



IP MOBILENET TEST REPORT

FOR THE

MOBILE STATION DATA RADIO TRANSCEIVER, M09150-12

FCC PART 90

COMPLIANCE

DATE OF ISSUE: NOVEMBER 4, 2003

PREPARED FOR:

IP MobileNet
16842 Von Karman Avenue
Irvine, CA 92606

PREPARED BY:

Mary Ellen Clayton
CKC Laboratories, Inc.
5473A Clouds Rest
Mariposa, CA 95338

P.O. No.: 003041-00
W.O. No.: 81319

Date of test: October 22-30, 2003

Report No.: FC03-068

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ADMINISTRATIVE INFORMATION

DATE OF TEST: October 22-30, 2003

DATE OF RECEIPT: October 22, 2003

PURPOSE OF TEST: To demonstrate the compliance of the Mobile Station Data Radio Transceiver, M09150-12 with the requirements for FCC Part 90 devices.

TEST METHOD: FCC Part 90

FREQUENCY RANGE TESTED: 10 MHz - 2 GHz

MANUFACTURER: IP MobileNet
16842 Von Karman Avenue
Irvine, CA 92606

REPRESENTATIVE: Jim Lukes

TEST LOCATION: CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92621

SUMMARY OF RESULTS

As received, the IP MobileNet Mobile Station Data Radio Transceiver, M09150-12 was found to be fully compliant with the following standards and specifications:

Canadian Standard	Canadian Section	FCC Standard	FCC Section	Test Description
RSS119	5.5	90	90.209	Bandwidth Limitations
RSS119	5.5.1	NA	NA	Specific Requirements for Channel BW > 12.5kHz
RSS119	5.5.7	90	90.217	Exemption from technical standards
RSS119	5.7	90	90.207	Authorized Modulation Types
RSS119	5.8	NA	NA	Equivalent Channels (>12.5kHz)
RSS119	6.2	90	90.215	Power Output
RSS119	6.3	90	90.210	Spurious Emissions OATS
RSS119	6.3	90	90.210	Spurious Emissions Ant Terminal
RSS119	6.4	90	90.210	Emissions Mask
RSS119	6.5	90	90.214	Transient Freq Behavior
RSS119	6.6	2	2.1047	Modulation Limiting
RSS119	6.9	NA	NA	Data Modem Requirements
RSS119	7	90	90.213	Frequency Stability
RSS119	8	15	Subpart B	Receiver Requirements
RSS119	9	OET	65 Sup. C	RF Exposure Requirements
IC 3082-B		90477		Site No.

CONDITIONS FOR COMPLIANCE

No modifications to the EUT were necessary to comply.

APPROVALS

Steve Behm, Director of Engineering Services

QUALITY ASSURANCE:

TEST PERSONNEL:



Joyce Walker, Quality Assurance Administrative Manager



Randy Clark, EMC Engineer

EQUIPMENT UNDER TEST (EUT) DESCRIPTION

The EUT tested by CKC Laboratories was a production unit

EQUIPMENT UNDER TEST

Mobile Station Data Radio Transceiver (2 each)

Manuf: IP Mobilenet
Model: M09150-12
Serial: 03402482 & 03402483
FCC ID: MI7 (pending)

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Power Supply

Manuf: Samlex America
Model: SEC 1223
Serial: 03061-2G04-00695
FCC ID: NA

Laptop Power Supply

Manuf: Go Forward Enterprise Corp.
Model: NT24-1S1220
Serial: NA
FCC ID: NA

Mouse

Manuf: Microsoft
Model: 93633
Serial: 02608451
FCC ID: DoC

Laptop Computer

Manuf: Compaq
Model: 1456VQLIN
Serial: 1V96CLS8W8PV
FCC ID: DoC

MEASUREMENT UNCERTAINTY

TEST	HIGHEST UNCERTAINTY
Radiated Emissions	+/- 2.94 dB
Conducted Emissions	+/- 1.56 dB

Note: Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Statements of compliance are based on the nominal values only.

TEMPERATURE AND HUMIDITY DURING TESTING

The temperature during testing was within +15°C and + 35°C.
The relative humidity was between 20% and 75%.

FCC 2.1033(c)(3) USER'S MANUAL

The necessary information is contained in a separate document.

FCC 2.1033(c)(4) TYPE OF EMISSIONS

20K0F1D

FCC 2.1033(c)(5) FREQUENCY RANGE

163 MHz & 173 MHz.

FCC 2.1033(c)(6) OPERATING POWER

60 Watts

FCC 2.1033(c)(7) MAXIMUM POWER RATING

Max power rating is listed per antenna height and is subject to secondary licensing requirements.
For max power rating see 90.205(d) Table 1.

FCC 2.1033(c)(8) DC VOLTAGES

The necessary information is contained in a separate document.

FCC 2.1033(c)(9) TUNE-UP PROCEDURE

The necessary information is contained in a separate document.

FCC 2.1033(c)(10) SCHEMATICS AND CIRCUITRY DESCRIPTION

The necessary information is contained in a separate document.

FCC 2.1033(c)(11) LABEL AND PLACEMENT

The necessary information is contained in a separate document.

FCC 2.1033(c)(12) SUBMITTAL PHOTOS

The necessary information is contained in a separate document.

FCC 2.1033(c)(13) MODULATION INFORMATION

4 level FSK

FCC 2.1033(c)(14)/2.1046/90.205 - RF POWER OUTPUT

Test Conditions: EUT is a data radio for mobile use in the VHF frequency range. Equipment is DC powered by support power supply. Support laptop is used for configuration and testing purposes only. Output of antenna port is fed through suitable external attenuation to a power meter.

