

Test Report

Electromagnetic Compatibility



DAT- P-121 / 02-00

Test report file no:	E-0065-1473-01 JP
Applicant:	Artchief Industries Limited Unit B, 16/F, Chinabest International Center, 8 Kwai On Road, Kwai Chung, N.T., HONG KONG
Contact person:	Mr. Charles Chu
Model:	SF-170
FCC ID:	NZTSF-170
Kind of Product:	FM Transmitter
Manufacturer:	Dong Guan Chang Ping General-Tech Electronic Ltd. Sha Gang Liug, Lu Wu Administration District, Chang Ping Town, Guadong
Contact person:	Mr. Tong
Test result Emission tests:	Compliance with FCC Part 15 Subpart C
Date of issue:	2005-January-24

The testresult only responds to the tested sample.
It is not allowed to copy this report partly without the allowance of the test laboratory.

DIRECTORY

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IDENTIFICATION OF THE TEST LABORATORY

Company name: *emitel* AG

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Contact address: Phone: +49 9421 9746-0
Fax.: +49 9421 9746-70
eMail: germany@emitel.de
Homepage: www.emitel.de

FCC Registration number: 765810

DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT):

Date of receipt of test sample: 2004-12-13

Testing Start Date: 2004-12-16

Testing End Date: 2004-12-23

Number of received/tested samples: 2

Serial Number: none

FCC-ID: NZTSF-170

Voltage consumption: 3V DC Battery / 3.7V DC plug

Product status:

- ☐ Development Sample
- ☒ Preproduction Sample
- ☐ Production Sample

REMARK: Resistor R10 was changed from 1.2kOhm to 10kOhm to reduce the transmit power.

Dimensions: L x W x H **90mm x 60mm x 25mm**

Following system devices connected during the measurement:

Signal generator HM8030, HAMEG, Emitel ID: 01-05/02-01-011

Following cables were connected during the measurement:

Audio in cable, length: 3m

OPERATION MODES

OPERATION MODES:

Transmitting mode on channels: 88.5MHz (lowest channel)
 98 MHz (center channel)
 107.5 MHz (highest channel)

EUT MONITORING

The TX signal was observed by a portable radio.

ENVIRONMENTAL CONDITIONS

Temperature 20 °C
Humidity 50 %
Atmospheric pressure: 860-1060 mbar

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced 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.

The measurement uncertainty was calculated for all measurements listed in this test report according to NIS 81 /5.1994 „The Treatment of Uncertainty in EMC Measurements“ and is documented in the emitel quality system according to EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

TEST SPECIFICATION

The tests were performed according to the following specifications:

- ☒ FCC Part 15 Subpart A Code of Regulations Part 15 (Radio Frequency Devices), November, 2004
Subpart A (General) of the Federal Communication Commission (FCC)
- ☒ FCC Part 15 Subpart C Code of Regulations Part 15 (Radio Frequency Devices), November, 2004
Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC)
- ☒ ANSI C63.4 American National Standard for Methods of 2003
Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz - 40 GHz

FCC Part 15 Subpart C

Specification	Result	Remarks
§15.207 Conducted emission (150kHz-30MHz)	limit kept	
§15.209 Radiated emission (30MHz-1000MHz)	limit kept	
§15.239 Operation in Band 88 MHz – 108 MHz	limit kept	

SUMMARY:

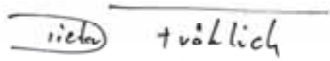
FINAL JUDGEMENT

The tested sample meets the requirements according to the technical regulations of

**Code of Regulations Part 15 Subpart C (intentional radiators)
of the Federal Communication Commission (FCC)**

Straubing, 2005-January-24

emitel AG



Dieter Fröhlich
Dipl. Ing. (FH)
Director

Test engineer:



Jürgen Pessinger

Emission test

Conducted emission

(150 kHz - 30 MHz)

TEST CONDITIONS AND RESULTS:

Conducted emissions were measured in the frequency range 0.15 MHz to 30 MHz. The bandwidth of the EMI-Receiver was set to 10 kHz and the detector-function was set to CISPR quasi-peak and average.

The test setup was made in accordance with ANSI C63.4-2003.

Measurements were performed on phase and neutral lines of the power-cords of the tested system. Preliminary scans were taken with the detector-function of the EMI-receiver set to peak to determine the conducted EMI-profile of the EUT. At the final test the cables and equipment were placed and moved within the range of positions likely to find their maximum emissions.

The measurements were performed in a shielded room.

☐ Test not applicable

Testlocation: ☒ Shielded room 1
☐ Shielded room 2
☐ Shielded room 3
☐ Shielded room 4

Used test instruments and test accessories:

Test instrument	Type	Manufacturer	ID - No.
Test receiver	ESH 3	Rohde & Schwarz	01-01/01-01-065
LISN	ESH2-Z5	Rohde & Schwarz	01-01/01-01-041
LISN	NSLK 8128	Schwarzbeck	01-01/01-01-056
HF-cable	RG 223	Emitel	01-05/02-01-046
HF-cable	RG 214	Emitel	01-05/02-01-038
Test System	PHE 5000/PAS/D	Spitzenberger & Spies	01-01/01-01-068

TEST RESULTS:

The requirements are: ☒ MET ☐ NOT MET

Remarks:

TEST CONDUCTED EMISSIONS:

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 16.12.2004
Operator: Jürgen Pessinger

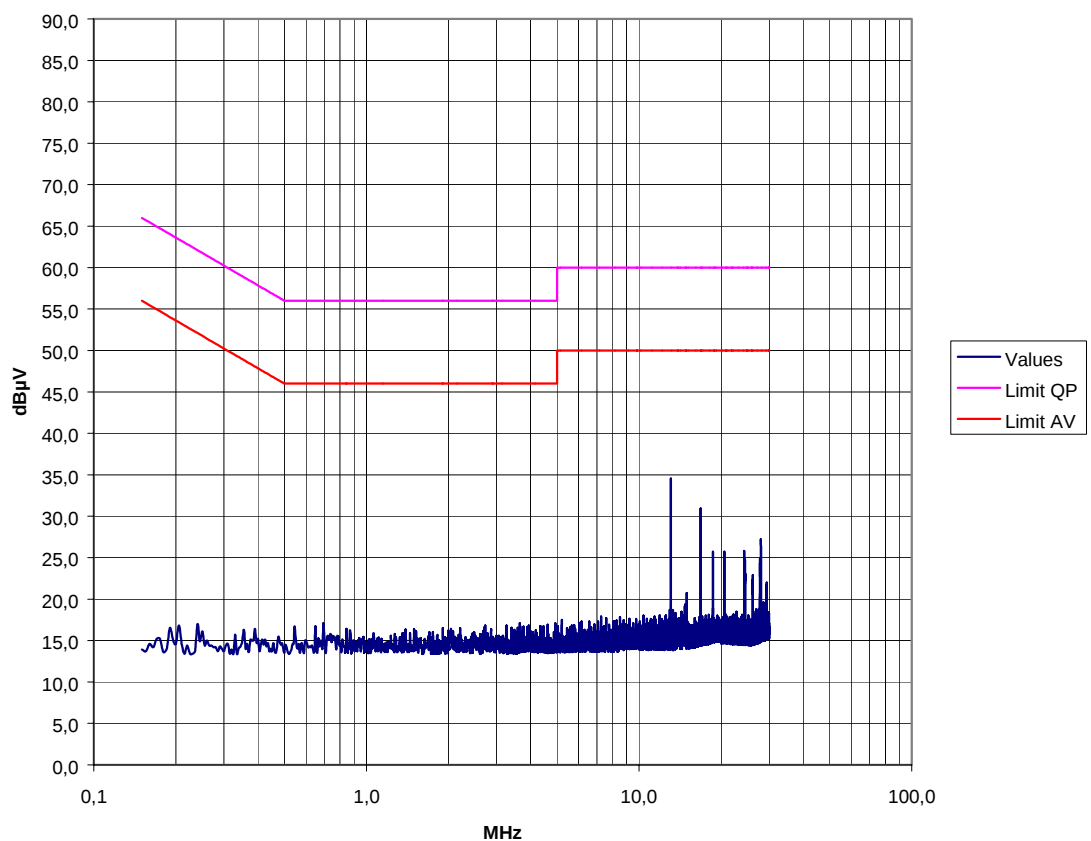
Mode:
TX mode
TX: 98 MHz
AF: 1kHz
ACDC-Adapter used for power supply

