

# **-48V SC4812T @ 800 MHz CDMA BTS FRAME**

## **TEST REPORT EXHIBIT**

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## **SECTION A**

# **SUMMARY OF RF MEASUREMENTS**

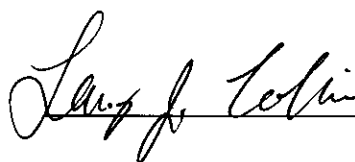
# Summary of Radiated RF Measurements

## WORST TRANSMIT RADIATED RF SPUR LEVEL FOR -48V SC4812T @ 800 MHz CDMA BTS

| SPUR<br>FREQUENCY<br>(GHz) | DISTANCE<br>MEASURED<br>(meters) | SPUR LEVEL<br>MEASURED<br>(dBμV/meter) | SPUR LEVEL<br>MEASURED<br>(dBm) | FCC MAX<br>LIMIT dBm |
|----------------------------|----------------------------------|----------------------------------------|---------------------------------|----------------------|
| 1.78662                    | 3                                | 64.89                                  | -30.34                          | -13                  |

FCC Max. Limit Per 47 CFR 22.917:

- “ =Transmitted Power ( $10 \log_{10} (P_{\text{watt}})$ ) - ( $43 + 10 \log_{10} (P_{\text{watt}})$ ) dBW
- “ = $10 \log_{10} (P_{\text{watt}})$  - ( $43 + 10 \log_{10} (P_{\text{watt}})$ ) dBW
- “ =-43 dBW
- “ =-13 dBm

 10.14.02

Radiated Engineer

Date

# Summary of Conducted RF Measurements

—48V SC4812T @ 800 MHz CDMA BTS

| SPUR LEVEL<br>MEASURED (dBm) | FREQUENCY (GHz) | SPUR LEVEL SPEC<br>(dBm Max) |
|------------------------------|-----------------|------------------------------|
| -39.15                       | 8.697000        | -13.0                        |



Conducted Engineer

10-14-02

Date



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## **SECTION B**

# **MODULATION CHARACTERISTICS**



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SECTION B

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# **MODULATION CHARACTERISTICS**

## **CDMA Transmitter Channel 1013**

### **Maximum Power**

## CDMA ANALYZER

0.9965

Time Offset

1.66

Frequency Error

-50 13.2 50

Carrier Feedthru

-44.3

Tune Freq

MHz

Input Atten

Input Port

Anl Special

Synth Ref

CDMA TB

PN Offset

Even Sec In

Meas Intvl

Gain

30 dB

Anl Dir

Analyzer

Qual Event

Tris Event

To Screen

More



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SECTION B

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# **MODULATION CHARACTERISTICS**

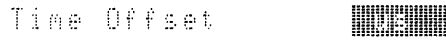
## **CDMA Transmitter Channel 1013**

### **Mid Power**

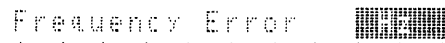
CDMA ANALYZER



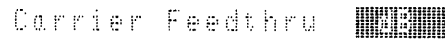
0.9966



1.66



Frequency Error  
-50 0 50  
8.9



Carrier Feedthru  
-44.8

| Tune Freq          | Synth Ref   | Meas Intvl       | Analyzer   | To Screen |
|--------------------|-------------|------------------|------------|-----------|
| 8921.000000<br>MHz | 8921.000000 | 1000000<br>ns    | RF GEN     | RF GEN    |
| Input Atten        | CDMA TB     | Gain             | RF ENV     | RF ENV    |
| 0dB                | 1000000     | 1000000<br>30 dB | RF ENV     | RF ENV    |
| Input Port         | PN Offset   | Anl Dir          | Qual Event | SCOPE     |
| RF ENV             | 1000000     | RF ENV           | RF ENV     | SPEC ANL  |
| Anl Special        | Even Sec In |                  | Tris Event | ENVELOPE  |
| RF ENV             | 1000000     |                  | RF ENV     | DECODER   |
|                    |             |                  |            | RF ENV    |
|                    |             |                  |            | More      |



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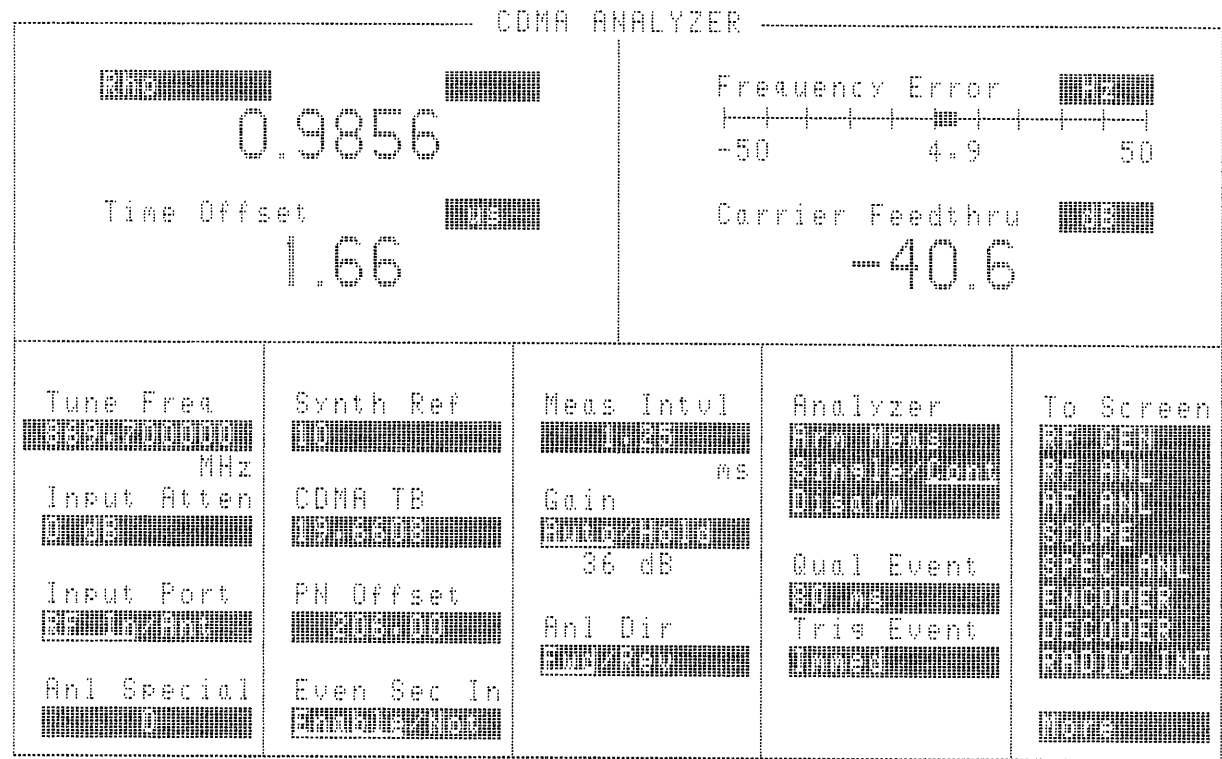
SECTION B

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# **MODULATION CHARACTERISTICS**

## **CDMA Transmitter Channel 1013**

### **Minimum Power**





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SECTION B

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# **MODULATION CHARACTERISTICS**

## **CDMA Transmitter Channel 777**

### **Maximum Power**

|                     |             |                               |            |           |
|---------------------|-------------|-------------------------------|------------|-----------|
| CDMA ANALYZER       |             |                               |            |           |
| 0.9970              |             | Frequency Error<br>-50 5.9 50 |            |           |
| Time Offset<br>1.65 |             | Carrier Feedthru<br>-40.7     |            |           |
| Tune Freq<br>MHz    | Synth Ref   | Meas Intvl<br>ns              | Analyzer   | To Screen |
| Input Atten         | CDMA TB     | Gain<br>30 dB                 | Qual Event | More      |
| Input Port          | PN Offset   | Anl Dir                       | Tris Event |           |
| Anl Special         | Even Sec In |                               |            |           |



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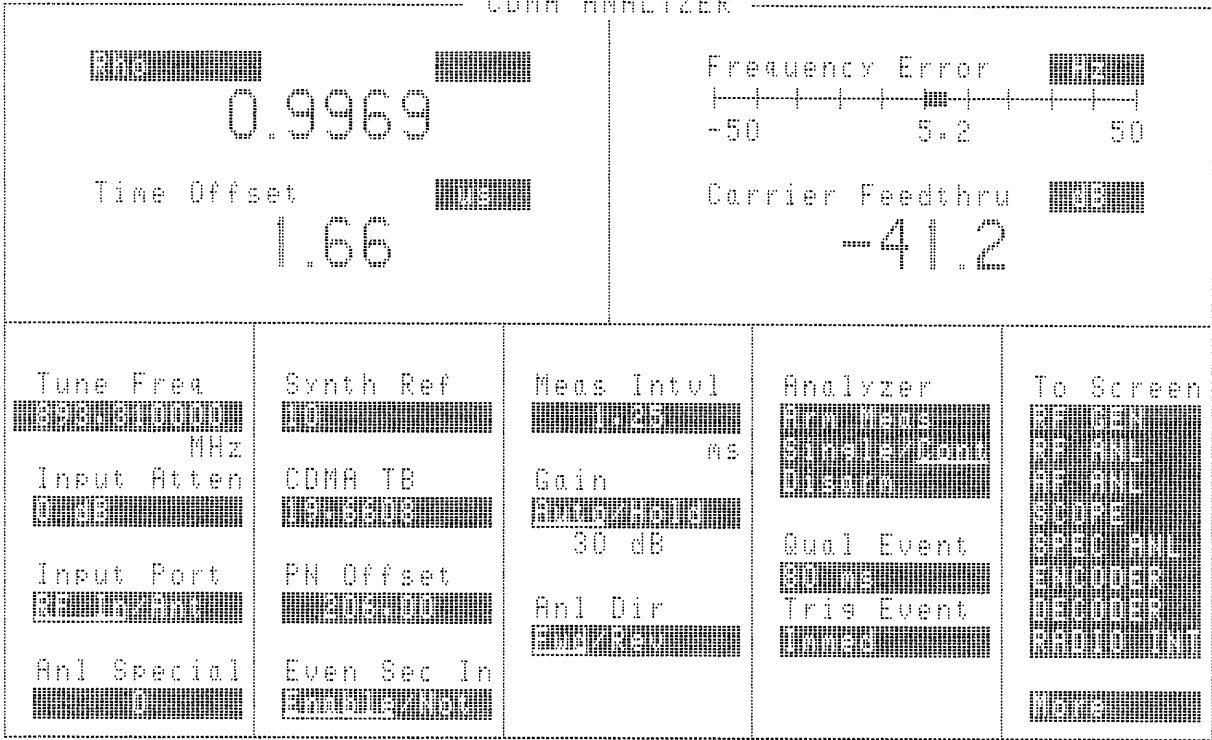
SECTION B

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# **MODULATION CHARACTERISTICS**

## **CDMA Transmitter Channel 777**

### **Mid Power**





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# **MODULATION CHARACTERISTICS**

## **CDMA Transmitter Channel 777**

### **Minimum Power**

## CDMA ANALYZER

RF:

0.9868

Time Offset

1.65

Frequency Error



Carrier Feedthru

-39.8

Tune Freq

888.000000

MHz

Input Atten

0 dB

Input Port

EXT/INT

Anl Special

0

Synth Ref

15

CDMA TB

15.8808

PN Offset

808.08

Even Sec In

808.08

Meas Intvl

1.00

ms

Gain

36 dB

Anl Dir

Aver

Analyzer

Fv. Type

Single/Tone

Display

Qual Event

80 ms

Tris Event

100 ms

To Screen

RF Freq

RF Freq

RF Freq

RF Freq

SCOPE

SPECT ANL

ENCODER

DECODER

RADIO UNIT

None



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## **SECTION C**

# **SPURIOUS & HARMONIC EMISSIONS RADIATED**

# Radiated RF Measurements

## WORST RADIATED RF SPUR LEVELS FOR -48V SC4812T @ 800 MHz CDMA BTS

| TRANSMIT CHANNEL | SPUR FREQUENCY (GHz) | MEASURED SIGNAL LEVEL<br>dBuV/meter | MEASURED Signal Level (dBm) | FCC, Part 22 MAX LIMIT (dBm) |
|------------------|----------------------|-------------------------------------|-----------------------------|------------------------------|
| 1013V<br>1013H   | 1.7394<br>2.609      | 63.513<br>63.46                     | -31.72<br>-31.77            | -13<br>-13                   |
| 777V<br>777H     | 1.78662<br>1.78662   | 64.89<br>64.89                      | -30.34<br>-30.41            | -13<br>-13                   |

Converting dBuV/meter to dBm when Part 22 is done at 3 meters.

1.  $(\text{dBuV/M} / 20) * (\text{Inverse Log}) = \text{uV/M}$
2.  $\text{Log}(\text{uV/M} / 57735) * 20 = \text{dBm}$

Example 42.52 dBuV/m to dBm

$$(-31.72 \text{ dBuV/m} / 20) * (\text{Inverse Log}) = 63.513 \text{ uV/M}$$

$$\text{Log}(64.89 \text{ uV/m} / 57735) * 20 = -30.41 \text{ dBm}$$

If the test is done at 10 meters, the first formula would remain the same. The 2nd is as follows

$$\text{Log}[(\text{uV/m} * 1 / (3 * 57735) / 10)] * 20 \text{ dBm}$$

*Larry J. Collins*

10-11-02

Radiated Engineer

Date



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## **SECTION D**

# **SPURIOUS & HARMONIC EMISSIONS CONDUCTED**

**NOTE:** The plots for conducted spurious and harmonic emissions are measured in peak mode. The higher (than 49.5 dBm) levels measured in peak mode are expected, due to typical CDMA peak to average performance. The average power level was set to 49.5 dBm using an HP438A power meter.



