

Nike

SMA011 **Digital Heart Rate Monitor**

July 21, 2003

Report No. NIKE0006

Report Prepared By:



1-888-EMI-CERT

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Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: July 21, 2003

Nike

Model : SMA011 Digital Heart Rate Monitor

Report No: NIKE0006

Emissions

Description	Pass	Fail
FCC 15.249, Field Strength of Fundamental	☒	☐
FCC 15.249, Field Strength of Spurious Emissions	☒	☐

The equipment was tested in the configuration and mode(s) of operation provided by the client. The specific tests and test levels were specified by the client. Any additional tests, or product configurations that should be tested are the responsibility of the client. Product compliance is the responsibility of the client.

List of Modifications to equipment under test required to meet the requirements:

- See the modifications page of the report.

Deviations to the test standard

- No deviations were made to the test standard

Test Facility

- The measurement facility used to collect the data is located at:
Northwest EMC, Inc.; 22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
Phone: (503) 844-4066 Fax: 844-3826
This site has been fully described in a report filed with the FCC (Federal Communications Commission), and accepted by the FCC in a letter maintained in our files.

Approved By:

Greg Kiemel, Director of Engineering

This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.

Revision Number	Description	Date	Page Number
00	None		

FCC: The Open Area Test Sites, and conducted measurement facilities, have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files.



TCB: Northwest EMC has been accredited by ANSI to ISO/IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

A2LA: Accreditation has been granted to Northwest EMC, Inc. to perform the Electromagnetic Compatibility (EMC) tests described in the Scope of Accreditation. Assessment performed to ISO/IEC 17025. Certificate Number: 1936-01, Certificate Number: 1936-02, Certificate Number 1936-03



Australia/New Zealand: The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body. (A2LA)



TÜV Product Service: Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0302C



TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.



NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.



Industry Canada: Accredited by Industry Canada for performance of radiated measurements. Our open area test sites comply with RSP 100, Issue 7, section 3.3.



VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (Registration Nos. - Evergreen: C-1071 and R-1025, Trails End: C-694 and R-677, Sultan: C-905, R-871 and R-1172, North Sioux City C-1246, R-1185 and R-1217)



BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.



CAB: Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement



GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



	FCC	NIST	TUV PS	TUV Rheinland	Nemko	Technology International	Industry Canada	BSMI	VCCI	GOST	NATA
IEC 1000-4-2			✓	✓	✓	✓					
IEC 1000-4-3			✓	✓	✓	✓					
IEC 1000-4-4			✓	✓	✓	✓					
IEC 1000-4-5			✓	✓	✓	✓					
IEC 1000-4-6			✓	✓	✓	✓					
IEC 1000-4-8			✓	✓	✓	✓					
IEC 1000-4-11			✓	✓	✓	✓					
IEC 1000-3-2			✓	✓	✓	✓					
IEC 1000-3-3			✓	✓	✓	✓					
AS/NZS 3548											✓
CNS 13438								✓			
ISO/IEC Guide 25			✓	✓	✓	✓		✓			
ISO/IEC17025			✓	✓	✓	✓					
Radiated Emissions			✓	✓	✓	✓	✓	✓	✓	✓	
Conducted Emissions			✓	✓	✓	✓	✓	✓	✓	✓	
OATS Sites	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Hillsboro 5-Meter Chamber (EV01)	✓		✓	✓	✓	✓	✓	✓	✓	✓	
TCB for Licensed Transmitters	✓										
TCB for un-Licensed Transmitters	✓										
Cab for R&TTE		✓									
CAB for EMC		✓									

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999

NORTHWEST EMC
Evergreen Facility
22975 NW Evergreen Pkwy #400
Hillsboro, OR 97124
David Tolman Phone: 503 844 4066

ELECTRICAL (EMC)

Valid until: July 31, 2004

Certificate Number: 1936-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following Electromagnetic Compatibility (EMC) tests:

EMC StandardsTitle*Radiated & Conducted Emissions*

CFR 47, FCC Part 15 using ANSI C63.4

American National Standard for methods of measurement of radio-noise emissions for low-voltage electrical and electronic equipment in the range of 9 kHz to 40GHz.

