# CERTIFICATE OF COMPLIANCE
# FCC PART 24 & 22 CERTIFICATION

| **Test Lab:** | **Applicant:** |
|---|---|
| **CELLTECH RESEARCH INC.**<br>Testing and Engineering Services<br>1955 Moss Court<br>Kelowna, B.C. Canada V1Y 9L3<br>Phone: 250 - 860-3130<br>Fax: 250 - 860-3110<br>Toll Free: 1-877-545-6287<br>e-mail: celltech@globuswireless.com<br>web site: www.globuswireless.com | **HANWHA CORPORATION**<br>**Telecommunication Division**<br>Hanwha Bldg., 111-5, Sokong-Dong<br>Chung-Ku, Seoul, Korea 100-070<br>Attn: Mr. Hyoung Sok Roh<br>Senior Manager, Research Lab |

| | |
|---|---|
| **FCC Classification:** | **Part 24 Licensed Portable Transmitter Held to Ear (PCE)** |
| **FCC Rule Part(s):** | **§24(E), §22(H), §22.901(d), §2** |
| **FCC ID:** | **OCCHWT-5000** |
| **Model(s):** | **HWT-5000** |
| **Equipment Type:** | **Dual-Band Tri-Mode PCS/Cellular Phone** |
| **Tx Frequency Range:** | **824.04 - 848.97 MHz (AMPS)**<br>**824.70 - 848.31 MHz (CDMA)**<br>**1851.25 - 1908.75 MHz (PCS CDMA)** |
| **Rx Frequency Range:** | **869.04 - 893.97 MHz (AMPS)**<br>**869.70 - 893.31 MHz (CDMA)**<br>**1931.25 - 1988.75 MHz (PCS CDMA)** |
| **Max. RF Output Power:** | **0.232 Watts ERP (AMPS)**<br>**0.150 Watts ERP (CDMA)**<br>**0.272 Watts EIRP (PCS CDMA)** |
| **Frequency Tolerance:** | **2.5 PPM** |
| **Emission Designator(s):** | **40K0F8W, 40K0F1D, 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.

Celltech Research Inc. certifies that no party to this application has been denied FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

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

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# MEASUREMENT REPORT - FCC PART 24 & 22

## *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.

### *§2.1033(a) General Information*

**APPLICANT:**

**HANWHA CORPORATION – Telecommunication Div.**
**Hanwha Bldg., 111-5, Sokong-Dong**
**Chung-Ku, Seoul, Korea 100-070**
**Attn: Mr. Hyoung Sok Roh - Senior Manager, Research Lab**

| | |
|---|---|
| **FCC ID** | **OCCHWT-5000** |
| **Model(s)** | **HWT-5000** |
| **EUT Type** | **Dual-Band Tri-Mode PCS/Cellular Phone** |
| **Classification** | **Part 24 Licensed Portable Transmitter Held to Ear (PCE)** |
| **Rule Part(s)** | **§24(E), §22(H), §22.901(d), §2** |
| **Max. RF Output Power** | **0.232 Watts ERP (AMPS)**<br>**0.150 Watts ERP (CDMA)**<br>**0.272 Watts EIRP (PCS CDMA)** |
| **Tx Freq. Range** | **824.04 - 848.97 MHz (AMPS)**<br>**824.70 - 848.31 MHz (CDMA)**<br>**1851.25 - 1908.75MHz (PCS CDMA)** |
| **Rx Freq. Range** | **869.04 - 893.97 MHz (AMPS)**<br>**869.70 - 893.31 MHz (CDMA)**<br>**1931.25 - 1988.75 MHz (PCS CDMA)** |
| **Emission Designator(s)** | **40K0F8W, 40K0F1D, 1M25F9W** |
| **Modulation(s)** | **AMPS / CDMA / PCS CDMA** |
| **Battery Type(s)** | **Standard (1000mAh)**<br>**Extended (1400mAh)** |

## *2.1 MEASUREMENT PROCEDURES*

### *2.2 TRANSMITTER AUDIO FREQUENCY RESPONSE - §2.1047(a)*

The frequency response of the audio modulating circuit over the frequency range 100 - 5000 Hz is measured. The audio signal generator is connected to the audio input circuit/microphone of the EUT. The audio signal input is adjusted to obtain 50% modulation at 1kHz and this point is taken as the 0dB reference. With the input held constant and below the limit at all frequencies, the audio signal generator is varied from 100 to 50 kHz.

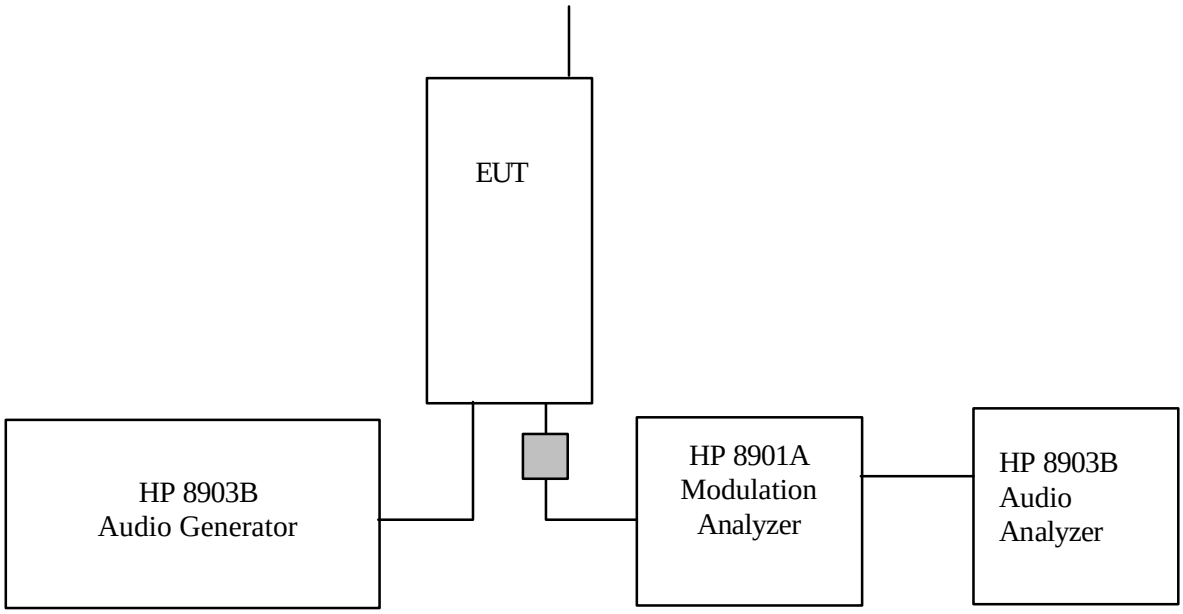
### *2.3 AUDIO LOW PASS FILTER FREQUENCY RESPONSE - §22.915(d)*

The response in dB relative to 1kHz is measured using the HP8901 Modulation Analyzer. For the frequency response of the audio low-pass filter, the audio input is connected at the input to the modulation limiter and the modulated stage. The audio output is connected at the output of the modulated stage.

### *2.4 MODULATION LIMITING - §2.1047(b) & §22.915(b)*

The audio signal generator is connected to the audio input circuit/microphone of the EUT. The modulation response is measured for each of the three modulating frequencies (300Hz, 1000 Hz, and 3000Hz), and the input voltage is varied from 30% modulation (±3.6kHz deviation) to at least 20dB higher than the saturation point. Measurements of modulation and the plots are attached herein. Measurements were performed for ST, SAT, and Wide-Band data modulations.

Note: ST, SAT, & Wide-Band data were internally generated by the EUT.




Transmitter Audio Frequency & Tone Modulation Test Setup.

### *2.5 OCCUPIED BANDWIDTH EMISSION LIMITS - §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.

(c) 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.

| BLOCK | Frequency Range (MHz) Transmitter (Tx) | Frequency Range (MHz) Receiver (Rx) |
|---|---|---|
| A | 1850 - 1865 | 1930 - 1945 |
| B | 1870 - 1885 | 1950 - 1965 |
| C | 1895 - 1910 | 1975 - 1990 |
| D | 1865 - 1870 | 1945 - 1950 |
| E | 1885 - 1890 | 1965 - 1970 |
| F | 1890 - 1895 | 1970 - 1975 |

Broadband PCS Service Frequency Blocks.

### *2.6 FREQUENCIES - §24.229*

At the input terminals of the spectrum analyzer, an isolator (RF pad) and a high-pass filter are connected between the test transceiver (for conducted tests) or the receive antenna (for radiated tests) and the analyzer. The high-pass filter (signals below 2 GHz) is to limit the fundamental frequency from interfering with the measurement of low-level spurious and harmonic emissions and to ensure that the preamplifier is not saturated.

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

The antenna output terminal of the EUT was connected to the input of a 50Ω spectrum analyzer through a matched 30dB attenuator. The radio transmitter was operating at maximum output power with and without internal data modulation. 100% of the in-band modulation is below the specified mask per §22.917.

Specified Limits:

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

### *2.8 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL - §2.1051*

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from 10MHz to 20GHz. The transmitter is modulated with a 2500Hz tone at a level of 16dB greater than that required to provided 50% modulation. The antenna output terminal of the EUT was connected to the input of a 50Ω spectrum analyzer through a matched 30dB attenuator and coaxial cable. The transmitter was operating at maximum power with internal data modulation.

### *2.9 RADIATED SPURIOUS EMISSIONS - §2.1053*

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

## *3.0 FREQUENCY STABILITY/TEMPERATURE VARIATION - §2.1055, §24.135*

The frequency stability of the transmitter is measured by:

a) Temperature: The temperature is varied from -30°C to +60°C using an environmental chamber.

b) Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied. The EUT is tested down to the battery endpoint.

*Specification – The minimum frequency stability shall be +/- 0.00025% at any time during normal operation.*

Time Period and Procedure:

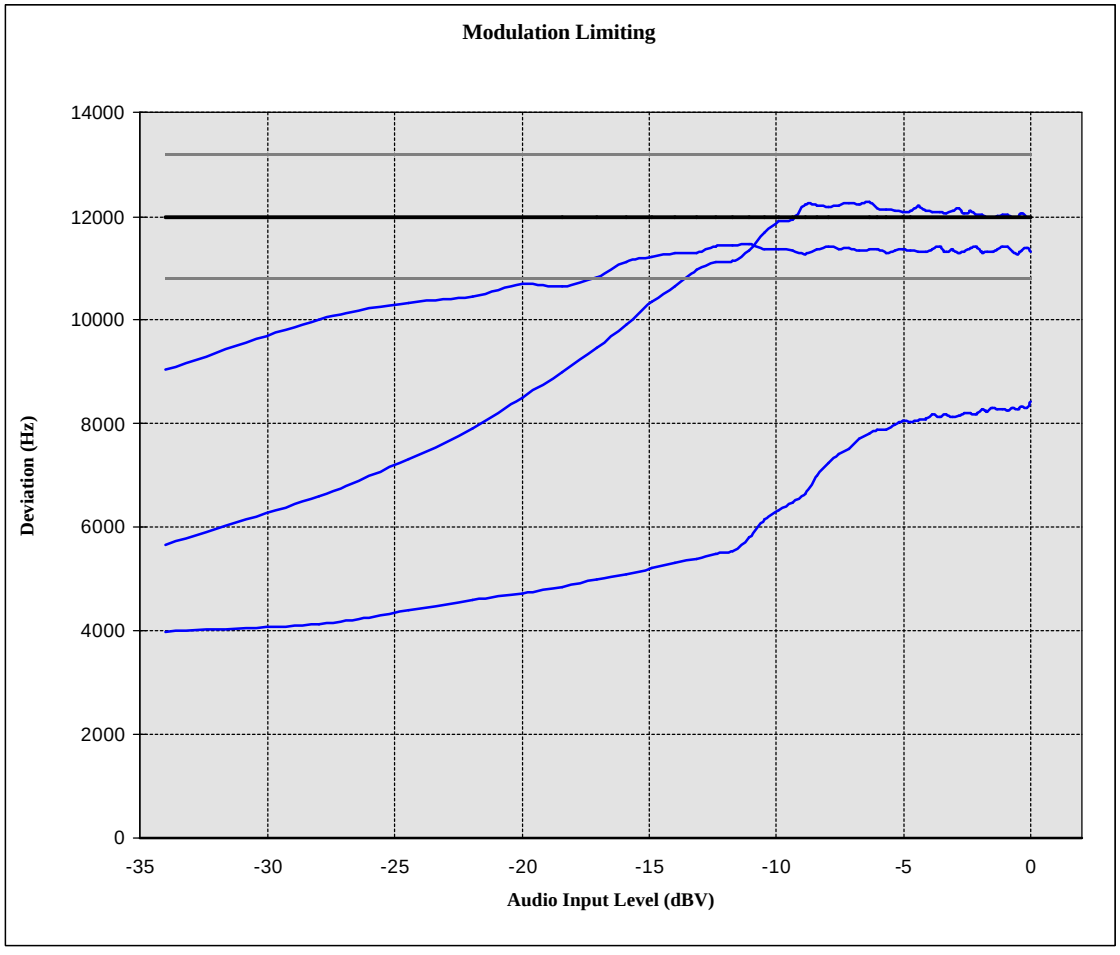
1. The carrier frequency of the transmitter and the individual oscillators is measured at room temperature (25°C to 27°C to provide a reference).
2. The equipment is subjected to an overnight “soak” at -30°C without any power applied.
3. After the overnight “soak” at -30°C (usually 14-16 hours), the equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter and the individual oscillators is made within a three-minute interval after applying power to the transmitter.
4. Frequency measurements were made at 10°C intervals up to +60°C, then back to room temperature. A minimum period of one and one half-hour is provided to allow stabilization of the equipment at each temperature level.

## *4.1 TEST DATA*

### *4.2 MODULATION LIMITING - §2.1047(b) & §22.915(b)*

Test Date: 10/18/2000
EUT: HANWHA Dual-Band Tri-Mode PCS/Cellular Phone
Model: HWT-5000
FCC ID: OCCHWT-5000

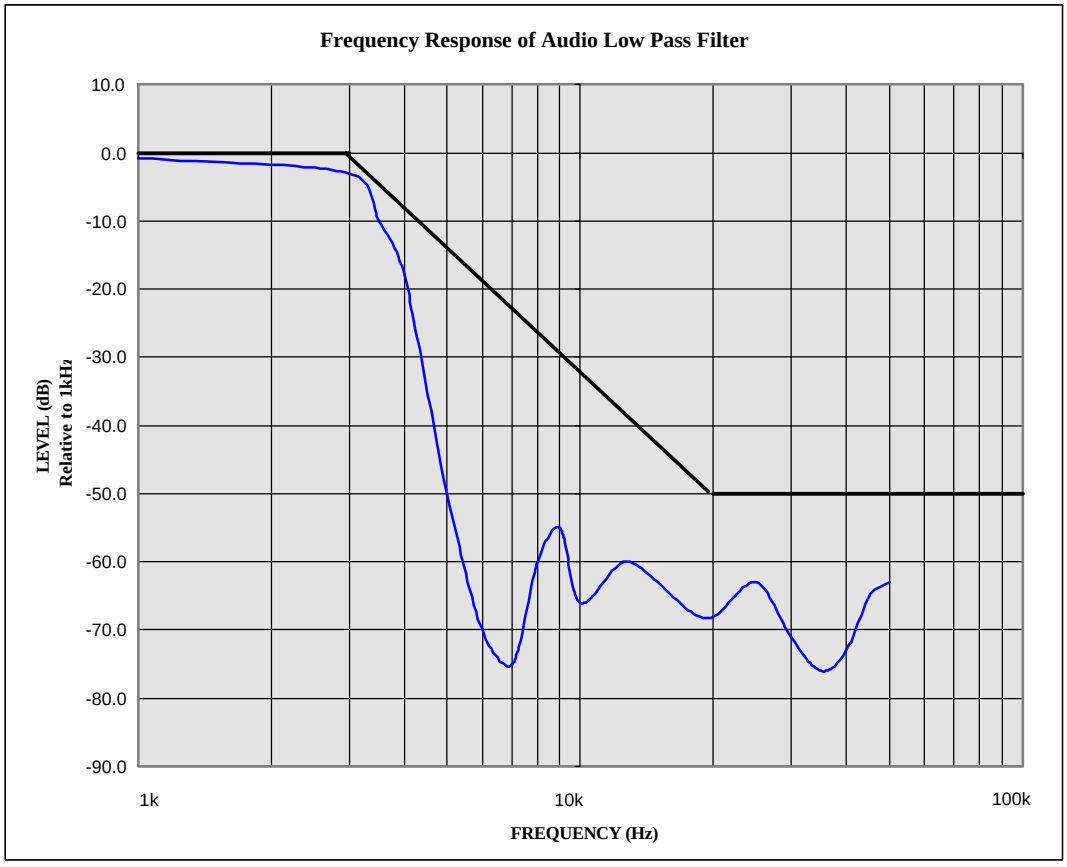
REFERENCE: 1 kHz = 0 dB



### *4.3 FREQUENCY RESPONSE OF LOW PASS FILTER - §22.915(d)*

Test Date: 10/18/2000
EUT: HANWHA Dual-Band Tri-Mode PCS/Cellular Phone
Model: HWT-5000
FCC ID: OCCHWT-5000

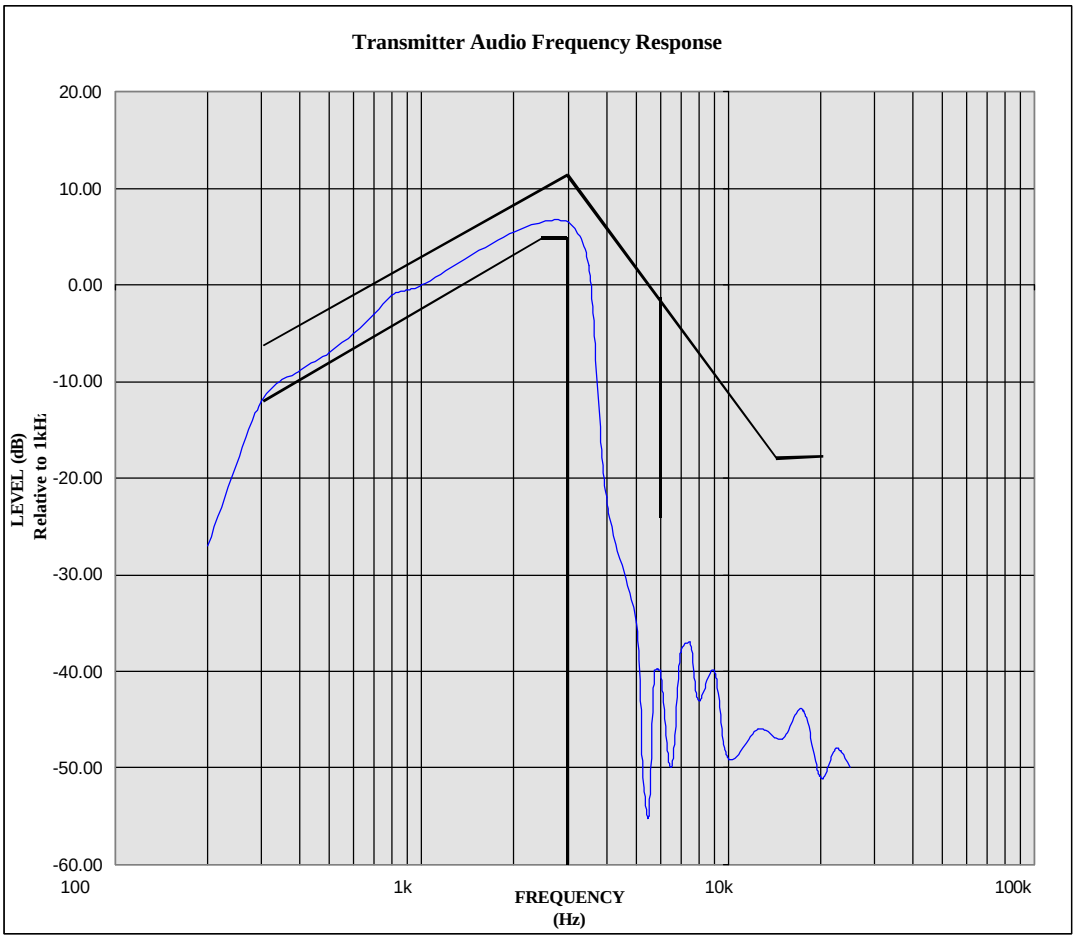
REFERENCE: 1 kHz = 0 dB



### *4.4 TRANSMITTER AUDIO FREQUENCY RESPONSE - §2.1047(a)*

Test Date: 10/18/2000
EUT: HANWHA Dual-Band Tri-Mode PCS/Cellular Phone
Model: HWT-5000
FCC ID: OCCHWT-5000

REFERENCE: 1 kHz = 0 dB



## *4.5 EFFECTIVE RADIATED POWER OUTPUT - §2.1046*

### AMPS MODE

| Frequency Tuned | EUT Conducted Power | Max. Field Strength of EUT (antenna extended) (dBm) | | Dipole Gain | Dipole Forward Conducted Power | ERP of EUT (Dipole Gain + Dipole Forward Conducted Power) | |
|---|---|---|---|---|---|---|---|
| (MHz) | (dBm) | V | H | (dBd) | (dBm) | (dBm) | (Watts) |
| 824.04 | 27.0 | - 16.16 | - 14.12 | - 1.44 | 23.21 | 21.77 | 0.150 |
| 836.49 | 27.0 | - 15.23 | - 13.17 | - 1.34 | 25.00 | 23.66 | 0.232 |
| 848.97 | 27.0 | - 19.77 | - 17.60 | - 1.24 | 20.91 | 19.67 | 0.093 |
| 836.49* | 27.0 | - 15.30 | - 13.22 | - 1.34 | 24.95 | 23.61 | 0.229 |

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. The dipole was fed through a directional coupler and the power at the coupler port was monitored. A signal generator and power amplifier controlled the dipole, and the input level of the dipole was adjusted to the same field strength level as the EUT. 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 forward power for the dipole was then determined and the ERP level was determined by adding the forward dipole 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, except for * using the extended battery.

## 800MHz CDMA MODE

| Frequency Tuned | EUT Conducted Power | Max. Field Strength of EUT (antenna extended) (dBm) | | Dipole Gain | Dipole Forward Conducted Power | ERP of EUT (Dipole Gain + Dipole Forward Conducted Power) | |
|---|---|---|---|---|---|---|---|
| (MHz) | (dBm) | V | H | (dBd) | (dBm) | (dBm) | (Watts) |
| 824.70 | 25.0 | - 16.58 | - 14.60 | - 1.44 | 22.70 | 21.26 | 0.134 |
| 835.89 | 25.0 | - 17.21 | - 15.23 | - 1.34 | 23.12 | 21.78 | 0.150 |
| 848.31 | 25.0 | - 21.10 | - 19.05 | - 1.24 | 19.32 | 18.08 | 0.064 |
| 835.89* | 25.0 | - 17.42 | - 15.37 | - 1.34 | 22.98 | 21.64 | 0.146 |

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 spectrum analyzer was set to measure channel power for CDMA mode. 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. The dipole was fed through a directional coupler and the power at the coupler port was monitored. A signal generator and power amplifier controlled the dipole, and the input level of the dipole was adjusted to the same field strength level as the EUT. 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 forward power for the dipole was then determined and the ERP level was determined by adding the forward dipole 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, except for * using the extended battery.

## *4.6 EFFECTIVE ISOTROPIC RADIATED POWER OUTPUT - §24.232(B)*

**PCS CDMA MODE**

| Frequency Tuned | EUT Conducted Power | Max. Field Strength of EUT (antenna extended) (dBm) | | Horn Gain | Horn Forward Conducted Power | EIRP of EUT (Horn Gain + Horn Forward Conducted Power) | |
|---|---|---|---|---|---|---|---|
| (MHz) | (dBm) | V | H | (dBi) | (dBm) | (dBm) | (Watts) |
| 1851.25 | 24.5 | - 15.24 | - 13.30 | 7.65 | 15.75 | 23.40 | 0.219 |
| 1880.00 | 24.5 | - 14.68 | - 12.60 | 7.78 | 16.57 | 24.35 | 0.272 |
| 1908.75 | 24.5 | - 15.39 | - 13.55 | 7.91 | 15.25 | 23.16 | 0.207 |
| 1880.00* | 24.5 | - 15.00 | - 12.75 | 7.78 | 16.42 | 24.20 | 0.263 |

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 spectrum analyzer was set to measure channel power for PCS CDMA mode. 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 forward power and the antenna gain in dB.

2. EIRP measurements were performed using the standard battery, except for * using the extended battery.

## *4.7 FIELD STRENGTH OF SPURIOUS RADIATION – §2.1053*

**AMPS MODE**

| | |
|---|---|
| Operating Frequency: | 824.04 MHz |
| Channel: | 991 (Low) |
| Measured Conducted Power: | 27.0 dBm |
| Modulation: | ST (Signaling Tone) |
| Distance: | 3 meters |
| Limit: | $43 + 10 \log_{10}$ (W) = 40.31 dBc |

| **Frequency** (MHz) | **Level** (dBm) | **Horn Forward Cond. Pwr.** (dBm) | **Standard-Gain Horn Antenna Gain** (dBi) | **POL** (H/V) | **EIRP** (dBm) | **ERP** (dBm) | **dBc** |
|---|---|---|---|---|---|---|---|
| 1648.08 | ≤ - 75.19 | - 46.76 | 9.40 | H | - 33.08 | - 35.22 | 56.99 |
| 2472.12 | ≤ - 93.24 | - 60.85 | 10.42 | H | - 46.25 | - 48.39 | 70.16 |
| 3296.16 | ≤ - 97.85 | - 62.26 | 11.02 | H | - 46.96 | - 49.10 | 70.87 |
| 4120.20 | < - 99.69 | | | | | | |

Notes:

Radiated 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 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 forward power and the antenna gain in dB.

## AMPS MODE

Operating Frequency: 836.49 MHz

Channel: 383 (Mid)

Measured Conducted Power: 27.0 dBm

Modulation: ST (Signaling Tone)

Distance: 3 meters

Limit: $43 + 10 \log_{10} (W) = 40.31$ dBc

| **Frequency** (MHz) | **Level** (dBm) | **Horn Forward Cond. Pwr.** (dBm) | **Standard-Gain Horn Antenna Gain** (dBi) | **POL** (H/V) | **EIRP** (dBm) | **ERP** (dBm) | **dBc** |
|---|---|---|---|---|---|---|---|
| 1672.98 | ≤ - 82.08 | - 54.11 | 9.60 | H | - 40.23 | - 42.37 | 66.03 |
| 2509.47 | ≤ - 84.49 | - 52.30 | 10.41 | H | - 37.61 | - 39.75 | 63.41 |
| 3345.96 | ≤ - 95.31 | - 62.23 | 11.25 | H | - 46.70 | - 48.84 | 72.50 |
| 4182.45 | < - 99.73 | | | | | | |

Notes:

Radiated 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 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 forward power and the antenna gain in dB.

## AMPS MODE

Operating Frequency: 848.97 MHz

Channel: 799 (High)

Measured Conducted Power: 27.0 dBm

Modulation: ST (Signaling Tone)

Distance: 3 meters

Limit: $43 + 10 \log_{10} (W) = 40.31$ dBc

| **Frequency** (MHz) | **Level** (dBm) | **Horn Forward Cond. Pwr.** (dBm) | **Standard-Gain Horn Antenna Gain** (dBi) | **POL** (H/V) | **EIRP** (dBm) | **ERP** (dBm) | **dBc** |
|---|---|---|---|---|---|---|---|
| 1697.94 | ≤ - 71.39 | - 43.64 | 9.79 | H | - 29.57 | - 31.71 | 51.38 |
| 2546.91 | ≤ - 91.32 | - 60.18 | 10.41 | H | - 45.49 | - 47.63 | 67.30 |
| 3395.88 | ≤ - 98.09 | - 63.26 | 11.56 | H | - 47.42 | - 49.56 | 69.23 |
| 5093.82 | < - 101.1 | | | | | | |

Notes:

Radiated 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 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 forward power and the antenna gain in dB.

## 800MHz CDMA MODE

| | |
|---|---|
| Operating Frequency: | 824.70 MHz |
| Channel: | 1013 (Low) |
| Measured Conducted Power: | 25.0 dBm |
| Modulation: | CDMA (Internal) |
| Distance: | 3 meters |
| Limit: | 43 + 10 $\log_{10}$ (W) = 37.48 dBc |

| **Frequency** (MHz) | **Level** (dBm) | **Horn Forward Cond. Pwr.** (dBm) | **Standard-Gain Horn Antenna Gain** (dBi) | **POL** (H/V) | **EIRP** (dBm) | **ERP** (dBm) | **dBc** |
|---|---|---|---|---|---|---|---|
| 1649.40 | ≤ - 73.47 | - 45.04 | 9.40 | H | - 31.36 | - 33.50 | 54.76 |
| 2474.10 | ≤ - 93.64 | - 61.25 | 10.42 | H | - 46.55 | - 48.69 | 69.95 |
| 3298.80 | ≤ -101.97 | - 66.38 | 11.02 | H | - 51.08 | - 53.22 | 74.48 |
| 4123.50 | < -103.20 | | | | | | |

Notes:

Radiated 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 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 forward power and the antenna gain in dB.

