

DECLARATION OF COMPLIANCE FCC PART 22.901(d) EMC MEASUREMENTS				
Test Lab		Applicant Information		
CELLTECH LABS INC.Testing and Engineering Services1955 Moss CourtKelowna, B.C.Canada V1Y 9L3Phone:250-448-7047Fax:250-448-7046e-mail:info@celltechlabs.comweb site:www.celltechlabs.com		ITRONIX CORPORATION 801 South Stevens Street Spokane, WA 99204		
IC Rule Part(s): Test Procedure(s): FCC Device Classification: IC Device Classification: Device Type: FCC ID: Model(s): Tx Frequency Range: Rx Frequency Range: Max. RF Output Power: Conducted Power Tested: Emission Designator(s): Frequency Tolerance(s):	Licensed Non-Broad Data Transmitter in Rugged Laptop PC KBCIX260AC300 IX260 824.04 - 848.97 MHz 869.04 - 893.97 MHz 0.491 Watts (ERP) 28.0 dBm 31K5FXW ± 0.00025 % External Dipole	1(d), §2; ANSI TIA/EIA-603-A-2001 dcast Station Transmitter (TNB) Cellular Mobile Band with Sierra Wireless AirCard 300/350 CDPD Modem		

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 FCC 47 CFR §22.901(d), §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.

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

Jussell W. Pupe

Russell Pipe Senior Compliance Technologist Celltech Labs Inc.





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# FCC PART 22.901(d) 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.

# 1.2 GENERAL INFORMATION - §2.1033(a)

### **APPLICANT**

**ITRONIX CORPORATION** 801 South Stevens Street Spokane, WA 99204

FCC ID	KBCIX260AC300				
Model(s)	IX260				
Serial No.	Pre-production				
EUT Type	Rugged Laptop PC with Sierra Wireless AirCard 300/350 DPD PCMCIA Modem Card				
FCC Rule Part(s)	47 CFR §22.901(d), §2				
IC Rule Part(s)	RSS-118 Issue 2				
FCC Classification	Licensed Non-Broadcast Station Transmitter (TNB)				
IC Classification	Data Transmitter in Cellular Mobile Band				
Tx Frequency Range	824.04 - 848.97 MHz				
Tx Frequency Range	869.04 - 893.97 MHz				
Max. RF Output Power	0.491 Watts (ERP)				
RF Conducted Output Power Tested	28.0 dBm				
Emission Designator	31K5FXW				
Frequency Tolerance	± 0.00025 %				
Modulation	GMSK				
Battery Type(s)	11.1V Lithium-Ion, 6.0Ah (Model: A2121-2)				
Antenna Type	External Dipole (Length: 4.3 inches)				



# 2.1 MEASUREMENT PROCEDURES

## 2.2 RF OUTPUT POWER MEASUREMENT - §2.1046

The peak conducted power levels were measured with a Gigatronics 8650A Universal Power Meter in Continuous Wave 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 EUT was placed into test mode via internal software. All subsequent tests were performed using the same tune-up procedures.

Conducted Power Measurement						
Frequency (MHz Peak Power (dBm)						
824.04	28.0					
836.49	28.0					
848.97	28.0					

### 2.3 SPURIOUS EMISSIONS AT ANTENNA TERMINAL - §2.1051

The EUT was placed in test mode via internal software at a full rated power. The conducted power was measured with a Gigatronics 8650A Universal Power Meter in Continuous Wave mode. An offset was entered into the power meter to correct for all losses of the attenuator and cable installed before the sensor input. The level of the carrier and the various conducted spurious frequencies were measured by means of a calibrated spectrum analyzer. The resolution bandwidth and video bandwidth were set to 1MHz. The spectrum was scanned from 10MHz to 20GHz at the low, mid, and high channels. The radio transmitter was operating at maximum output power. The antenna output terminal of the EUT was connected to the input of a  $50\Omega$  spectrum analyzer through a matched 30dB attenuator and coaxial cable. The reported emissions were below the specified limit of -13dBm.

