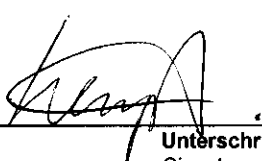


Prüfbericht - Nr.: <i>Test Report No.</i>		14004100 002		Seite 1 von 19 Page 1 of 19	
Auftraggeber: <i>Client:</i>		Gigawavetech Pte Ltd. 1 Jalan Kilang Timor #07-02 Pacific Tech Centre Singapore			
Gegenstand der Prüfung: <i>Test item:</i>		Class 1 Bluetooth Adapter			
Bezeichnung: CF-II-1 <i>Identification:</i>		Serien-Nr.: <i>Serial No.</i>		Engineering sample	
Wareneingangs-Nr.: 030311026 <i>Receipt No.:</i>		Eingangsdatum: 11.3.2003 <i>Date of receipt:</i>			
Prüfört: <i>Testing location:</i>		Refer to section 4.1			
Prüfgrundlage: <i>Test specification:</i>		FCC Part 15, Subpart C ANSI C63.4-1992 CISPR 22:1997			
Prüfergebnis: <i>Test Result</i>		Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage. The a. m. test item passed.			
geprüft / tested by: Hugo Wan		kontrolliert / reviewed by Stephan Wald			
23.09.2003 Datum Date		 Unterschrift Signature		23.09.2003 Datum Date	
				 Unterschrift Signature	
Sonstiges / Other Aspects:					
Abkürzungen: OK, Pass = entspricht Prüfgrundlage Fail = entspricht nicht Prüfgrundlage N/A = nicht anwendbar Abbreviations: OK, Pass = passed Fail = failed N/A = not applicable					
Dieser Prüfbericht bezieht sich nur auf den o.g. Prüfgegenstand und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report relates to the a. m. test item. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products. Authorized format 16.12.1996, R.M.					

1 Test Summary

7.1.1 ANTENNA CONNECTOR SUBCLAUSE 15.203

7.1.2 ANTENNA TYPE SUBCLAUSE 15.204

7.1.3 DISTURBANCE VOLTAGE ON AC MAINS SUBCLAUSE 15.207(A)

RESULT: N/A

Limit Subclause 15.207(a)

7.1.4 CARRIER FREQUENCY SEPERATION SUBCLAUSE 15.247(A)(1)

Limit Subclause 15.247(a)(1)

7.1.5 DWELL TIME SUBCLAUSE 15.247(A)(1)(III)

RESULT: Pass

Limit Subclause 15.247(a)(1)(iii)

7.1.6 20dB BANDWIDTH SUBCLAUSE 15.247(A)(1)

RESULT: Pass

Limit Subclause 15.247(a)(1)(ii)

7.1.7 HOPPING SEQUENCE SUBCLAUSE 15.247(A)(1)

7.1.8 RECEIVER INPUT BANDWIDTH SUBCLAUSE 15.247(A)(1)

7.1.9 PEAK OUTPUT POWER SUBCLAUSE 15.247(B)(1)

RESULT: Pass

Limit Subclause 15.247(b)(1)

7.1.10 BAND EDGE COMPLIANCE SUBCLAUSE 15.247(C)

RESULT: Pass

Limit Subclause 15.247(c)

7.1.11 SPURIOUS CONDUCTED EMISSIONS SUBCLAUSE 15.247(C)

RESULT: Pass

Limit Subclause 15.247(c)

7.1.12 SPURIOUS RADIATED EMISSIONS SUBCLAUSE 15.247(C)

RESULT: Pass

Limit Subclause 15.247(c)

2 Contents

1	TEST SUMMARY	2
2	CONTENTS	3
3	GENERAL REMARKS	4
3.1	COMPLEMENTARY MATERIALS.....	4
4	TEST SITES	4
4.1	TEST FACILITIES	4
4.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS	5
5	GENERAL PRODUCT INFORMATION	6
5.1	PRODUCT FUNCTION AND INTENDED USE	6
5.2	RATINGS AND SYSTEM DETAILS	6
5.3	INDEPENDENT OPERATION MODES	6
5.4	SUBMITTED DOCUMENTS	7
6	TEST SET-UP AND OPERATION MODE	7
6.1	PRINCIPLE OF CONFIGURATION SELECTION	7
6.2	TEST OPERATION AND TEST SOFTWARE.....	7
6.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	7
7	TEST RESULTS.....	7
7.1.1	<i>Antenna connector Subclause 15.203</i>	<i>8</i>
7.1.2	<i>Antenna type Subclause 15.204.....</i>	<i>8</i>
7.1.3	<i>Disturbance voltage on AC mains Subclause 15.207(a).....</i>	<i>9</i>
7.1.4	<i>Carrier frequency seperation Subclause 15.247(a)(1).....</i>	<i>10</i>
7.1.5	<i>Dwell time Subclause 15.247(a)(1)(iii).....</i>	<i>11</i>
7.1.6	<i>20dB bandwidth Subclause 15.247(a)(1)</i>	<i>12</i>
7.1.7	<i>Hopping sequence Subclause 15.247(a)(1).....</i>	<i>13</i>
7.1.8	<i>Receiver input bandwidth Subclause 15.247(a)(1)</i>	<i>14</i>
7.1.9	<i>Peak output power Subclause 15.247(b)(1)</i>	<i>15</i>
7.1.10	<i>Band edge compliance Subclause 15.247(c)</i>	<i>16</i>
7.1.11	<i>Spurious conducted emissions Subclause 15.247(c)</i>	<i>17</i>
7.1.12	<i>Spurious radiated emissions Subclause 15.247(c)</i>	<i>18</i>

3 General Remarks

3.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test Results

Appendix 2: Test Setup

Appendix 3: EUT Photos

Appendix 4: FCCID Label, Block Diagram and Schematics

4 Test Sites

4.1 Test Facilities

Hong Kong Productivity Council
HKPC Building
78 Tat Chee Avenue
Kowloon
Hong Kong

4.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

	Kind of Equipment	Manufacturer	Type	S/N
☒	Test Receiver	Rohde & Schwarz	ESH-3	890173/033
☒	L/I/S/N	Rohde & Schwarz	ESH 3-Z5	849876/026
☐	Oscilloscope	HP	54713B	US34510455
☐	Test Receiver	Rohde & Schwarz	ESVP	882402/033
☐	Absorbing Clamp	Rohde & Schwarz	MDS-21	979 3/4
☒	Test Receiver	Rohde & Schwarz	ESVS30	842807/009
☒	Biconical Antenna	Rohde & Schwarz	HK116	841489/015
☒	Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/017
☐	Universal Power Analyzer	Voltech	PM3000A	9915
☐	Reference Impedance Network	Voltech	IEC 555 Standard	9946
☐	AC Power Source	California Instr.	4500L	HK51895
☐	Trip-Loop Antenna	Chase	LLA6142	1019
☒	Double Ridge Horn Antenna	EMCO	3115	9002-3351
☒	Double Ridge Horn Antenna	EMCO	3116	9002-3347
☐	RF Comms Test Set	HP	8920B	US36492628
☐	Spectrum Analyser + Tracking Gen.	HP	8596E	3639A00758
☒	Signal Generator	Rohde & Schwarz	SMY 01	844146/024
☒	Signal Generator	Rohde & Schwarz	SMY 01	844146/023
☐	BiLog Antenna	EMCO	3143	9607-1287
☐	Isotropic Field Probe	Holladay	HI-4422	90956
☐	Power Amplifier	Kalmus	757-LC	7620-1
☐	Power Amplifier	Kalmus	122-FC	7620-2
☐	Coupling Clamp	Schaffner	CDN 126	312
☐	Couple Device Network	Fischer	CDN-M2	9604
☒	Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30
☐	Temperature Chamber	Binder	MK 240	9020-0028
☐	EFT,ESD,SURGE, DIPS tester	Schaffner	Best 96	IN3796-011

5 General Product Information

5.1 Product Function and Intended Use

The submitted sample is a Bluetooth CompactFlash adapter which adds Bluetooth functionality to the handheld or laptop PC with CompactFlash adapter or PCMCIA slot.

Bluetooth is a short-range radio link intended to be a cable replacement between portable and/or fixed electronic devices.

Bluetooth operates in the unlicensed ISM Band at 2.4 GHz. In the US a band of 83.5 MHz width is available. In this band, 79 RF channels spaced 1MHz apart are defined.

The channel is represented by a pseudo-random hopping sequence through the 79 channels. The channel is divided into time slots, with a nominal slot length of 625µs, where each slot corresponds to different RF hop frequencies. The nominal hop rate is 1600 hops/s. The symbol rate on the channel is 1 Ms/s.

5.2 Ratings and System Details

	Receiver	Transmitter
Frequency range	: 2402 - 2480MHz	2402 - 2480MHz
Number of channels	: 79	79
Channel separation	: 1MHz	1MHz
Type of antenna	: Surface mount chip antenna	Surface mount chip antenna
Power supply	: Host supply	Host supply

5.3 Independent Operation Modes

- a) Inquiry scan
- b) Page scan
- c) Connection state:
ACL link

For further information, please refer to the user manual.

5.4 Submitted Documents

Schematics
Block Diagram
PCB Layout
User manual

6 Test Set-up and Operation Mode

6.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

6.2 Test Operation and Test Software

Refer to Test set-up in chapter 7.

6.3 Special Accessories and Auxiliary Equipment

A PCMCIA card with a CF card slot is accompanying with the sample equipment.
During the test, a laptop computer is used with the PCMCIA card and the EUT.

1. Laptop Computer: Toshiba Portege 4010
Model number: PP401T-0TEL9
Serial number: 92015403J
Voltage supply: DC 15V
2. Laptop Computer: Sharp ACTIUS Notebook Computer
Model number: PC-A280
Serial number: 90016549
Voltage supply: DC 22V

7 Test Results

7.1.1 Antenna connector

Subclause 15.203

The EUT has no antenna connector.

7.1.2 Antenna type

Subclause 15.204

The EUT has a surface mount chip antenna soldered to the circuit board. The antenna gain is 1.65 dBi.

7.1.3 Disturbance voltage on AC mains

Subclause 15.207(a)

RESULT:

N/A

Test Specification : CISPR 22: 1997
 Mode of operation : Normal operating mode (hopping on)
 Port of testing : AC power port of charger of the notebook computer
 Supply voltage : AC 110V
 Temperature : 21°C
 Humidity : 51%

For Live measurement

Frequency	QP reading	QP limit	Av reading	Av limit
MHz	dB μ V	dB μ V	dB μ V	dB μ V
0.192	50.3	66 – 56*	38.2	56 – 46*

For Neutral measurement

Frequency	QP reading	QP limit	Av reading	Av limit
MHz	dB μ V	dB μ V	dB μ V	dB μ V
0.258	48.4	66 – 56*	39.0	56 – 46*

* Decreases with the logarithm of the frequency.

The radio frequency voltage conducted back onto the Live and the Neutral power lines complies with the limits.

