



Project: 04ME06985
File: NC4557
Date: 5/18/04
Model: M185
FCC ID: EP9TMXM185

Test Report

On

Electromagnetic Compatibility Testing

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Test Report Details

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Tests Performed For: **Timex Corporation
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Test Report Date: **5/18/2004**

Product Type: **GPS Transceiver**

Model Number: **M185**

Sample Serial Number: **#4**

Sample Tag Number: **0578185001**

Sample Receive Date: **5/10/04**

EUT Category: **ITE**

Testing Start Date: **5/12/04**

Date Testing Complete: **5/13/2004**

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Report Revision History

Revision Date	Description	Revised By	Revision Reviewed By
6/1/2004	Original	--	--

1.0 GENERAL - Product Description

The M185 is a portable GPS Transceiver that will be worn by athletes, joggers, hikers and others on the upper arm or a belt and that will receive GPS signals from satellites, convert the signals to GPS data and transmit such GPS data to Timex watch Receiver.

1.1 Device Configuration During Test

The GPS speed and distance system is composed of two units a transmitter and a receiver watch.

The EUT (Equipment under Test) was configured in a typical user configuration. The Timex M185 is a 137.5 to 141.03 kHz radio transmitter, which utilizes a Mark frequency of 137.5KHz and a Space frequency of 141.03KHz in conjunction with the receiver located inside a wristwatch. The receiver receives the transmitted radio signals, decodes it and displays the information on the LCD screen of the watch. The system uses an FSK (frequency shift keying) based simplex data communication scheme. The data rate does not exceed 1024 baud. The system is designed to function up to a maximum distance of 1 meter between transmitter and receiver.

The Transmit antenna is permanently attached to the M185 Transceiver.

1.1.1 Equipment Used During Test:

Use*	Product Type	Manufacturer	Model	Comments
EUT	Transceiver	Timex	M185	None
ACC	Watch Receiver	Timex	M529	None

* Use = EUT - Equipment Under Test, ACC - Accessory (Not Subjected to Test), or SIM - Simulator (Not Subjected to Test)

1.1.2 Input/Output Ports:

Port #	Name	Type*	Cable Max. >3m	Cable Shielded	Comments
0	Enclosure	N/E	-	-	None
1	Mains	-	-	-	AA Battery Power

*AC = AC Power Port DC = DC Power Port N/E = Non-Electrical

I/O = Signal Input or Output Port (Not Involved in Process Control)

PMC = Process Measurement and Control Port

1.1.3 EUT Internal Operating Frequencies:

Frequency (MHz)	Description	Frequency (MHz)	Description
0.1375	Mark Frequency	-	-
0.141	Space Frequency	-	-

1.1.4 Power Interface:

Mode #	Voltage (V)	Current (A)	Power (W)	Frequency (DC/AC-Hz)	Phases (#)	Comments
Rated						
1	-	-	-	-	-	AA Battery Power

1.2 EUT Operation Modes:

Mode #	Description
1	Search mode (Transmit)
2	Receive Mode

1.3 EUT Configuration Modes:

Mode #	Description
1	The manufacturer configured the Transceiver to continuously communicate with the watch receiver. This was configured because of the availability to communicate with the GPS during test
2	Receiver (watch) not communicating with transceiver

"The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report"

Note: The EUT orientation was tested in a vertical axis, which was deemed worst-case emissions.

Per FCC Part 2.1093 (C) this device is not required to undergo testing for radio-frequency radiation exposure.

1.4 Block Diagram:

The diagram below illustrates the configuration of the equipment above.



1.5 Deviations from standard test methods.

Not Applicable

1.6 Device Modifications Necessary for Compliance

Not Applicable.

1.7 Test Summary

Test Name Test Requirement/Specification	Comply	Does Not Comply	See Remark
Radiated Disturbance Emissions – 10KHz to 1000 MHz Electric Field	Yes	-	1
FCC Part 15, Subpart C and RSS-210 Class B	Yes	-	1
Conducted Disturbance Emissions - Voltage	Yes	-	3
FCC Part 15, Subpart C	Yes	-	3

Remarks:

- 1) No Modifications required for compliance.
- 2) Modifications required to comply as described in Section 1.6
- 3) Not applicable DC power

2.0 Conclusion:

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by Underwriters Laboratories Inc. in accordance with the procedures stated in each test requirement and specification. The Applicant as being applicable to the Equipment Under Test determined the test list. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

The equipment under test has Met the technical requirements as defined under sections 5.0 and 6.0.

Test Start Date: 12 May 2004
Test Completion Date: 13 May 2004



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3.0 FCC Labeling Information

Devices Subject to Verification

In 47 CFR, Part 2, § 2.954:

“Devices subject only to verification shall be uniquely identified by the person responsible for marketing or importing the equipment within the United States. However, the identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified or type accepted equipment. The importer or manufacturer shall maintain adequate identification records to facilitate positive identification for each verified device.”

Devices Subject to Declaration of Conformity

In 47 CFR, Part 2, § 2.1074:

“Devices subject only to a Declaration of Conformity shall be uniquely identified by the responsible party. This identification shall not be of a format which could be confused with the FCC Identifier required on certified, notified, type accepted or type approved equipment. The responsible party shall maintain adequate identification records to facilitate positive identification for each device.”

3.1 Compliance information

§ 2.1077 Compliance information.

(a) If a product must be tested and authorized under a Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

- (1) Identification of the product, e.g., name and model number;
- (2) A statement, similar to that contained in § 15.19(a)(3) of this chapter, that the product complies with part 15 of this chapters; and
- (3) The identification, by name, address and telephone number, of the responsible party, as defined in §

2.909.

The responsible party for a Declaration of Conformity must be located within the United States.

(c) The compliance information statement shall be included in the user’s manual or as a separate sheet.

§ 15.19(a)(3):

“ All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.”

3.2 Labeling.

Labeling Certification or Verification

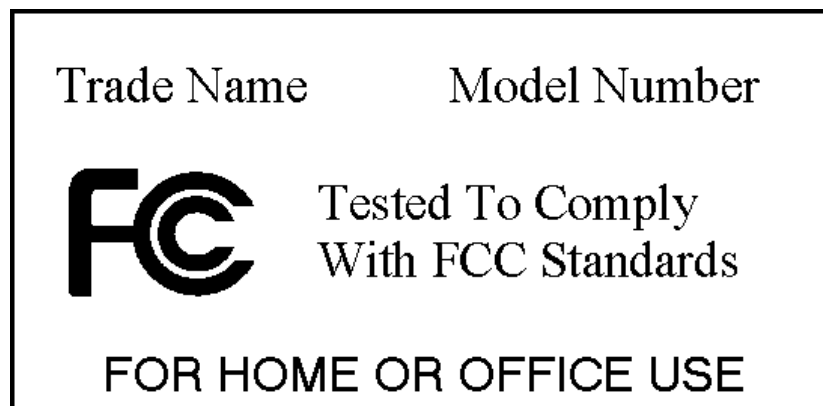
In addition to the requirements in Part 2 of this CFR 47 (See **1.6.1 Identification** above), a device subject to certification or verification shall be labeled as follows:

- (1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:
This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.
- (2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:
This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.
- (3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
- (4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.
- (5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

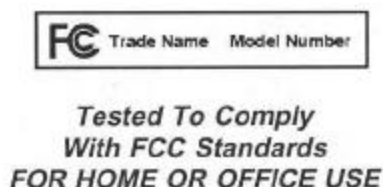
Declaration of Conformity Labeling

In addition to the requirements in Part 2 of CFR 47 (See **1.6.1 Identification** above), a device subject to authorization under a Declaration of Conformity shall be labeled as follows:

- (1) The label shall be located in a conspicuous location on the device and shall contain the unique identification described in Section 2.1074 of this chapter and the following logo:
 - (i) If the product is authorized based on testing of the product or system:



Alternate label format for small devices:



The text shown in ***bold-face italics*** may be placed in a prominent location in the instruction manual or pamphlet supplied to the user.

