

TEST RESULT SUMMARY

FCC PART 15 SUBPART C Section 15.247 Radiated Emissions in Restricted Bands

MANUFACTURER'S NAME	Monarch Marking Systems, Inc, dba Paxar Corporation
NAME OF EQUIPMENT	Sierra Sport2 Thermal Barcode Printer with Symbol MOM Radio Card
MODEL NUMBER	M09460IP w/Symbol #LA-4137 Spread Spectrum Transmitter (FCC ID: H9PCC4137)
MANUFACTURER'S ADDRESS	170 Monarch Lane Miamisburg, OH 45342
TEST REPORT NUMBER	NC202942.2
TEST DATE	26 June 2002

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

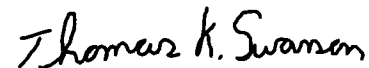
TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15.

Date: 31 July 2002

Location: Taylors Falls MN
USA



R M Johnson
Test Technician



T. K. Swanson
Test Technician

Not Transferable

EMC EMISSION - TEST REPORT

Test Report File No. : **NC202942.2** Date of issue: 31 July 2002Model / Serial No. : **M09460IP w/Symbol #LA-4137 (FCC ID: H9PCC4137)**Product Type : Sierra Sport2 Thermal Barcode Printer with Symbol MOM Radio CardApplicant : Monarch Marking Systems, Inc, dba Paxar CorporationManufacturer : Monarch Marking Systems, Inc, dba Paxar CorporationLicense holder : Monarch Marking Systems, Inc, dba Paxar CorporationAddress : 170 Monarch Lane: Miamisburg, OH 45342Test Result : **Positive** **Negative**Test Project Number :
Reference(s) : **NC202942.2**Total pages including
Appendices : 23

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- | | | |
|---|---|------------------------------------|
| <input type="checkbox"/> - EN 50081-1 / 1991 | <input type="checkbox"/> - Group 1 | <input type="checkbox"/> - Group 2 |
| <input type="checkbox"/> - EN 55011 / 1998
w/Amendment A1:1999 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - EN 55013 / 1990 | <input type="checkbox"/> - Household appliances and similar | |
| <input type="checkbox"/> - EN 55014 / 1987 | <input type="checkbox"/> - Portable tools | |
| | <input type="checkbox"/> - Semiconductor devices | |
| <input type="checkbox"/> - EN 55014 / A2:1990 | <input type="checkbox"/> - Household appliances and similar | |
| <input type="checkbox"/> - EN 55014 / 1993 | <input type="checkbox"/> - Portable tools | |
| | <input type="checkbox"/> - Semiconductor devices | |
| <input type="checkbox"/> - EN 55015 / 1987 | | |
| <input type="checkbox"/> - EN 55015 / A1:1990 | | |
| <input type="checkbox"/> - EN 55015 / 1993 | | |
| <input type="checkbox"/> - EN 55022 / 1987 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - EN 55022 / 1998 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - BS | | |
| <input type="checkbox"/> - VCCI | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input checked="" type="checkbox"/> - FCC Part 15 Subpart C Section 15.247(c) | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - AS 3548 (1995) | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - CISPR 11 (1990) | <input type="checkbox"/> - Group 1 | <input type="checkbox"/> - Group 2 |
| | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - CISPR 22 (1993) | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |

Environmental conditions in the lab:

	<u>Actual</u>
Temperature	: 23 °C
Relative Humidity	: 67 %
Atmospheric pressure	: 98.8 kPa
Power supply system	: 60 Hz –115 VAC – 1 Phase

Sign Explanations:

- not applicable
- applicable

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-25000 MHz, were tested in a horizontal and vertical polarization at the following test location:

- Test not applicable

- - Wild River Lab Large Test Site (Open Area Test Site) – NSA measurements made 7-01, due 7-03.
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)

at a test distance of :