**800MHz CDMA MODE**

| | |
|---|---|
| Operating Frequency: | 835.89 MHz |
| Channel: | 363 (Mid) |
| Measured Conducted Power: | 25.0 dBm |
| Modulation: | CDMA (Internal) |
| Distance: | 3 meters |
| Limit: | 43 + 10 $\log_{10}$ (W) = 37.48 dBc |

| **Frequency** (MHz) | **Level** (dBm) | **Horn Forward Cond. Pwr.** (dBm) | **Standard-Gain Horn Antenna Gain** (dBi) | **POL** (H/V) | **EIRP** (dBm) | **ERP** (dBm) | **dBc** |
|---|---|---|---|---|---|---|---|
| 1671.78 | ≤ - 85.95 | - 57.98 | 9.60 | H | - 44.10 | - 46.24 | 68.02 |
| 2507.67 | ≤ - 86.48 | - 53.99 | 10.41 | H | - 39.30 | - 41.44 | 63.22 |
| 3343.56 | ≤ - 97.65 | - 64.57 | 11.25 | H | - 49.04 | - 51.18 | 72.96 |
| 5015.34 | < -100.02 | | | | | | |

Notes:

Radiated 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 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 forward power and the antenna gain in dB.

## 800MHz CDMA MODE

| | |
|---|---|
| Operating Frequency: | 848.31 MHz |
| Channel: | 777 (High) |
| Measured Conducted Power: | 25.0 dBm |
| Modulation: | CDMA (Internal) |
| Distance: | 3 meters |
| Limit: | 43 + 10 $\log_{10}$ (W) = 37.48 dBc |

| **Frequency** (MHz) | **Level** (dBm) | **Horn Forward Cond. Pwr.** (dBm) | **Standard-Gain Horn Antenna Gain** (dBi) | **POL** (H/V) | **EIRP** (dBm) | **ERP** (dBm) | **dBc** |
|---|---|---|---|---|---|---|---|
| 1696.62 | ≤ - 77.47 | - 49.72 | 9.79 | H | - 35.65 | - 37.79 | 55.87 |
| 2544.93 | ≤ - 95.15 | - 64.01 | 10.41 | H | - 53.60 | - 53.60 | 73.82 |
| 3393.24 | ≤ - 99.62 | - 64.79 | 11.56 | H | - 53.23 | - 53.23 | 73.45 |
| 4241.55 | < -101.97 | | | | | | |

Notes:

Radiated 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 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 forward power and the antenna gain in dB.

**PCS CDMA MODE**

| | |
|---|---|
| Operating Frequency: | 1851.25 MHz |
| Channel: | 0025 (Low) |
| Measured Conducted Power: | 24.5 dBm |
| Modulation: | CDMA (Internal) |
| Distance: | 3 meters |
| Limit: | 43 + 10 $\log_{10}$ (W) = 38.13 dBc |

| **Frequency** (MHz) | **Level** (dBm) | **AFCL** (dB) | **POL** (H/V) | **EIRP** (dBm) | **dBc** |
|---|---|---|---|---|---|
| 3702.50 | $\leq$ - 91.55 | 31.10 | H | - 46.16 | 69.56 |
| 5553.75 | $\leq$ - 97.92 | 36.38 | H | - 47.27 | 70.67 |
| 7405.00 | $\leq$ - 89.22 | 40.56 | H | - 34.39 | 57.79 |
| 9256.25 | $\leq$ - 96.92 | 41.75 | H | - 40.90 | 64.30 |
| 11107.50 | < - 100 | | | | |

Notes:
1. The bandwidth is set per §24.238.
2. The spectrum was checked from 10 MHz up to 20GHz.
3. < -100dBm is below the floor of the spectrum analyzer.
4. The EUT is manipulated through 3 orthogonal axis and the worst-case emission are reported.
5. The EUT is placed 3.0 meters away from the receiving antenna and the EIRP is calculated using the formula.
   EIRP (dBm) = 10 $\text{Log}_{10}$ (((r(mV/m)/1 x $10^6$)$^2$ / 30.0/1 x $10^{-3}$)
   EIRP (dBm) = 10 $\text{Log}_{10}$ [ (3 x FS/1 x $10^6$)$^2$ / (30.0) x 1000]
   EIRP (Watts) = {(3 x FS)/1 x $10^6$}$^2$ / 30.0
6. The antenna factor and cable loss were determined prior to the test.

## PCS CDMA MODE

| | |
|---|---|
| Operating Frequency: | 1880.00 MHz |
| Channel: | 0600 (Mid) |
| Measured Conducted Power: | 24.5 dBm |
| Modulation: | CDMA (Internal) |
| Distance: | 3 meters |
| Limit: | $43 + 10 \log_{10} (W) = 38.13$ dBc |

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | EIRP (dBm) | dBc |
|---|---|---|---|---|---|
| 3760.00 | $\leq$ - 87.98 | 31.22 | H | - 42.49 | 66.84 |
| 5640.00 | $\leq$ - 93.76 | 36.47 | H | - 43.02 | 67.37 |
| 7520.00 | $\leq$ - 93.86 | 40.77 | H | - 38.82 | 63.17 |
| 9400.00 | $\leq$ - 98.36 | 41.88 | H | - 42.21 | 66.56 |
| 11280.00 | < - 100 | | | | |

Notes:
1. The bandwidth is set per §24.238.
2. The spectrum was checked from 10 MHz up to 20GHz.
3. < -100dBm is below the floor of the spectrum analyzer.
4. The EUT is manipulated through 3 orthogonal axis and the worst-case emission are reported.
5. The EUT is placed 3.0 meters away from the receiving antenna and the EIRP is calculated using the formula.
   EIRP (dBm) $= 10 \text{ Log}_{10} (((r(\text{mV/m})/1 \times 10^6)^2 / 30.0/1 \times 10^{-3})$
   EIRP (dBm) $= 10 \text{ Log}_{10} [ (3 \times \text{FS}/1 \times 10^6)^2 / (30.0) \times 1000]$
   EIRP (Watts) $= \{(3 \times \text{FS})/1 \times 10^6\}^2 / 30.0$
6. The antenna factor and cable loss were determined prior to the test.

## PCS CDMA MODE

| | |
|---|---|
| Operating Frequency: | 1908.75 MHz |
| Channel: | 1175 (High) |
| Measured Conducted Power: | 24.5 dBm |
| Modulation: | CDMA (Internal) |
| Distance: | 3 meters |
| Limit: | $43 + 10 \log_{10} (W) = 38.13$ dBc |

| Frequency (MHz) | Level (dBm) | AFCL (dB) | POL (H/V) | EIRP (dBm) | dBc |
|---|---|---|---|---|---|
| 3817.50 | ≤ - 78.62 | 31.35 | H | - 33.00 | 56.16 |
| 5726.25 | ≤ - 95.55 | 36.71 | H | - 44.57 | 67.73 |
| 7635.00 | ≤ - 95.77 | 41.05 | H | - 40.45 | 63.61 |
| 9543.75 | ≤ - 98.71 | 41.97 | H | - 42.47 | 65.63 |
| 11452.50 | < - 100 | | | | |

Notes:
1. The bandwidth is set per §24.238.
2. The spectrum was checked from 10 MHz up to 20GHz.
3. < -100dBm is below the floor of the spectrum analyzer.
4. The EUT is manipulated through 3 orthogonal axis and the worst-case emission are reported.
5. The EUT is placed 3.0 meters away from the receiving antenna and the EIRP is calculated using the formula.
   EIRP (dBm) $= 10 \text{ Log}_{10} (((r(\text{mV/m})/1 \times 10^6)^2 / 30.0/1 \times 10^{-3})$
   EIRP (dBm) $= 10 \text{ Log}_{10} [ (3 \times \text{FS}/1 \times 10^6)^2 / (30.0) \times 1000]$
   EIRP (Watts) $= \{(3 \times \text{FS})/1 \times 10^6\}^2 / 30.0$
6. The antenna factor and cable loss were determined prior to the test.

### *4.8 FREQUENCY STABILITY (AMPS) - § 2.1055*

Operating Frequency: 836,490,000 Hz

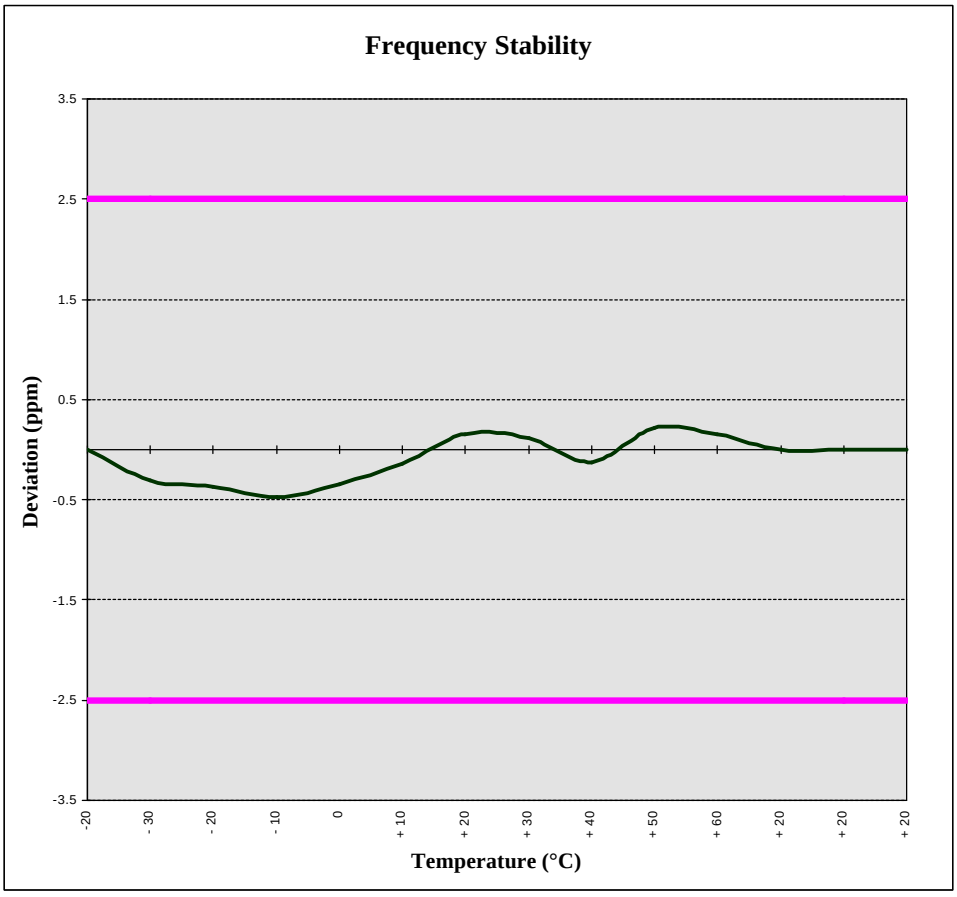
Channel: 383

Reference Voltage: 3.6 VDC

Deviation Limit: ± 0.00025 % or 2.5 ppm

| VOLTAGE (%) | POWER (VDC) | TEMP (ºC) | FREQ. (Hz) | Deviation (%) |
|---|---|---|---|---|
| 100 % | 3.60 | + 20 (Ref) | 836490000 | 0.00000000 |
| 100 % | | - 30 | 836490258 | -0.00000031 |
| 100 % | | - 20 | 836490309 | -0.00000037 |
| 100 % | | - 10 | 836490397 | -0.00000047 |
| 100 % | | 0 | 836490288 | -0.00000034 |
| 100 % | | + 10 | 836490115 | -0.00000014 |
| 100 % | | + 20 | 836489868 | 0.00000016 |
| 100 % | | + 30 | 836489903 | 0.00000012 |
| 100 % | | + 40 | 836490102 | -0.00000012 |
| 100 % | | + 50 | 836489818 | 0.00000022 |
| 100 % | | + 60 | 836489874 | 0.00000015 |
| 85 % | 3.06 | + 20 | 836490000 | 0.00000000 |
| 115 % | 4.14 | + 20 | 836490000 | 0.00000000 |
| BATT. ENDPOINT | 2.88 | + 20 | 836490000 | 0.00000000 |

***FREQUENCY STABILITY (AMPS) - § 2.1055***



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

Operating Frequency: 835,890,000 Hz

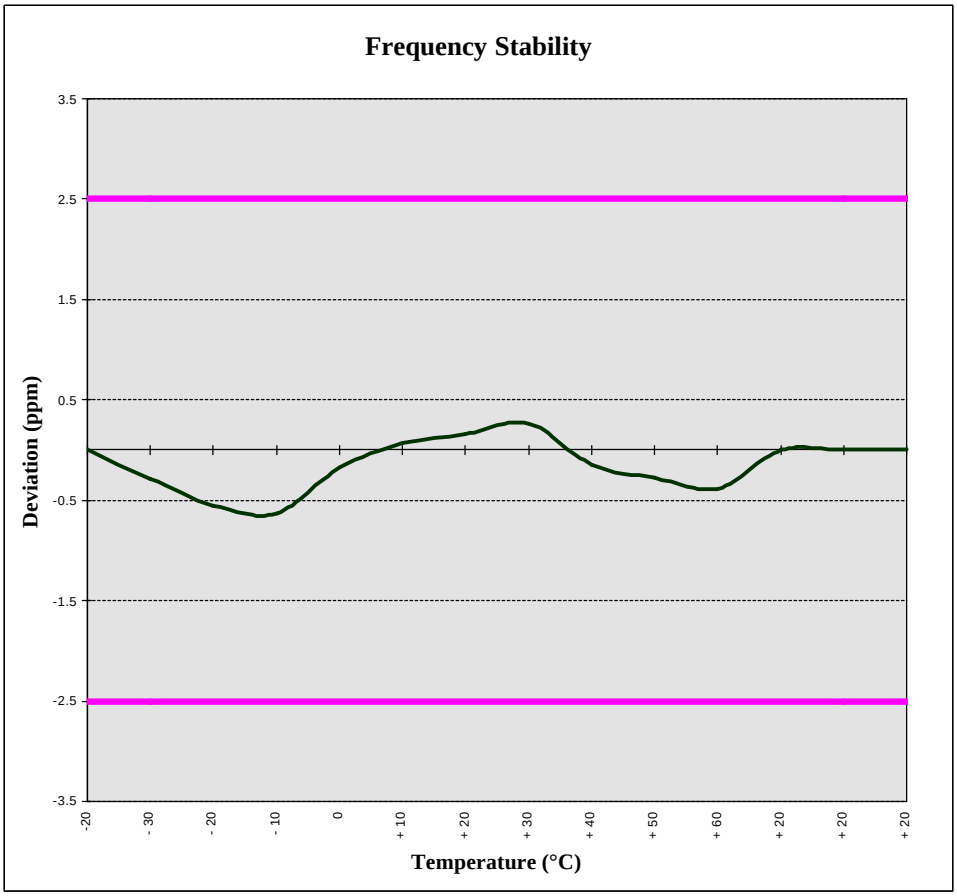
Channel: 363

Reference Voltage: 3.6 VDC

Deviation Limit: ± 0.00025 % or 2.5 ppm

| **VOLTAGE** (%) | **POWER** (VDC) | **TEMP** (ºC) | **FREQ.** (Hz) | **Deviation** (%) |
|---|---|---|---|---|
| 100 % | 3.60 | + 20 (Ref) | 835890000 | 0.00000000 |
| 100 % | | - 30 | 835890236 | -0.00000028 |
| 100 % | | - 20 | 835890462 | -0.00000055 |
| 100 % | | - 10 | 835890525 | -0.00000063 |
| 100 % | | 0 | 835890147 | -0.00000018 |
| 100 % | | + 10 | 835889945 | 0.00000007 |
| 100 % | | + 20 | 835889867 | 0.00000016 |
| 100 % | | + 30 | 835889779 | 0.00000026 |
| 100 % | | + 40 | 835890121 | -0.00000014 |
| 100 % | | + 50 | 835890233 | -0.00000028 |
| 100 % | | + 60 | 835890319 | -0.00000038 |
| 85 % | 3.14 | + 20 | 835890000 | 0.00000000 |
| 115 % | 4.25 | + 20 | 835890000 | 0.00000000 |
| BATT. ENDPOINT | 2.40 | + 20 | 835890000 | 0.00000000 |

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



***FREQUENCY STABILITY (PCS CDMA) - § 24.135***

Operating Frequency: 1,880,000,000 Hz

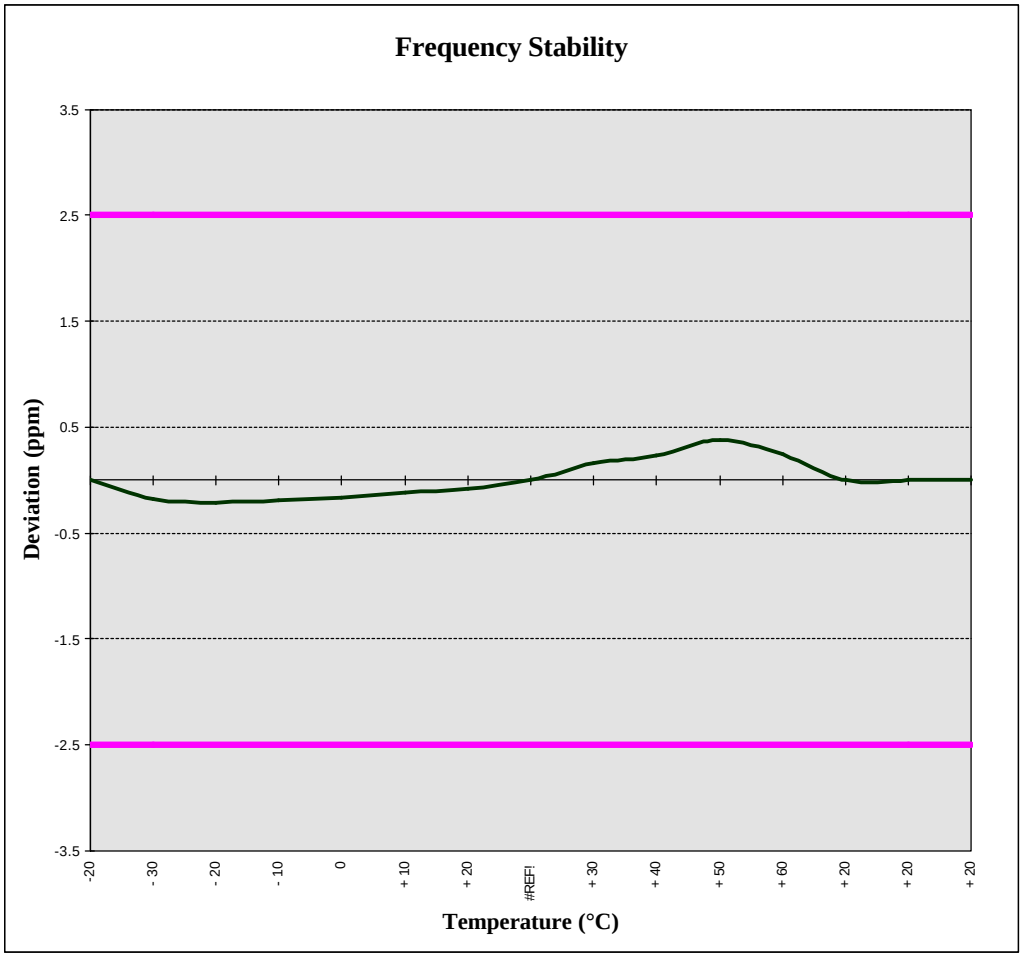
Channel: 600

Reference Voltage: 3.6 VDC

Deviation Limit: ± 0.00025 % or 2.5 ppm

| **VOLTAGE** (%) | **POWER** (VDC) | **TEMP** (ºC) | **FREQ.** (Hz) | **Deviation** (%) |
|---|---|---|---|---|
| 100 % | 3.60 | + 20 (Ref) | 1,880,000,000 | 0.000000 |
| 100 % | | - 30 | 1,880,000,338 | -0.000018 |
| 100 % | | - 20 | 1,880,000,395 | -0.000021 |
| 100 % | | - 10 | 1,880,000,357 | -0.000019 |
| 100 % | | 0 | 1,880,000,301 | -0.000016 |
| 100 % | | + 10 | 1,880,000,226 | -0.000012 |
| 100 % | | + 20 | 1,880,000,150 | -0.000008 |
| 100 % | | + 30 | 1,879,999,699 | 0.000016 |
| 100 % | | + 40 | 1,879,999,568 | 0.000023 |
| 100 % | | + 50 | 1,879,999,286 | 0.000038 |
| 100 % | | + 60 | 1,879,999,549 | 0.000024 |
| 85 % | 3.06 | + 20 | 1,880,000,000 | 0.000000 |
| 115 % | 4.14 | + 20 | 1,880,000,000 | 0.000000 |
| BATT. ENDPOINT | 2.52 | + 20 | 1,880,000,000 | 0.000000 |

***FREQUENCY STABILITY (PCS CDMA) - § 24.135***



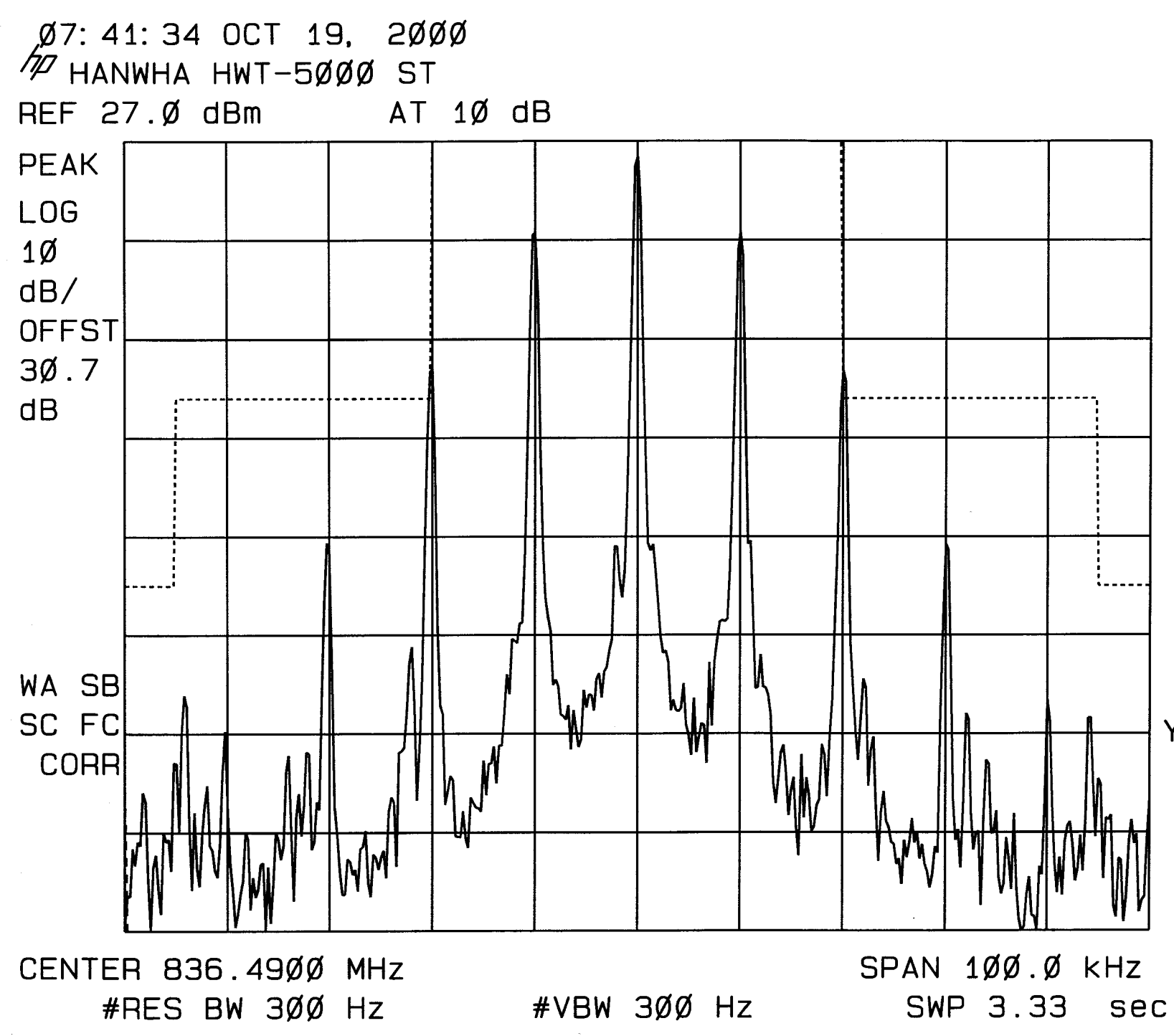
## *5.1 TEST EQUIPMENT*

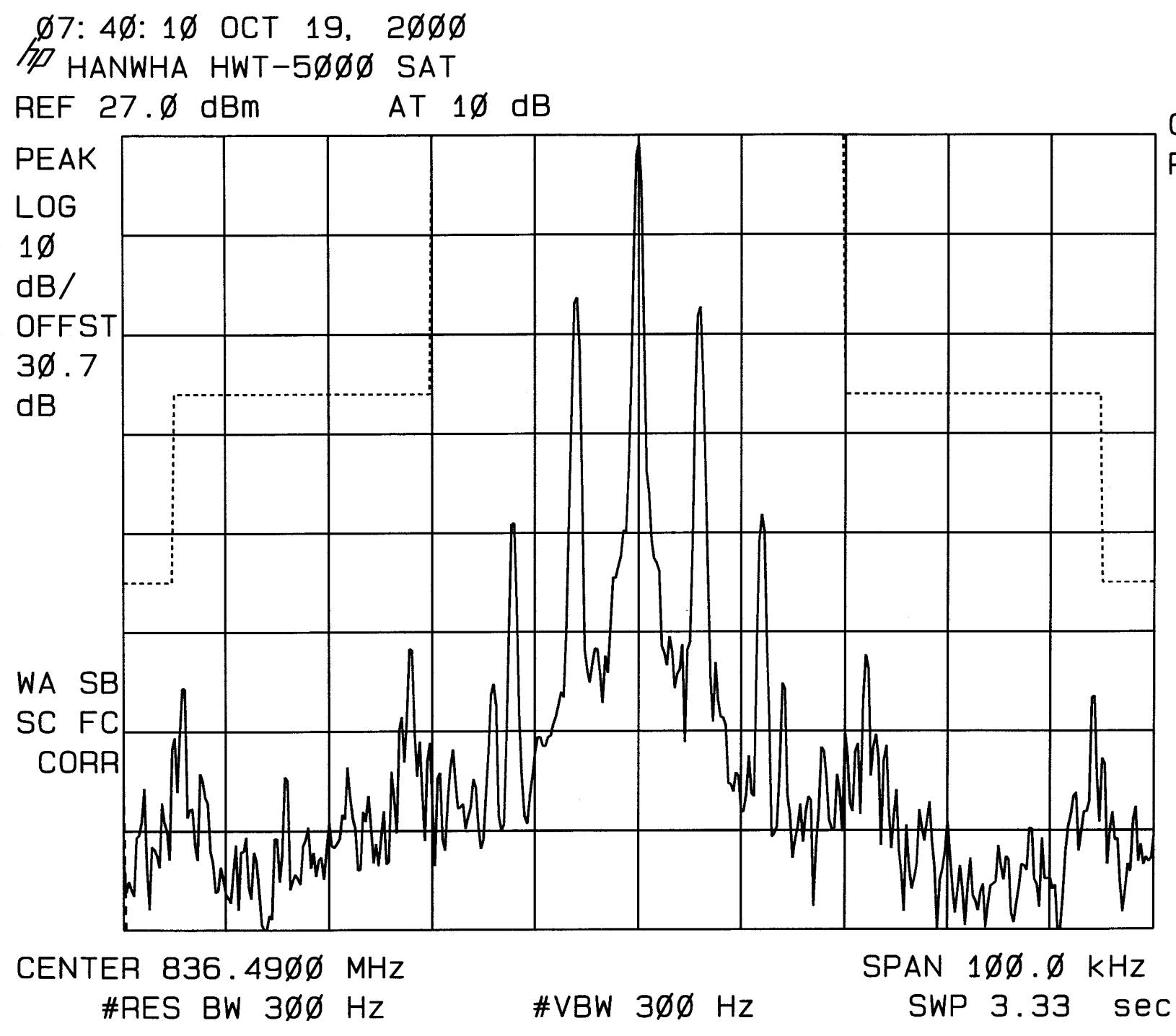
| Type | Model | Calib. Date | Serial No. |
|---|---|---|---|
| Signal Generator | HP 8648D (9kHz-4.0GHz) | Nov 1999 | 3847A00611 |
| Gigatronics Power Meter | 8652A | Oct 1999 | 1835272 |
| Gigatronics Power Sensor (2) | 80701A (0.05-18GHz) | Oct 1999 | 1833535, 1833542 |
| Amplifier Research Power 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 1999 | US38433013 |
| Audio Analyzer | HP 8903B | March 1999 | 3729A18691 |
| Modulation Analyzer | HP 8901A | March 1999 | 3749A07154 |
| Frequency Counter | HP 53181A (3GHz) | May 1999 | 3736A05175 |
| DC Power Supply | HP E3611A | N/A | KR83015294 |
| 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. 2000 | N/A |
| Double Ridged Horn Antenna | ETS 3115 (1-18GHz) | Oct. 2000 | N/A |
| Horn Antenna | Chase BBHA 9120-A (0.7-4.8GHz) | Sept 1998 | 9120A-239 |
| Horn Antenna | Chase BBHA 9120-A (0.7-4.8GHz) | Sept 1998 | 9120A-240 |
| Roberts Dipoles | Compliance Design (2 sets) 3121C | June 2000 | |
| Spectrum Analyzer | HP 8594E | March 2000 | 3543A02721 |
| Spectrum Analyzer | HP E4408B | Nov 1999 | US39240170 |
| Shielded Screen Room | Lindgren R.F. 18W-2/2-0 | N/A | 16297 |
| Environmental Chamber | ESPEC ECT-2 (Temperature/Humidity) | Feb 2000 | 0510154-B |