## 2.4 RECEIVER SPURIOUS EMISSIONS - §22.917(f)

Conducted spurious emissions were measured at the antenna terminal of the EUT using a spectrum analyzer. The transmitter of the EUT was placed into full power and the frequency span of the spectrum analyzer was set to the receiving band of the device. The recorded spurious emissions at the antenna terminal must be attenuated to a level not to exceed -80dBm.

### 2.5 OCCUPIED BANDWIDTH - §2.1049, §22.917

The EUT was placed in test mode via internal software at a full rated power. The EUT was connected to the input of a  $50\Omega$  spectrum analyzer through a matched 30dB attenuator. The resolution bandwidth and video bandwidth were set to 30kHz

#### Specified Limits (as of February 18, 2003):

(a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P) dB$ .

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. 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. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). 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) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.



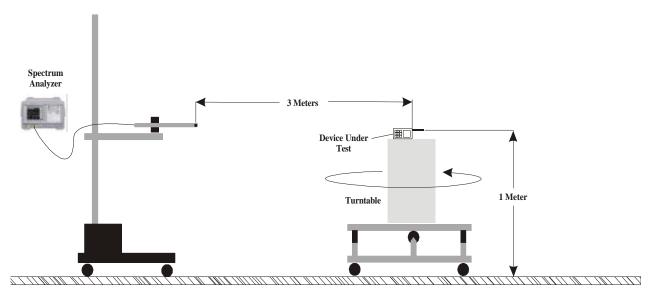
## 2.6 FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053

Radiated and harmonic emissions were measured on a 3-meter open area test site. The EUT was placed into test mode via internal software at a full rated power. The EUT was placed on the turntable with the transmitter transmitting into a non-radiating load. A receiving antenna located 3 meters from the turntable received any signal radiated from the transmitter and its operating accessories. The receiving antenna was varied in height from 1 to 4 meters and the polarization was varied (horizontal and vertical) to determine the worst-case emission level. All spurious emissions made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier were investigated.

## 2.7 EFFECTIVE RADIATED POWER OUTPUT - §22.913

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

## 2.8 RADIATED MEASUREMENT TEST SETUP



#### Figure 1. Radiated Measurement Test Setup Diagram - Dipole Antenna



## 2.9 FREQUENCY STABILITY / TEMPERATURE VARIATION - §2.1055

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 EUT was evaluated inside the ESPEC ECT-2 temperature chamber.

#### Measurement Method:

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 equipment 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 equipment.

#### **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 equipment 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 equipment at each temperature level.



# 3.1 TEST DATA

## 3.2 EFFECTIVE RADIATED POWER OUTPUT - §22.913

Freq. Tuned	EUT Conducted Power	Maximum Field Strength of EUT	Antenna Polariz.	Dipole Gain	Dipole Forward Conducted Power	Dipole Dipole I	of EUT Gain F Forward ed Power
MHz	dBm	dBm	H/V	dBd	dBm	dBm	Watts
824.04	28.0	-8.87	Н	- 1.44	26.15	26.91	0.491
836.49	28.0	-8.99	Н	- 1.34	25.85	25.71	0.372
848.97	28.0	-10.90	Н	- 1.24	25.13	25.89	0.388
824.04	28.0	-13.56	V	- 1.44	25.48	26.24	0.421
836.49	28.0	-13.12	V	- 1.34	26.60	26.46	0.443
848.97	28.0	-15.48	V	- 1.24	25.62	26.38	0.435

Note(s):

