

EMISSIONS TEST REPORT

Report Number: 3082770BOX.006

Project Number: 3082770

Testing performed on the

Pedometer

Model: M597

To

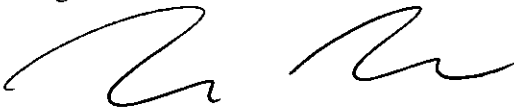
FCC Part 15 Subpart C 15.209

For

Timex Communication

Test Performed by:
Intertek – ETL SEMKO
70 Codman Hill Road
Boxborough, MA 01719

Test Authorized by:
Timex Communication
555 Christian Road PO Box 310
Middlebury, CT 06762-0310

Prepared by: 
Nicholas Abbondante

Date: 3/24/06

Reviewed by: 
Michael F. Murphy

Date: 3/27/06

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1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company: Timex Communication
555 Christian Road
PO Box 310
Middlebury, CT 06762-0310
Contact: John Davino
Telephone: 203-346-4340
Fax: 203-346-7146
Email: jdavino@timex.com

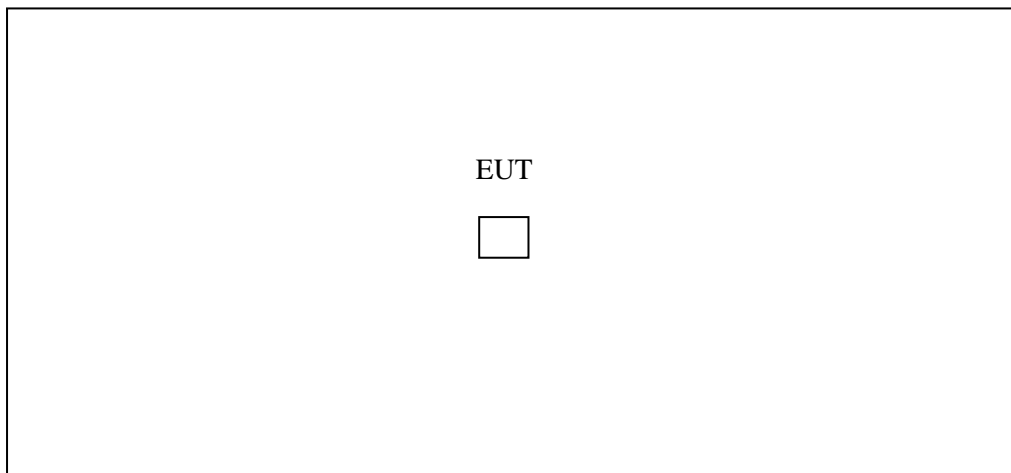
1.2 Equipment Under Test

Equipment Type: Pedometer
Model Number(s): M597
Serial number(s): QCE6483
Manufacturer: Timex Communication
EUT receive date: 02/23/2006
EUT received condition: Prototype in good condition
Test start date: 03/01/2006
Test end date: 03/06/2006

1.3 Test Plan Reference: Tested according to the standards listed and ANSI C63.4:2003.

1.4 Test Configuration

1.4.1 Block Diagram



Turntable

1.4.2. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
No cables				

1.4.3. Support Equipment:

Name: No support equipment
Model No.:
Serial No.:

1.5 Mode(s) of Operation:

The EUT was activated from a fresh 3 Volt battery for all testing except for the frequency stability test, which used a DC power supply to vary the input power around 3 VDC. During testing, the EUT was programmed to transmit in a continuous fashion. The EUT was investigated in 3 orthogonal axes.

2.0 Test Summary

TEST STANDARD	RESULTS	
FCC Part 15 Subpart C 15.209		
SUB-TEST	TEST PARAMETER	COMMENT
RF Output Power and Spurious Emissions Below 30 MHz FCC 15.205, 15.209	Emissions must be below the 15.209 limits.	Pass
Occupied Bandwidth	There is no bandwidth requirement.	Pass
Spurious Emissions Above 30 MHz FCC 15.205, 15.209	Emissions must be below the 15.209 limits.	Pass

Notes: The EUT transmits at 137.5 and 141 kHz.

