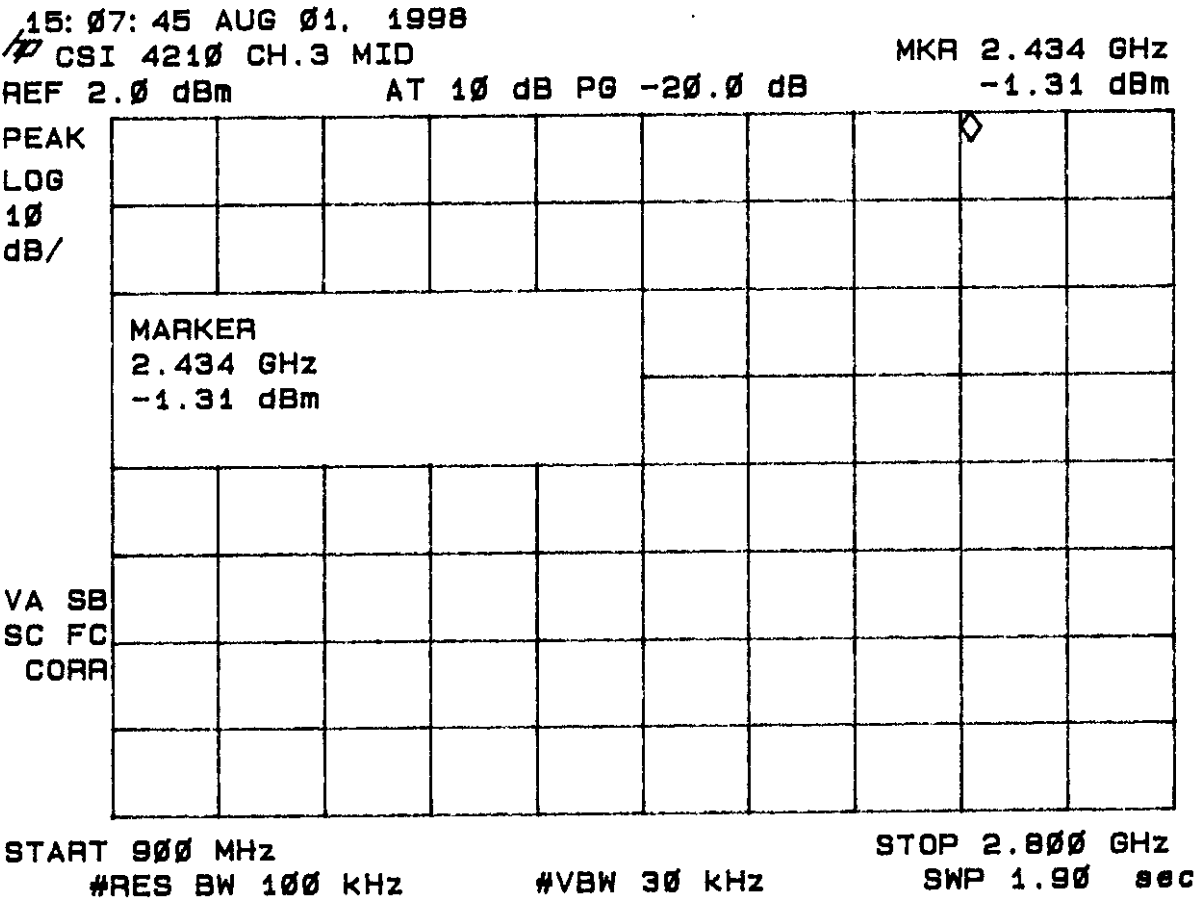
SWP 970 msec

Model 4200

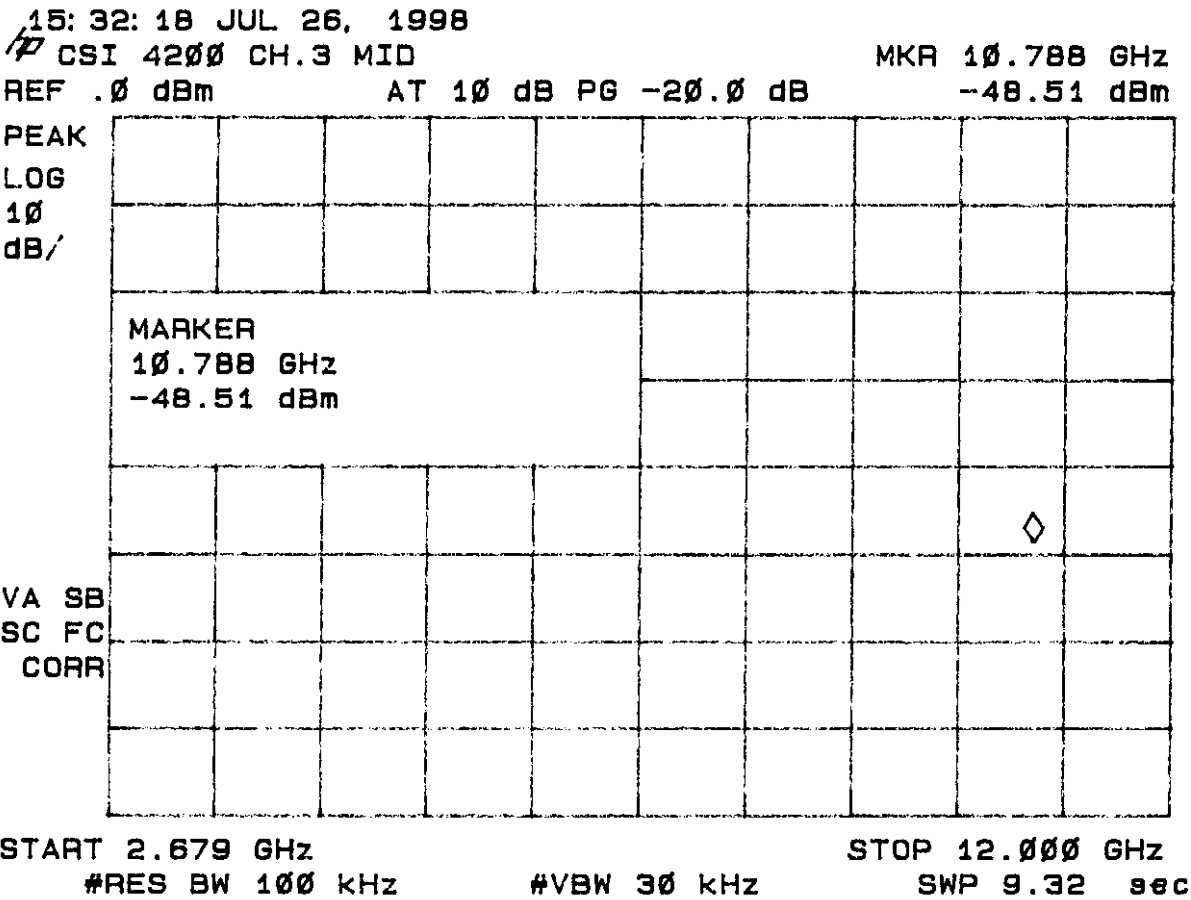
Figure 10A. Conducted Spurious Emission 15.247(c) (Mid)



Model 4210
Figure 10B. Conducted Spurious Emission 15.247(c) (Mid)



Model 4200
Figure 11A. Conducted Spurious Emission 15.247(c) (Mid)



Model 4210

Figure 11B. Conducted Spurious Emission 15.247(c) (Mid)

15:10:41 AUG 01, 1998

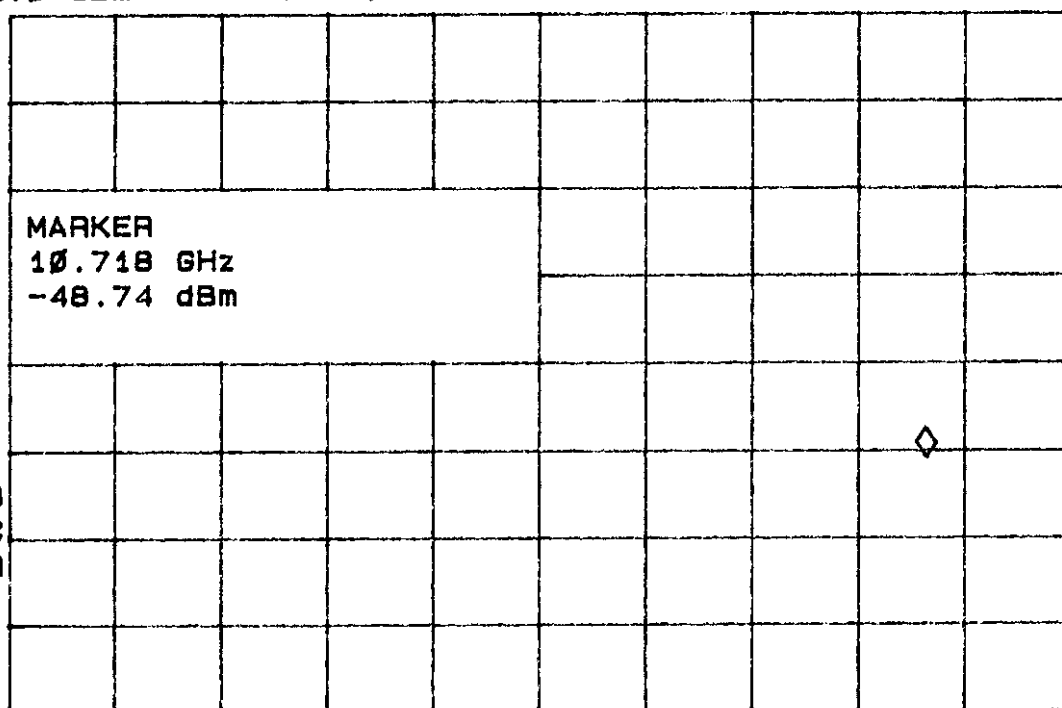
CSI 4210 CH.3 MID

MKR 10.718 GHz

REF 2.0 dBm

AT 10 dB PG -20.0 dB

-48.74 dBm

PEAK
LOG
10
dB/

START 2.679 GHz

#RES BW 100 kHz

#VBW 30 kHz

STOP 12.000 GHz

SWP 9.32 sec

Model 4200

Figure 12A. Conducted Spurious Emission 15.247(c) (Mid)

