

**LISTING OF REQUIRED MEASUREMENTS**  
**SECTION 2.1033 (c) (14)**

## MEASUREMENT PER SECTION 2.999 OF THE RULES

### SECTION 2.1033 (c) (14)

The data required by Section 2.1046 through 2.1057, inclusive, measured in accordance with the procedures set out in Section 2.1041.

### RESPONSE:

The following pages include the data required for the Certification of the FCC ID: **AS5CMP-41** measured in accordance with the procedures set out in Section 2.999 of the Rules.

Each required measurement and its corresponding exhibit number are:

Measurement: 1	Section 2.1046	RF Power Output
Measurement: 2	Section 2.1047	Modulation Characteristics
Measurement: 3	Section 2.1049	Occupied Bandwidth
Measurement: 4	Section 2.1051	Spurious Emissions at Antenna Terminals
Measurement: 5	Section 2.1053	Field Strength of Spurious Radiation
Measurement: 6	Section 2.1055	Measurement of Frequency Stability
	Section 2.1057	Frequency Spectrum to be Investigated
	.....	Test Instrumentation List

**MEASUREMENT OF DC POWER**  
**SECTION 2.1033 (c) (8)**

## **Measurement of DC Power**

### **SECTION 2.1033 (c) (8)**

The DC voltages applied to and DC currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.

**RESPONSE:** The PCBR outputs 14 dBm max. The PCBR has the following voltage and maximum current.

Final Output Transistor: The final state output transistor draws 0.49A at 6V DC.

**Measurement: 1**

**MEASUREMENT OF RADIO FREQUENCY  
POWER OUTPUT**

**Section 2.1046**

**SECTION 2.1046****Measurement: 1****MEASUREMENT OF RADIO FREQUENCY POWER OUTPUT**

The test arrangements used to measure the radio frequency power output of the Predistortion CDMA Baseband Radio (1900) (PCBR) FCC ID: **AS5CMP-41**, is on the following page. Required measurements were made respectively at each frequency where occupied Bandwidth measurements must be performed. The use of the PCBR is for a single CDMA carrier. This requires that the RF power output level be calibrated for the specific channel of use. The test configuration, Figure 1A, allowed the measurement of RF output power for each channel investigated for Occupied Bandwidth. These included the upper, and lower band edges and at the center channels for 15MHz wide frequency blocks and upper, and lower band edge channels for 5 MHz wide frequency blocks. The IS-97 channel allocations are listed below:

**IS 97 channel allocation consists of following channel Blocks:**

Block	Frequency Bands Per FCC 24.229  MHz	Valid CDMA Channel s & Frequency Range	
		Channel No.	MHz
A (15 MHz )	1930.000 – 1945.000	25 – 275	1931.250 – 1943.750
D (5 MHz)	1945.000 – 1950.000	325 – 375	1946.250 – 1948.750
B (15 MHz)	1950.000 – 1965.000	425 – 675	1951.250 – 1963.750
E (5 MHz)	1965.000 – 1970.000	725 – 775	1966.250 – 1968.750
F (5 MHz)	1970.000 – 1975.000	825 – 875	1971.250 – 1973.750
C (15 MHz)	1975.000 – 1990.000	925 - 1175	1976.250 – 1988.750

The edge channels are 25 and 1175.

The PCBR has a maximum RF power output of 0.025 Watts (14 dBm) +2/-4 dB, it also has a minimum power output at the antenna terminals of 0.00016 Watts (-8 dBm) +2/-4 dB, across the PCS band (1930-1990 MHz). The signal applied to the PCBR is defined in Table 1.1. The power was reset to 14 dBm at each measurement frequency to verify the spectral performance at that power level. The attenuation range was also verified. The specific Frequencies and channels and set power level was documented on each “Occupied Bandwidth” sheet. (see Measurement-3)

Type	Number of Channels	Fraction of Power (Linear)	Fraction of Power (dB)	Comments
Pilot	1	0.2000	-7.0	Walsh 0
Sync	1	0.0471	-13.3	Walsh 32, always 1/8 rate
Paging	1	0.1882	-7.3	Walsh 1, full rate only
Traffic	6	0.09412 each	-10.3 each	Variable Walsh Assignments, full rate only

**TABLE 1.1 BASE STATION TEST MODEL, NOMINAL****TEST SETUP FOR MEASUREMENT OF RADIO FREQUENCY POWER OUTPUT****EQUIPMENT:**

<b>BBU:</b>	<b>Baseband Unit</b>
<b>PCBR:</b>	<b>Predistortion CDMA Baseband Radio (1900) (FCCID:AS5CMP-41)</b>
<b>PA</b>	<b>Power Amplifier (ICLA) (FCCID: AS5CMP-42)</b>
<b>Transmit Filter:</b>	<b>PCS Band Transmit Filter appropriate for the investigated Band</b>
<b>Directional Coupler:</b>	<b>HP 778D Dual Directional Coupler</b>
<b>Power Meter:</b>	<b>HP 437B with HP 8481A Power Head</b>
<b>Plotter:</b>	<b>HP Model 520 DeskJet</b>
<b>Spectrum Analyzer:</b>	<b>Rohde &amp; Schwarz FSEK EMI Test Receiver</b>

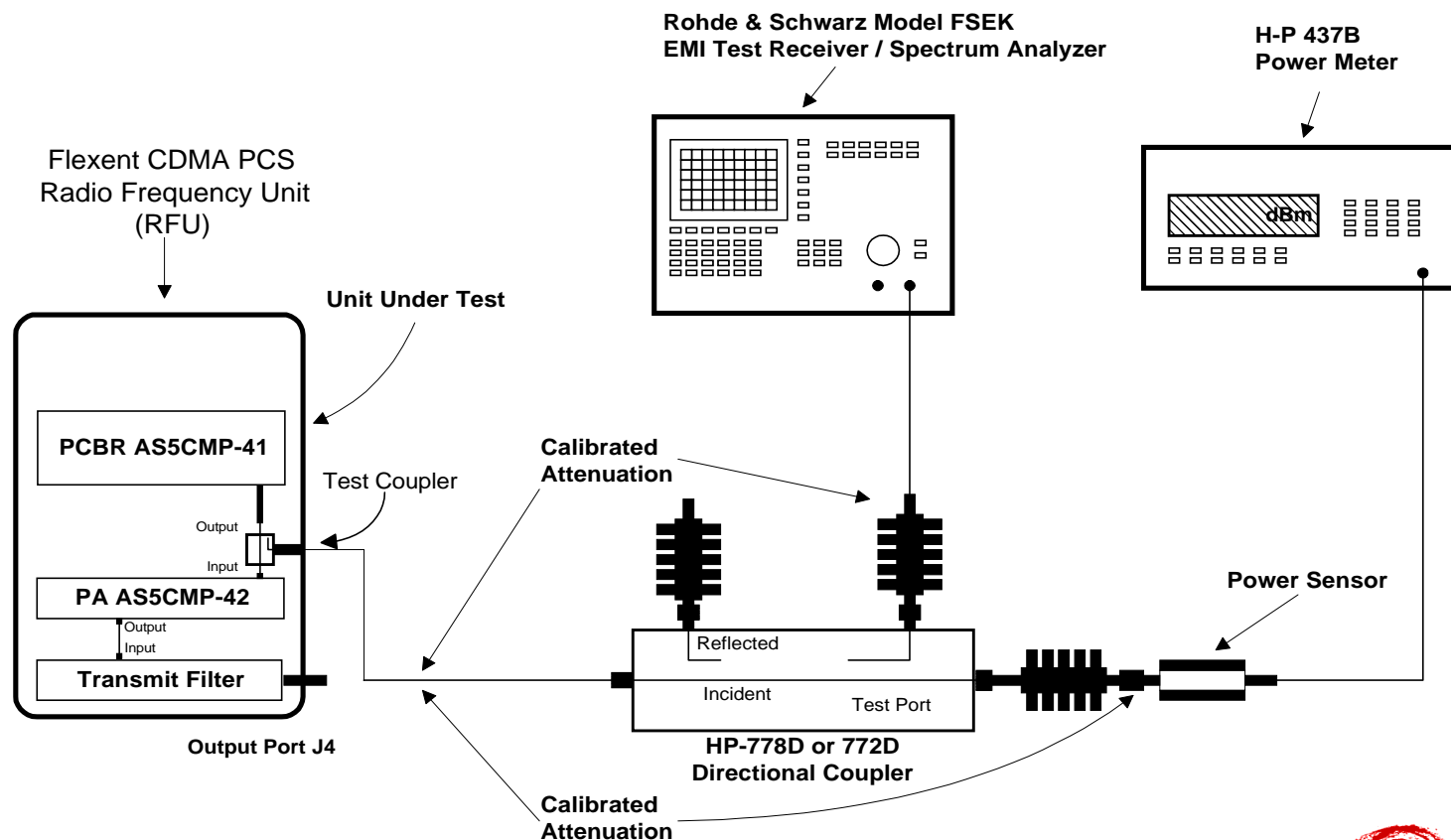
**RESULTS:**

The PCBR was configured in the test setup shown in Figure 1A. For each of the PCS channels tested the PCBR delivered a 14 dBm when measured at the RF output connection. This data is recorded on the Occupied Bandwidth Data Sheets (see Measurement : 3).

**Figure 1A. TEST CONFIGURATION FOR RF POWER OUTPUT**

APPLICANT: Lucent Technologies

FCC ID: AS5CMP - 41



All components are calibrated over the frequency range of interest

**Lucent Technologies**  
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**Measurement: 2**

**MEASUREMENT OF MODULATION  
CHARACTERISTICS**

**SECTION 2.1047**

**MEASUREMENT: 2****MEASUREMENT OF MODULATION CHARACTERISTICS****SECTION 2.1047**

The modulation methods used in CDMA are completely different from those used in FM analog System. The methods used in evaluating the PCBR are described in the EIA/TAIS document TIA/EIA-97-C “recommended Minimum performance Standards for Base Stations Supporting Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations”. The modulation quantify criteria are as follows:

**1.0 Modulation Requirements – Section 4.3 of TIA/EIA-97-C**

Waveform specifications are tested by measuring the waveform quality of  $\rho$ , as defined in TIA/EIA-97-C Section 4.3.2, and code domain power as defined in 4.4.4

Transmit waveform quality can be viewed as the output of a normalized matched filter. The range of values for the transmit waveform quality is from 1.0 for a perfect CDMA waveform to 0.0 for a non-CDMA signal. As an example, the base station with a 0.5 dB degradation in its transmit waveform would have a quality,  $\rho$ , of 0.89.

**1.1 Required Results**

Section 4.3.2.3 of TIA/EIA-97-C “The normal cross correlation coefficient,  $\rho$ , shall be greater than 0.912 (excess power <0.4 dB)”.

The test method and diagrams are taken from TIA/EIA-97-C Section 4 and 6.

**1.2 Waveform Quality**

- 1.2.1 Definition Waveform quality is measured by determining the normalized correlated power between the actual waveform and the identical waveform
- 1.2.2 Method of Measurement – Refer to Figure 2A. of this exhibit for functional block diagram of the test set-up.

1. Configure transmit channel as shown in Table 2.1.
2. Tune the PCBR to the test middle channel.
3. Apply a CDMA digital transmit signal from arbitrary waveform generator at the PCBR backplane that will product 15% modulation level (pilot only) of the appropriate level for full transmit power (TX\_IQ\_SIN\_FULL) –8.24 dB.
4. Set the PCBR power level to 40 for PCS.
5. Measure Rho. This measurement should be greater than TX\_RHO limit.

