Intertek ETL SEMKO

Testing everywhere for markets anywhere.

October 17, 2006

Mr. John Davino
Timex Corporation
555 Christian Road PO Box 310
Middlebury, CT 06762-0310

Mr. Davino;

Enclosed you will find our EMC data report covering testing on the HRM Chest Strap, Model: M640. Testing was performed on September 13th – Oct. 17th, 2006.

If there are any questions regarding this report, please contact the undersigned or your account representative.

Sincerely,

Nicholas Abbondante
Project Engineer

Jeff Goulet
Engineering Team Leader, EMC

Enclosure

Intertek Testing Services NA, Inc.
70 Codman Hill Road, Boxborough, MA 01719
Telephone: +1 978-263-2662 Fax: +1 978-263-7086 Web: www.etlsemko.com

EMC TEST REPORT

Report Number: 3104393BOX-001a
Project Number: 3104393

Testing performed on the

HRM Chest Strap
Model: M640

To
AS/NZS 4268:2003
CENELEC EN 55022:1998
CENELEC EN 55024:1998
ETSI EN 300 330-1 V1.3.2 (2002-12)
ETSI EN 300 330-2 V1.2.1 (2004-11)
ETSI EN 301 489-1 V1.6.1 (2005-09)
ETSI EN 301 489-3 V1.4.1 (2002-08)
FCC Part 15 Subpart C 15.209
Industry Canada RSS-210 Issue 6 September 2005

For
Timex Corporation

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

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

Prepared by: _____ Date: 10/17/06
Nicholas Abbondante

Reviewed by: _____ Date: 10-17-06
Jeff Goulet

1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company:	Timex Corporation 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

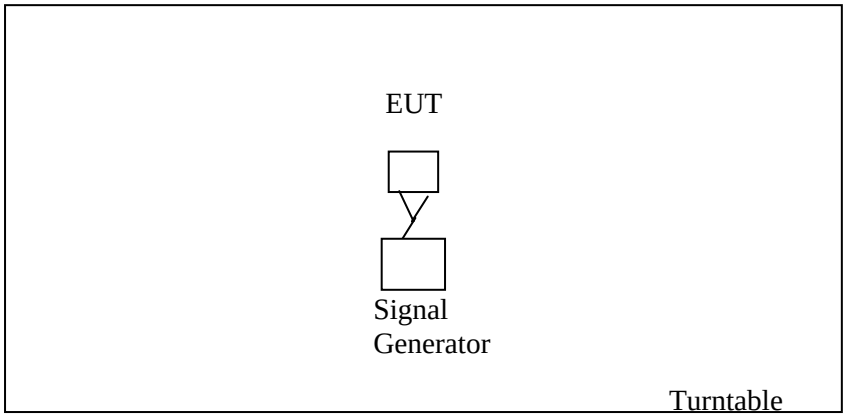
1.2 Equipment Under Test

Equipment Type:	HRM Chest Strap
Model Number(s):	M640
Serial number(s):	6
Manufacturer:	Timex Corporation
EUT receive date:	09/12/2006
EUT received condition:	Prototype in good condition
Test start date:	09/13/2006
Test end date:	10/17/2006

1.3 Test Plan Reference: Tested according to the standards listed, ANSI C63.4:2003, ERC/REC 70-03 November 2005, RSS-Gen Issue 1 September 2005, New Zealand Radiocommunications Notice 2005 No. 2, and ETSI EN 300 330-1 V1.3.2 (2002-12).

1.4 Test Configuration

1.4.1 Block Diagram



1.4.2. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
DC Power Cables	None	Wire	0.15	2
Signal Generator Cable	Coaxial	BNC to 2-wire DC	0.3	1

1.4.3. Support Equipment:

Name: HRM Signal Generator
Model No.: HRM Generator
Serial No.: N/L

Name: Lambda DC Power Supply
Model No.: LQD-423
Serial No.: C96143

Name: Timex Fitness HRM Wristwatch
Model No.: 686-5J0410
Serial No.: N/L

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. The EUT was investigated in 3 orthogonal axes. The Signal Generator support equipment was connected to the sensor pads on the EUT via alligator clips which delivered a 2 Hz signal to the device. This caused the EUT to transmit a typical signal on a 2 second interval. The watch receiver was used to verify continuing transmission via the display which showed the Beats Per Minute (BPM) value that the EUT transmitted, 120 BPM for the 2 Hz signal input.

1.5a EUT Cycle Time: 2 Seconds

1.6 Monitoring of Sample:

The EUT was monitored via the watch receiver display which showed the BPM value which was detected by the EUT and transmitted to the watch receiver.

1.7 Sample Performance Criteria:

EN 55024 Performance Criteria

Criterion A: The EUT must not be affected by the test disturbance.

Criterion B: The EUT may be affected by the test disturbance, but must resume normal operation when the test disturbance is removed.

Criterion C: The EUT may be affected by the test disturbance and may require operator intervention to resume normal operation.

Per Clause 6.1 of ETSI EN 301 489-1 V1.6.1 (2005-09)

During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended.

During the test the EUT shall not unintentionally transmit or change its actual operating state and stored data.

Since the EUT is used for fitness purposes and not medical diagnostics, small errors in the Beats Per Minute value would be insignificant, and large variations would be obvious to the user as an erroneous result.

1.8 Floor Standing Equipment: Applicable:____ Not Applicable:_X_

For floor standing equipment, 40cm RFI field uniformity data is located in the chamber equipment folder.

2.0 Test Summary

TEST STANDARD		
AS/NZS 4268:2003 CENELEC EN 55022:1998 & CENELEC EN 55024:1998 ETSI EN 300 330-1 V1.3.2 (2002-12) & ETSI EN 300 330-2 V1.2.1 (2004-11) ETSI EN 301 489-1 V1.6.1 (2005-09) & ETSI EN 301 489-3 V1.4.1 (2002-08) FCC Part 15 Subpart C 15.209 Industry Canada RSS-210 Issue 6 September 2005		
SUB-TEST	**TEST PARAMETER**	**NOTE**
AS/NZS 4268 ETSI EN 300 330-1 ETSI EN 300 330-2 FCC Part 15 Subpart C Industry Canada RSS-210		
RF Output Power and Spurious Emissions Below 30 MHz AS/NZS 4268 5.4, 8.2 ETSI EN 300 330-1 7.2, 7.4 ERC/REC 70-03 Annex 9 FCC 15.205, 15.209 IC RSS-210 2.7	AS/NZS: The fundamental field strength must not exceed 3 uW (18.5 dBuA/m at 3m) in Australia and 10 mW in New Zealand. The spurious emissions must not exceed 0.1 uW (-40 dBm) in Australia and 2.25 uW in New Zealand. ETSI: The fundamental field strength at 137.5 kHz must not exceed 73.4 dBuA/m (ERC/REC 70-03) or 46.6 dBuA/m and the fundamental field strength at 141 kHz must not exceed 69.1 dBuA/m (ERC/REC 70-03) or 46.5 dBuA/m at 3 meters. The field strength of spurious emissions must not exceed 27 dBuA/m at 9 kHz descending 3 dB/Octave at 10 meters. FCC: Emissions must be below the 15.209 limits. IC: Emissions must be below the RSS-210 2.7 Table 3 limits.	Pass
Spurious Emissions Above 30 MHz AS/NZS 4268 8.2 ETSI EN 300 330-1 7.4 FCC 15.205, 15.209 IC RSS-210 2.7	AS/NZS: The spurious emissions must not exceed 0.1 uW (-40 dBm) in Australia and 2.25 uW in New Zealand. ETSI: The spurious emissions must not exceed 250 nW (-36.0 dBm), except in the ranges from 47-74, 87.5-118, 174-230, and 470-862 MHz, where the limit is 4 nW (-54.0 dBm). FCC: Emissions must be below the 15.209 limits. IC: Emissions must be below the RSS-210 2.7 Table 2 limits.	Pass
Occupied Bandwidth AS/NZS 4268 8.3 FCC 15.215 IC RSS-Gen 4.4.1	There is no limit on bandwidth.	Pass
Operating Frequencies/ Permitted Frequency Range of the Modulation Bandwidth AS/NZS 4268 8.4 ETSI EN 300 330-1 7.3	AS/NZS: The fundamental emissions must remain within the band from 70 kHz to 160 kHz in Australia and between 30 kHz and 190 kHz in New Zealand. ETSI: The fundamental emissions must remain within the assigned frequency band.	Pass
CENELEC EN 55022:1998 ETSI EN 301 489-1 V1.6.1 (2005-09) ETSI EN 301 489-3 V1.4.1 (2002-08) Emissions		
Radiated Emissions	Emissions below specified limits	Pass
CENELEC EN 55024:1998 ETSI EN 301 489-1 V1.6.1 (2005-09) ETSI EN 301 489-3 V1.4.1 (2002-08) Immunity		
EN 61000-4-2:1995 Electrostatic Discharge (ESD)	±4kV Contact discharge and ±8kV Air discharge	Pass
EN 61000-4-3:1996 Electromagnetic Field Immunity	80-1000MHz & 1400-2000MHz @ 3V/m at 1kHz 80% AM modulation	Pass
EN 61000-4-8:1993 Magnetic Fields	1 A/m @ 50 Hz	Pass

Notes: The EUT transmits at 137.5 and 141.0 kHz. The EUT is Product Class 4, Power Class 4.