CISPR 22

Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

CNS 13438

Limits and methods of measurement of radio interference characteristics of information technology equipment.

EN 55022

Limits and methods of measurement of radio disturbance characteristics of information technology equipment.

Canada ICES-003

Digital apparatus

AS/NZS 3548

Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of information technology equipment

Canada ICES-001

Industrial, scientific and medical radio frequency generators

CNS 13803

Industrial, Scientific and Medical Instrument

(A2LA Cert. No. 1936.01) 06/28/02

AS/NZS 2064	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
EN 61000-6-3	Electromagnetic capability – Generic emission standard. Part 1: Residential, commercial and light industry. (I.S.)
EN 61000-6-4	Electromagnetic compatibility – Generic emission standard. Part 2: Industrial environment
VCCI V-3/99.05	Technical Requirements
VCCI V-4/99.05	Instruction for Test Conditions for Requirement under Test
CISPR 11	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
EN 55011	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
EN 55103-1	Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission
EN 61000-3-2	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limits for harmonic current emissions
EN 61000-3-3	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limitation of voltage fluctuations and flicker in low-voltage supply systems.
GR-1089 Section 3 (excluding analog voice band)	Bellcore electromagnetic compatibility and electrical safety – Generic criteria for network telecommunications equipment.
<i>Immunity</i>	
EN 61000-4-2 AS/NZS 61000-4-2	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test – Basic EMC Publication
EN 61000-4-3 AS/NZS 61000-4-3	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3: Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4 AS/NZS 61000-4-4	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4: Electrical fast transient/burst immunity test – Basic EMC publication

EN 61000-4-5 AS/NZS 61000-4-5	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques. Section 5: Surge immunity test.
EN 61000-4-6 AS/NZS 61000-4-6	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 6: Immunity to conducted disturbances, induce by radio-frequency fields.
EN 61000-4-8	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 8: Power frequency magnetic field immunity test.
EN 61000-4-11	Electromagnetic Compatibility (EMC) Part 4: Testing and measurement techniques. Section 11: Voltage dips, short interruptions and voltage. Variations immunity tests.
EN 61000-6-1	Electromagnetic Compatibility (EMC)- Part 6: Generic standards- Section 1: Immunity for residential, commercial and light-industrial environments
EN 61000-6-2	Electromagnetic Compatibility (EMC)- Part 6: Generic standards- Section 2: Immunity for industrial environments
IEEE/ANSI C62.41	IEEE recommended practice on surge voltages in low-voltage AC power circuits
<i>Product Standards</i>	
GR-1089 Section 3 (excluding voice band)	Bellcore electromagnetic compatibility and electrical safety – Generic criteria for network telecommunications equipment.
EN 61326	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 60601-1-2	Medical electrical equipment Part 1: general requirements for safety Section 2: Collateral standard: Electromagnetic compatibility – requirements and tests
EN 50130-4	Alarm Systems. Part 4: Electromagnetic compatibility. Product family standard: Immunity requirements for components of fire, intruder and social alarm systems.
EN 55103-2	Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control professional use. Part 2: Immunity
EN 55024	Immunity Requirements for Information Technology Equipment – ITE Immunity

Other Standards

ETS 300 220	Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices; Technical characteristics and test methods for radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Parameters intended for regulatory purposes; Part 2: Supplementary parameters not intended for regulatory Purposes
ETS 300 224	Electro Magnetic Compatability and Radio Spectrum Matters; Paging Services; Technical characteristics and test methods for on site paging service devices.
ETS 300 328	Radio Equipment and Systems (RES); Wideband transmission systems; Technical characteristics and test conditions for data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques
ETS 300 489-1	Electro Magnetic Compatability and Radio Spectrum Matters; Common Technical Requirements
ETS 300 489-2	Specific conditions for radio paging equipment
ETS 300 489-3	Specific conditions for Short Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz
Canadian RSS-102	Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields
Canadian RSS-119	Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
Canadian RSS-123	Low Power Licensed Radiocommunication Devices
Canadian RSS-139	Licensed Radiocommunications Devices in the Band 2400- 2483.5 MHz
Canadian RSS-210	Industry Canada – Low power license-exempt radio communication devices
SAE J1113-41	Radiated and conducted emissions.
SAE J1113-21	Radiated immunity absorber lined chamber (200 MHz – 1 GHz)
SAE J1113-23	Radiated immunity stripline method (only 10 kHz – 200 MHz @ 80 V/m)

