

TÜV OHTAMA CO., LTD.

1661,OHSHUKU, ASHIGAWA-MURA, HIGASHI-YATSUSHIRO-GUN
YAMANASHI-KEN 409-3704 JAPAN
TEL: 81-55-298-2141 FAX: 81-55-298-2125 (Rev.No.0003)

ENGINEERING TEST REPORT

FCC PART 15 SUBPART C

APPLICANT : Yokogawa Electric corporation
REGULATION : FCC Paragraph 15.209
MEASURING DISTANCE : 3 m
MEASUREMENT PROCEDURE : ANSI C63.4-1992

EQUIPMENT : ID Tag Transceiver
TRADE NAME : YOKOGAWA
MODEL NUMBER : M3049BA
FCC ID CODE : *****
SERIAL NUMBER : 0250050
CONDITION OF EUT : GOOD
DATE OF RECEIPT : May 11, 2004
COMPANY NAME : Yokogawa Electric corporation
ADDRESS : 2-9-32 Naka-cho 2-chome ,Musashino-shi,Tokyo, 180-8750 Japan
DATE OF TEST : May 11,2004
REPORT No. : OTMAJ No.2389
TEST SITE : YAMANASHI EMC OPEN FIELD No1 TEST SITE
LOCATION : No.1661,OHSHUKU,ASHIGAWA-MURA,HIGASHI-
YATSUSHIRO-GUN YAMANASHI-KEN 409-3704 JAPAN
FCC FILE NUMBER : 31040-SIT 1300B3
NVLAP LAB CODE : 200175-0

Measurement Results: Positive

TÜV OHTAMA CO.,LTD



HIDEMASA FUJIMOTO
QUALITY MANAGER

DATE May 11,2004

May 11, 2004 TÜV OHTAMA CO., LTD
REGULATION: FCC part C 15.209

MODEL : M3049BA
REPORT No. : OTMAJ No.2389

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1.0 TEST METHODOLOGY

These tests were conducted on a sample of the equipment for the purpose of certification compliance with 47CFR Part 15 subpart C Section 209, Low Power Communication Device Transmitters operating at 125kHz.

Radiated emissions measurement were conducted in accordance with American National Standards Institute ANSI C63.4-1992 American National Standard for methods of Measurement of Radio Noise Emission from Low -Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz.

1.1 METHOD OF MEASUREMENTS

Refer to ANSI 63.4-2001 Paragraph 8 for detailed radiations measurement procedures.

Applies to harmonics/spurious that fall in the restricted band listed in Section 15.205 the maximum permitted average field strength is listed in Section 15.209.

For measurement below 1GHz, set RBW=100kHz, VBW \geq 100kHz, sweep=AUTO

For measurement above 1GHz, set RBW=1MHz, VBW=1MHz(Peak), sweep=AUTO

2.0 MEASUREMENT UNCERTAINTY

The data and results referred in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error of ± 2 dB. Furthermore , component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued of the device.

3.0 EQUIPMENT UNDER TEST

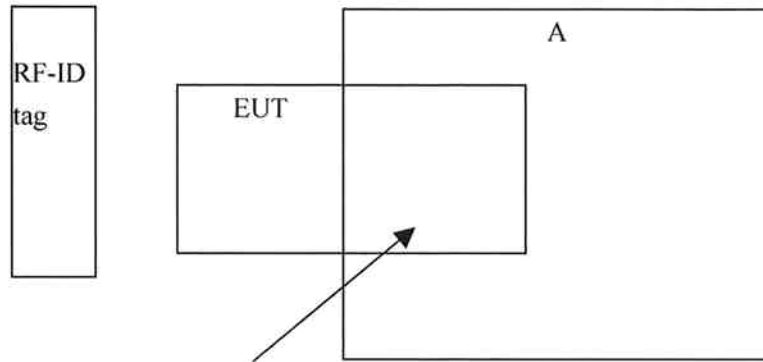
3.1 DESCRIPTION OF THE EUT

Type of equipment :	: Low Power Communication Device Transmitter
Trade name	: YOKOGAWA
Model number	: M3049BA
Serial number	: 0250050
Operating frequency	: 125 KHz
OSC. frequency	: 125kHz
Modulation employed	: Amplitude shift keying(ASK)
Emission designation	: A1A
Date of manufacture	: May 24,2002
Rated power	: DC3.3V
Associated devices	: Yokogawa Electric Corporation, ID Tag Transceiver
FCC ID	

3.2 TEST PROGRAM&OPERATION MODE

These measurements were performed with test program, and operated continuous transmitting mode.

3.3 CONFIGURATION OF THE SYSTEM FOR TESTING



The EUT connected to a PDA through
CF interface. Power is supplied by
the PDA

A is powered by battery.

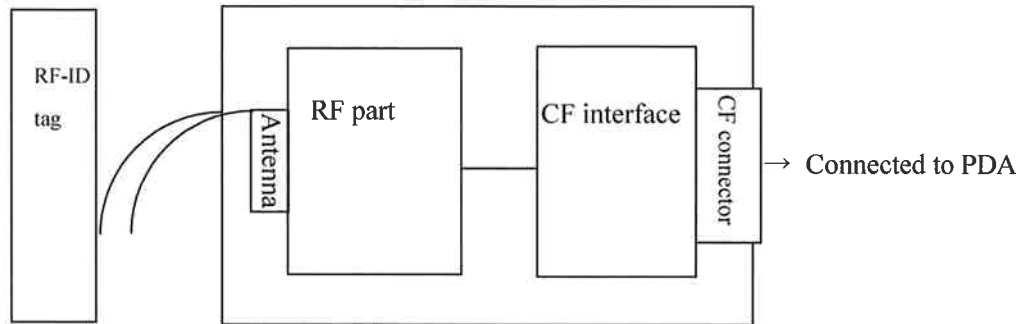
3.4 DEVICES USED FOR THE TEST

<u>MARK</u>	<u>NAME</u>	<u>MODEL</u>	<u>SERIAL No.</u>	<u>MANUFACTURE</u>
EUT	ID Tag Transceiver	M3049A	0250050	Yokogawa Electric corporation
A	PDA	EG-800	—	CASIO

