CERTIFICATE OF COMPLIANCE
FCC PART 90 CLASS II PERMISSIVE CHANGE

Test Lab:	**Applicant Information:**
CELLTECH RESEARCH INC. Testing and Engineering Services 1955 Moss Court Kelowna, B.C. Canada V1Y 9L3 Phone: 250 - 860-3130 Fax: 250 - 860-3110 Toll Free: 1-877-545-6287 e-mail: info@celltechlabs.com web site: www.celltechlabs.com	**ITRONIX CORPORATION** 801 South Stevens Street Spokane, WA 99024 Attn: Fred Phillips, Certification Engineer Phone: 509-742-1506 Fax: 509-626-4204

FCC Classification:	**Licensed Non-Broadcast Station Transmitter (TNB)**
FCC Rule Part(s):	**§90, §2**
FCC ID:	**KBCIX250RIM902**
New Model(s):	**IX550**
Equipment Type:	**Rugged Laptop PC with RIM 902 Mobitex Radio Modem**
Tx Frequency Range:	**896 - 901 MHz**
Rx Frequency Range:	**935 - 941 MHz**
Max. RF Output Power:	**1.72 Watts (ERP)**
Frequency Tolerance:	**1.5 PPM**
Emission Designator:	**12K8F1D**
Original Grant Date:	**December 7, 2000**
Class II Change(s):	**New Laptop PC Model: IX550 (See Attachment B)**

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.

TABLE OF CONTENTS

MEASUREMENT REPORT - FCC PART 90

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:

ITRONIX CORPORATION
801 South Stevens Street
Spokane, WA 99024
Attn: Fred Phillips, Certification Engineer
Phone: 509-742-1506
Fax: 509-626-4204

FCC ID	**KBCIX250RIM902**
New Model	**IX550**
EUT Type	**Rugged Laptop PC with RIM 902 Mobitex Radio Modem**
Classification	**Licensed Non-Broadcast Station Transmitter (TNB)**
Rule Part(s)	**§90, §2**
Application Type	**Class II Permissive Change**
Max. RF Output Power	**1.72 Watts (ERP)**
Tx Freq. Range	**896-901 MHz**
Rx Freq. Range	**935-941 MHz**
Emission Designator	**12K8F1D**
Signal Modulation	**GMSK**
Modes Tested	**Unmodulated Carrier, Modulated Carrier**

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.

Test Results

A. UNMODULATED CARRIER – High power
30.0dBm conducted power with a 30dB matched attenuator and coaxial cable with a total loss of 1.0dB.

B. INTERNAL MODULATION
Please see attached test plots. 100% of the in-band modulation is below the specified mask per 90.210(j).

Emission Mask - 896-901MHz (Mobitex)

FREQUENCY (MHz)	FORMULA	LIMIT (dBc)
-26500	50+10 log (P)	- 53
-0.0115	157 log (f_d / 5.3)	- 53
-0.0095	157 log (f_d / 5.3) or 103 log (f_d / 3.9)	- 39.8
-0.0062	103 log (f_d / 3.9) or 53 log (f_d / 2.5)	- 21.1
-0.0025	53 log (f_d / 2.5)	0.0
0.0025	53 log ((f_d / 2.5)	0.0
0.0062	103 log (f_d / 3.9) or 53 log (f_d / 2.5)	- 21.1
0.0095	157 log (f_d / 5.3) or 103 log (f_d / 3.9)	- 39.8
0.0115	157 log (f_d / 5.3)	- 53
26500	50+10 log (P)	- 53

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 and without 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 with the integral antenna loaded. 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 +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.

3.1 TEST DATA

3.2 EFFECTIVE RADIATED POWER OUTPUT - §2.1046

Freq. Tuned	**EUT Conducted Power**	**Max. Field Strength of EUT** (dBm)	**Dipole Gain**	**Dipole Forward Conducted Power**	**ERP of EUT Dipole Gain + Dipole Forward Conducted Power**	
(MHz)	(dBm)	Vertical Pol.	(dBd)	(dBm)	dBm	Watts
896	31.57	- 9.961	- 0.94	32.72	31.78	1.51
901	31.49	- 9.444	- 0.94	33.29	32.35	1.72

Notes:

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.

3.3 FIELD STRENGTH OF SPURIOUS RADIATION - 2.1053

Operating Frequency (MHz):	896
Channel:	Low
Measured Conducted Power:	31.57 dBm
Modulation:	Unmodulated Carrier
Distance:	3 Meters
Limit:	43 + 10 log (W) = 39.47 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
1792	≤ -97.03	-60.21	6.6	V	-53.61	-55.75	87.53
2688	≤ -96.58	-59.55	7.8	V	-51.75	-53.89	85.67
3584	≤ -96.17	-61.63	7.8	V	-53.88	-56.02	87.80
4480	≤ -98.38	-57.12	7.6	V	-49.52	-51.66	83.44
5376	≤ -100.21	-68.38	8.5	V	-59.88	-62.02	93.80
6272	≤ -102.39	-71.14	8.8	V	-62.34	-64.48	96.26
7168	≤ -103.16	-78.26	9.6	V	-68.66	-70.80	102.58
8064	≤ -101.67	-80.67	9.0	V	-71.67	-73.81	105.59
8960	≤ -102.93	-75.85	9.3	V	-66.55	-68.69	100.47

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.

