DECLARATION OF COMPLIANCE
FCC PART 24(E) EMC MEASUREMENTS

Test Lab

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Applicant Information

ITRONIX CORPORATION
801 South Stevens Street
Spokane, WA 99204
USA

FCC IDENTIFIER:	**KBCIX100XAC750**
IC Certification No.:	**1943A-IX100Xa**
Model(s):	**IX100XAC750**

FCC Rule Part(s):	**FCC 47 CFR §24(E), §2**
IC Rule Part(s):	**RSS-133 Issue 2**
Test Procedure(s):	**FCC 47 CFR §24(E), §2; ANSI TIA/EIA-603-A-2001**
FCC Device Classification:	**PCS Licensed Transmitter (PCB)**
IC Device Classification:	**2GHz Personal Communication Services (RSS-133 Issue 2)**

Device Type:	**Rugged Handheld PC with Sierra Wireless AirCard 750 PCS GPRS Modem**
Tx Frequency Range:	**1850.2 - 1909.8 MHz**
Max. EIRP Measured:	**1.07 Watts (30.28 dBm)**
Conducted Power Tested:	**28.7 dBm - Peak (1850.2 MHz)** **28.6 dBm - Peak (1880.0 MHz)** **28.6 dBm - Peak (1909.8 MHz)**
Modulation:	**GMSK**
Emission Designator:	**271KGXW**
Frequency Tolerance(s):	**0.1 PPM**
Antenna Type(s) Tested:	**External - ¼ Wave Helix (PCS GPRS)**
Battery Type(s) Tested:	**Lithium-ion 7.4 V, 3.0 Ah (P/N: 46-0136-001)**

This wireless portable device has demonstrated compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC 47 CFR §24(E), §2, Industry Canada RSS-133 Issue 2, and ANSI TIA/EIA-603-A-2001.

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.

Russell Pipe
Senior Compliance Technologist
Celltech Labs Inc.

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FCC PART 24(E) EMC MEASUREMENT REPORT

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 and Industry Canada.

2.1 GENERAL INFORMATION

APPLICANT

ITRONIX CORPORATION
801 South Stevens Street
Spokane, WA 99204
USA

FCC IDENTIFIER		KBCIX100XAC750			
Model(s)		IX100XAC750			
Serial No.		510495001-U5103-0025		Identical Prototype	
Device Type		Rugged Handheld PC with internal PCS GPRS PCMCIA Modem			
FCC	**Rule Part(s)**	47 CFR §24(E), §2			
	Classification(s)	PCS Licensed Transmitter (PCB)			
IC	**Rule Part(s)**	RSS-133 Issue 2			
	Classification(s)	2GHz Personal Communication Services			
Test Procedure(s)		FCC 47 CFR §24(E), §2; ANSI TIA/EIA-603-A-2001			
Tx Frequency Range		1850.2 - 1909.8 MHz			
Modulation		GMSK			
Max. EIRP Measured		1.07 Watts		1909.8 MHz	
Max. RF Conducted Output Power Tested		28.7 dBm	1850.2 MHz	Peak Conducted	at PCMCIA Card
		28.6 dBm	1880.0 MHz	Peak Conducted	at PCMCIA Card
		28.6 dBm	1909.8 MHz	Peak Conducted	at PCMCIA Card
Emission Designator		271KGXW			
Frequency Tolerance		0.1 PPM			
Battery Type(s) Tested		Lithium-ion	7.4 V, 3.0 Ah	P/N: 46-0136-001	
Antenna Type(s) Tested		GPRS	External	¼ Wave Helix	

3.1 RF OUTPUT POWER MEASUREMENT - §2.1046; RSS-133 §6.2

The conducted power levels were measured with a Gigatronics 8652A Universal Power Meter using modulated burst average power mode. An offset was entered into the power meter to correct for the losses of the attenuator and cable installed before the sensor input. The transmitter terminal was coupled to the power meter and the DUT was placed into test mode via internal software. All subsequent tests were performed using the same tune-up procedures.

Conducted Power Measurements					
Frequency (MHz)	Measured at the IX100X Antenna Connector			Measured at the PCMCIA Card	
	Average Power (dBm)	Peak Power (dBm)	Cable Loss (dB)	Average Power (dBm)	Peak Power (dBm)
1850.2	27.6	27.7	1.0	28.6	28.7
1880.0	27.6	27.7	0.9	28.5	28.6
1909.8	27.5	27.6	0.9	28.4	28.6

4.1 SPURIOUS EMISSIONS AT ANTENNA TERMINAL - §2.1051; RSS-133 §6.3

The DUT was tested in GPRS mode via internal software at a full rated power with the DUT transmitting in 4 time slots. An offset was entered into the power meter to correct for all losses of the attenuator and cable installed before the sensor input. The antenna output terminal of the DUT was connected to the input of a 50Ω spectrum analyzer through a matched 30dB attenuator and coaxial cable. The resolution bandwidth and video bandwidth were set to 1MHz. The spectrum was scanned from 10MHz to 20GHz at the low, medium, and high channels. The reported emissions were below the specified limit of -13dBm. Spectrum analyzer plots are shown in Appendix A.

5.1 OCCUPIED BANDWIDTH & EMISSION BANDWIDTH - §2.1049, §24.238; RSS-133 §6.3

The DUT was tested in GPRS mode via internal software at a full rated power with the DUT transmitting in 4 time slots. The DUT was connected to the input of a 50Ω spectrum analyzer through a matched 30dB attenuator. The resolution bandwidth and video bandwidth were set to 3kHz. -26dBc emission bandwidth and 99% occupied bandwidth data was reported for low, mid and high frequencies as shown in the table below. Spectrum analyzer plots are shown in Appendix A.

Frequency (MHz)	-26 dBc Emission Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
1850.2	300.8	256.7827
1880.0	300.3	254.5114
1909.8	300.7	253.7166

Specified 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 emissions 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 measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.
(e) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

6.1 EFFECTIVE ISOTROPIC RADIATED POWER OUTPUT - §24.232(b); RSS-133 §6.2

EIRP measurements were performed using the Signal Substitution Method in accordance with ANSI TIA/EIA-603-A-2001 on a 3-meter open area test site. The DUT was placed on a turntable 3-meters from the receive antenna. The DUT was transmitting in 4 time slots in GPRS mode via internal software at a full rated power. The field of maximum intensity was found by rotating the DUT 360 degrees and changing the height of the receive antenna from 1 to 4 meters. Once a peak was found the spectrum analyzer was set to peak hold and the value of the emission was extracted. The field strength was recorded for each channel being tested, and for both DUT antenna polarizations and modes. A standard gain horn antenna was substituted in place of the DUT. 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 signal to the antenna, and the input level of the antenna was adjusted to the same field strength level as the DUT. 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 conducted power for the horn antenna was then determined and the EIRP level was determined by adding the horn forward conducted power and the horn antenna gain.