1. Radiated spurious measurements were performed using the Signal Substitution Method per ANSI TIA/EIA-603-A-2001.



## 3.3 FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053

Operating Frequency (MHz):	824.04
Channel:	991 (Low)
EUT Conducted Pwr. (dBm):	28.0
Measured ERP (dBm):	26.91
Mode:	CW
Distance:	3 Meters
Limit:	43 + 10 log (W) = 39.91 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	
1648.08	-69.07	-36.18	6.6	Н	-29.58	-31.72	58.63
2472.12	-71.35	-33.55	7.8	Н	-25.75	-27.89	54.80
3296.16	-75.77	-39.19	7.8	Н	-31.39	-33.53	60.44
4120.20	-77.22	-39.20	7.6	Н	-31.60	-33.74	60.65
4944.24	-77.43	-41.07	8.5	Н	-32.57	-34.71	61.62
5768.28	-76.08	-38.20	8.8	Н	-29.40	-31.54	58.45
6592.32	-74.58	-36.70	9.6	Н	-27.10	-29.24	56.15
7416.36	-74.34	-36.51	9.0	Н	-27.51	-29.65	56.56
8240.40	-75.76	-39.55	9.3	Н	-30.25	-32.39	59.30

Notes:

- 1. Radiated spurious measurements were performed using the Signal Substitution Method per ANSI TIA/EIA-603-A-2001.
- 2. All other spurious emissions generated from the lowest frequency of the EUT to the tenth harmonic were investigated and found to be below the magnitude of each harmonic level.
- 3. Spurious emissions more than 20 dB below the limit are reported, though not required per §2.1051.



### FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053

Operating Frequency (MHz):	836.49
Channel:	383 (Mid)
EUT Conducted Pwr. (dBm):	28.0
Measured ERP (dBm):	25.71
Mode:	CW
Distance:	3 Meters
Limit:	43 + 10 log (W) = 38.71 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	
1672.98	-69.67	-36.78	6.6	Н	-30.18	-32.32	58.03
2509.47	-73.63	-35.83	7.8	Н	-28.03	-30.17	55.88
3345.96	-76.62	-40.04	7.8	Н	-32.24	-34.38	60.09
4182.45	-76.55	-38.53	7.6	Н	-30.93	-33.07	58.78
5018.94	-74.72	-38.36	8.5	Н	-29.86	-32.00	57.71
5855.43	-75.79	-37.91	8.8	Н	-29.11	-31.25	56.96
6691.92	-76.68	-38.80	9.6	Н	-29.20	-31.34	57.05
7528.41	-73.53	-35.70	9.0	Н	-26.70	-28.84	54.55
8364.90	-74.81	-38.60	9.3	Н	-29.30	-31.44	57.15

Notes:

- 1. Radiated spurious measurements were performed using the Signal Substitution Method per ANSI TIA/EIA-603-A-2001.
- 2. All other spurious emissions generated from the lowest frequency of the EUT to the tenth harmonic were investigated and found to be below the magnitude of each harmonic level.
- 3. Spurious emissions more than 20 dB below the limit are reported, though not required per §2.1051.



### FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053

Operating Frequency (MHz):	848.97
Channel:	799 (High)
EUT Conducted Pwr. (dBm):	28.0
Measured ERP (dBm):	25.89
Mode:	CW
Distance:	3 Meters
Limit:	43 + 10 log (W) = 38.89 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	
1697.94	-70.20	-37.31	6.6	Н	-30.71	-32.85	58.74
2546.91	-73.43	-35.63	7.8	Н	-27.83	-29.97	55.86
3395.88	-76.15	-39.57	7.8	Н	-31.77	-33.91	59.80
4244.85	-75.39	-37.37	7.6	Н	-29.77	-31.91	57.80
5093.82	-77.04	-40.68	8.5	Н	-32.18	-34.32	60.21
5942.79	-76.76	-38.88	8.8	Н	-30.08	-32.22	58.11
6791.76	-73.51	-35.63	9.6	Н	-26.03	-28.17	54.06
7640.73	-74.74	-36.91	9.0	Н	-27.91	-30.05	55.94
8489.70	-75.17	-38.96	9.3	Н	-29.66	-31.80	57.69

Notes:

- 1. Radiated spurious measurements were performed using the Signal Substitution Method per ANSI TIA/EIA-603-A-2001.
- 2. All other spurious emissions generated from the lowest frequency of the EUT to the tenth harmonic were investigated and found to be below the magnitude of each harmonic level.
- 3. Spurious emissions more than 20 dB below the limit are reported, though not required per §2.1051.