Detector: PEAK
Result: **SCAN**

FCC Part 15 Subpart C

Limit Class B

Phase L1



TEST CONDUCTED EMISSIONS:

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 16.12.2004
Operator: Jürgen Pessinger

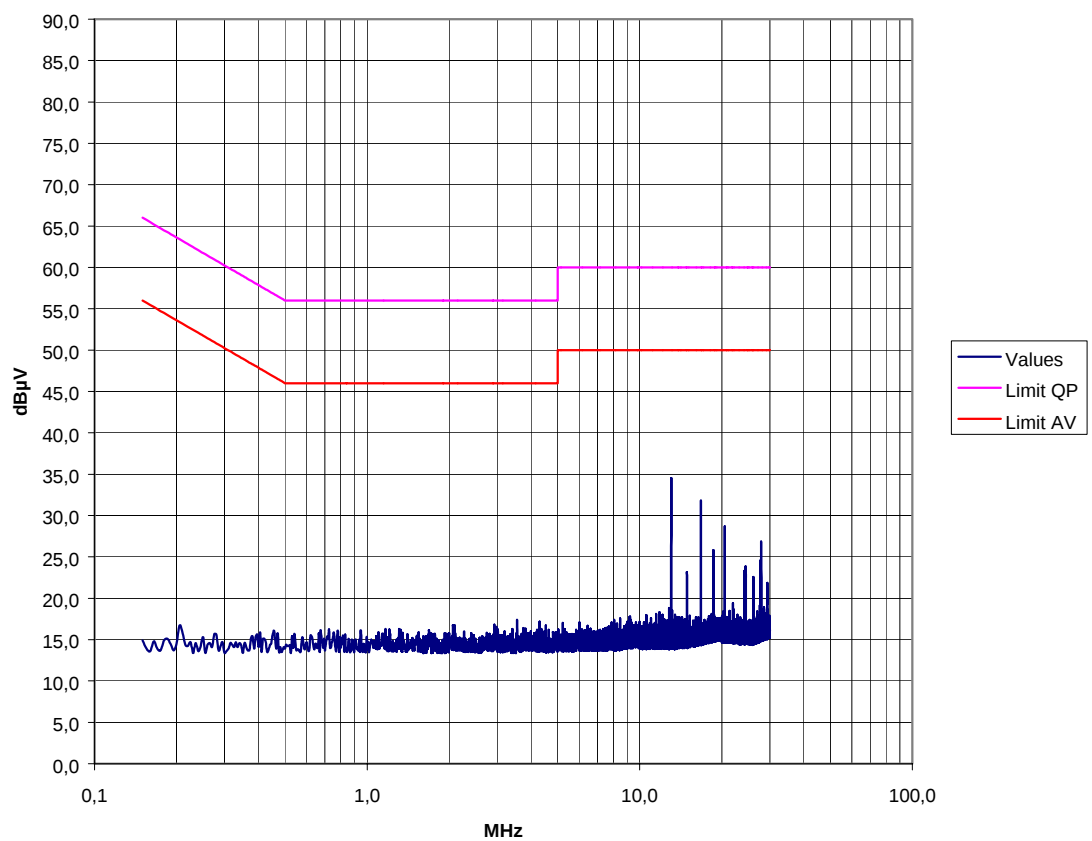
Mode:
TX mode
TX: 98 MHz
AF: 1kHz
ACDC-Adapter used for power supply

Detector: PEAK
Result: **SCAN**

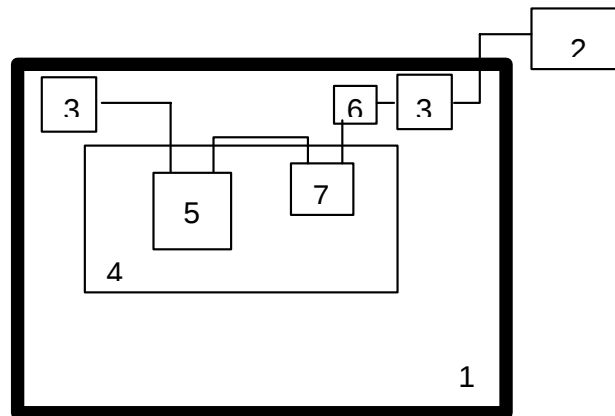
FCC Part 15 Subpart C

Limit Class B

Phase N



MEASUREMENT SETUP CONDUCTED EMISSIONS



- | | |
|--------------------|-----------------|
| 1 Shielded room | 2 Test receiver |
| 3 LISN | 4 Wooden table |
| 5 Signal generator | 6 AC/DC adaptor |
| 7 EUT | |

PHOTO TESTSETUP CONDUCTED EMISSIONS



Radiated emission

(30 MHz – 1000 MHz)

TEST CONDITIONS AND RESULTS:

Radiated emissions are measured over the frequency range from 30 MHz to 1 GHz. The bandwidth of the EMI-receiver is set to 120 kHz and the detector-function is set to CISPR quasi-peak.

The test setup is made in accordance with ANSI C63.4-2003. Measurements are made in both the horizontal and vertical planes of polarization. Preliminary scans are taken in a full-anechoic room using a spectrum analyzer with the detector function set to peak. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing.

All tests are performed at a test-distance of 3 meters. For final testing an open-area test-site is used. During the tests the EUT is rotated all around and the receiving-antenna is raised and lowered from 1 meter to 4 meters to find the maximum levels of emissions. The cables and equipment is placed and moved within the range of position likely to find their maximum emissions.

☐ Test not applicable

Test location: ☒ Shielded room 2, Pretest
☒ Open site, Final test

Antenna EuT distance: ☒ 3 m, Pretest
☒ 3 m, Final test

Used test instruments and test accessories:

Test instrument	Type	Manufacturer	ID - No.
Pretest:			
Spectrum Analyser	FSP 30	Rohde & Schwarz	01-01/01-01-063
Antenna	3142 B	EMCO	01-01/01-01-067
HF-Cable	RG 213	Suhner	01-05/02-01-043
HF-Cable	RG 213	Emitel	01-05/02-01-038
Preamplifier	TVV 695	MTS	01-05/02-01-016
Final test:			
Receiver	ESVP	Rohde & Schwarz	01-01/01-01-035
Antenna	VULB 9163	Schwarzbeck	01-01/01-01-059
HF-Cable	RG 217	Suhner	01-05/02-01-048
HF-Cable	RG 214	Emitel	01-05/02-01-050

TEST RESULTS:

The requirements are: ☒ MET ☐ NOT MET

Remarks:

FINAL TEST RADIATED EMISSIONS:

Horizontal Antenna Polarization

Test distance: 3 m

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 22.12.2004
Operator: Jürgen Pessinger