3.5 CABLE USED FOR THE TEST

Non

3.6 CIRCUIT DIAGRAM OF THE EUT



4.0 RADIATED EMISSION MEASUREMENTS

4.1 General test procedures

4.2 Electrical field radiated emission measurement - general test method

- Test site location:
 - 1661 Ohshuku, Ashigawa-mura, Higashi-yatsushiro-gun, Yamanashi, Japan
 - TUV Ohtama Co., Ltd. Yamanashi EMC Center
 - 3m – 10m Open area test site
- Characteristics of the test site have already filed to FCC. (FCC File number 31040-SIT 1300B3)

- For radiated emission measurements, following measuring instruments were used.

Radiated emission measurements were made using the following test instrument.

- a) Calibrated EMCO active loop antenna in the frequency range from 10kHz to 30MHz.
- b) Calibrated Schwarzbeck biconical antenna in the frequency range 30MHz to 300MHz.
- c) Calibrated Schwarzbeck log-periodic antenna in the frequency range 300MHz to 1GHz.
- d) Calibrated Hewlett Packard spectrum analyzer in the frequency range 100Hz to 1.5GHz and 9KHz to 50GHz
- e) Calibrated Rohde&Schwarz EMI Receiver in the frequency range 9kHz to 30MHz and 20MHz to 1000MHz

Resolution bandwidth RBW and video bandwidth VBW of the spectrum analyzer were set as follows:

Below 30MHz	:RBW=10kHz, VBW \geq RBW
30MHz to 1000MHz	:RBW=100kHz, VBW \geq RBW

For EMI receiver Quasi Peak detector was used and resolution bandwidth was set as follows:

Below 150kHz	:RBW=200Hz
150kHz to 30MHz	:RBW=10kHz

- Measurement method
 - Below 30MHz
 - 1) Radiated emission measurement below 30MHz complies with ANSI C 643.4-1992 4.1.5.1. For selection of antenna and measuring distance, they comply with ANSI C63.4- 1992 8.2.1.
 - 2) EUT shall be placed on the wooden table at 0.8m from the floor. The table was placed on the turntable.
 - 3) The loop antenna shall be set at the distance of 3 m from the EUT. The center of the loop antenna shall be 1.0 m height from the ground plane.
 - 4) By rotating the turn table 360°, reading of maximum radiation of the spectrum analyzer or EMI receiver connected to the loop antenna shall be searched.
 - 5) Repeat the previous procedure with the angle of the loop antenna varied from 360° .
 - 6) Measurement value shall be the greater one of item 4) and 5).
 - 7) Repeat the step 4, 5 and 6 for every frequency.

• Frequency over 30MHz to 1000MHz

- 1) Radiated emission measurement over 30MHz to 1000MHz complies with ANSI C63.4-1992 4.1.5.3. For selection of antenna and measuring distance, they comply with ANSI C63.4-1992 8.2.3.
- 2) Biconical antenna shall be used for measurement over 30MHz to 300MHz.
- 3) Log-periodic antenna shall be used for measurement over 300MHz to 1000MHz.
- 4) EUT shall be placed on the wooden table at 0.8m from the floor. The table was placed on the turntable.
- 5) Each antenna shall be set at the distance of 3 m from the EUT.
- 6) The height of the antenna shall be varied from 1m to 4m.
- 7) By rotating the turn table 360° , reading of maximum radiation of the spectrum analyzer or EMI receiver connected to the antenna shall be searched, and then it shall be found with the antenna height varied from 1m to 4m.
- 8) Repeat previous item 7 with the antenna polarization of vertical and horizontal for each frequency. The maximum value shall be recorded as measured value.

• Calculation of the field strength

Field strength: measured reading + antenna factor and cable loss factor – gain of pre-amplifier