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SECTION D

FCC ID: IHET5CR1

# **SPURIOUS & HARMONIC EMISSIONS CONDUCTED**

## **CDMA Transmitter Channel 1013**

### **Maximum Power**

13:49:58 AUG 26, 2002

~~12~~

MKR 869.700 MHz

REF 47.0 dBm

#AT 0 dB

36.31 dBm

PEAK

LOG

10

dB/

OFFST

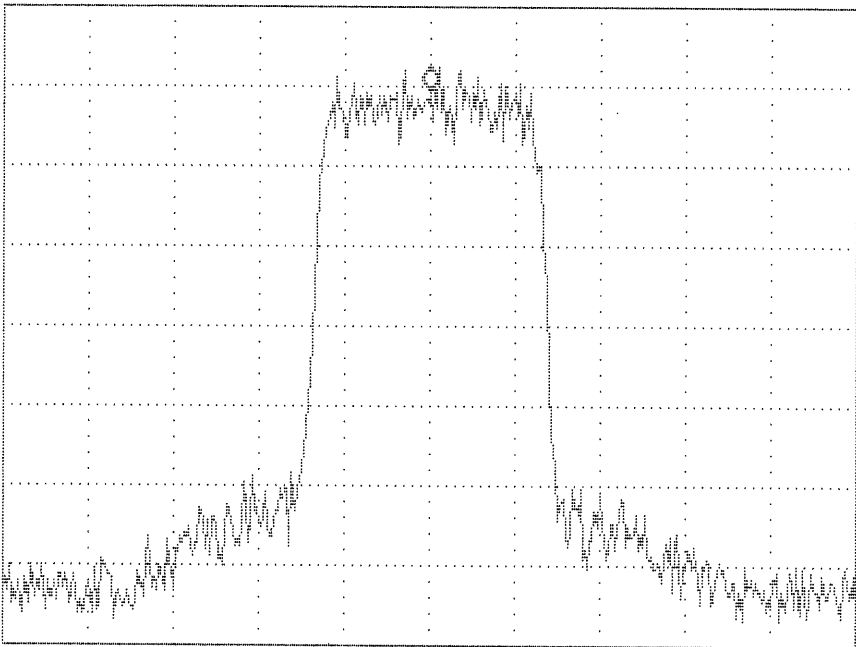
73.0

dB

WA SB

SC FC

CORR



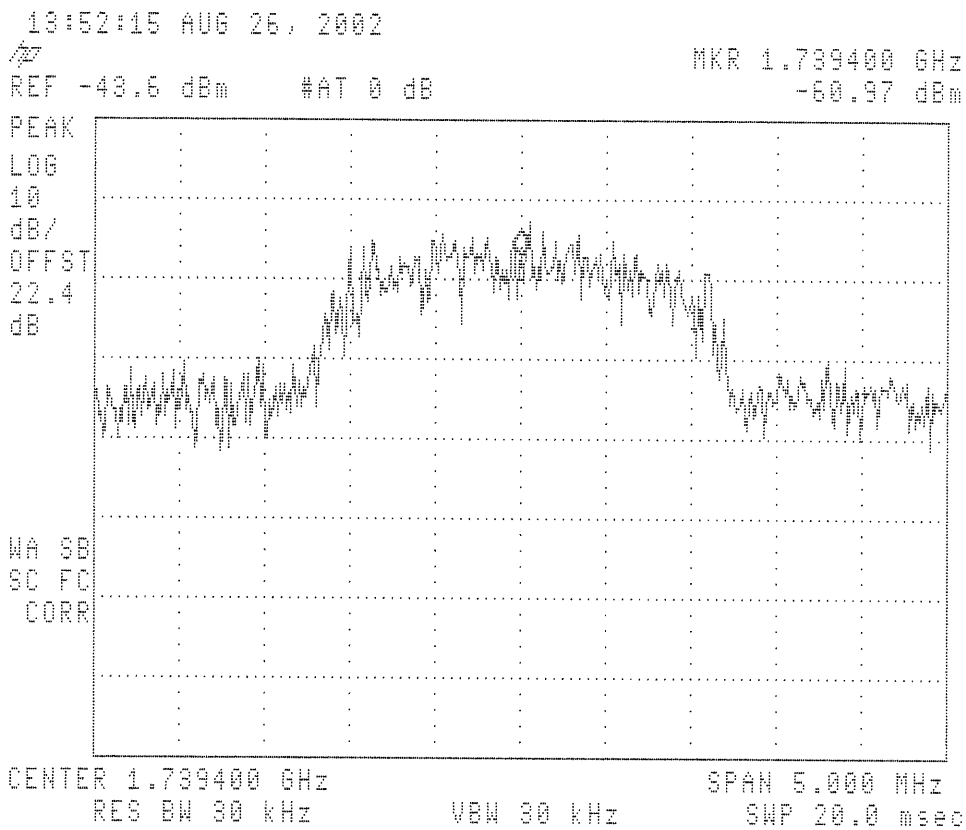
CENTER 869.700 MHz

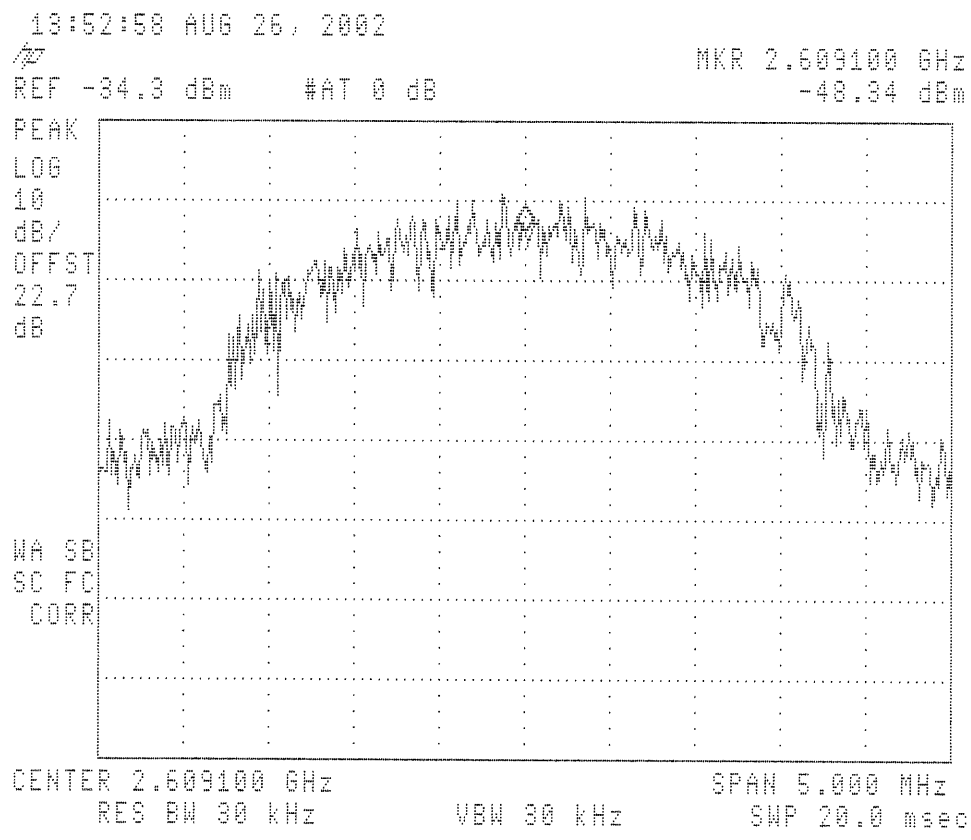
RES BW 30 kHz

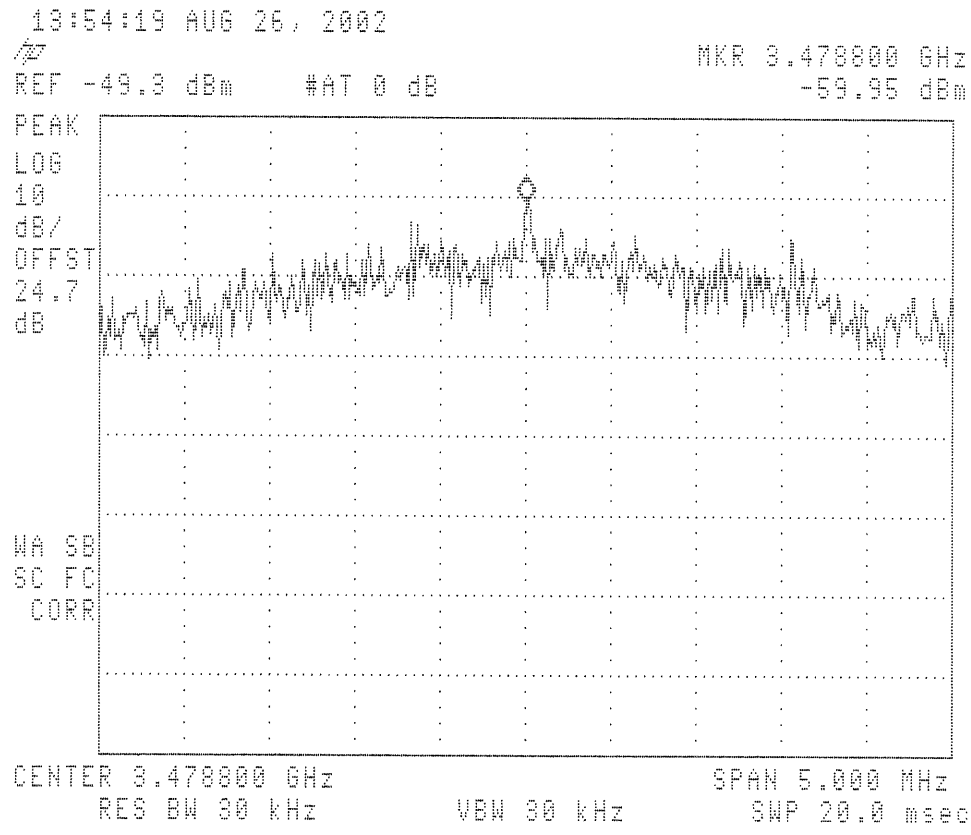
VBW 30 kHz

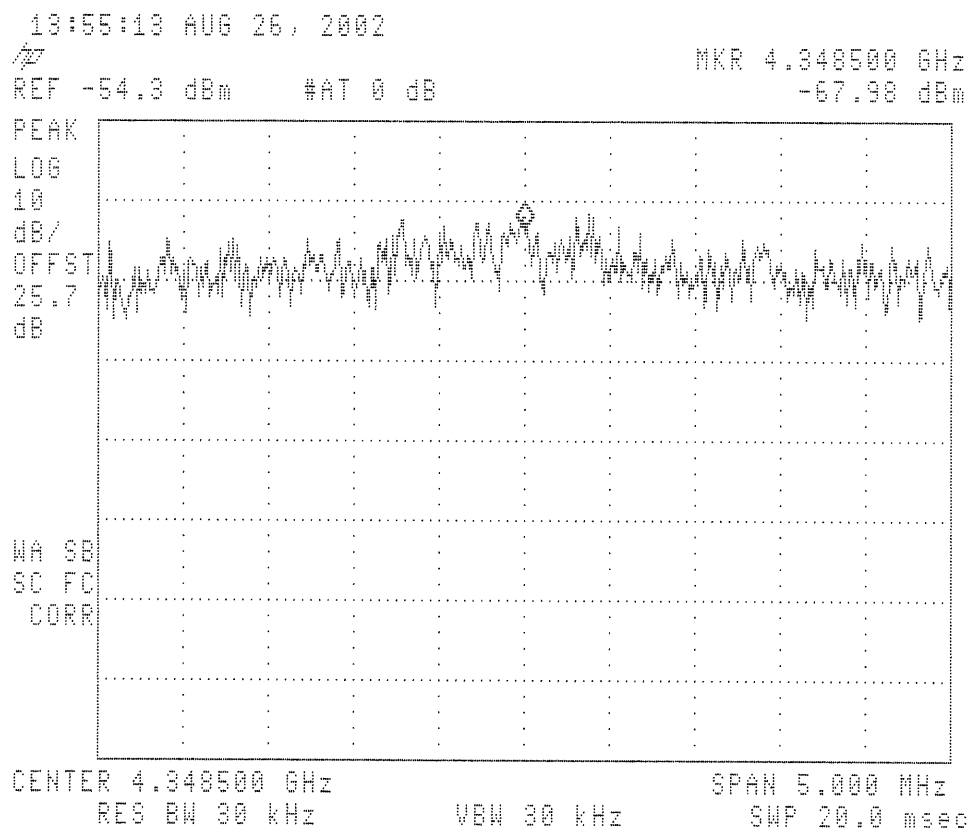
SPAN 5.000 MHz

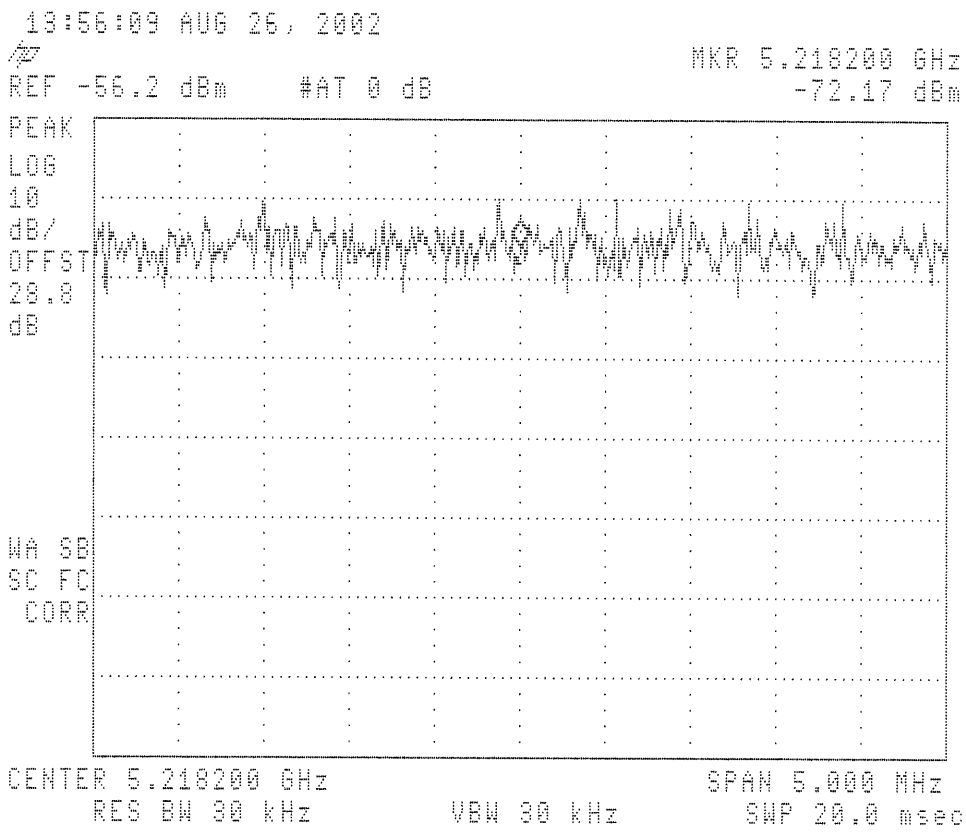
SWP 20.0 msec











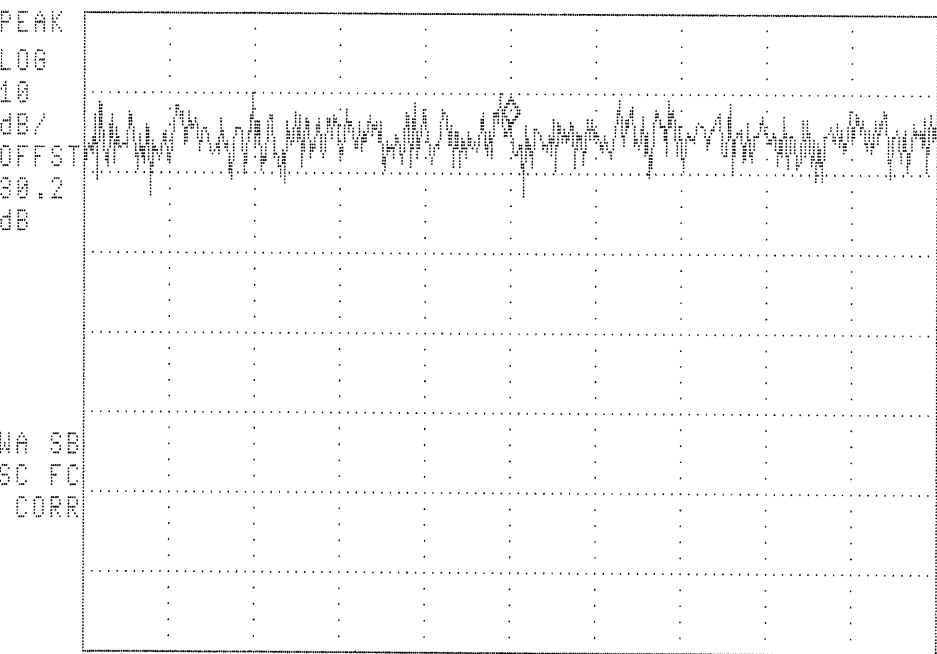
13:57:16 AUG 26, 2002



MKR 6.087900 GHz

REF -54.8 dBm #AT 0 dB

-69.06 dBm



CENTER 6.087900 GHz

SPAN 5.000 MHz

RES BW 30 kHz

VBW 30 kHz

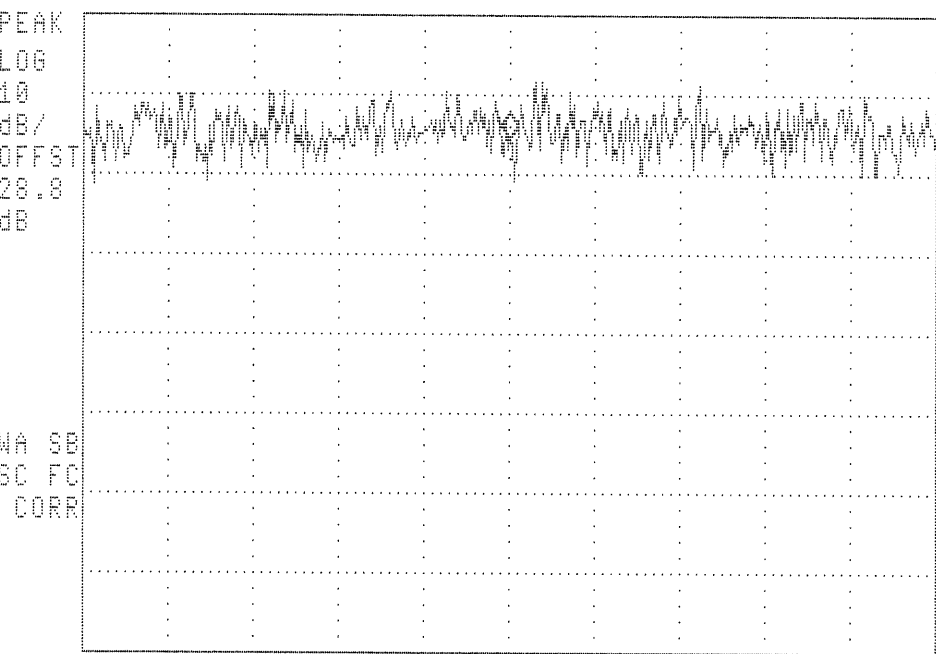
SWP 20.0 msec

13:57:59 AUG 26, 2002

~~17~~

REF -50.2 dBm #AT 0 dB

MKR 6.957600 GHz  
-64.95 dBm



CENTER 6.957600 GHz SPAN 5.000 MHz  
RES BW 30 kHz VBW 30 kHz SWP 20.0 msec

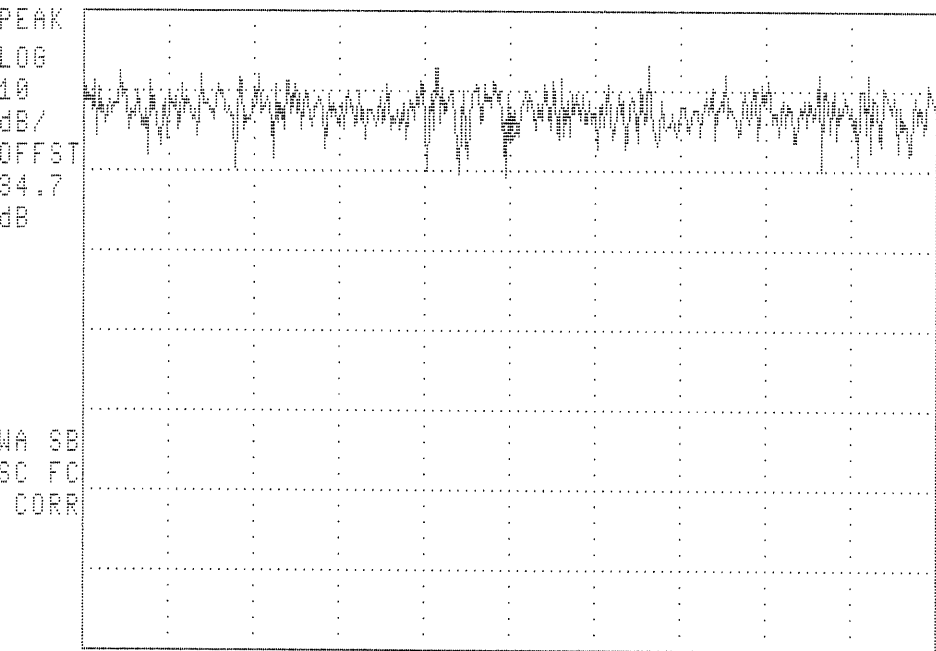
13:59:09 AUG 26, 2002

~~12~~

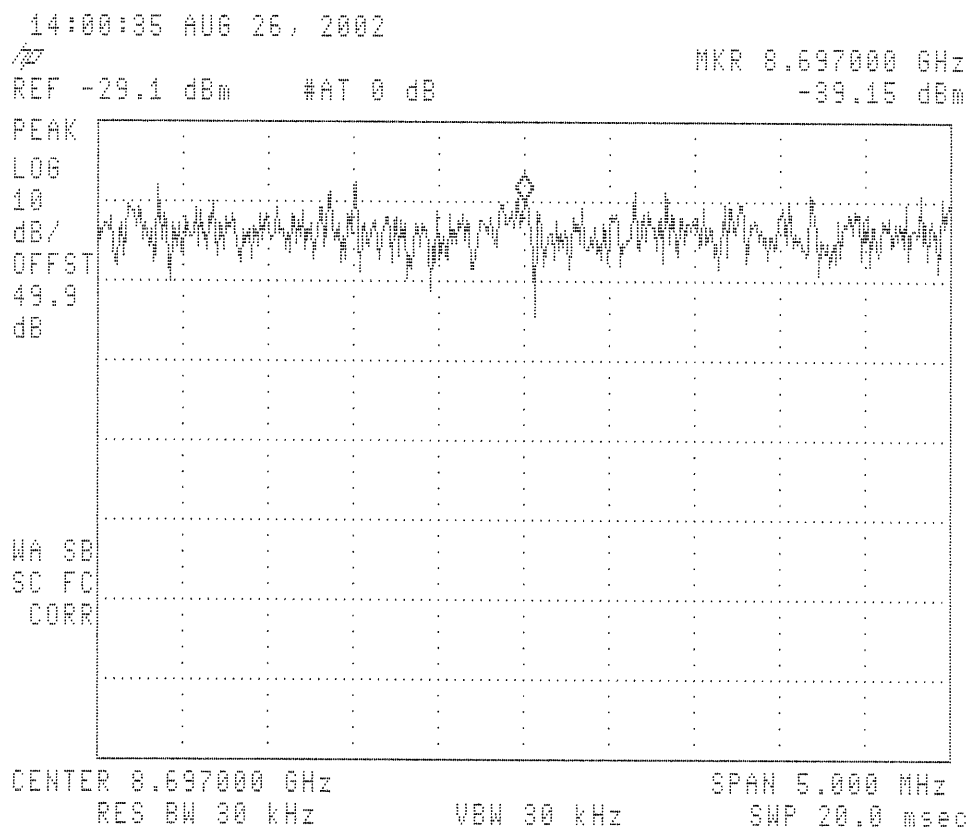
MKR 7.827300 GHz

REF -44.3 dBm #AT 0 dB

-60.84 dBm



CENTER 7.827300 GHz SPAN 5.000 MHz  
RES BW 30 kHz VBW 30 kHz SWP 20.0 msec





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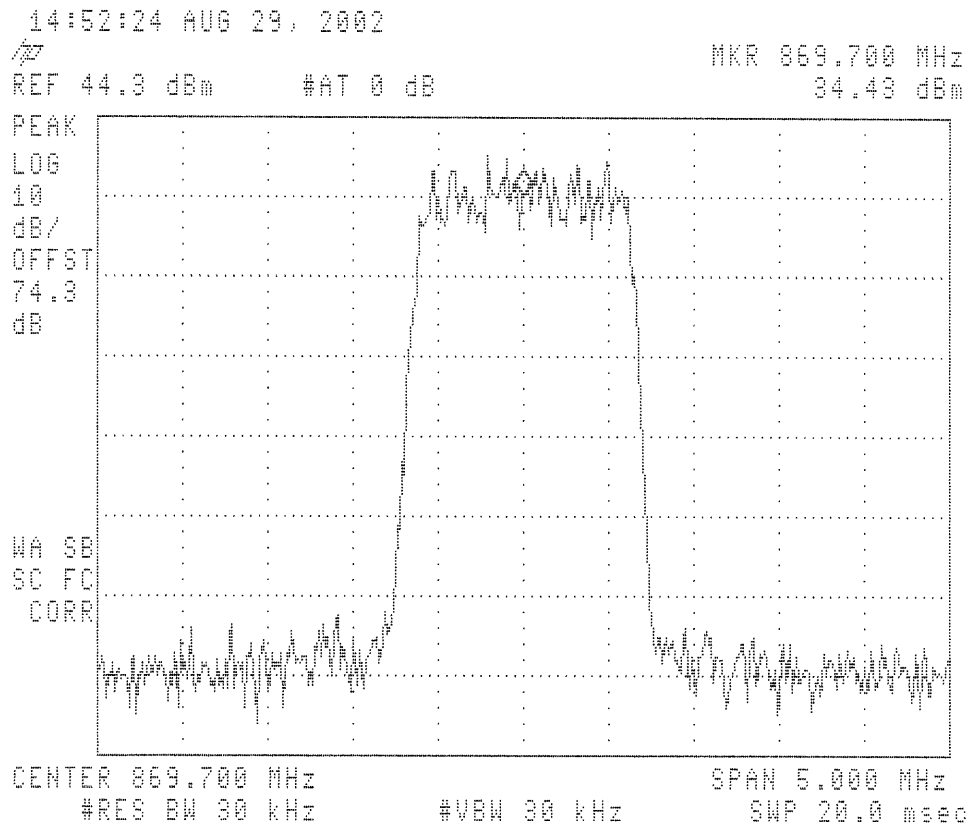
SECTION D

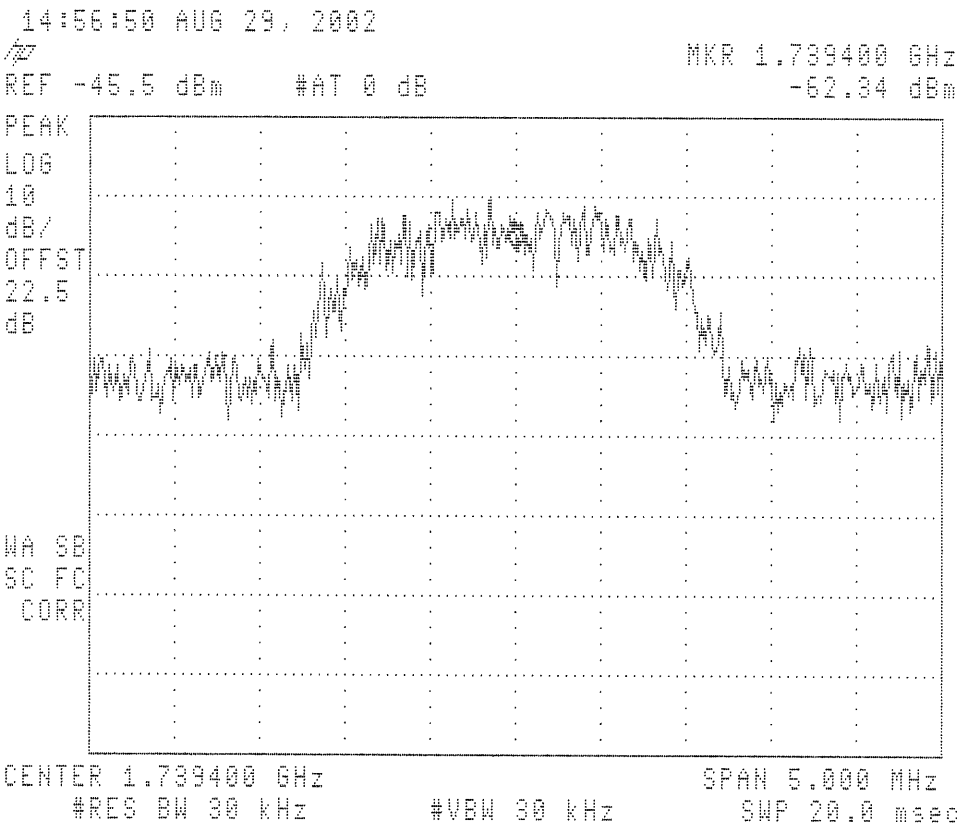
FCC ID: IHET5CR1

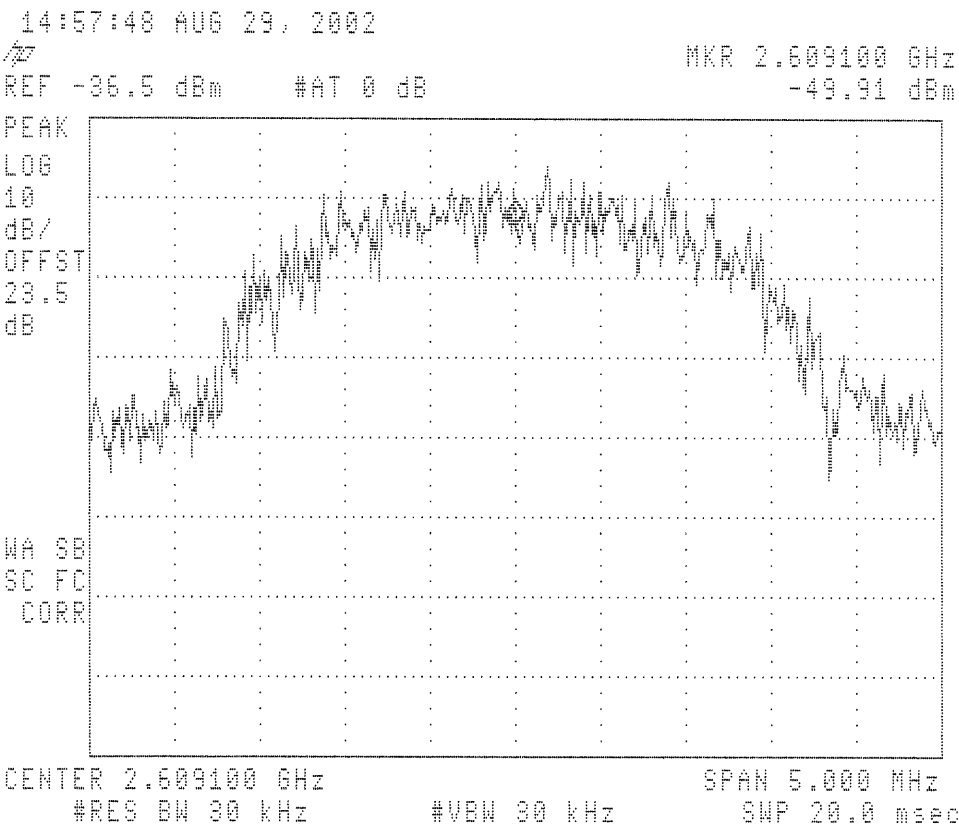
# **SPURIOUS & HARMONIC EMISSIONS CONDUCTED**