15:34:57 JUL 26, 1998

CSI 4200 CH.3 MID

MKR 23.71 GHz

REF .0 dBm

AT 10 dB PG -20.0 dB

-39.28 dBm

PEAK
LOG
10
dB/STOP
25.00 GHzVA SB
SC FC
CORR

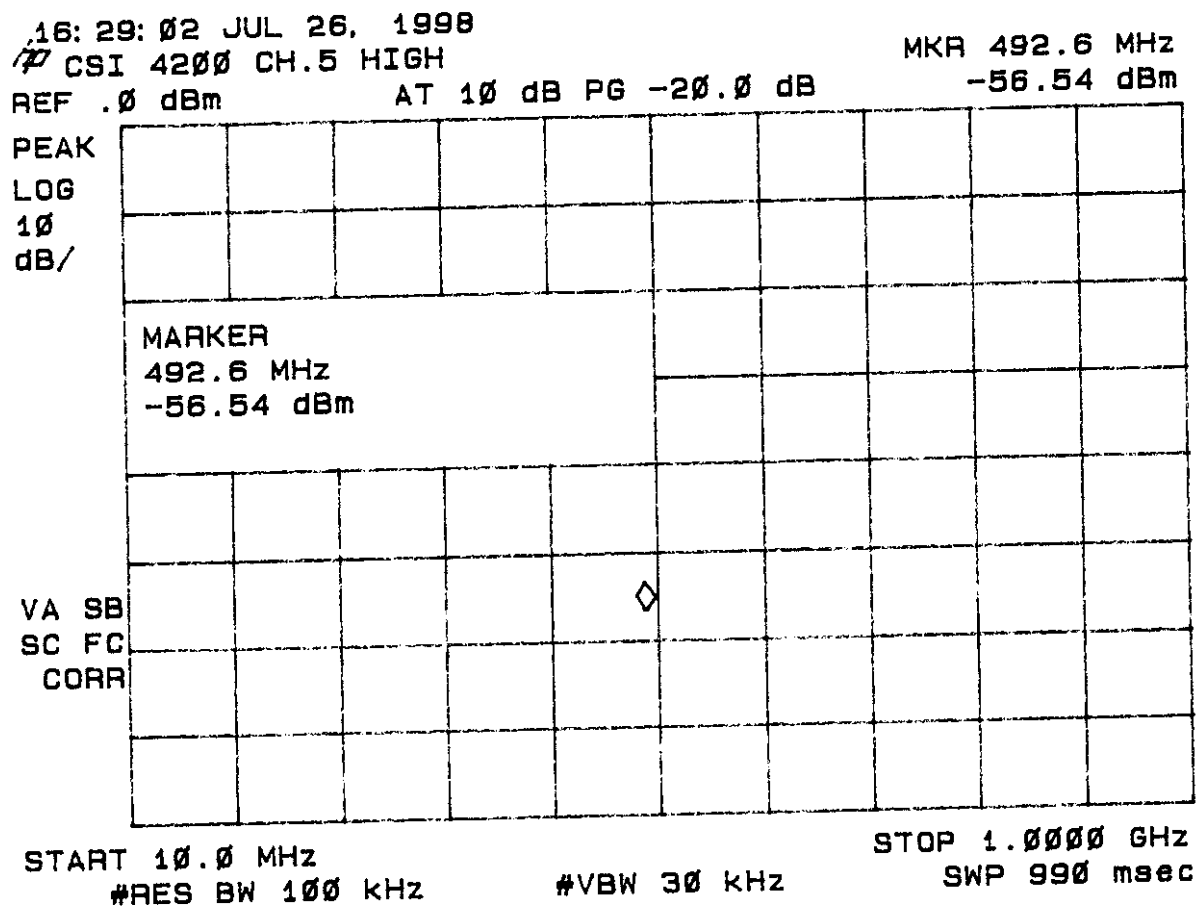
START 11.00 GHz

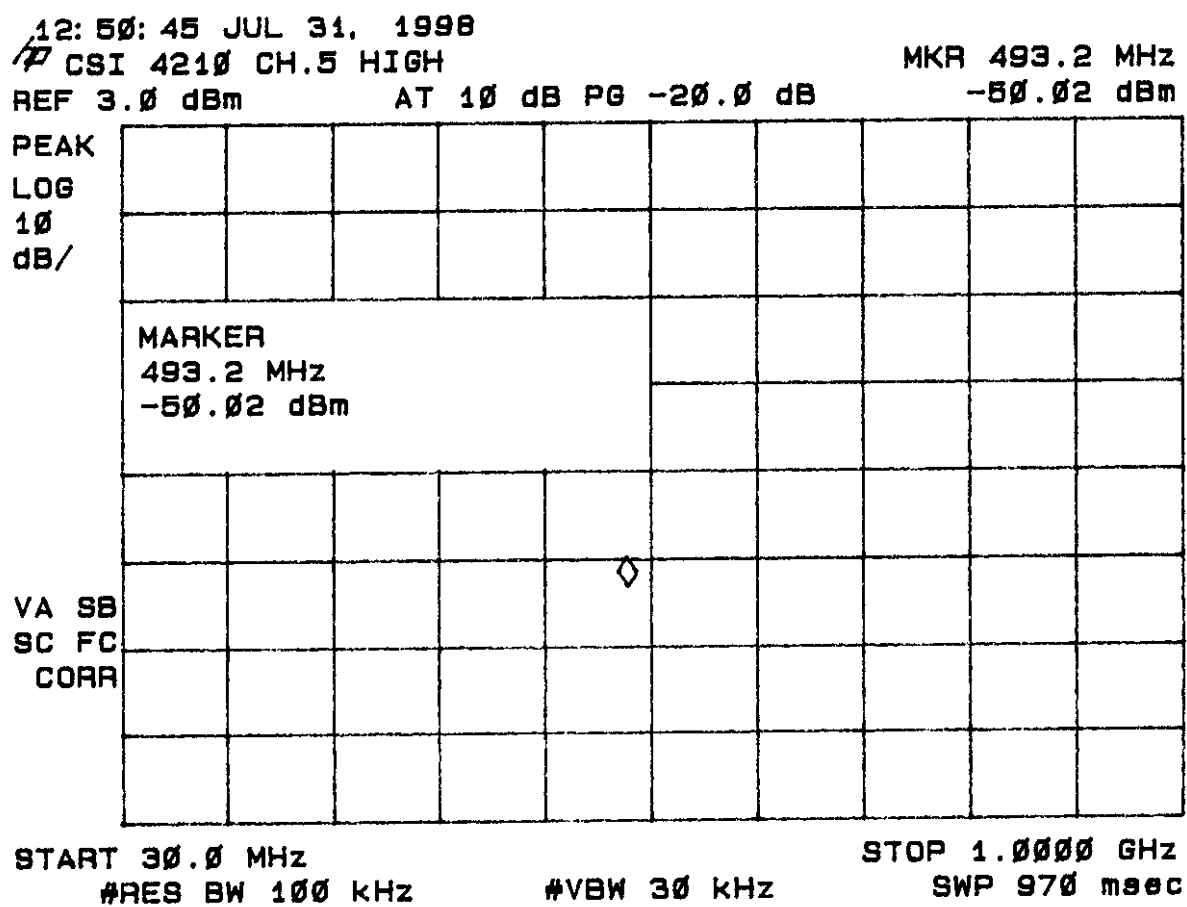
#RES BW 100 kHz

#VBW 30 kHz

STOP 25.00 GHz

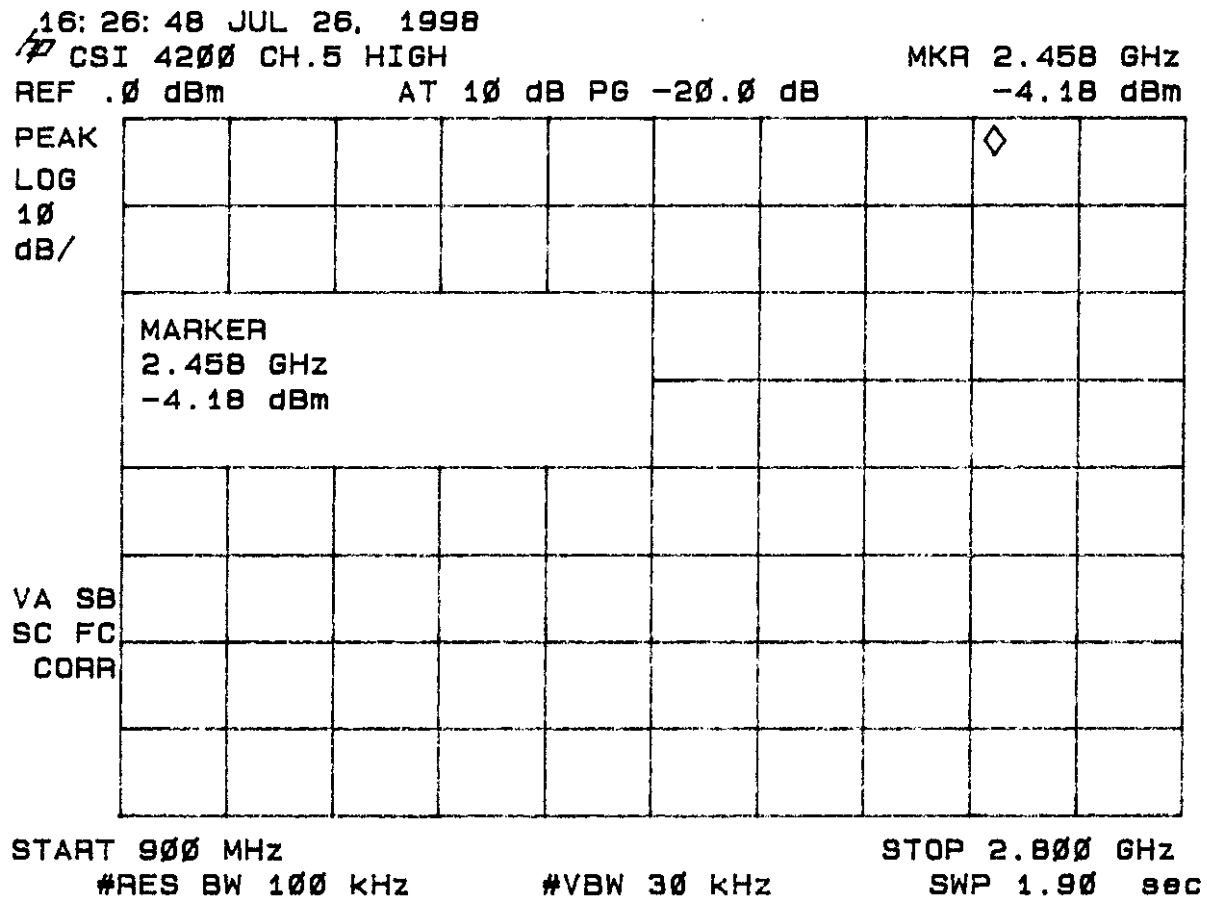
SWP 14.0 sec





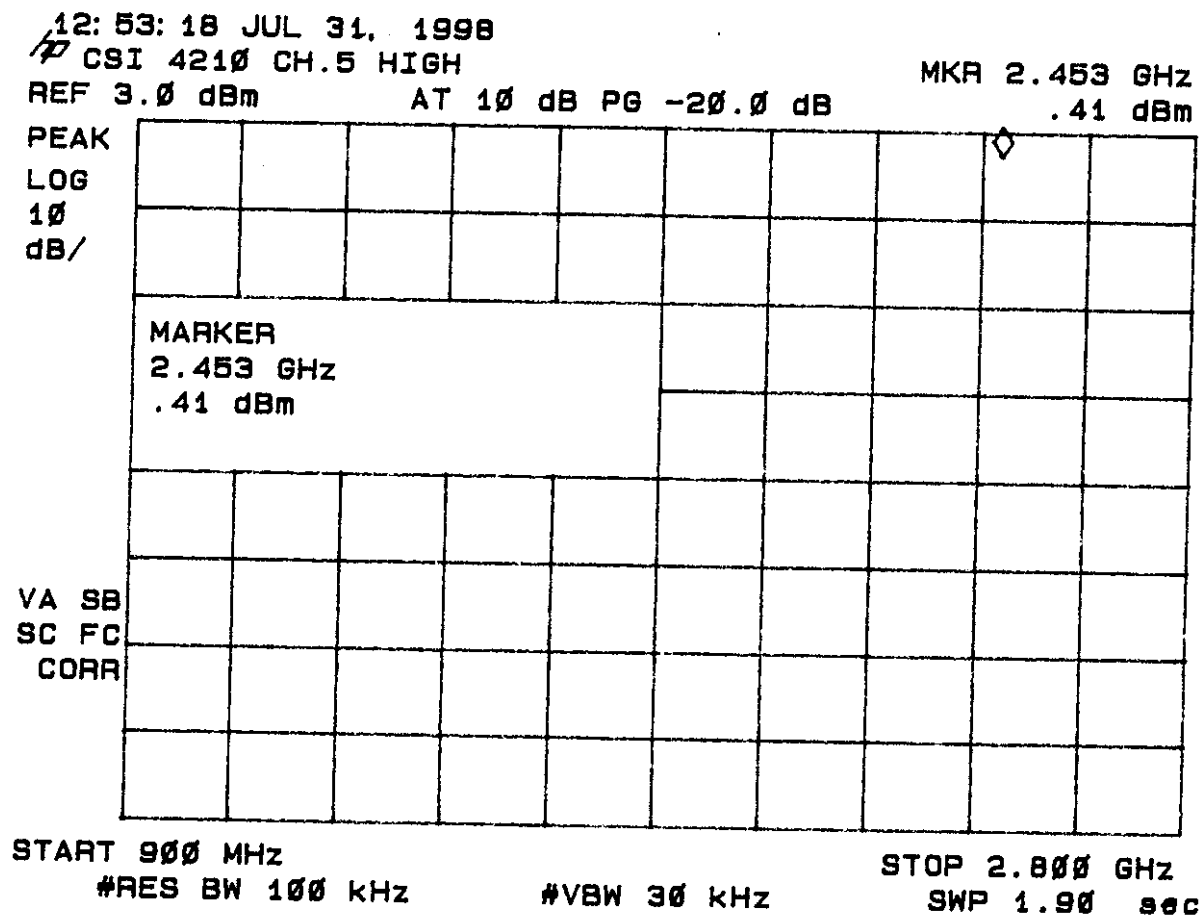
Model 4200

Figure 14A. Conducted Spurious Emission 15.247(c) (High)



Model 4210

Figure 14B. Conducted Spurious Emission 15.247(c) (High)



Model 4200

Figure 15A. Conducted Spurious Emission 15.247(c) (High)

16:32:09 JUL 26, 1998

CSI 4200 CH.5 HIGH

MKR 10.835 GHz

REF 0 dBm

AT 10 dB PG -20.0 dB

-48.41 dBm

PEAK
LOG
10
dB/MARKER
10.835 GHz
-48.41 dBmVA SB
SC FC
CORR

START 2.679 GHz

#RES BW 100 kHz

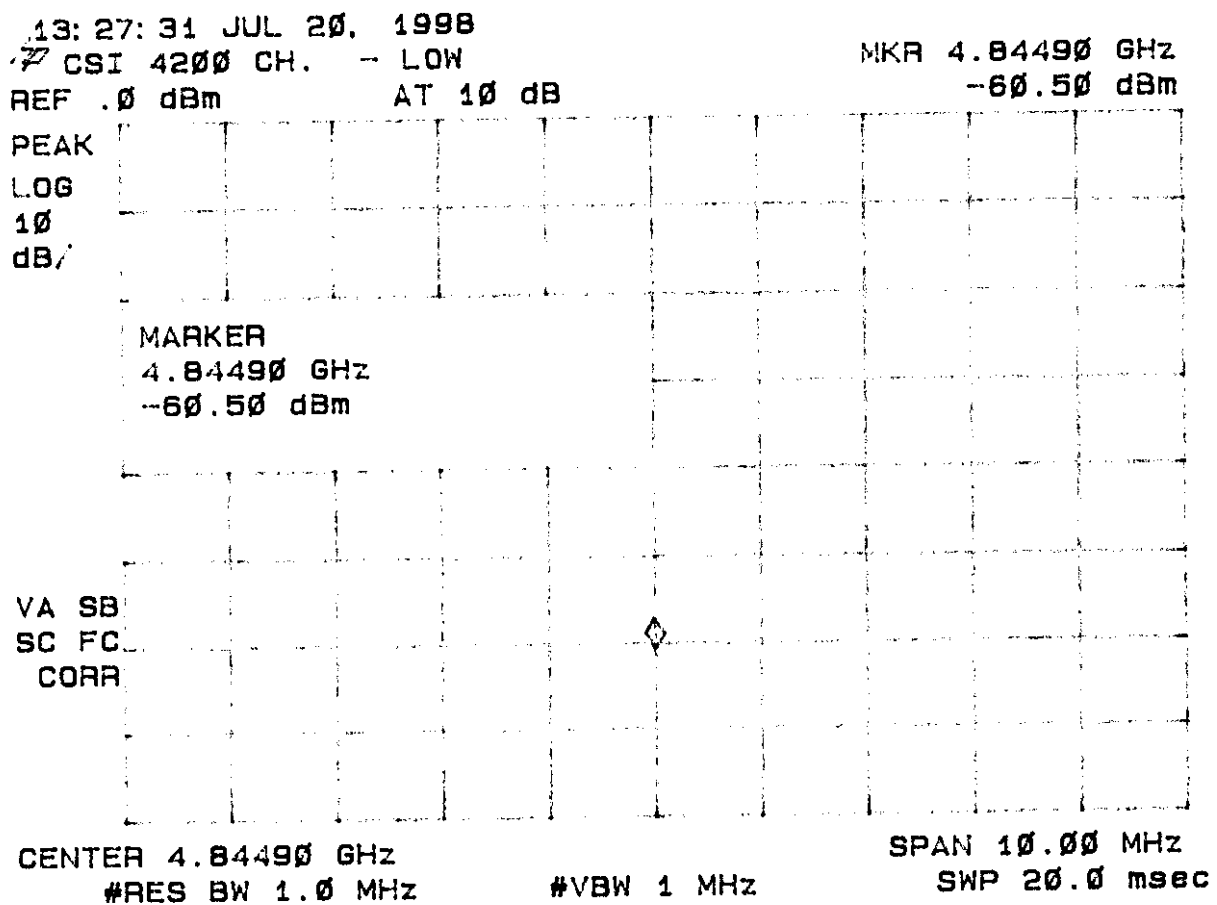
#VBW 30 kHz

STOP 12.000 GHz

SWP 9.32 sec

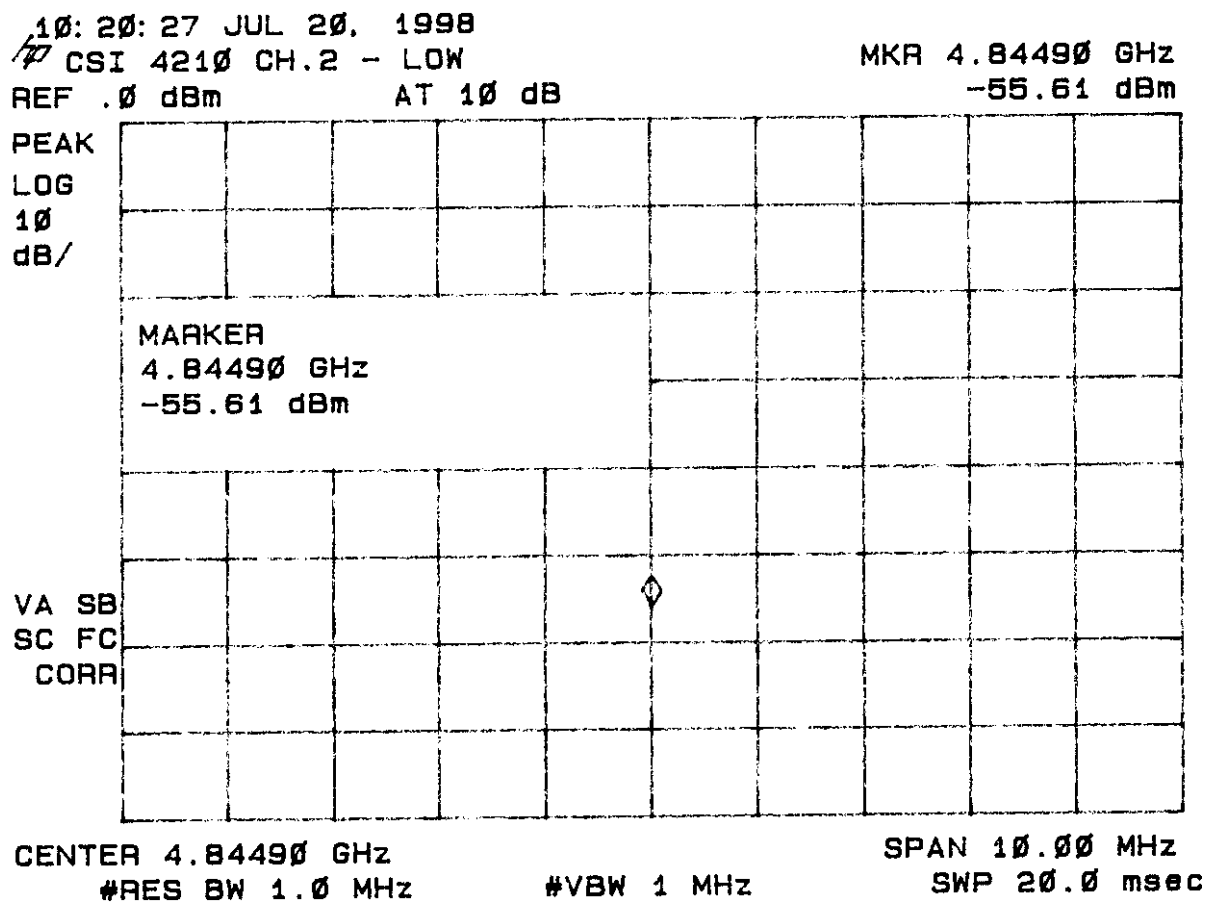
SWP 9.32 sec

Model 4200
Figure 17A. Peak Radiated Spurious Emission 15.247(c) (Low)