Operating Frequency (MHz): 901
Channel: High
Measured Conducted Power: 31.49 dBm
Modulation: Unmodulated Carrier
Distance: 3 Meters
Limit: 43 + 10 log (W) = 39.47 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
1802	≤ -97.88	-59.43	6.6	V	-52.83	-54.97	87.32
2703	≤ -96.61	-58.55	7.8	V	-50.75	-52.89	85.24
3604	≤ -99.66	-60.47	7.8	V	-52.72	-54.86	87.21
4505	≤ -99.43	-61.12	7.6	V	-53.52	-55.66	88.01
5406	≤ -101.76	-65.55	8.5	V	-57.05	-59.19	91.54
6307	≤ -103.09	-70.63	8.8	V	-61.83	-63.97	96.32
7208	≤ -104.54	-76.19	9.6	V	-66.59	-68.73	101.08
8109	≤ -102.16	-77.94	9.0	V	-68.94	-71.08	103.43
9010	≤ -103.21	-79.10	9.3	V	-69.8	-71.94	104.29

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.

3.4 FREQUENCY STABILITY - § 2.1055

Operating Frequency: 901,000,000 Hz

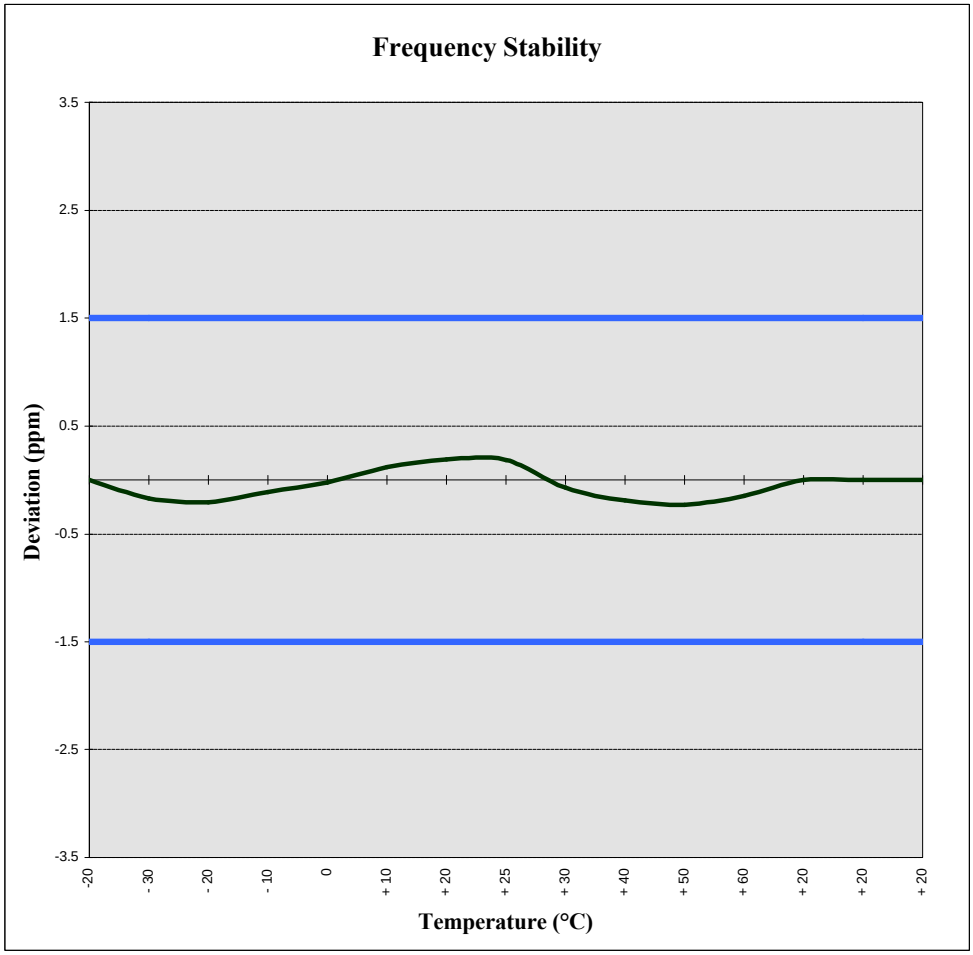
Channel: High

Reference Voltage: 4.75 VDC

Deviation Limit: ± 0.00015 % or 1.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (ºC)	FREQ. (Hz)	Deviation (%)
100 %	4.75	+ 20 (Ref)	901,000,000	0.000000
100 %		- 30	901,000,153	-0.000017
100 %		- 20	901,000,184	-0.000020
100 %		- 10	901,000,099	-0.000011
100 %		0	901,000,020	-0.000002
100 %		+ 10	900,999,895	0.000012
100 %		+ 20	900,999,829	0.000019
100 %		+ 25	900,999,833	0.000019
100 %		+ 30	901,000,066	-0.000007
100 %		+ 40	901,000,171	-0.000019
100 %		+ 50	901,000,204	-0.000023
100 %		+ 60	901,000,133	-0.000015
85 %	N/A	+ 20	901,000,000	0.000000
115 %	N/A	+ 20	901,000,000	0.000000
BATT. ENDPOINT	N/A	+ 20	901,000,000	0.000000

