CERTIFICATE OF COMPLIANCE
FCC PART 22 CERTIFICATION

Test Lab:

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Applicant Name:

SK TELETECH CO., LTD.
267, 5-Ga, Namdaemunno
Chung-Gu, Seoul, Korea 100-095
Attn: Mr. Sang-Seok Oh

FCC Classification:	**Licensed Non-Broadcast Transmitter Held to Ear (TNE)**
FCC Rule Part(s):	**§22, §2**
FCC ID:	**OL6IM-2000**
Model(s):	**IM-2000**
Equipment Type:	**Single-Mode CDMA Cellular Phone**
Tx Frequency Range:	**824.70 - 848.31 MHz**
Rx Frequency Range:	**869.70 - 893.31 MHz**
Max. RF Output Power:	**0.275 Watts (ERP)**
Frequency Tolerance:	**2.5 PPM**
Emission Designator:	**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 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:

SK TELETECH CO., LTD.
267, 5-Ga, Namdaemunno
Chung-Gu, Seoul, Korea 100-095
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FCC ID	**OL6IM-2000**
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EUT Type	**Single-Mode CDMA Cellular Phone**
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Tx Freq. Range	**824.70 - 848.31 MHz**
Rx Freq. Range	**869.70 - 893.31 MHz**
Emission Designator	**1M25F9W**
Modulation	**CDMA**
Battery Type(s)	**3.7V Li-ion Standard or 3.6V Li-ion Slim**

2.1 MEASUREMENT PROCEDURES

2.2 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.

2.3 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.

2.4 RADIATED SPURIOUS AND HARMONIC 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 connected to a dummy load in normal operation using the intended power source. 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.

2.5 FREQUENCY STABILITY/TEMPERATURE VARIATION - §2.1055

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 room temperature. A minimum period of one and one half-hour is provided to allow stabilization of the equipment at each temperature level.

3.1 TEST DATA

3.2 EFFECTIVE RADIATED POWER OUTPUT - §2.1046

CDMA MODE

Frequency Tuned (MHz)	EUT Conducted Power (dBm)	Max. Field Strength of EUT (antenna extended) (dBm)		Dipole Gain (dBd)	Dipole Forward Conducted Power (dBm)	ERP of EUT Dipole Gain + Dipole Forward Conducted Power (dBm)
		V	H			
824.70	23.2	- 19.25	- 18.19	- 1.44	24.32	22.88
835.89	23.2	- 18.56	- 17.00	- 1.34	25.01	23.67
848.31	23.2	- 19.01	- 17.60	- 1.24	25.63	24.39
848.31	23.2	-19.51	-18.10	- 1.24	25.13	23.89*

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 slim battery except for * using the standard battery.

3.3 FIELD STRENGTH OF SPURIOUS RADIATION – §2.1053

Operating Frequency:	824.70 MHz
Channel:	1013
Measured Conducted Power:	23.2 dBm
Modulation:	CDMA (Internal)
Distance:	3 meters
Limit:	$43 + 10 \log_{10}$ (W) = 37.48 dBc

Frequency (MHz)	**Level** (dBm)	**AFCL** (dB)	**POL** (H/V)	**ERP** (dBm)	(dBc)
1649.40	≤ - 46.00	28.96	H	- 4.92	28.12
2474.10	≤ - 56.50	28.26	H	- 15.42	38.62
3298.80	≤ - 64.48	28.96	H	- 23.40	46.6
4123.50	≤ - 72.10	28.96	H	- 31.02	54.22
4948.20	≤ - 100				

Notes:

1. The bandwidth is set per §22.917 (RBW = 1MHz, VBW = 1MHz).
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 ERP is calculated using the formula.
   ERP (dBm) $= 10 \text{ Log}_{10} (((r(\text{mV/m})/1 \times 10^6)^2 / 49.2/1 \times 10^{-3})$
   ERP (dBm) $= 10 \text{ Log}_{10} [(3 \times FS/1 \times 10^6)^2 / (49.2) \times 1000]$
   ERP (Watts) $= \{(3 \times FS)/1 \times 10^6\}^2 / 49.2$
   Note: The antenna factor and cable loss were determined prior to the test.

Operating Frequency:	835.89 MHz
Channel:	363
Measured Conducted Power:	23.2 dBm
Modulation:	CDMA (Internal)
Distance:	3 meters
Limit:	43 + 10 $\log_{10}$ (W) = 37.48 dBc

Frequency (MHz)	**Level** (dBm)	**AFCL** (dB)	**POL** (H/V)	**ERP** (dBm)	(dBc)
1671.78	$\leq$ - 47.00	28.55	H	- 6.33	29.53
2507.67	$\leq$ - 61.00	28.55	H	- 20.33	43.53
3343.56	$\leq$ - 78.55	28.55	H	- 37.88	61.08
4179.45	$\leq$ - 86.30	28.55	H	- 45.63	68.83
5015.34	< - 100				

Notes:

1. The bandwidth is set per §22.917 (RBW = 1MHz, VBW = 1MHz).
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 ERP is calculated using the formula:
   ERP (dBm) = 10 Log_{10} (((r(mV/m)/1 x 10^6)^2 / 49.2/1 x 10^{-3})
   ERP (dBm) = 10 Log_{10} [(3 x FS/1 x 10^6)^2 / (49.2) x 1000]
   ERP (Watts) = {(3 x FS)/1 x 10^6}^{2} / 49.2
   Note: The antenna factor and cable loss were determined prior to the test.

Operating Frequency:	848.31 MHz
Channel:	777
Measured Conducted Power:	23.2 dBm
Modulation:	CDMA (Internal)
Distance:	3 meters
Limit:	43 + 10 $\log_{10}$ (W) = 37.48 dBc

Frequency (MHz)	**Level** (dBm)	**AFCL** (dB)	**POL** (H/V)	**ERP** (dBm)	(dBc)
1696.62	$\leq$ -42.50	29.87	H	- 0.51	23.71
2544.93	$\leq$ - 51.50	29.87	H	- 9.51	32.71
3393.24	$\leq$ - 63.25	29.87	H	- 21.26	44.46
4241.55	$\leq$ - 76.63	29.87	H	- 34.64	57.84
5089.86	< - 100				

Notes:

1. The bandwidth is set per §22.917 (RBW = 1MHz, VBW = 1MHz).
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 ERP is calculated using the formula:
   ERP (dBm) = 10 Log_{10} (((r(mV/m)/1 x 10^6)^2 / 49.2/1 x 10^{-3})
   ERP (dBm) = 10 Log_{10} [(3 x FS/1 x 10^6)^2 / (49.2) x 1000]
   ERP (Watts) = {(3 x FS)/1 x 10^6}^{2} / 49.2
   Note: The antenna factor and cable loss were determined prior to the test.

3.4 FREQUENCY STABILITY - § 2.1055

Operating Frequency: 835,890,000 Hz

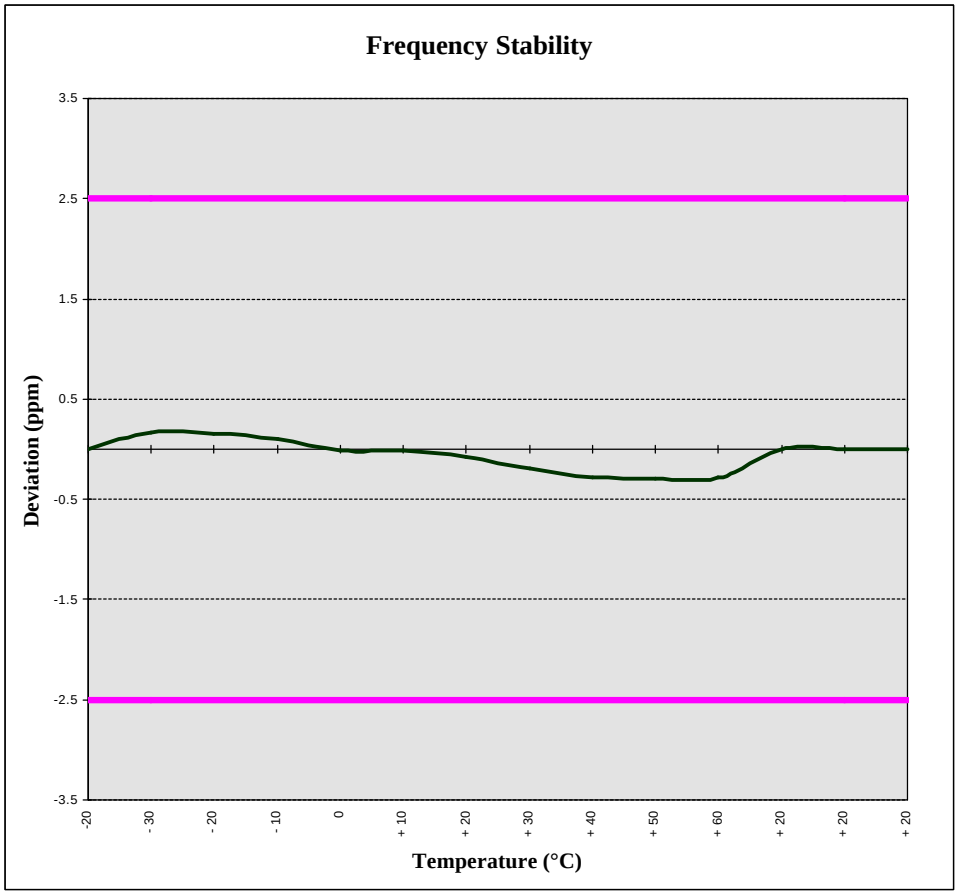
Channel: 363

Reference Voltage: 3.7 VDC

Deviation Limit: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	**POWER** (VDC)	**TEMP** (ºC)	**FREQ.** (Hz)	**Deviation** (%)
100 %	3.70	+ 20 (Ref)	835890000	0.00000000
100 %		- 30	835889856	0.00000017
100 %		- 20	835889871	0.00000015
100 %		- 10	835889916	0.00000010
100 %		0	835890012	-0.00000001
100 %		+ 10	835890014	-0.00000002
100 %		+ 20	835890063	-0.00000008
100 %		+ 30	835890165	-0.00000020
100 %		+ 40	835890231	-0.00000028
100 %		+ 50	835890248	-0.00000030
100 %		+ 60	835890239	-0.00000029
85 %	3.14	+ 20	835890000	0.00000000
115 %	4.25	+ 20	835890000	0.00000000
BATT. ENDPOINT	2.40	+ 20	835890000	0.00000000