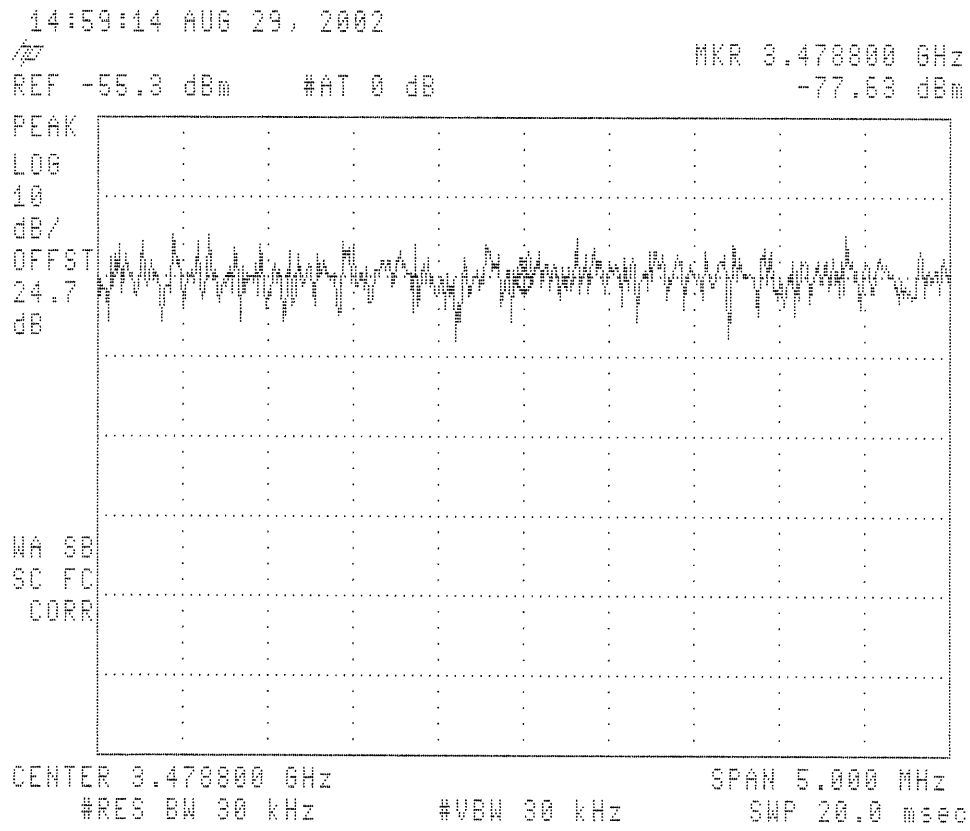
## **CDMA Transmitter Channel 1013**

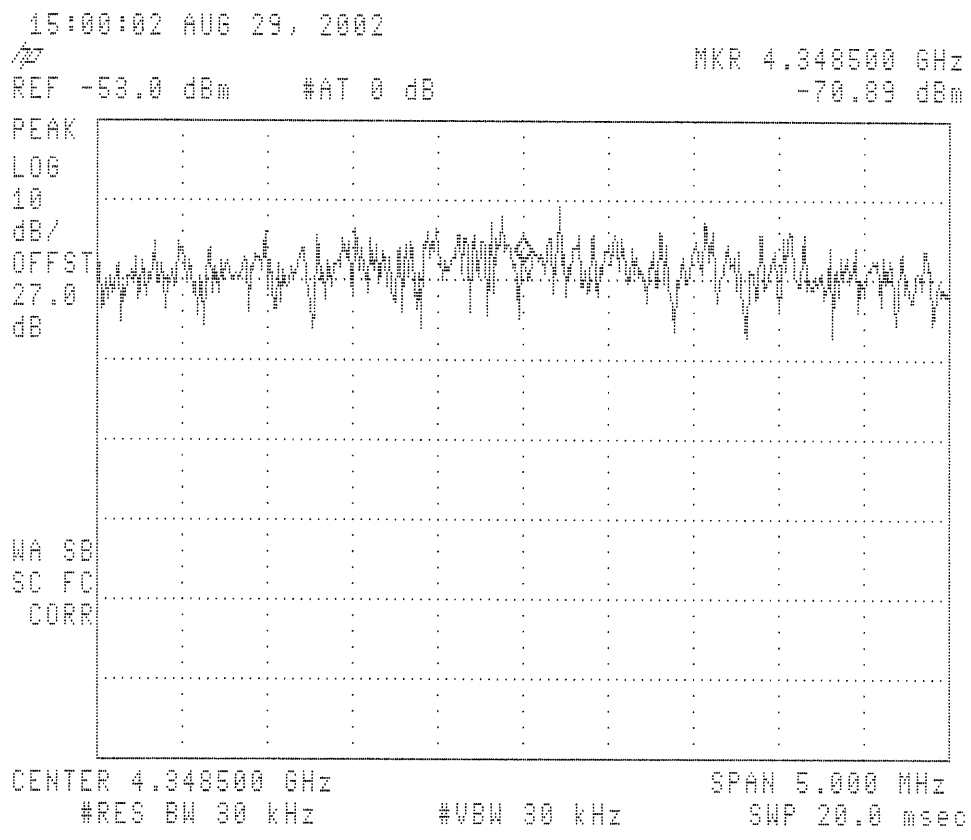
### **Mid Power**

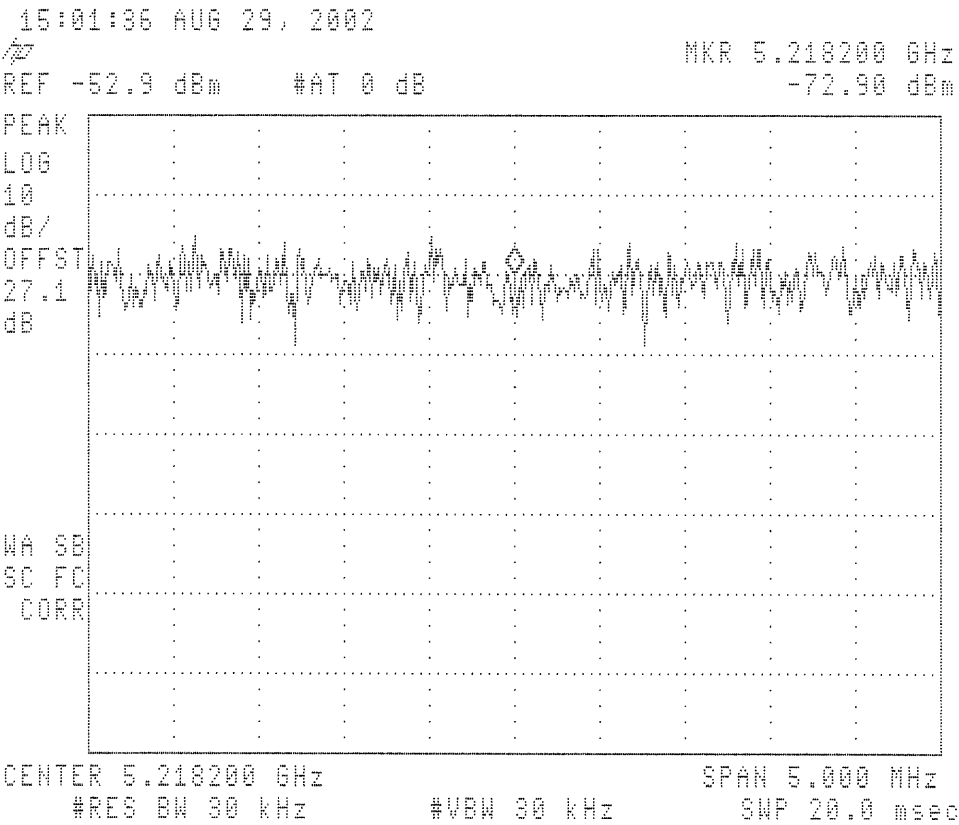


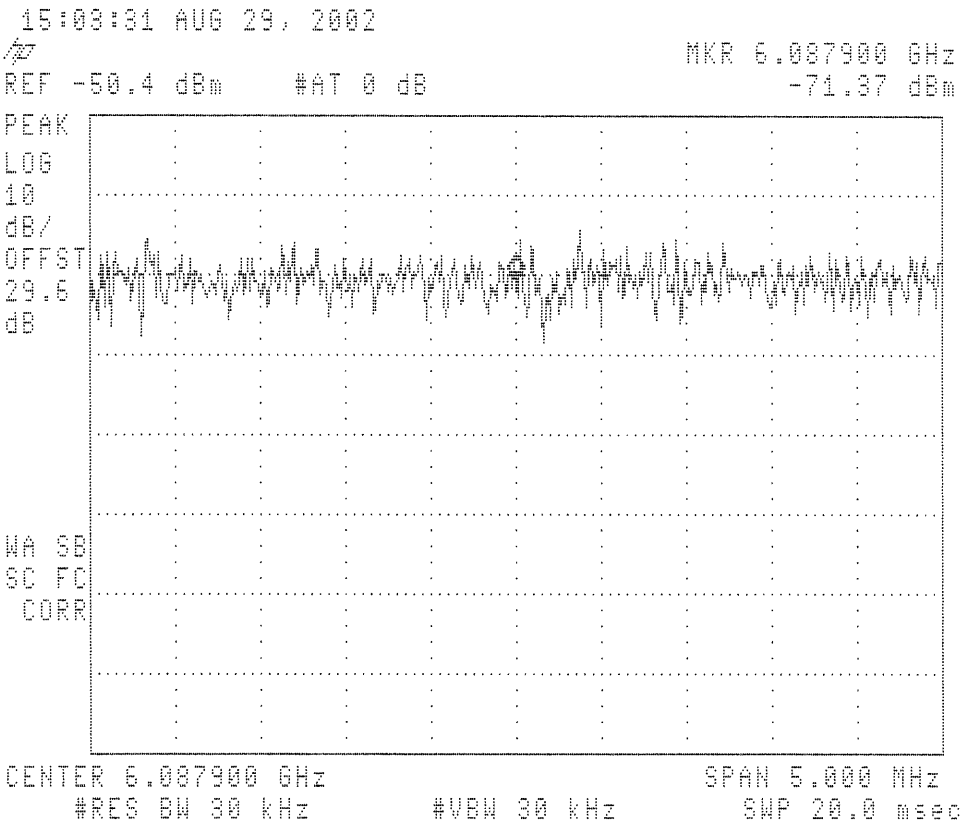


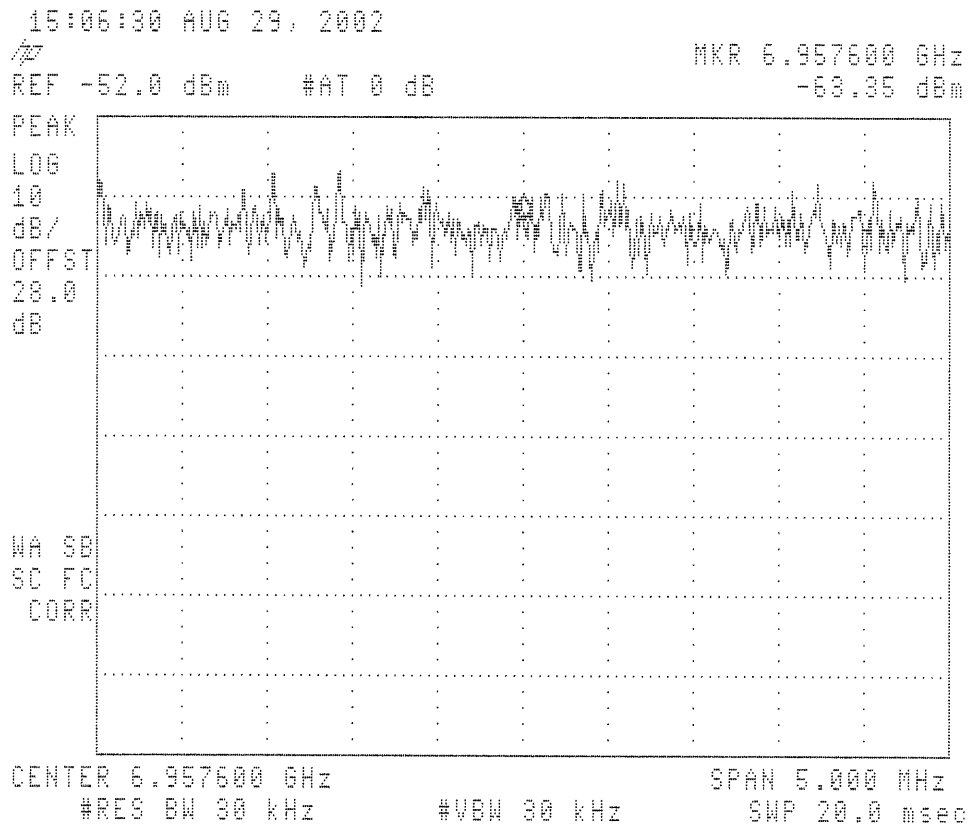


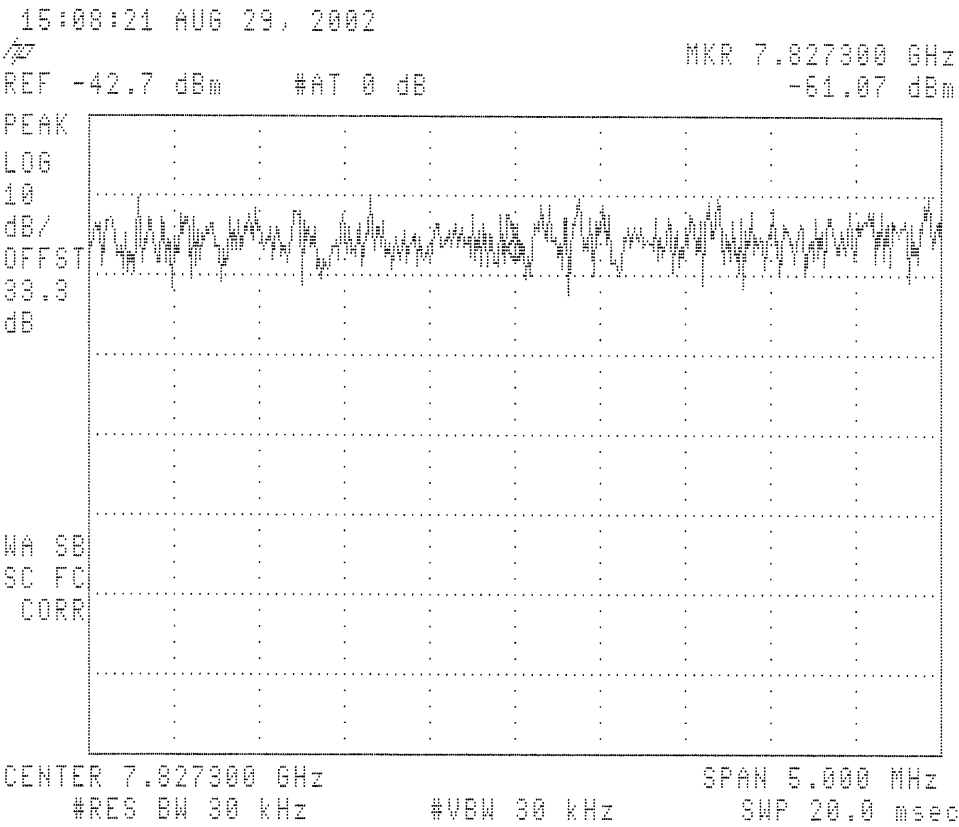


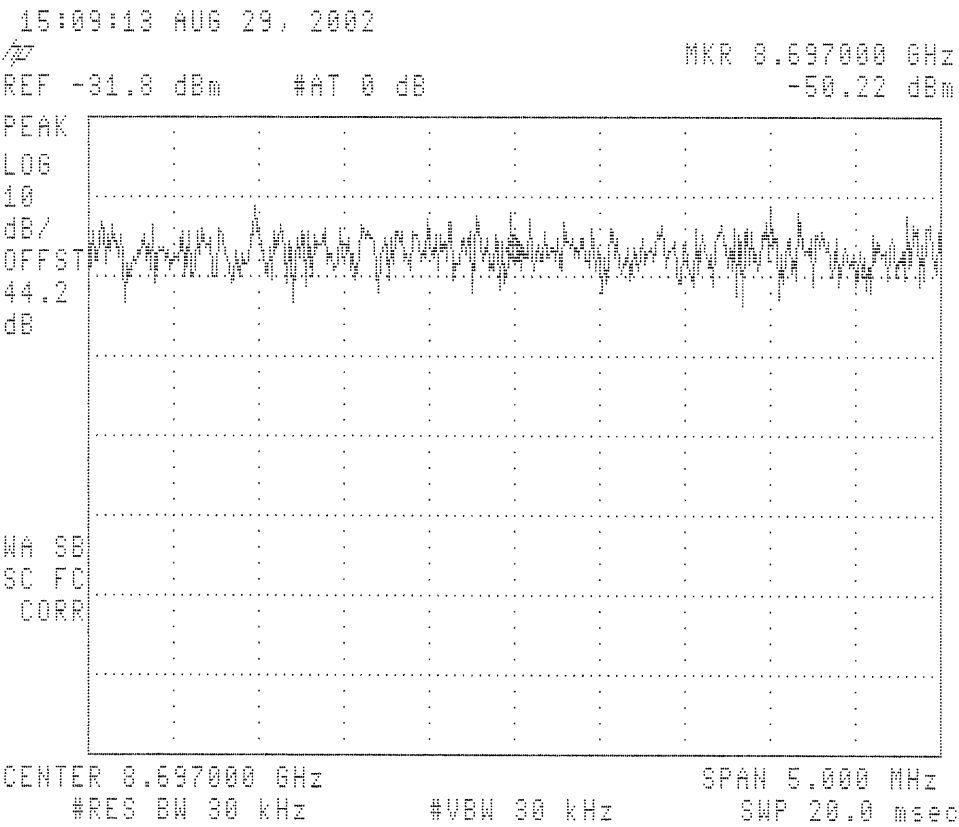














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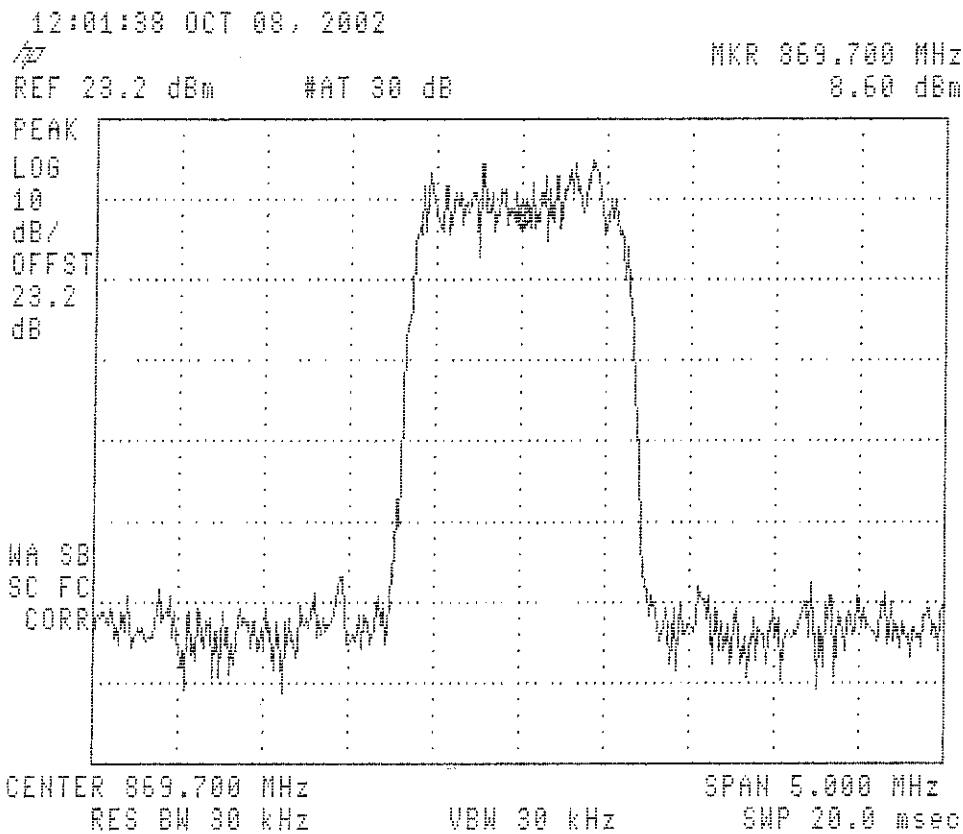
SECTION D

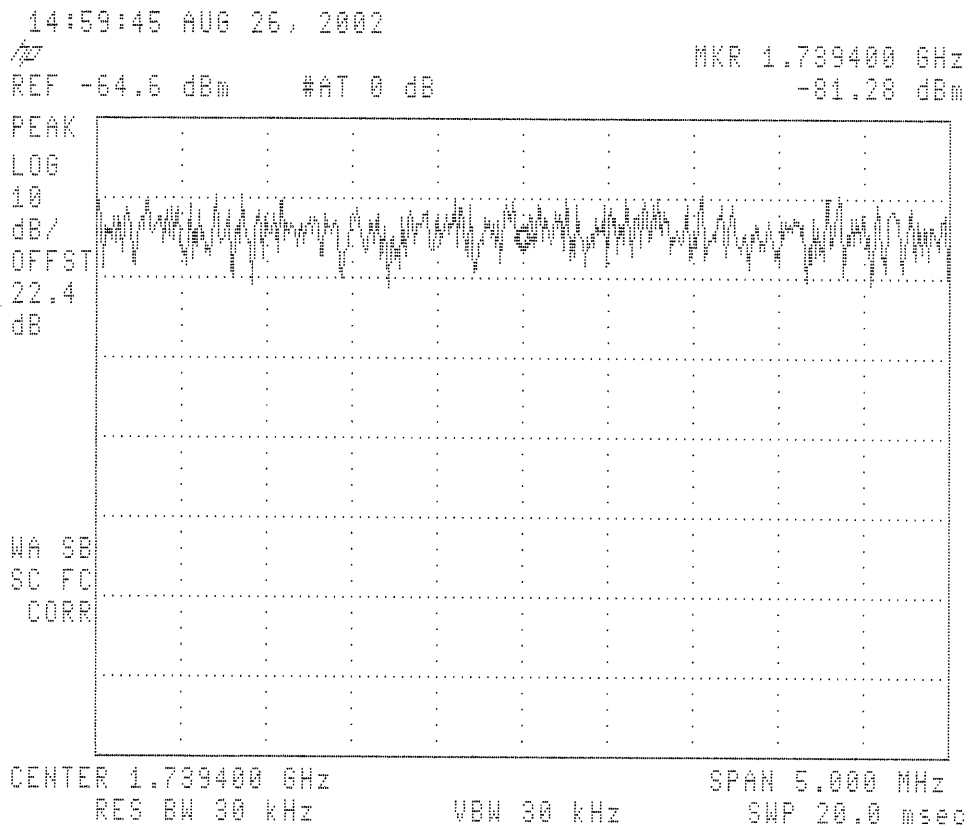
FCC ID: IHET5CR1

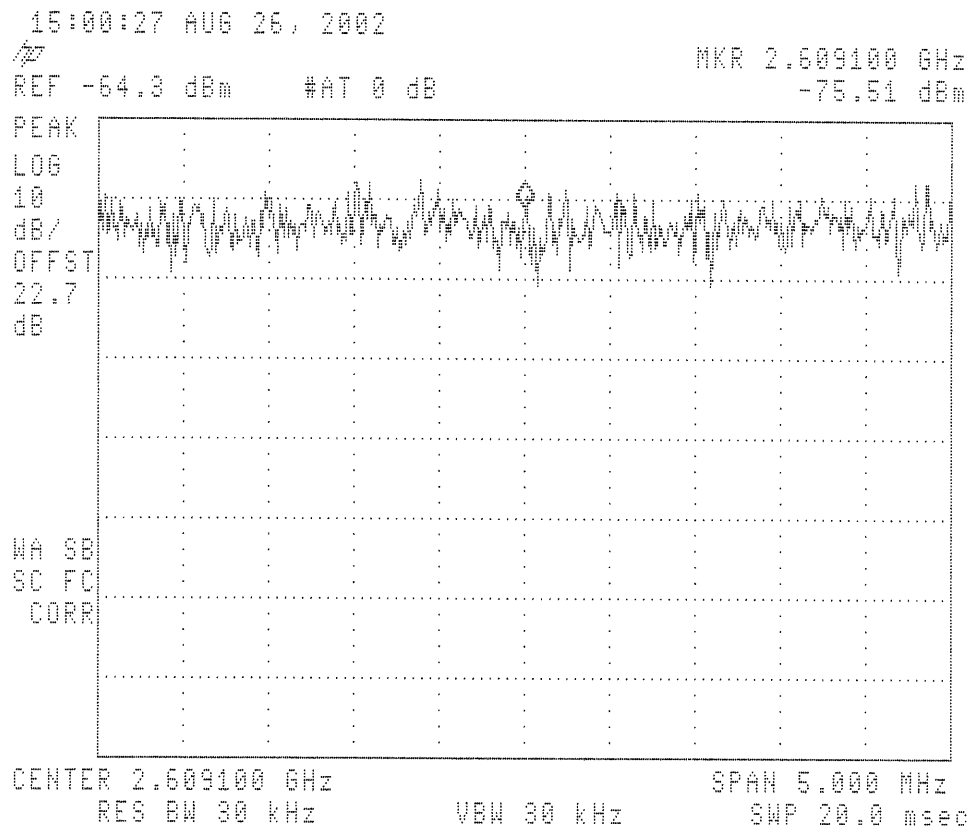
# **SPURIOUS & HARMONIC EMISSIONS CONDUCTED**

