

TEST RESULT SUMMARY

FCC PART 15 SUBPART C

Section 15.209 & 15.207

MANUFACTURER'S NAME	Eastman Kodak
NAME OF EQUIPMENT	8700 RFID Tag Rollback Upgrade Kit (intentional radiator) in DryView 8700 Laser Imager (Medical Film Printer)
MODEL NUMBER	M8700
MANUFACTURER'S ADDRESS	1 Imation Way Oakdale MN 55128
TEST REPORT NUMBER	W0667.1
TEST DATE	18 December 2000

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.

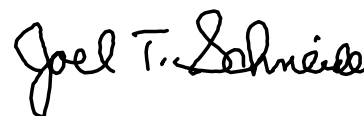
It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production 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: 13 February 2001



R. M. Johnson
Test Technician



J. T. Schneider
Chief Engineer

Location: Taylors Falls MN
USA

Not Transferable

EMC EMISSION - TEST REPORT

Test Report File No. : **WC1G066701.1** Date of issue: 13 February 2001Model / Serial No. : **M8700 /**Product Type : 8700 RFID Tag Rollback Upgrade Kit (intentional radiator) in
DryView 8700 Laser Imager (Medical Film Printer)Applicant : Eastman KodakManufacturer : Eastman KodakLicense holder : Eastman KodakAddress : 1 Imation Way: Oakdale MN 55128Test Result : **Positive** **Negative**Test Project Number :
Reference(s) : **W0667.1**Total pages including
Appendices : 21

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

D I R E C T O R Y - E M I S S I O N S

		Page(s)
A) Documentation		
	Test report	1 – 11
	Directory	2
	Test Regulations	3
	Deviation from standard / Summary	9
	Test-setups (Photos)	10 – 11

B) Test data		
	Conducted emissions 10/150 kHz - 30 MHz	5
	Radiated emissions 10 kHz - 30 MHz	6
	Radiated emissions 30 MHz - 1000 MHz	7

C) Appendix A		
	Constructional Data Form	A2 – A8
	Product Information Form(s)	N/A
D) Appendix B		
	Measurement Protocol	B1 – B2

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 / 1991 | <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 / 1994 | <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 15.209/15.207 | | |
| <input type="checkbox"/> - FCC Part 15 Subpart B | <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	: 14 %
Atmospheric pressure	: 99 kPa
Power supply system	: 60 Hz – 208 VAC – 1 Phase

Sign Explanations:

- not applicable
- applicable



CONDUCTED EMISSIONS (15.207)

Conducted emissions 450 kHz - 30 MHz

The requirements are - MET - NOT MET
 Minimum margin of compliance 13 dB at 25.0 MHz

The CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE) measurements were performed at the following test location:

- Wild River Lab Large Test Site (Open Area Test Site)

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Due
■ - ESHS-20	Rohde & Schwarz	EMI Receiver	837055/003	3-01
■ - 3825/2	Electro-Mechanics (EMCO)	50 Ω LISN	1329	4-01

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

CONDUCTED EMISSIONS ON M8700

TEST REPORT #W0667 DATE 18 DECEMBER 2000

MHz	dBuV NEUTRAL	dBuV LINE	spec limit FCC B	margin-dB FCC B
0.45				48
0.81	24	30		18
19.89	28	30		18
25	34	35		13
30				48

QUASI-PEAK, 60 HZ, 208 VAC, TESTED BY RMJ

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 450 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 μH (CISPR 16) characteristics. 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. The final measurement is taken off of the receiver, which has the LISN insertion loss, cable loss, and 10 dB attenuator factors stored in memory.

RADIATED EMISSIONS (15.209 - 10 kHz to 30 MHz)

Radiated emissions 10 kHz - 30 MHz

The requirements are

■ - MET

□ - NOT MET

Minimum limit margin for fundamental

37 dB

at

13.56 MHz

Minimum limit margin for harmonics/spurious

38 dB

at

23.37 MHz

With the exception of the reading at 1 MHz, no signals could be detected from the eut at a 3 meter antenna distance.

Measurements were made at 0.3 and 1 meters in order to establish the falloff rate of the measured signals, and this rate was used to extrapolate the measured values out to 30 or 300 meters, as appropriate.

