

TEST: RF POWER OUTPUT

FCC ID: EO9DATAPAC

Grantee: Itron, Inc.

Serial No.: none

Manufacture Rating: 10 Watt +40 dBm

Equipment Authorization
Procedure: Para. 2.985 (a)

Test Equipment: See Block Diagram

Duty Cycle: Mobile Network Intermittent

Frequency Measured: 956.99975 MHz

FINAL RADIO FREQUENCY AMPLIFYING DEVICE

Transistor Type Micro Devices: RF/PM 2105 Module

Measured Power Output: 10 Watt + 40 dBm

Note: Due to the product design it was not possible to physically measure the collector current (IC) and collector voltage (VC) directly for the exciter. The RF/PM 2105 module operates at approximately 50% efficiency over the 951.00 - 962.00 MHz band at the rated temperature and power levels tested. Power level is controlled by varying the voltage to the RF/PM 2105 module under software control. A Motorola power amplifier module MHW2821-2 increases the exciter output power to a fixed 10 watts.

The maximum power output of +40 dBm, was measured at the maximum output level of the modulation square wave form (Amplitude Modulation). Modulation was essentially square-wave and was set for the maximum tone frequency or data rate of 57.78 Hz or tone 14. No data is actually transmitted only the appropriate "wake up" tone. The depth of modulation observed was about 70 dB with +40 dBm output power, when modulated at the maximum rate. The power output was measured at the transceiver's external antenna type "N" connector.

TEST: OCCUPIED BANDWIDTH

FCC ID: EO9DATAPAC

Manufacturer: Itron, Inc.

Serial No.: none

Minimum Standard Specified: Para. 101.111 (a)(5)

Test Results: Equipment is Compliant with Standard

Equipment Authorization Procedure: Para. 2.989 (c)(1)

Test Equipment Set Up: Please refer to Block Diagram #1

MEASUREMENT DATA

Spectrum Analyzer: Hewlett Packard 8562A

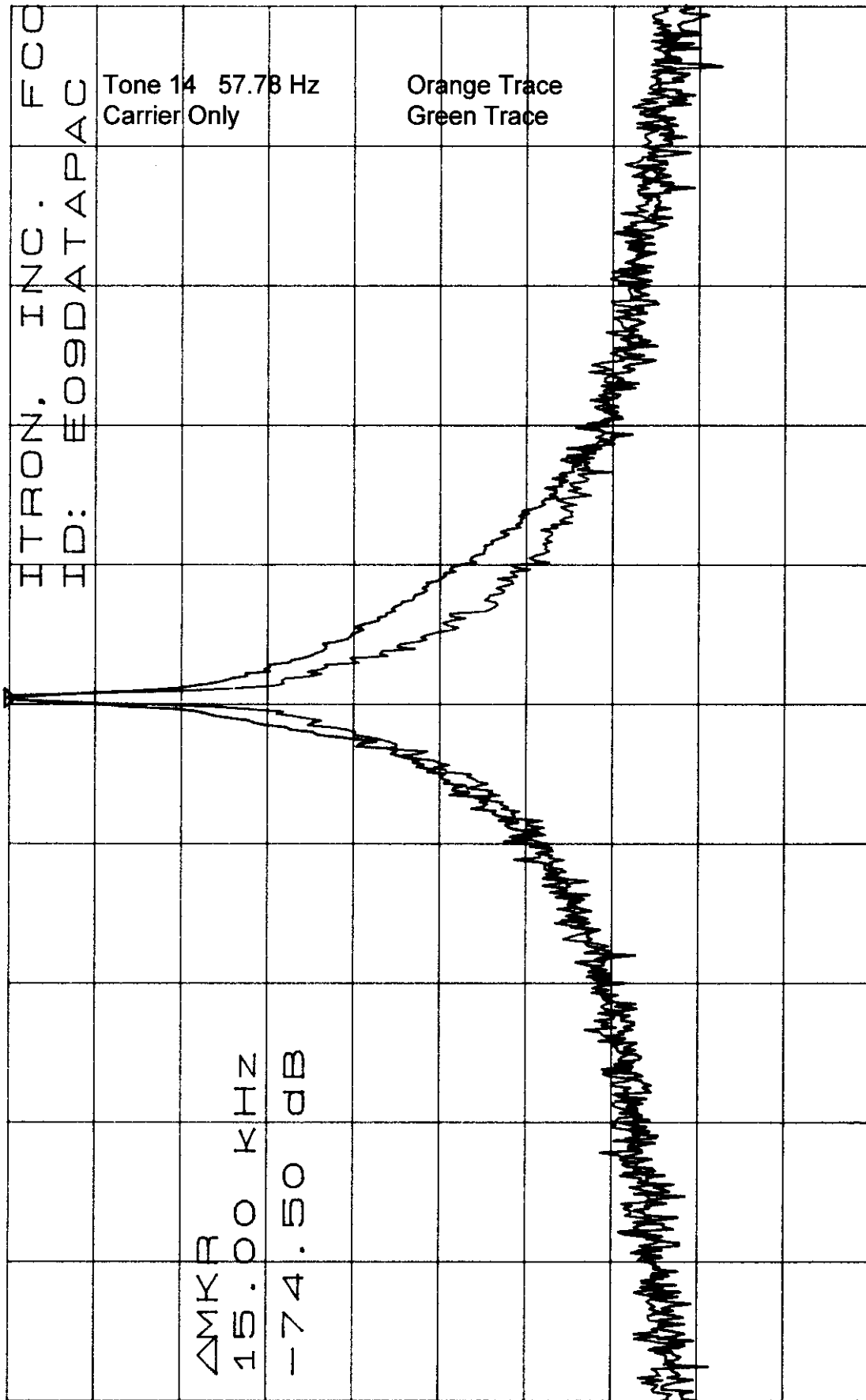
	Plot A	Plot B	
Settings: Resolution Bandwidth:	100	100	Hz
Video Filter:	300	300	Hz
Scan Time:	10	20	sec.
Scan Width:	40	75	kHz
Center Frequency:	956.99975	956.99975	MHz