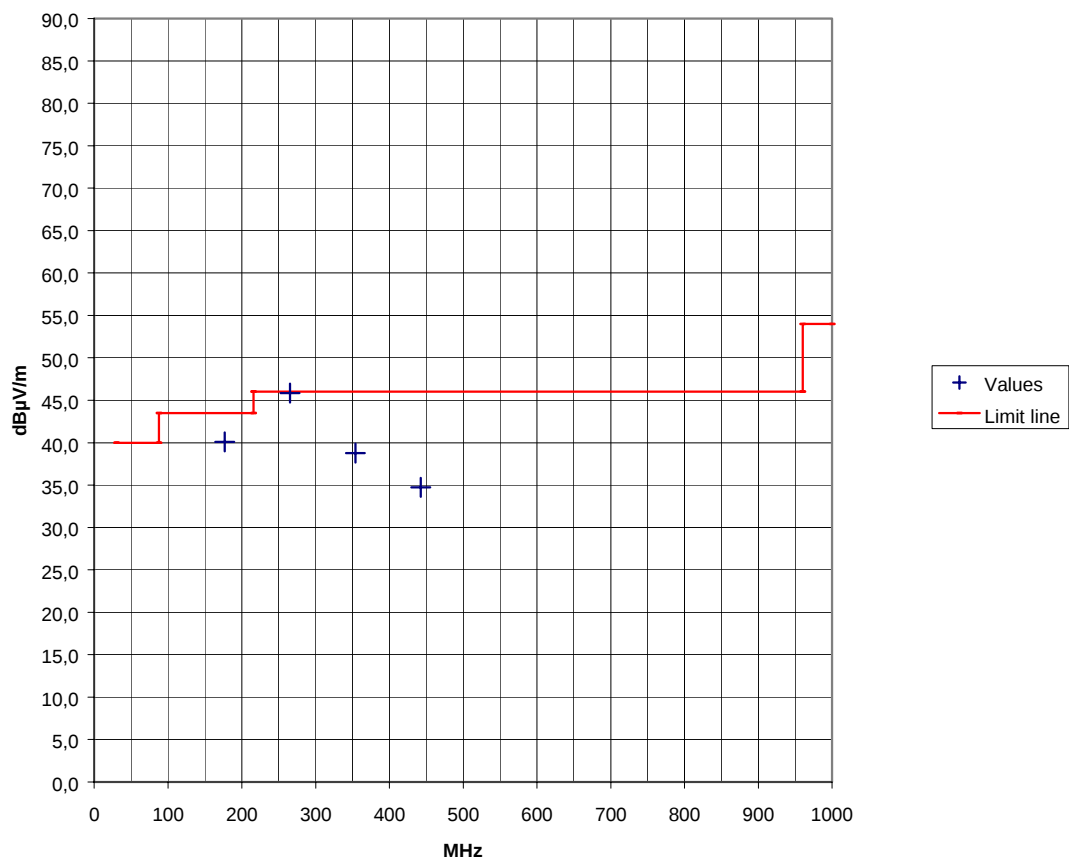
Mode:
TX mode
lowest channel
88,5 MHz

Detector: QuasiPeak
Result: Limit kept

FCC Part 15

Subpart C, Limit QP

Horizontal Polarization



FINAL TEST RADIATED EMISSION:

Vertical Antenna Polarization

Test distance: 3 m

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 22.12.2004
Operator: Jürgen Pessinger

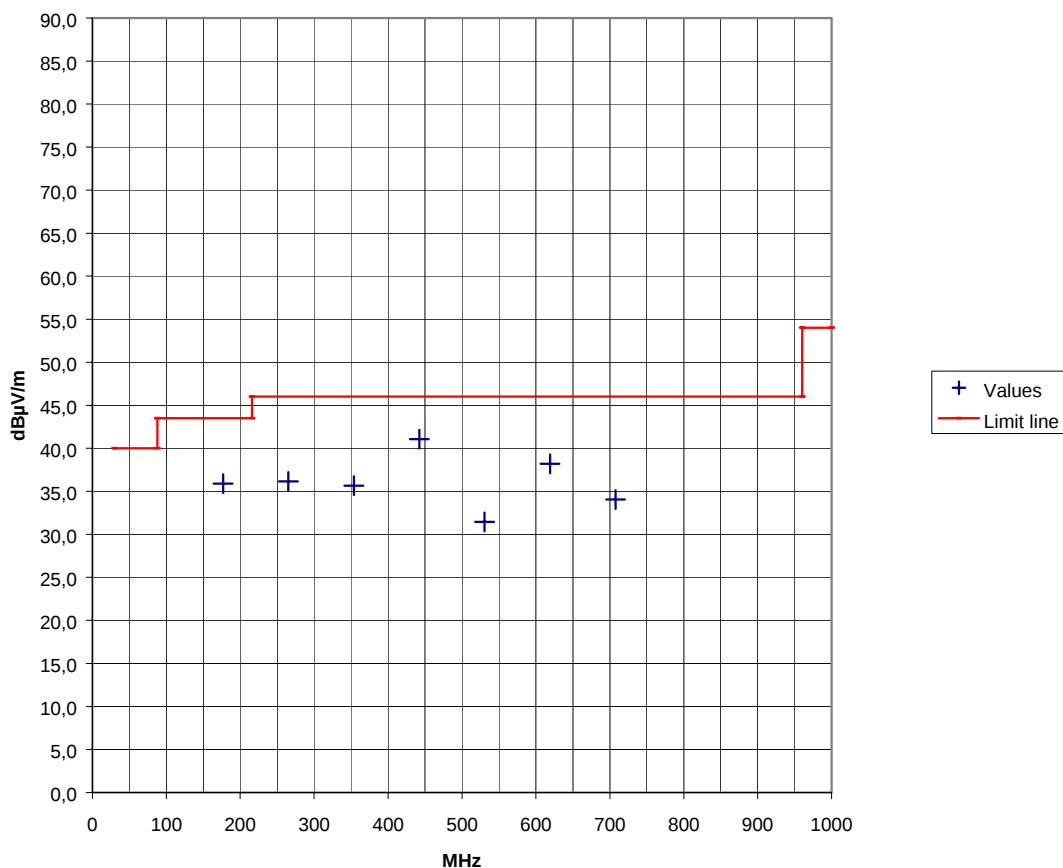
Mode:
TX mode
lowest channel
88,5 MHz

Detector: QuasiPeak
Result: Limit kept

FCC Part 15

Subpart C, Limit QP

Vertical Polarization



FINAL TEST RADIATED EMISSIONS (TABLE):

Vertical Antenna Polarization

Test distance:

3 m

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 22.12.2004
Operator: Jürgen Pessinger

Mode:
 TX mode
 lowest channel
 88,5 MHz

Detector: QuasiPeak
Result: Limit kept

FCC Part 15

Subpart C, Limit QP

Vertical Polarization

Frequency [MHz]	Reading [dBμV]	Correction [dB]	Value [dBμV/m]	Limit [dBμV/m]	Limit exceeded [dB]
176,7	24,0	11,9	35,9	43,5	
265,2	20,1	16,0	36,1	46,0	
353,7	17,2	18,5	35,7	46,0	
442,1	20,4	20,7	41,1	46,0	
530,6	8,8	22,6	31,4	46,0	
619,1	13,8	24,4	38,2	46,0	
707,6	8,9	25,1	34,0	46,0	

Remarks: Frequencies which are not listed have a margin more than 6dB to the limit.

FINAL TEST RADIATED EMISSIONS:

Horizontal Antenna Polarization

Test distance: 3 m

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 22.12.2004
Operator: Jürgen Pessinger

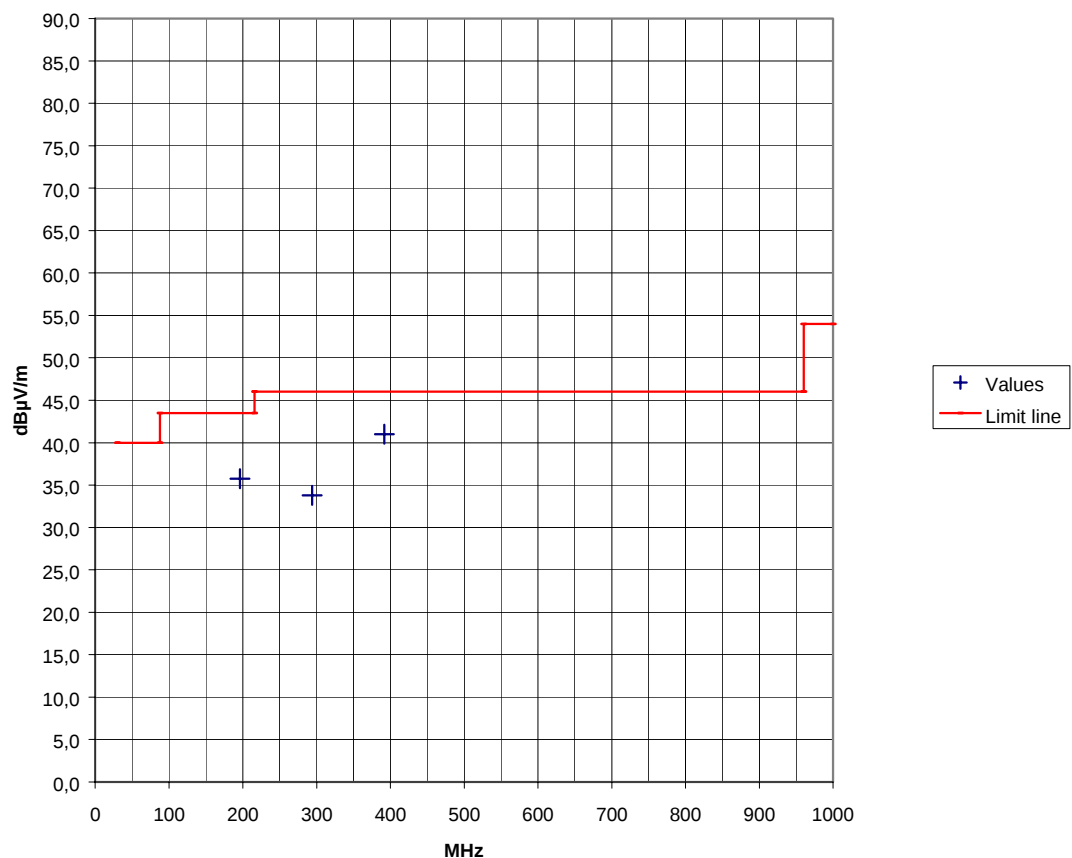
Mode:
TX mode
center channel
98 MHz

Detector: QuasiPeak
Result: Limit kept

FCC Part 15

Subpart C, Limit QP

Horizontal Polarization



FINAL TEST RADIATED EMISSION:

Vertical Antenna Polarization

Test distance: 3 m

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 22.12.2004
Operator: Jürgen Pessinger

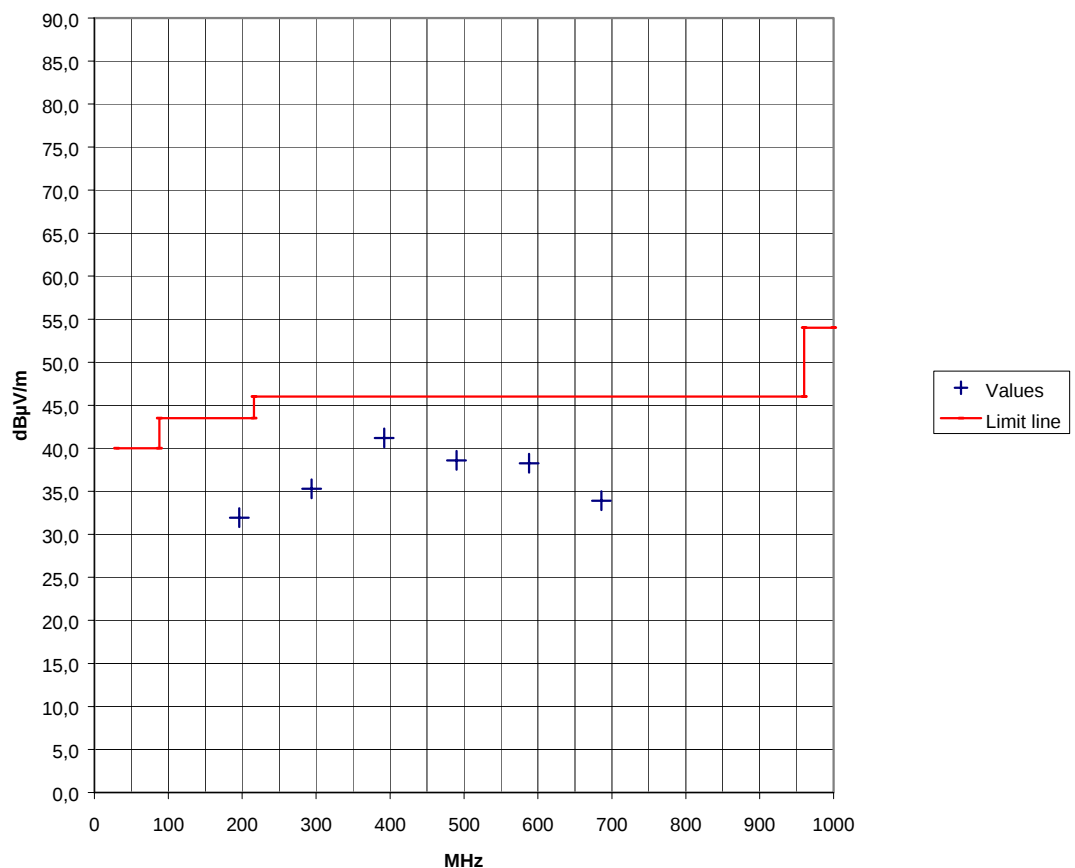
Mode:
TX mode
center channel
98 MHz

Detector: QuasiPeak
Result: Limit kept

FCC Part 15

Subpart C, Limit QP

Vertical Polarization



FINAL TEST RADIATED EMISSIONS:

Horizontal Antenna Polarization

Test distance: 3 m

Project file: E-0065-1473-00

Applicant: Artchief

Model: SF-170

Date of test: 22.12.2004

Operator: Jürgen Pessinger

Mode:

TX mode

highest channel

107,8 MHz

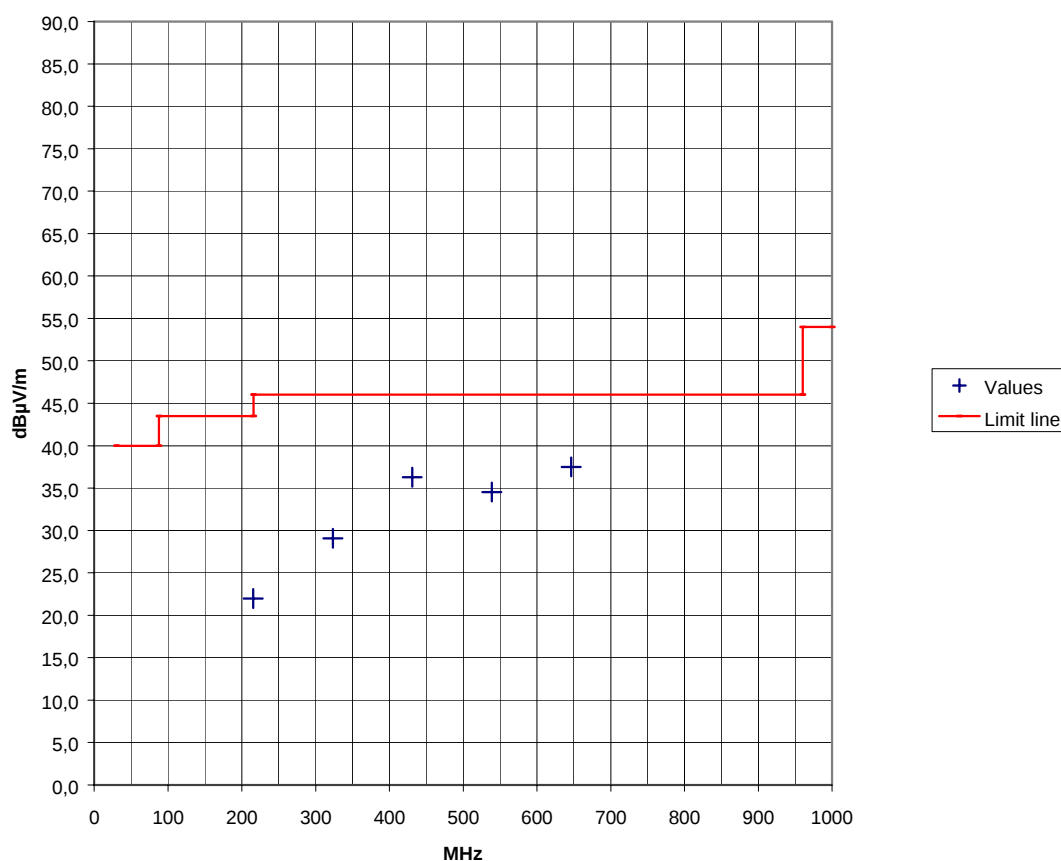
Detector: QuasiPeak

Result: Limit kept

FCC Part 15

Subpart C, Limit QP

Horizontal Polarization



FINAL TEST RADIATED EMISSION:

Vertical Antenna Polarization

Test distance: 3 m

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 22.12.2004
Operator: Jürgen Pessinger