Freq. Tuned	Maximum Field Strength of DUT	Antenna Polariz.	Horn Gain	Horn Forward Conducted Power	EIRP of DUT Horn Gain + Horn Forward Conducted Power	
MHz	dBm	H/V	dBi	dBm	dBm	Watts
1850.2	-8.560	H	6.55	22.40	28.95	0.785
1880.0	-8.412	H	6.58	23.15	29.73	0.940
1909.8	-8.563	H	6.61	23.67	30.28	1.07
1850.2	-12.17	V	6.55	18.31	24.86	0.306
1880.0	-12.02	V	6.58	19.08	25.66	0.368
1909.8	-12.21	V	6.61	19.58	26.19	0.416

7.1 RADIATED MEASUREMENT TEST SETUP - §2.1053, §24.232(b); RSS-133 §6.2, §6.3

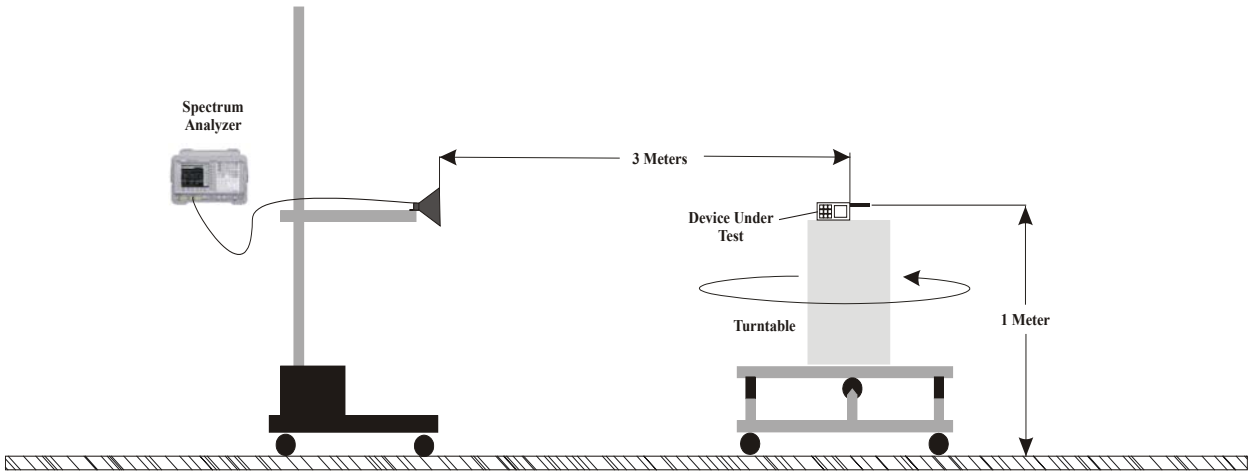


Figure 1. Radiated Measurement Test Setup Diagram

8.1 FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053; RSS-133 §6.3

Radiated and harmonic emissions were measured on a 3-meter open area test site using the Signal Substitution Method in accordance with ANSI TIA/EIA-603-A-2001. The DUT was transmitting in 4 time slots in GPRS mode via internal software at a full rated power. The DUT was placed on the turntable with the transmitter transmitting into a non-radiating load. A receiving antenna located 3 meters from the turntable received any signal radiated from the transmitter and its operating accessories. The receiving antenna was varied in height from 1 to 4 meters and the polarization was varied (horizontal and vertical) to determine the worst-case emission level. A standard gain horn antenna was substituted in place of the DUT. A modulated signal was fed through a directional coupler to the antenna 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 DUT. The antenna feed point was then connected to a calibrated power meter and the power was adjusted to read the same power at the coupler port previously recorded, to account for any mismatch in impedance, which may occur at the horn antenna. The conducted power at the antenna feed point was then recorded. The forward conducted power for the horn antenna was determined by measuring the power at the horn antenna feed point and reproducing the coupler power previously measured. The EIRP level was determined by adding the horn forward conducted power and the horn antenna gain. All spurious emissions from the lowest radio frequency generated in the device to the tenth harmonic of the carrier were investigated.

Test Date: 03/19/04
Operating Frequency (MHz): 1850.2
Channel: 512 (Low)
Peak Conducted Pwr. (dBm): 28.7
Measured EIRP (dBm): 28.95
Modulation: GMSK
Distance: 3 Meters
Limit: 43 + 10 log (W) = 41.95 dBc

Frequency	Field Strength of Spurious Radiation	Horn Forward Conducted Power	Standard Gain Horn Antenna Gain	POL	EIRP	ERP	dBc
MHz	dBm	dBm	dBi	H/V	dBm	dBm	
3700.40	-75.38	-42.49	6.6	H	-35.89	-38.03	66.98
5550.60	-76.57	-38.77	7.8	H	-30.97	-33.11	62.06
7400.80	-73.60	-37.02	7.8	H	-29.22	-31.36	60.31
9251.00	-73.84	-35.82	7.6	H	-28.22	-30.36	59.31
11101.20	-75.09	-38.73	8.5	H	-30.23	-32.37	61.32
12951.40	-74.94	-37.06	8.8	H	-28.26	-30.40	59.35
14801.60	-70.34	-32.46	9.6	H	-22.86	-25.00	53.95
16651.80	-71.94	-34.11	9.0	H	-25.11	-27.25	56.20
18502.00	-73.21	-37.00	9.3	H	-27.70	-29.84	58.79

FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053; RSS-133 §6.3 (Cont.)

Test Date: 03/19/04
Operating Frequency (MHz): 1880.0
Channel: 661 (Mid)
Peak Conducted Pwr. (dBm): 28.6
Measured EIRP (dBm): 29.73
Modulation: GMSK
Distance: 3 Meters
Limit: 43 + 10 log (W) = 42.73 dBc

Frequency	Field Strength of Spurious Radiation	Horn Forward Conducted Power	Standard Gain Horn Antenna Gain	POL	EIRP	ERP	dBc
MHz	dBm	dBm	dBi	H/V	dBm	dBm	
3760.00	-76.57	-43.68	6.6	H	-37.08	-39.22	68.95
5640.00	-75.39	-37.59	7.8	H	-29.79	-31.93	61.66
7520.00	-72.64	-36.06	7.8	H	-28.26	-30.40	60.13
9400.00	-74.31	-36.29	7.6	H	-28.69	-30.83	60.56
11280.00	-75.01	-38.65	8.5	H	-30.15	-32.29	62.02
13160.00	-74.36	-36.48	8.8	H	-27.68	-29.82	59.55
15040.00	-71.95	-34.07	9.6	H	-24.47	-26.61	56.34
16920.00	-71.93	-34.10	9.0	H	-25.10	-27.24	56.97
18800.00	-73.24	-37.03	9.3	H	-27.73	-29.87	59.60

Test Date: 03/19/04
Operating Frequency (MHz): 1909.8
Channel: 810 (High)
Peak Conducted Pwr. (dBm): 28.6
Measured EIRP (dBm): 30.28
Modulation: GMSK
Distance: 3 Meters
Limit: 43 + 10 log (W) = 43.29 dBc

Frequency	Field Strength of Spurious Radiation	Horn Forward Conducted Power	Standard Gain Horn Antenna Gain	POL	EIRP	ERP	dBc
MHz	dBm	dBm	dBi	H/V	dBm	dBm	
3819.60	-77.23	-44.34	6.6	H	-37.74	-39.88	70.16
5729.40	-75.90	-38.10	7.8	H	-30.30	-32.44	62.72
7639.20	-74.54	-37.96	7.8	H	-30.16	-32.30	62.58
9549.00	-74.58	-36.56	7.6	H	-28.96	-31.10	61.38
11458.80	-74.79	-38.43	8.5	H	-29.93	-32.07	62.35
13368.60	-68.78	-30.90	8.8	H	-22.10	-24.24	54.52
15278.40	-71.76	-33.88	9.6	H	-24.28	-26.42	56.70
17188.20	-71.86	-34.03	9.0	H	-25.03	-27.17	57.45
19098.00	-71.68	-35.47	9.3	H	-26.17	-28.31	58.59