Audio Input: Internal AM data generation, software controlled ERT tone frequency between 24.76 and 57.78 Hz. The 57.78 Hz or The maximum tone rate , tone 14 was used during this test. The tone is essentially a square wave and no data is transmitted.

Two plots of the occupied bandwidth measured follow, with the Scan Width at 40 kHz (PLOT A) and at 75 kHz (PLOT B).

ATTEN 20dB
RL 1.0dBm

ΔMKR -74.50dB
15.00KHz



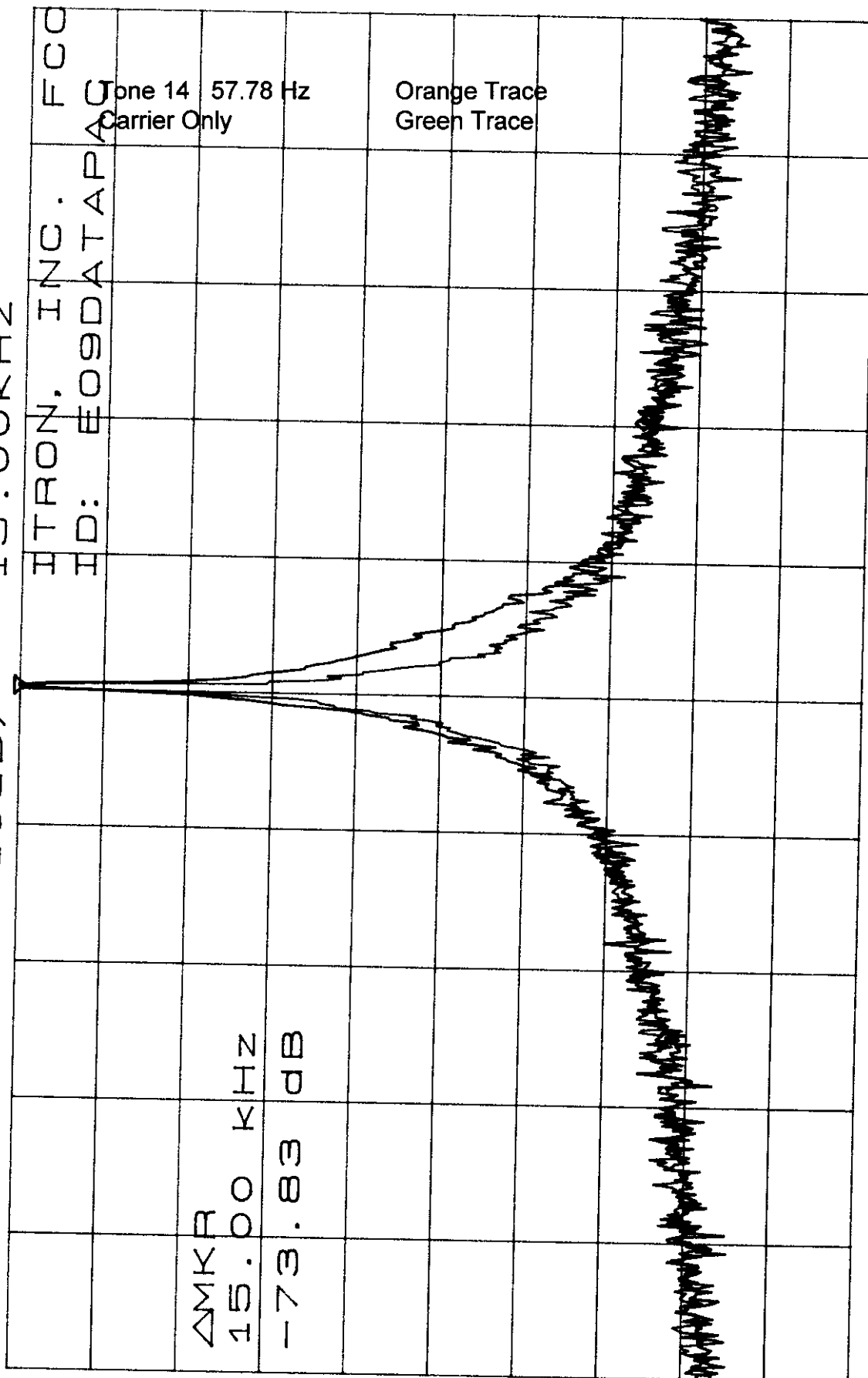
11-17-98 4:20 PM
CENTER 956.99975MHz
SPAN 40.00KHz
*RBW 100Hz *VBW 300Hz
SWP 10sec

ATTEN 20dB

RL 1.0dBm

ΔMKR -73.83dB
15.00KHZ

10dB/



CENTER 956.99975MHZ

*RBW 100HZ

*VBW 300HZ

SPAN 75.00KHZ

SWP 20sec

11-17-98 6/10/98

TEST: SPURIOUS EMISSIONS AT ANTENNA TERMINALS

FCC ID: EO9DATAPAC

Manufacturer: Itron, Inc.

Serial No.: none

Minimum Standard Specified: Para.101.111(a)(5)

Test Results: Equipment compliant with standard

Equipment Authorization Procedure: Para. 2.991 & 2.989

Test Equipment Set Up: See Block Diagram

Frequency Range Observed: 0 to 10 GHz

Operating Frequency: 956.99975 MHz

Crystal Frequency: 16.4 MHz TCXO

Power Output: 10 Watt high power (peak)

Spurious Limit = $50 \text{ dB} + 10\text{Log}_{10} \text{ PO} = 50 + (10) = -60 \text{ dBc high power}$

The carrier was modulated at the max data rate of 57.78 Hz as specified in para. 2.989. Fo was reduced 35 dB with a High pass filter E/M, Inc. Model: 3FH-2/18 and needed to be trapped at this power level, to avoid overloading the spectrum analyzer .

<u>FORMULA</u>	<u>FREQUENCY IN MHz</u>	<u>Level (dB below carrier)</u>
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Fo	952.30625	-0-
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Please refer to the plots on following three pages.

Plot 1.) 0 - 1000 MHz 100 kHz RBW & VBW

Plot 2.) 1. - 2.9 GHz 1.0 MHz RBW & VBW

Plot 3.) 2.75 - 10.0 GHz 1.0 MHz RBW & VBW

No spurious emissions were measurable at the antenna terminals. All were below the spectrum analyzer noise floor at the given RBW & VBW. This would seem reasonable considering the EUT has a low pass filter on the output of the PA.