- (2) Label text and information should be in a size of type large enough to be readily legible, consistent with the dimensions of the equipment and the label. However, the type size for the text is not required to be larger than eight point.
- (3) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (b)(1) of this section on it, such as for a CPU board or a plug-in circuit board peripheral device, the text associated with the logo may be placed in a prominent location in the instruction manual or pamphlet supplied to the user. However, the unique identification (trade name and model number) and the logo must be displayed on the device.
- (4) The label shall not be a stick-on, paper label. The label on these products shall be permanently affixed to the product and shall be readily visible to the purchaser at the time of purchase, as described in Section 2.925(d) of this chapter. "Permanently affixed" means that the label is etched, engraved, stamped, silk-screened, indelibly printed, or otherwise permanently marked on a permanently attached part of the equipment or on a nameplate of metal, plastic, or other material fastened to the equipment by welding, riveting, or a permanent adhesive. The label must be designed to last the expected lifetime of the equipment in the environment in which the equipment may be operated and must not be readily detachable.

3.3 User information.

In 47 CFR, Part 15, § 15.21 Information to user:

“The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.”

In 47 CFR, Part 15, § 15.105 Information to the user:

Class A Devices

“(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.”

Class B Devices

“(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

“(d) For systems incorporating several digital devices, the statement shown in paragraph (a) or (b) of this section needs to be contained only in the instruction manual for the main control unit.”

4.0 Calibration of Equipment Used for Measurement

All test equipment and test accessories are calibrated on a regular basis. The maximum time between calibrations is the manufacturer recommends one year or what whichever is less.

All test equipment calibrations are traceable to the National Institute of Standards and Technology (NIST); therefore, all test data recorded in this report is traceable to NIST.

5.0 EMISSIONS TEST REGULATIONS

The emissions tests were performed according to following regulations:

----- United States -----

FCC Part 15, Subpart B (15.109). Code of Federal Regulations, Part 15, Subpart B and C,
and Section; (15.209). Radio Frequency Devices

----- Canada -----

RSS-210: Issue 5 2001 Low Power License-Exempt Radio Communications Devices
(All Frequency Bands)

5.1.1 Radiated Emissions Test (10 Meter Semi-Anechoic Chamber)

Test Applicable

Measurements were made in a 10-meter semi-anechoic chamber that complies to ANSI C63.4. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

Results

The system met the requirements for radiated emissions. Data Pages follow.

Temperature:	22.0 °C	Mode*	
Humidity:	60.0 %RH	Power	Operation
Pressure:	1009 mbar	<u>1</u>	<u>1</u>
Date test performed:	12 May 2004	<u>1</u>	<u>2</u>

1 fully configured sample was scanned over the following frequency range:

Electric fields:	9KHz – 30MHz	(1 meter measurement distance)
Electric fields:	9KHz – 30MHz	(3 meter measurement distance)
Electric fields:	30MHz - 1GHz	(10 meter measurement distance)
	1GHz - 10GHz	(3 meter measurement distance)

9kHz – 30MHz a Magnetic Loop Antenna was utilized. The limit was adjusted using the 40dB/decade-limit extrapolation method. In addition, the electric field strengths when measured with the loop antenna were maximized about the antenna full azimuth during test.

30MHz – 1.0GHz the measurement was made throughout the frequency banned on the EUT.

Tests were performed on the transmitter in accordance with the limitation set forth by CFR47 FCC Part 15 Subpart C Paragraph 15.209 and tested in accordance with the test procedures and methodologies in ANSI C63.4: 2001.

The EUT was checked throughout the frequency band 9kHz to 1.0GHz. The transmitter operated at 137.5 -141kHz. The allowable field strength limits in accordance with 15.209 were applied to the fundamental frequency. All other emissions were tested in accordance with the general limitations 15.209.

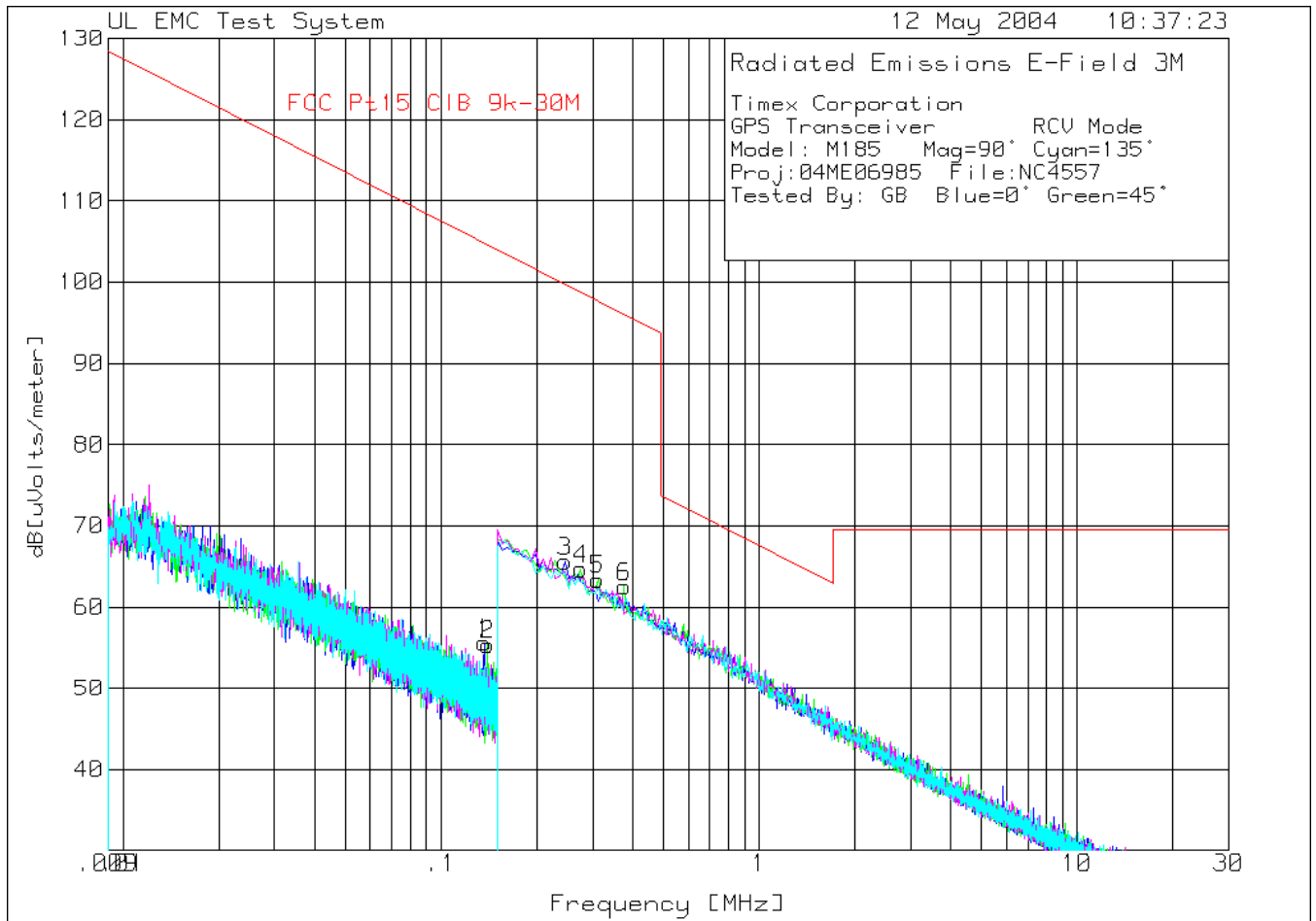
All frequencies were evaluated and the plots enclosed show worst-case emissions.