Type	Number of Channels	Fraction of Power (Linear)	Fraction of Power (dB)	Comments
Pilot	1	0.2000	-7.0	Walsh 0
Sync	1	0.0471	-13.3	Walsh 32, always 1/8 rate
Paging	1	0.1882	-7.3	Walsh 1, full rate only
Traffic	6	0.09412 each	-10.3 each	Variable Walsh Assignments, full rate only

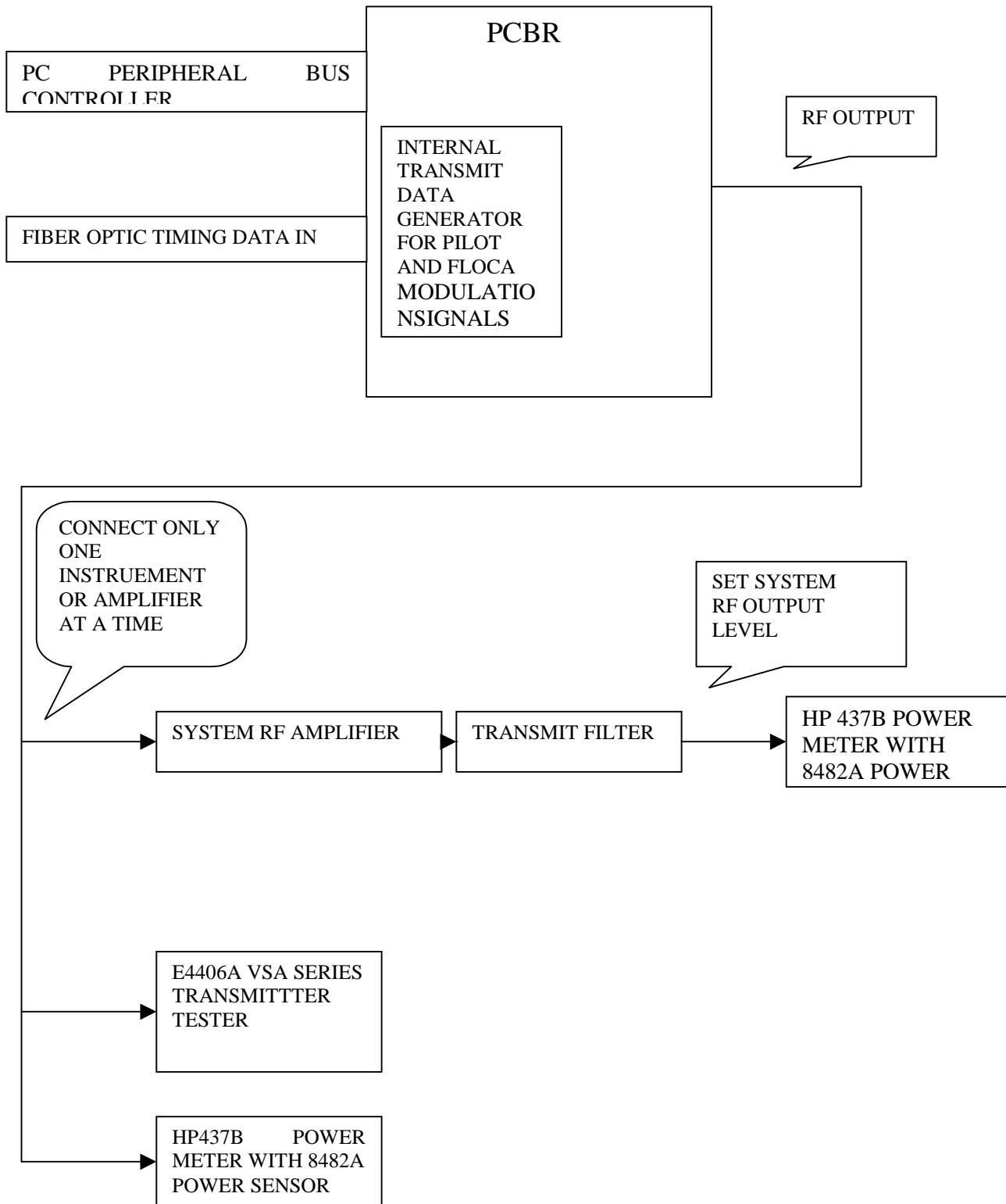
**TABLE 2.1 Base Station Test Model, Nominal**

### **1.3 Minimum Standard**

The normalized cross correlation coefficient,  $\rho$ , shall be greater than 0.912 (excess power <0.4 dB).

### **1.4 Results**

The test verified that the waveform quality factor, the normalized cross correlation coefficient,  $\rho$ , is  $\geq 0.96$ . It also verifies that the frequency assignment is less than (+0.05 PPM) of the frequency assignment.

**Figure 2A. RHO TEST SETUP**

**Measurement: 3**

**MEASUREMENT OF OCCUPIED BANDWIDTH**  
**SECTION 2.1049**

**SECTION 2.1049****MEASUREMENT: 4****MEASUREMENT OF OCCUPIED BANDWIDTH**

The occupied bandwidth of the FCC ID: **AS5CMP-41** PCBR was measured using a Rohde & Schwarz FSEK Spectrum Analyzer and a HP Model 520 DeskJet Printer. The RF power level was measured using RF power meter as shown in the test setup in Figure 3A. The RF output from the transmitter to spectrum analyzer was reduced (to an amplitude usable by the spectrum analyzer) by using a calibrated attenuator. This attenuation was offset on the display and the signal adjusted to the -16.1 dB level corresponding to the corrected RF power level for a 30 kHz resolution bandwidth. The reference-line on the spectrum analyzer display corresponds to level measured by the RF power meter.

Occupied Bandwidth plots show measurements made at RF Power output terminals of PCBR for an output of 0.025 watts (14 dBm)

**IS 97 channel allocation consists of following channel Blocks:**

Block	Frequency Bands Per FCC 24.229  MHz	Valid CDMA Channel s & Frequency Range	
		Channel No.	MHz
A (15 MHz )	1930.000 – 1945.000	25 – 275	1931.250 – 1943.750
D (5 MHz)	1945.000 – 1950.000	325 – 375	1946.250 – 1948.750
B (15 MHz)	1950.000 – 1965.000	425 – 675	1951.250 – 1963.750
E (5 MHz)	1965.000 – 1970.000	725 – 775	1966.250 – 1968.750
F (5 MHz)	1970.000 – 1975.000	825 – 875	1971.250 – 1973.750
C (15 MHz)	1975.000 – 1990.000	925 - 1175	1976.250 – 1988.750

The edge channels are 25 and 1175.

*The frequencies and channels used for measurements are tabulated on the bottom of each plot. The PCBR output signals are plotted at each frequency blocks/bands. Plots are also provided for Left Edge, Center and Right Edge of PCS bands A, B and C (Blocks of 15 MHz wide) Plots are provided for Left Edge, and Right Edge of PCS bands D, E and F (Blocks of 5 MHz wide). These frequencies were chosen to show the occupied bandwidth in the channels in each of the PCS bands in which this radio can be operated, in compliance with Section 24.229 and 24.238 (c) of the Commission code. There are no SAT or Wide band data signals associated with CDMA. The signal used to show the occupied bandwidth is defined in Table 3.2. This is the signal recommended in TIA/EIA-97-C. The power output level was adjusted to provide the documented power levels at the bottom of each chart.*

Type	Number of Channels	Fraction of Power (Linear)	Fraction of Power (dB)	Comments
Pilot	1	0.2000	-7.0	Walsh 0
Sync	1	0.0471	-13.3	Walsh 32, always 1/8 rate
Paging	1	0.1882	-7.3	Walsh 1, full rate only
Traffic	6	0.09412 each	-10.3 each	Variable Walsh Assignments, full rate only

**TABLE 3.2 Base Station Test Model, Nominal**

The minimum standard presented in TIA/EIA-97-C.

**“Suppression Inside the Licensee’s Frequency Block(s)”**

For all frequencies within the base station transmit band of 1930 to 1990 MHz that are within the specific block(s) allocated to the operator’s system. The total conducted spurious emissions in any 30 kHz band greater than 885 kHz for the CDMA channel center frequency shall not exceed a level of –45 dBc....

The spectrum analyzer output plots show the CDMA channel signal is 16.1 dB below the reference line of the spectrum analyzer for the following reason: For the CDMA system there is no carrier without modulation. The CDMA transmit bandwidth is 1.23 MHz. Since spectrum analyzer does not have Resolution Bandwidth setting for 1.23 MHz, the following relationship was used to provide the correct level.

$$10 \cdot \log (\text{Resolution Bandwidth} / \text{Transmit Bandwidth}) = \text{Signal Offset}$$

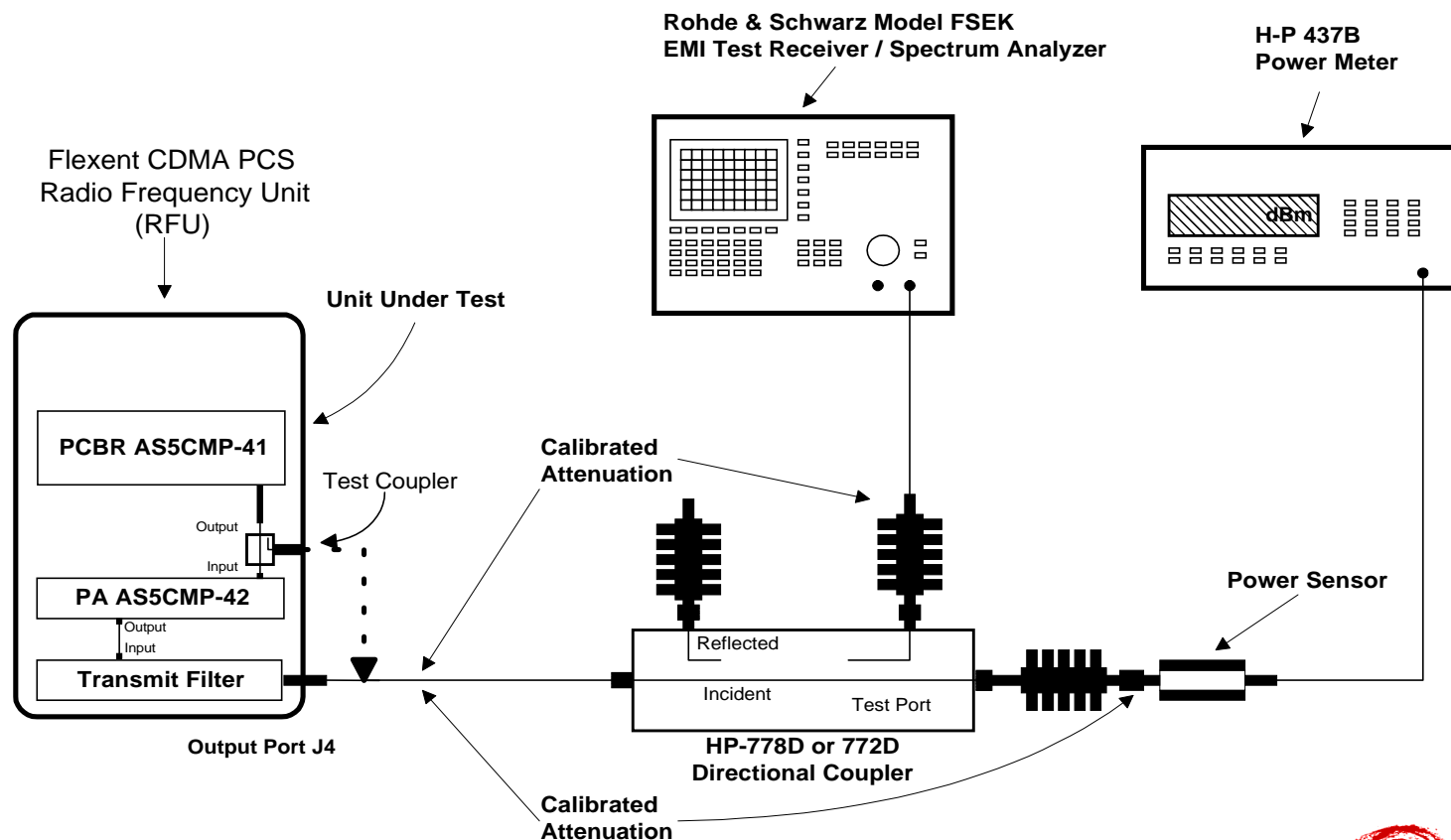
For the peak of the CDMA signal measured with a resolution bandwidth of 30 kHz the signal offset is:

$$\text{Signal Offset} = 10 \cdot \log (30 \text{ kHz} / 1.23 \text{ MHz}) = -16.1 \text{ dB}$$

