TÜV ÖSTERREICH

Division Medical Technology/ Communication Technology/ EMC

Testing Body for Communication Technology/ EMC

Prüfzentrum Wien
A-1230 Wien
Deutschstraße 10

Tel.: +43 1 / 610 91
Fax: Ext. 6505
Mail: office@tuev.or.at

Accredited Testing Laboratory, Inspection Body, Certification Body, Calibration Body

Notified Body 0408

TEST REPORT

of the accredited test laboratory

TÜV Nr.:M/EMV-06/144

about

the following EMC - test/- research

Applicant: FREQUENTIS Ges.m.b.H
Spittelbreitengasse 34
A-1120 Vienna

Product: VCS 3020 X Rel. 4.1 (product name for USA)
VCS 3020 X Rel. 5.x (product name for europa)

+ Operator Positions: EPOSA 04.40; EPOSA 04.50;
cPOS 02.00; cPOS 02.10;
PP 04.H.64
+ Interfaces: ERIF 04.00; GPIF 04.00
+ Peripherals: PIPS 09.00; D-LAP XM

Standard: EN 55022:1998+ A1:2000+ A2:2003;
IEC/CISPR 22:1997+ A1:2000+ A2:2002;
FCC Part 15 February 1, 2006 Edition;
ICES-003 Issue 4 Feb. 2004; EN 55024:1998+ A1:2001+ A2:2003;
EN 61000-6-2:2001; EN 61000-6-3:2001

TÜV Österreich
Test laboratory for EMC

Supervisor of EMC-laboratory

Official seal

Checked by

Ing. Wilhelm Seier 12.04.2006 Ing. Michael Emminger

Copy Nbr.: 01

The results of this test report only refer to the provided equipment.

DVR 0047 333
UID ATU 37086005

TÜV ÖSTERREICH

Contents

TÜV ÖSTERREICH

1. Applicant

Company	FREQUENTIS Ges.m.b.H
Department	
Address	A-1120 Vienna; Spittelbreitengasse 34
Contact person	Dipl.-Ing. FH Gerald Herndl

EUT received on	23.3.2006
Tests were performed on	23. to 28.03.2006

TÜV ÖSTERREICH

2. Description of EUT

EUT	VCS 3020 X Rel. 4.1 (product name for USA) VCS 3020 X Rel. 5.x (product name for europa) + Operator Positions: EPOSA 04.40; EPOSA 04.50; cPOS 02.00; cPOS 02.10; PP 04.H.64 + Interfaces: ERIF 04.00; GPIF 04.00 + Peripherals: PIPS 09.00; D-LAP XM
Serial Number	---
Manufacturer	FREQUENTIS Ges.m.b.H A-1120 Vienna; Spittelbreitengasse 34
Description	FREQUENTIS Ges.m.b.H provided the following configuration for the measurements: Voice communication system built into a 19" cabinet. Operator positions for console. For a detailed description see Appendix 4
Operating mode	The measurements were carried out at the following running states: Normal operation with the following connections made: GPIF 04.00 – ERIF 04.00 ERIF 04.00 – Radio simulator box Operator positions Digital Switch – TMCS PC During testing active connections were establilshed and monitored. Via the TMCS (technical monitoring and control system) the status of the system was monitored. Emission testing was made with setup 1 to 4. Setup 5 to 7 was used for immunity testing. Each operator position was tested separately for radiated emissions (setup 1 to 3) with the cabinet placed outside the chamber. The operator positions were connected with the digital switch (cabinet) over 2 Mb cabling.

TÜV ÖSTERREICH

3. Standards / Final result

Name	Title	Deviation	Result
EN 55022:1998 + A1:2000 + A2:2003	Information technology equipment Radio disturbance characteristics Limits and methods of measurement	none	OK
IEC/CISPR 22:1997 + A1:2000 + A2:2002	Information technology equipment Radio disturbance characteristics Limits and methods of measurement	none	OK
FCC Part 15 February 1, 2006 Edition	Radio Frequency Devices	none	OK
ICES-003 Issue 4 Feb. 2004	Digital Apparatus	none	OK
EN 55024 :1998 + A1 :2001 + A2 :2003	Information technology equipment Immunity characteristics Limits and methods of measurement	Some tests were performed with higher levels, so that the equipment shows a better immunity level.	OK
EN 61000-6-2 :2001	Electromagnetic compatibility (EMC) Part 6-2: Generic Standards Immunity for industrial environments	none	OK
EN 61000-6-3 :2001	Electromagnetic compatibility (EMC) Part 6-3: Generic Standards Emission standard for residential, commercial and light-industrial environments	none	OK
OK EUT passed NOK EUT failed			