FREQUENCY STABILITY - § 2.1055



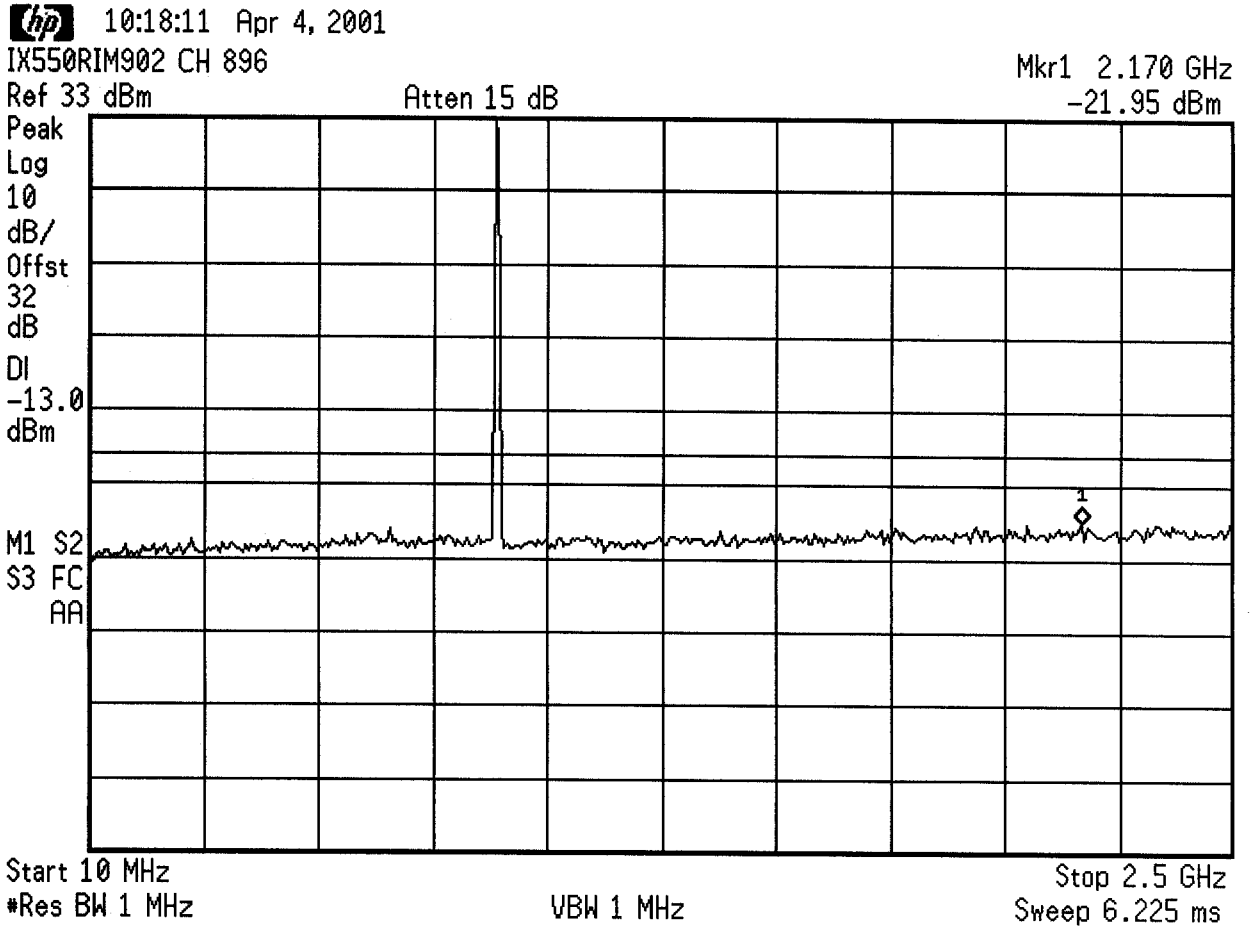
4.1 TEST EQUIPMENT

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
CDMA Base Station Test Set	Agilent E8285A	N/A	US40332926
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	6267
Double Ridged Horn Antenna	ETS 3115 (1-18GHz)	Oct. 2000	6276
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

5.1 CONCLUSION

The data collected shows that the Itronix IX550 Rugged Laptop PC with RIM 902 Mobitex Radio Modem FCC ID: KBCIX250RIM902 (with the Class II Permissive Changes described in this report) complies with all the requirements of Parts 2 and 90 of the FCC rules.

