

## **CERTIFICATE OF COMPLIANCE** **FCC PARTS 24(E) & 22.901(d) CERTIFICATION**

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**Applicant Information:**

**WITHUS IT CO., LTD.**  
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Shingil-5Dong, YongDungPo-Ku,  
Seoul, Korea

**FCC Classification:**

**Part 24 Licensed Portable Transmitter Held to Ear (PCE)**

**FCC Rule Part(s):**

**§24(E), §22.901(d), §2**

**FCC ID:**

**POQWPE-2000**

**Model(s):**

**WPE-2000**

**Equipment Type:**

**Dual-Band Cellular/PCS CDMA Phone**

**Tx Frequency Range:**

**1851.25 - 1908.75 MHz (PCS CDMA)**

**824.70 - 848.31 MHz (Cellular CDMA)**

**Rx Frequency Range:**

**1931.25 - 1988.75 MHz (PCS CDMA)**

**869.70 - 893.31 MHz (Cellular CDMA)**

**Max. RF Output Power:**

**0.267 Watts EIRP (PCS CDMA)**

**0.243 Watts ERP (Cellular CDMA)**

**Frequency Tolerance(s):**

**150 Hz (PCS CDMA), 300 Hz (Cellular CDMA)**

**Emission Designator(s):**

**1M25F9W**

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

*This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Research Inc. The results and statements contained in this report pertain only to the device(s) evaluated.*



**Shawn McMillen**  
**General Manager**  
**Celltech Research Inc.**



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## **MEASUREMENT REPORT - FCC PARTS 24(E) & 22.901(d)**

### **1.1 SCOPE**

Measurement and determination of electromagnetic emissions (EME) from radio frequency devices for compliance with the technical rules and regulations of the Federal Communications Commission.

### ***1.2 GENERAL INFORMATION - §2.1033(a)***

#### **APPLICANT:**

**WITHUS IT CO., LTD.**  
2F. DongNam Bldg. 448-16  
Shingil-5Dong, YongDungPo-Ku,  
Seoul, Korea

<b>FCC ID</b>	<b>POQWPE-2000</b>
<b>Model(s)</b>	<b>WPE-2000</b>
<b>EUT Type</b>	<b>Dual-Band Cellular/PCS CDMA Phone</b>
<b>Classification</b>	<b>Part 24 Licensed Portable Transmitter Held to Ear (PCE)</b>
<b>Rule Part(s)</b>	<b>§24(E), §22.901(d), §2</b>
<b>Max. RF Output Power</b>	<b>0.267 Watts EIRP (PCS CDMA) 0.243 Watts ERP (Cellular CDMA)</b>
<b>Tx Freq. Range(s)</b>	<b>1851.25 - 1908.75 MHz (PCS CDMA) 824.70 - 848.31 MHz (Cellular CDMA)</b>
<b>Rx Freq. Range(s)</b>	<b>1931.25 - 1988.75 MHz 869.70 - 893.31 MHz</b>
<b>Emission Designator(s)</b>	<b>1M25F9W</b>
<b>Modulation(s)</b>	<b>PCS CDMA / Cellular CDMA</b>
<b>Frequency Tolerance(s)</b>	<b>± 150 Hz (PCS) / ± 300 Hz (Cellular)</b>
<b>Battery Type(s)</b>	<b>3.7 V 950mA/h Lithium Ion</b>
<b>Antenna Type</b>	<b>Retractable Whip (1/4l)</b>

## **2.1 MEASUREMENT PROCEDURES**

### **2.2 RF OUTPUT POWER MEASUREMENT - 2.1046**

The conducted power was measured using a Gigatronics 8650A Universal Power Meter in modulated average power mode. An offset value in dB was entered into the power meter to correct for the losses of the attenuator and cable installed before the sensor input. The transmitter terminal was coupled to the power meter and the EUT was placed into test mode via keypad access at a full data rate in the “always up” power control mode. All subsequent tests were performed using the same tune up procedures.

### **2.3 OCCUPIED BANDWIDTH - §2.1049(c)**

The antenna output terminal of the EUT was connected to the input of a  $50\Omega$  spectrum analyzer through a matched 30dB attenuator. The radio transmitter was operating at maximum output power. 100% of the in-band modulation was below the specified mask per §22.917.

- (a) On any frequency removed from the assigned carrier frequency by more than 20kHz, up to and including 45kHz, the sideband was at least 26dB below the carrier.
- (b) On any frequency removed from the assigned carrier frequency by more than 45kHz, up to and including 90kHz, the sideband was at least 45dB below the carrier.
- (c) On any frequency removed from the assigned carrier frequency by more than 90kHz, up to the first multiple of the carrier frequency, the sideband was at least 60dB below the carrier of  $40 + \log_{10}$  (mean power output in Watts) dB, whichever was the smaller attenuation.

### **2.4 OCCUPIED BANDWIDTH - §24.238**

The antenna output terminal of the EUT was connected to the input of a  $50\Omega$  spectrum analyzer through a matched 30dB attenuator. The radio transmitter was operating at maximum output power. 100% of the in-band modulation was below the specified mask per §24.238.

- (a) On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB.
- (b) Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. 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 emission are attenuated at least 26 dB below the transmitter power.

When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.

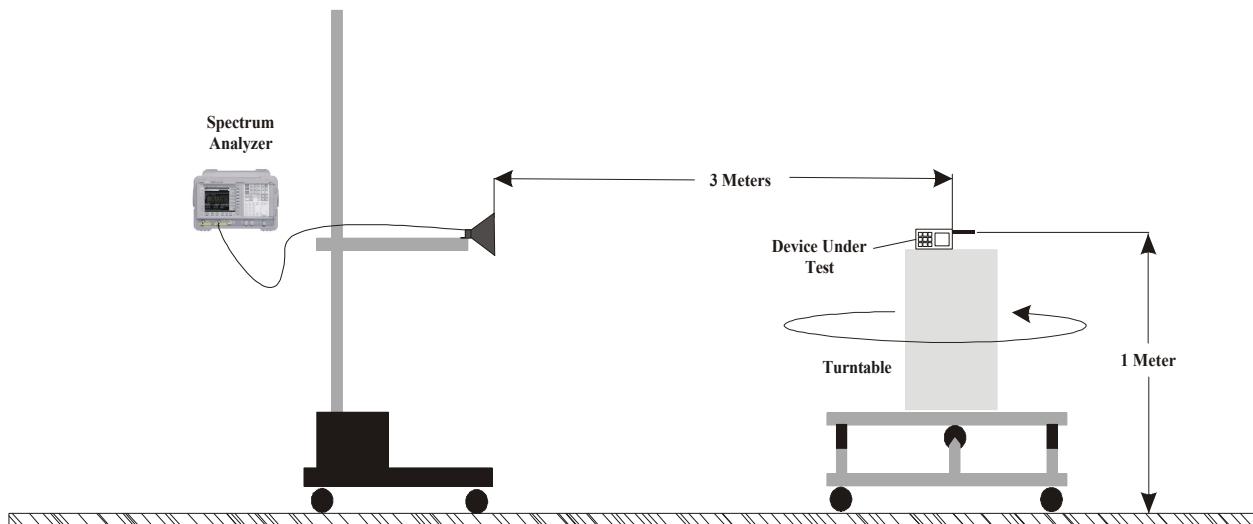
- (d) The measurement of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

## 2.5 SPURIOUS EMISSIONS AT ANTENNA TERMINAL - §2.1051

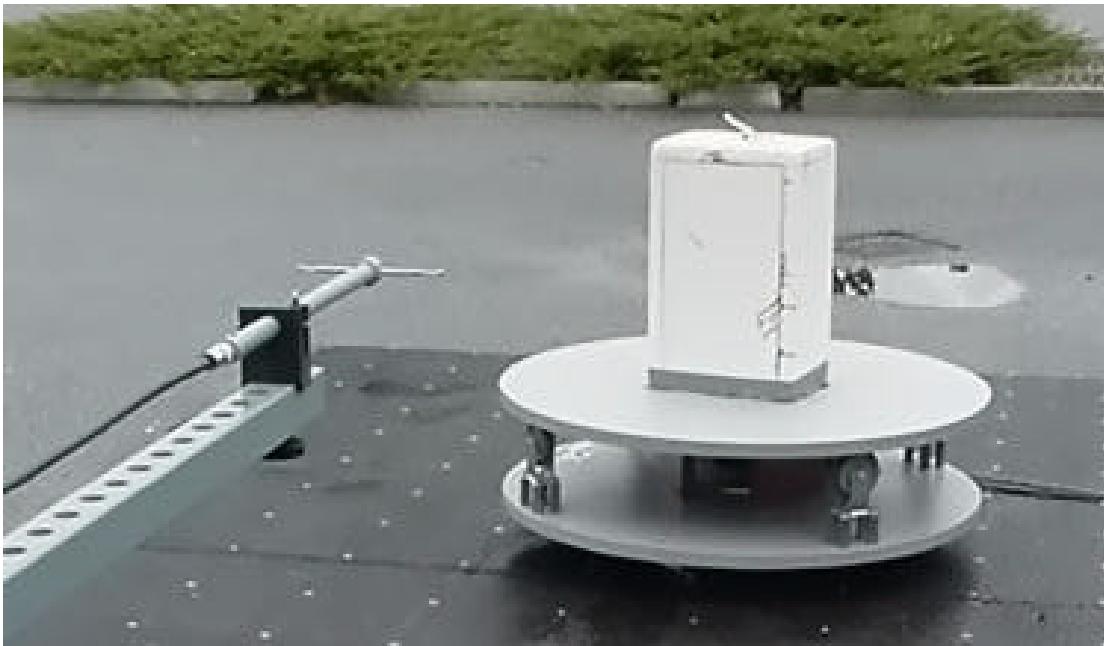
The level of the carrier and the various conducted spurious frequencies were measured by means of a calibrated spectrum analyzer. The spectrum was scanned from 10MHz to 20GHz. The antenna output terminal of the EUT was connected to the input of a 50 ohm attenuator and coaxial cable.

## 2.6 FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053

Radiated and harmonic emissions were measured on a 3-meter outdoor site. The EUT was placed on the turntable with the transmitter transmitting into a non-radiating load. A receiving antenna located 3 meters from the turntable received any signal radiated from the transmitter and its operating accessories. The receiving antenna was varied in height from 1 to 4 meters and the polarization was varied (horizontal and vertical) to determine the worst-case emission level.



Radiated Measurement Test Setup Diagram with Receive Antenna



**Cellular CDMA Radiated Measurement Test Setup Photograph with Dipole Antenna**



**PCS CDMA Radiated Measurement Test Setup Photograph with Horn Antenna**

## **2.7 FREQUENCY STABILITY / TEMPERATURE VARIATION - §2.1055, §24.235**

The minimum frequency stability shall be  $\pm 300\text{Hz}$  (Cellular CDMA) and  $\pm 150\text{Hz}$  (PCS CDMA) referenced to a received carrier frequency from a base station. This meets the requirement for operational accuracy of 0.00005% for digital mode. A base station simulator was used in order to measure the error in the frequency.

### **Measurement Method:**

The frequency stability of the transmitter was measured by:

1. Temperature: The temperature was varied from  $-30^\circ\text{C}$  to  $+60^\circ\text{C}$  at intervals no more than  $10^\circ\text{C}$  throughout the temperature range using an environmental chamber. A period of time sufficient to stabilize all of the components in the equipment shall be allowed prior to each frequency measurement.
2. Primary Supply Voltage: The primary supply voltage was set at the specified nominal rating and reduced to the battery operating endpoint specified by the manufacturer. When the battery voltage reaches the operating endpoint the device turns off. The voltage was measured at the terminals of the power supply or at the input to the cable normally provided with the equipment.

### **Time Period and Procedure:**

1. The carrier frequency of the transmitter was measured at room temperature ( $25^\circ\text{C}$  to  $27^\circ\text{C}$  to provide a reference).
2. The equipment was subjected to an overnight “soak” at  $-30^\circ\text{C}$  without any power applied.
3. After the overnight “soak” at  $-30^\circ\text{C}$ , the measurement of the carrier frequency of the transmitter was made within a three-minute interval after applying power to the transmitter.

Frequency measurements were made at  $10^\circ\text{C}$  intervals up to  $+60^\circ\text{C}$ , then back to room temperature. A minimum period of one hour was provided to allow stabilization of the equipment at each temperature level.

## **2.8 EMISSION DESIGNATOR - §2.202**

2M + 2DK

CDMA BW = 1.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

### **3.1 TEST DATA**

#### **3.2 EFFECTIVE ISOTROPIC RADIATED POWER OUTPUT - §24.232(b)**

##### **PCS CDMA MODE (1900MHz)**

<b>Freq. Tuned</b>	<b>EUT Conducted Power</b>	<b>Max. Field Strength of EUT (dBm) (Horizontal Polarization)</b>		<b>Horn Gain</b>	<b>Horn Forward Conducted Power</b>	<b>EIRP of EUT Horn Gain + Horn Forward Conducted Power</b>	
<b>(MHz)</b>	<b>(dBm)</b>	Antenna Retracted	Antenna Extended	<b>(dBi)</b>	<b>(dBm)</b>	<b>(dBm)</b>	<b>Watts</b>
1851.25	24.50	- 16.09	- 15.52	6.67	15.34	22.01	0.159
1880.00	24.50	- 16.30	- 13.62	6.68	17.58	24.26	0.267
1908.75	24.50	- 19.04	- 16.00	6.69	15.71	22.40	0.174

Notes:

1. EIRP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A horn antenna was substituted in place of the EUT. A CDMA signal with the same bandwidth as the EUT was generated, amplified, and fed through a directional coupler. The height and direction of the horn antenna was adjusted in order to give the field of maximum intensity. The power to the antenna was adjusted in order to give the same field strength reading as previously recorded for the EUT. The power at the coupler port was recorded at this point. The feed point for the antenna was then connected to a calibrated power meter and the power adjusted to read the same as the coupler port previously recorded, to account for any mismatch in impedance, which may occur at the horn antenna. The conducted power at the antenna feed point was recorded. The EIRP level was determined by adding the horn forward conducted power and the horn antenna gain in dB.

2. EIRP measurements were performed using the standard battery, which is the only battery option for this phone.

### 3.3 EFFECTIVE RADIATED POWER OUTPUT - §2.1046

#### CELLULAR CDMA MODE (800MHz)

Freq. Tuned (MHz)	EUT Conducted Power (dBm)	Max. Field Strength of EUT (dBm) (Horizontal Polarization)		Dipole Gain (dBd)	Dipole Forward Conducted Power (dBm)	ERP of EUT Dipole Gain + Dipole Forward Conducted Power (dBm)	Watts
824.70	24.00	- 12.79	- 10.79	- 1.44	24.27	22.83	0.192
835.89	24.00	- 12.87	- 10.61	- 1.34	24.61	23.27	0.212
848.31	24.00	- 13.11	- 10.68	- 1.24	25.09	23.85	0.243

Notes:

##### 1. ERP Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A half-wave dipole was substituted in place of the EUT. A CDMA signal with the same bandwidth as the EUT was generated, amplified, and fed through a directional coupler. The height and direction of the dipole was adjusted in order to give the field of maximum intensity. The power to the dipole was adjusted in order to give the same field strength reading as previously recorded for the EUT. The power at the coupler port was recorded at this point. The feed point for the dipole was then connected to a calibrated power meter and the power adjusted to read the same as the coupler port previously recorded, this is to account for any mismatch in impedance, which may occur at the dipole antenna. The conducted power at the antenna feed point was recorded. The ERP level was determined by adding the dipole forward conducted power and the dipole gain in dB. For readings above 1GHz the above method is repeated using standard gain horn antennas.