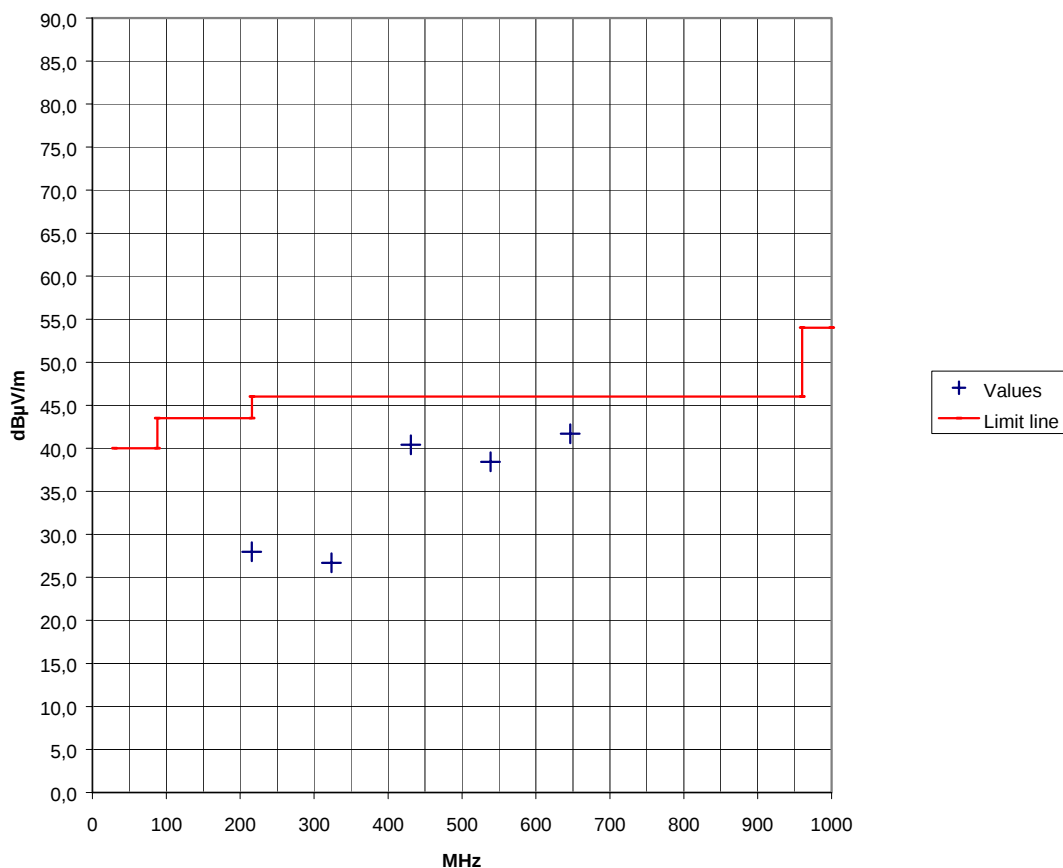
Mode:
TX mode
highest channel
107,8 MHz

Detector: QuasiPeak
Result: Limit kept

FCC Part 15

Subpart C, Limit QP

Vertical Polarization



FINAL TEST RADIATED EMISSIONS (TABLE):

Vertical Antenna Polarization

Test distance:

3 m

Project file: E-0065-1473-00
Applicant: Artchief
Model: SF-170
Date of test: 22.12.2004
Operator: Jürgen Pessinger

Mode:
 TX mode
 highest channel
 107,8 MHz

Detector: QuasiPeak
Result: Limit kept

FCC Part 15

Subpart C, Limit QP

Vertical Polarization

Frequency [MHz]	Reading [dBμV]	Correction [dB]	Value [dBμV/m]	Limit [dBμV/m]	Limit exceeded [dB]
215,5	13,9	14,1	28,0	43,5	
323,2	9,0	17,7	26,7	46,0	
430,9	20,0	20,4	40,4	46,0	
538,6	15,6	22,8	38,4	46,0	
646,4	17,1	24,6	41,7	46,0	

Remarks: Frequencies which are not listed have a margin more than 6dB to the limit.

Radiated Emission

(9 kHz – 30 MHz)

TEST CONDITIONS AND RESULTS:

Radiated emissions in the frequency range 9 kHz – 30 MHz will be measured initially at a distance of 3 meters. A prescan at 3 meter distance will be performed in a shielded room with the detector of the spectrum analyser or EMI Receiver set to peak. Final measurement is performed at 30 meter distance. In case the regulation requires testing at other distances, the result will be extrapolated. The extrapolation factor will be determined by making a second measurement at 10 meter distance. The provisions of 15.31 (d) apply.

According to section 15.209 (d) final measurements performed with the detector set to Quasi Peak except for frequency bands 9-90 kHz and 110 – 490 kHz where average detector is employed.

Used test instruments and test accessories:

Test instrument	Type	Manufacturer	ID - No.
Test receiver	ESH 3	Rohde & Schwarz	01-01/01-01-065
Antenna	FMZB 1516	Schwarzbeck	01-01/01-01-050
HF-cable	RG 223	Emitel	01-05/02-01-046
HF-cable	RG 214	Emitel	01-05/02-01-038

TEST RESULTS:

The requirements are: ☒ MET ☐ NOT MET

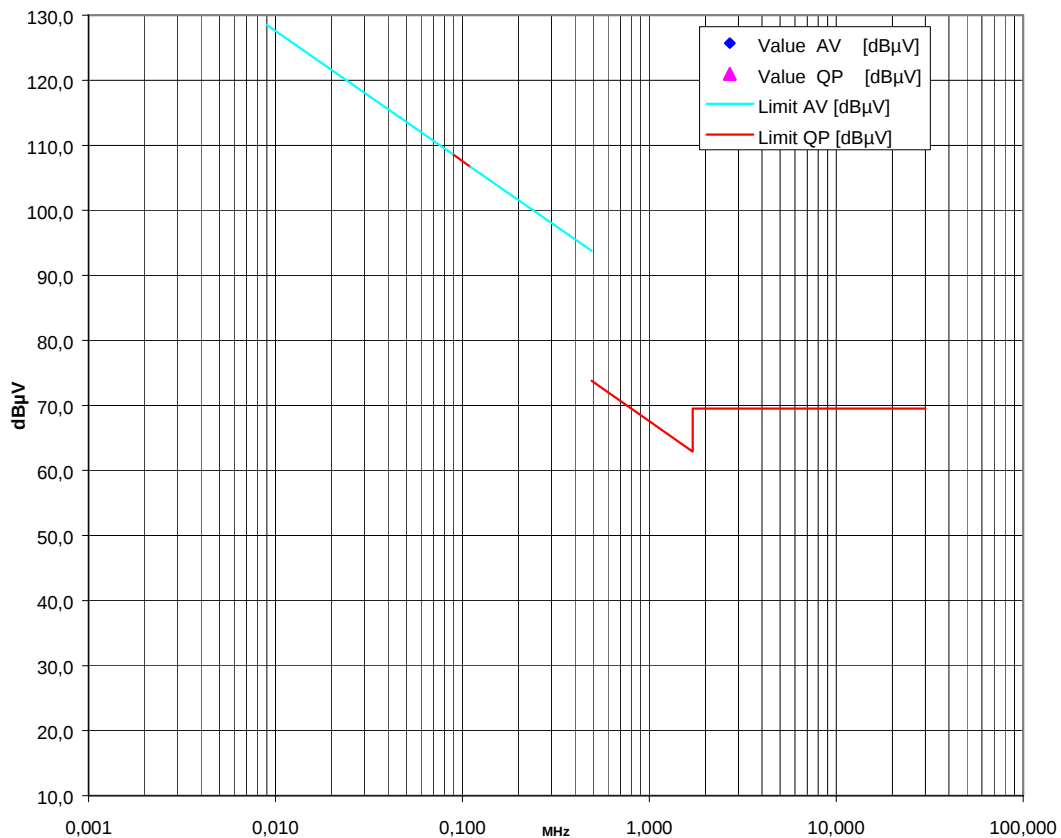
Remarks:

TEST RADIATED EMISSION:

Project file: E-0065-1473-00 **Mode:**
Applicant: Artchief TX mode
Model: SF-170 98MHz
Date of test: 22.12.2004
Operator: Jürgen Pessinger

Detector: QP / AV
Result: Limit kept

FCC Part 15 Subpart C



Radiated emission

(Maximum Field strength within the 200kHz Band)

TEST CONDITIONS AND RESULTS:

The maximum Field strength in the permitted 200kHz band are measured with Average and MaxPeak detector. The test setup is made in accordance with ANSI C63.4-2003. Measurements are made in both the horizontal and vertical planes of polarization. Preliminary scans are taken in a full-anechoic room using a spectrum analyzer with the detector function set to peak. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration produces the highest emission relative to the limit and therefore shall be used for final testing. All tests are performed at a test-distance of 3 meters. For final testing an open-area test-site is used. During the tests the EUT is rotated all around and the receiving-antenna is raised and lowered from 1 meter to 4 meters to find the maximum levels of emissions. The cables and equipment is placed and moved within the range of position likely to find their maximum emissions.