**Figure 3A. TEST CONFIGURATION FOR MEASUREMENT OF OCCUPIED BANDWIDTH**

APPLICANT: Lucent Technologies

FCC ID: AS5CMP - 41



All components are calibrated over the frequency range of interest

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## **OCCUPIED BANDWIDTH**

### **PCBR OUTPUT**

#### **BLOCK A**

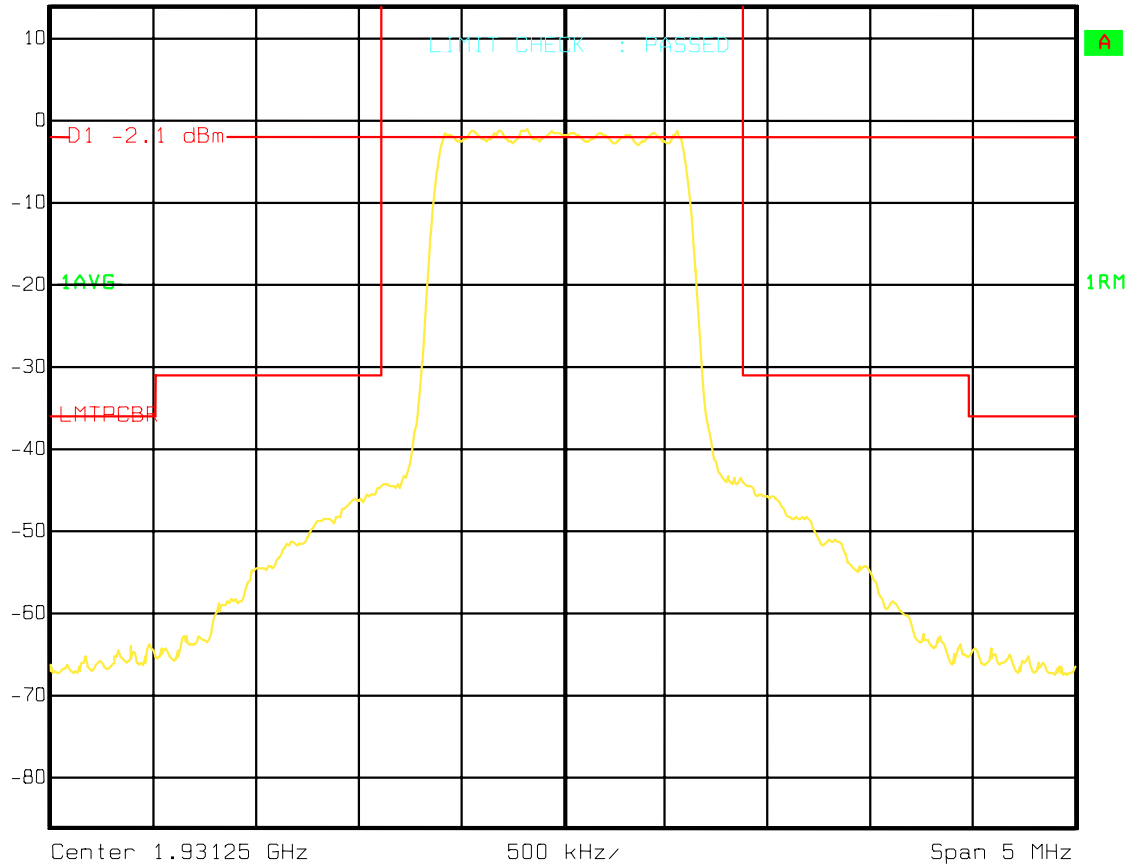
**(1930 - 1945 MHz)**

<b>Left Edge:</b>	<b>1931.25 MHz</b>	<b>(Channel 25)</b>
<b>Center:</b>	<b>1937.50 MHz</b>	<b>(Channel 150)</b>
<b>Right Edge:</b>	<b>1943.75 MHz</b>	<b>(Channel 275)</b>

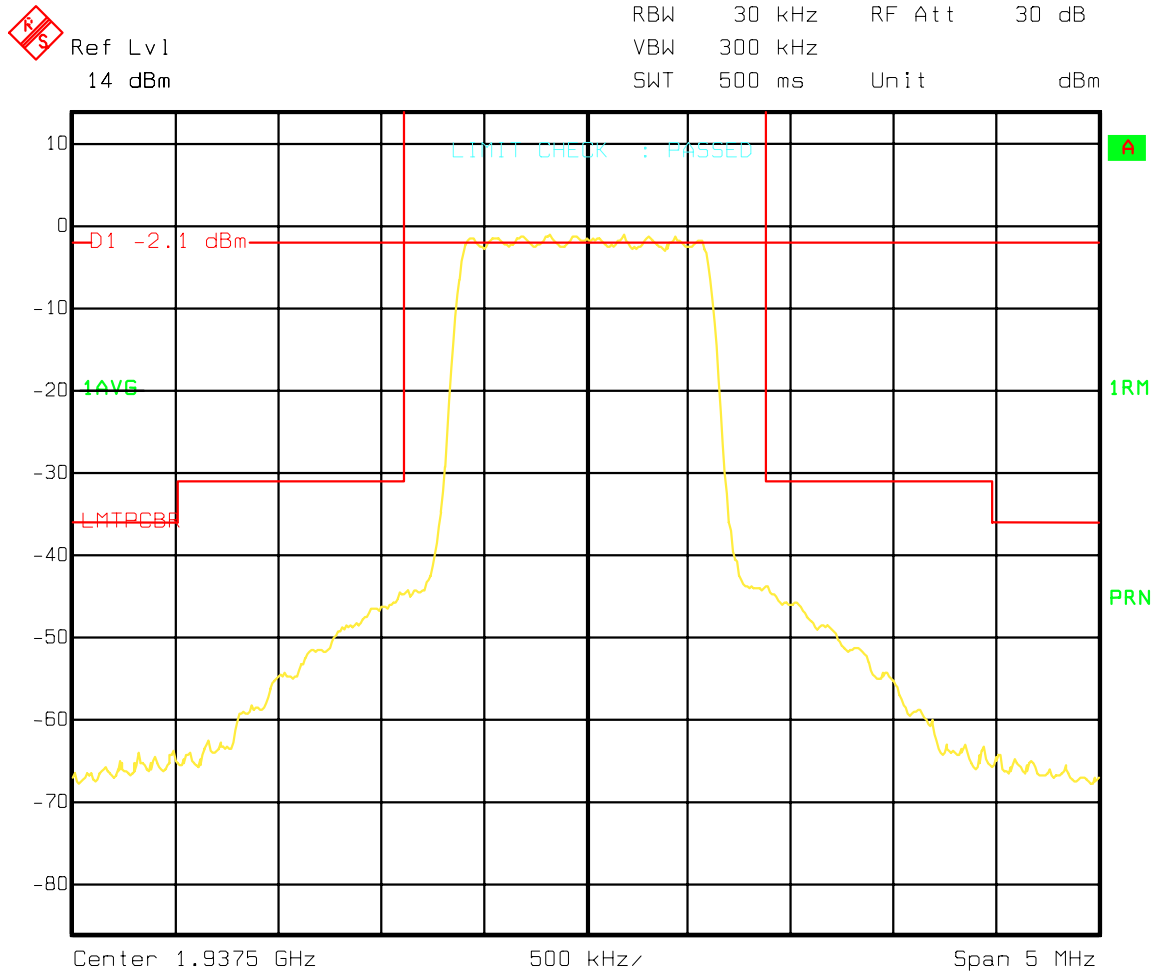


Ref Lvl  
14 dBm

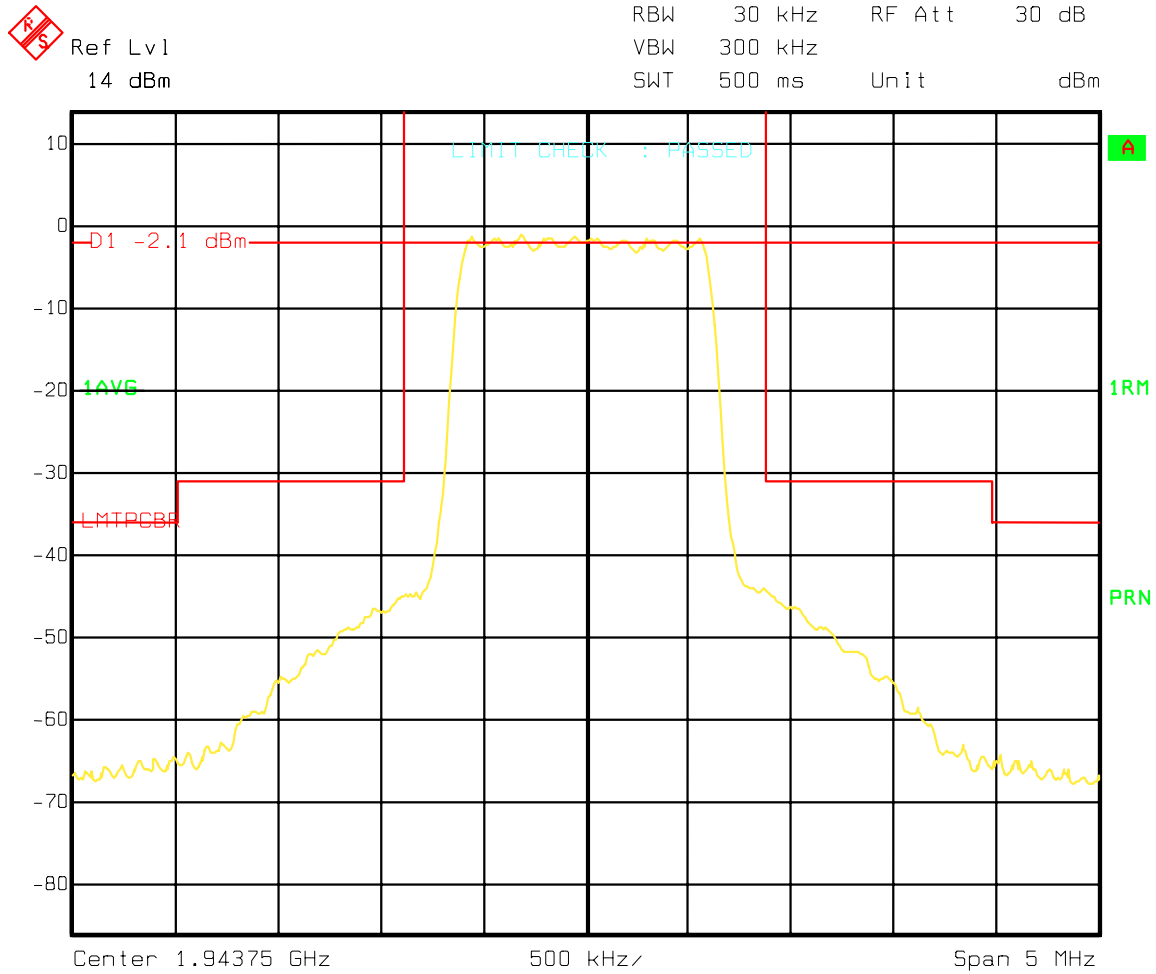
RBW 30 kHz RF Att 30 dB  
VBW 300 kHz  
SWT 500 ms Unit dBm



Title: OCCUPIED BANDWIDTH  
Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 25, P  
CBR output = 14dBm  
Date: 6.DEC.2000 15:57:51



Title: OCCUPIED BANDWIDTH  
 Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 150,  
 PCBR output = 14dBm  
 Date: 6.DEC.2000 15:59:43



Title: OCCUPIED BANDWIDTH  
 Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 275,  
 PCBR output = 14dBm  
 Date: 6.DEC.2000 16:01:11