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

Date	Project No.	Project Handler	Page(s)	Item	Description of Change
10-17-2006	3104393	Nicholas Abbondante	28-29	ESD	Updated report with recent test results for ESD
10-17-2006	3104393	Nicholas Abbondante	31-32	Radiated RF Immunity	Updated report with recent test results for radiated RF immunity
10-17-2006	3104393	Nicholas Abbondante	2, 10-17	Radiated <30 MHz	Updated report with recent test results for radiated emissions below 30 MHz

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 dBμV/m
RA = Receiver Amplitude (including preamplifier) in dBμV
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 dBμV 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 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

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

Level in μV/m = [10(32 dBμV/m)/20] = 39.8 μV/m

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

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

To convert from dBμV to μV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in μV

Example:

NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(48.1\ dB\mu V / 20)}$ = 254 μV/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 and EMC and parking lot in front of Site 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: AS/NZS 4268 5.4, 8.2, ETSI EN 300 330-1 7.2, 7.4, ERC/REC 70-03 Annex 9, FCC 15.205, 15.209, IC RSS-210 2.7

Test: RF Output Power and Spurious Emissions Below 30 MHz

Performance Criterion:
AS/NZS: The fundamental field strength must not exceed 3 uW (18.5 dBuA/m at 3m) in Australia and 10 mW in New Zealand. The spurious emissions must not exceed 0.1 uW (-40 dBm) in Australia and 2.25 uW in New Zealand.
ETSI: The fundamental field strength at 137.5 kHz must not exceed 73.4 dBuA/m (ERC/REC 70-03) or 46.6 dBuA/m and the fundamental field strength at 141 kHz must not exceed 69.1 dBuA/m (ERC/REC 70-03) or 46.5 dBuA/m at 3 meters. The field strength of spurious emissions must not exceed 27 dBuA/m at 9 kHz descending 3 dB/Octave at 10 meters.
FCC: Emissions must be below the 15.209 limits.
IC: Emissions must be below the RSS-210 2.7 Table 3 limits.

Test Environment:

Environmental Conditions During Testing:	Humidity (%):	See Table	Pressure (hPa):	See Table	Ambient (°C):	See Table
Pretest Verification Performed	Yes		Equipment under Test:		M640	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	LOOP ANTENNA	Empire	LG-105	61	05/10/2007
2	ANTENNA, LOOP, 150 kHz - 30 MHz	Empire	LP-105A	127	08/30/2007
3	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	08/02/2007
4	ANTENNA	EMCO	3142	9701-1116	11/10/2006
5	Cable, BNC - BNC, 15' long	Belden	RG-58/U	CBL022	01/03/2007
6	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	09/26/2007
7	Spectrum Analyzer	Agilent	E7405A	US40240205	08/16/2007

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	1/17/06 Revision

Test Details:

Special Radiated Emissions

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineers: Nicholas Abbondante Location: Site 2
Project #: 3104393 Date(s): 10/17/06
Standard: FCC Part 15 Subpart C 15.209, IC RSS-210
Receiver: Agilent E7405A (AGL001) Limit Distance (m): 3
PreAmp: NONE. Test Distance (m): 3
Barometer: BAR2 Temp/Humidity/Pressure: 18c 51% 1012mB

Antenna & Cables: LF Bands: N, LF, HF, SHF
LF Antenna: Loop1 05-10-07 1m E.ant Loop1 05-10-07 1m H.ant
N Antenna: LOG1 11-10-06 V3.ant LOG1 11-10-06 H3.ant
HF Antenna: EMP2 08-30-07 1m E.ANT EMP2 08-30-07 1m H.ANT
SHF Antenna: NONE. NONE.
LF Cable(s): CBL022 1-03-07.cbl NONE.
N Cable(s): S2 3M FLR 9-26-07.txt NONE.
HF Cable(s): CBL022 1-03-07.cbl NONE.
SHF Cable(s): CBL030 12-12-2006.txt NONE.

PreAmp Used? (Y or N): N Voltage/Frequency: Fresh 3V Battery Frequency Range: 9 kHz - 150 kHz
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
PK	V	0.138	22.3	49.1	0.0	0.0	0.0	71.3	104.8	-33.5	200/300 Hz
PK	V	0.141	24.7	49.1	0.0	0.0	0.0	73.8	104.6	-30.8	200/300 Hz
QP	V	0.138	7.6	49.1	0.0	0.0	0.0	56.7	104.8	-48.2	200/300 Hz
QP	V	0.141	4.4	49.1	0.0	0.0	0.0	53.5	104.6	-51.1	200/300 Hz
AVG	V	0.138	-1.8	49.1	0.0	0.0	0.0	47.3	104.8	-57.5	200/300 Hz
AVG	V	0.141	-5.4	49.1	0.0	0.0	0.0	43.7	104.6	-60.9	200/300 Hz

Notes: The limits were extrapolated to 3 meters using a 40 dB/decade scaling factor.

Special Radiated Emissions

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineers: Nicholas Abbondante Location: Site 2
Project #: 3104393 Date(s): 10/17/06
Standard: ETSI EN 300 330
Receiver: Agilent E7405A (AGL001) Limit Distance (m): 3
PreAmp: NONE. Test Distance (m): 3
Barometer: BAR2 Temp/Humidity/Pressure: 18c 51% 1012mB

Antenna & Cables: LF Bands: N, LF, HF, SHF
LF Antenna: Loop1 05-10-07 1m E.ant Loop1 05-10-07 1m H.ant
N Antenna: LOG1 11-10-06 V3.ant LOG1 11-10-06 H3.ant
HF Antenna: EMP2 08-30-07 1m E.ANT EMP2 08-30-07 1m H.ANT
SHF Antenna: NONE. NONE.
LF Cable(s): CBL022 1-03-07.cbl NONE.
N Cable(s): S2 3M FLR 9-26-07.txt NONE.
HF Cable(s): CBL022 1-03-07.cbl NONE.
SHF Cable(s): CBL030 12-12-2006.txt NONE.

PreAmp Used? (Y or N): N Voltage/Frequency: Fresh 3V Battery Frequency Range: 9 kHz - 150 kHz
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(uA/m)	Limit dB(uA/m)	Margin dB	Bandwidth
PK	V	0.138	22.3	49.1	0.0	0.0	0.0	20.8	46.6	-25.8	200/300 Hz
PK	V	0.141	24.7	49.1	0.0	0.0	0.0	23.3	46.5	-23.2	200/300 Hz
QP	V	0.138	7.6	49.1	0.0	0.0	0.0	6.2	46.6	-40.4	200/300 Hz
QP	V	0.141	4.4	49.1	0.0	0.0	0.0	3.0	46.5	-43.5	200/300 Hz
AVG	V	0.138	-1.8	49.1	0.0	0.0	0.0	-3.2	46.6	-49.8	200/300 Hz
AVG	V	0.141	-5.4	49.1	0.0	0.0	0.0	-6.8	46.5	-53.3	200/300 Hz

Notes: A 51.5 dB factor was used to convert readings from dBuV/m to dBuA/m. The limits were extrapolated to a 3 meter test distance using the methods of ETSI EN 300 330-1 Annex J.

Special Radiated Emissions

Company:	Timex Corporation			Antenna & Cables:	LF	Bands: N, LF, HF, SHF	
Model #:	M640			LF Antenna:	Loop1 05-10-07 1m E.ant	Loop1 05-10-07 1m H.ant	
Serial #:	6			N Antenna:	LOG1 11-10-06 V3.ant	LOG1 11-10-06 H3.ant	
Engineers:	Nicholas Abbondante	Location:	Site 2	HF Antenna:	EMP2 08-30-07 1m E.ANT	EMP2 08-30-07 1m H.ANT	
Project #:	3104393	Date(s):	10/17/06	SHF Antenna:	NONE.	NONE.	
Standard:	AS/NZS 4268			LF Cable(s):	CBL022 1-03-07.cbl	NONE.	
Receiver:	Agilent E7405A (AGL001)	Limit Distance (m):	3	N Cable(s):	S2 3M FLR 9-26-07.txt	NONE.	
PreAmp:	NONE.	Test Distance (m):	3	HF Cable(s):	CBL022 1-03-07.cbl	NONE.	
Barometer:	BAR2	Temp/Humidity/Pressure:	18c 51% 1012mB	SHF Cable(s):	CBL030 12-12-2006.txt	NONE.	

PreAmp Used? (Y or N): N Voltage/Frequency: Fresh 3V Battery Frequency Range: 9 kHz - 150 kHz

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(Ω/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uA/m)	Limit dB(uA/m)	Margin dB	Bandwidth
QP	H	0.138	7.6	-2.4	0.0	0.0	0.0	5.2	18.5	-13.3	200/300 Hz
QP	H	0.141	4.4	-2.4	0.0	0.0	0.0	2.0	18.5	-16.5	200/300 Hz

Notes: The limits were extrapolated to a 3 meter test distance using the methods of AS/NZS 4268 5.4.