##### 2. ERP measurements were performed using the standard battery, which is the only battery option for this phone.

**3.4 FIELD STRENGTH OF SPURIOUS RADIATION - § 2.1053 (PCS CDMA)**

**Operating Frequency (MHz):** 1851.25  
**Channel:** 25 (Low)  
**Measured Cond. Pwr. (dBm):** 24.50  
**Measured EIRP (dBm):** 22.01  
**Modulation:** PCS CDMA  
**Distance:** 3 Meters  
**Limit:**  $43 + 10 \log (W) = 38.13 \text{ dBc}$

Frequency (MHz)	Field Strength of Spurious Radiation (dBm)	Horn Forward Cond. Pwr. (dBm)	Standard Gain Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBm)	ERP (dBm)	dBc
3702.50	-91.58	-58.89	6.6	H	-52.29	-54.43	76.44
5553.75	-79.78	-41.57	7.8	H	-33.77	-35.91	57.92
7405.00	-93.16	-59.08	7.75	H	-51.33	-53.47	75.48
9256.25	-93.91	-59.89	7.6	H	-52.29	-54.43	76.44
11107.50	-94.69	-61.53	8.5	H	-53.03	-55.17	77.18
12958.75	-95.19	-62.31	8.8	H	-53.51	-55.65	77.66
14810.00	-96.27	-64.99	9.6	H	-55.39	-57.53	79.54
16661.25	-96.13	-64.00	9.0	H	-55.00	-57.14	79.15
18512.50	-97.02	-63.81	9.3	H	-54.51	-56.65	78.66

Radiated Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The video bandwidth and resolution bandwidth were set to 3MHz. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A standard gain horn antenna was substituted in place of the EUT. The antenna was fed through a directional coupler and the power at the coupler port was monitored. A signal generator and power amplifier controlled the antenna, and the input level of the antenna was adjusted to the same field strength level as the EUT. The feed point for the antenna was then connected to a calibrated power meter and the power adjusted to read the same as the coupler port previously recorded, this is to account for any mismatch in impedance, which may occur at the horn antenna. The conducted power at the antenna feed point was recorded. The forward power for the antenna was then determined and the EIRP level was determined by adding the horn forward conducted power and the horn antenna gain in dB.

NOTE: All other spurious emissions were found to be below the magnitude of each harmonic.

***FIELD STRENGTH OF SPURIOUS RADIATION - § 2.1053 (PCS CDMA)***

**Operating Frequency (MHz):** 1880.00  
**Channel:** 600 (Mid)  
**Measured Cond. Pwr. (dBm):** 24.50  
**Measured EIRP (dBm):** 24.26  
**Modulation:** PCS CDMA  
**Distance:** 3 Meters  
**Limit:**  $43 + 10 \log (W) = 38.13 \text{ dBc}$

Frequency (MHz)	Field Strength of Spurious Radiation (dBm)	Horn Forward Cond. Pwr. (dBm)	Standard Gain Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBm)	ERP (dBm)	dBc
3760.00	-85.82	-53.73	6.6	H	-47.13	-49.27	73.53
5640.00	-91.00	-58.12	7.8	H	-50.32	-52.46	76.72
7520.00	-91.79	-59.11	7.75	H	-51.36	-53.50	77.76
9400.00	-94.53	-62.61	7.6	H	-55.01	-57.15	81.41
11280.00	-94.83	-62.97	8.5	H	-54.47	-56.61	80.87
13160.00	-94.88	-63.00	8.8	H	-54.20	-56.34	80.60
15040.00	-95.27	-63.89	9.6	H	-54.29	-56.43	80.69
16920.00	-96.13	-65.20	9.0	H	-56.20	-58.34	82.60
18800.00	-96.75	-65.84	9.3	H	-56.54	-58.68	82.94

Radiated Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The video bandwidth and resolution bandwidth were set to 3MHz. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A standard gain horn antenna was substituted in place of the EUT. The antenna was fed through a directional coupler and the power at the coupler port was monitored. A signal generator and power amplifier controlled the antenna, and the input level of the antenna was adjusted to the same field strength level as the EUT. The feed point for the antenna was then connected to a calibrated power meter and the power adjusted to read the same as the coupler port previously recorded, this is to account for any mismatch in impedance, which may occur at the horn antenna. The conducted power at the antenna feed point was recorded. The forward power for the antenna was then determined and the EIRP level was determined by adding the horn forward conducted power and the horn antenna gain in dB.

NOTE: All other spurious emissions were found to be below the magnitude of each harmonic.

***FIELD STRENGTH OF SPURIOUS RADIATION - § 2.1053 (PCS CDMA)***

**Operating Frequency (MHz):** 1908.75  
**Channel:** 1175 (High)  
**Measured Cond. Pwr. (dBm):** 24.50  
**Measured EIRP (dBm):** 22.40  
**Modulation:** PCS CDMA  
**Distance:** 3 Meters  
**Limit:**  $43 + 10 \log (W) = 38.13 \text{ dBc}$

Frequency (MHz)	Field Strength of Spurious Radiation (dBm)	Horn Forward Cond. Pwr. (dBm)	Standard Gain Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBm)	ERP (dBm)	dBc
3817.50	-82.78	-52.29	6.6	H	-45.69	-47.83	70.23
5726.25	-88.39	-53.69	7.8	H	-45.89	-48.03	70.43
7635.00	-92.58	-57.70	7.75	H	-49.95	-52.09	74.49
9543.75	-94.27	-57.25	7.6	H	-49.65	-51.79	74.19
11452.50	-95.38	-59.52	8.5	H	-51.02	-53.16	75.56
13361.25	-95.79	-58.81	8.8	H	-50.01	-52.15	74.55
15270.00	-96.57	-60.09	9.6	H	-50.49	-52.63	75.03
17178.75	-96.31	-60.33	9.0	H	-51.33	-53.47	75.87
19087.50	-96.87	-59.66	9.3	H	-50.36	-52.50	74.90

Radiated Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The video bandwidth and resolution bandwidth were set to 3MHz. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A standard gain horn antenna was substituted in place of the EUT. The antenna was fed through a directional coupler and the power at the coupler port was monitored. A signal generator and power amplifier controlled the antenna, and the input level of the antenna was adjusted to the same field strength level as the EUT. The feed point for the antenna was then connected to a calibrated power meter and the power adjusted to read the same as the coupler port previously recorded, this is to account for any mismatch in impedance, which may occur at the horn antenna. The conducted power at the antenna feed point was recorded. The forward power for the antenna was then determined and the EIRP level was determined by adding the horn forward conducted power and the horn antenna gain in dB.

NOTE: All other spurious emissions were found to be below the magnitude of each harmonic.

***FIELD STRENGTH OF SPURIOUS RADIATION - § 2.1053 (800MHz CDMA)***

**Operating Frequency (MHz):** 824.70  
**Channel:** 1013 (Low)  
**Measured Cond. Pwr. (dBm):** 24.00  
**Measured ERP (dBm):** 22.83  
**Modulation:** CDMA  
**Distance:** 3 Meters  
**Limit:**  $43 + 10 \log (W) = 38.13 \text{ dBc}$

Frequency (MHz)	Field Strength of Spurious Radiation (dBm)	Horn Forward Cond. Pwr. (dBm)	Standard Gain Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBm)	ERP (dBm)	dBc
1649.40	-93.56	-68.67	6.6	H	-62.07	-64.21	87.04
2474.10	-94.13	-65.33	7.8	H	-57.53	-59.67	82.50
3298.80	-95.80	-68.22	7.75	H	-60.47	-62.61	85.44
4123.50	-96.01	-68.99	7.6	H	-61.39	-63.53	86.36
4948.20	-96.74	-69.38	8.5	H	-60.88	-63.02	85.85
5772.90	-96.79	-67.91	8.8	H	-59.11	-61.25	84.08
6597.60	-96.27	-67.39	9.6	H	-57.79	-59.93	82.76
7422.30	-96.59	-69.06	9.0	H	-60.06	-62.20	85.03
8247.00	-94.23	-69.02	9.3	H	-59.72	-61.86	84.69

**Radiated Measurements by Substitution Method:**

The EUT was placed on a turntable 3-meters from the receive antenna. The video bandwidth and resolution bandwidth were set to 3MHz. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A standard gain horn antenna was substituted in place of the EUT. The antenna was fed through a directional coupler and the power at the coupler port was monitored. A signal generator and power amplifier controlled the antenna, and the input level of the antenna was adjusted to the same field strength level as the EUT. The feed point for the antenna was then connected to a calibrated power meter and the power adjusted to read the same as the coupler port previously recorded, this is to account for any mismatch in impedance, which may occur at the horn antenna. The conducted power at the antenna feed point was recorded. The forward power for the antenna was then determined and the EIRP level was determined by adding the horn forward conducted power and the horn antenna gain in dB.

NOTE: All other spurious emissions were found to be below the magnitude of each harmonic.

***FIELD STRENGTH OF SPURIOUS RADIATION - § 2.1053 (800MHz CDMA)***

**Operating Frequency (MHz):** **835.89**  
 Channel: 363 (Mid)  
 Measured Cond. Pwr. (dBm): 24.00  
 Measured ERP (dBm): 23.27  
 Modulation: CDMA  
 Distance: 3 Meters  
 Limit:  $43 + 10 \log (W) = 38.13 \text{ dBc}$

Frequency (MHz)	Field Strength of Spurious Radiation (dBm)	Horn Forward Cond. Pwr. (dBm)	Standard Gain Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBm)	ERP (dBm)	dBc
1671.78	-90.87	-68.48	6.6	H	-61.88	-64.02	87.29
2507.67	-93.66	-64.36	7.8	H	-56.56	-58.70	81.97
3343.56	-94.59	-68.31	7.75	H	-60.56	-62.70	85.97
4179.45	-95.67	-67.78	7.6	H	-60.18	-62.32	85.59
5015.34	-97.01	-71.05	8.5	H	-62.55	-64.69	87.96
5851.23	-96.71	-69.58	8.8	H	-60.78	-62.92	86.19
6687.12	-95.91	-68.83	9.6	H	-59.23	-61.37	84.64
7523.01	-96.12	-70.69	9.0	H	-61.69	-63.83	87.10
8358.90	-95.21	-69.50	9.3	H	-60.20	-62.34	85.61

Radiated Measurements by Substitution Method:

The EUT was placed on a turntable 3-meters from the receive antenna. The video bandwidth and resolution bandwidth were set to 3MHz. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A standard gain horn antenna was substituted in place of the EUT. The antenna was fed through a directional coupler and the power at the coupler port was monitored. A signal generator and power amplifier controlled the antenna, and the input level of the antenna was adjusted to the same field strength level as the EUT. The feed point for the antenna was then connected to a calibrated power meter and the power adjusted to read the same as the coupler port previously recorded, this is to account for any mismatch in impedance, which may occur at the horn antenna. The conducted power at the antenna feed point was recorded. The forward power for the antenna was then determined and the EIRP level was determined by adding the horn forward conducted power and the horn antenna gain in dB.

NOTE: All other spurious emissions were found to be below the magnitude of each harmonic.

***FIELD STRENGTH OF SPURIOUS RADIATION - § 2.1053 (800MHz CDMA)***

**Operating Frequency (MHz):** 848.31  
**Channel:** 777 (High)  
**Measured Cond. Pwr. (dBm):** 24.00  
**Measured ERP (dBm):** 23.85  
**Modulation:** CDMA  
**Distance:** 3 Meters  
**Limit:**  $43 + 10 \log (W) = 38.13 \text{ dBc}$

Frequency (MHz)	Field Strength of Spurious Radiation (dBm)	Horn Forward Cond. Pwr. (dBm)	Standard Gain Horn Antenna Gain (dBi)	POL (H/V)	EIRP (dBm)	ERP (dBm)	dBc
1696.62	-91.81	-69.92	6.6	H	-63.32	-65.46	89.31
2544.93	-93.58	-64.78	7.8	H	-56.98	-59.12	82.97
3393.24	-94.29	-68.71	7.75	H	-60.96	-63.10	86.95
4241.55	-95.27	-68.25	7.6	H	-60.65	-62.79	86.64
5089.86	-96.01	-70.65	8.5	H	-62.15	-64.29	88.14
5938.17	-96.58	-69.70	8.8	H	-60.90	-63.04	86.89
6786.48	-95.49	-68.61	9.6	H	-59.01	-61.15	85.00
7634.79	-95.76	-71.23	9.0	H	-62.23	-64.37	88.22
8483.10	-94.17	-68.96	9.3	H	-59.66	-61.80	85.65

Radiated Measurements by Substitution Method:

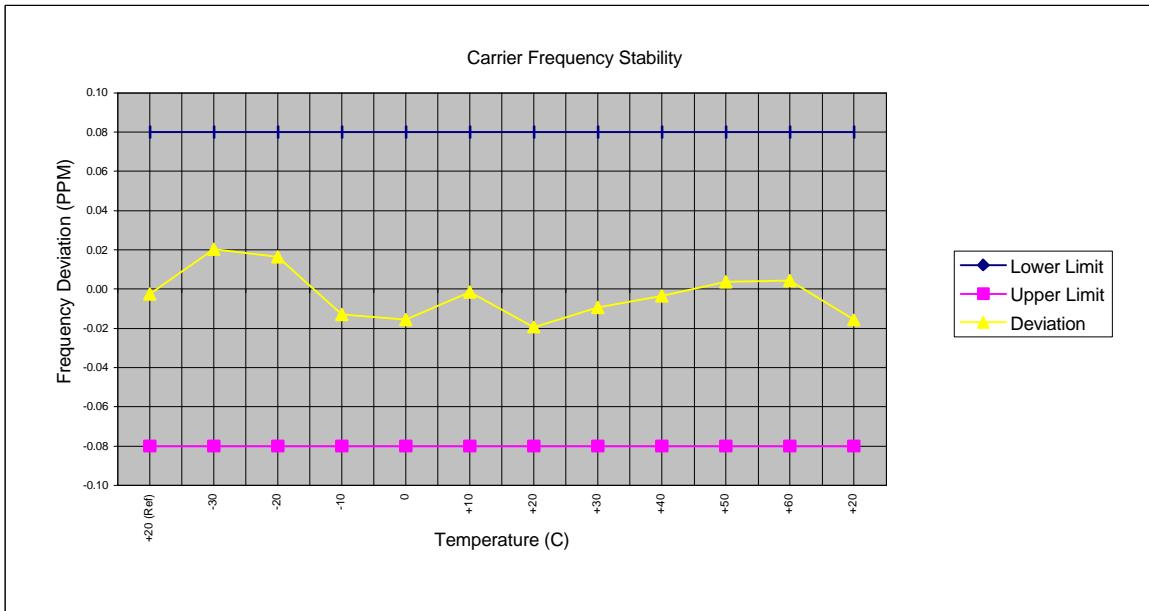
The EUT was placed on a turntable 3-meters from the receive antenna. The video bandwidth and resolution bandwidth were set to 3MHz. The field of maximum intensity was found by rotating the EUT approximately 360 degrees and changing the height of the receive antenna from 1 to 4 meters. The field strength was recorded from a calibrated spectrum analyzer for each channel being tested. A standard gain horn antenna was substituted in place of the EUT. The antenna was fed through a directional coupler and the power at the coupler port was monitored. A signal generator and power amplifier controlled the antenna, and the input level of the antenna was adjusted to the same field strength level as the EUT. The feed point for the antenna was then connected to a calibrated power meter and the power adjusted to read the same as the coupler port previously recorded, this is to account for any mismatch in impedance, which may occur at the horn antenna. The conducted power at the antenna feed point was recorded. The forward power for the antenna was then determined and the EIRP level was determined by adding the horn forward conducted power and the horn antenna gain in dB.

NOTE: All other spurious emissions were found to be below the magnitude of each harmonic.