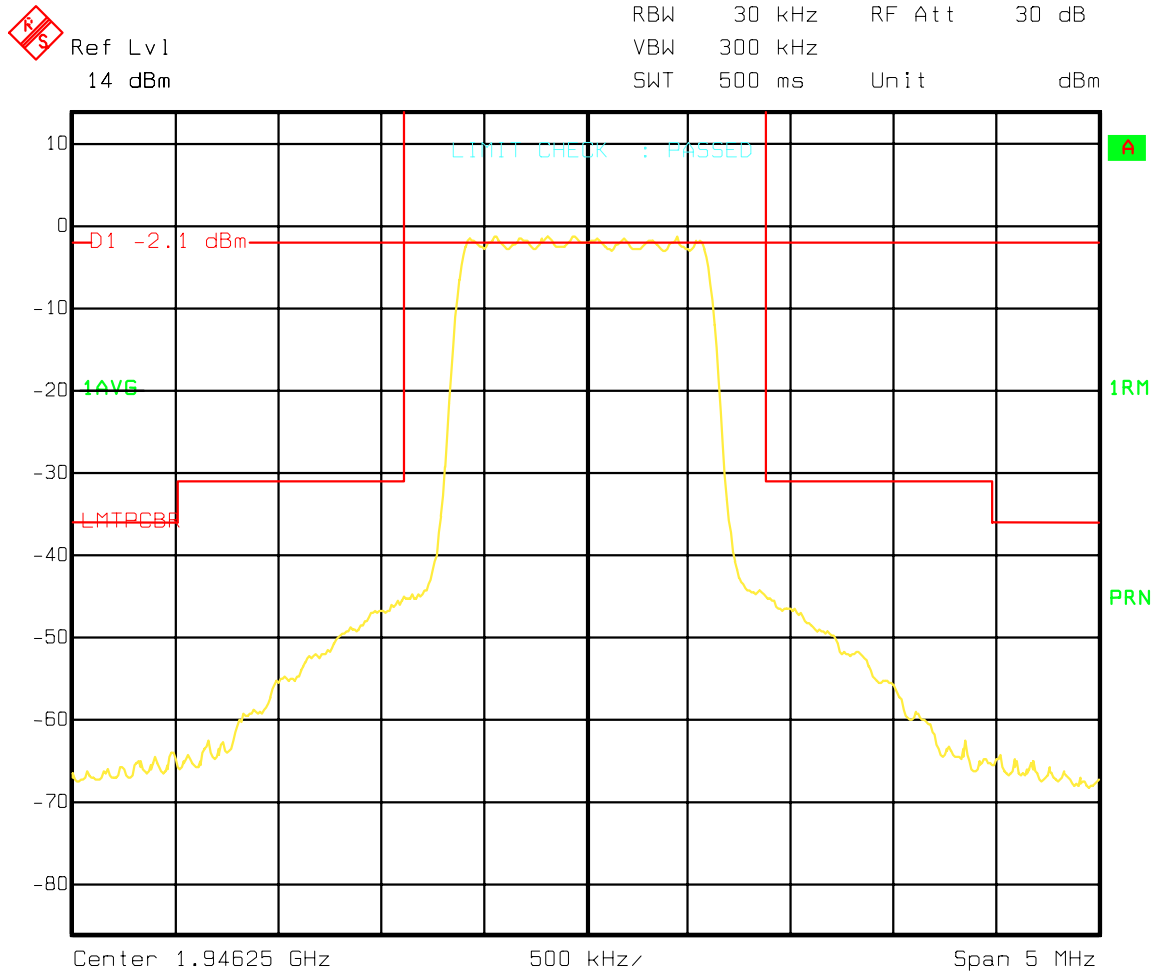
## **OCCUPIED BANDWIDTH**

### **PCBR OUTPUT**

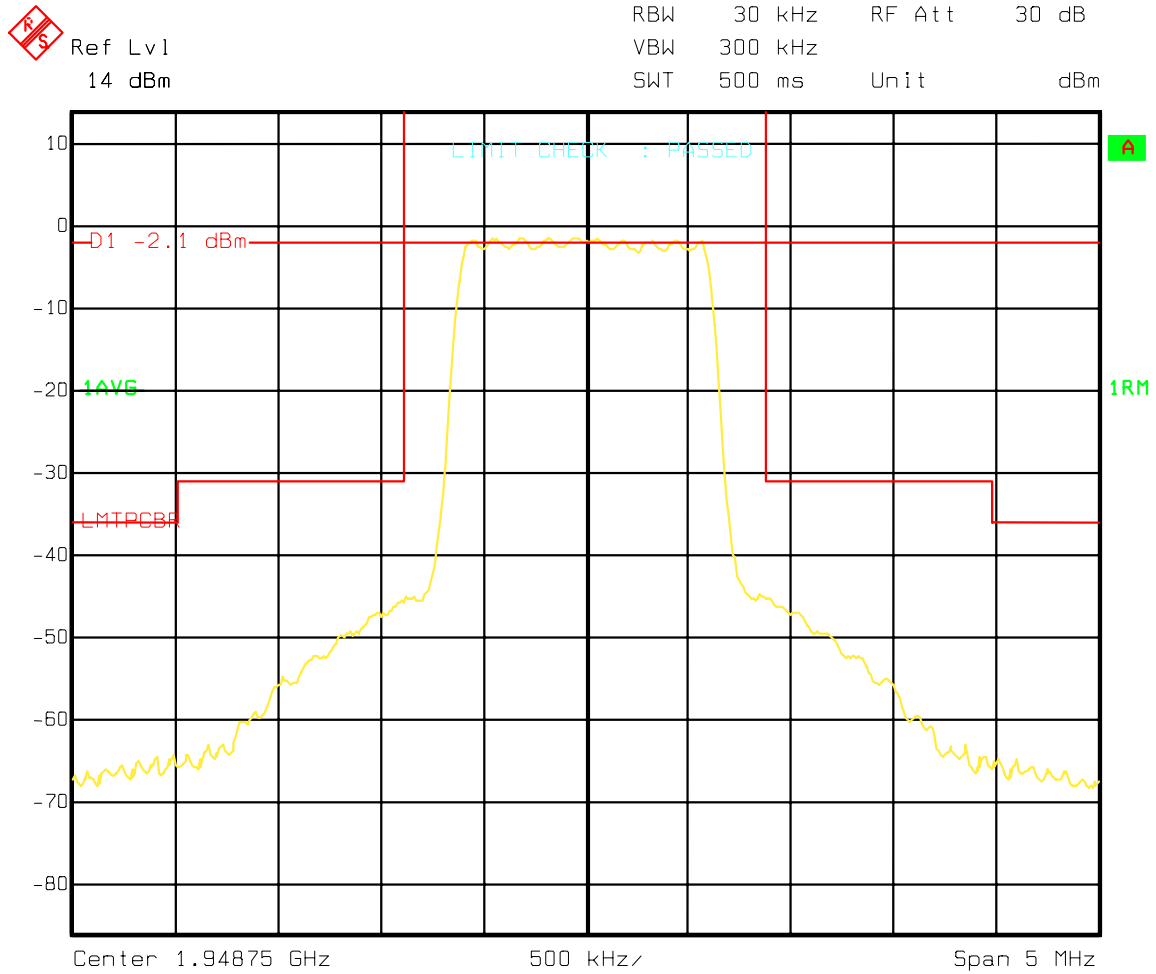
#### **BLOCK D**

**(1945 - 1950 MHz)**

<b>Left Edge:</b>	<b>1946.25 MHz</b>	<b>(Channel 325)</b>
<b>Right Edge:</b>	<b>1948.75 MHz</b>	<b>(Channel 375)</b>



Title: OCCUPIED BANDWIDTH  
 Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 325,  
 PCBR output = 14dBm  
 Date: 6.DEC.2000 16:03:12