Test equipment used for radiated emissions

ESI26	Rhode & Schwartz	EMI Receiver	Equipment No.: ME5B-081
			Quasi Peak BW: 200Hz 9kHz to 150kHz
			RBW 10 KHz
			Quasi Peak BW: 9kHz 150kHz to 30MHz
			RBW 100 KHz
			Quasi Peak BW: 120 30 to 1000MHz
			kHz
			RBW 1.0 MHz
Range: 9kHz-1000Mhz	Last Calibration Date: 28 August 2003		Calibration Due Date: 31 August 2004

Test Accessories for Radiated Emissions

94455-1	Ailtech	Biconnical Antenna	Equipment No.: ME5-439
Range: 30-200MHz	Last Calibration Date: 02 December 2003		Calibration Due Date: 02 December 2004
3146	EMCO	Log Periodic Antenna	Equipment No.: ME5-451
Range: 200-1000Mhz	Last Calibration Date: 04 December 2003		Calibration Due Date: 04 December 2004
6507	EMCO	Active Loop	Equipment No.: ME5A-288
Range: 1kHz-30Mhz	Last Calibration Date: 25 March 2004		Calibration Due Date: 25 March 2005
99760-00	Cole -Parmer	Hygrometer/Temp/Baro	Equipment No.: ME4-268
		meter	
		Ranges	Temp: 0°C-55°C
			Humidity: 25% to 95 %RH
			Pressure: 795 to 1050 mbar
	Last Calibration Date: 27 May 2003		Calibration Due Date: 27 May 2004



The emission where the system noise floor was above the fundamental was checked with the antenna at 1 meter.

Timex Corporation
 GPS Transceiver RCV Mode
 Model: M185 Mag=90° Cyan=135°
 Proj:04ME06985 File:NC4557
 Tested By: GB Blue=0° Green=45°

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====						
Range: 1 .009 - .15MHz -----						
1	.13679	39.91 pk	0	15.7	55.61	104.9
	Azimuth:219	Height:101	Horz	Margin [dB]		-49.29

Range: 2 .15 - 30MHz -----						
3	.24554	50.43 pk	0	15.2	65.63	99.8
	Azimuth:23	Height:101	Horz	Margin [dB]		-34.17

Range: 3 .009 - .15MHz -----						
2	.14043	39.65 pk	0	15.7	55.35	104.6
	Azimuth:358	Height:123	Horz	Margin [dB]		-49.25

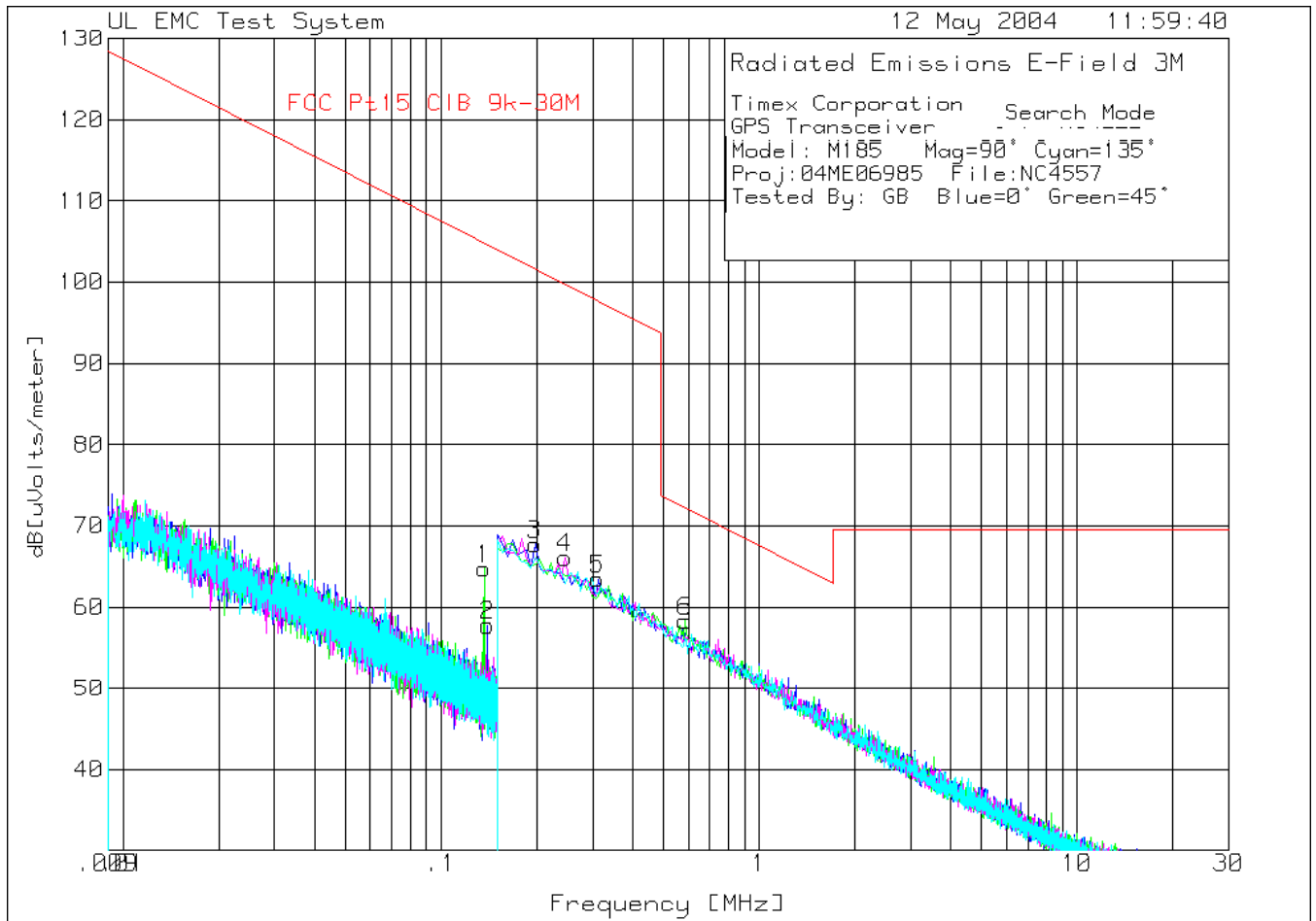
Range: 4 .15 - 30MHz -----						
4	.27539	49.46 pk	0	15.2	64.66	98.8
	Azimuth:358	Height:123	Horz	Margin [dB]		-34.14

5	.31122	48.2 pk	0	15.2	63.4	97.7
	Azimuth:23	Height:123	Horz	Margin [dB]		-34.3

6	.3769	47.33 pk	0	15.2	62.53	96.1
	Azimuth:23	Height:123	Horz	Margin [dB]		-33.57

LIMIT 1: FCC Pt15 ClB 9k-30M

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 avem - denotes EMI average detection
 tm - Trace Math Result



The emission where the system noise floor was above the fundamental was checked with the antenna at 1 meter.