☐ Test not applicable

Test location: ☒ Shielded room 2, Pretest
☒ Open site, Final test

Antenna EuT distance: ☒ 3 m, Pretest
☒ 3 m, Final test

Used test instruments and test accessories:

Test instrument	Type	Manufacturer	ID - No.
Pretest:			
Spectrum Analyser	FSP 30	Rohde & Schwarz	01-01/01-01-063
Antenna	3142 B	EMCO	01-01/01-01-067
HF-Cable	RG 213	Suhner	01-05/02-01-043
HF-Cable	RG 213	Emitel	01-05/02-01-038
Preamplifier	TVV 695	MTS	01-05/02-01-016
Final test:			
Receiver	ESVP	Rohde & Schwarz	01-01/01-01-035
Antenna	VULB 9163	Schwarzbeck	01-01/01-01-059
HF-Cable	RG 217	Suhner	01-05/02-01-048
HF-Cable	RG 214	Emitel	01-05/02-01-050

TEST RESULTS:

The requirements are: ☒ MET ☐ NOT MET

Remarks: _____

TEST MAXIMUM FIELDSTRENGTH IN THE 200KHZ BAND:

lowest channel:

Frequency [MHz]	Reading [dBµV]	Correction [dB]	Value [dBµV/m]	Limit [dBµV/m]	Detector
88,5	30,2	12,6	42,8	47,9	Average
88,5	30,4	12,6	43,0	47,9	Max Peak

center channel

Frequency [MHz]	Reading [dBµV]	Correction [dB]	Value [dBµV/m]	Limit [dBµV/m]	Detector
98,0	32,7	14,4	47,1	47,9	Average
98,0	33,4	14,4	47,8	47,9	Max Peak

highest channel

Frequency [MHz]	Reading [dBµV]	Correction [dB]	Value [dBµV/m]	Limit [dBµV/m]	Detector
107,8	33,8	13,6	47,4	47,9	Average
107,8	33,9	13,6	47,5	47,9	Max Peak

MEASUREMENT SETUP RADIATED EMISSIONS

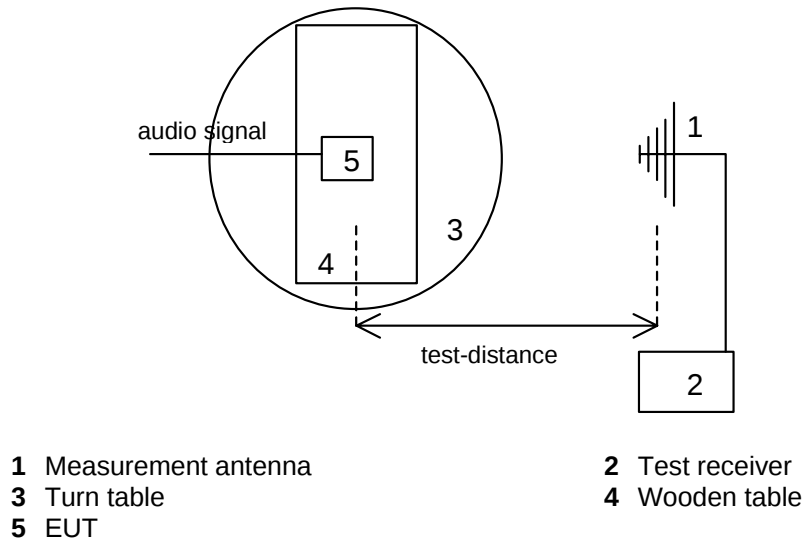


PHOTO TESTSETUP RADIATED EMISSION



Occupied Bandwidth

TEST CONDITIONS AND RESULTS:

The test setup is made in accordance with ANSI C63.4-2003. The test is made in a anechoic chamber. The EUT is operated unmodulated. The spectrum analyser is set to 10kHz resolution bandwidth. The offset of the spectrum analyser is adjusted that the maximum of the fundamental field strength correspondence with the 0dB level of the spectrum analyser. The -26dB points of the power envelope are measured. The difference is recorded as the occupied bandwidth.

☐ Test not applicable

Test location: ☒ Shielded room 2

Antenna EuT distance: ☒ 3 m

Used test instruments and test accessories:

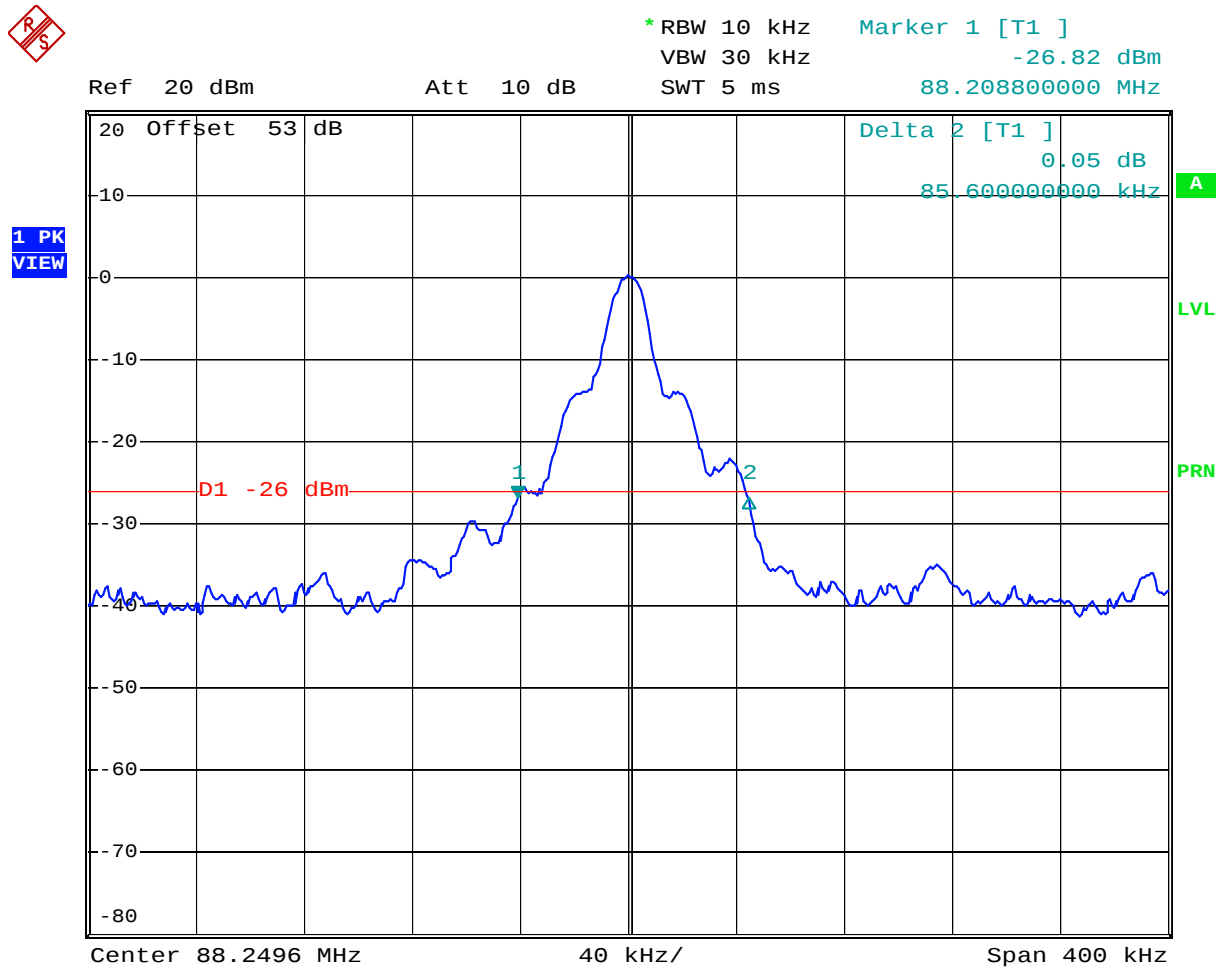
Test instrument	Type	Manufacturer	ID - No.
Spectrum Analyser	FSP 30	Rohde & Schwarz	01-01/01-01-063
Antenna	3142 B	EMCO	01-01/01-01-067
HF-Cable	RG 213	Suhner	01-05/02-01-043
HF-Cable	RG 213	Emitel	01-05/02-01-038
Preamplifier	TVV 695	MTS	01-05/02-01-016