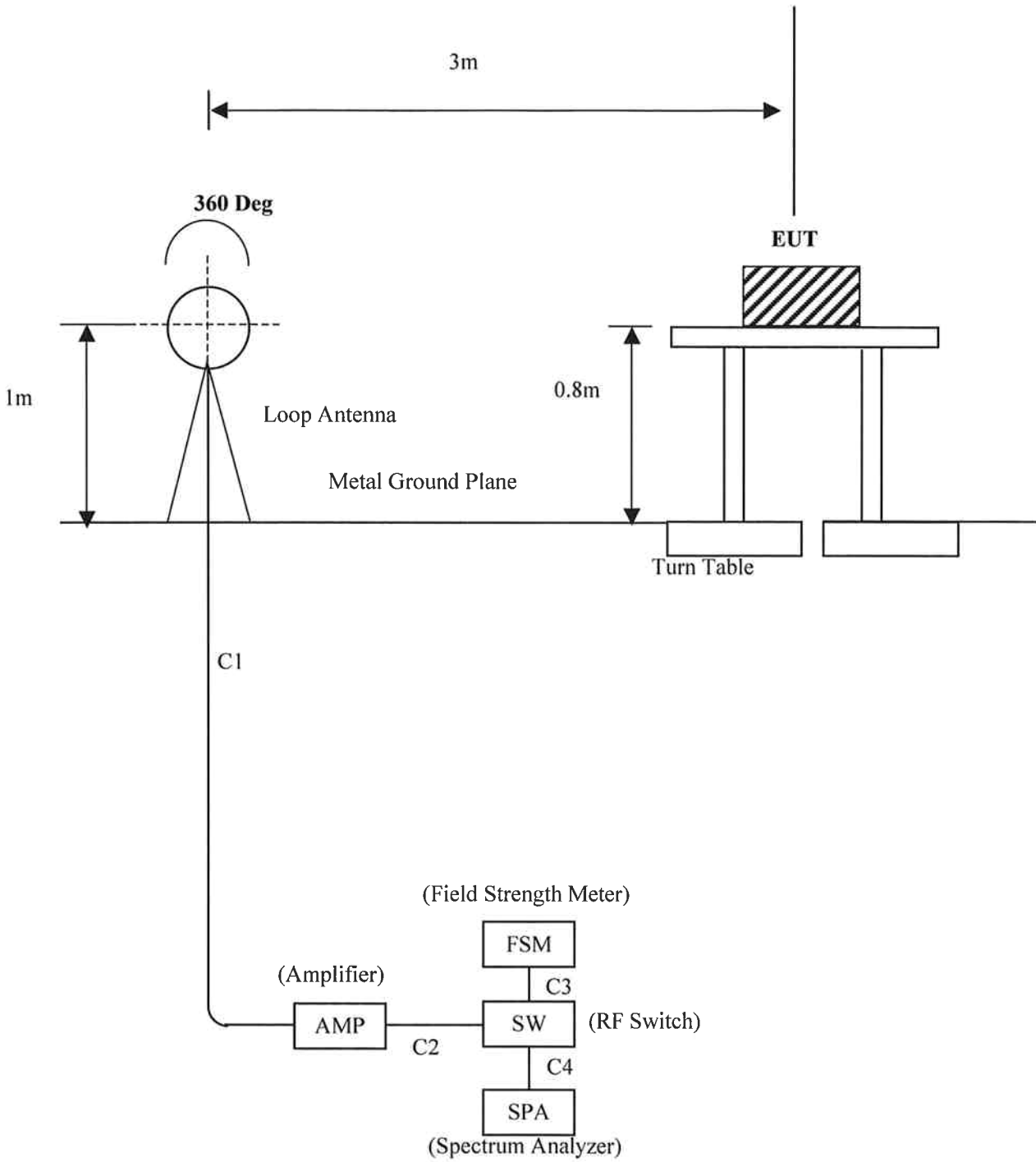
Formula shall be as follows:

$$F_s = M_r + A_f + C_f - A_{pr}$$

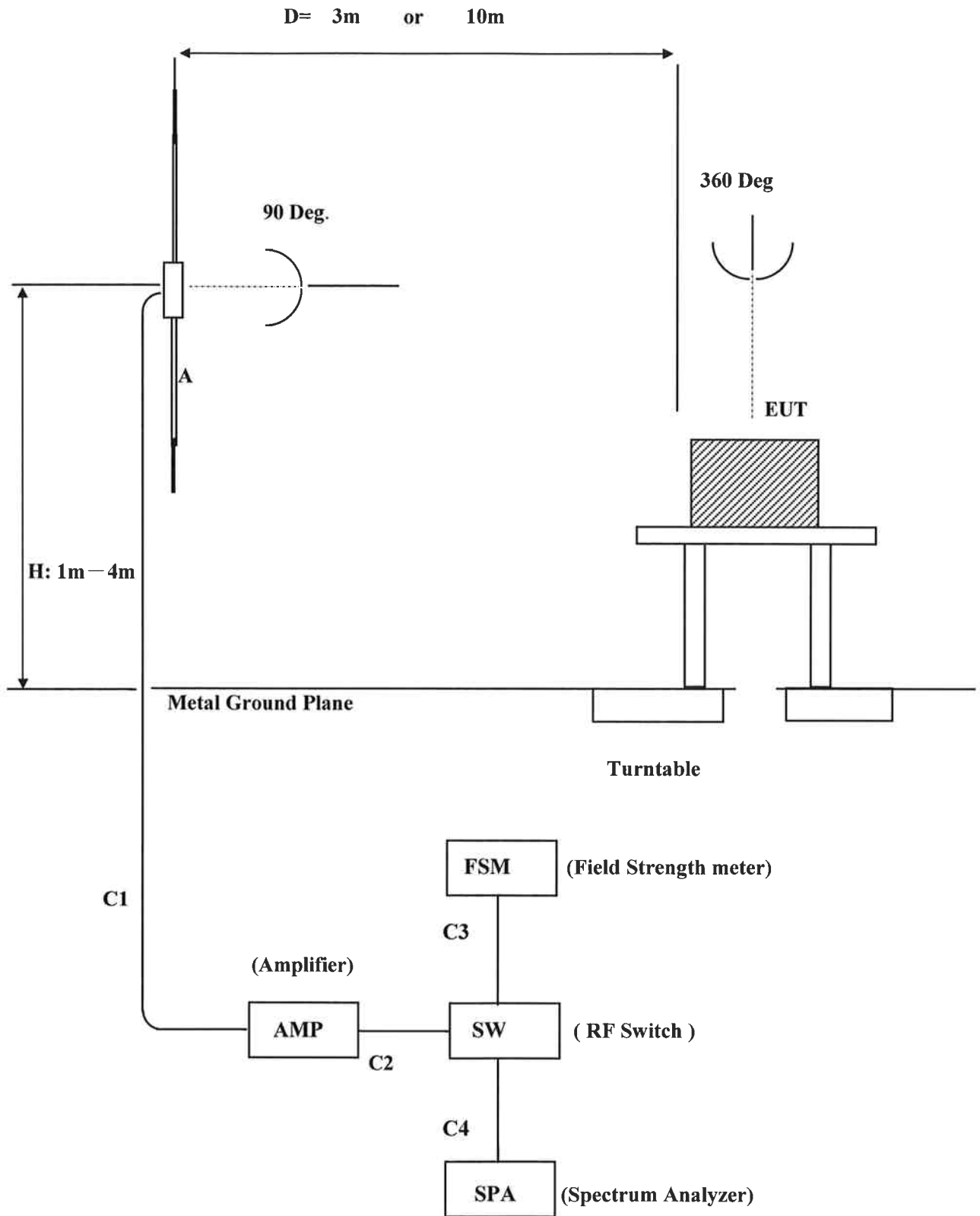
where

F_s	=	Field strength
M_r	=	EMI receiver/spectrum analyzer reading
C_f	=	Cable loss factor
A_{pr}	=	Pre-amplifier gain