- - 3 meters
- 10 meters
- 30 meters

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	9-24-02
■ -	2075	3115	Electro-Metrics	Ridge Guide Ant 1-18 GHz	9001-3275	10-21-02
■ -	2005	3116	Electro-Metrics	Horn Ant 18-40 GHz	6717	2-11-03
■ -	2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	9-12-02
■ -	2477	AFT-8434	Avantek	Preamplifier 4-8 GHz	9112 Z221	3-18-03
■ -	2478	AWT-18037	Avantek	Preamplifier 8-18 GHz	1001-9226	3-18-03
■ -	2127	11975A	Hewlett-Packard	Amplifier	2738A01200	1-24-03
■ -	2690	8566B	Hewlett-Packard	Spectrum Analyzer (Unit F)	2430A00930	11-19-02
■ -	2678	85662A	Hewlett-Packard	Analyzer Display (Unit F)	2403A08134	11-19-02
■ -	2684	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit F)	2521A01006	11-19-02
■ -	2662	11970K	Hewlett-Packard	Ext. Mixer 18-26.5 GHz	2332A01170	1-17-03

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

- Standby
- Test program (H - Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal Operating Mode
- Spurious radiated emissions measured in restricted bands with signal transmitting at 2400, 2441 and 2483 MHz using software.

Configuration of the device under test:

- See Constructional Data Form in Appendix B - Page B2
- See Product Information Form in Appendix B - beginning on Page B3

The following peripheral devices and interface cables were connected during the measurement:

- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- unshielded power cable
- unshielded cables
- shielded cables MPS.No.: _____
- customer specific cables
- _____
- _____

Emission Test Results:

Conducted emissions 10/150 kHz - 30 MHz

The requirements are - MET - NOT MET
 Minimum margin of compliance _____ dB at _____ kHz
 Maximum margin of non-compliance _____ dB at _____ MHz
 Remarks: _____

Conducted common mode disturbance at telecommunication ports – 150 kHz to 30 MHz

The requirements are - MET - NOT MET
 Minimum margin of compliance _____ dB at _____ MHz
 Maximum margin of non-compliance _____ dB at _____ MHz
 Remarks: _____

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are - MET - NOT MET
 Minimum margin of compliance >10 dB at _____ MHz
 Maximum margin of non-compliance _____ dB at _____ MHz
 Remarks: No emissions detected within 10 dB of the limit.

Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are - MET - NOT MET
 Minimum limit margin _____ dB at _____ MHz
 Maximum limit exceeding _____ dB at _____ MHz
 Remarks: _____

Equivalent Radiated emissions 1 GHz - 18 GHz

The requirements are - MET - NOT MET
 Minimum limit margin 6 dB at 4881.98 MHz
 Maximum limit exceeding _____ dB at _____ MHz
 Remarks: _____

DEVIATIONS FROM STANDARD:

None

GENERAL REMARKS:

SUMMARY:

The requirements according to the technical regulations are

- met
- not met.

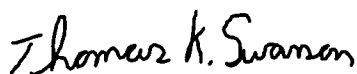
The device under test does

- fulfill the general approval requirements mentioned on page 3.
- not fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 26 June 2002