For test results refer to Appendix 1, page 32-36

Limit

Subclause 15.207(a)

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of Emission (Mhz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

7.1.4 Carrier frequency separation

Subclause 15.247(a)(1)

Test specification	:	FCC § 15.31
Mode of operation	:	Tx mode (hopping on), DH1 packet
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	100kHz/300kHz
Supply voltage	:	DC 3,3V
Temperature	:	22°C
Humidity	:	49%

The centre frequencies of the hopping channels are separated by 1MHz.
For test results refer to Appendix 1, page 1-2

Limit

Subclause 15.247(a)(1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

7.1.5 Dwell time

Subclause 15.247(a)(1)(iii)

RESULT:

Pass

Test specification	:	FCC § 15.31
Mode of operation	:	Tx mode (2441MHz), DH5 packet
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	1MHz/3MHz
Supply voltage	:	DC 3,3V
Temperature	:	22°C
Humidity	:	49%

The screenshot in Appendix1 P.5 shows the occurrence of a channel in a 12.8s time period. In inquiry and page scan mode Bluetooth is using 32 hopping channels only. The frequency was used 52 times. The dwell time for the longest supported packet type is about 3ms. As a result the average time of occupancy will not be greater than 400ms.

i.e. Time period calculation:
 $0.4 \times 32 = 12.8s$

Limit calculation:
 $52 \times 2.928 \times 10^{-3} = 152.3 \times 10^{-3} s$
 $\leq 400 \times 10^{-3} s$

For test results please refer to Appendix 1, page 3 – 5.

Limit

Subclause15.247(a)(1)(iii)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping chasnnels employed.

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 12 von 19
 Page 12 of 19

7.1.6 20dB bandwidth

Subclause 15.247(a)(1)

RESULT:

Pass

Test specification : FCC § 15.31
 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH5 packet
 Port of testing : Temporary antenna port
 Detector : Peak
 RBW/VBW : 30kHz/100kHz
 Supply voltage : DC 3,3V
 Temperature : 22°C
 Humidity : 49%

20dB bandwidth (MHz)		
2402	2441	2480
(0.620)-(-0.296)	(0.616)-(-0.300)	(0.624)-(-0.296)
= 0.916	= 0.916	= 0.920

For test results refer to Appendix 1, page 6 – 9.

Limit

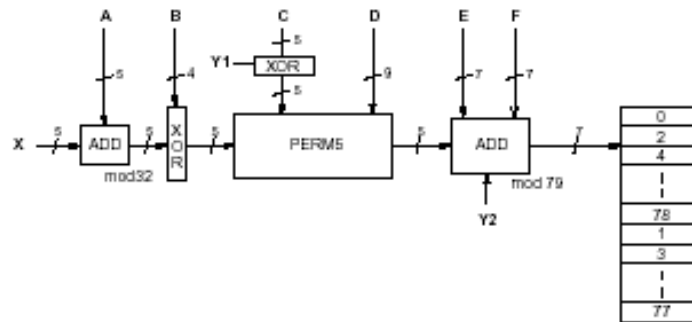
Subclause 15.247(a)(1)(ii)

The maximum 20dB bandwidth of the hopping channel is 1MHz.

7.1.7 Hopping sequence

Subclause 15.247(a)(1)

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master. The X input determines the phase in the 32-hop segment, whereas Y1 and Y2 selects between master-to-slave and slave-to-master transmission. The inputs A to D determine the ordering within the segment, the inputs E and F determine the mapping onto the hop frequencies.



Example data:

Hop sequence {k} for CONNECTION STATE:
 CLK start: 0x0000010
 ULAP: 0x00000000

#ticks: 00 02 | 04 06 | 08 0a | 0c 0e | 10 12 | 14 16 | 18 1a | 1c 1e |

0x0000010:	08 66	10 70	12 19	14 23	16 01	18 05	20 33	22 37
0x0000030:	24 03	26 07	28 35	30 39	32 72	34 76	36 25	38 29
0x0000050:	40 74	42 78	44 27	46 31	48 09	50 13	52 41	54 45
0x0000070:	56 11	58 15	60 43	62 47	64 25	66 19	68 49	70 51
0x0000090:	40 21	44 23	42 53	46 55	48 33	52 35	50 65	54 67
0x00000b0:	56 37	60 39	58 69	62 71	64 25	68 27	66 57	70 59
0x00000d0:	72 29	76 31	74 61	78 63	01 41	05 43	03 73	07 75
0x00000f0:	09 45	13 47	11 77	15 00	64 49	66 53	68 02	70 06
0x0000110:	01 51	03 55	05 04	07 08	72 57	74 61	76 10	78 14
0x0000130:	09 59	11 63	13 12	15 16	17 65	19 69	21 18	23 22
0x0000150:	33 67	35 71	37 20	39 24	25 73	27 77	29 26	31 30
0x0000170:	41 75	43 00	45 28	47 32	17 02	21 04	19 34	23 36
0x0000190:	33 06	37 08	35 38	39 40	25 10	29 12	27 42	31 44
0x00001b0:	41 14	45 16	43 46	47 48	49 18	53 20	51 50	55 52
0x00001d0:	65 22	69 24	67 54	71 56	57 26	61 28	59 58	63 60
0x00001f0:	73 30	77 32	75 62	00 64	49 34	51 42	57 66	59 74
0x0000210:	53 36	55 44	61 68	63 76	65 50	67 58	73 03	75 11
0x0000230:	69 52	71 60	77 05	00 13	02 38	04 46	10 70	12 78
0x0000250:	06 40	08 48	14 72	16 01	18 54	20 62	26 07	28 15
0x0000270:	22 56	24 64	30 09	32 17	02 66	06 74	10 19	14 27
0x0000290:	04 70	08 78	12 23	16 31	18 03	22 11	26 35	30 43
0x00002b0:	20 07	24 15	28 39	32 47	34 68	38 76	42 21	46 29
0x00002d0:	36 72	40 01	44 25	48 33	50 05	54 13	58 37	62 45
0x00002f0:	52 09	56 17	60 41	64 49	34 19	36 35	50 51	52 67
0x0000310:	38 21	40 37	54 53	56 69	42 27	44 43	58 59	60 75
0x0000330:	46 29	48 45	62 61	64 77	66 23	68 39	03 55	05 71
0x0000350:	70 25	72 41	07 57	09 73	74 31	76 47	11 63	13 00
0x0000370:	78 33	01 49	15 65	17 02	66 51	70 67	03 04	07 20
0x0000390:	68 55	72 71	05 08	09 24	74 59	78 75	11 12	15 28
0x00003b0:	76 63	01 00	13 16	17 32	19 53	23 69	35 06	39 22
0x00003d0:	21 57	25 73	37 10	41 26	27 61	31 77	43 14	47 30
0x00003f0:	29 65	33 02	45 18	49 34	19 04	21 08	23 20	25 24

7.1.8 Receiver input bandwidth

Subclause 15.247(a)(1)

The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1 MHz. The receiver bandwidth is indirectly verified during Bluetooth RF conformance testing.

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 15 von 19
 Page 15 of 19

7.1.9 Peak output power

Subclause 15.247(b)(1)

RESULT:

Pass

Test specification : FCC § 15.31
 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
 Port of testing : Temporary antenna port
 Detector : PK
 RBW/VBW : 1MHz/3MHz
 Supply voltage : DC 3,3V
 Temperature : 22°C
 Humidity : 49%

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Corrected value (dBm)
2402	12.98	5.11	18.09
2441	12.83	5.11	17.94
2480	12.06	5.11	17.17

All three transmit frequency modes comply with the maximum peak output power limit.
 For test results refer to Appendix 1, page 10 - 13

According to section 2.1093, the SAR report for the portable transmitter is included in *SAR_report.pdf* and *SAR_report_supplement.pdf*.

Limit

Subclause 15.247(b)(1)

Frequency range	RF output power
2.400-2.483,5MHz	0.125W (21.0dBm)

7.1.10 Band edge compliance

Subclause 15.247(c)

RESULT:

Pass

Test specification	:	FCC § 15.31
Mode of operation	:	Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	300kHz/1.0MHz
Supply voltage	:	DC 3,3V
Temperature	:	22°C
Humidity	:	49%

There is no peak found outside the 100kHz bandwidth of the operating frequency band in the three transmit frequency. All three transmit frequency modes comply with the limit stated in subclause 15.247(c).

For test results refer to Appendix 1, page 14 - 17

Limit

Subclause 15.247(c)

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

7.1.11 Spurious conducted emissions

Subclause 15.247(c)

RESULT:

Pass

Test specification : FCC § 15.31
 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
 Port of testing : Temporary antenna port
 Detector : PK
 RBW/VBW : 100kHz/300kHz
 Supply voltage : DC 3,3V
 Temperature : 22°C
 Humidity : 49%

Operating frequency : 2402MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
3202.48	-44.10	6.93	-51.03
4803.64	-45.44	6.93	-52.37

Operating frequency : 2441MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
3254.48	-43.25	11.63	-54.88
4881.68	-42.81	11.63	-54.44

Operating frequency : 2480MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
3306.48	-44.99	10.58	-55.57
4960.34	-46.50	10.58	-57.08

All three transmit frequency modes comply with the 20dB limit stated in subclause 15.247(c).
 For test results refer to Appendix 1, page 18 - 31

Limit

Subclause 15.247(c)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 18 von 19
Page 18 of 19

7.1.12 Spurious radiated emissions

Subclause 15.247(c)

RESULT:

Pass

Test specification : ANSI C63.4 - 1992
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Port of testing : Enclosure
Measurement Location: 10m Semi Anechoic Chamber
Measurement Distance: 3m
Measurement BW : 1 MHz
Supply voltage : DC 3,3V
Temperature : 23°C
Humidity : 55%

Tx frequency 2402MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
4804.28	50.67	32.40	3.34	33.18	0.36	53.59	54/A
4803.70	54.19	32.40	3.34	33.18	0.36	57.11	74/P

Tx frequency 2402MHz, Polarization Horizontal

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

Tx frequency 2441MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
1200.60	60.20	24.40	1.52	37.10	1.87	50.89	54/A
4881.84	47.16	32.40	3.34	33.18	0.36	50.08	54/P

Tx frequency 2441MHz, Polarization Horizontal

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

Tx frequency 2480MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
4959.84	40.74	32.40	3.34	33.18	0.36	43.66	54/A

Tx frequency 2480MHz, Polarization Horizontal

Prüfbericht - Nr.:

14004100 002

Test Report No.

Seite 19 von 19

Page 19 of 19

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

All three transmit frequency modes comply with the field strength within the restricted bands.

Limit

Subclause 15.247(c)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Field strength limits within the restricted bands using average detector:

Frequency (MHz)	Field strength (microvolts/meter)	Field strength (dB μ V/m)	Measurement distance (meters)
30-88	100	$20 \cdot \log(100) = 40.0$	3
88-216	150	$20 \cdot \log(150) = 43.5$	3
216-960	200	$20 \cdot \log(200) = 46.0$	3
960-2500	500	$20 \cdot \log(500) = 54.0$	3

According to section 15.35(b), on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit for the frequency being investigated.



Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 1 von 36
Page 1 of 36

Carrier Frequency Separation

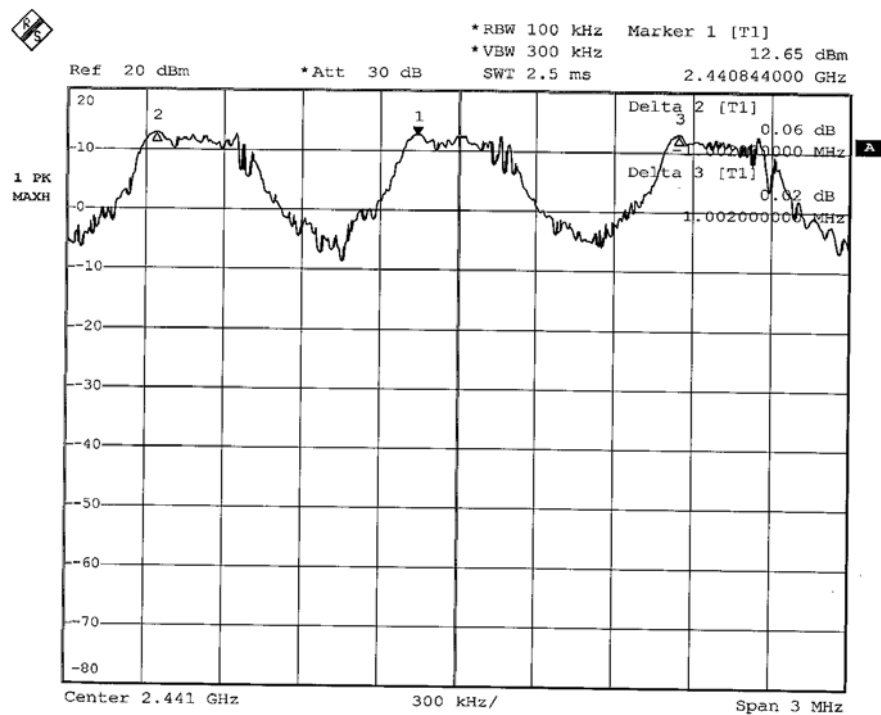
Date: 15 Jul 03
EUT: Bluetooth CF card (CF-II-1)
Company: Gigawavetech Pte Ltd.
Humidity: 49%
Temperature: 22°C
Voltage supply: 3.3V
Test by: Hugo Wan
Initial conditions: Hopping on

Reference frequency (MHz)	Channel Separation (MHz)	Results
2440 844	1.002	Passed

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 2 von 36
 Page 2 of 36



Date: 15.JUL.2003 18:26:19



Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 3 von 36
Page 3 of 36

Dwell Time

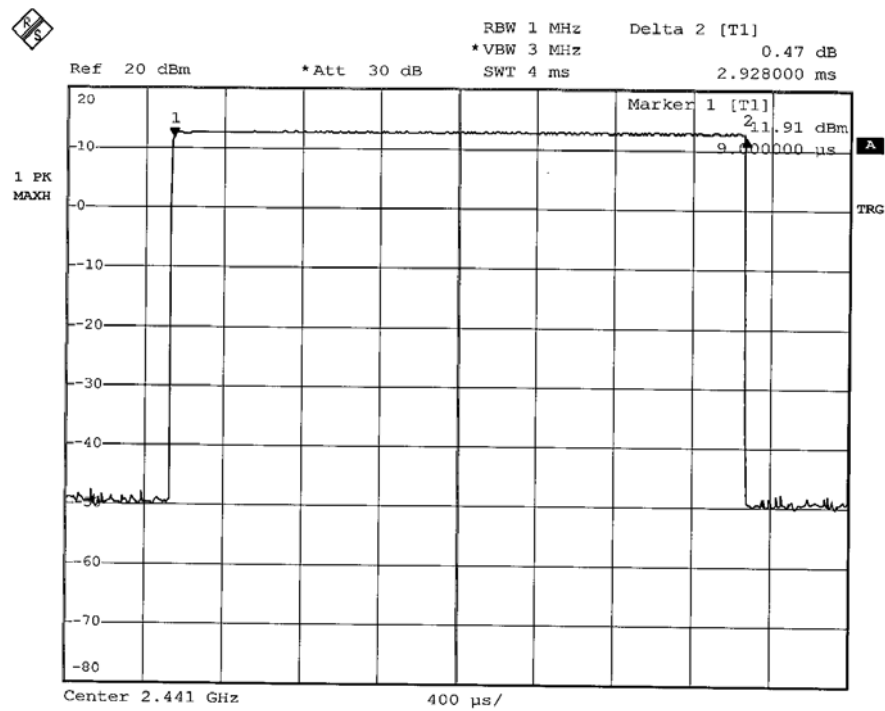
Date: 15 Jul 03
EUT: Bluetooth CF card (CF-II-1)
Company: Gigawavetech Pte Ltd.
Humidity: 49%
Temperature: 22°C
Voltage supply: 3.3V
Test by: Hugo Wan
Initial conditions: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.928	52	$0.002928 \times 52 = 0.1523$	Passed

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 4 von 36
Page 4 of 36

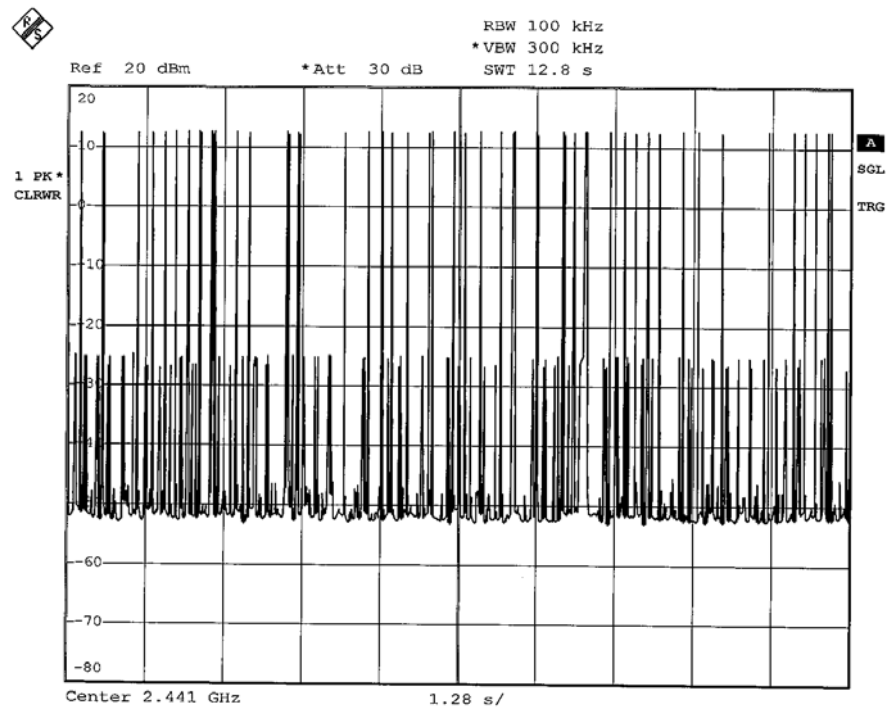


Date: 15.JUL.2003 18:31:14

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 5 von 36
Page 5 of 36



Date: 15.JUL.2003 18:33:25

52 bursts



20dB Bandwidth

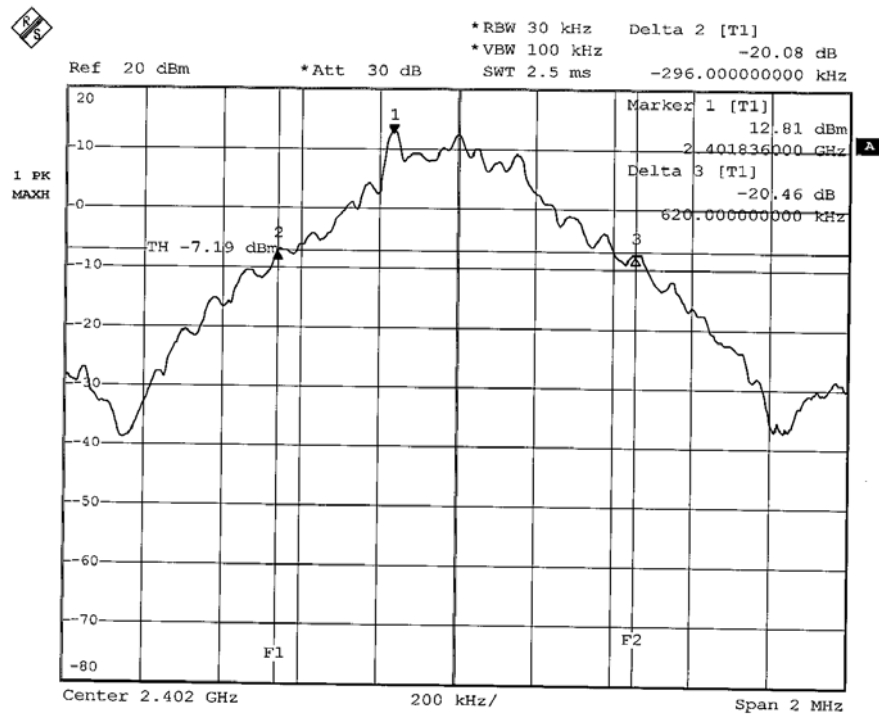
Date: 15 Jul 03
EUT: Bluetooth CF card (CF-I-I-1)
Company: Gigawavetech Pte Ltd.
Humidity: 49%
Temperature: 22°C
Voltage supply: 3.3V
Test by: Hugo Wan
Initial conditions: TX mode, DH5 with PRBS9 payload

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$ \Delta f_H + \Delta f_L $ (MHz)	Results
2402	-0.296	0.620	0.916	Passed
2441	-0.300	0.616	0.916	Passed
2480	-0.296	0.624	0.920	Passed