DETAILS OF LOCATION OF EQUIPMENT FOR RADIATED EMISSION MEASUREMENT (THE FREQUENCY UNDER 30MHz)



DETAILS OF LOCATION OF EQUIPMENT FOR RADIATED EMISSION MEASUREMENT (THE FREQUENCY 30MHz to 1000MHz)



May 11, 2004 TÜV OHTAMA CO., LTD
 REGULATION: FCC part C 15.209

MODEL : M3049BA
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List of measuring Instruments (No.1 SITE)

Model	Item	Manufacturer	Serial No.	Date of last Calibration	Calibration Period
EHS3	Field strength meter	Rohde&Schwarz	893044/005	17 Nov,2003	1Year
ESVS10	Field strength meter	Rohde&Schwarz	84923/012	17 Nov,2003	1Year
8568B	Spectrum analyzer	Hewlett Packard	3026A20112	31 Aug,2003	1Year
8447D	Broadband amplifier	Hewlett Packard	2944A07995	14 Aug,2003	1Year
8491A	Pad	Hewlett Packard	37364	14 Aug,2003	1Year
BBA9106	Biconical antenna	Schwarzbeck	None	27 Dec,2003	1Year
UHALP9107	Log-periodic antenna	Schwarzbeck	9107858	27 Dec,2003	1Year
8565E	Spectrum analyzer	Hewlett Packard	3337A00140	5 Jun ,2003	1Year
6502	Active loop antenna	EMCO	1068	19 Jan,2004	1Year
	Site attenuation			25 Jan,2004	1Year
	Radiated cable			14 Aug,2003	1Year
	Conducted cable			14 Aug,2003	1Year

6.0 RADIATED EMISSION MEASUREMENT DATA

The measurement result in this test which was made duly in accordance with ANSI C63.4-1992 is shown in the next page.

- 6.1. Test data
 - 6.1.1 Radiated Emission Measurements
 - 6.1.1.1 Field Strength of Emission according to 15.209
 - 6.1.1.2 Specification limit

Frequency MHz	Field strength micro volts/meter	Measurement distance meters
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960 -	500	3

- 6.1.1.3 Distance correction factor
Inverse distance linear factor DF:

DF= 40 log (D1/D2) = 80dB
 where D1 is 300 meters specified measurement distance.
 D2 is 3 meters test measuring distance.

The DF=80dB was applied for limit calculation at 3 meters test distance measurement.

For 126.2kHz frequency the calculated limit is:
 Limit(3m) = Limit(300m)+DF = 25.6 (dB μ V/m)+80dB= 105.6 (dB μ V/m)

DF=40dB
 where D1 is 30 meters specified measurement distance.
 D2 is 3 meters test measuring distance.

The DF=40dB was applied for limit calculation at 3 meters test distance measurement.

0.490 MHz ~ 1.705 MHz the calculated limit is:
 Limit(3m) = Limit(30m)+DF =20 log (24000/F (kHz) (dB μ V/m)+40dB

1.705MHz ~ 30MHz the calculated limit is:
 Limit(3m) = limit (30m)+DF=29.5+40 =69.5 (dB μ V/m)

30MHz~88MHz the limit is 40 (dB μ V/m) (DF=0)
 88MHz~216MHz the limit is 43.5 (dB μ V/m) (DF=0)
 216MHz~960MHz the limit is 46.0 (dB μ V/m) (DF=0)
 960MHz~ the limit is 54.0 (dB μ V/m) (DF=0)

TEST DATA

Model name : M3049BA
Serial No. : 0250050
Power supply : DC3.3V
Limit : FCC Para 15.209
Distance : 3m
EUT Condition: Test mode

Test date : May 11,2004
Weather condition : Fine
Temperature : 21 °C
Humidity : 53 %
Test engineer : K.Amemiya

Polarization : Vertical

1.Fundamental and harmonics emission)

Frequency kHz	Resolution bandwidth kHz	Measured result dB μ V/m	Distance correction factor dB	Calculated limit dB μ V/m	Specified margin dB	Comments
126.2	10	74.0	80	105.6	31.6	
252.4	10	47.4	80	99.6		Noise level of receiver
378.6	10	44.9	80	96.1	51.2	
504.8	10	41.4	40	73.5		Noise level of receiver
631.0	10	40.4	40	71.6	31.2	
757.2	10	37.5	40	70.0		Noise level of receiver
833.4	10	36.1	40	68.7		Noise level of receiver
1009.6	10	35.3	40	67.5		Noise level of receiver
1135.8	10	34.1	40	66.5		Noise level of receiver
1262.2	10	33.1	40	65.6	-	Noise level of receiver

2.1 Spurious emission (Horizontal polarization)

Frequency (MHz)	Reading QP (dB μ V)	Correction factor (dB)	Emission level QP (dB μ V/m)	Antenna height (m)	Turntable angle(°)	Limit (dB μ V/m)	Margin (dB)
802.81	34.5	7.1	41.6	4.0	253	46.0	4.4
884.72	29.8	8.2	38.0	1.1	97	46.0	8.0
921.58	33.3	9.3	42.6	1.1	83	46.0	3.4
958.46	34.4	9.4	43.8	1.0	91	46.0	2.2

There is margin of more than 20 dB for other frequencies.