TEST PLOTS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Atten 15 dB
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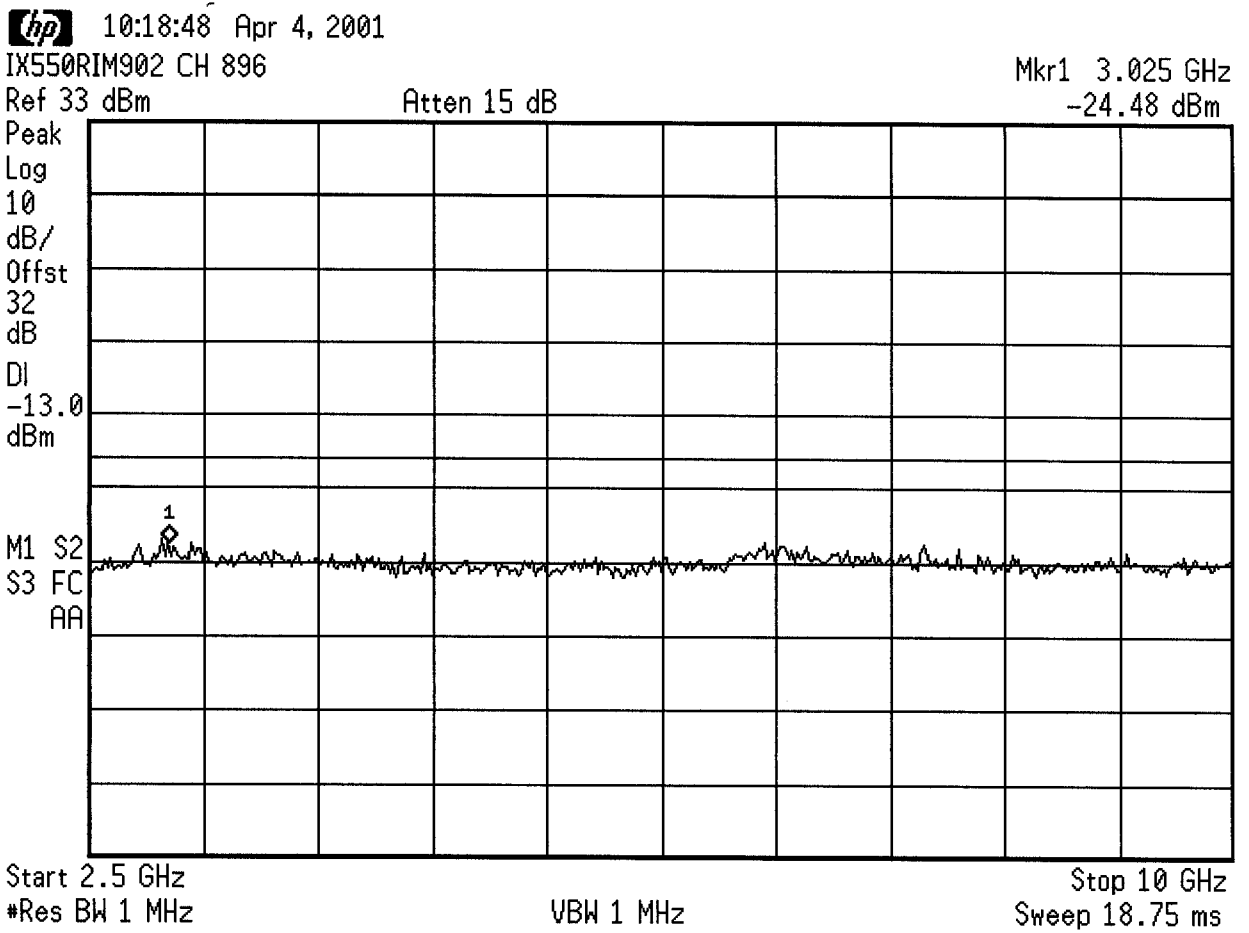
Peak
Log
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms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32
dB
Dl
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M1 S2
S3 FC
AA
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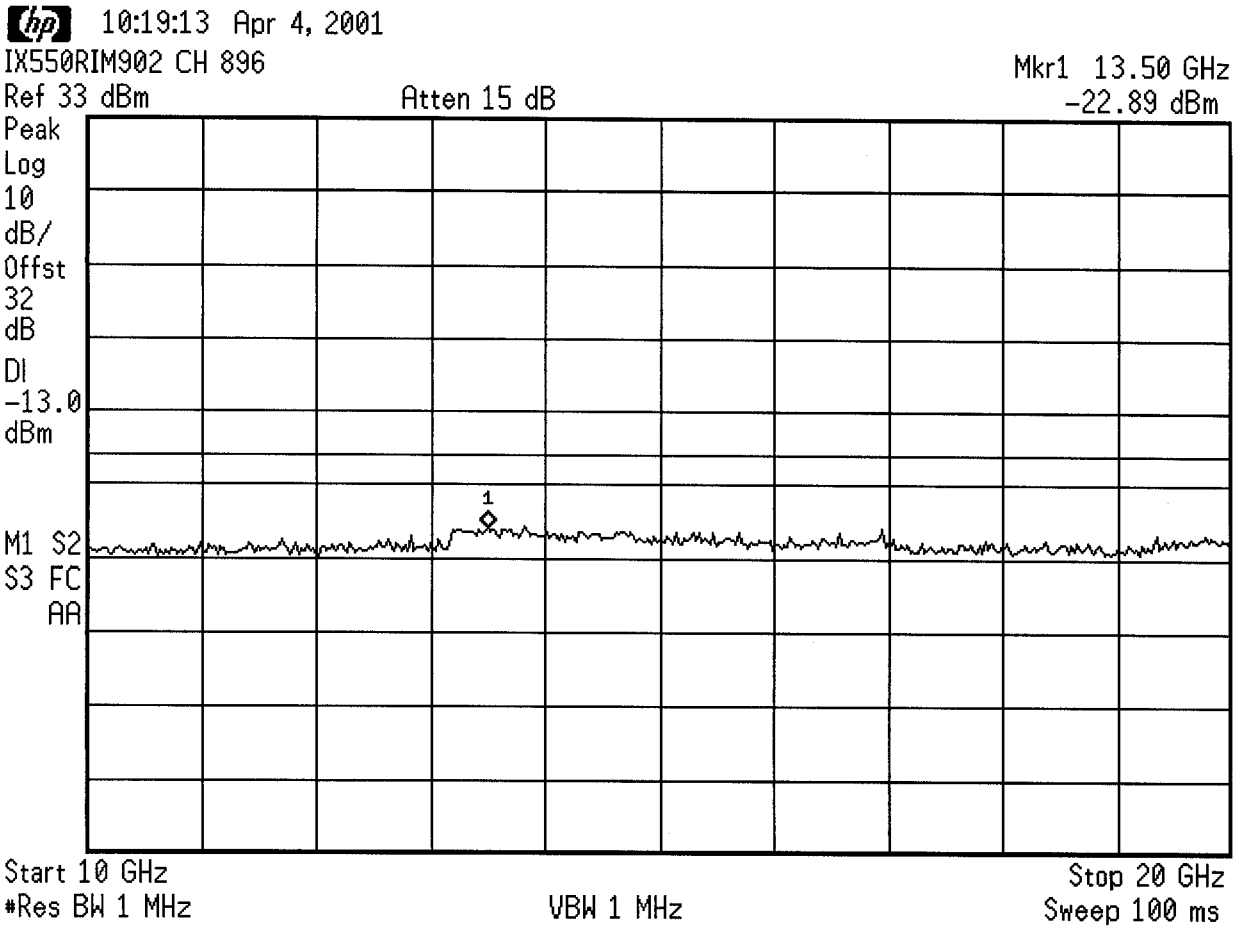