The RADIATED EMISSIONS (10 KHZ TO 30 MHZ) measurements were performed at the following test location:

■ - Wild River Lab Large Test Site (Open Area Test Site)

at a test distance of :

- - .3 meters
- - 1 meters
- - 3 meters

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Due
■ - ESH-3	Rohde & Schwarz	EMI Receiver	892473/004	3-01
■ - HFH2-Z2	Polarad	Loop Antenna	879285/036	2-02

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

MHz	spec limit					spec limit		margin
	.3 meters	1 meter	3 meters	10 meters	30 meters	15.209	300 meters	
	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB
13.56	40	28	16*	4*	-8	29.54243		37.54243
23.37	39	27	15*	3*	-9	29.54243		38.54243
27.12	30*	18*	6*	-6	-18	29.54243		47.54243

QUASI-PEAK, EXCEPT AVERAGE IN 9-90, 110-490 KHZ RANGES.

In the frequency range of 10 kHz to 30 MHz, a shielded loop antenna is positioned with its plane vertical at 0.3 and 1 meters from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The loop antenna is also positioned horizontally. The center of the loop antenna is 1 meter above the ground plane. Since the measurements were well within the requirements, the unit was not remeasured off of the ground plane. Measurements between 9 kHz and 30 MHz are made with 9 kHz/6 dB bandwidth and quasi-peak detection with a receiver.

Emissions Test Conditions: RADIATED EMISSIONS (30-1000 MHz)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

- - Wild River Lab Large Test Site (Open Area Test Site) – NSA measurements made 7-00, due 7-01

at a test distance of :

- - 3 meters – no signals detected from the transmitter within 10 dB of the limit.

Test equipment used :

Model Number	Manufacturer	Description	Serial Number	Cal Due
■ - 8566B	Hewlett-Packard	Spectrum Analyzer	2430A00930	5-01
■ - 85662A	Hewlett-Packard	Analyzer Display	2152A03640	5-01
■ - 85650A	Hewlett-Packard	Quasi-Peak Adapter	2811A01127	5-01
■ - ZHL-1042J	Mini-Circuits	Preamplifier	H072294-11	3-01
■ - EM-6917B	Electro-Metrics	Biconicalog Periodic	101	9-01

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

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 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. The final level, expressed in dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ V) and adding the antenna correction factor and cable loss factor, and subtracting the preamplifier gain, to it.

Example:

FREQ (MHz)	LEVEL (dB μ V)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL (dB μ V/m)	POL/HGT/AZ (m) (deg)	DELTA1
79.06	40.7Qp +	1.9 + 6.6 - 28.3 =	20.9	V 1.0 0.0	-9.1

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
- Production release software rev. 1.26 – normal non-printing and printing.

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
- _____
- _____

DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

SUMMARY:

The requirements according to the technical regulations are

- met

- **not** met.

The device under test does

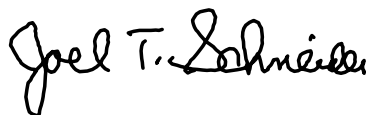
- fulfill the general approval requirements mentioned on page 3.