Special Radiated Emissions

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineers: Nicholas Abbondante Location: Site 2
Project #: 3104393 Date(s): 10/17/06
Standard: FCC Part 15 Subpart C 15.209, IC RSS-210
Receiver: Agilent E7405A (AGL001) Limit Distance (m): 3
PreAmp: NONE. Test Distance (m): 3
Barometer: BAR2 Temp/Humidity/Pressure: 18c 51% 1012mB
PreAmp Used? (Y or N): N Voltage/Frequency: Fresh 3V Battery Frequency Range: 150 kHz - 30 MHz

Antenna & Cables: HF Bands: N, LF, HF, SHF
LF Antenna: Loop1 05-10-07 1m E.ant Loop1 05-10-07 1m H.ant
N Antenna: LOG1 11-10-06 V3.ant LOG1 11-10-06 H3.ant
HF Antenna: EMP2 08-30-07 1m E.ANT EMP2 08-30-07 1m H.ANT
SHF Antenna: NONE. NONE.
LF Cable(s): CBL022 1-03-07.cbl NONE.
N Cable(s): S2 3M FLR 9-26-07.txt NONE.
HF Cable(s): CBL022 1-03-07.cbl NONE.
SHF Cable(s): CBL030 12-12-2006.txt NONE.

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	FCC	IC
QP	V	0.275	-13.3	59.5	0.0	0.0	0.0	46.2	98.8	-52.7	9/30 kHz		
QP	V	0.282	-13.8	59.4	0.0	0.0	0.0	45.7	98.6	-52.9	9/30 kHz		
QP	V	0.413	-17.8	56.8	0.1	0.0	0.0	39.1	95.3	-56.2	9/30 kHz		
QP	V	0.423	-12.9	56.8	0.1	0.0	0.0	44.0	95.1	-51.1	9/30 kHz		
QP	V	0.550	-4.5	56.1	0.1	0.0	0.0	51.7	72.8	-21.1	9/30 kHz		
QP	V	0.564	-10.2	56.0	0.1	0.0	0.0	45.9	72.6	-26.6	9/30 kHz		
QP	V	0.705	-15.3	55.7	0.1	0.0	0.0	40.5	70.6	-30.2	9/30 kHz		
QP	V	0.846	-1.9	55.4	0.1	0.0	0.0	53.6	69.1	-15.4	9/30 kHz		
QP	V	0.963	-6.2	54.2	0.1	0.0	0.0	48.0	67.9	-19.9	9/30 kHz		
QP	V	0.987	-3.8	54.1	0.1	0.0	0.0	50.4	67.7	-17.3	9/30 kHz		
QP	V	1.100	-14.2	53.9	0.1	0.0	0.0	39.9	66.8	-26.9	9/30 kHz		
QP	V	1.128	-3.2	53.9	0.1	0.0	0.0	50.8	66.6	-15.7	9/30 kHz		
QP	V	1.238	-9.0	53.7	0.1	0.0	0.0	44.9	65.8	-20.9	9/30 kHz		
QP	V	1.269	-11.3	53.7	0.1	0.0	0.0	42.5	65.5	-23.0	9/30 kHz		
QP	V	1.375	-5.8	53.5	0.1	0.0	0.0	47.9	64.8	-17.0	9/30 kHz		
QP	V	1.410	-11.8	53.4	0.1	0.0	0.0	41.8	64.6	-22.9	9/30 kHz		
QP	V	1.513	-3.6	53.3	0.2	0.0	0.0	49.9	64.0	-14.1	9/30 kHz		
QP	V	1.650	-17.8	53.1	0.2	0.0	0.0	35.4	63.3	-27.8	9/30 kHz		
QP	V	1.692	-17.7	53.0	0.2	0.0	0.0	35.5	63.0	-27.6	9/30 kHz		
QP	V	1.788	-17.8	52.9	0.2	0.0	0.0	35.2	69.5	-34.3	9/30 kHz		
QP	V	1.833	-17.7	52.8	0.2	0.0	0.0	35.3	69.5	-34.2	9/30 kHz		
QP	V	1.925	-17.6	52.7	0.2	0.0	0.0	35.3	69.5	-34.2	9/30 kHz		
QP	V	1.974	-17.5	52.6	0.2	0.0	0.0	35.3	69.5	-34.2	9/30 kHz		
QP	V	2.200	-15.6	51.5	0.2	0.0	0.0	36.2	69.5	-33.3	9/30 kHz		
QP	V	2.256	-17.9	51.4	0.2	0.0	0.0	33.7	69.5	-35.8	9/30 kHz		
QP	V	2.338	-18.1	51.3	0.2	0.0	0.0	33.4	69.5	-36.1	9/30 kHz		
QP	V	2.397	-18.0	51.2	0.2	0.0	0.0	33.4	69.5	-36.1	9/30 kHz		
QP	V	2.475	-18.3	51.0	0.2	0.0	0.0	33.0	69.5	-36.5	9/30 kHz		
QP	V	2.538	-18.2	50.9	0.2	0.0	0.0	32.9	69.5	-36.6	9/30 kHz		
QP	V	2.613	-18.1	50.8	0.2	0.0	0.0	32.9	69.5	-36.6	9/30 kHz		
QP	V	2.679	-18.0	50.6	0.2	0.0	0.0	32.8	69.5	-36.7	9/30 kHz		
QP	V	2.750	-18.0	50.5	0.2	0.0	0.0	32.8	69.5	-36.8	9/30 kHz		
QP	V	2.820	-17.9	50.4	0.2	0.0	0.0	32.7	69.5	-36.8	9/30 kHz		
QP	V	2.888	-17.7	50.2	0.2	0.0	0.0	32.7	69.5	-36.8	9/30 kHz		
QP	V	2.961	-17.7	50.1	0.2	0.0	0.0	32.6	69.5	-36.9	9/30 kHz		
QP	V	3.025	-17.5	50.0	0.2	0.0	0.0	32.7	69.5	-36.8	9/30 kHz		RB
QP	V	3.102	-17.4	49.8	0.2	0.0	0.0	32.6	69.5	-36.9	9/30 kHz		
QP	V	3.163	-17.5	49.7	0.2	0.0	0.0	32.4	69.5	-37.1	9/30 kHz		
QP	V	3.243	-17.2	49.6	0.2	0.0	0.0	32.6	69.5	-36.9	9/30 kHz		
QP	V	3.300	-17.2	49.5	0.2	0.0	0.0	32.5	69.5	-37.0	9/30 kHz		
QP	V	3.384	-17.2	49.3	0.2	0.0	0.0	32.3	69.5	-37.2	9/30 kHz		
QP	V	3.438	-17.0	49.2	0.2	0.0	0.0	32.4	69.5	-37.1	9/30 kHz		
QP	V	3.525	-16.9	49.0	0.2	0.0	0.0	32.3	69.5	-37.2	9/30 kHz		

Notes: The limits are extrapolated to 3 meters using a 40 dB/decade scaling factor.

Special Radiated Emissions

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineers: Nicholas Abbondante Location: Site 2
Project #: 3104393 Date(s): 10/17/06
Standard: ETSI EN 300 330
Receiver: Agilent E7405A (AGL001) Limit Distance (m): 3
PreAmp: NONE. Test Distance (m): 3
Barometer: BAR2 Temp/Humidity/Pressure: 18c 51% 1012mB

Antenna & Cables: HF Bands: N, LF, HF, SHF
LF Antenna: Loop1 05-10-07 1m E.ant Loop1 05-10-07 1m H.ant
N Antenna: LOG1 11-10-06 V3.ant LOG1 11-10-06 H3.ant
HF Antenna: EMP2 08-30-07 1m E.ANT EMP2 08-30-07 1m H.ANT
SHF Antenna: NONE. NONE.
LF Cable(s): CBL022 1-03-07.cbl NONE.
N Cable(s): S2 3M FLR 9-26-07.txt NONE.
HF Cable(s): CBL022 1-03-07.cbl NONE.
SHF Cable(s): CBL030 12-12-2006.txt NONE.

