

Radio Satellite Communication
Untertürkheimer Straße 6-10 . D-66117 Saarbrücken
Telefon: +49 (0)681 598 -9100
Telefax: -9075

RSC

This test report consists of 29 Pages

Page 1 (29)

Recognized by the
Federal Communications Commission and Industry Canada
Anechoic chamber registration No.: 90462 (FCC)
Anechoic chamber registration No.: 3463 (IC)
TCB ID: DE0001



Accredited by the
German Accreditation Council
DAR-Registration Number
TTI-P-G 081/94-D0



Independent ETSI
compliance test house



Accredited Bluetooth™ Test Facility (BQTF)

Test Report No.: 2-3565-01-01/04
Applicant: Siemens Building Technologies AG, Cerberus Division
FCC Part 15.245
IRM80
FCC ID: RW8571678

CETECOM – ICT Services GmbH
Untertürkheimerstr. 6-10
66117 Saarbrücken, Germany

Telephone: + 49 (0) 681 / 598-0
Fax: + 49 (0) 681 /598-9075

Table of contents

- 1 General information
 - 1.1 Notes
 - 1.2 Testing laboratory
 - 1.3 Details of applicant
 - 1.4 Application details
 - 1.5 Test item
 - 1.6 Test specifications
- 2 Technical test
 - 2.1 Summary of test results
 - 2.2 Test report

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

Test laboratory manager:

04.05.2004 RSC - 8434 M. Paschwitz



Date	Section	Name	Signature
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Technical responsibility for area of testing:

04.05.2004 RSC - 8432 K. Kammerinke



Date	Section	Name	Signature
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1.2 Testing laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 - 10

66117 Saarbrücken

Germany

Telephone : + 49 681 598 - 0

Telefax : + 49 681 598 - 9075

E-mail : Klaus.Kammerinke@ict.cetecom.de

Internet : www.cetecom-ict.de

Accredited testing laboratory

Accredited by : Regulierungsbehörde für Telekommunikation und Post (RegTP)

Listed by : Federal Communications Commission (FCC)

Authority	Identification/Registration No.
RegTP	TTI-P-G 081/94-D0
FCC	90462

1.3 Details of applicant

Name : Siemens Building Technologies AG, Cerberus Division
Street : Alte Landstr. 411
City : CH 8708 Männersdorf
Country : Switzerland
Telephone : +41 1 922 63 71
Telex : +41 1 922 67 67
E-mail : stefan.hegnauer@siemens.com

Contact person:

Name : Mr. Stefan Hegnauer
Telephone : +41 1 922 63 71
Telex : +41 1 922 67 67
E-mail : stefan.hegnauer@siemens.com

1.4 Application details

Date of receipt of application : 23.04.2004
Date of receipt of test item : 27.04.2004
Date of test : 04.05.2004

1.5 Test item

Type of equipment : Field disturbance sensor in security systems.
Type designation : IRM80
Manufacturer : see applicant
Street :
City :
Country :
Serial number : - / -

Technical information :
Frequency range : 2435.000 MHz - 2465.000 MHz
Fundamental frequency : 2449.091 MHz
Type of modulation : 2M5P0N
Pulse width : 75 µs
Pulse spacing : 2.5 ms
Channel spacing : not applicable
Number of channels : 1
Antenna : integral microstrip patch antenna
Field strength : 81.9 dBµV/m at 3m
Power supply : 12.0V DC external
Temperature range : -20°C to +55°C
Transmitter spurious : 47.9 dBµV/m at 3m

DECLARATION OF COMPLIANCE: I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Signature:



Date: 04.05.2004, Manfred Paschwitz Test management
NAME AND TITLE (Please print or type)

1.6 Test specifications: FCC Part 15 §15.245

2 Technical test

2.1 Summary of test results

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 9 kHz to 20 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber.

The receiving antennas are conform with specifications ANSI C63.2-1996 clause 15 and ANSI C63.4-2001 clause 4.1.5. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test set-ups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received.

The wanted and unwanted emissions are received by spectrum analysers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63-4-2001 clause 4.2.

Antennas are conform with ANSI C63.2-1996 item 15.

150 kHz - 30 MHz: Passive loop antenna.

30 MHz - 200 MHz: Biconical antenna

200 MHz - 1GHz: Log periodic antenna

>1 GHz: Wave guide horn

All measurement settings are according to FCC 15.35, 15.209.

150 kHz - 30 MHz: Quasi Peak measurement, 9 kHz Bandwidth

30 MHz - 200 MHz: Quasi Peak measurement, 120 kHz Bandwidth

200 MHz - 1GHz Quasi Peak measurement, 120 kHz Bandwidth

>1 GHz: Average, RBW 1 MHz, VBW 10 Hz

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

FINAL VERDICT : PASS

LIST OF MEASUREMENTS.

The list of measured parameters is given below.

Clause	Page number
FIELDSTRENGTH OF FUNDAMENTAL § 15.245	8
SPURIOUS RADIATION 9 kHz - 30 MHz § 15.209	10
SPURIOUS RADIATION 30 MHz - 4000 MHz § 15.245	12
SPURIOUS RADIATION 4000 MHz - 25000 MHz § 15.245	14
SPURIOUS RADIATION 4000 MHz - 25000 MHz § 15.245	15
DUTY CYCLE	16
DUTY CYCLE	17
CONDUCTED SPURIOUS FREQUENCIES 150 kHz - 30 MHz § 15.207	18

Equipment under test: IRM80
 Ambient temperature: 23.0 °C
 Relative humidity: 41.0 %

FIELDSTRENGTH OF FUNDAMENTAL

§ 15.245

TEST CONDITIONS	MAXIMUM OUTPUT POWER PEAK EIRP (dBm)	MAXIMUM OUTPUT POWER AVERAGE (dBμV/m)
	Frequency 2450.000 MHz	Frequency 2450.000 MHz
T _{nom} (23.0)°C 12.0 VDC	- 0.2 dBm = 97.3 dBμV/m	81.9 dBμV/m
Measurement uncertainty	±3dB	±3dB

AV correction factor: -15.4 dB (see page 9)

p (AV) = -15.6 dBm

Conversion eirp to field strength at 3 m

e = p (dBm eirp) + 97.5 dB.

