DECLARATION OF COMPLIANCE
FCC PART 90 EMC MEASUREMENTS

Test Lab

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Applicant Information

MOBILTEX DATA LTD.
3640 - 26th Street N.E.
Calgary, Alberta T1Y 4T7
Canada

FCC Rule Part(s):	**47 CFR §90, §2**
IC Rule Part(s):	**RSS-119 Issue 6**
Test Procedure(s):	**FCC 47 CFR §90, §2; ANSI TIA/EIA-603-A-2001**
FCC Device Classification:	**Licensed Non-Broadcast Station Transmitter (TNB)**
IC Device Classification:	**Land Mobile Radio Transmitter**
Device Type:	**Body-worn Data Transmitter with RIM 902 Mobitex Radio Modem**
FCC ID:	**KLU03472**
IC Certification No.:	**3079A-03472**
Model(s):	**OVPC2**
Tx Frequency Range:	**896.0 - 901.0 MHz**
Rx Frequency Range:	**935.0 - 941.0 MHz**
Max. RF Output Power:	**0.719 Watts ERP (28.57 dBm)**
Conducted Power Tested:	**33.0 dBm**
Modulation:	**GMSK**
Emission Designator(s):	**12K8F1D**
Frequency Tolerance(s):	**± 0.00015 %**
Antenna Type:	**Folded Dipole PCB**
Power Supply:	**7.4V Lithium-ion, 740mAh**

This wireless portable device has demonstrated to be in 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 §90, §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 90 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 - §2.1033(a)

APPLICANT

MOBILTEX DATA LTD.
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Calgary, Alberta T1Y 4T7
Canada

FCC ID	KLU03472
Model(s)	OVPC2
Serial No.	29000006
DUT Type	Body-worn Data Transmitter with RIM 902 Mobitex Radio Modem
FCC Rule Part(s)	47 CFR §90, §2
IC Rule Part(s)	RSS-119 Issue 6
FCC Classification	Licensed Non-Broadcast Station Transmitter (TNB)
IC Classification	Land Mobile Radio Transmitter
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Max. RF Conducted Output Power Tested	33.0 dBm
Emission Designator	12K8F1D
Frequency Tolerance	± 0.00015 %
Modulation	GMSK
Modes Tested	Unmodulated Carrier, Modulated Carrier
Antenna Type	Folded Dipole PCB
Power Supply	7.4V Lithium-ion Battery, 740mAh

FCC PART 90 MEASUREMENT PROCEDURES & DATA

3.1 RF OUTPUT POWER MEASUREMENT - §2.1046

The peak conducted power levels were measured at the RIM 902 Mobitex radio modem RF port with a Gigatronics 8652A Universal Power Meter in 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 in test mode using the RIM 902 Mobitex test software with the internal transmitter in modulated carrier mode (25% duty cycle) at a full rated power. All subsequent tests were performed using the same power measurement procedures.

Conducted Power Measurement	
Frequency (MHz)	**Peak Power (dBm)**
896.0	33.0
901.0	33.0

4.1 SPURIOUS EMISSIONS AT ANTENNA TERMINAL - §2.1051

The DUT was placed in test mode using the RIM 902 Mobitex test software with the internal transmitter in modulated carrier mode (25% duty cycle) at a full rated power. The level of the carrier and the various conducted spurious frequencies were measured using 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 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 reported emissions were below the specified limit of -20dBm. The test results are shown in Appendix A.

5.1 FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053

Radiated spurious 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 placed in test mode using the RIM 902 Mobitex test software with the internal transmitter in modulated carrier mode (25% duty cycle) 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 equipment to the tenth harmonic of the carrier were investigated. The test data is shown on the following page.

FIELD STRENGTH OF SPURIOUS RADIATION - §2.1053 (Cont.)

DUT without Symbol PC

Operating Frequency (MHz): 896.0
Channel: 480 (Low)
EUT Conducted Pwr. (dBm): 33.0
Measured ERP (dBm): 28.57
Modulation: Modulated Carrier
Distance: 3 Meters
Limit: 50 + 10 log (W) = 48.57 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	
1792.0	-62.08	-29.19	6.6	V	-22.59	-24.73	53.30
2688.0	-70.13	-32.33	7.8	V	-24.53	-26.67	55.24
3584.0	-75.24	-38.66	7.8	V	-30.86	-33.00	61.57
4480.0	-75.49	-37.47	8.6	V	-28.87	-31.01	59.58
5376.0	-77.25	-40.89	8.5	V	-32.39	-34.53	63.10
6272.0	-76.86	-38.98	9.4	V	-29.58	-31.72	60.29
7168.0	-71.76	-33.88	9.2	V	-24.68	-26.82	55.39
8064.0	-73.84	-36.01	9.2	V	-26.81	-28.95	57.52
8960.0	-75.46	-39.25	9.1	V	-30.15	-32.29	60.86

DUT without Symbol PC

Operating Frequency (MHz): 901.0
Channel: 880 (High)
EUT Conducted Pwr. (dBm): 33.0
Measured ERP (dBm): 27.92
Modulation: Modulated Carrier
Distance: 3 Meters
Limit: 50 + 10 log (W) = 47.92 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	
1802.0	-61.20	-28.31	6.6	V	-21.71	-23.85	51.77
2703.0	-69.31	-31.51	7.8	V	-23.71	-25.85	53.77
3604.0	-75.69	-39.11	7.8	V	-31.31	-33.45	61.37
4505.0	-76.98	-38.96	8.6	V	-30.36	-32.50	60.42
5406.0	-75.66	-39.30	8.5	V	-30.80	-32.94	60.86
6307.0	-75.08	-37.20	9.4	V	-27.80	-29.94	57.86
7208.0	-72.65	-34.77	9.2	V	-25.57	-27.71	55.63
8109.0	-74.31	-36.48	9.2	V	-27.28	-29.42	57.34
9010.0	-74.90	-38.69	9.1	V	-29.59	-31.73	59.65