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

Testing Start Date: 16 December 2000

Testing End Date: 16 December 2000

- TÜV PRODUCT SERVICE INC -



J. T. Schneider
Chief Engineer



Tested By:
R. M. Johnson

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

See Test-Setup Exhibit



Test-setup photo(s):
Radiated emission 10 kHz - 1000 MHz

See Test-Setup Exhibit



Appendix A

Constructional Data Form



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: Eastman Kodak

Address: 1 Imation Way
Oakdale, MN 55128
Discovery 3B-61

Contact: Kevin Reller Position: Sr. EE

Phone: (651) 393 - 1423 Fax: (651) 393 - 1440

E-mail Address: kevin.reller@kodak.com

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

EUT Description Medical Film Printer

EUT Name DryView 8700 Laser Imager

Model No.: M8700 Serial No.: _____

Product Options: Video and Digital

Configurations to be tested: Video and Digital

Test Objective

- | | |
|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> EMC Directive 89/336/EEC (EMC)
Std: _____ | <input type="checkbox"/> FCC: Class <input type="checkbox"/> A <input checked="" type="checkbox"/> B Part <u>15</u> |
| <input type="checkbox"/> Machinery Directive 89/392/EEC (EMC)
Std: _____ | <input type="checkbox"/> VCCI: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| <input type="checkbox"/> Medical Device Directive 93/42/EEC (EMC)
Std: _____ | <input type="checkbox"/> BCIQ: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| <input type="checkbox"/> Vehicle Directive 72/245/EEC (EMC)
Std: _____ | <input type="checkbox"/> Canada: Class <input type="checkbox"/> A <input checked="" type="checkbox"/> B |
| <input type="checkbox"/> FDA Reviewers Guidance for Premarket
Notification Submissions (EMC) | <input type="checkbox"/> Australia: Class <input type="checkbox"/> A <input type="checkbox"/> B |
| | <input checked="" type="checkbox"/> Other: <u>R&TTE Directive</u> |

TÜV Product Service Certification Requested

- | | |
|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Attestation of Conformity (AoC) | <input type="checkbox"/> International EMC Mark (IEM) |
| <input type="checkbox"/> Certificate of Conformity (CoC) | <input type="checkbox"/> Compliance Document |
| Protection Class (N/A for vehicles) | <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.)

Attendance

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

EMC Test Plan and Constructional Data Form



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): _____
- Continue testing to complete test series.
- Continue testing to define corrective action.
- Stop testing.

EUT Specifications and Requirements

Length: 32.0 in Width: 26.0 in Height: 50.4 in Weight: 550

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: 200/220/240 (If battery powered, make sure battery life is sufficient to complete testing.)

of Phases: 1

Current (Amps/phase(max)): 9.4/8.5/7.8 A Current (Amps/phase(nominal)): 3-4 A

Other _____

Other Special Requirements

Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)
Hospital, Medical Clinic

EUT Power Cable

Permanent OR Removable Length (in meters): 2
 Shielded OR Unshielded
 Not Applicable

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"/>
Video	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Triax	Coaxial	BNC	50 Ohm	30	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Digital	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over Braid	Straight Pin	37 Pin D-Sub	50 Ohm	30	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Keypad	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over Braid	Straight Pin	26 pin D-Sub	50 Ohm	3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Network	<input type="checkbox"/>	<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil	Straight Pin	RJ 45	50 Ohm	3	<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"/>
	<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"/>

EMC Test Plan and Constructional Data Form



EUT Software.

Revision Level: 1.26

Description: Production Release

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. Normal non printing and printing

- 2.

- 3.

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 #
Keypad	8700 Keypad	VK8700762	

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>
Video generator			

Oscillator Frequencies			
<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
20 mhz		Dual Printer Board	Timing
10 mhz		Fiber Interface Board	"
3.6864 mhz		Host Interface Board	"
33.33 mhz		Image Processor Board	"
32.678 mhz		System Control Board	"
16 mhz		Trans Daughter Board	"

Power Supply			
<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
Condor	MSP 1327		<input checked="" type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____
C&D Technologies	PX400-U45_BNH-PLN		<input checked="" 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>
Corcom	10EBH1	Line Filter

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>
Ferrite	Steward	28B2024-0A0	3	Local Panel, Optics data, Optics Control Cables
Ferrite	FerriShield	TC28B1500	1	Module Interconnect Harn
Ferrite	FerriShield	FA28B2480	4	IPB/NMB, IPB/SCB, Optics Data, PDB/SCB Cables
Ferrite	FerriShield	SS28B2035 TC28B200	1 2	DC Power Cable Video Input Cable

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

Ground strap

(PLEASE INSERT "ELECTRONIC SIGNATURE" BELOW IF POSSIBLE)

Authorization Signatures

Kevin Reller

Customer authorization to perform tests according to this test plan.