Temperature: 22°C

Humidity: 45%

Frequency (MHz)	RF Power Output (Watts)
163	59.8
173	60.0

<i>Description</i>	<i>Asset #</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Attenuator	P02229	Pasternack	PE7010-10	NA	9/5/03	9/4/05
Attenuator	P01630	JFW	50FHC-014-20	NA	5/9/03	5/8/04
Attenuator		Pasternack	PE7021-40	NA	10/20/03	10/20/04
Cable #5 (20')	P04275	Andrew	FSJ1-50A	HF-005-20	6/3/03	6/2/05
Power Meter	00613	HP	435B	2702A16632	8/12/02	8/11/04
Power Sensor	02392	HP	8482A	2652A16108	1/31/03	1/30/05
Spectrum Analyzer 100Hz - 22.5GHz	00490	HP	8566B	2209A01404	2/26/03	2/26/04
Spectrum Analyzer Display	00489	HP	8566B	2403A08241	2/26/03	2/26/04
Spectrum Analyzer QP Adapter	00478	HP	85650A	2811A01267	2/26/03	2/26/04

PHOTOGRAPH SHOWING DIRECT CONNECT EMISSIONS



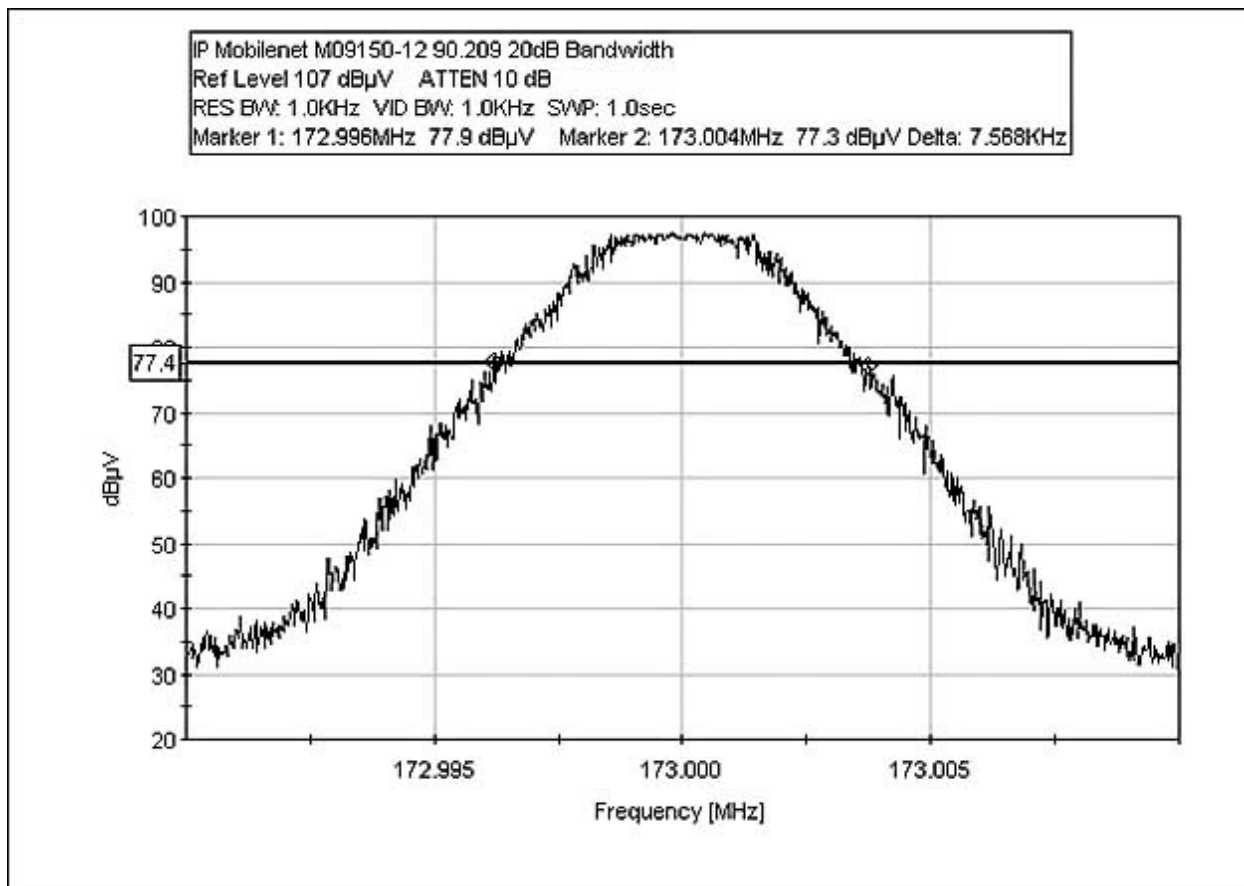
**FCC 2.1033(c)(14)/2.1047(a) - MODULATION CHARACTERISTICS - AUDIO
FREQUENCY RESPONSE**

Not applicable to this unit.

**FCC 2.1033(c)(14)/2.1047(b) MODULATION CHARACTERISTICS- Modulation
Limiting Response**

Not applicable to this unit.