6.1 RADIATED POWER MEASUREMENT TEST SETUP

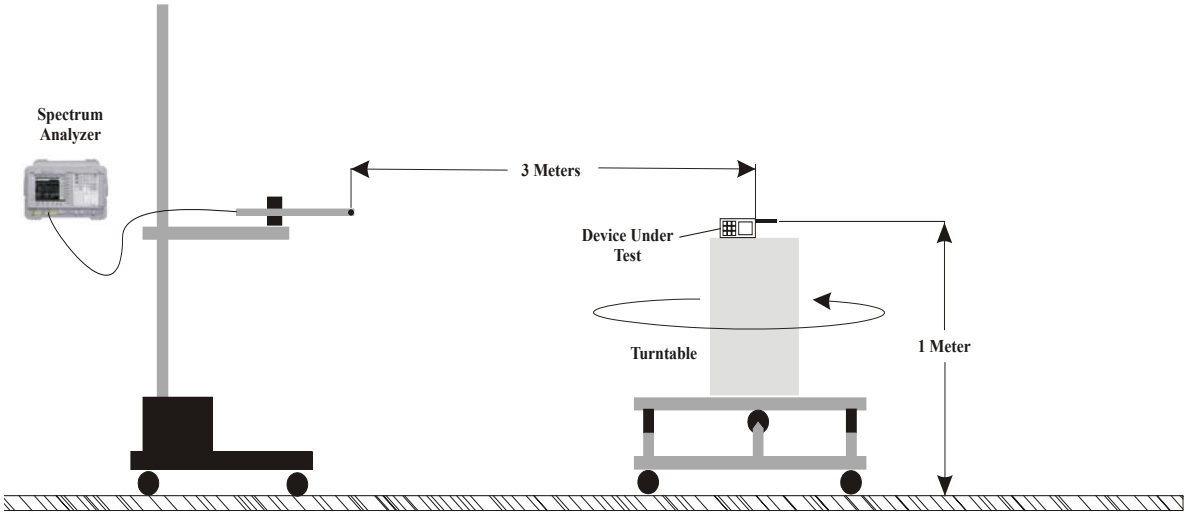


Figure 1. Radiated Power Measurement Test Setup Diagram

7.1 EFFECTIVE RADIATED POWER OUTPUT - §90.635; §2.1046

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 DUT was placed in test mode using the RIM 902 Mobitex test software with the internal transmitter in modulated carrier mode (25% duty cycle) at a full rated power. The DUT was placed on a turntable 3-meters from the receive antenna. The field of maximum intensity was found by rotating the DUT 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 DUT. A modulated signal with the same bandwidth as the DUT 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 DUT. 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.

ERP MEASUREMENT DATA

Test Configuration	Freq. Tuned	DUT Conducted Power	Maximum Field Strength of DUT (dBm)		Dipole Gain	Dipole Forward Conducted Power	ERP of DUT Dipole Gain + Dipole Forward Conducted Power	
	MHz	dBm	Antenna Polarization		dBd	dBm	dBm	Watts
			V	H				
With Symbol PC	896.0	33.0	-9.048	-12.26	-0.84	28.75	27.91	0.618
	901.0	33.0	-8.860	-12.48	-0.84	29.40	28.56	0.718
Without Symbol PC	896.0	33.0	-8.308	-10.13	-0.84	29.41	28.57	0.719
	901.0	33.0	-9.606	-10.40	-0.84	28.76	27.92	0.619

8.1 OCCUPIED BANDWIDTH - §90.209; §90.210(j); §2.1049

The DUT was placed in test mode using the RIM 902 Mobitex test software with the internal transmitter in unmodulated and modulated carrier mode (25% duty cycle) at a full rated power. The antenna output terminal of the DUT was connected to the 50Ω input of the spectrum analyzer through a matched 30dB attenuator. The resolution bandwidth and video bandwidth were set to 300 Hz. The test results are shown in Appendix A.

A. UNMODULATED CARRIER

33.0 dBm conducted power with a 30 dB matched attenuator and coaxial cable with a total loss of 0.2 dB.

B. INTERNAL MODULATION

100% of the in-band modulation is below the specified mask per 90.210(j).

§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

9.1 FREQUENCY STABILITY - §90.213; §2.1055

The minimum frequency stability for the 896-901MHz frequency band must be 1.5 parts per million (ppm). The DUT was placed in test mode using the RIM 902 Mobitex test software with the internal transmitter in modulated carrier mode (25% duty cycle). 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 transmit band. The DUT was evaluated inside the ESPEC ECT-2 environmental chamber.

MEASUREMENT METHOD:

The frequency stability of the transmitter was measured by:

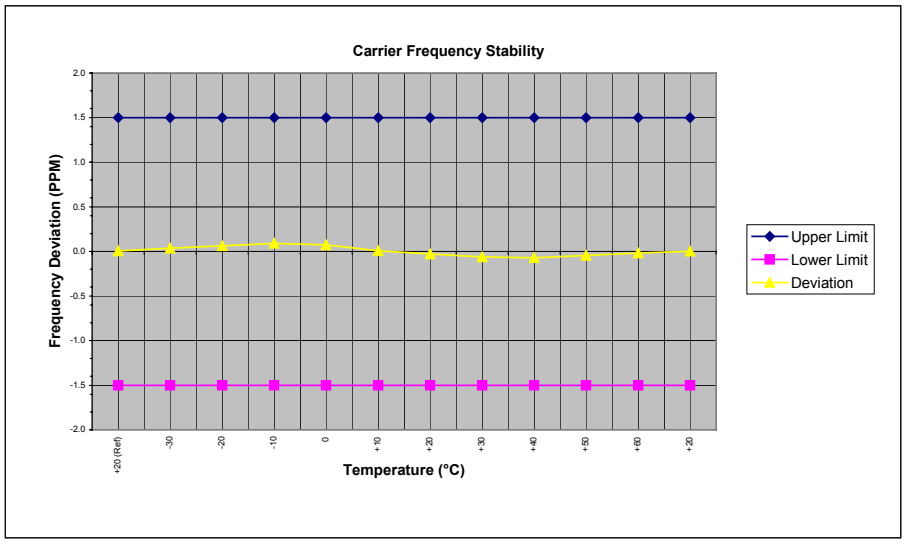
1. Temperature: The temperature was varied from -30°C to +60°C at intervals no more than 10°C throughout the temperature range in the environmental chamber. A period of time sufficient to stabilize all of the components in the device was allowed prior to each frequency measurement.
2. Primary Supply 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.

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.
3. 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.