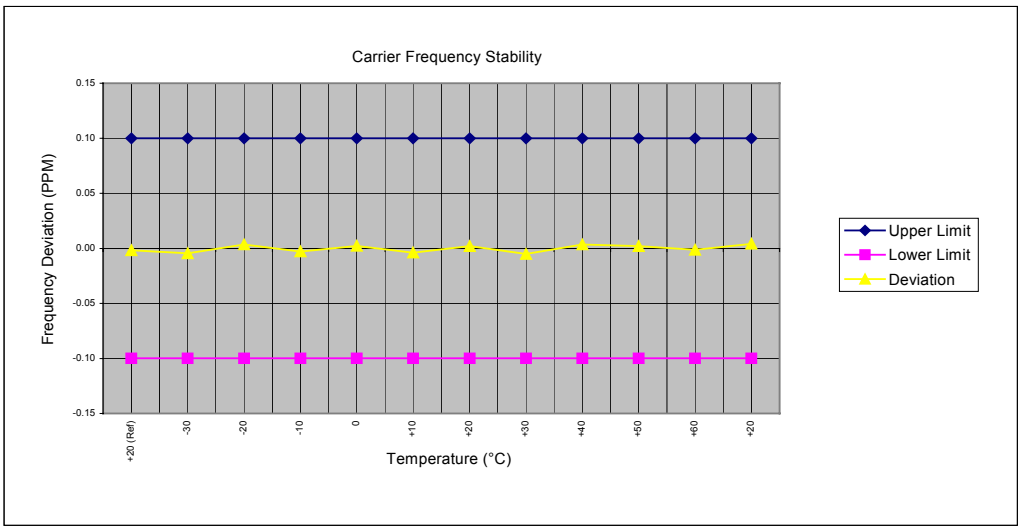
9.1 FREQUENCY STABILITY / TEMPERATURE VARIATION - §2.1055, §24.235; RSS-133 §7

The minimum frequency stability shall be ±150Hz referenced to a received carrier frequency. This meets the requirement for operational accuracy of 0.00005% for digital mode. An HP 53181A Frequency Counter was used to measure the error in the fundamental frequency. The transmitter was set to maximum power at the center frequency of the band. The DUT was tested inside the temperature chamber.

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

Carrier Frequency (GHz): 1.88
Channel: 661
Mode: GPRS
Deviation Limit (PPM): 0.1

Temperature	Voltage	Power	Carrier Frequency Deviation		Specification	
(°C)	(%)	(VDC)	(Hz)	(PPM)	Lower Limit (PPM)	Upper Limit (PPM)
+20 (Ref)	100	7.4	-3.56	-0.002	0.1	-0.1
-30	100	7.4	-8.66	-0.005	0.1	-0.1
-20	100	7.4	6.59	0.004	0.1	-0.1
-10	100	7.4	-5.43	-0.003	0.1	-0.1
0	100	7.4	4.20	0.002	0.1	-0.1
+10	100	7.4	-7.14	-0.004	0.1	-0.1
+20	100	7.4	3.77	0.002	0.1	-0.1
+30	100	7.4	-9.85	-0.005	0.1	-0.1
+40	100	7.4	6.34	0.003	0.1	-0.1
+50	100	7.4	3.91	0.002	0.1	-0.1
+60	100	7.4	-2.60	-0.001	0.1	-0.1
+20	Endpoint	6.1	7.55	0.004	0.1	-0.1



Time Period and Procedure:

1. The carrier frequency of the transmitter was measured at room temperature (25°C to 27°C to provide a reference).
2. The device was subjected to an overnight "soak" at -30°C without any power applied.
3. After the overnight "soak" at -30°C, the measurement of the carrier frequency of the transmitter was 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 hour was provided to allow stabilization of the device at each temperature level.