Title: OCCUPIED BANDWIDTH

Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 375,  
PCBR output = 14dBm

Date: 6.DEC.2000 16:04:41

## **OCCUPIED BANDWIDTH**

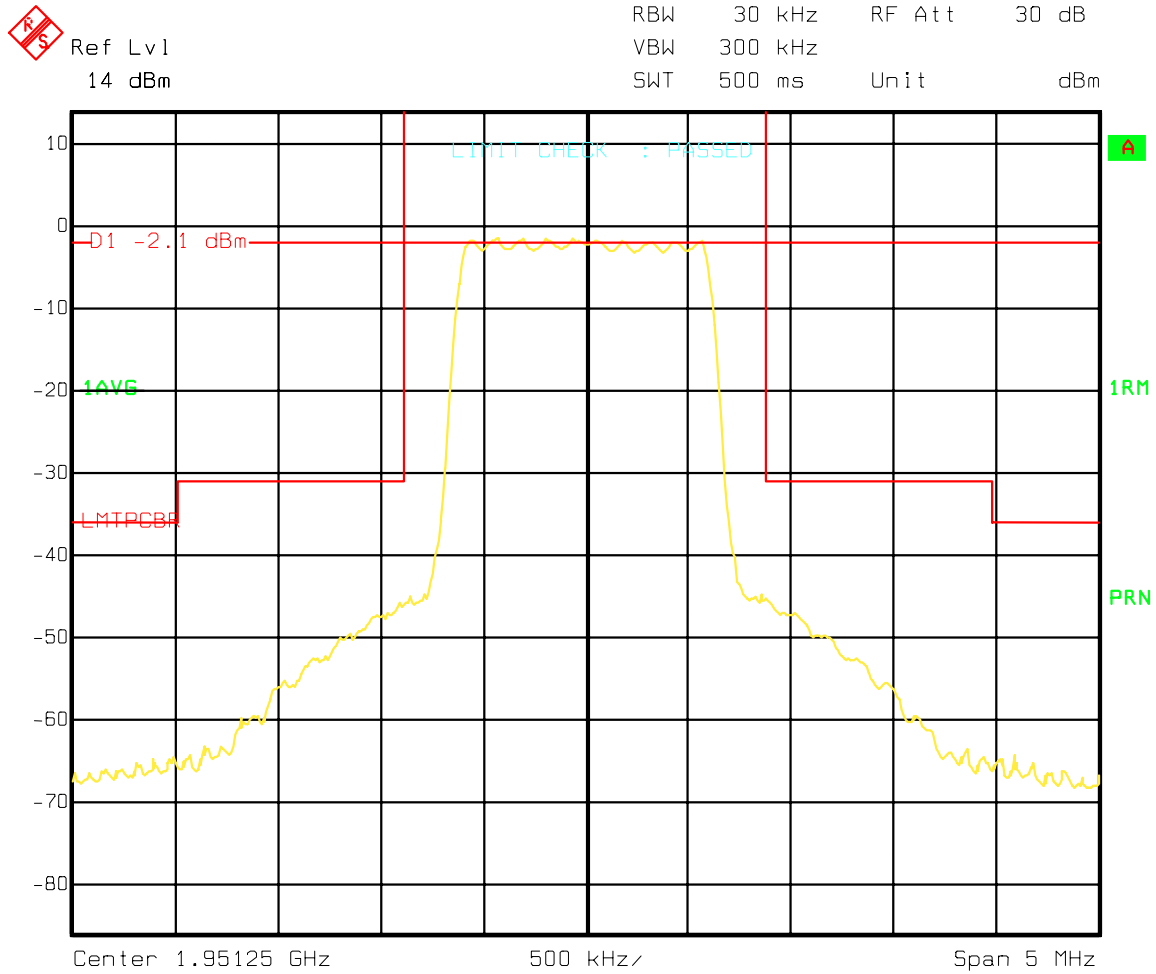
### **PCBR OUTPUT**

#### **BLOCK B**

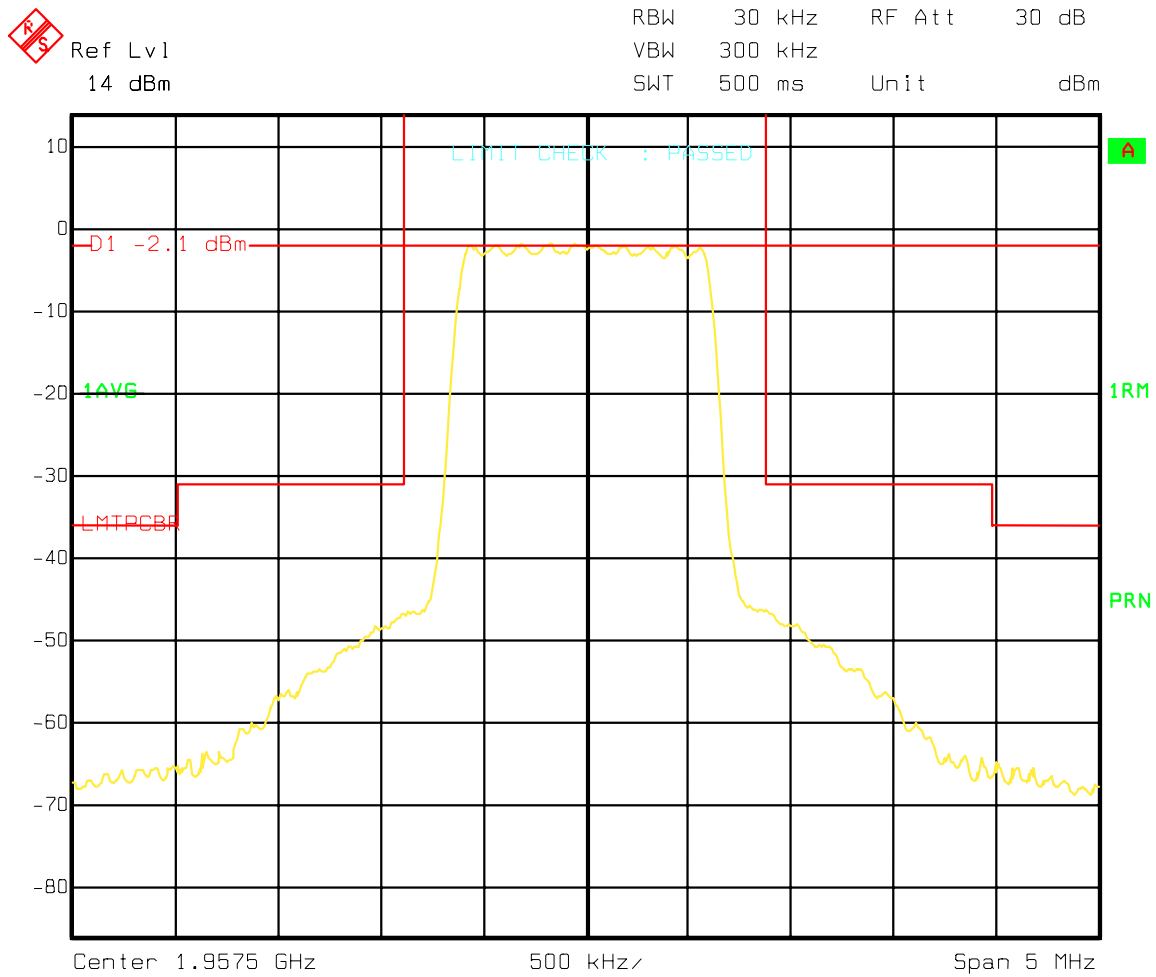
**(1950 - 1965 MHz)**

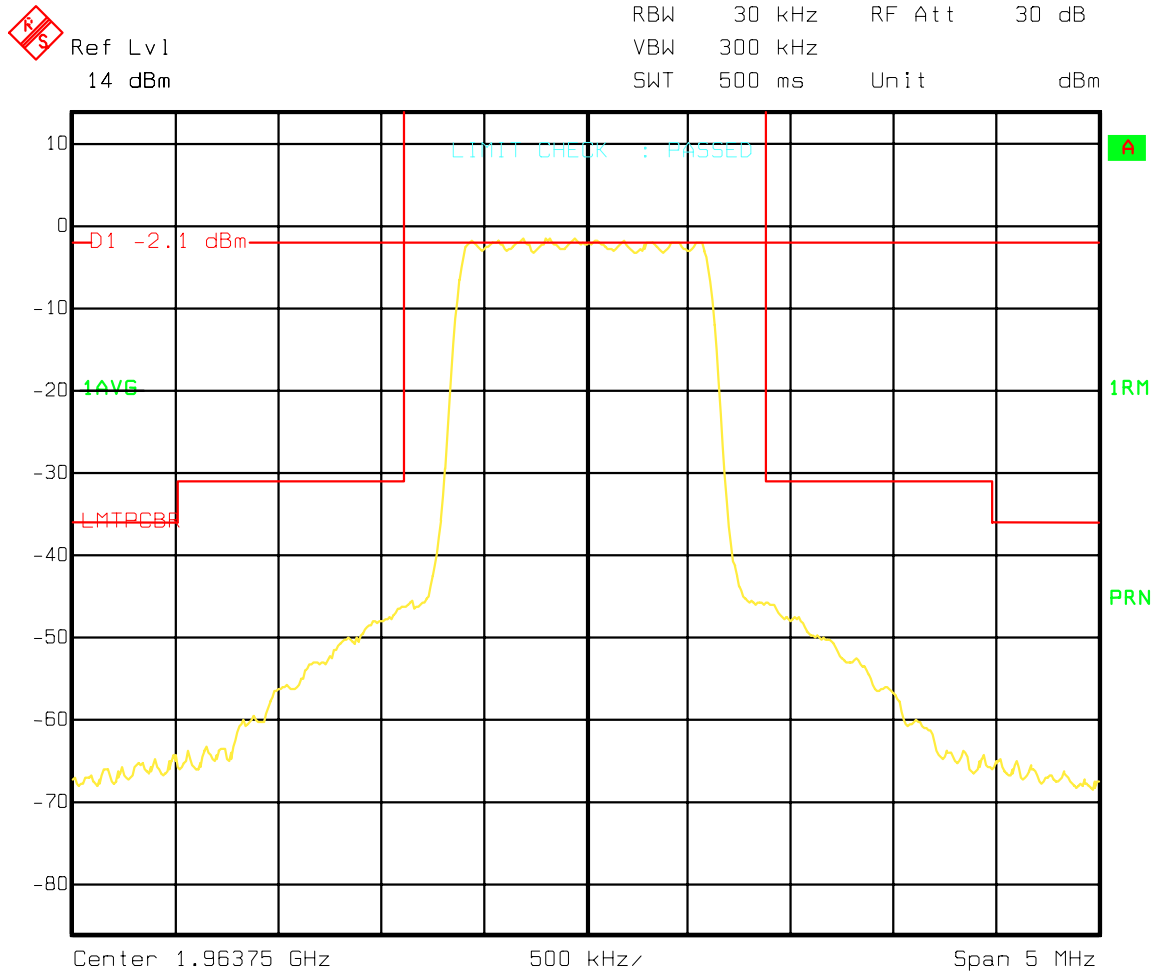
<b>Left Edge:</b>	<b>1951.25 MHz</b>	<b>(Channel 425)</b>
<b>Center:</b>	<b>1957.50 MHz</b>	<b>(Channel 550)</b>
<b>Right Edge:</b>	<b>1963.75 MHz</b>	<b>(Channel 675)</b>





Title: OCCUPIED BANDWIDTH  
 Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 425,  
 PCBR output = 14dBm  
 Date: 6.DEC.2000 16:06:19





Title: OCCUPIED BANDWIDTH

Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 675,  
PCBR output = 14dBm

Date: 6.DEC.2000 16:09:26

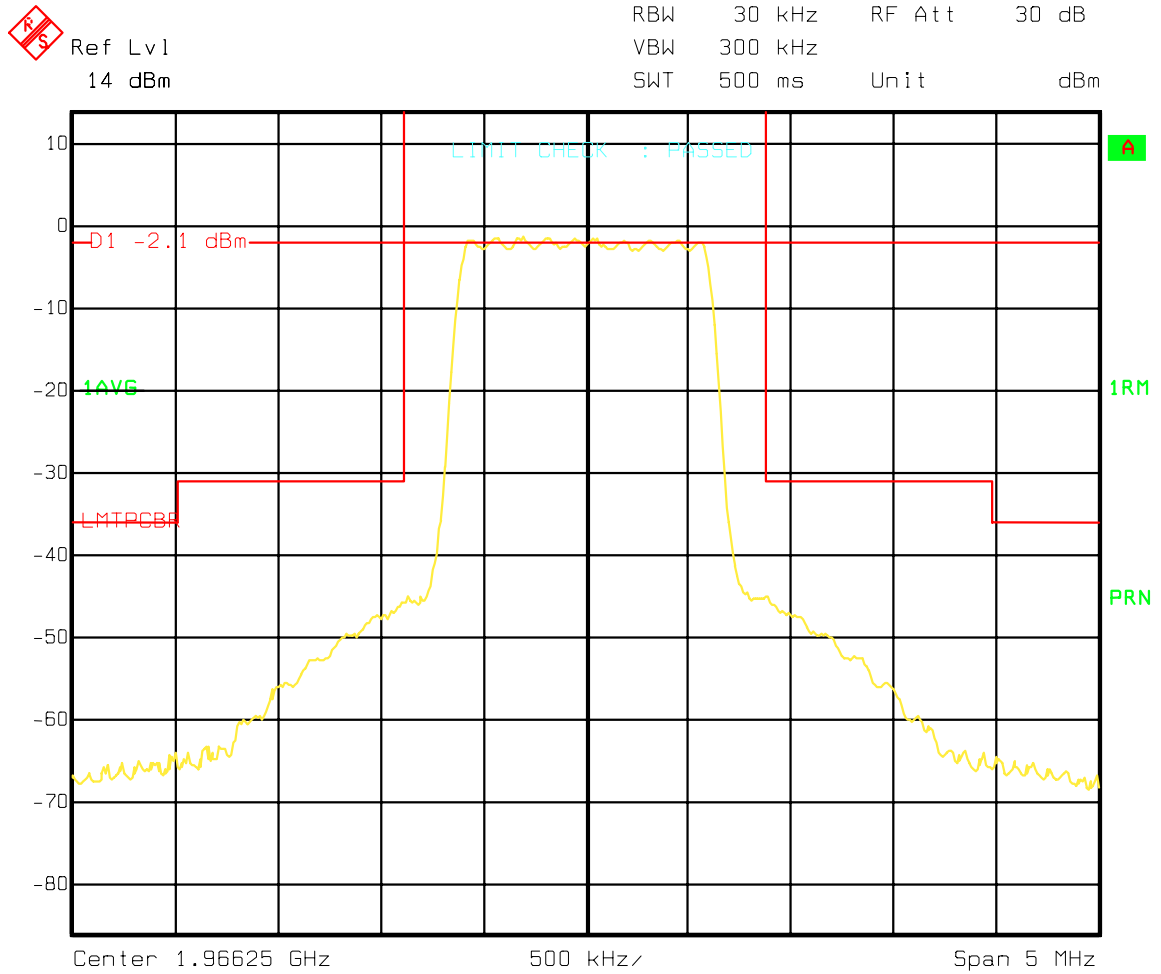
## **OCCUPIED BANDWIDTH**

### **PCBR OUTPUT**

#### **BLOCK E**

**(1965 - 1970 MHz)**

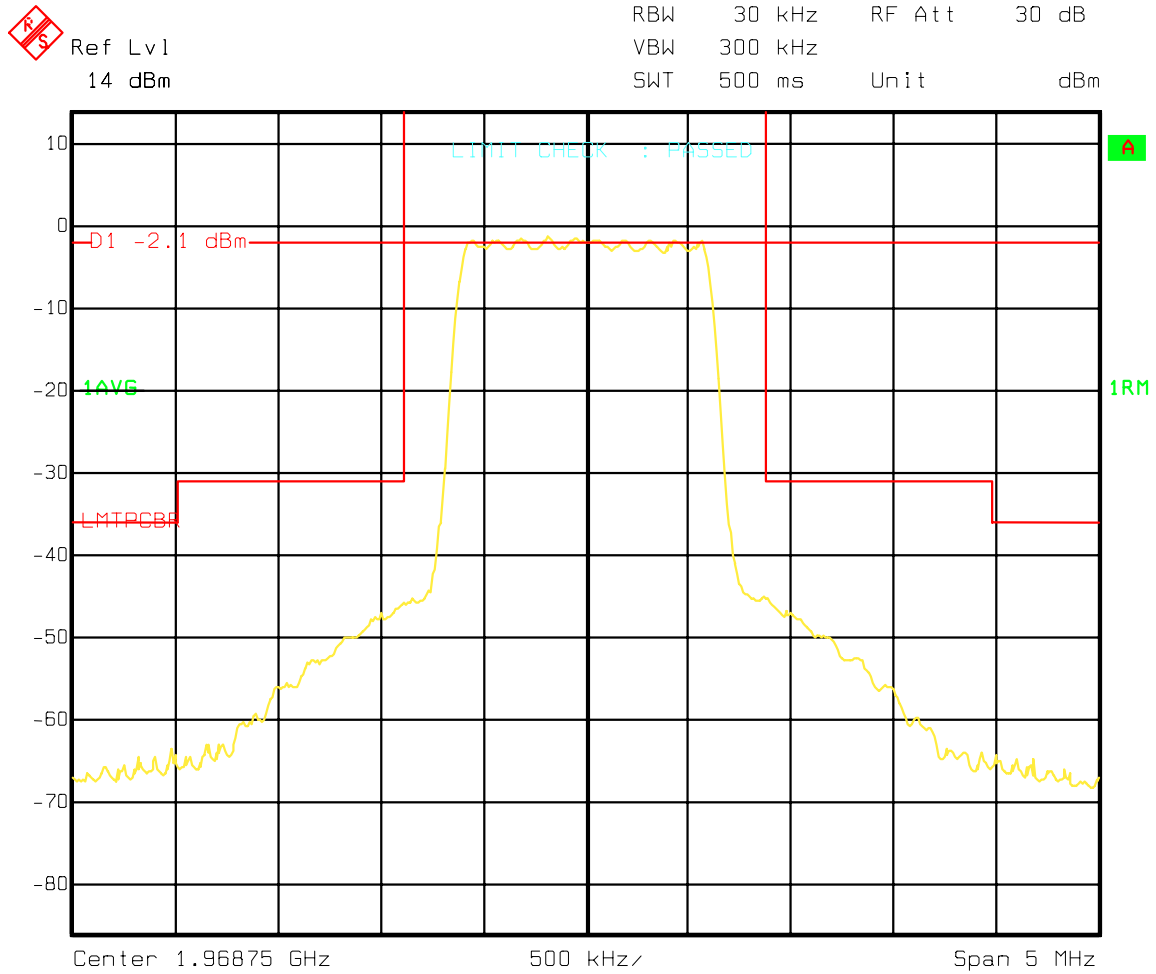
<b>Left Edge:</b>	<b>1966.25 MHz</b>	<b>(Channel 725)</b>
<b>Right Edge:</b>	<b>1968.75 MHz</b>	<b>(Channel 775)</b>