FREQUENCY STABILITY - § 2.1055



4.1 SAMPLE CALULATIONS

A. ERP

$$\text{Level } \mu\text{/Vm } @ \text{ 3 meters} = \text{Log}_{10}^{-1}\frac{(\text{dBm} + 107 + \text{AFCL})}{20}$$

$$\text{Log}_{10}^{-1}\frac{(-14 + 107 + 31.7)}{20}$$

1717908.4 µ/Vm @ 3 meters

Sample Calculation (relative to a dipole)

ERP (dBm) = 10 Log_{10} (((r(µV/m)1x10^{6})^{2}/49.2/1x10^{-3})

ERP (dBm) = 10 Log_{10}(((3(1717908.4)1x10^{6})^{2}/49.2/1x10^{-3})

ERP (dBm) = 28.95

B. EMISSION DESIGNATOR (§2.201)

CDMA

2M + 2DK

CDMA BW = 1.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

Emission Designator = 1M25F9W

5.1 TEST EQUIPMENT

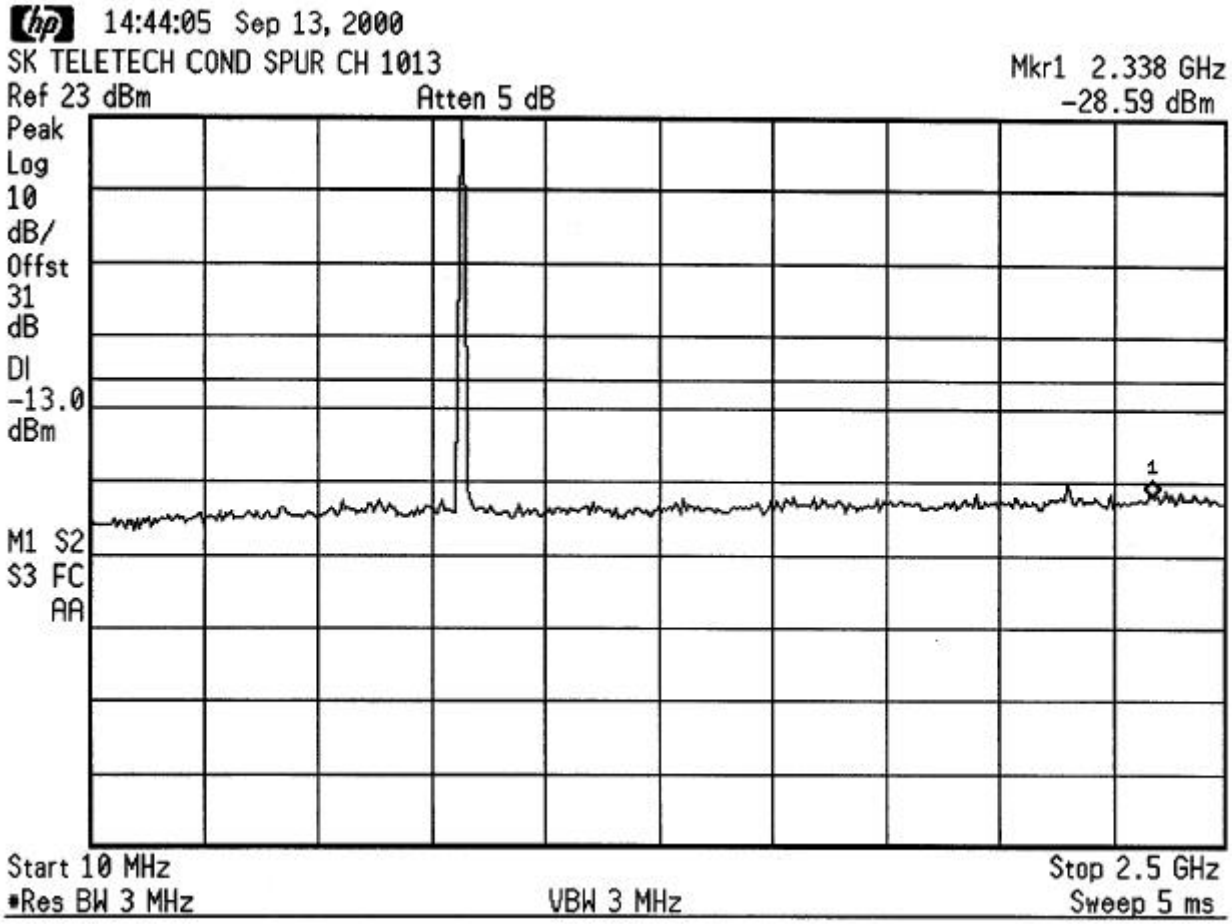
Type	Model	Calib. Date	Serial No.
Signal Generator	HP 8648D (9kHz-4.0GHz)	Nov 1999	3847A00611
Gigatronics Power Meter	8652A	Oct 1999	1835272
Gigatronics Power Sensor (2)	80701A (0.05-18GHz)	Oct 1999	1833535, 1833542
Amplifier Research Power Amp.	5S1G4 (5W, 800MHz-4.2GHz)	N/A	26235
Microwave System Amplifier	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
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 SK TELETECH CO., LTD. IM-2000 Single-Mode CDMA Cellular Phone FCC ID: OL6IM-2000 complies with all the requirements of Parts 2 and 22 of the FCC rules.

TEST PLOTS

CONDUCTED SPURIOUS
Channel 1013



CONDUCTED SPURIOUS
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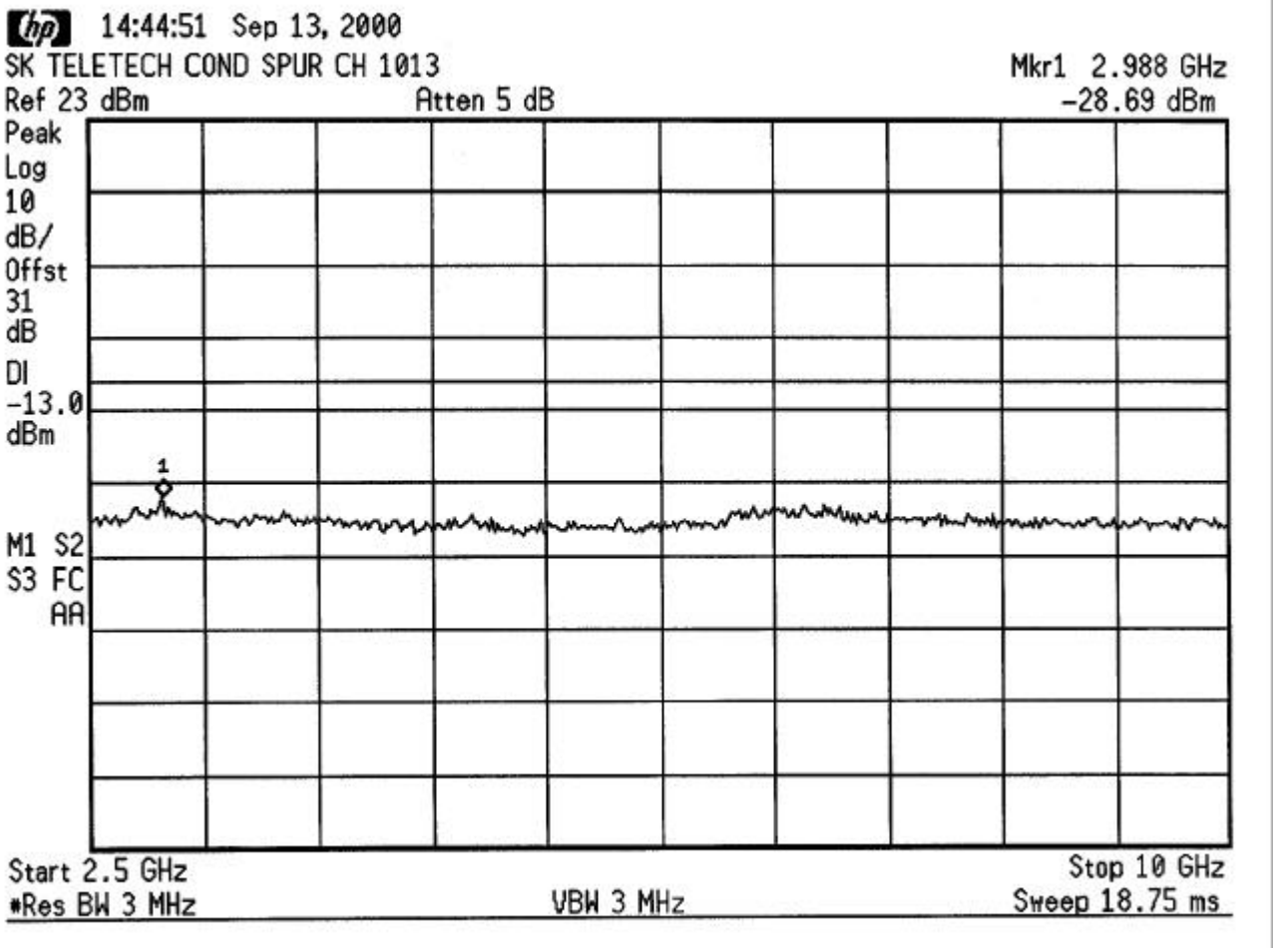