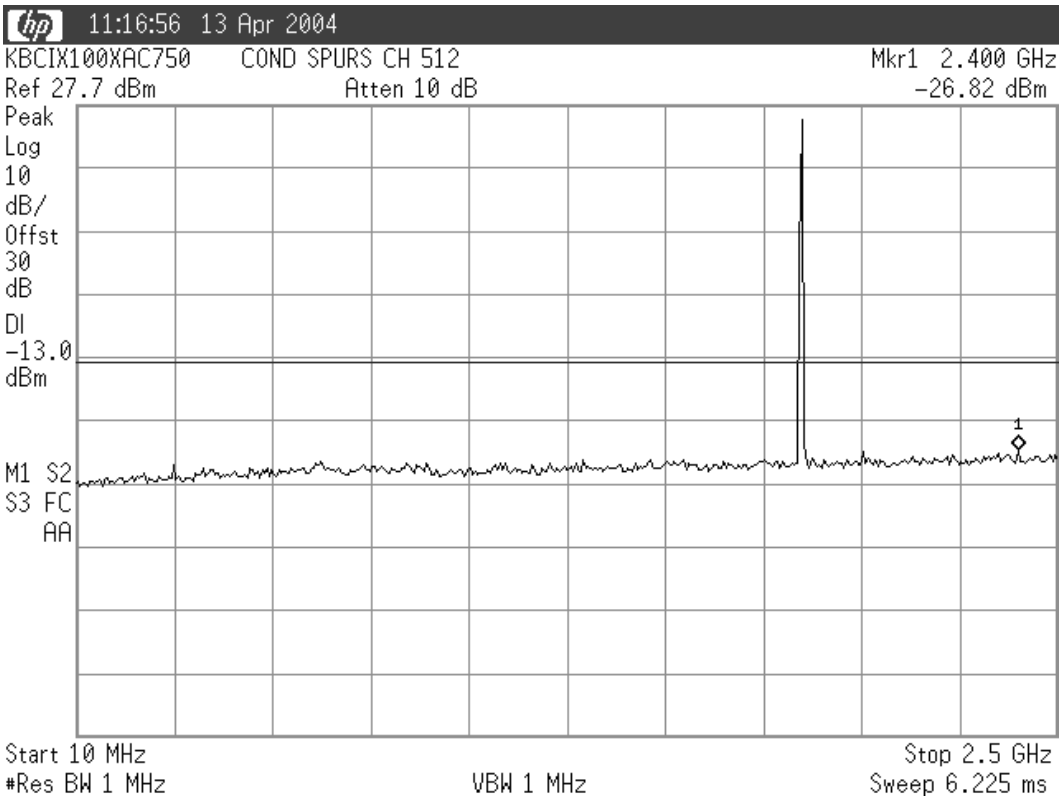
10.1 TEST EQUIPMENT LIST

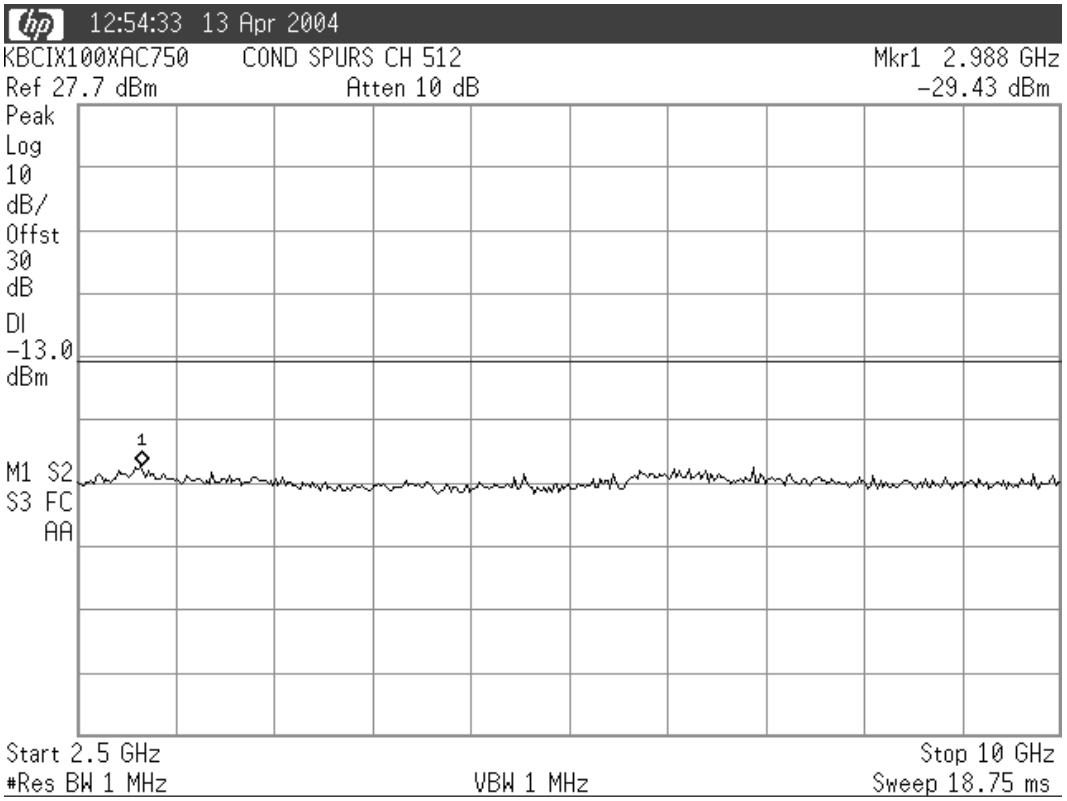
TEST EQUIPMENT LIST			
Equipment Type	**Model**	**Serial No.**	**Calibration Date**
HP Signal Generator	8648D (9kHz-4.0GHz)	3847A00611	April 2003/4
Rohde & Schwarz Signal Generator	SMR 20 (10MHz-40GHz)	100104	April 2003/4
Gigatronics Power Meter	8651A	8650137	April 2003/4
Gigatronics Power Meter	8652A	1835267	April 2003/4
Gigatronics Power Sensor	80701A (0.05-18GHz)	1833535	April 2003/4
Gigatronics Power Sensor	80701A (0.05-18GHz)	1833542	April 2003/4
Gigatronics Power Sensor	80701A (0.05-18GHz)	1834350	April 2003/4
Amplifier Research Power Amp.	5S1G4 (5W, 800MHz-4.2GHz)	26235	N/A
Microwave System Amplifier	HP 83017A (0.5-26.5GHz)	3123A00587	N/A
Network Analyzer	HP 8753E (30kHz-3GHz)	US38433013	April 2003/4
Frequency Counter	HP 53181A (3GHz)	3736A05175	April 2003/4
DC Power Supply	HP E3611A	KR83015294	N/A
Multi-Device Controller	EMCO 2090	9912-1484	N/A
Mini Mast	EMCO 2075	0001-2277	N/A
Turntable	EMCO 2080-1.2/1.5	0002-1002	N/A
Double Ridged Horn Antenna	ETS 3115 (1-18GHz)	6267	Oct 2003
Double Ridged Horn Antenna	ETS 3115 (1-18GHz)	6276	Oct 2003
Horn Antenna	Chase BBHA 9120-A (0.7-4.8GHz)	9120A-239	Sept 2003
Horn Antenna	Chase BBHA 9120-A (0.7-4.8GHz)	9120A-240	Sept 2003
Roberts Dipole Antenna	3121C-DB4	0003-1494	Dec 2003
Roberts Dipole Antenna	3121C-DB4	0003-1498	Dec 2003
Spectrum Analyzer	HP 8594E	3543A02721	April 2003/4
Spectrum Analyzer	HP E4408B	US39240170	Dec 2003
Shielded Screen Room	Lindgren R.F. 18W-2/2-0	16297	N/A
Environmental Chamber	ESPEC ECT-2 (Temperature/Humidity)	0510154-B	Feb 2004

11.1 SUMMARY

The data in this measurement report demonstrates that the ITRONIX CORPORATION Model: IX100XAC750 Rugged Handheld PC FCC ID: KBCIX100XAC750 with internal Sierra Wireless AirCard 750 PCS GPRS PCMCIA Modem complies with the test requirements of FCC Parts §24(E), §2 and IC RSS-133 Issue 2.

APPENDIX A - TEST PLOTS





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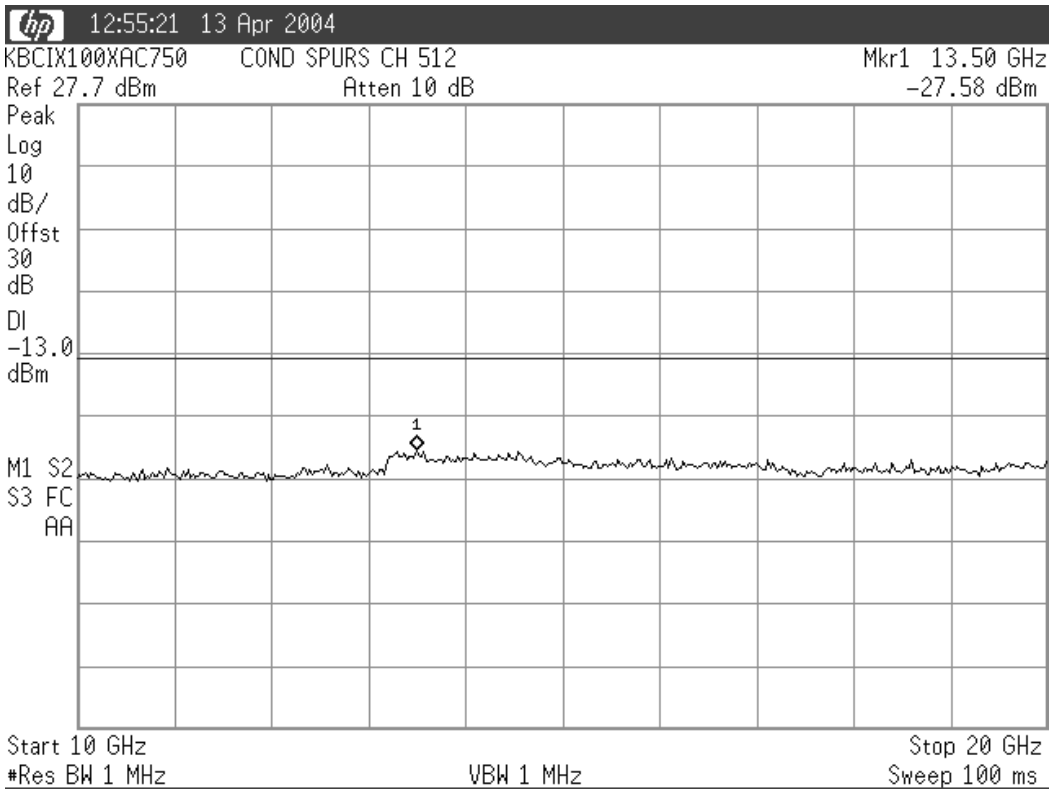