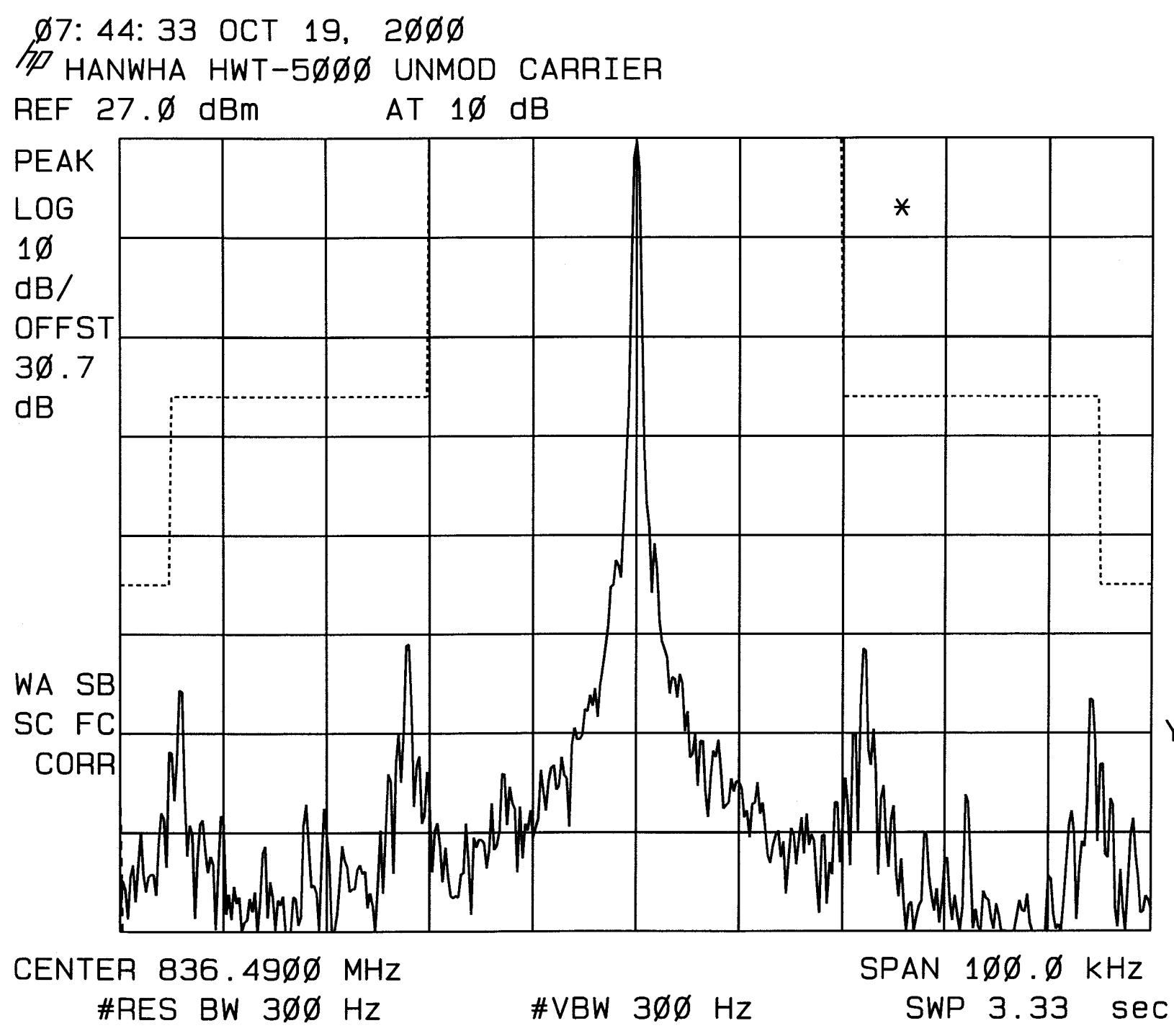
### *6.1 CONCLUSION*

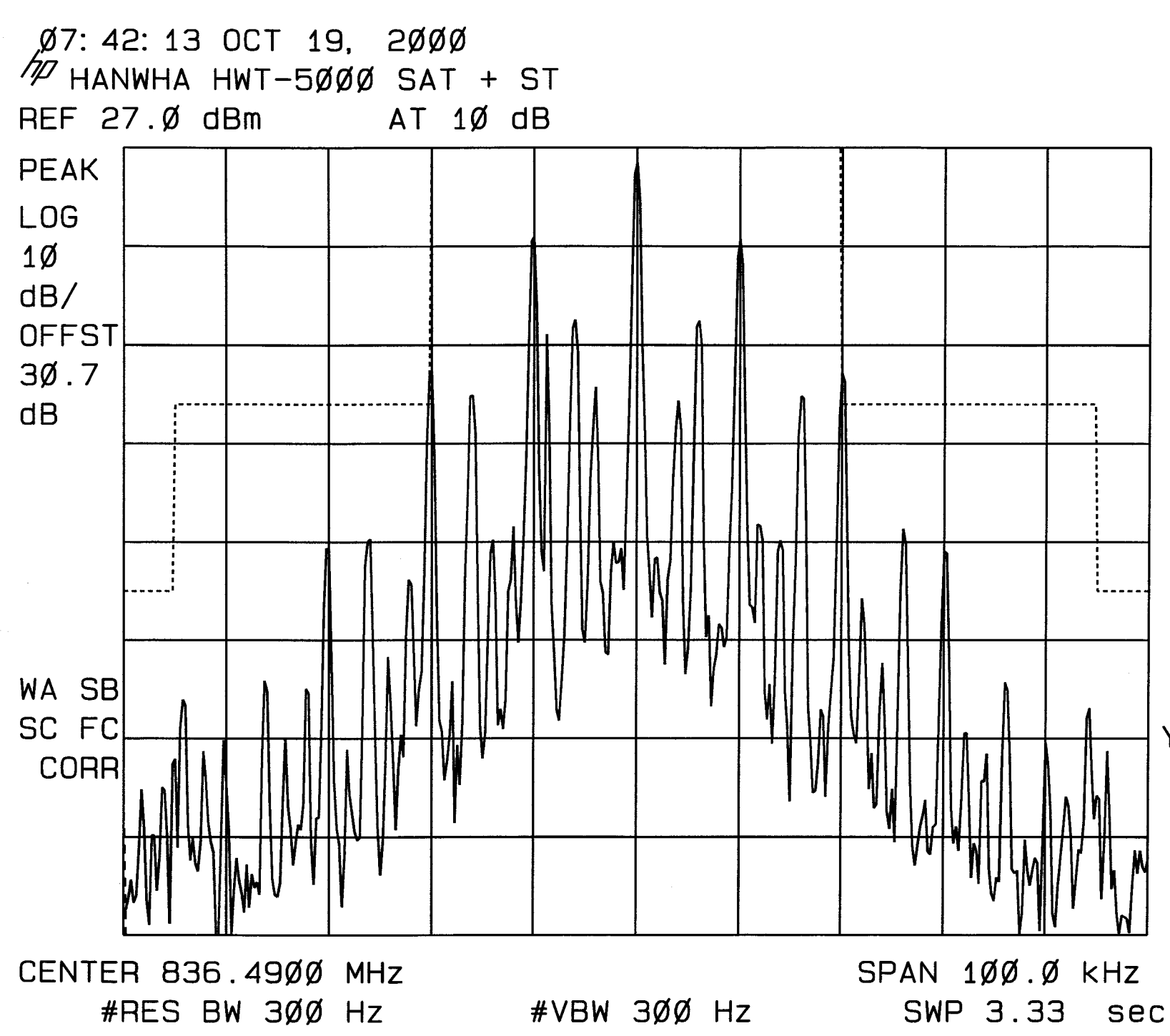
The data collected shows that the HANWHA CORPORATION HWT-5000 Dual-Band Tri-Mode PCS/Cellular Phone FCC ID: OCCHWT-5000 complies with all the requirements of Parts 2, 22, and 24 of the FCC rules.

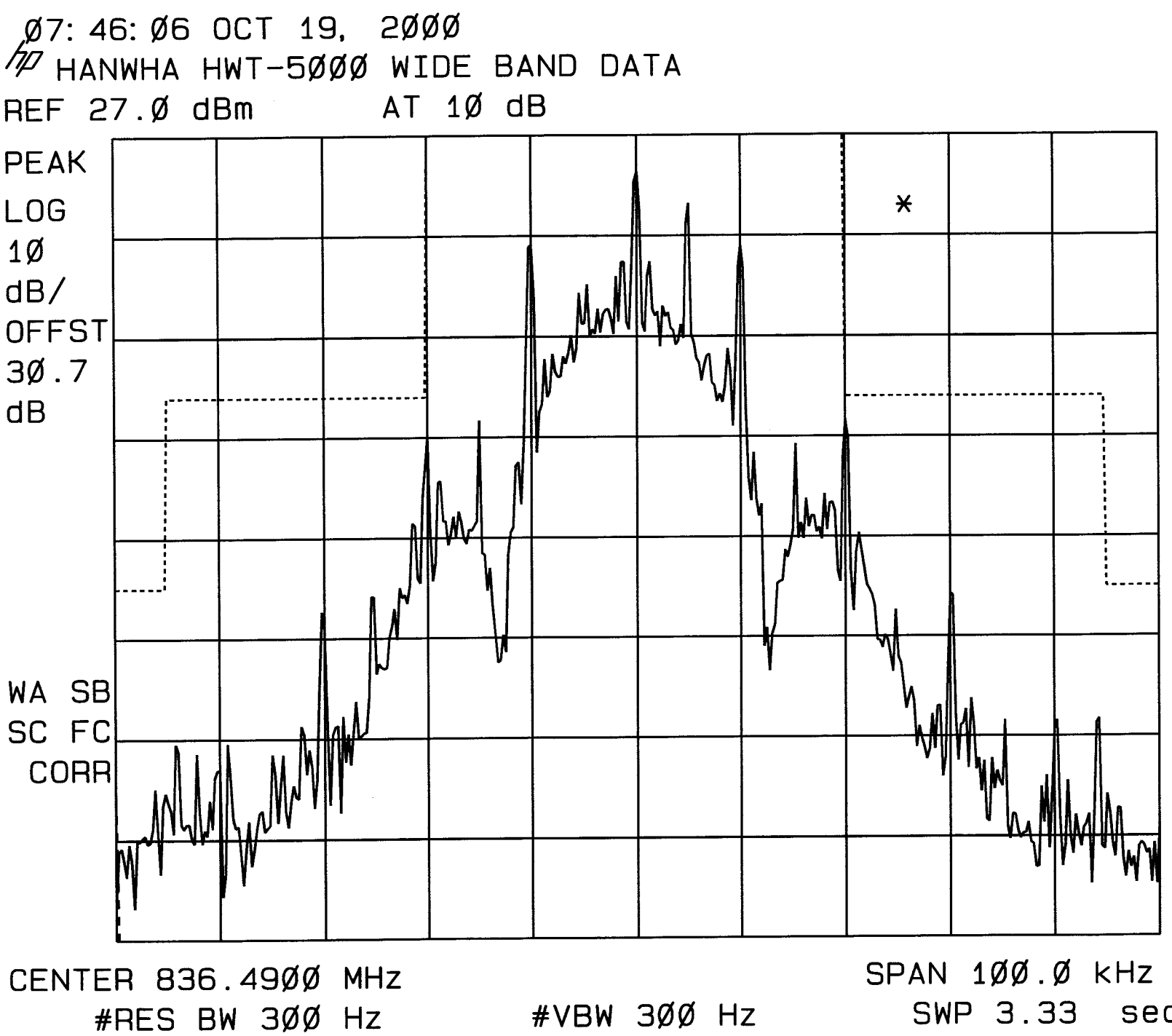
## TEST PLOTS

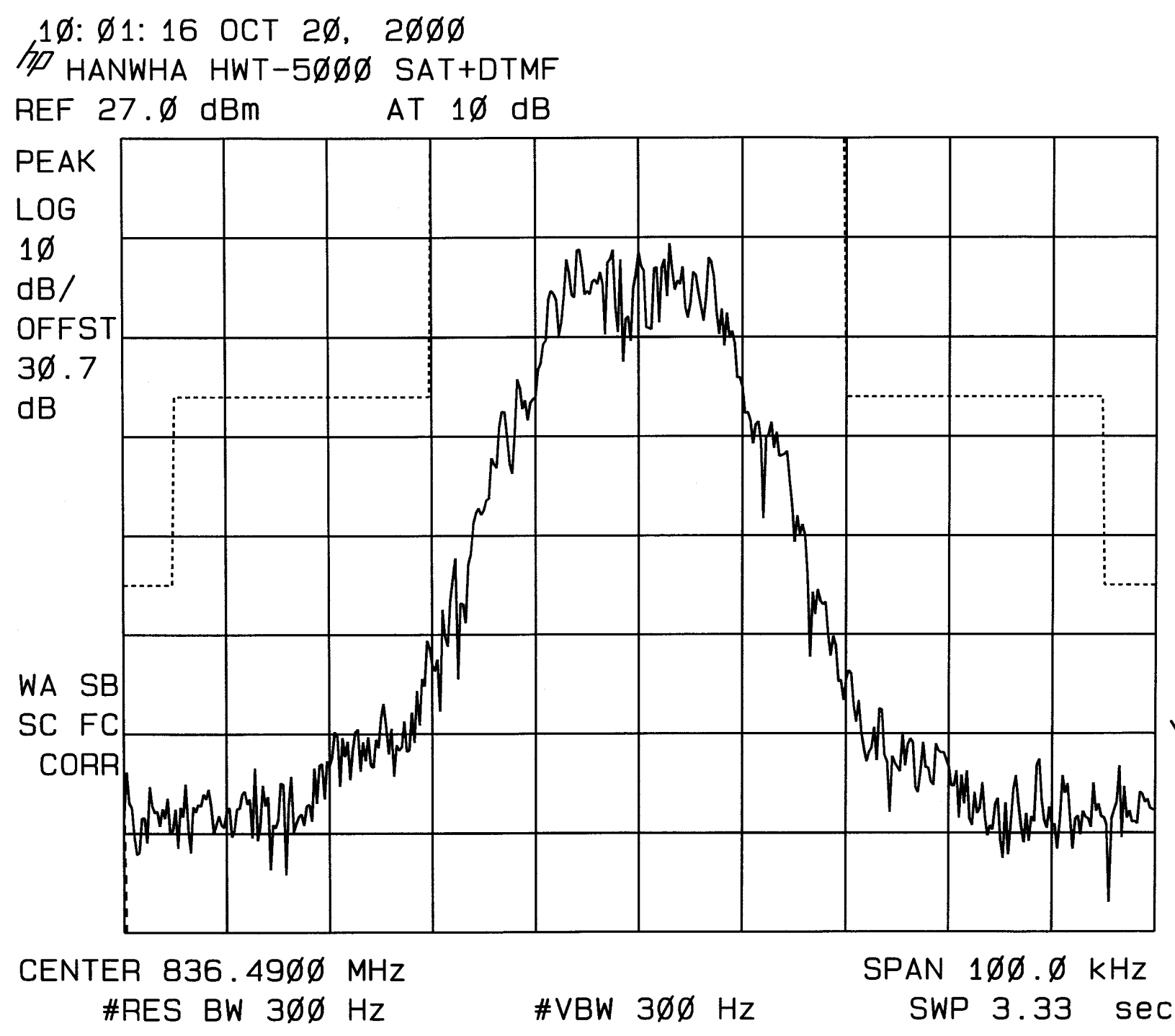

Ø7: 41: 34 OCT 19, 2ØØØ
HANWHA HWT-5ØØØ ST
REF 27.Ø dBm
AT 1Ø dB
PEAK
LOG
1Ø
dB/
OFFST
3Ø.7
dB
WA SB
SC FC
CORR
CENTER 836.49ØØ MHz
SPAN 1ØØ.Ø kHz
#RES BW 3ØØ Hz
#VBW 3ØØ Hz
SWP 3.33 sec

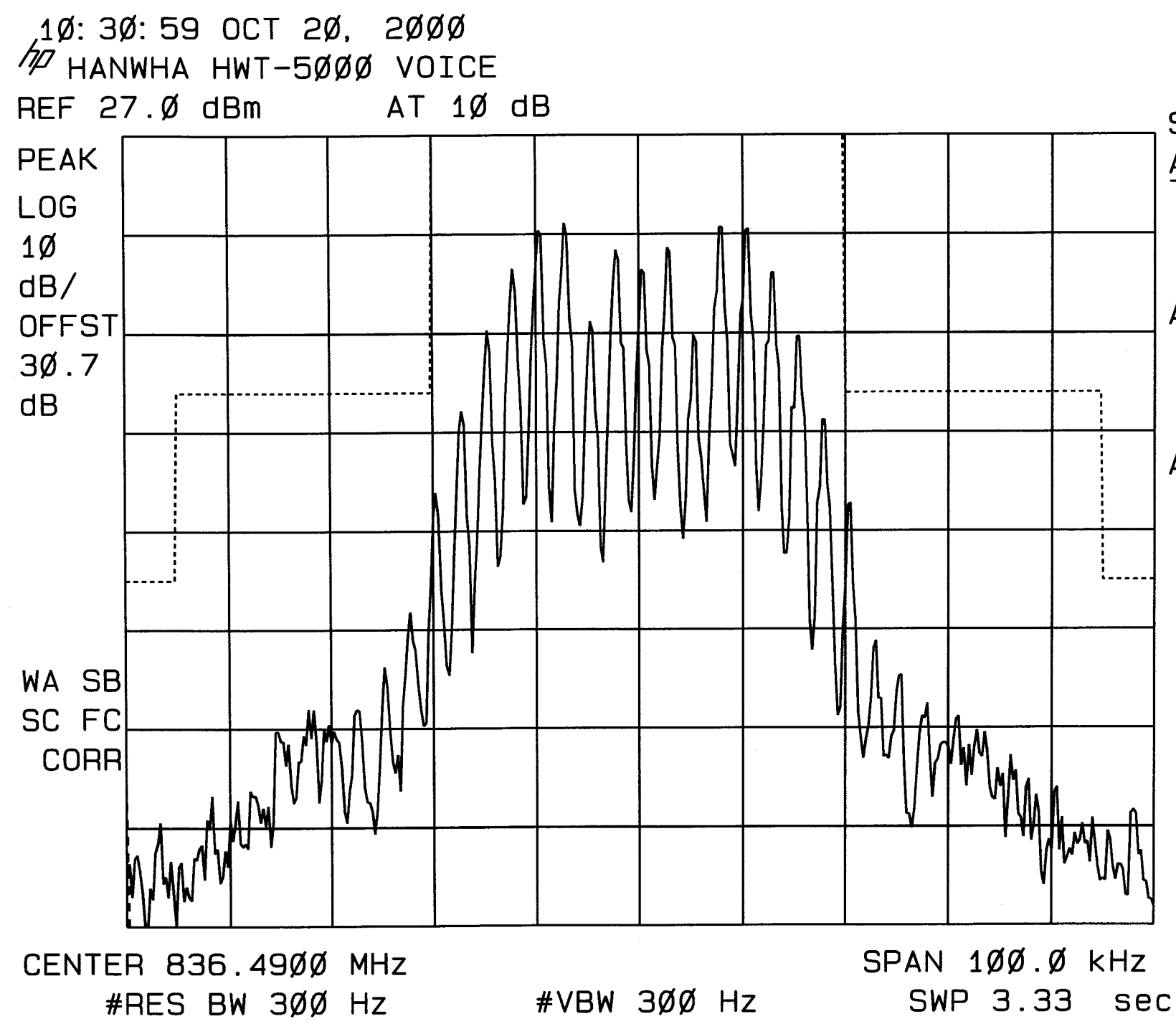

Ø7: 4Ø: 1Ø OCT 19, 2ØØØ
HANWHA HWT-5ØØØ SAT
REF 27.Ø dBm
AT 1Ø dB
PEAK
LOG
1Ø
dB/
OFFST
3Ø.7
dB
WA SB
SC FC
CORR
CENTER 836.49ØØ MHz
SPAN 1ØØ.Ø kHz
#RES BW 3ØØ Hz
#VBW 3ØØ Hz
SWP 3.33 sec

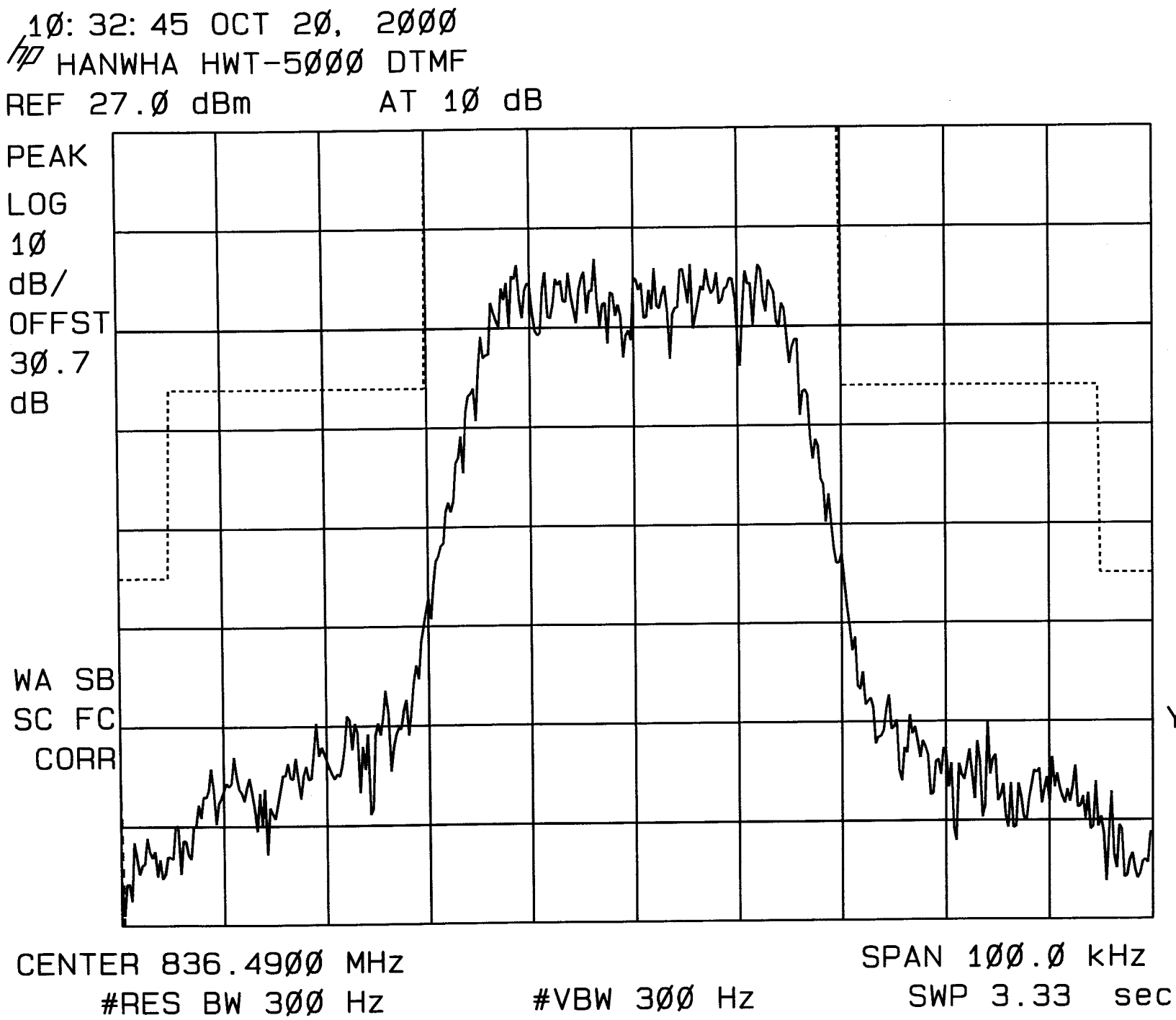

Ø7: 44: 33 OCT 19, 2ØØØ
HANWHA HWT-5ØØØ UNMOD CARRIER
REF 27.Ø dBm
AT 1Ø dB
PEAK
LOG
1Ø
dB/
OFFST
3Ø.7
dB
WA SB
SC FC
CORR
CENTER 836.49ØØ MHz
SPAN 1ØØ.Ø kHz
#RES BW 3ØØ Hz
#VBW 3ØØ Hz
SWP 3.33 sec

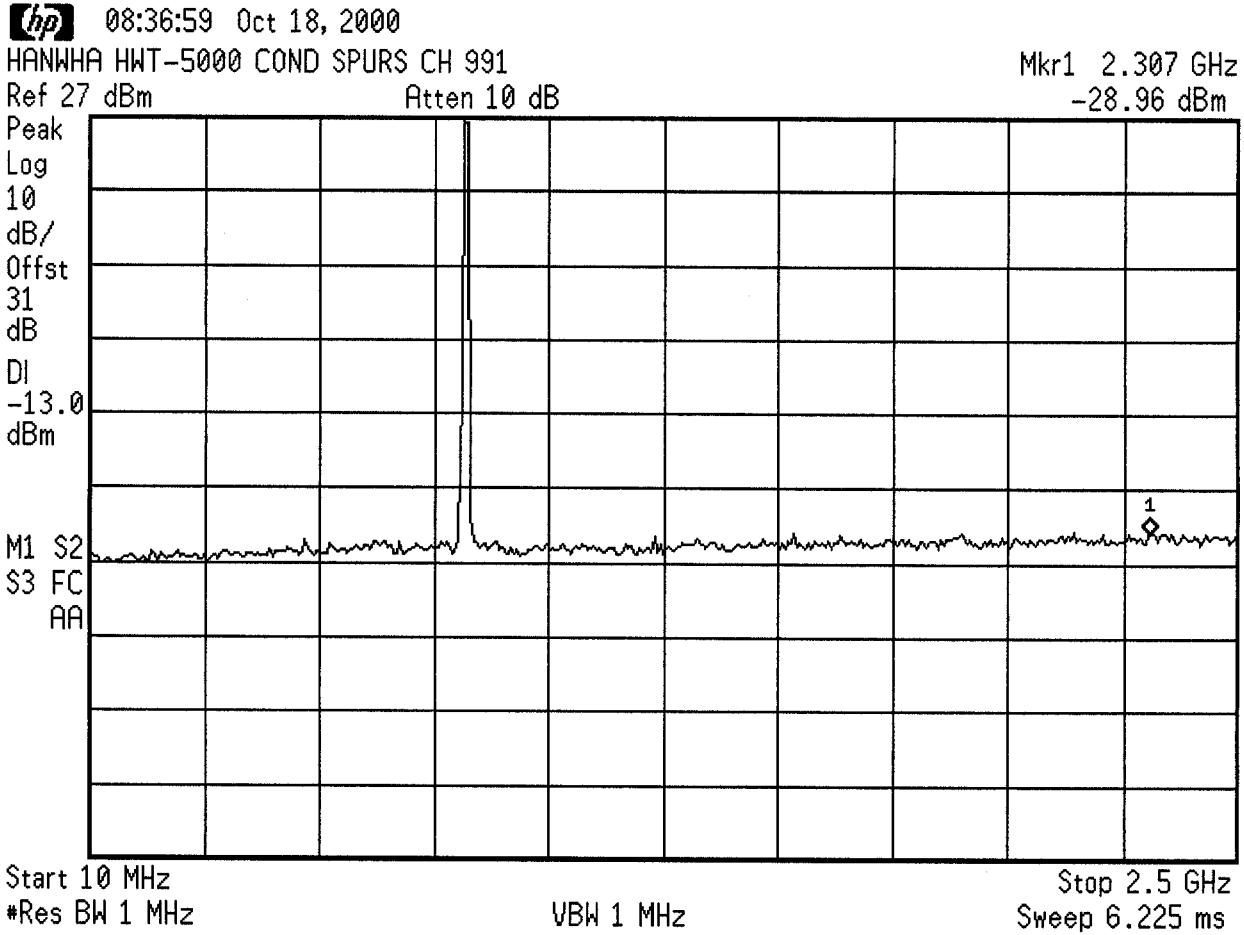

Ø7: 42: 13 OCT 19, 2ØØØ
HANWHA HWT-5ØØØ SAT + ST
REF 27.Ø dBm
AT 1Ø dB
PEAK
LOG
1Ø
dB/
OFFST
3Ø.7
dB
WA SB
SC FC
CORR
CENTER 836.49ØØ MHz
SPAN 1ØØ.Ø kHz
#RES BW 3ØØ Hz
#VBW 3ØØ Hz
SWP 3.33 sec