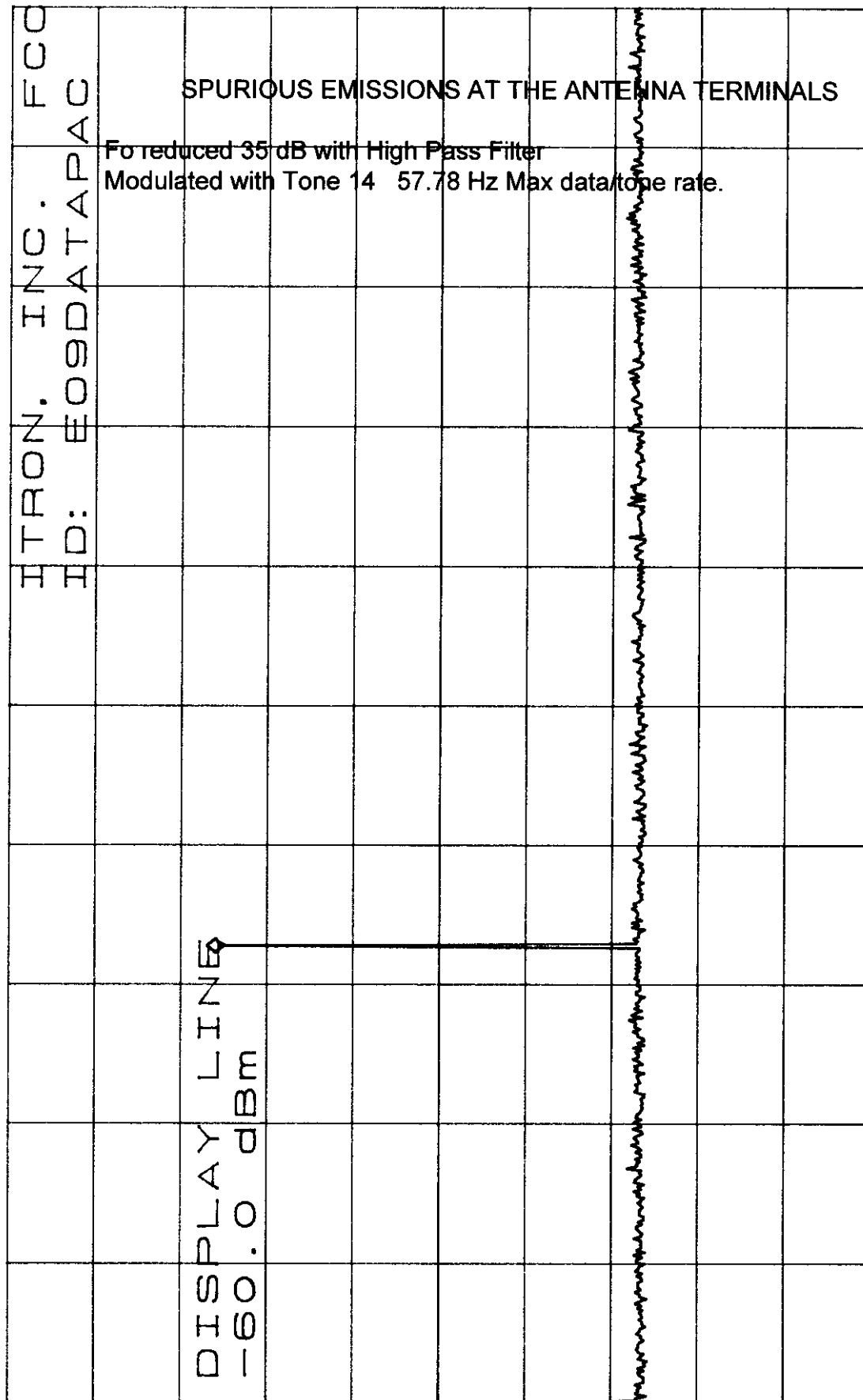
*ATTEN 0dB

MKR -35.00dBm

RL -10.0dBm

10dB/

952MHz



START 0HZ

STOP 2.900GHZ

*RBW 100KHZ

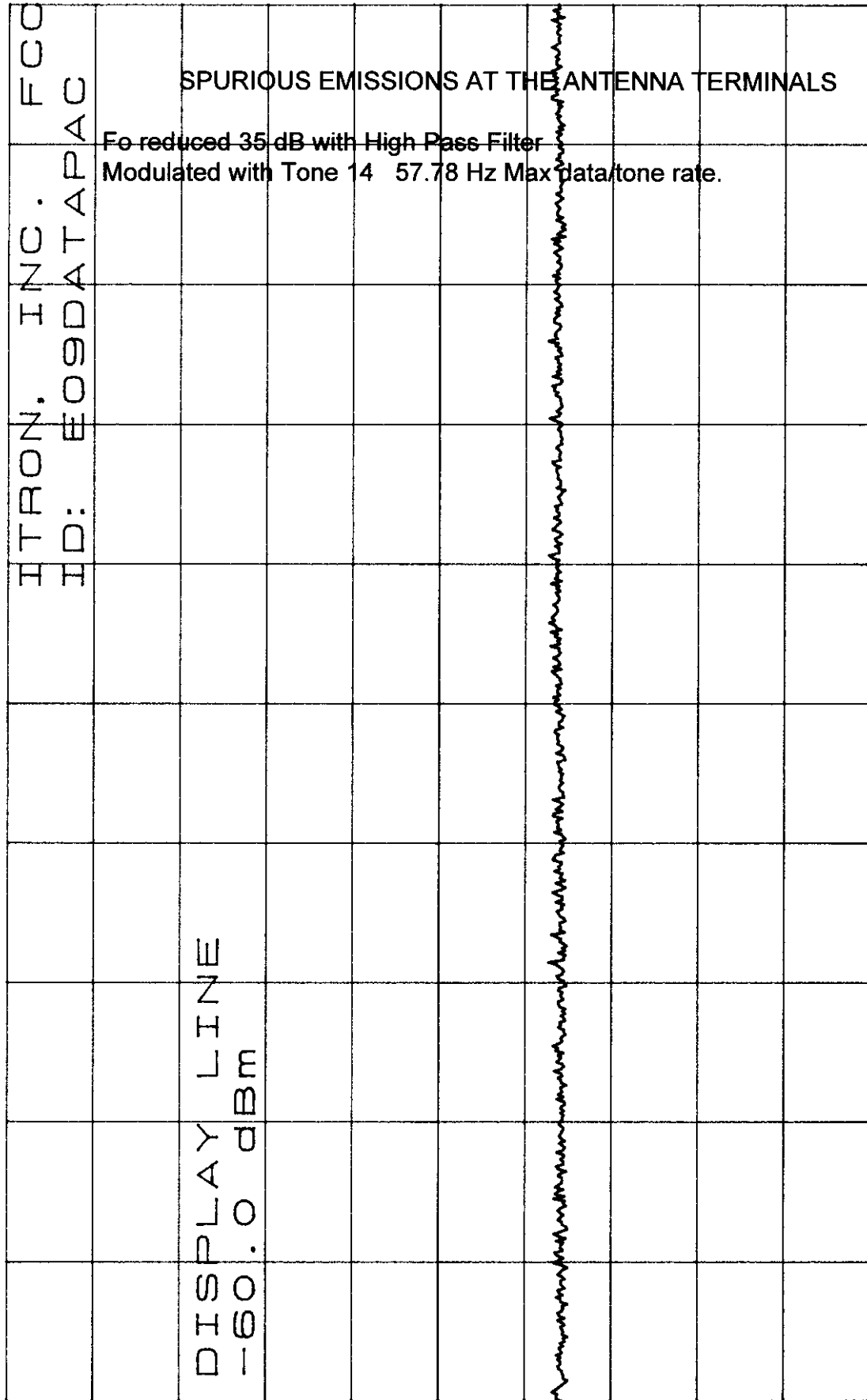
VBW 100KHZ

SWP 800ms

11/16/95