REVISION SUMMARY – The following changes have been made to this Report:

<u>Date</u>	<u>Project No.</u>	<u>Project Handler</u>	<u>Page(s)</u>	<u>Item</u>	<u>Description of Change</u>
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3.0 Sample Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dB μ V
 AF = 7.4 dB/m
 CF = 1.6 dB
 AG = 29.0 dB
 FS = 32 dB μ V/m

$$\text{Level in } \mu\text{V/m} = [10(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where

- NF = Net Reading in dB μ V
- RF = Reading from receiver in dB μ V
- LF = LISN Correction Factor in dB
- CF = Cable Correction Factor in dB
- AF = Attenuator Loss Factor in dB

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF/20)} \text{ where UF = Net Reading in } \mu\text{V}$$

Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

$$UF = 10^{(49.1 \text{ dB}\mu\text{V} / 20)} = 254 \mu\text{V/m}$$

3.1 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.

The expanded uncertainty ($k = 2$) for radiated emissions from 30 to 1000 MHz has been determined to be:
 ± 3.5 dB at 10m, ± 3.8 dB at 3m

The expanded uncertainty ($k = 2$) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 2.6 dB

The expanded uncertainty ($k = 2$) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 3.2 for ISN and voltage probe measurements

± 3.1 for current probe measurements

3.2 Site Description

Test Site(s): 2

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.

The EMC Lab has two Semi-anechoic Chambers and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference groundplanes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Test Results: Pass

Test Standard: FCC Part 15 Subpart C 15.205, 15.209

Test: RF Output Power and Spurious Emissions Below 30 MHz

Test Environment:

Environmental Conditions During Testing:	Humidity (%):	See Table	Pressure (hPa):	See Table	Ambient (°C):	See Table
Pretest Verification Performed	Yes		Equipment under Test:		M597 Pedometer	

Maximum Test Disturbance Parameters:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	LOOP ANTENNA	Empire	LG-105	61	04/28/2006
2	LOOP ANTENNA	Empire	LP-105	905	08/15/2006
3	ANTENNA	EMCO	3142	9701-1116	11/10/2006
4	Cable, BNC - BNC, 15' long	Belden	RG-58/U	CBL022	01/03/2007
5	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	08/02/2007
6	10 Meter in floor cable for site 2	ITS	RG214B/U	S2 10M FLR	09/02/2006
7	Spectrum Analyzer	Agilent	E7405A	US40240205	08/09/2006

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	2/07/05 Revision

Test Details:

Radiated Emissions

Company: Timex Communication Antenna & Cables: LF Bands: N, LF, HF, SHF
 Model #: M597 Pedometer LF Antenna: LOOP2-E 8-15-06.txt LOOP2-H 8-15-06.txt
 Serial #: QCE6483 N Antenna: LOG1 11-10-06 V10.ant LOG1 11-10-06 H10.ant
 Engineers: Nicholas Abbondante Location: Site 2 HF Antenna: NONE. NONE.
 Project #: 3082770 Date(s): 03/01/06 SHF Antenna: NONE. NONE.
 Standard: FCC Part 15 Subpart C 15.209 LF Cable(s): CBL022 1-03-07.cbl NONE.
 Receiver: Agilent E7405A (AGL001) Limit Distance (m): 3 N Cable(s): S2 10M FLR 9-2-2006.cbl NONE.
 PreAmp: NONE. Test Distance (m): 3 HF Cable(s): NONE. NONE.
 Barometer: BAR2 Temp/Humidity/Pressure: 19c 24% 993 mB SHF Cable(s): NONE. NONE.
 PreAmp Used? (Y or N): N Voltage/Frequency: 3.0VDC Frequency Range: 9 kHz - 30 MHz
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
Note: LOOP1 4-28-06											
QP	V	0.138	19.0	48.3	0.0	0.0	0.0	67.3	104.8	-37.6	200/300 Hz
QP	V	0.141	21.4	48.3	0.0	0.0	0.0	69.7	104.6	-35.0	200/300 Hz
Note: LOOP2 8-15-06											
QP	V	0.280	-6.4	57.4	0.0	0.0	0.0	51.0	98.7	-47.7	9/30 kHz
QP	V	0.420	-10.5	55.3	0.1	0.0	0.0	45.0	95.1	-50.2	9/30 kHz
QP	V	0.560	-1.0	53.8	0.1	0.0	0.0	53.0	72.6	-19.7	9/30 kHz
QP	V	0.700	-3.9	53.0	0.1	0.0	0.0	49.2	70.7	-21.5	9/30 kHz
QP	V	0.840	-0.8	52.4	0.1	0.0	0.0	51.7	69.1	-17.4	9/30 kHz
QP	V	1.260	-0.4	50.8	0.1	0.0	0.0	50.5	65.6	-15.1	9/30 kHz
QP	V	1.400	5.2	50.5	0.1	0.0	0.0	55.8	64.7	-8.8	9/30 kHz
QP	V	1.540	-4.5	50.2	0.2	0.0	0.0	45.8	63.9	-18.0	9/30 kHz
QP	V	1.680	-17.3	50.1	0.2	0.0	0.0	32.9	63.1	-30.2	9/30 kHz
QP	V	1.820	-17.2	49.9	0.2	0.0	0.0	32.9	69.5	-36.6	9/30 kHz
QP	V	1.960	-16.9	49.8	0.2	0.0	0.0	33.1	69.5	-36.4	9/30 kHz