SAE J1113-4
(only substitution method)

Conducted immunity Bulk Current Injection

SAE J1113-13

ESD

FCC 47 Parts 22
(Cellular), 24, 25, 26 & 27

TCB Scope B1 (Excluding SAR testing)

FCC 47 Parts 22
(Non-Cellular), 73,74,90,95 & 97

TCB Scope B2 (Excluding SAR testing)

FCC 47 Parts 80 & 87

TCB Scope B3 (Excluding SAR testing)

FCC 47 Parts 21, 74, 101

TCB Scope B4 (Excluding SAR testing)

Onsite Testing

EN61000-6-2

Generic Immunity Standard for Industrial Applications

EN61000-6-4

Generic Emissions Standard for Industrial Applications

What is measurement uncertainty?

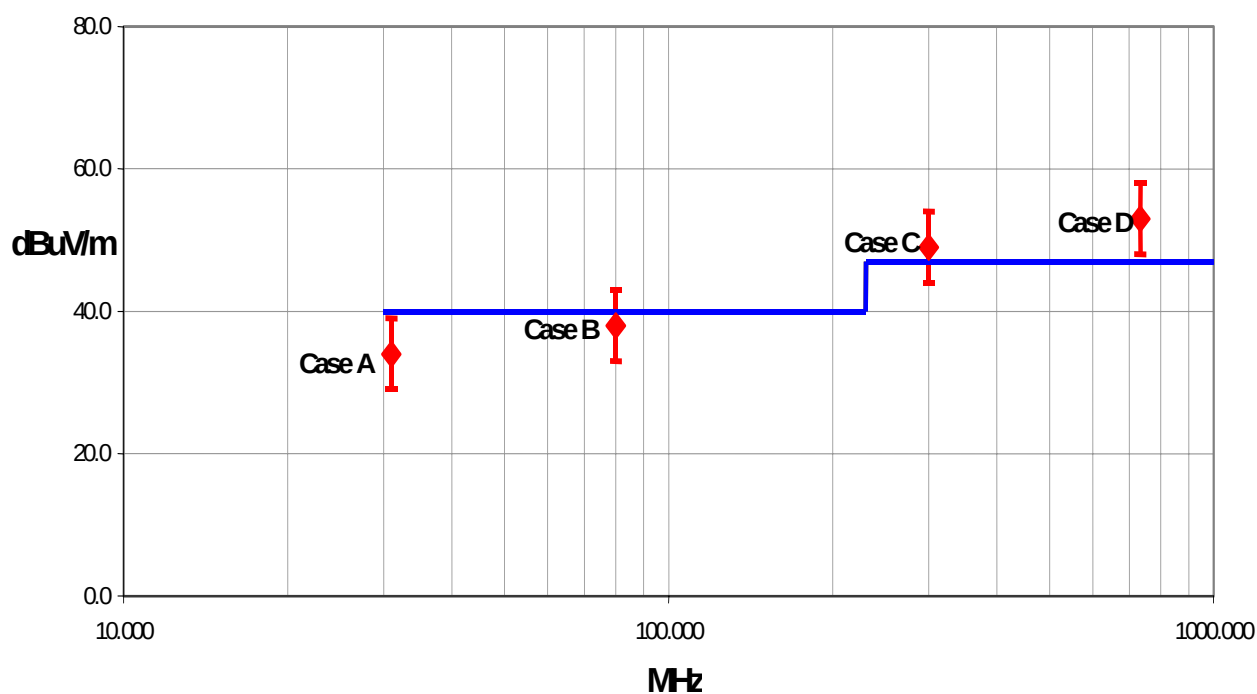
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- "ISO Guide to the Expression of Uncertainty in Measurements", October 1993
- "NIS81: The Treatment of Uncertainty in EMC Measurements", May 1994
- "IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques", December 2000

How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and – measurement uncertainty, then test results can be interpreted from the diagram below.



