

Straubing, May 17, 2010

TEST-REPORT

No. 50511-061106-2(Edition 3)

for

FMR24X / FMR25X / FMR54X

Tank Level Probing Radar

Applicant: Endress & Hauser GmbH & Co. KG

Test Specifications: FCC Code of Federal Regulations,

CFR 47, Part 15,

Sections 15.205, 15.207 and 15.209

Note:

The test data of this report is related only to the individual item which has been tested. This report shall not be reproduced except in full extent without the written approval of the testing laboratory.



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1 Description of the Equipment Under Test (EUT)

General data of EUT

Type designation¹: FMR24X / FMR25X / FMR54X

Serial number(s): N/A

Manufacturer: Endress & Hauser GmbH & Co. KG

Type of equipment: Tank Level Probing Radar (TLPR)

Version: As delivered

FCC ID:

Additional parts/accessories:

Technical data of EUT

Application frequency range: 24.05 - 27.00 GHz

Frequency range: 24.05 - 27 GHz GHz

Operating frequency: 25.9 GHz (nominal)

Type of modulation: 1G08P0NAN

Pulse train: 558.5 ns
Pulse width: 2.79 ns

Number of RF-channels: 1

Channel spacing: Not Applicable

Designation of emissions²: 1G08P0NAN

Type of antenna: See table overleaf

Size/length of antenna: Type Gain Length Tested Plated horn 80 mm / 3" 26 dBi N/A Yes 100 mm / 4" Horn antenna 26 dBi 282 mm Yes Parabolic antenna 200 mm 34 dBi N/A Yes

Type of power supply: DC supply

Specifications for power supply: nominal voltage: 24 V minimum voltage: 16 V

minimum voltage: 16 V maximum voltage: 36 V

_

¹ Type designation of the system if EUT consists of more than one part.

² Also known as "Class of Emission".



Variants and antennas covered by this report

| | Model | Description | Main - Electronic | RF-Module | Antennas |
|---|------------------|-----------------------|------------------------------|--|--|
| 1 | FMR25X | Solid-Radar | HART, PA FF (in develop.) | RF-Modul E+H with Power-Amplifier | 200mm-Parabol 3" - Horn 4" - Horn |
| 2 | FMR54X | Tank-Gauging Radar | Own Electronic | Same as in 1, without Power-Amplifier | 200mm-Parabol 4" - Horn |
| 3 | FMR24X FMR240 | Liquid-Radar | Same as in 1 | Same as in 1, without Power-Amplifier | 1.5" - Horn 2" - Horn 3" - Horn 4" - Horn |
| | FMR244 | | | | 1.5" - Horn 3" plated |
| | FMR245 | | | | 2" plated Horn 3" plated Horn filled |

Note: By combining the underlined two RF modules and 3 antennas , all the variants listed above are covered.



2 Administrative Data

Application details

Applicant (full address): Endress & Hauser GmbH & Co. KG

Hauptstraße 1 D 79689 Maulburg

Germany

Contact person: Mr. Ralf Reimelt

Contract identification:

Receipt of EUT: 10 May 2007

Date(s) of test: September 2007

Note(s):

Report details

Report number: 50511-061106-2 Issue date: 17 May 2010



3 Identification of the Test Laboratory

Details of the Test Laboratory

Company name: Senton GmbH EMI/EMC Test Center

Address: Aeussere Fruehlingstrasse 45

D-94315 Straubing

Germany

Laboratory Accreditation: DAR-Registration No. DAT-P-171/94-02

FCC Test Site registration number 90926 Industry Canada Test site registration: IC 3050

Contact person: Mr. Johann Roidt

Phone: (+49) (0)9421 5522-0 Fax: (+49) (0)9421 5522-99



4 Summary

Summary of test results

The tested sample complies with the requirements set forth in the

Code of Federal Regulations CFR 47, Part 15, Sections 15.205, 15.207 and 15.209 of the Federal Communication Commission (FCC)

| Dorconnol | involved | in thi | roport |
|-----------|----------|---------|----------|
| Personnel | invoived | in this | s report |

Laboratory Manager:

Mr. Johann Roidt

Responsible for testing: Mr. Johann Roidt

Responsible for test report: Mr. Johann Roidt



5 Operation Mode and Configuration of EUT

Operation Mode

Normal operation mode: Measurement with pulsed signal.

Configuration of EUT

FCC test setup.

DC 24 V power supply.