e = -15.6 dB + 97.5 dB = 81.9 dBμV/m

f > 1 GHz : RBW/VBW: 1.0 MHz

H = Horizontal ; V= Vertical

Measured at a distance of 3m

Limits

SUBCLAUSE § 15.245

Fundamental Frequency (MHz)	Field strength of Fundamental
902-928	500 (mV/m) 54 (dBmV/m)
2435-2465	500 (mV/m) 54 (dBmV/m)
5785-5815	500 (mV/m) 54 (dBmV/m)
10500- 10550	2500 (mV/m) 68 (dBmV/m)
24.075-24.175 GHz	2500 (mV/m) 68 (dBmV/m)

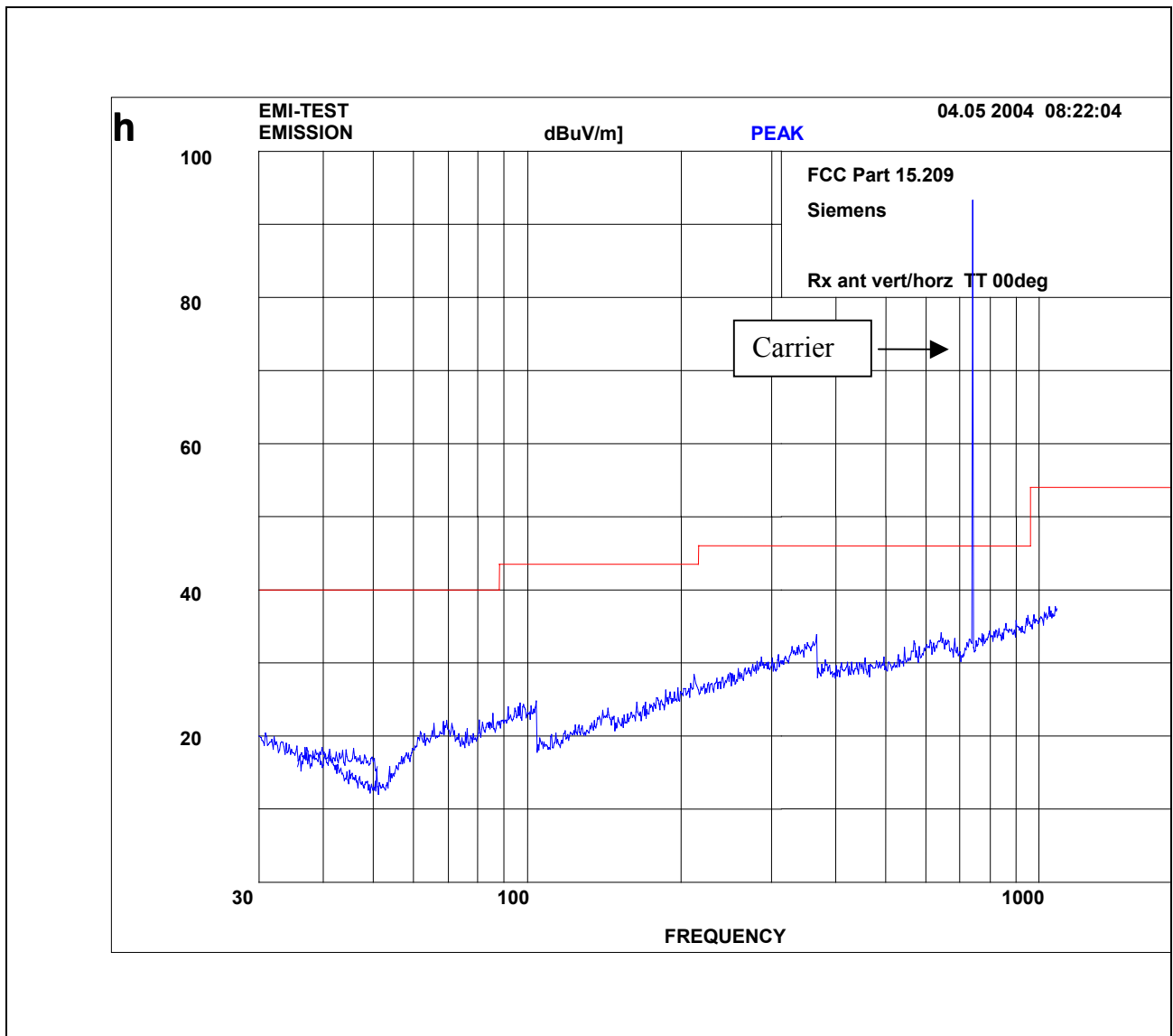
Reference Number(s) of Test Equipment used

17 - 24, 64

Verdict :	Maximum power is kept
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Equipment under test: IRM80
 Ambient temperature: 23.0 °C
 Relative humidity: 41.0 %

FIELDSTRENGTH OF FUNDAMENTAL



T_{on} : 0.0725 ms

T_{off} : 2.425 ms

Average correcting factor : $10 \log \frac{T_{on}}{T_{on} + T_{off}} = 15.4 \text{ dB}$

Reference Number(s) of Test Equipment used
 17 - 24, 64

Verdict : Maximum power is kept

Equipment under test: IRM80
 Ambient temperature: 23.0 °C
 Relative humidity: 41.0 %

SPURIOUS RADIATION 9 kHz - 30 MHz

§ 15.209

SPURIOUS EMISSIONS LEVEL (µV/m)					
f carrier = 2450.000 MHz					
f (MHz)	Detector mode	Level (dBµV/m)	Detector mode	Position RX antenna	Level (dBµV/m)
no					
spurious -					
noise level					
Measurement uncertainty					