Testing End Date: 26 June 2002

- TÜV PRODUCT SERVICE INC -



T. K. Swanson
Test Technician

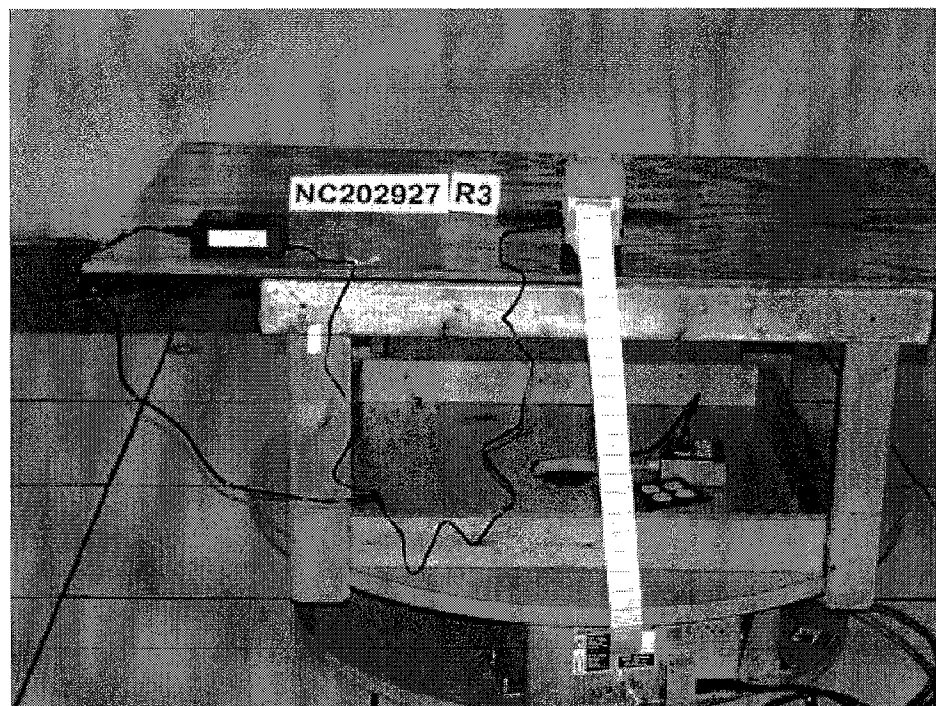


Tested By:
G. S. Jakubowski

Test-setup photo(s):
Conducted emission 10/150 kHz - 30 MHz

Not Applicable

Test-setup photo(s):
Radiated emission 30 MHz - 25000 MHz



Appendix A

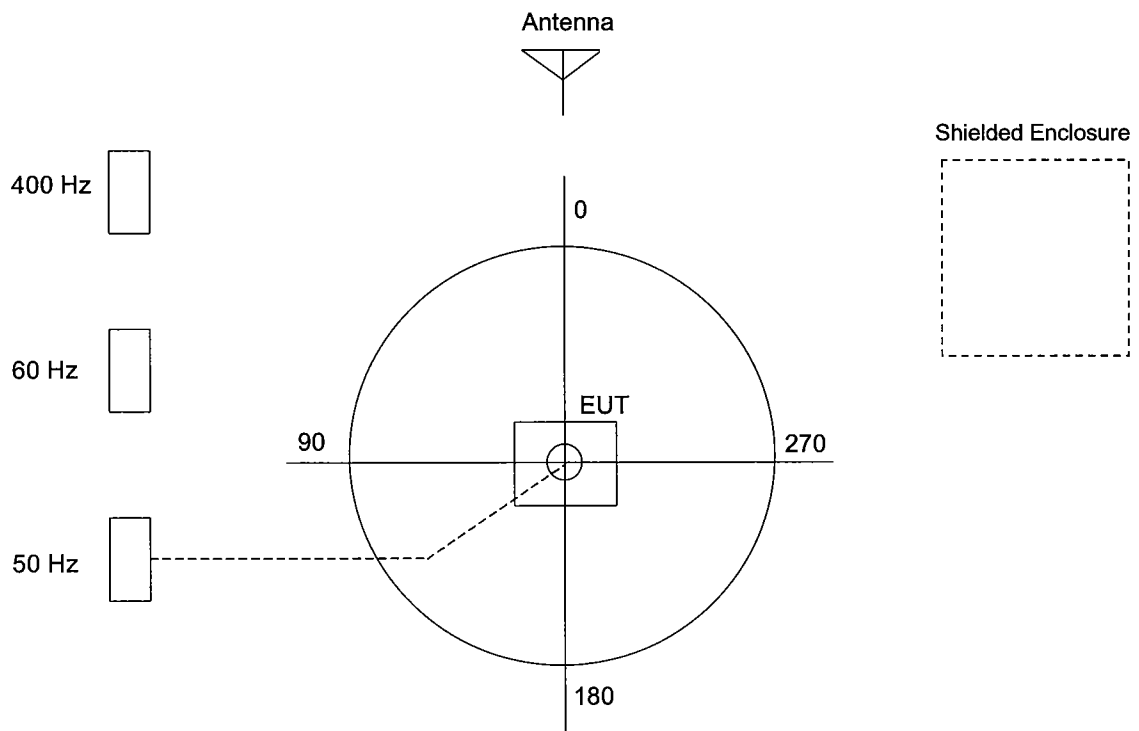
Test Data Sheets
and
Test Setup Drawing(s)

TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Large Test Site

Notes:

1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.
2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.
3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.
4. The circle is a 6.7 meter diameter turntable.
5. A ground plane is in the plane of this sheet.
6. The test sample is shown in the azimuthal position representing zero degrees.