EUT in vertical position.

| List | List of ports and cables | | | | | | |
|------|--------------------------|-----------------------------|------------|--------------|--|--|--|
| Port | Description | Classification ³ | Cable type | Cable length | | | |
| 1 | DC supply with | dc power | Shielded | > 3 m | | | |
| | HART communication | signal/control port | | | | | |

| List | List of devices connected to EUT | | | | | | |
|------|----------------------------------|------------------|------------------|--------------|--|--|--|
| Item | Description | Type Designation | Serial no. or ID | Manufacturer | | | |
| | | | | | | | |

| List of suppo | rt devices | | |
|---------------|--------------------|----------------------|--------------|
| Item Descrip | tion Type Designat | ion Serial no. or ID | Manufacturer |
| | | | |

³ Ports shall be classified as ac power, dc power or signal/control port



6 Measuring Methods

6.1 Conducted AC powerline emission

| Measurement Procedure: | | | | |
|---------------------------|---|--|--|--|
| Rules and Specifications: | CFR 47 Part 15, section 15.207 IC RSS-Gen Issue 2, section 7.2.2 | | | |
| Guide: | ANSI C63.4 / CISPR 22 | | | |

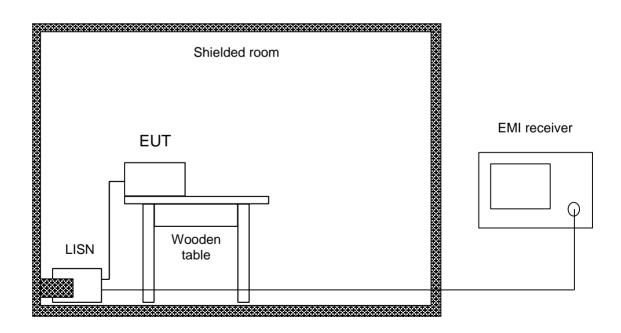
Conducted emission tests in the frequency range 150 kHz to 30 MHz are performed using Line Impedance Stabilization Networks (LISNs). To simplify testing with quasi-peak and average detector the following procedure is used:

First the whole spectrum of emission caused by the equipment under test (EUT) is recorded with detector set to peak using CISPR bandwidth of 10 kHz. After that all emission levels having less margin than 10 dB to or exceeding the average (CFR 47 Part 15) or quasi-peak (IC RSS-210) limit are retested with detector set to quasi-peak.

If average limit is kept with quasi-peak levels no additional scan with average detector is necessary. In cases of emission levels between quasi-peak and average limit an additional scan with detector set to average is performed.

According to ANSI C63.4, section 13.1.3.1, testing of intentional radiators with detachable antenna shall be performed using a suitable dummy load connected to the antenna output terminals. Otherwise, the tests shall be made with the antenna connected and, if adjustable, fully extended.

Testing with dummy load may be necessary to distinguish (unintentional) conducted emissions on the supply lines from (intentional) emissions radiated by the antenna and coupling directly to supply lines and/or LISN. Usage of dummy load has to be stated in the appropriate test record(s) and notes should be added to clarify the test setup.





Test instruments used:

| | | | • | |
|-------------|---------------|---------|------------------|--------------------|
| Used | Туре | Model | Serial No. or ID | Manufacturer |
| \boxtimes | EMI receiver | ESHS 10 | 860043/016 | Rohde & Schwarz |
| \boxtimes | LISN | ESH3-Z5 | 862770/021 | Rohde & Schwarz |
| | LISN | ESH3-Z5 | 830952/025 | Rohde & Schwarz |
| | Shielded room | No. 1 | 1451 | Albatross Projects |
| \boxtimes | Shielded room | No. 4 | 3FD-100 544 | Euroshield |



6.2 Radiated emission in Fully Anechoic Room

| Measurement Procedure: | | | | | |
|---------------------------|---|--|--|--|--|
| Rules and Specifications: | CFR 47 Part 15, section 15.209 IC RSS-210 Issue 7, section 2.6 | | | | |
| Guide: | ANSI C63.4 | | | | |

Radiated emission in fully anechoic room is measured in the frequency range from 30 MHz to the maximum frequency as specified in CFR 47 Part 15 section 15.33.

Measurements are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 100 kHz (below 1 GHz) or 1 MHz (above 1 GHz).

Testing up to 1 GHz is performed with a linear polarized logarithmic periodic antenna combined with a 4:1 broadband dipole ("Trilog broadband antenna"). For testing above 1 GHz horn antennas are used.

All tests below 18 GHz are performed at a test distance D of 3 meters. For higher frequencies the test distance is reduced (e.g. to 1 meter) due to the sensitivity of the measuring instrument(s) and the test results are calculated according to CFR 47 Part 15 section 15.31(f)(1) using an extrapolation factor of 20 dB/decade. If required, preamplifiers are used for the whole frequency range. Special care is taken to avoid overload, using appropriate attenuators and filters, if necessary.