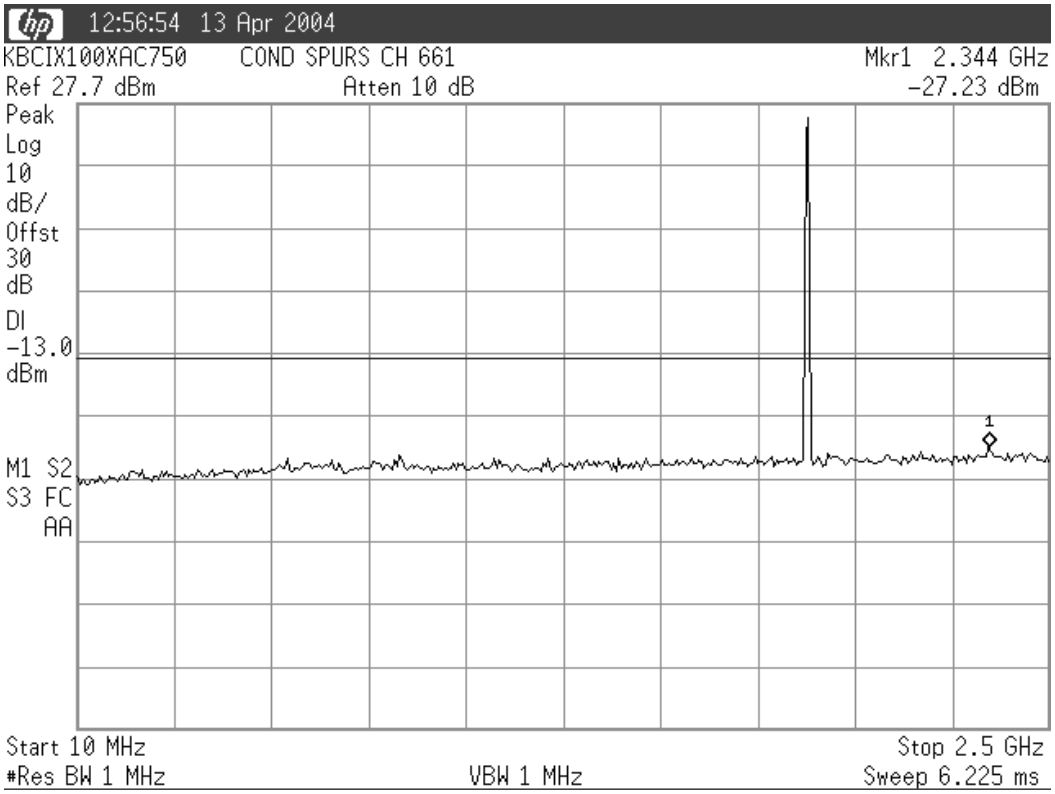

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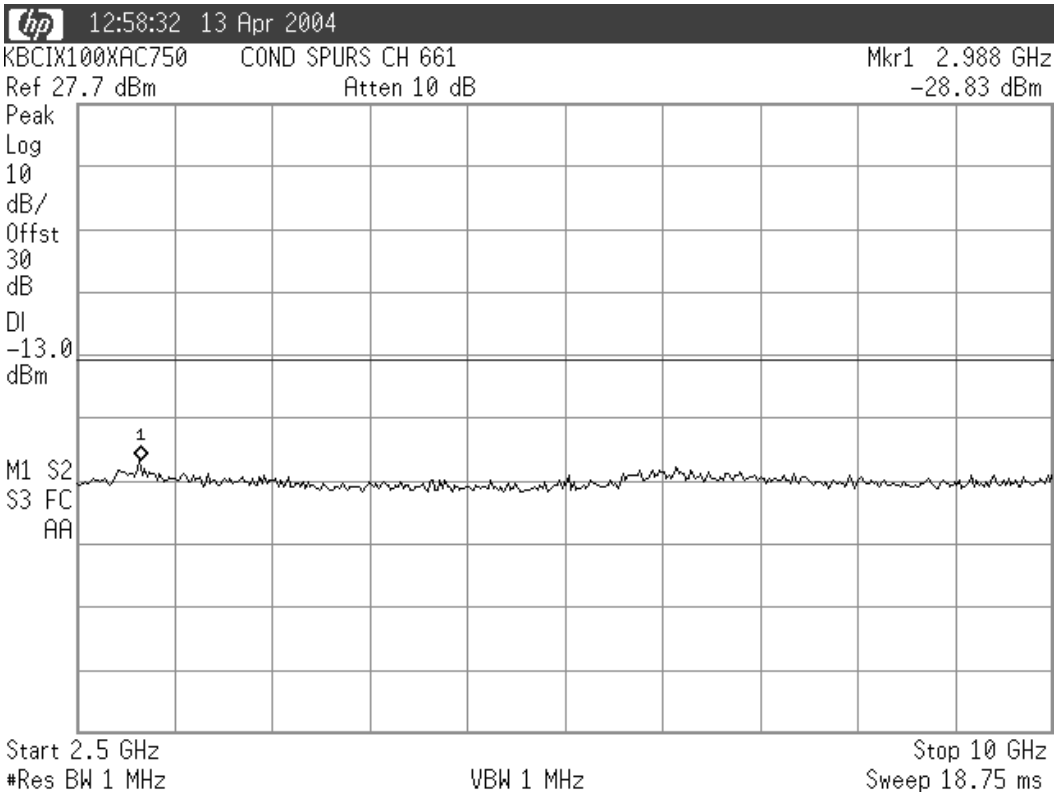