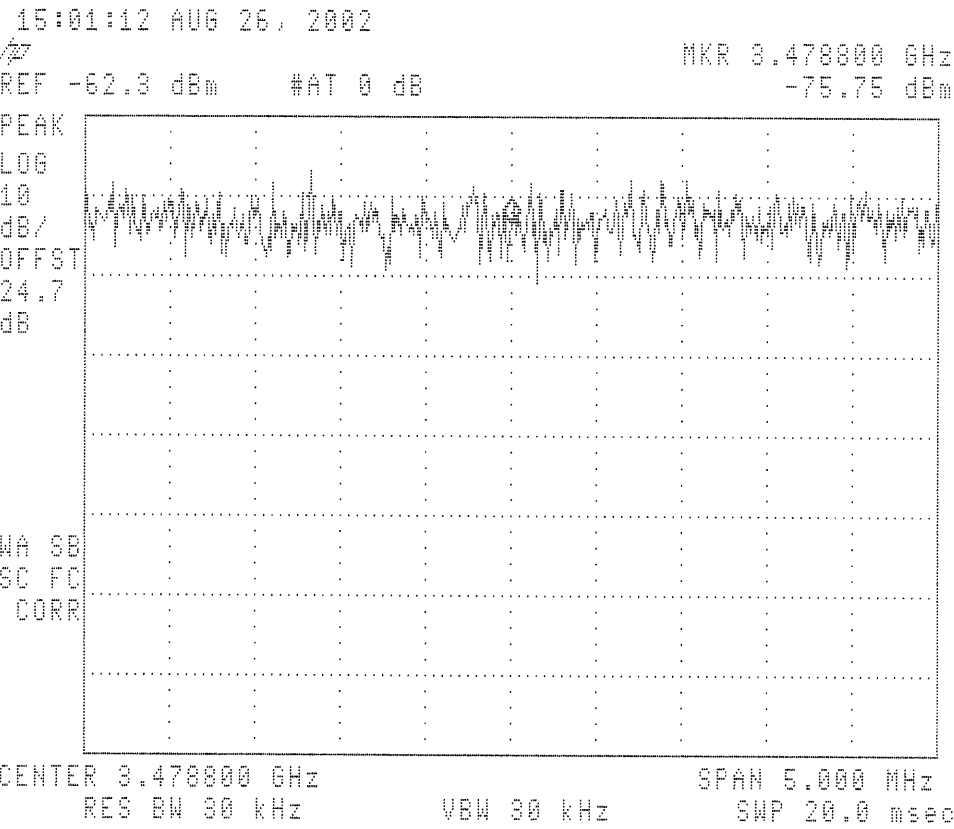
## **CDMA Transmitter Channel 1013**

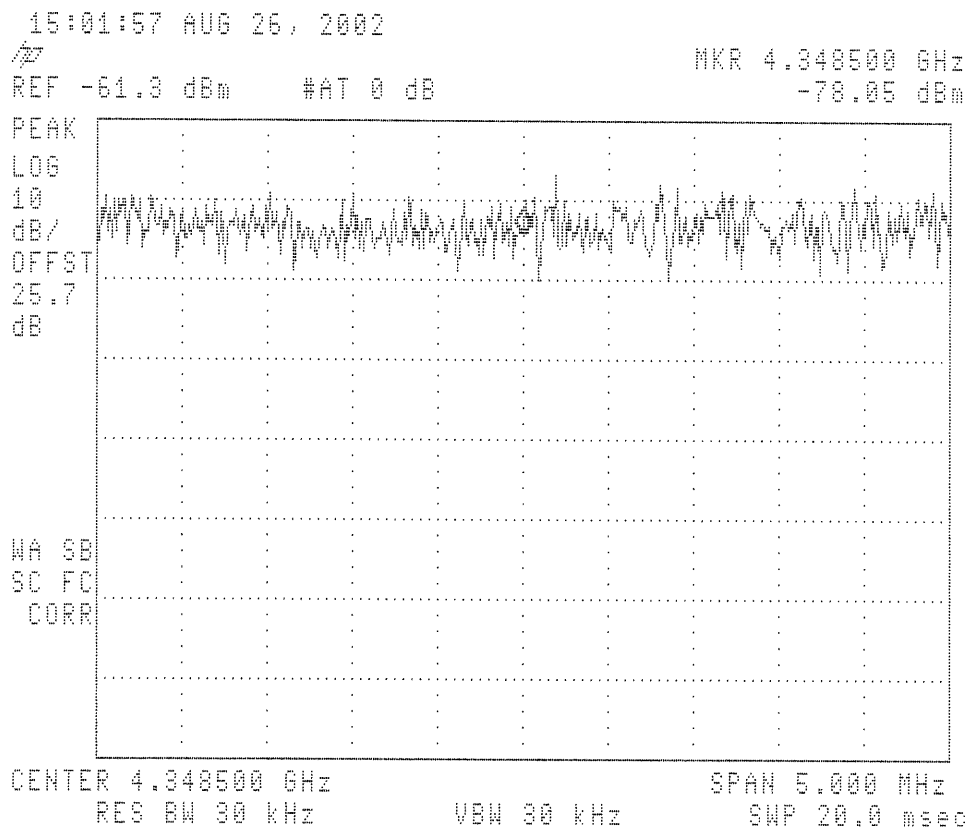
### **Minimum Power**

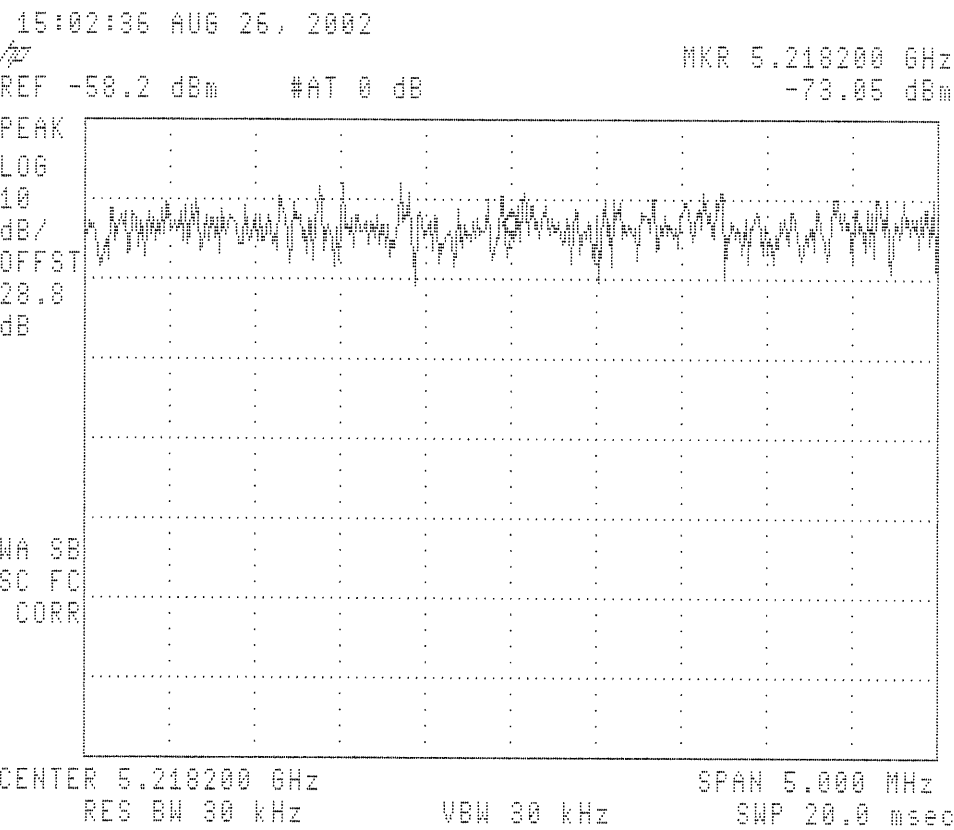


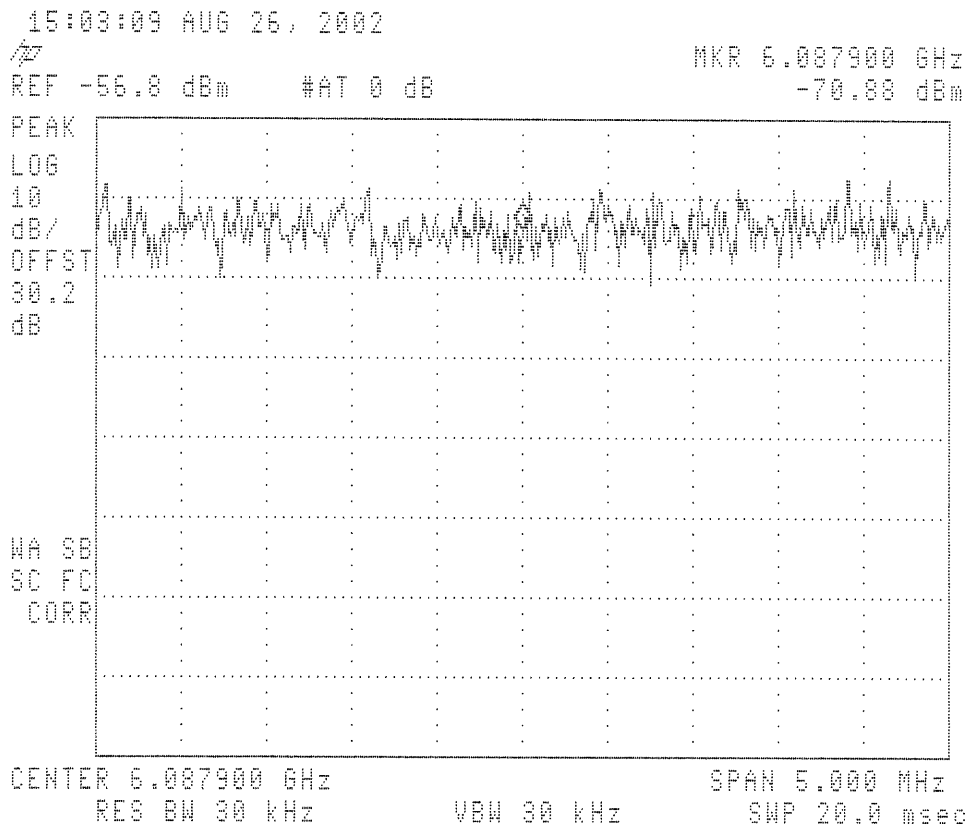












15:04:02 AUG 26, 2002

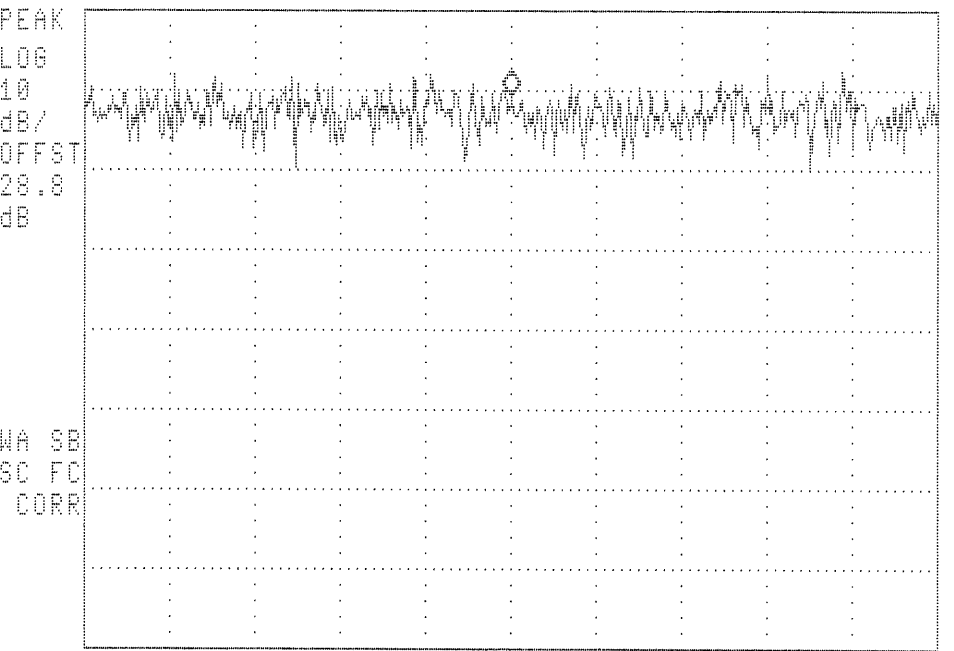
✓

REF -52.2 dBm

#AT 0 dB

MKR 6.957600 GHz

-63.03 dBm



CENTER 6.957600 GHz

RES BW 30 kHz

VBW 30 kHz

SPAN 5.000 MHz

SWP 20.0 msec

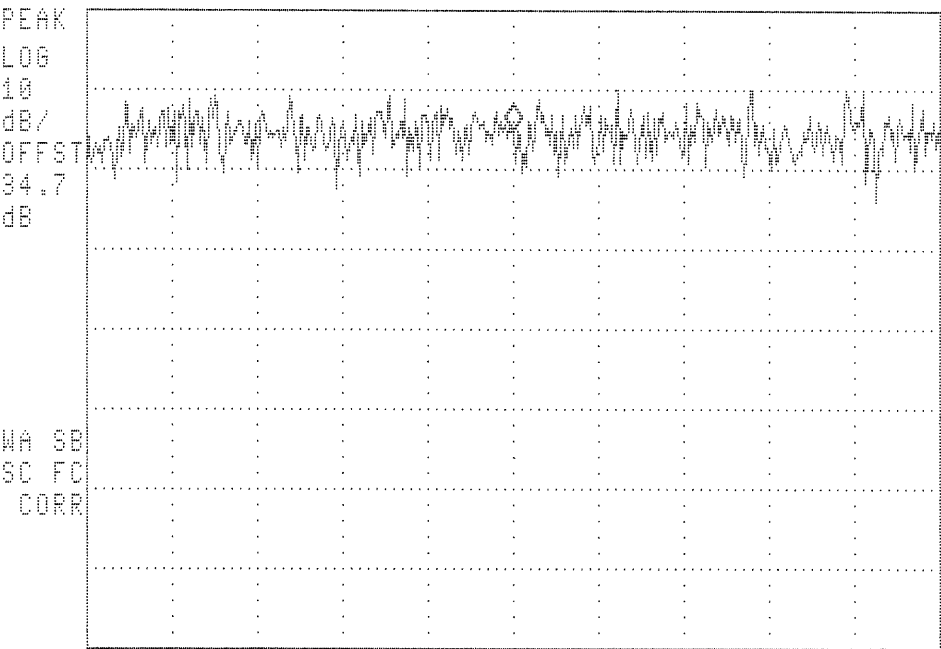
15:04:50 AUG 26, 2002

/Z

MKR 7.827300 GHz

REF -41.3 dBm #AT 0 dB

-56.52 dBm



CENTER 7.827300 GHz

SPAN 5.000 MHz

RES BW 30 kHz

VBW 30 kHz

SWP 20.0 msec

15:05:34 AUG 26, 2002

~~17~~

MKR 8.697000 GHz

REF -26.1 dBm #AT 0 dB

-44.61 dBm

PEAK

LOG

10

dB/

OFFST

49.9

dB

WA SB

SC FC

CORR

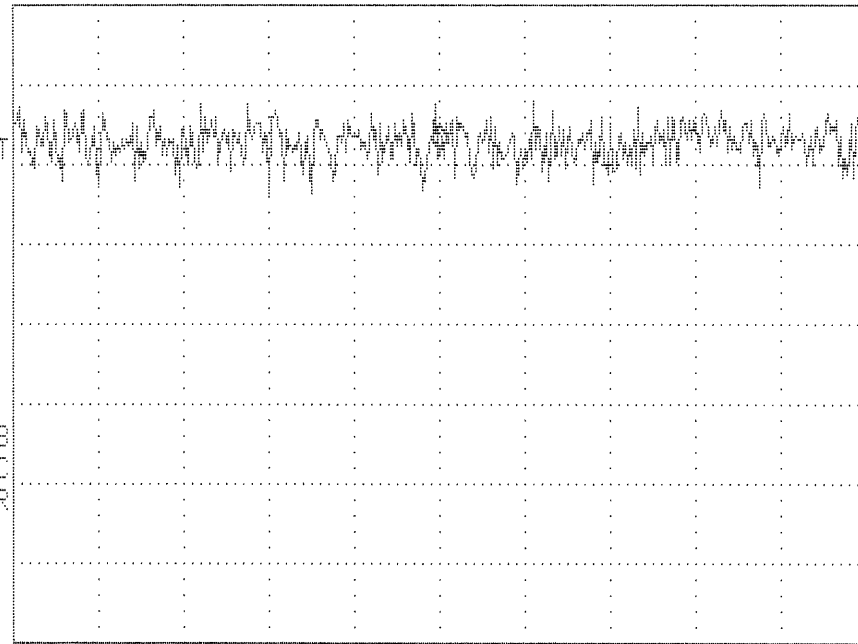
CENTER 8.697000 GHz

RES BW 30 kHz

VBW 30 kHz

SPAN 5.000 MHz

SWP 20.0 msec





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SECTION D

FCC ID: IHET5CR1

# **SPURIOUS & HARMONIC EMISSIONS CONDUCTED**

## **CDMA Transmitter Channel 777**

### **Maximum Power**

15:28:46 AUG 30, 2002

~~17~~

REF 45.0 dBm

#AT 30 dB

MKR 893.310 MHz

38.35 dBm

PEAK

LOG

10

dB/

OFFST

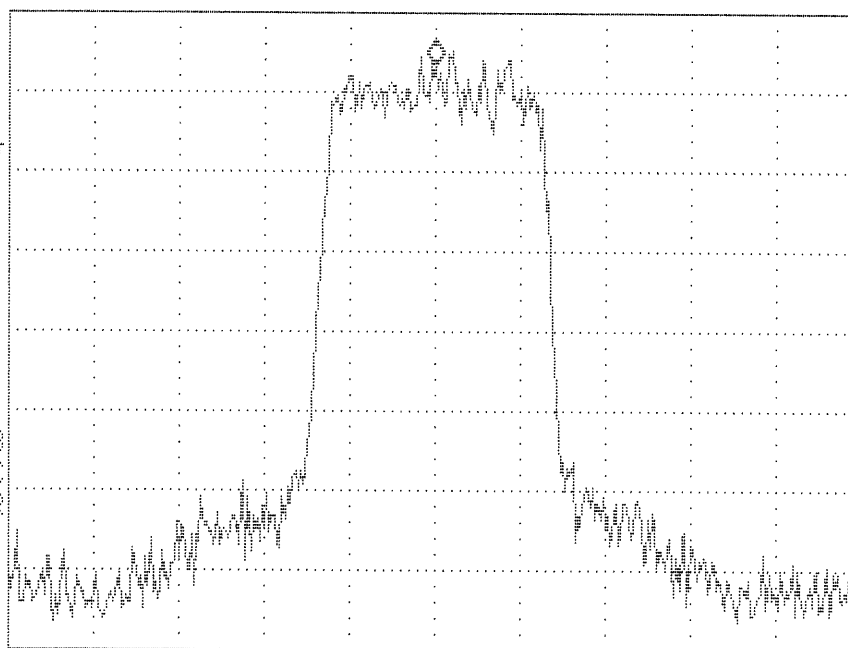
40.0

dB

WA SB