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 7 von 36
 Page 7 of 36

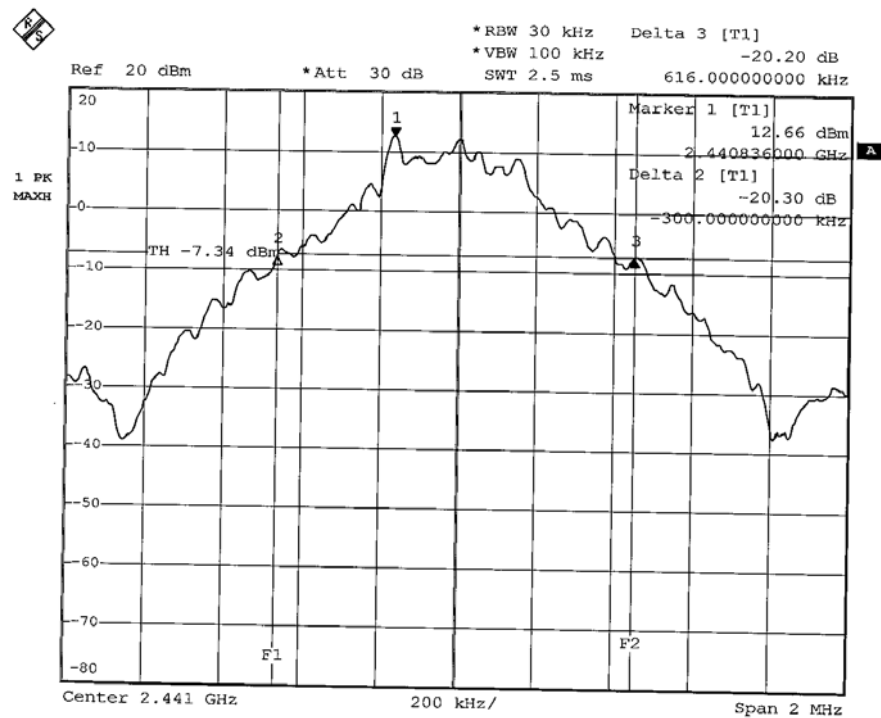


Date: 15.JUL.2003 18:39:38

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 8 von 36
 Page 8 of 36

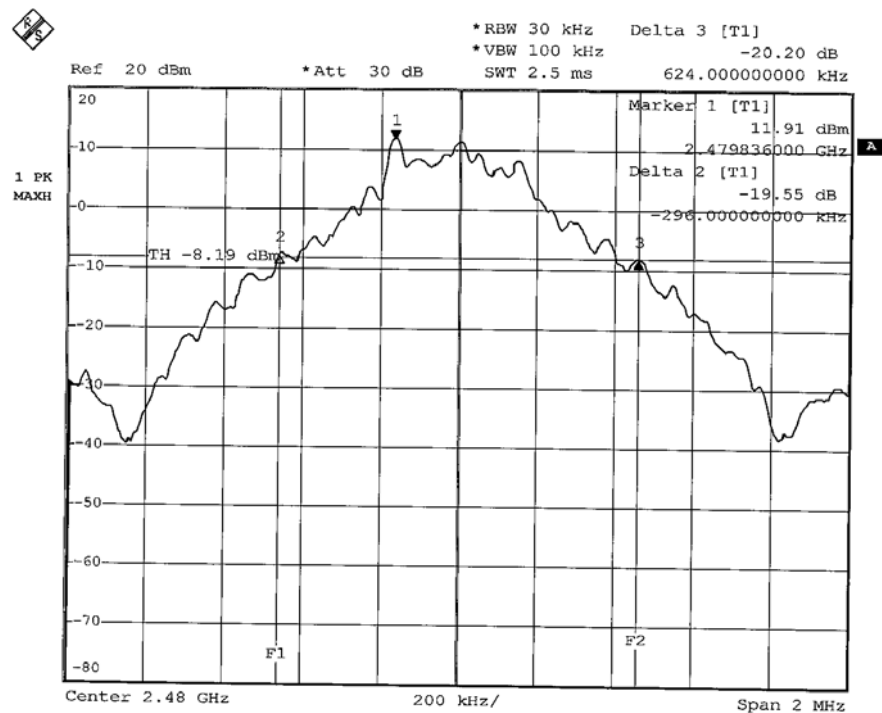


Date: 15.JUL.2003 18:42:21

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 9 von 36
 Page 9 of 36



Date: 15.JUL.2003 18:44:18



Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 10 von 36
Page 10 of 36

Peak Output Power

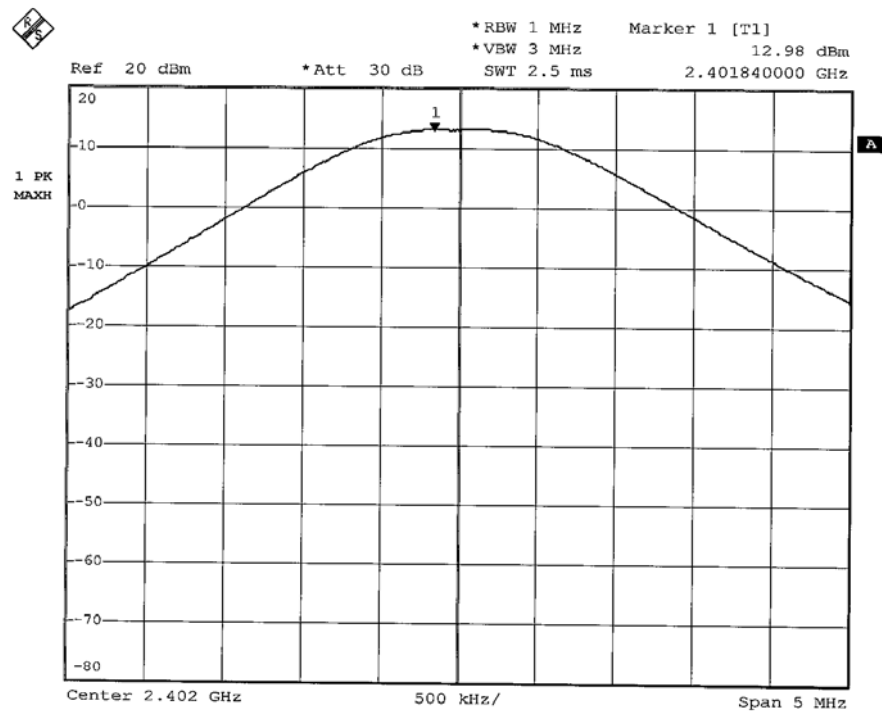
Date: 15 Jul 03
EUT: Bluetooth CF card (CF-II-1)
Company: Gigawavetech Pte Ltd.
Humidity: 49%
Temperature: 22°C
Voltage supply: 3.3V
Test by: Hugo Wan
Initial conditions: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Cable Attenuation (dB)	Power P _{PK} (dBm)	Actual Peak Power (dBm)	Results
2402	5.11	12.98	18.09	Passed
2441	5.11	12.83	17.94	Passed
2480	5.11	12.06	17.17	Passed

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 11 von 36
Page 11 of 36

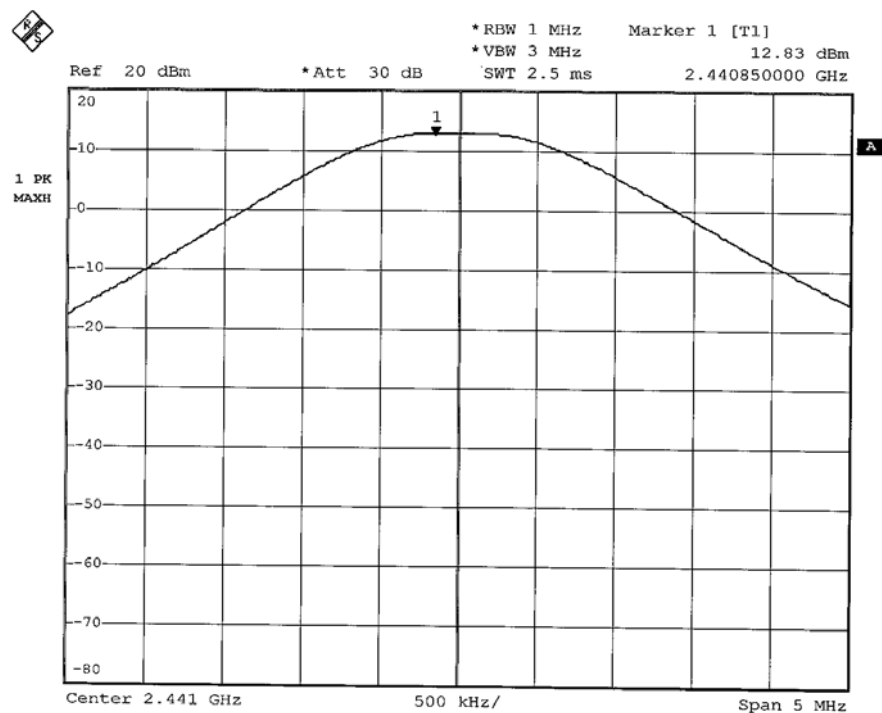


Date: 15.JUL.2003 18:46:25

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 12 von 36
Page 12 of 36

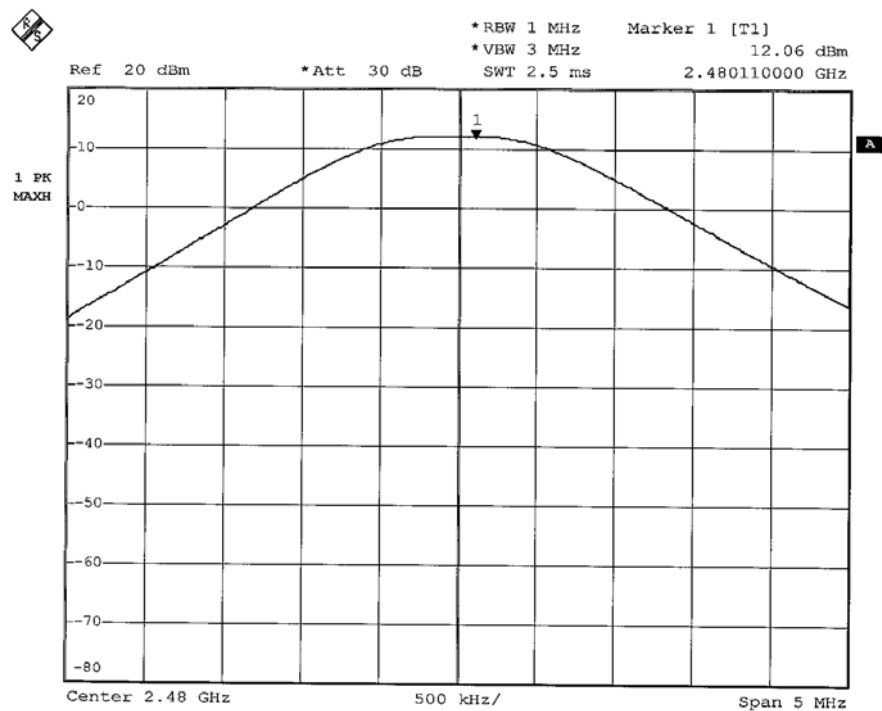


Date: 15.JUL.2003 18:46:53

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 13 von 36
Page 13 of 36



Date: 15.JUL.2003 18:47:19



Band Edge Compliance

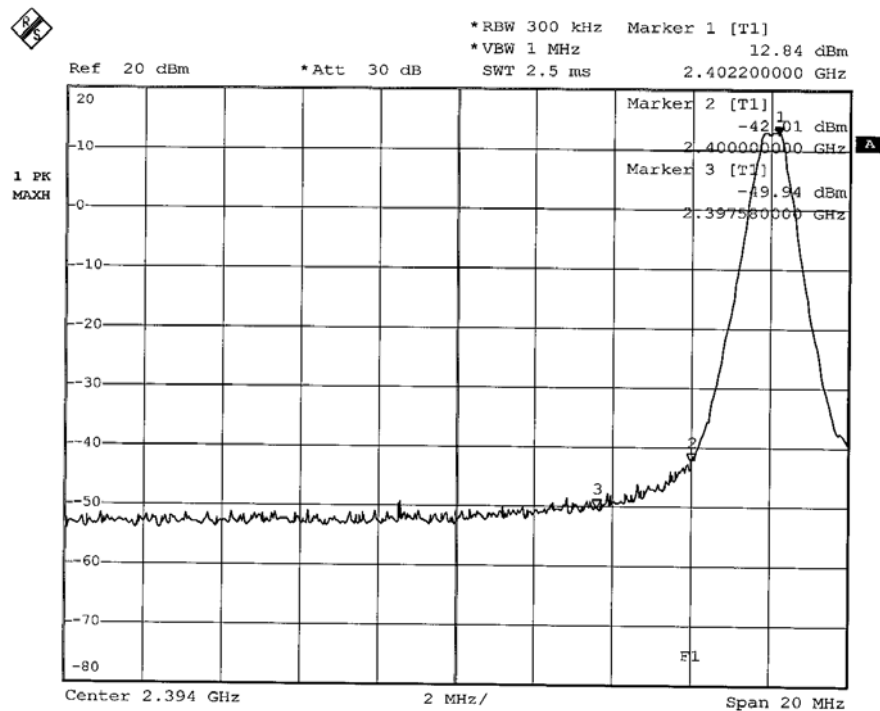
Date: 15 Jul 03
EUT: Bluetooth CF card (CF-II-1)
Company: Gigawavetech Pte Ltd.
Humidity: 49%
Temperature: 22°C
Voltage supply: 3.3V
Test by: Hugo Wan
Initial conditions: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (MHz)	RF power difference outside 100kHz BW (dB)	Results
2402	12.84	No Peak	-	Passed
2480	11.97	No Peak	-	Passed