AV correction factor: -15.4 dB (see page 9)
 p (AV) = -15.6 dBm

f < 1 GHz : RBW/VBW: 100 kHz
 H = Horizontal ; V= Vertical

Measured at a distance of 3m

Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dBµV/m	30

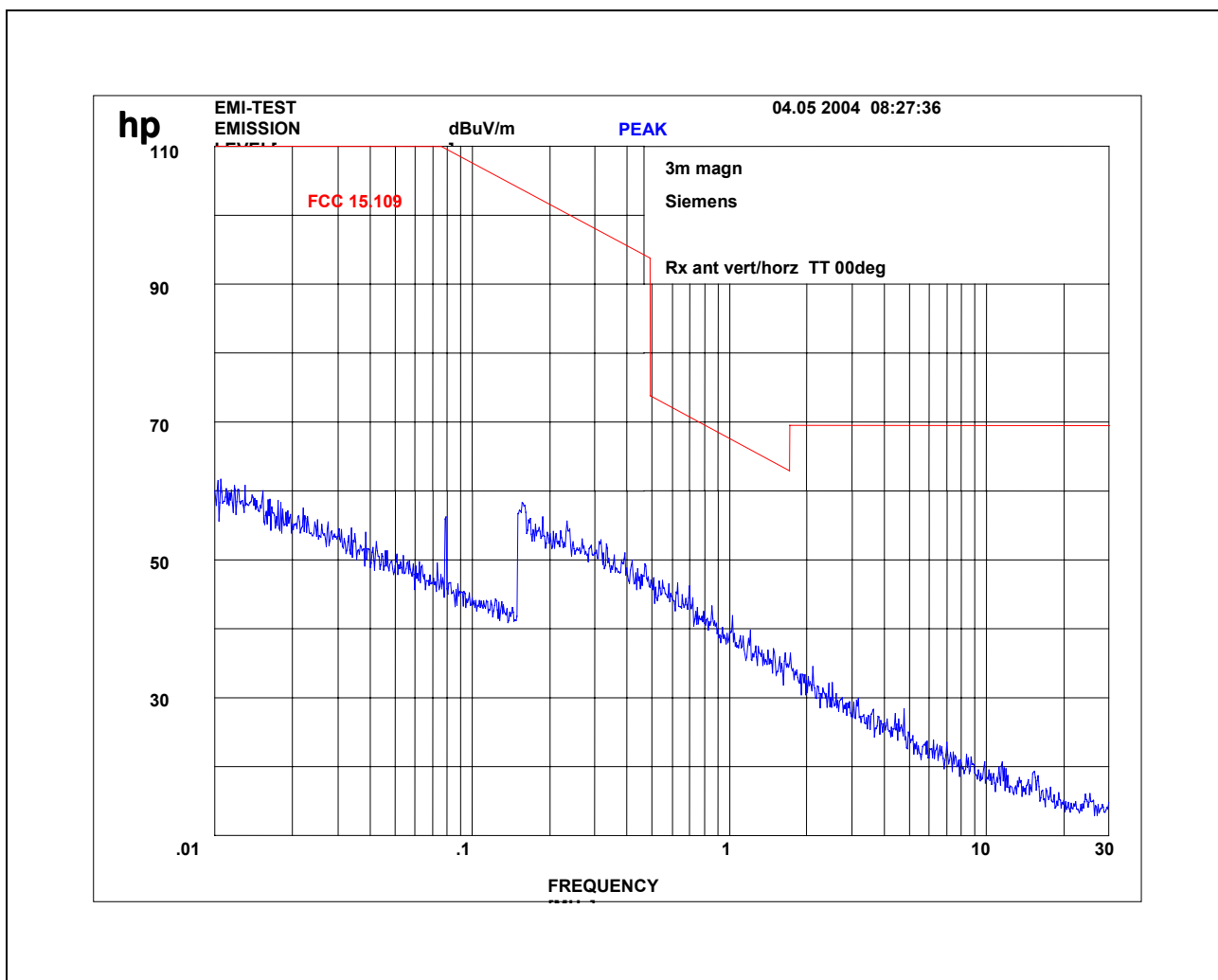
Reference Number(s) of Test Equipment used
 17 - 24, 64

Verdict : Spurious radiation is kept

Equipment under test: IRM80
 Ambient temperature: 23.0 °C
 Relative humidity: 41.0 %

SPURIOUS RADIATION 9 kHz – 30 MHz
 Part 15.209 Magnetics

§ 15.209



Limits

SUBCLAUSE § 15.209

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Measurement distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30 / 29.5 dB $\mu\text{V/m}$	30

Reference Number(s) of Test Equipment used
 52 - 64

Verdict : Spurious radiation is kept

Equipment under test: IRM80
 Ambient temperature: 23.0 °C
 Relative humidity: 41.0 %

SPURIOUS RADIATION 30 MHz - 4000 MHz

§ 15.245

SPURIOUS EMISSIONS LEVEL (µV/m)					
f carrier = 2450.000 MHz					
f (MHz)	Detector mode	Level (dBm)	Detector mode	Position RX antenna	Level (dBµV/m)
2450.00	peak	- 0.2	AV and dBµV/m	V and H	81.9
no spurious (carrier)					
Measurement uncertainty					

AV correction factor: -15.4 dB (see page 9)

p (AV) = -15.6 dBm

Conversion eirp to field strength at 3 m

e = p (dBm eirp) + 97.5 dB. See Section 15.521

e = -15.6 dB + 97.5 dB = 81.9 dBµV/m

f < 1 GHz : RBW/VBW: 100 kHz

f > 1 GHz : RBW/VBW: 1.0 MHz

H = Horizontal ; V= Vertical

Measured at a distance of 3m

Limits

SUBCLAUSE § 15.245

Frequency range (MHz)	Field strength
30.0-88.0	100 (µV/m) 40 (dBµV/m)
88.0-216.0	150 (µV/m) 43.5 (dBµV/m)
216.0-960.0	200 (µV/m) 46 (dBµV/m)
> 960.0	500 (µV/m) 54 (dBµV/m)
Harmonics	1.6 (mV/m) 64 (dBµV/m)