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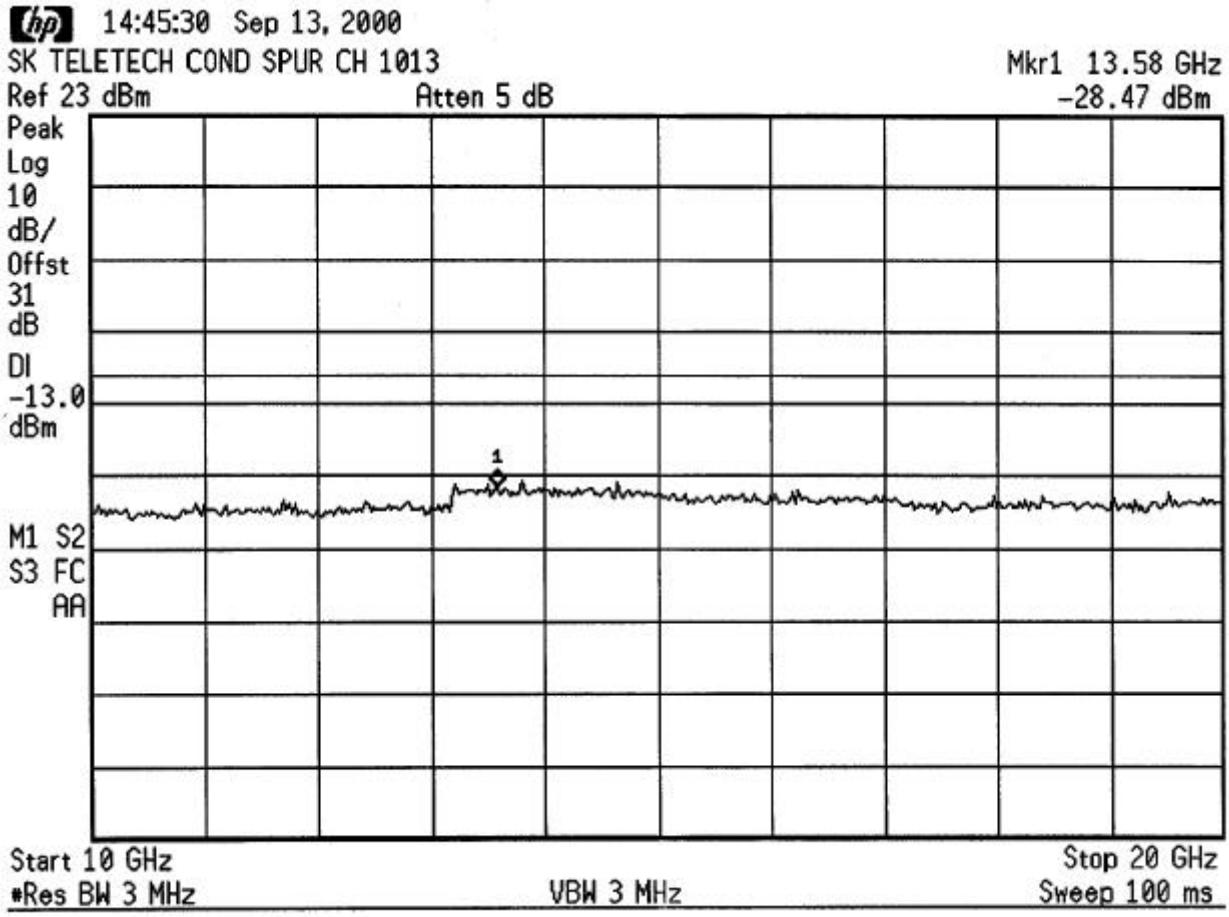

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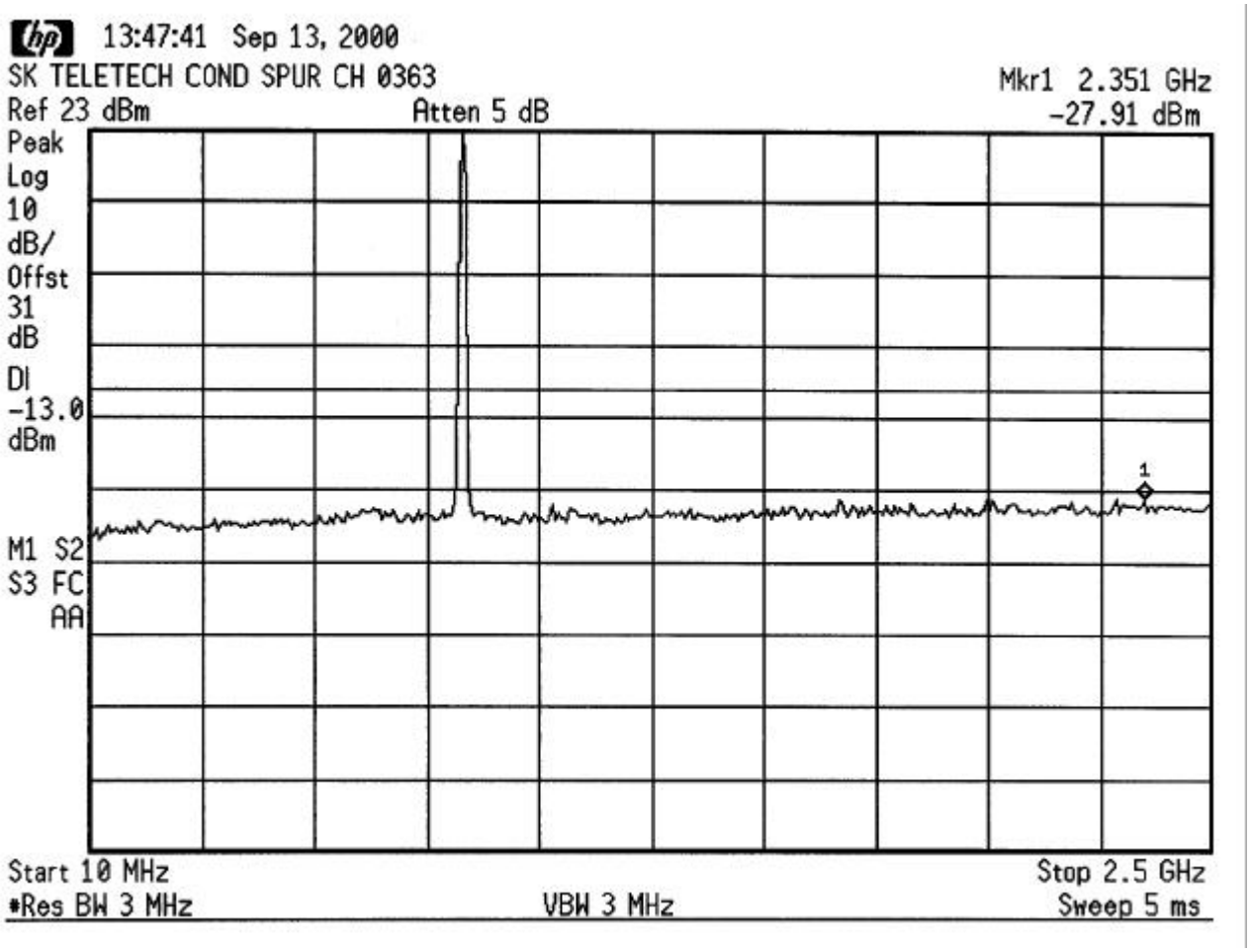