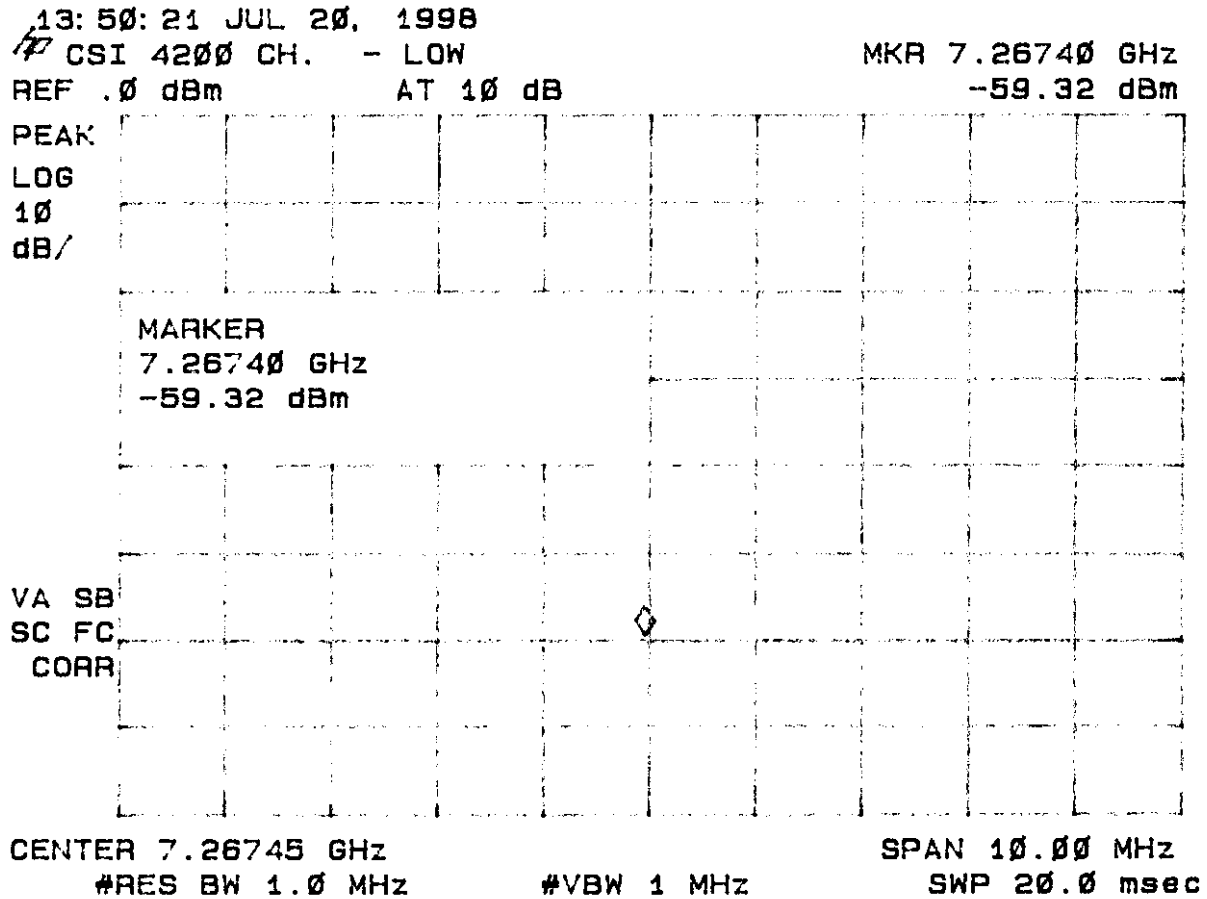
Model 4210

Figure 17B. Peak Radiated Spurious Emission 15.247(c) (Low)



Model 4200

Figure 18A. Peak Radiated Spurious Emission 15.247(c) (Low)



Model 4210

Figure 18B. Peak Radiated Spurious Emission 15.247(c) (Low)

10:31:04 JUL 20, 1998

CSI 4210 CH.2 - LOW

MKR 7.26753 GHz

REF .0 dBm

AT 10 dB

-59.76 dBm

PEAK
LOG
10
dB/MARKER
7.26753 GHz
-59.76 dBmVA SB
SC FC
CORR

CENTER 7.26740 GHz

#RES BW 1.0 MHz

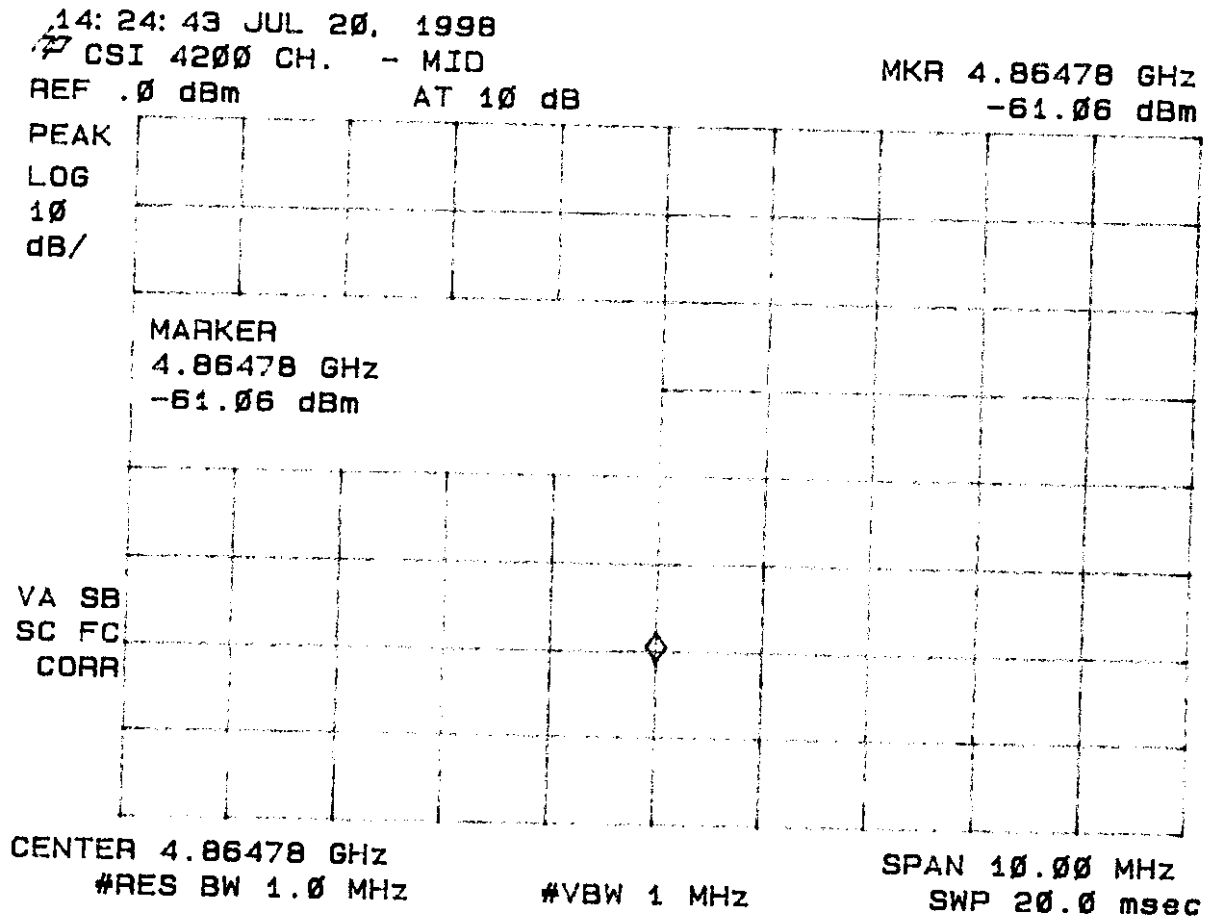
#VBW 1 MHz

SPAN 10.00 MHz

SWP 20.0 msec

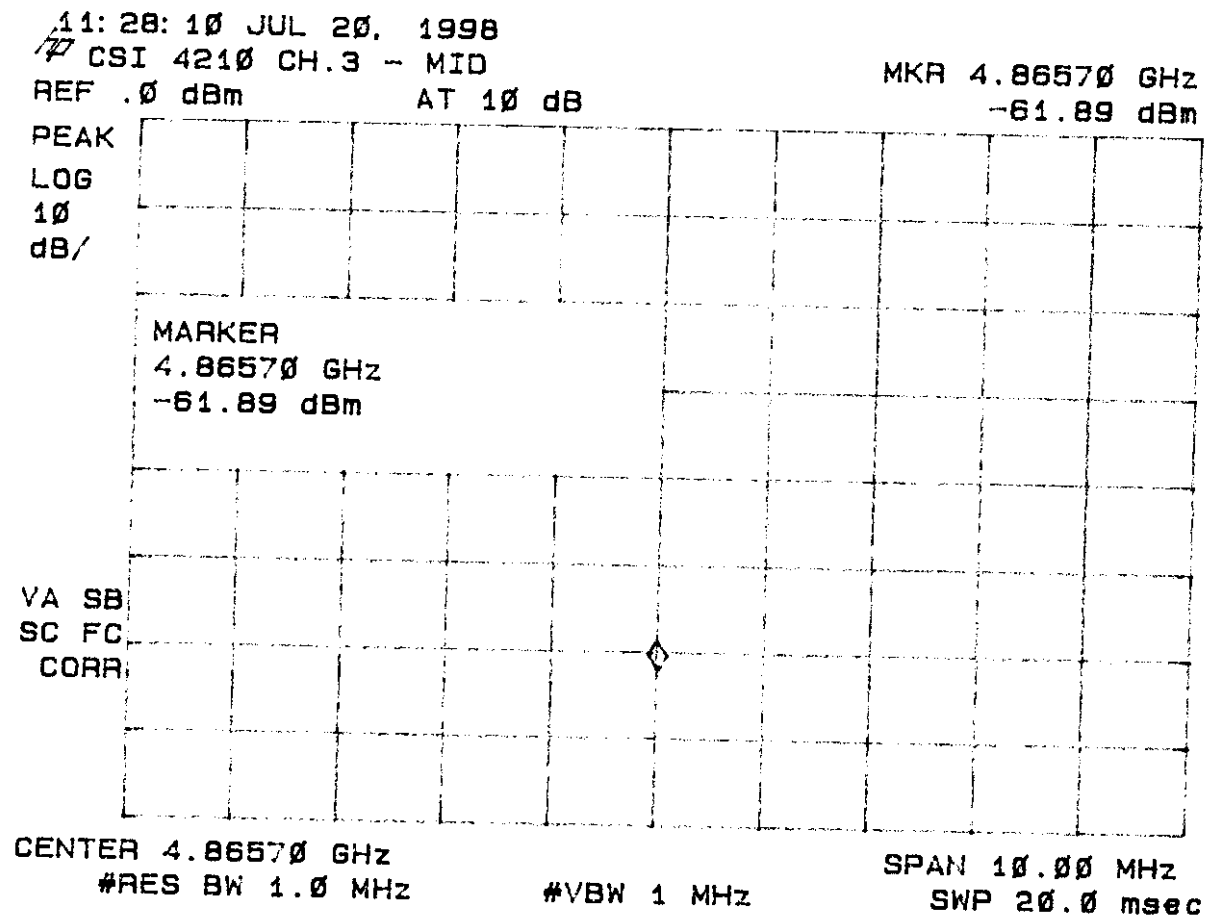
Model 4200

Figure 19A. Peak Radiated Spurious Emission 15.247(c) (Mid)



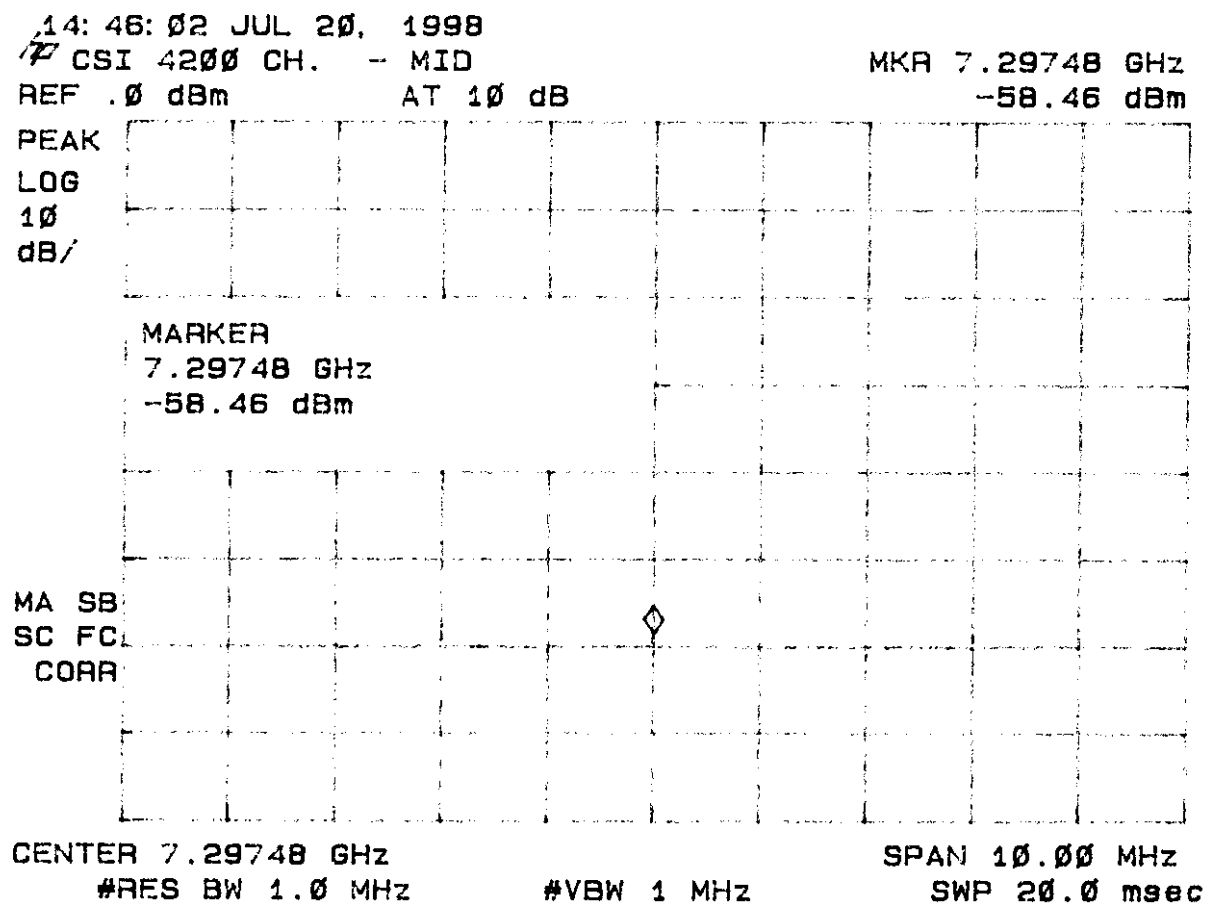
Model 4210

Figure 19B. Peak Radiated Spurious Emission 15.247(c) (Mid)



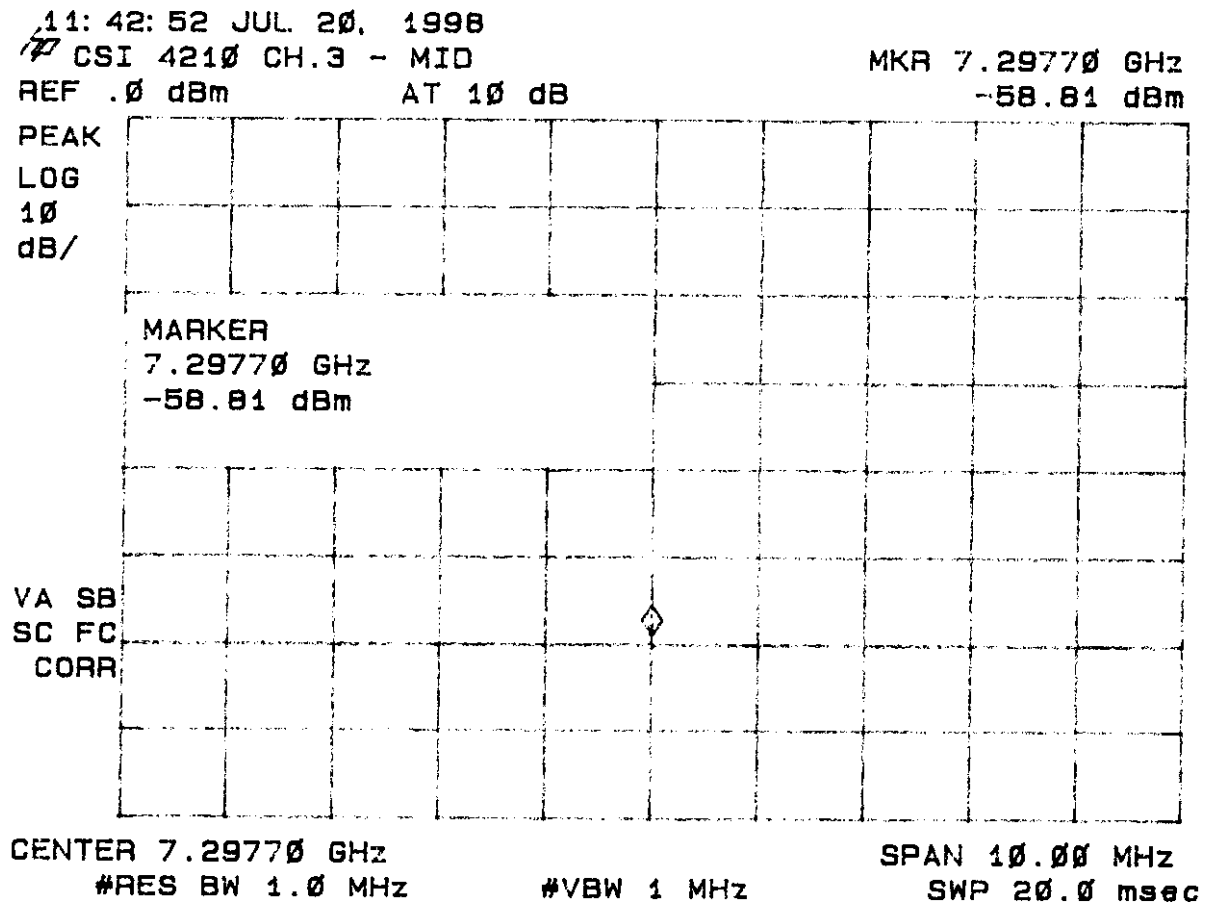
Model 4200

Figure 20A. Peak Radiated Spurious Emission 15.247(c) (Mid)