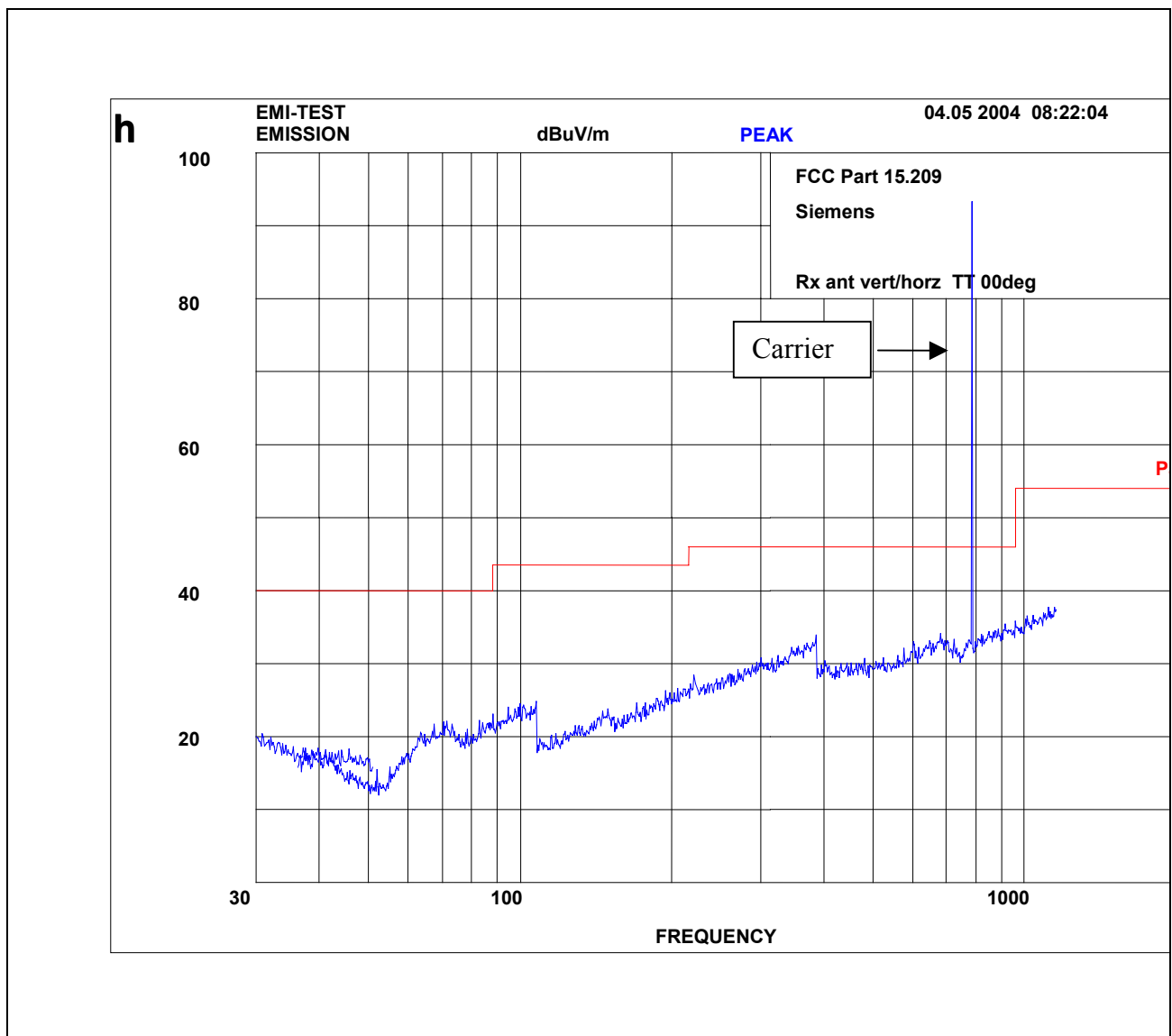
Reference Number(s) of Test Equipment used

17 - 24, 64

Verdict :	Spurious radiation is kept
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Equipment under test: IRM80
 Ambient temperature: 23.0 °C
 Relative humidity: 41.0 %

SPURIOUS RADIATION 30 MHz - 4000 MHz



T_{on} : 0.0725 ms

T_{off} : 2.425 ms

Average correcting factor : $10 \log \frac{T_{on}}{T_{on} + T_{off}} = 15.4 \text{ dB}$

Reference Number(s) of Test Equipment used
 17 - 24, 64

Verdict : Maximum power is kept

Equipment under test: IRM80
 Ambient temperature: 23.0 °C
 Relative humidity: 41.0 %

SPURIOUS RADIATION 4000 MHz - 25000 MHz

§ 15.245

SPURIOUS EMISSIONS LEVEL (µV/m)					
f carrier = 2450.000 MHz					
f (MHz)	Detector mode	Level (dBµV/m)	Detector mode	Position RX antenna	Level (dBµV/m)
4894.000	peak	42.5	AV	V and H	27.1
7340.000	peak	63.3	AV	V and H	47.9
9786.000	peak	36.8	AV	V and H	21.4
Measurement uncertainty					

AV correction factor: -15.4 dB (see page 9)
 p (AV) = -15.6 dBm

f ≥ 1GHz : RBW/VBW: 1 MHz
 H = Horizontal ; V= Vertical

Measured at a distance of 3m

Limits

SUBCLAUSE § 15.245

Frequency range (MHz)	Field strength
30.0-88.0	100 (µV/m) 40 (dBµV/m)
88.0-216.0	150 (µV/m) 43.5 (dBµV/m)
216.0-960.0	200 (µV/m) 46 (dBµV/m)
> 960.0	500 (µV/m) 54 (dBµV/m)
Harmonics	1.6 (mV/m) 64 (dBµV/m)