CONDUCTED SPURIOUS
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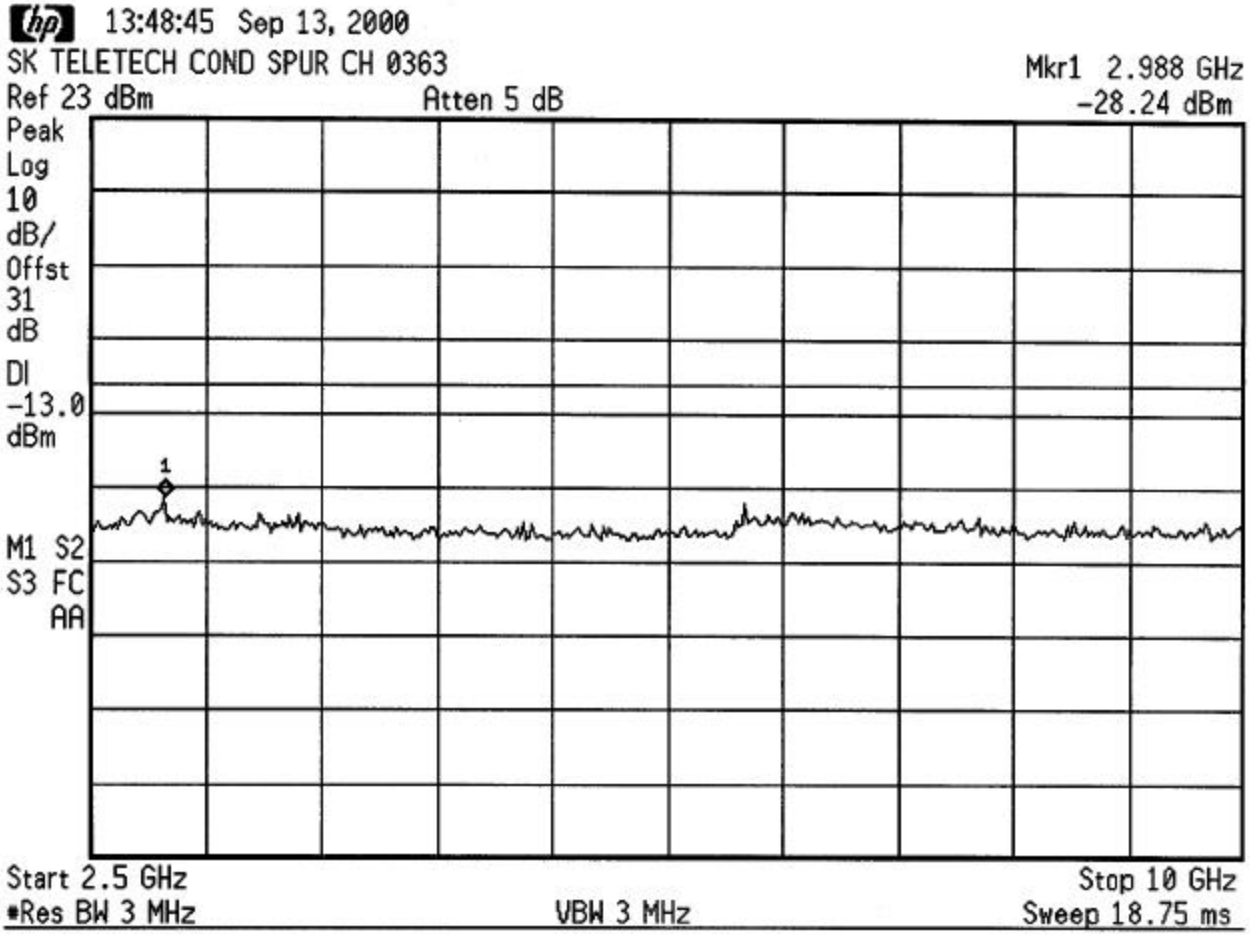

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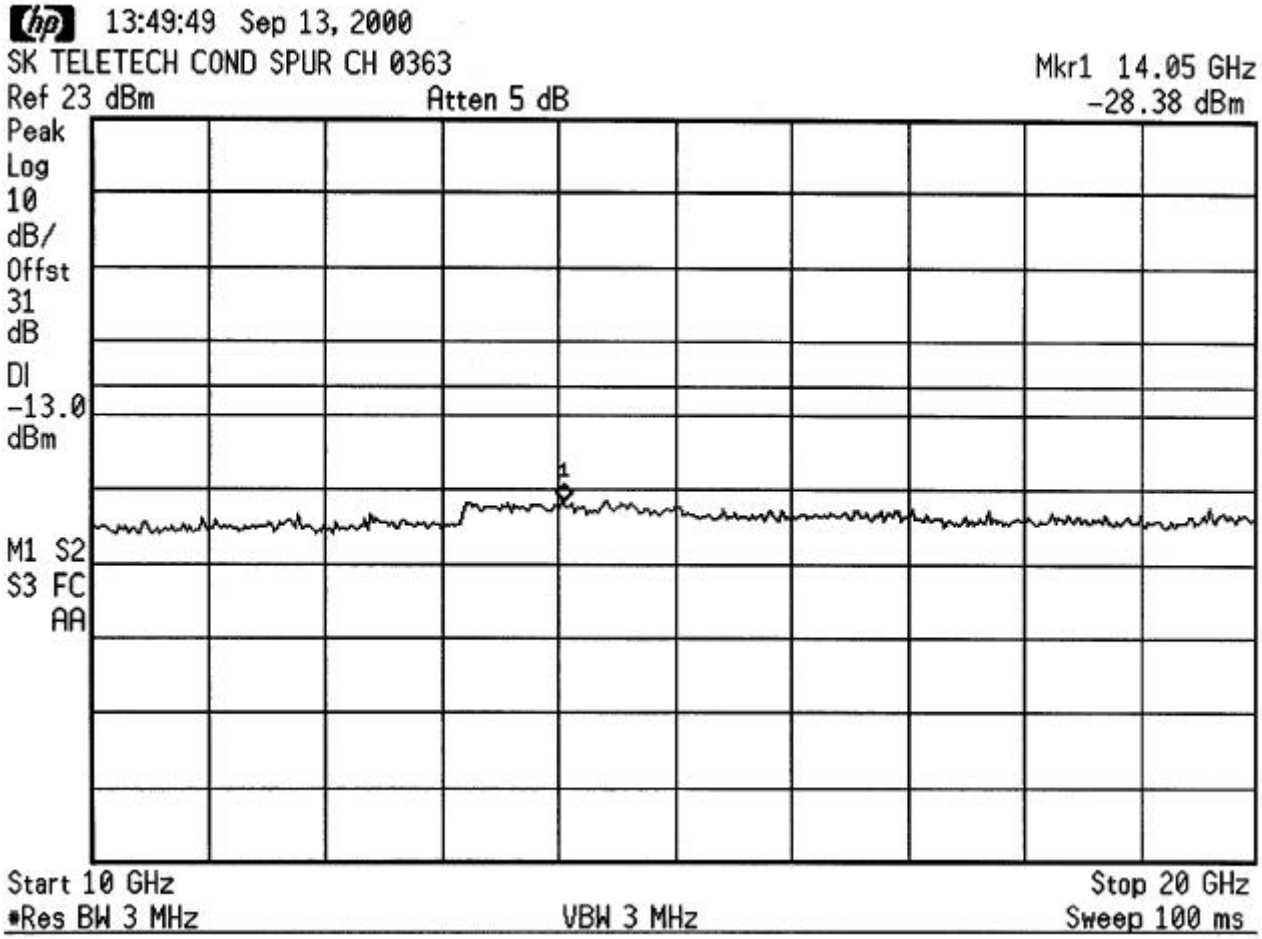

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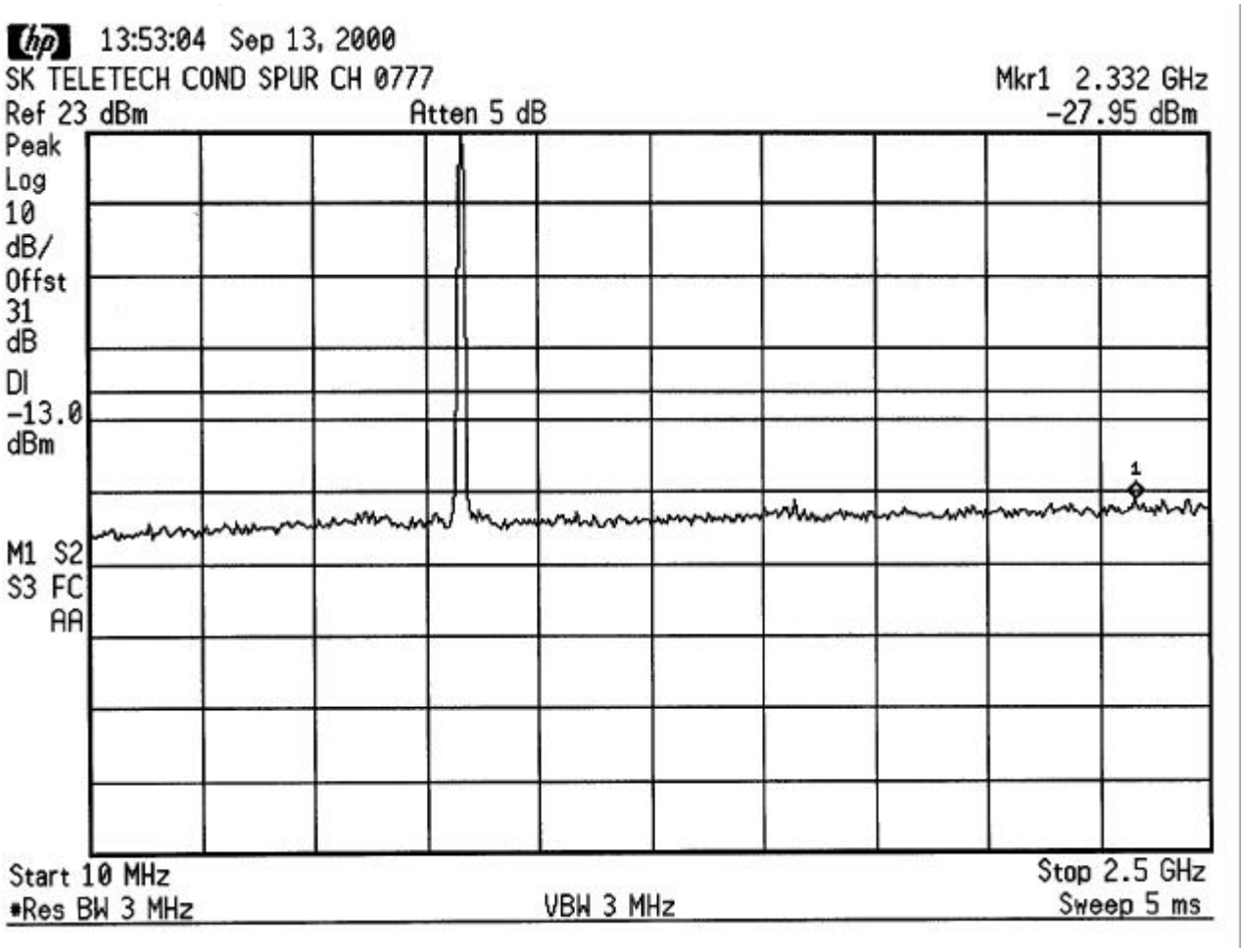