FCC 2.1033(c)(14)/2.1049(i)/90.209- OCCUPIED BANDWIDTH

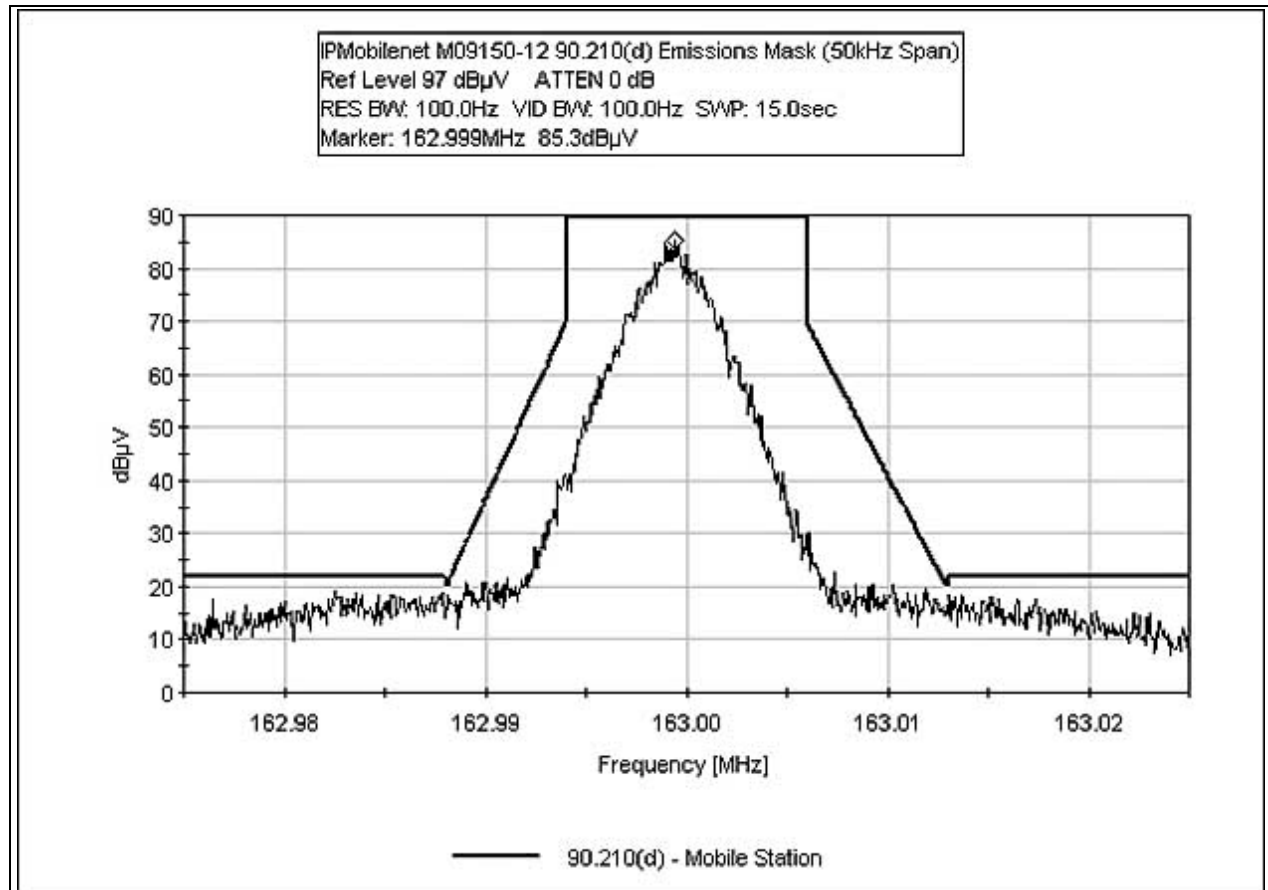


<i>Description</i>	<i>Asset #</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Attenuator	P02229	Pasternack	PE7010-10	NA	9/5/03	9/4/05
Attenuator	P01630	JFW	50FHC-014-20	NA	5/9/03	5/8/04
Attenuator		Pasternack	PE7021-40	NA	10/20/03	10/20/04
Preselector	00484	HP	85685A	2510A00167	2/24/03	2/24/04
Spectrum Analyzer 100Hz - 22.5GHz	00490	HP	8566B	2209A01404	2/26/03	2/26/04
Spectrum Analyzer Display	00489	HP	8566B	2403A08241	2/26/03	2/26/04
Spectrum Analyzer QP Adapter	00478	HP	85650A	2811A01267	2/26/03	2/26/04
Cable #5 (20')	P04275	Andrew	FSJ1-50A	HF-005-20	6/3/03	6/2/05

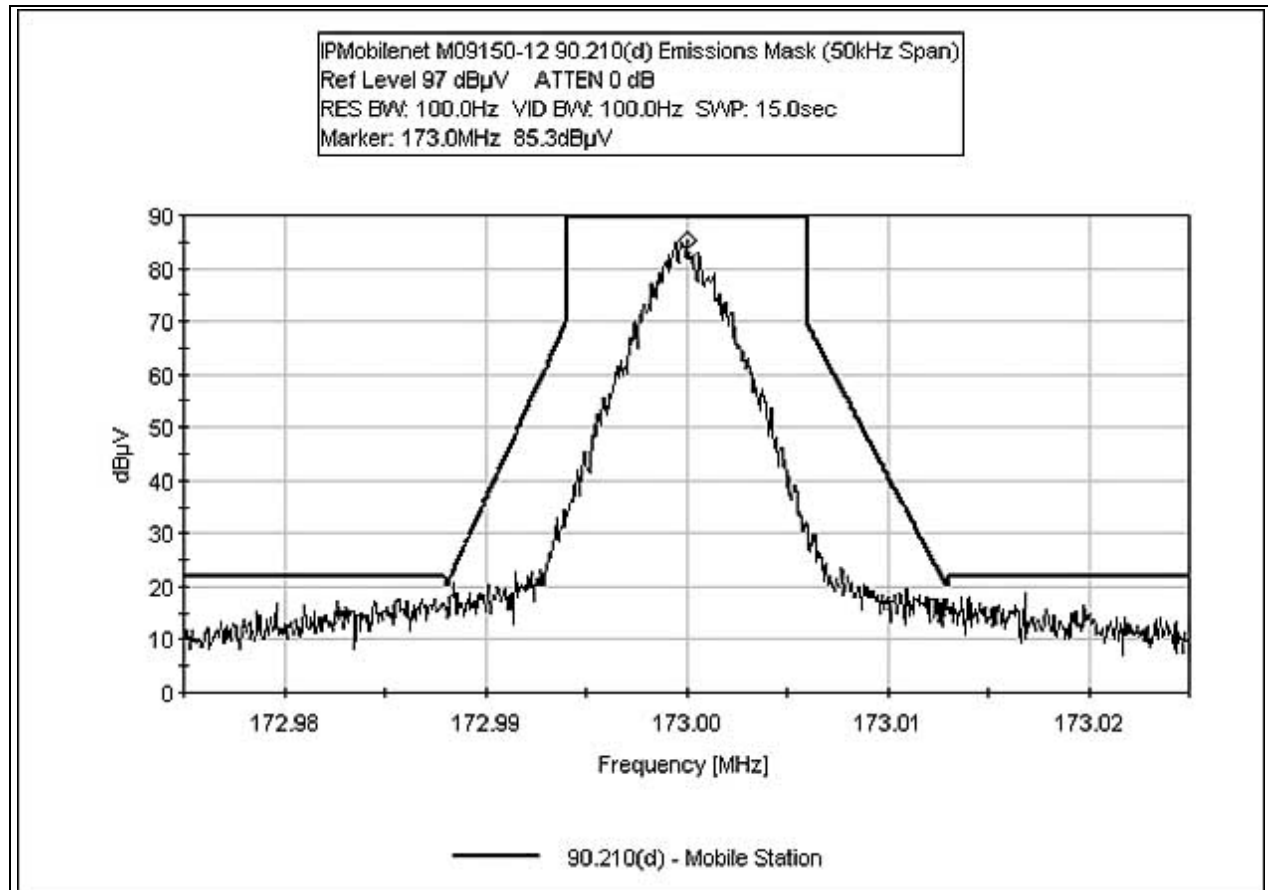
PHOTOGRAPH SHOWING DIRECT CONNECT EMISSIONS



FCC 90.210 EMISSIONS MASK 163 MHz



FCC 90.210 EMISSIONS MASK 173 MHz



FCC 2.1033(c)(14)/2.1051/90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINAL

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **IP Mobilenet**
 Specification: **90.210(d) - Mobile Station**
 Work Order #: **81319** Date: 10/23/2003
 Test Type: **Antenna Terminals** Time: 10:36:04
 Equipment: **Mobile Station Data Radio** Sequence#: 8
 Manufacturer: IP Mobilenet Tested By: Randal Clark
 Model: M09150-12
 S/N: 03402483

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Mobile Station Data Radio*	IP Mobilenet	M09150-12	03402483

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Samlex America	SEC 1223	03061-2G04-00695
Laptop Power Supply	Go Forward Enterprise Corp.	NT24-1S1220	NA
Mouse	Microsoft	93633	02608451
Laptop Computer	Compaq	1456VQLIN	1V96CLS8W8PV

Test Conditions / Notes:

EUT is a data radio for mobile use in the VHF frequency range. Equipment is DC powered by support power supply. Support laptop is used for configuration and testing purposes only. Output of antenna port is fed through suitable external attenuation to a spectrum analyzer. Transmit Frequency: 163 MHz. Temperature: 22°C Humidity: 47%. Frequency Range Investigated: 10 MHz to 2000 MHz. Plot Bandwidth Settings: 10MHz to 2000MHz - RBW=VBW=1kHz. Measurement Bandwidth Settings: 10 MHz to 1000 MHz - RBW=VBW=10kHz, 1000 MHz to 2000 MHz - RBW=VBW=1MHz. Note: Plot indicates preliminary investigation, tabular data reflects proper measurement bandwidth settings.

Transducer Legend:

T1=10dB Attenuation	T2=14 dB Atten
T3=20' Cable	T4=40dB Atten

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	326.003M	20.1	+10.0	+14.2	+0.6	+40.6	+0.0	85.5	87.0	-1.5	None
2	651.993M	19.6	+10.0	+14.1	+1.0	+40.7	+0.0	85.4	87.0	-1.6	None
3	489.003M	18.5	+10.0	+14.1	+0.8	+40.6	+0.0	84.0	87.0	-3.0	None
4	163.000M	85.2	+10.0	+14.2	+0.4	+40.6	+0.0	150.4	154.8 Fundamental	-4.4	None
5	814.999M	13.4	+10.0	+14.2	+1.0	+40.7	+0.0	79.3	87.0	-7.7	None
6	184.053M	2.6	+10.0	+14.1	+0.5	+40.6	+0.0	67.8	87.0	-19.2	None

Test Location: CKC Laboratories • 5473A Clouds Rest • Mariposa, CA 95338 • 1-800-500-4EMC (4362)

Customer: **IP Mobilenet**
 Specification: **90.210(d) - Mobile Station**
 Work Order #: **81319**
 Test Type: **Antenna Terminals**
 Equipment: **Mobile Station Data Radio**
 Manufacturer: IP Mobilenet
 Model: M09150-12
 S/N: 03402482

Date: 10/23/2003
 Time: 10:41:17
 Sequence#: 7
 Tested By: Randal Clark

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Mobile Station Data Radio*	IP Mobilenet	M09150-12	03402482

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Samlex America	SEC 1223	03061-2G04-00695
Laptop Power Supply	Go Forward Enterprise Corp.	NT24-1S1220	NA
Mouse	Microsoft	93633	02608451
Laptop Computer	Compaq	1456VQLIN	1V96CLS8W8PV

Test Conditions / Notes:

EUT is a data radio for mobile use in the VHF frequency range. Equipment is DC powered by support power supply. Support laptop is used for configuration and testing purposes only. Output of antenna port is fed through suitable external attenuation to a spectrum analyzer. Transmit Frequency: 173 MHz. Temperature: 22°C Humidity: 47%. Frequency Range Investigated: 10 MHz to 2000 MHz. Plot Bandwidth Settings: 10MHz to 2000MHz - RBW=VBW=1kHz. Measurement Bandwidth Settings: 10 MHz to 1000 MHz - RBW=VBW=10kHz, 1000 MHz to 2000 MHz - RBW=VBW=1MHz. Note: Plot indicates preliminary investigation, tabular data reflects proper measurement bandwidth settings.

Transducer Legend:

T1=10dB Attenuation	T2=14 dB Atten
T3=20' Cable	T4=40dB Atten

Measurement Data: Reading listed by margin. Test Distance: None

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	173.000M	85.3	+10.0	+14.1	+0.5	+40.6	+0.0	150.5	154.8	-4.3	None
Fundamental											
2	519.000M	15.8	+10.0	+14.1	+0.8	+40.6	+0.0	81.3	87.0	-5.7	None
3	691.995M	11.0	+10.0	+14.1	+1.0	+40.7	+0.0	76.8	87.0	-10.2	None
4	346.003M	9.3	+10.0	+14.2	+0.6	+40.6	+0.0	74.7	87.0	-12.3	None

<i>Description</i>	<i>Asset #</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Attenuator	P02229	Pasternack	PE7010-10	NA	9/5/03	9/4/05
Attenuator	P01630	JFW	50FHC-014-20	NA	5/9/03	5/8/04
Attenuator		Pasternack	PE7021-40	NA	10/20/03	10/20/04
Preselector	00484	HP	85685A	2510A00167	2/24/03	2/24/04
Spectrum Analyzer 100Hz - 22.5GHz	00490	HP	8566B	2209A01404	2/26/03	2/26/04
Spectrum Analyzer Display	00489	HP	8566B	2403A08241	2/26/03	2/26/04
Spectrum Analyzer QP Adapter	00478	HP	85650A	2811A01267	2/26/03	2/26/04
Cable #5 (20')	P04275	Andrew	FSJ1-50A	HF-005-20	6/3/03	6/2/05

PHOTOGRAPH SHOWING DIRECT CONNECT EMISSIONS



FCC 2.1033(c)(14)/2.1053/90.210 - FIELD STRENGTH OF SPURIOUS RADIATION

Test Conditions: EUT is a data radio for mobile use in the VHF frequency range. Equipment is DC powered by support power supply. Support laptop is used for configuration and testing purposes only. Output of antenna port is fed through suitable external attenuation to a spectrum analyzer. Transmit Frequency: 173 and 163 MHz Temperature: 22°C, Humidity: 47%. Frequency Range Investigated: 10 MHz to 2000 MHz. Measurement Bandwidth Settings: 10 MHz to 1000 MHz - RBW=VBW=10kHz, 1000 MHz to 2000 MHz - RBW=VBW=1MHz. **No EUT emissions detected within 20dB of the limit.**