### 3.5 FREQUENCY STABILITY - § 24.235 (PCS CDMA)

Carrier Frequency (GHz): 1.88  
Channel: 600  
Mode: PCS CDMA  
Deviation Limit (PPM): 0.08

Temperature (C)	Voltage (%)	Power (VDC)	Carrier Frequency Deviation		Specification	
			(Hz)	(PPM)	Lower Limit (PPM)	Upper Limit (PPM)
+20 (Ref)	100	3.7	-4.40	-0.002	0.08	-0.08
-30	100	3.7	38.00	0.020	0.08	-0.08
-20	100	3.7	30.70	0.016	0.08	-0.08
-10	100	3.7	-24.30	-0.013	0.08	-0.08
0	100	3.7	-29.20	-0.016	0.08	-0.08
+10	100	3.7	-2.50	-0.001	0.08	-0.08
+20	100	3.7	-36.30	-0.019	0.08	-0.08
+30	100	3.7	-17.50	-0.009	0.08	-0.08
+40	100	3.7	-6.80	-0.004	0.08	-0.08
+50	100	3.7	6.90	0.004	0.08	-0.08
+60	100	3.7	8.00	0.004	0.08	-0.08
+20	Battery Endpoint	3.3	-29.40	-0.016	0.08	-0.08



**FREQUENCY STABILITY - § 2.1055 (800MHz CDMA)**

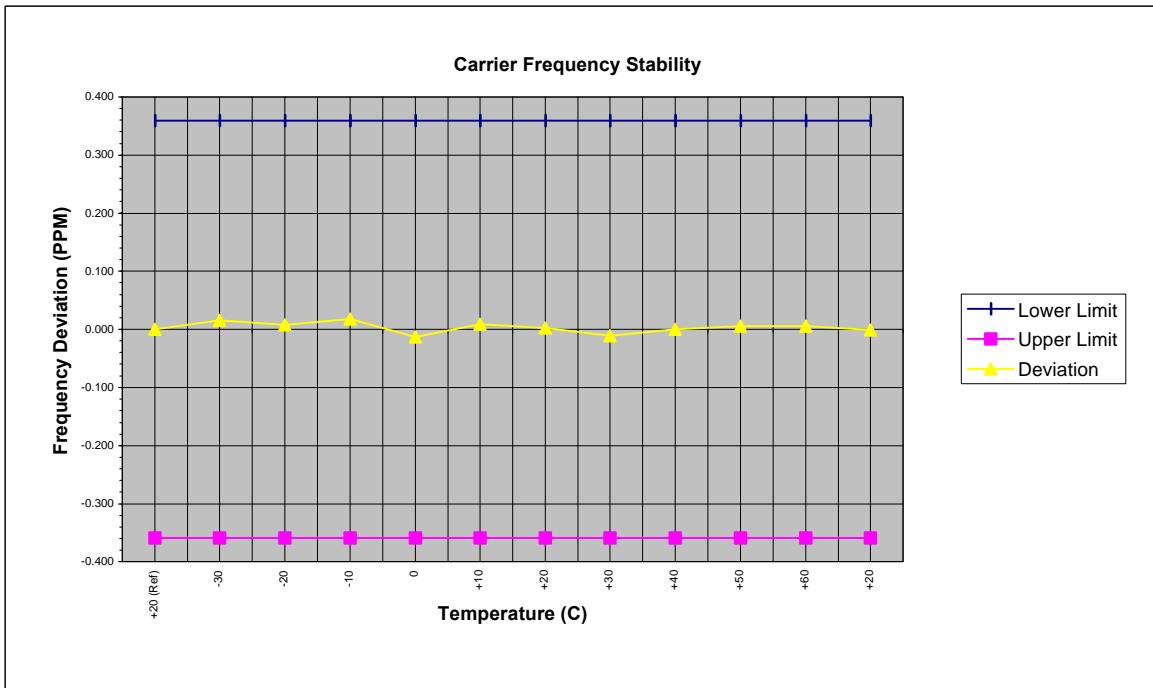
Carrier Frequency (MHz): 835.89

Channel: 363

Mode: CDMA

Deviation Limit (PPM): 0.359

Temperature (C)	Voltage (%)	Power (VDC)	Carrier Frequency Deviation		Specification	
			(Hz)	(PPM)	Lower Limit (PPM)	Upper Limit (PPM)
+20 (Ref)	100	3.7	0.30	0.000	0.359	-0.359
-30	100	3.7	12.90	0.015	0.359	-0.359
-20	100	3.7	6.60	0.008	0.359	-0.359
-10	100	3.7	14.40	0.017	0.359	-0.359
0	100	3.7	-10.50	-0.013	0.359	-0.359
+10	100	3.7	7.30	0.009	0.359	-0.359
+20	100	3.7	2.00	0.002	0.359	-0.359
+30	100	3.7	-9.40	-0.011	0.359	-0.359
+40	100	3.7	0.40	0.000	0.359	-0.359
+50	100	3.7	4.60	0.006	0.359	-0.359
+60	100	3.7	5.00	0.006	0.359	-0.359
+20	Battery Endpoint	3.3	-0.90	-0.001	0.359	-0.359



#### 4.1 TEST EQUIPMENT

<u>Type</u>	<u>Model</u>	<u>Calib. Due Date</u>	<u>Serial No.</u>
HP Signal Generator	8648D (9kHz-4.0GHz)	Nov 2002	3847A00611
Rohde & Schwarz Signal Generator	SMR40 (10MHz-40GHz)	Nov 2002	835537/022
Gigatronics Power Meter	8652A	Oct 2002	1835272
Gigatronics Power Sensor	80701A (0.05-18GHz)	Sept. 2002	1833535
Gigatronics Power Sensor	80701A (0.05-18GHz)	Sept. 2002	1833542
Amplifier Research Power Amp.	5S1G4 (5W, 800MHz-4.2GHz)	N/A	26235
Microwave System Amplifier	HP 83017A (0.5-26.5GHz)	N/A	3123A00587
Network Analyzer	HP 8753E (30kHz-3GHz)	Nov 2002	US38433013
Audio Analyzer	HP 8903B	Nov 2002	3729A18691
Modulation Analyzer	HP 8901A	July 2002	3749A07154
Frequency Counter	HP 53181A (3GHz)	May 2002	3736A05175
DC Power Supply	HP E3611A	N/A	KR83015294
CDMA Base Station Simulator	Agilent E8285A	Feb. 2002	US40332926
Multi-Device Controller	EMCO 2090	N/A	9912-1484
Mini Mast	EMCO 2075	N/A	0001-2277
Turntable	EMCO 2080-1.2/1.5	N/A	0002-1002
Double Ridged Horn Antenna	ETS 3115 (1-18GHz)	Oct. 2002	6267
Double Ridged Horn Antenna	ETS 3115 (1-18GHz)	Oct. 2002	6276
Horn Antenna	Chase BBHA 9120-A (0.7-4.8GHz)	Sept 2002	9120A-239
Horn Antenna	Chase BBHA 9120-A (0.7-4.8GHz)	Sept 2002	9120A-240
Roberts Dipoles	Compliance Design (2 sets) 3121C	June 2002	
Spectrum Analyzer	HP 8594E	March 2002	3543A02721
Spectrum Analyzer	HP E4408B	Nov 2002	US39240170
Shielded Screen Room	Lindgren R.F. 18W-2/2-0	N/A	16297
Environmental Chamber	ESPEC ECT-2 (Temperature/Humidity)	Feb 2002	0510154-B

### **5.1 CONCLUSION**

The data in this measurement report shows that the WITHUS IT CO., LTD. Model: WPE-2000 Dual-Band Cellular/PCS CDMA Phone FCC ID: POQWPE-2000 complies with all the requirements of Parts 2, 22.901(d) and 24(E) of the FCC rules.

## TEST PLOTS

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## **1900MHz PCS CDMA PART 24 TEST PLOTS**

**hp** 12:09:00 Nov 21, 2001

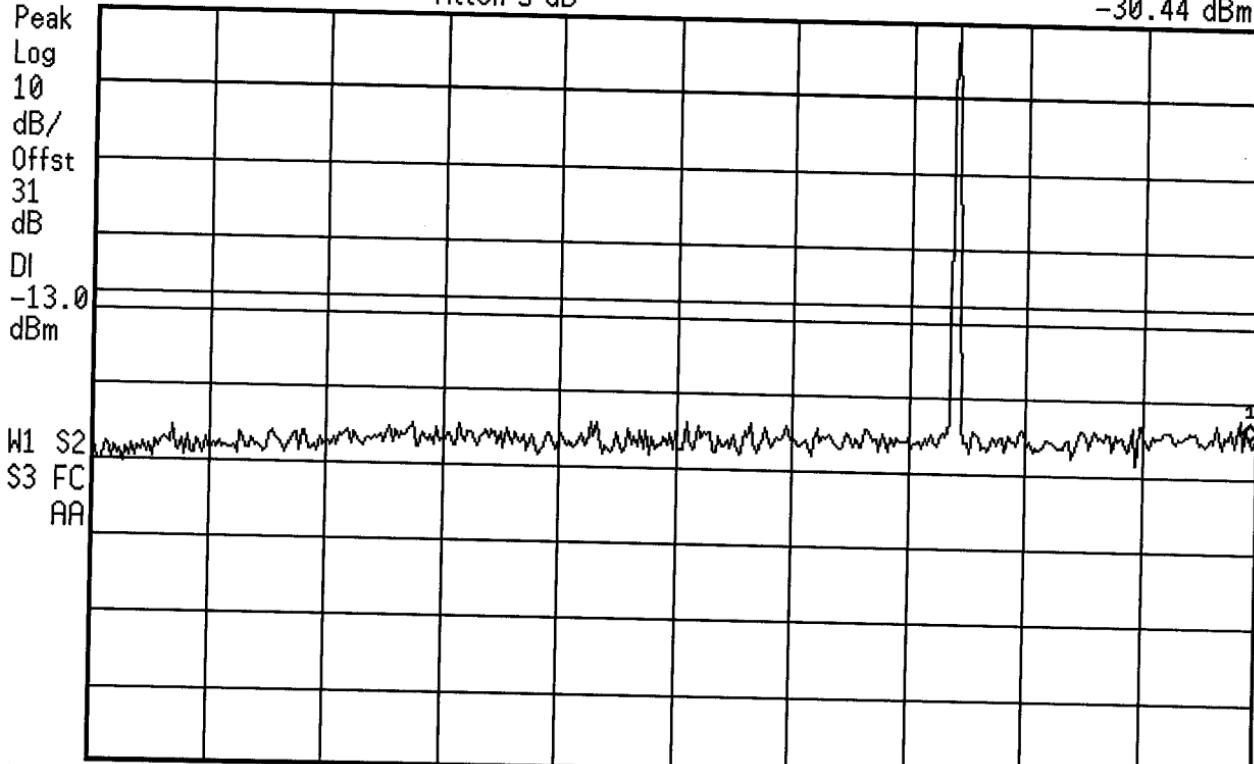
WITHUS WPE-2000 PCS CDMA COND SPURS CH 25

Ref 24.5 dBm

Atten 5 dB

Mkr1 2.481 GHz

-30.44 dBm



Start 10 MHz

Res BW 3 MHz

VBW 3 MHz

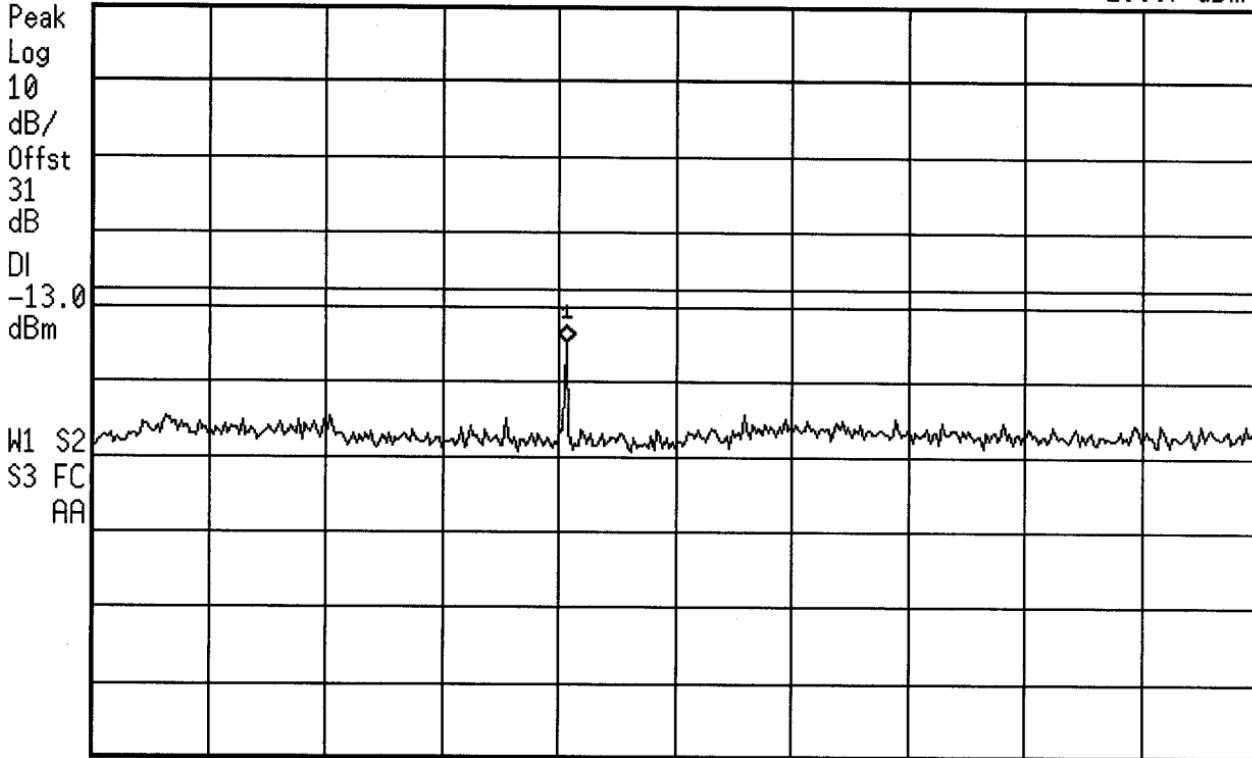
Stop 2.5 GHz

Sweep 5 ms

**hp** 12:10:27 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA COND SPURS CH 25  
Ref 24.5 dBm Atten 5 dB

Mkr1 5.556 GHz  
-20.07 dBm



**[hp]** 12:11:03 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA COND SPURS CH 25

Ref 24.5 dBm

Atten 5 dB

Mkr1 13.23 GHz

-29.55 dBm

Peak

Log

10

dB/

0ffst

31

dB

DI

-13.0

dBm

W1 S2

S3 FC

AA

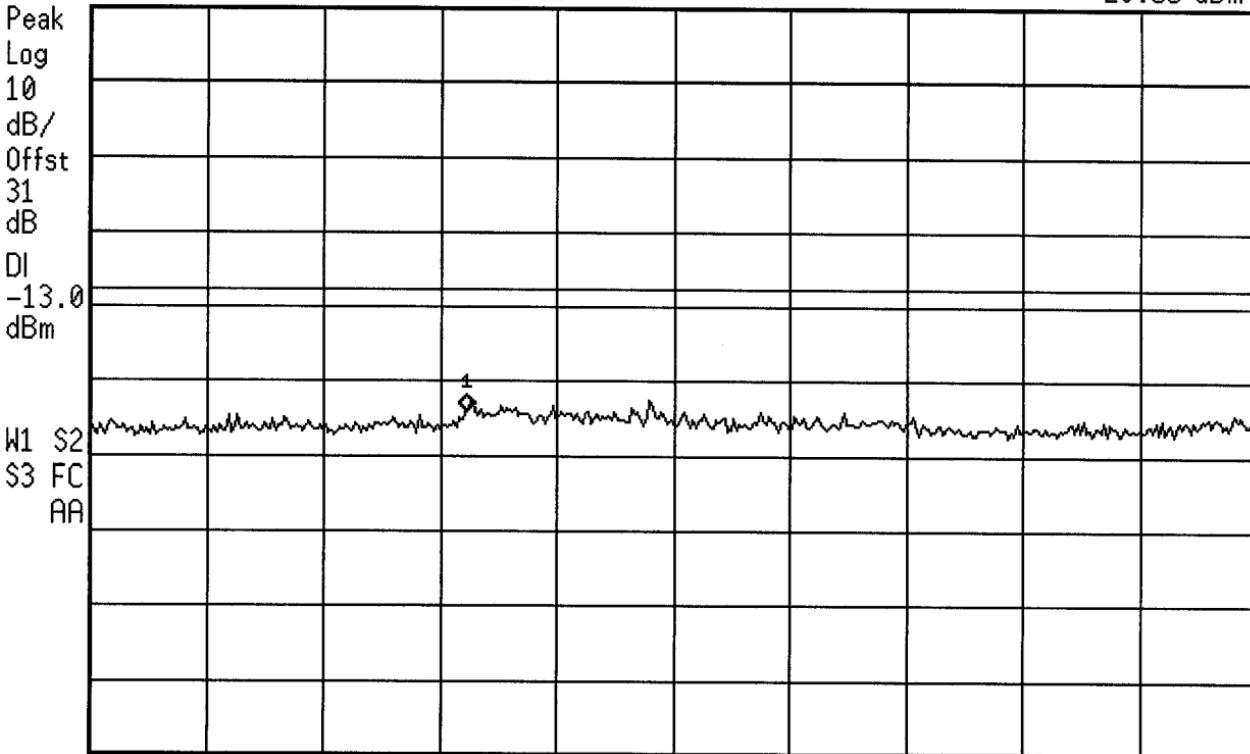
Start 10 GHz

Res BW 3 MHz

VBW 3 MHz

Stop 20 GHz

Sweep 100 ms





12:13:32 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA COND SPURS CH 600