Reference Number(s) of Test Equipment used
 17 - 24, 64

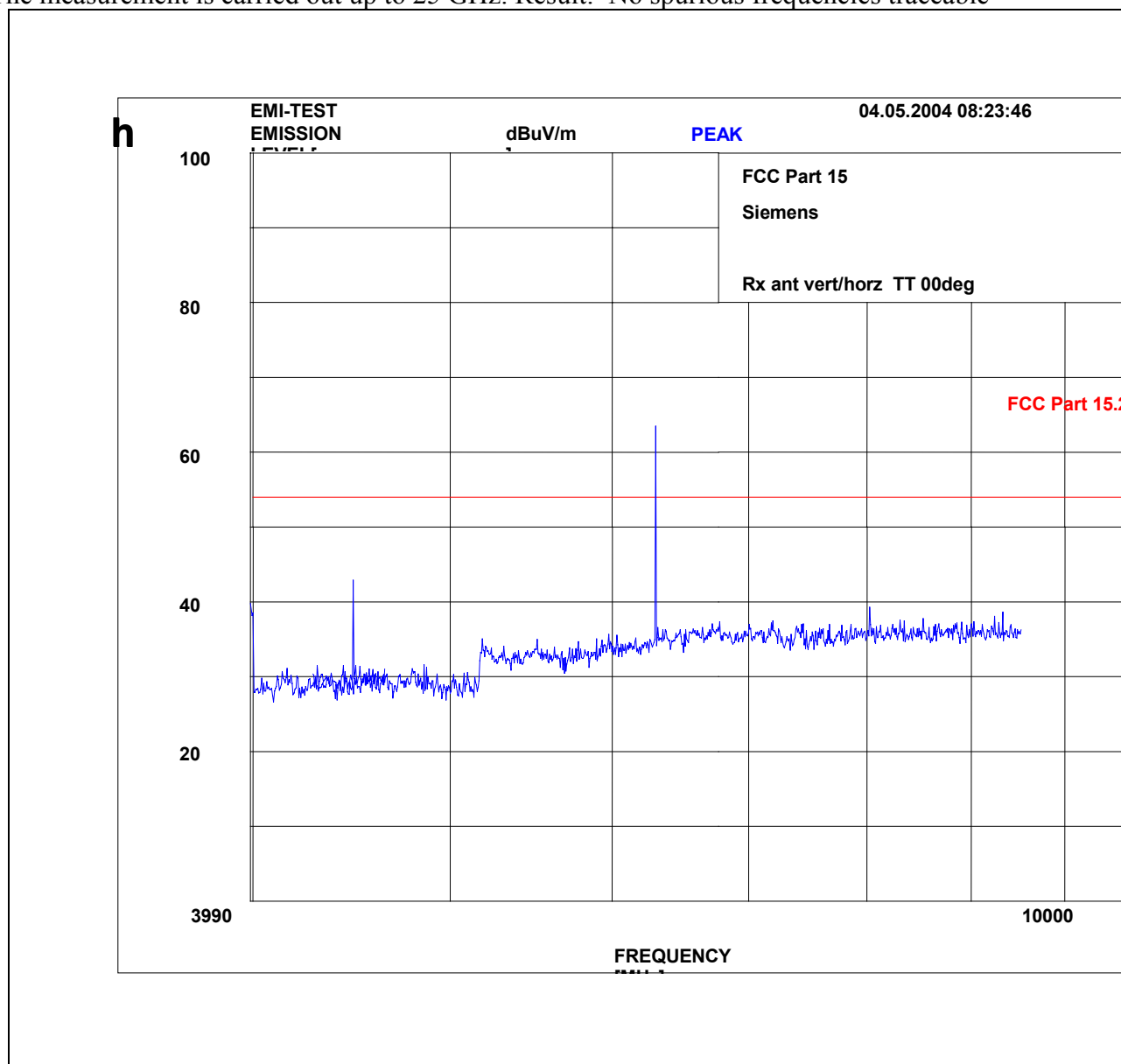
Verdict :	Spurious radiation is kept
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Equipment under test: IRM80
Ambient temperature: 23.0 °C
Relative humidity: 41.0 %

SPURIOUS RADIATION 4000 MHz - 25000 MHz

§ 15.245

The measurement is carried out up to 25 GHz. Result: No spurious frequencies traceable

 $T_{on} : 0.0725 \text{ ms}$ $T_{off} : 2.425 \text{ ms}$

Average correcting factor :

$$10 \log \frac{T_{on}}{T_{on} + T_{off}} = 15.4 \text{ dB}$$

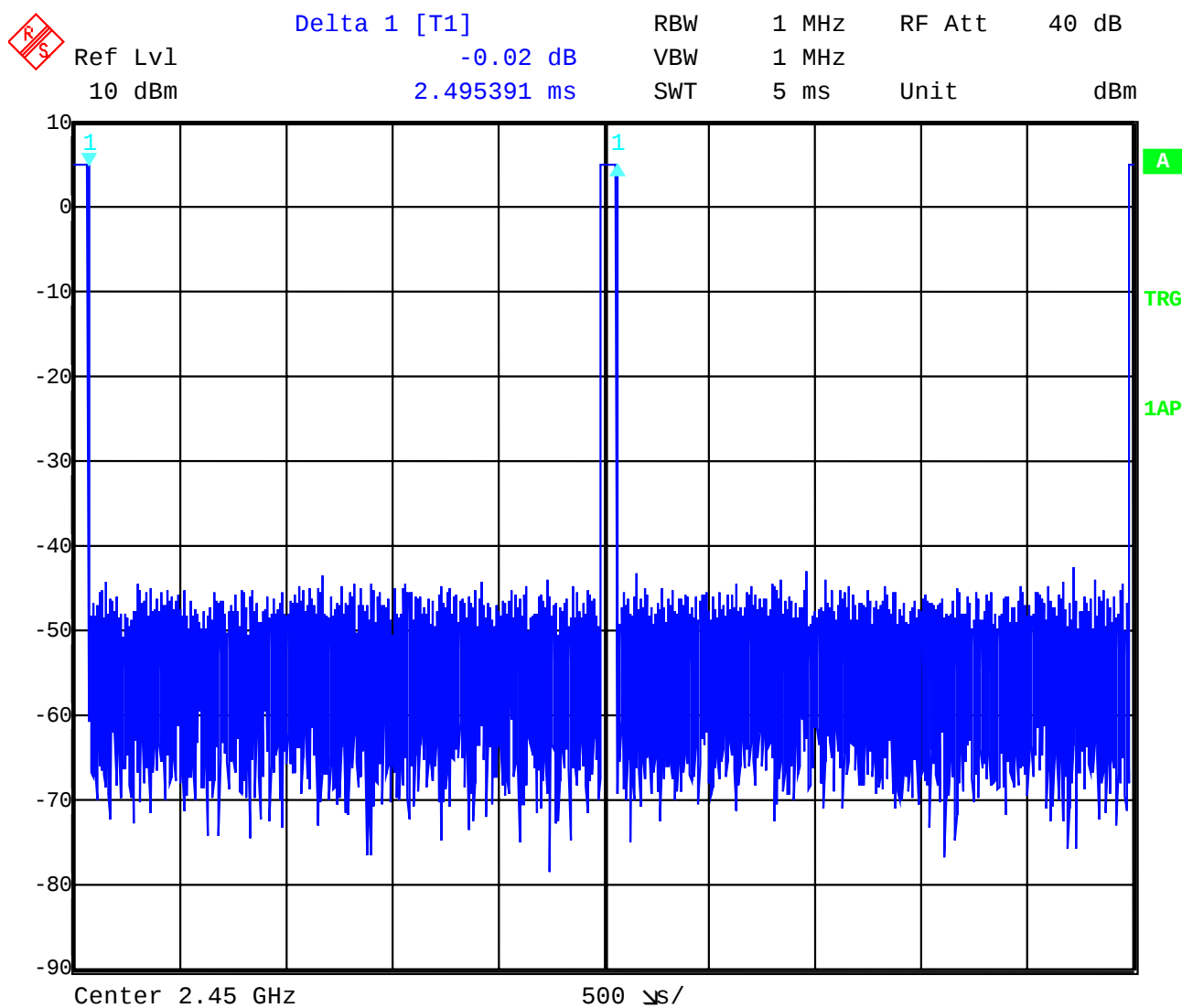
Reference Number(s) of Test Equipment Used