Timex Corporation
 GPS Transceiver Search Mode
 Model: M185 Mag=90° Cyan=135°
 Proj:04ME06985 File:NC4557
 Tested By: GB Blue=0° Green=45

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====						
Range: 1 .009 - .15MHz -----						
2	.14015	42.05 pk	0	15.7	57.75	104.7
	Azimuth:84	Height:100	Horz	Margin [dB]		-46.95

Range: 2 .15 - 30MHz -----						
3	.19777	52.54 pk	0	15.2	67.74	101.7
	Azimuth:358	Height:100	Horz	Margin [dB]		-33.96

5	.31122	48.26 pk	0	15.2	63.46	97.7
	Azimuth:358	Height:100	Horz	Margin [dB]		-34.24

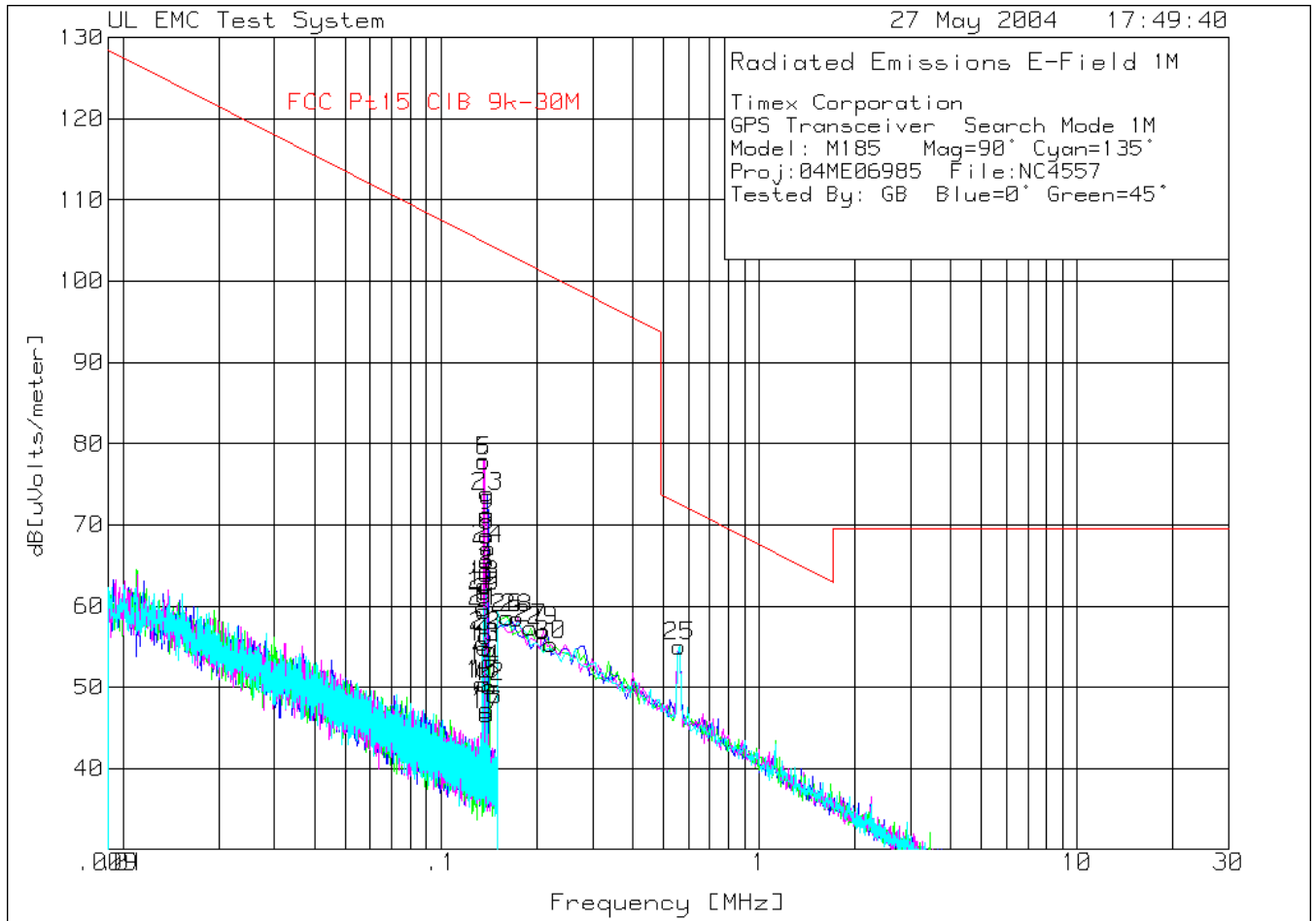
Range: 3 .009 - .15MHz -----						
1	.13668	49.06 pk	0	15.7	64.76	104.9
	Azimuth:343	Height:123	Horz	Margin [dB]		-40.14

Range: 4 .15 - 30MHz -----						
6	.58588	43.31 pk	0	15	58.31	72.2
	Azimuth:18	Height:123	Horz	Margin [dB]		-13.89

Range: 6 .15 - 30MHz -----						
4	.24554	50.9 pk	0	15.2	66.1	99.8
	Azimuth:358	Height:147	Horz	Margin [dB]		-33.7

LIMIT 1: FCC Pt15 ClB 9k-30M

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 avem - denotes EMI average detection
 tm - Trace Math Result



Radiated Emissions @ 1 Meter Distance

```

Timex Corporation
GPS Transceiver Search Mode 1 Meter
Model: M185 Mag=90° Cyan=135°
Proj:04ME06985 File:NC4557
Tested By: GB Blue=0° Green=45°
  
```

No.	Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Range: 1 .009 - .15MHz -----						
18	.13732	46.91 pk	0	15.7	62.61	104.8
	Azimuth:358	Height:101	Horz	Margin [dB]		-42.19
19	.13713	46.09 pk	0	15.7	61.79	104.9
	Azimuth:358	Height:101	Horz	Margin [dB]		-43.11
20	.13707	45.6 pk	0	15.7	61.3	104.9
	Azimuth:358	Height:101	Horz	Margin [dB]		-43.6
21	.13699	43.7 pk	0	15.7	59.4	104.9
	Azimuth:358	Height:101	Horz	Margin [dB]		-45.5
23	.1404	57.84 pk	0	15.7	73.54	104.7
	Azimuth:343	Height:101	Horz	Margin [dB]		-31.16
24	.14085	51.42 pk	0	15.7	67.12	104.6
	Azimuth:343	Height:101	Horz	Margin [dB]		-37.48
Range: 3 .009 - .15MHz -----						
11	.14192	39.04 pk	0	15.7	54.74	104.6
	Azimuth:343	Height:123	Horz	Margin [dB]		-49.86
12	.14239	34.41 pk	0	15.7	50.11	104.5
	Azimuth:343	Height:123	Horz	Margin [dB]		-54.39
13	.13738	39.19 pk	0	15.7	54.89	104.8
	Azimuth:17	Height:123	Horz	Margin [dB]		-49.91
14	.13749	36.52 pk	0	15.7	52.22	104.8
	Azimuth:17	Height:123	Horz	Margin [dB]		-52.58
15	.13786	34.7 pk	0	15.7	50.4	104.8
	Azimuth:17	Height:123	Horz	Margin [dB]		-54.4
16	.13933	31.52 pk	0	15.7	47.22	104.7
	Azimuth:358	Height:123	Horz	Margin [dB]		-57.48
17	.13945	30.93 pk	0	15.7	46.63	104.7
	Azimuth:358	Height:123	Horz	Margin [dB]		-58.07
Range: 4 .15 - 30MHz -----						
25	.562	39.97 pk	0	15.1	55.07	72.6
	Azimuth:358	Height:123	Horz	Margin [dB]		-17.53
26	.16194	43.13 pk	0	15.5	58.63	103.4
	Azimuth:17	Height:123	Horz	Margin [dB]		-44.77
27	.1918	42.01 pk	0	15.3	57.31	101.9
	Azimuth:358	Height:123	Horz	Margin [dB]		-44.59

Emissions were measured at 1 meter between 10kHz and 30MHz and the data is shown above.