Ref 24.5 dBm

Atten 5 dB

Mkr1 2.481 GHz

-29.99 dBm

Peak

Log

10

dB/

Offset

31

dB

DI

-13.0

dBm

W1 S2

S3 FC

AR

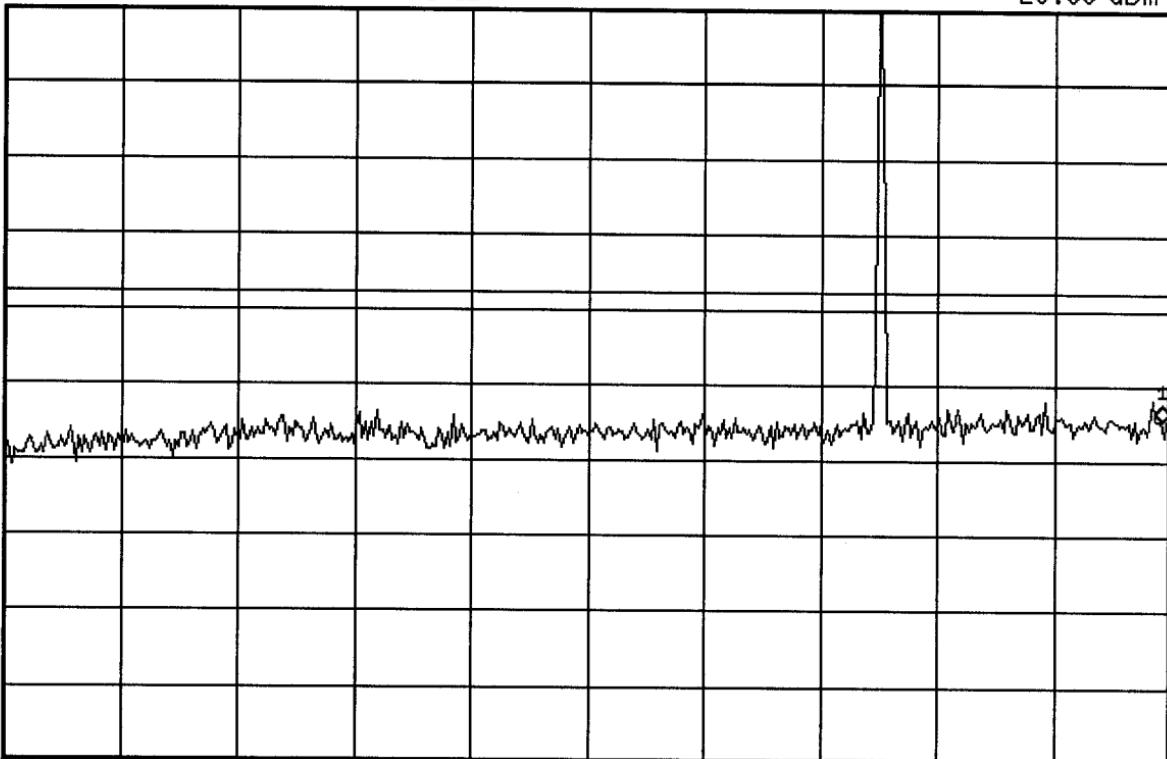
Start 10 MHz

Res BW 3 MHz

VBW 3 MHz

Stop 2.5 GHz

Sweep 5 ms



**[hp]**

12:14:12 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA COND SPURS CH 600

Ref 24.5 dBm

Atten 5 dB

Mkr1 5.650 GHz

-22.75 dBm

Peak

Log

10

dB/

0ffst

31

dB

DI

-13.0

dBm

W1 S2

S3 FC

AA

Start 2.5 GHz

Res BW 3 MHz

VBW 3 MHz

Stop 10 GHz

Sweep 18.75 ms

1

◆

**hp**

12:15:27 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA COND SPURS CH 600

Ref 24.5 dBm

Atten 5 dB

Mkr1 14.08 GHz

-30.53 dBm

Peak

Log

10

dB/

0ffst

31

dB

DI

-13.0

dBm

W1 S2

S3 FC

AA

Start 10 GHz

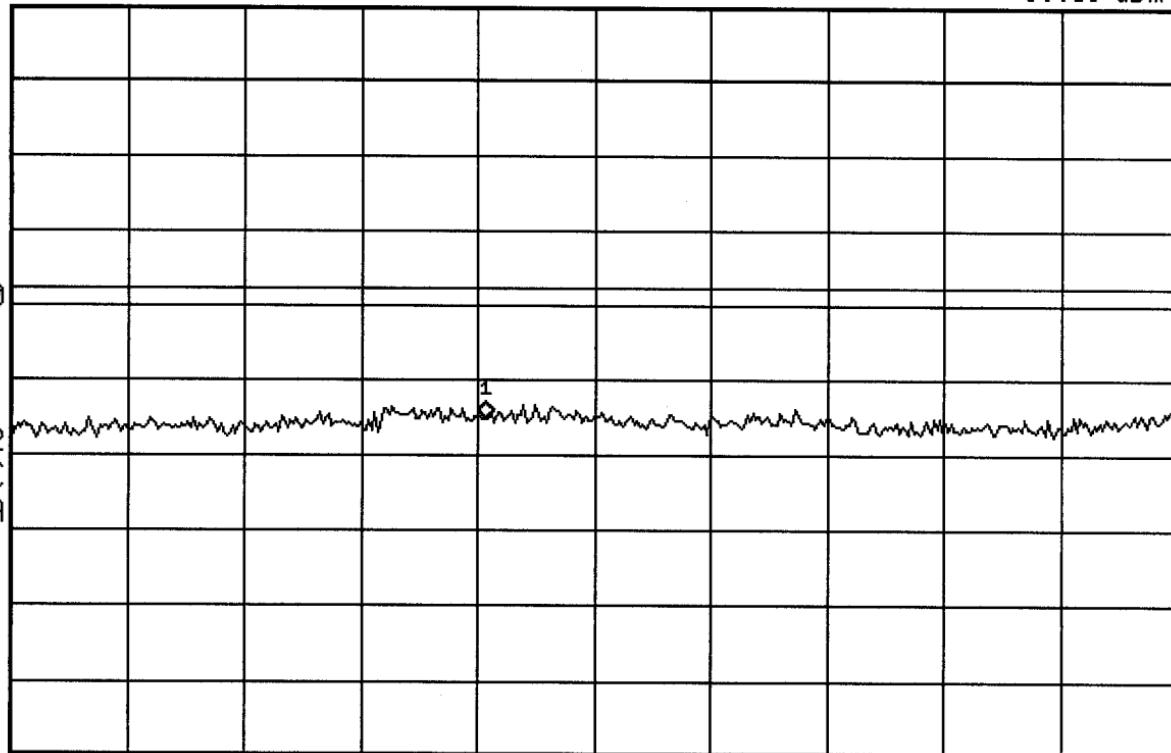
Res BW 3 MHz

VBW 3 MHz

Stop 20 GHz

Sweep 100 ms

1



**hp**

12:24:50 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA COND SPURS CH 1175

Ref 24.5 dBm

Atten 5 dB

Mkr1 2.494 GHz

-31.06 dBm

Peak

Log

10

dB/

0ffst

31

dB

DI

-13.0

dBm

&gt;

W1 S2

S3 FC

AA

Start 10 MHz

Res BW 3 MHz

VBW 3 MHz

Stop 2.5 GHz

Sweep 5 ms

**hp**

12:24:22 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA COND SPURS CH 1175

Ref 24.5 dBm

Atten 5 dB

Mkr1 5.725 GHz

-28.7 dBm

Peak

Log

10

dB/

0ffst

31

dB

DI

-13.0

dBm

W1 S2

S3 FC

AA

Start 2.5 GHz

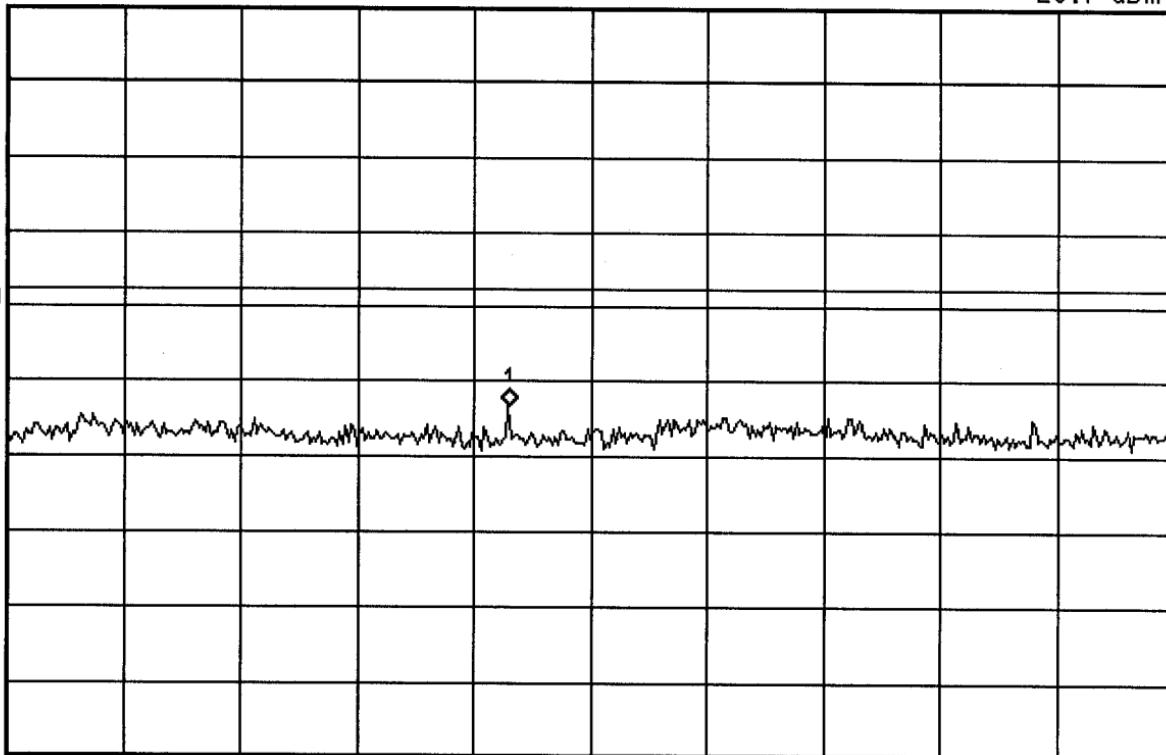
Res BW 3 MHz

VBW 3 MHz

Stop 10 GHz

Sweep 18.75 ms

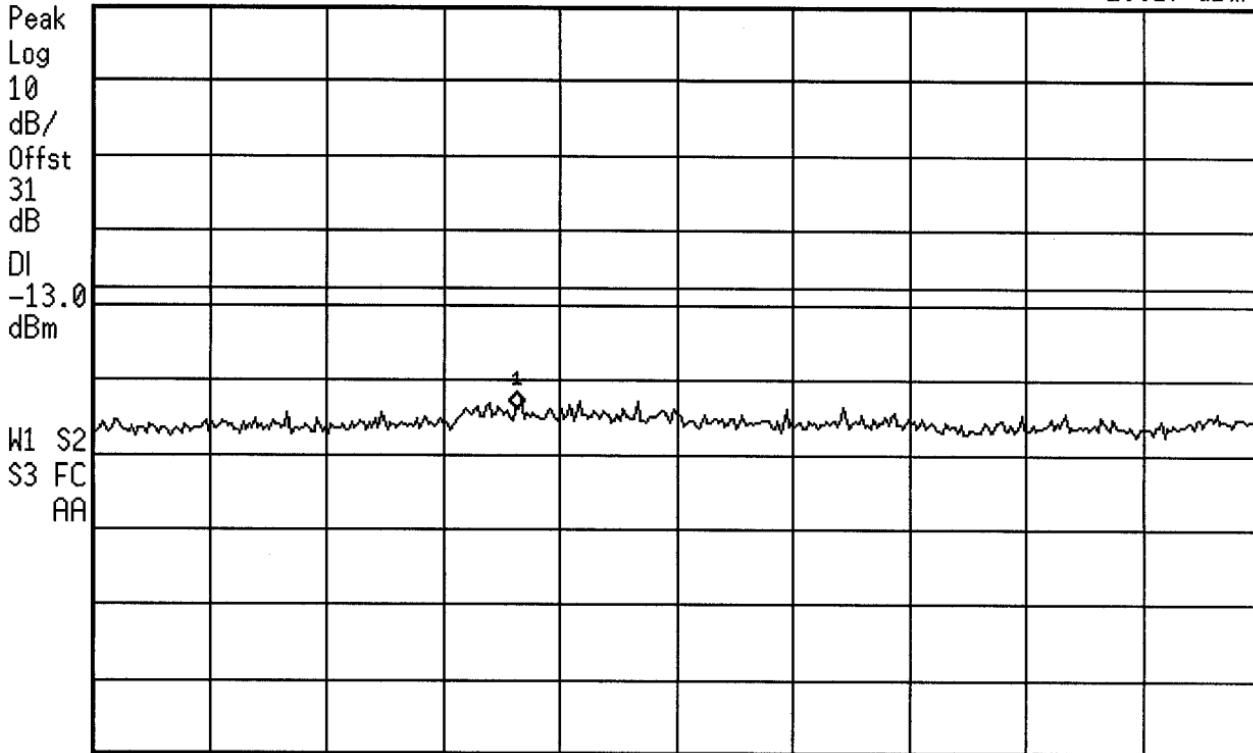
1



hp 12:23:58 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA COND SPURS CH 1175  
Ref 24.5 dBm Atten 5 dB