Test Result Scenarios:

Case A: Product complies.

Case B: Product conditionally complies. It is not possible to say with 95% confidence that the product complies.

Case C: Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.

Case D: Product does not comply.

Radiated Emissions ≤ 1 GHz

Value (dB)

Test Distance	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
		3m	10m	3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.86 - 1.88	+ 1.82 - 1.87	+ 2.23 - 1.41	+ 1.29 - 1.26	+ 1.31 - 1.27	+ 1.25 - 1.25
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k=2)	+ 3.72 - 3.77	+ 3.64 - 3.73	+ 4.46 - 2.81	+ 2.59 - 2.52	+ 2.61 - 2.55	+ 2.49 - 2.49

Radiated Emissions > 1 GHz

Value (dB)

Test Distance	Probability Distribution	Without High Pass Filter		With High Pass Filter	
		3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.38 - 1.35	+ 1.29 - 1.25	+ 1.38 - 1.35
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k=2)	+ 2.57 - 2.51	+ 2.76 - 2.70	+ 2.57 - 2.51	+ 2.76 - 2.70

Conducted Emissions

Test Distance	Probability Distribution	Value (+/- dB)	
		3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.48 - 1.48	+ 1.48 - 1.48
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	+ 2.97 - 2.97	+ 2.97 - 2.97

Radiated Immunity

Test Distance	Probability Distribution	Value (+/- dB)	
		3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.05 - 1.05	+ 1.05 - 1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	+ 2.11 - 2.11	+ 2.11 - 2.11

Conducted Immunity

Test Distance	Probability Distribution	Value (+/- dB)	
		3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.05 - 1.05	+ 1.05 - 1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	+ 2.10 - 2.10	+ 2.10 - 2.10

Legend

$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties

U = combined standard uncertainty multiplied by the coverage factor: k . This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then $k=3$ (CL of 99.7%) can be used. Please note that with a coverage factor of one, $u_c(y)$ yields a confidence level of only 68%.

**California****Orange County Facility**

41 Tesla Ave.
Irvine, CA 92618
(888) 364-2378
FAX (503) 844-3826

**Oregon****Evergreen Facility**

22975 NW Evergreen Pkwy.,
Suite 400
Hillsboro, OR 97124
(503) 844-4066
FAX (503) 844-3826

**Oregon****Trails End Facility**

30475 NE Trails End Lane
Newberg, OR 97132
(503) 844-4066
FAX (503) 537-0735

**South Dakota****North Sioux City Facility**

745 N. Derby Lane
P.O. Box 217
North Sioux City, SD 57049
(605) 232-5267
FAX (605) 232-3873

**Washington****Sultan Facility**

14128 339th Ave. SE
Sultan, WA 98294
(888) 364-2378
FAX (360) 793-2536

Party Requesting the Test

Company Name:	Nike
Address:	1 Bowerman Drive, Mia Hamm Building, Floor 2
City, State, Zip:	Beaverton, OR, 97005
Test Requested By:	Charlie Case
Model:	SMA011 Digital Heart Rate Monitor
First Date of Test:	07-21-2003
Last Date of Test:	07-21-2003
Receipt Date of Samples:	07-21-2003
Equipment Design Stage:	Pre-Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	32kHz crystal
I/O Ports:	No I/O Ports

Functional Description of the EUT (Equipment Under Test):

EUT is part of a sport system used for monitoring an athlete's heart rate during exercise. Heart rate data is transmitted from the EUT to a watch about 1 meter away.

Client Justification for EUT Selection:

Random sample provided by National from pre-production units.