2.2 Spurious emission (Vertical polarization)

Frequency (MHz)	Reading QP (dB μ V)	Correction factor (dB)	Emission level QP (dB μ V/m)	Antenna height (m)	Turntable angle(°)	Limit (dB μ V/m)	Margin (dB)
501.76	28.9	1.1	30.0	1.0	198	46.0	16.0
802.81	31.1	7.0	38.1	2.2	207	46.0	7.9
921.59	26.7	9.6	36.3	1.0	0	46.0	9.7
958.45	30.2	8.0	38.2	1.0	352	46.0	7.8

There is margin of more than 20 dB for other frequencies.

May 11, 2004 TÜV OHTAMA CO., LTD
REGULATION: FCC part C 15.209

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3. Center frequency and Occupied bandwidth (99% bandwidth) measurements

3.1 Test results

Test specification : FCC part 15 subpart C 15.205
 Company : Yokogawa Electric Corporation.
 EUT : M3049BA
 DATE : 2004.05.11
 Relative humidity : 53%
 Ambient temperature : 21°C

3.1.1 center frequency

Center Frequency kHz	Measurement result kHz	variation ppm	
125	126.225	9800	

Remark :

Loop antenna was placed at the distance of 3m from the EUT. The output of the loop antenna was connected to RF input of the spectrum analyzer, HP8565E and measured with its frequency measurement function.

3.1.2 occupied bandwidth

Occupied bandwidth	Measurement result kHz		
	3.42		No radio frequency signals found to be spread out in the adjacent restricted band.

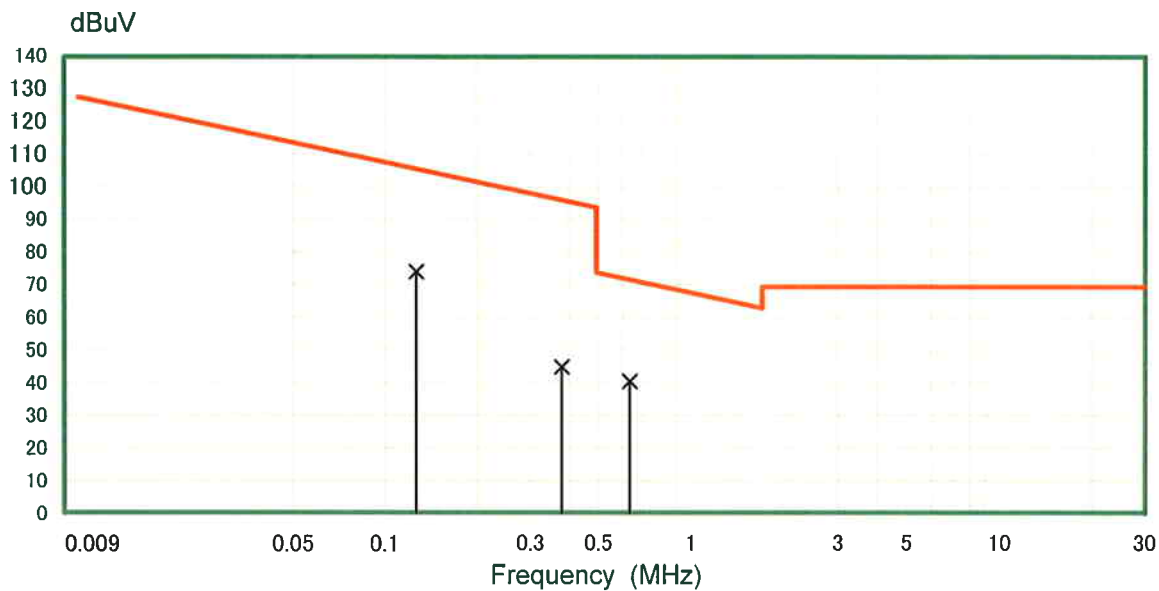
Remark :

Loop antenna was placed at the distance of 3m from the EUT. The output of the loop antenna was connected to RF input of the spectrum analyzer, HP8565E and measured with its occupied bandwidth measurement function.

Rediated Emission

Model name M3049BA
Serial No. 0250050
Power supply DC3.3V
EUT condition Test mode
Detector mode QP
Limitis 0.009-30MHz

Point frquency 3 points
Test equipment ESH3
Engineer K.Amemiya
Weather condition Fine
Date May-11-04
Temp 21 °C Humi. 53 %