*ATTEN 0dB

RL -10.0dBm 10dB/



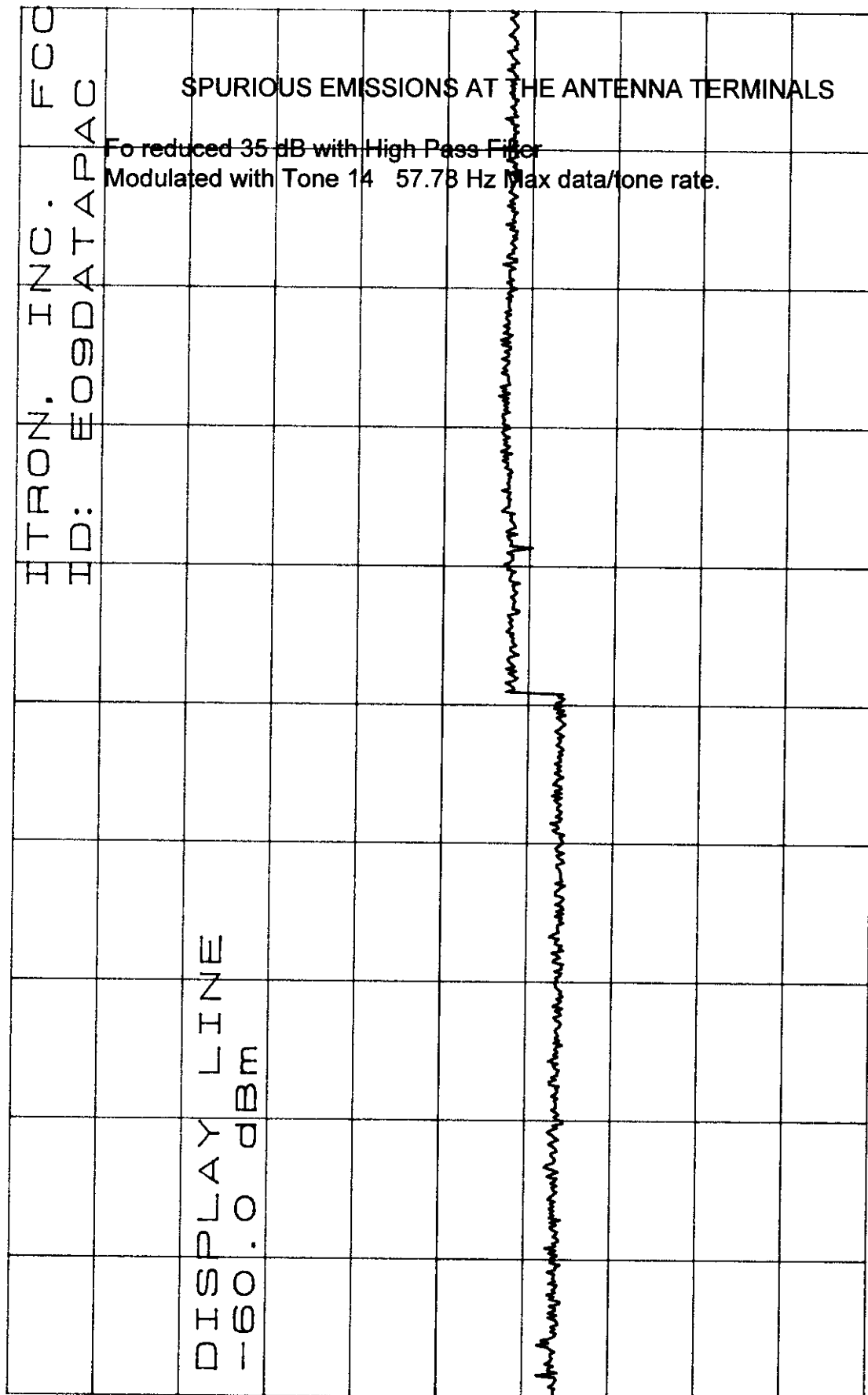
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START 1.000GHZ STOP 2.900GHZ
*RBW 1.0MHZ VBW 1.0MHZ SWP 50ms

11/16/95 W/CM/...

*ATTEN 0dB

RL -10.0dBm 10dB/



START 2.750GHZ STOP 10.000GHZ
*RBW 1.0MHZ VBW 1.0MHZ SWP 200ms
11/16/98 6:00/1000

TEST: FIELD INTENSITY MEASUREMENTS OF SPURIOUS RADIATION

FCC ID: EO9DATAPAC

Manufacturer: Itron, Inc.