Title: OCCUPIED BANDWIDTH

Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 725,  
PCBR output = 14dBm

Date: 6.DEC.2000 16:11:08



Title: OCCUPIED BANDWIDTH

Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 775,  
PCBR output = 14dBm

Date: 6.DEC.2000 16:12:27

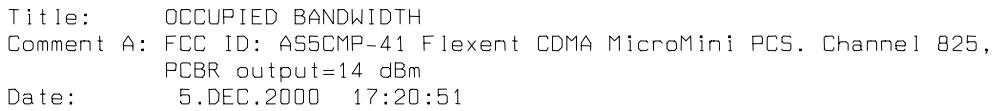
## **OCCUPIED BANDWIDTH**

### **PCBR OUTPUT**

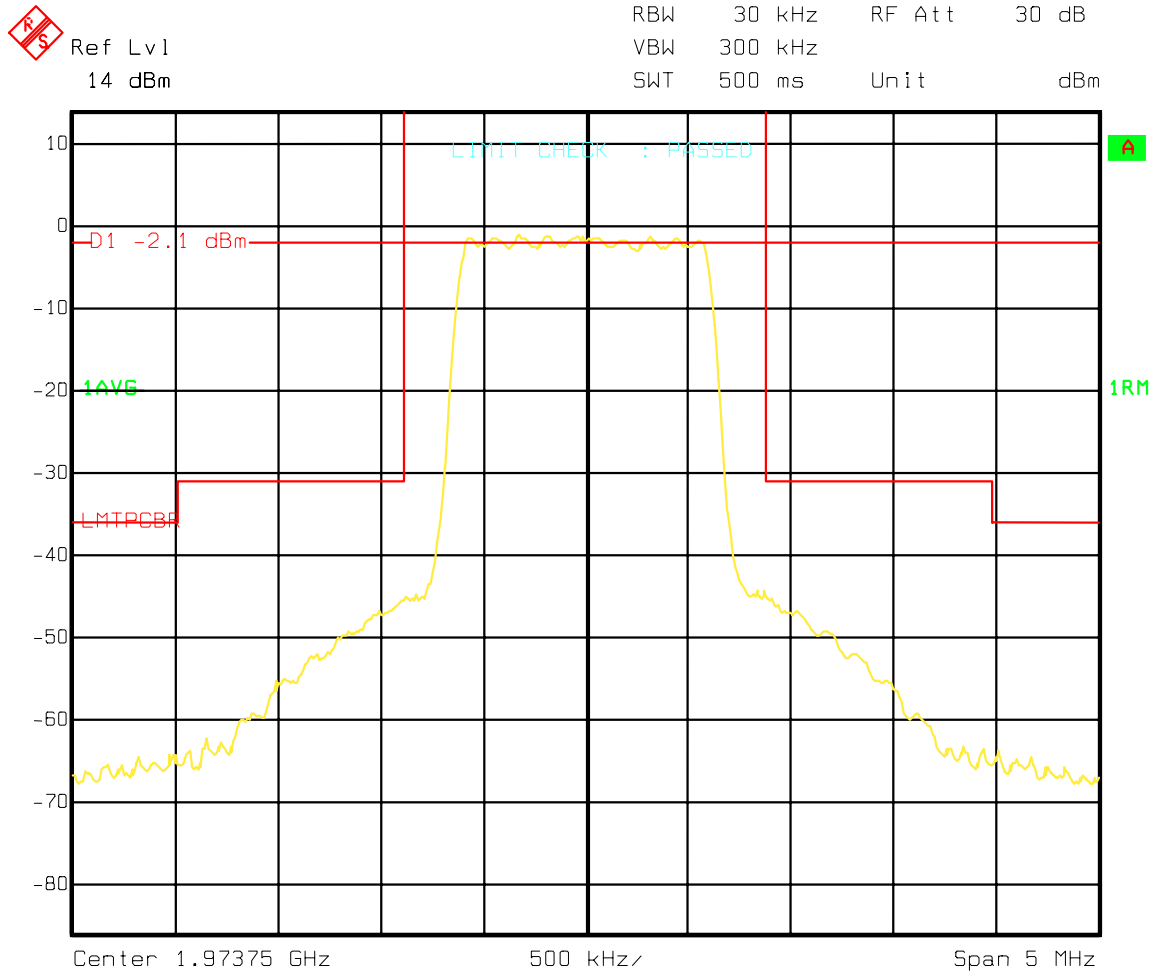
#### **BLOCK F**

**(1970 - 1975 MHz)**

<b>Left Edge:</b>	<b>1971.25 MHz</b>	<b>(Channel 825)</b>
<b>Right Edge:</b>	<b>1973.75 MHz</b>	<b>(Channel 875)</b>