#Res BW 1 MHz
VBW 1 MHz
Sweep 18.75 ms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Peak
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dB/
Offst
32
dB
Dl
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dBm
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S3 FC
AA
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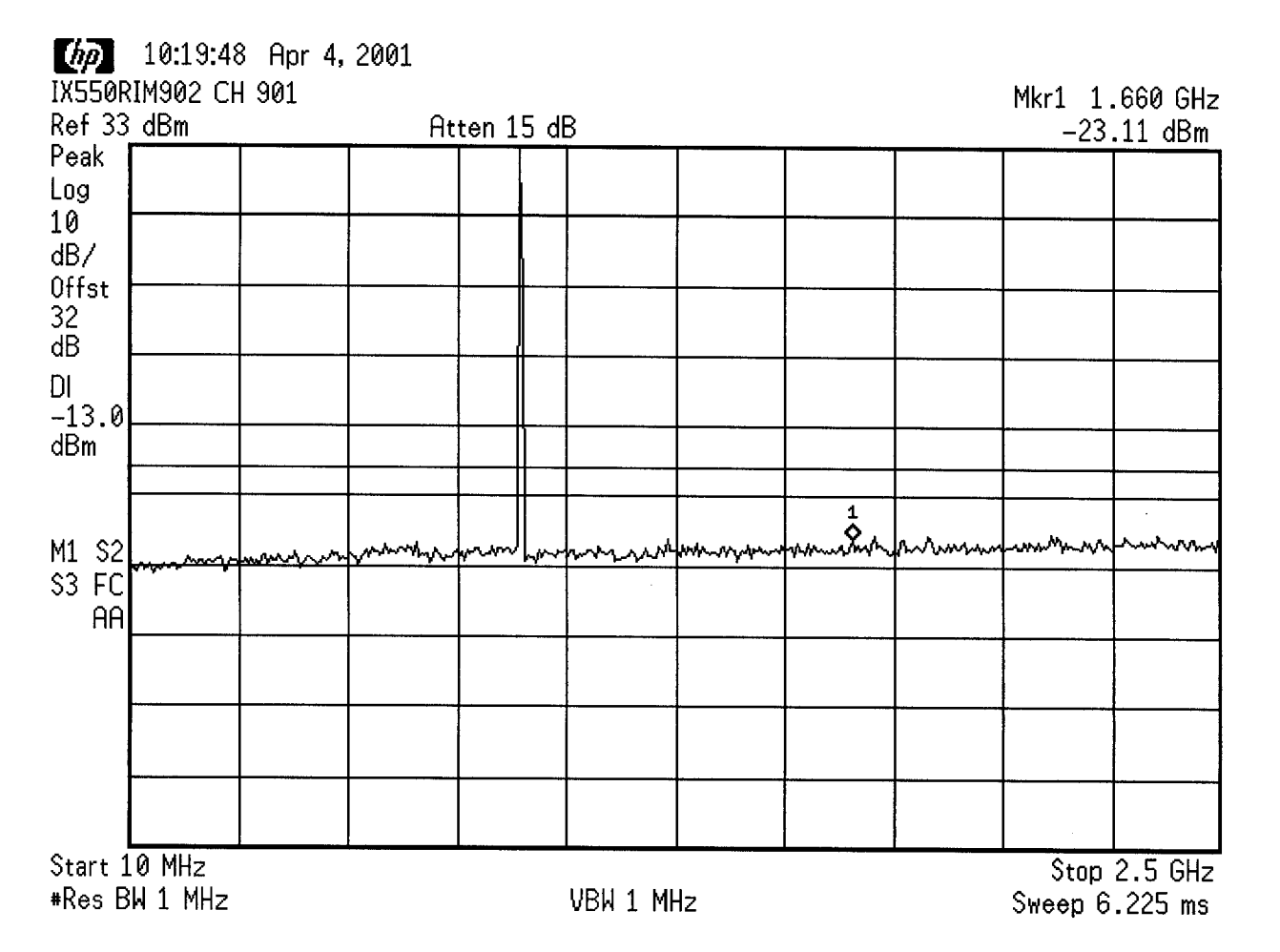
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms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-23.11 dBm