Mkr1 13.63 GHz  
-29.17 dBm



Start 10 GHz  
Res BW 3 MHz

VBW 3 MHz

Stop 20 GHz  
Sweep 100 ms

hp 12:52:59 Nov 21, 2001

WITHUS WPE-2000 RECEIVER SPURS

Ref -8.1 dBm

Atten 5 dB

Mkr1 1.97827 GHz

-66.72 dBm

Peak

Log

10

dB/

Offst

1

dB

DI

-13.0

dBm

W1 S2

S3 FC

AA

Start 1.931 GHz

#Res BW 3 MHz

\*VBW 3 MHz

Stop 1.989 GHz

Sweep 5 ms



12:43:29 Nov 21, 2001

## WITHUS WPE-2000 BAND EDGE PCS CDMA LOW CH

Ref 24.5 dBm

Atten 5 dB

Peak

Log

10

dB/

Offst

31

dB

DI

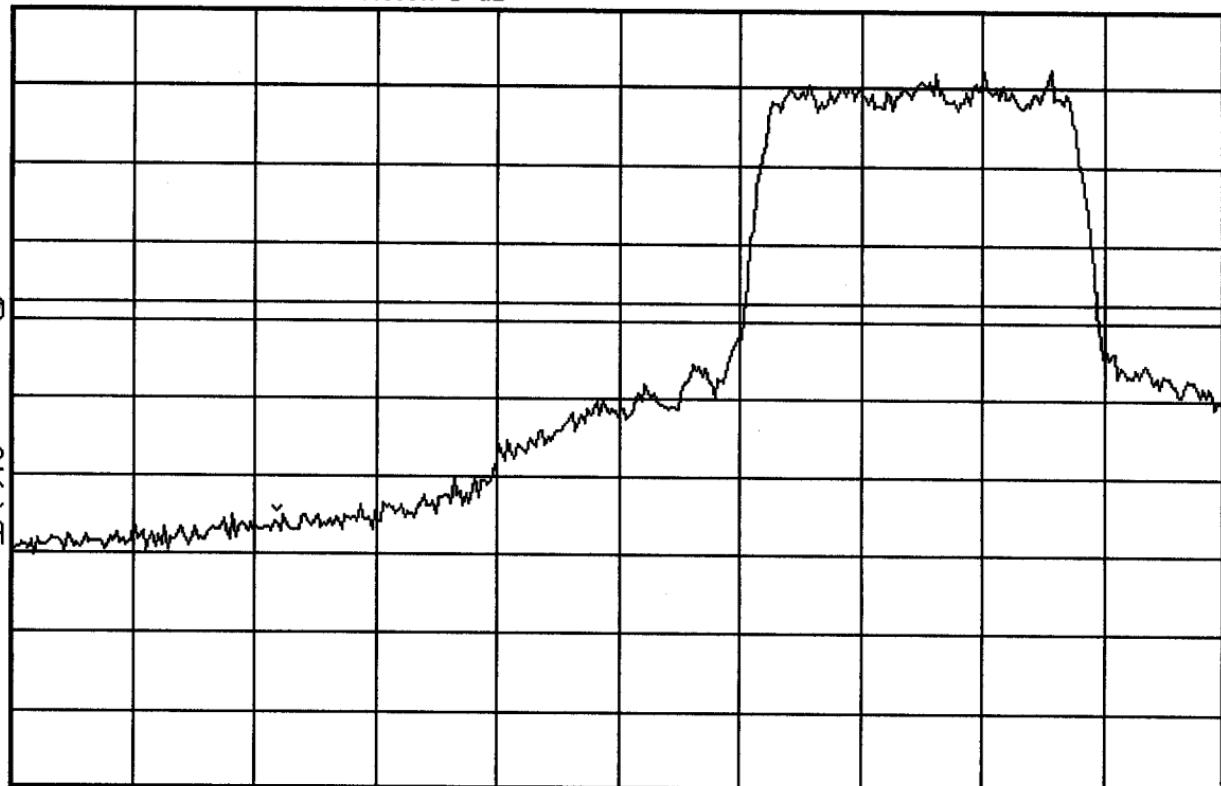
-13.0

dBm

W1 W2

S3 FC

AA



Center 1.85 GHz

#Res BW 30 kHz

#VBW 30 kHz

Span 5 MHz

#Sweep 2.083 s



12:46:27 Nov 21, 2001

WITHUS WPE-2000 BAND EDGE PCS CDMA HIGH CH

Ref 24.5 dBm

Atten 5 dB

Peak

Log

10

dB/

Offst

31

dB

DI

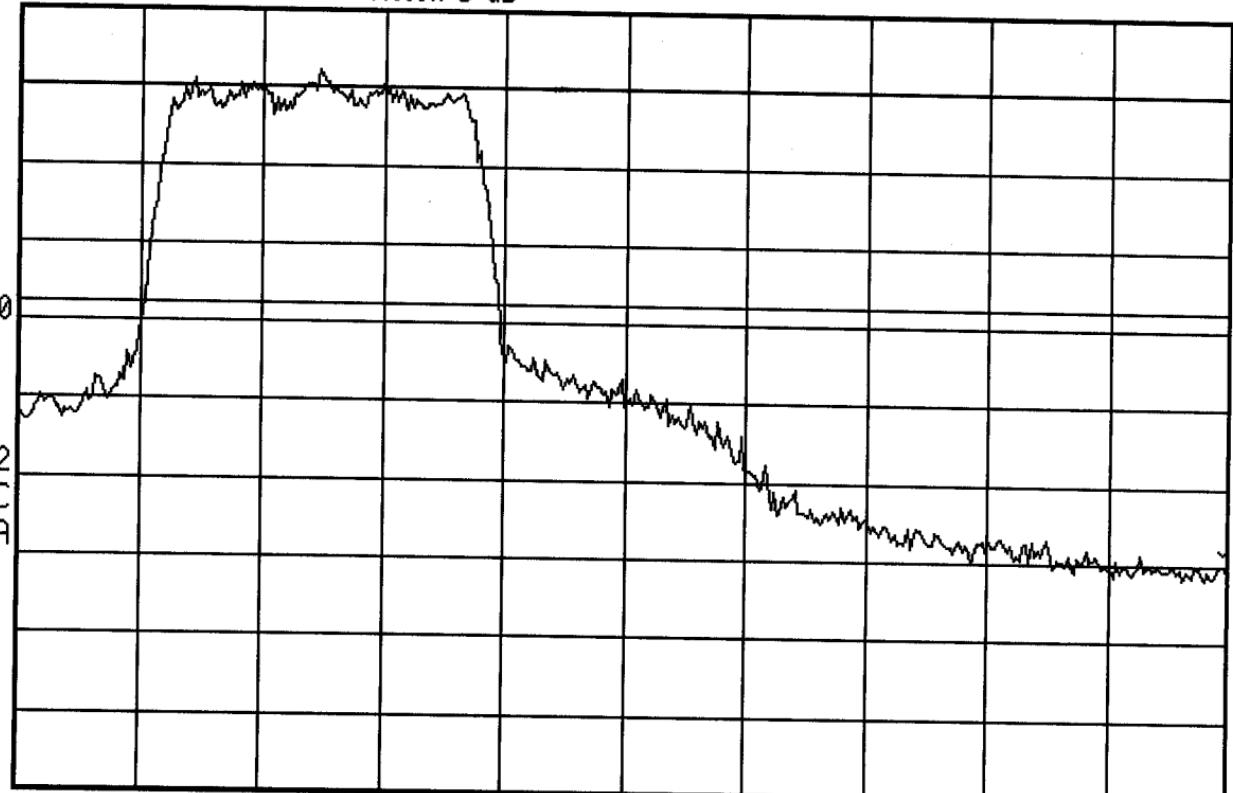
-13.0

dBm

W1 W2

S3 FC

AA



Center 1.91 GHz

\*Res BW 30 kHz

\*VBW 30 kHz

Span 5 MHz

\*Sweep 2.083 s



12:49:55 Nov 21, 2001

WITHUS WPE-2000 BAND EDGE PCS CDMA HIGH CH

Ref 24.5 dBm

Atten 5 dB

Samp

Log

10

dB/

Offst

31

dB

DI

-13.0

dBm

W1 S2

Center 1.88 GHz

#Res BW 30 kHz

#VBW 30 kHz

Span 3 MHz

Sweep 9.167 ms

Occupied Bandwidth Results (measuring..)