Title: OCCUPIED BANDWIDTH

Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 875,  
PCBR output=14 dBm

Date: 5.DEC.2000 17:26:50

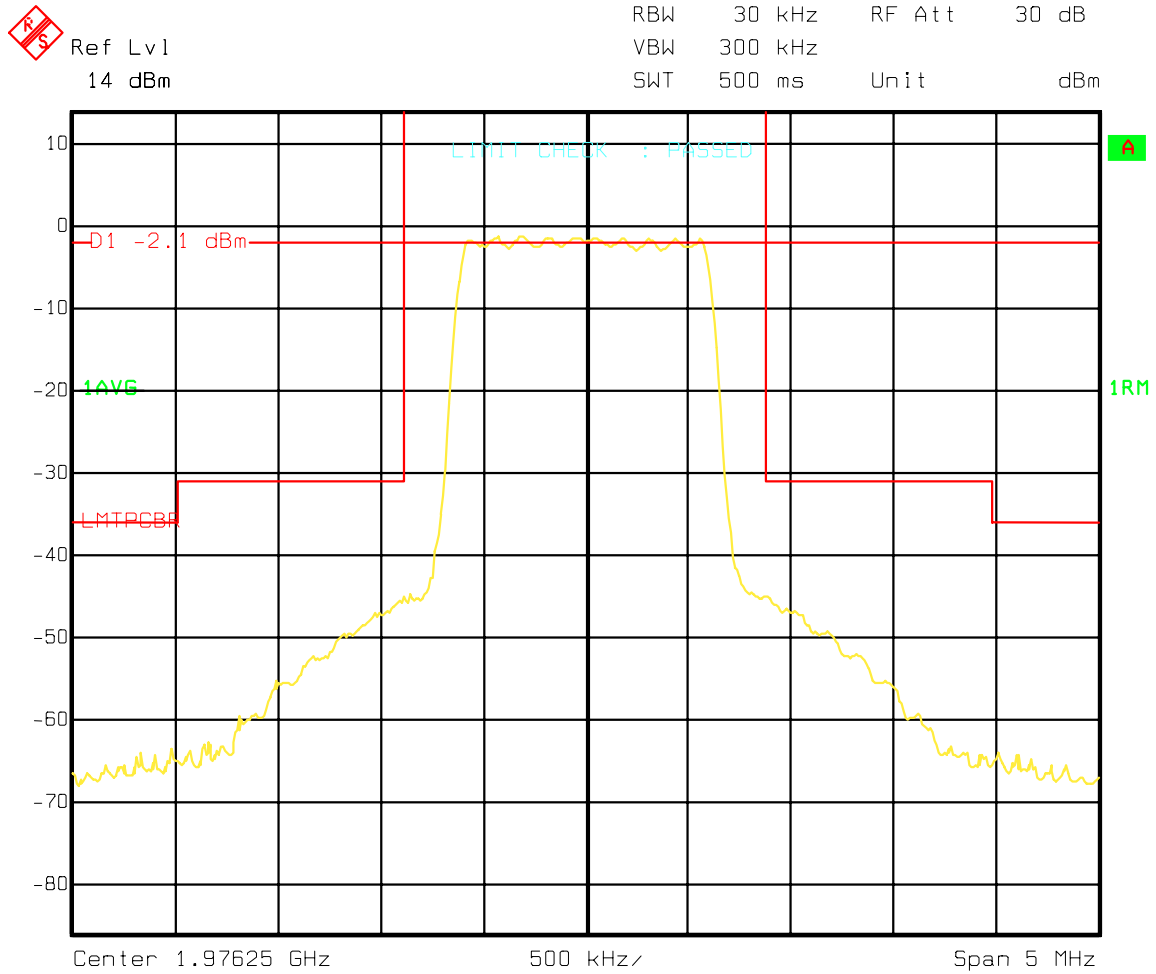
## **OCCUPIED BANDWIDTH**

### **PCBR OUTPUT**

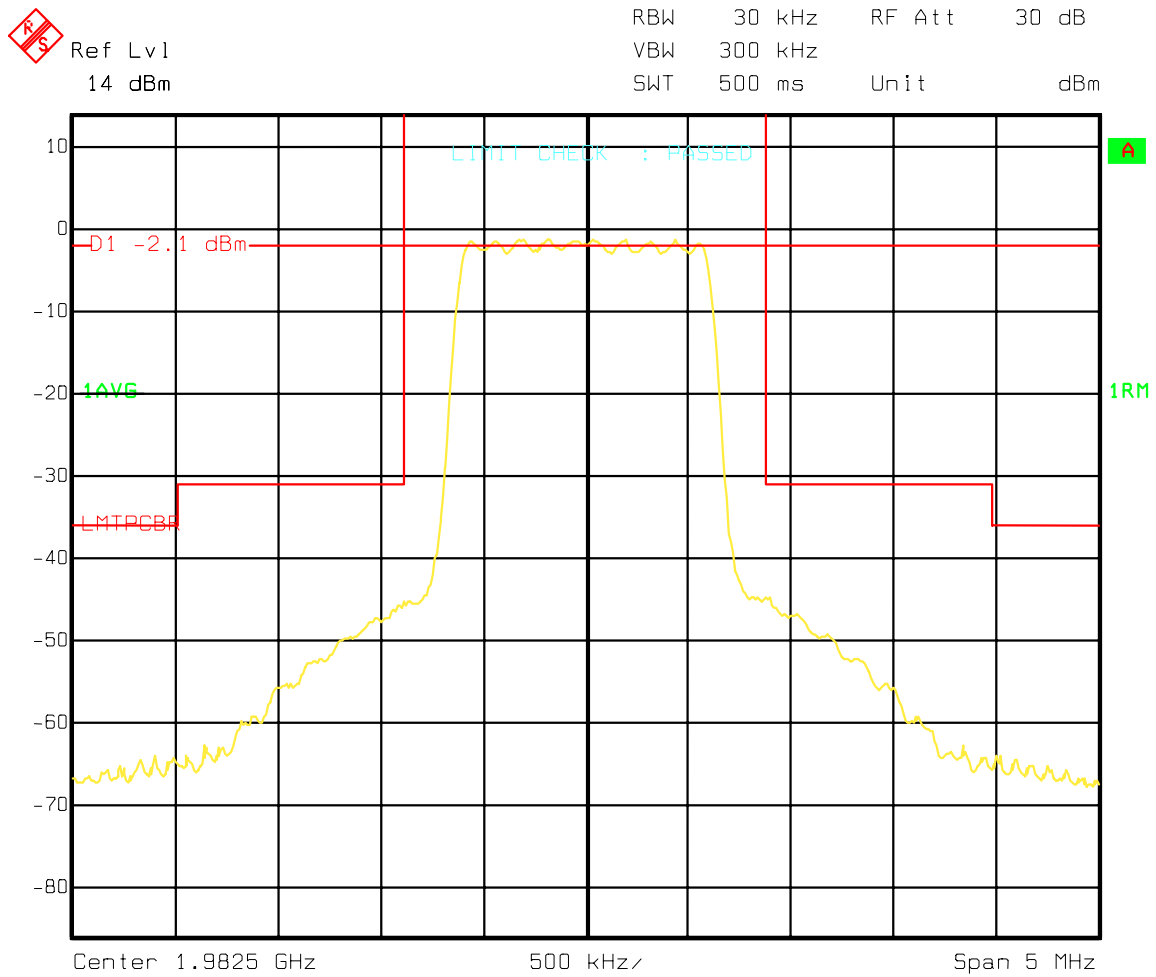
#### **BLOCK C**

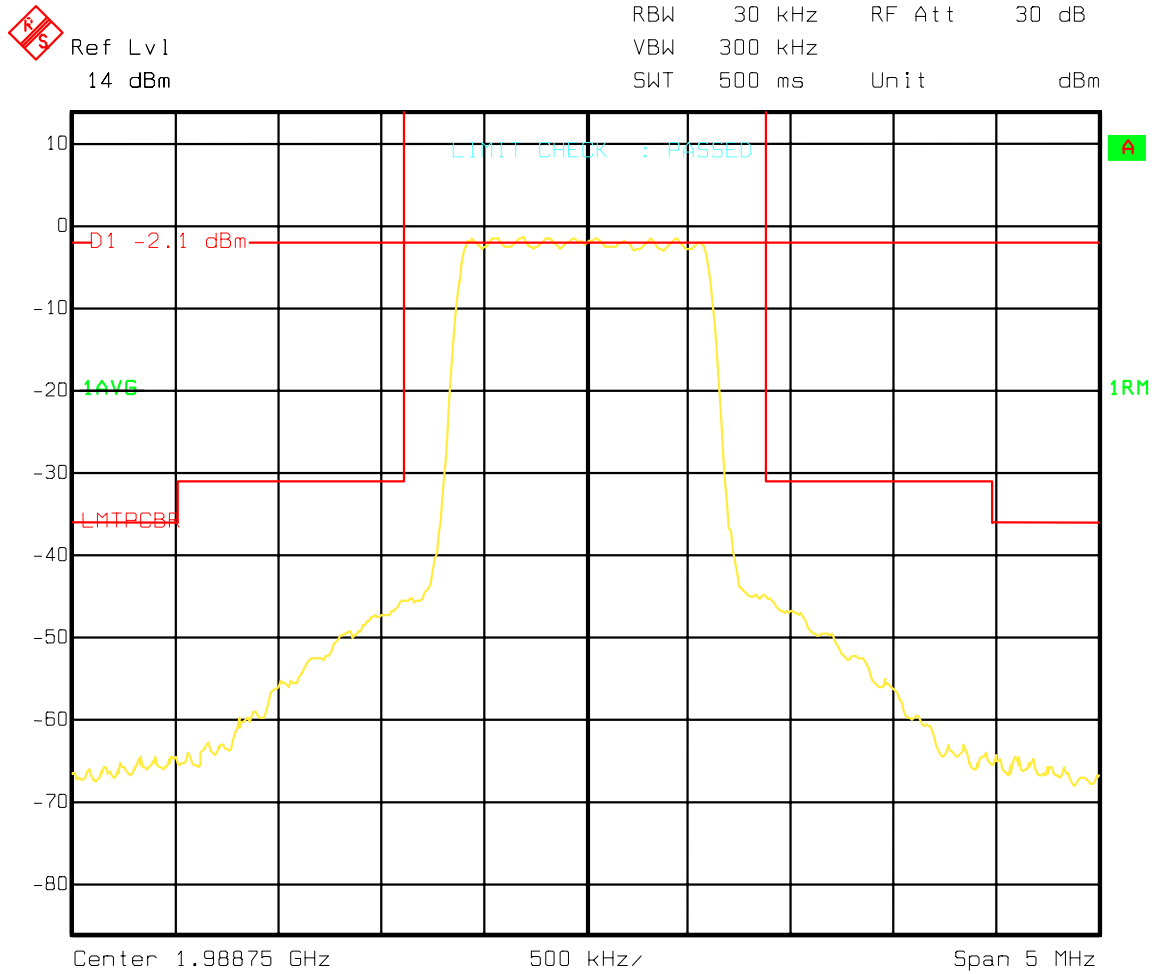
**(1975 - 1990 MHz)**

<b>Left Edge:</b>	<b>1976.25 MHz</b>	<b>(Channel 925)</b>
<b>Center:</b>	<b>1982.50 MHz</b>	<b>(Channel 1050)</b>
<b>Right Edge:</b>	<b>1988.75 MHz</b>	<b>(Channel 1175)</b>



Title: OCCUPIED BANDWIDTH  
 Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 925,  
 PCBR output=14 dBm  
 Date: 5.DEC.2000 17:29:26





Title: OCCUPIED BANDWIDTH

Comment A: FCC ID: AS5CMP-41 Flexent CDMA MicroMini PCS. Channel 1175,  
PCBR output=14 dBm

Date: 5.DEC.2000 17:33:20

**MEASUREMENT: 4**

**SPURIOUS EMISSIONS AT ANTENNA  
TERMINALS**

**SECTION 2.1051**

**MEASUREMENT: 4****Section 2.1051****Spurious Emissions at Antenna Terminals**

Spurious Emissions at the RF Power output terminal of PCBR was investigated over the frequency range of 0 MHz to the 10<sup>th</sup> harmonic of the carrier frequency. The test setup was as described in Figure 4A. Measurements were made using a Rohde & Schwarz FSEK Spectrum Analyzer and a HP Model 520 DeskJet Printer. The RF output from the transmitter was reduced (to an amplitude usable by the spectrum analyzer) by using a calibrated attenuator. The RF power level was continuously monitored via RF Power Meter as shown in the test setup in Figure 4A. The required emission limitation specified in Section 24.238 of the Code was applied to these tests. The applied signal met the recommended characteristics per TIA/EIA-97-C as defined below. All measurements were made for 0.025 Watts (14 dBm) output at PCBR RF Power output terminal.

Based upon the criterion given in Section 24.238 of the Code the required emission limitation is equal to -27.0 dBc or -13 dBm. The magnitude of spurious emissions that are attenuated more than 20 dB below the permissible value need not specified (Section 2.1051 and 2.1057 (a) and (c)) in the report.

**IS 97 channel allocation consists of following channel Blocks:**

Block	Frequency Bands Per FCC 24.229  MHz	Valid CDMA Channels & Frequency Range	
		Channel No.	MHz
A (15 MHz)	1930.000 – 1945.000	25 – 275	1931.250 – 1943.750
D (5 MHz)	1945.000 – 1950.000	325 – 375	1946.250 – 1948.750
B (15 MHz)	1950.000 – 1965.000	425 – 675	1951.250 – 1963.750
E (5 MHz)	1965.000 – 1970.000	725 – 775	1966.250 – 1968.750
F (5 MHz)	1970.000 – 1975.000	825 – 875	1971.250 – 1973.750
C (15 MHz)	1975.000 – 1990.000	925 – 1175	1976.250 – 1988.750

Per FCC out of band is any frequency < 1930.000 MHz and > 1990.000 MHz  
The edge channels are 25 and 1175.

*The frequencies and channels used were tabulated on the bottom of each plot. Output signals were plotted at each frequency block/bands. Plots were also made for Left Edge, Center and Right Edge of each PCS bands A, B and C (Blocks that are 15 MHz wide). Plots were made for Left Edge, and Right Edge of PCS bands D, E and F (Blocks that are 5 MHz wide).*

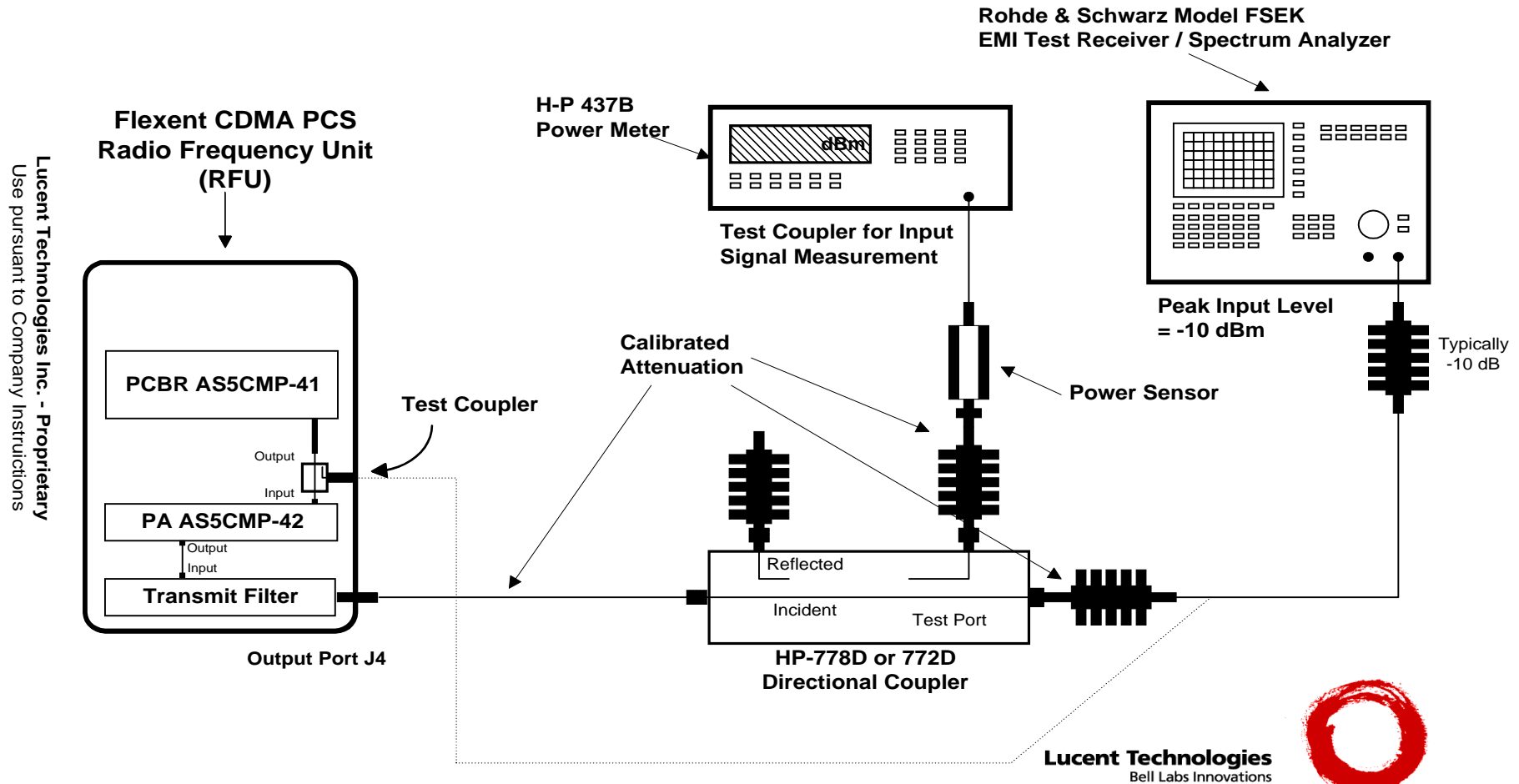
Type	Number of Channels	Fraction of Power (Linear)	Fraction of Power (dB)	Comments
Pilot	1	0.2000	-7.0	Walsh 0
Sync	1	0.0471	-13.3	Walsh 32, always 1/8 rate
Paging	1	0.1882	-7.3	Walsh 1, full rate only
Traffic	6	0.09412 each	-10.3 each	Variable Walsh Assignments, full rate only

**TABLE 4.1 Base Station Test Model, Nominal****RESULTS:**

The magnitude of spurious emissions that are attenuated more than 20 dB below the permissible value need not be specified in the FCC report (Section 2.1051 and 2.1057 (a) and (c)). The spectral plot document showed that the spurious emissions at PCBR RF power output terminal were less than -33 dBm. Therefore plots are kept in our files and not submitted to FCC.



**Figure 4A. TEST CONFIGURATION FOR CONDUCTED SPURIOUS**



**Measurement: 5**

**FIELD STRENGTH OF SPURIOUS  
RADIATION**

**SECTION 2.1053**

**MEASUREMENT : 5****SECTION 2.1053****FIELD STRENGTH OF SPURIOUS RADIATION**

Field strength measurements of radiated spurious emissions were made at a ten meter Open Area Test Site (OATS) maintained by Lucent Technologies Bell Laboratories Global Product Compliance Laboratory in Holmdel, New Jersey. A complete description and full measurement data for the site is on file with the Commission. (FCC file31040/SIT)

The PCBR was assembled with a Flexent Power Amplifier (ICLA) and all other associated equipment in an **FLEXENT®** CDMA Radio Frequency Unit Cabinet. The tests were repeated for each RF filter installed between antenna port terminal and Flexent Power Amplifier RF Power output port. The spectrum from 10 MHz to the 10<sup>th</sup> harmonic of the carrier was searched for spurious radiation. Measurements were made according to ANSI C63.4. All emissions more than 20 dB below the specification limit were considered not reportable (Section 2.1057 (a) (c)).