Carrier Frequency (MHz): 899.0
Channel: 720 (Mid)
Modulation: Modulated Carrier
Deviation Limit (PPM): 1.5

Temperature	Voltage	Power	Carrier Frequency Deviation		Specification	
(°C)	(%)	(VDC)	(Hz)	(PPM)	Lower Limit (PPM)	Upper Limit (PPM)
+20 (Ref)	100	7.4	4.27	0.005	1.5	-1.5
-30	100	7.4	31.28	0.035	1.5	-1.5
-20	100	7.4	55.77	0.062	1.5	-1.5
-10	100	7.4	80.95	0.090	1.5	-1.5
0	100	7.4	67.14	0.075	1.5	-1.5
+10	100	7.4	6.71	0.007	1.5	-1.5
+20	100	7.4	-25.72	-0.029	1.5	-1.5
+30	100	7.4	-56.36	-0.063	1.5	-1.5
+40	100	7.4	-64.43	-0.072	1.5	-1.5
+50	100	7.4	-41.00	-0.046	1.5	-1.5
+60	100	7.4	-16.19	-0.018	1.5	-1.5
+20	Battery Endpoint	6.14	1.60	0.002	1.5	-1.5



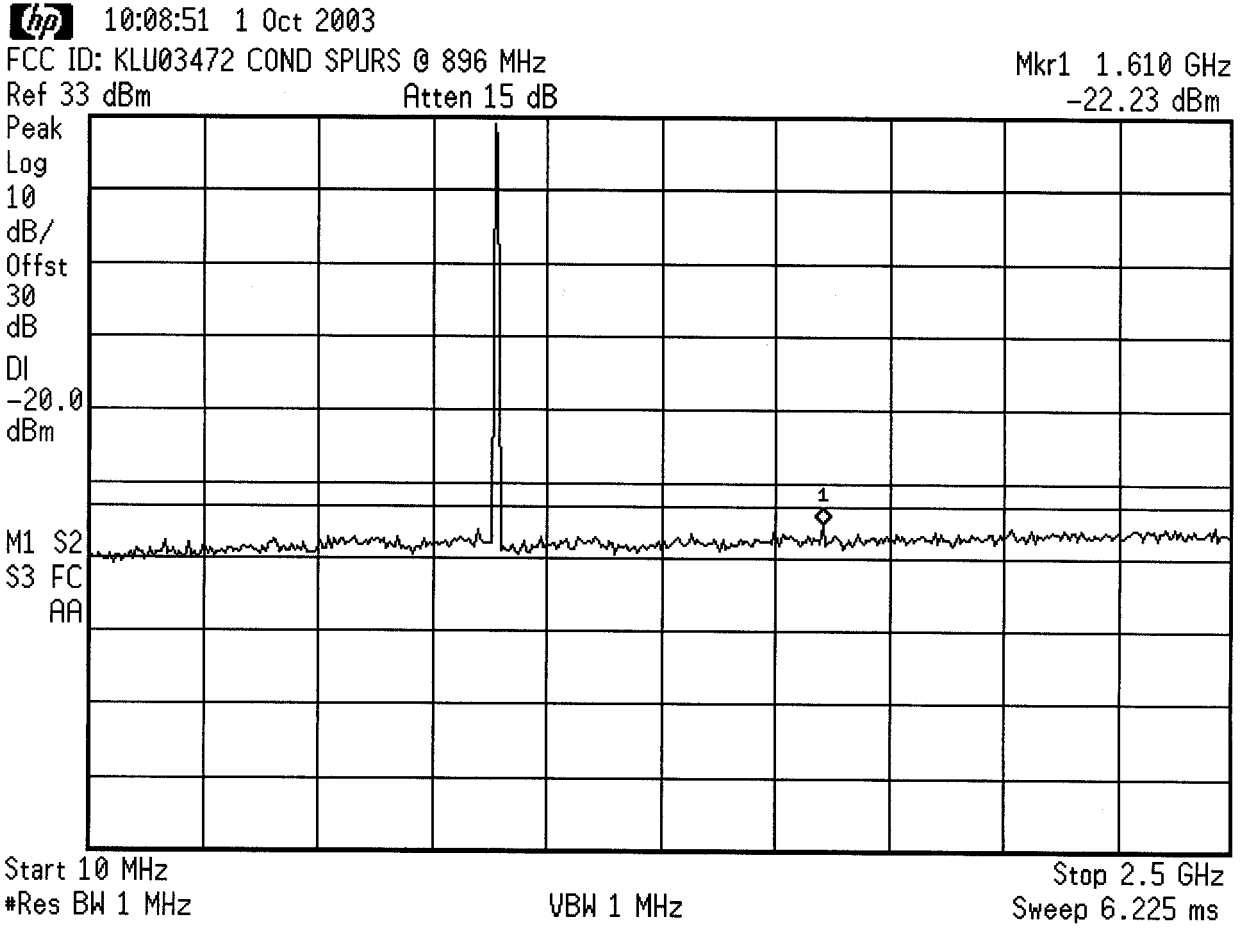
10.1 TEST EQUIPMENT LIST

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
Frequency Counter	HP 53181A (3GHz)	3736A05175	May 2004
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 2004
Double Ridged Horn Antenna	ETS 3115 (1-18GHz)	6276	Oct 2004
Horn Antenna	Chase BBHA 9120-A (0.7-4.8GHz)	9120A-239	Sept 2004
Horn Antenna	Chase BBHA 9120-A (0.7-4.8GHz)	9120A-240	Sept 2004
Roberts Dipoles	Compliance Design (2 sets) 3121C		June 2004
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

11.1 CONCLUSION

The data in this measurement report shows that the MOBILTEX DATA LTD. Model: OVPC2 FCC ID: KLU03472 Body-worn Data Transmitter with RIM 902 Mobitex Radio Modem complies with the requirements of FCC Rule Parts §90 and §2.