TEST RESULTS:

Channel	bandwith [kHz]	limit [kHz]	result
lowest	85,6	200	limit kept
center	96,0	200	limit kept
highest	111,2	200	limit kept

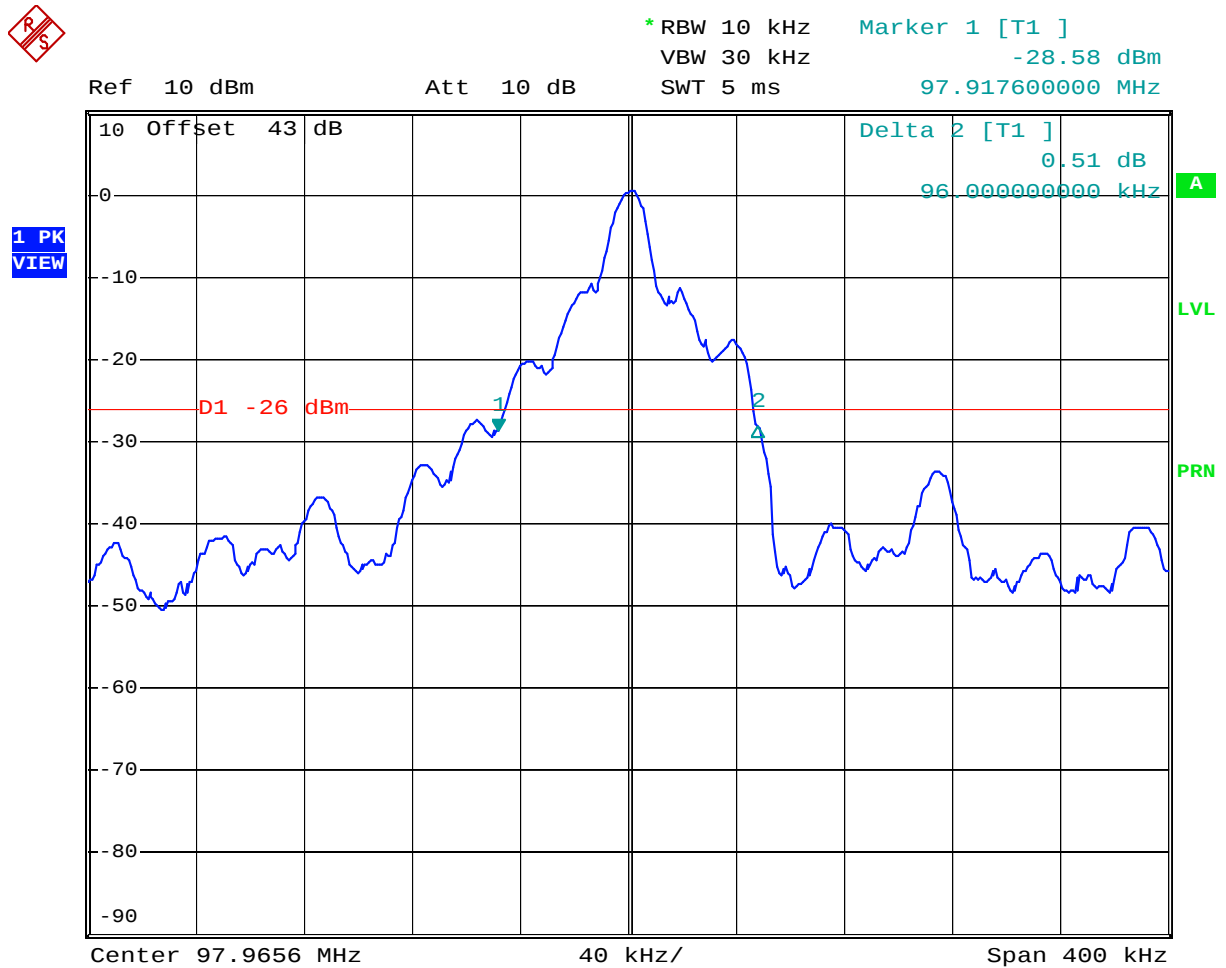
Remarks: Pay attention to attached charts.