Client Justification for Test Selection

Full FCC and IC testing to be able to legally ship products in the US and Canada

Internal Components and Subassemblies

Description	Manufacturer	Model / Part Number	Serial Number
Microprocessor	Texas Instruments	MSP430F1101	N/A

Equipment modifications				
Item #	Test	Date	Modification	Note
1	Field Strength of Fundamental	07-21-2003	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.
2	Field Strength of Spurious Emissions	07-21-2003	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Single channel

Operating Modes Investigated:

Typical

Antennas Investigated:

Integral

Data Rates Investigated:

Typical

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

Battery

Software\Firmware Applied During Test

Exercise software	Heart Rate Monitor Firmware	Version	Unknown
Description			
The system was tested using standard operating production firmware to exercise the functions of the device during the testing.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
SMA011 Digital Heart Rate Monitor	National Electronics and Watch	SMA011	Non-serialized

Remote equipment

Description	Manufacturer	Model/Part Number	Serial Number
Function Generator	Hewlett-Packard	33120A	TEA

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Control Leads	No	0.5	No	SMA011 Digital Heart Rate Monitor	BNC
Control Lead	No	0.5	No	SMA011 Digital Heart Rate Monitor	BNC
BNC	Yes	1.5	No	Control Leads	Function Generator

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Spectrum Analyzer Display	Hewlett Packard	85662A	AALD	01/07/2003	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo

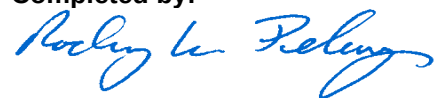
Test Description

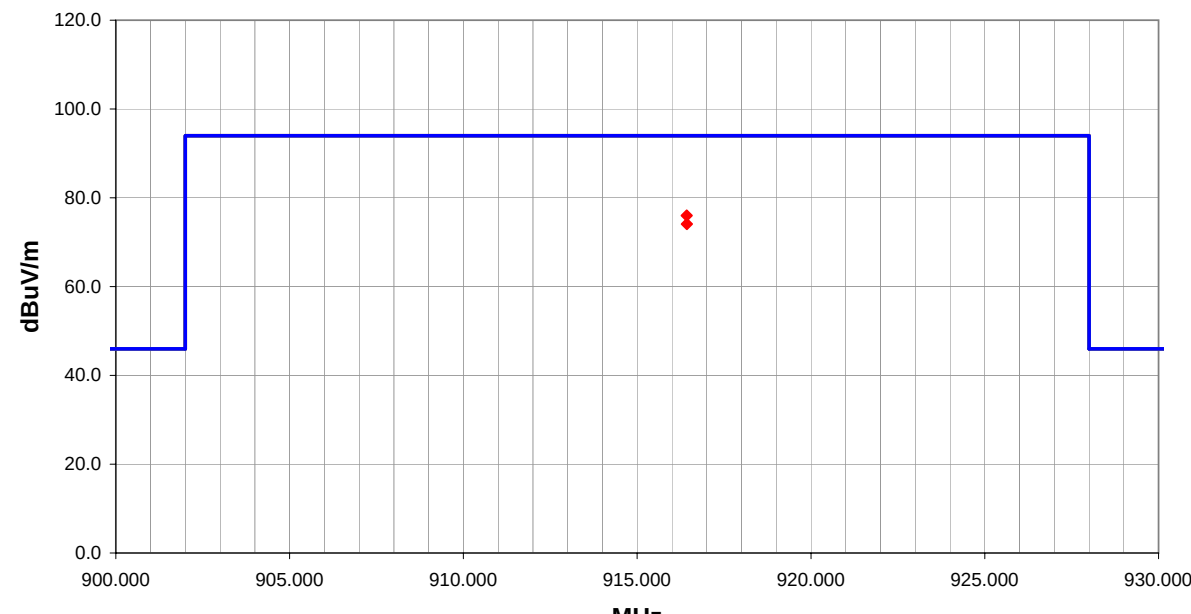
Requirement: The field strength of the fundamental emission shall comply with the limits, as defined in 47 CFR 15.249. Field strength limits are specified at a distance of 3 meters.

Configuration: The antenna to be used with the EUT was tested. The EUT was transmitting while set at the single channel available. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.4:1992).

The square wave output of a function generator was used to simulate a 2 Hz heart beat.