Date

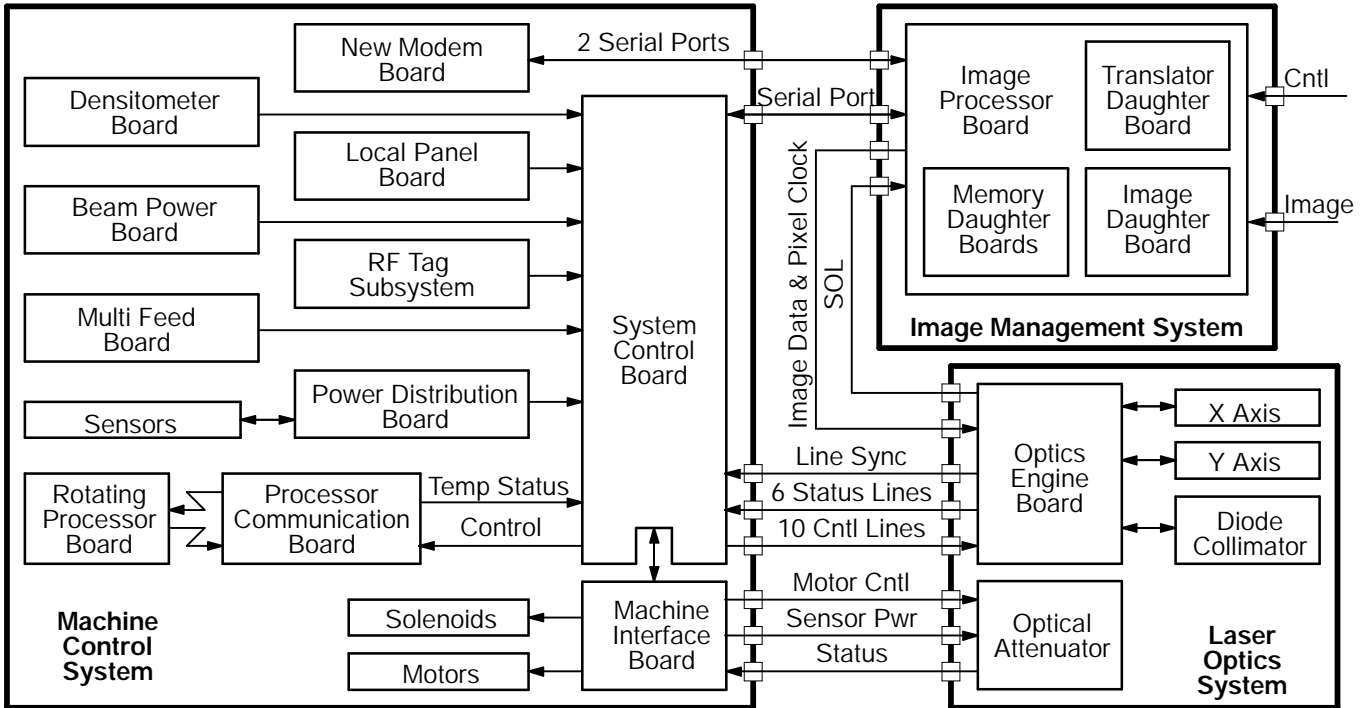
Test Plan/CDF Prepared By (please print)

Date

Kevin Reller

Reviewed by TÜV Product Service Associate

Date



Appendix B

MEASUREMENT PROTOCOL FOR FCC

GENERAL INFORMATION

Test Methodology

Conducted and 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 its 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 $\text{dB}\mu\text{V}$, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC limit.

To convert between $\text{dB}\mu\text{V}$ and μV , 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 $\text{dB}\mu\text{V}/\text{m}$, is arrived at by taking the reading from the spectrum analyzer (Level $\text{dB}\mu\text{V}$) and adding the antenna correction factor and cable loss factor, and subtracting the preamplifier gain, to it. This result then has the duty cycle correction factor subtracted from it to provide the final average reading.

Example:

FREQ (MHz)	LEVEL ($\text{dB}\mu\text{V}$)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL ($\text{dB}\mu\text{V}/\text{m}$)	POL/HGT/AZ (m) (deg)	DELTA1
79.06	40.7Qp +	1.9 + 6.6 - 28.3 =	20.9	V 1.0 0.0	-9.1

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 60 Hz power interface of the EUT are measured in the frequency range of 450 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 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. Intentional radiators are rotated through three orthogonal axes to determine the attitude that maximizes the emissions.

In the frequency range of 10 kHz to 30 MHz, a shielded loop antenna is positioned with its plane vertical at 0.3 and 1 meters from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The loop antenna is also positioned horizontally. The center of the loop antenna is 1 meter above the ground plane. Since the measurements were well within the requirements, the unit was not remeasured off of the ground plane. Measurements between 9 kHz and 30 MHz are made with 9 kHz/6 dB bandwidth and quasi-peak detection with a receiver.