Serial No.: none

Minimum Standard Specified: Para. 101.111

Test Results: Equipment compliant with standard

Equipment Authorization Procedure: Para. 2.993 & 2.989

Test Equipment Set Up: See Block Diagram

Frequency Range Observed: 0 to 10 GHz

Operating Frequency: 956.9975 MHz

Crystal Frequency: 16.4 MHz TCXO

Power Output: 10 Watt high power (peak)

Spurious Limit = $50 \text{ dB} + 10\text{Log}_{10} \text{ PO} = 50 + (10) = -60 \text{ dBc}$

The carrier was modulated at the maximum data rate of 57.78 Hz (tone 14) as specified in para. 2.989.

<u>FORMULA</u>	<u>FREQUENCY IN MHz</u>	<u>high power Level (dB below carrier)</u>
Fo	956.99975	-0-
5Fo	5742.00	-79.07

All other radiated emissions measured were more than 20 dB below the spurious limit when measured at three meters EUT to antenna spacing.

4/18/98
[Signature]

TEST: OPERATIONAL FREQUENCY STABILITY PERFORMANCE

FCC ID:	EO9DATAPAC	
Grantee:	ltron, Inc.	
Serial No:	none	
Minimum Standard Specified:	Para. 101	Limit +/- .00015%
Equipment Authorization Procedure:	Para. 2.995	-20 to +50 C
Test Frequency:	957.000 MHz	1.5 ppm = +/- 1434 Hz

The measurement data reported on the following page displays the frequency observed when the transmitter was first keyed immediately following power up, a period of approximately 45-60 seconds during which the DataPac was initialized and software was loaded to allow activation of the transmitter. This value was recorded and is reported. Measurements at -30, 0 and +50 degrees C showed that after the initial 60 seconds or more that the transmitter was powered, that the transmitter was well within the 1.5 ppm limit. The equipment power was turned off during changes in ambient temperature.

Two temperature probes connected to a Fluke 52, were used during the measurements. The first probe was inserted through a small opening in the transceiver cover and placed in contact with the largest internal mass inside the transceiver. The other probe was left outside of the transmitter within the chamber at a location with good air circulation to accurately measure the internal chamber temperature for comparison the internal transmitter temperature and insure that the equipment was stabilized at a given temperature.

The voltages used for measurements at -30, 0, & +50 degrees Celsius:

+ 15 %	15.87 VDC
Nominal	13.80 VDC
- 15 %	11.73 VDC

TEST: OPERATIONAL FREQUENCY STABILITY PERFORMANCE

FCC ID: EO9DATAPAC

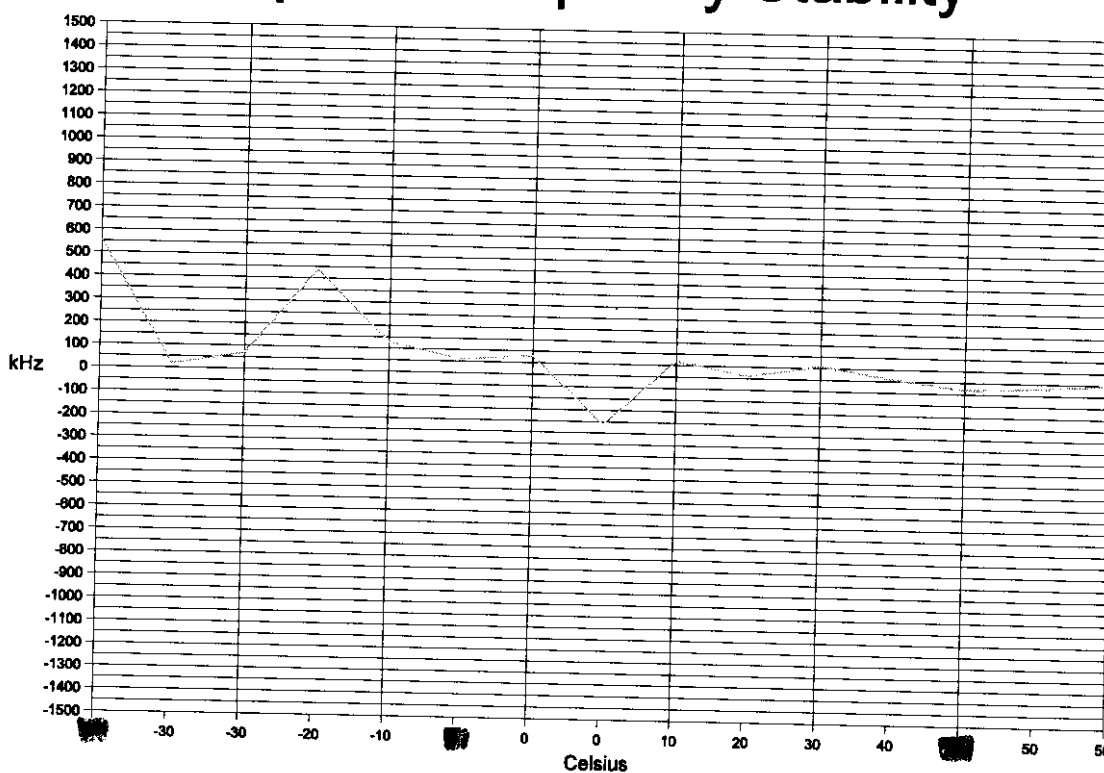
Grantee: Itron, Inc.