4. Test results

4. 1.) Conducted emission on the power-supply-line

Class B Limits

Frequeny range	Limit Class B	
Detector	Quasi Peak	Average
0,150 – 0,5 MHz	66 – 56 dBµV decreasing with the logarithm of frequency	56 – 46 dBµV decreasing with the logarithm of frequency
0,5 – 5 MHz	56 dBµV	46 dBµV
5 – 30 MHz	60 dBµV	50 dBµV
Remark:	Quasi Peak and Average limits must be both met	

An AC mains line filter is needed for the equipment to meet the limit.
Filter: Schaffner FN 670-6/06

Measuring apparatus parameters

Parameter	Preview measurement	Final measurement	Parameter	Preview measurement	Final measurement
Start frequency	150 kHz	150 kHz	Detector	MP/AV	QP/AV
Stop frequency	30 MHz	30 MHz	Measuring time	10 ms	1 s
Stepsize	5 kHz	5 kHz	RF-attenuation	0dB	0dB
IF- Bandwidth	9 kHz	9 kHz	Preamplifier	0 dB	0 dB

Operating mode	Measuring result
Normal operation	Measurement diagram 1

TÜV ÖSTERREICH

Test result

4. 1.1.) Measurement with QP-Detector

Due to the large margin of the prescan measurements, no final assessment was conducted.

4. 1.2.) Measurement with AV-Detector

Due to the large margin of the prescan measurements, no final assessment was conducted.

TÜV ÖSTERREICH

4. 2.) Conducted emission on the power-supply-line

Class A Limits

Frequeny range	Limit Class A	
Detector	Quasi Peak	Average
0,150 – 0,5 MHz	79 dBµV	66 dBµV
0,5 – 30 MHz	73 dBµV	60 dBµV
Remark:	Quasi Peak and Average limits must be both met	

Measuring apparatus parameters

Parameter	Preview measurement	Final measurement	Parameter	Preview measurement	Final measurement
Start frequency	150 kHz	150 kHz	Detector	MP/AV	QP/AV
Stop frequency	30 MHz	30 MHz	Measuring time	10 ms	1 s
Stepsize	5 kHz	5 kHz	RF-attenuation	0dB	0dB
IF- Bandwidth	9 kHz	9 kHz	Preamplifier	0 dB	0 dB

Operating mode	Measuring result
Normal operation	Measurement diagram 2

TÜV ÖSTERREICH

Test result

4. 2.1.) Measurement with QP-Detector

Frequency MHz	Level dBµV	Limit dBµV	Margin dB	Exceed-Mark	Phase	PE
0,175	61,1	79	17,9		N	GND

4. 2.2.) Measurement with AV-Detector

Frequency	Level	Limit	Margin	Exceed-	Phase	PE
0,175	57,4	66	8,6		L	GND
0,26	41,9	66	24,1		N	GND
0,85	36,0	60	24		L	GND

4. 3.) Telecom-Port Conducted Emissions

Class B Limits

Frequeny range	Limit Class B	
Detector	Quasi Peak	Average
0,150 – 0,5 MHz	40 – 30 dBµA decreasing with the logarithm of frequency	30 – 20 dBµA decreasing with the logarithm of frequency
0,5 – 30 MHz	30 dBµA	20 dBµA
Remark:	Quasi Peak and Average limits must be both met	

Measuring apparatus parameters

Parameter	Preview measurement	Final measurement	Parameter	Preview measurement	Final measurement
Start frequency	150 kHz	150 kHz	Detector	MP/AV	QP/AV
Stop frequency	30 MHz	30 MHz	Measuring time	10 ms	1 s
Stepsize	5 kHz	5 kHz	RF-attenuation	0dB	0dB
IF- Bandwidth	9 kHz	9 kHz	Preamplifier	0 dB	0 dB

Operating mode	Measuring result
Normal operation Measurement on ERIF 04.00 line Measurement on GPIF 04.00 line	Measurement diagram 3 → ERIF 04.00 Measurement diagram 4 → GPIF 04.00

TÜV ÖSTERREICH

Test result

4. 3.1.) Measurement with QP-Detector on ERIF line

Due to the large margin of the prescan measurements, no final assessment was conducted.

4. 3.2.) Measurement with QP-Detector on GPIF line

Due to the large margin of the prescan measurements, no final assessment was conducted.