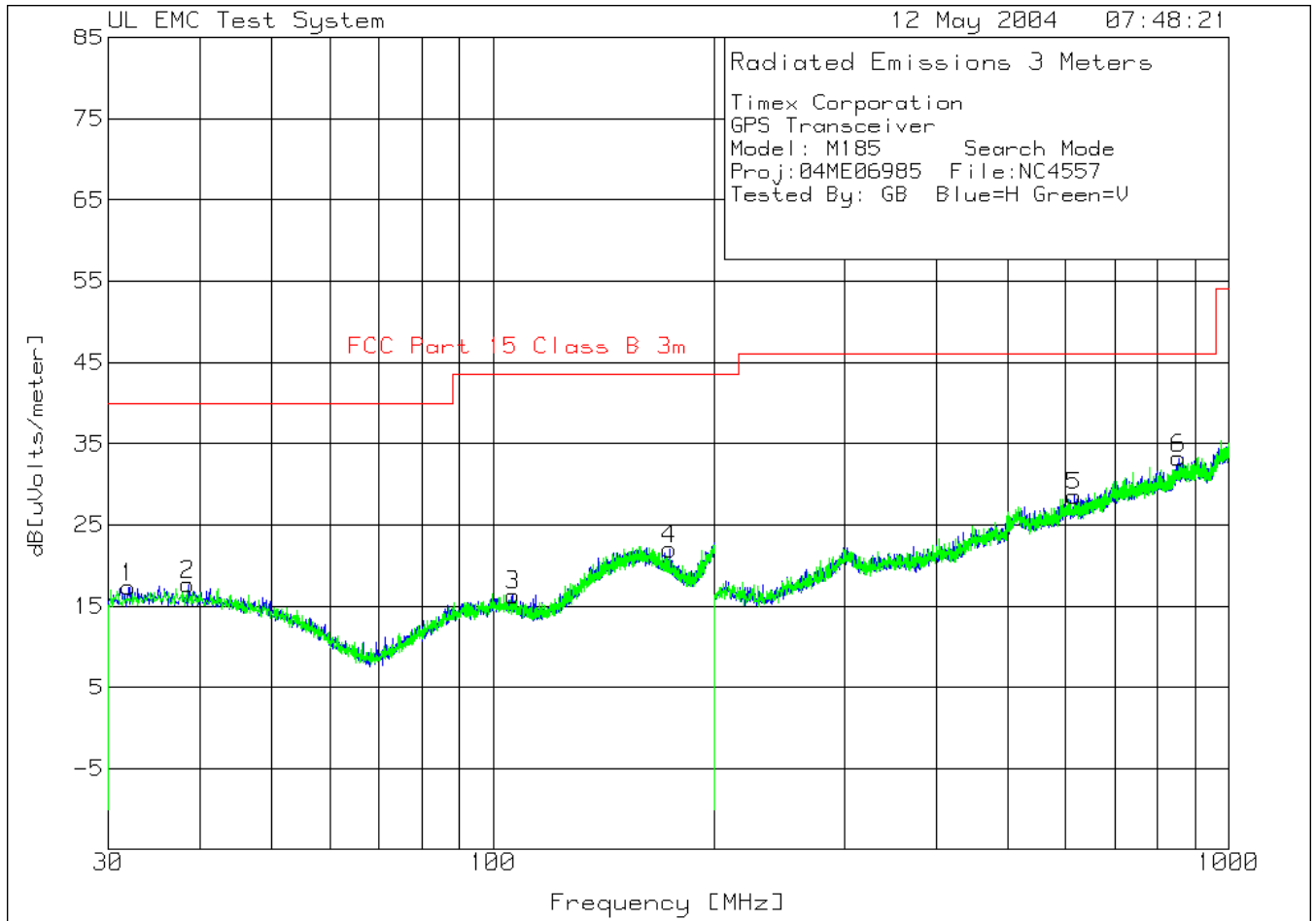
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Timex Corporation
GPS Transceiver Search Mode 1M
Model: M185 Mag=90° Cyan=135°
Proj:04ME06985 File:NC4557
Tested By: GB Blue=0° Green=45°
  
```

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
=====						
Range: 5 .009 - .15MHz -----						
5	.13657	62.16 pk	0	15.7	77.86	104.9
	Azimuth:358	Height:147	Horz	Margin [dB]		-27.04
6	.13674	62.19 pk	0	15.7	77.89	104.9
	Azimuth:358	Height:147	Horz	Margin [dB]		-27.01
7	.13931	49.89 pk	0	15.7	65.59	104.7
	Azimuth:343	Height:147	Horz	Margin [dB]		-39.11
8	.13951	52.97 pk	0	15.7	68.67	104.7
	Azimuth:343	Height:147	Horz	Margin [dB]		-36.03
9	.13973	55.51 pk	0	15.7	71.21	104.7
	Azimuth:343	Height:147	Horz	Margin [dB]		-33.49
10	.13424	34.7 pk	0	15.7	50.4	105
	Azimuth:343	Height:147	Horz	Margin [dB]		-54.6
Range: 6 .15 - 30MHz -----						
28	.17388	43.12 pk	0	15.4	58.52	102.8
	Azimuth:23	Height:147	Horz	Margin [dB]		-44.28
29	.20971	41.75 pk	0	15.2	56.95	101.2
	Azimuth:18	Height:147	Horz	Margin [dB]		-44.25
30	.22165	40.08 pk	0	15.2	55.28	100.7
	Azimuth:358	Height:147	Horz	Margin [dB]		-45.42
Range: 7 .009 - .15MHz -----						
1	.13578	44.11 pk	0	15.7	59.81	104.9
	Azimuth:358	Height:167	Horz	Margin [dB]		-45.09
2	.13889	48.65 pk	0	15.7	64.35	104.7
	Azimuth:343	Height:167	Horz	Margin [dB]		-40.35
3	.13898	48.25 pk	0	15.7	63.95	104.7
	Azimuth:343	Height:167	Horz	Margin [dB]		-40.75
4	.13528	39.75 pk	0	15.7	55.45	105
	Azimuth:358	Height:167	Horz	Margin [dB]		-49.55
22	.13858	40.65 pk	0	15.7	56.35	104.8
	Azimuth:343	Height:167	Horz	Margin [dB]		-48.45

Emissions were measured at 1 meter between 10kHz and 30MHz and the data is shown above.

LIMIT 1: FCC Pt15 ClB 9k-30M
 pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 avem - denotes EMI average detection
 tm - Trace Math Result

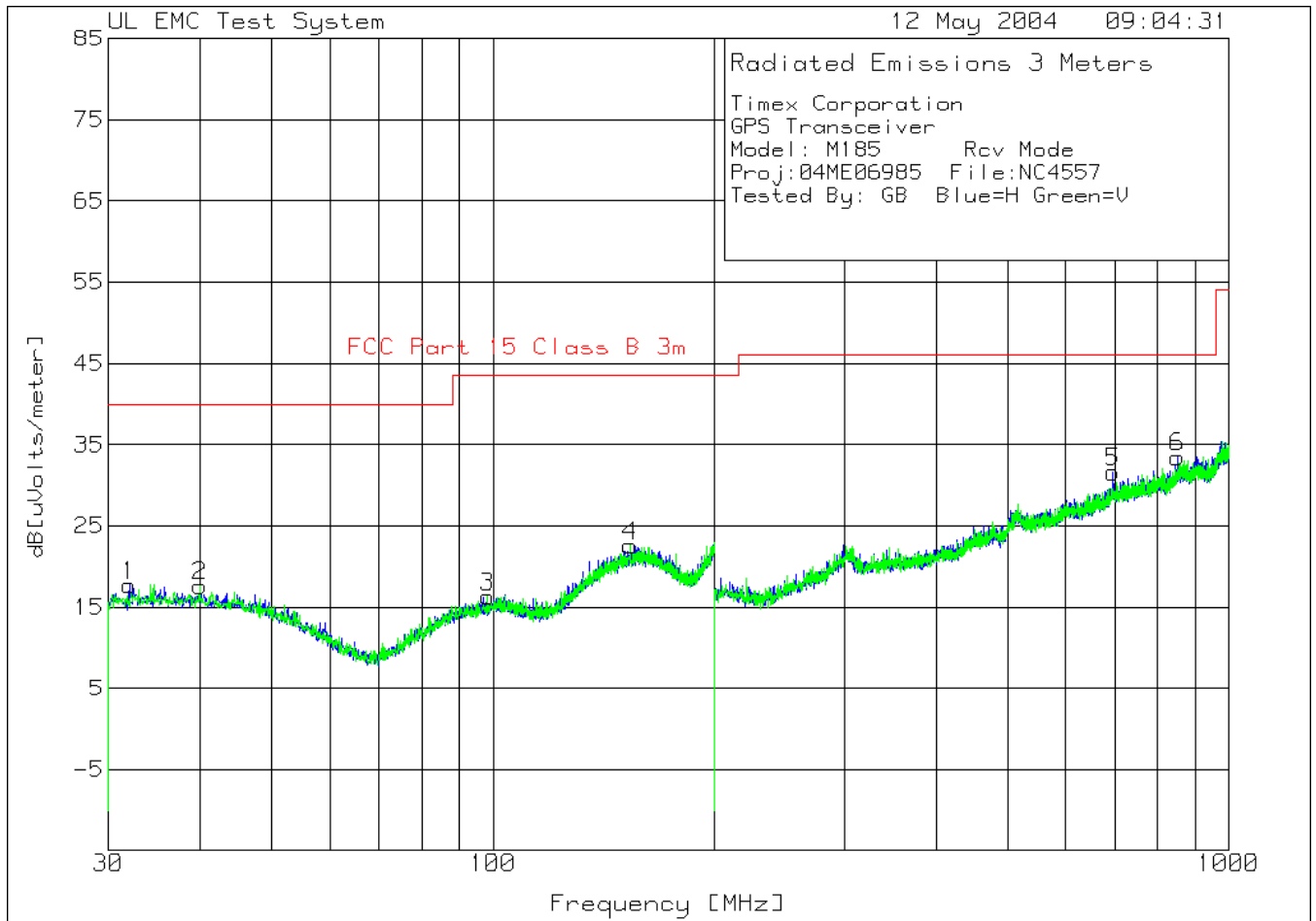


Timex Corporation
 GPS Transceiver
 Model: M185 Search Mode
 Proj:04ME06985 File:NC4557
 Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Horizontal 30 - 200MHz -----						
1	31.956	2.84 pk	.8	13.7	17.34	40
	Azimuth:280	Height:299	Horz	Margin [dB]		-22.66
2	38.5043	3.17 pk	.9	13.6	17.67	40
	Azimuth:280	Height:299	Horz	Margin [dB]		-22.33
3	106.5387	4.34 pk	1.5	10.5	16.34	43.5
	Azimuth:38	Height:101	Horz	Margin [dB]		-27.16
4	173.7227	5.22 pk	1.9	14.9	22.02	43.5
	Azimuth:280	Height:299	Horz	Margin [dB]		-21.48