Model: DataPac

Minimum Standard Specified: Para. 101.107 .00015% 1.5 ppm
Equipment Authorization Procedure: Para. 2.995 @ 957MHz = +/-1435 Hz

Test Frequency: 957.000 MHz 951 - 962 MHz Band

Graph Of Frequency Stability



W. Allen

The variation in frequency with voltage are shown on the plot above for +50, 0 and -30 C. Three readings are shown at these temperatures. The left hand reading is the **138** VAC and the right hand reading is +15% 138 VDC. The center reading at -30, 0 and +50 degrees C and all of the other reported readings are at the nominal operating voltage of 120 VDC.

TEST EQUIPMENT LIST A SPECTRUM TECHNOLOGY, INC.

<u>Equipment</u>	<u>Manufacturer</u>	<u>Serial Number</u>	<u>Cal Date/Due Date</u>
Spectrum Analyzer	Hewlett-Packard 8562A	08562-60062	9/14/98 9/14/99
Amplifier 9 kHz-1300 MHz	Hewlett-Packard 8447F OPT H64	2727A02208	9/14/98 9/14/99
RF Signal Gen.	Fluke 6071A	2915016	8/11/98 5/11/99
Service Monitor	IFR FM/AM 500A	4103	---
Oscilloscope	Kikusui C055060	6132295	---
Power Supply	Astron VS35	8601266	---
Voltmeter	Fluke 8020A	N2420658	---
Multimeter	Fluke 25	3710310	---
Wattmeter	Bird 43	56227	---
RF Termination	Bird 8135	10004	---
Dual Phase LISN 50 ohm/50 uH	STI per MP-4	02	1/9/98 1/9/99
Dual Phase LISN 50 ohm/50 uH	Compliance Design	8012-50R-24-BNC	1/9/98 1/9/99
Audio Generator	Hewlett-Packard 205-AG	8689	---
Attenuators:	Texscan FP45-20 Texscan FP45-10 Weinschel 40-10-33 Mini-Circuits CAT30 Pomona 4108-10	CZ682 8419 01	
Thermometer	Fluke 52	3965185	---
Test Line Simulator	Teltona TLS-2	none	---
Turn Table, RC	EMCO 1060-2M	8912-1415	---
Antenna Mast, RC	Compliance Design, Inc.	M100	---
Antennas:			
DiPole Set	EMCO Model: 3121C	1335	9/18/97 3/18/99
Dipole Set	EMCO Model: 3121C	1336	9/18/97 3/18/99
Bi-Conical	EMCO 3104	3763	reference only
Bi-Conical	EMCO 3104C	9401-4635	6/20/97 1/20/99
Log-Periodic	EMCO 3146	1754	6/15/98 6/15/99
Active Loop	EMCO 6502	9107-2645	reference only