4. 3.3.) Measurement with AV-Detector on ERIF line

Due to the large margin of the prescan measurements, no final assessment was conducted.

4. 3.4.) Measurement with AV-Detector on GPIF line

Due to the large margin of the prescan measurements, no final assessment was conducted.

4. 4.) Radiated emission

Class B Limits

Frequency range	Limit (quasi peak) *
30 – 230 MHz	39,6 dBµV/m
230 – 1000 MHz	46,6 dBµV/m

*) Because the measurements were done at a measurement distance of 3m the limit was increased by a factor of 9,6 dB. This is still class B limit.

Measuring apparatus parameters

Parameter	Preview measurement	Final measurement	Parameter	Preview measurement	Final measurement
Start frequency	30 MHz	30 MHz	Detector	Max Peak	Quasi Peak
Stop frequency	1000 MHz	1000 MHz	Measuring time	10 ms	1 s
Stepsize	50 kHz	50 kHz	RF-attenuation	0dB	0dB
IF- Bandwidth	120 kHz	120 kHz	Preamplifier	20 dB	20 dB

Operating mode	Measuring result
Setup Nr. 1 (see appendix 4)	Measurement diagram 5 + 6
Setup Nr. 2 (see appendix 4)	Measurement diagram 7 + 8
Setup Nr. 3 (see appendix 4)	Measurement diagram 9 + 10
Setup Nr. 4 (see appendix 4)	Measurement diagram 11 + 12

TÜV ÖSTERREICH

Test result

4. 4.1.) Measurement with QP-Detector (30 MHz – 1000 MHz) **Setup Nr. 1**

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark	Height cm	Azimuth deg	Polarization
31,9	28,7	39,6	10,9		104	45	Vertical
41,35	25,2	39,6	14,4		109	12	Vertical
81,95	34,1	39,6	5,5		400	9	Horizontal
122,9	33,6	39,6	6,0		296	30	Horizontal
163,85	35,2	39,6	4,4		198	278	Horizontal
200,0	35,2	39,6	4,4		242	225	Horizontal
327,65	39,6	46,6	7,0		190	45	Vertical
450,55	42,1	46,6	4,5		250	15	Horizontal
573,45	41,4	46,6	5,2		104	11	Vertical
655,35	39,4	46,6	7,2		102	0	Vertical
696,35	44,2	46,6	2,4		147	315	Vertical

4. 4.2.) Measurement with QP-Detector (30 MHz – 1000 MHz) **Setup Nr. 2**

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark	Height cm	Azimuth deg	Polarization
30,2	30,7	39,6	8,9		100	315	Vertical
135,1	28,1	39,6	11,5		100	50	Vertical
168,4	27,3	39,6	12,3		213	135	Horizontal
200	29,1	39,6	10,5		100	0	Vertical
333,35	35,6	46,6	11,0		100	160	Horizontal
885,75	25,6	46,6	21,0		142	20	Vertical

TÜV ÖSTERREICH

4. 4.3.) Measurement with QP-Detector (30 MHz – 1000 MHz) **Setup Nr. 3**

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark	Height cm	Azimuth deg	Polarization
35,55	27,6	39,6	12,0		109	45	Vertical
40,0	39,5	39,6	0,1		100	355	Vertical
44,45	27,2	39,6	12,4		100	45	Vertical
66,25	13,0	39,6	26,6		119	215	Horizontal
106,9	16,1	39,6	23,5		393	213	Horizontal
200,0	39,4	39,6	0,2		100	42	Vertical
208,95	30,4	39,6	9,2		102	150	Vertical
228,55	34,5	39,6	5,1		100	32	Vertical
231,2	33,5	46,6	13,1		100	24	Vertical
234,6	23,7	46,6	22,9		104	0	Vertical
240,0	44,3	46,6	2,3		102	355	Vertical