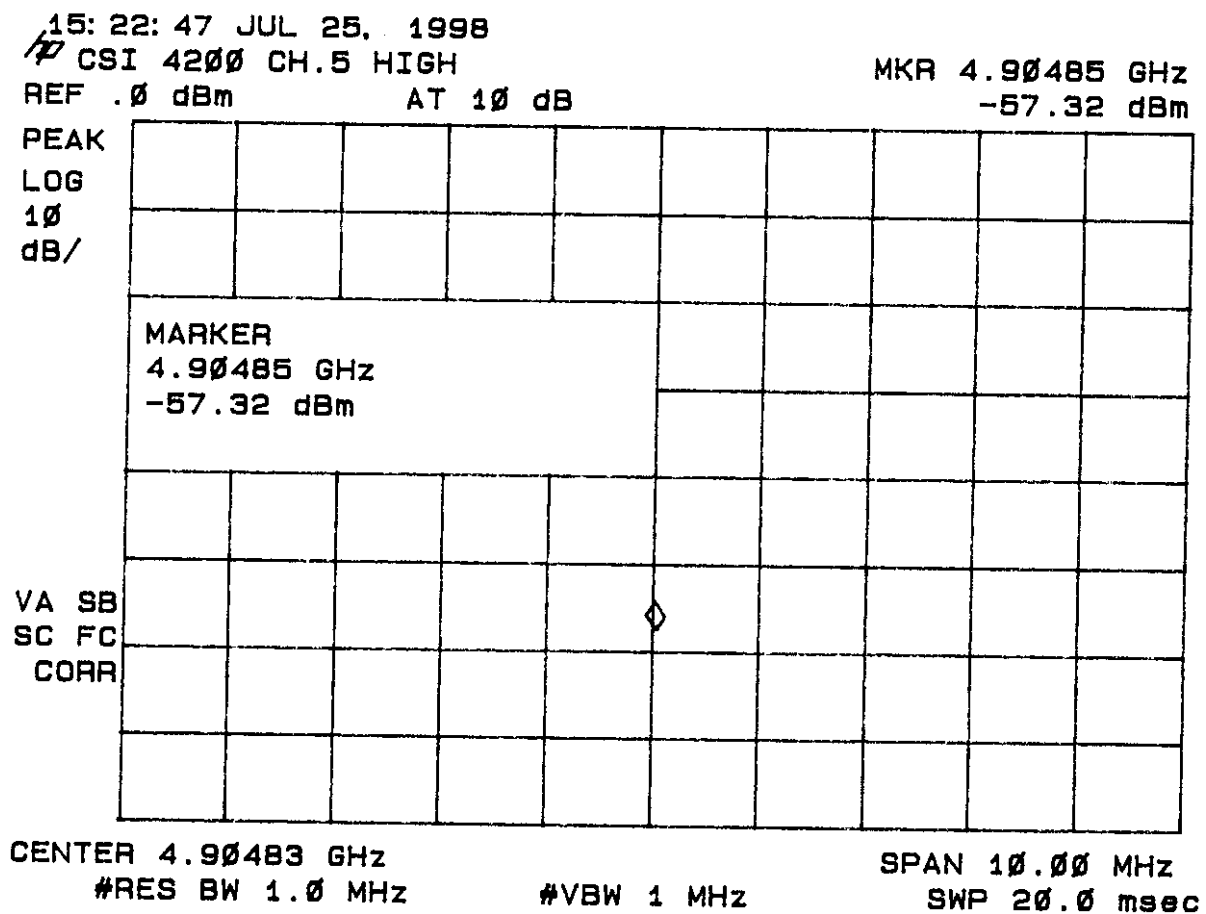
Model 4210

Figure 20B. Peak Radiated Spurious Emission 15.247(c) (Mid)



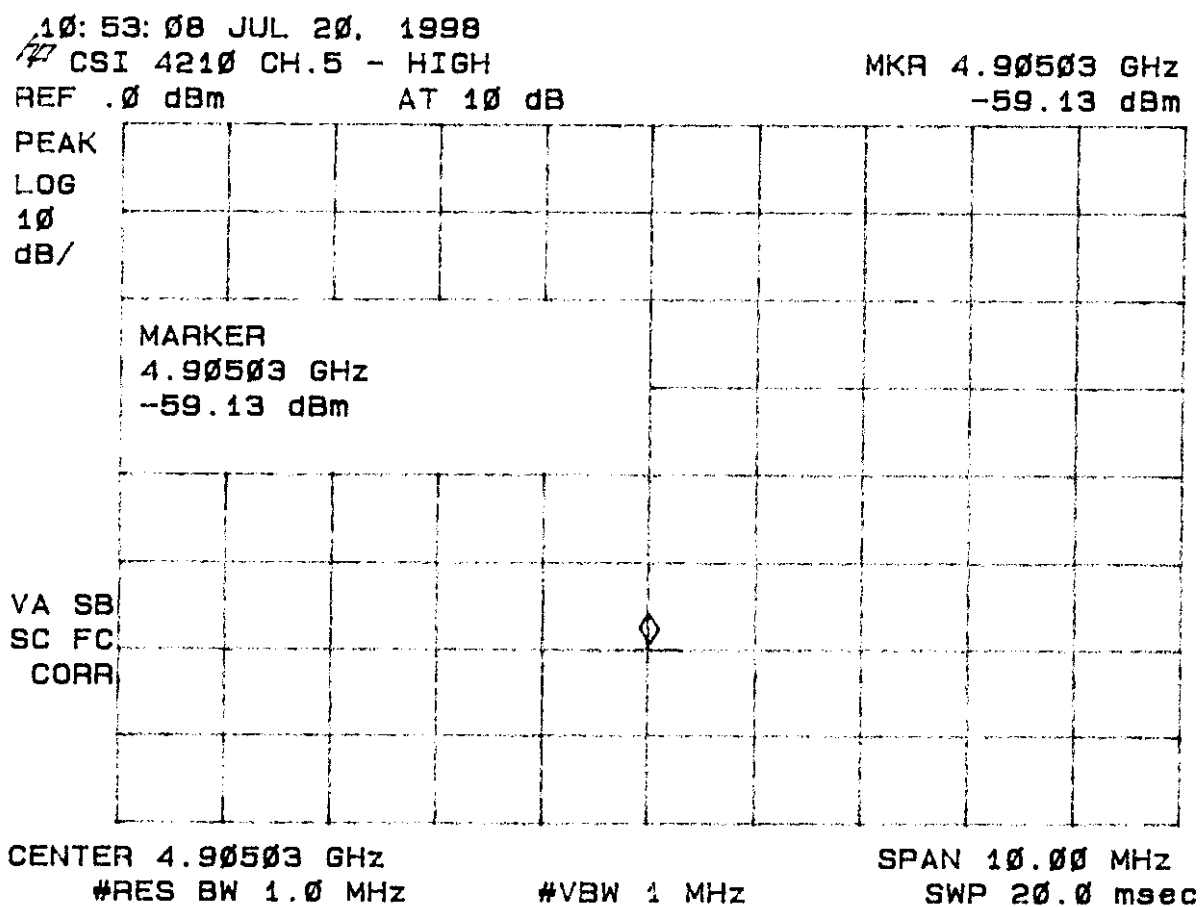
Model 4200

Figure 21A. Peak Radiated Spurious Emission 15.247(c) (High)



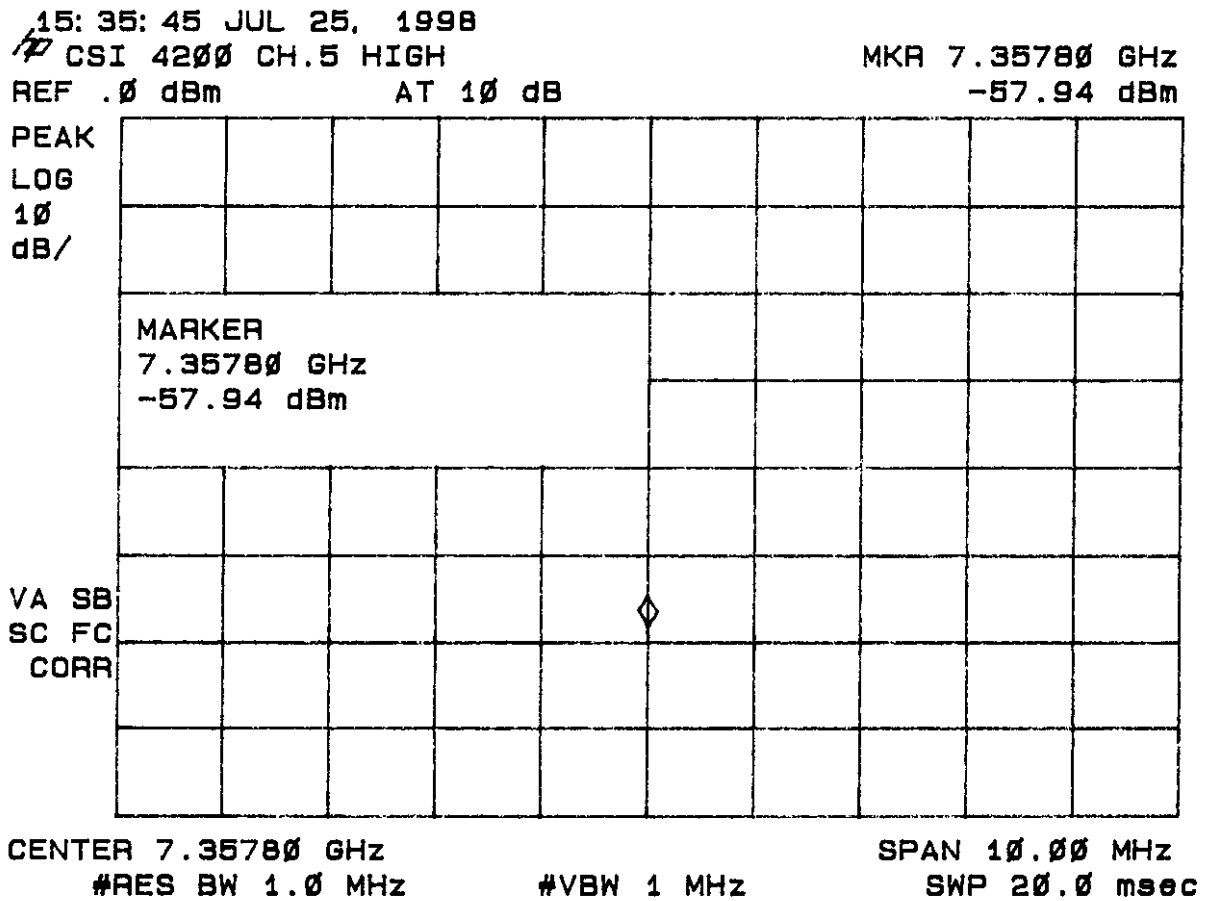
Model 4210

Figure 21B. Peak Radiated Spurious Emission 15.247(c) (High)



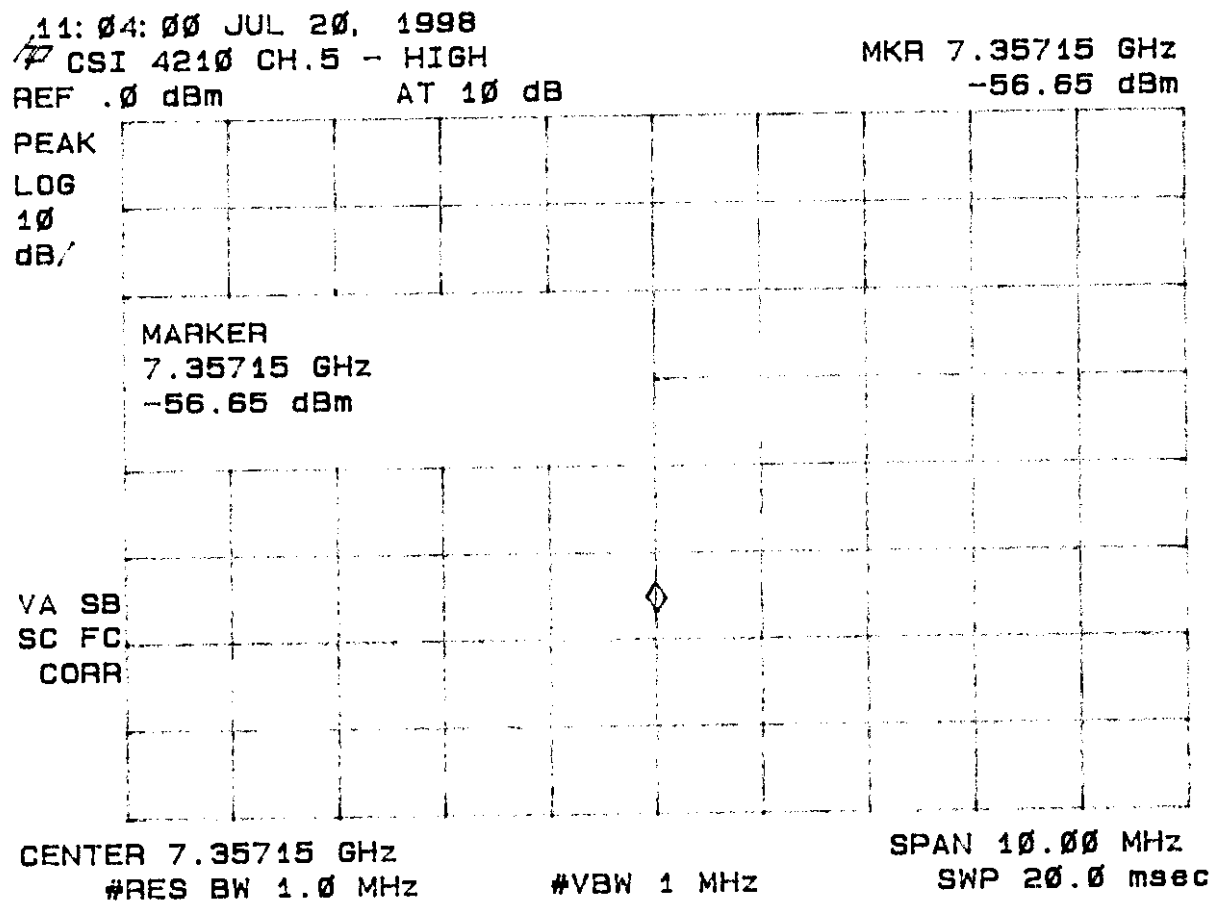
Model 4200

Figure 22A. Peak Radiated Spurious Emission 15.247(c) (High)