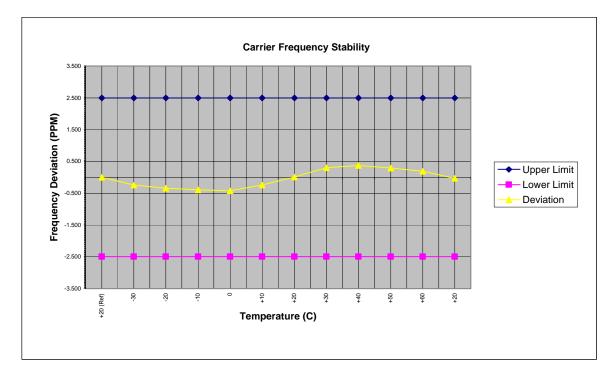


## 3.4 FREQUENCY STABILITY - §2.1055

Carrier Frequency (MHz): 836.49

Channel: 383 Mode: CW Deviation Limit (PPM): 2.5

Temperature	Voltage	Power	Carrier Frequency Deviation		Specif	ication
(C)	(%)	(VDC)	(Hz)	(PPM)	Lower Limit (PPM)	Upper Limit (PPM)
+20 (Ref)	100	6.0	0.00	0.000	2.500	-2.500
-30	100	6.0	-206.37	-0.247	2.500	-2.500
-20	100	6.0	-286.74	-0.343	2.500	-2.500
-10	100	6.0	-328.33	-0.393	2.500	-2.500
0	100	6.0	-353.85	-0.423	2.500	-2.500
+10	100	6.0	-203.64	-0.243	2.500	-2.500
+20	100	6.0	4.00	0.005	2.500	-2.500
+30	100	6.0	251.18	0.300	2.500	-2.500
+40	100	6.0	312.13	0.373	2.500	-2.500
+50	100	6.0	246.77	0.295	2.500	-2.500
+60	100	6.0	161.04	0.193	2.500	-2.500
+20	Battery Endpoint	4.0	-21.62	-0.026	2.500	-2.500





# 4.1 TEST EQUIPMENT LIST

TEST EQUIPMENT LIST								
Equipment Type	Model	Serial No.	Calibration Due Date					
HP Signal Generator	8648D (9kHz-4.0GHz)	3847A00611	Feb 2004					
Rohde & Schwarz Signal Generator	SMR40 (10MHz-40GHz)	835537/022	Nov 2003					
Gigatronics Power Meter	8652A	1835272	Feb 2004					
Gigatronics Power Sensor	80701A (0.05-18GHz)	1833535	Feb 2004					
Gigatronics Power Sensor	80701A (0.05-18GHz)	1833542	Feb 2004					
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	Feb 2004					
Audio Analyzer	HP 8903B	3729A18691	Nov 2003					
Modulation Analyzer	HP 8901A	3749A07154	July 2003					
Frequency Counter	HP 53181A (3GHz)	3736A05175	May 2003					
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 Dipoles	Compliance Design (2 sets) 3121C		June 2003					
Spectrum Analyzer	HP 8594E	3543A02721	Feb 2004					
Spectrum Analyzer	HP E4408B	US39240170	Nov 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					