TÜV ÖSTERREICH

4. 4.4.) Measurement with QP-Detector (30 MHz – 200 MHz) **Setup Nr. 4**

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark	Height cm	Azimuth deg	Polarization
30,6	24,2	39,6	15,4		157	152	Vertical
33,45	39,0	39,6	0,6		101	165	Vertical
36,1	39,4	39,6	0,2		126	226	Vertical
38,95	38,9	39,6	0,7		100	257	Vertical
39,65	34,2	39,6	5,4		101	135	Vertical
45,25	39,1	39,6	0,5		103	90	Vertical
47,25	30,8	39,6	8,8		102	316	Vertical
50,45	30,3	39,6	9,3		156	315	Vertical
54,15	30,0	39,6	9,6		132	225	Vertical
58,7	38,3	39,6	1,3		140	45	Vertical
70,9	34,5	39,6	5,1		100	140	Vertical
74,8	26,3	39,6	13,3		100	225	Vertical
85,3	18,4	39,6	21,2		377	135	Horizontal
91,5	23,3	39,6	16,3		175	308	Vertical
92,7	23,3	39,6	16,3		185	290	Vertical
93,1	19,3	39,6	20,3		325	135	Vertical
103,6	22,2	39,6	17,4		100	259	Vertical
104,6	26,6	39,6	13,0		139	278	Vertical
150,0	36,4	39,6	3,2		100	225	Horizontal

TÜV ÖSTERREICH

4. 4.5.) Measurement with QP-Detector (20 MHz – 1000 MHz) **Setup Nr. 4**

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark	Height cm	Azimuth deg	Polarization
200,0	34,3	39,6	5,3		157	8	Horizontal
221,7	34,7	39,6	4,9		139	4	Horizontal
233,3	39,0	46,6	7,6		129	0	Vertical
266,65	38,4	46,6	8,2		154	0	Vertical
353,15	37,8	46,6	8,8		103	345	Horizontal
375,0	40,7	46,6	5,9		100	10	Vertical
400,0	40,1	46,6	6,5		112	0	Vertical
450,0	42,4	46,6	4,2		101	11	Vertical
600,0	41,6	46,6	5,0		106	11	Horizontal
625,0	41,8	46,6	4,8		104	27	Horizontal

4. 5. Radiated emission

Limits according to FCC Part 15

	≤ 1 GHz → Quasi Peak Limit > 1 GHz → Average Limit (Peak Limit 20 dB above average Limit)		
Frequency range	Limit	Bandwith	Measurement distance
30 – 88 MHz	100 µV/m	120 kHz	3 m
88 – 216 MHz	150 µV/m	120 kHz	3 m
216 – 960 MHz	200 µV/m	120 kHz	3 m
960 MHz - 1000 MHz	500 µV/m	120 kHz	3 m
Above 1000 MHz	500 µV/m	1 MHz	3 m

Operating mode	Measuring result
Setup Nr. 1 (see appendix 4)	Measurement diagram 13 + 15
Setup Nr. 2 (see appendix 4)	Measurement diagram 16 + 18
Setup Nr. 3 (see appendix 4)	Measurement diagram 19 + 21
Setup Nr. 4 (see appendix 4)	Measurement diagram 22 + 24

TÜV ÖSTERREICH

Test result

4. 5.1.) Measurement with QP-Detector (30 MHz – 1000 MHz) **Setup Nr. 1**

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark	Height cm	Azimuth deg	Polarization
31,9	28,7	40	11,3		104	45	Vertical
41,35	25,2	40	14,8		109	12	Vertical
81,95	34,1	40	5,9		400	9	Horizontal
122,9	33,6	43,5	9,9		296	30	Horizontal
163,85	35,2	43,5	8,3		198	278	Horizontal
200,0	35,2	43,5	8,3		242	225	Horizontal
327,65	39,6	46	6,4		190	45	Vertical
450,55	42,1	46	3,9		250	15	Horizontal
573,45	41,4	46	4,6		104	11	Vertical
655,35	39,4	46	6,6		102	0	Vertical
696,35	44,2	46	1,8		147	315	Vertical

4. 5.2.) Measurement with QP- and AV-Detector (1000 MHz – 2000 MHz) **Setup Nr. 1**

Due to the large margin of the premeasurements to the limit, no final assessment was made.

TÜV ÖSTERREICH

4. 5.3.) Measurement with QP-Detector (30 MHz – 1000 MHz) **Setup Nr. 2**

Frequency MHz	Level dBµV/m	Limit dBµV/m	Margin dB	Exceed-Mark	Height cm	Azimuth deg	Polarization
30,2	30,7	40	9,3		100	315	Vertical
135,1	28,1	43,5	15,4		100	50	Vertical
168,4	27,3	43,5	16,2		213	135	Horizontal
200	29,1	43,5	14,4		100	0	Vertical
333,35	35,6	46	10,4		100	160	Horizontal
885,75	25,6	46	20,4		142	20	Vertical

4. 5.4.) Measurement with QP- and AV-Detector (1000 MHz – 2000 MHz) **Setup Nr. 2**

Due to the large margin of the premeasurements to the limit, no final assessment was made.