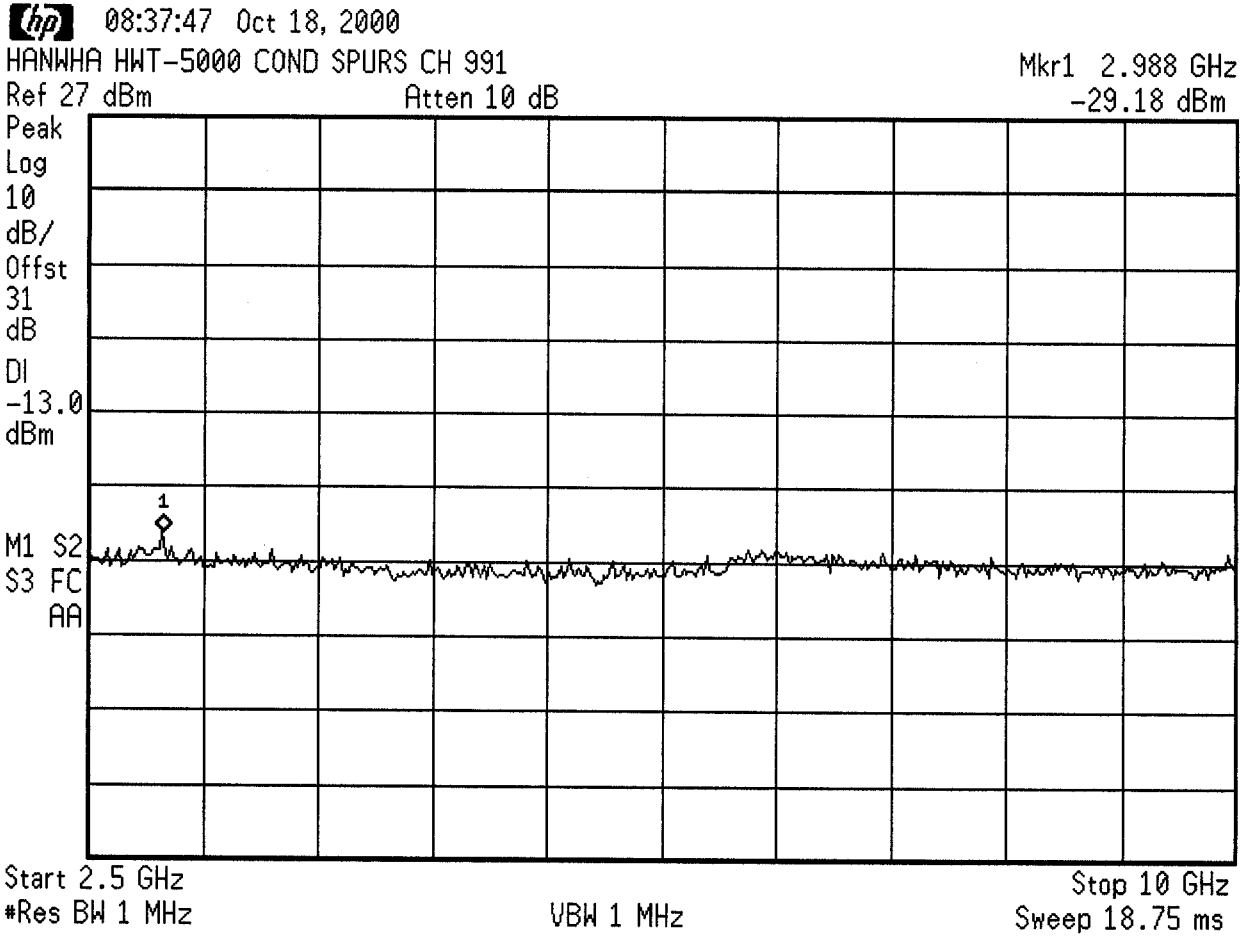

Ø7: 46: Ø6 OCT 19, 2ØØØ
HANWHA HWT-5ØØØ WIDE BAND DATA
REF 27.Ø dBm
AT 1Ø dB
PEAK
LOG
1Ø
dB/
OFFST
3Ø.7
dB
WA SB
SC FC
CORR
CENTER 836.49ØØ MHz
#RES BW 3ØØ Hz
#VBW 3ØØ Hz
SPAN 1ØØ.Ø kHz
SWP 3.33 sec

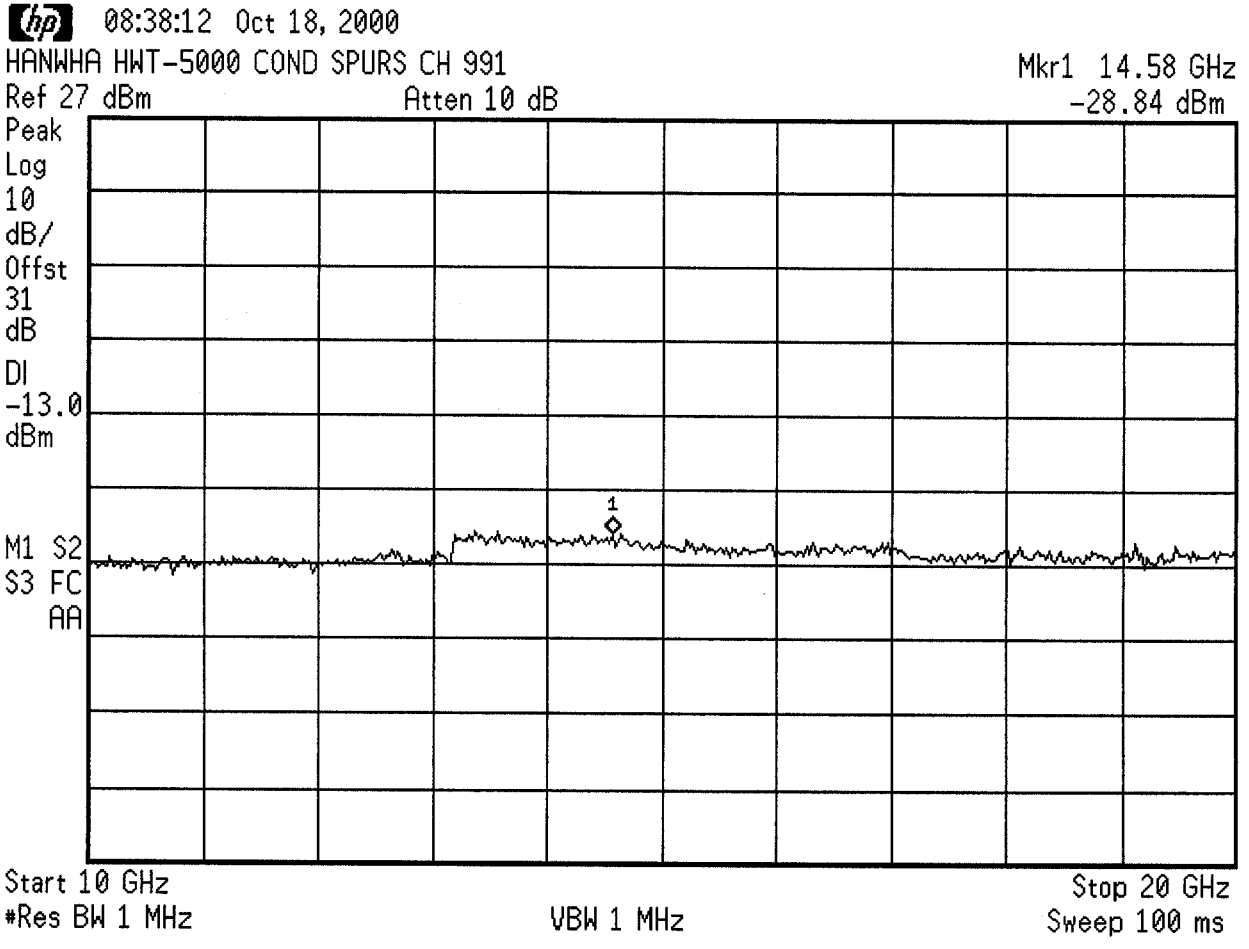

10: 01: 16 OCT 20, 2000
HANWHA HWT-5000 SAT+DTMF
REF 27.0 dBm
AT 10 dB
PEAK
LOG
10
dB/
OFFST
30.7
dB
WA SB
SC FC
CORR
CENTER 836.4900 MHz
SPAN 100.0 kHz
#RES BW 300 Hz
#VBW 300 Hz
SWP 3.33 sec

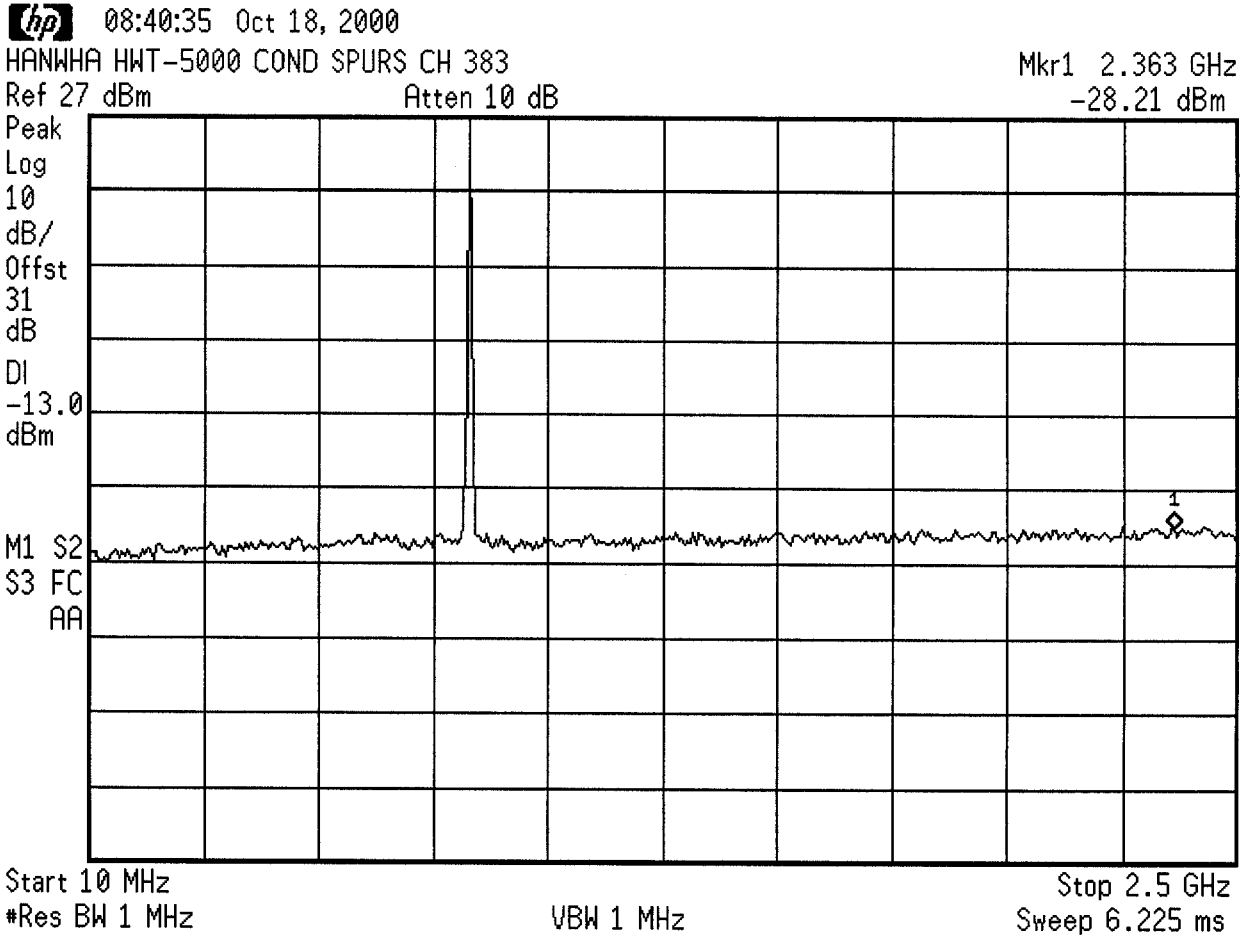

10: 30: 59 OCT 20, 2000
HANWHA HWT-5000 VOICE
REF 27.0 dBm
AT 10 dB
PEAK
LOG
10
dB/
OFFST
30.7
dB
WA SB
SC FC
CORR
CENTER 836.4900 MHz
#RES BW 300 Hz
#VBW 300 Hz
SPAN 100.0 kHz
SWP 3.33 sec

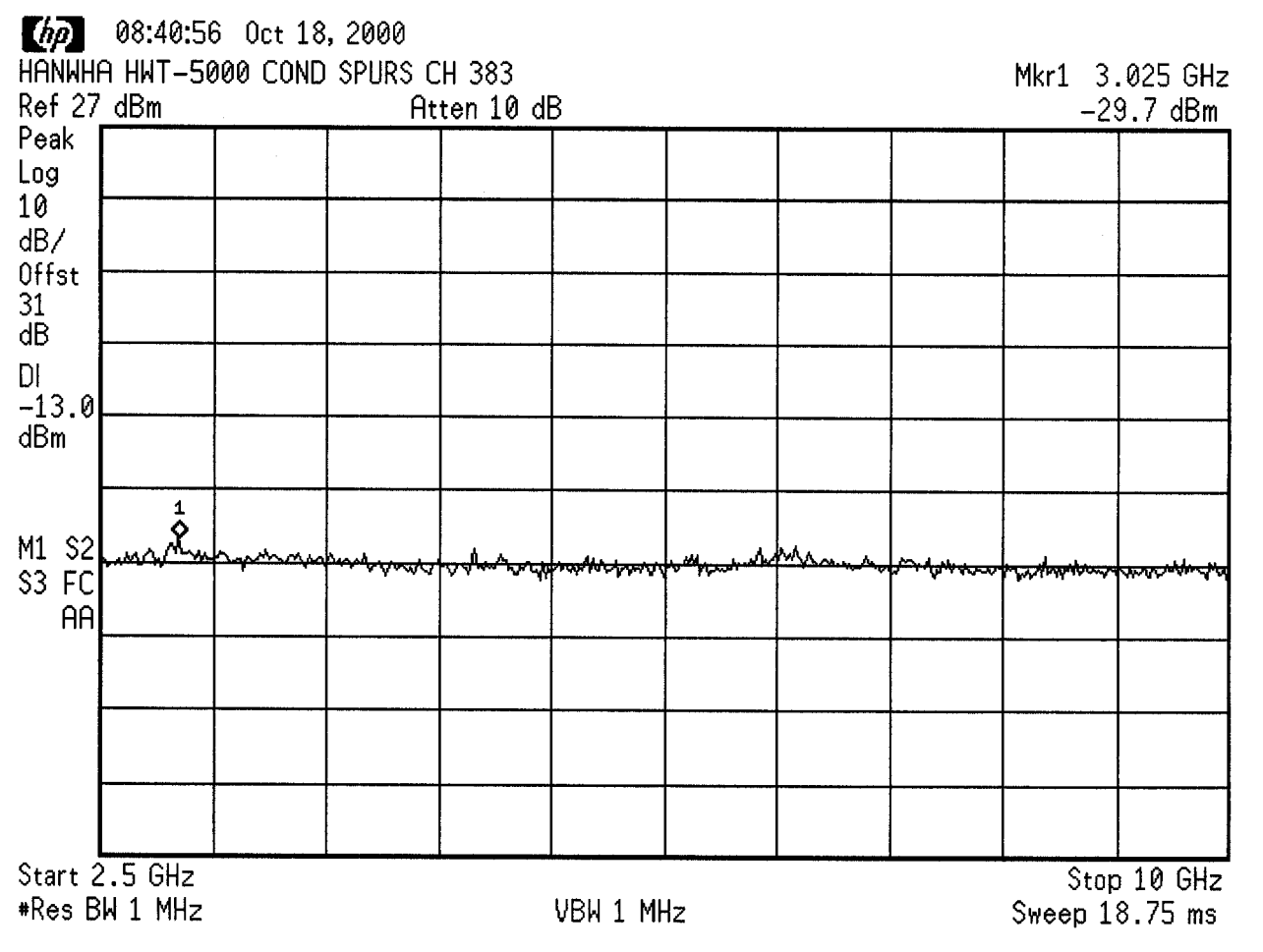

10: 32: 45 OCT 20, 2000
HANWHA HWT-5000 DTMF
REF 27.0 dBm
AT 10 dB
PEAK
LOG
10
dB/
OFFST
30.7
dB
WA SB
SC FC
CORR
CENTER 836.4900 MHz
#RES BW 300 Hz
#VBW 300 Hz
SPAN 100.0 kHz
SWP 3.33 sec

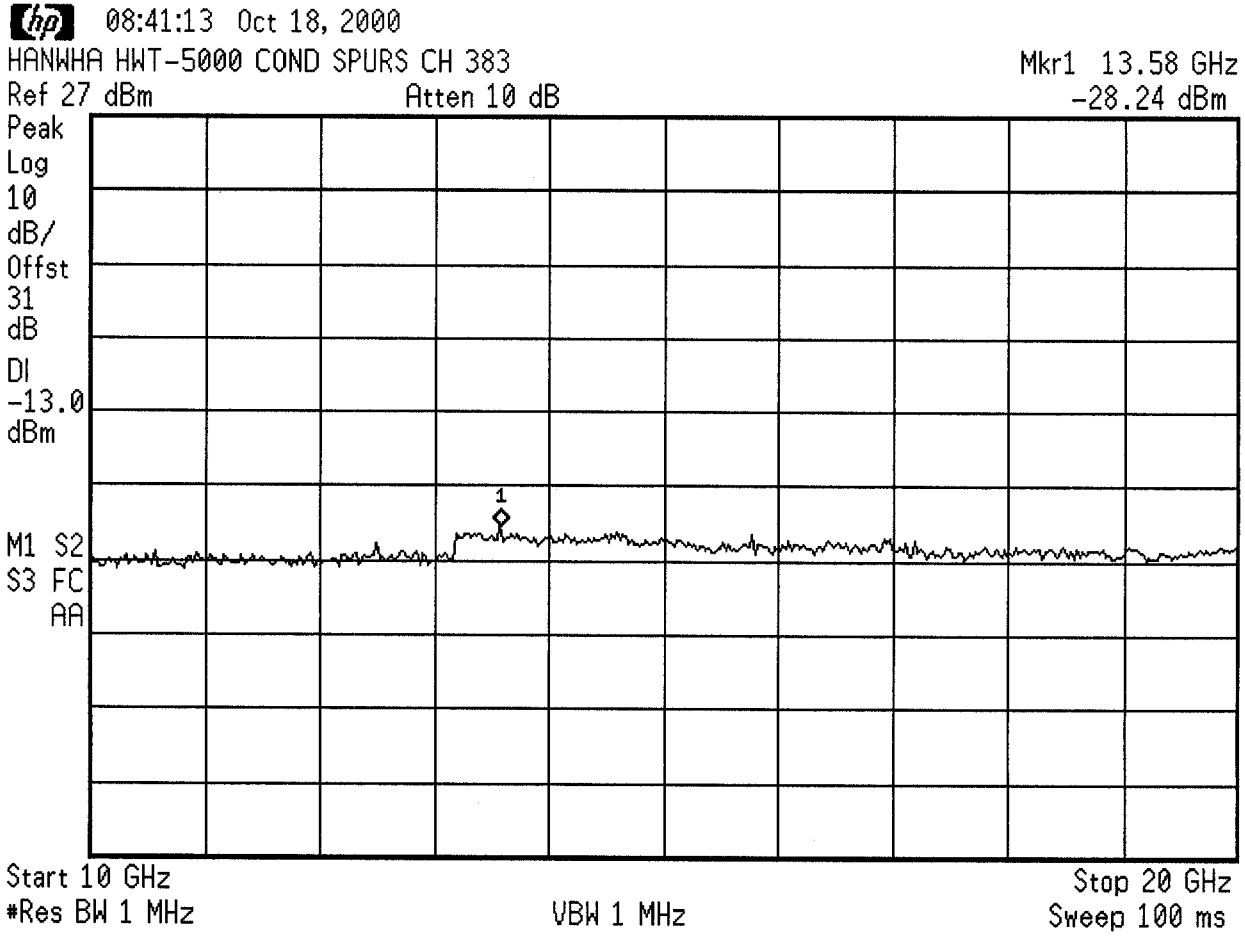

08:36:59 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 991
Ref 27 dBm
Atten 10 dB
Mkr1 2.307 GHz
-28.96 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms

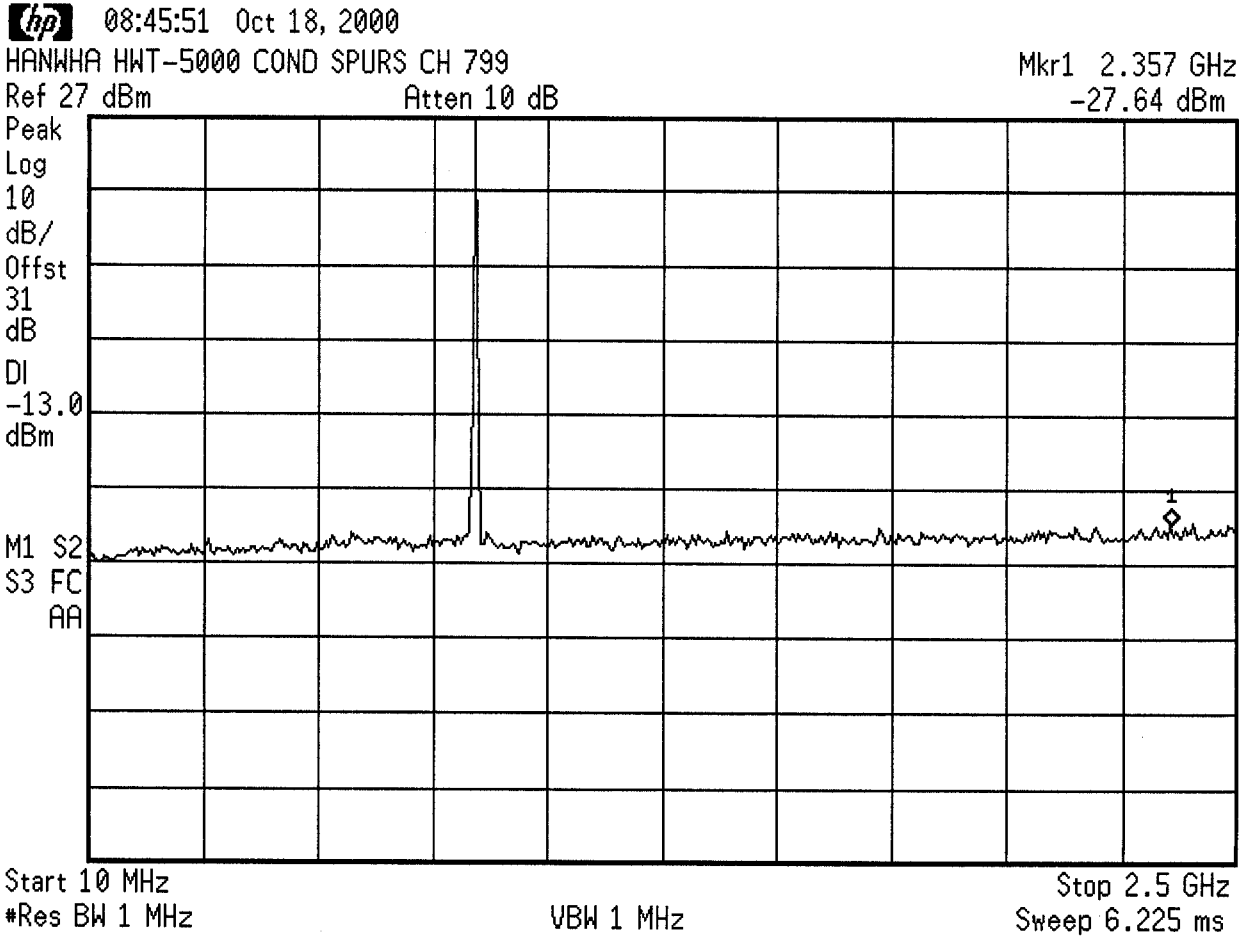

08:37:47 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 991
Ref 27 dBm
Atten 10 dB
Mkr1 2.988 GHz
-29.18 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms

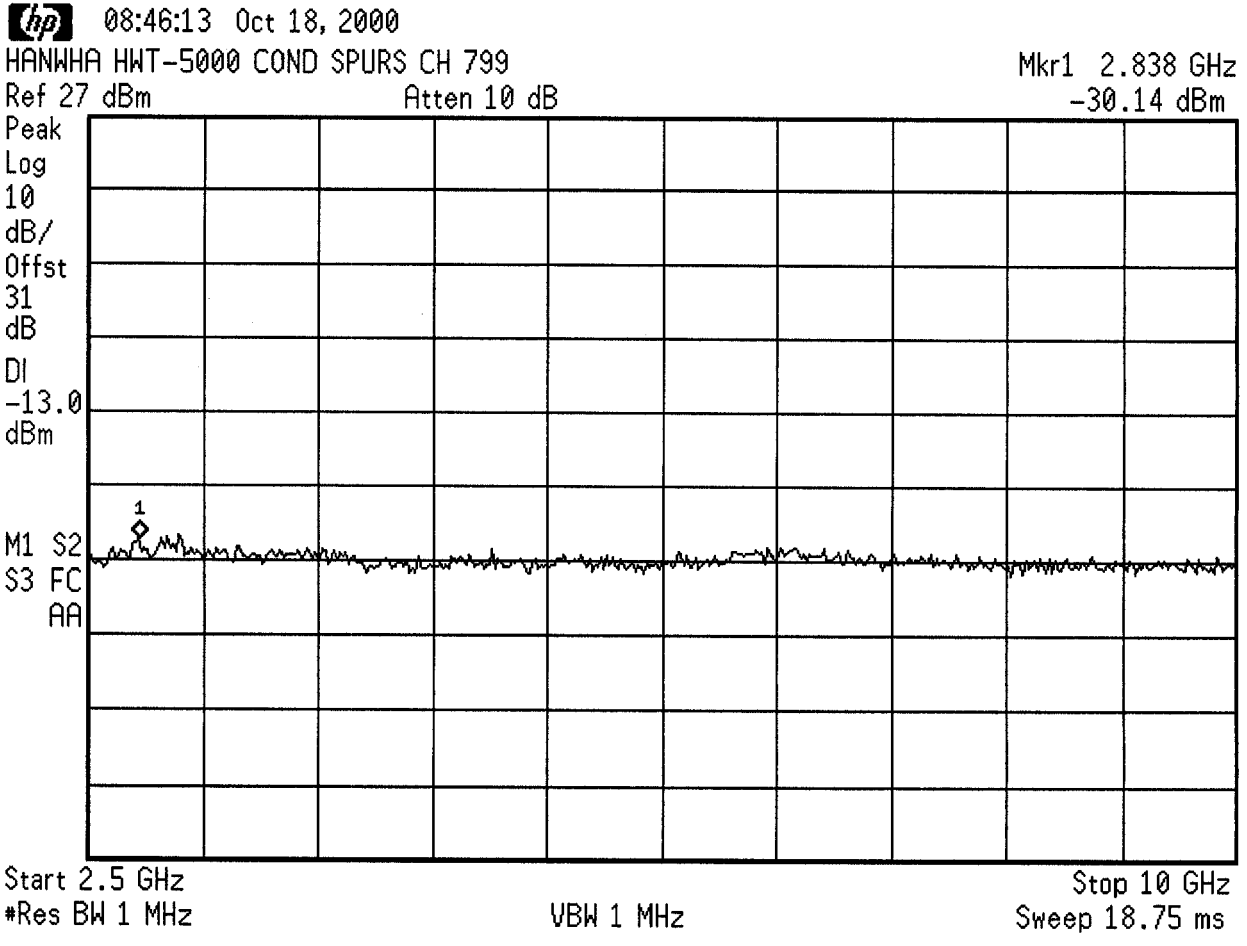

08:38:12 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 991
Ref 27 dBm
Atten 10 dB
Mkr1 14.58 GHz
-28.84 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms

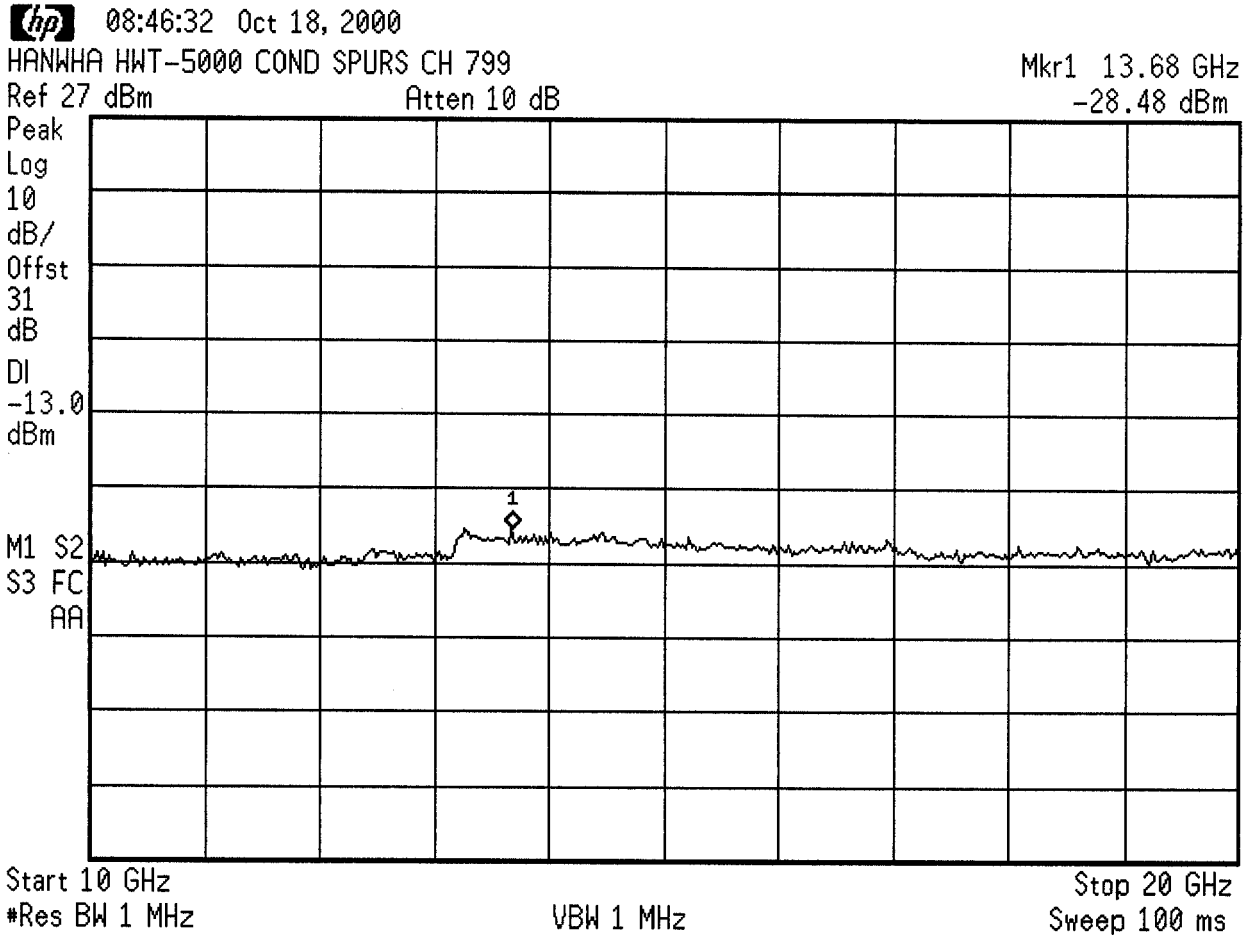

08:40:35 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 383
Ref 27 dBm
Atten 10 dB
Mkr1 2.363 GHz
-28.21 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms

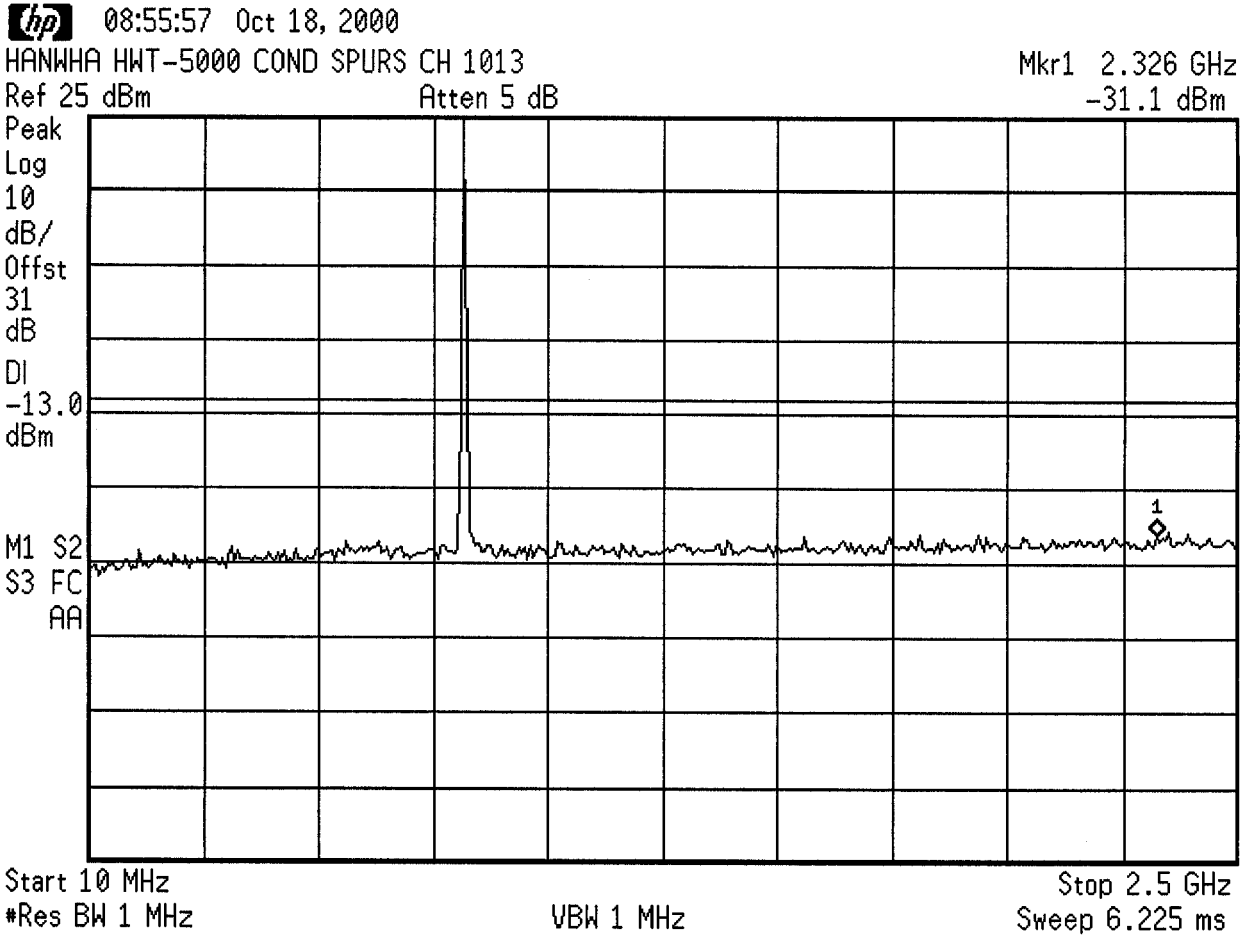

08:40:56 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 383
Mkr1 3.025 GHz
Ref 27 dBm
Atten 10 dB
-29.7 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms

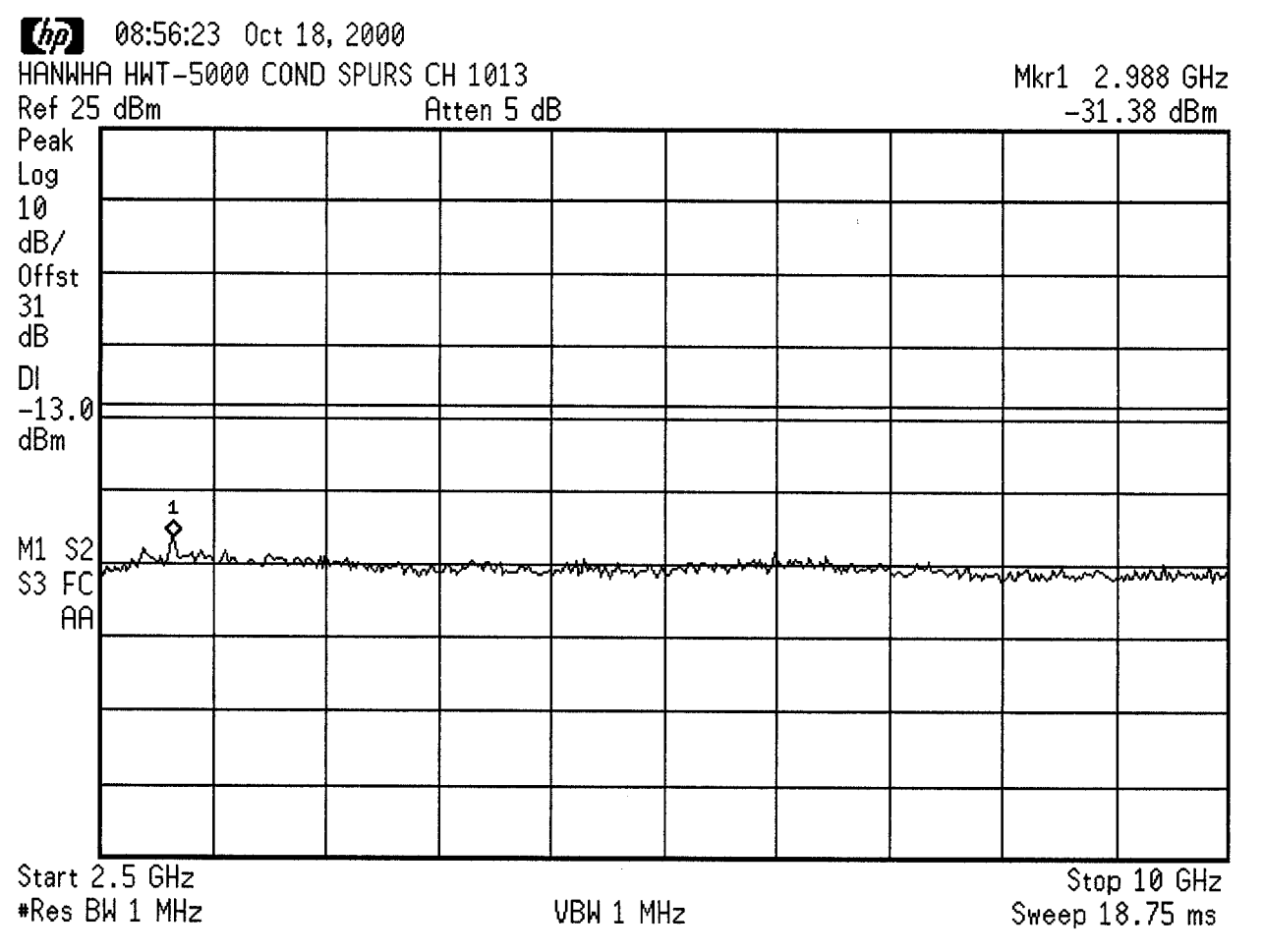

08:41:13 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 383
Mkr1 13.58 GHz
Ref 27 dBm
Atten 10 dB
-28.24 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms

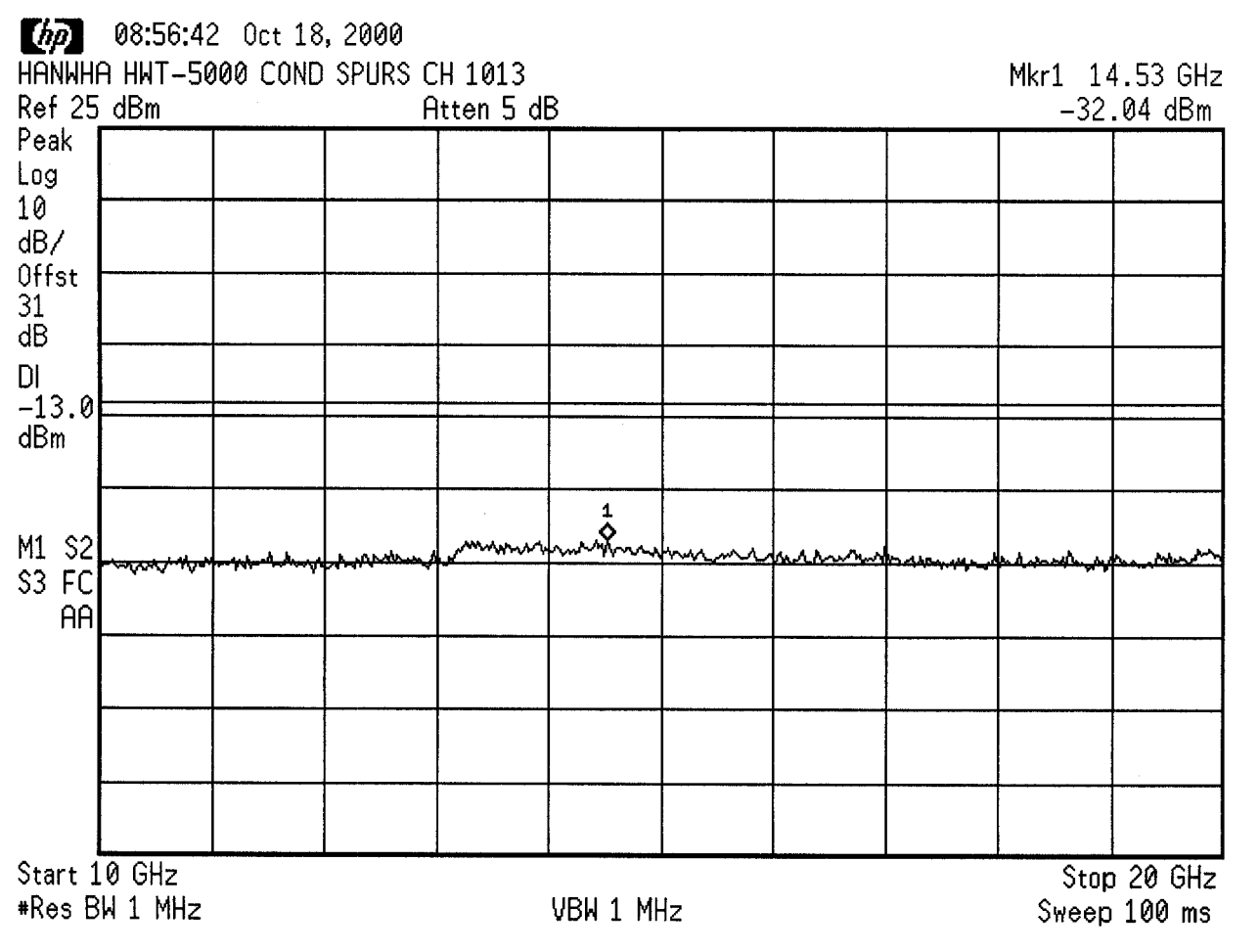

08:45:51 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 799
Mkr1 2.357 GHz
-27.64 dBm
Ref 27 dBm
Atten 10 dB
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms

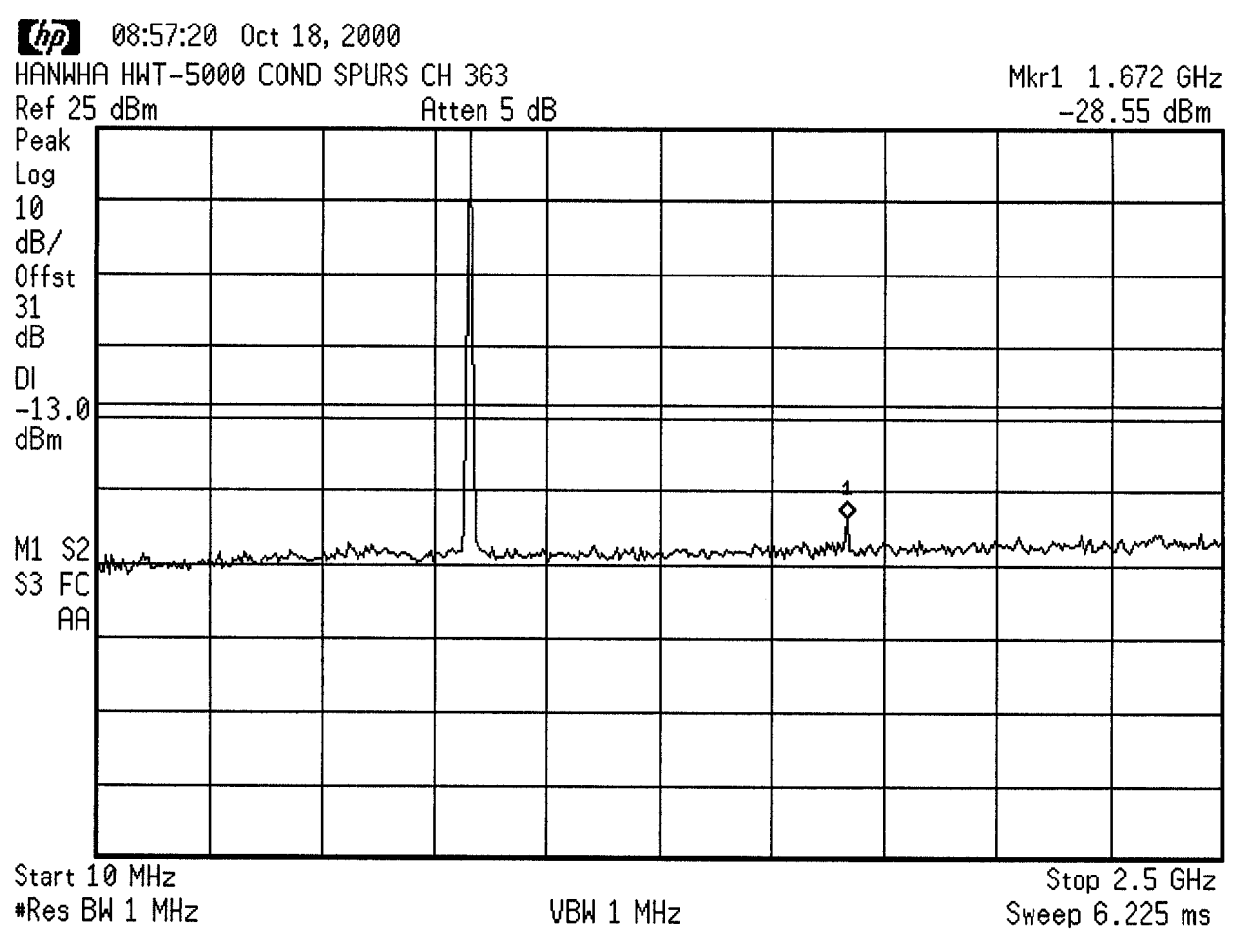

08:46:13 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 799
Ref 27 dBm
Atten 10 dB
Mkr1 2.838 GHz
-30.14 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms

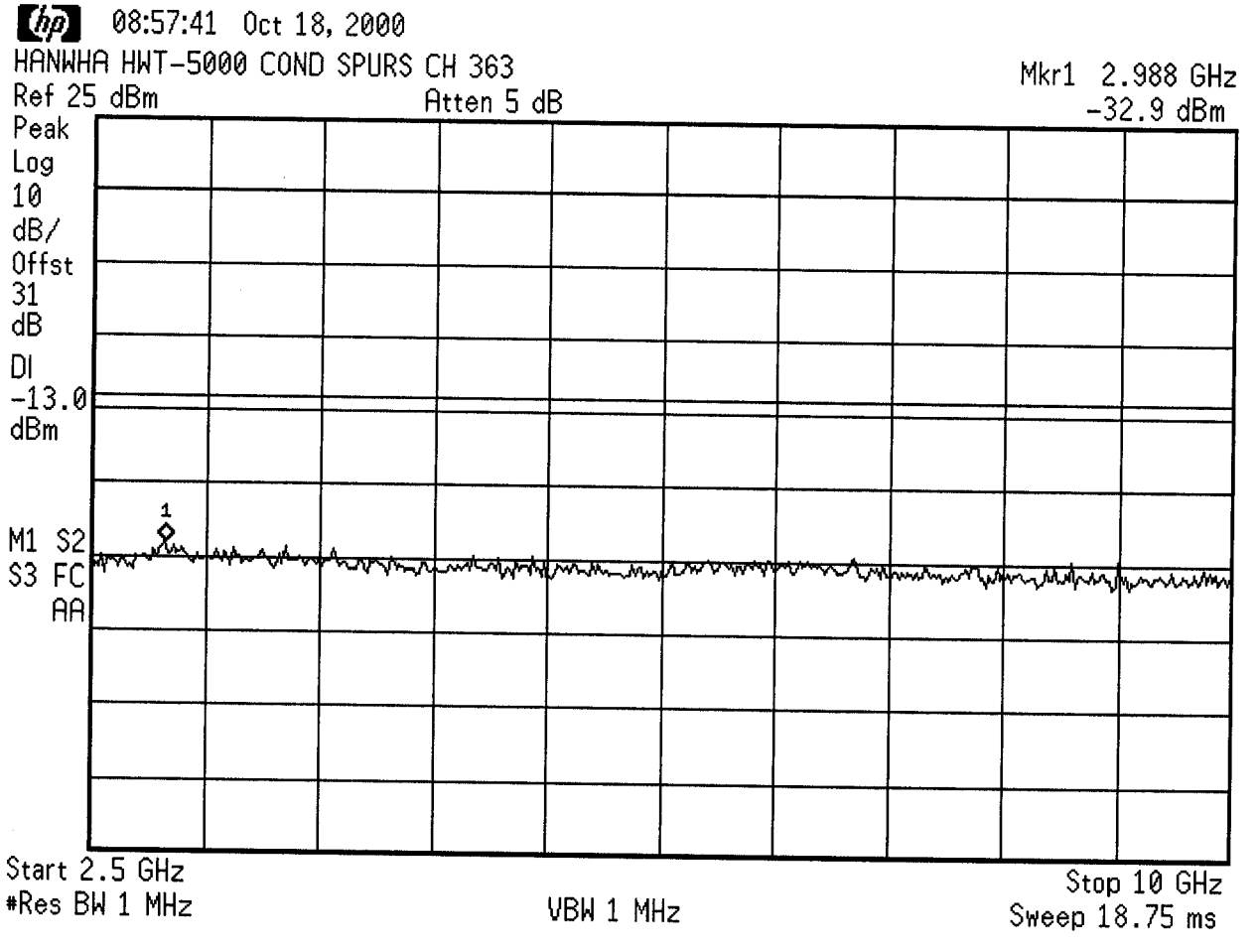

08:46:32 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 799
Ref 27 dBm
Atten 10 dB
Mkr1 13.68 GHz
-28.48 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms

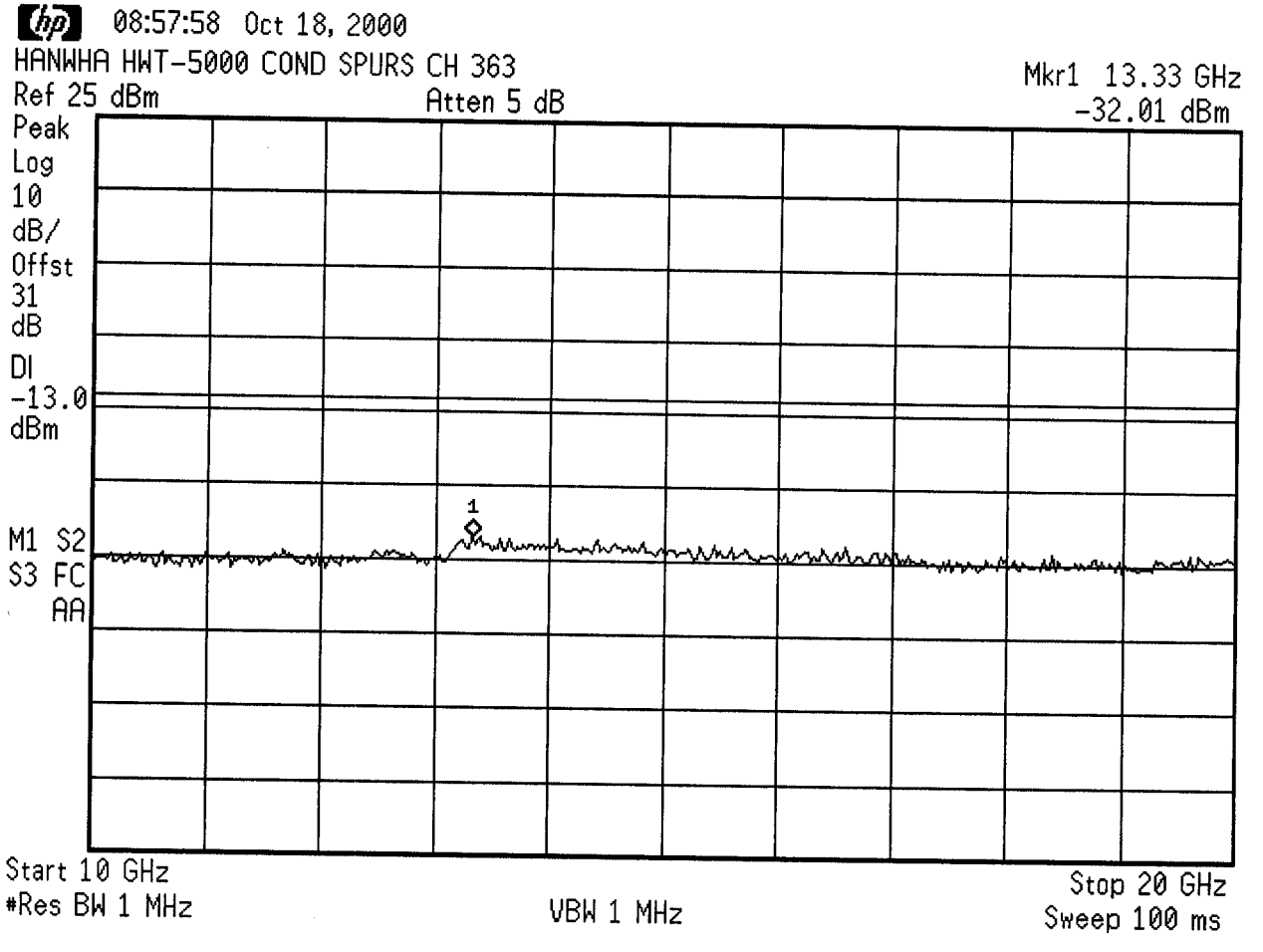

08:55:57 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 1013
Ref 25 dBm
Atten 5 dB
Mkr1 2.326 GHz
-31.1 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms

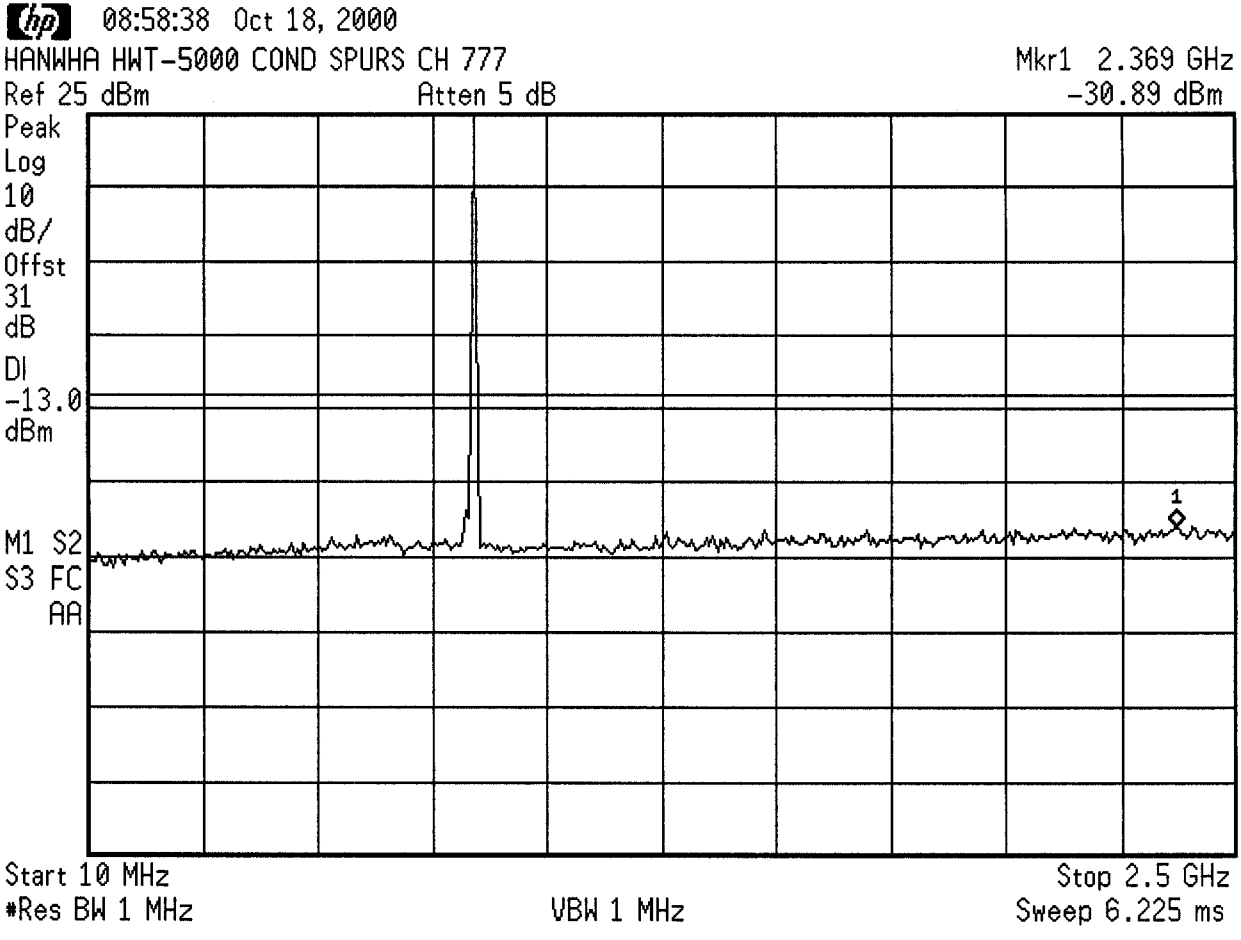

08:56:23 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 1013
Mkr1 2.988 GHz
Ref 25 dBm
Atten 5 dB
-31.38 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms

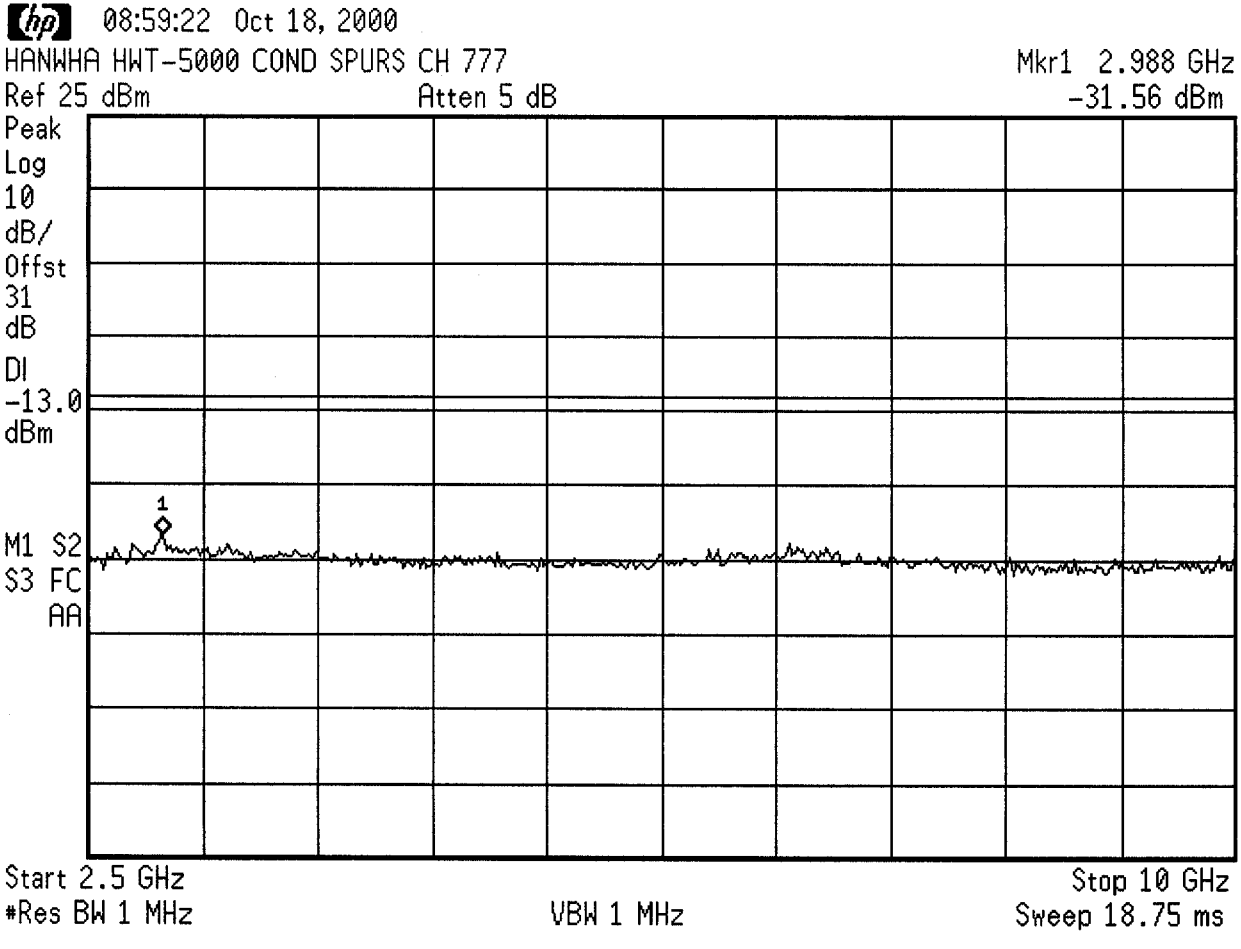

08:56:42 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 1013
Mkr1 14.53 GHz
Ref 25 dBm
Atten 5 dB
-32.04 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms

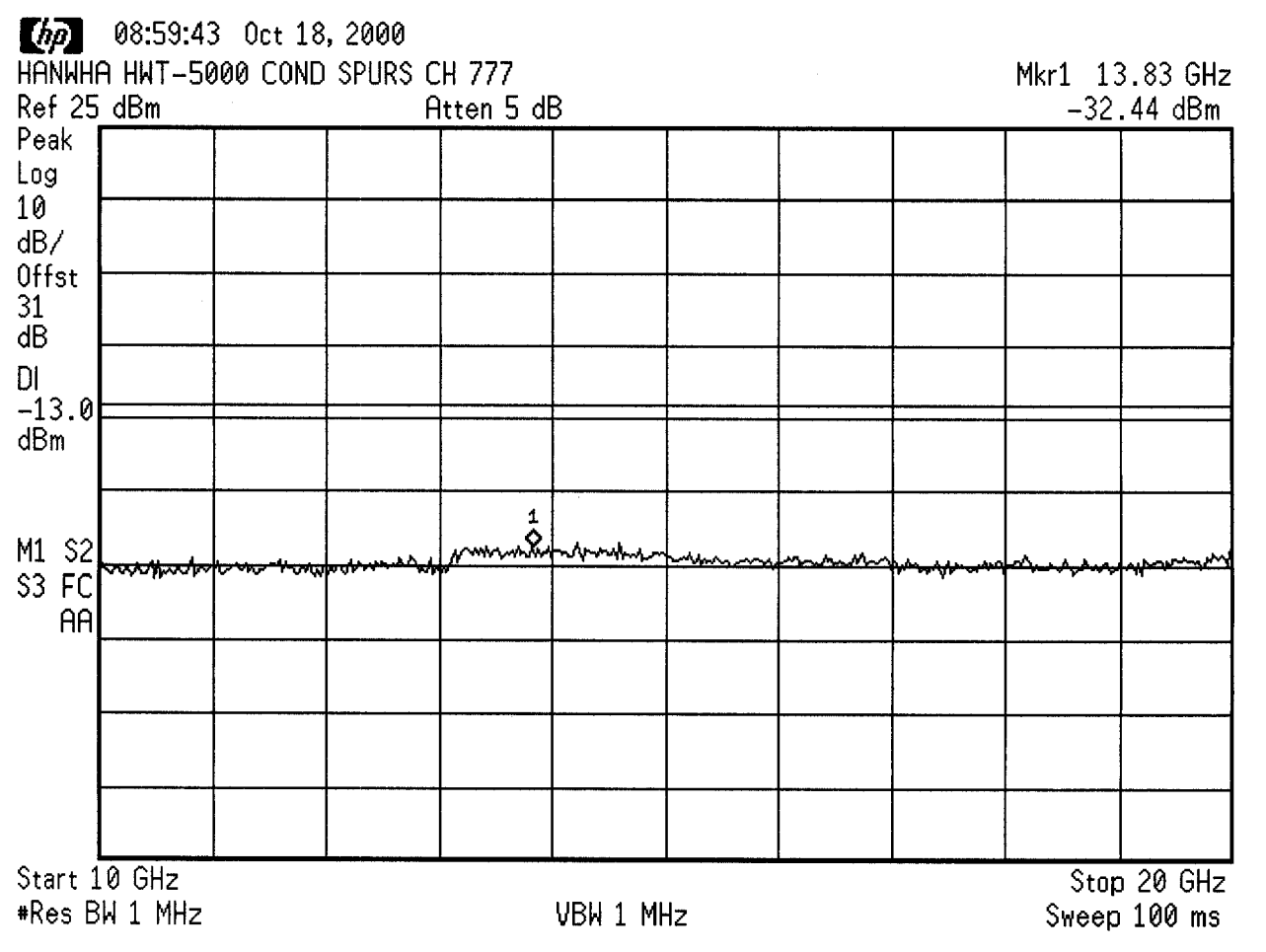

08:57:20 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 363
Mkr1 1.672 GHz
Ref 25 dBm
Atten 5 dB
-28.55 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms

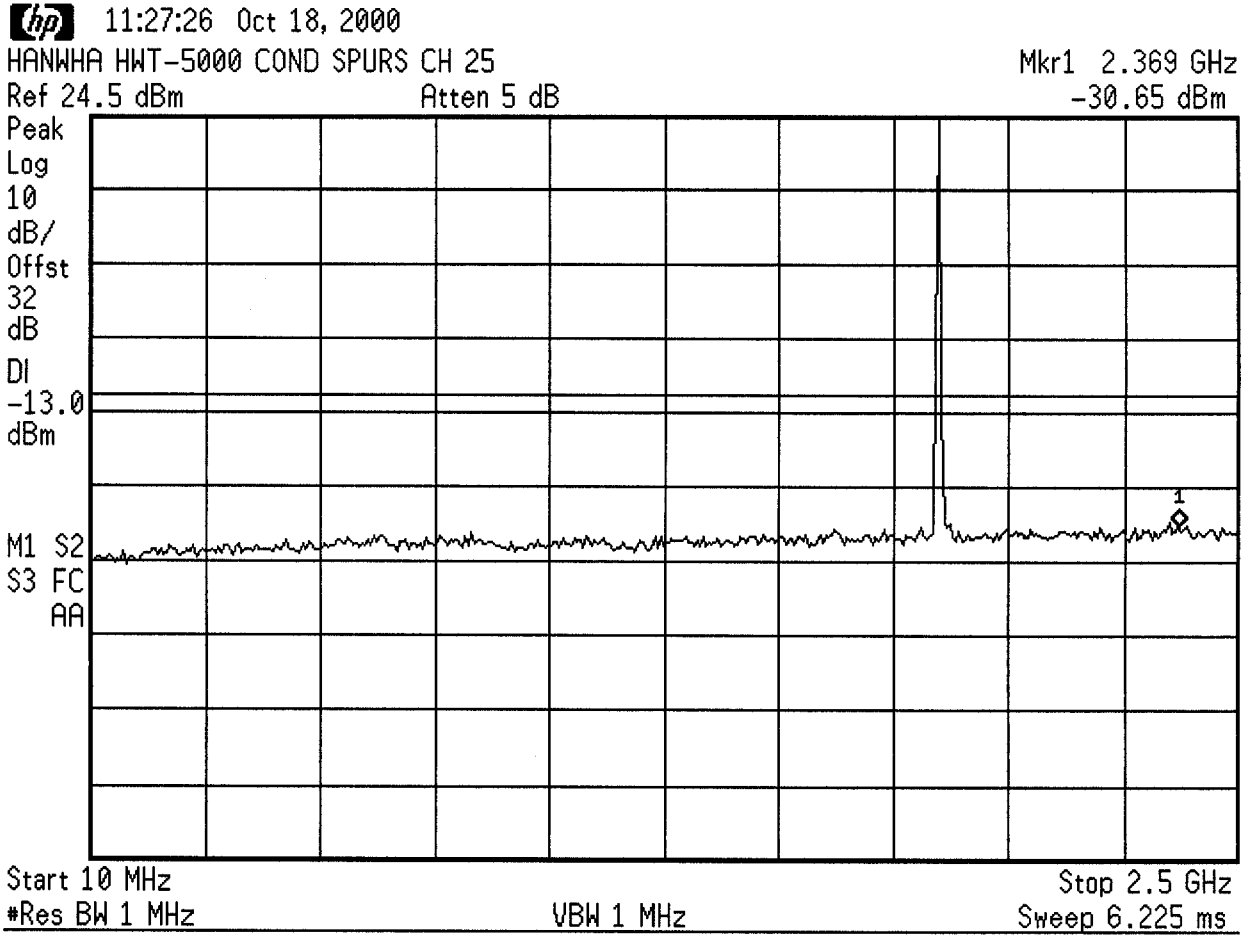

08:57:41 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 363
Ref 25 dBm
Atten 5 dB
Mkr1 2.988 GHz
-32.9 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms

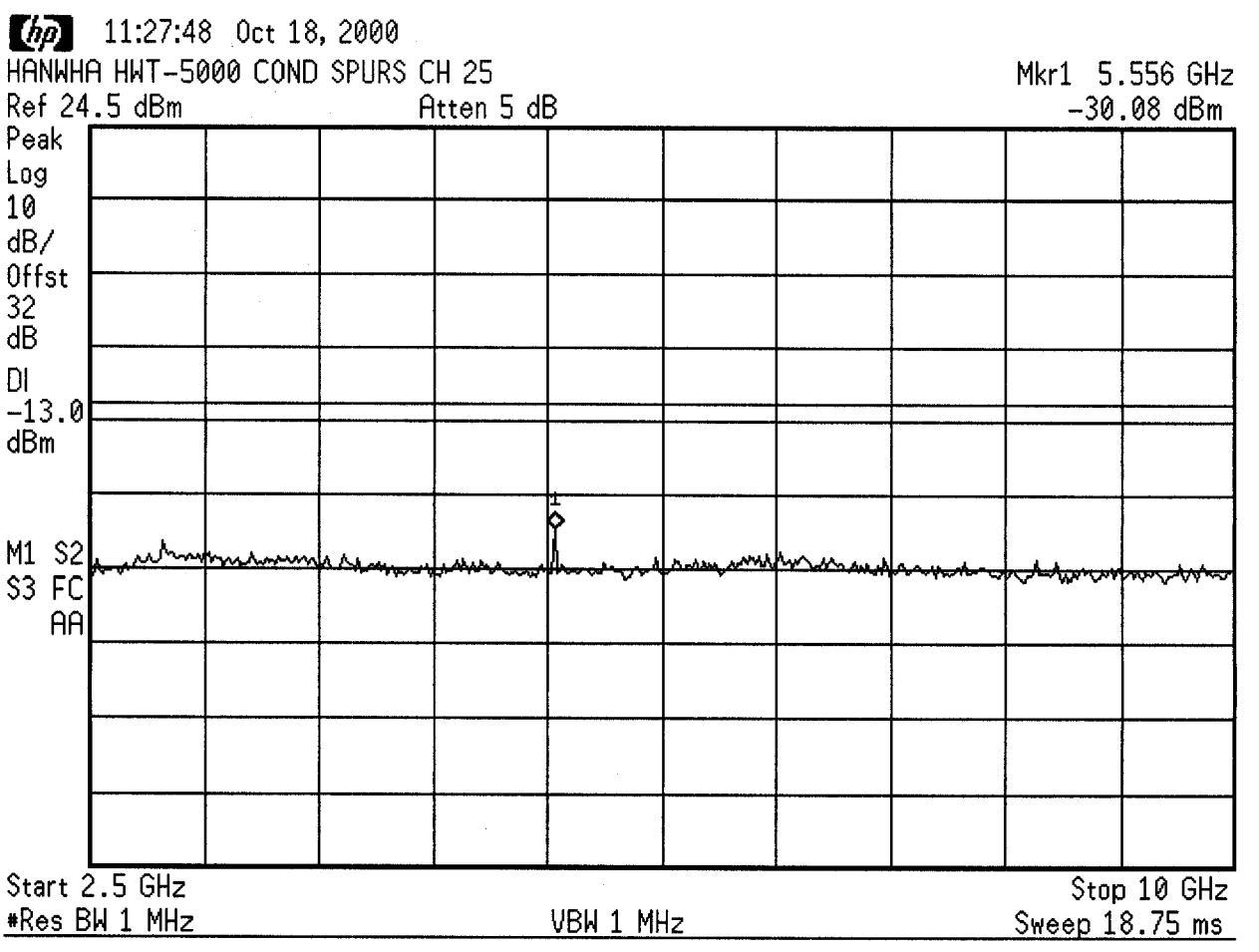

08:57:58 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 363
Ref 25 dBm
Atten 5 dB
Mkr1 13.33 GHz
-32.01 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms

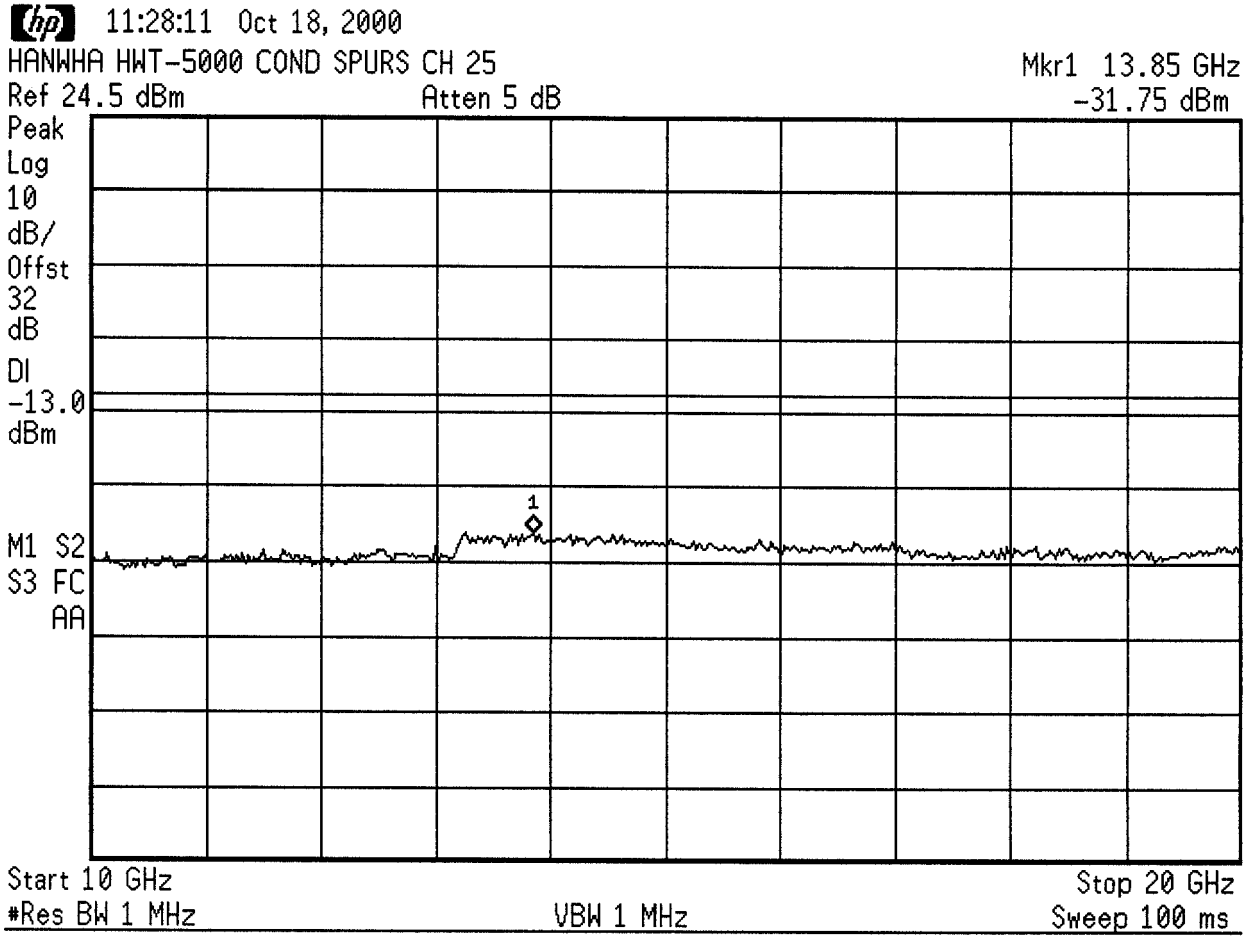

08:58:38 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 777
Mkr1 2.369 GHz
Ref 25 dBm
Atten 5 dB
-30.89 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
Stop 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 6.225 ms

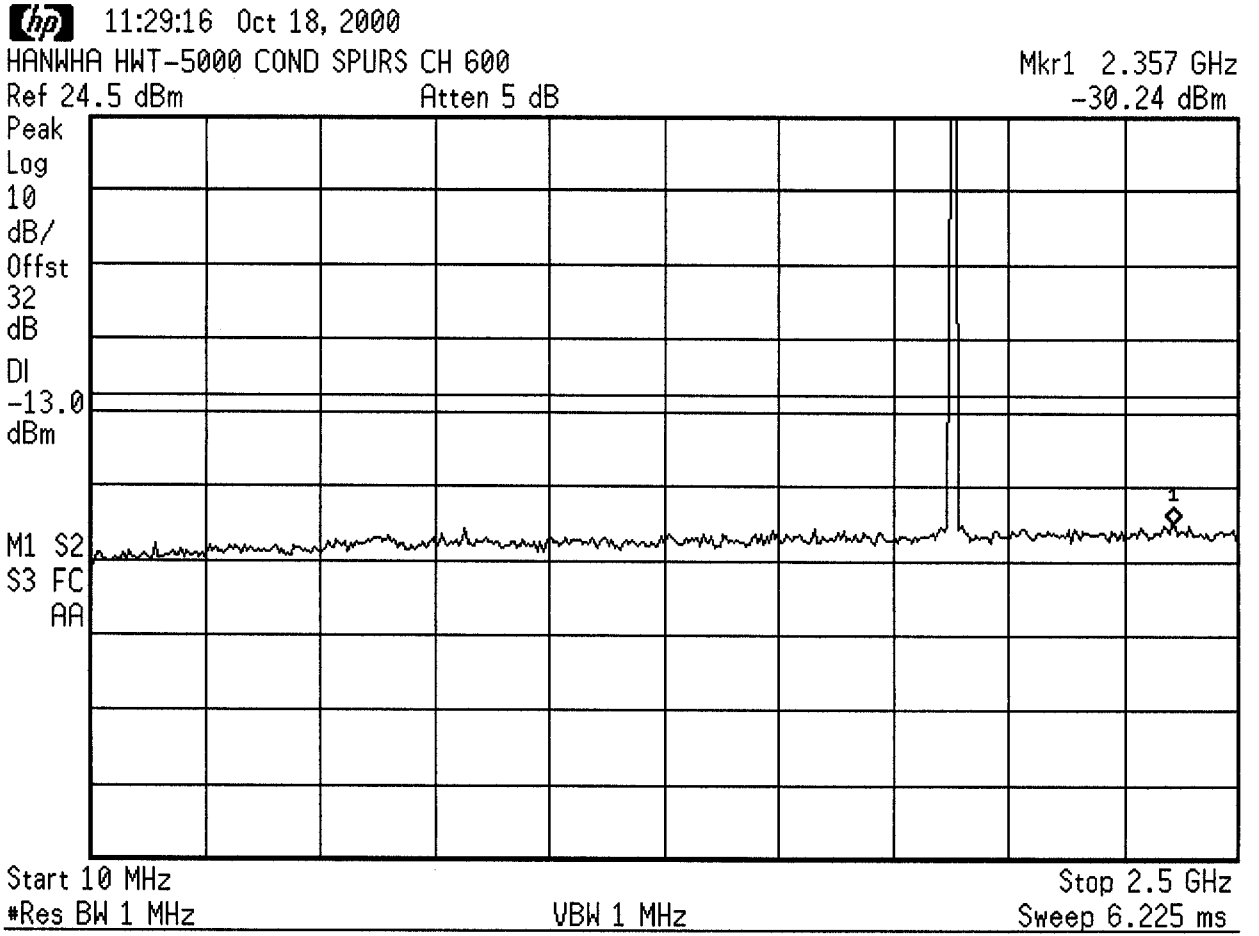

08:59:22 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 777
Ref 25 dBm
Atten 5 dB
Mkr1 2.988 GHz
-31.56 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms

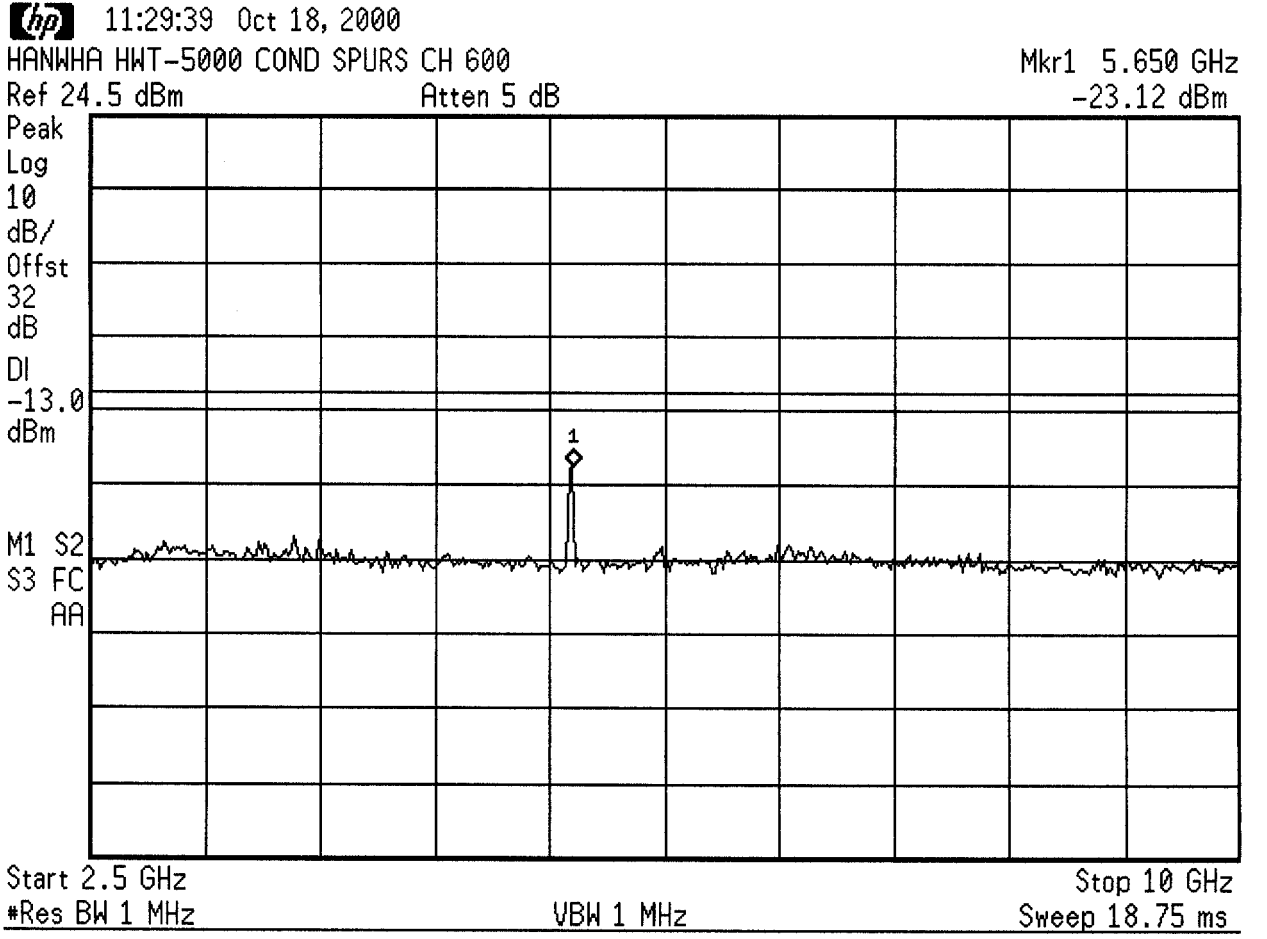

08:59:43 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 777
Mkr1 13.83 GHz
Ref 25 dBm
Atten 5 dB
-32.44 dBm
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
Stop 20 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 100 ms

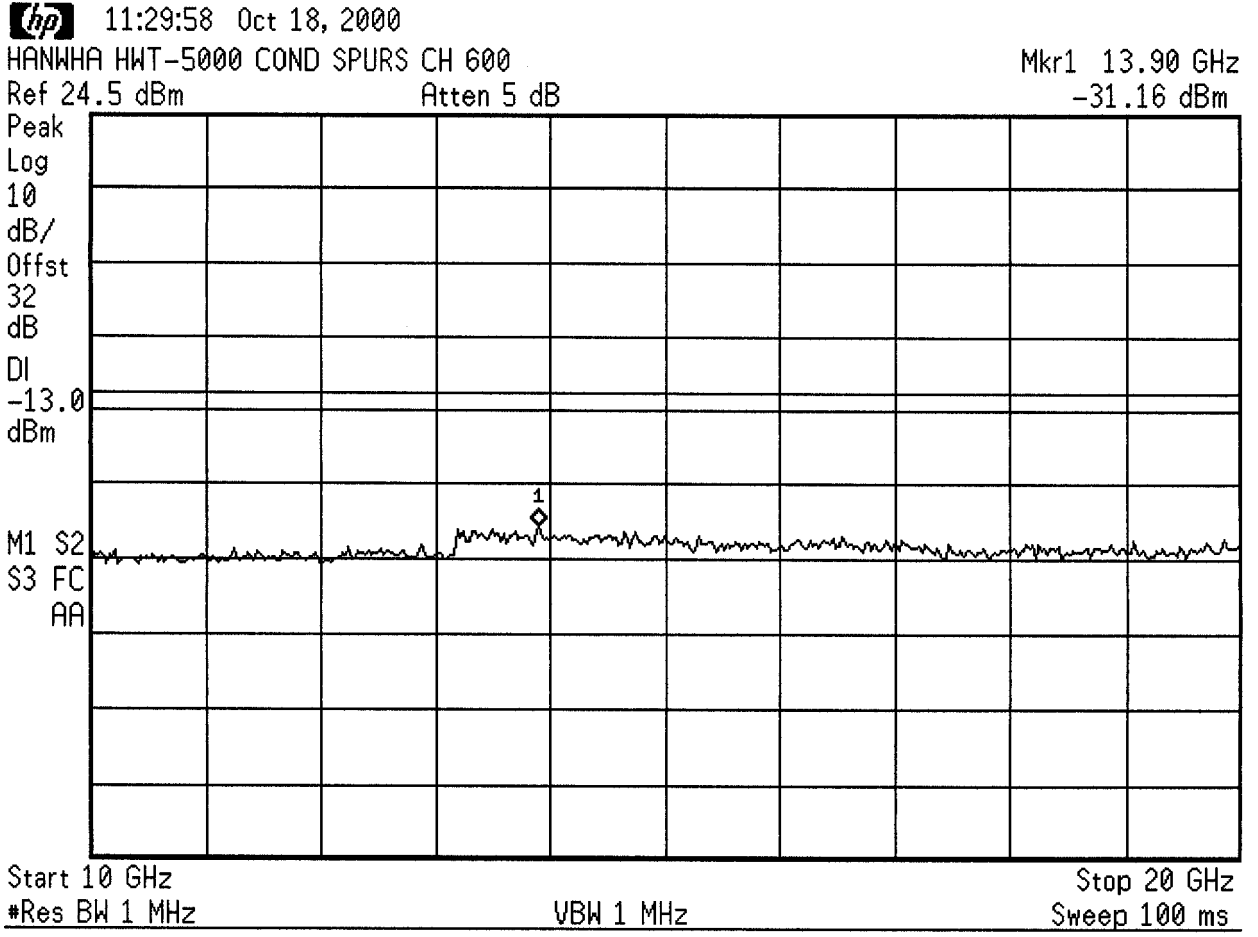

11:27:26 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 25
Mkr1 2.369 GHz
Ref 24.5 dBm
Atten 5 dB
-30.65 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
Stop 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 6.225 ms