Peak
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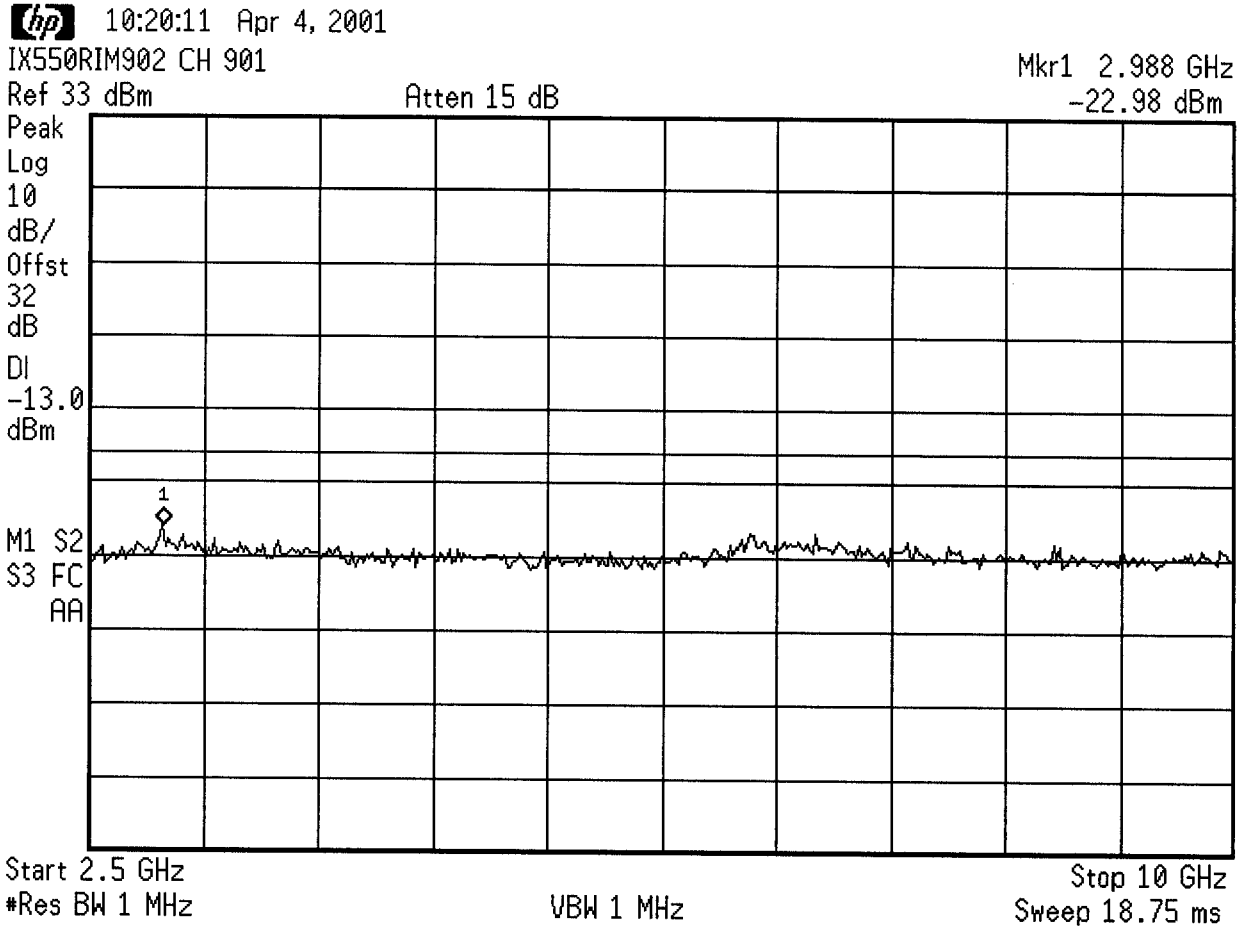
10
dB/
Offst
32
dB
Dl
-13.0
dBm
M1 S2
S3 FC
AA
1
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms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32
dB
Dl
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S3 FC
AA
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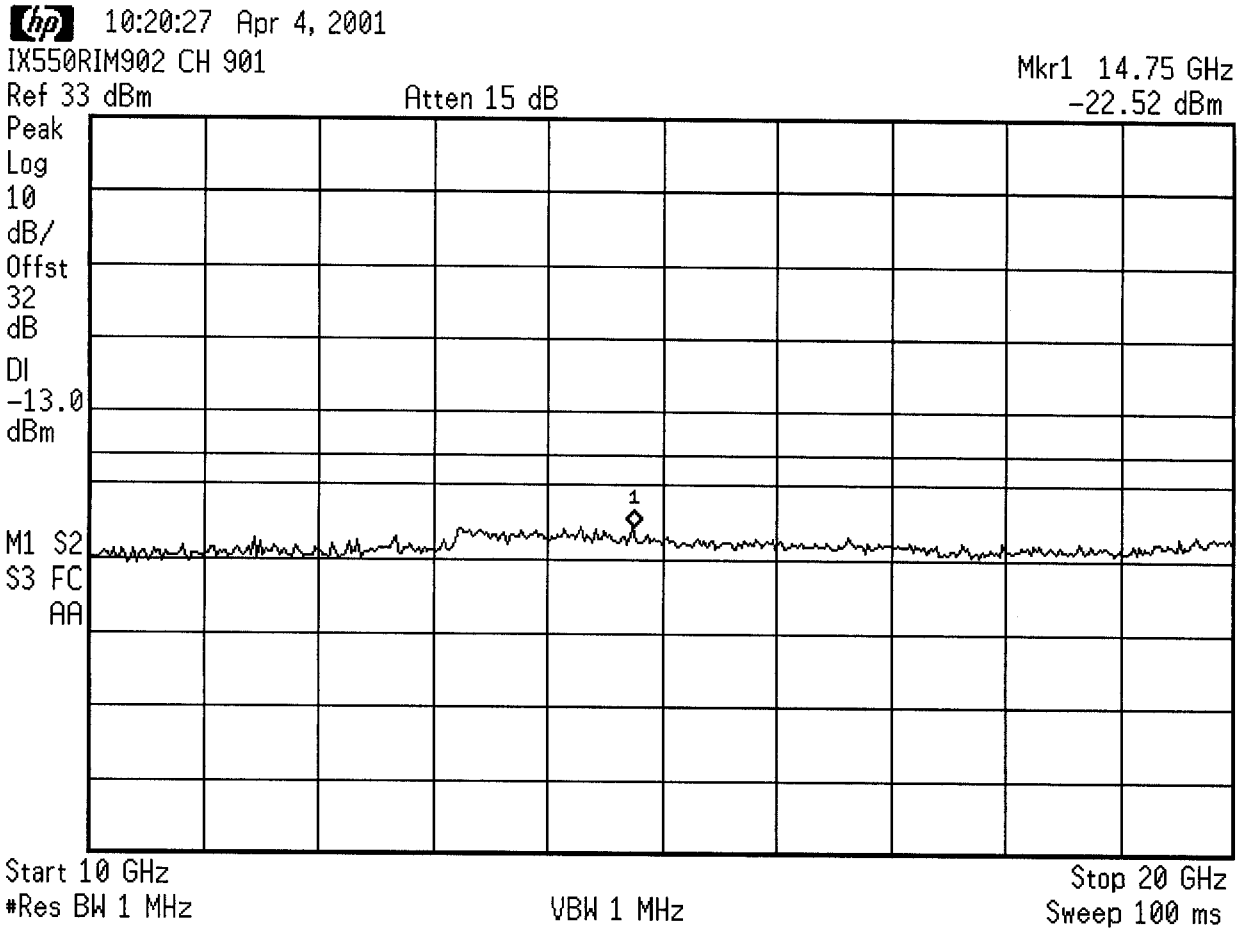