Notes: The limit has been extrapolated to the 3 meter test distance using a 40 dB/decade scaling factor. This was done in order to demonstrate that the spurious emissions do not exceed the level of the fundamental emissions.

Test Results: Pass

Test Standard: FCC Part 15 Subpart C 15.209

Test: 20 dB Bandwidth

Test Environment:

Environmental Conditions During Testing:	Humidity (%):	N/A	Pressure (hPa):	N/A	Ambient (°C):	N/A
Pretest Verification Performed	N/A		Equipment under Test:	M597 Pedometer		

Maximum Test Disturbance Parameters: There is no bandwidth requirement.

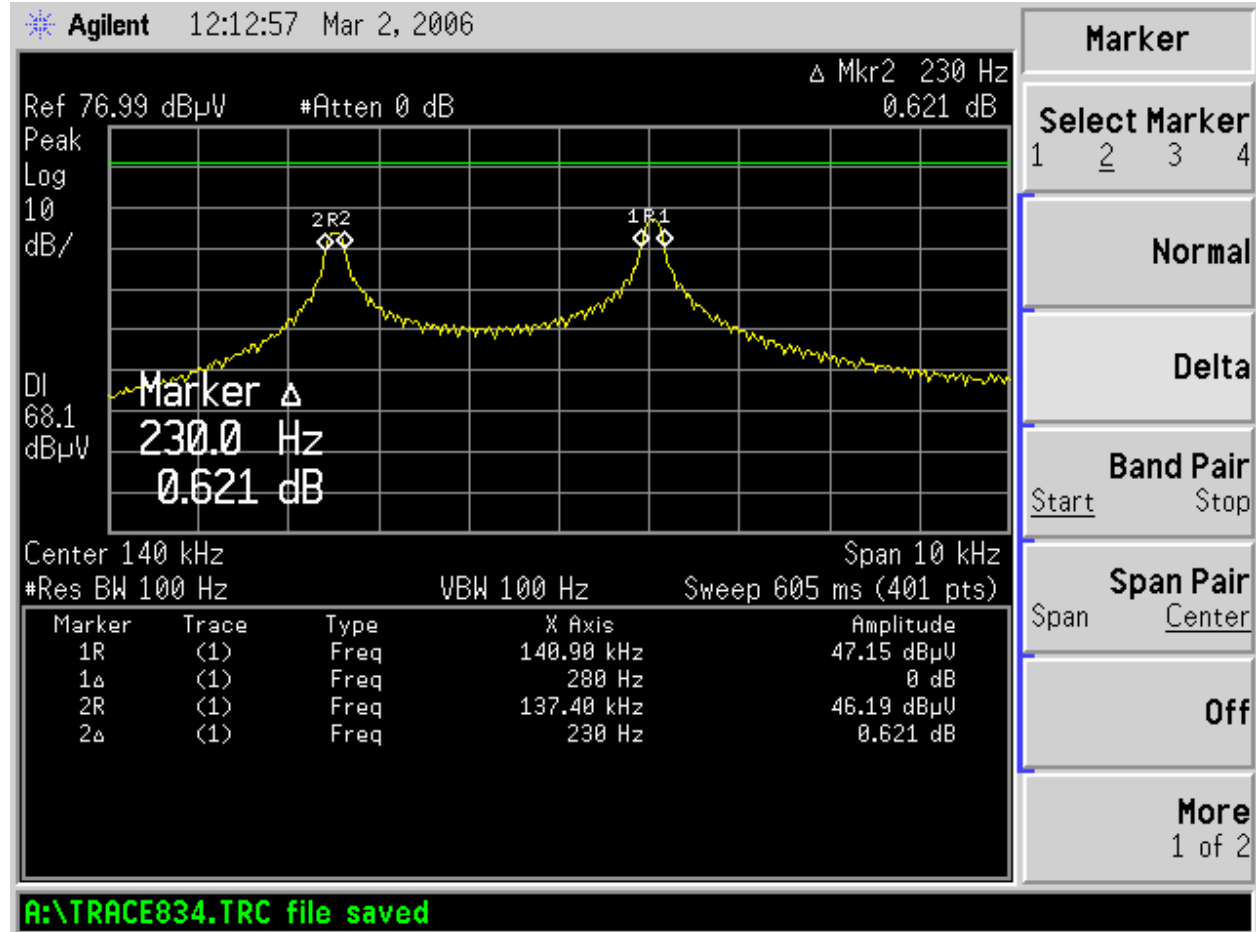
Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Spectrum Analyzer	Agilent	E7405A	US40240205	08/09/2006