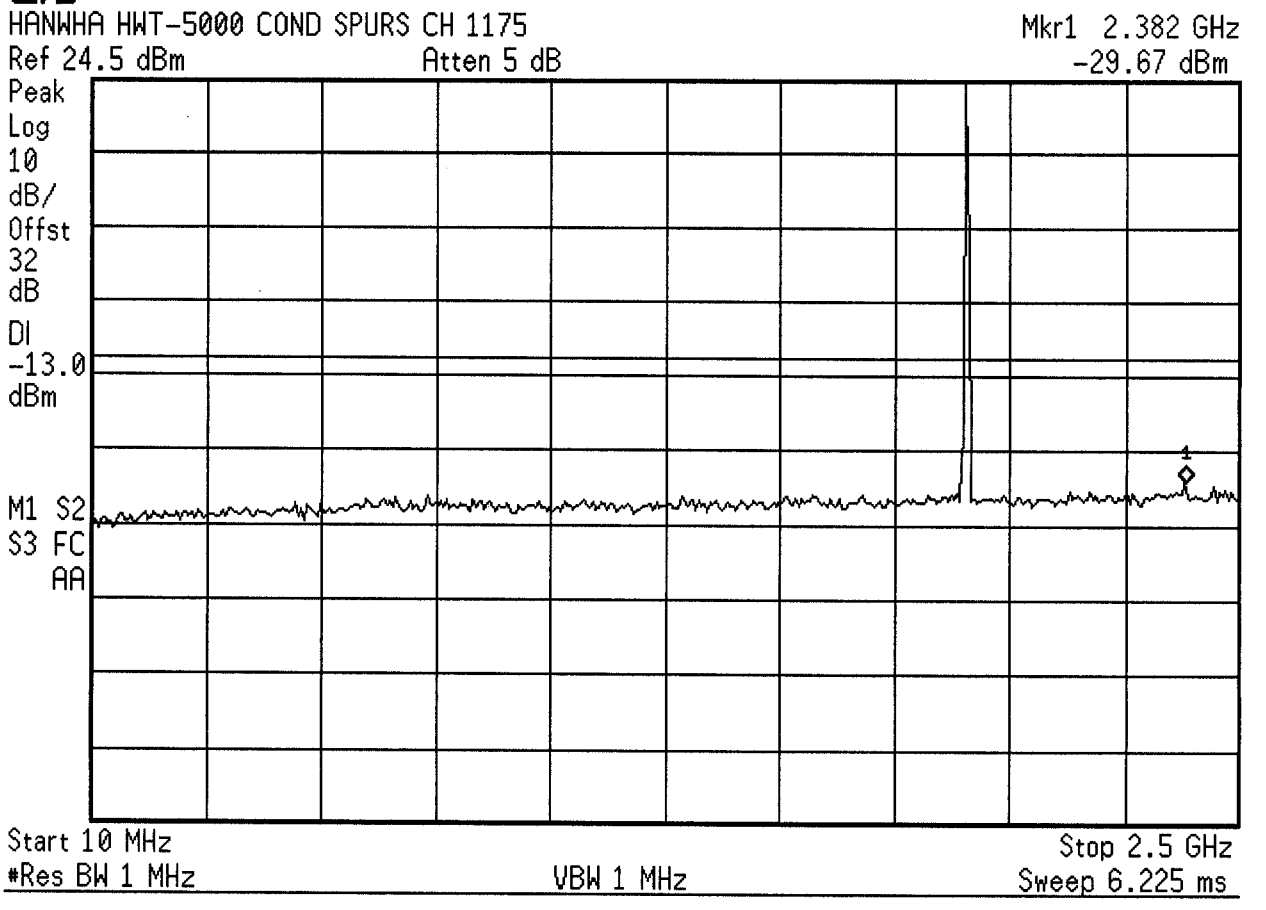

11:27:48 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 25
Mkr1 5.556 GHz
Ref 24.5 dBm
Atten 5 dB
-30.08 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 2.5 GHz
Stop 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 18.75 ms

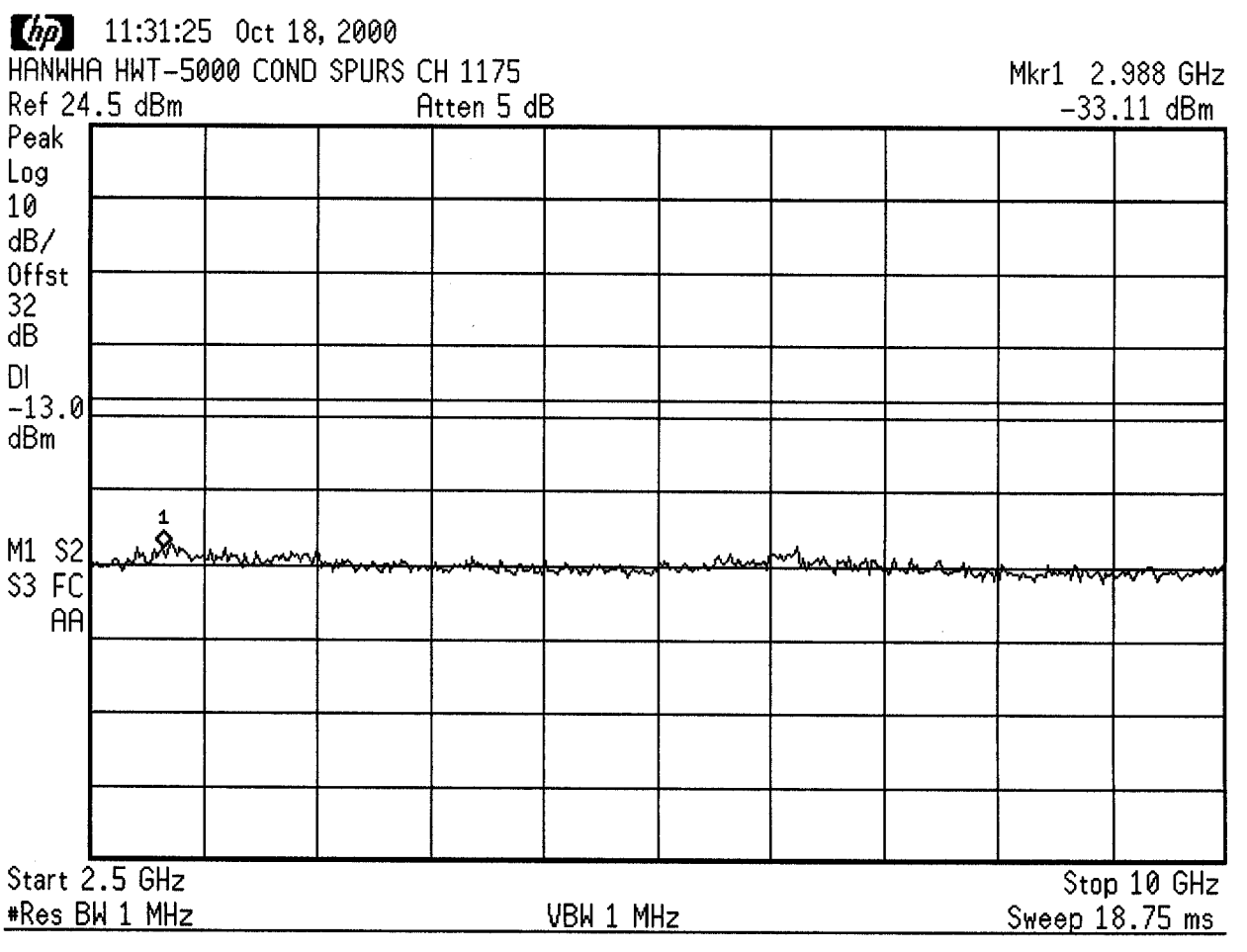

11:28:11 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 25
Ref 24.5 dBm
Atten 5 dB
Mkr1 13.85 GHz
-31.75 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms

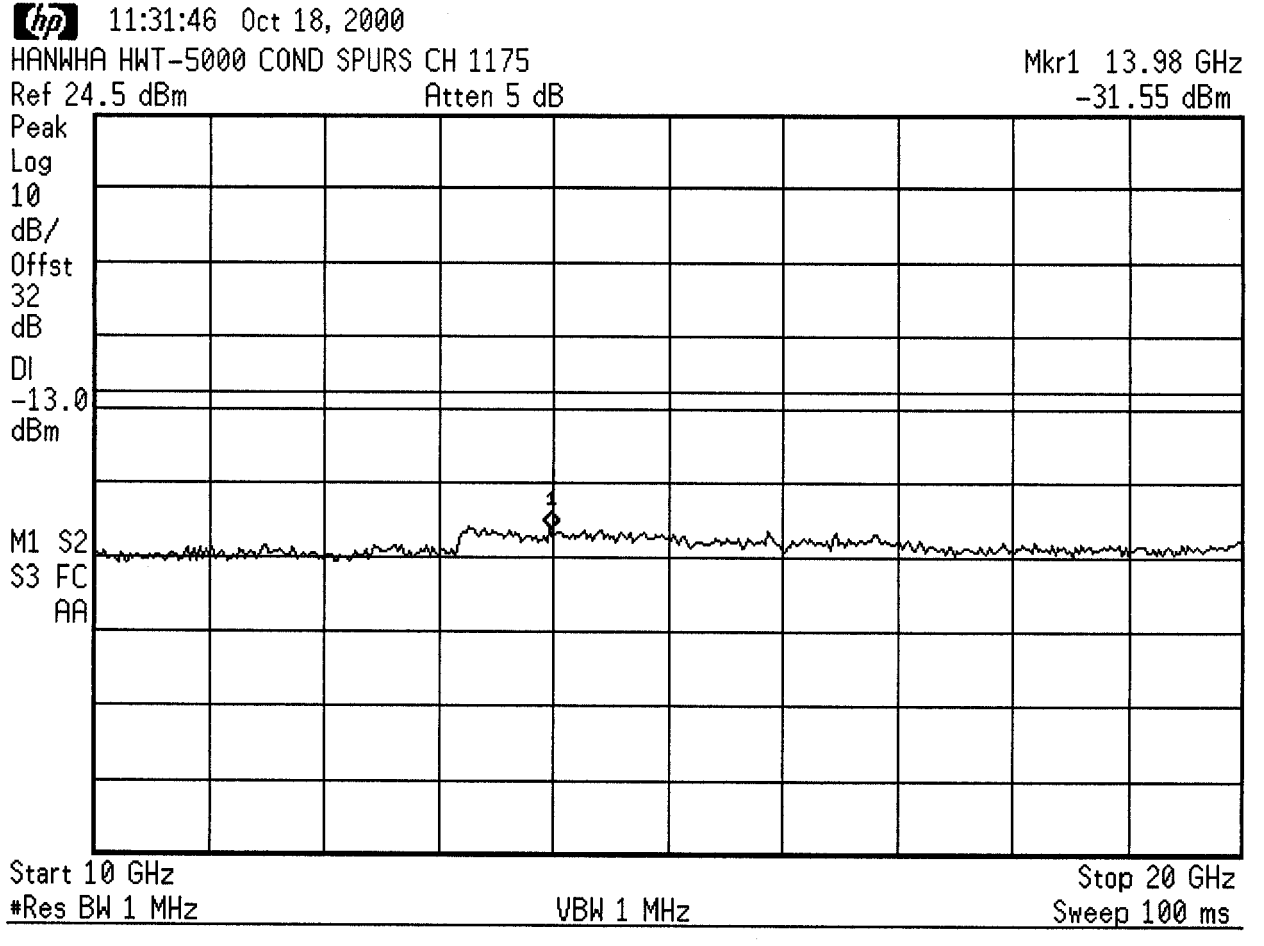

11:29:16 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 600
Mkr1 2.357 GHz
Ref 24.5 dBm
Atten 5 dB
-30.24 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
Stop 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 6.225 ms

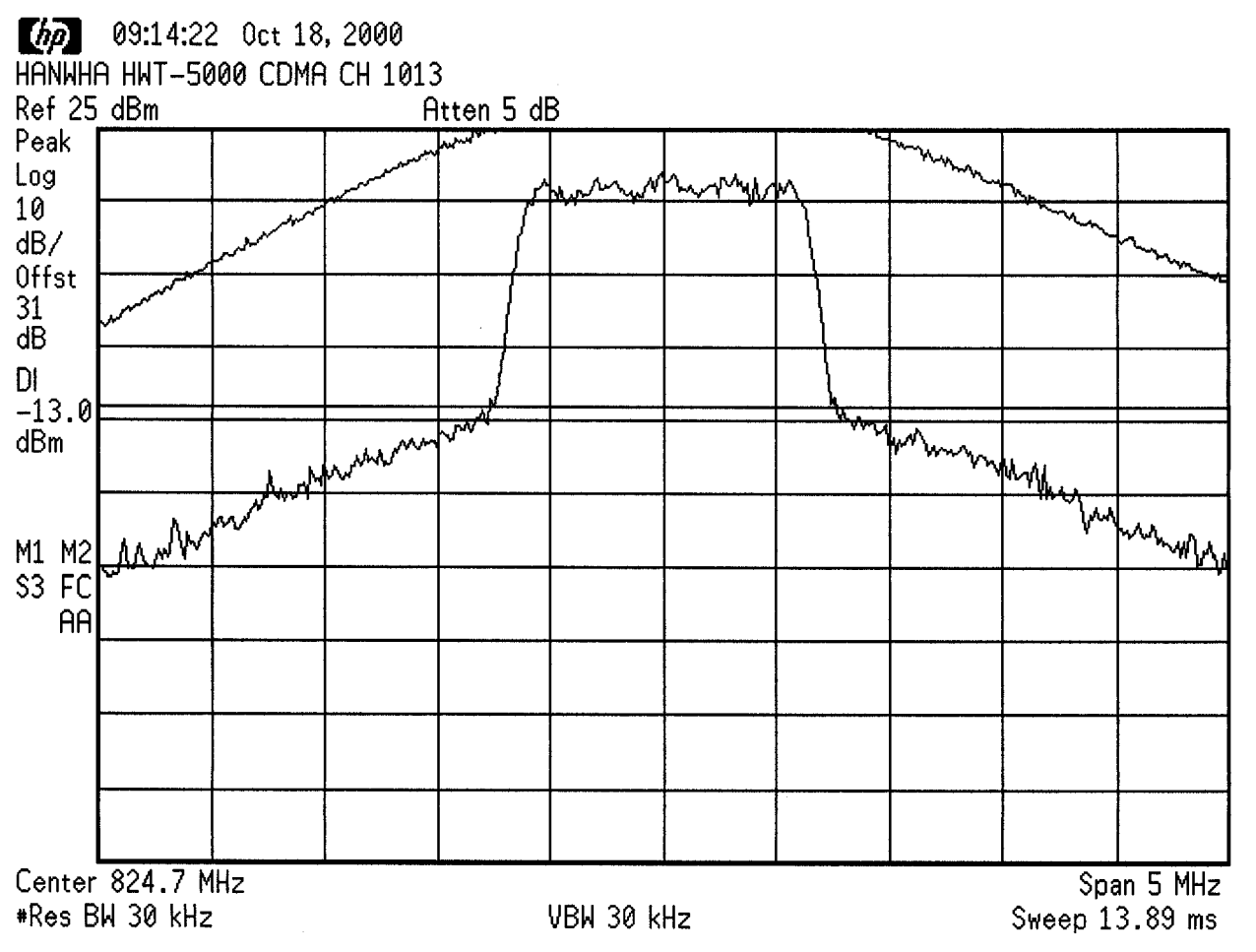

11:29:39 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 600
Mkr1 5.650 GHz
Ref 24.5 dBm
Atten 5 dB
-23.12 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
Stop 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 18.75 ms

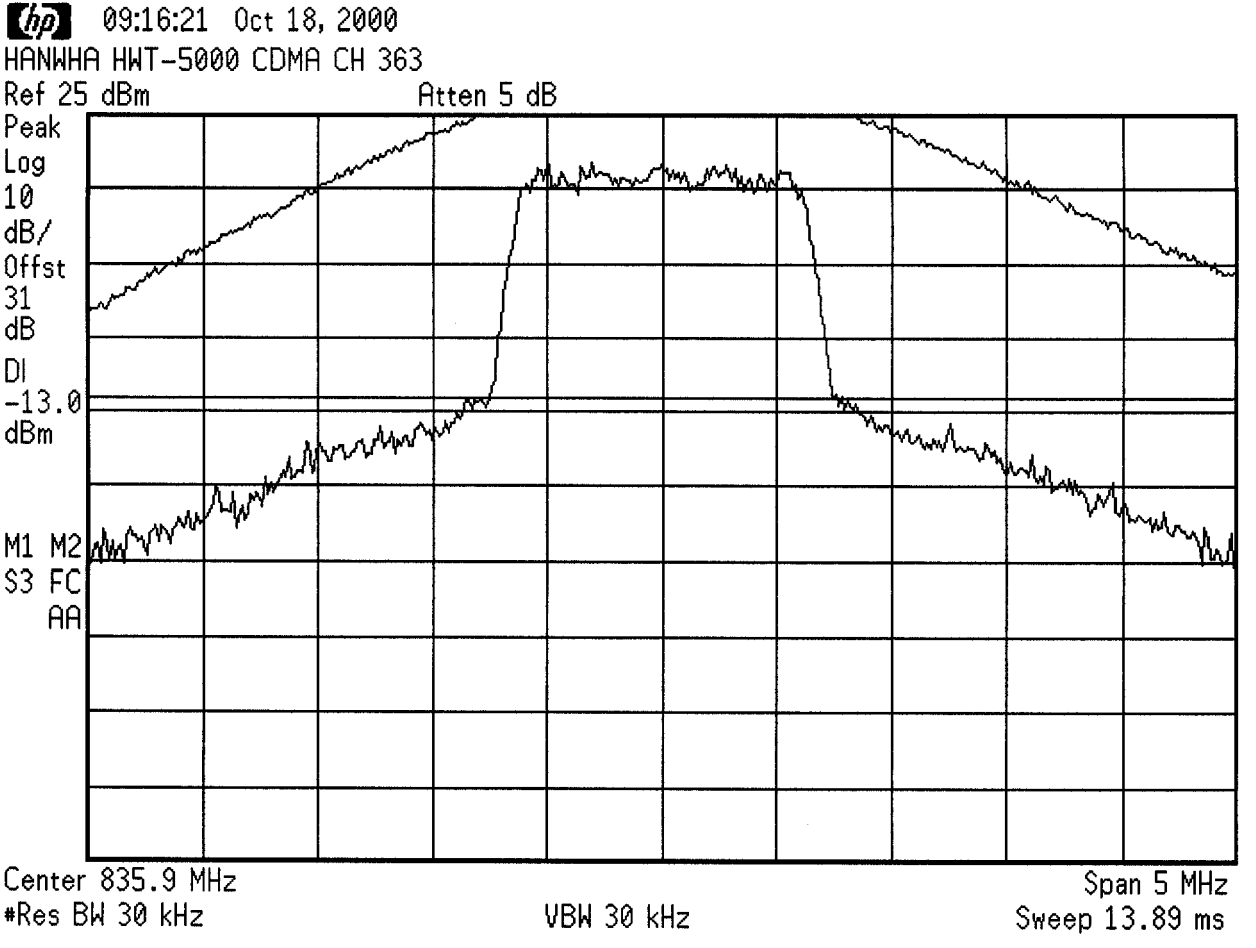

11:29:58 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 600
Mkr1 13.90 GHz
Ref 24.5 dBm
Atten 5 dB
-31.16 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
Stop 20 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 100 ms

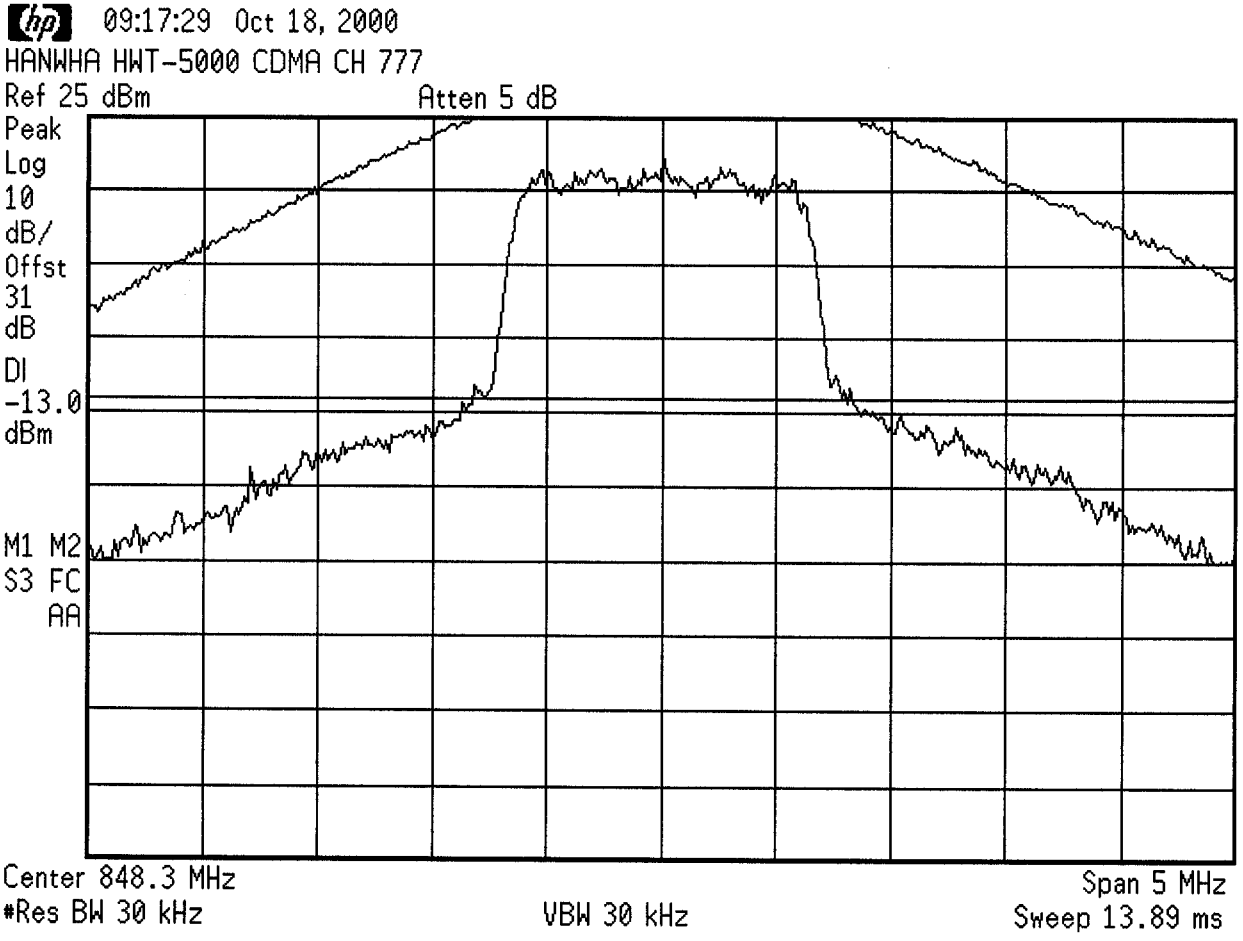

11:30:55 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 1175
Ref 24.5 dBm
Atten 5 dB
Mkr1 2.382 GHz
-29.67 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms

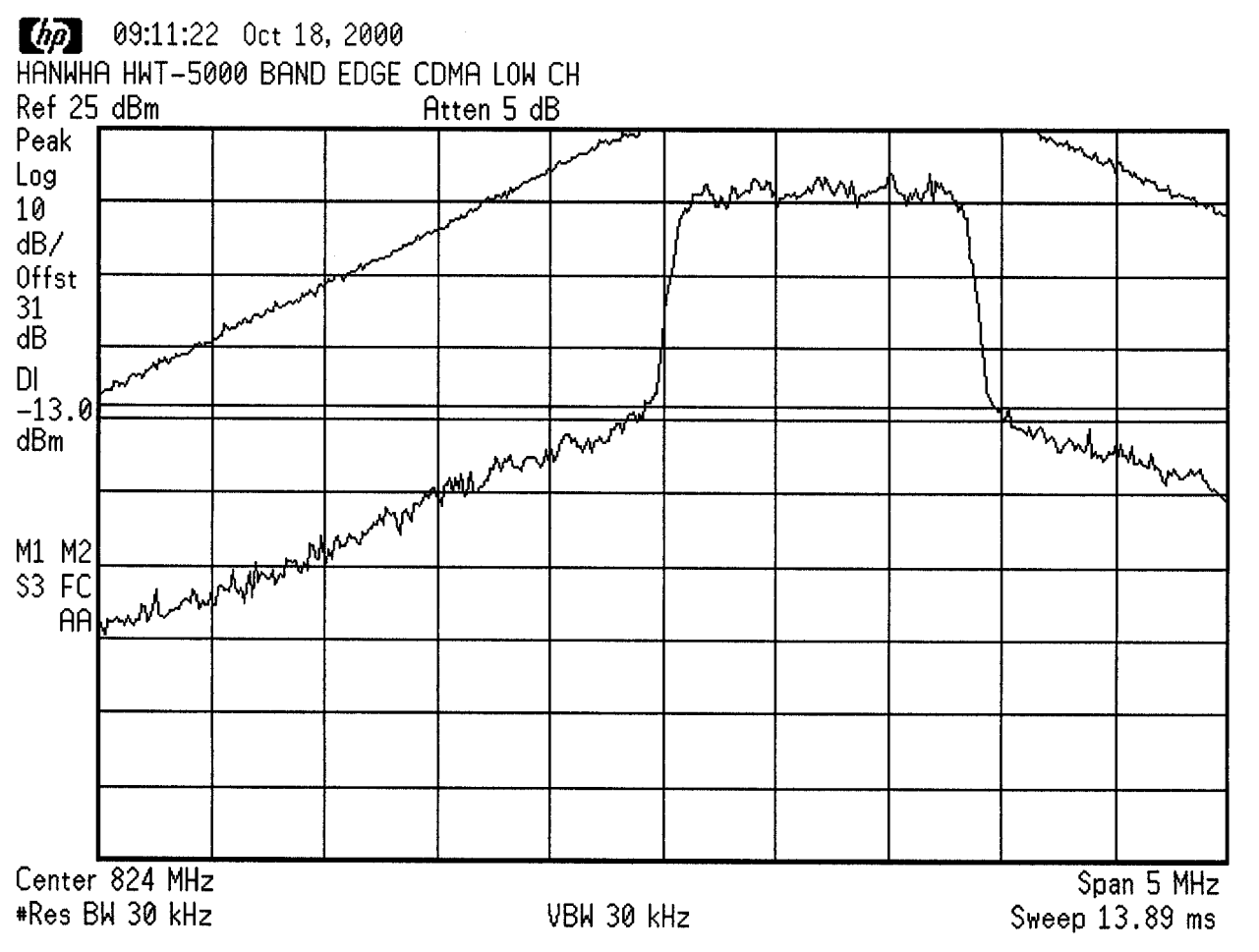

11:31:25 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 1175
Ref 24.5 dBm
Atten 5 dB
Mkr1 2.988 GHz
-33.11 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms

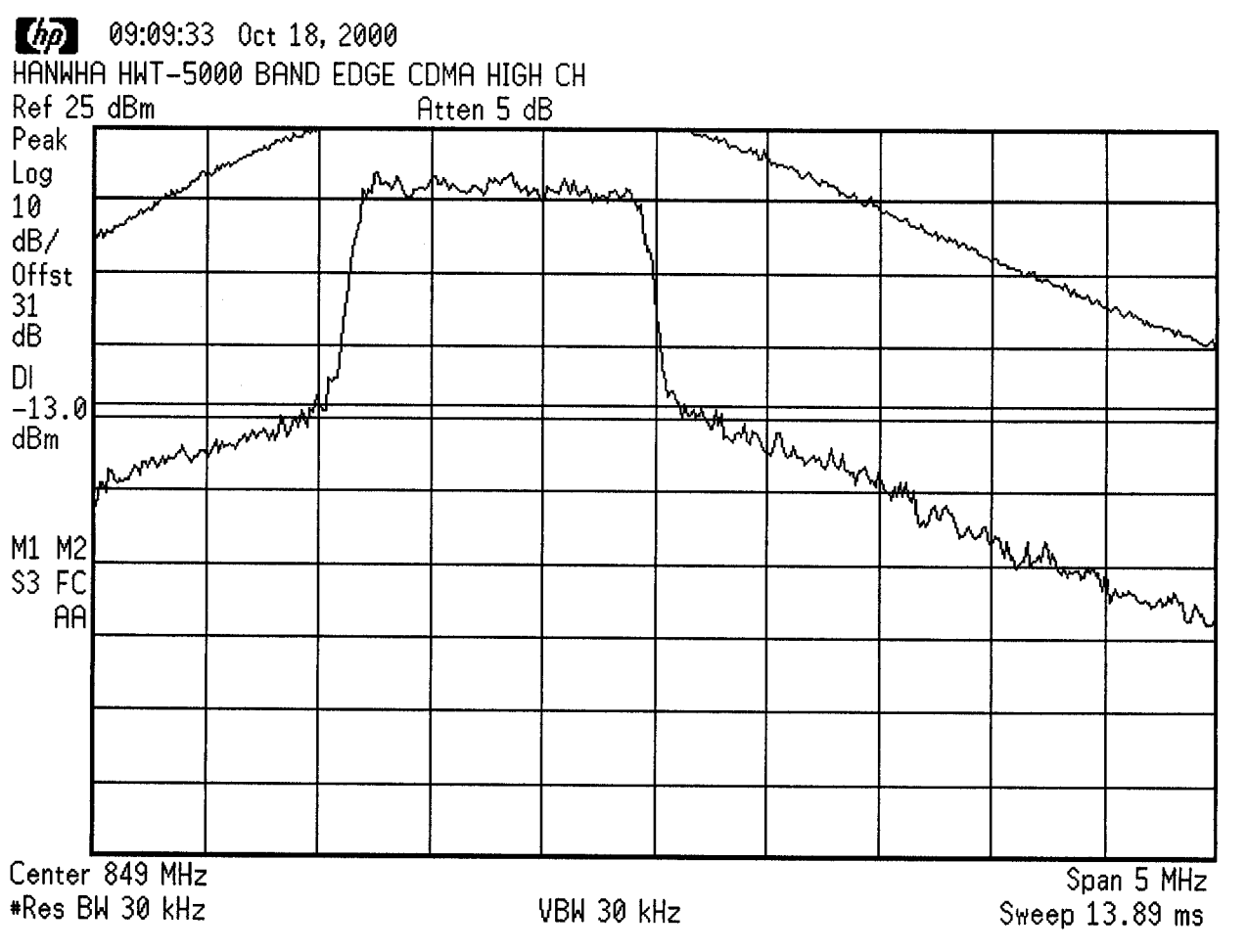

11:31:46 Oct 18, 2000
HANWHA HWT-5000 COND SPURS CH 1175
Mkr1 13.98 GHz
Ref 24.5 dBm
Atten 5 dB
-31.55 dBm
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
Stop 20 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 100 ms

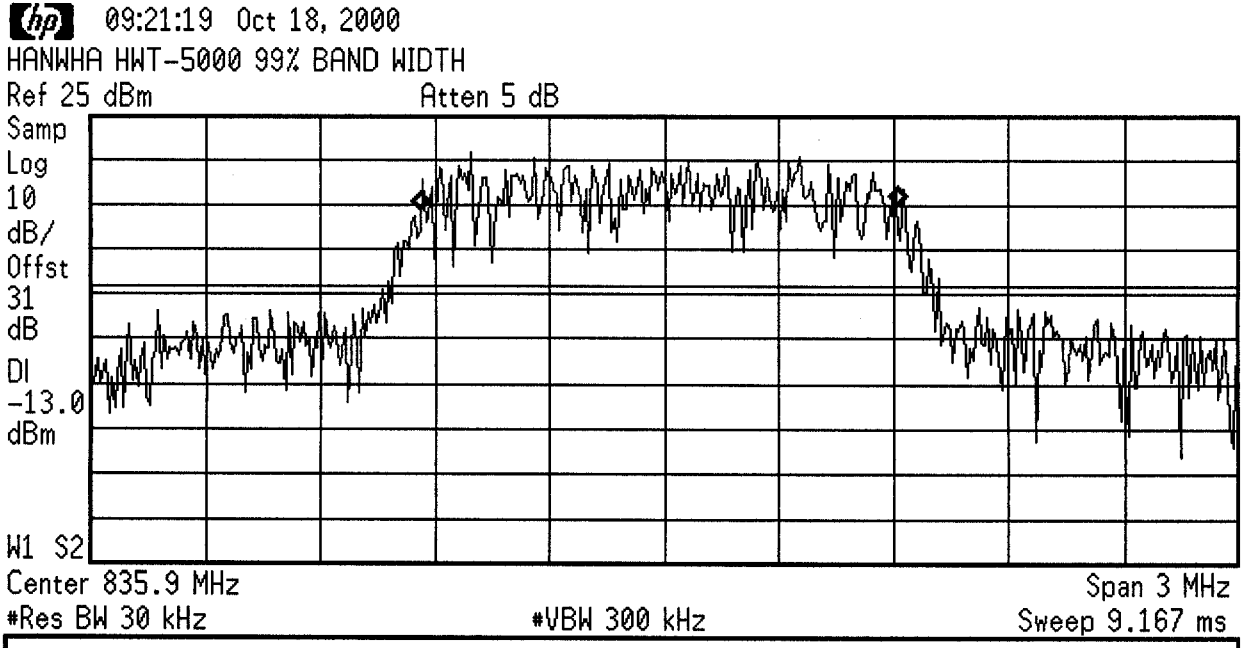

09:14:22 Oct 18, 2000
HANWHA HWT-5000 CDMA CH 1013
Ref 25 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 824.7 MHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms


09:16:21 Oct 18, 2000
HANWHA HWT-5000 CDMA CH 363
Ref 25 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 835.9 MHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms


09:17:29 Oct 18, 2000
HANWHA HWT-5000 CDMA CH 777
Ref 25 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 848.3 MHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms


09:11:22 Oct 18, 2000
HANWHA HWT-5000 BAND EDGE CDMA LOW CH
Ref 25 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 824 MHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms


09:09:33 Oct 18, 2000
HANWHA HWT-5000 BAND EDGE CDMA HIGH CH
Ref 25 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
31
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 849 MHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms



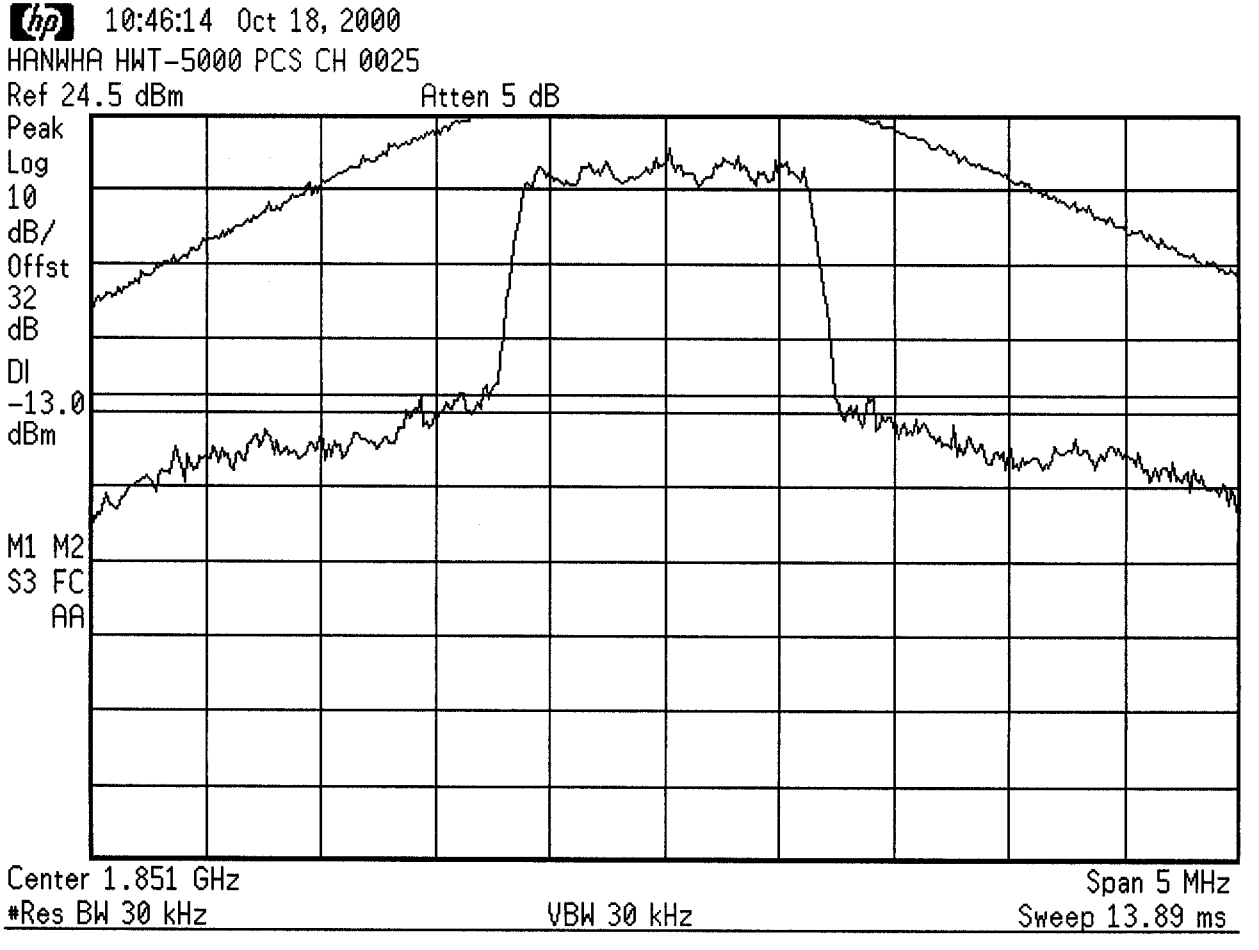

Occupied Bandwidth Results (measuring..)

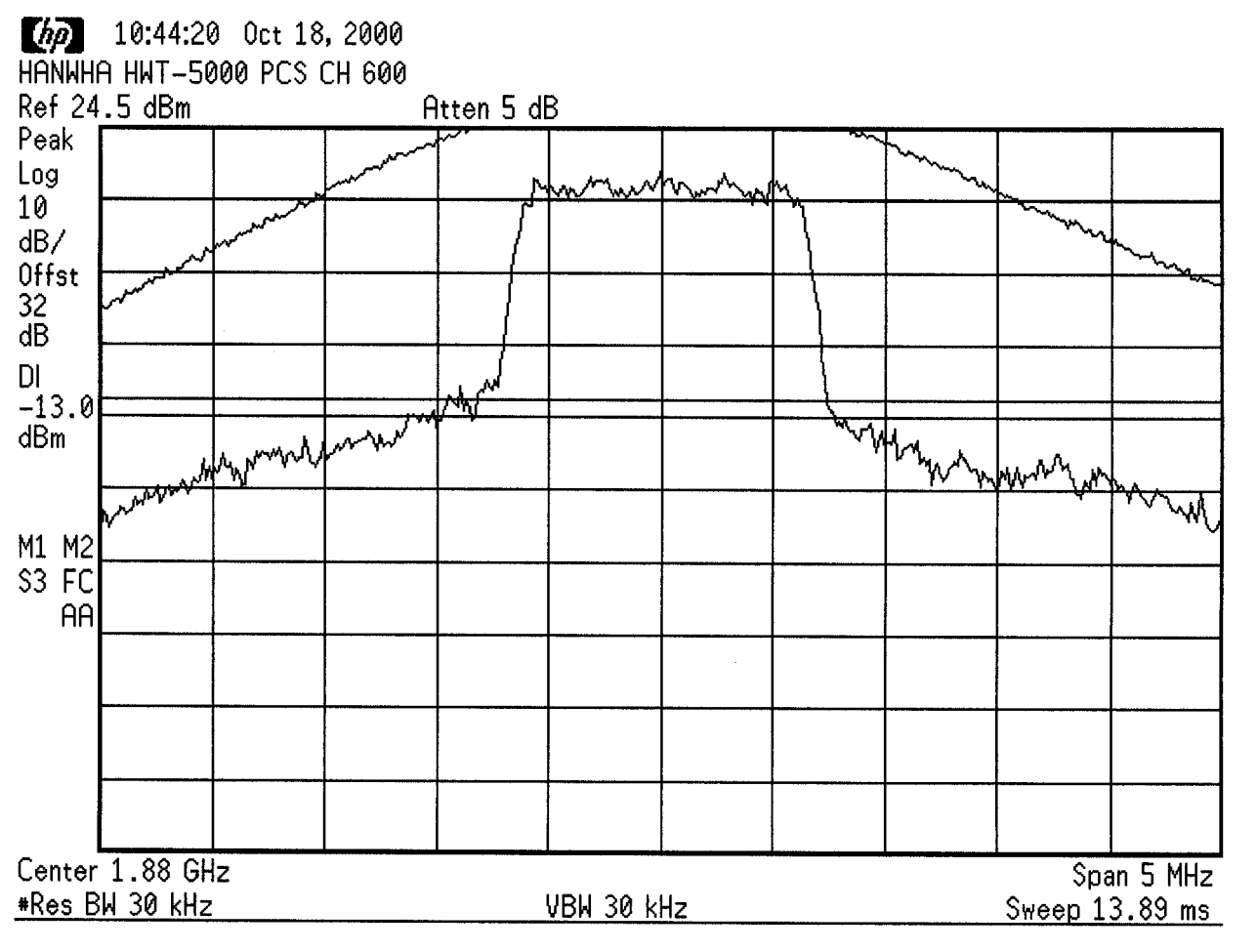
Occupied Bandwidth

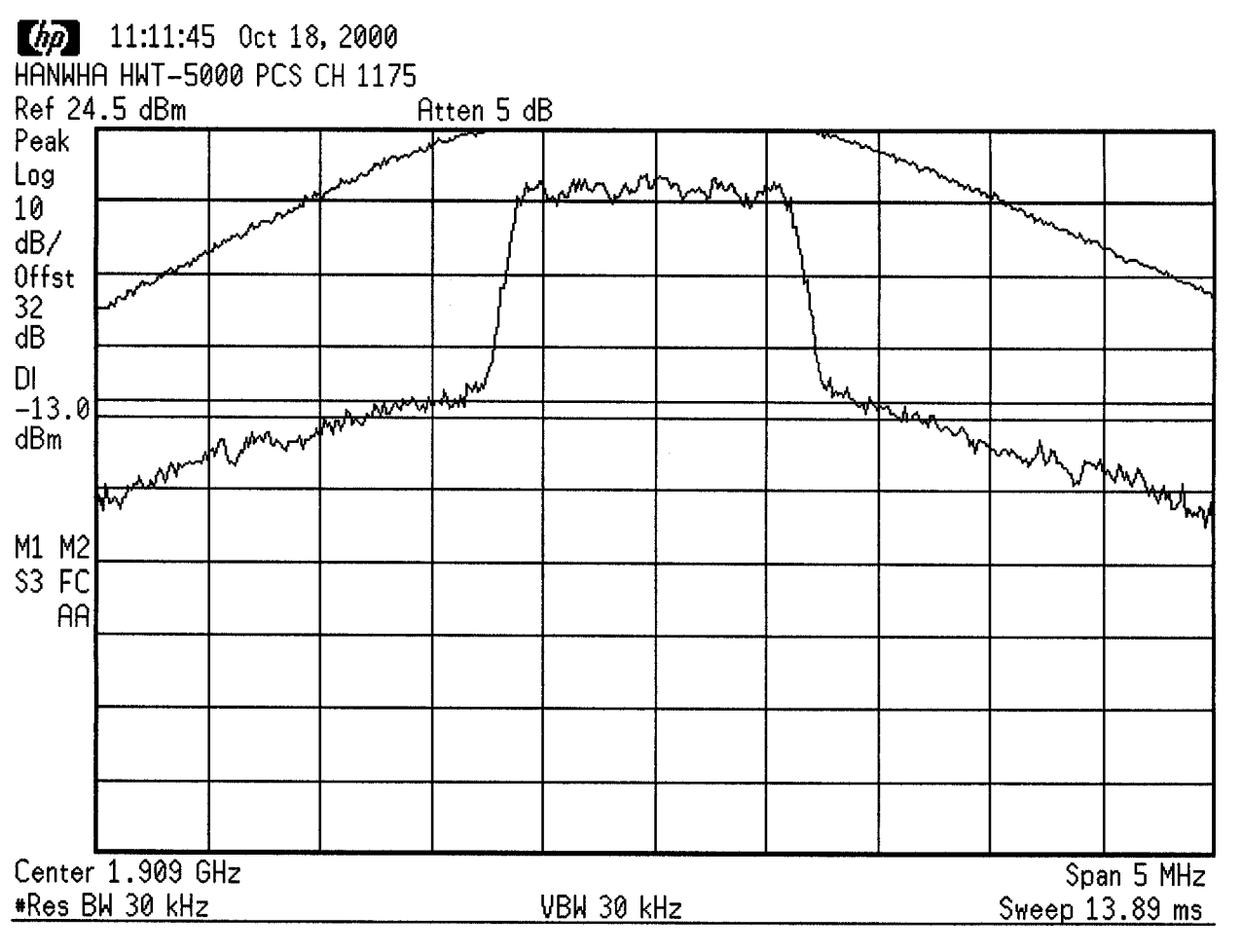
1.252 MHz

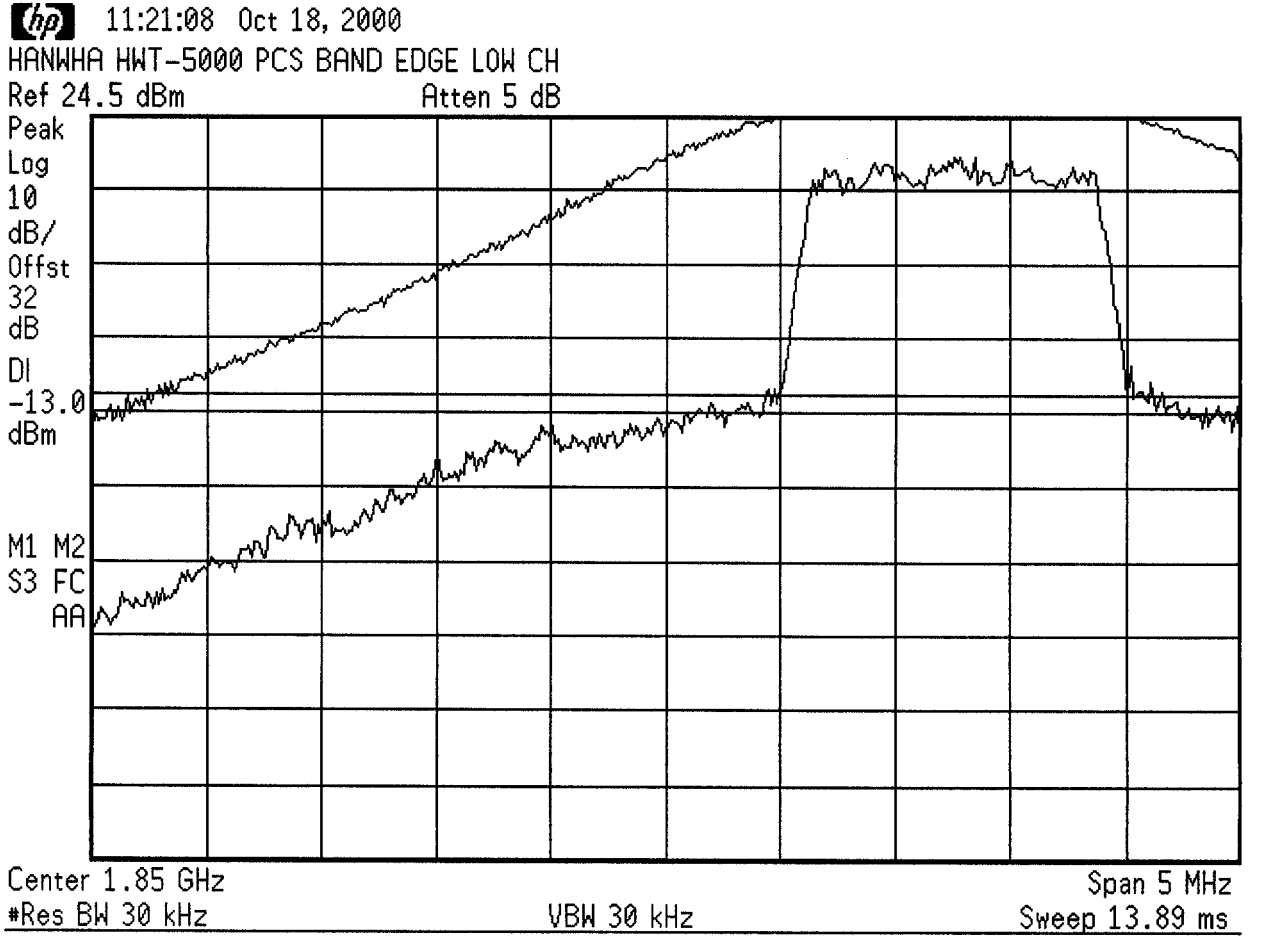
**Occ BW % Pwr** 99.00 %

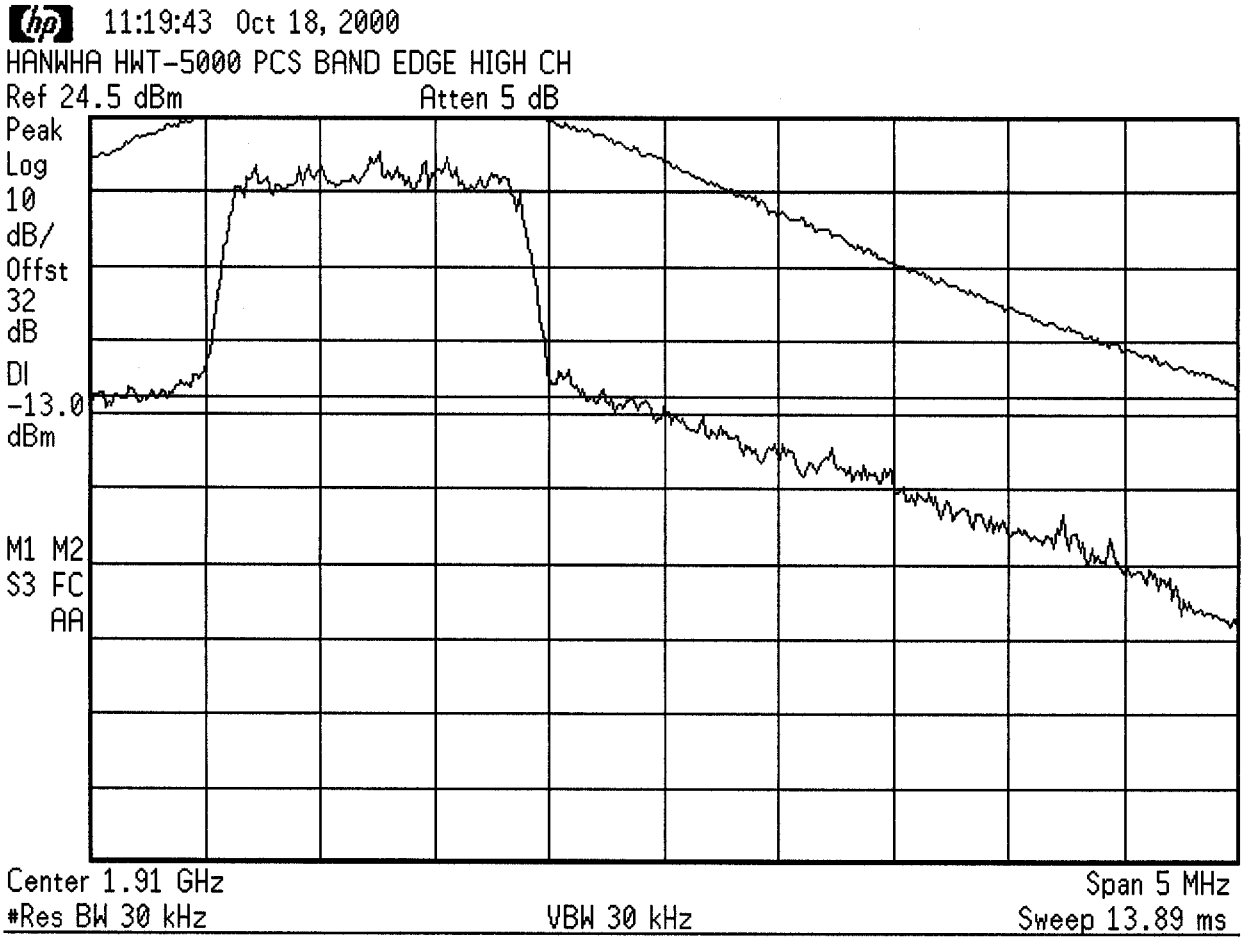
**Transmit Freq Error** -9.916 kHz

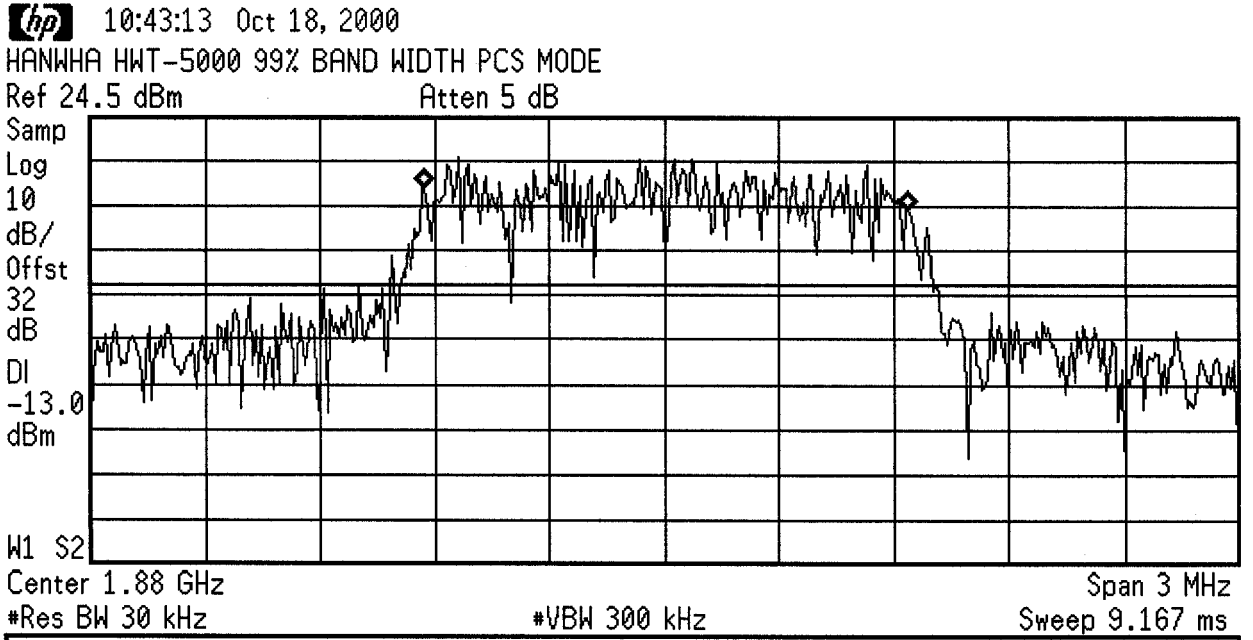

10:46:14 Oct 18, 2000
HANWHA HWT-5000 PCS CH 0025
Ref 24.5 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 1.851 GHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms


10:44:20 Oct 18, 2000
HANWHA HWT-5000 PCS CH 600
Ref 24.5 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 1.88 GHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms


11:11:45 Oct 18, 2000
HANWHA HWT-5000 PCS CH 1175
Ref 24.5 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 1.909 GHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms


11:21:08 Oct 18, 2000
HANWHA HWT-5000 PCS BAND EDGE LOW CH
Ref 24.5 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 1.85 GHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms


11:19:43 Oct 18, 2000
HANWHA HWT-5000 PCS BAND EDGE HIGH CH
Ref 24.5 dBm
Atten 5 dB
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 M2
S3 FC
AA
Center 1.91 GHz
#Res BW 30 kHz
VBW 30 kHz
Span 5 MHz
Sweep 13.89 ms




Occupied Bandwidth Results (measuring..)

## Occupied Bandwidth

**1.270 MHz**

**Occ BW % Pwr** 99.00 %

**Transmit Freq Error** 5.374 kHz