Horizontal 200 - 1000MHz -----						
5	616.9396	5.07 pk	3.6	19.9	28.57	46
	Azimuth:99	Height:198	Horz	Margin [dB]		-17.43
6	854.3525	5.62 pk	4.2	23.4	33.22	46
	Azimuth:16	Height:100	Horz	Margin [dB]		-12.78

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 avem - denotes EMI average detection
 tm - Trace Math Result

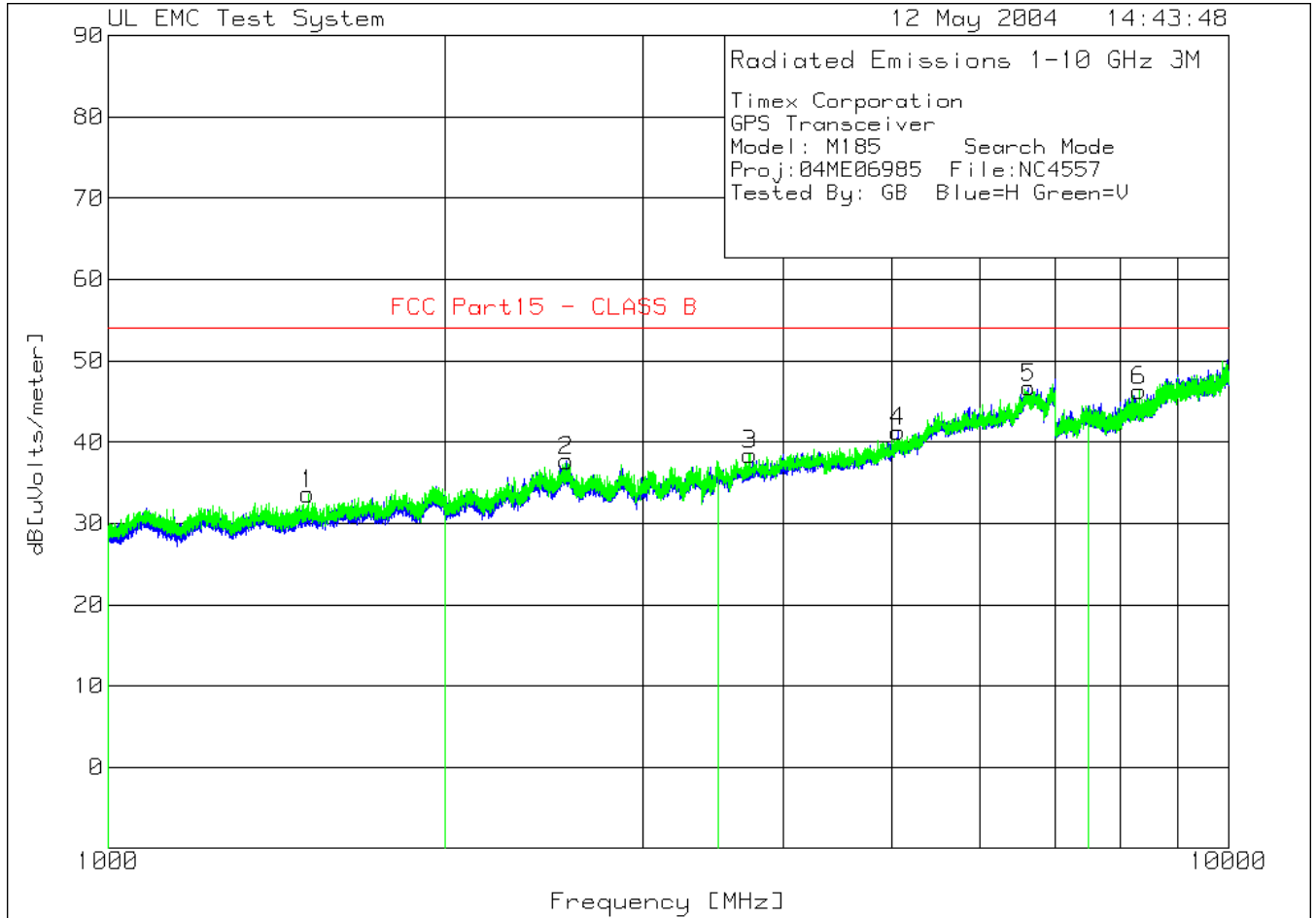


Timex Corporation
 GPS Transceiver
 Model: M185 Rcv Mode
 Proj:04ME06985 File:NC4557
 Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1
Horizontal 30 - 200MHz -----						
1	32.041	3.22 pk	.8	13.7	17.72	40
	Azimuth:121	Height:399	Horz	Margin [dB]		-22.28
Vertical 30 - 200MHz -----						
2	39.95	3.08 pk	.9	13.6	17.58	40
	Azimuth:343	Height:101	Vert	Margin [dB]		-22.42
3	98.3746	4.3 pk	1.4	10.6	16.3	43.5
	Azimuth:118	Height:398	Vert	Margin [dB]		-27.2
4	153.7376	4.57 pk	1.8	16.2	22.57	43.5
	Azimuth:321	Height:101	Vert	Margin [dB]		-20.93
Horizontal 200 - 1000MHz -----						
5	695.8994	6.11 pk	3.9	21.6	31.61	46
	Azimuth:18	Height:199	Horz	Margin [dB]		-14.39
6	851.1514	5.97 pk	4.2	23.3	33.47	46
	Azimuth:129	Height:399	Horz	Margin [dB]		-12.53

LIMIT 1: FCC Part 15 Class B 3m

pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 avem - denotes EMI average detection
 tm - Trace Math Result



Timex Corporation
 GPS Transceiver
 Model: M185 Receive Mode
 Proj:04ME06985 File:NC4557
 Tested By: GB Blue=H Green=V

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1

Horizontal 2000 - 3500MHz -----						
2	2564.188	33.83 pk	-26.8	30.7	37.73	54
	Azimuth:139	Height:100	Horz	Margin [dB]		-16.27

Horizontal 3500 - 7500MHz -----						
4	5065.855	29.38 pk	-23.3	35.2	41.28	54
	Azimuth:1	Height:199	Horz	Margin [dB]		-12.72
5	6630.377	31.52 pk	-21.4	36.6	46.72	54
	Azimuth:14	Height:199	Horz	Margin [dB]		-7.28

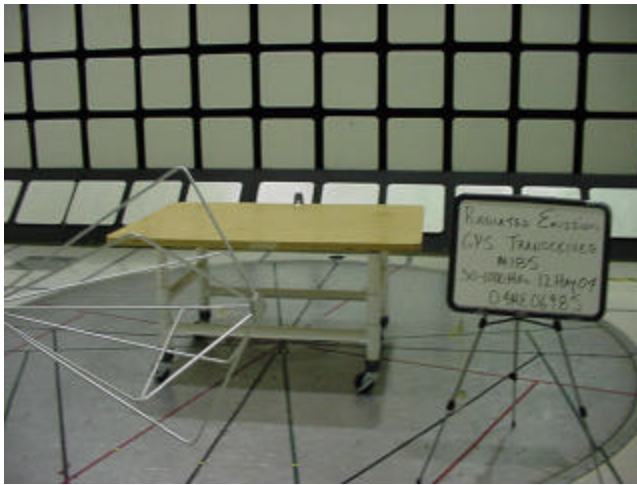
Vertical 1000 - 2000MHz -----						
1	1507.168	37.54 pk	-30.6	26.7	33.64	54
	Azimuth:262	Height:199	Vert	Margin [dB]		-20.36

Vertical 3500 - 7500MHz -----						
3	3736.079	30.38 pk	-25.5	33.6	38.48	54
	Azimuth:259	Height:199	Vert	Margin [dB]		-15.52

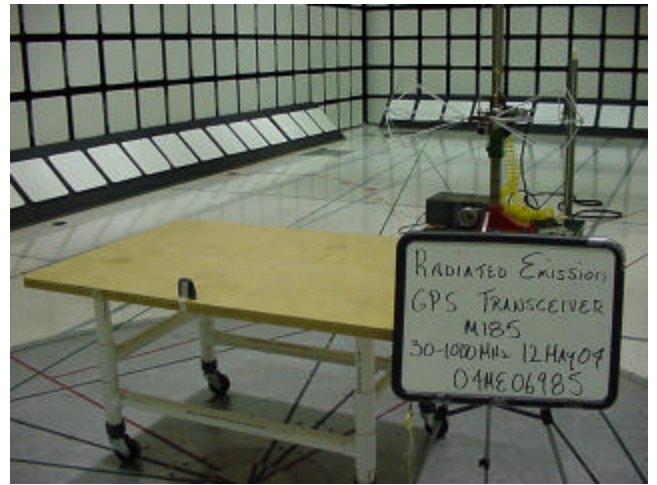
Vertical 7500 - 10000MHz -----						
6	8316.939	27.51 pk	-19	37.8	46.31	54
	Azimuth:148	Height:198	Vert	Margin [dB]		-7.69

LIMIT 1: FCC Part15 - CLASS B

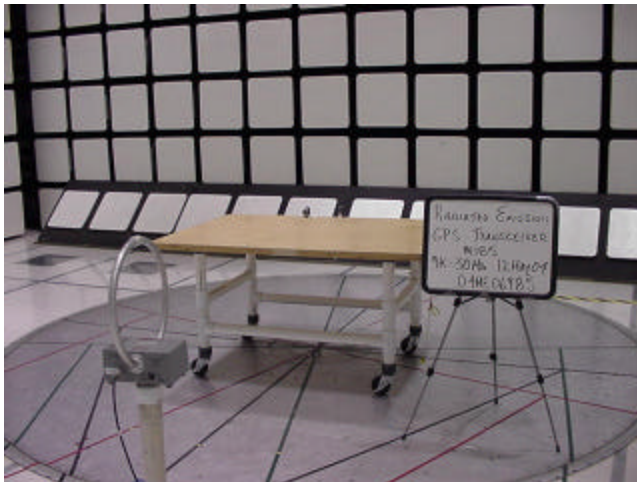
pk - Peak detector
 qp - Quasi-Peak detector
 av - Average detector
 avlg - denotes average log detection