PreAmp Used? (Y or N): N Voltage/Frequency: Fresh 3V Battery Frequency Range: 150 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(uA/m)	Limit dB(uA/m)	Margin dB	Bandwidth
QP	V	0.275	-13.3	59.5	0.0	0.0	0.0	-4.3	43.6	-47.9	9/30 kHz
QP	V	0.282	-13.8	59.4	0.0	0.0	0.0	-4.8	43.5	-48.3	9/30 kHz
QP	V	0.413	-17.8	56.8	0.1	0.0	0.0	-11.4	41.8	-53.2	9/30 kHz
QP	V	0.423	-12.9	56.8	0.1	0.0	0.0	-6.5	41.7	-48.2	9/30 kHz
QP	V	0.550	-4.5	56.1	0.1	0.0	0.0	1.2	40.6	-39.3	9/30 kHz
QP	V	0.564	-10.2	56.0	0.1	0.0	0.0	-4.6	40.5	-45.0	9/30 kHz
QP	V	0.705	-15.3	55.7	0.1	0.0	0.0	-10.0	39.5	-49.5	9/30 kHz
QP	V	0.846	-1.9	55.4	0.1	0.0	0.0	3.1	38.7	-35.6	9/30 kHz
QP	V	0.963	-6.2	54.2	0.1	0.0	0.0	-2.5	38.2	-40.6	9/30 kHz
QP	V	0.987	-3.8	54.1	0.1	0.0	0.0	-0.1	38.0	-38.1	9/30 kHz
QP	V	1.100	-14.2	53.9	0.1	0.0	0.0	-10.7	37.6	-48.2	9/30 kHz
QP	V	1.128	-3.2	53.9	0.1	0.0	0.0	0.3	37.5	-37.1	9/30 kHz
QP	V	1.238	-9.0	53.7	0.1	0.0	0.0	-5.6	37.1	-42.7	9/30 kHz
QP	V	1.269	-11.3	53.7	0.1	0.0	0.0	-8.0	37.0	-44.9	9/30 kHz
QP	V	1.375	-5.8	53.5	0.1	0.0	0.0	-2.6	36.6	-39.2	9/30 kHz
QP	V	1.410	-11.8	53.4	0.1	0.0	0.0	-8.7	36.5	-45.2	9/30 kHz
QP	V	1.513	-3.6	53.3	0.2	0.0	0.0	-0.6	36.2	-36.8	9/30 kHz
QP	V	1.650	-17.8	53.1	0.2	0.0	0.0	-15.1	58.3	-73.4	9/30 kHz
QP	V	1.692	-17.7	53.0	0.2	0.0	0.0	-15.0	58.0	-73.1	9/30 kHz
QP	V	1.788	-17.8	52.9	0.2	0.0	0.0	-15.3	57.5	-72.8	9/30 kHz
QP	V	1.833	-17.7	52.8	0.2	0.0	0.0	-15.2	57.3	-72.5	9/30 kHz
QP	V	1.925	-17.6	52.7	0.2	0.0	0.0	-15.2	56.8	-72.0	9/30 kHz
QP	V	1.974	-17.5	52.6	0.2	0.0	0.0	-15.2	56.5	-71.7	9/30 kHz
QP	V	2.200	-15.6	51.5	0.2	0.0	0.0	-14.3	55.4	-69.7	9/30 kHz
QP	V	2.256	-17.9	51.4	0.2	0.0	0.0	-16.8	55.2	-72.0	9/30 kHz
QP	V	2.338	-18.1	51.3	0.2	0.0	0.0	-17.1	54.8	-71.8	9/30 kHz
QP	V	2.397	-18.0	51.2	0.2	0.0	0.0	-17.1	54.5	-71.6	9/30 kHz
QP	V	2.475	-18.3	51.0	0.2	0.0	0.0	-17.5	54.2	-71.7	9/30 kHz
QP	V	2.538	-18.2	50.9	0.2	0.0	0.0	-17.6	53.9	-71.4	9/30 kHz
QP	V	2.613	-18.1	50.8	0.2	0.0	0.0	-17.6	53.6	-71.1	9/30 kHz
QP	V	2.679	-18.0	50.6	0.2	0.0	0.0	-17.7	53.3	-70.9	9/30 kHz
QP	V	2.750	-18.0	50.5	0.2	0.0	0.0	-17.8	53.0	-70.7	9/30 kHz
QP	V	2.820	-17.9	50.4	0.2	0.0	0.0	-17.8	52.7	-70.5	9/30 kHz
QP	V	2.888	-17.7	50.2	0.2	0.0	0.0	-17.8	52.4	-70.2	9/30 kHz
QP	V	2.961	-17.7	50.1	0.2	0.0	0.0	-17.9	52.1	-70.0	9/30 kHz
QP	V	3.025	-17.5	50.0	0.2	0.0	0.0	-17.8	51.8	-69.7	9/30 kHz
QP	V	3.102	-17.4	49.8	0.2	0.0	0.0	-17.9	51.6	-69.4	9/30 kHz
QP	V	3.163	-17.5	49.7	0.2	0.0	0.0	-18.1	51.3	-69.4	9/30 kHz
QP	V	3.243	-17.2	49.6	0.2	0.0	0.0	-17.9	51.0	-68.9	9/30 kHz
QP	V	3.300	-17.2	49.5	0.2	0.0	0.0	-18.0	50.8	-68.8	9/30 kHz
QP	V	3.384	-17.2	49.3	0.2	0.0	0.0	-18.2	50.5	-68.6	9/30 kHz
QP	V	3.438	-17.0	49.2	0.2	0.0	0.0	-18.1	50.3	-68.3	9/30 kHz
QP	V	3.525	-16.9	49.0	0.2	0.0	0.0	-18.2	50.0	-68.1	9/30 kHz

Notes: A 51.5 dB factor was used to convert readings from dBuV/m to dBuA/m. The limits were extrapolated to a 3 meter test distance using the methods of ETSI EN 300 330-1 Annex J.

Special Radiated Emissions

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineers: Nicholas Abbondante Location: Site 2
Project #: 3104393 Date(s): 10/17/06
Standard: AS/NZS 4268
Receiver: Agilent E7405A (AGL001) Limit Distance (m): 3
PreAmp: NONE. Test Distance (m): 3
Barometer: BAR2 Temp/Humidity/Pressure: 18c 51% 1012mB

Antenna & Cables: HF Bands: N, LF, HF, SHF
LF Antenna: Loop1 05-10-07 1m E.ant Loop1 05-10-07 1m H.ant
N Antenna: LOG1 11-10-06 V3.ant LOG1 11-10-06 H3.ant
HF Antenna: EMP2 08-30-07 1m E.ANT EMP2 08-30-07 1m H.ANT
SHF Antenna: NONE. NONE.
LF Cable(s): CBL022 1-03-07.cbl NONE.
N Cable(s): S2 3M FLR 9-26-07.txt NONE.
HF Cable(s): CBL022 1-03-07.cbl NONE.
SHF Cable(s): CBL030 12-12-2006.txt NONE.

PreAmp Used? (Y or N): N Voltage/Frequency: Fresh 3V Battery Frequency Range: 150 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(Ω/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uA/m)	Limit dB(uA/m)	Margin dB	Bandwidth
QP	H	0.275	-13.3	8.0	0.0	0.0	0.0	-5.3	3.7	-9.0	9/30 kHz
QP	H	0.282	-13.8	7.9	0.0	0.0	0.0	-5.8	3.7	-9.5	9/30 kHz
QP	H	0.413	-17.8	5.3	0.1	0.0	0.0	-12.4	3.7	-16.1	9/30 kHz
QP	H	0.423	-12.9	5.3	0.1	0.0	0.0	-7.5	3.7	-11.2	9/30 kHz
QP	H	0.550	-4.5	4.6	0.1	0.0	0.0	0.2	3.7	-3.5	9/30 kHz
QP	H	0.564	-10.2	4.5	0.1	0.0	0.0	-5.6	3.7	-9.3	9/30 kHz
QP	H	0.705	-15.3	4.2	0.1	0.0	0.0	-11.0	3.7	-14.7	9/30 kHz
QP	H	0.846	-1.9	3.9	0.1	0.0	0.0	2.1	3.7	-1.6	9/30 kHz
QP	H	0.963	-6.2	2.7	0.1	0.0	0.0	-3.5	3.7	-7.2	9/30 kHz
QP	H	0.987	-3.8	2.6	0.1	0.0	0.0	-1.1	3.7	-4.8	9/30 kHz
QP	H	1.100	-14.2	2.4	0.1	0.0	0.0	-11.7	3.7	-15.4	9/30 kHz
QP	H	1.128	-3.2	2.4	0.1	0.0	0.0	-0.7	3.7	-4.4	9/30 kHz
QP	H	1.238	-9.0	2.2	0.1	0.0	0.0	-6.7	3.7	-10.4	9/30 kHz
QP	H	1.269	-11.3	2.1	0.1	0.0	0.0	-9.0	3.7	-12.7	9/30 kHz
QP	H	1.375	-5.8	1.9	0.1	0.0	0.0	-3.7	3.7	-7.4	9/30 kHz
QP	H	1.410	-11.8	1.9	0.1	0.0	0.0	-9.8	3.7	-13.5	9/30 kHz
QP	H	1.513	-3.6	1.7	0.2	0.0	0.0	-1.7	3.7	-5.4	9/30 kHz
QP	H	1.650	-17.8	1.5	0.2	0.0	0.0	-16.1	3.7	-19.8	9/30 kHz
QP	H	1.692	-17.7	1.4	0.2	0.0	0.0	-16.1	3.7	-19.8	9/30 kHz
QP	H	1.788	-17.8	1.3	0.2	0.0	0.0	-16.3	3.7	-20.0	9/30 kHz
QP	H	1.833	-17.7	1.3	0.2	0.0	0.0	-16.3	3.7	-20.0	9/30 kHz
QP	H	1.925	-17.6	1.1	0.2	0.0	0.0	-16.3	3.7	-20.0	9/30 kHz
QP	H	1.974	-17.5	1.1	0.2	0.0	0.0	-16.2	3.7	-19.9	9/30 kHz
QP	H	2.200	-15.6	0.0	0.2	0.0	0.0	-15.4	3.7	-19.1	9/30 kHz
QP	H	2.256	-17.9	-0.1	0.2	0.0	0.0	-17.9	3.7	-21.6	9/30 kHz
QP	H	2.338	-18.1	-0.3	0.2	0.0	0.0	-18.1	3.7	-21.8	9/30 kHz
QP	H	2.397	-18.0	-0.4	0.2	0.0	0.0	-18.2	3.7	-21.9	9/30 kHz
QP	H	2.475	-18.3	-0.6	0.2	0.0	0.0	-18.6	3.7	-22.3	9/30 kHz
QP	H	2.538	-18.2	-0.7	0.2	0.0	0.0	-18.6	3.7	-22.3	9/30 kHz
QP	H	2.613	-18.1	-0.8	0.2	0.0	0.0	-18.7	3.7	-22.4	9/30 kHz
QP	H	2.679	-18.0	-0.9	0.2	0.0	0.0	-18.7	3.7	-22.4	9/30 kHz
QP	H	2.750	-18.0	-1.1	0.2	0.0	0.0	-18.8	3.7	-22.5	9/30 kHz
QP	H	2.820	-17.9	-1.2	0.2	0.0	0.0	-18.9	3.7	-22.6	9/30 kHz
QP	H	2.888	-17.7	-1.3	0.2	0.0	0.0	-18.8	3.7	-22.5	9/30 kHz
QP	H	2.961	-17.7	-1.4	0.2	0.0	0.0	-18.9	3.7	-22.6	9/30 kHz
QP	H	3.025	-17.5	-1.6	0.2	0.0	0.0	-18.8	3.7	-22.5	9/30 kHz
QP	H	3.102	-17.4	-1.7	0.2	0.0	0.0	-18.9	3.7	-22.6	9/30 kHz
QP	H	3.163	-17.5	-1.8	0.2	0.0	0.0	-19.1	3.7	-22.8	9/30 kHz
QP	H	3.243	-17.2	-2.0	0.2	0.0	0.0	-19.0	3.7	-22.7	9/30 kHz
QP	H	3.300	-17.2	-2.1	0.2	0.0	0.0	-19.1	3.7	-22.8	9/30 kHz
QP	H	3.384	-17.2	-2.3	0.2	0.0	0.0	-19.2	3.7	-22.9	9/30 kHz
QP	H	3.438	-17.0	-2.4	0.2	0.0	0.0	-19.2	3.7	-22.9	9/30 kHz
QP	H	3.525	-16.9	-2.6	0.2	0.0	0.0	-19.3	3.7	-23.0	9/30 kHz