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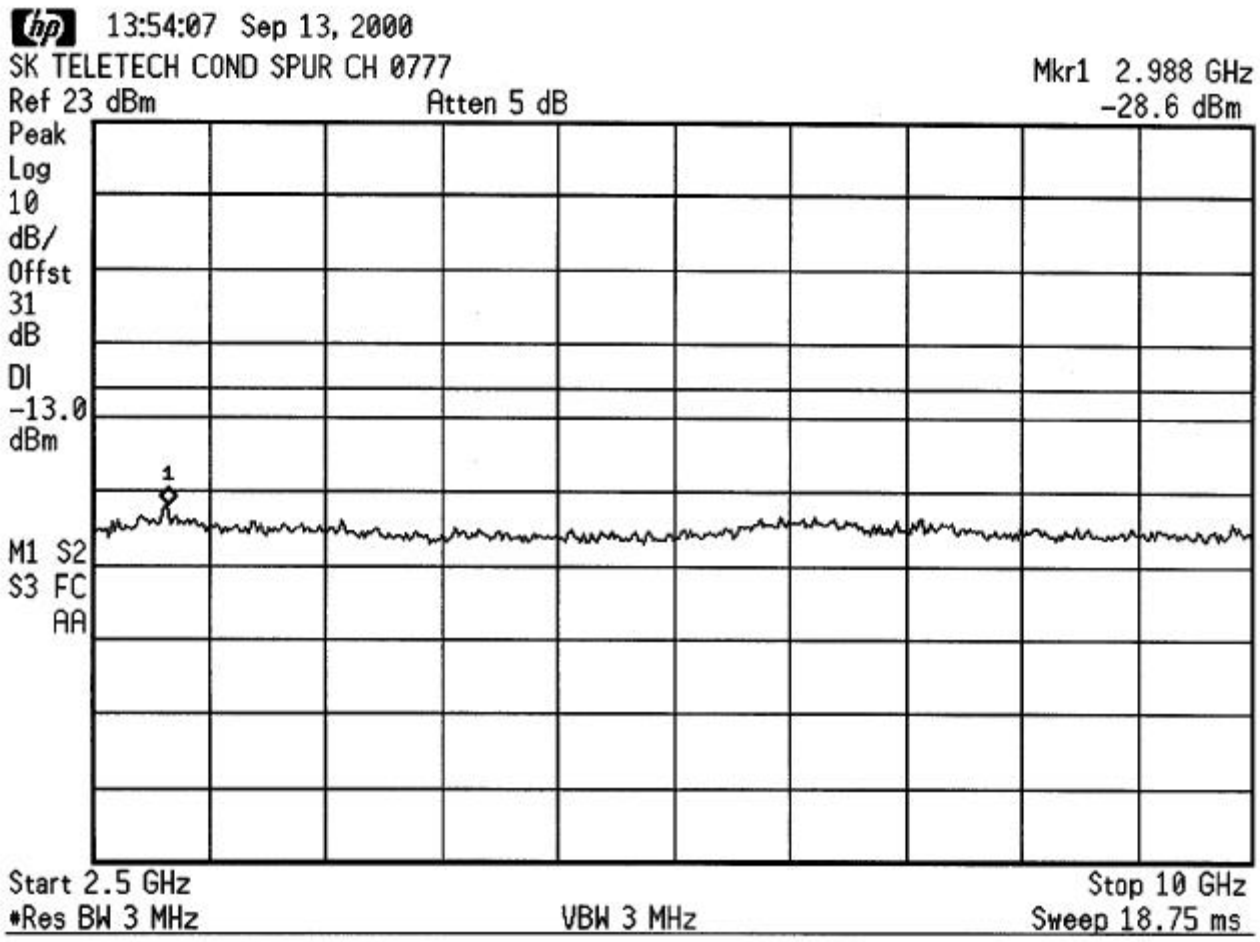

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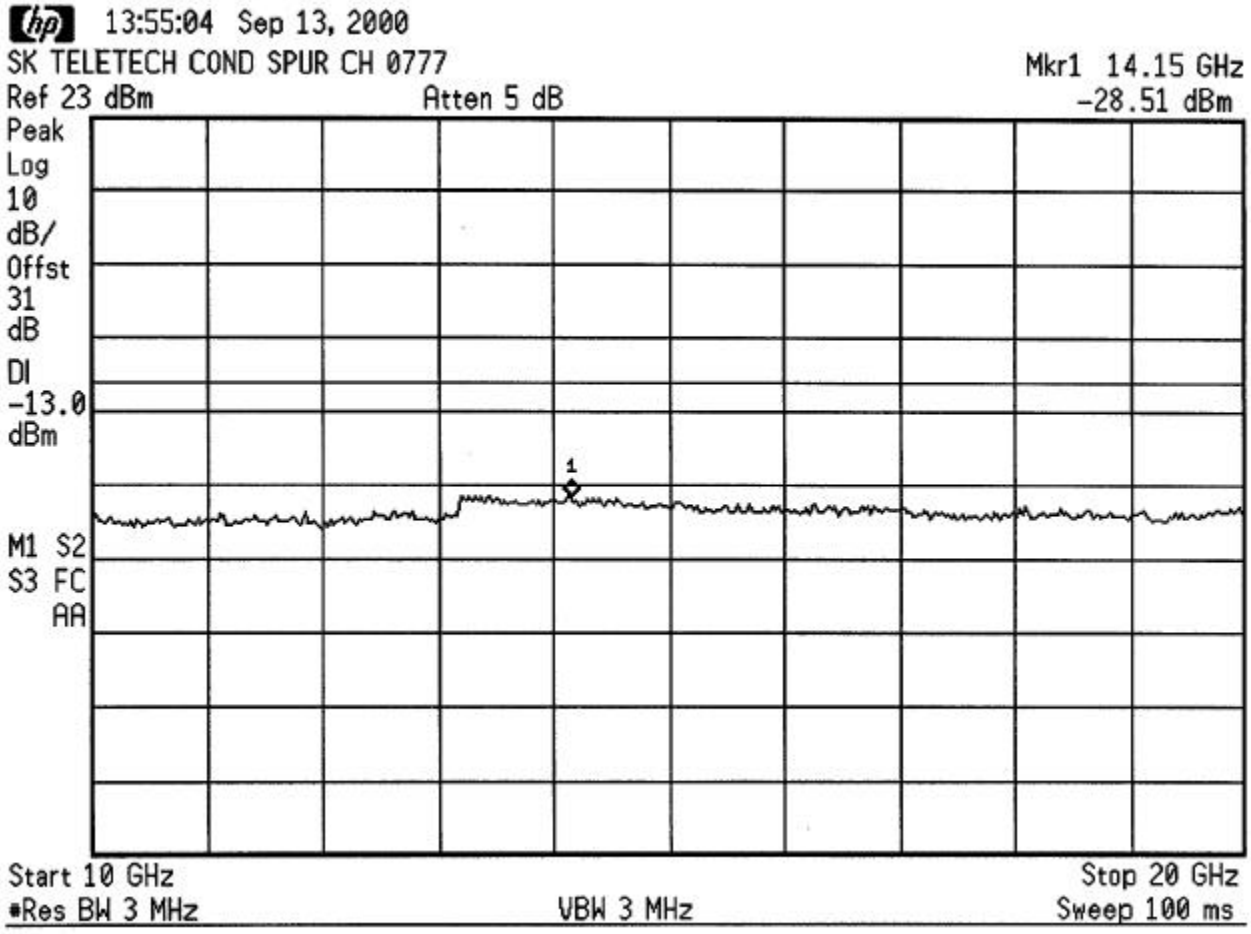
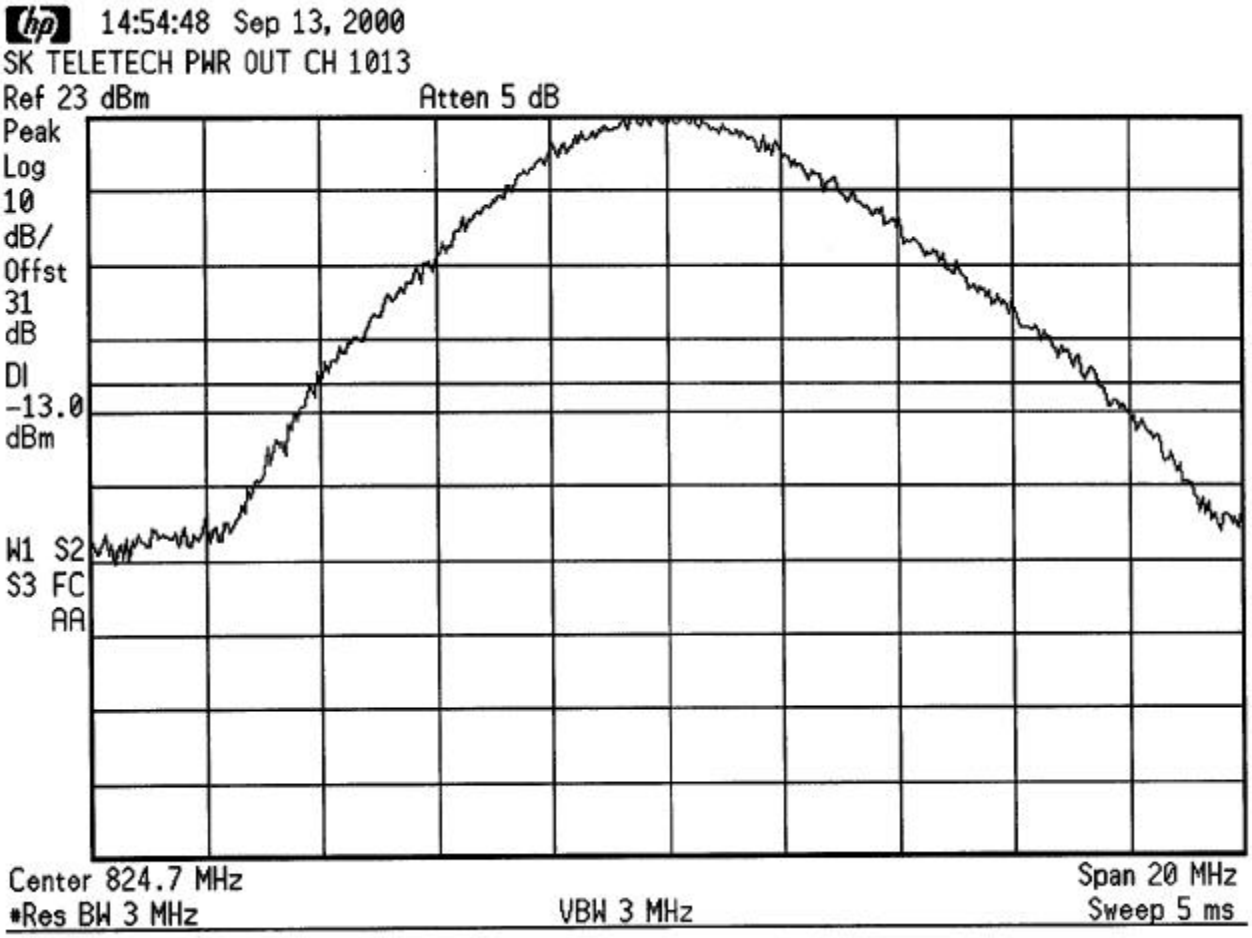