Occupied bandwidth chart of lowest channel



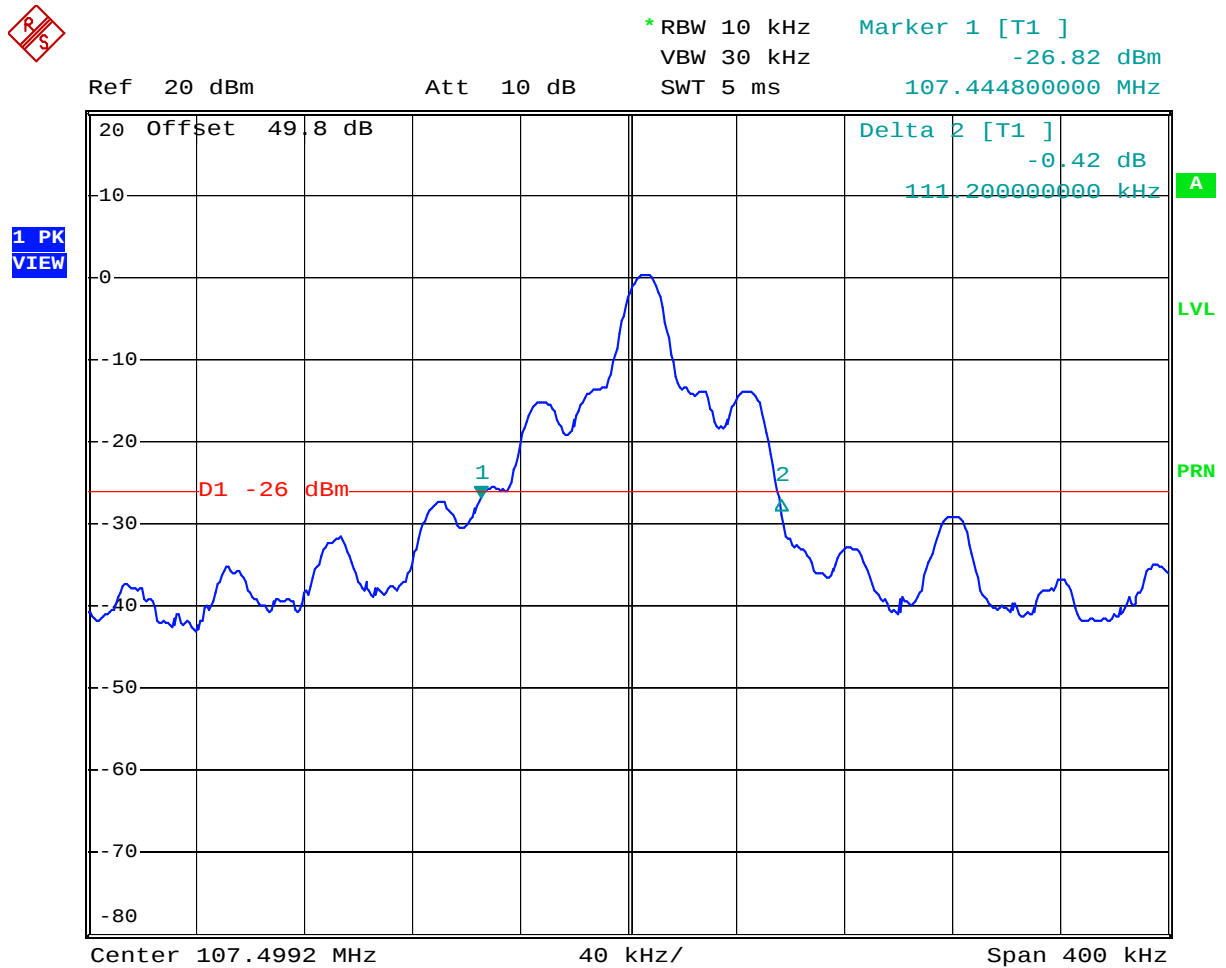
Date: 22.DEC.2004 09:58:07

Occupied bandwidth chart of center channel



Date: 22.DEC.2004 10:05:59

Occupied bandwidth chart of highest channel



Date: 22.DEC.2004 09:47:31

PHOTOS OF THE EUT

Top view of EUT



Bottom view of EUT



left side of EUT



right side of EUT



Fixed audio in cable



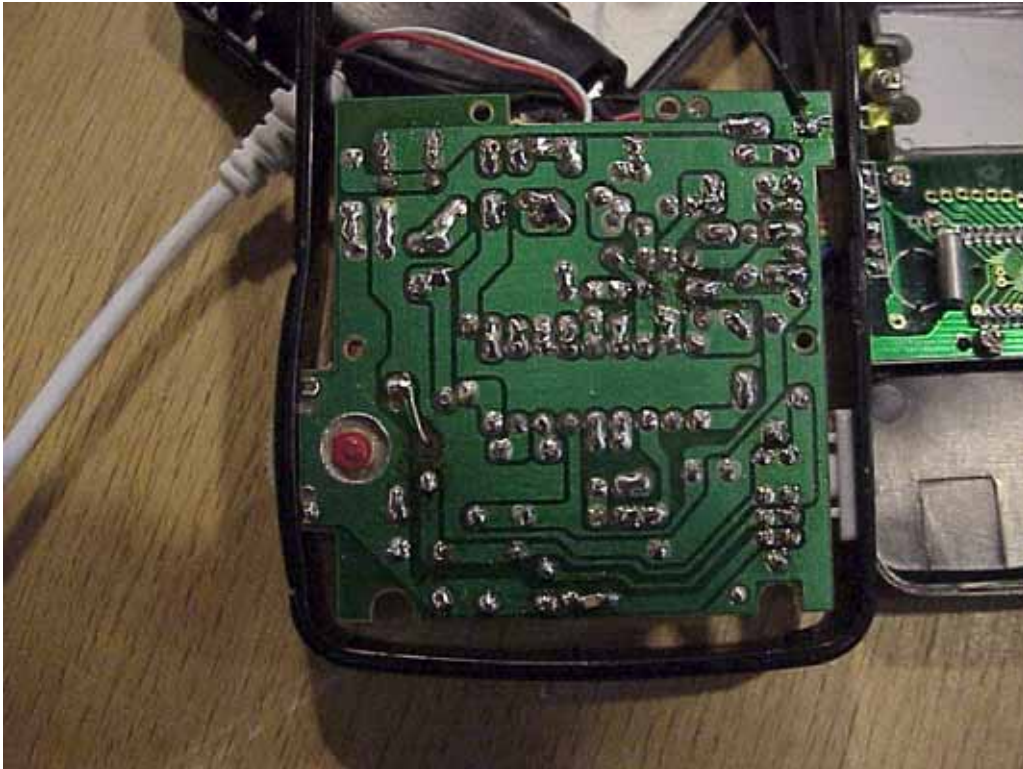
EUT disassembled



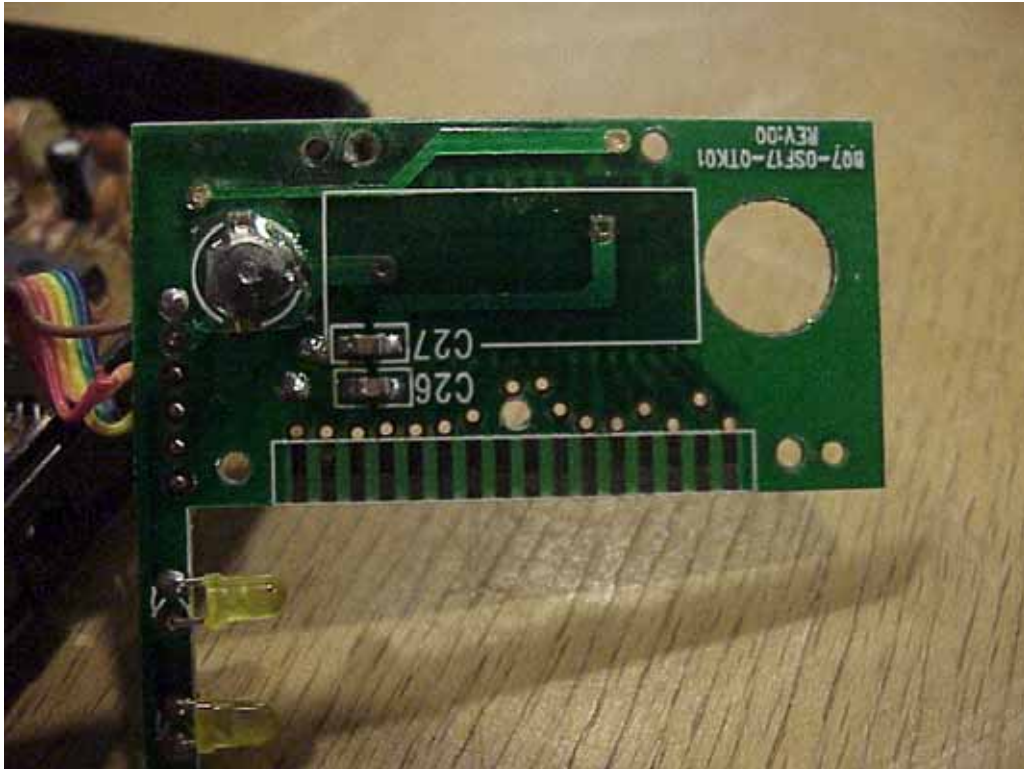
Main PCB top view



Main PCB bottom view



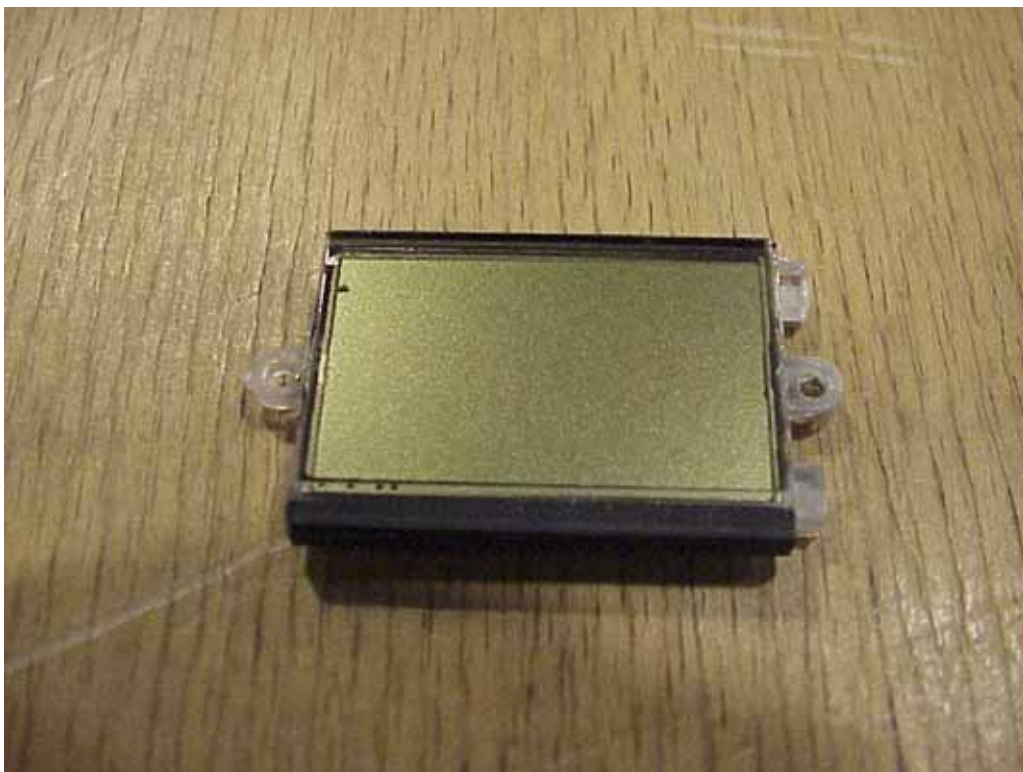
Display PCB top view



Display PCB bottom view



Display front view



Display back view