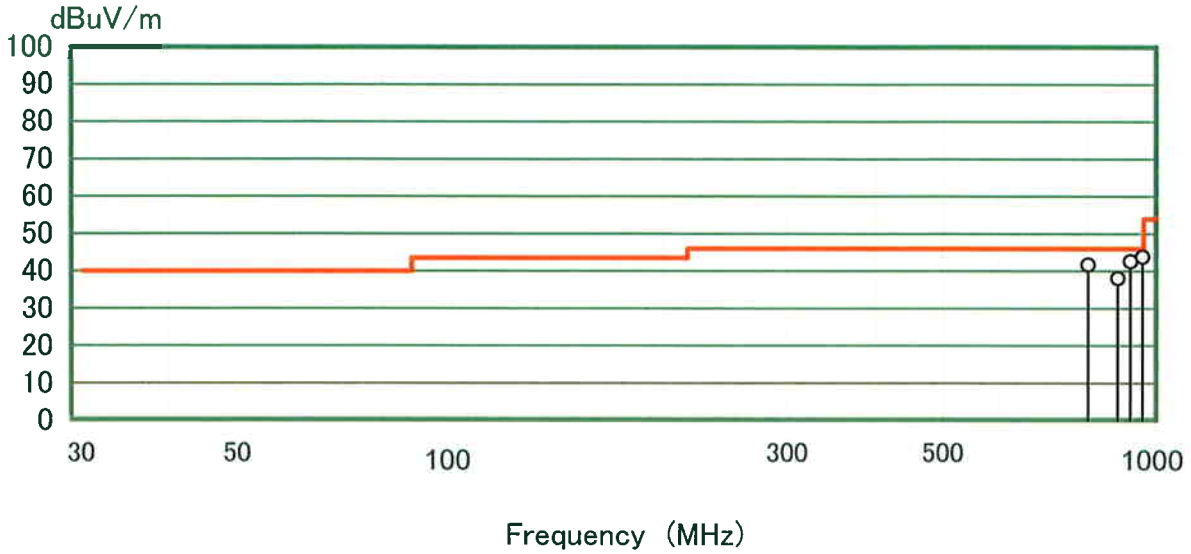
Radiated emissions

Model name M3049BA
Serial No. 0250050
Power supply DC3.3V
EUT condition Test mode
Detector mode QP
Limitis (30 - 1000MHz)

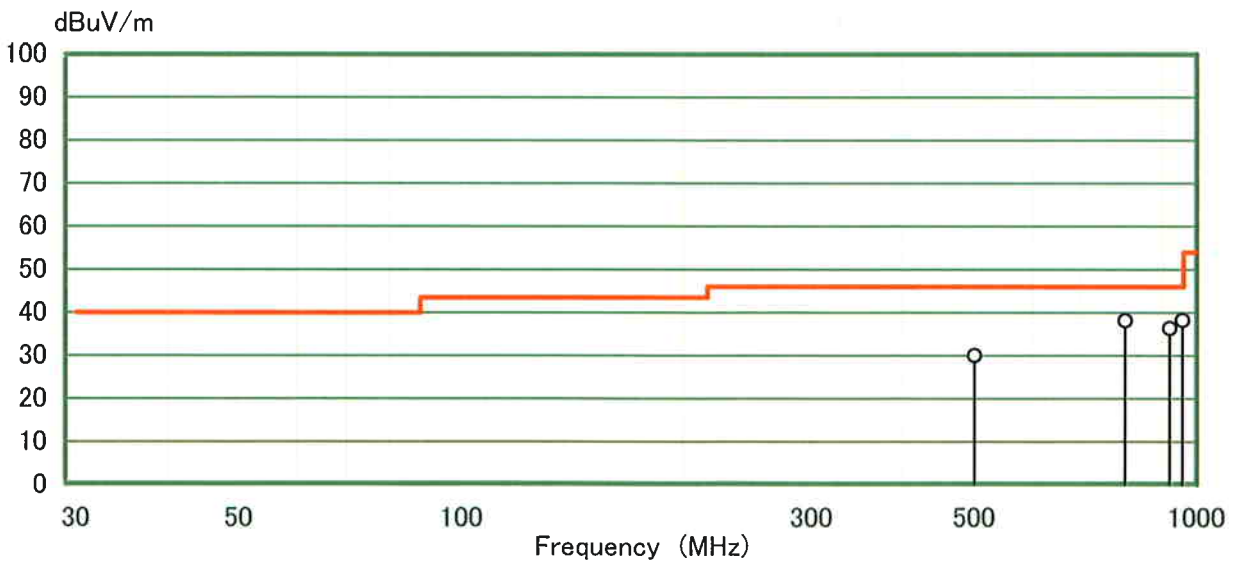
Point frequency
Horizontal 4 Points Vertical 4 Points
Test equipment ESVS10
Engineer K.Amemiya
Weather condition Fine
Date May-11-04
Temp 21 °C Humi. 53 %

FCC Part15 Part C 15.209 (3m)