<i>Description</i>	<i>Asset #</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Antenna, Biconilog	01991	Chase	CBL6111C	2456	12/13/02	12/12/04
Antenna, Loop	00226	EMCO	6502	1074	5/21/03	5/20/05
Antennna, Horn 18-26GHz	02046	ARA	MWH-1826/B	1005	7/1/03	6/30/04
Preamp	02010	HP	8449B	3008A00301	10/18/02	10/17/04
Preamp	00099	HP	8447D	1937A02604	3/7/03	3/6/04
Spectrum Analyzer 100Hz - 22.5GHz	00490	HP	8566B	2209A01404	2/26/03	2/26/04
Spectrum Analyzer Display	00489	HP	8566B	2403A08241	2/26/03	2/26/04
Spectrum Analyzer QP Adapter	00478	HP	85650A	2811A01267	2/26/03	2/26/04

PHOTOGRAPH SHOWING RADIATED EMISSIONS



Radiated Emissions - Front View



Radiated Emissions - Back View

FCC 2.1033(c)(14)/2.1055/90.213 - FREQUENCY STABILITY AND VOLTAGE VARIATIONS

Test Conditions: EUT is a data radio for mobile use in the VHF frequency range. Equipment is DC powered by support power supply. Support laptop is used for configuration and testing purposes only. Output of antenna port is fed through suitable external attenuation to a spectrum analyzer. Input supply voltage is varied $\pm 15\%$ of nominal.

Customer: IP Mobilenet
WO#: 81319
Date: 27-Oct-03
Test Engineer: Randal Clark

Device Model #: M09150-12
Operating Voltage: 13.8 VDC
Frequency Limit: 5 PPM

Temperature Variations

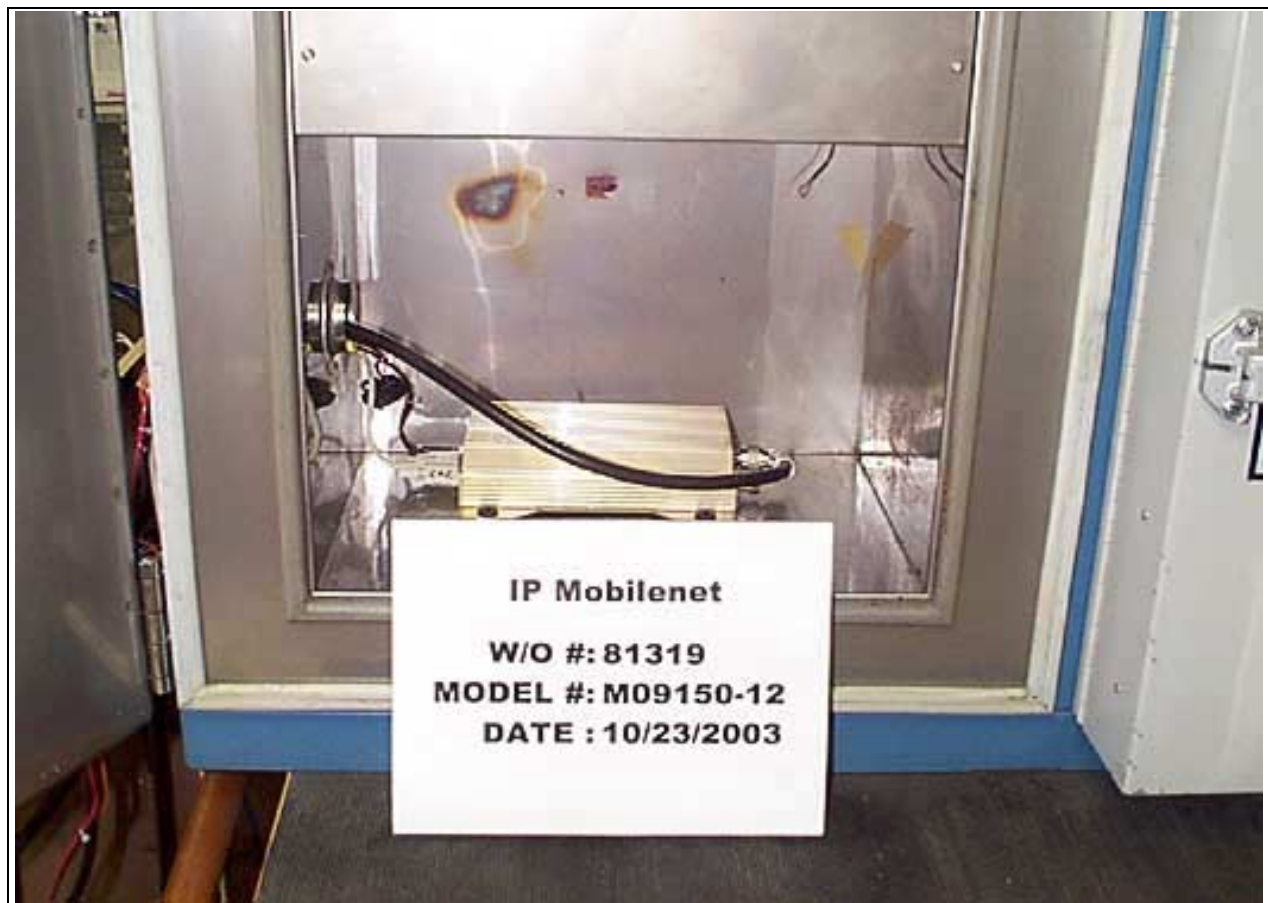
Channel Frequency:	Channel 1 (MHz)	Dev. (MHz)	Channel 2 (MHz)	Dev. (MHz)
	163		173	
Temp (C) Voltage				
-30 13.8	162.99947	0.00053	172.99925	0.00075
-20 13.8	162.99958	0.00043	172.99948	0.00052
-10 13.8	162.99949	0.00051	172.99991	0.00009
0 13.8	162.99944	0.00056	173.00006	0.00006
10 13.8	162.99943	0.00057	173.00010	0.00010
20 13.8	162.99940	0.00060	172.99998	0.00002
30 13.8	162.99931	0.00070	172.99989	0.00011
40 13.8	162.99929	0.00071	172.99973	0.00027
50 13.8	162.99931	0.00070	173.00025	0.00025

Voltage Variations ($\pm 15\%$)