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 15 von 36
 Page 15 of 36

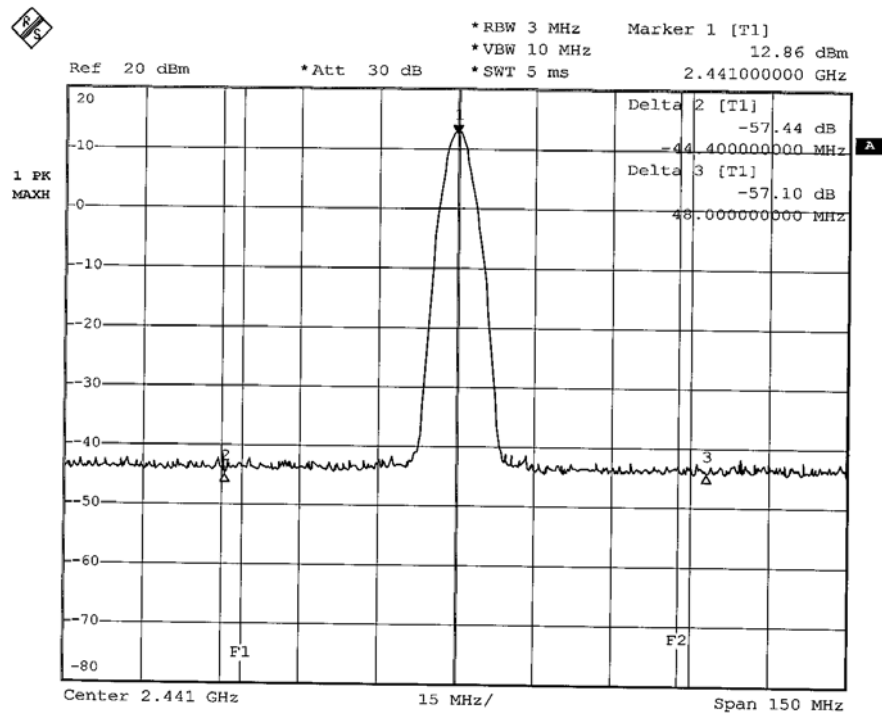


Date: 15.JUL.2003 19:31:29

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 16 von 36
 Page 16 of 36

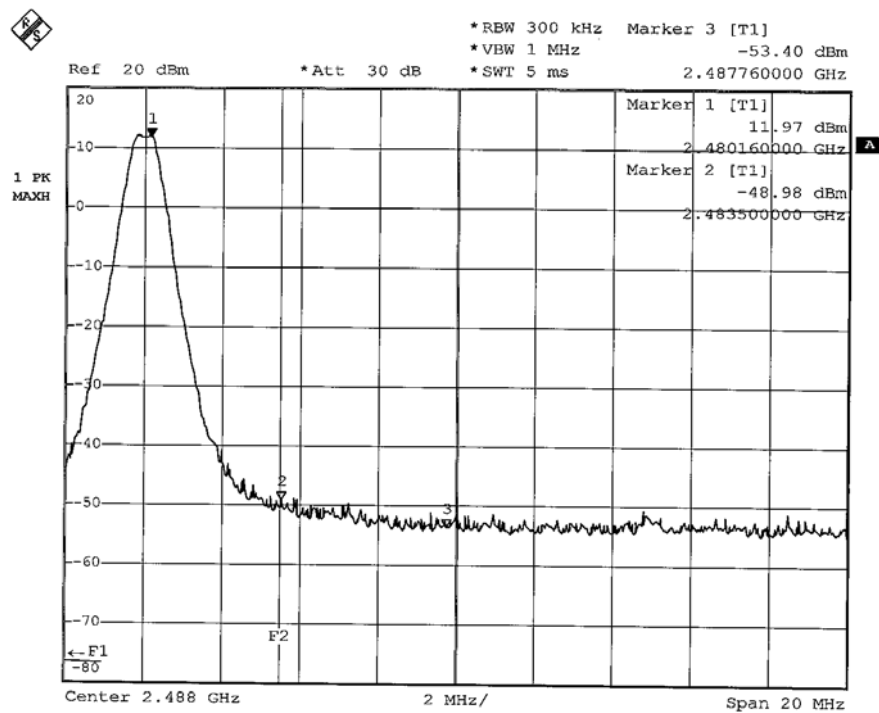


Date: 15.JUL.2003 19:33:18

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 17 von 36
 Page 17 of 36



Date: 15.JUL.2003 19:34:41

Spurious Emissions - Conducted

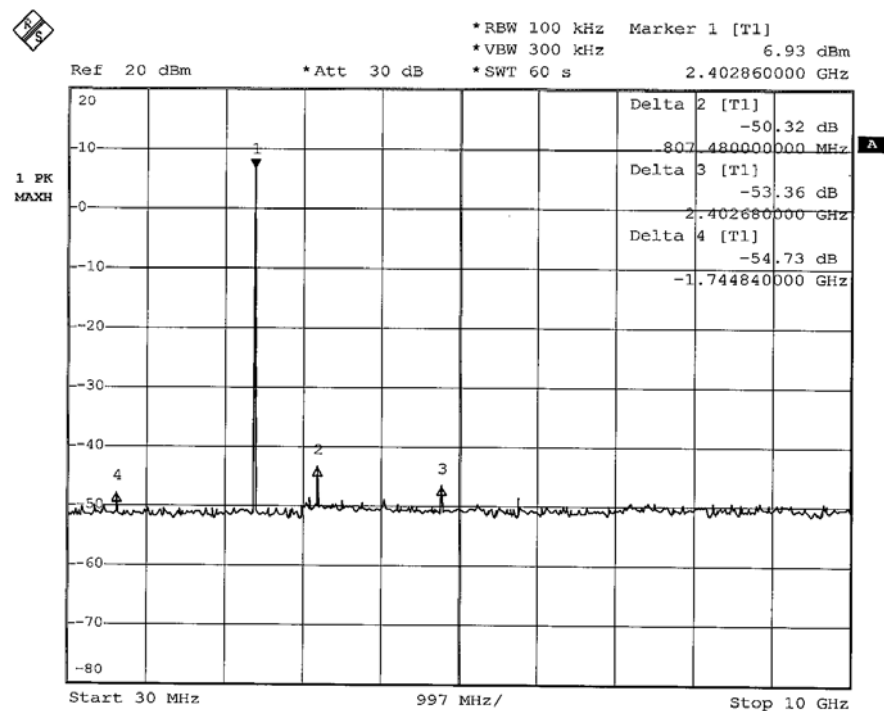
Date: 15 Jul 03
EUT: Bluetooth CF card (CF-II-1)
Company: Gigawavetech Pte Ltd.
Humidity: 49%
Temperature: 22°C
Voltage supply: 3.3V
Test by: Hugo Wan
Initial conditions: TX mode, DH1 with PRBS9 payload

Tx frequency : 2402MHz				
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
3202.48	-44.10	6.93	-51.03	Passed
4803.64	-45.44	6.93	-52.37	Passed
Tx frequency : 2441MHz				
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
3254.48	-43.25	11.63	-43.25	Passed
4881.68	-42.81	11.63	-54.44	Passed
Tx frequency : 2480MHz				
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
3306.48	-44.99	10.58	-55.57	Passed
4960.34	-46.50	10.58	-57.08	Passed