Radiated Electromagnetic Emissions



Test Report #: 2942 Run 02 Test Area: LTS 3m
 Test Method: FCC Part 15 Test Date: 26-Jun-2002
 EUT Model #: M09460IP EUT Power: 50HZ/230VAC
 EUT Serial #: _____ Temperature: 23 °C
 Manufacturer: MONARCH MARKING Relative Humidity: 67 %
 EUT Description: Portable Lable Printer Air Pressure: 98.8 kPa
 Notes: TRANSMITTING Page: 1 of 2

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (> 1GHz)	DELTA2 N/A
Fundamental measured for information only						
Maximized						
2440.99	68.5 Av	7.1 / 30.6 / 0.0	106.2	H / 1.5 / 169.0	52.2 *	N/A
Maximized 2nd harmonics at low, mid, and high frequency settings						
4881.98	43.7 Av	10.3 / 34.8 / 41.1	47.7	H / 1.0 / 159.0	-6.3	N/A
4799.99	36.8 Av	10.1 / 34.6 / 41.3	40.2	H / 1.2 / 323.0	-13.8	N/A
4965.98	38.1 Av	10.6 / 35.0 / 40.9	42.7	H / 1.1 / 171.0	-11.3	N/A
Fundamental Conducted measurements (includes .5dB for cable loss)						
RBW = 1Mhz, VBW = 10Hz						
2.400 GHz = 5.4 dBm						
2.441 GHz = 8.5 dBm						
2.483 GHz = 6.6 dBm						

Tested by: G Jakubowski

Printed

Signature

Reviewed by: JTS

Printed

Signature

Radiated Electromagnetic Emissions



Test Report #:	2942 Run 02	Test Area:	LTS 3m		
Test Method:	FCC Part 15	Test Date:	26-Jun-2002		
EUT Model #:	M09460IP	EUT Power:	50HZ/230VAC	Temperature:	23 °C
EUT Serial #:				Relative Humidity:	67 %
Manufacturer:	MONARCH MARKING			Air Pressure:	98.8 kPa
EUT Description:	Portable Lable Printer			Page:	2 of 2
Notes:	TRANSMITTING				

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (> 1GHz)	DELTA2 N/A
---------------	-----------------	--	-------------------	-----------------------------	--------------------------	---------------

***** MEASUREMENT SUMMARY *****						
4881.98	43.7 Av	10.3 / 34.8 / 41.1	47.7	H / 1.0 / 159.0	-6.3	N/A
4965.98	38.1 Av	10.6 / 35.0 / 40.9	42.7	H / 1.1 / 171.0	-11.3	N/A
4799.99	36.8 Av	10.1 / 34.6 / 41.3	40.2	H / 1.2 / 323.0	-13.8	N/A

Tested by: G Jakubowski

Printed

Signature

Reviewed by: JTS

Printed

Signature

Appendix B

Constructional Data Form(s)

and/or

Product Information Form(s)

EMC Test Plan and Constructional Data Form



PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE.
Applicant -- NOTE: This information will be input into your test report as shown below.
Press the F1 key at any time to get HELP for the current field selected.

Company: Monarch Marking Systems, Inc, dba Paxar Corporation
 Address: 170 Monarch Lane
Miamisburg, OH 45342
 Contact: Jim Bacher Position: Senior Engineer
 Phone: 937-865-2020 Fax: 937-865-2048
 E-mail Address: jim.bacher@paxar.com

General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description Thermal Barcode Printer
 EUT Name Sierra Sport2
 Model No.: M09460IP Serial No.: _____
 Product Options: 802.11b LAN Radio Symbol # LA-4137, FCC id H9PCC4137
 Configurations to be tested: Above

Test Objective

- | | |
|--|---|
| <input checked="" type="checkbox"/> EMC Directive 89/336/EEC (EMC)
Std: _____
<input type="checkbox"/> Machinery Directive 89/392/EEC (EMC)
Std: _____
<input type="checkbox"/> Medical Device Directive 93/42/EEC (EMC)
Std: _____
<input type="checkbox"/> Vehicle Directive 72/245/EEC (EMC)
Std: _____
<input type="checkbox"/> FDA Reviewers Guidance for Premarket
Notification Submissions (EMC) | <input checked="" type="checkbox"/> FCC: Class <input checked="" type="checkbox"/> A <input type="checkbox"/> B Part _____
<input checked="" type="checkbox"/> VCCI: Class <input checked="" type="checkbox"/> A <input type="checkbox"/> B
<input type="checkbox"/> BSMI: Class <input type="checkbox"/> A <input type="checkbox"/> B
<input checked="" type="checkbox"/> Canada: Class <input checked="" type="checkbox"/> A <input type="checkbox"/> B
<input type="checkbox"/> Australia: Class <input type="checkbox"/> A <input type="checkbox"/> B
<input checked="" type="checkbox"/> Other: <u>France, Germany, Spain, Uk, Japan, Hong Kong</u> |
|--|---|