Notes: The limits were extrapolated to a 3 meter test distance using the methods of AS/NZS 4268 5.4.

Setup Photos

Radiated Emissions, 150 kHz – 30 MHz

Radiated Emissions, 150 kHz – 30 MHz

Test Results: Pass

Test Standard: AS/NZS 4268 8.3, ETSI EN 300 330-1, FCC 15.215, IC RSS-Gen 4.4.1

Test: 20 dB Bandwidth

Performance Criterion: There is no limit on bandwidth.

Test Environment:

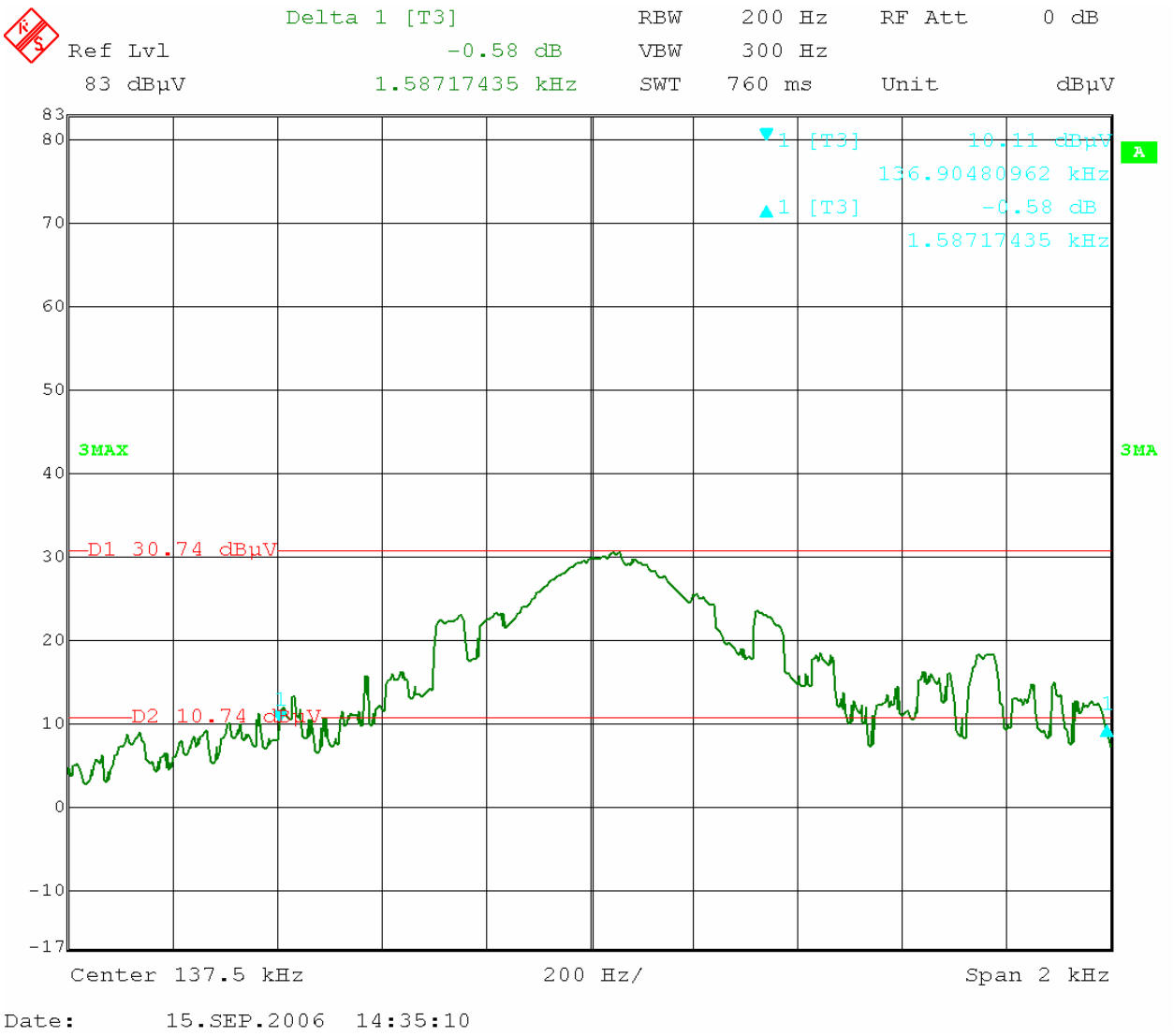
Environmental Conditions During Testing:	Humidity (%):	N/A	Pressure (hPa):	N/A	Ambient (°C):	N/A
Pretest Verification Performed	N/A		Equipment under Test:		M640	

Test Equipment Used:

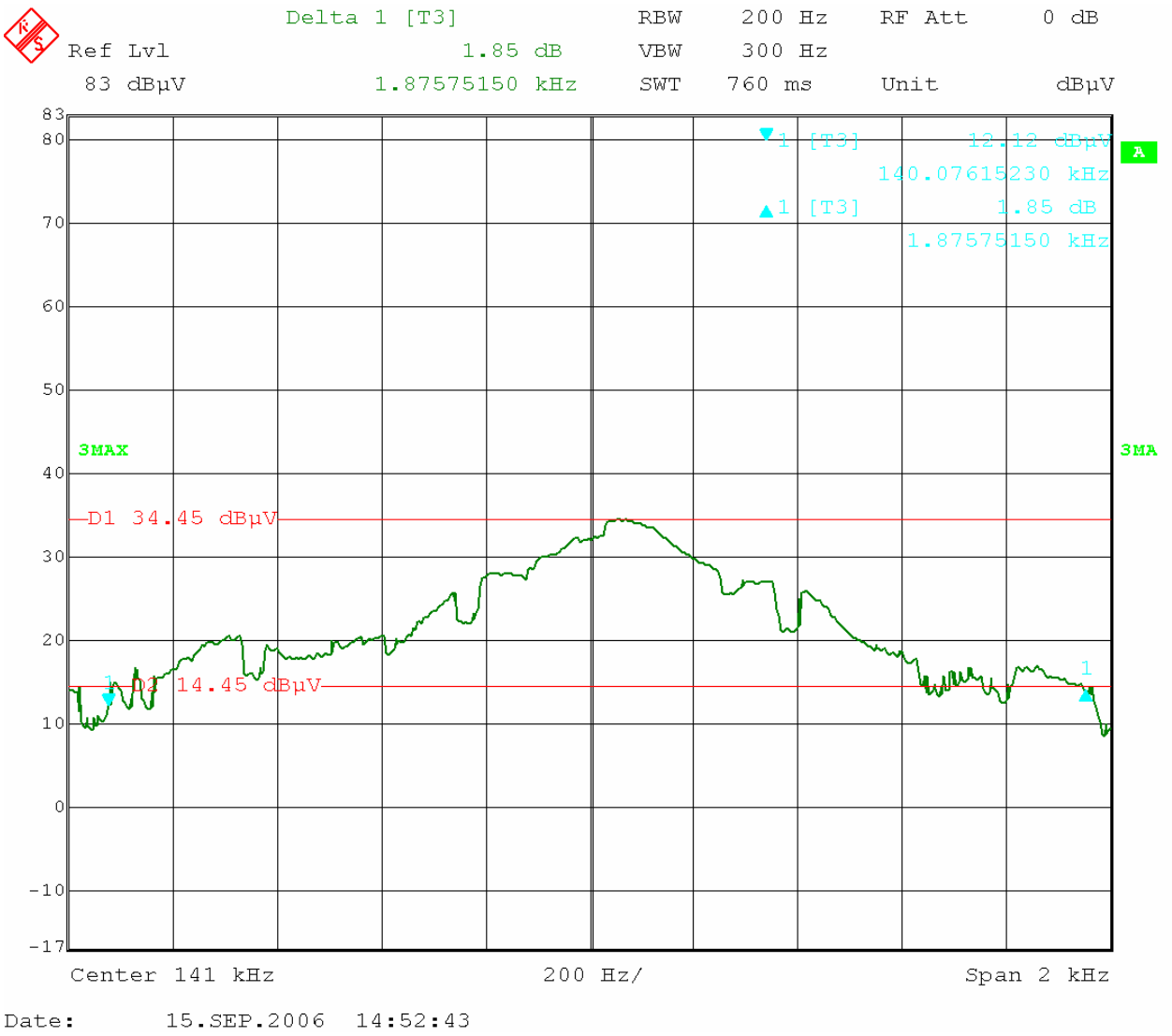
TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	07/01/2007

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 1.59 kHz at 137.5 kHz and 1.88 kHz at 141 kHz.



137.5 kHz Fundamental: 1.59 kHz 20 dB Bandwidth



141 kHz Fundamental: 1.88 kHz 20 dB Bandwidth

Test Results: Pass

Test Standard: AS/NZS 4268 8.2, ETSI EN 300 330-1 7.4, EN 55022, ETSI EN 301 489, FCC 15.205, 15.209, IC RSS-210 2.7

Test: Spurious Emissions above 30 MHz

Performance Criterion:
AS/NZS: The spurious emissions must not exceed 0.1 uW (-40 dBm) in Australia and 2.25 uW in New Zealand.
ETSI: The spurious emissions must not exceed 250 nW (-36.0 dBm), except in the ranges from 47-74, 87.5-118, 174-230, and 470-862 MHz, where the limit is 4 nW (-54.0 dBm).
FCC: Emissions must be below the 15.209 limits.
IC: Emissions must be below the RSS-210 2.7 Table 2 limits.

Test Environment:

Environmental Conditions During Testing:	Humidity (%):	See Table	Pressure (hPa):	See Table	Ambient (°C):	See Table
Pretest Verification Performed	Yes		Equipment under Test:		M640	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Digital 4 Line Barometer	Mannix	0ABA116	BAR2	08/02/2007
2	ANTENNA	EMCO	3142	9701-1116	11/10/2006
3	3 Meter In floor cable for site 2	ITS	RG214B/U	S2 3M FLR	09/26/2007
4	BROADBAND ANTENNA	Compliance Design	B100	1852	09/08/2007
5	BROADBAND ANTENNA	Compliance Design	B200	1850	09/08/2007
6	BROADBAND ANTENNA	Compliance Design	B300	00674	09/08/2007
7	EMI Receiver, 9kHz to 6.5GHz	Hewlett Packard	8546A	3410A00173	07/26/2007
8	EMI Filter	Hewlett Packard	85460A	344800203	07/26/2007
9	Synthesized Sweep Generator	Hewlett Packard	83620A	3213A01244	01/25/2007

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	1/17/06 Revision

Test Details:

Notes: No emissions were observed. All readings are measurements of the instrumentation noise floor.

Radiated Emissions, Substitution

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineer(s): Nicholas Abbondante
Project #: 3104393
Standard: AS/NZS 4268:2003
Barometer: BAR2 Temp/Humidity/Pressure: 22c 70% 999mB
Location: Site 2
Date(s): 09/18/06
Test Distance (m): 3 Voltage/Frequency: Fresh 3V Battery
Rx Antenna: LOG1
Rx Cable(s): S2 3M FLR
Rx Preamp: NONE Receiver: Atlanta5/6
Tx Antenna: ANT2A ANT2B ANT2C
Tx Cable(s): NONE
Tx Signal Generator: HEW62
ERP or EIRP?: EIRP
Frequency Range: 30-1000 MHz

Net = Generator Level (0.00 dBm) + (EUT reading - Generator reading) - Cable Loss + Antenna Gain (dBi or dBd)
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	EUT Reading dB(uV)	Generator Reading dB(uV)	Transmit Cable Loss dB	Transmit Antenna dBi	Generator Level dBm	Net dBm	Limit dBm	Margin dB	Bandwidth
PK	V	42.150	5.5	60.0	0.2	-7.6	-20.0	-82.2	-40.0	-42.2	120/300 kHz
PK	V	132.700	1.7	70.5	0.3	1.1	-20.0	-88.0	-40.0	-48.0	120/300 kHz
PK	V	355.400	2.1	55.0	0.5	-1.6	-20.0	-74.9	-40.0	-34.9	120/300 kHz
PK	V	489.700	3.8	57.1	0.5	0.9	-20.0	-73.0	-40.0	-33.0	120/300 kHz
PK	V	610.400	1.7	55.2	0.6	1.6	-20.0	-72.5	-40.0	-32.5	120/300 kHz
PK	V	912.400	2.5	49.2	0.8	0.6	-20.0	-66.9	-40.0	-26.9	120/300 kHz

Radiated Emissions, Substitution

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineer(s): Nicholas Abbondante
Project #: 3104393
Standard: ETSI EN 300 330
Barometer: BAR2 Temp/Humidity/Pressure: 22c 70% 999mB
Location: Site 2
Date(s): 09/18/06
Test Distance (m): 3 Voltage/Frequency: Fresh 3V Battery
Rx Antenna: LOG1
Rx Cable(s): S2 3M FLR
Rx Preamp: NONE Receiver: Atlanta5/6
Tx Antenna: ANT2A ANT2B ANT2C
Tx Cable(s): NONE
Tx Signal Generator: HEW62
ERP or EIRP?: EIRP
Frequency Range: 30-1000 MHz

Net = Generator Level (0.00 dBm) + (EUT reading - Generator reading) - Cable Loss + Antenna Gain (dBi or dBd)
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	EUT Reading dB(uV)	Generator Reading dB(uV)	Transmit Cable Loss dB	Transmit Antenna dBi	Generator Level dBm	Net dBm	Limit dBm	Margin dB	Bandwidth
PK	V	42.150	5.5	60.0	0.2	-7.6	-20.0	-82.2	-36.0	-46.2	120/300 kHz
PK	V	132.700	1.7	70.5	0.3	1.1	-20.0	-88.0	-36.0	-52.0	120/300 kHz
PK	V	355.400	2.1	55.0	0.5	-1.6	-20.0	-74.9	-36.0	-38.9	120/300 kHz
PK	V	489.700	3.8	57.1	0.5	0.9	-20.0	-73.0	-54.0	-19.0	120/300 kHz
PK	V	610.400	1.7	55.2	0.6	1.6	-20.0	-72.5	-54.0	-18.5	120/300 kHz
PK	V	912.400	2.5	49.2	0.8	0.6	-20.0	-66.9	-36.0	-30.9	120/300 kHz

Radiated Emissions

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineers: Nicholas Abbondante Location: Site 2
Project #: 3104393 Date(s): 09/13/06
Standard: FCC Part 15 Subpart C 15.209, IC RSS-210 2.7 Table 2
Receiver: HP 85462A (Atlanta5/6) Limit Distance (m): 3
PreAmp: NONE. Test Distance (m): 3
Barometer: BAR2 Temp/Humidity/Pressure: 21c 53% 1007mB

Antenna & Cables: N Bands: N, LF, HF, SHF
LF Antenna: Loop1 05-10-07 1m E.ant Loop1 05-10-07 1m H.ant
N Antenna: LOG1 11-10-06 V3.ant LOG1 11-10-06 H3.ant
HF Antenna: EMP2 08-30-07 1m E.ANT EMP2 08-30-07 1m H.ANT
SHF Antenna: NONE. NONE.
LF Cable(s): CBL022 1-03-07.cbl NONE.
N Cable(s): S2 3M FLR 9-26-2007.cbl NONE.
HF Cable(s): CBL022 1-03-07.cbl NONE.
SHF Cable(s): CBL030 12-12-2006.txt NONE.