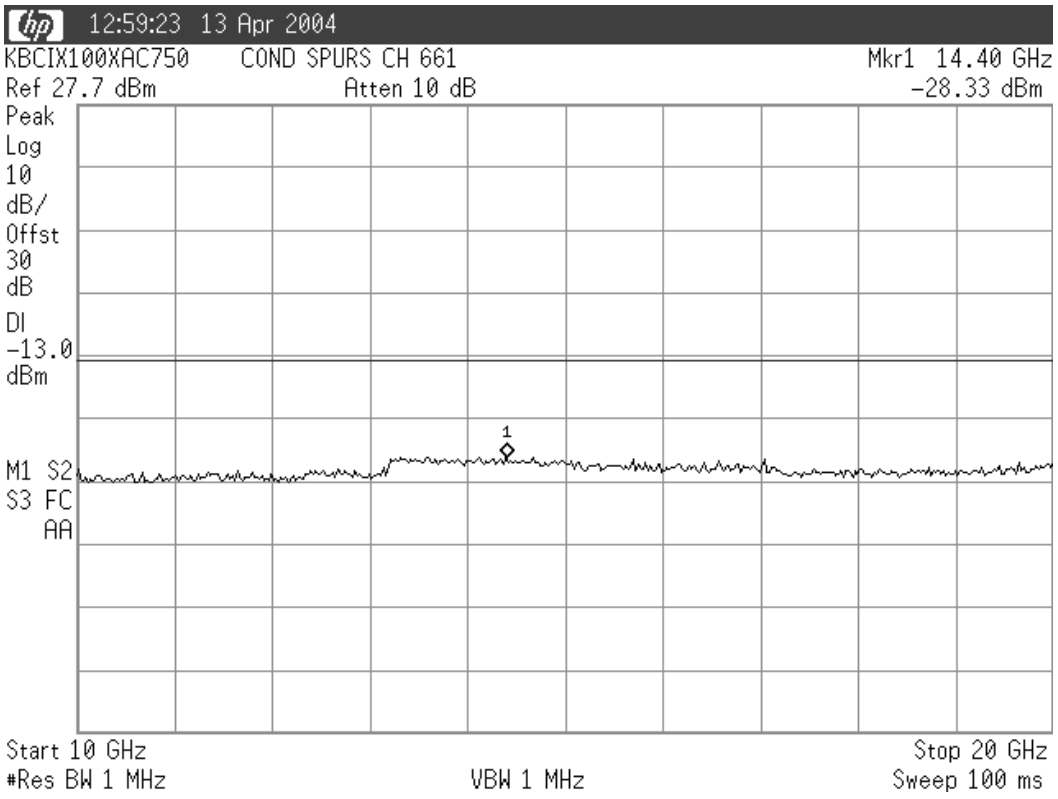

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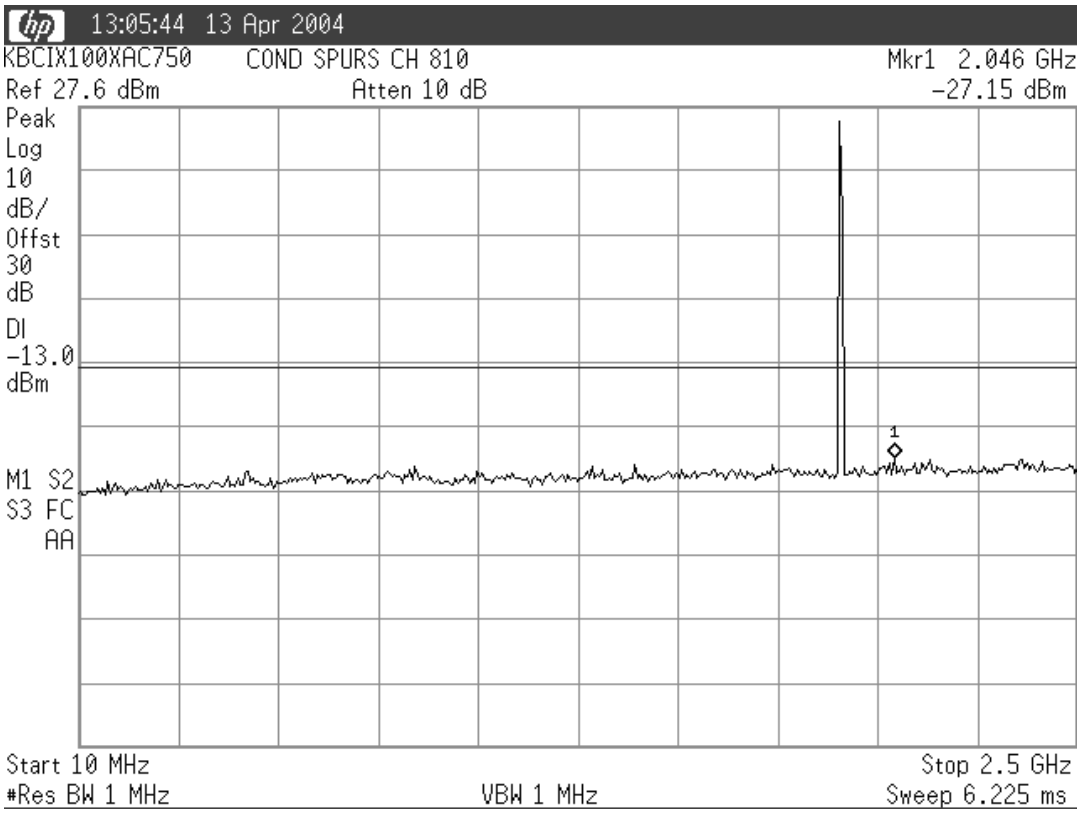

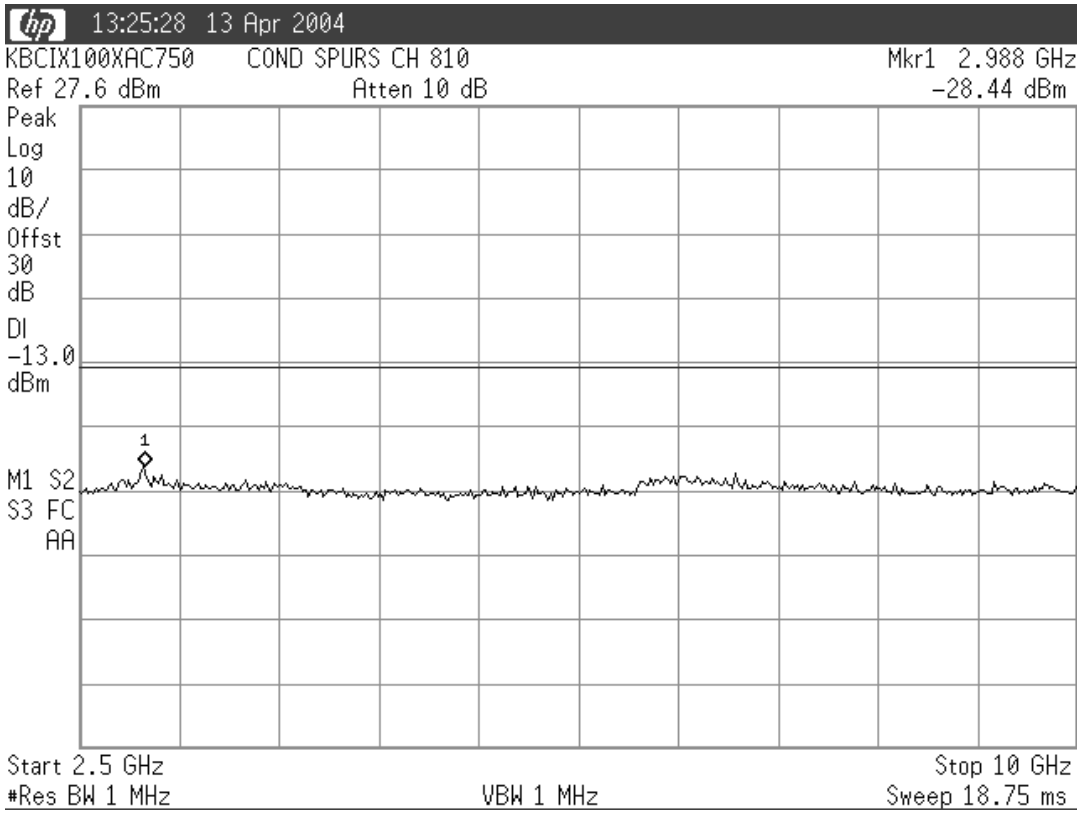

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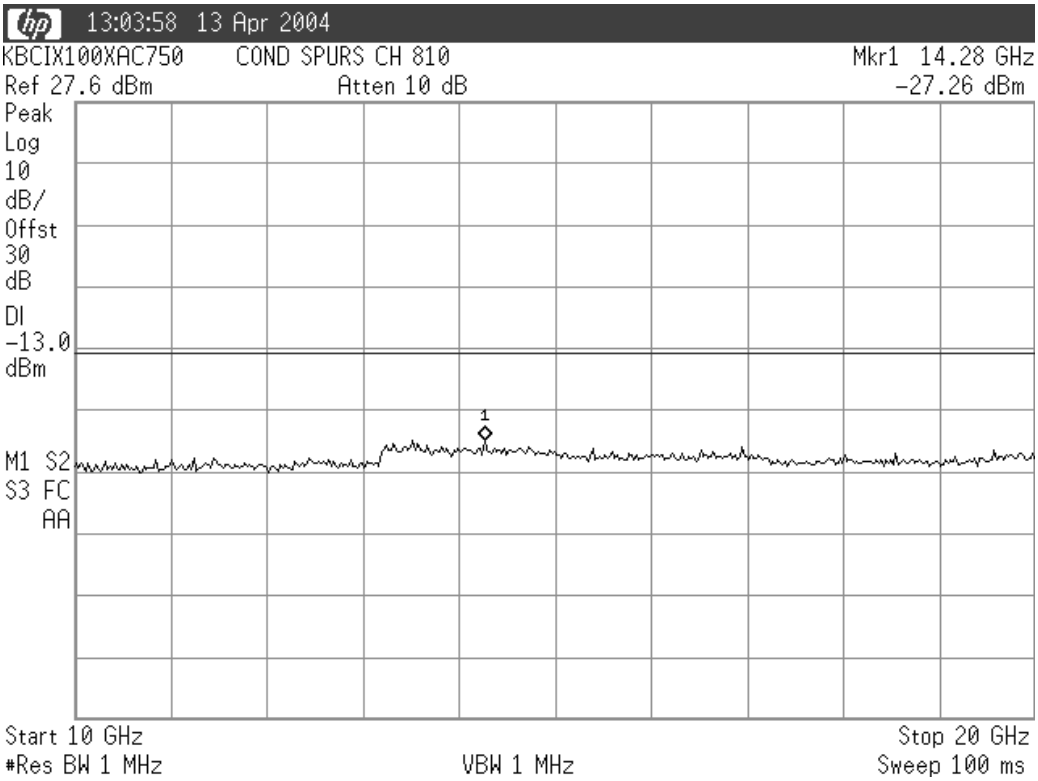