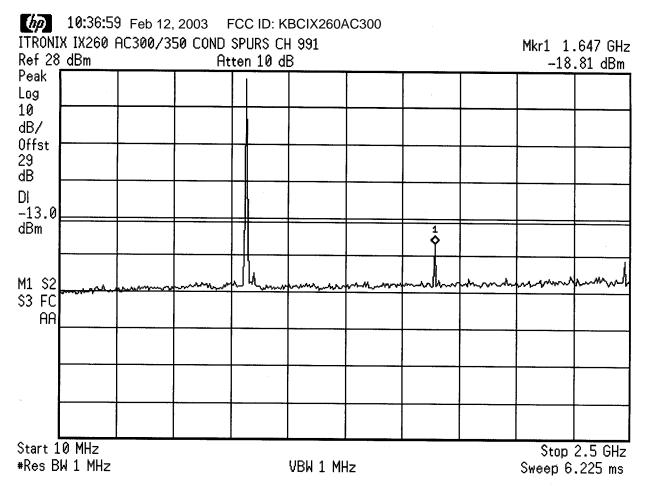


# 5.1 CONCLUSION

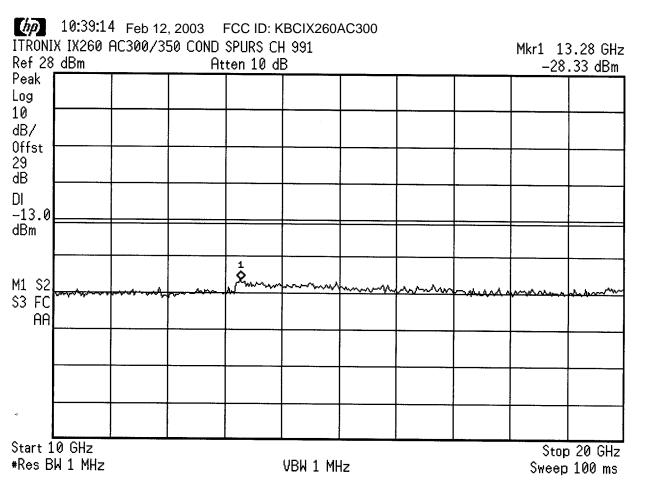
The data in this measurement report shows that the ITRONIX CORPORATION Model: IX260 FCC ID: KBCIX260AC300 Rugged Laptop PC with Sierra Wireless AirCard 300/350 CDPD PCMCIA Modem Card complies with the requirements of FCC Rule Parts §22.901(d), and §2.