Occupied Bandwidth  
1.284 MHz

Occ BW % Pwr 99.00 %

Transmit Freq Error -5.272 kHz



12:40:08 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA CH 25

Ref 24.5 dBm

Atten 5 dB

Peak

Log

10

dB/

Offset

31

dB

DI

-13.0

dBm

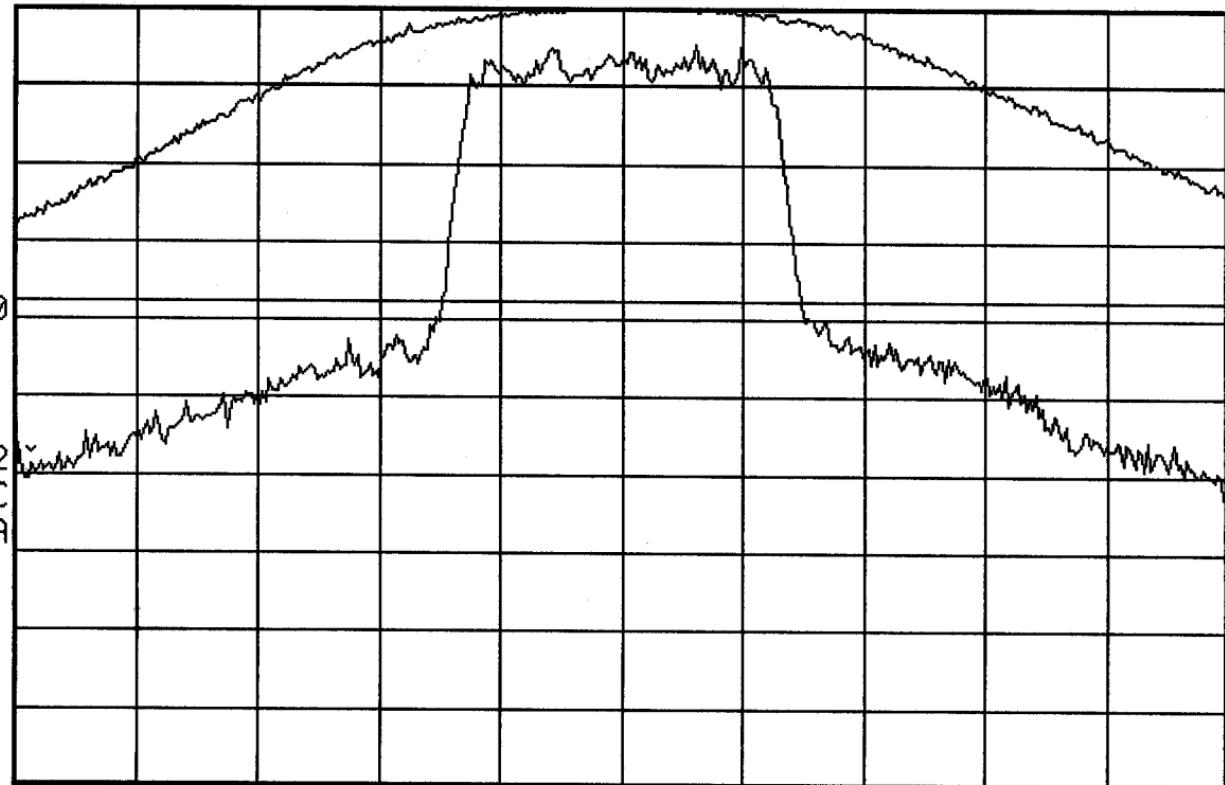
M1

W2

S3

FC

AA



Center 1.851 GHz

#Res BW 30 kHz

\*VBW 30 kHz

Span 5 MHz

#Sweep 2.083 s

hp

12:33:33 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA CH 600

Ref 24.5 dBm

Atten 5 dB

Peak

Log

10

dB/

0ffst

31

dB

DI

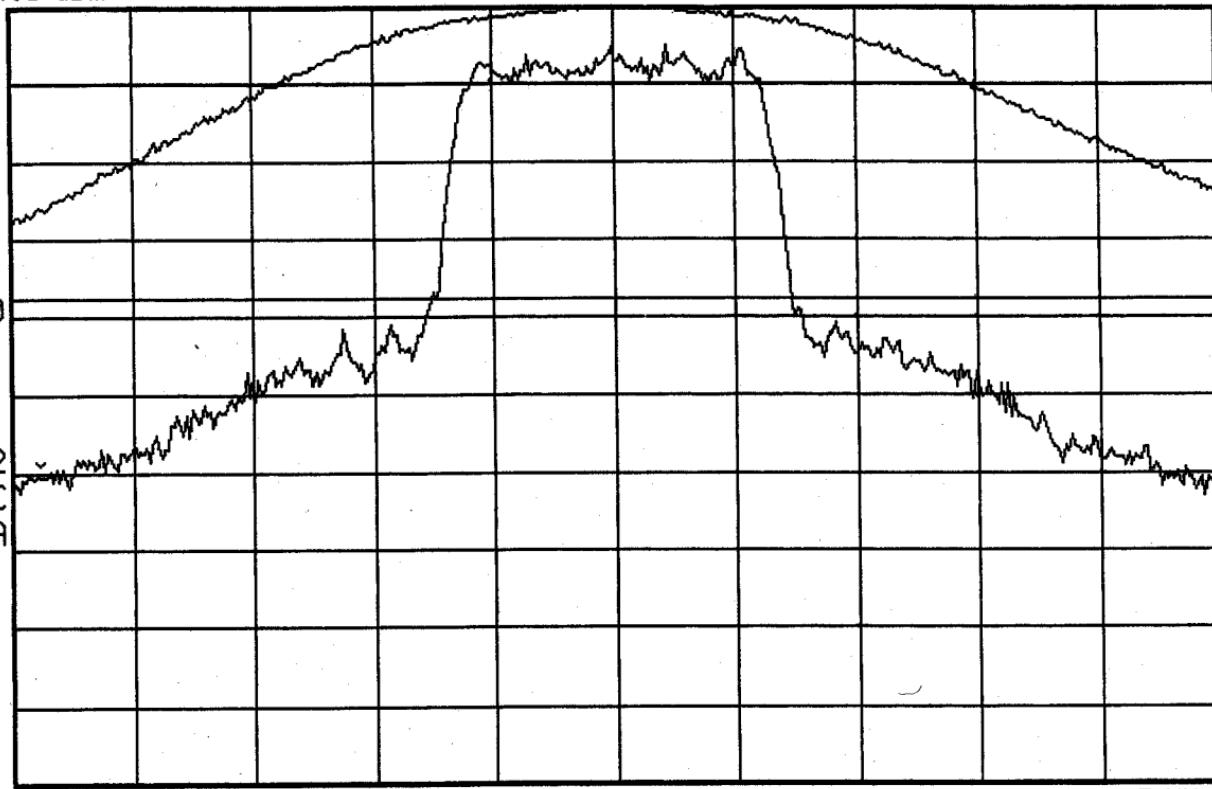
-13.0

dBm

M1 W2

S3 FC

AA



Center 1.88 GHz

#Res BW 30 kHz

\*VBW 30 kHz

Span 5 MHz

\*Sweep 2.083 s

**hp**

12:35:28 Nov 21, 2001

WITHUS WPE-2000 PCS CDMA CH 1175

Ref 24.5 dBm

Atten 5 dB

Peak

Log

10

dB/

Offset

31

dB

DI

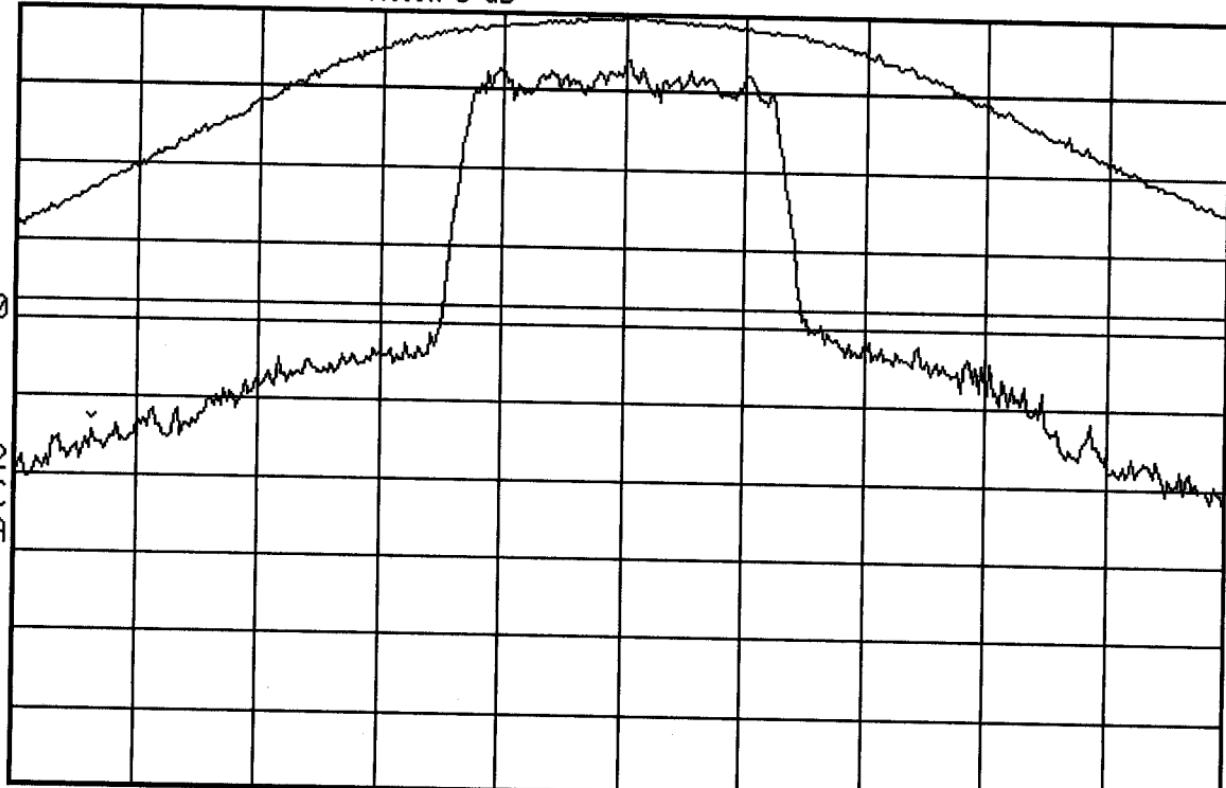
-13.0

dBm

M1 W2

S3 FC

AA



Center 1.909 GHz

\*Res BW 30 kHz

\*VBW 30 kHz

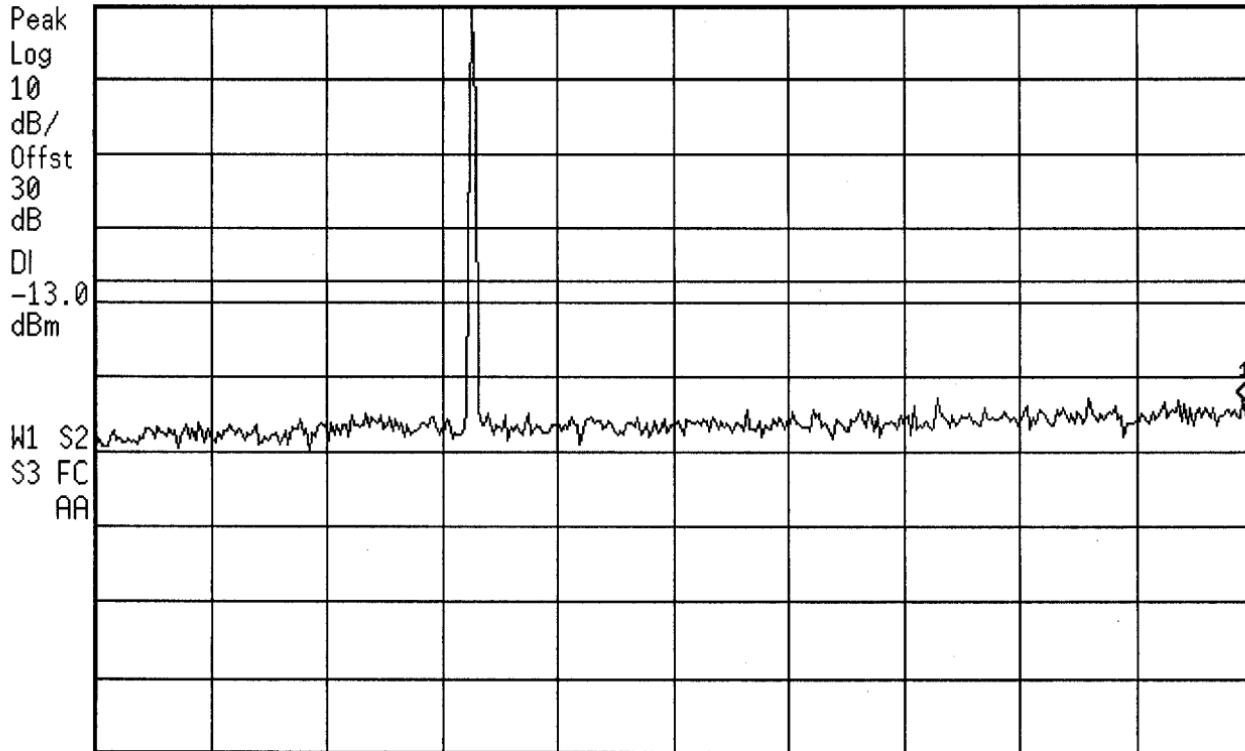
Span 5 MHz

\*Sweep 2.083 s

## **800MHz CELLULAR CDMA PART 22 TEST PLOTS**

**hp** 16:29:08 Nov 22, 2001  
WITHUS WPE-2000 CDMA COND SPURS CH 1013  
Ref 24 dBm Atten 5 dB

Mkr1 2.481 GHz  
-29.05 dBm



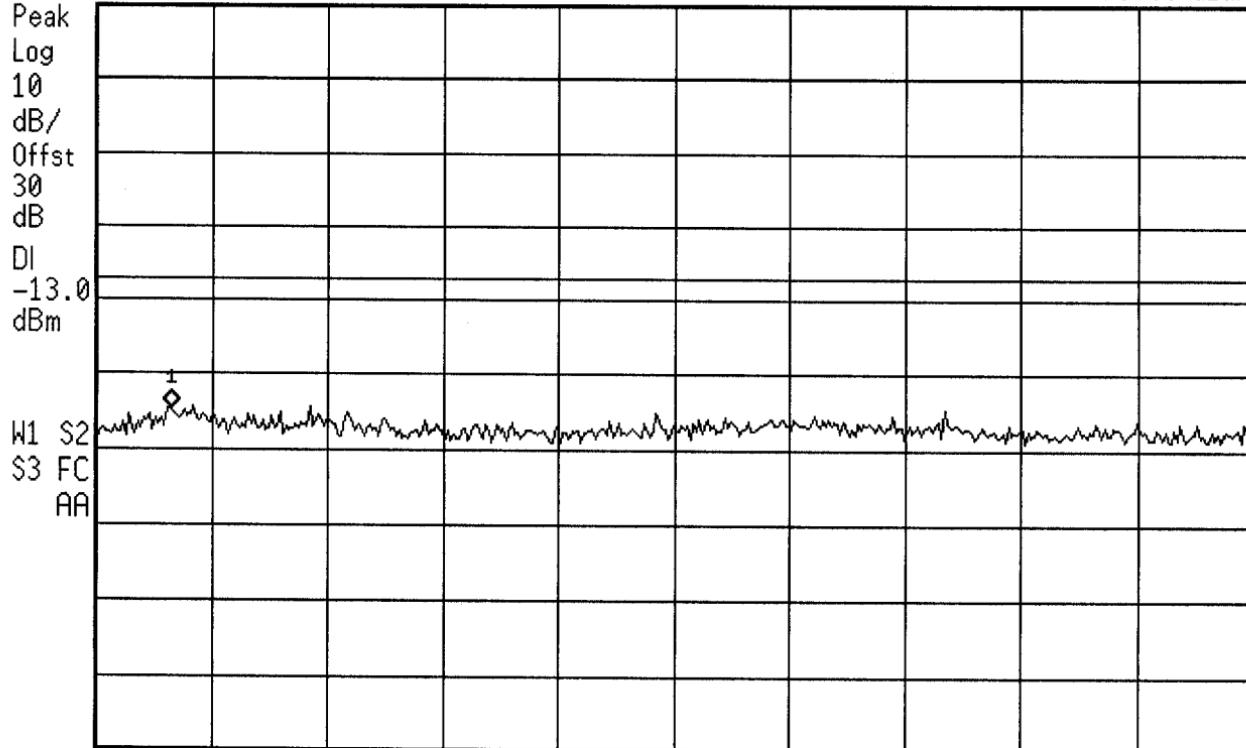
Start 10 MHz  
#Res BW 3 MHz

#VBW 3 MHz

Stop 2.5 GHz  
Sweep 5 ms

**hp** 16:29:38 Nov 22, 2001  
WITHUS WPE-2000 CDMA COND SPURS CH 1013  
Ref 24 dBm Atten 5 dB

Mkr1 2.988 GHz  
-30.68 dBm



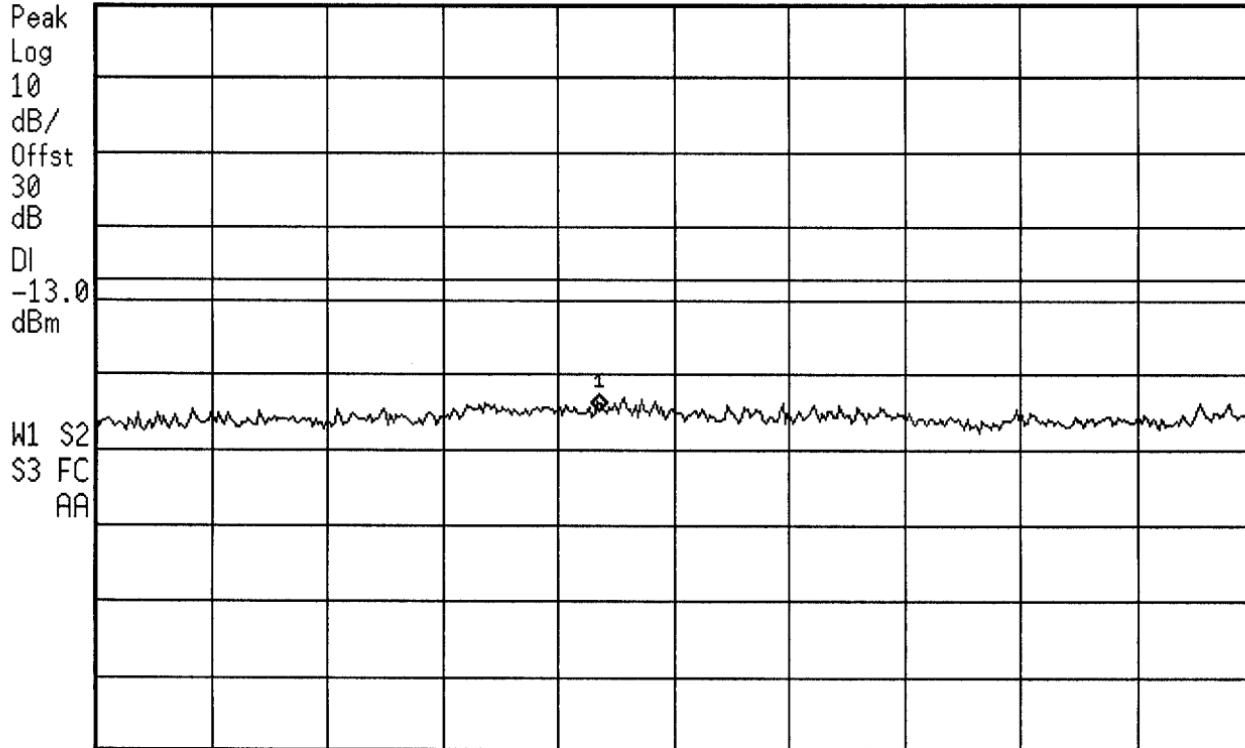
Start 2.5 GHz  
#Res BW 3 MHz

\*VBW 3 MHz

Stop 10 GHz  
Sweep 18.75 ms

**hp** 16:30:13 Nov 22, 2001  
WITHUS WPE-2000 CDMA COND SPURS CH 1013  
Ref 24 dBm Atten 5 dB

Mkr1 14.35 GHz  
-30.77 dBm



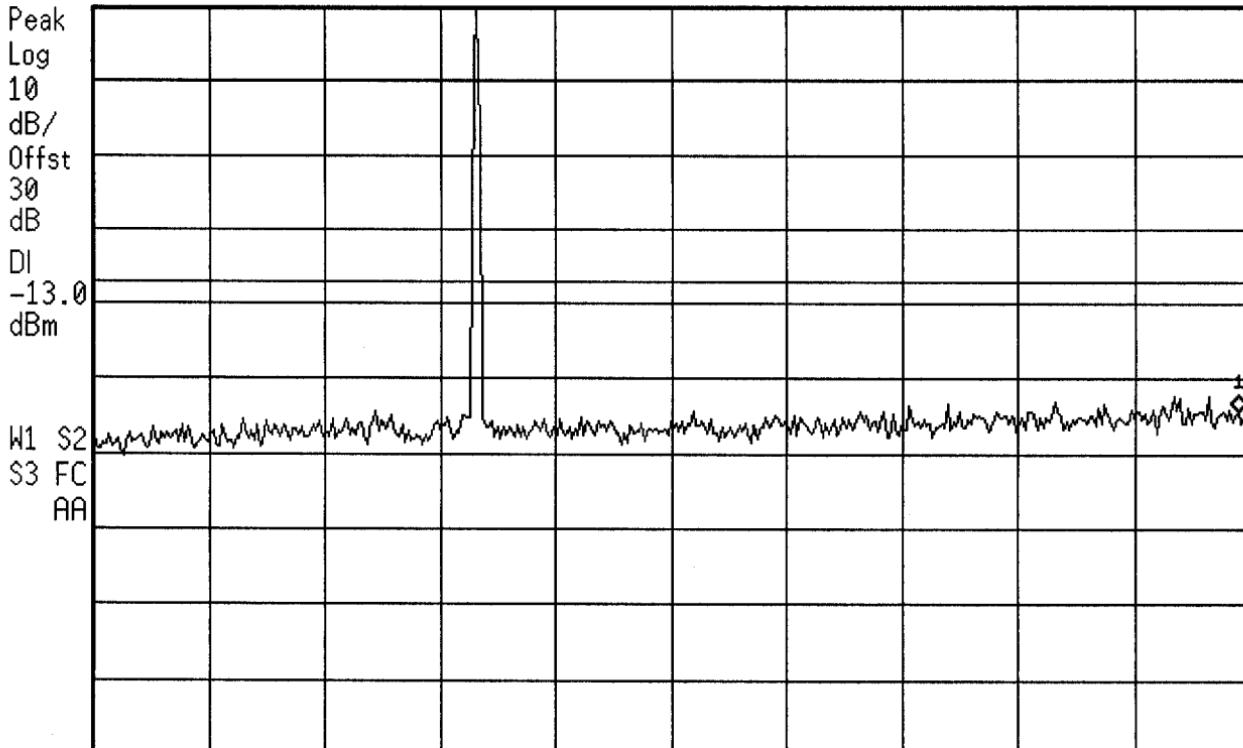
Start 10 GHz  
#Res BW 3 MHz

#VBW 3 MHz

Stop 20 GHz  
Sweep 100 ms

**hp**

16:23:50 Nov 22, 2001

WITHUS WPE-2000 CDMA COND SPURS CH 363  
Ref 24 dBm Atten 5 dBMkr1 2.475 GHz  
-30.21 dBmStart 10 MHz  
#Res BW 3 MHz

#VBW 3 MHz

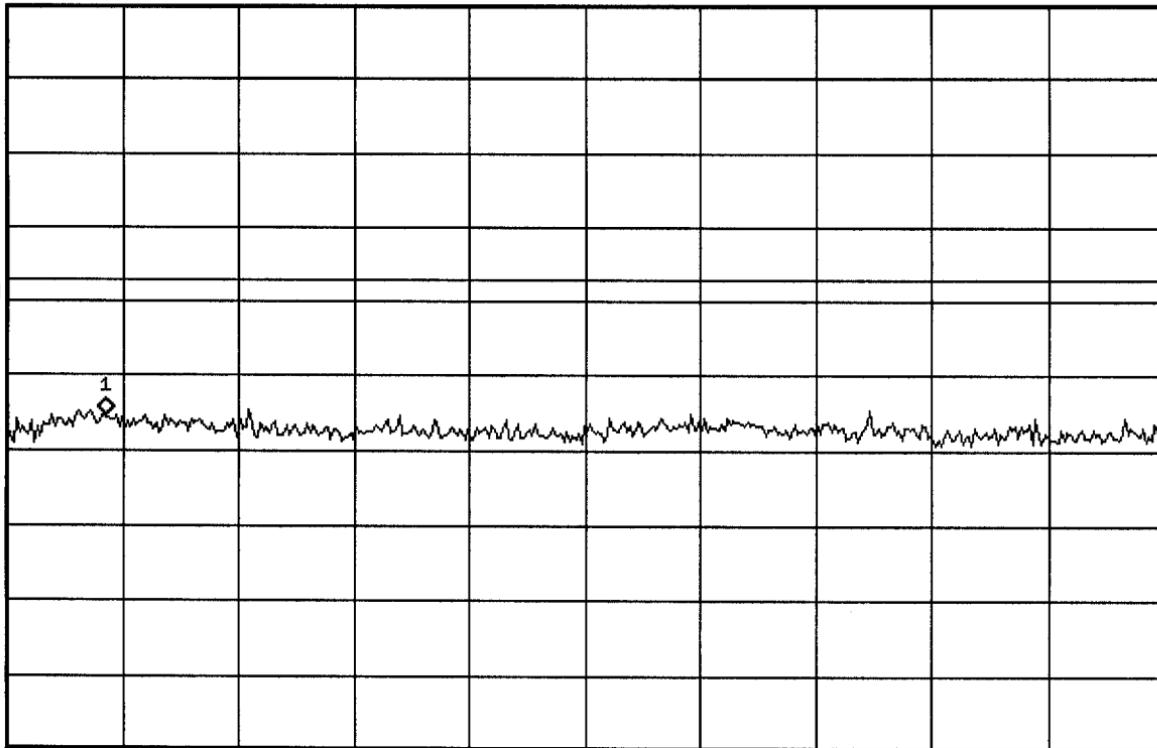
Stop 2.5 GHz  
Sweep 5 ms

**hp**

16:25:46 Nov 22, 2001

WITHUS WPE-2000 CDMA COND SPURS CH 363  
Ref 24 dBm

Atten 5 dB

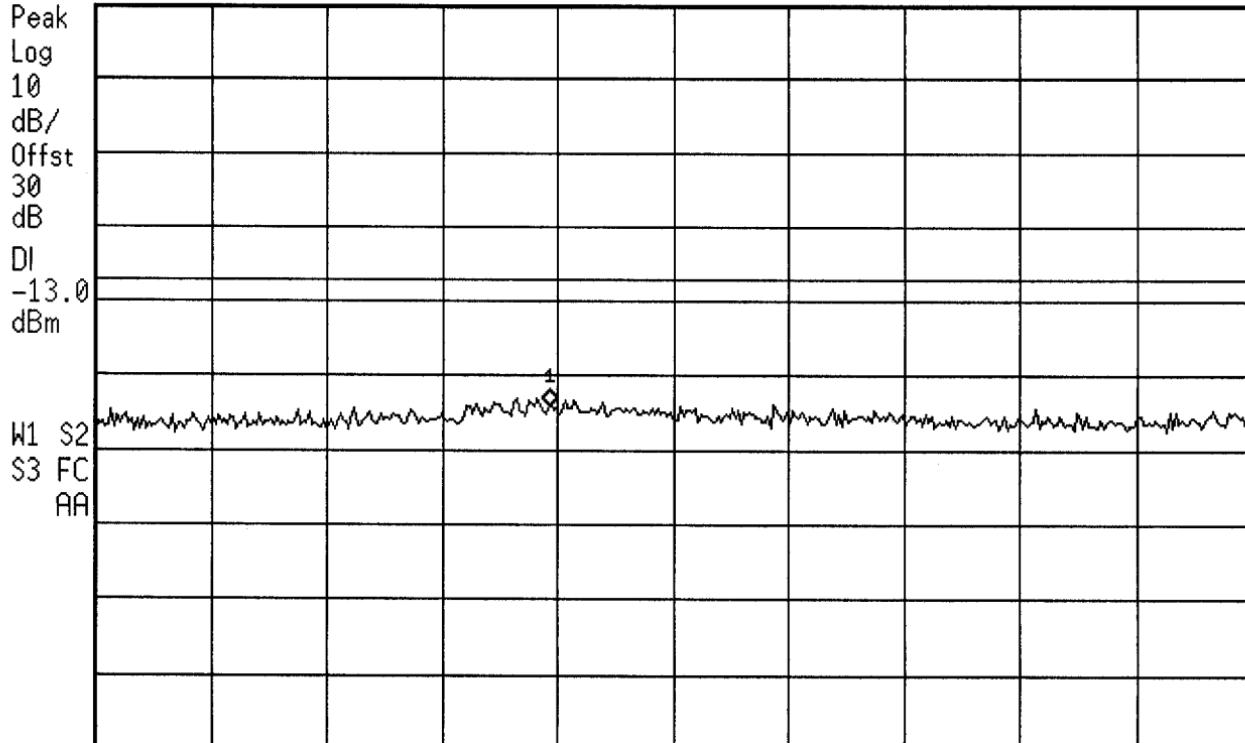
Mkr1 3.138 GHz  
-31.39 dBmPeak  
Log  
10  
dB/  
Offst  
30  
dB  
DI  
-13.0  
dBmW1 S2  
S3 FC  
AAStart 2.5 GHz  
#Res BW 3 MHz