CHANNEL POWER
Channel 1013



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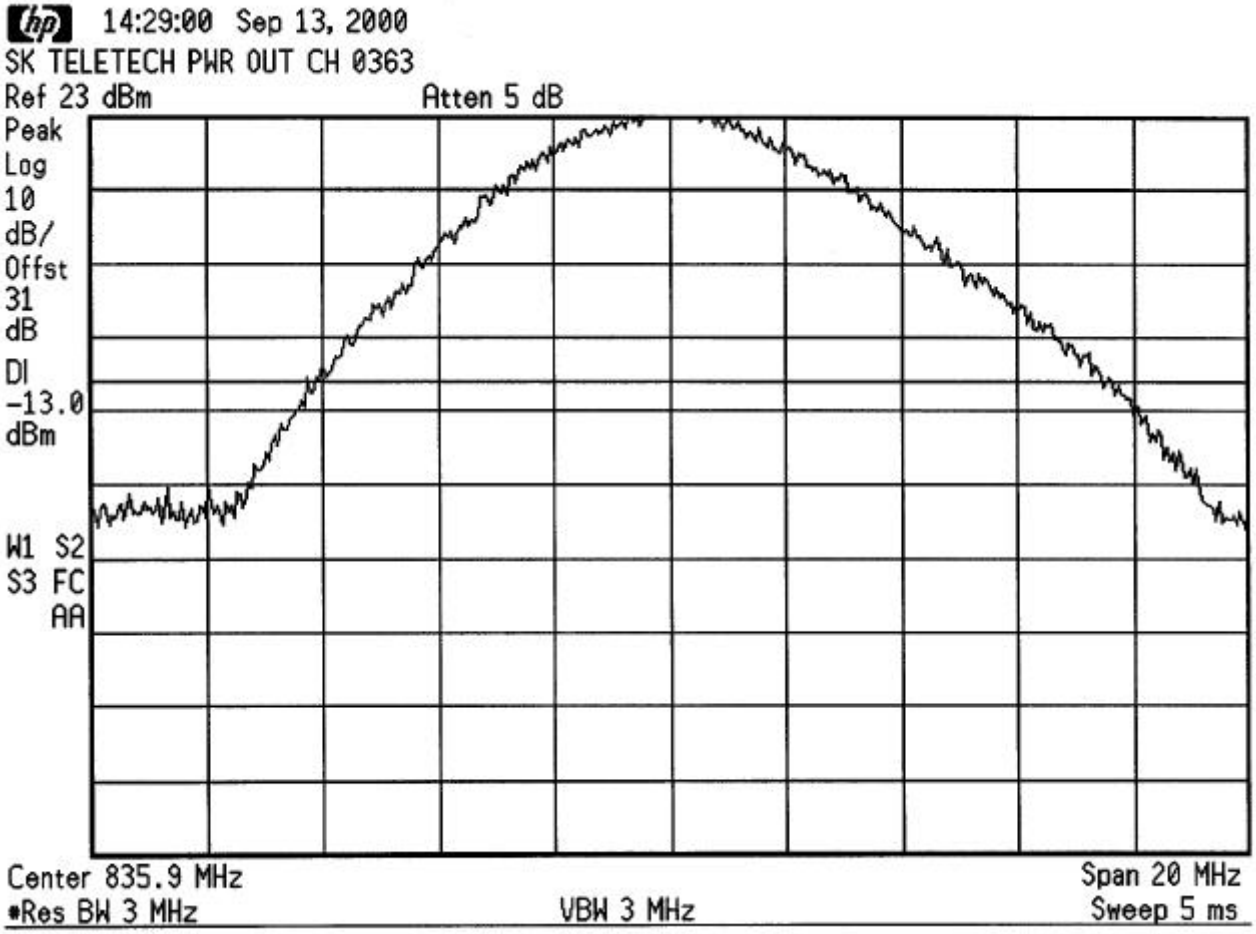