APPENDIX A - TEST PLOTS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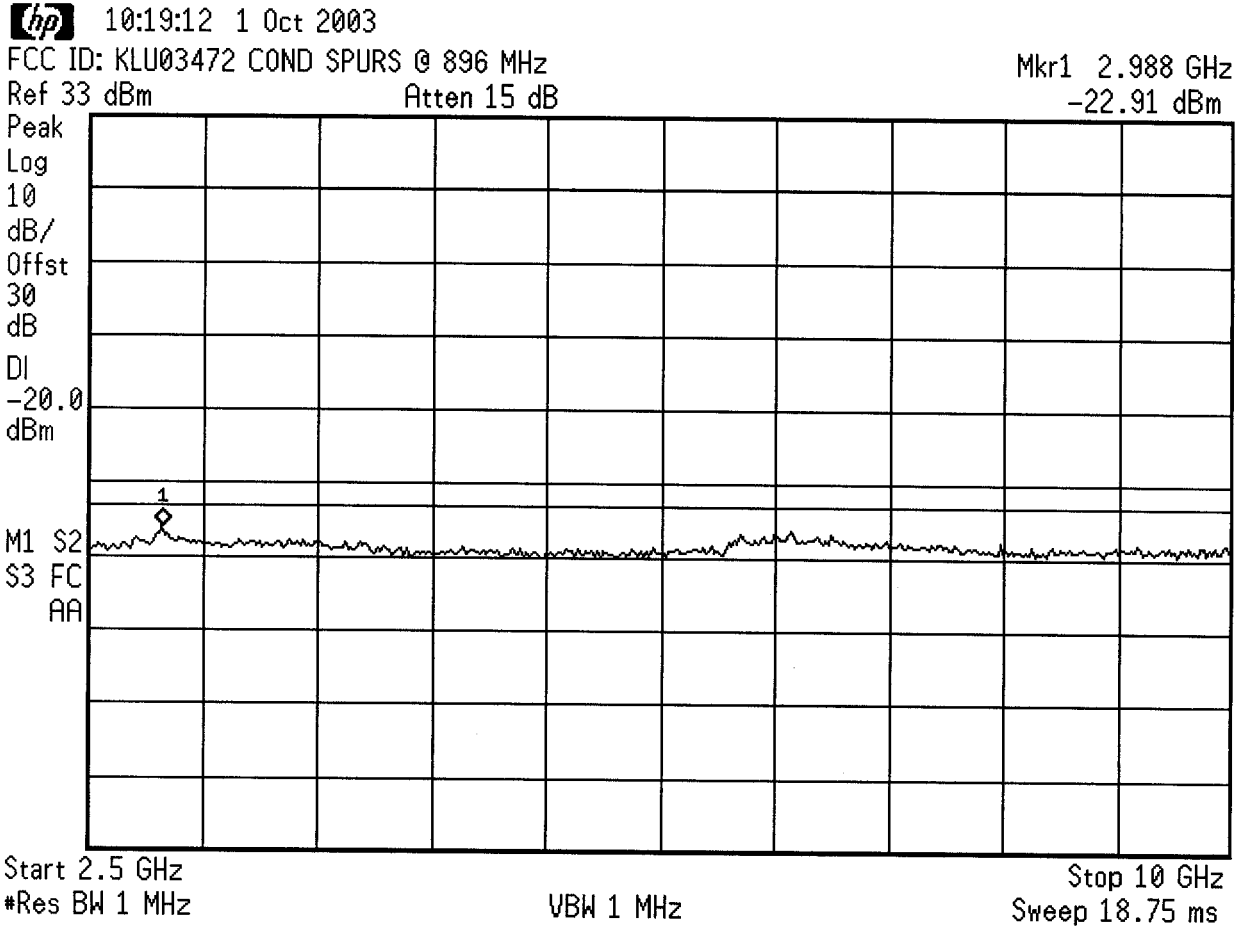
Mkr1 1.610 GHz
Ref 33 dBm
Atten 15 dB
-22.23 dBm
Peak
Log
10
dB/
Offst
30
dB
Dl
-20.0
dBm
1
M1 S2
S3 FC
AA
Start 10 MHz
Stop 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 6.225 ms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Atten 15 dB
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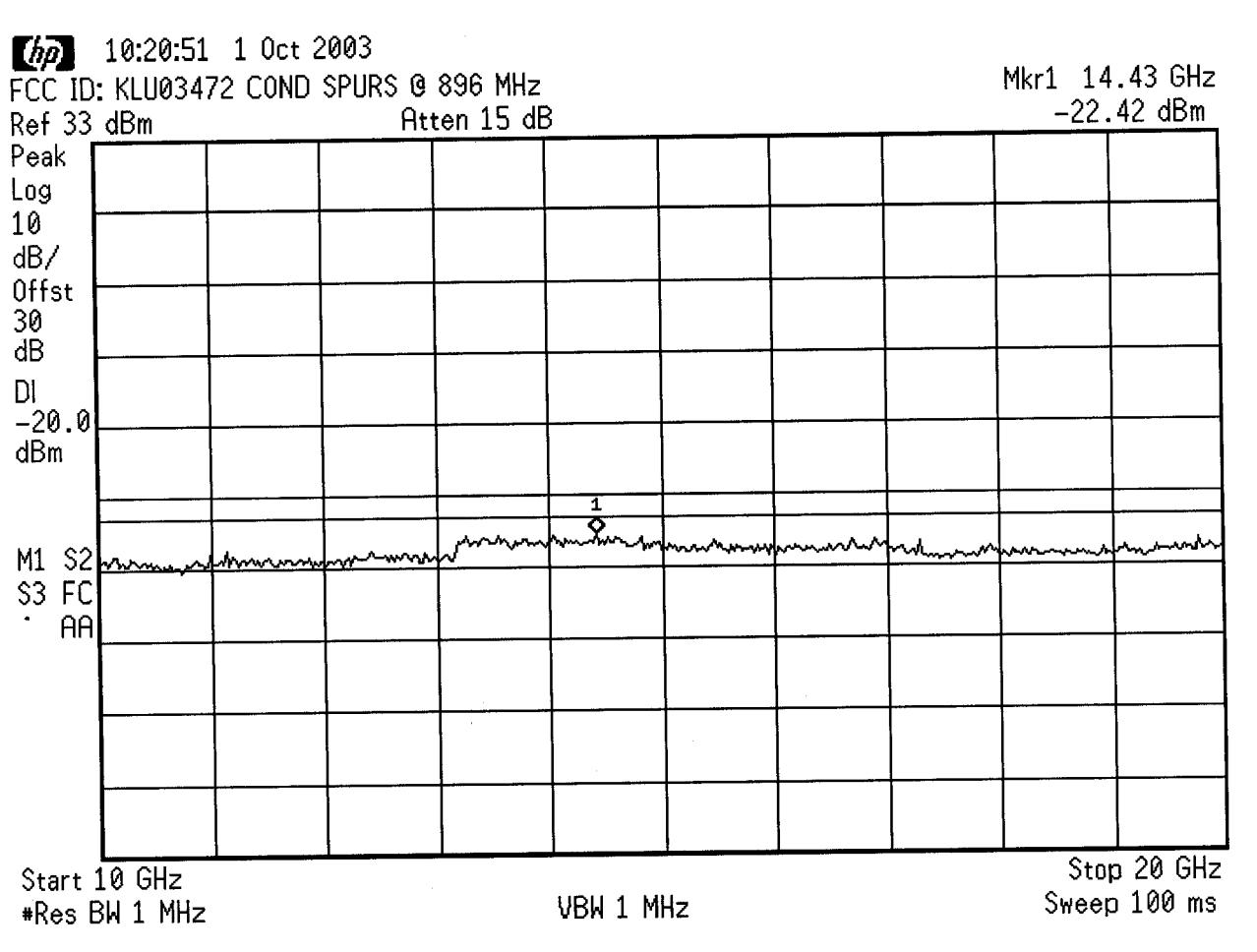