SC FC

CORR



CENTER 893.310 MHz

#RES BW 30 kHz

#VBW 30 kHz

SPAN 5.000 MHz

SWP 20.0 msec

14:13:49 AUG 26, 2002

~~17~~

MKR 1.786620 GHz

REF -44.8 dBm

#AT 0 dB

-55.50 dBm

PEAK

LOG

10

dB/

OFFST

22.2

dB

WA SB

SC FC

CORR

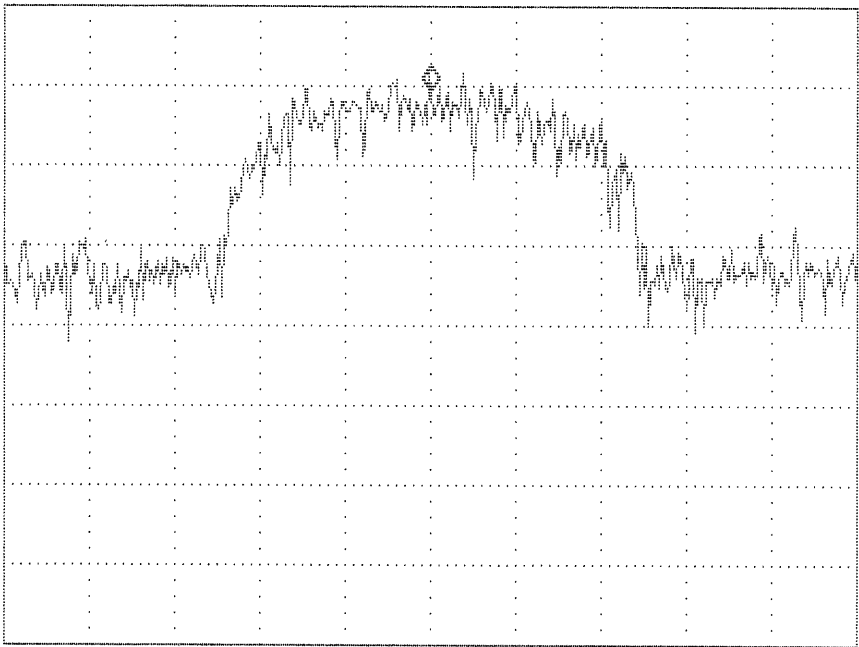
CENTER 1.786620 GHz

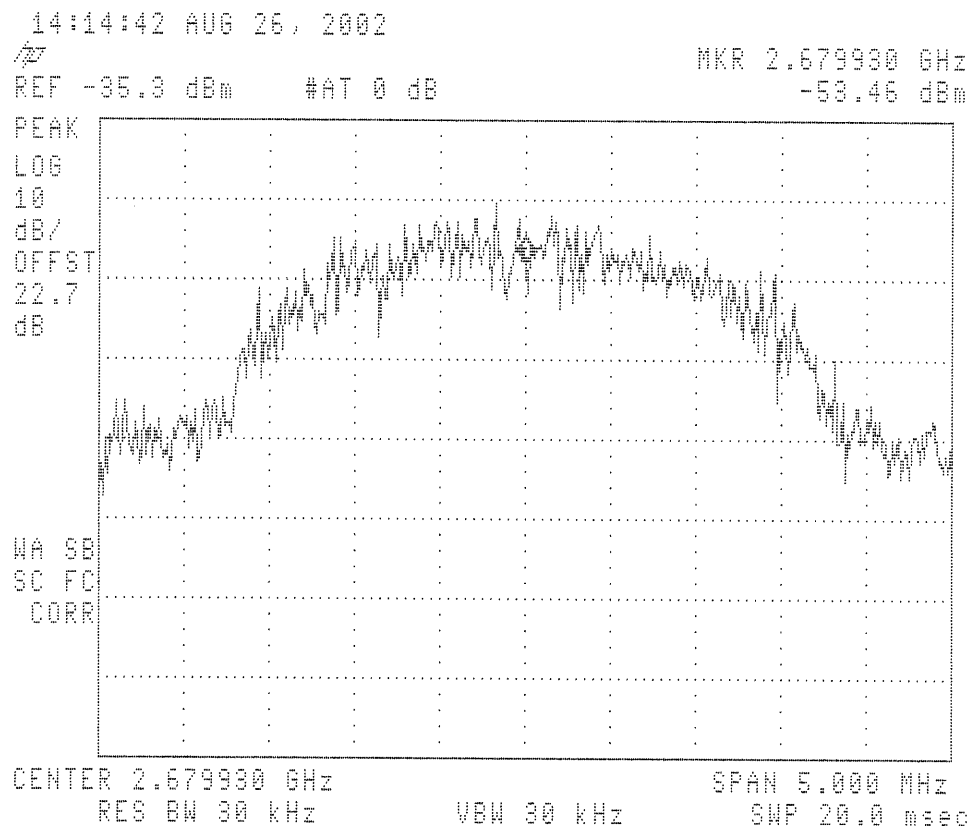
RES BW 30 kHz

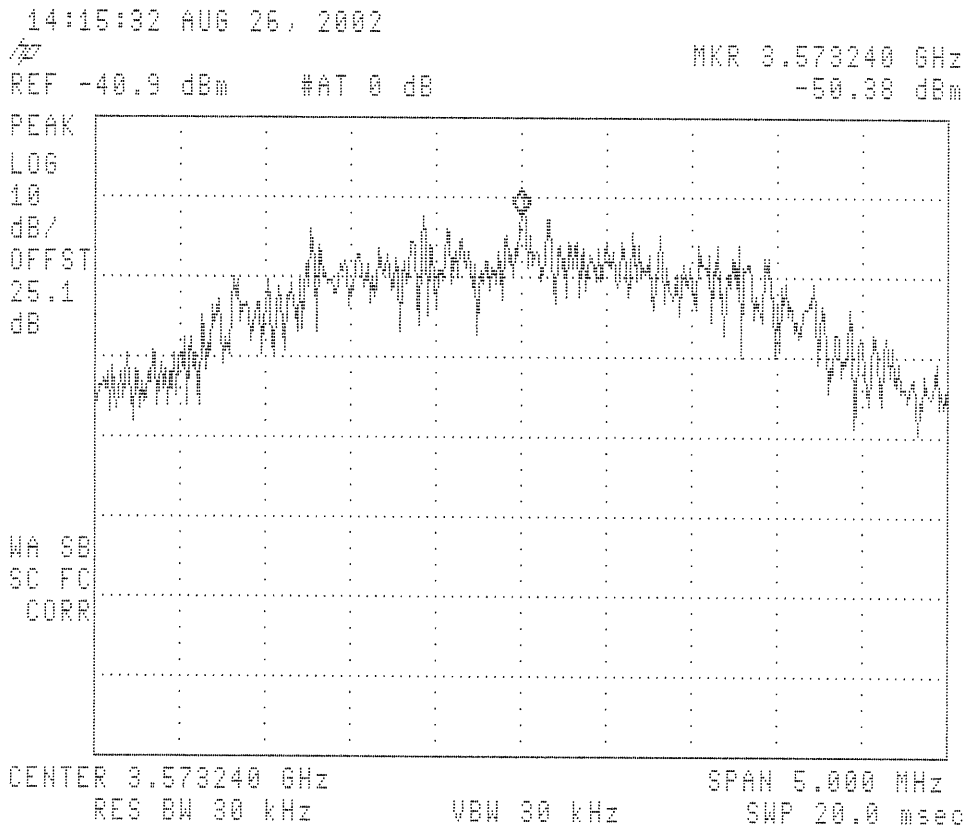
VBW 30 kHz

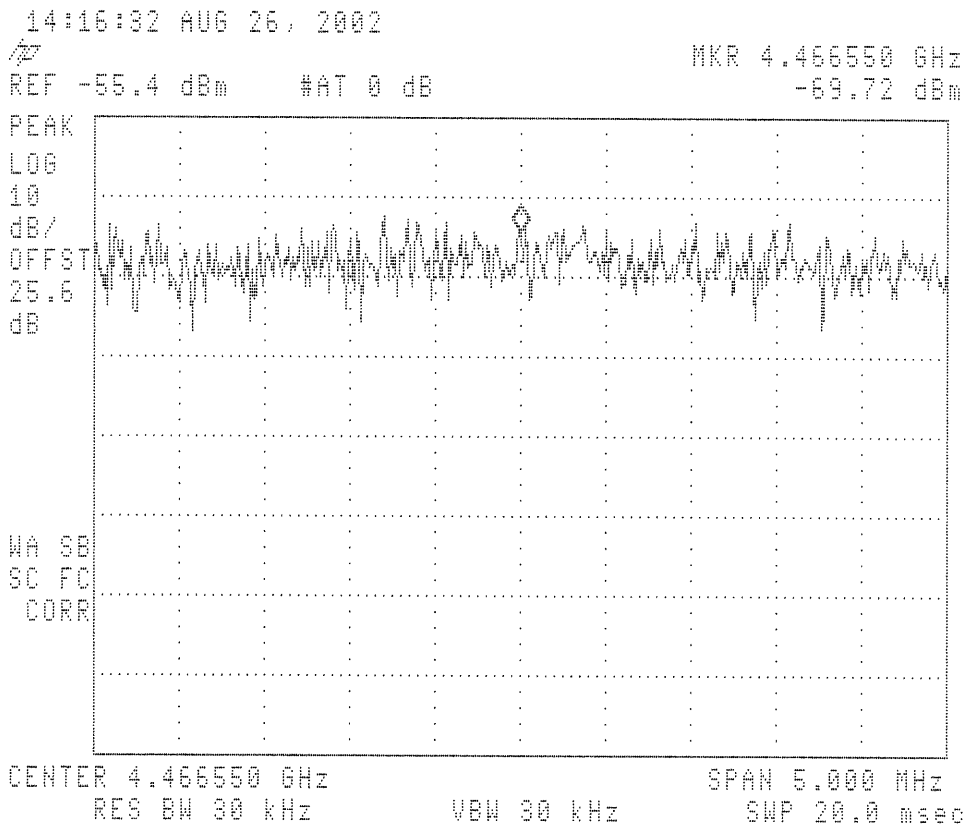
SPAN 5.000 MHz

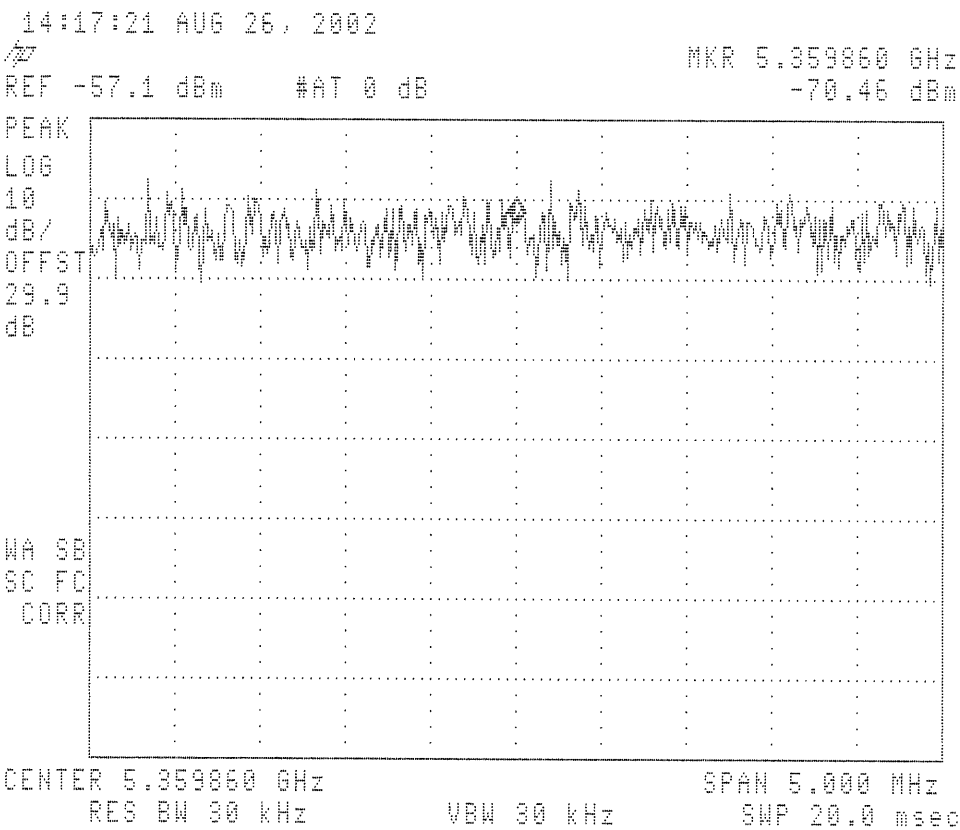
SWP 20.0 msec

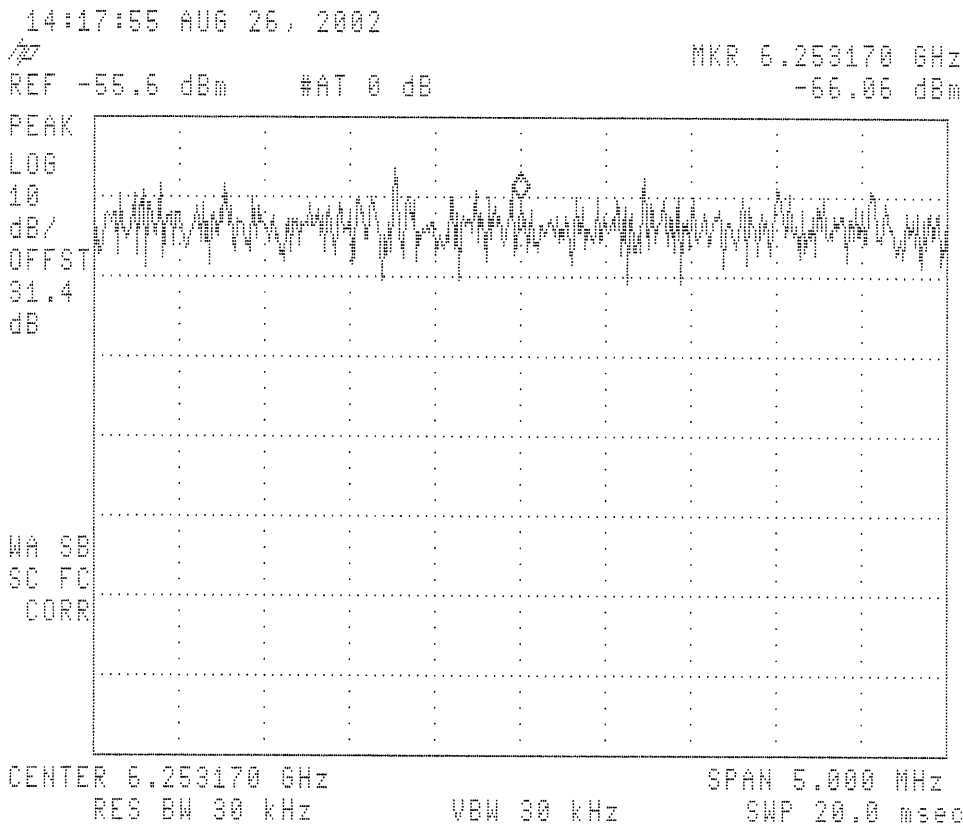


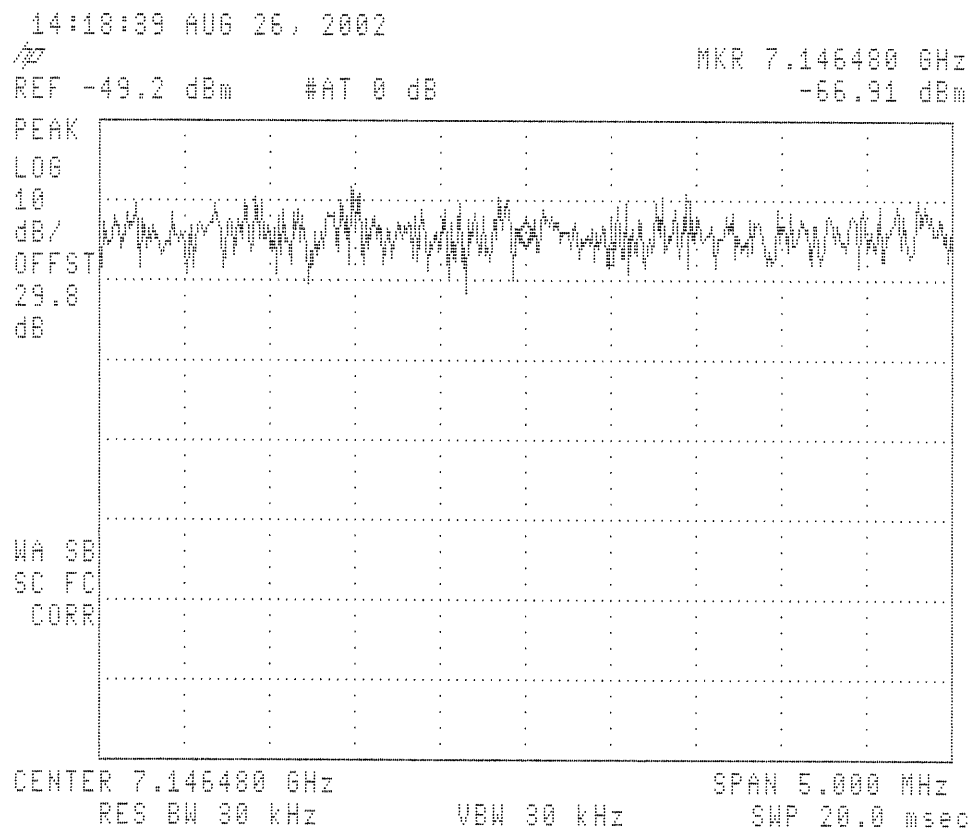


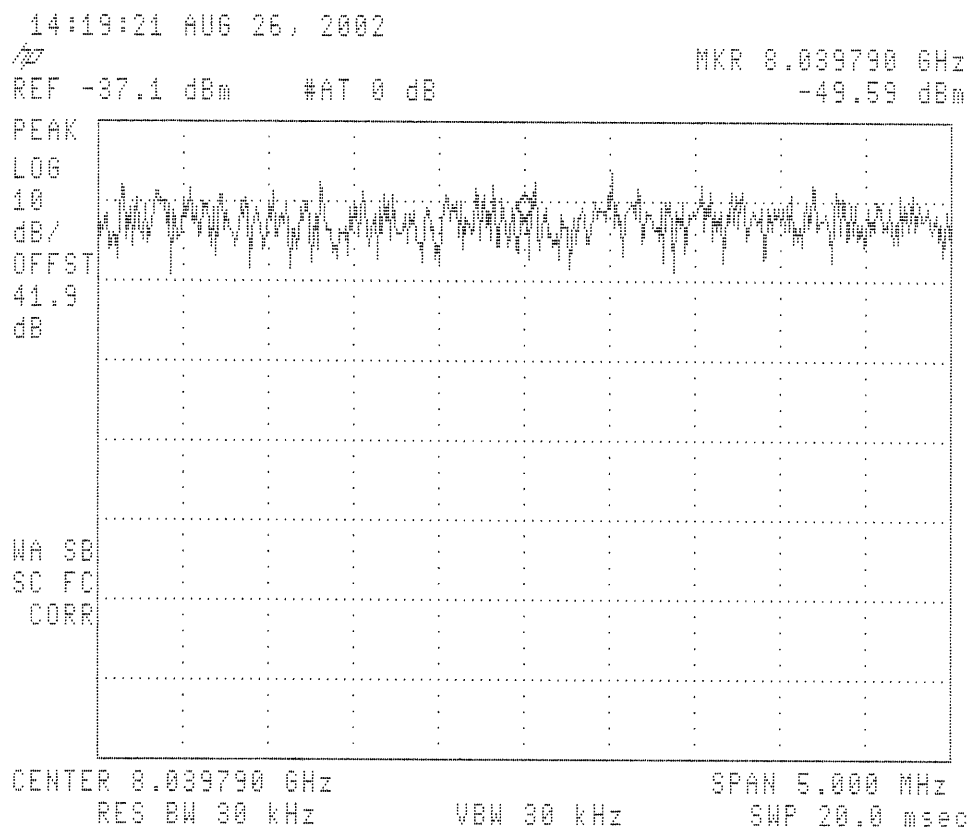












14:20:08 AUG 26, 2002

~~17~~

MKR 8.933100 GHz

REF -32.2 dBm #AT 0 dB

-45.60 dBm

PEAK

LOG

10

dB/

OFFS

46.8

dB

WA SB

SC FC

CORR

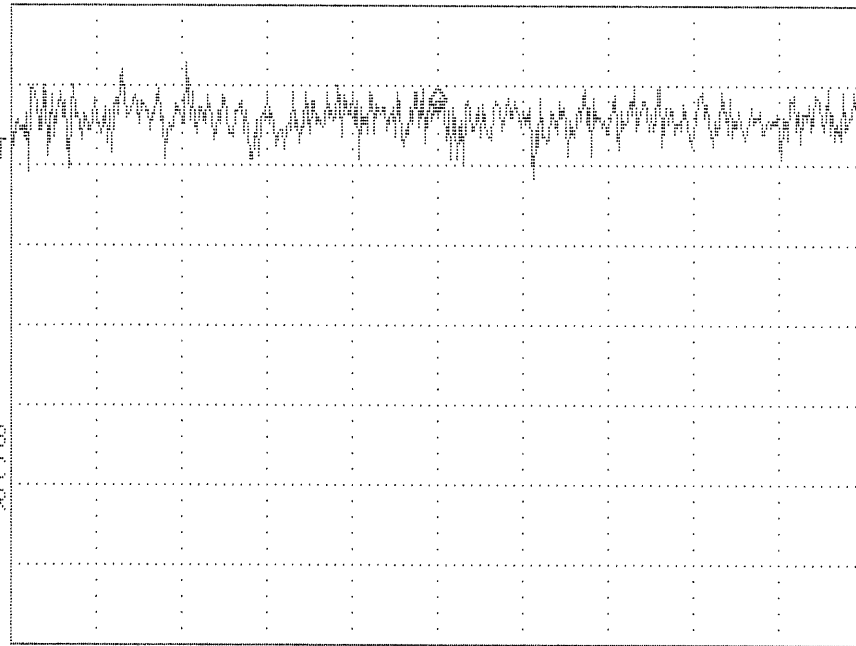
CENTER 8.933100 GHz

RES BW 30 kHz

VBW 30 kHz

SPAN 5.000 MHz

SWP 20.0 msec





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SECTION D

FCC ID: IHET5CR1

# **SPURIOUS & HARMONIC EMISSIONS CONDUCTED**

## **CDMA Transmitter Channel 777**

### **Mid Power**

11:33:46 AUG 26, 2002

/F

REF 48.7 dBm

#AT 0 dB

MKR 893.310 MHz

34.86 dBm

PEAK

LOG

10

dB/

OFFST

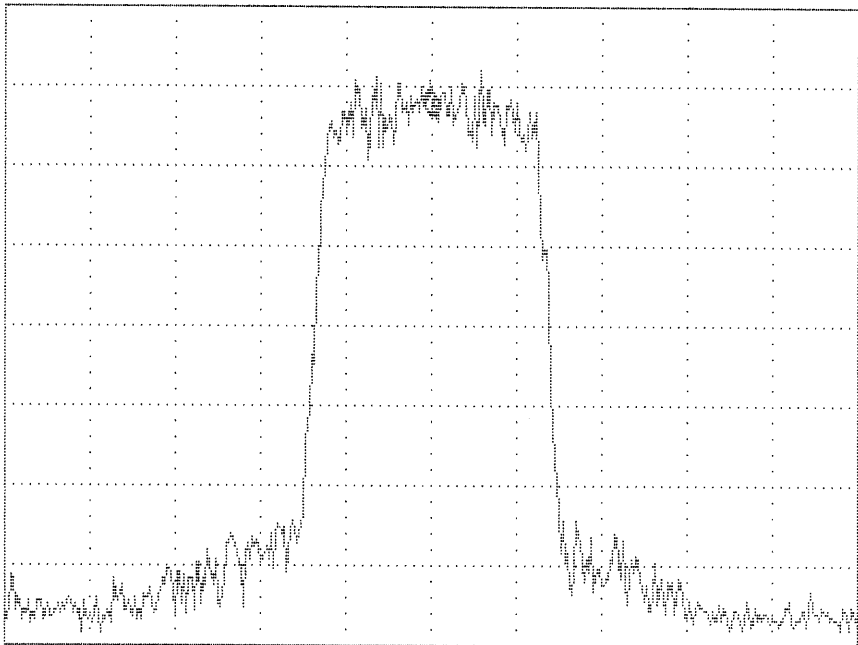
68.7