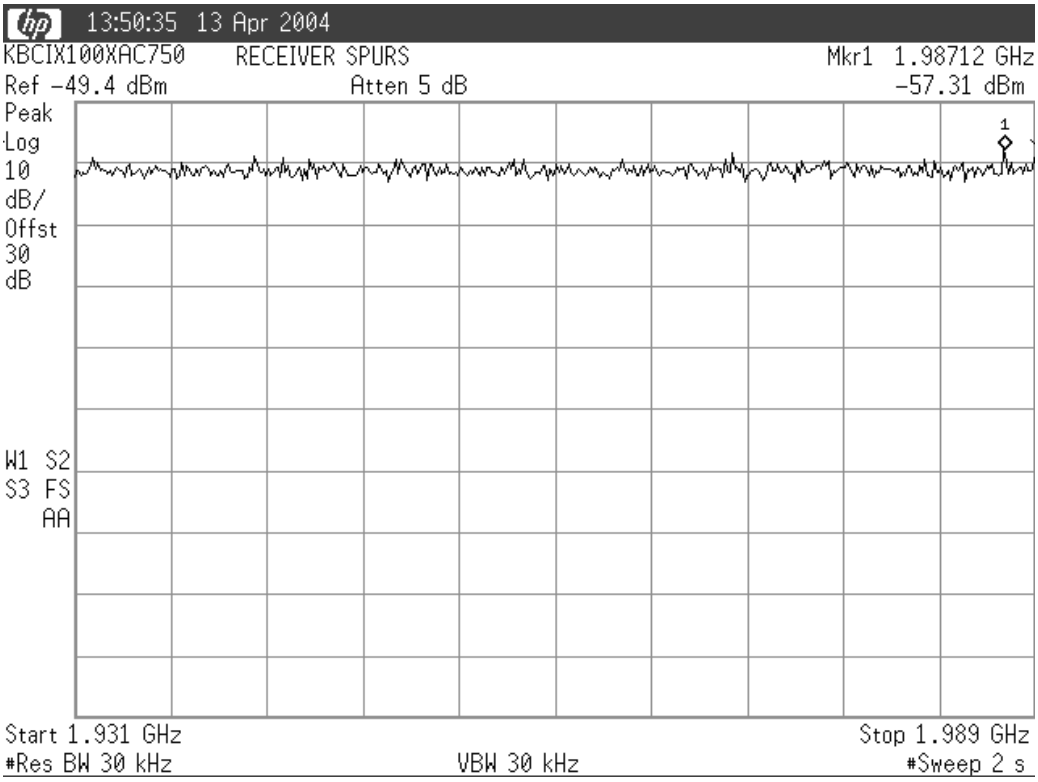

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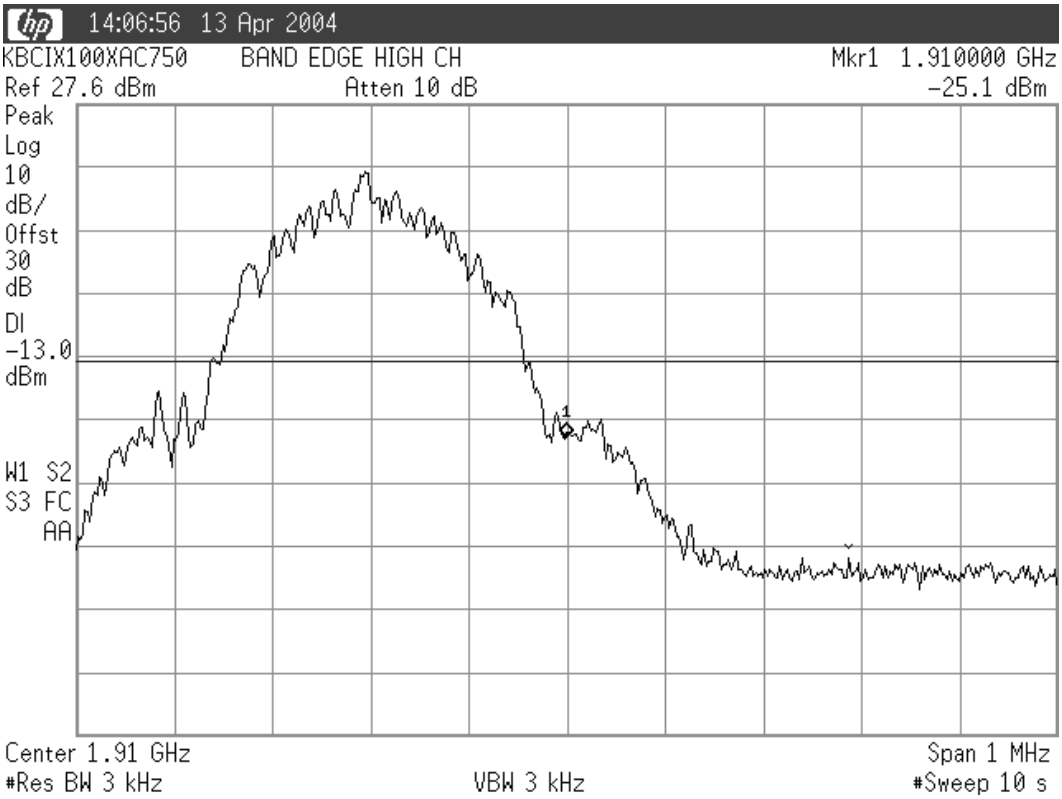