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 19 von 36
 Page 19 of 36

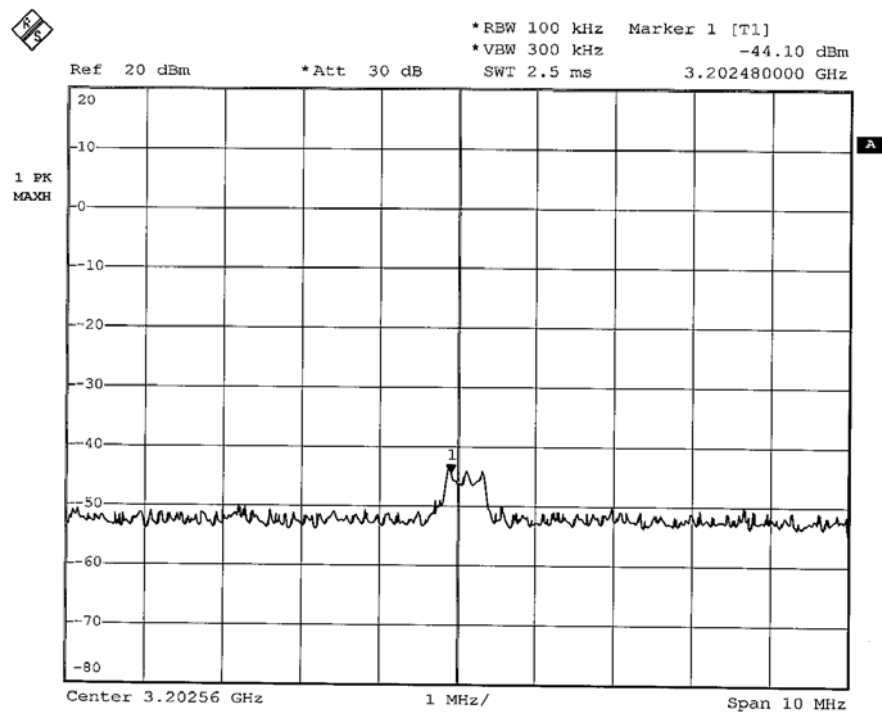


Date: 15.JUL.2003 19:43:01

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 20 von 36
Page 20 of 36

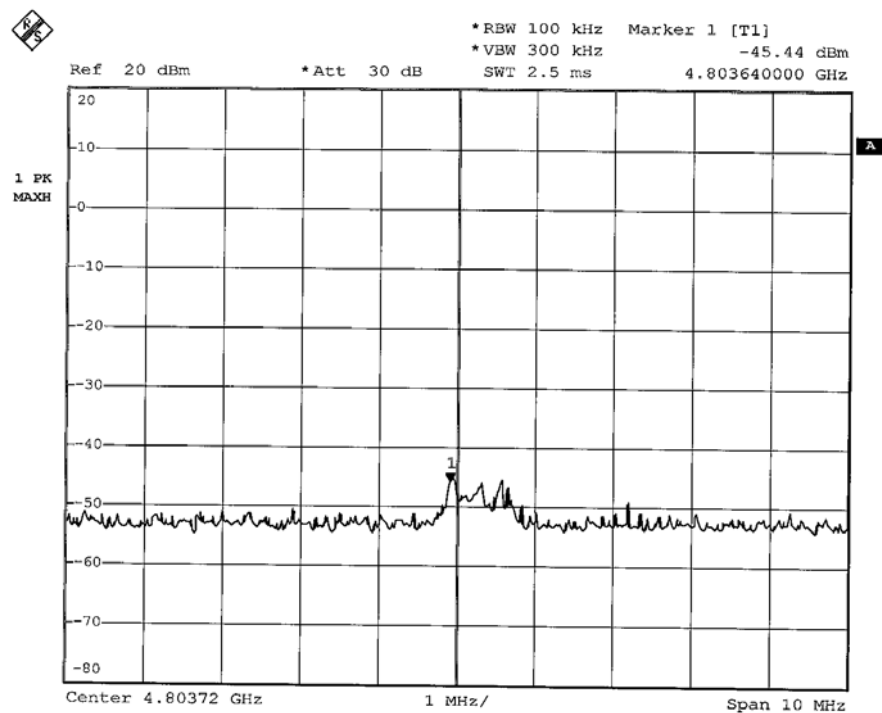


Date: 15.JUL.2003 19:48:01

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 21 von 36
Page 21 of 36

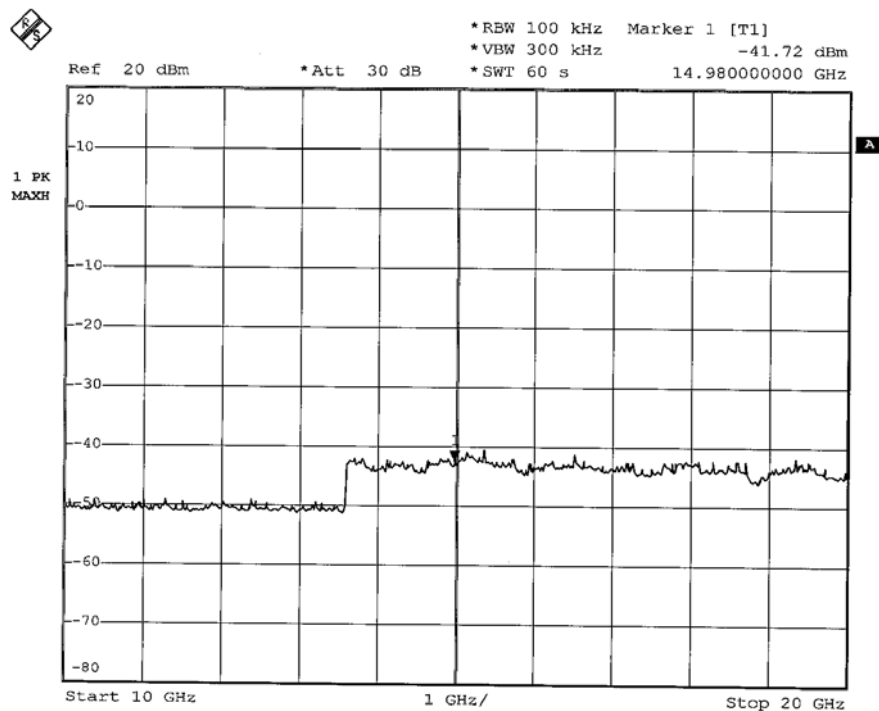


Date: 15.JUL.2003 19:48:37

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 22 von 36
Page 22 of 36

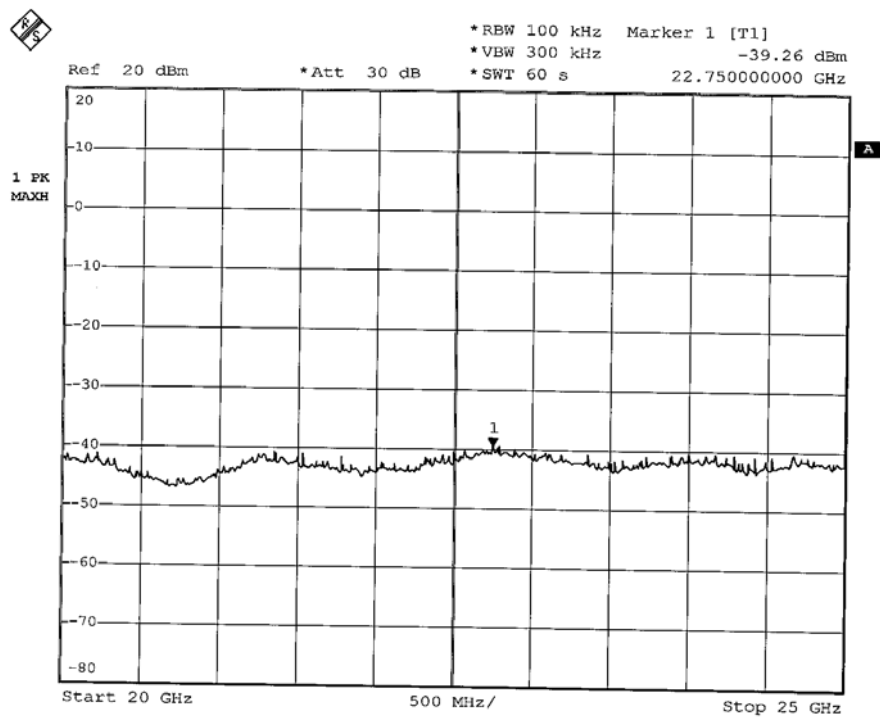


Date: 15.JUL.2003 19:45:06

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 23 von 36
Page 23 of 36

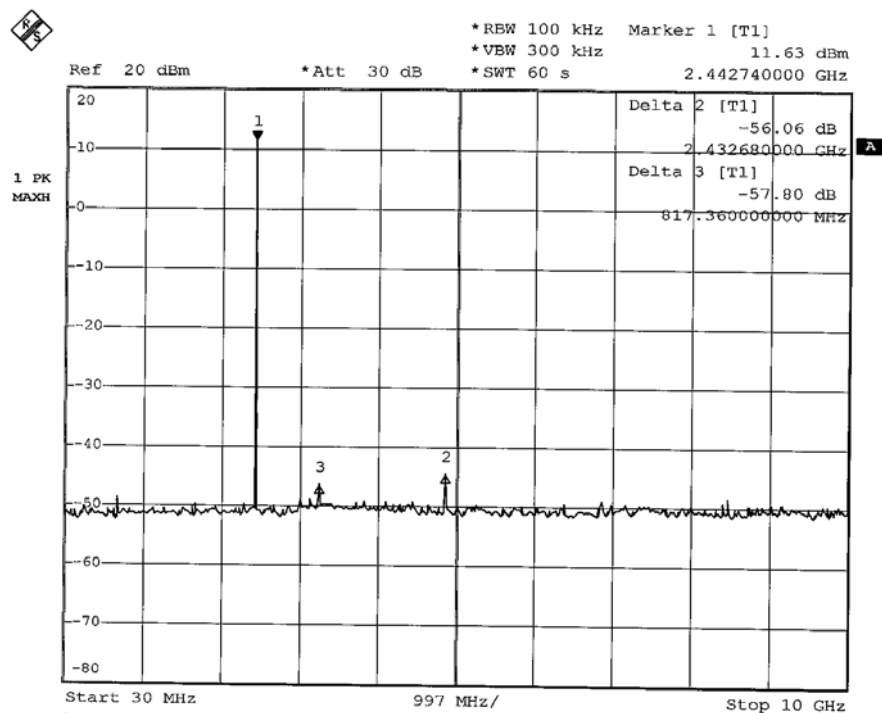


Date: 15.JUL.2003 19:46:15

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 24 von 36
 Page 24 of 36

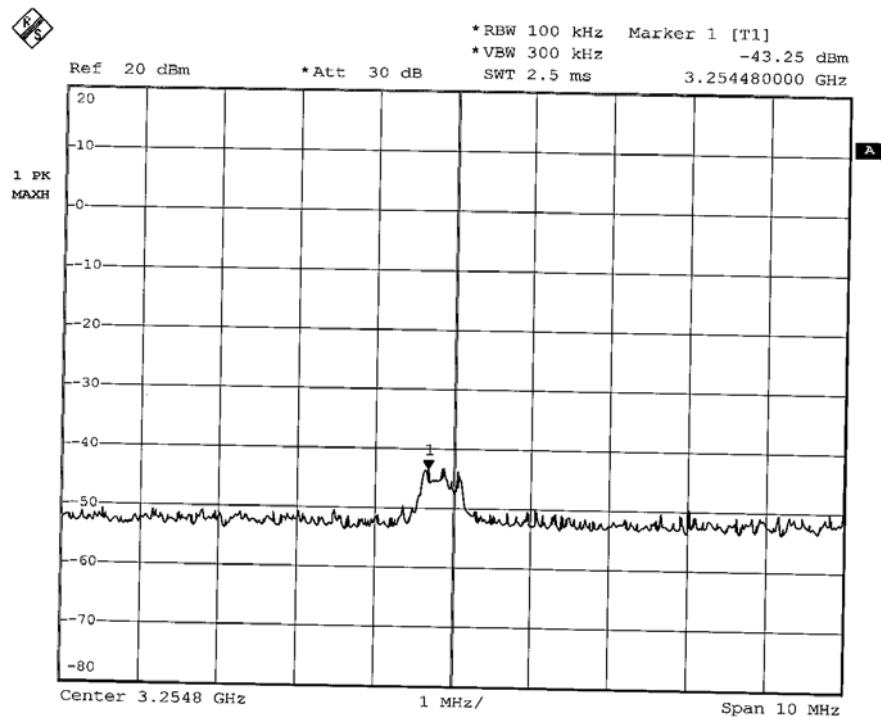


Date: 15.JUL.2003 19:52:16

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 25 von 36