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	2/07/05 Revision

Test Details:



Notes: The 20 dB bandwidth is referenced to the full power of the emission when measured with a bandwidth larger than the bandwidth of the emission. The bandwidth was 230 Hz at 137.5 kHz and 280 Hz at 141 kHz.

Test Results: Pass

Test Standard: FCC Part 15 Subpart C 15.205, 15.209

Test: Radiated Spurious Emissions above 30 MHz

Test Environment:

Environmental Conditions During Testing:	Humidity (%):	See Table	Pressure (hPa):	See Table	Ambient (°C):	See Table
Pretest Verification Performed	Yes		Equipment under Test:		M597 Pedometer	

Maximum Test Disturbance Parameters:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Spectrum Analyzer	Agilent	E7405A	US40240205	08/09/2006
2	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	08/02/2007
3	ANTENNA	EMCO	3142	9701-1116	11/10/2006
4	10 Meter in floor cable for site 2	ITS	RG214B/U	S2 10M FLR	09/02/2006
5	BROADBAND ANTENNA	Compliance Design	B100	1852	08/26/2006
6	BROADBAND ANTENNA	Compliance Design	B200	1850	08/29/2006
7	BROADBAND ANTENNA	Compliance Design	B300	00674	08/29/2006
8	Synthesized Sweep Generator	Hewlett Packard	83620A	3213A01244	01/25/2007
9	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 80	CBL030	12/12/2006

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	2/07/05 Revision

Test Details:

Radiated Emissions

Company: Timex Communication
 Model #: M597 Pedometer
 Serial #: QCE6483
 Engineers: Nicholas Abbondante
 Project #: 3082770 Date(s): 03/01/06
 Standard: FCC Part 15 Subpart C 15.209
 Receiver: Agilent E7405A (AGL001)
 PreAmp: NONE.
 Barometer: BAR2 Temp/Humidity/Pressure: 20c 24% 999 mB
 PreAmp Used? (Y or N): N Voltage/Frequency: Fresh Battery Frequency Range: 30 - 1000 MHz
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Antenna & Cables: N Bands: N, LF, HF, SHF
 LF Antenna: LOOP2-E 8-15-06.txt LOOP2-H 8-15-06.txt
 N Antenna: LOG1 11-10-06 V10.ant LOG1 11-10-06 H10.ant
 HF Antenna: NONE. NONE.
 SHF Antenna: NONE. NONE.
 LF Cable(s): CBL022 1-03-07.cbl NONE.
 N Cable(s): S2 10M FLR 9-2-2006.cbl NONE.
 HF Cable(s): NONE. NONE.
 SHF Cable(s): NONE. NONE.

Location: Site 2
 Limit Distance (m): 3
 Test Distance (m): 10

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth
QP	V	63.300	5.9	7.1	1.6	0.0	-10.5	25.0	40.0	-15.0	120/300 kHz
QP	V	170.400	-2.9	10.0	2.4	0.0	-10.5	20.0	43.5	-23.5	120/300 kHz
QP	V	354.800	-6.2	15.8	3.3	0.0	-10.5	23.3	46.0	-22.7	120/300 kHz
QP	V	493.000	-5.9	17.3	3.9	0.0	-10.5	25.8	46.0	-20.2	120/300 kHz
QP	V	812.000	-5.7	23.0	5.5	0.0	-10.5	33.3	46.0	-12.7	120/300 kHz
QP	V	984.800	-5.3	23.6	5.7	0.0	-10.5	34.4	54.0	-19.6	120/300 kHz

Notes: The test results are extrapolated to a 3 meter test distance using a 20 dB/decade scaling factor.

Setup Photos