dB

WA SB

SC FC

CORR



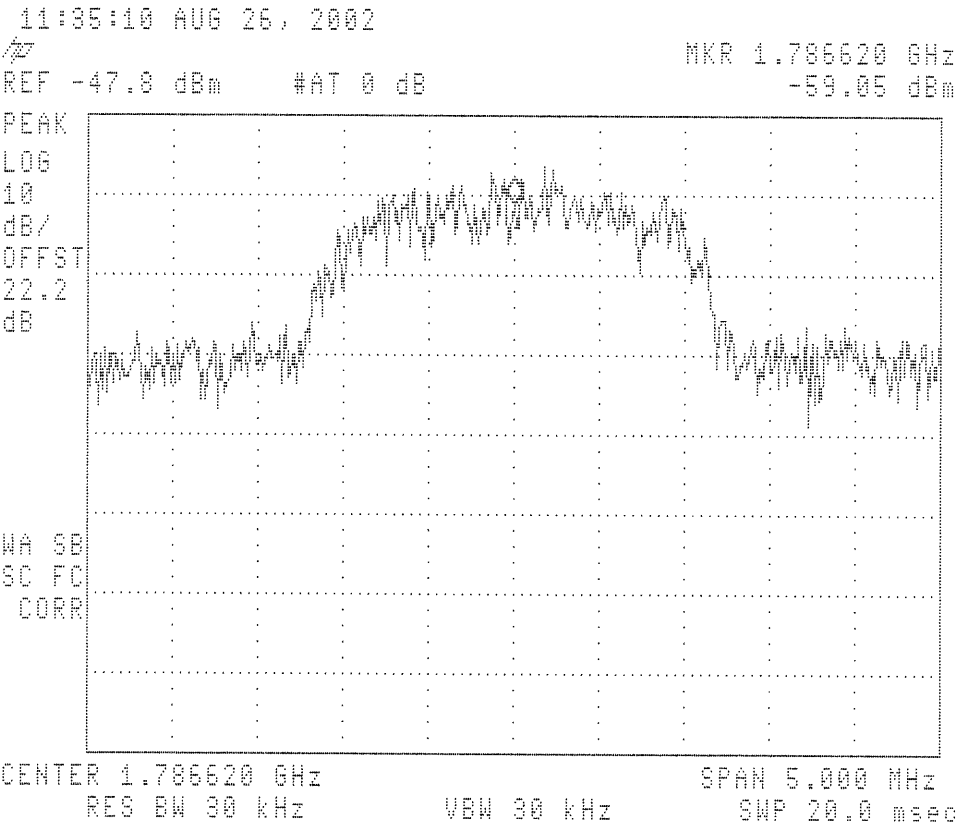
CENTER 893.310 MHz

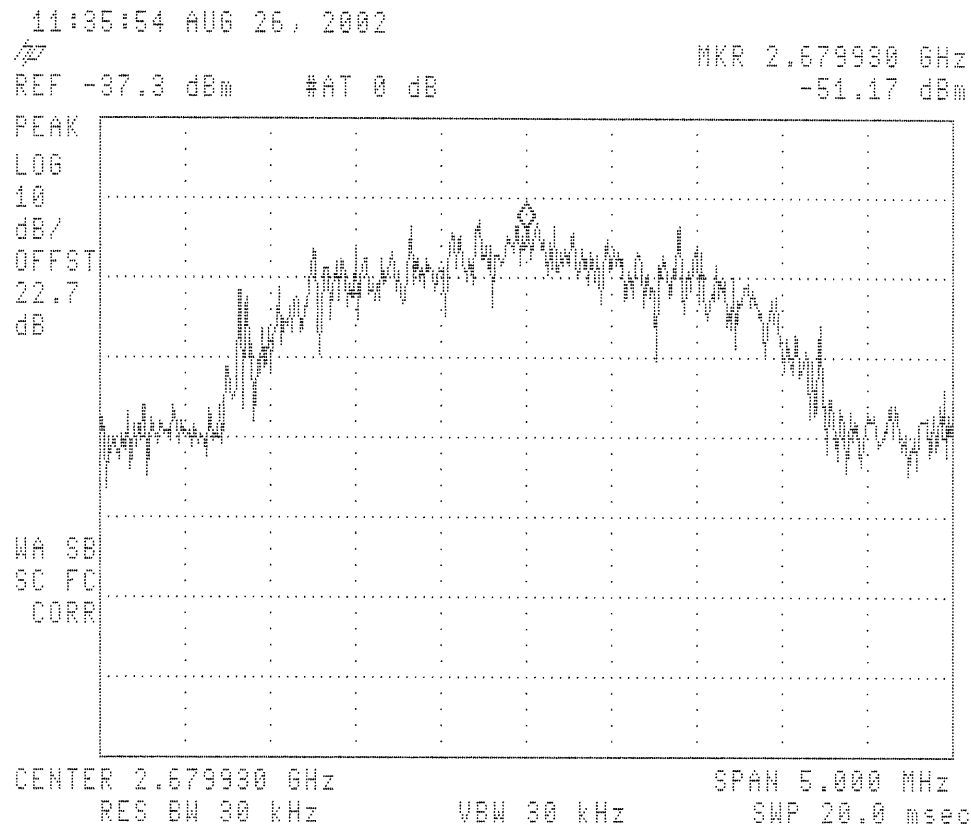
RES BW 30 kHz

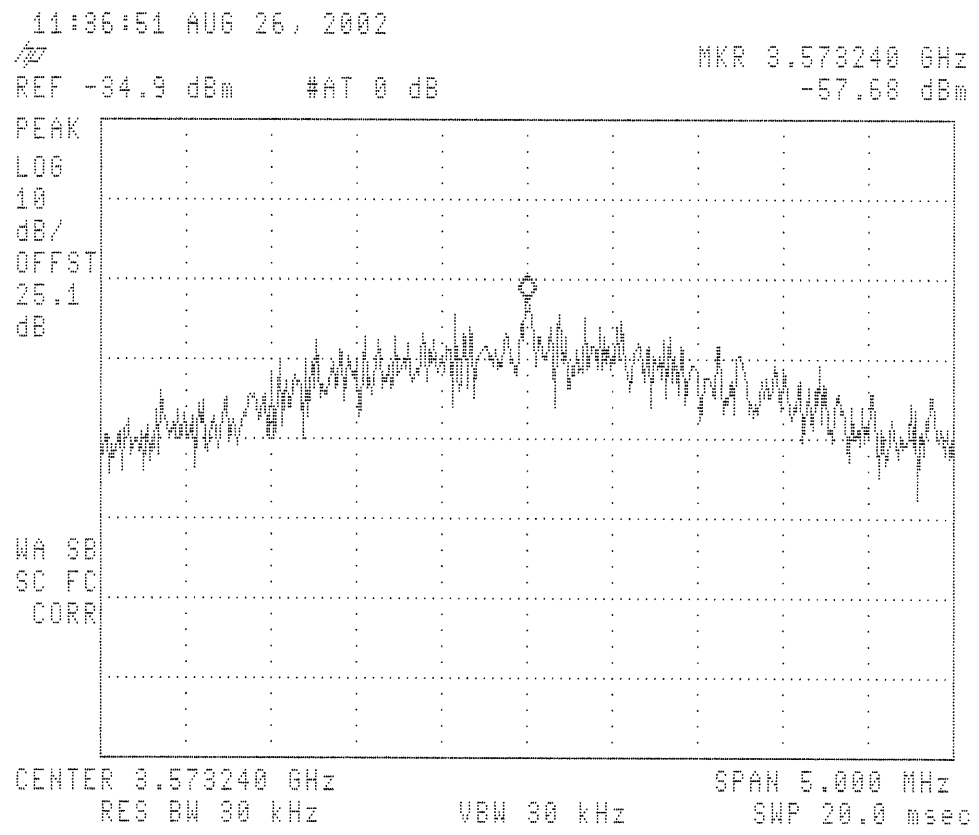
VBW 30 kHz

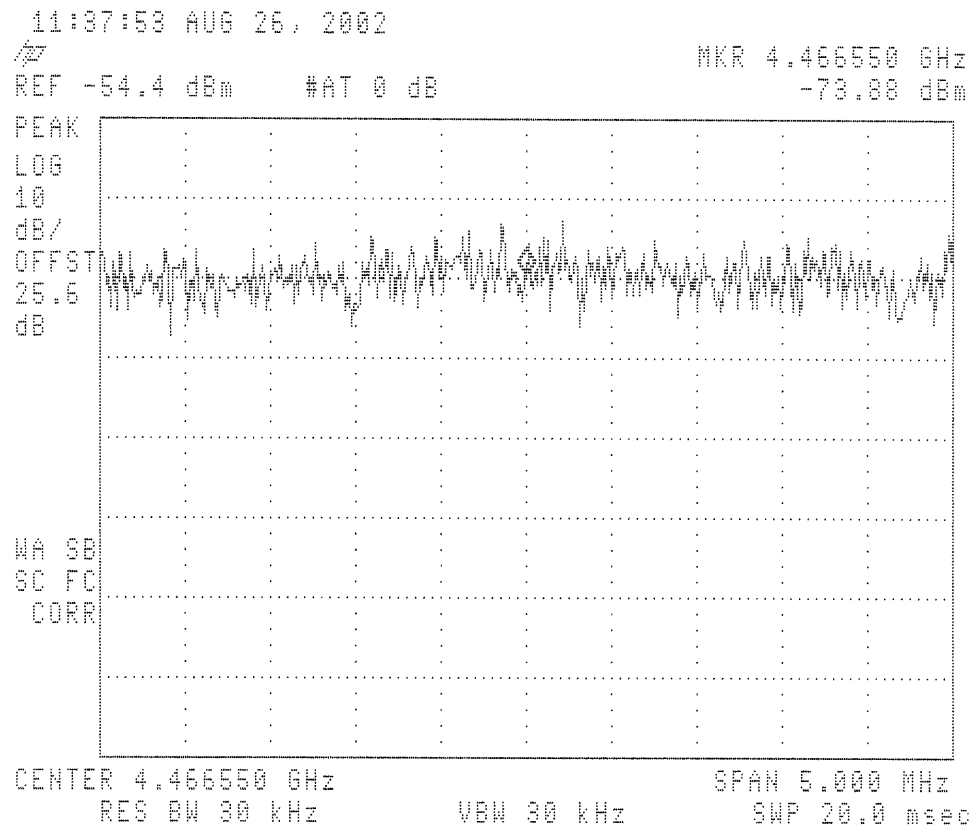
SPAN 5.000 MHz

SWP 20.0 msec

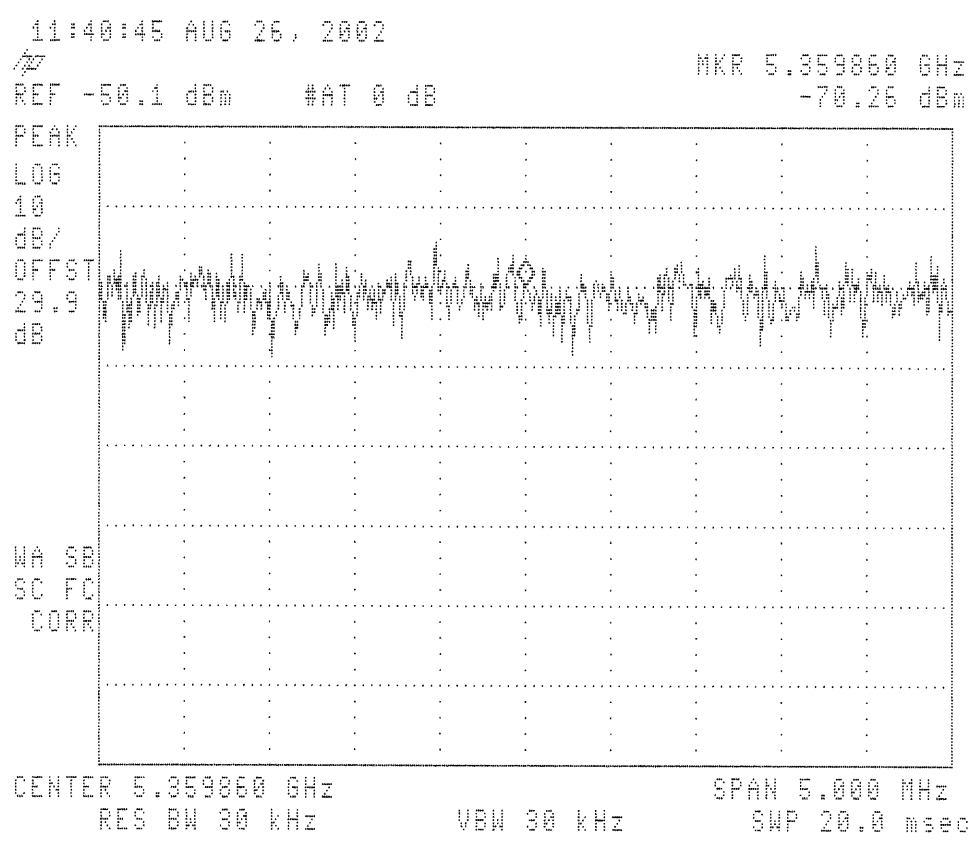


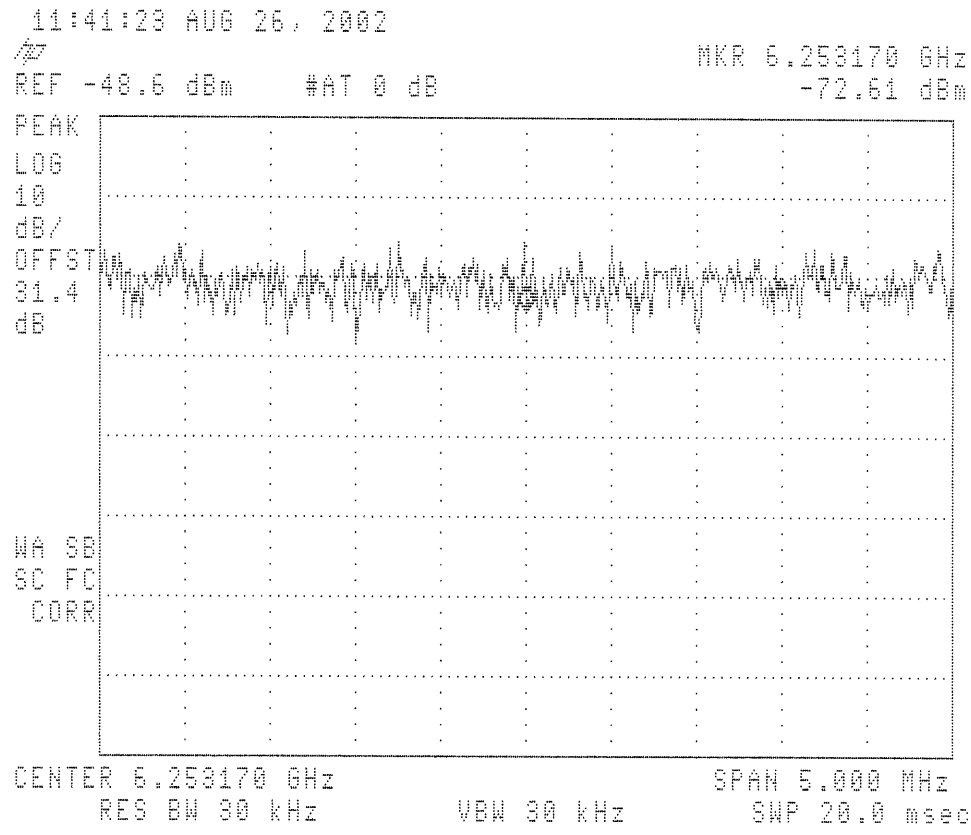






300R





11:42:21 AUG 26, 2002

~~7~~

MKR 7.146480 GHz

REF -40.2 dBm

#AT 0 dB

-63.89 dBm

PEAK

LOG

10

dB/

OFFST

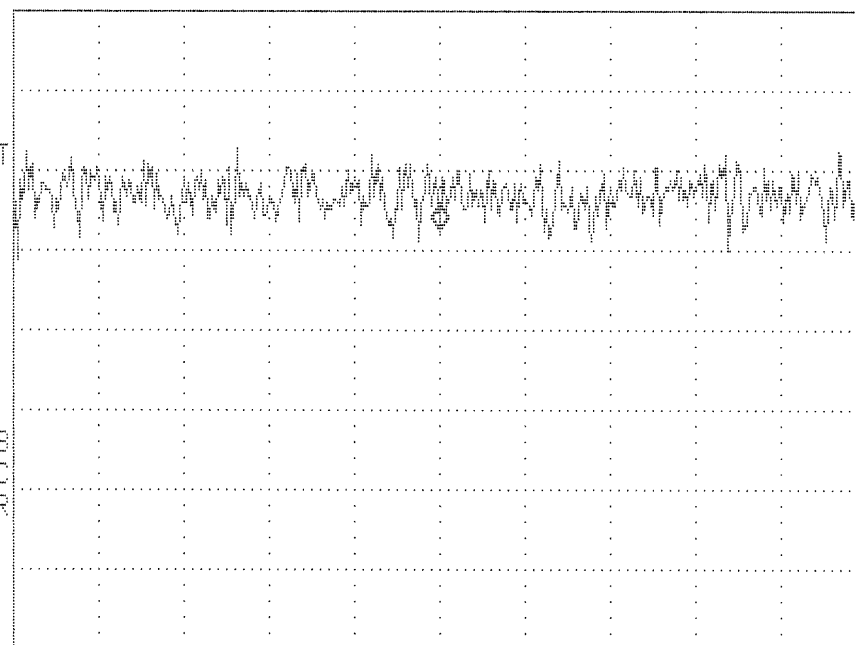
29.8

dB

WA SB

SC FC

CORR



CENTER 7.146480 GHz

SPAN 5.000 MHz

RES BW 30 kHz

VBW 30 kHz

SMP 20.0 msec

11:43:07 AUG 26, 2002

~~17~~

MKR 8.039790 GHz

REF -28.1 dBm

#AT 0 dB

-49.05 dBm

PEAK

LOG

10

dB/

OFFST

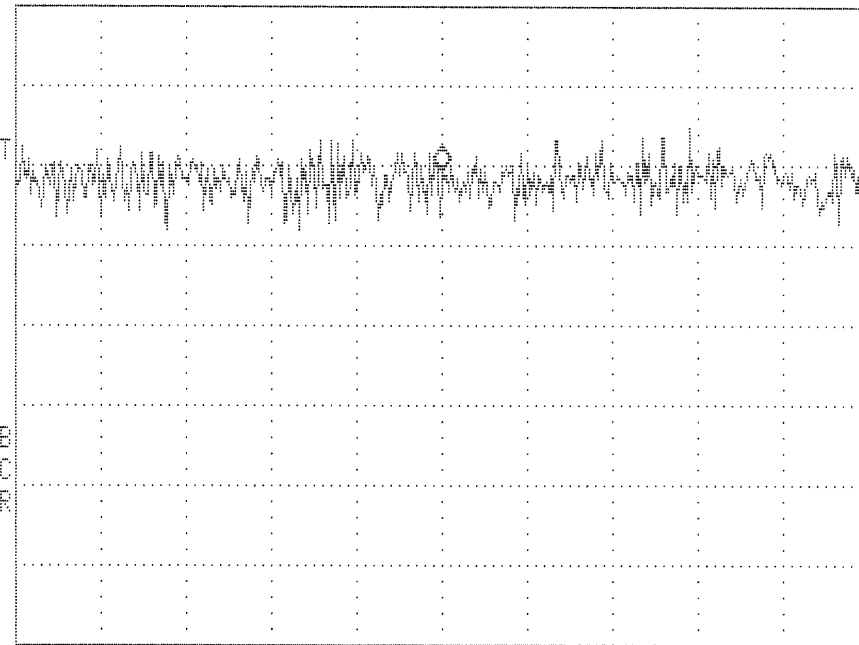
41.9

dB

WA SB

SC FC

CORR



CENTER 8.039790 GHz

RES BW 30 kHz

SPAN 5.000 MHz

VBW 30 kHz

SWP 20.0 msec

11:43:56 AUG 26, 2002

~~7~~

MKR 8.938100 GHz

REF -23.2 dBm #AT 0 dB

-43.48 dBm

PEAK

LOG

10

dB/

OFFST

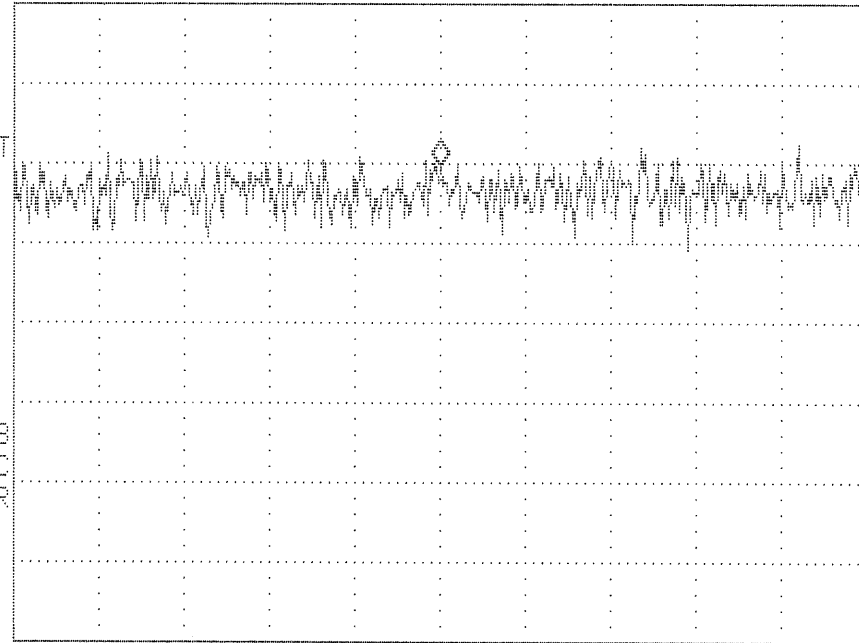
46.8

dB

NA SB

SC FC

CORR



CENTER 8.938100 GHz

RES BW 30 kHz

VBW 30 kHz

SPAN 5.000 MHz

SWP 20.0 msec



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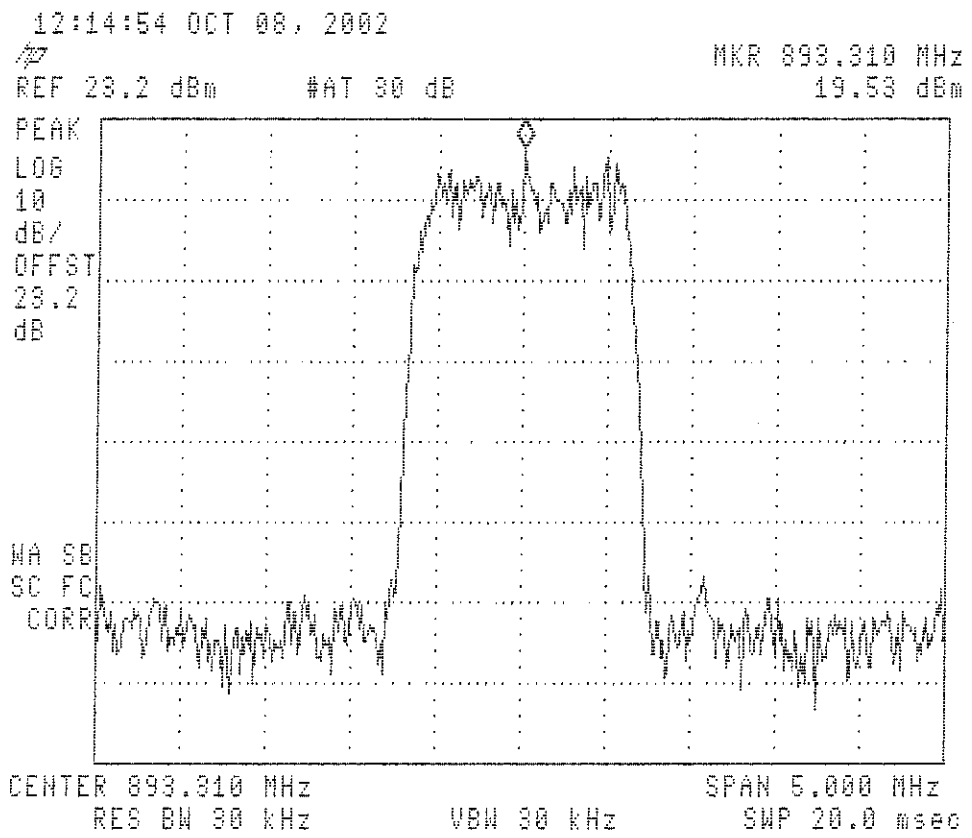
SECTION D