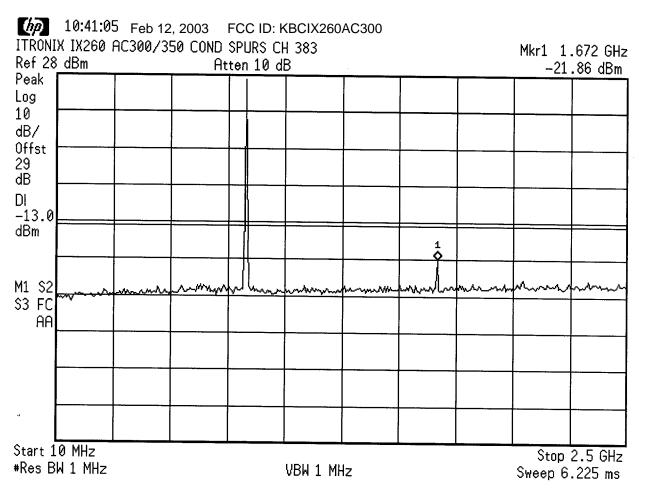


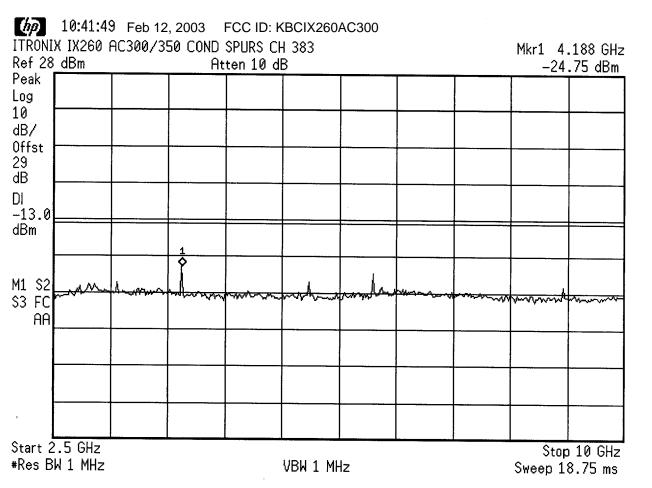
# **APPENDIX A - TEST PLOTS**

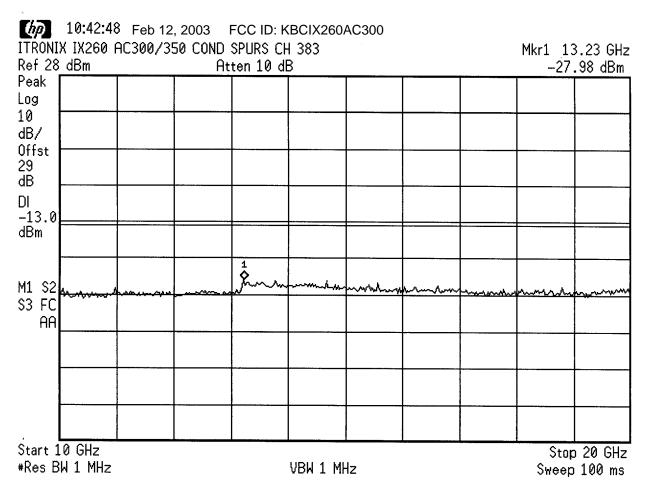


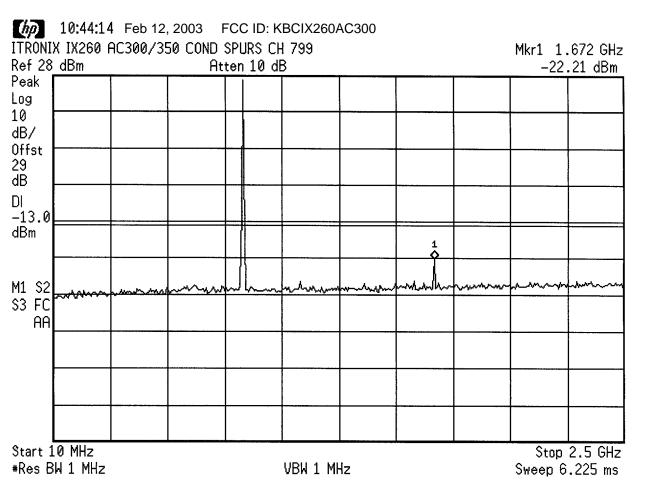
ITRONI Ref 28	X IX260 i	Feb 12 AC300/3	FCC ID: K SPURS Cl ten 10 d	4 991	AC300				.113 GHz .19 dBm
Peak Log 10 dB/ Offst 29 dB DI									
-13.0 dBm M1 S2									
S3 FC AA				and the stand of the		<u>~~~~~~~~~</u> ~~~~~~~~~~~~~~~~~~~~~~~~~~~	Month of the state	wanne vert	
	2.5 GHz W 1 MHz			VBW 1 M	łz			Stop Sweep 13	) 10 GHz 8.75 ms