 avem - denotes EMI average detection
 tm - Trace Math Result



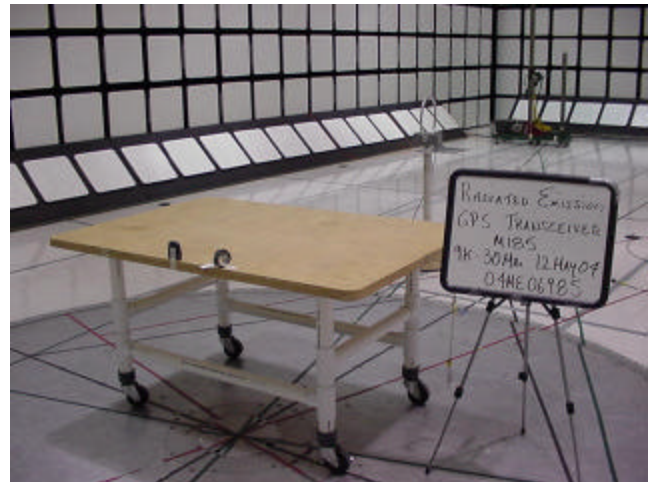
Front – 30-1000MHz



Rear – 30-1000MHz

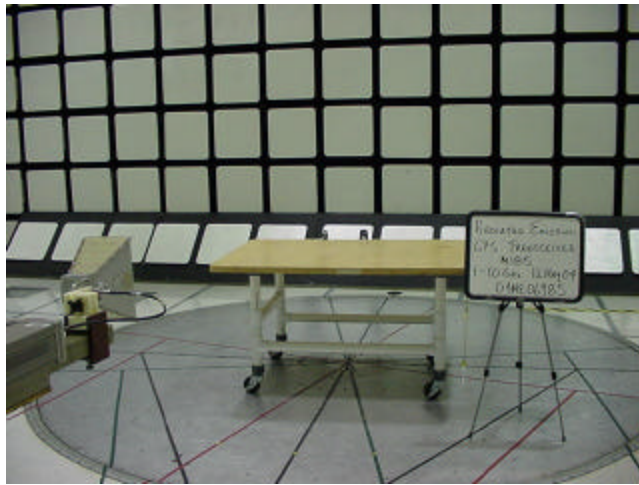


Front – 9kHz-30MHz

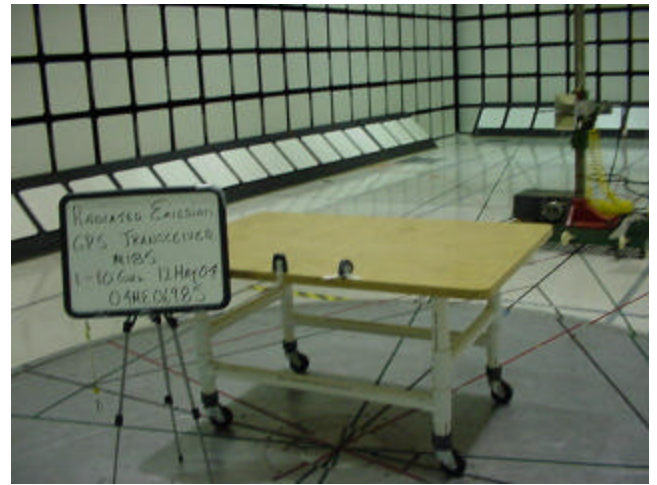


Rear– 9kHz-30MHz

Radiated Emissions Test Set-Up



Front - 1-10GHz



Rear- 1-10GHz

Radiated Emissions Test Set-Up

5.1.2 Sample Calculation:

Radiated Emission Limit Conversion from dBuV/m
(Limits in accordance with paragraph 15.109)

Radiated Emissions Limit (dBuV/m) = $20 \cdot \log(uV/m)$

Radiated Emissions Limit (dBuV/m) = $20 \cdot \log(90)$

Radiated Emissions Limit (dBuV/m) = 39.0

Radiated Emissions test data obtained during measurements.

Field strength (dBuV / m) = Measured field strength (dBuV) + Antenna factor (dB) + cable factor (dB).

Field strength (dBuV / m) = 51.1 dBuV/m + 15.8 dB + 0.3 dB.

Field strength (dBuV / m) = 71.3

Radiated Emissions Limit conversion from Uv/m to dBuV/m add 40 dB / Decade.
(Limits in accordance with paragraph 15.209).

Radiated Emissions Limits General Requirements.

Frequency between 0.009-0.490 MHz,

$2400/F$ (kHz) at 300 meters = Field strength in uV/meter.

Fundamental Frequency = 9KHz.

$2400/(9KHz)$ at 300 meters

Radiated Emission at 9 kHz at 300 meters = 266.6uV/meter.

$\text{dBuV/m } 20 \cdot \log(266.6uV/m)$.

$\text{dBuV/M} = 48.5$ at 300 meters.

Add 40 dB /decade

300meters to 3 meters = 80 dB.

Radiated Emission Limit = $\text{dBuV/M} + \text{dB}$.

$48.5 + 80$

128.5dBuV/m

Magnetic field conversion of the active loop antenna:

The magnetic field reading was converted to an electrical field reading by adding the electric field factors (dB) to the field strength reading. The electric antenna factors are established at the time of the antenna calibration.

Antenna factor (dB) + constant = Field strength dBuV/m

At 100 kHz $16.4 + 51.5 = 67.9$.

Appendix A

Accreditations and Authorizations



NVLAP Lab code: 100255-0

NVLAP: Recognized under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with criteria established in Title 15, Part 285 Code of Federal Regulations. These criteria encompass the requirements of ISO/IEC EN17025 and the relevant requirements of ISO 9002 (ANSI/ASQC Q92-1987) as suppliers of calibration or test results. The specific scope includes IEC/CISPR 22:1997, Amendment 1:1995, Amendment 2:1997, EN 55022:1998, AS/NZS 1044, CNS 13438:1997, ANSI C63.4, FCC Method - 47 CFR Part 15, FCC Method - 47 CFR Part 68, AS/NZS 3548, IEC 61000-3-2, EN 61000-3-2, CISPR 14-1, EN 55014-1, AS/NZS 1044, CNS 13783-1, CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, and IEC 61000-4-11 testing.