-22.91 dBm
Peak
Log
10
dB/
Offst
30
dB
Dl
-20.0
dBm
1
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms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-22.42 dBm
Ref 33 dBm
Atten 15 dB
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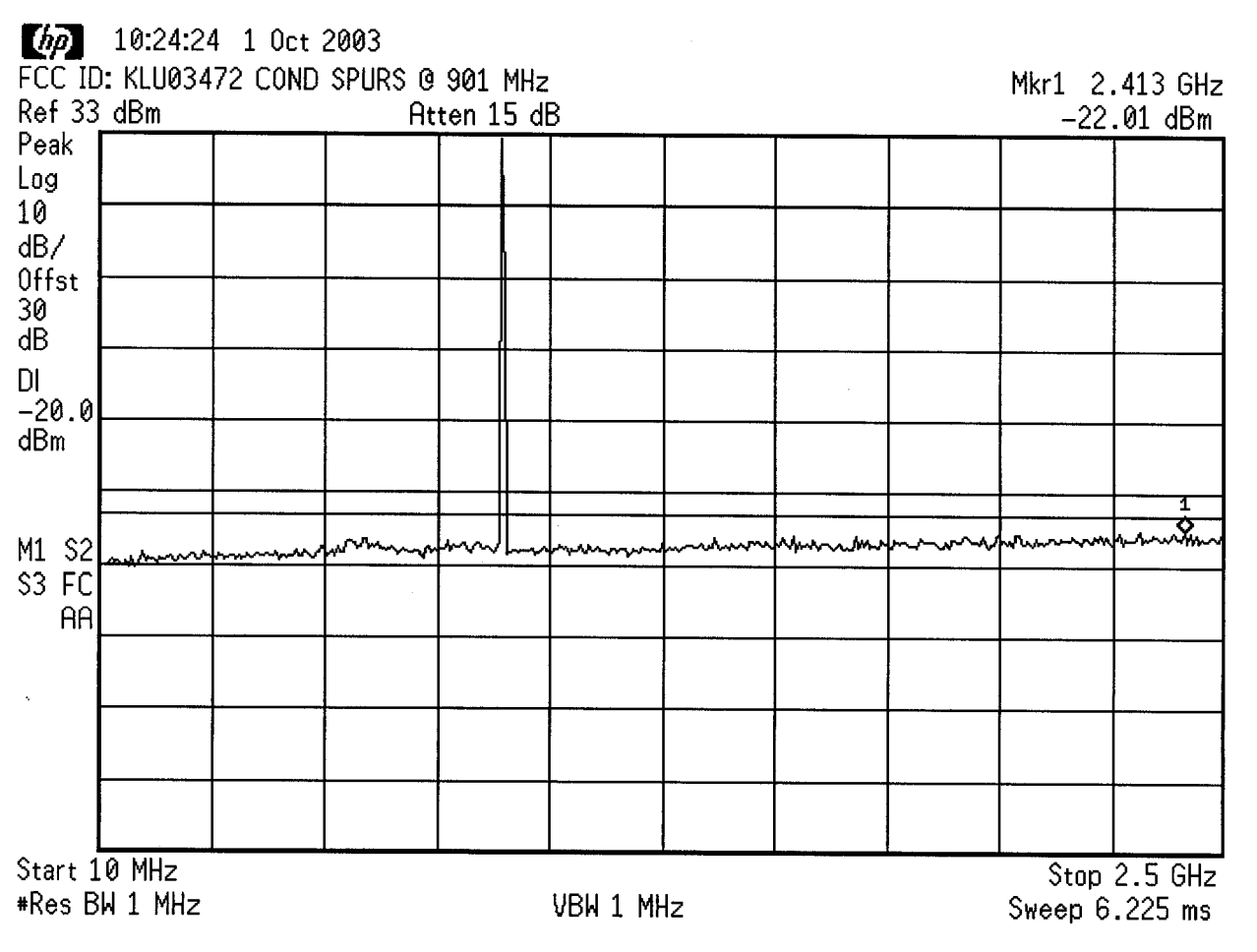
Log
10
dB/
Offst
30
dB
Dl
-20.0
dBm
1
M1 S2
S3 FC
AA
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms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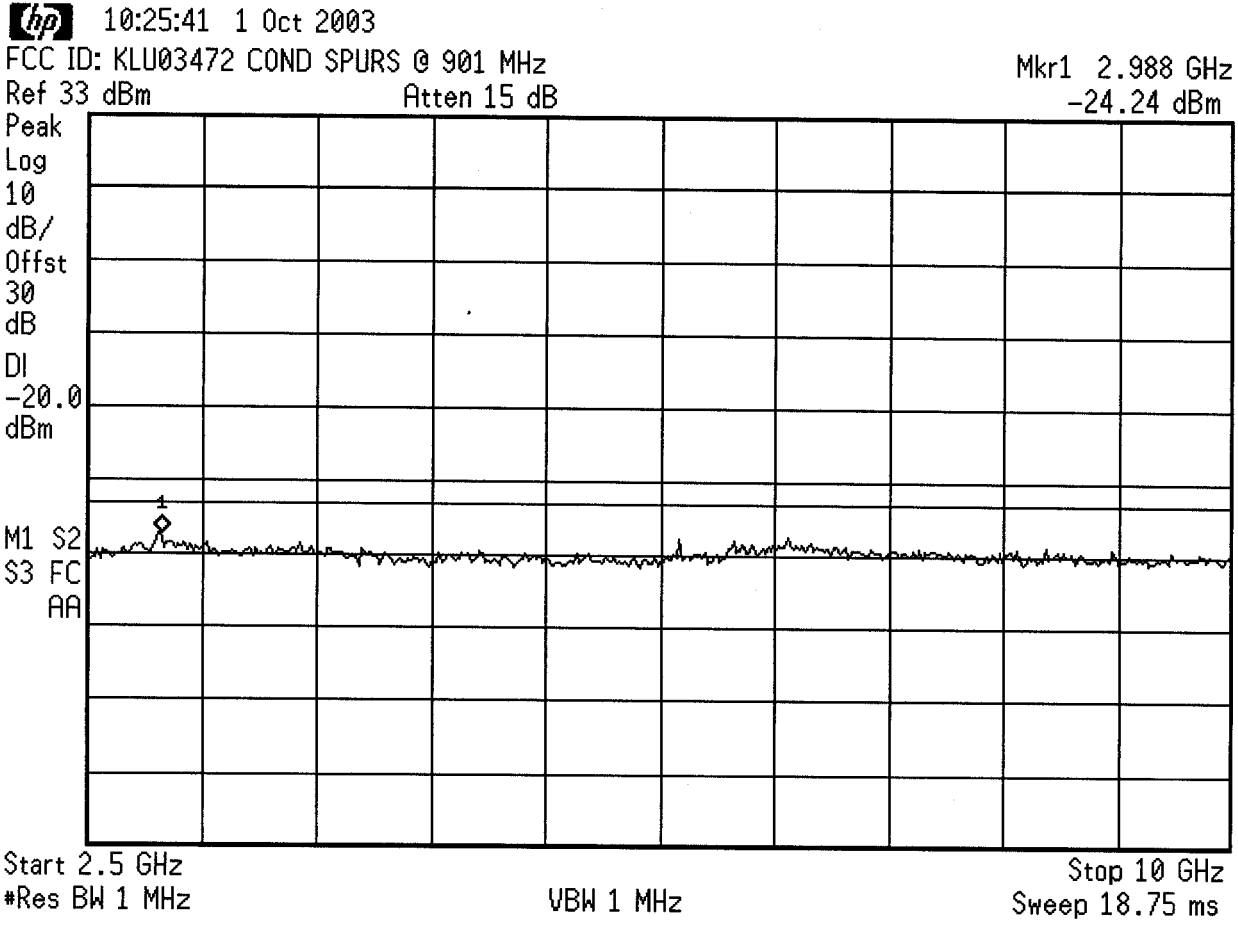
-22.01 dBm
Peak
Log
10
dB/
Offst
30
dB
Dl
-20.0
dBm
1
M1 S2
S3 FC
AA
Start 10 MHz
#Res BW 1 MHz
VBW 1 MHz
Stop 2.5 GHz
Sweep 6.225 ms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dB/
Offst
30
dB
Dl
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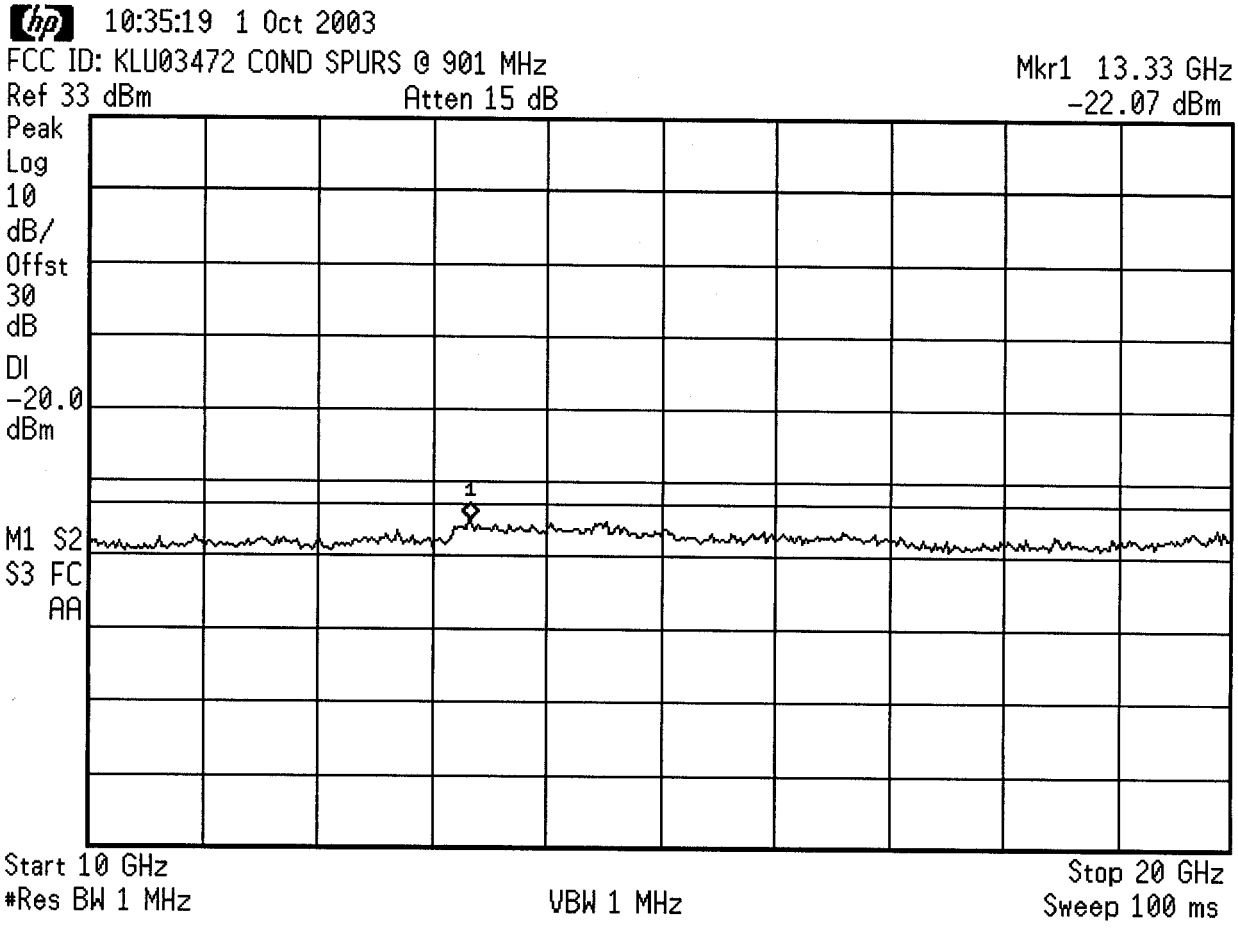
dBm
M1 S2
S3 FC
AA
Start 2.5 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 10 GHz