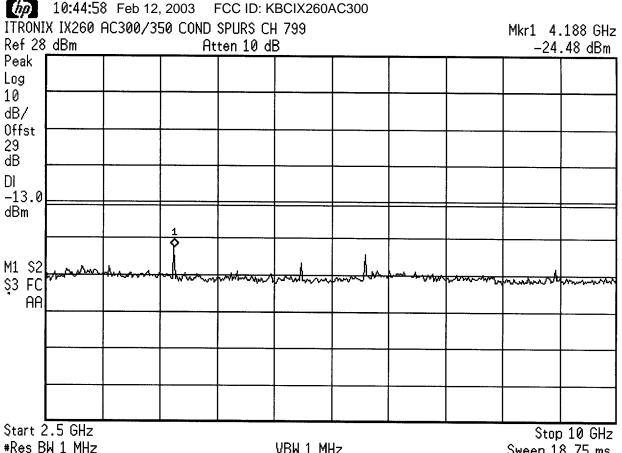






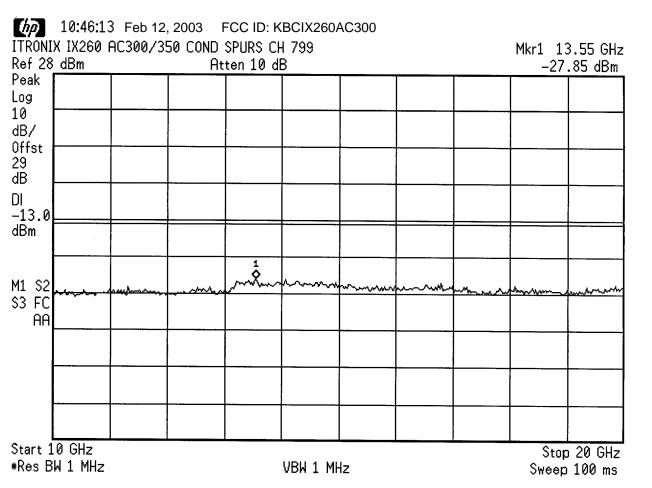




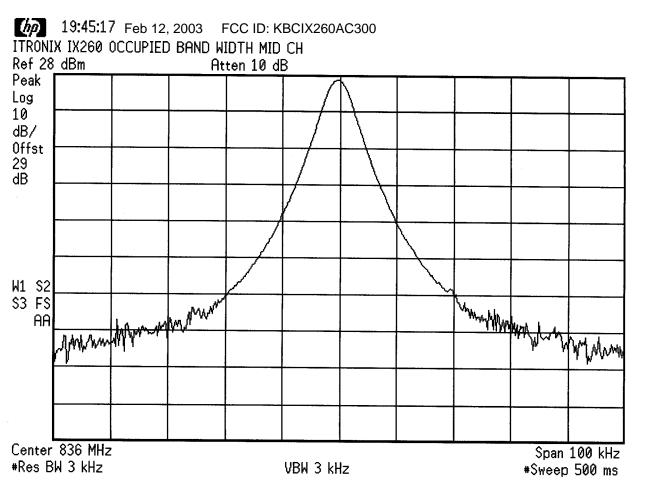


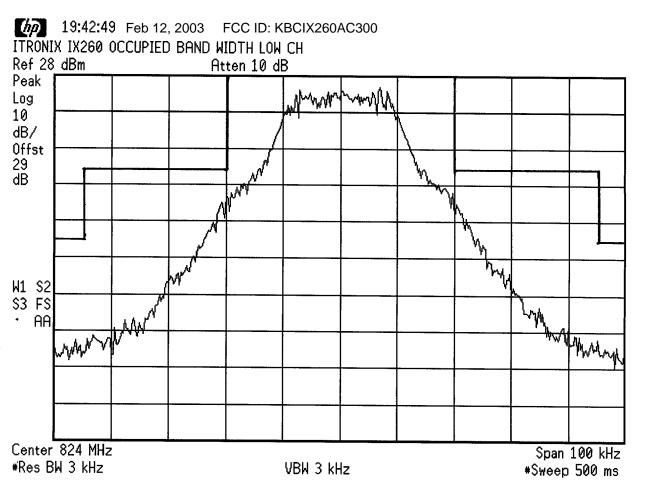
VBW 1 MHz

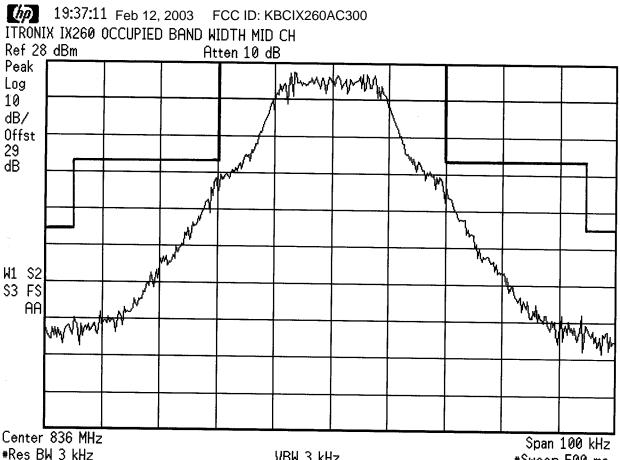
Sweep 18.75 ms



Ref -5			2, 2003 8 SPURS ( F		E	AC300		9.75 MHz .77 dBm
Peak Log 10 dB/ Offst 29 dB		<u></u>	<u>₩</u> ₽₽* <u>₩₽.₩</u> ₽	man M. A. M.	1 *********	an charter	 na a saranda.	wywer and
M1 S2 S3 FC AA								