The calculated emission levels were found by:

$$\text{Measured level (dB}\mu\text{V)} + \text{Cable Loss(dB)} + \text{Antenna Factor(dB)} = \text{Field Strength (dB}\mu\text{V/m)}$$

Section 24.238 and 2.1053 contains the requirements for the levels of spurious radiation as a function of the level of the unmodulated carrier. The reference level for the unmodulated carrier is calculated as the field produced by an ideal dipole excited by the transmitter output power according to the following relation taken from Reference Data for Radio Engineers, page 676, 4<sup>th</sup> edition, IT&T Corp.

$$E = [(49.2 * P)^{1/2}] / R$$
$$20 \log (E * 10^6) - (43 + 10 \log P) = 73.9 \text{ dB } \mu\text{V/meter}$$

E = Field Intensity in Volts/meter

P = Transmitted Power in Watts

R = Distance in meters = 10 m

**RESULTS:**

For this particular test, the field strength of any spurious radiation is required to be less than 73.9 dB $\mu$ V/meter. Reportable measurement levels are equal to or greater than 53.9 dB  $\mu$ V/meter. Over the spectrum investigated, 10 MHz to 10<sup>th</sup> harmonic of the carrier, no reportable spurious emissions were detected. This demonstrates that the (PCBR), the subject of this application, complies with Sections 2.1053, 24.238 and 2.1057 of the Rules.

**FREQUENCY SPECTRUM TO BE  
INVESTIGATED**  
SECTION 2.1057

## **SECTION 2.1057**

### **FREQUENCY SPECTRUM TO BE INVESTIGATED**

Frequency Spectrum to be investigated, Measurement Bandwidth and detector function used meet or exceed the Specification contained in Section 2.1057, 24.238, ANSI C63.4, TIA/EIA-97-C.

**Measurement: 6**

**MEASUREMENT OF FREQUENCY  
STABILITY  
SECTION 2.1055**

## **MEASUREMENT OF FREQUENCY STABILITY**

### **SECTION 2.1055**

#### **RESPONSE:**

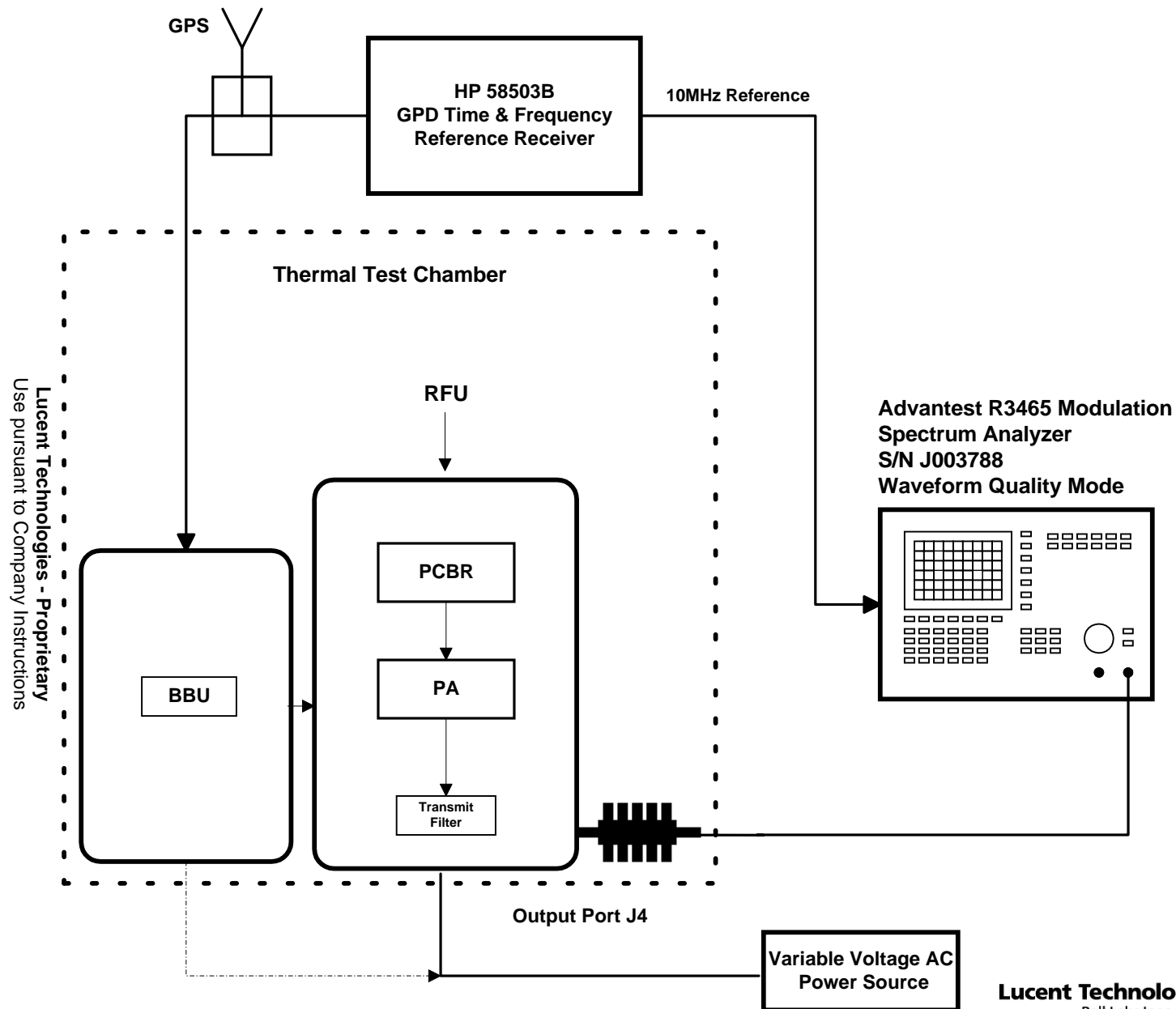
The frequency stabilization and accuracy of the CDMA signal amplified by the Power Amplifier (ICLA) (FCC ID: AS5CMP-42) is a function of the input signal which it is provided from the PCBR (FCC ID: **AS5CMP-41**). The Baseband Unit (BBU) contains Time Frequency Unit. The TFU provides the time and frequency reference (19.66 MHz) used by the PCBR (FCC ID: **AS5CMP-41**). The reference frequency to PCBR is supplied through a Fiber Optic link from the BBU. The Reference frequency is highly accurate time and frequency unit which relies upon a signal lock of GPS satellites to provide the primary system timing. In the event of loss of GPS lock, the Oscillator Module (OM) can provide up to eight hours of freewheel operation. The system provides for automatic timing synchronization upon reacquisition of GPS lock. These units are powered by an AC-DC converter with battery backup to provide immunity to power fluctuations and failures.

The frequency stability test data for the Power Amplifier output was measured as installed and tested in a FLEXENT CDMA Distributed Base station. The entire CDMA Distributed Base station (BBU and Radio Frequency Unit) were subjected to the FCC specified environments while operating at full rated power. The Carrier Frequency deviations were measured. The nominal Voltage input to this device is 120V, but, it is designed to operate between 100 to 230V. The measurement setup is depicted in Figure 6A.

#### **RESULTS:**

The attached data documents that the worse case carrier frequency stability over temperature and voltage was 0.0381 ppm.

**Figure 6A. TEST CONFIGURATION FOR FREQUENCY STABILITY**





**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation upon return to +25 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.2
0.5	21.0
1.0	-0.4
1.5	-0.3
2.0	-0.2
2.5	-0.4
3.0	-0.4
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation upon return to +25 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-2.2
100	4.7
120	-23.8
130	-37.9
180	-22.4
220	-34.0
265	-24.9
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at -40 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.3
0.5	0.2
1.0	0.3
1.5	0.3
2.0	0.2
2.5	0.0
3.0	0.1
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at -40 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	43.3
100	1.0
120	0.3
130	1.0
180	1.1
220	0.5
265	43.3
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at -30 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.4
0.5	0.3
1.0	-0.4
1.5	-0.2
2.0	-0.1
2.5	15.9
3.0	-0.2
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at -30 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	1.1
100	75.5
120	15.9
130	47.1
180	-0.6
220	3.4
265	-0.5
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.1 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at -20 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-0.2
0.5	-0.5
1.0	-0.3
1.5	-0.5
2.0	0.1
2.5	0.2
3.0	-0.2
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at -20 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	0.4
100	0.7
120	-0.5
130	0.3
180	-3.0
220	-0.5
265	0.6
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.3 dB, Transmit Channel monitored : 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at -10 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.1
0.5	-0.5
1.0	3.2
1.5	0.1
2.0	-1.0
2.5	0.3
3.0	-0.5
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at -10 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-4.4
100	-6.5
120	3.2
130	2.2
180	11.4
220	64.6
265	2.8
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at 0 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-0.5
0.5	-0.3
1.0	-0.5
1.5	-0.5
2.0	0.4
2.5	0.3
3.0	0.1
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at 0 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	0.5
100	0.6
120	-0.5
130	0.7
180	-7.3
220	0.7
265	0.5
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at +10 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-0.6
0.5	-21.6
1.0	0.0
1.5	-3.0
2.0	-0.5
2.5	-0.3
3.0	-0.2
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at +10 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-2.7
100	-36.2
120	-21.6
130	-0.8
180	-0.6
220	-18.0
265	-0.7
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at +20 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-0.2
0.5	0.3
1.0	0.1
1.5	0.6
2.0	-40.1
2.5	-0.3
3.0	-0.7
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at +20 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	-40.7
100	-60.3
120	-40.1
130	-22.0
180	18.0
220	8.0
265	-25.0
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.2 dB, Transmit Channel monitored: 1025 [1981.25 MHz]



**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at +30 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	-0.4
0.5	-0.3
1.0	0.2
1.5	0.4
2.0	0.3
2.5	1.0
3.0	-0.8
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at +30 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	0.7
100	-0.8
120	1.0
130	21.0
180	-0.7
220	0.7
265	-0.8
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.1 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at +40 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.0
0.5	0.0
1.0	0.5
1.5	13.3
2.0	4.4
2.5	-7.6
3.0	-14.9
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at +40 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	26.3
100	21.9
120	-14.9
130	20.1
180	23.2
220	-19.6
265	65.3
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at +50 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.3
0.5	-0.1
1.0	-0.5
1.5	0.8
2.0	0.6
2.5	-0.1
3.0	0.0
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at +50 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	0.2
100	36.0
120	0.8
130	0.7
180	-20.0
220	-31.2
265	-3.1
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation at +55 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.2
0.5	0.1
1.0	-0.1
1.5	-0.1
2.0	0.4
2.5	0.5
3.0	0.7
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation at +55 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	41.4
100	0.9
120	0.7
130	1.0
180	0.8
220	-2.2
265	0.9
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.1 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

**MEASUREMENT OF FREQUENCY STABILITY**  
Flexent CDMA Distributed Base Station

Reference and Transmit Frequency Deviation upon return to +25 degrees C @ 120 Volts

Time ( Minutes )	TX frequency Deviation (Hz)
0	0.3
0.5	0.4
1.0	0.4
1.5	0.5
2.0	0.3
2.5	-0.1
3.0	-0.1
Specification	+ / - 99.06 Hz (+ / - 0.05 ppm)
RESULTS	PASS

**Reference and Transmit Frequency Deviation upon return to +25 degrees C over voltage range**

Voltage AC	TX Frequency Deviation (Hz)
85	53.7
100	0.4
120	1.0
130	1.0
180	44.3
220	0.7
265	0.9
SPECIFICATIONS	+/- 99.06 Hz (+/- 0.05 PPM)
RESULTS	<b>PASS</b>

J1 TX Power Deviation = 0.0 dB, Transmit Channel monitored: 1025 [1981.25 MHz]

## **TEST INSTRUMENTATION LIST**

**TEST INSTRUMENTATION LIST**

Manufacturer	Model Number	Serial Number	Description	Last Calibrated mm/dd/yy	Cal Cycle Month
Rohde & Schwarz	FSEK	826939/013	Spectrum Analyzer	6/30/00	12
HP	437B	3125U24744	Power Meter	12/29/00	12
HP	778D	18300	Dual Directional Coupler	6/28/00	12
Pasternack	PE7019-20	N/A	50 W Attenuator	N/A	N/A
Pasternack	PE7019-30	N/A	50 W Attenuator	N/A	N/A
Eaton	96002	2436	Biconical Antenna	7/31/00	12
Electro-Metrics	EM-2135/EMC-60	44174	Test Receiver	12/29/00	12
EMCO	3146	9509-4165	Log-Periodic Antenna	8/15/00	12
Rohde & Schwarz	ESVP	879807/049	Test Receiver	9/11/00	12
Rohde & Schwarz	EPM	883613/014	Panorama Monitor	N/A	N/A
EMCO	3115	9006-3460	Double Ridged Horn 1-18 Ghz	5/22/00	12
Advantest	R3465	J003788	Spectrum Analyzer	6/2/00	12
HP	58503	3710A01153	GPS Frequency Reference Receiver	N/A	N/A
HP	E4406A	US39480797	VSA SERIES Transmitter Tester	1/19/00	12
HP	8482A	US37294201	Power Sensor	5/16/00	12

\* Calibrated before use.