Polarization Horizontal



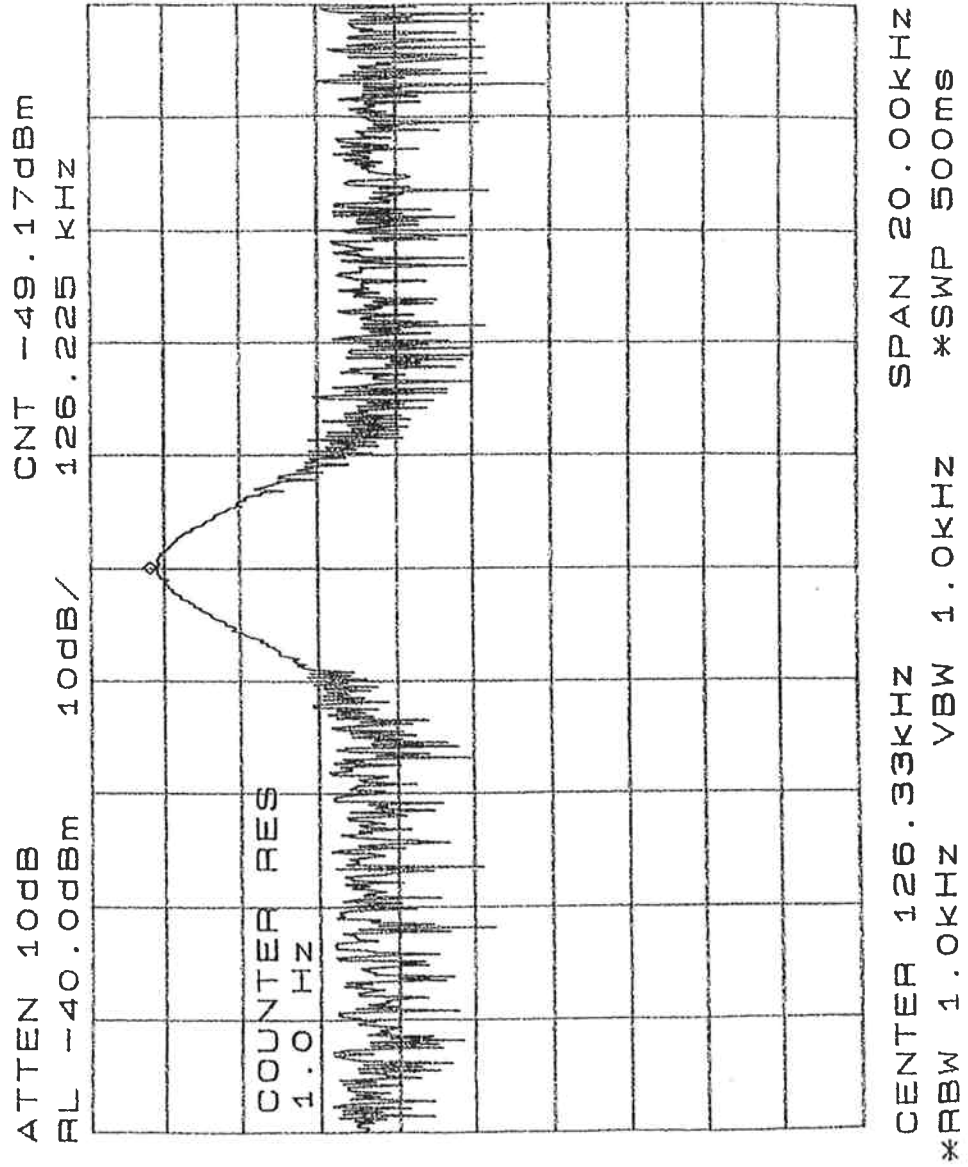
Polarization Vertical



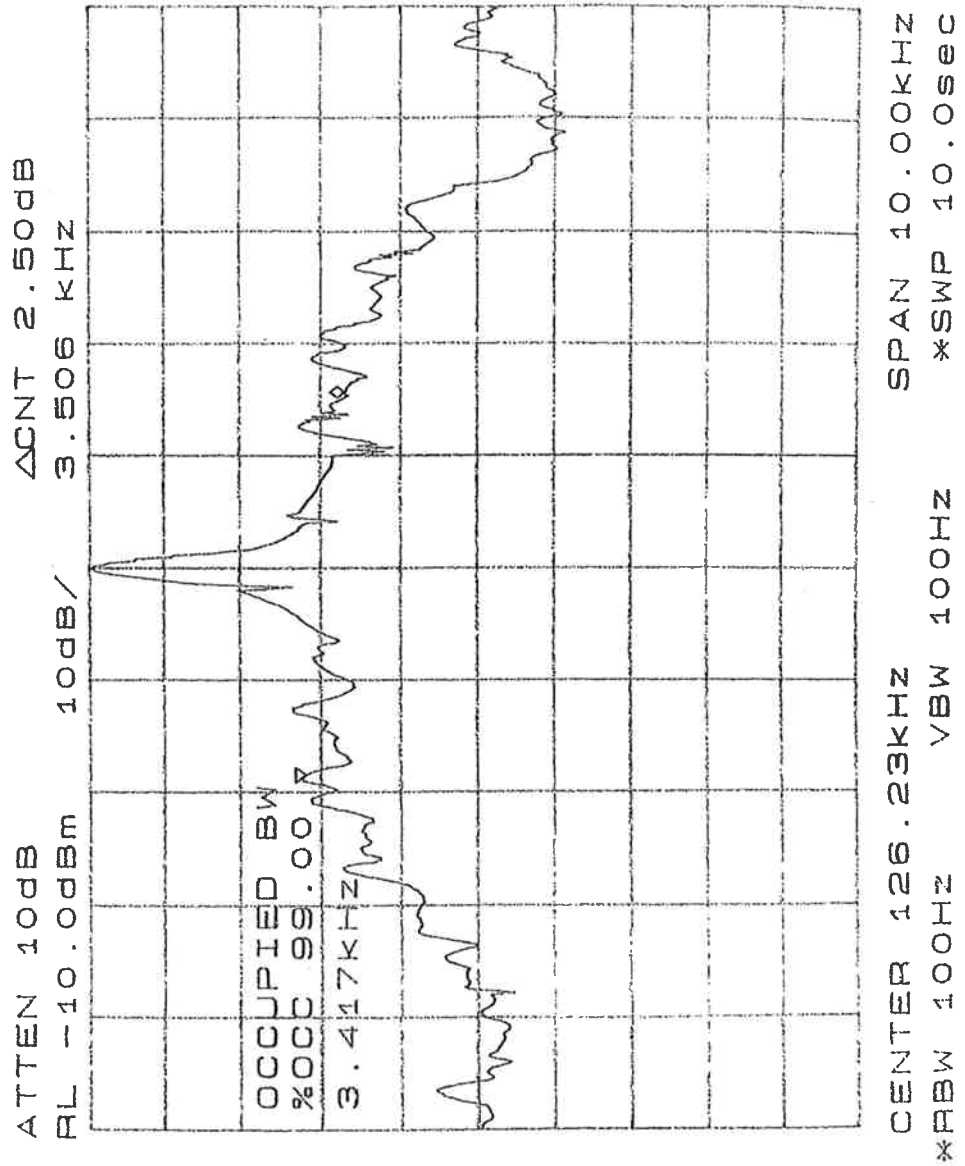
May 11, 2004 TÜV OHTAMA CO., LTD
REGULATION: FCC part C 15.209