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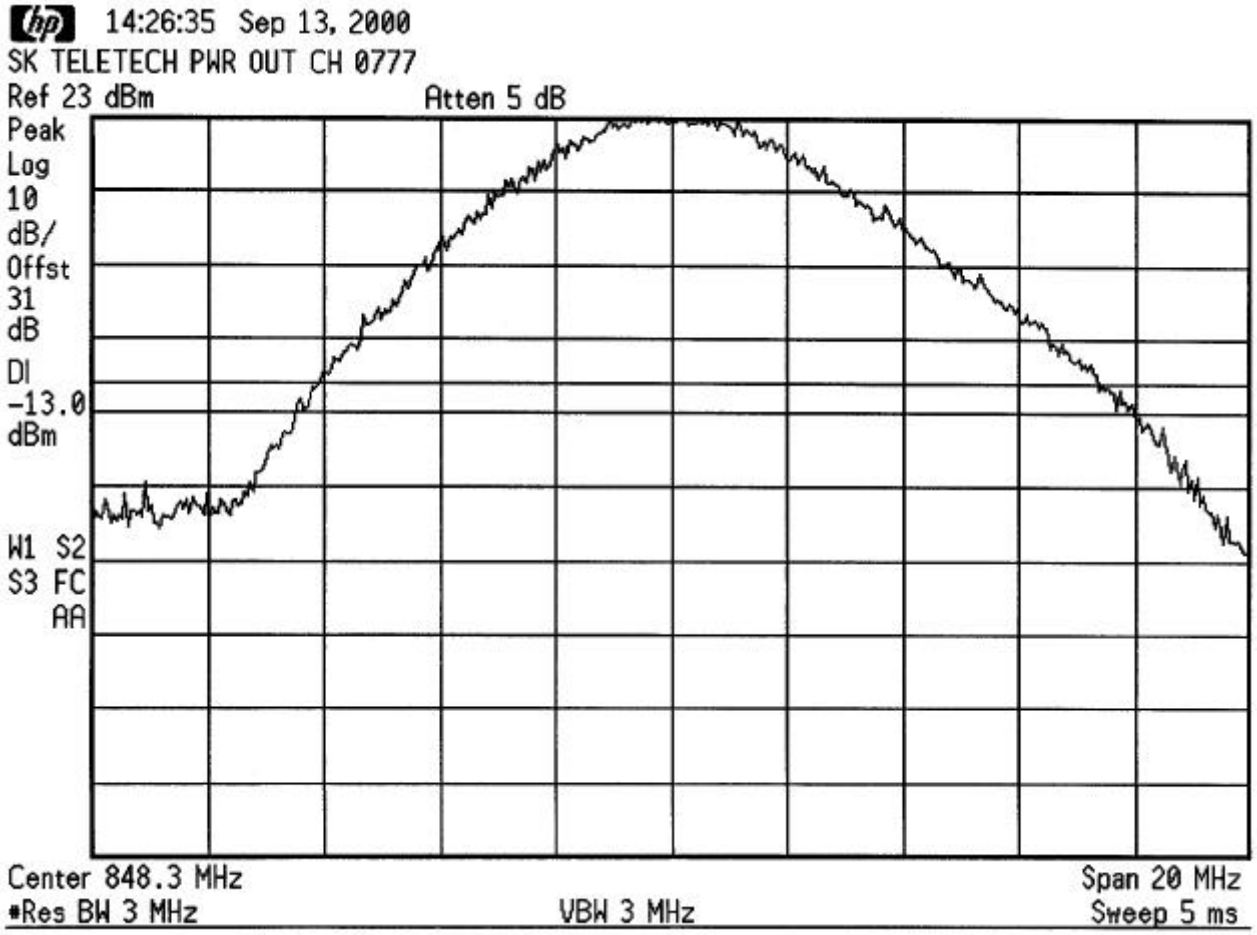
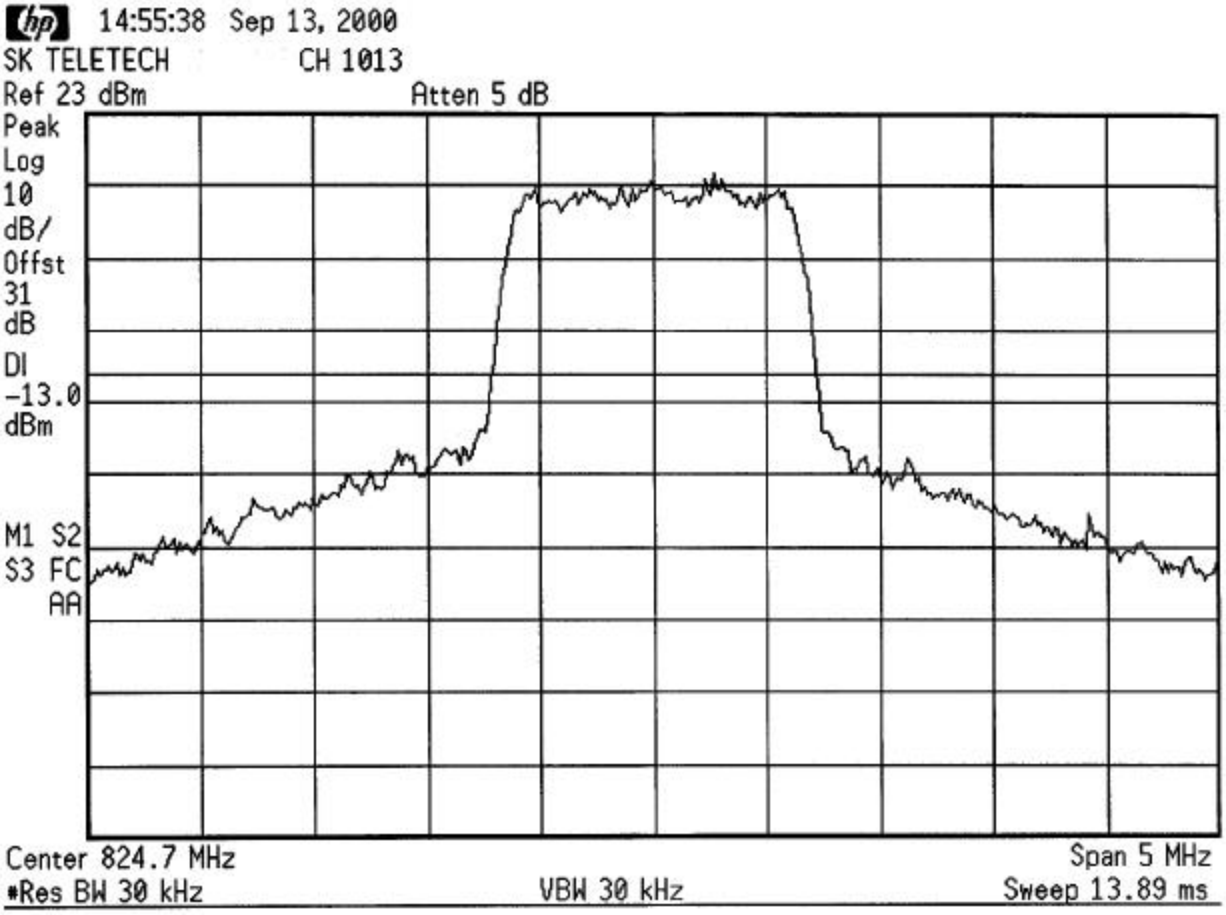


OCCUPIED BANDWIDTH
Channel 1013



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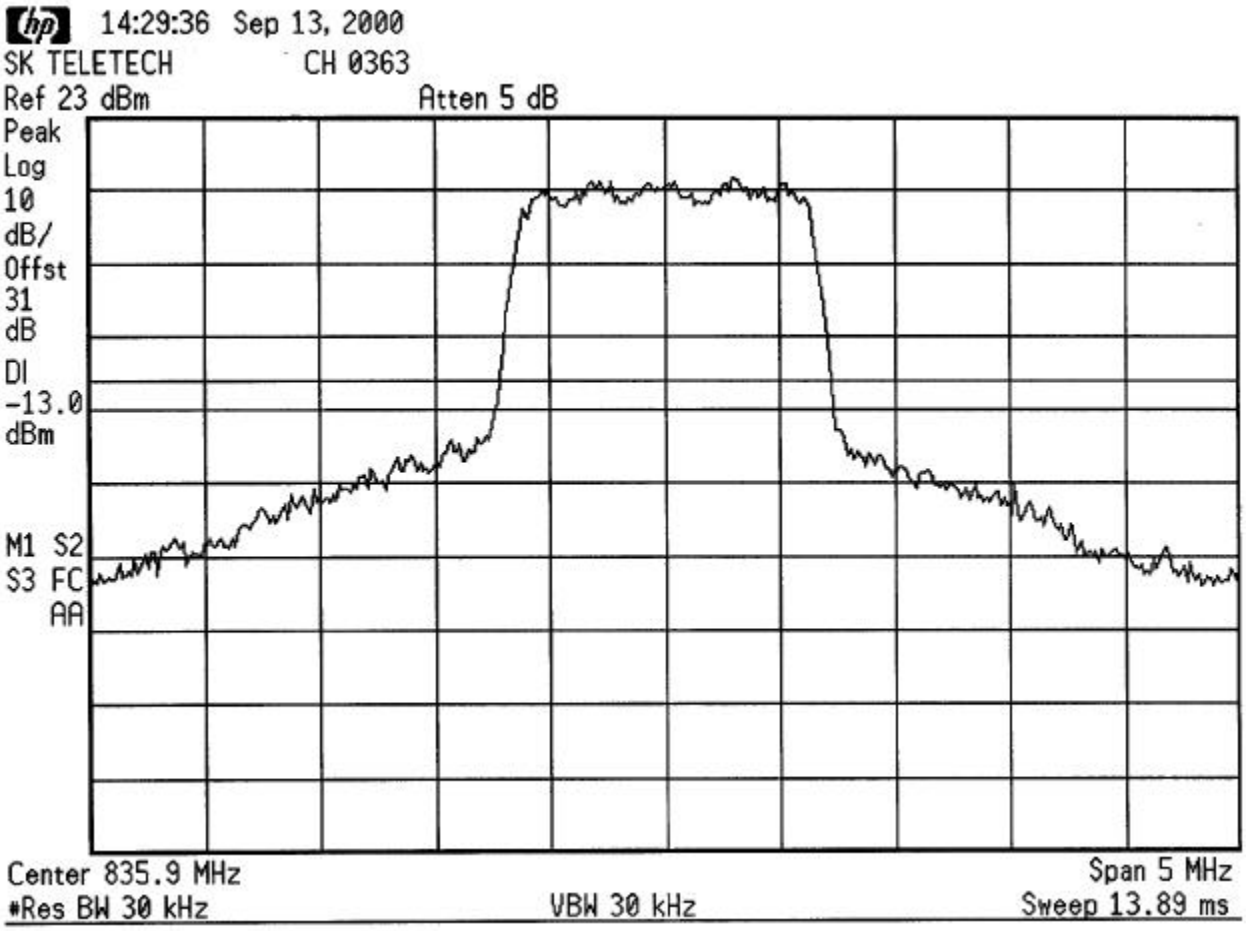

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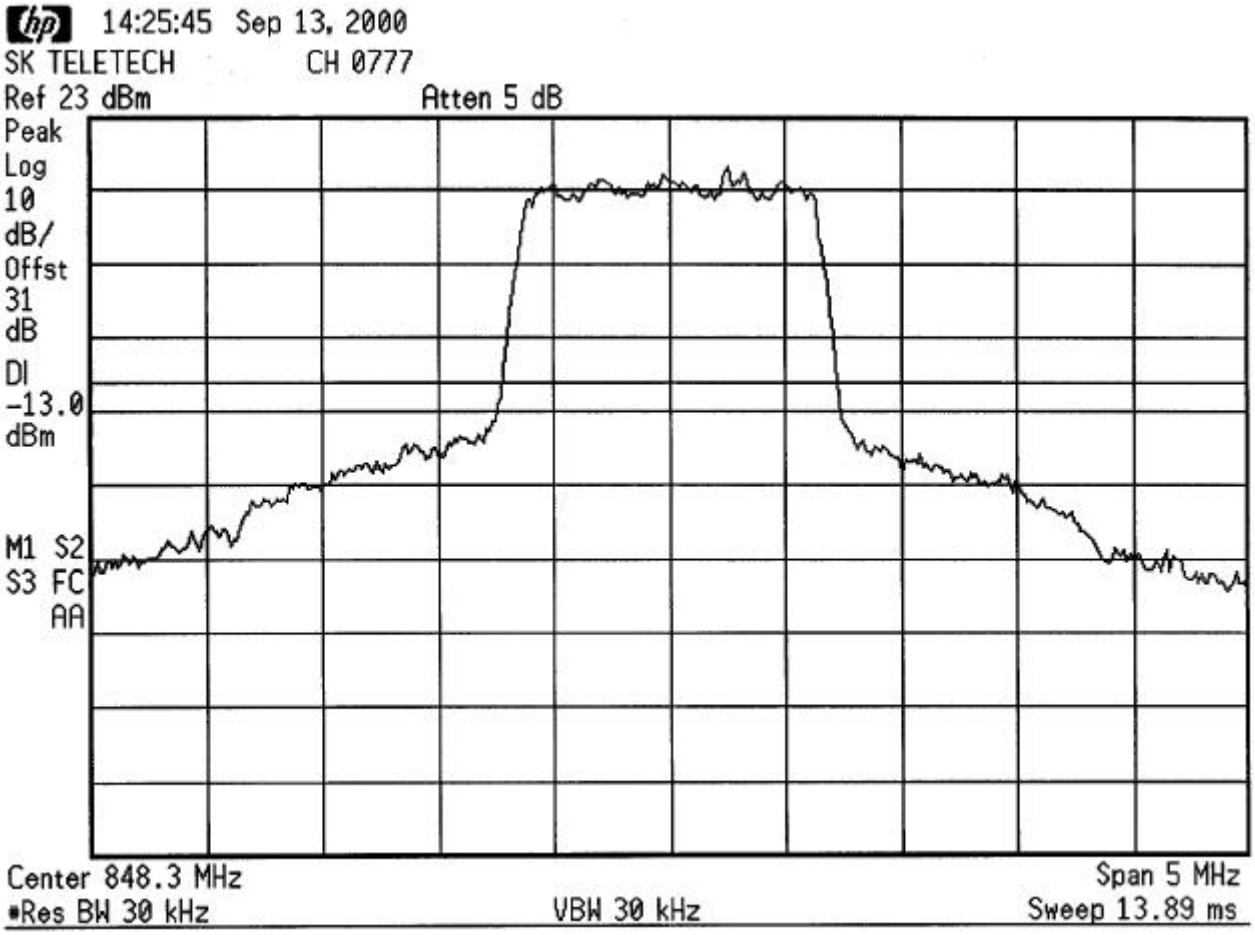