20 11.7	162.99936	0.00064	172.99999	0.00001
20 13.8	162.99940	0.00060	172.99998	0.00002
20 15.9	162.99936	0.00064	172.99997	0.00003
Max Deviation (MHz)	0.00071		0.00075	
Max Deviation (PPM)	4.35583		4.33526	
	PASS		PASS	
Max Deviation (MHz)	0.00071		0.00075	
Max Deviation (%)	0.00000		0.00000	
	PASS		PASS	

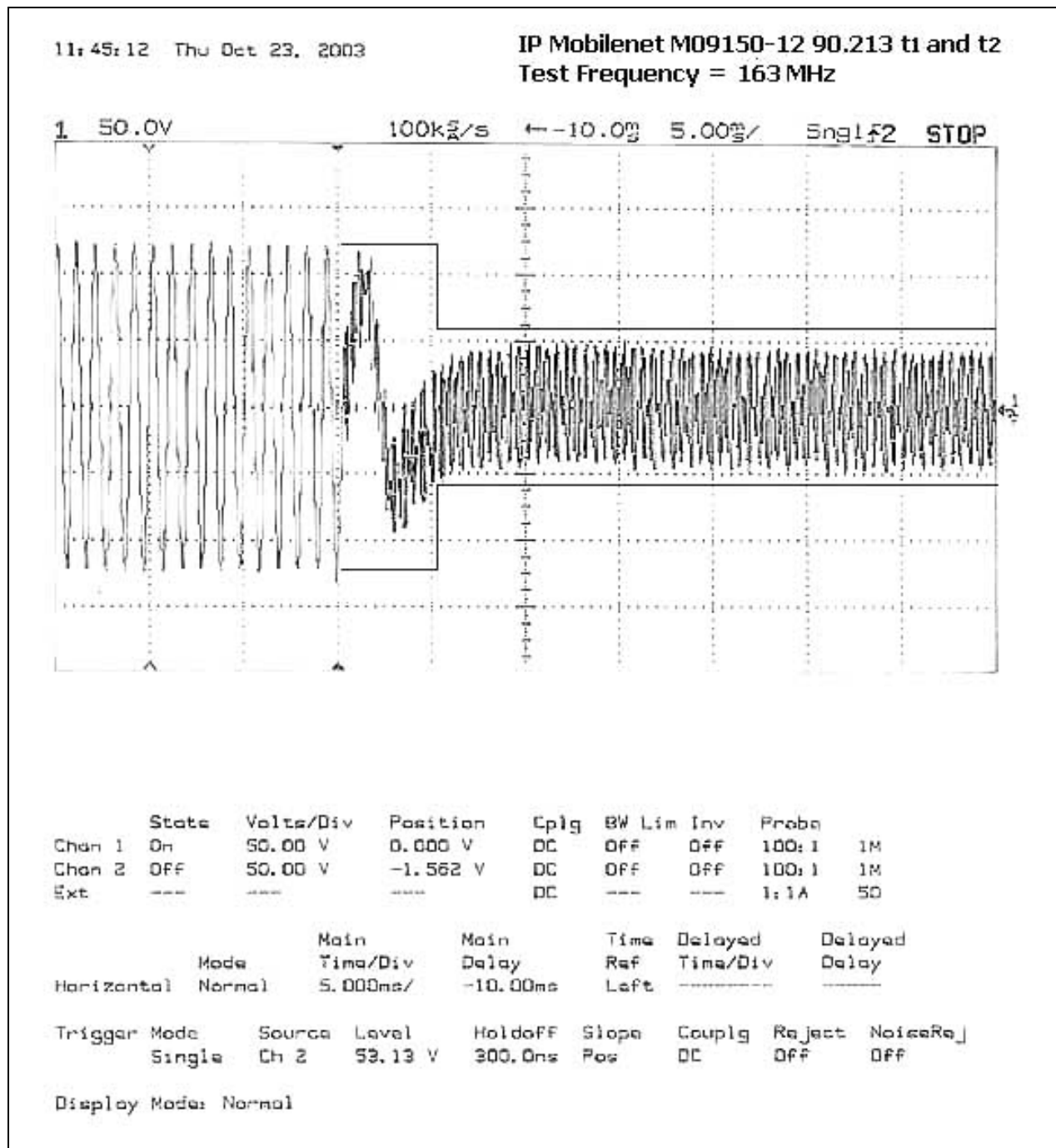
<i>Description</i>	<i>Asset #</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Spectrum Analyzer 100Hz - 22.5GHz	00490	HP	8566B	2209A01404	2/26/03	2/26/04
Spectrum Analyzer Display	00489	HP	8566B	2403A08241	2/26/03	2/26/04
Spectrum Analyzer QP Adapter	00478	HP	85650A	2811A01267	2/26/03	2/26/04
Temp Chamber	01879	Thermotron	S-1.2 MiniMax	11899	1/31/03	1/31/04
Thermometer	02242	Omega	HH-26K	T-202884	8/15/03	8/14/05
Power Supply, DC	00765	Sorensen	DCR-60-30B	176	7/8/03	7/7/05