	69 MHz W 30 kHz			ł	/BW 30 kH	Ιz		894 MHz 9.44 ms

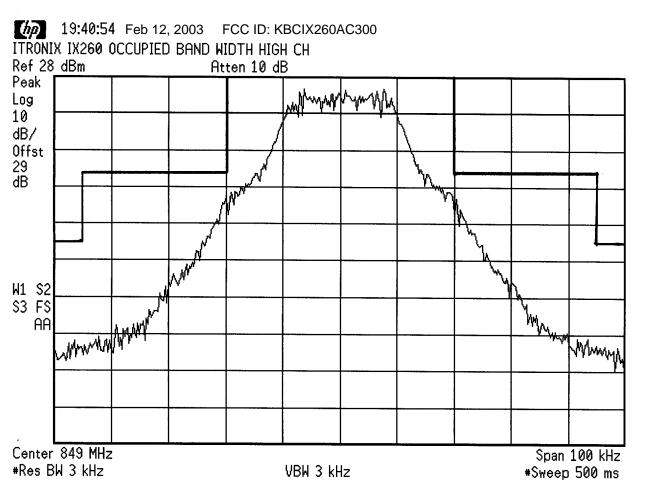






VBW 3 kHz

#Sweep 500 ms

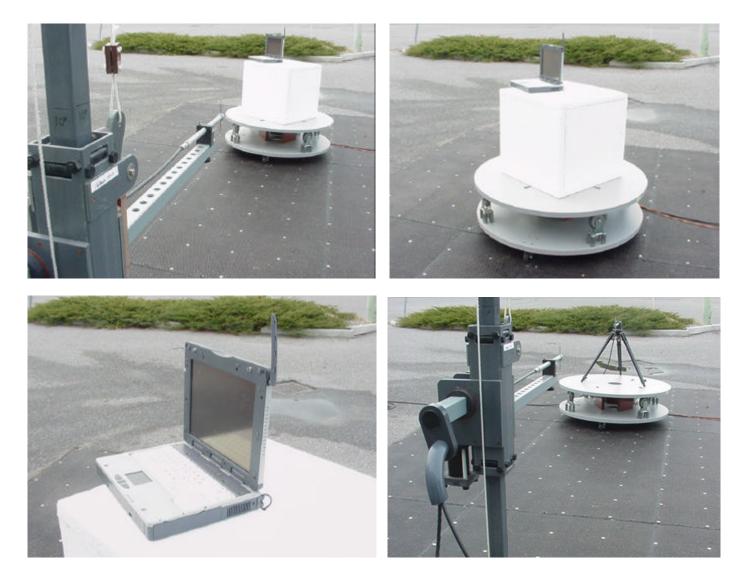




# **APPENDIX B - RADIATED TEST SETUP PHOTOGRAPHS**



# RADIATED TEST SETUP PHOTOGRAPHS Vertical Polarization



ITRONIX CORPORATION FCC ID: KBCIX260AC300 Rugged Laptop PC with CDPD PCMCIA Modem Card



## RADIATED TEST SETUP PHOTOGRAPHS Horizontal Polarization