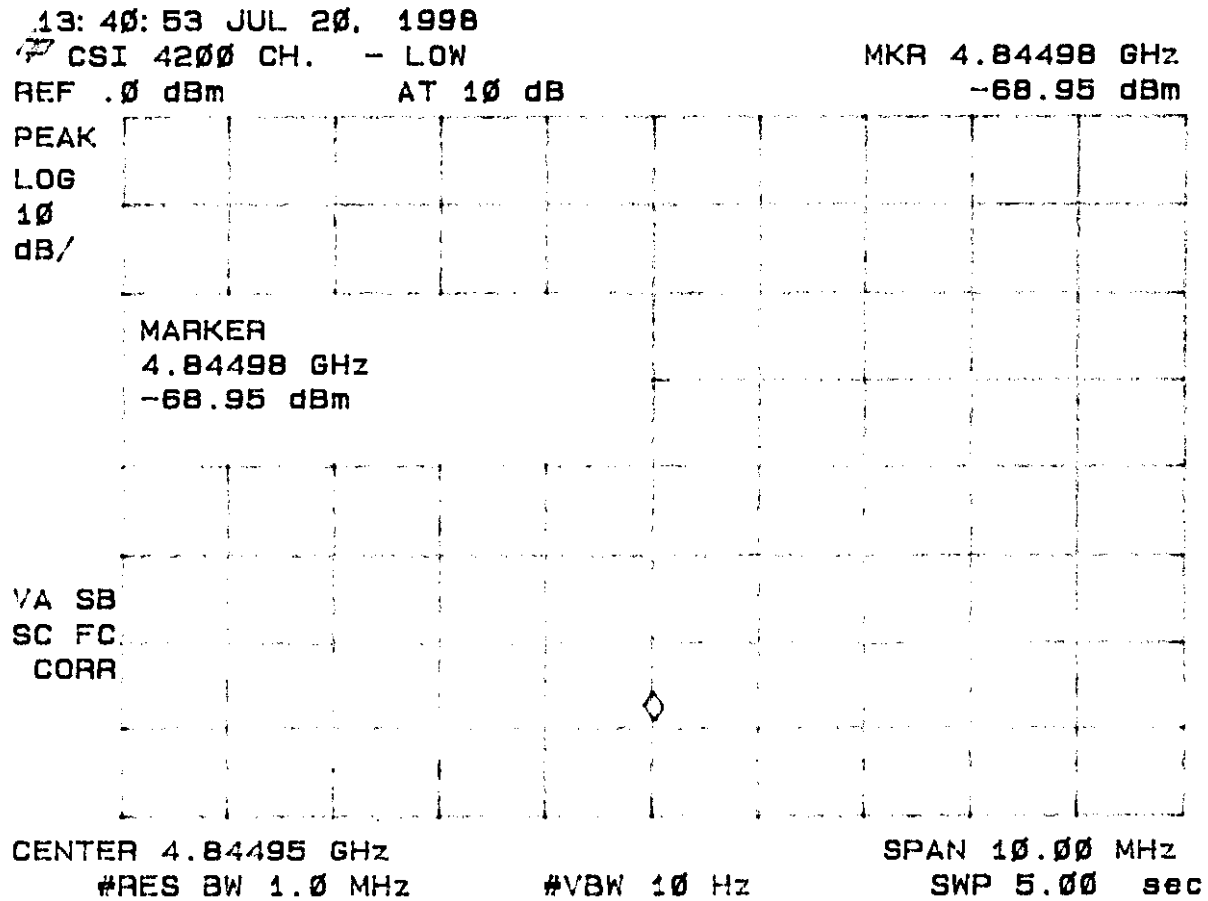
Model 4210

Figure 22B. Peak Radiated Spurious Emission 15.247(c) (High)



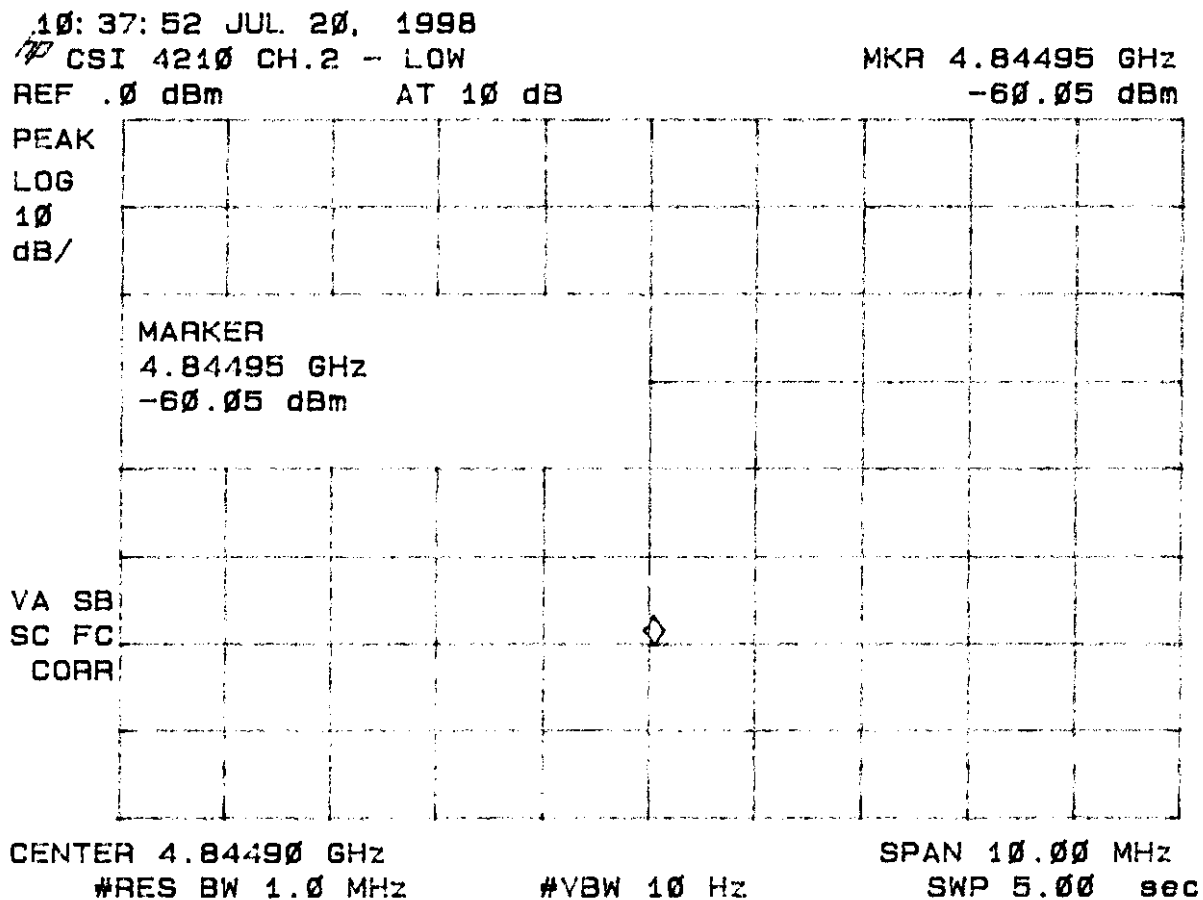
Model 4200

Figure 23A. Average Radiated Spurious Emission 15.247(c) (Low)



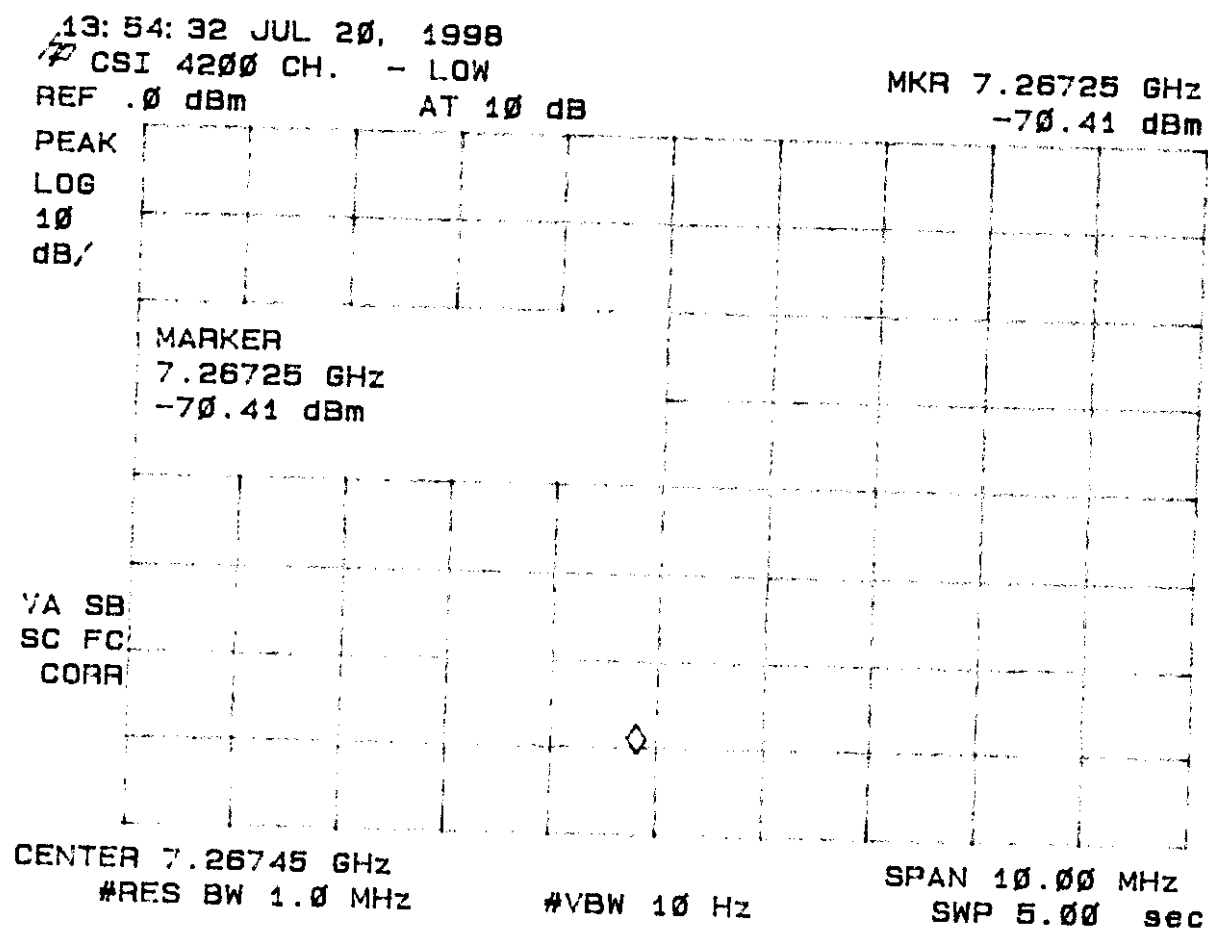
Model 4210

Figure 23B. Average Radiated Spurious Emission 15.247(c) (Low)



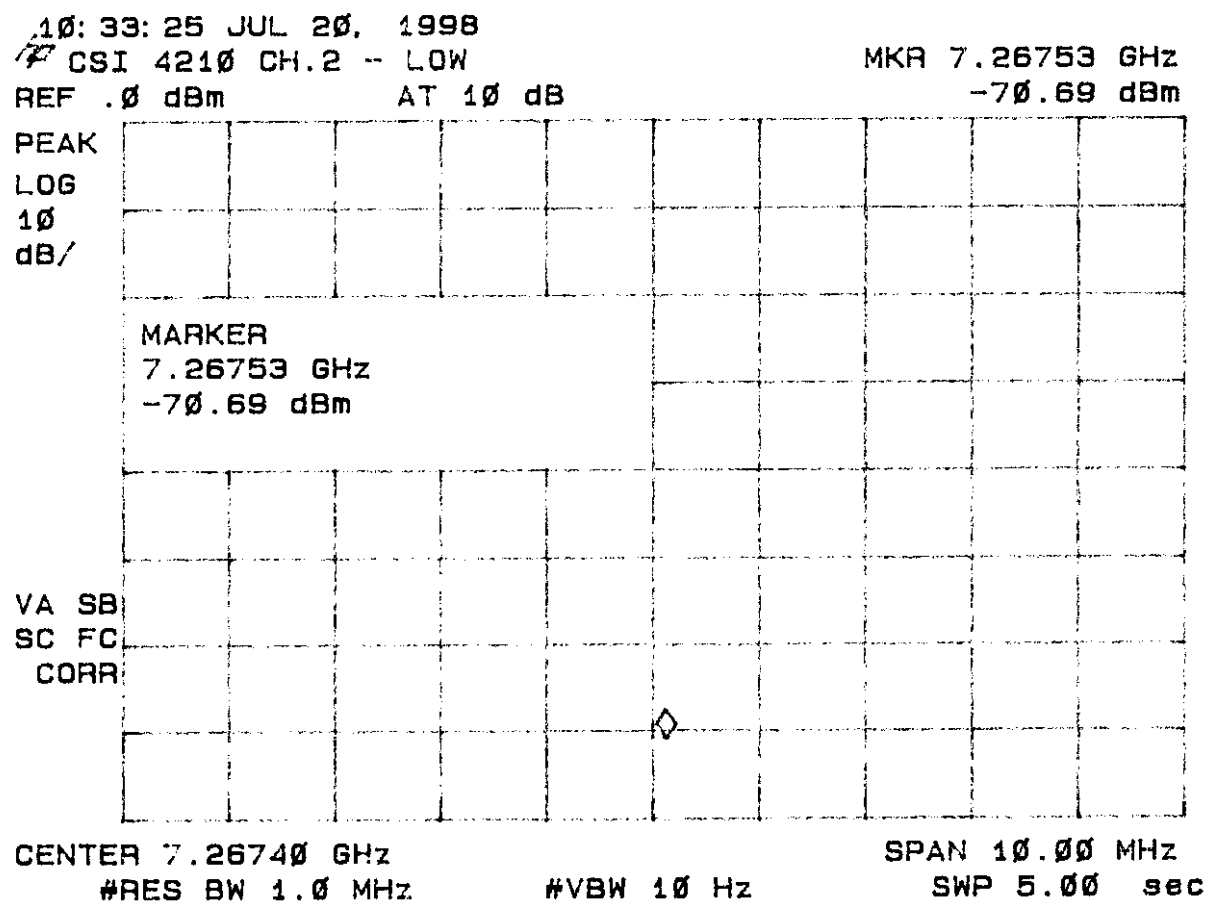
Model 4200

Figure 24A. Average Radiated Spurious Emission 15.247(c) (Low)



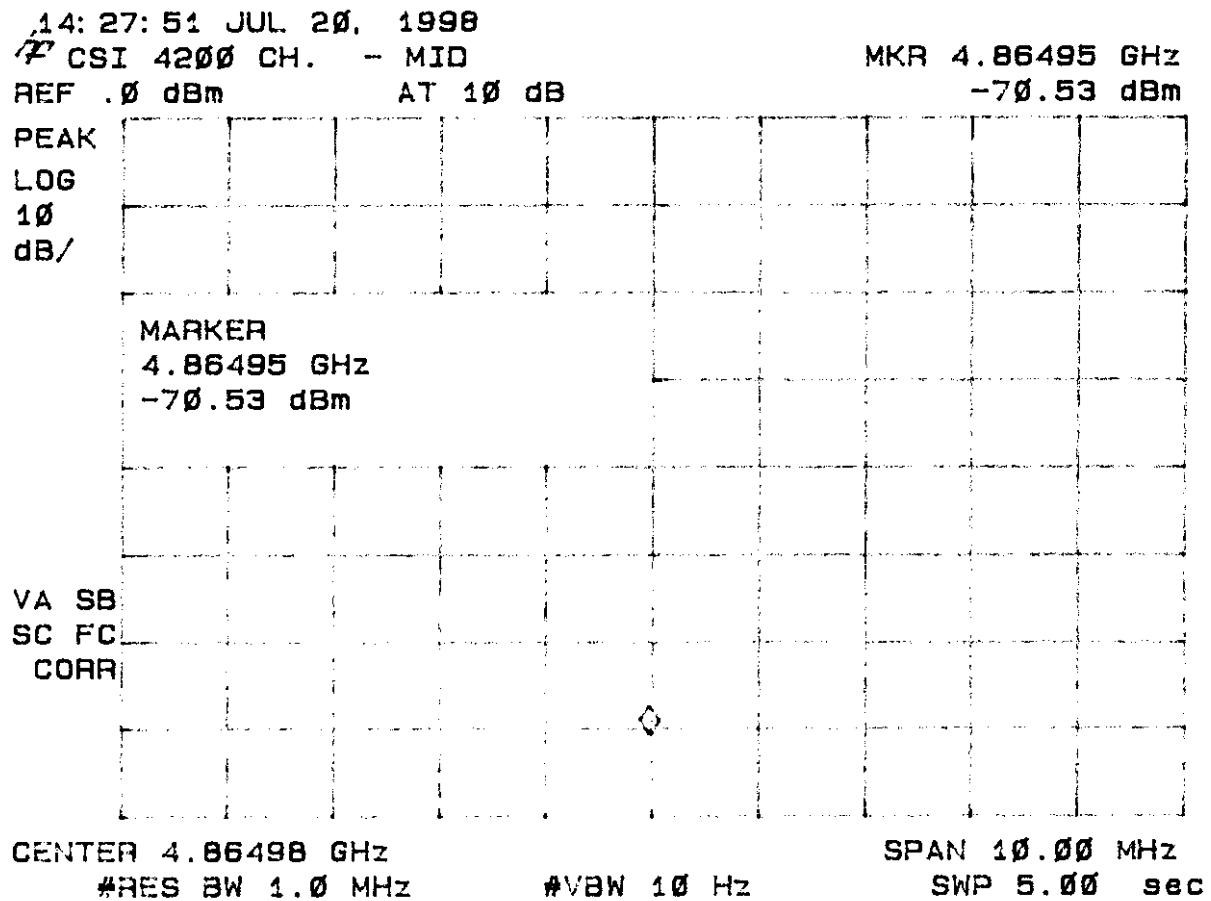
Model 4210

Figure 24B. Average Radiated Spurious Emission 15.247(c) (Low)