PHOTOGRAPH SHOWING TEMPERATURE TESTING

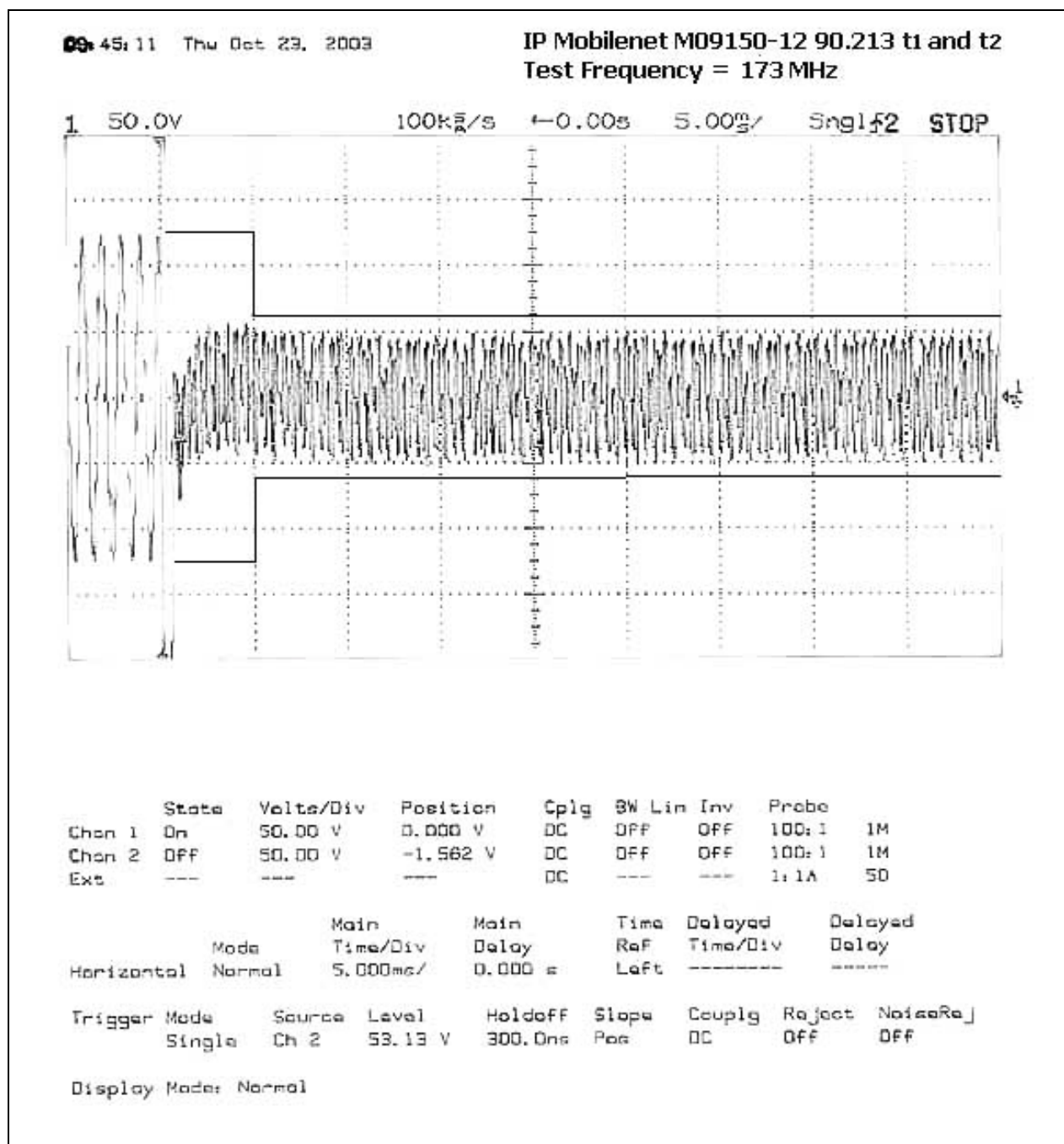


FCC 90.214 TRANSIENT FREQUENCY BEHAVIOR T1&T2 - 163 MHz

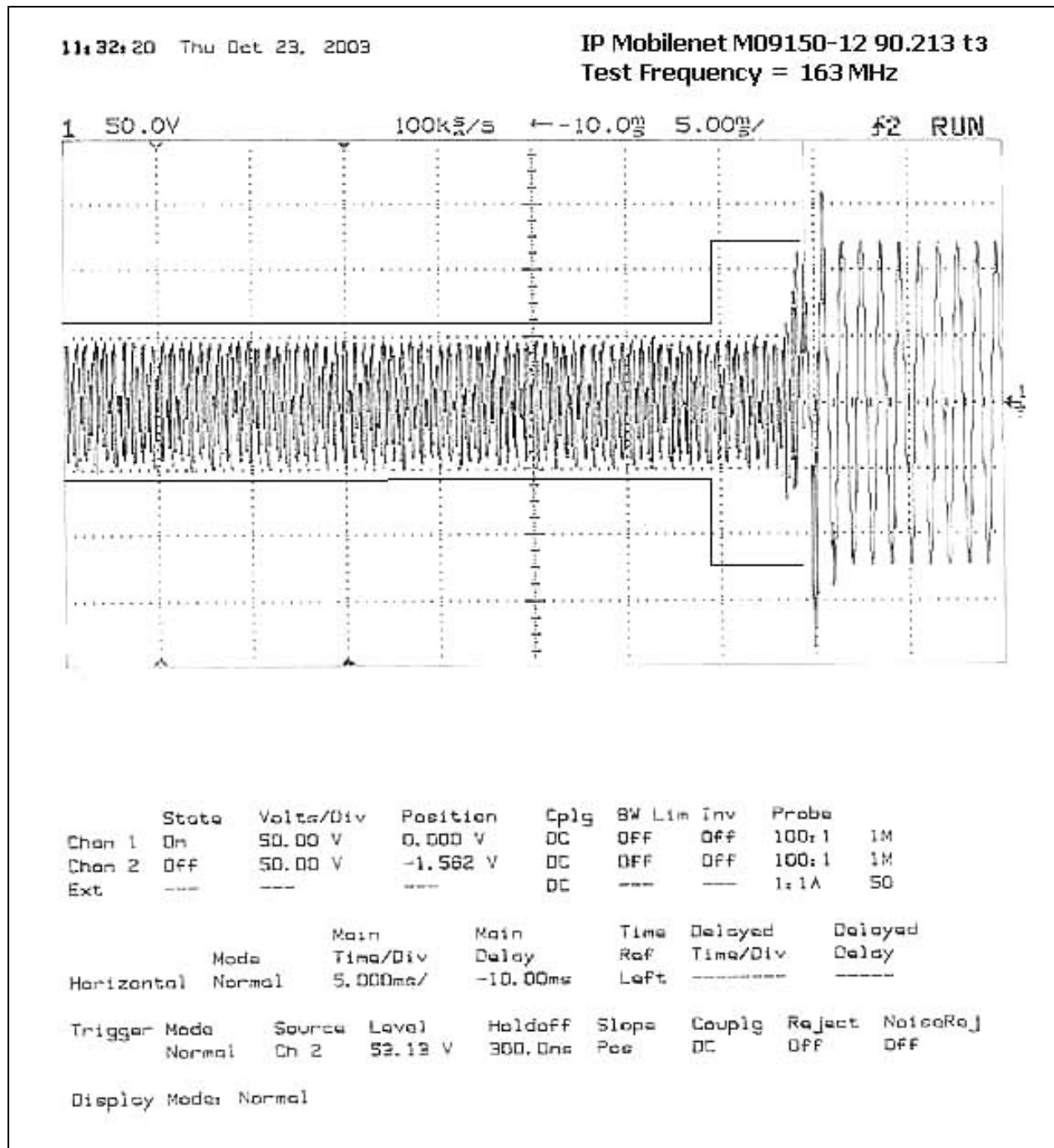
Test Conditions: EUT is a data radio for mobile use in the VHF frequency range. Equipment is DC powered by support power supply. Support laptop is used for configuration and testing purposes only. Test setup in accordance with TIA 603.