Page 25 of 36

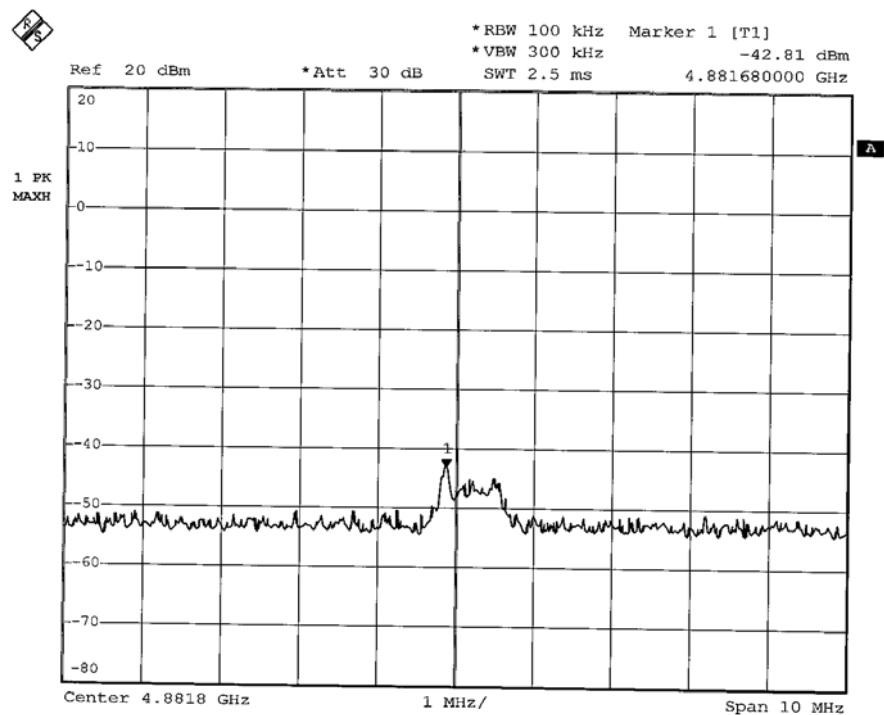


Date: 15.JUL.2003 19:53:55

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 26 von 36
Page 26 of 36

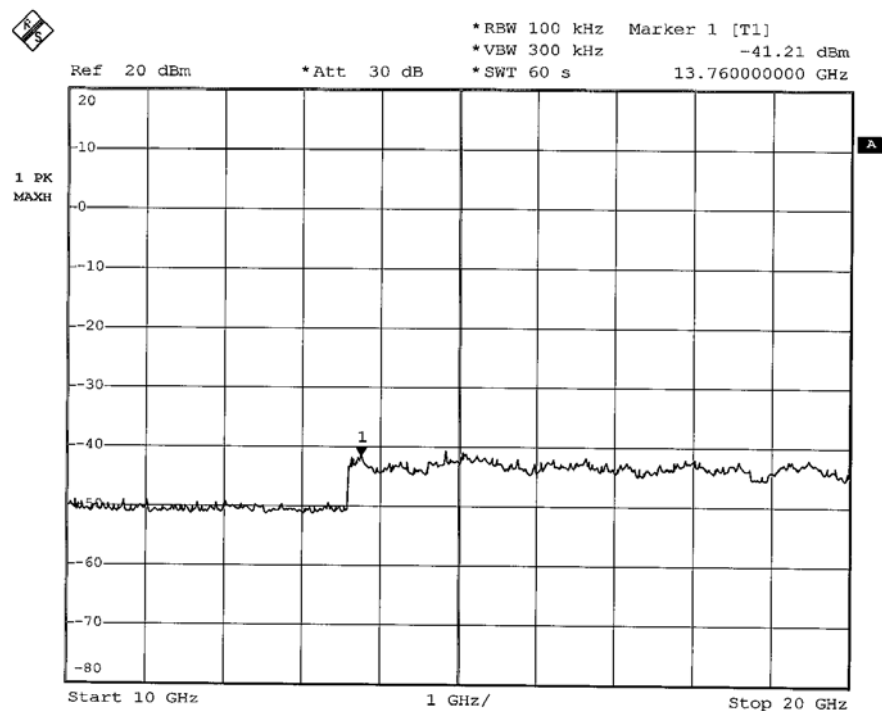


Date: 15.JUL.2003 19:53:21

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 27 von 36
 Page 27 of 36

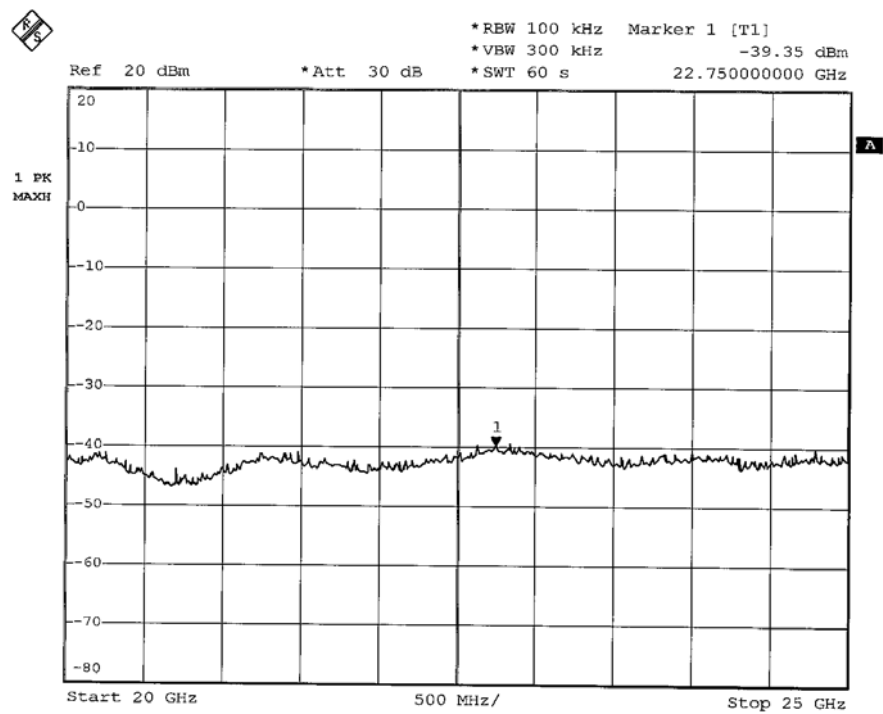


Date: 15.JUL.2003 19:56:11

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 28 von 36
Page 28 of 36

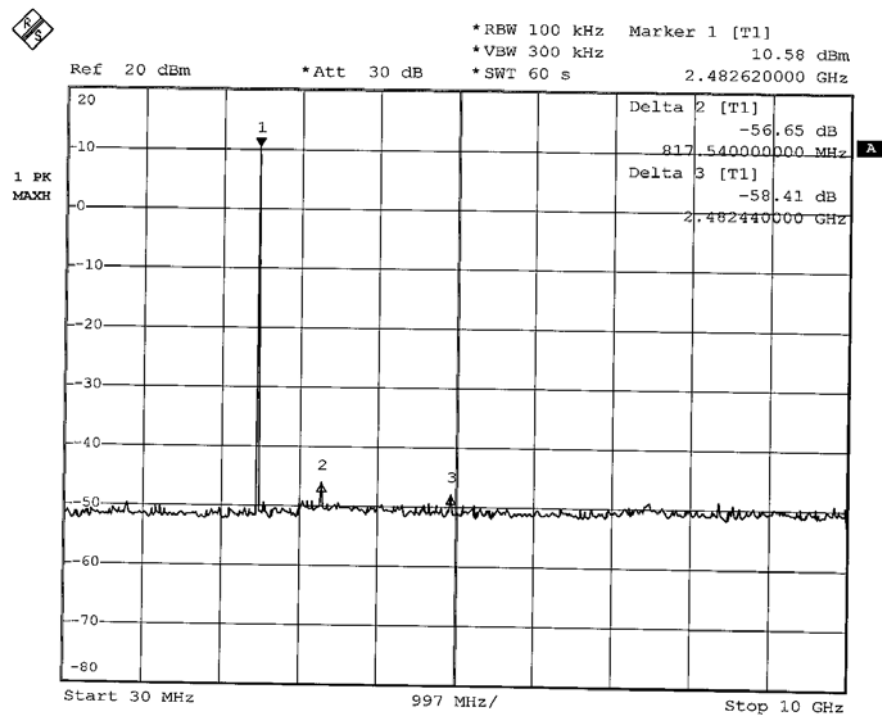


Date: 15.JUL.2003 19:57:21

Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 29 von 36
 Page 29 of 36

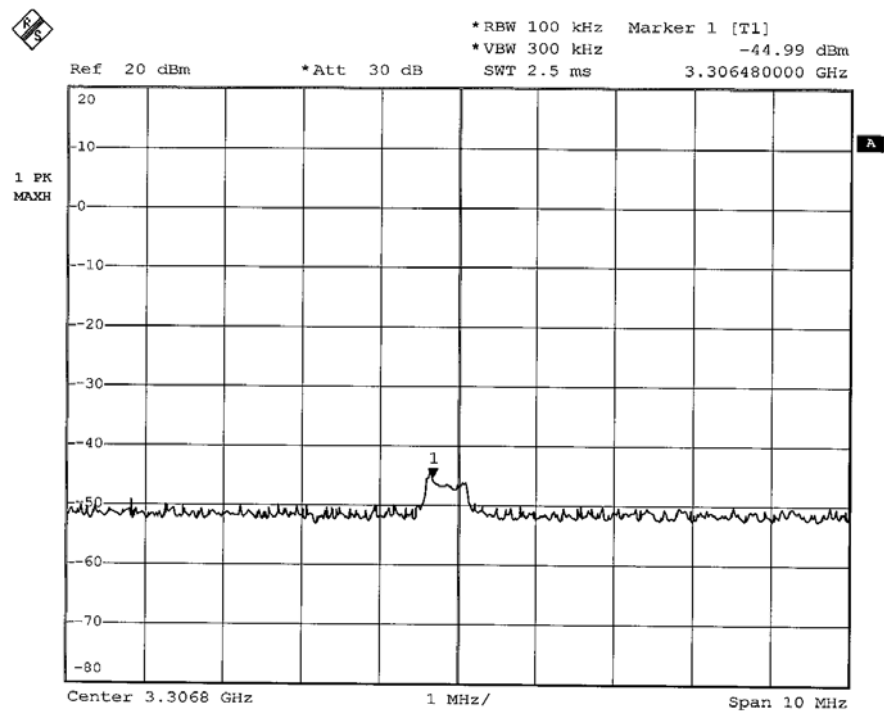


Date: 15.JUL.2003 19:59:47

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 30 von 36
Page 30 of 36

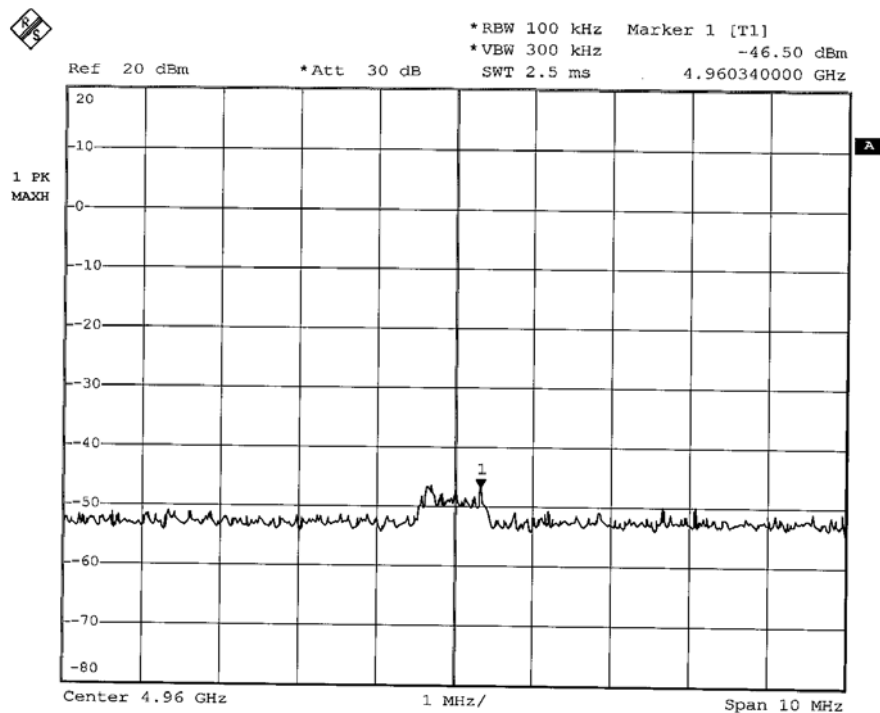


Date: 15.JUL.2003 20:01:05

Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 31 von 36
Page 31 of 36