FCC: Details of the measurement facilities used for these tests have been filed with the Federal Communications Commission's Laboratory in Columbia, Maryland and accepted in a letter dated September 24, 1997 (Ref. No. 91040).



Industry of Canada: Accredited by Industry Canada for performance of radiated measurements. Our test site complies with RSP 100, Issue 7, Section 3.3. File #: IC 2181



VCCI: Accepted as an Associate Member to the VCCI. The measurement facilities detailed in this test report have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. Registration Nos.: (Radiated Emissions) R-797, (Conducted Emissions) C-832, C-833, C-834 and (Conducted Emissions - Telecommunications Ports) T-160.



ICASA: ICASA (Independent Communications Authority of South Africa) has appointed UL as a Designated Test Laboratory to test Telecommunications equipment for type approval in compliance with CISPR 22 to assist in fulfilling its mandate under section 54(1) of the Telecommunications Act, 1996 (Act 103 of 1996).



NIST/CAB: Validated by the European Commission as a U.S. Conformity Assessment Body (CAB) of the U.S.-EU Mutual Recognition Agreement (MRA) for the Electromagnetic Compatibility - Council Directive 89/336/EEC, Article 10 (2). Also validated for the Telecommunication Equipment-Council Directive 99/5/EC, Annex III and IV, Identification Number: 0983.

NIST/CAB: Provisioned to act as a U.S. Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the Asia Pacific Economic Cooperation (APEC) MRA between the American Institute in Taiwan (AIT) and the United States. Our laboratory is considered qualified to test equipment subject to the applicable EMC regulations of the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) which require testing to CNS 13438 (CISPR 22).

NIST/CAB: Recognized by the Infocomm Development Authority of Singapore (IDA) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Our laboratory is provisionally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA. Our scope of designation includes IDA TS EMC (CISPR 22), IEC 61000-4-2, -4-3, -4-4, -4-5, and -4-6. U.S. Identifier Number: US0113