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms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Log
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dB/
Offst
32
dB
Dl
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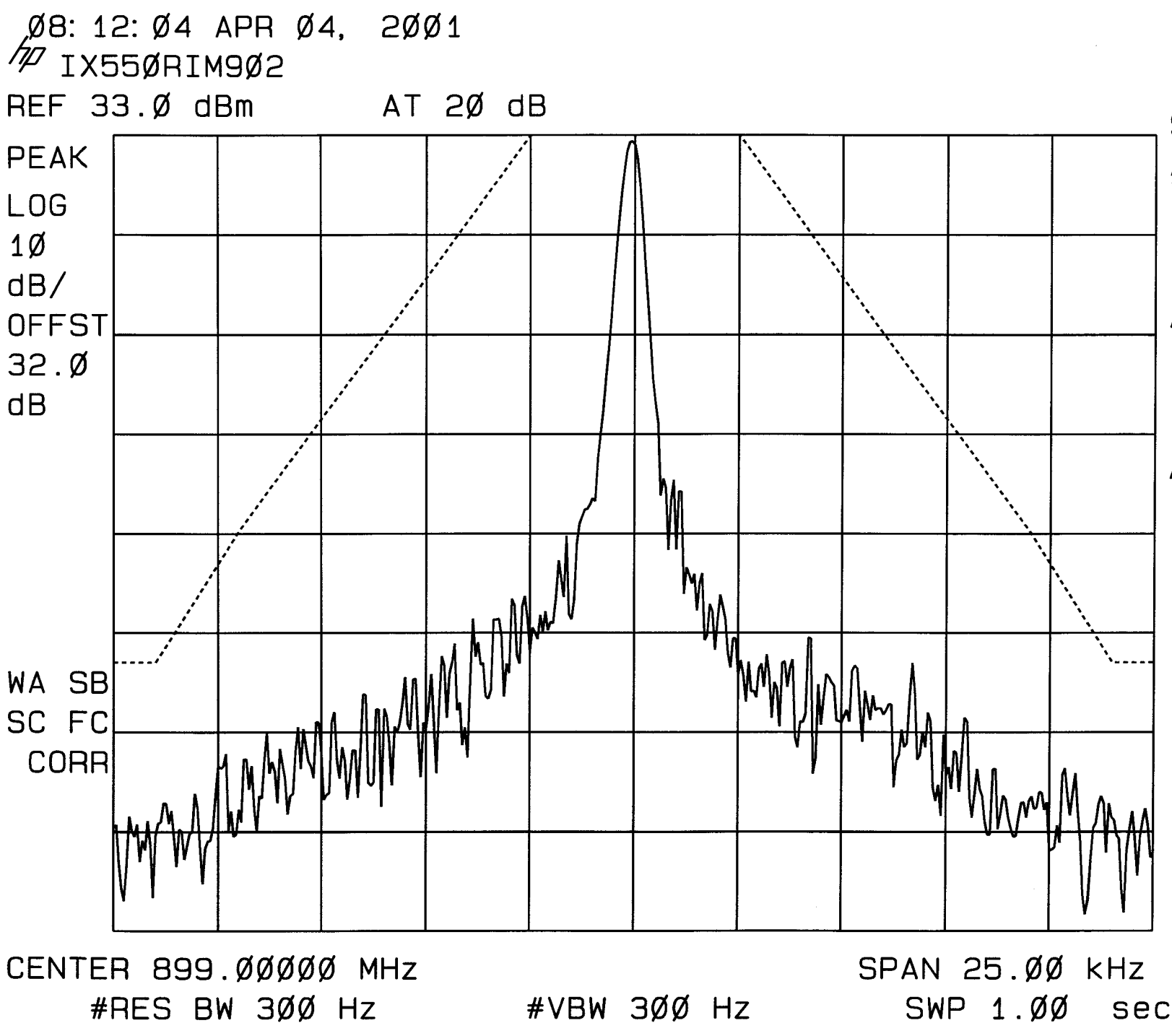
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms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IX55ØRIM9Ø2
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AT 2Ø dB