#VBW 3 MHz

Stop 10 GHz  
Sweep 18.75 ms

**hp** 16:26:18 Nov 22, 2001  
WITHUS WPE-2000 CDMA COND SPURS CH 363  
Ref 24 dBm Atten 5 dB

Mkr1 13.93 GHz  
-30.05 dBm



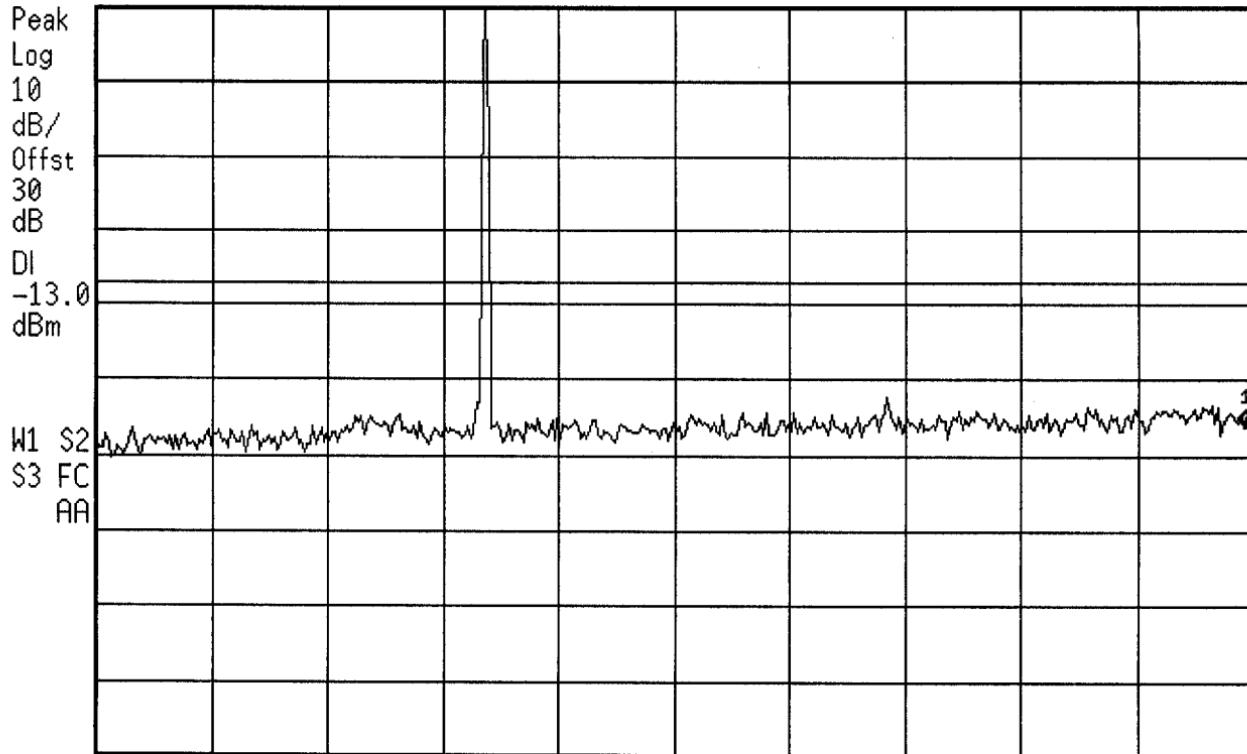
Start 10 GHz  
#Res BW 3 MHz

\*VBW 3 MHz

Stop 20 GHz  
Sweep 100 ms

**hp** 16:34:31 Nov 22, 2001  
WITHUS WPE-2000 CDMA COND SPURS CH 777  
Ref 24 dBm Atten 5 dB

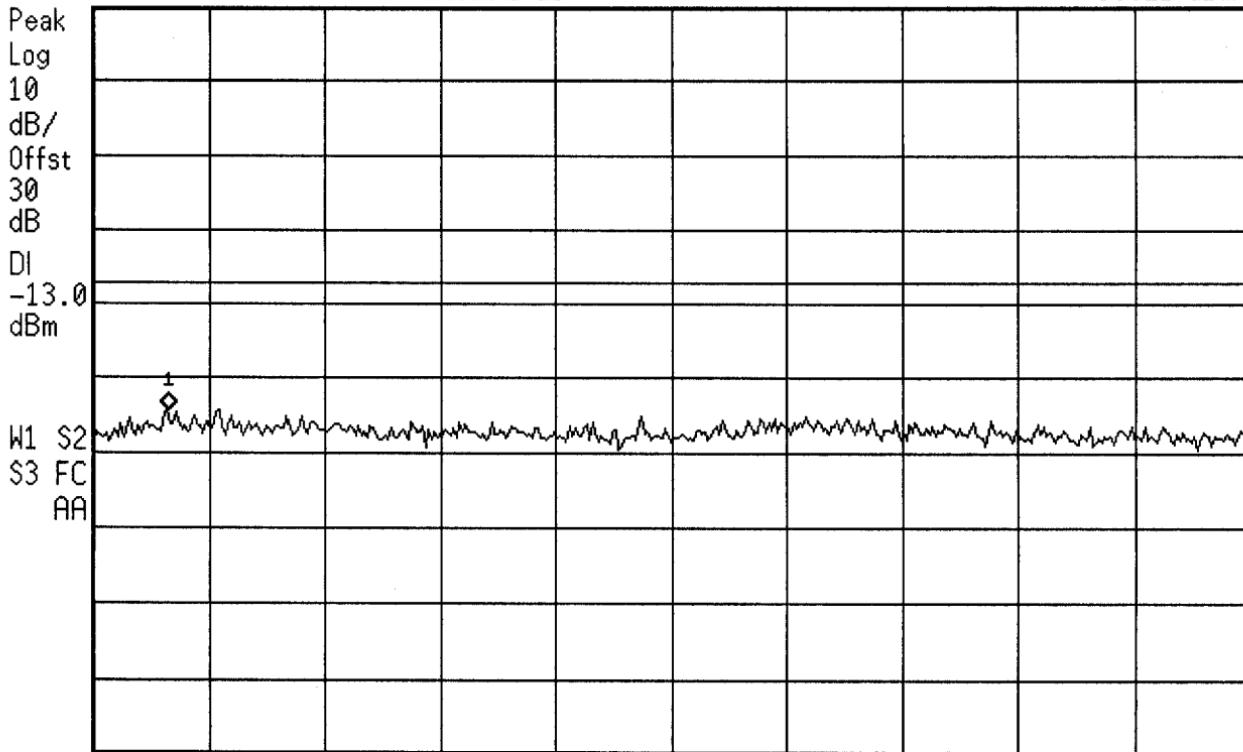
Mkr1 2.481 GHz  
-32.15 dBm



Start 10 MHz  
#Res BW 3 MHz  
#VBW 3 MHz  
Stop 2.5 GHz  
Sweep 5 ms

**hp**

16:34:55 Nov 22, 2001

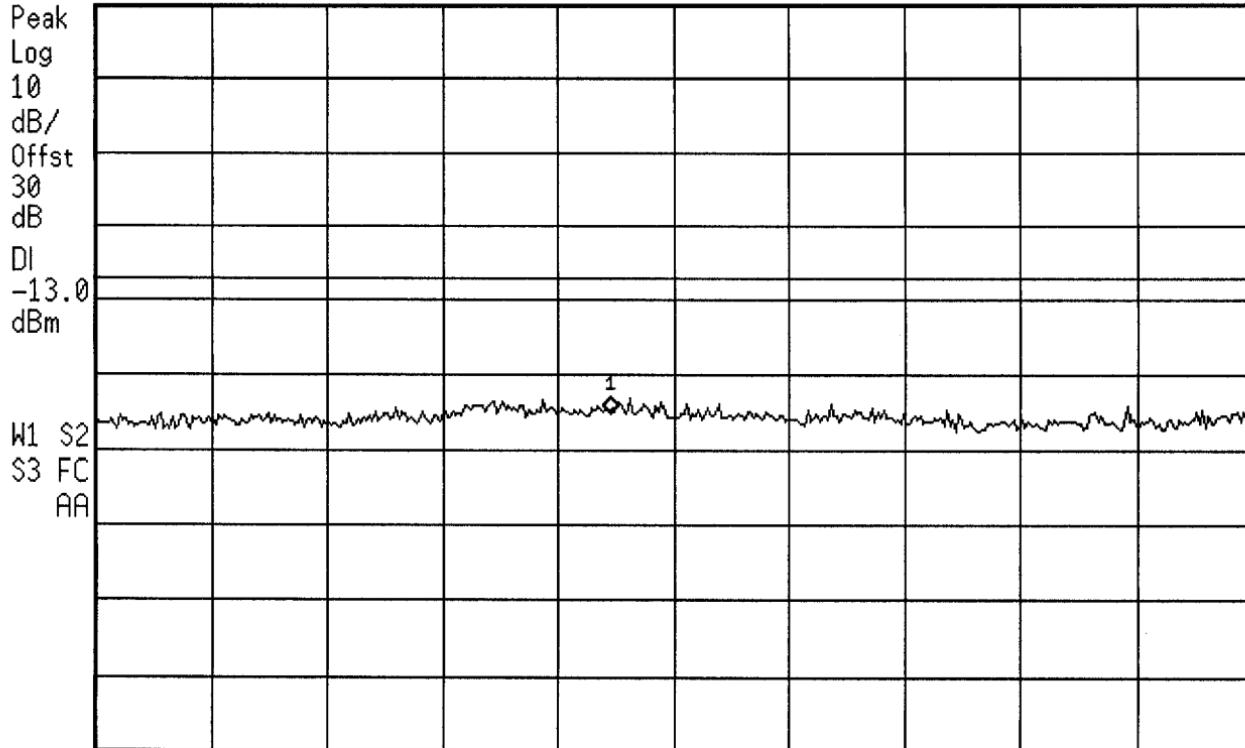
WITHUS WPE-2000 CDMA COND SPURS CH 777  
Ref 24 dBm Atten 5 dBMkr1 2.988 GHz  
-30.21 dBmStart 2.5 GHz  
#Res BW 3 MHz

#VBW 3 MHz

Stop 10 GHz  
Sweep 18.75 ms

**hp** 16:35:42 Nov 22, 2001  
WITHUS WPE-2000 CDMA COND SPURS CH 777  
Ref 24 dBm Atten 5 dB

Mkr1 14.45 GHz  
-30.97 dBm



Start 10 GHz  
#Res BW 3 MHz

#VBW 3 MHz

Stop 20 GHz  
Sweep 100 ms

**hp** 16:13:22 Nov 22, 2001

WITHUS WPE-2000 RECEIVER SPURS

Ref -8.5 dBm

Atten 5 dB

Mkr1 870.06 MHz

-61.17 dBm

Peak

Log

10

dB/

Offst

1

dB

DI

-13.0

dBm

M1 S2

S3 FC

AA

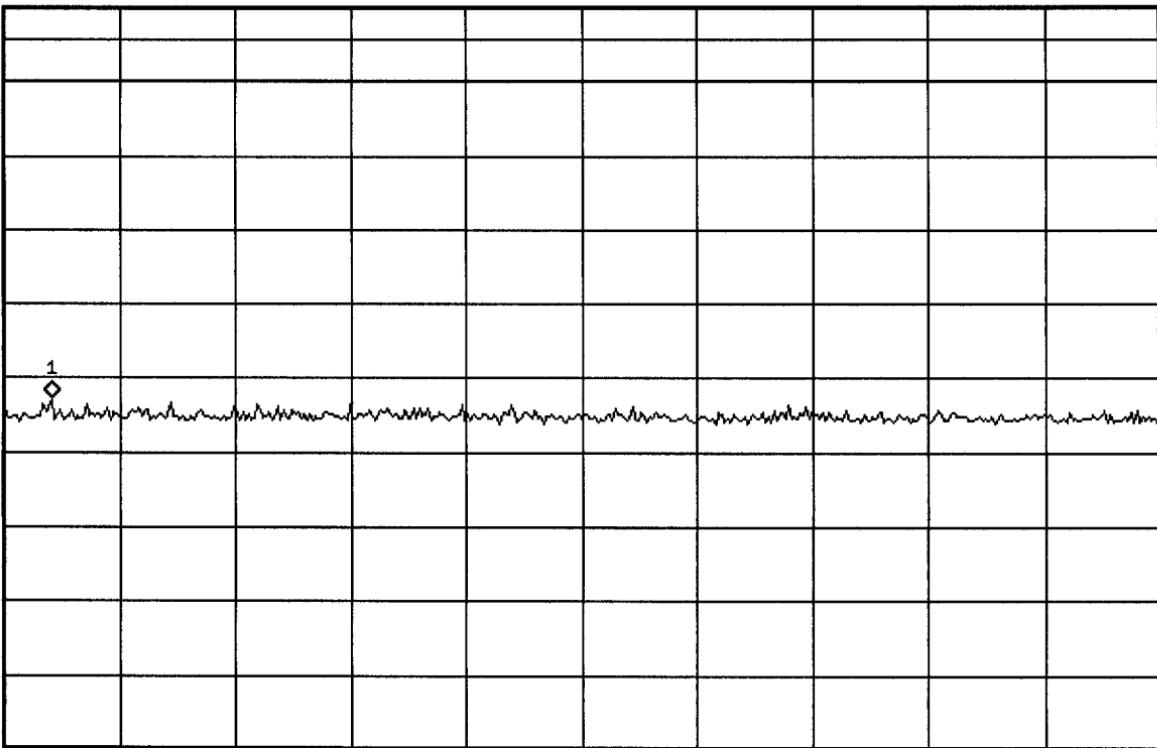
Start 869 MHz

#Res BW 3 MHz

\*VBW 3 MHz

Stop 894 MHz

Sweep 5 ms





16:42:05 Nov 22, 2001

WITHUS WPE-2000 BAND EDGE CDMA LOW CH

Ref 24 dBm

Atten 5 dB

Mkr1 824.000 MHz  
-20.89 dBm

Peak

Log

10

dB/

Offset

30

dB

DI

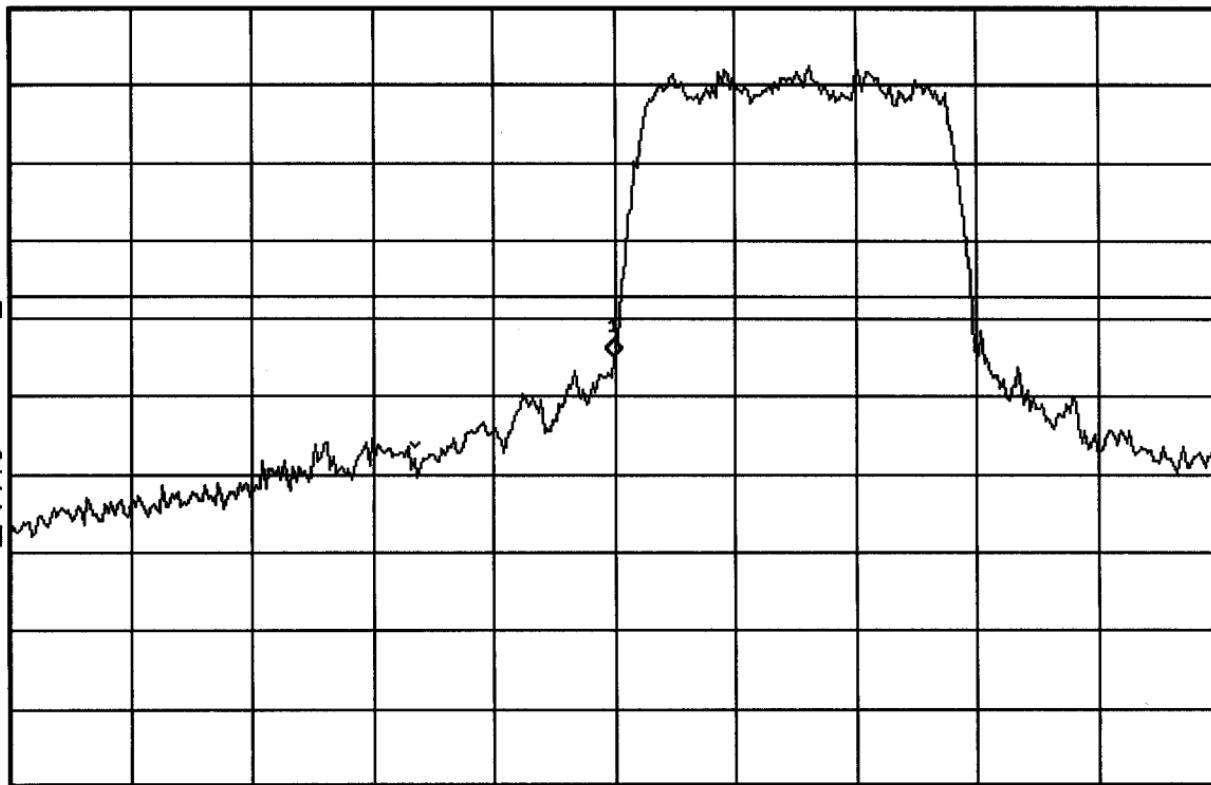
-13.0

dBm

S1 W2

S3 FC

AA



Center 824 MHz

#Res BW 30 kHz

#VBW 30 kHz

Span 5 MHz

#Sweep 2.083 s

**hp**

16:38:27 Nov 22, 2001

WITHUS WPE-2000 BAND EDGE CDMA HIGH CH  
Ref 24 dBm Atten 5 dBMkr1 849.000 MHz  
-21.55 dBm