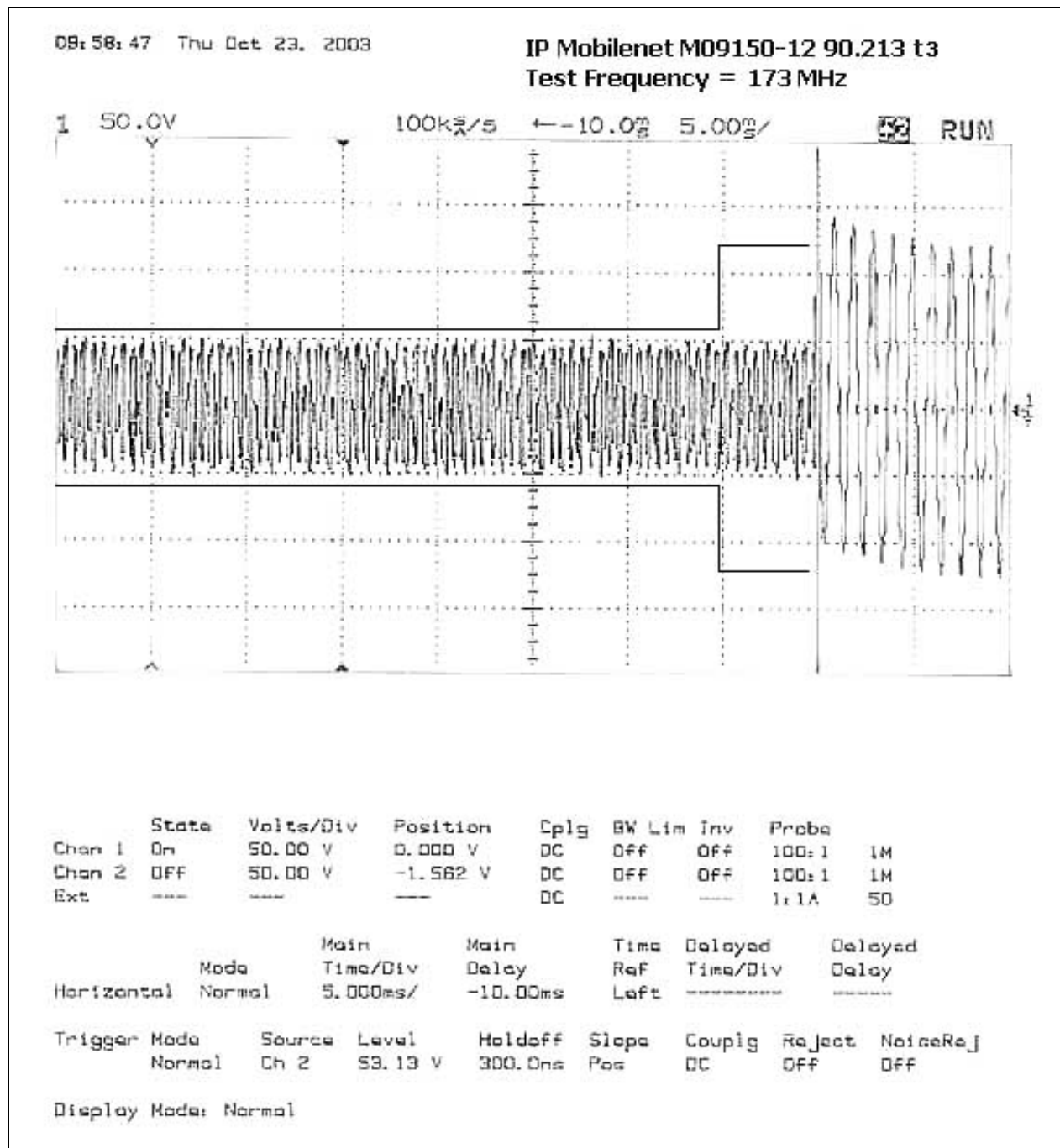
FCC 90.214 T1 & T2 173 MHz



FCC 90.214 T3 163 MHz



FCC 90.214 T3 173 MHz



<i>Description</i>	<i>Asset #</i>	<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Cal Date</i>	<i>Cal Due</i>
Analyzer, Modulation	02072	HP	8901A	2751A05181	11/27/02	11/27/03
Oscilloscope	02313	HP	84615B	US373340347	1/2/03	1/2/04
Power Meter	00613	HP	435B	2702A16632	8/12/02	8/11/04
Directional Coupler	2576	Werlatone	C5571	11363	11/6/02	11/6/03
Generator, Signal	01870	Marconi	2022D	119259/016	9/5/02	9/4/04
Power Sensor	00774	HP	8481A	2349A41124	8/12/02	8/11/04

PHOTOGRAPH SHOWING TRANSIENT FREQUENCY BEHAVIOR



FCC 2.1091 – MPE CALCULATIONS

Date of Report: 10/29/03

Calculations prepared for:

IP Mobilenet

Calculations prepared by:

Randal Clark
CKC Laboratories, Inc.
5473A Clouds Rest Road
Mariposa, CA 95338

Model Number: M09150-12

Fundamental Operating Frequency: 163-173 MHz

Maximum Rated Output Power: 60 Watts

Measured Output Power: 60 Watts

MPE Limit in accordance with 1.1310(b): Limits for general population/uncontrolled exposure

$$\text{MPE Limit} = 0.2 \text{ (mW/cm}^2\text{)}$$

EIRP (mW)	Distance (meters)	Power Density (mW/cm ²)	Result
60000.00	1.54	0.2	Pass

$$\text{PowerDensity(mW / cm}^2\text{)} = \frac{\text{EIRP}}{4\pi d^2} \quad \text{Given: EIRP in mW and d in cm}$$

Note: Antennae are not sold with this equipment; EIRP is listed assuming a 0dBi gain antenna.

As can be seen from the MPE results, this device passes the limits specified in 1.1310 at a distance of 1.54 meters and at a output power of 60 watts assuming a 0dBi gain antenna. Users and installers must be provided with appropriate antenna installation instructions and transmitter operating conditions, including antenna co-location requirements of §1.1307(b)(3), for satisfying RF exposure compliance.

RSS 119 20 dB BANDWIDTH