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LOG
1Ø
dB/
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32.Ø
dB
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SC FC
CORR
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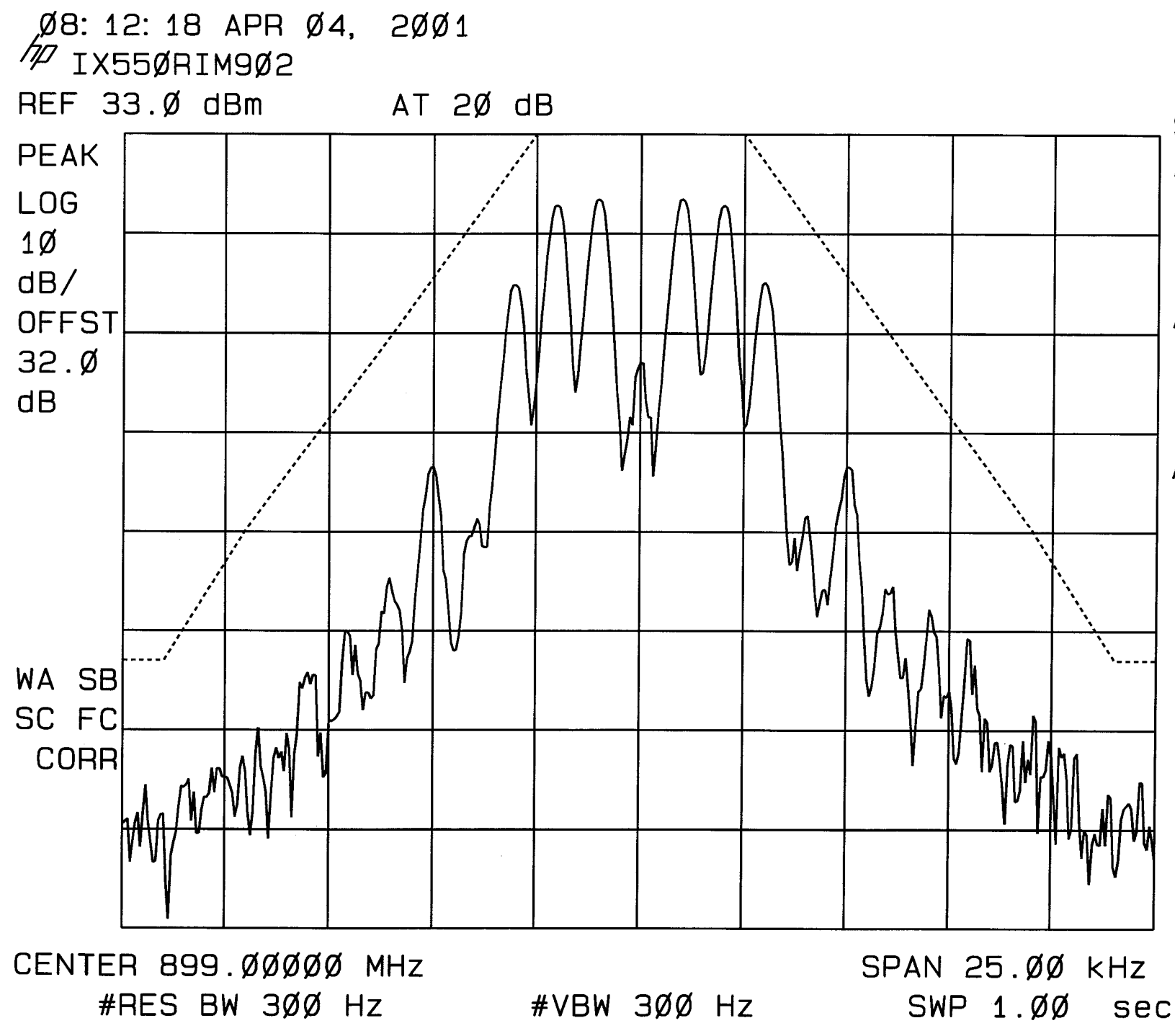
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dB
WA SB
SC FC
CORR
CENTER 899.ØØØØØ MHz
SPAN 25.ØØ kHz
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