Peak

Log

10

dB/

Offst

30

dB

DI

-13.0

dBm

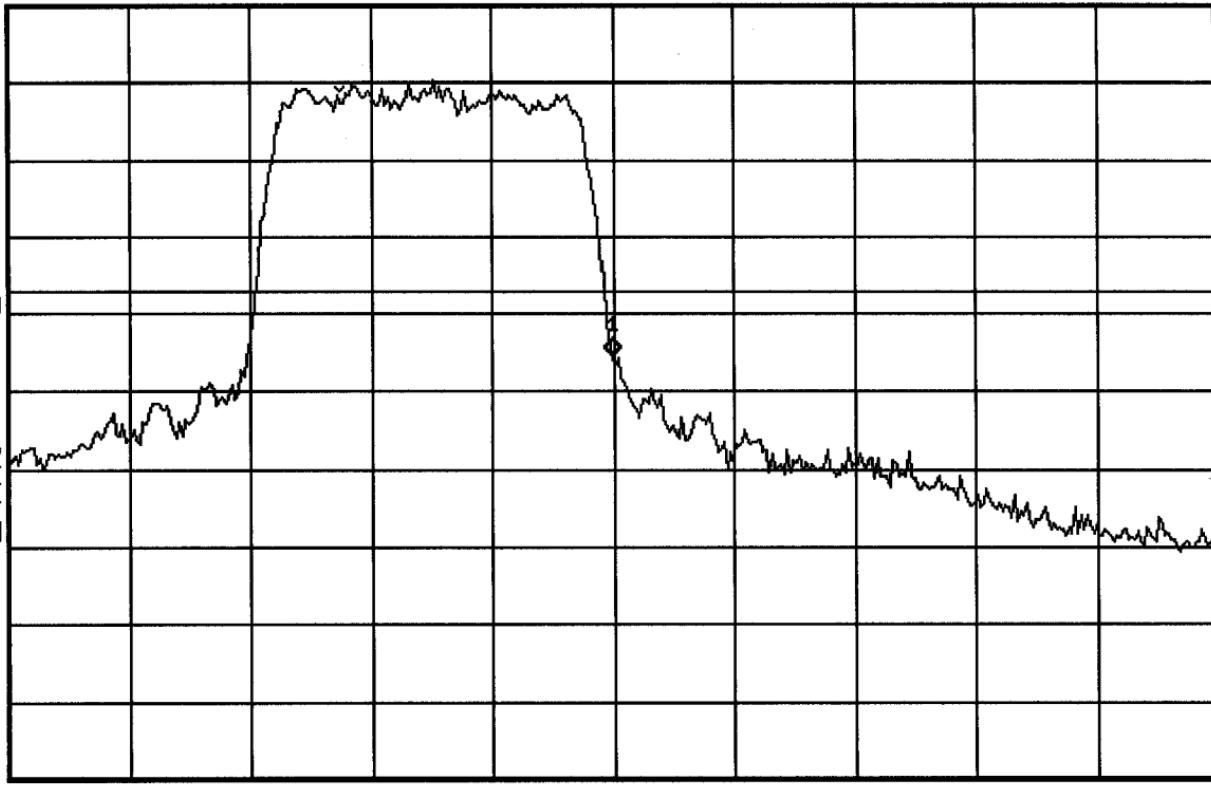
S1

W2

S3

FC

AA

Center 849 MHz  
#Res BW 30 kHz

#VBW 30 kHz

Span 5 MHz  
#Sweep 2.083 s

**hp**

16:20:13 Nov 22, 2001

## WITHUS WPE-2000 OCCUPIED BANDWIDTH

Ref 24 dBm

Atten 5 dB

Samp

Log

10

dB/

Offst

30

dB

DI

-13.0

dBm

W1 S2

Center 835.9 MHz

#Res BW 30 kHz

#VBW 30 kHz

Span 3 MHz

Sweep 9.167 ms

Occupied Bandwidth Results (measuring..)

Occupied Bandwidth

Occ BW % Pwr 99.00 %

1.261 MHz

Transmit Freq Error -322.4 Hz



16:44:06 Nov 22, 2001

WITHUS WPE-2000 CDMA CH 1013

Ref 24 dBm

Atten 5 dB

Peak

Log

10

dB/

0ffst

30

dB

DI

-13.0

dBm

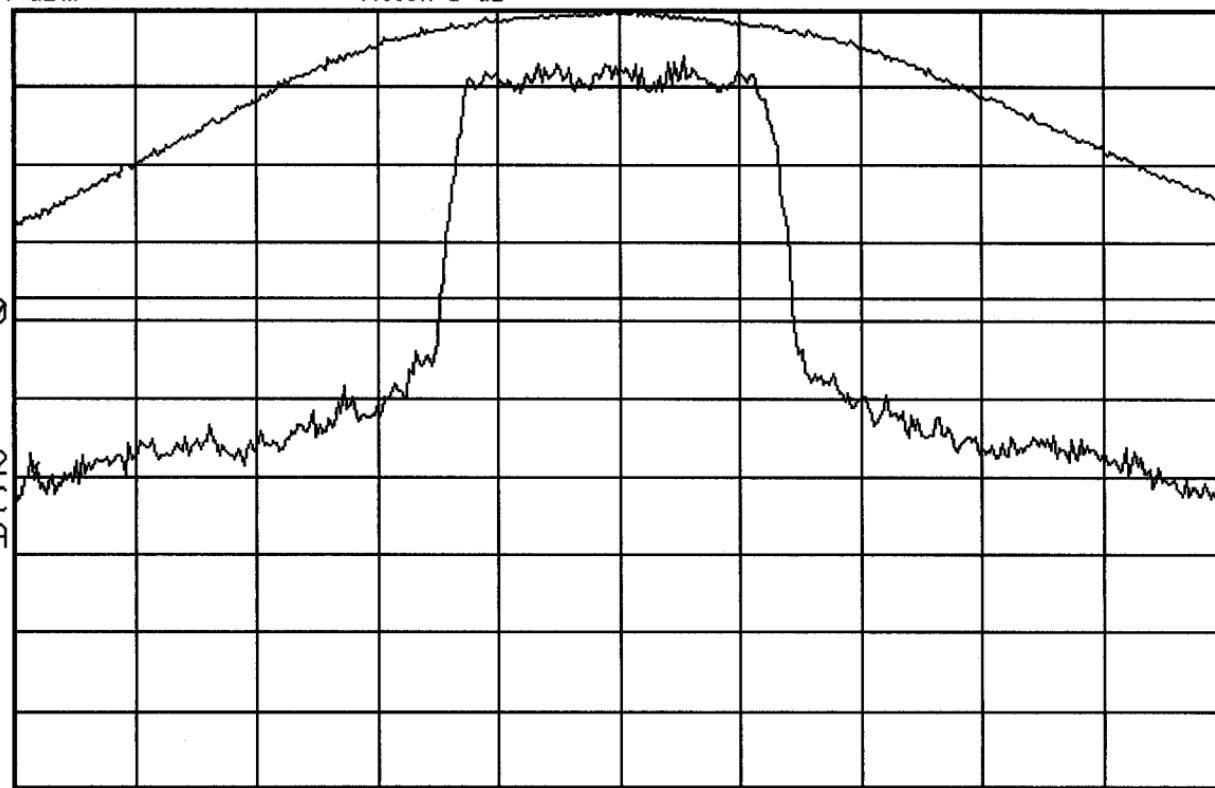
M1

W2

S3

FC

AA



Center 824.7 MHz

#Res BW 30 kHz

#VBW 30 kHz

Span 5 MHz

#Sweep 2.083 s

**hp**

16:16:31 Nov 22, 2001

WITHUS WPE-2000 CDMA CH 363

Ref 24 dBm

Atten 5 dB

Peak

Log

10

dB/

Offset

30

dB

DI

-13.0

dBm

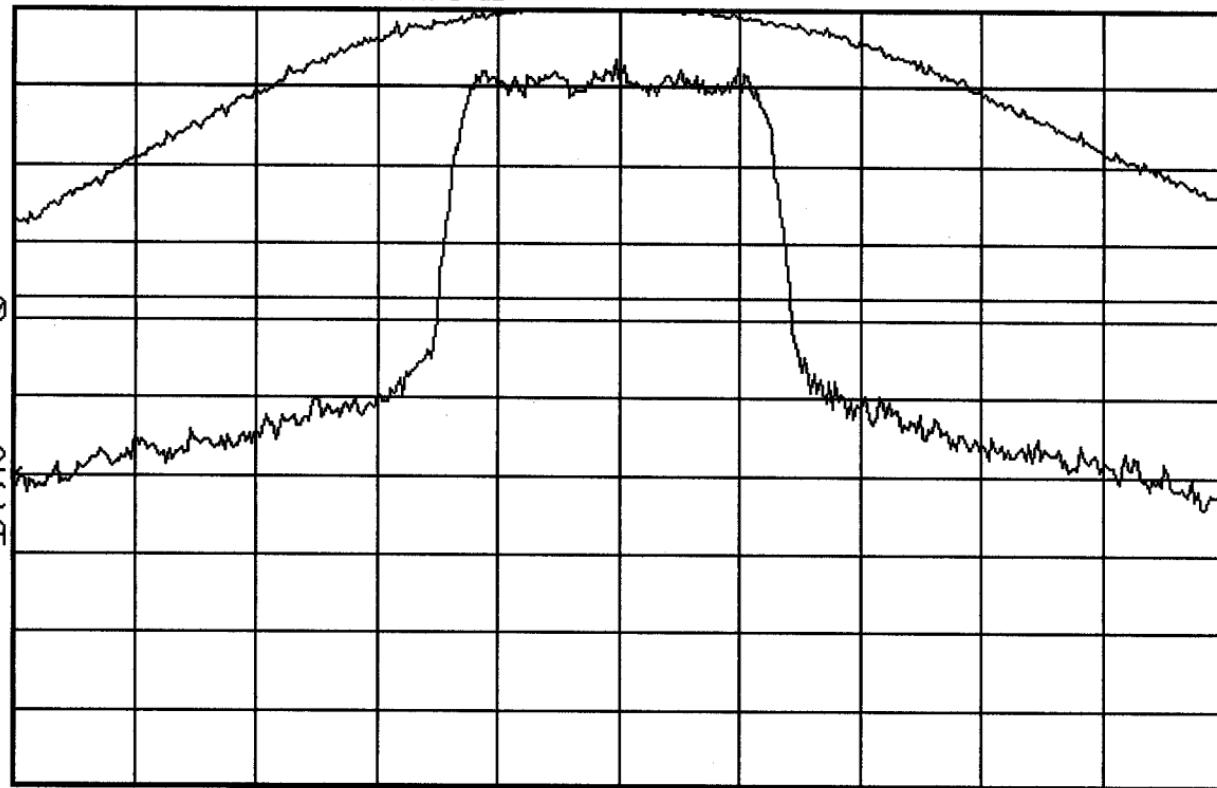
M1

W2

S3

FC

AA



Center 835.9 MHz

#Res BW 30 kHz

#VBW 30 kHz

Span 5 MHz

#Sweep 2.083 s



16:46:15 Nov 22, 2001

WITHUS WPE-2000 CDMA CH 777

Ref 24 dBm

Atten 5 dB

Peak

Log

10

dB/

Offst

30

dB

DI

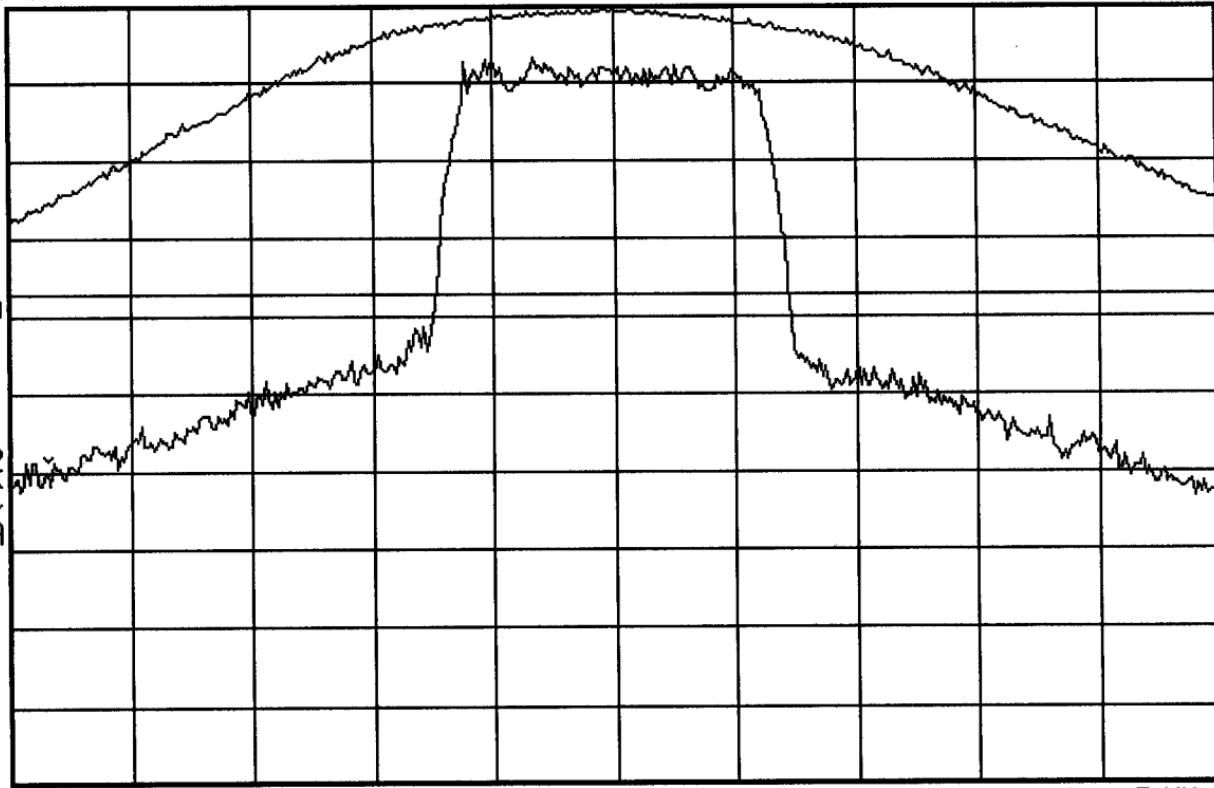
-13.0

dBm

M1 W2

S3 FC

AA



Center 848.3 MHz

#Res BW 30 kHz

#VBW 30 kHz

Span 5 MHz

#Sweep 2.083 s