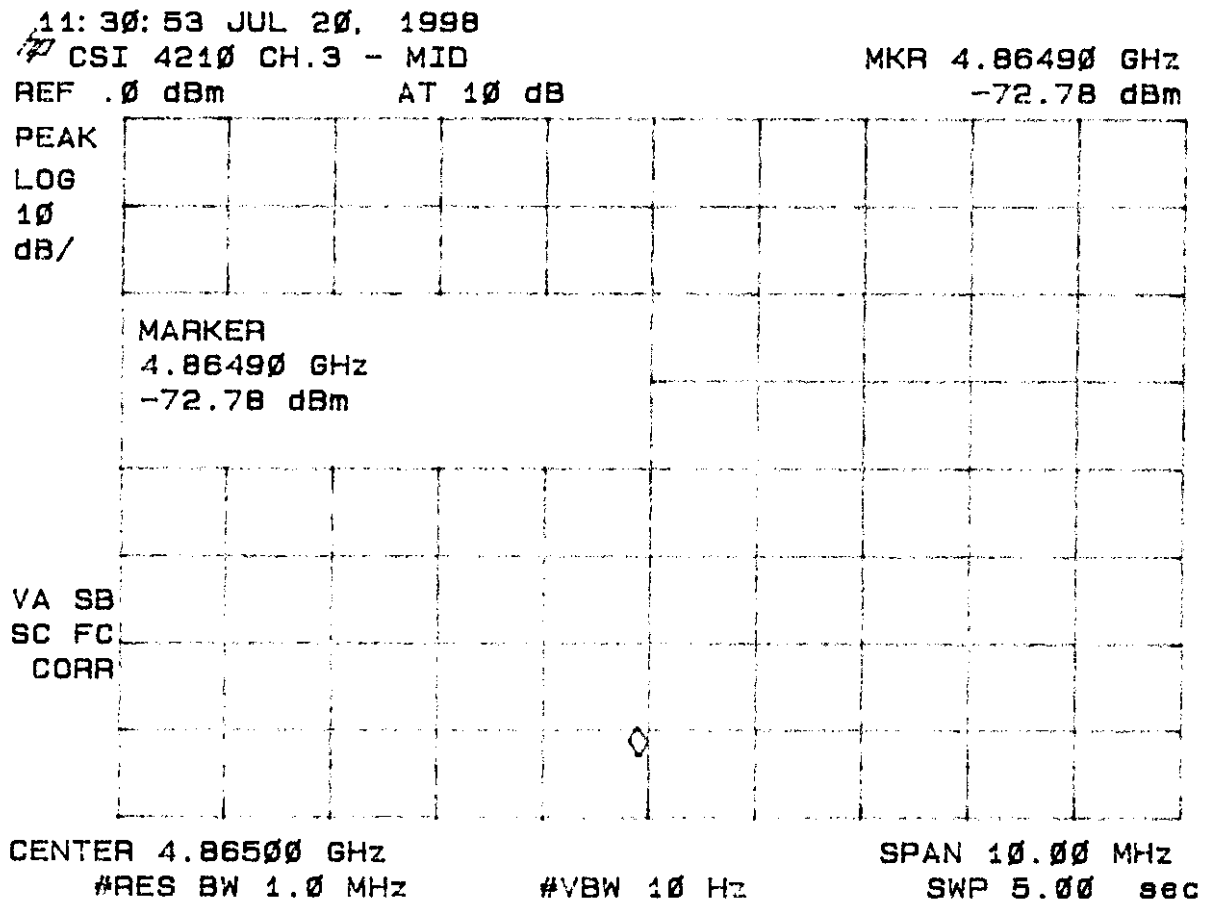
Model 4200

Figure 25A. Average Radiated Spurious Emission 15.247(c) (Mid)



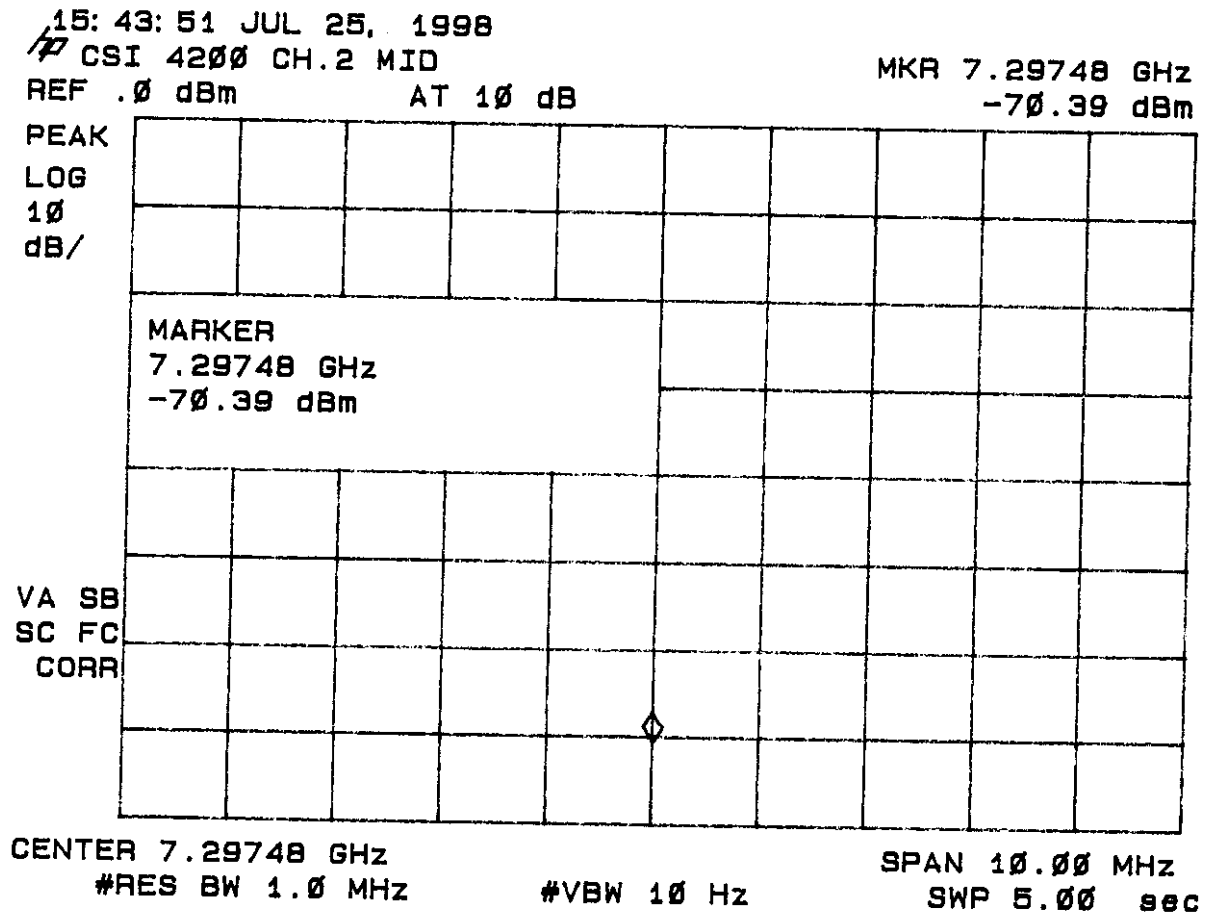
Model 4210

Figure 25B. Average Radiated Spurious Emission 15.247(c) (Mid)



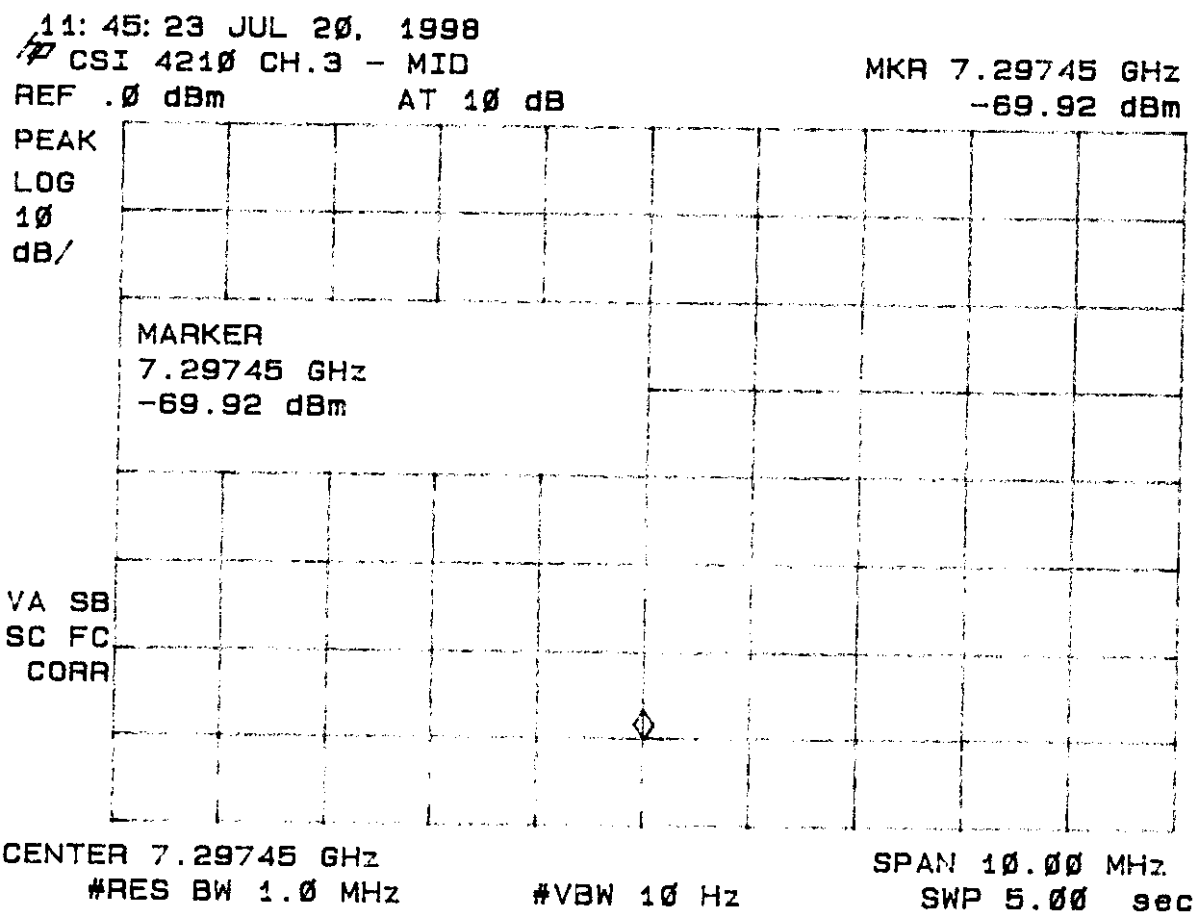
Model 4200

Figure 26A. Average Radiated Spurious Emission 15.247(c) (Mid)



Model 4210

Figure 26B. Average Radiated Spurious Emission 15.247(c) (Mid)



Model 4200

Figure 27A. Average Radiated Spurious Emission 15.247(c) (High)