17 - 24, 64

Verdict :	Spurious emission level is kept
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Equipment under test: IRM80
Ambient temperature: 23.0 °C
Relative humidity: 41.0 %

Duty Cycle



Date: 04.MAY.2004 12:31:58

T on = 0.075 ms

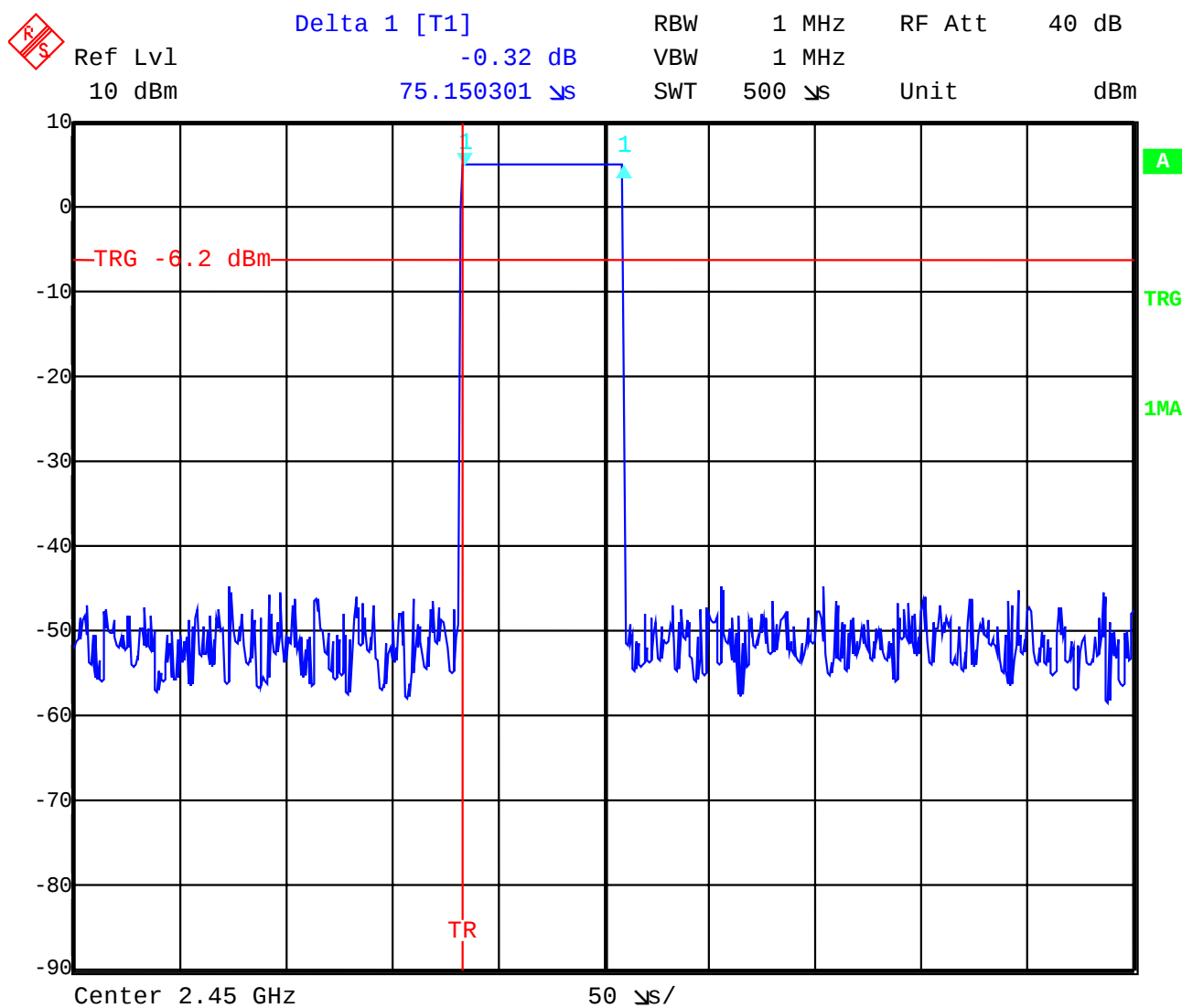
T off = 2.495 ms

Reference Number(s) of Test Equipment Used

64

Equipment under test: IRM80
Ambient temperature: 23.0 °C
Relative humidity: 41.0 %