PreAmp Used? (Y or N): N Voltage/Frequency: Fresh 3V 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

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	FCC	IC
QP	V	42.150	0.1	10.6	1.0	0.0	0.0	11.7	40.0	-28.3	120/300 kHz		
QP	V	132.700	-0.8	7.5	1.4	0.0	0.0	8.1	43.5	-35.4	120/300 kHz	RB	RB
QP	V	355.400	-3.1	15.3	2.4	0.0	0.0	14.6	46.0	-31.4	120/300 kHz		
QP	V	489.700	-3.1	17.6	2.9	0.0	0.0	17.4	46.0	-28.6	120/300 kHz		
QP	V	610.400	-4.3	19.7	3.5	0.0	0.0	18.9	46.0	-27.1	120/300 kHz	RB	RB
QP	V	912.400	-3.2	22.2	4.6	0.0	0.0	23.7	46.0	-22.3	120/300 kHz		

Radiated Emissions

Company: Timex Corporation
Model #: M640
Serial #: 6
Engineers: Nicholas Abbondante Location: Site 2
Project #: 3104393 Date(s): 09/13/06
Standard: EN 55022 Class B, ETSI EN 301 489
Receiver: HP 85462A (Atlanta5/6) Limit Distance (m): 10
PreAmp: NONE. Test Distance (m): 3
Barometer: BAR2 Temp/Humidity/Pressure: 21c 53% 1007mB

Antenna & Cables: N Bands: N, LF, HF, SHF
LF Antenna: Loop1 05-10-07 1m E.ant Loop1 05-10-07 1m H.ant
N Antenna: LOG1 11-10-06 V3.ant LOG1 11-10-06 H3.ant
HF Antenna: EMP2 08-30-07 1m E.ANT EMP2 08-30-07 1m H.ANT
SHF Antenna: NONE. NONE.
LF Cable(s): CBL022 1-03-07.cbl NONE.
N Cable(s): S2 3M FLR 9-26-07.txt NONE.
HF Cable(s): CBL022 1-03-07.cbl NONE.
SHF Cable(s): CBL030 12-12-2006.txt NONE.

PreAmp Used? (Y or N): N Voltage/Frequency: Fresh 3V 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

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	42.150	0.1	10.6	0.9	0.0	10.5	1.2	30.0	-28.8	120/300 kHz
QP	V	132.700	-0.8	7.5	1.5	0.0	10.5	-2.3	30.0	-32.3	120/300 kHz
QP	V	355.400	-3.1	15.3	2.8	0.0	10.5	4.6	37.0	-32.4	120/300 kHz
QP	V	489.700	-3.1	17.6	3.1	0.0	10.5	7.2	37.0	-29.8	120/300 kHz
QP	V	610.400	-4.3	19.7	3.4	0.0	10.5	8.4	37.0	-28.6	120/300 kHz
QP	V	912.400	-3.2	22.2	4.7	0.0	10.5	13.3	37.0	-23.7	120/300 kHz

Setup Photos

Test Results: Pass

Test Standard: AS/NZS 4268 8.4, ETSI EN 300 330-1 7.3

Test: Operating Frequencies/ Permitted Frequency Range of the Modulation Bandwidth

Performance Criterion:
AS/NZS: The fundamental emissions must remain within the band from 70 kHz to 160 kHz in Australia and between 30 kHz and 190 kHz in New Zealand.
ETSI: The fundamental emissions must remain within the assigned frequency band.

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:		M640	

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	Spectrum Analyzer	Agilent	E7405A	US40240205	08/16/2007
2	Cable, BNC - BNC, 15' long	Belden	RG-58/U	CBL022	01/03/2007
3	Digital Multimeter	Fluke	87 III	75250621	04/20/2007
4	Small Temperature/Humidity Chamber	Bryant Manufacturing	TH-5S	1207	04/06/2007
5	ANTENNA, LOOP, 150 kHz - 30 MHz	Empire	LP-105A	127	08/30/2007

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	1/17/06 Revision

Test Details:

Frequency Stability

Company: Timex Communication
Model #: M640
Serial #: 6
Engineer(s): Nicholas Abbondante Location: Safety
Project #: 3104393 Date(s): 09/19/06 9/20/2006
Standard: AS/NZS 4268, ETSI EN 300 330

Test Equipment Used:
AGL001 SAF187 SAF100 EMP2 CBL022

Voltage: 3 VDC

%	Voltage Volts	Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz	Power	Deviation dB	F Low kHz	F High kHz
-10%	2.7	-20	0.137518	0	0.00	40.04	-8.83	137.125	138.331
+0%	3	-20	0.137518	0	0.00	41.41	-7.46	137.118	138.312
+0%	3	+20	0.137518	0	0.00	48.87	0	137.125	138.368
-10%	2.96	+55	0.137525	0.007	0.00	46.07	-2.8	136.856	138.268
+0%	3	+55	0.137518	0	0.00	49.92	1.05	137.1	138.537
							Max	136.856	138.268

%	Voltage Volts	Temp Celsius	Frequency MHz	Deviation kHz	Limit kHz	Power	Deviation dB	F Low kHz	F High kHz
-10%	2.7	-20	0.141031	-0.012	0.00	44.21	-8.45	140.268	141.487
+0%	3	-20	0.14105	0.007	0.00	45.53	-7.13	140.275	141.468
+0%	3	+20	0.141043	0	0.00	52.66	0	140.275	141.525
-10%	2.96	+55	0.141043	0	0.00	49.1	-3.56	140.268	141.812
+0%	3	+55	0.141043	0	0.00	49.42	-3.24	140.243	141.475
							Max	140.243	141.468

At +55 degrees Celsius, the EUT shut off if voltage dropped below 2.958 V.

AS/NZS Notes: Given the ~1.59 kHz bandwidth at 137.5 kHz and the ~1.88 kHz bandwidth at 141.0 kHz measured previously, and the maximum measured frequency drift of 12 Hz, the fundamental frequencies meet the requirements to stay in band. The power shown in the table is a relative value and is not representative of actual EUT output power.

ETSI EN 300 330 Notes: The spurious limit is 15.2 dBuA/m at 137.5 kHz, and 15.1 dBuA/m at 141.0 kHz at 10 meters. The fundamental field strength is well below the spurious limits, after adjustment by a 31.37 dB distance factor. This factor is used to extrapolate the 10m limit to the 3m fundamental field strength measurement distance, obtained using the methods of ETSI EN 300 330 Annex J. Therefore since the fundamental field strength is lower than the spurious limit, the EUT meets the requirements. The power shown in the table is a relative value and is not representative of actual EUT output power.

Test Results: Pass

Test Standard: Basic Standards from EN 55024 and ETSI EN 301 489

Test: ESD

Performance Criterion: B, See Section 1.7

Test Environment:

Environmental Conditions During Testing:	Humidity (%):	45 36	Pressure (hPa):	992 1011	Ambient (°C):	22 22
Pretest Verification Performed	Yes		Equipment under Test:		M640	

Maximum Test Disturbance Parameters: ±4kV Contact discharge, ±8kV Air discharge

Test Equipment Used:

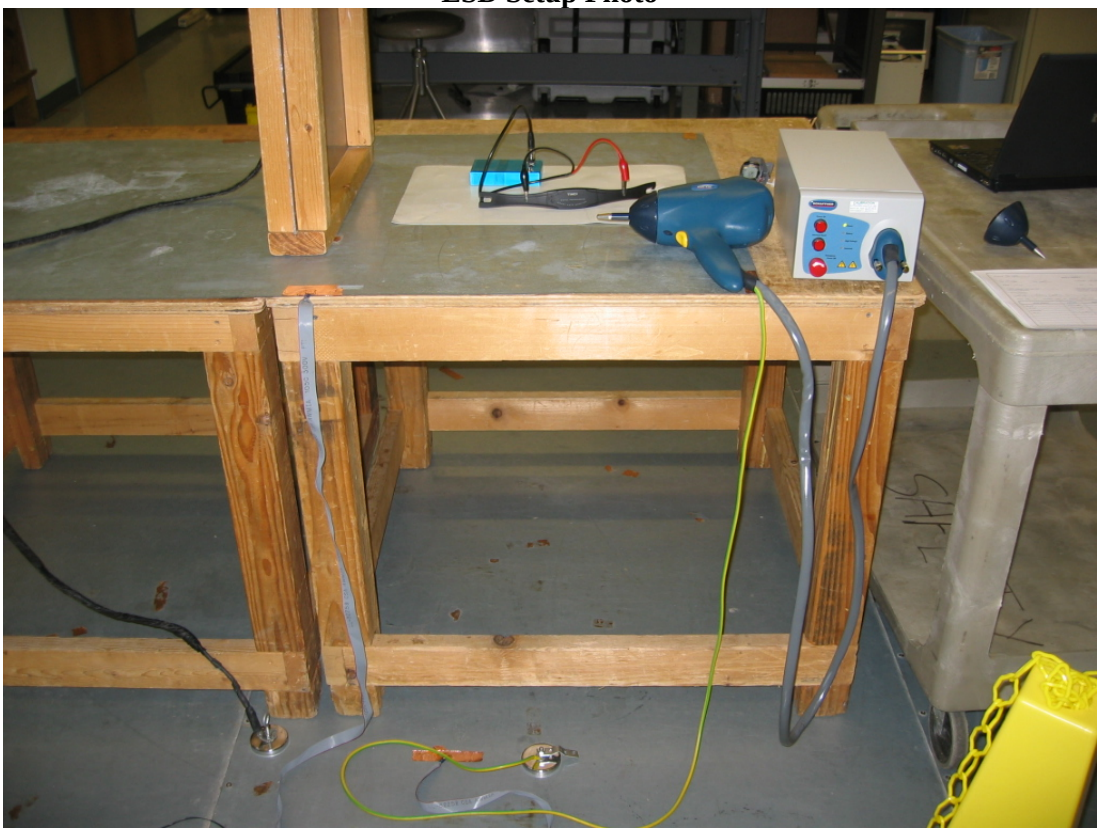
TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	ESD Test Set	Schaffner	NSG438	557	04/21/2007
2	Electrostatic Voltmeter	Sensitive Research	ESH	U24187	01/05/2007
3	6 line Digital Barometer	Mannix	0ABA8886	SAF285	11/04/2006