LOWER BAND EDGE
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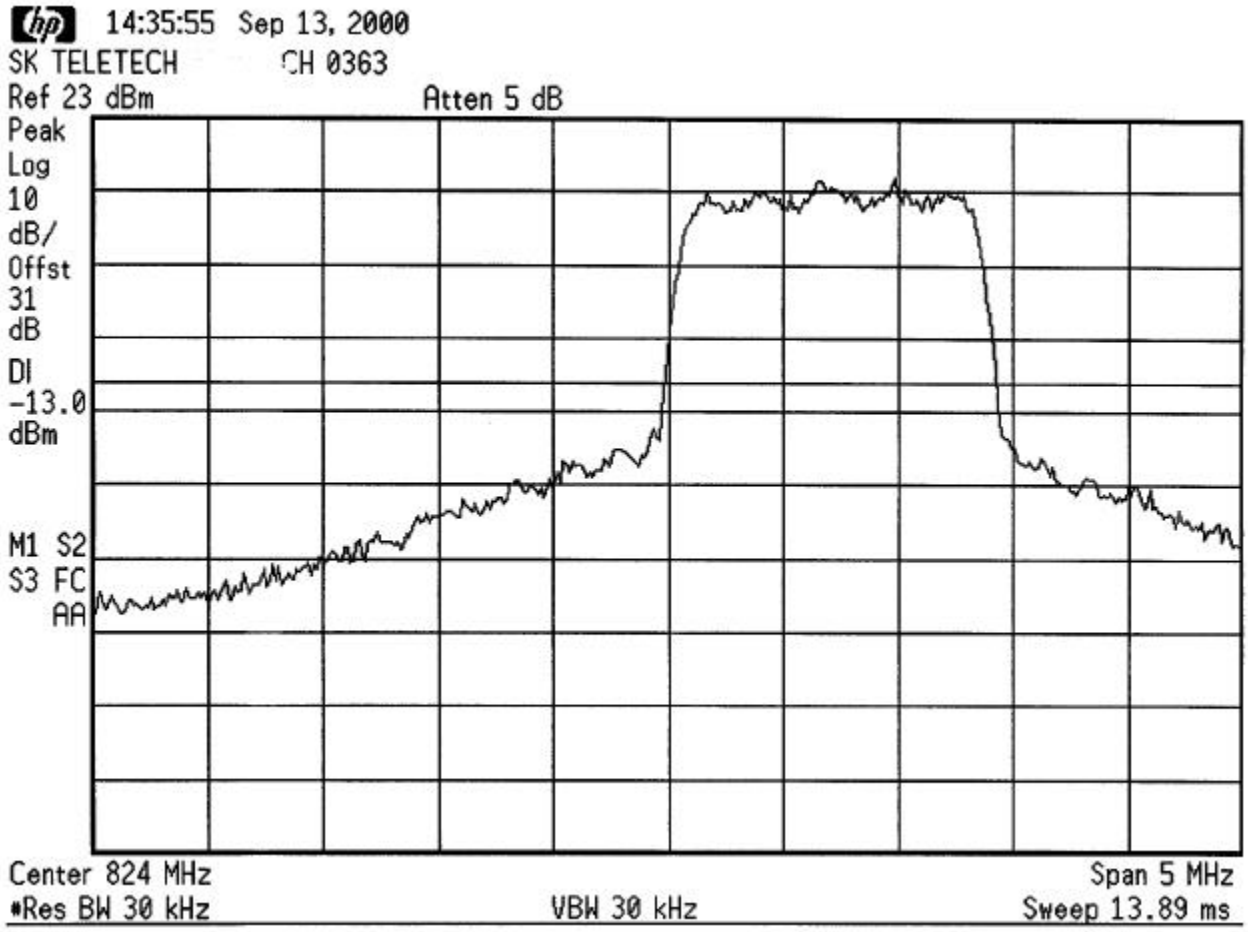

UPPER BAND EDGE
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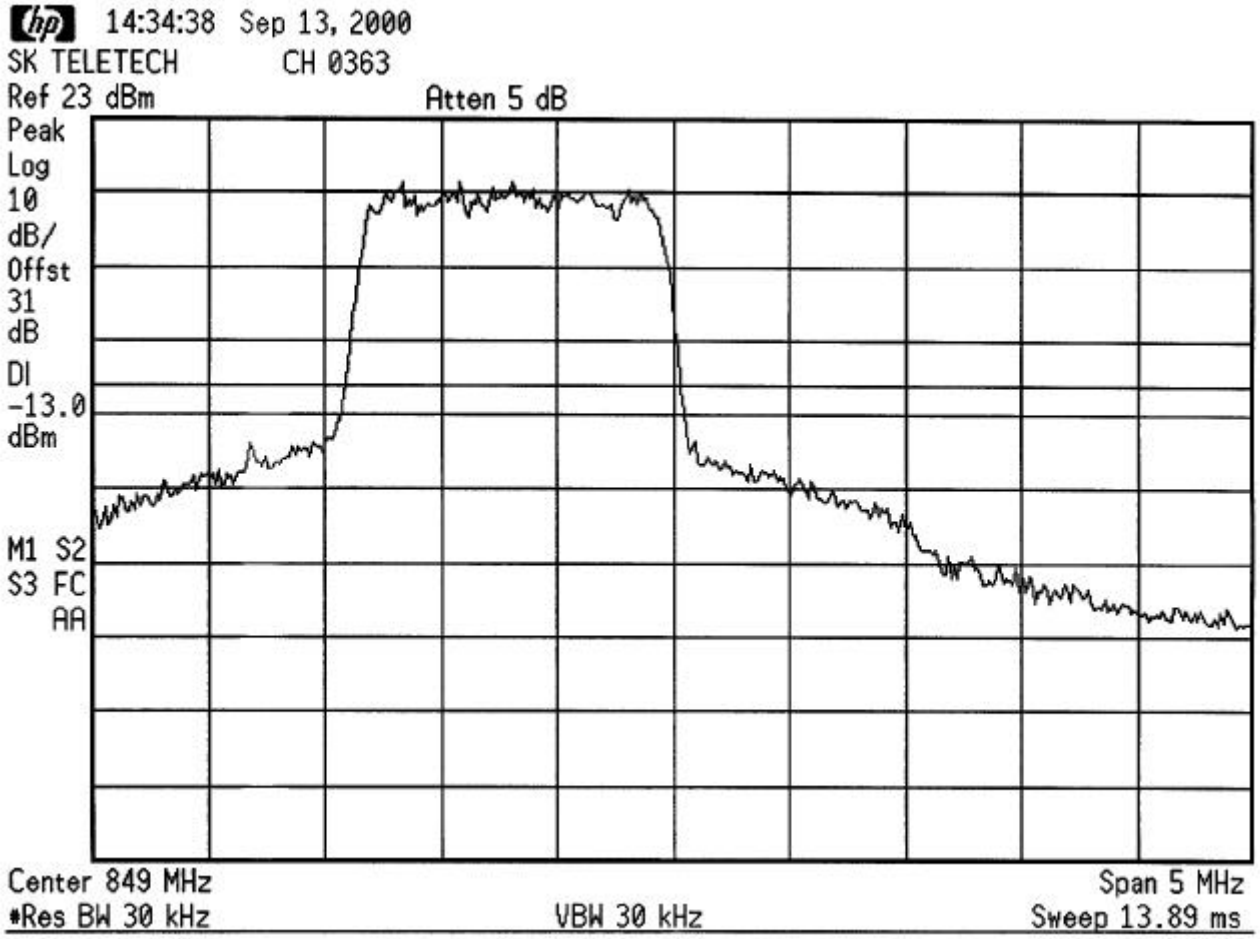

99% BANDWIDTH
Channel 363