Sweep 18.75 ms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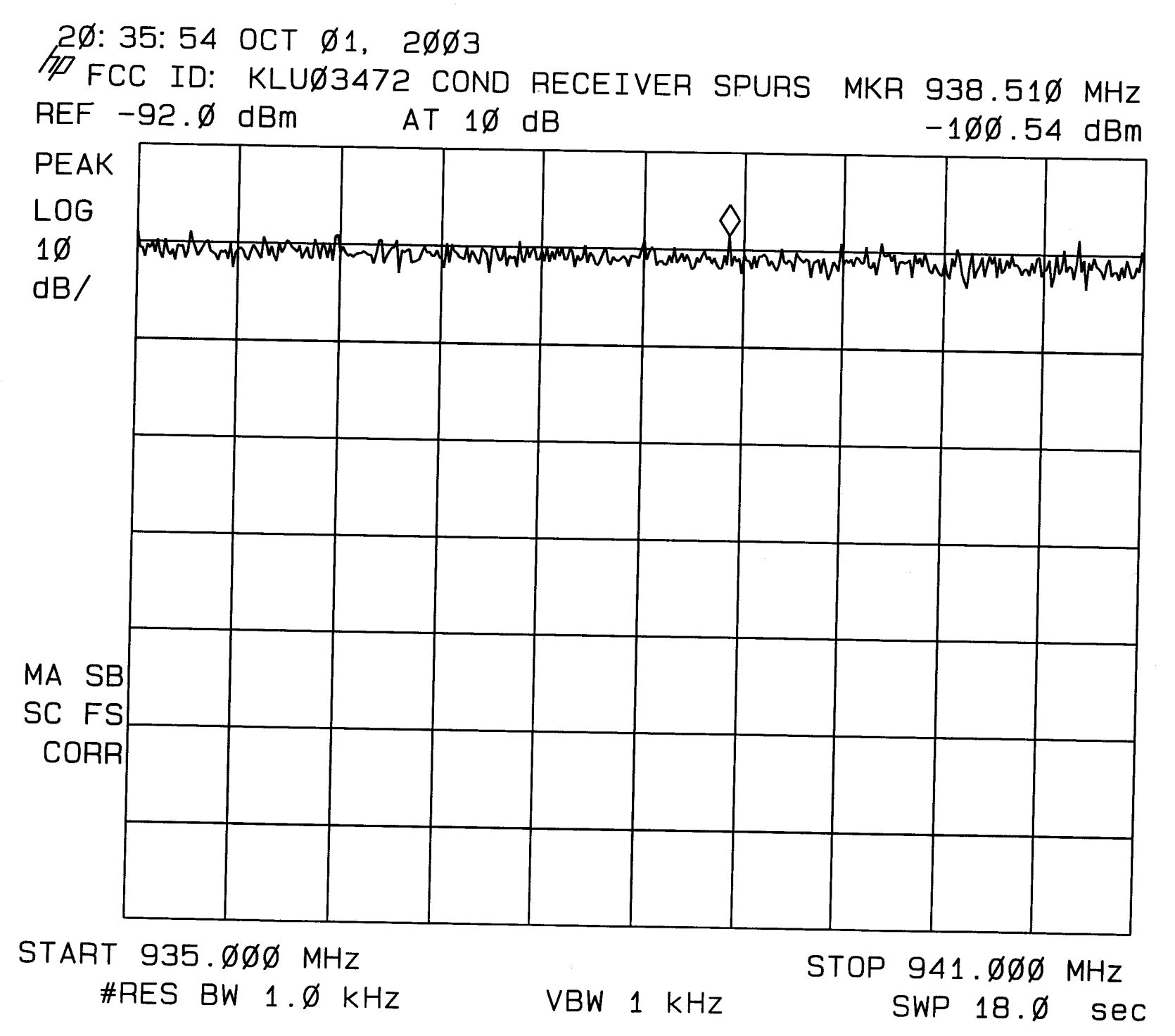
Start 10 GHz
#Res BW 1 MHz
VBW 1 MHz
Stop 20 GHz
Sweep 100 ms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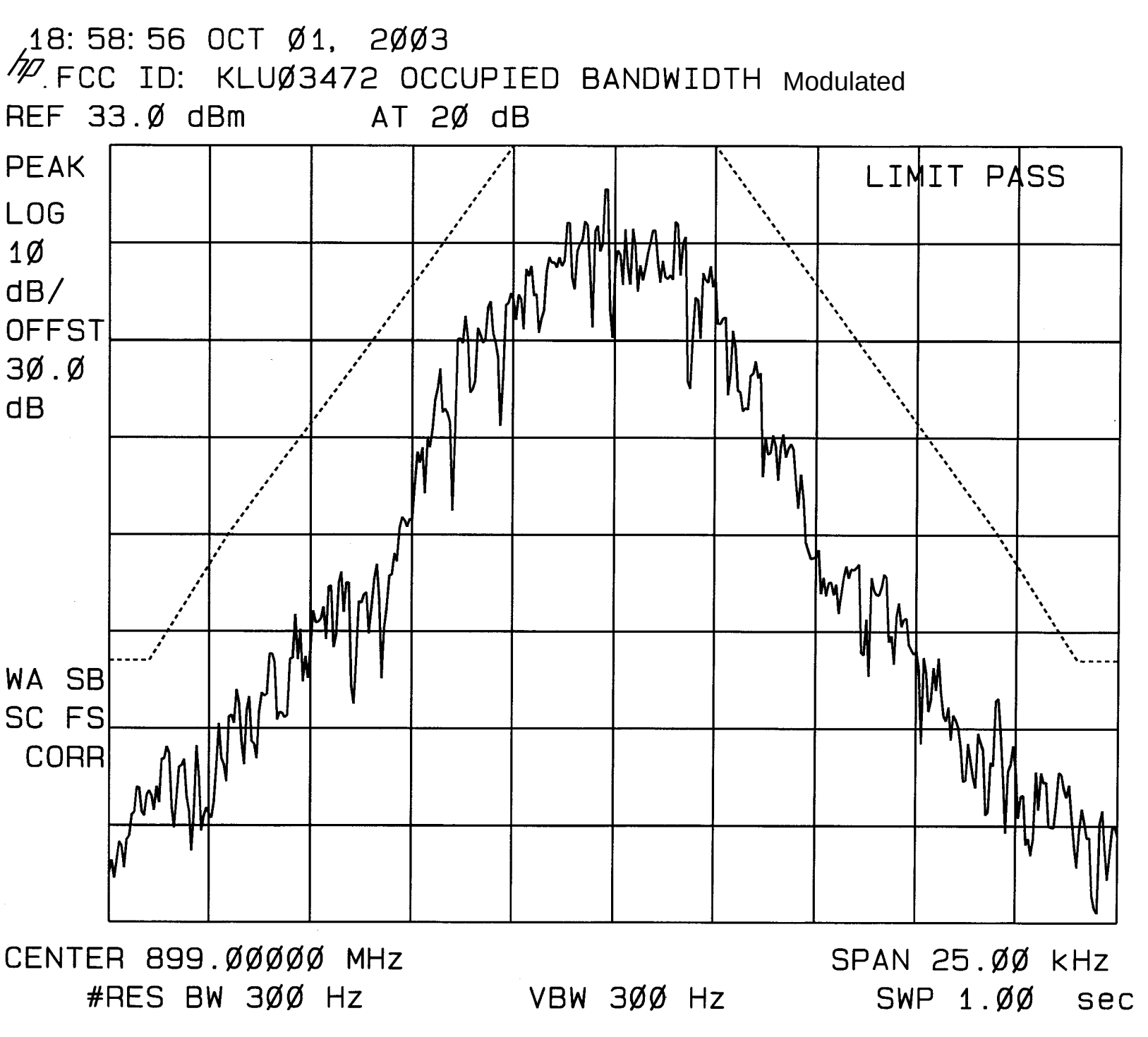
MKR 938.51Ø MHz
REF -92.Ø dBm
AT 1Ø dB
-1ØØ.54 dBm
PEAK
LOG
1Ø
dB/
MA SB
SC FS
CORR
START 935.ØØØ MHz
#RES BW 1.Ø kHz
VBW 1 kHz
STOP 941.ØØØ MHz