Date: 15.JUL.2003 20:01:59



Disturbance Voltage on AC Mains

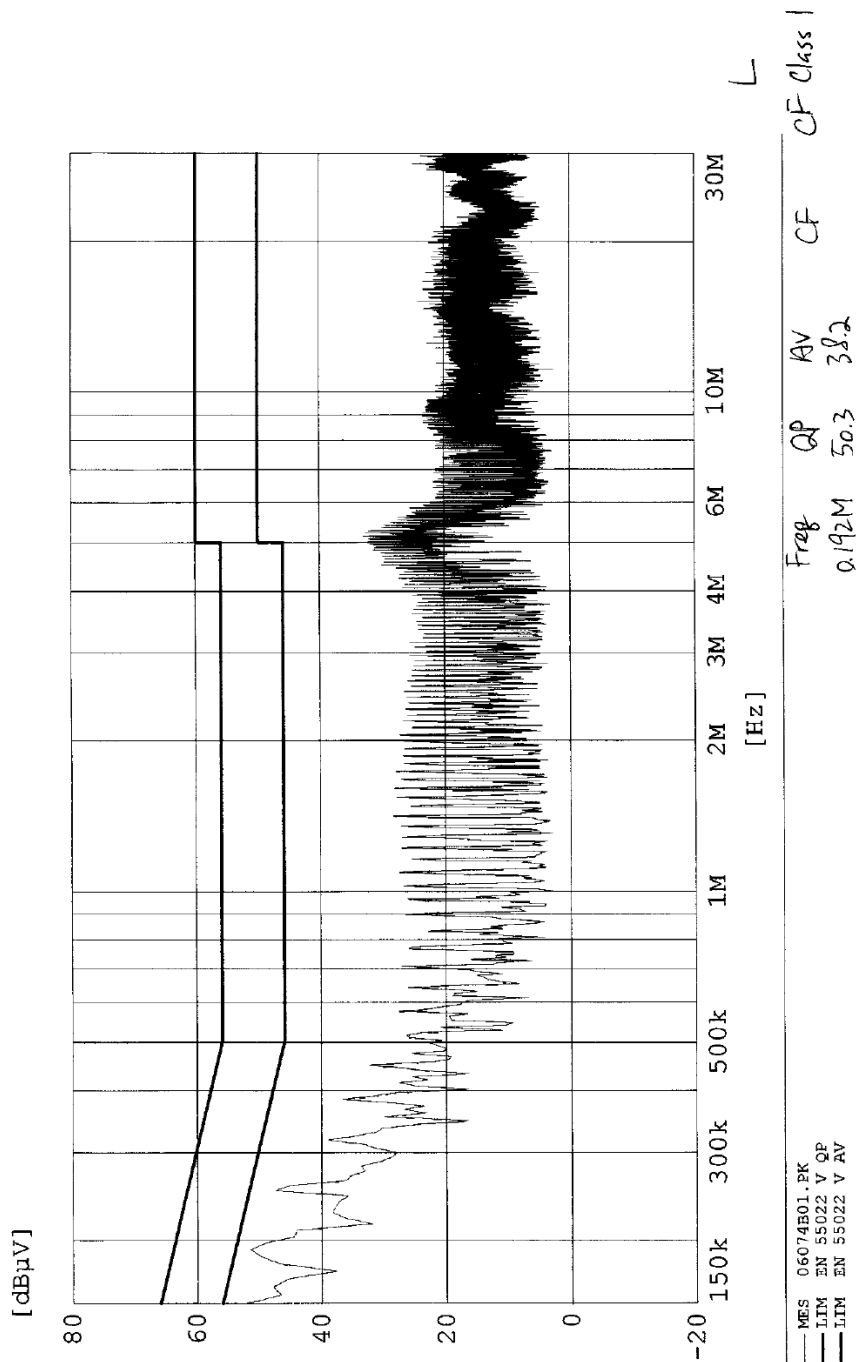
Date: 5 Jun 03
EUT: Bluetooth CF card (Class 1)
Company: Gigawavetech Pte Ltd.
Humidity: 51%
Temperature: 21°C
Voltage supply: 110V
Test by: Hugo Wan
Initial conditions: Normal operation using file transfer application

Live measurement			
Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.192	50.3	38.2	Passed
Neutral measurement			
Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.258	48.4	39.0	Passed

Prüfbericht - Nr.:
Test Report No.

14004100 002

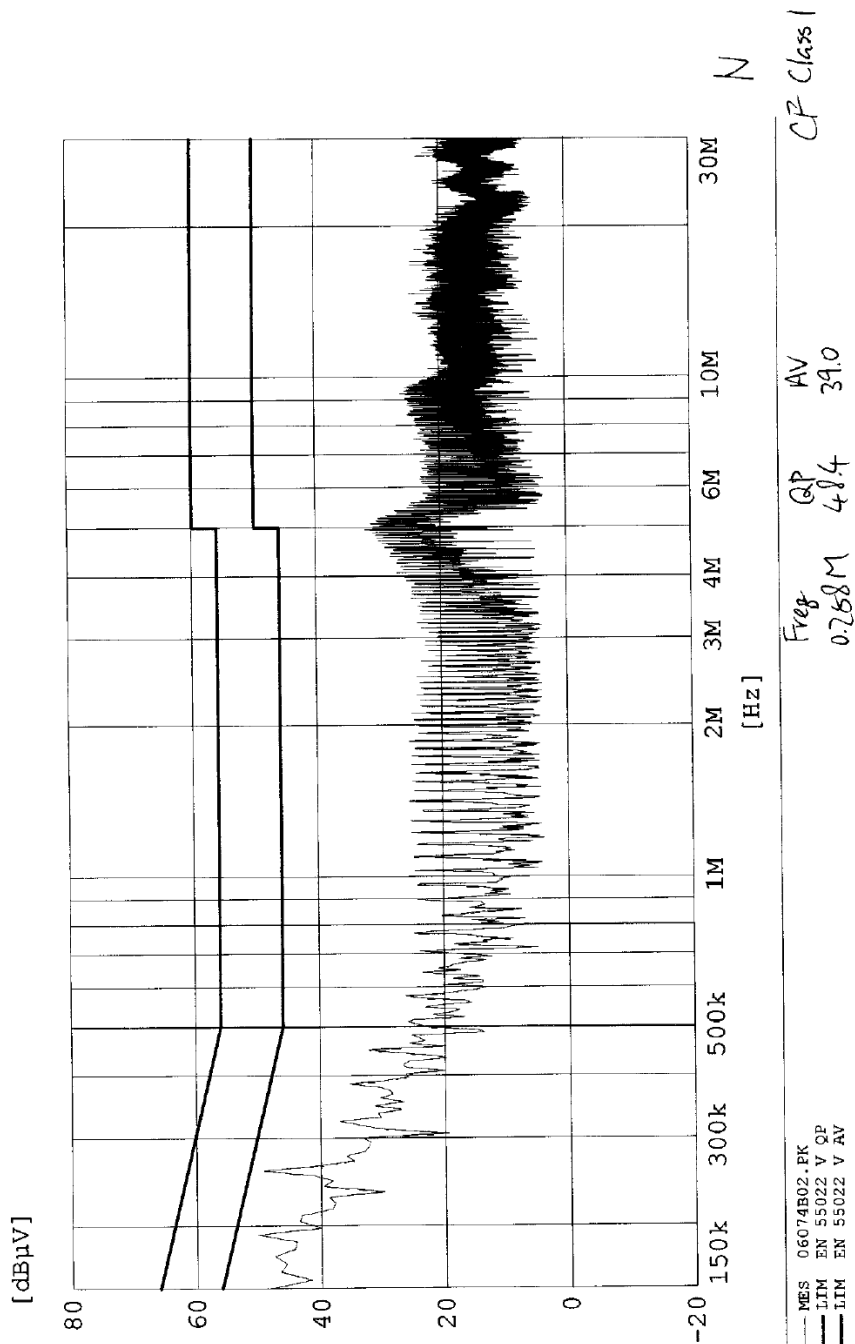
Seite 33 von 36
Page 33 of 36



Prüfbericht - Nr.:
Test Report No.

14004100 002

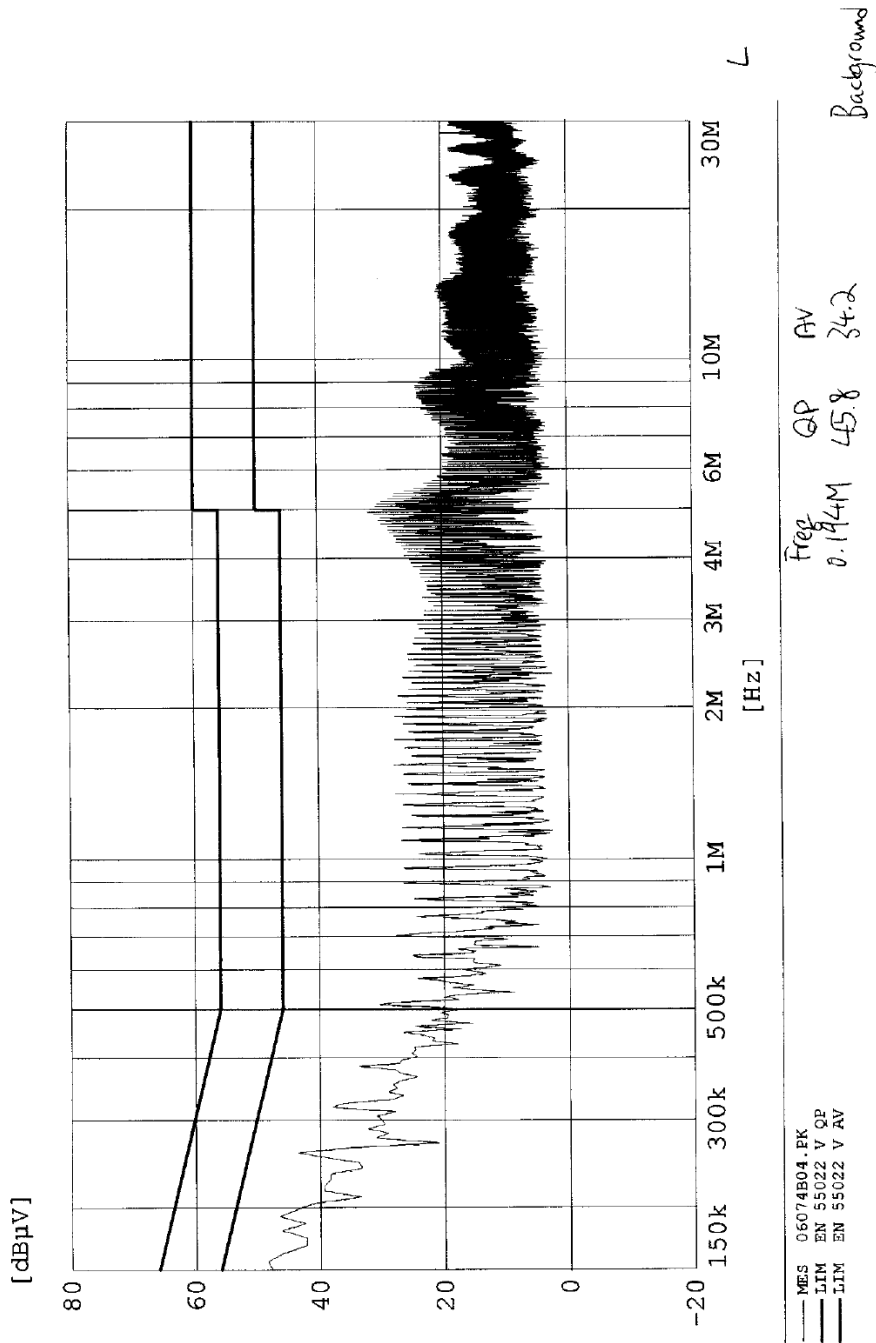
Seite 34 von 36
Page 34 of 36



Prüfbericht - Nr.:
Test Report No.

14004100 002

Seite 35 von 36
Page 35 of 36



Prüfbericht - Nr.:
 Test Report No.

14004100 002

Seite 36 von 36
 Page 36 of 36