Duty Cycle



Date: 04.MAY.2004 12:32:47

T on = 0.075 ms

T off = 2.495 ms

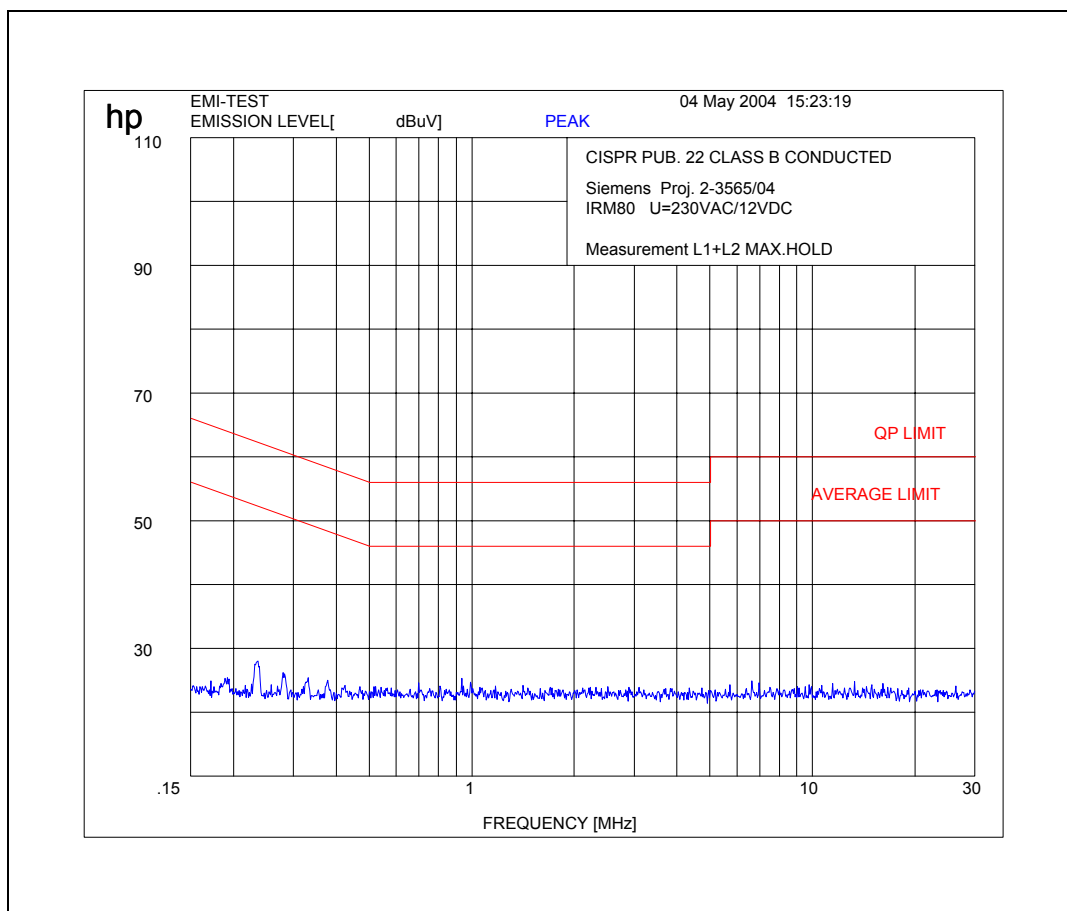
Reference Number(s) of Test Equipment Used

64

Equipment under test: IRM80
 Ambient temperature: 23.0 °C
 Relative humidity: 41.0 %

Conducted spurious frequencies 150 kHz - 30 MHz

§ 15.207



Limits

SUBCLAUSE § 15.207

Frequency range (MHz)	Conducted Limits (dB μ V)	
	Quasi-peak	Average
0.150 to 0.500	66 to 56	56 to 46
0.500 to 5.000	56	46
5.000 to 30.000	60	50