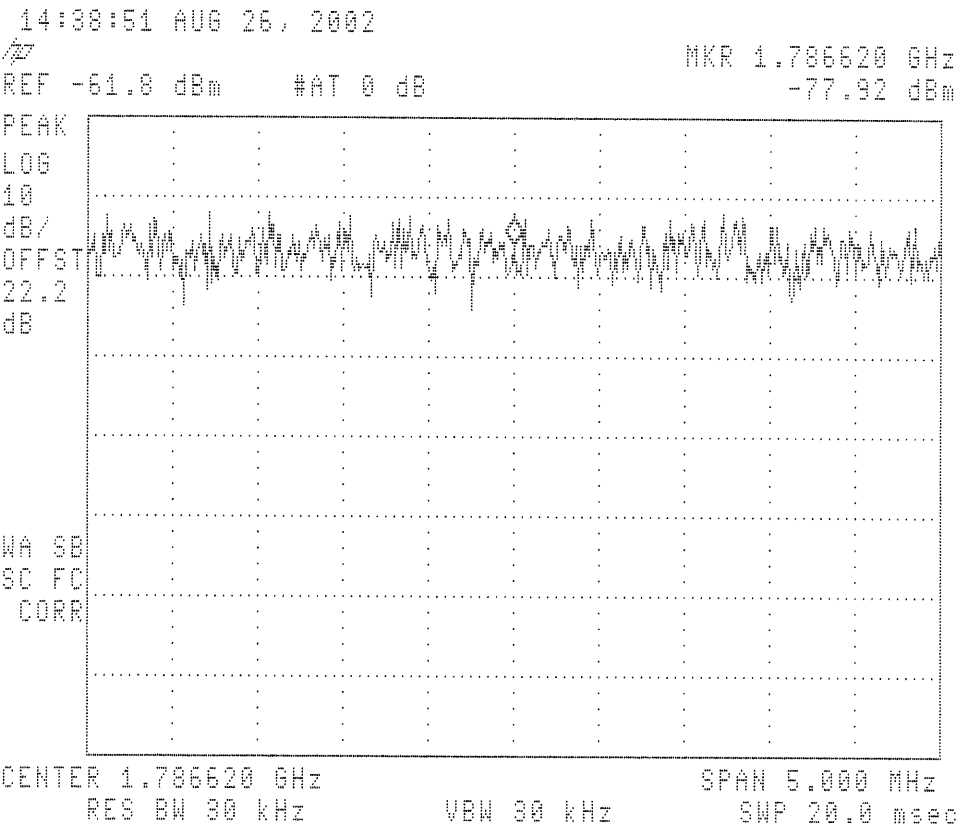
FCC ID: IHET5CR1

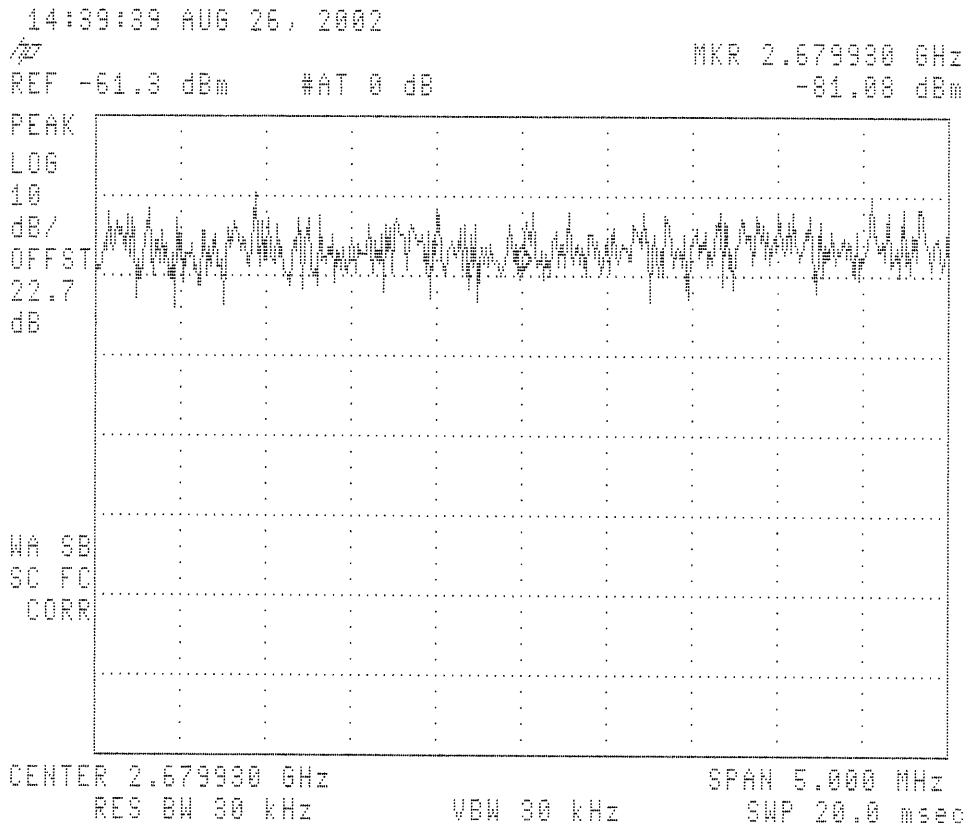
# **SPURIOUS & HARMONIC EMISSIONS CONDUCTED**

## **CDMA Transmitter Channel 777**

### **Minimum Power**





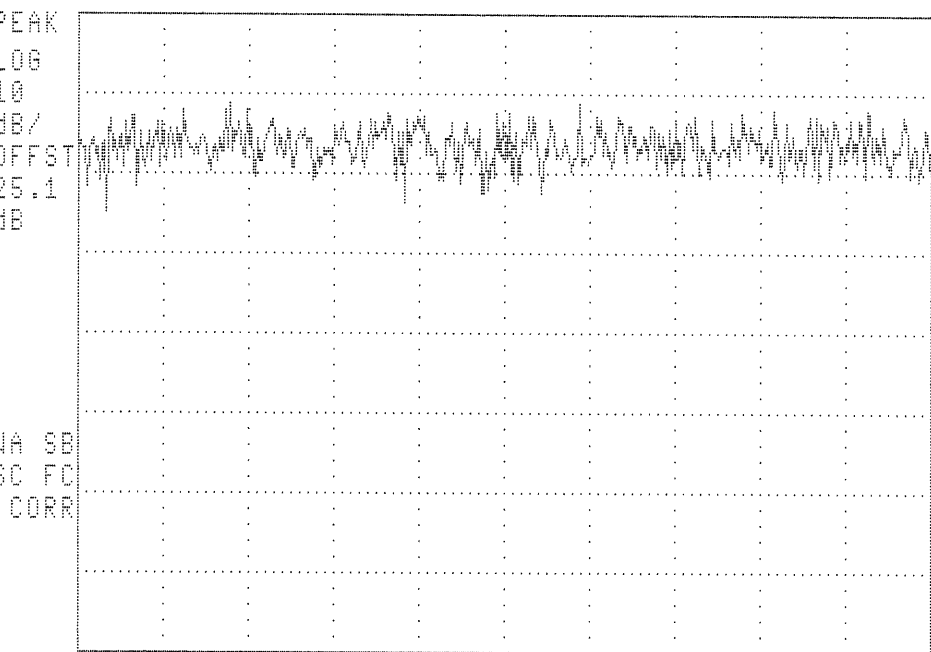


14:41:27 AUG 26, 2002

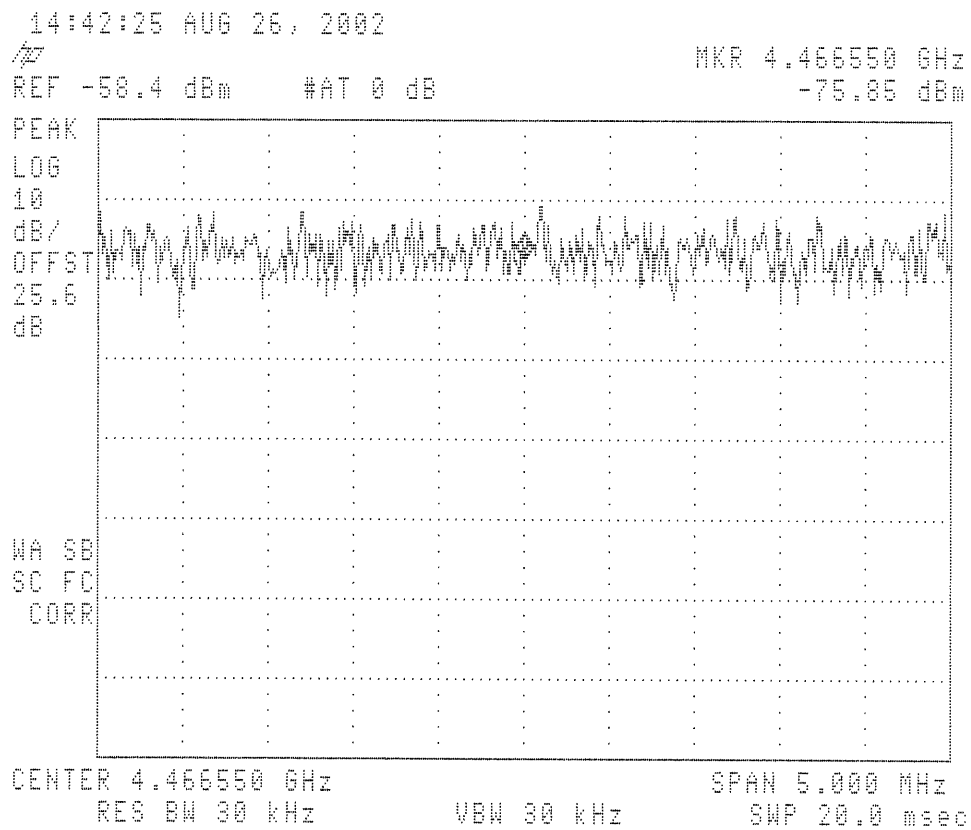
/Z

MKR 3.573240 GHz  
-77.35 dBm

REF -58.9 dBm #AT 0 dB



CENTER 3.573240 GHz SPAN 5.000 MHz  
RES BW 30 kHz VBW 30 kHz SWP 20.0 msec

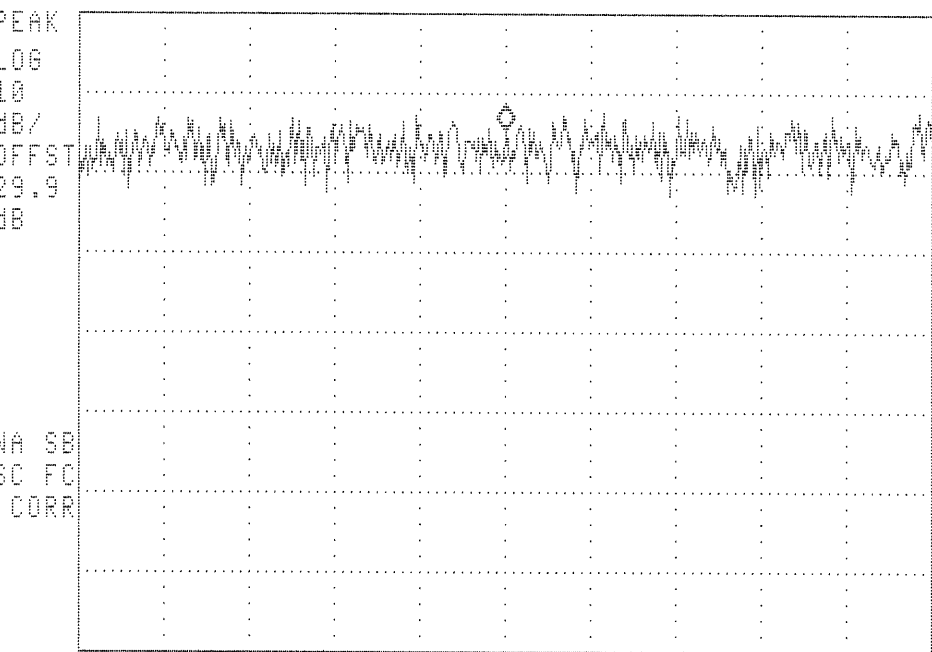


14:48:23 AUG 26, 2002

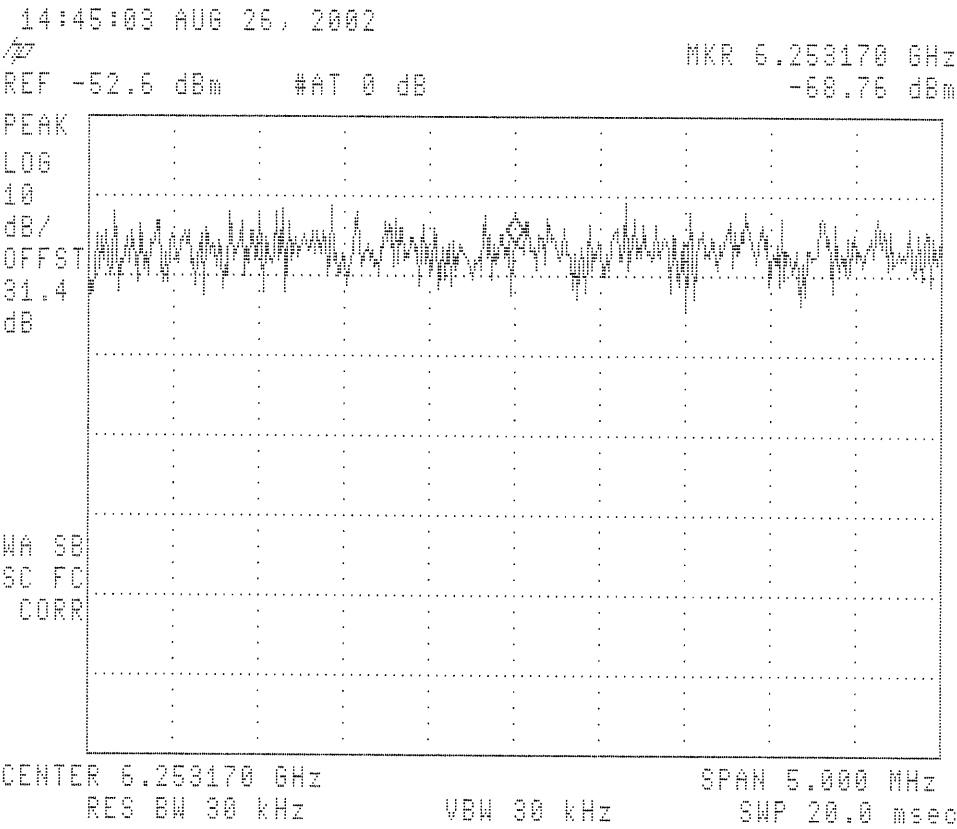
/Z

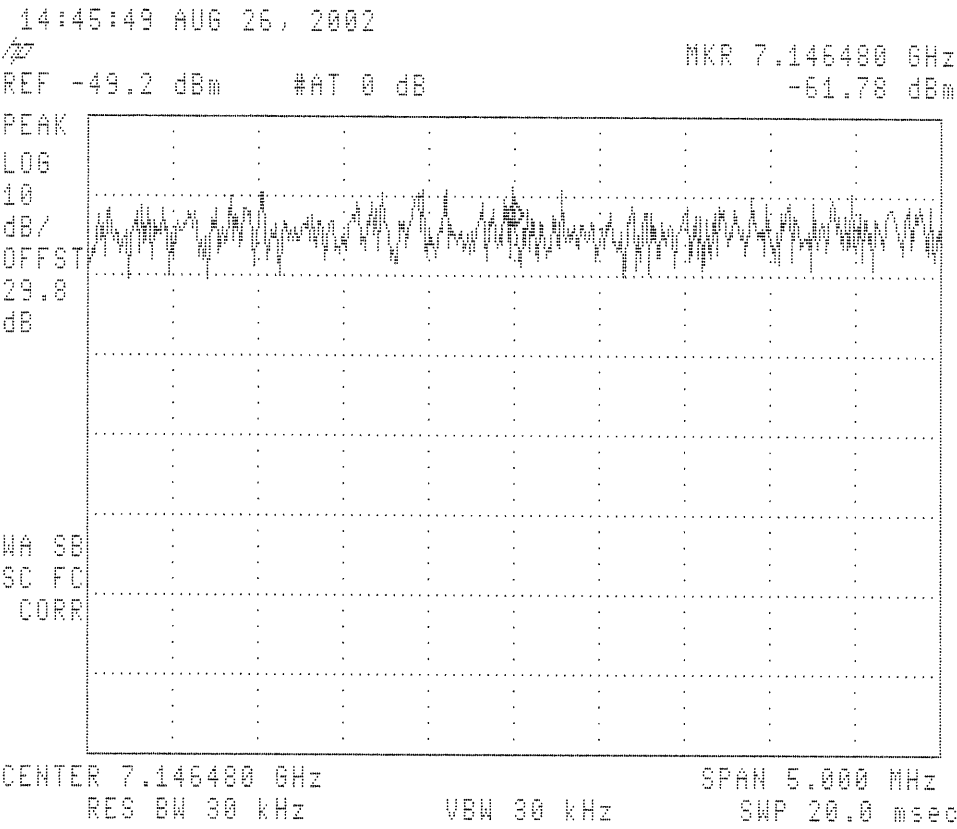
MKR 5.359860 GHz  
-68.83 dBm

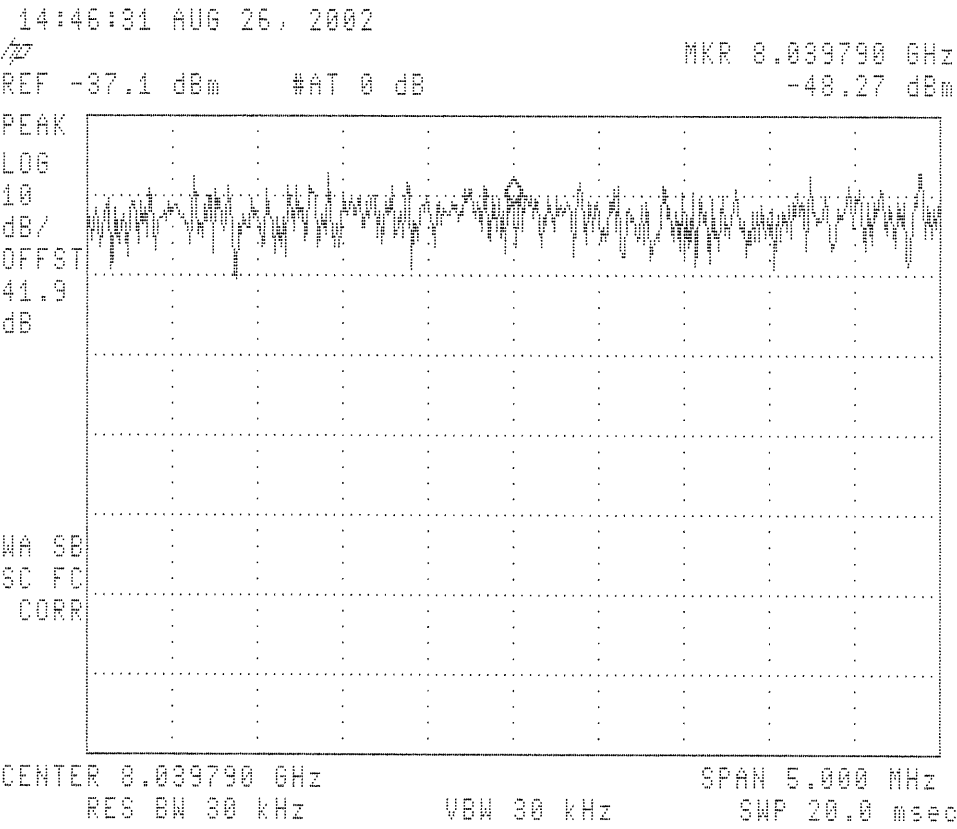
REF -54.1 dBm #AT 0 dB



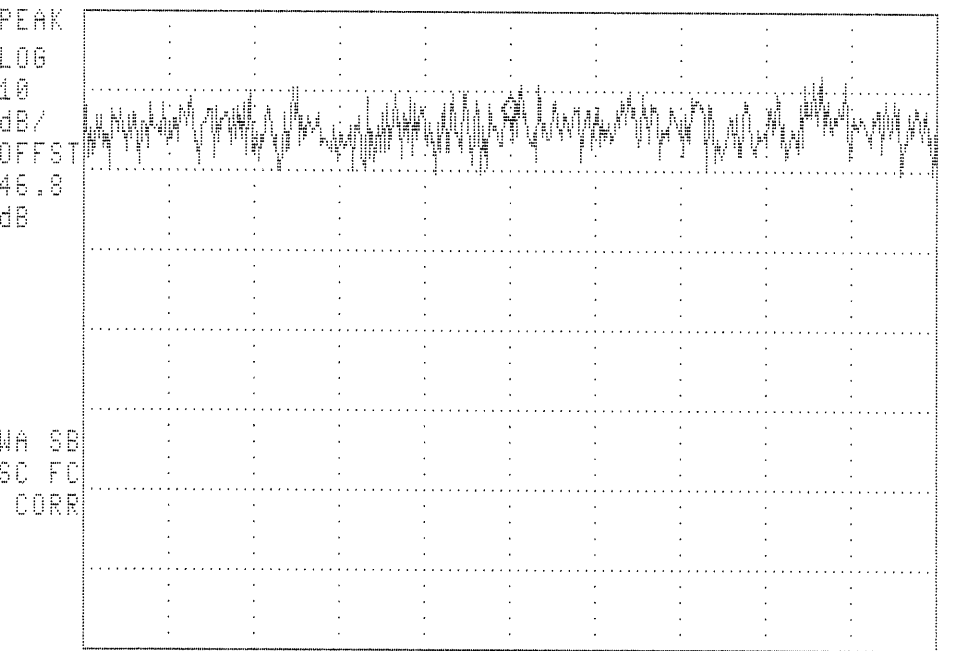
CENTER 5.359860 GHz SPAN 5.000 MHz  
RES BW 30 kHz VBW 30 kHz SWP 20.0 msec







14:48:04 AUG 26, 2002  
/Z  
REF -32.2 dBm #AT 0 dB MKR 8.933100 GHz  
-44.42 dBm



CENTER 8.933100 GHz SPAN 5.000 MHz  
RES BW 30 kHz VBW 30 kHz SWP 20.0 msec



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**FCC ID: IHET5CR1**

## **SECTION E**

# **OCCUPIED BANDWIDTH**



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SECTION E

FCC ID: IHET5CR1

# **OCCUPIED BANDWIDTH**

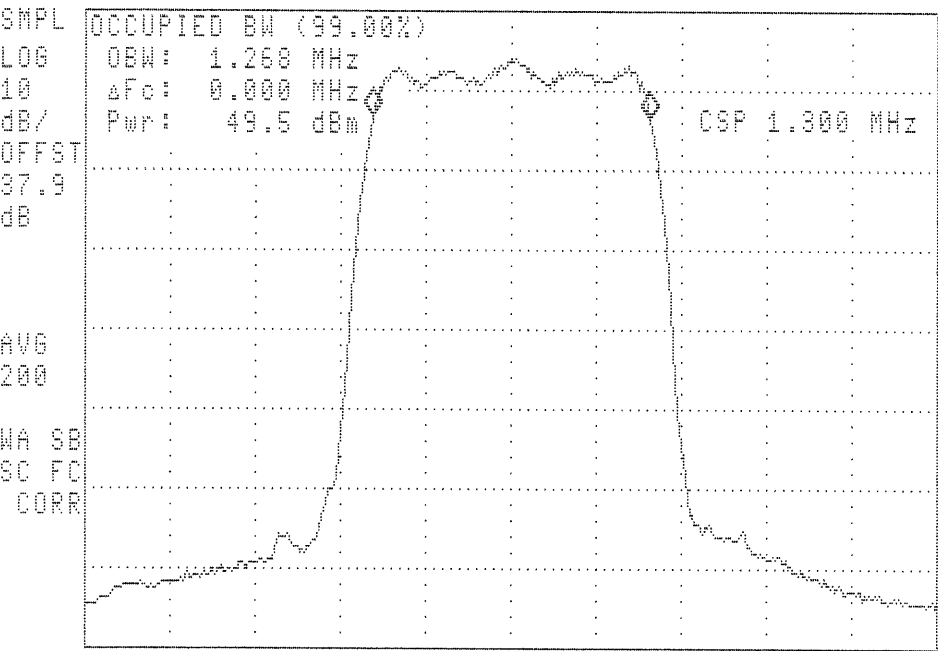
## **CDMA Transmitter Channel 1013**

### **Maximum Power**

11:18:38 SEP 18, 2002



REF 41.9 dBm #AT 30 dB



CENTER 869.700 MHz SPAN 3.900 MHz

#RES BW 30 kHz #VBW 30 kHz SWP 20.0 msec



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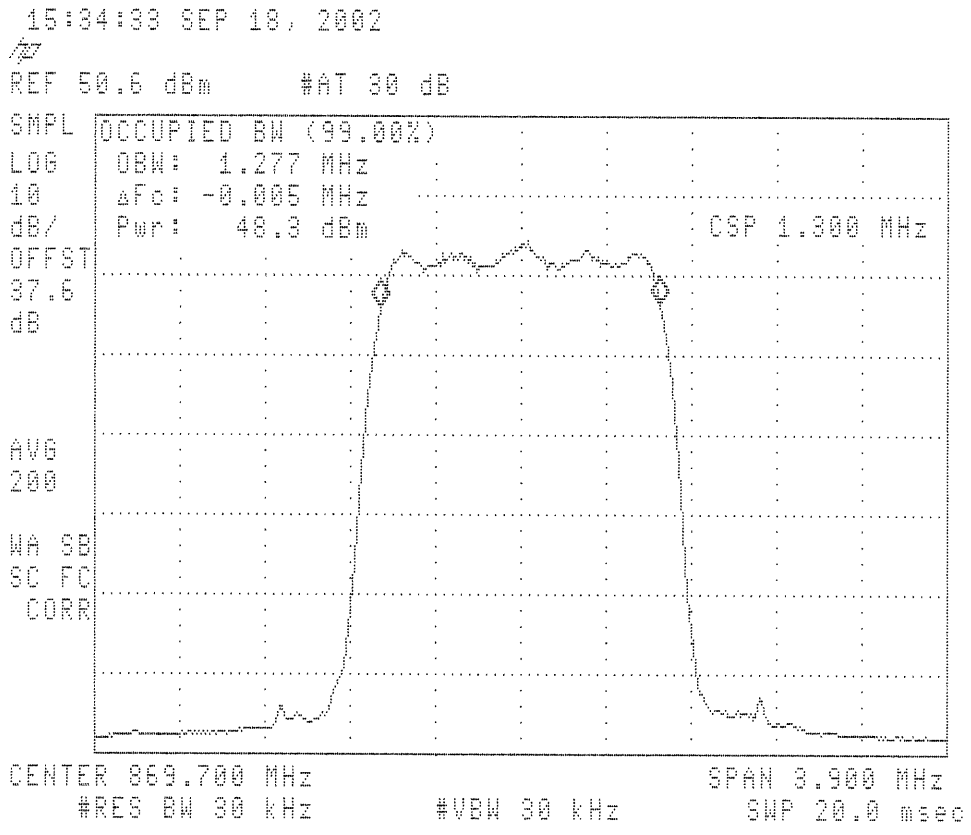
SECTION E