SWP 18.Ø sec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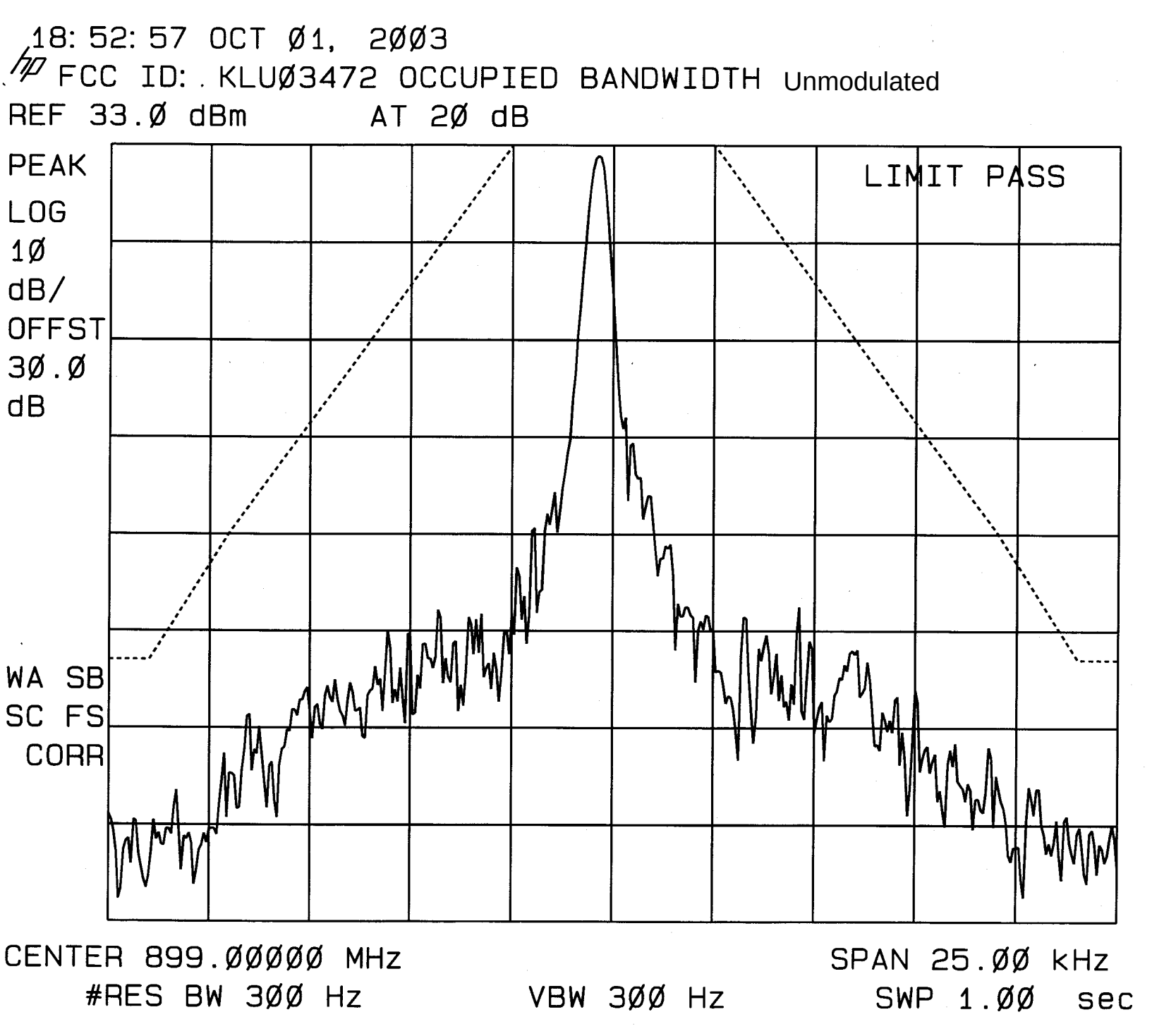
REF 33.Ø dBm
AT 2Ø dB
PEAK
LOG
1Ø
dB/
OFFST
3Ø.Ø
dB
LIMIT PASS
WA SB
SC FS
CORR
CENTER 899.ØØØØØ MHz
SPAN 25.ØØ kHz
#RES BW 3ØØ Hz
VBW 3ØØ Hz
SWP 1.ØØ sec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AT 2Ø dB
PEAK
LOG
1Ø
dB/
OFFST
3Ø.Ø
dB
LIMIT PASS
WA SB
SC FS
CORR
CENTER 899.ØØØØØ MHz
SPAN 25.ØØ kHz
#RES BW 3ØØ Hz
VBW 3ØØ Hz
SWP 1.ØØ sec