MODEL : M3049BA
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M3049B
Center frequency measurement



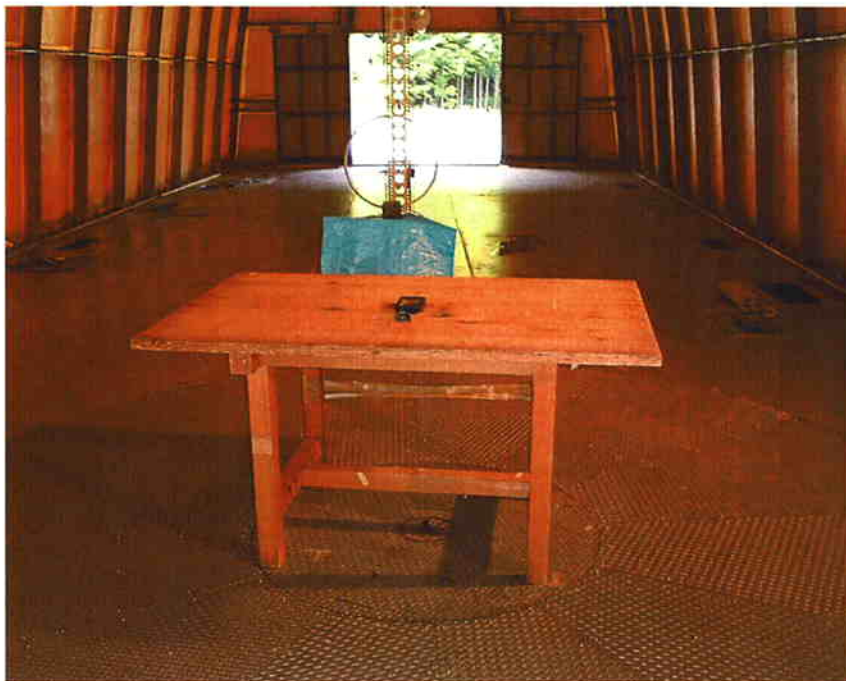
M3049B
Occupied bandwidth measurement



May 11, 2004 TÜV OHTAMA CO., LTD
REGULATION: FCC part C 15.209

MODEL : M3049BA
REPORT No. : OTMAJ No.2389

Photograph of measurement for the Radiated Emission



May 11, 2004 TÜV OHTAMA CO., LTD
REGULATION: FCC part C 15.209

MODEL : M3049BA
REPORT No. : OTMAJ No.2389

CERTIFICATE

COPY

CERTIFICATE



CERTIFICATE OF COMPLIANCE OF THE QUALITY SYSTEM WITH SPECIFIC REQUIREMENTS

TÜV Ohtama Co., Ltd.

TÜV Sueddeutschland Group

Yamanashi EMC Center Ashigawa Laboratory
Oshuku Ashigawa-Mura, Higashi-Yatsushirogun
Yamanashi-ken
409-3704 Japan

This certifies that this Laboratory with its testing facilities: open field test site (No. 1, No. 2 & No. 3) is included into the TÜV PRODUCT SERVICE GROUP (TÜVPS). Use of this certificate is the Laboratory's representation that this Laboratory meets the requirements of the Quality Management System of TÜVPS which is based on ISO/IEC 17025.

Munich, 24 March 2004

For the Executive Committee of TÜVPS:

A handwritten signature in black ink, appearing to read 'Buitkamp', with a decorative flourish at the end.

Dr. Hermann Buitkamp



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National Institute
of Standards and Technology



National Voluntary
Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

Scope of Accreditation



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**ELECTROMAGNETIC COMPATIBILITY
AND TELECOMMUNICATIONS**

NVLAP LAB CODE 200175-0

TUV OHTAMA CO., LTD. YAMANASHI EMC TEST SITE

1661 Oshuku Asigawa Higashi-Yatsushiro

Yamanashi

JAPAN

Mr. Etsuji Nogami

Phone: 81-552-98-2141 Fax: 81-552-98-2125

E-Mail: e-nogami@tuv-ohtama.co.jp

URL: <http://www.tuy-ohtama.co.jp>

NVLAP Code Designation / Description

Emissions Test Methods:

12/CIS22	IEC/CISPR 22 (1997) and EN 55022 (1998): Limits and methods of measurement of radio disturbance characteristics of information technology equipment
12/CIS22a	IEC/CISPR 22 (1993): Limits and methods of measurement of radio disturbance characteristics of information technology equipment, Amendment 1:1995, and Amendment 2:1996.
12/CIS22b	CNS 13438 (1997): Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment
12/F01	ANSI C63.4 (2001) - cited in FCC Method - 47 CFR Part 15 - Digital Devices
12/F01a	Conducted Emissions, Power Lines, 150 KHz to 30 MHz
12/F01b	Radiated Emissions

June 30, 2004

Effective through

A handwritten signature in black ink, appearing to read 'C. D. Lawson'.

For the National Institute of Standards and Technology

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National Institute
of Standards and Technology



National Voluntary
Laboratory Accreditation Program

ISO/IEC 17025:1999
ISO 9002:1994

Scope of Accreditation



Page: 2 of 2

**ELECTROMAGNETIC COMPATIBILITY
AND TELECOMMUNICATIONS**

NVLAP LAB CODE 200175-0

TUV OHTAMA CO., LTD. YAMANASHI EMC TEST SITE

NVLAP Code ***Designation / Description***

12/T51 AS/NZS CISPR (2002) and AS/NZS 3548: Electromagnetic Interference - Limits and
Methods of Measurement of Information Technology Equipment

June 30, 2004

Effective through

A handwritten signature in cursive script, reading 'C. D. Faison'.

For the National Institute of Standards and Technology