Completed by:



NORTHWEST EMC										OATS DATA SHEET				REV d13.11 06/23/2003	
EUT: SMA011 Digital Heart Rate Monitor										Work Order: NIKE0006					
Serial Number: N/A										Date: 07/21/03					
Customer: Nike										Temperature: 73					
Attendees: Charlie Case										Humidity: 37%					
Cust. Ref. No.:										Barometric Pressure: 29.98					
Tested by: Rod Peloquin					Power: Battery					Job Site: EV01					
TEST SPECIFICATIONS															
Specification: FCC Part 15.249										Year: 2001					
Method: ANSI C63.4										Year: 1992					
SAMPLE CALCULATIONS															
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation															
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator															
COMMENTS															
Function generator used at 2Hz to simulate heart beat.															
EUT OPERATING MODES															
Transmitting with modulation at 916.5MHz.															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
RESULTS												Run #			
Pass												2			
Other															
										 Tested By:					
															
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)			
916.424	49.5	26.5	192.0	1.5	3.0	0.0	H-Bilog	PK	0.0	76.0	94.0	-18.0			
916.428	47.6	26.5	242.0	2.6	3.0	0.0	V-Bilog	PK	0.0	74.1	94.0	-19.9			

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Single channel

Operating Modes Investigated:

Typical

Antennas Investigated:

Integral

Data Rates Investigated:

Typical

Output Power Setting(s) Investigated:

Maximum

Power Input Settings Investigated:

Battery

Frequency Range Investigated

Start Frequency	30 MHz	Stop Frequency	10 GHz
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Software\Firmware Applied During Test

Exercise software	Heart Rate Monitor Firmware	Version	Unknown
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Description

The system was tested using standard operating production firmware to exercise the functions of the device during the testing.
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EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
SMA011 Digital Heart Rate Monitor	National Electronics and Watch	SMA011	Non-serialized

Remote equipment

Description	Manufacturer	Model/Part Number	Serial Number
Function Generator	Hewlett-Packard	33120A	TEA

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Control Leads	No	0.5	No	SMA011 Digital Heart Rate Monitor	BNC
Control Lead	No	0.5	No	SMA011 Digital Heart Rate Monitor	BNC
BNC	Yes	1.5	No	Control Leads	Function Generator

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	01/07/2003	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	01/06/2003	12 mo
Antenna, Horn	EMCO	3115	AHC	08/12/2002	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/06/2003	12 mo

Test Description

Requirement: The field strength of harmonics and spurious radiated emissions shall comply with the limits as defined in 47 CFR 15.249. Field strength limits are specified at a distance of 3 meters. Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Sec. 15.209, whichever is the lesser attenuation. As shown in Sec. 15.35(b), for frequencies above 1000 MHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified in Sec. 15.249 by more than 20 dB under any condition of modulation.

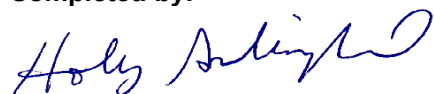
Configuration: The antenna to be used with the EUT was tested. The EUT was transmitting and receiving while set at it single channel. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