FCC ID: IHET5CR1

# **OCCUPIED BANDWIDTH**

## **CDMA Transmitter Channel 1013**

### **Mid Power**





**MOTOROLA**

*Global Telecom Solutions Sector*

SECTION E

FCC ID: IHET5CR1

# **OCCUPIED BANDWIDTH**

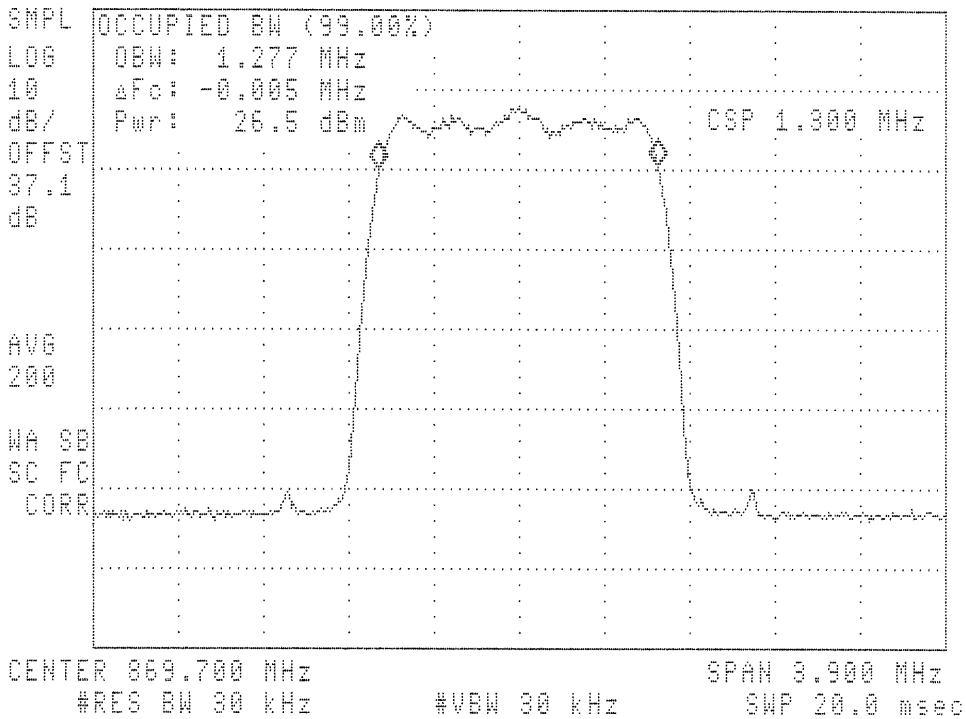
## **CDMA Transmitter Channel 1013**

### **Minimum Power**

14:25:27 SEP 18, 2002

~~17~~

REF 25.1 dBm #AT 30 dB





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SECTION E

FCC ID: IHET5CR1

# **OCCUPIED BANDWIDTH**

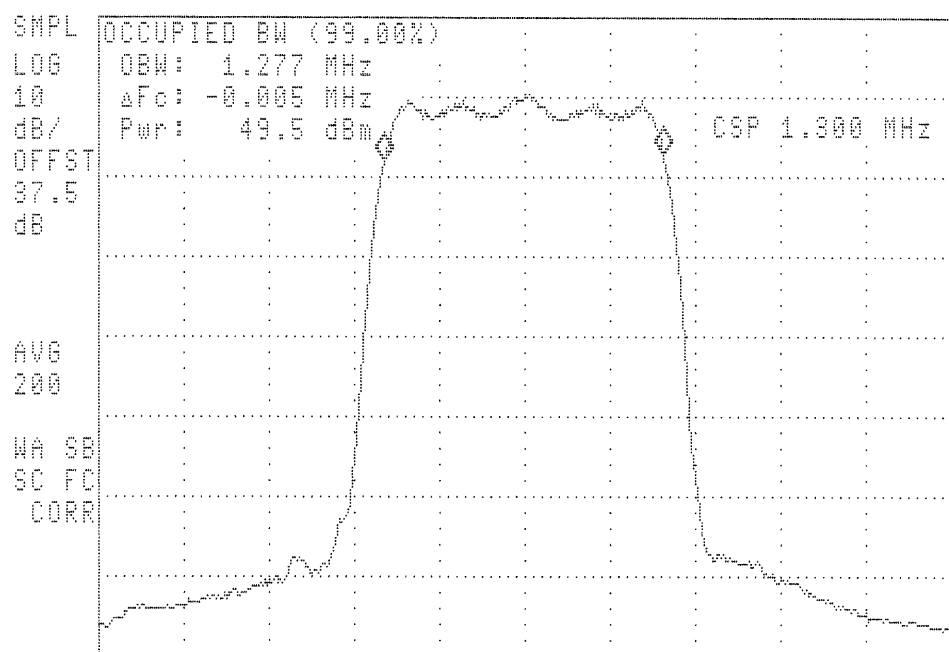
## **CDMA Transmitter Channel 777**

### **Maximum Power**

13:56:50 SEP 18, 2002

~~10~~

REF 45.5 dBm #AT 30 dB



CENTER 893.310 MHz

#RES BW 30 kHz

#VBW 30 kHz

SPAN 3.900 MHz

SWP 20.0 msec



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SECTION E

FCC ID: IHET5CR1

# **OCCUPIED BANDWIDTH**

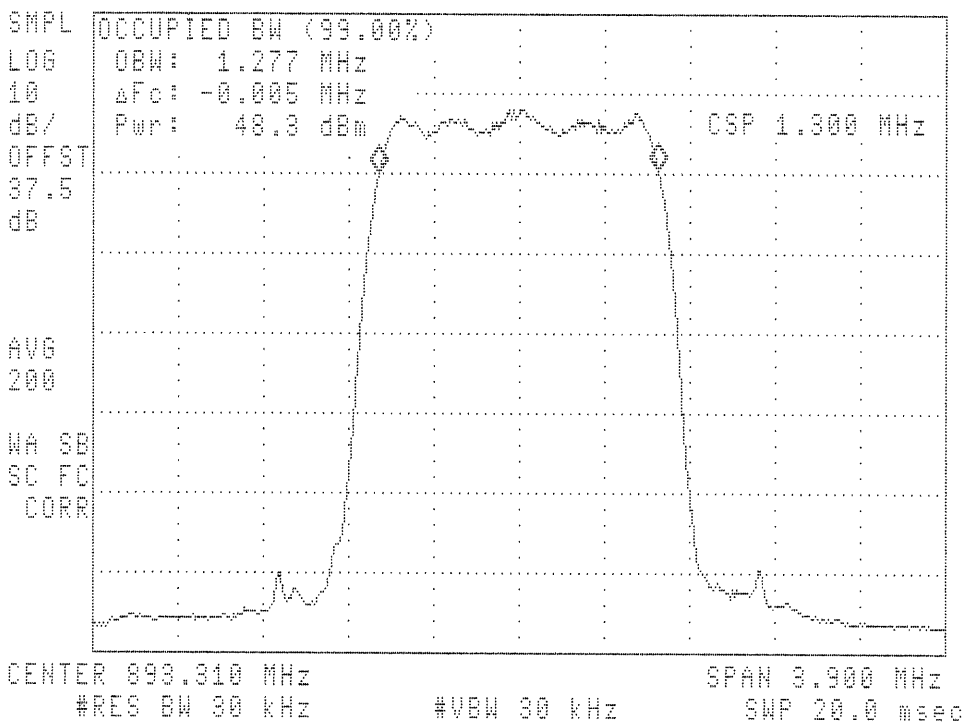
## **CDMA Transmitter Channel 777**

### **Mid Power**

15:55:01 SEP 18, 2002

~~12~~

REF 46.5 dBm #AT 30 dB





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SECTION E

FCC ID: IHET5CR1

# OCCUPIED BANDWIDTH

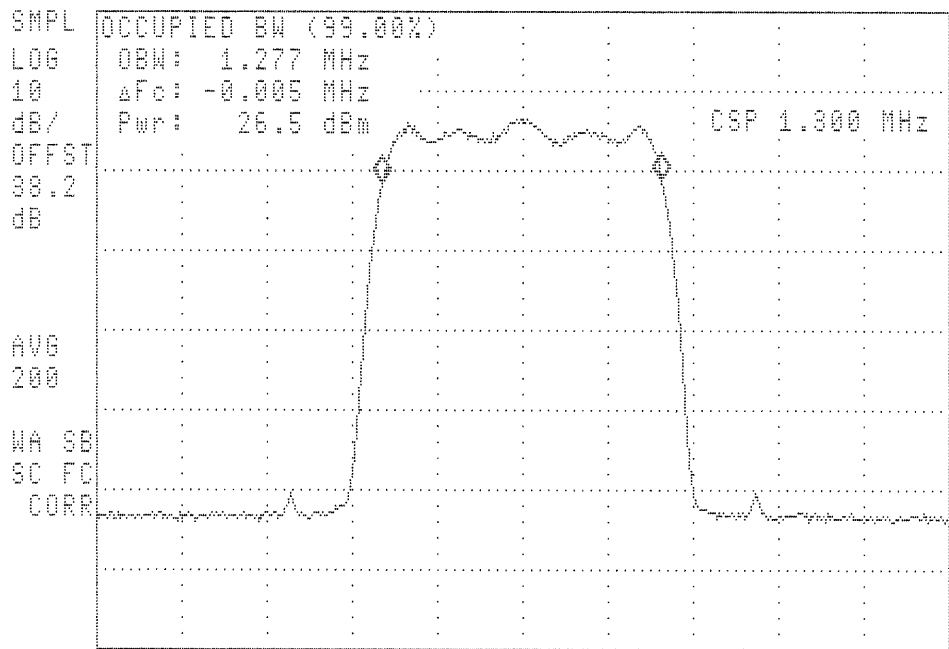
## CDMA Transmitter Channel 777

### Minimum Power

14:34:05 SEP 18, 2002

~~17~~

REF 26.2 dBm #AT 30 dB



CENTER 893.310 MHz

#RES BW 30 kHz

#VBW 30 kHz

SPAN 3.900 MHz

SWP 20.0 msec



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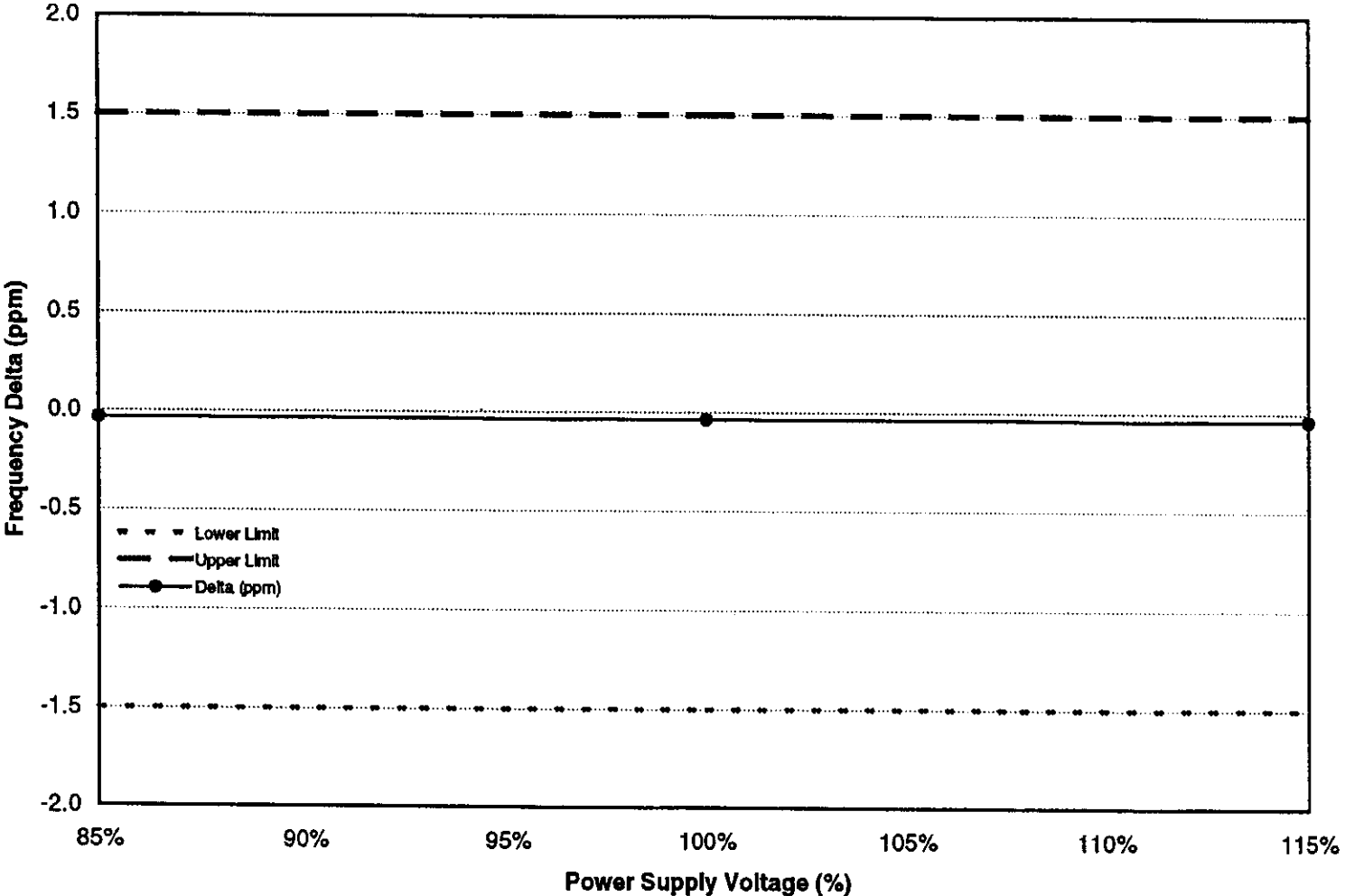
*Global Telecom Solutions Sector*

FCC ID: IHET5CR1

## **SECTION F**

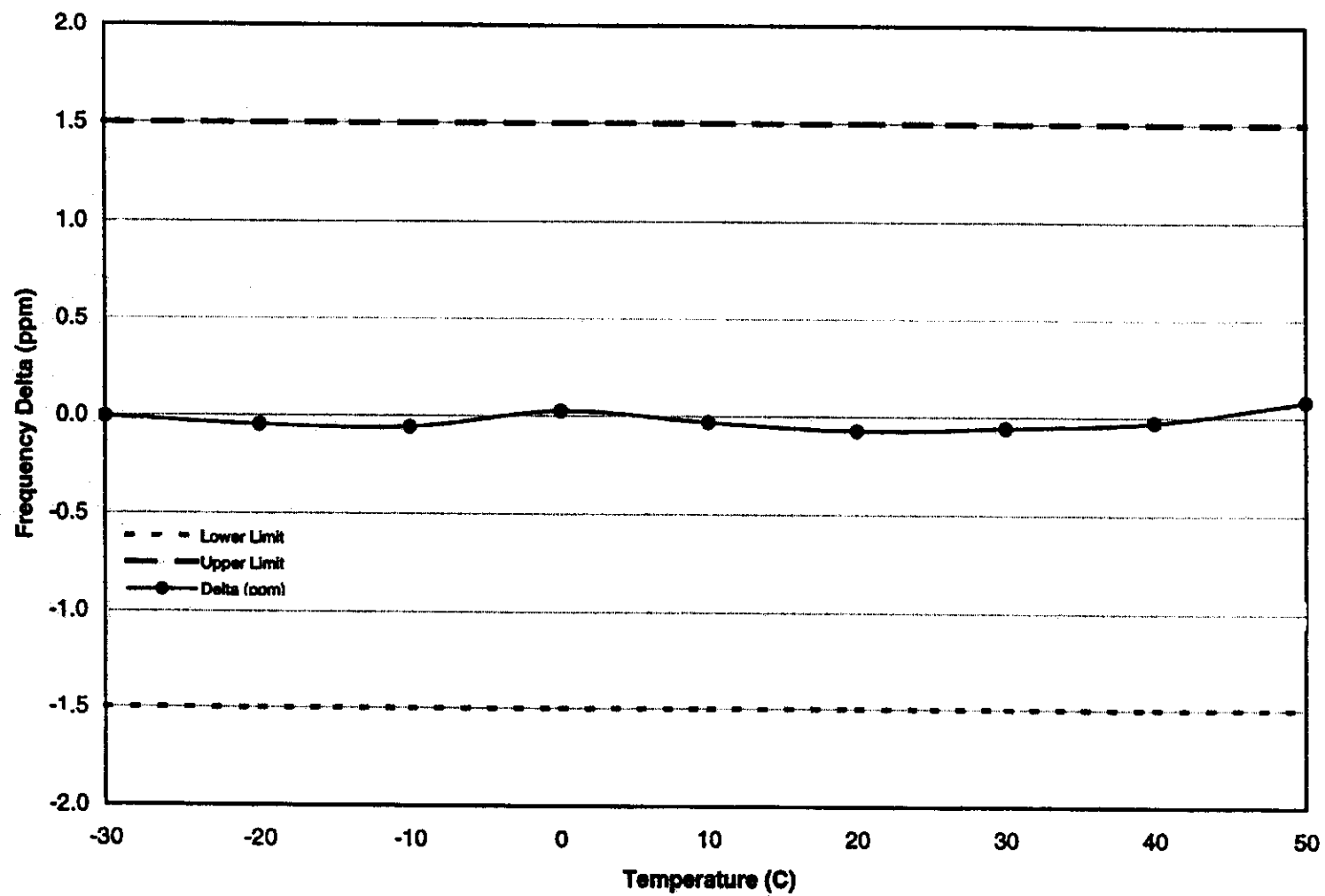
# **FREQUENCY STABILITY**

Frequency Stability with Varying Supply Voltage - CSM1



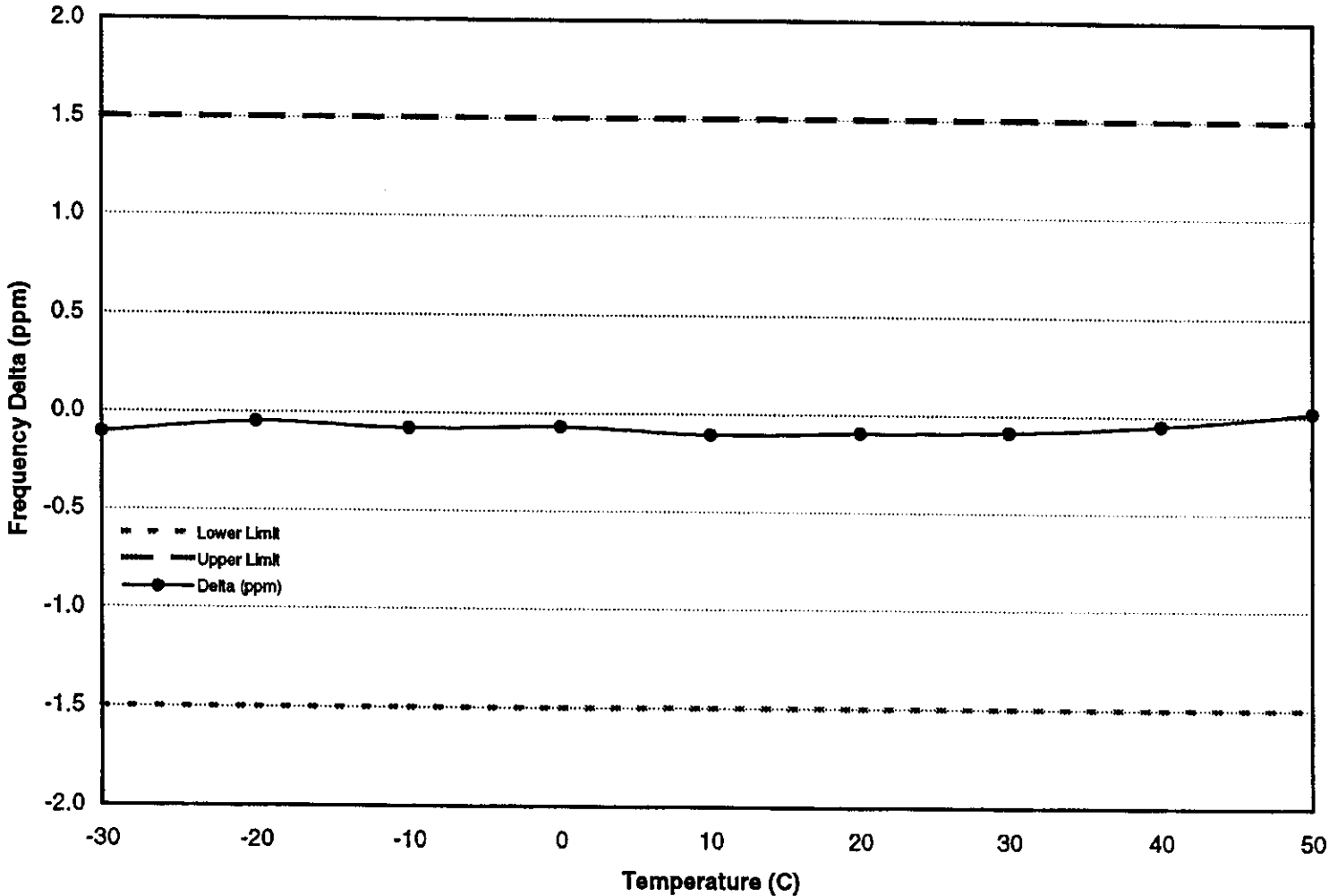
SC4812T @800 MHz  
CDMA BTS Frame

### Frequency Stability Over Temperature - CSM1



SC4812T @800 MHz  
CDMA BTS Frame

Frequency Stability Over Temperature - CSM2



SC4812T @800 MHz  
CDMA BTS Frame