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass Fail N/A	Comment
HCP	±2, 4 kV	±2, 4 kV	Pass	No Effect
VCP	±2, 4 kV	±2, 4 kV	Pass	See Notes
Contact Discharges	±2, 4 kV	±2, 4 kV	Pass	No conductive surfaces
Air Discharges	±2, 4, 6, 8kV	±2, 4 kV	Pass	See Notes

Notes – During the test, the BPM stayed within ±1 BPM of the nominal 120 BPM value.

ESD Setup Photo



Test Results: Pass

Test Standard: Basic Standards from EN 55024 and ETSI EN 301 489

Test: Radiated RF Susceptibility

Performance Criterion: A, See Section 1.7

Test Environment:

Environmental Conditions During Testing:	Humidity (%):	43 36	Pressure (hPa):	992 1011	Ambient (°C):	23 22
Pretest Verification Performed	Yes		Equipment under Test:		M640	

Maximum Test Disturbance Parameters: 80-1000, 1400-2000 MHz @ 3 V/m, 1kHz AM 80% modulation

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	METER, POWER	Hewlett Packard	436A/022	2604A25294	04/27/2007
2	Attenuator, SWITCH DRIVER	Hewlett Packard	11713A	2421A03484	Verified
3	Generator, Signal	Hewlett Packard	8648C	3847A05291	01/04/2007
4	SENSOR, POWER	Hewlett Packard	8481A	2349A38886	11/23/2006
5	Dual Directional Coupler	Amplifier Research	DC7144, .8 - 4.2GHz	28765	11/14/2006
6	AMPLIFIER, 50W, .8 - 4.2GHz	Amplifier Research	50S1G4A	29183	Verified
7	Istropic Field Probe	Amplifier Research	FP2000	16896	07/28/2007
8	Antenna, Log Periodic, 80 - 1000MHz	Amplifier Research	AT1080	15259	Verified
9	MICROWAVE HORN ANTENNA	Amplifier Research	AT4002, 1-4.2GHz, 25	21499	Verified
10	AMPLIFIER; 100W; 200-1000MHz	Kalmus	717FC/1-70-563-002	8053-2	Verified
11	AMPLIFIER; 1kW; 10kHz-200MHz	Kalmus	137C/1-60-105-002	8044-1	Verified
12	COUPLER, BI-DIRECTIONAL	Werlatone inc.	C3910	5284	03/06/2007
13	COUPLER, BI-DIRECTIONAL	Werlatone inc.	C5960	7727	12/13/2006
14	Isotropic Field Monitor	Amplifier Research	FM2000	16839	Verified
15	Istropic Field Probe	Amplifier Research	FP2000	15398	08/04/2007

16	Generator, Signal	Hewlett Packard	8648B	3537A01040	08/23/2007
17	6 line Digital Barometer	Mannix	0ABA8886	SAF285	11/04/2006

Software Utilized:

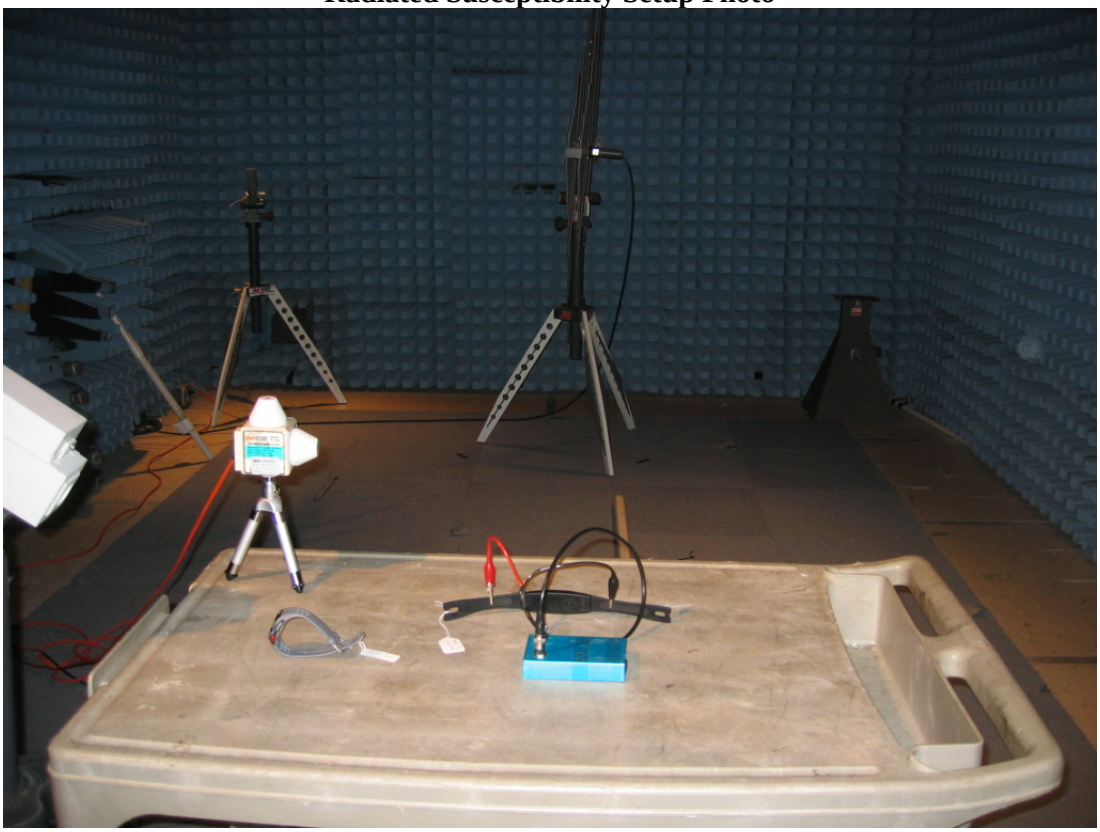
Name	Manufacturer	Version
TILE	Quantum Change/EMC Systems, LLC	3.2.L

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass Fail N/A	Comment
Front	3 V/m (h&v)	3 V/m (h&v)	Pass	See Notes

During the test, at vertical and horizontal polarities, the BPM varied by +/-3 BPM across the entire range.

Radiated Susceptibility Setup Photo



Test Results: Pass

Test Standard: Basic Standards from EN 55024 and ETSI EN 301 489

Test: Power Frequency Magnetics

Performance Criterion: A, See Section 1.7

Test Environment:

Environmental Conditions During Testing:	Humidity (%):	45	Pressure (hPa):	992	Ambient (°C):	22
Pretest Verification Performed	Yes		Equipment under Test:		M640	

Maximum Test Disturbance Parameters: 1 A/M

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	**Equipment Type**	**Make**	**Model No.**	**Serial No.**	**Next Cal. Due**
1	EMC Test System consisting of: NSG-1007-45 (SN 55512), CCN 1000-3 (SN 72203), INA 2197 (SN 72200), INA 2196 (SN 72198), INA 2145 (SN 72199), INA 2171 (SN 8006), INA 2141 (SN 6012)	Schaffner	MX45-3PI-CTSHL-SCH	43964	01/18/2008
2	Spectrum Analyzer	Hewlett Packard	3585B	3008A00932	05/16/2007
3	ANTENNA, LOOP	Solar Electronics	7334-1	11899	11/08/2006
4	6 line Digital Barometer	Mannix	0ABA8886	SAF285	11/04/2006

Software Utilized:

Name	Manufacturer	Version
WIN2120	Schaffner	2.60

Test Details:

Test Point	Standard Limit (as published)	Compliance Level	Pass Fail N/A	Comment
X,Y&Z Axis	1A/m 50 Hz	1A/m 50 Hz	Pass	No Effect

Power Frequency Magnetics Setup Photo