TÜV Product Service Certification Requested

- | | |
|--|--|
| <input type="checkbox"/> Attestation of Conformity (AoC)
<input checked="" type="checkbox"/> Certificate of Conformity (CoC)
Protection Class (N/A for vehicles) | <input checked="" type="checkbox"/> EMC Certification (used with Octagon Mark)
<input checked="" type="checkbox"/> Compliance Document
<input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III |
|--|--|
- (Press F1 when field is selected to show additional information on Protection Class.)

Form



EMC Test Plan and Constructional Data Form

Attendance

Test will be: Attended by the customer Unattended by the customer

Failure - Complete this section if testing will not be attended by the customer.

If a failure occurs, TUV Product Service should:

- Call contact listed above, if not available then stop testing. (After hrs phone): 937-367-5107 (cell)
- Continue testing to complete test series.
- Continue testing to define corrective action.
- Stop testing.

EUT Specifications and Requirements

Length: _____ Width: _____ Height: _____ Weight: _____

Power Requirements

Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)

Voltage: 7.4VDC (If battery powered, make sure battery life is sufficient to complete testing.)

of Phases: _____

Current (Amps/phase(max)): _____ Current (Amps/phase(nominal)): _____

Other _____

Other Special Requirements

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Retail and warehouses

EUT Power Cable

Permanent OR Removable Length (in meters): _____
 Shielded OR Unshielded
 Not Applicable

Form

EMC Test Plan and Constructional Data Form



EUT Interface Ports and Cables												
Interface				Shielding								
Type	Analog	Digital	Qty	Yes	No	Type	Termination	Connector Type	Port Termination	Length (in meters)	Removable	Permanent
EXAMPLE: RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
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	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	<input type="checkbox"/>

Form

EMC Test Plan and Constructional Data Form



EUT Software.

Revision Level: Firmware Rev 1.11.0.0.3

Description: Print engine firmware controls printing functions.

Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test. It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Printer will print a line of 'H's every 2.5s approximately.
2. The access point will ping the radio transmitter, variably set from 10ms to 1000ms.
- 3.

Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc.)

Description	Model #	Serial #	FCC ID #
Printer	M09460IP		
Symbol MOM Radio Card	LA-4137		H9PCC4137
AC Power Adapter	M09463		

Form

EMC Test Plan and Constructional Data Form



Support Equipment -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)			
<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>
802.11b Access Point			
Gateway Portable PC			

Oscillator Frequencies			
<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
4.194MHz	18.350MHz	X1 on 119810 assembly	Crystal for Print Engine Processor

Power Supply			
<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
Martek Power	PES-40-10A-1		<input checked="" type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

Power Line Filters		
<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>
Built into OEM power supply		

Form

EMC Test Plan and Constructional Data Form



Critical EMI Components (Capacitors, ferrites, etc.)

<i>Description</i>	<i>Manufacturer</i>	<i>Part # or Value</i>	<i>Qty</i>	<i>Component # / Location</i>
Bypass capacitors and best practice on board layout				

EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

Authorization Signatures

Customer authorization to perform tests according to this test plan.

Date

Test Plan/CDF Prepared By (please print)

Date

Reviewed by TÜV Product Service Associate

Date

Appendix C

MEASUREMENT PROTOCOL

GENERAL INFORMATION

Test Methodology

Radiated emission testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1993), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1993). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-1992 procedures and using the CISPR 22 Limits.

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ± 4.5 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it's characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the CISPR limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

RADIATED EMISSIONS

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ V), adding the antenna correction factor and cable loss factor (Factor dB) to it, then subtracting the preamp gain. This result then has the CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment A.

Example:

FREQ (MHz)	LEVEL (dB μ V)	CABLE/ANT/PREAMP (dB)	FINAL (dB μ V/m)	POL/HGT/AZ (m) (deg)	DELTA1 EN 55022 A
60.80	42.5Qp	+ 1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 1000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.