Verdict : Conducted voltage level is kept

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

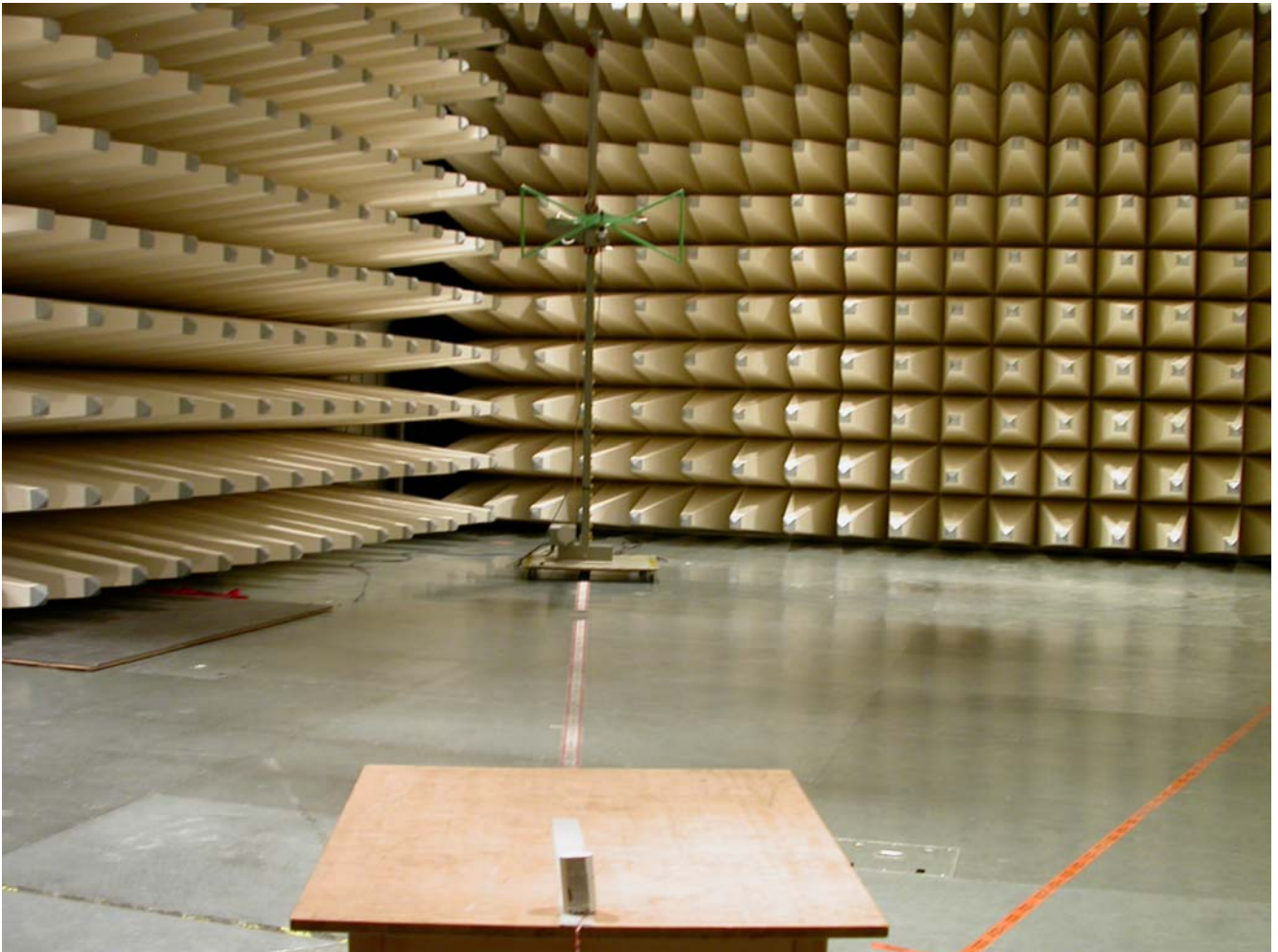
No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	8566 A	Hewlett-Packard	1925A00257
02	Analyzer Display	8566 A	Hewlett-Packard	1925A00860
03	Oscilloscope	7633	Tektronix	230054
04	Radio Analyzer	CMTA 54	Rohde & Schwarz	894 043/010
05	System Power Supply	6038 A	Hewlett-Packard	2848A07027
06	Signal Generator	8111 A	Hewlett-Packard	2215G00867
07	Signal Generator	8662 A	Hewlett-Packard	2224A01012
08	Funktionsgenerator	AFGU	Rohde & Schwarz	862 480/032
09	Regeltrenntrafo	MPL	Erfi	91350
10	Netznachbildung	NNLA 8120	Schwarzbeck	8120331
11	Relais-Matrix	PSU	Rohde & Schwarz	893 285/020
12	Power-Meter	436 A	Hewlett-Packard	2101A12378
13	Power-Sensor	8484 A	Hewlett-Packard	2237A10156
14	Power-Sensor	8482 A	Hewlett-Packard	2237A00616
15	Modulationsmeter	9008	Racal-Dana	2647
16	Frequenzzähler	5340 A	Hewlett-Packard	1532A03899
17	Absorber Schirmkabine	---	MWB	87400/002
18	Spectrum Analyzer	85660 B	Hewlett-Packard	2747A05306
19	Analyzer Display	85662 A	Hewlett-Packard	2816A16541
20	Quasi Peak Adapter	85650 A	Hewlett-Packard	2811A01131
21	RF-Preselector	85685 A	Hewlett-Packard	2833A00768
22	Biconical Antenne	3104	Emco	3758
23	Log. Per. Antenne	3146	Emco	2130
24	Double Ridge Horn	3115	Emco	3088
25	EMI-Testreceiver	ESAI	Rohde & Schwarz	863 180/013
26	EMI-Analyzer-Display	ESAI-D	Rohde & Schwarz	862 771/008
27	Biconical Antenne	HK 116	Rohde & Schwarz	888 945/013
28	Log. Per. Antenne	HL 223	Rohde & Schwarz	825 584/002
29	Relais-Switch-Unit	RSU	Rohde & Schwarz	375 339/002
30	Highpass	HM985955	FSY Microwave	001
31	Amplifier	P42-GA29	Tron-Tech	B 23602
32	Absorber Schirmkabine		Frankonia	
33	Steuerrechner	PSM 7	Rohde & Schwarz	834 621/004
34	EMI Test Reciever	ESMI	Rohde & Schwarz	827 063/010
35	EMI Test Receiver	Display	Rohde & Schwarz	829 808/010

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
36	Controler	HD 100	Deisel	100/322/93
37	Relais Matrix	PSN	Rohde & Schwarz	829 065/003
38	Control Unit	GB 016 A2	Rohde & Schwarz	344 122/008
39	Relais Switch Unit	RSU	Rohde & Schwarz	316 790/001
40	Power Supply	6032A	Hewlett Packard	2846A04063
41	Spektrum Monitor	EZM	Rohde & Schwarz	883 720/006
42	Meßempfänger	ESH 3	Rohde & Schwarz	890 174/002
43	Meßempfänger	ESVP	Rohde & Schwarz	891 752/005
44	Biconi Ant. 20-300MHz	HK 116	Rohde & Schwarz	833 162/011
45	Logper Ant. 0.3-1 GHz	HL 223	Rohde & Schwarz	832 914/010
46	Amplifier 0.1-4 GHz	AFS4	Miteq Inc.	206461
47	Logper Ant. 1-18 GHz	HL 024 A2	Rohde & Schwarz	342 662/002
48	Polarisationsnetzwerk	HL 024 Z1	Rohde & Schwarz	341 570/002
49	Double Ridge G Horn Antenne 1-26.5 GHz	3115	EMCO	9107-3696
50	Microw. Sys. Amplifier 0.5- 26.5 GHz	8317A	Hewlett Packard	3123A00105
51	Spectrum Analyzer	8562A	Hewlett Packard	2809AO2682
52	Steuerrechner	PSM 7	Rohde & Schwarz	883 086/026
53	DC V-Netzwerk	ESH3-Z6	Rohde & Schwarz	861 406/005
54	DC V-Netzwerk	ESH3-Z6	Rohde & Schwarz	893 689/012
55	AC 2 Phasen V-Netzwerk	ESH3-Z5	Rohde & Schwarz	861 189/014
56	AC 2 Phasen V-Netzwerk	ESH3-Z5	Rohde & Schwarz	894 981/019
57	AC-3 Phasen V-Netzwerk	ESH2-Z5	Rohde & Schwarz	882 394/007
58	Stromversorgung	6032A	Rohde & Schwarz	2933A05441
59	HF-Test Empfänger	ESVP.52	Rohde & Schwarz	881 487/021
60	Spectrum Monitor	EZM	Rohde & Schwarz	883 086/026
61	HF-Test Empfänger	ESH3	Rohde & Schwarz	881 515/002
62	Relais Matrix	PSU	Rohde & Schwarz	882 943/029
63	Relais Matrix	PSU	Rohde & Schwarz	828 628/007
64	Spectrum Analyzer	FSIQ 26	Rohde & Schwarz	119.6001.27
65	Spectrum Analyzer	HP 8565E	Hewlett Packard	3473A00773
66				

Test set-up for radiation measurements



Photos of Equipment