15: 25: 03 JUL 25, 1998

CSI 4200 CH.5 HIGH

MKR 4.90495 GHz

REF .0 dBm

AT 10 dB

-62.60 dBm

PEAK

LOG

10

dB/

MARKER
4.90495 GHz
-62.60 dBm

VA SB
SC FC
CORR

CENTER 4.90500 GHz

#RES BW 1.0 MHz

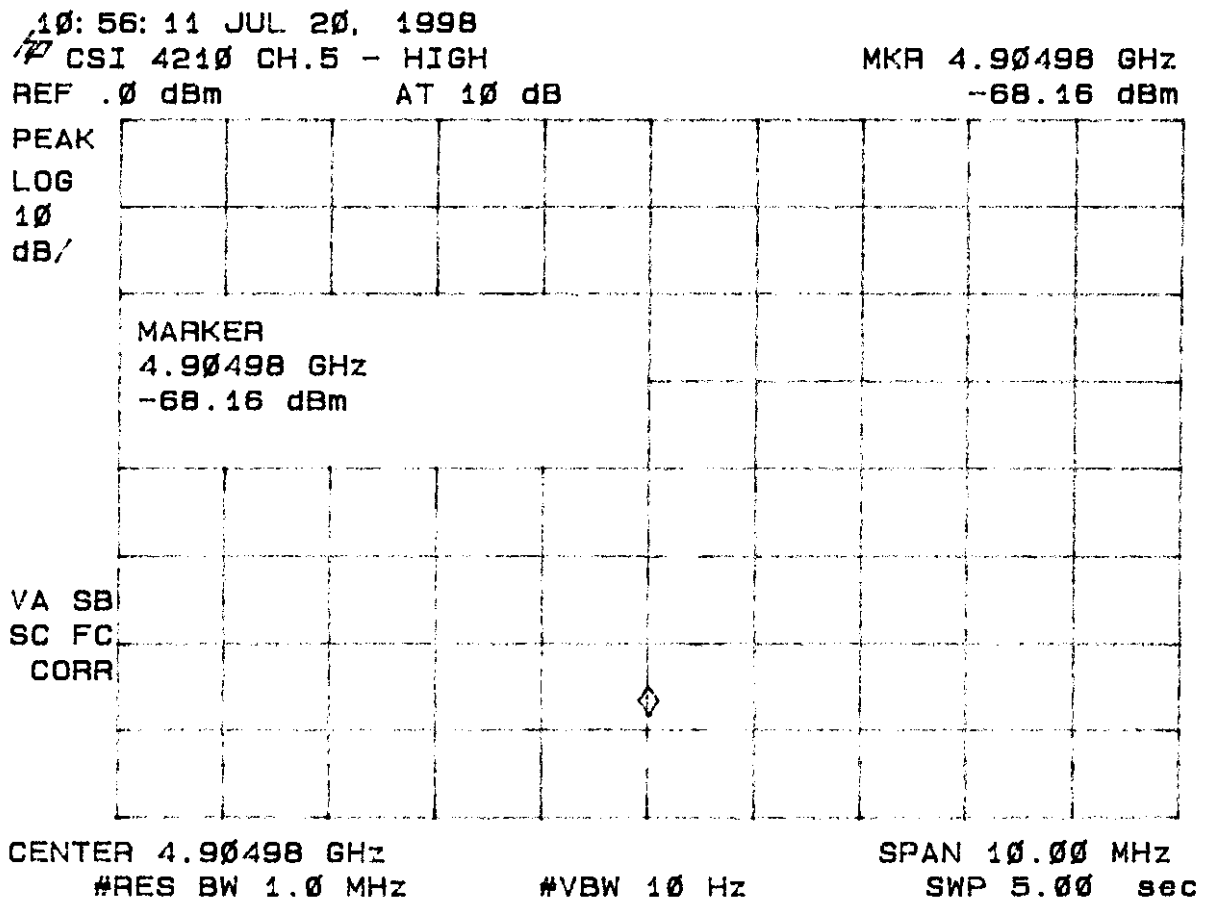
#VBW 10 Hz

SPAN 10.00 MHz

SWP 5.00 sec

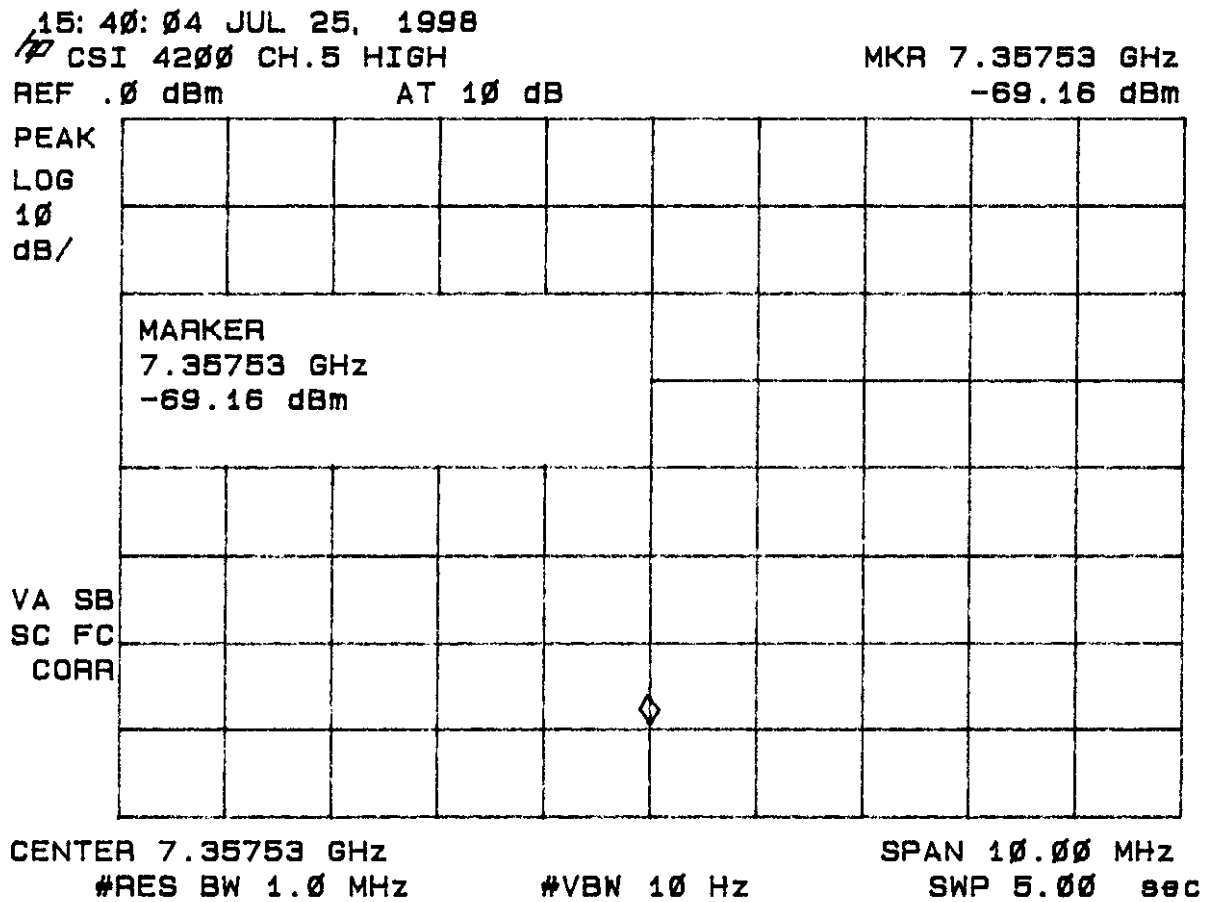
Model 4210

Figure 27B. Average Radiated Spurious Emission 15.247(c) (High)



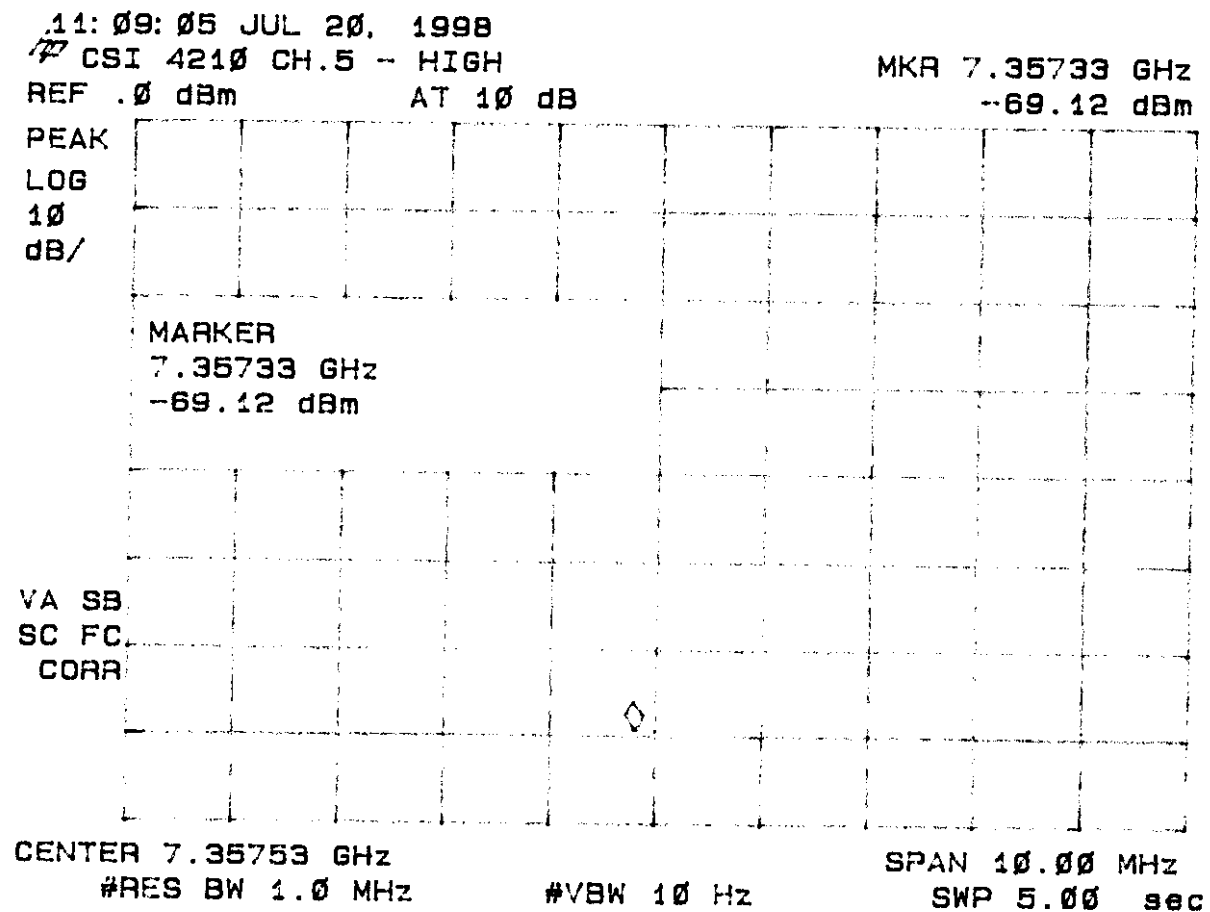
Model 4200

Figure 28A. Average Radiated Spurious Emission 15.247(c) (High)



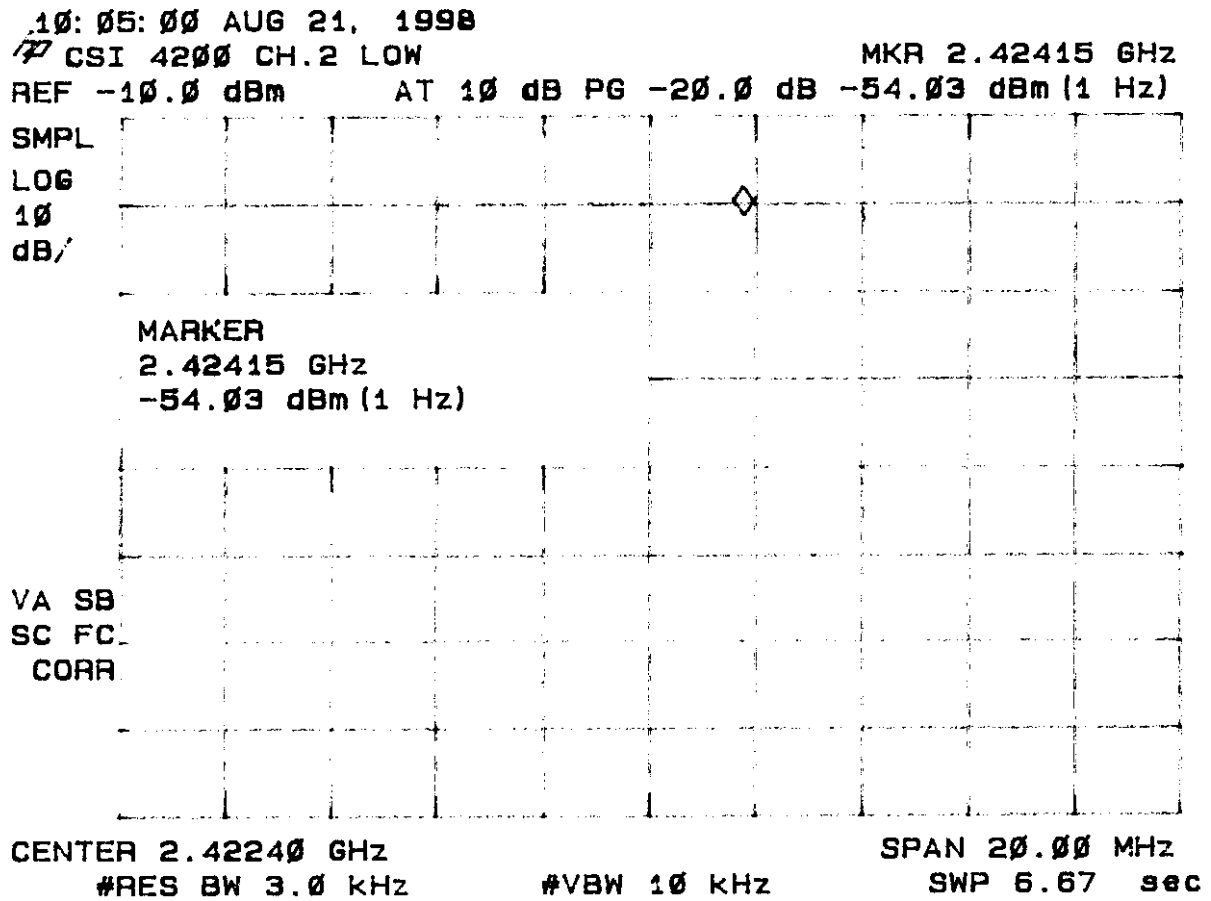
Model 4210

Figure 28B. Average Radiated Spurious Emission 15.247(c) (High)

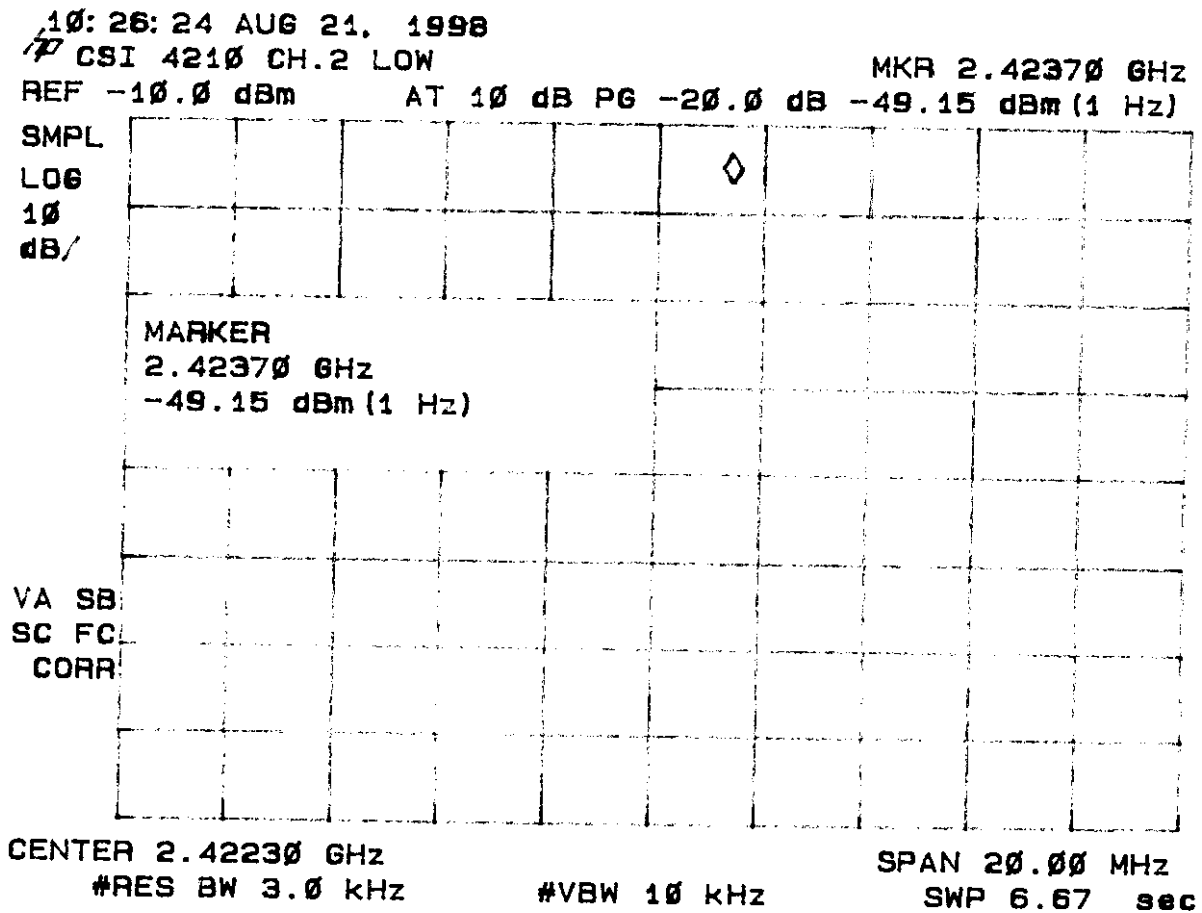


Model 4200

Figure 29A. Power Density 15.247(c) (Low)



Model 4210
Figure 29B. Power Density 15.247(c) (Low)



Model 4200
Figure 30A. Power Density 15.247(c) (Mid)

10:02:05 AUG 21, 1998

CSI 4200 CH.3 MID

MKR 2.43385 GHz

REF -10.0 dBm

AT 10 dB PG -20.0 dB -52.81 dBm (1 Hz)

SMPL

LOG

10

dB/

MARKER

2.43385 GHz

-52.81 dBm (1 Hz)