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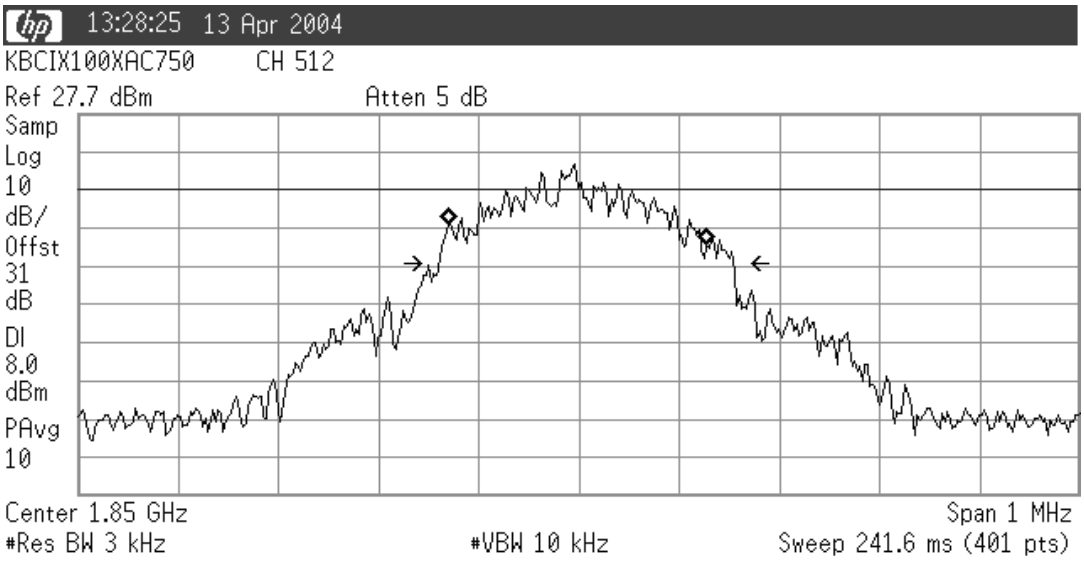
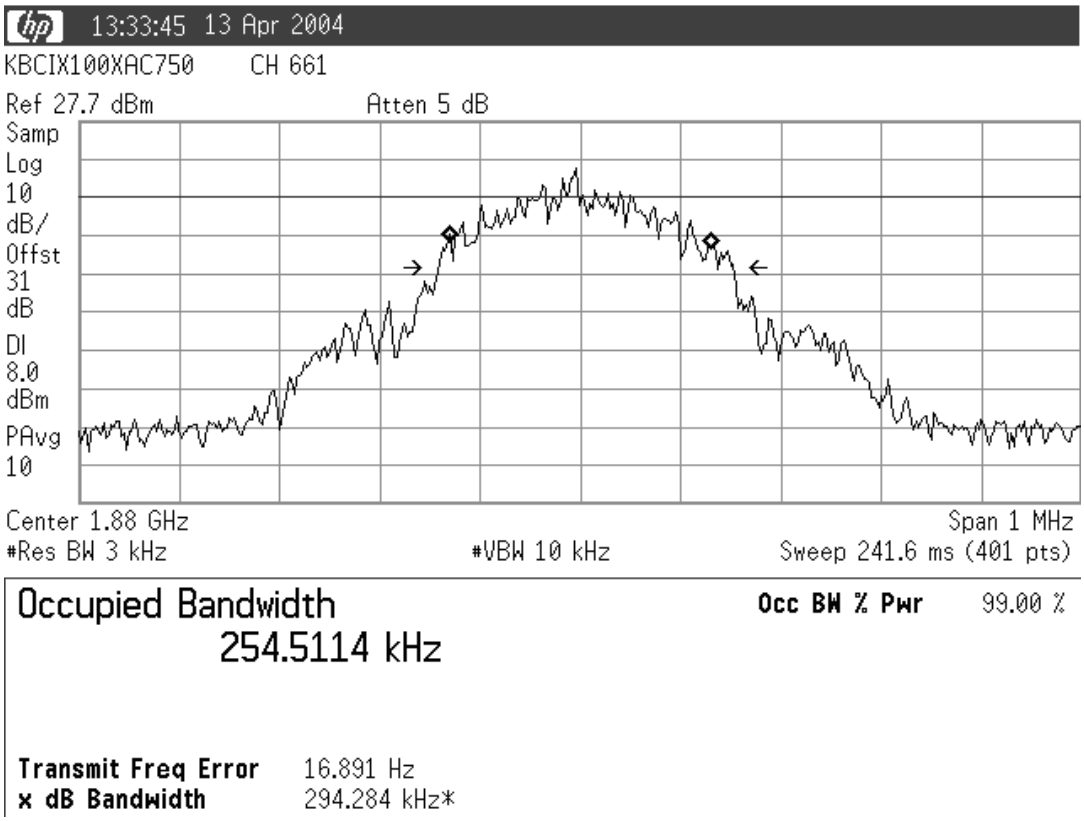
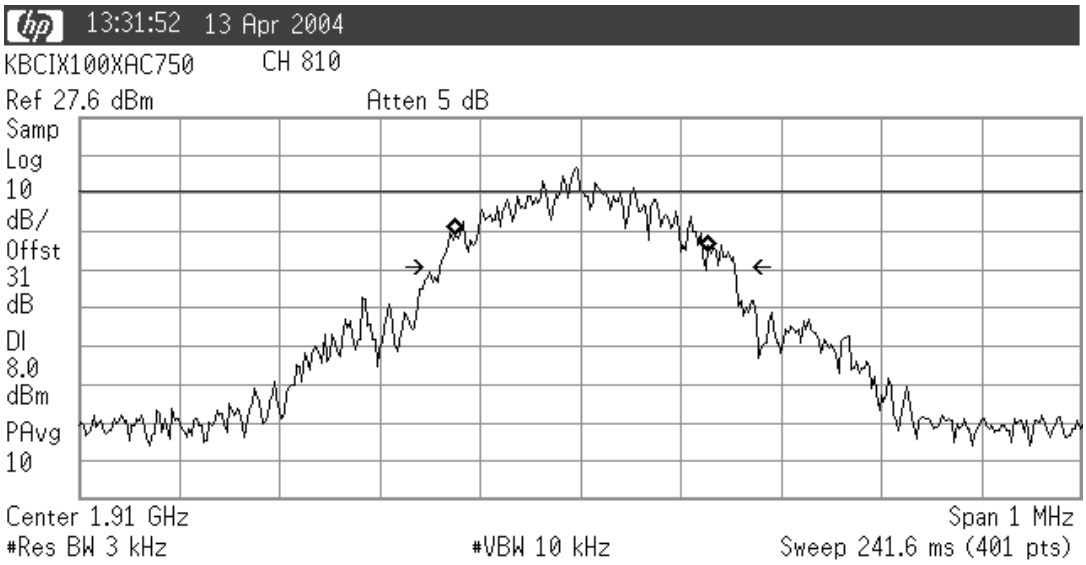
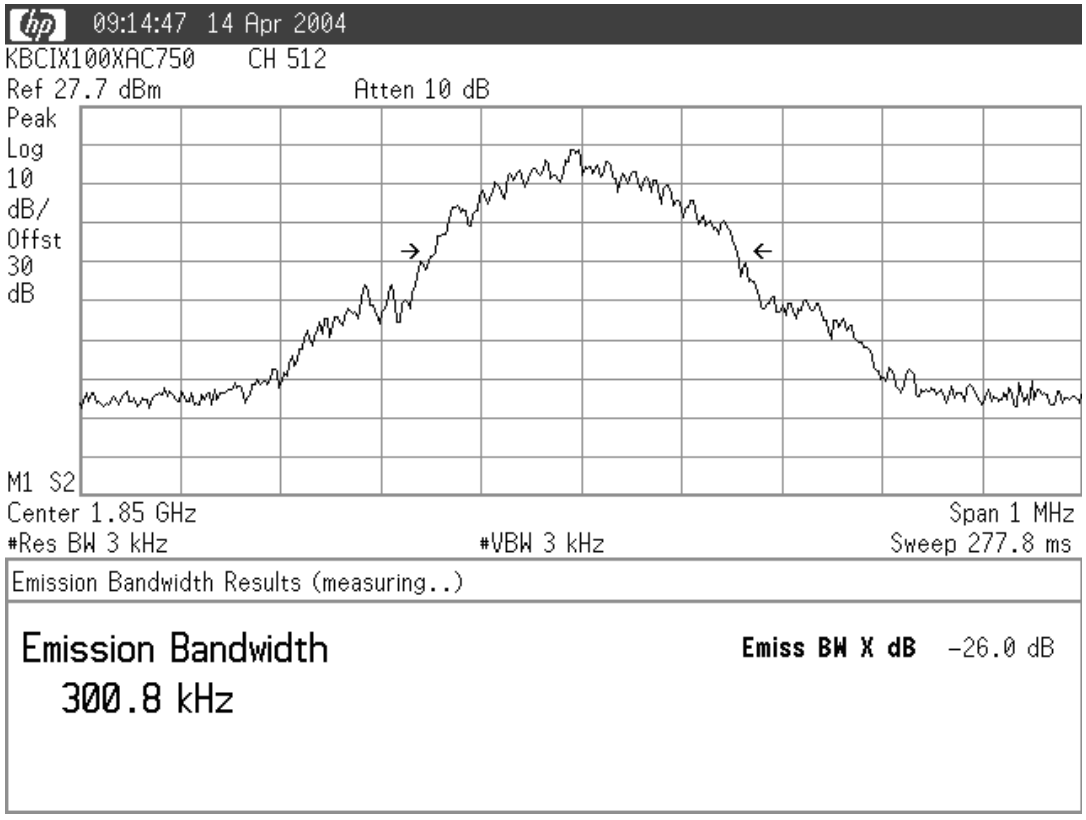




TEST PLOTS (Cont.)





TEST PLOTS (Cont.)