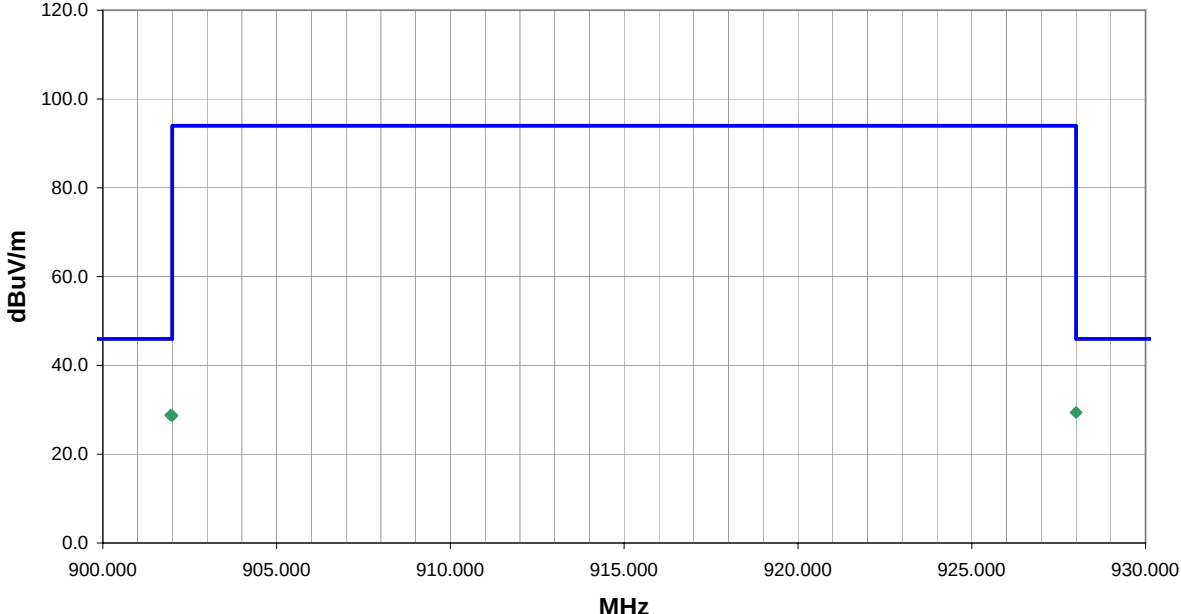
The square wave output of a function generator was used to simulate a 2 Hz heart beat.

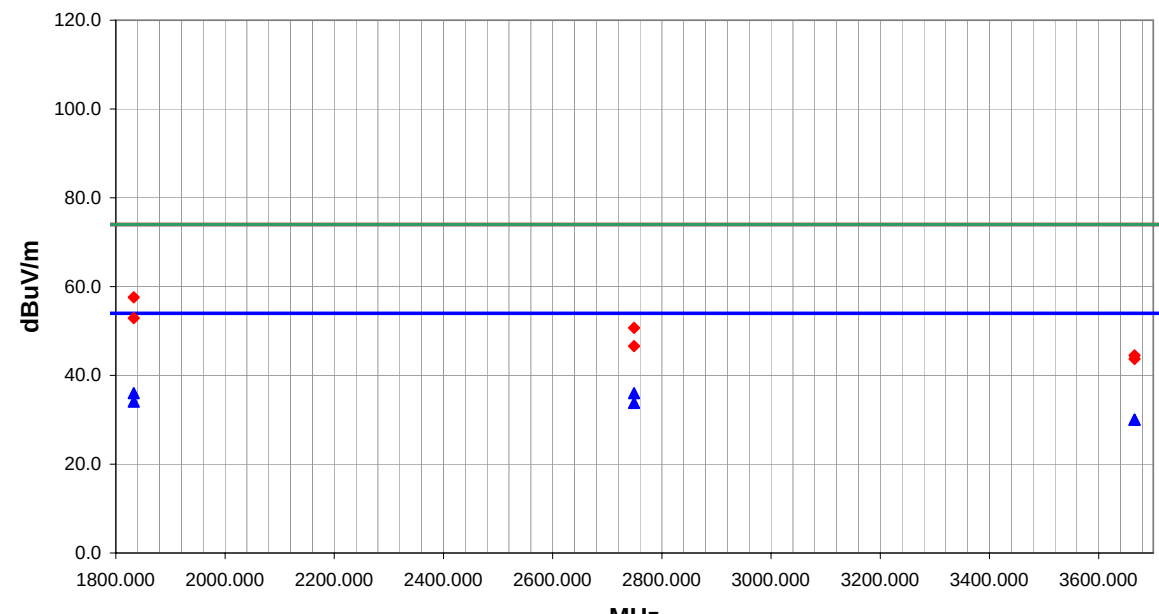
Bandwidths Used for Measurements

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 – 0.15	1.0	0.2	0.2
0.15 – 30.0	10.0	9.0	9.0
30.0 – 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0
<i>Measurements were made using the bandwidths and detectors specified. No video filter was used.</i>			

Completed by:



NORTHWEST EMC										OATS DATA SHEET				REV d13.11 06/23/2003	
EUT: SMA011 Digital Heart Rate Monitor										Work Order: NIKE0006					
Serial Number: N/A										Date: 07/21/03					
Customer: Nike										Temperature: 73					
Attendees: Charlie Case										Humidity: 37%					
Cust. Ref. No.:										Barometric Pressure: 29.98					
Tested by: Rod Peloquin						Power: Battery		Job Site: EV01							
TEST SPECIFICATIONS															
Specification: FCC Part 15.249										Year: 2001					
Method: ANSI C63.4										Year: 1992					
SAMPLE CALCULATIONS															
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation															
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator															
COMMENTS															
Function generator used at 2Hz to simulate heart beat.															
EUT OPERATING MODES															
Transmitting with modulation at 916.5MHz.															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
RESULTS												Run #			
Pass												4			
Other															
										 Tested By:					
															
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)			
928.003	23.1	-3.7	303.0	1.0	3.0	10.0	H-Bilog	QP	0.0	29.4	46.0	-16.6			
928.004	23.1	-3.7	360.0	1.2	3.0	10.0	V-Bilog	QP	0.0	29.4	46.0	-16.6			
901.947	22.9	-4.1	89.0	1.2	3.0	10.0	V-Bilog	QP	0.0	28.8	46.0	-17.2			
901.997	22.8	-4.1	343.0	1.0	3.0	10.0	H-Bilog	QP	0.0	28.7	46.0	-17.3			

NORTHWEST EMC										OATS DATA SHEET				REV d13.11 06/23/2003	
EUT: SMA011 Digital Heart Rate Monitor										Work Order: NIKE0006					
Serial Number: N/A										Date: 07/21/03					
Customer: Nike										Temperature: 73					
Attendees: Charlie Case										Humidity: 37%					
Cust. Ref. No.:										Barometric Pressure: 29.98					
Tested by: Holly Ashkannejhad						Power: Battery		Job Site: EV01							
TEST SPECIFICATIONS															
Specification: FCC Part 15.249										Year: 2001					
Method: ANSI C63.4										Year: 1992					
SAMPLE CALCULATIONS															
Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation															
Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator															
COMMENTS															
Function generator used at 2Hz to simulate heart beat.															
EUT OPERATING MODES															
Transmitting with modulation at 916.5MHz.															
DEVIATIONS FROM TEST STANDARD															
No deviations.															
RESULTS												Run #			
Pass												6			
Other															
										 Tested By:					
															
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)			
1832.862	38.6	-2.6	172.0	1.4	3.0	0.0	H-Horn	AV	0.0	36.0	54.0	-18.0			
2749.250	34.2	1.8	254.0	1.4	3.0	0.0	H-Horn	AV	0.0	36.0	54.0	-18.0			
1832.862	36.7	-2.6	284.0	1.2	3.0	0.0	V-Horn	AV	0.0	34.1	54.0	-19.9			
2749.250	32.0	1.8	137.0	2.0	3.0	0.0	V-Horn	AV	0.0	33.8	54.0	-20.2			
3665.700	26.2	3.8	331.0	1.0	3.0	0.0	V-Horn	AV	0.0	30.0	54.0	-24.0			
3665.700	26.2	3.8	102.0	2.1	3.0	0.0	H-Horn	AV	0.0	30.0	54.0	-24.0			
1832.862	60.2	-2.6	172.0	1.4	3.0	0.0	H-Horn	PK	0.0	57.6	74.0	-16.4			
1832.862	55.5	-2.6	284.0	1.2	3.0	0.0	V-Horn	PK	0.0	52.9	74.0	-21.1			
2749.250	48.9	1.8	254.0	1.4	3.0	0.0	H-Horn	PK	0.0	50.7	74.0	-23.3			
2749.250	44.8	1.8	137.0	2.0	3.0	0.0	V-Horn	PK	0.0	46.6	74.0	-27.4			
3665.700	40.7	3.8	102.0	2.1	3.0	0.0	H-Horn	PK	0.0	44.5	74.0	-29.5			
3665.700	39.9	3.8	331.0	1.0	3.0	0.0	V-Horn	PK	0.0	43.7	74.0	-30.3			