VA SB

SC FC

CORR

CENTER 2.43260 GHz

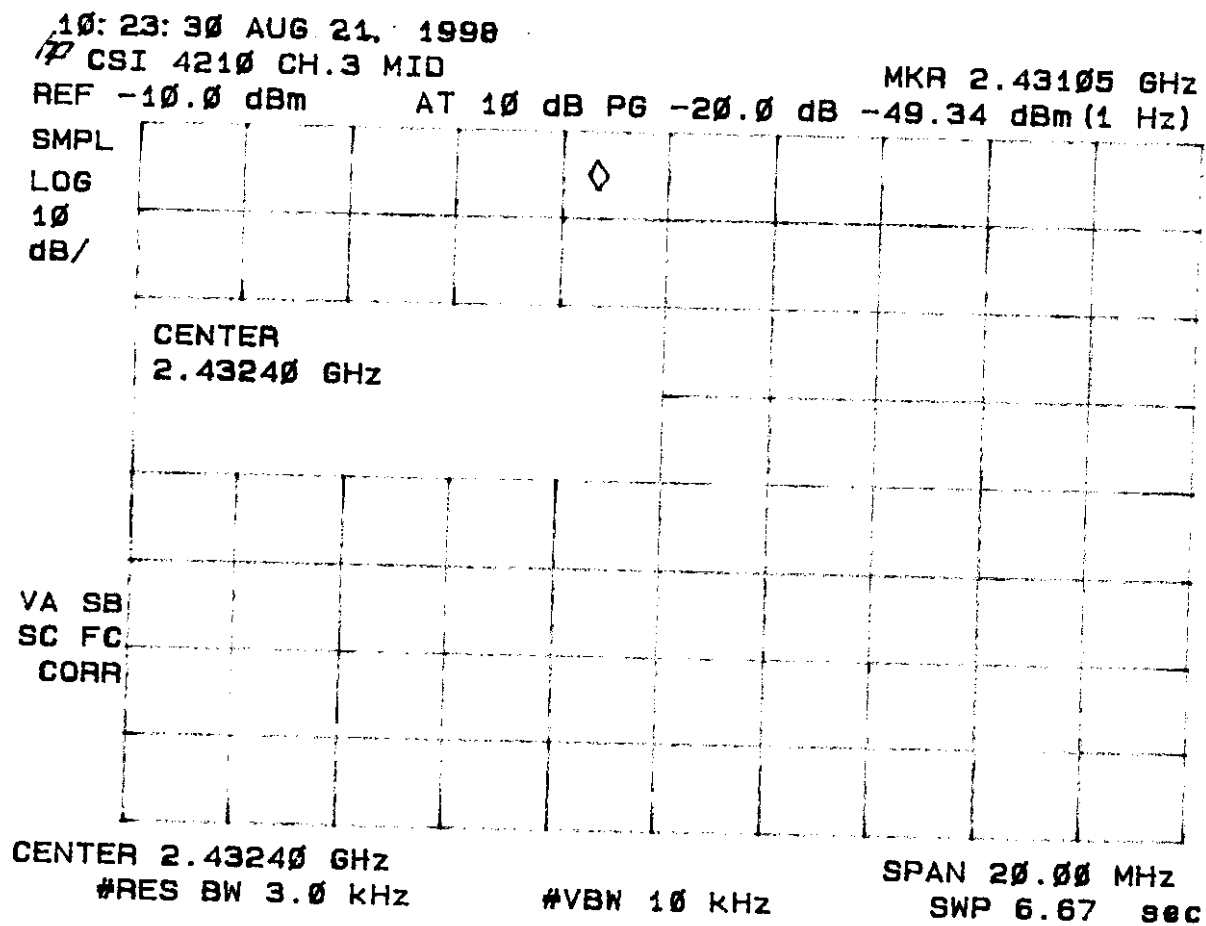
#RES BW 3.0 kHz

#VBW 10 kHz

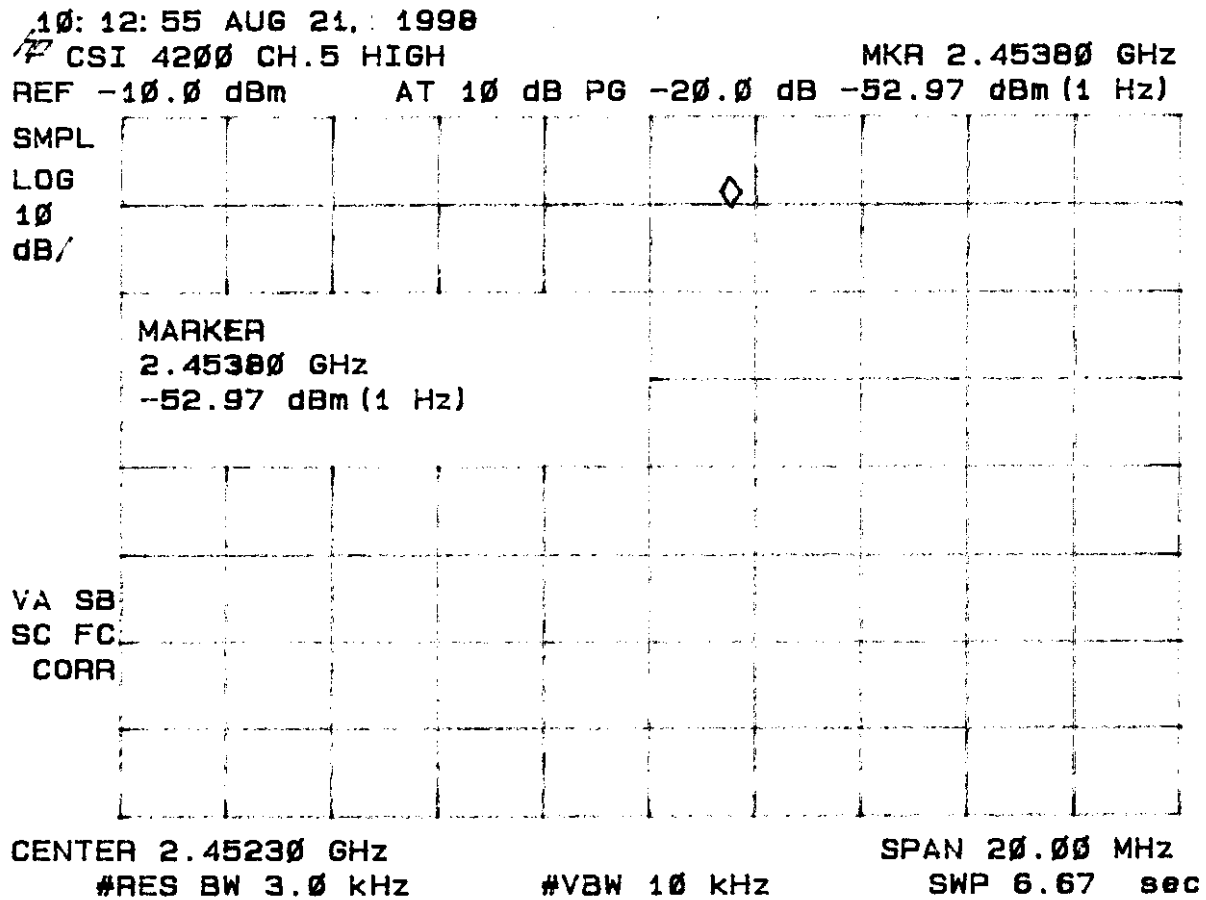
SPAN 20.00 MHz

SWP 6.67 sec

Model 4210
Figure 30B. Power Density 15.247(c) (Mid)



Model 4200
Figure 31A. Power Density 15.247(c) (High)



Model 4210
Figure 31B. Power Density 15.247(c) (High)

10:19:51 AUG 21, 1998

CSI 4210 CH.5 HIGH

MKR 2.44960 GHz

REF -10.0 dBm

AT 10 dB PG -20.0 dB -51.34 dBm (1 Hz)

SMPL

LOG

10

dB/

MARKER

2.44960 GHz

-51.34 dBm (1 Hz)

VA SB

SC FC

CORR

CENTER 2.45230 GHz

#RES BW 3.0 kHz

#VBW 10 kHz

SPAN 20.000 MHz

SWP 6.67 sec

Model 4200
Figure 32A. Band Edge Emissions 15.247(c)

16:16:22 AUG 31, 1998

CSI 4200 CH.2 LOW

MKR 2.39000 GHz

REF -20.0 dBm AT 10 dB

-72.36 dBm

PEAK

LOG

10

dB/

MARKER
2.39000 GHz
-72.36 dBm

VA SB

SC FC

CORR

CENTER 2.39000 GHz

#RES BW 1.0 MHz

#VBW 1 MHz

SPAN 75.00 MHz

SWP 20.0 msec

Model 4210
Figure 32B. Band Edge Emissions 15.247(c)

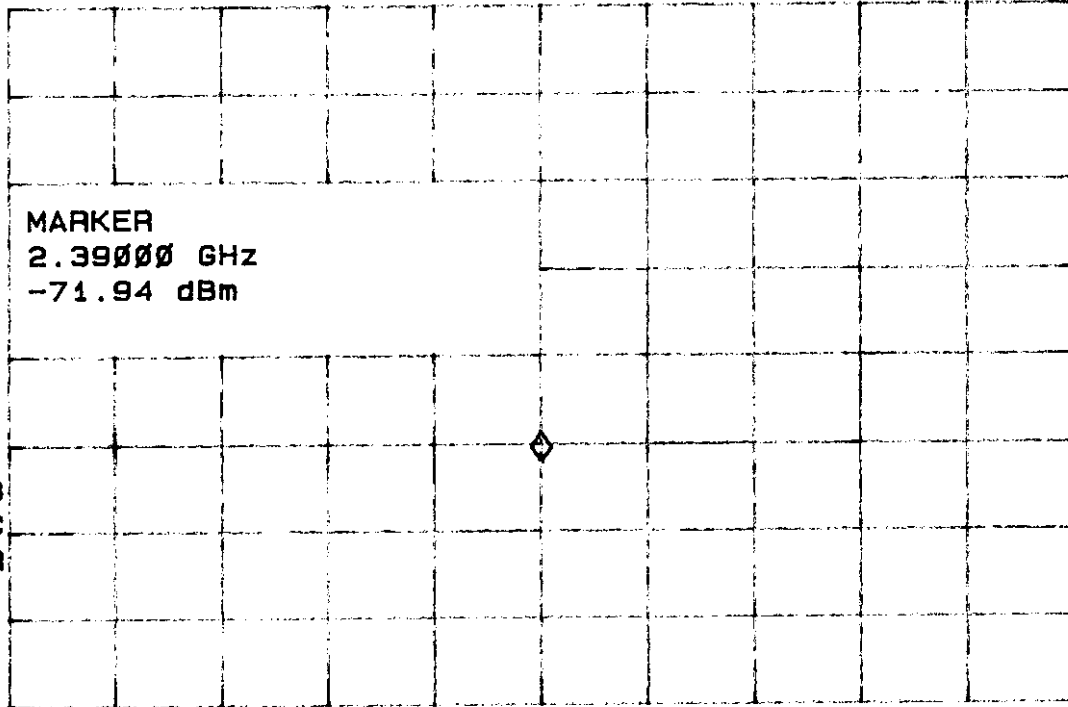
16:06:45 AUG 31, 1998

CSI 4210 CH.2 LOW

MKR 2.39000 GHz

REF -20.0 dBm AT 10 dB

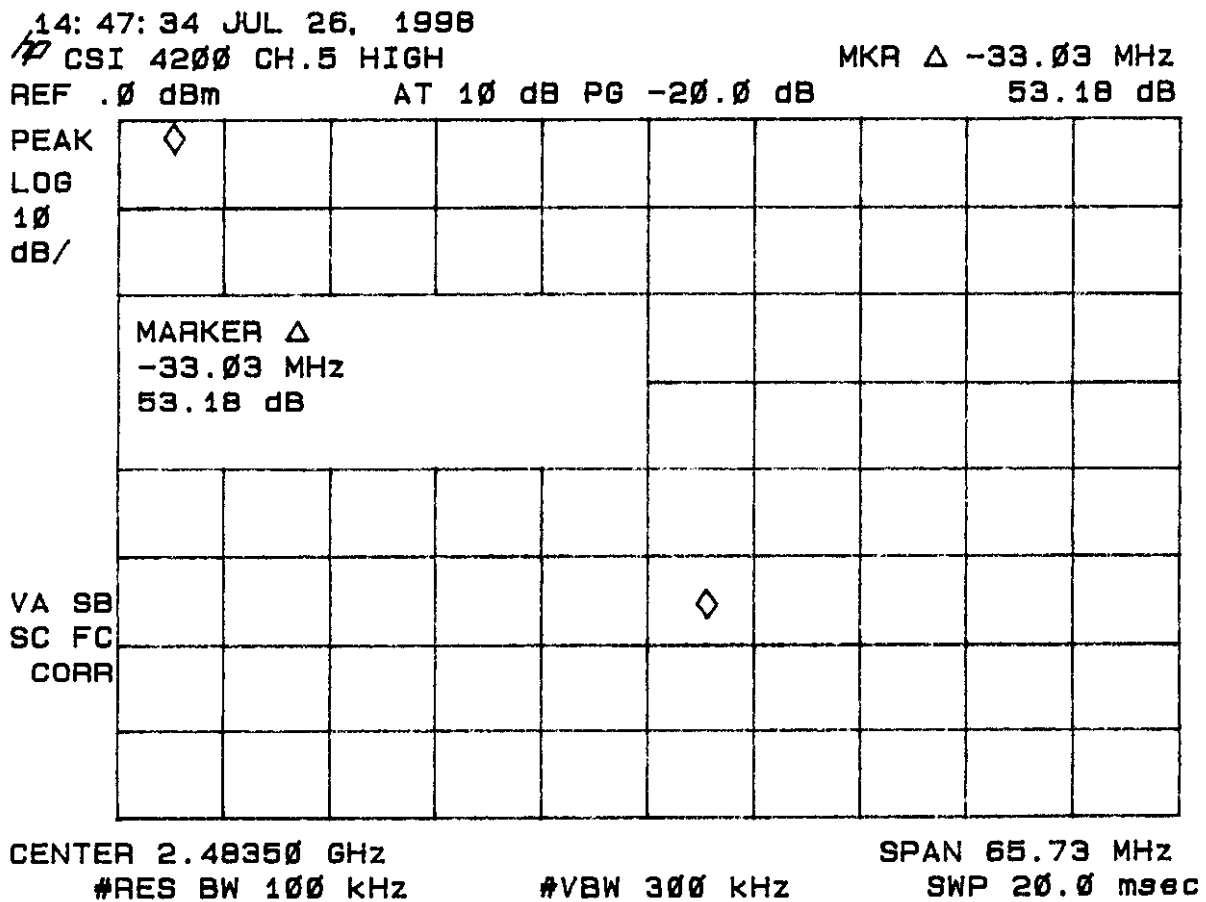
-71.94 dBm

PEAK
LOG
10
dB/VA SB
SC FC
CORRCENTER 2.39000 GHz
#RES BW 1.0 MHz

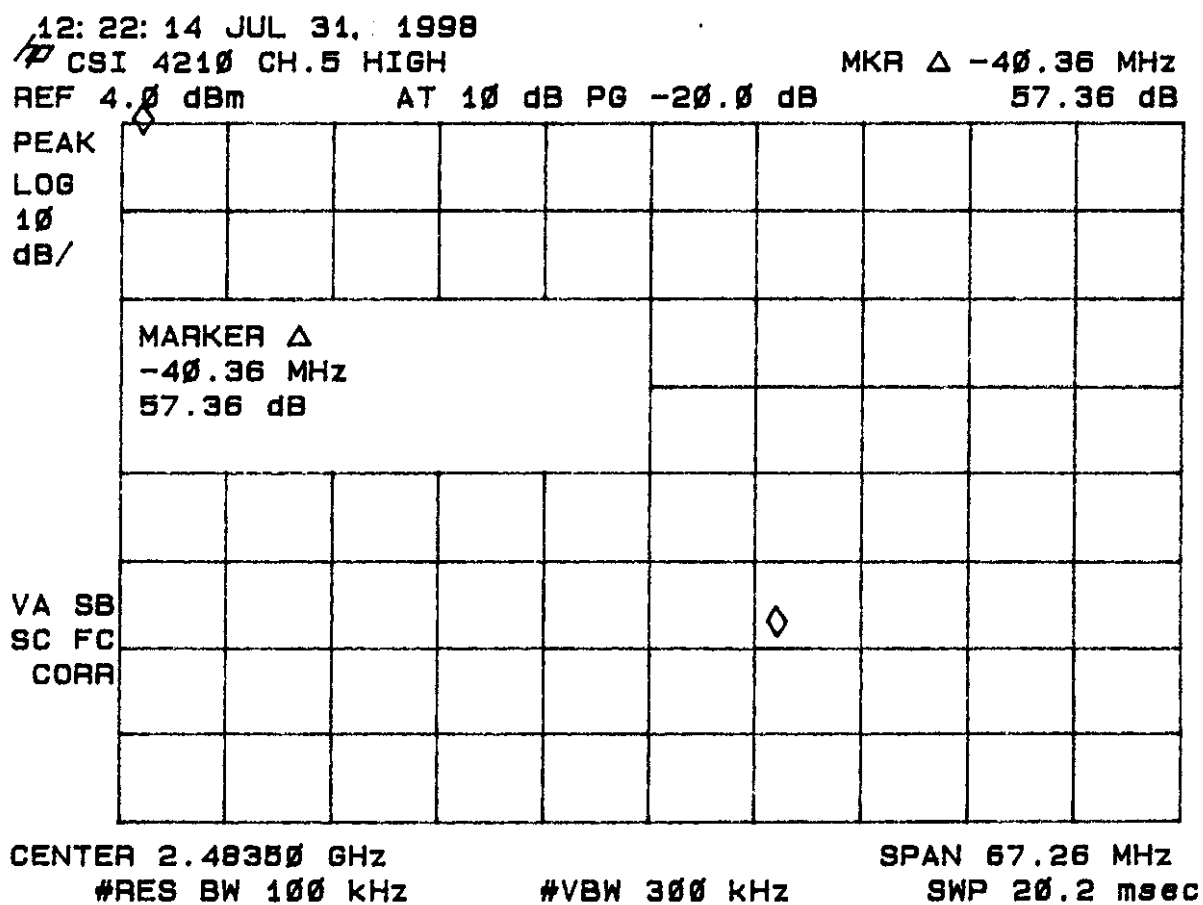
#VBW 1 MHz

SPAN 75.00 MHz
SWP 20.0 msec

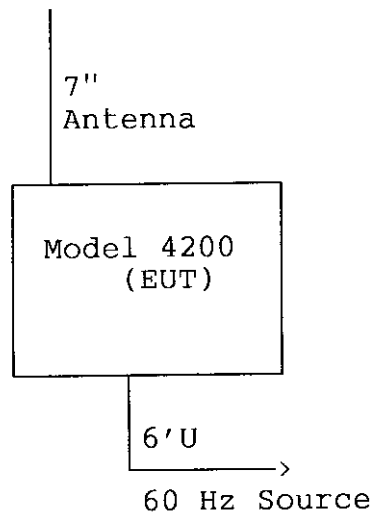
Model 4200
Figure 33A. band Edge Emissions 15.247(c)



Model 4210
Figure 33B. band Edge Emissions 15.247(c)



**FIGURE 34A. Test Set-up
Model 4200**



**FIGURE 34B. Test Set-up
Model 4210**