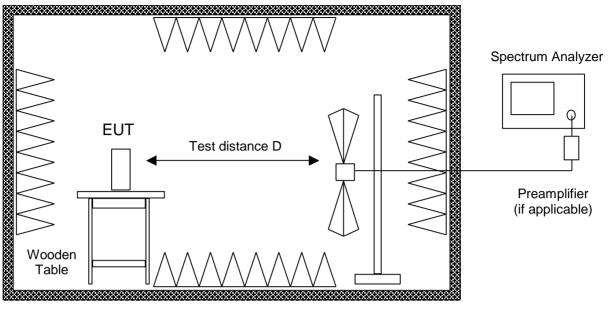
If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value.

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.

During testing the EUT is rotated all around to find the maximum levels of emissions. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For final testing below 1 GHz an open field test-site is used and the plots recorded in the fully anechoic room are indicated as prescans.





Fully anechoic room

Test instruments used:

| Used | Туре | Model | Serial No. or ID | Manufacturer |
|-------------|-------------------------------|----------------------|--------------------------|--------------------|
| | Spectrum Analyzer | FSP 30 | 100063 | Rohde & Schwarz |
| | EMI test receiver | ESMI | 839379/013 839587/006 | Rohde & Schwarz |
| \boxtimes | Preamplifier | CPA9231A | 3393 | Schaffner |
| \boxtimes | Preamplifier 1-8 GHz | AFS3-00100800-32-LN | 847743 | Miteq |
| | Preamplifier 0.5-8 GHz | AMF-4D-005080-25-13P | 860149 | Miteq |
| \boxtimes | Preamplifier 8-18 GHz | ACO/180-3530 | 32641 | CTT |
| \boxtimes | External Mixer | WM782A | 845881/005 | Tektronix |
| | Harmonic Mixer Accessories | FS-Z30 | 843389/007 | Rohde & Schwarz |
| \boxtimes | Trilog broadband antenna | VULB 9163 | 9163-188 | Schwarzbeck |
| \boxtimes | Horn antenna | 3115 | 9508-4553 | EMCO |
| | Horn antenna | 3160-03 | 9112-1003 | EMCO |
| | Horn antenna | 3160-04 | 9112-1001 | EMCO |
| \boxtimes | Horn antenna | 3160-05 | 9112-1001 | EMCO |
| \boxtimes | Horn antenna | 3160-06 | 9112-1001 | EMCO |
| \boxtimes | Horn antenna | 3160-07 | 9112-1008 | EMCO |
| \boxtimes | Horn antenna | 3160-08 | 9112-1002 | EMCO |
| \boxtimes | Horn antenna | 3160-09 | 9403-1025 | EMCO |
| \boxtimes | Horn antenna | 3160-10 | 399185 | EMCO |
| | Fully anechoic room | No. 2 | 1452 | Albatross Projects |



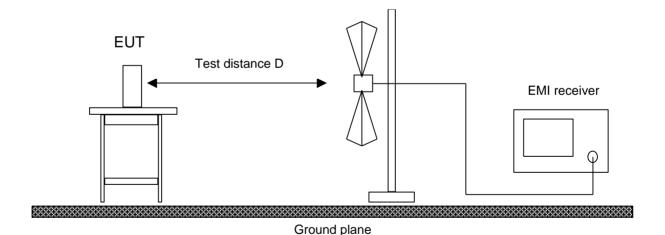
6.3 Radiated emission at Open Field Test Site

| Measurement Procedure: | | | | | |
|---------------------------|---|--|--|--|--|
| Rules and Specifications: | CFR 47 Part 15, section 15.209 IC RSS-210 Issue 7, section 2.6 | | | | |
| Guide: | ANSI C63.4 | | | | |

Radiated emission at open field test site is measured in the frequency range 30 MHz to 1 GHz using a biconical antenna up to 300 MHz and a logarithmic periodic antenna above. The measurement bandwidth of the test receiver is set to 120 kHz with quasi-peak detector selected.

If the radiated emission limits are expressed in terms of the average value of the emission there also is a peak limit corresponding to 20 dB above the maximum permitted average limit. Additionally, if pulsed operation is employed, the average field strength is determined by averaging over one complete pulse train, including blanking intervals, as specified in CFR 47 Part 15 section 15.35(c). If the pulse train exceeds 0.1 second that 0.1 second interval during which the value of the emission is at its maximum is selected for calculation. The pulse train correction is added to the peak value of the emission to get the average value. Hand-held or body-worn devices are tested in the position producing the highest emission relative to the limit as verified by prescans in the fully anechoic room. EUT is rotated all around and receiving antenna is raised and lowered within 1 meter to 4 meters to find the maximum levels of emission. Equipment and cables are placed and moved within the range of position likely to find their maximum emissions.

For measuring emissions of intentional radiators and receivers a test distance D of 3 meters is selected. Testing of unintentional radiators is performed at a distance of 10 meters. If limits specified for 3 meters shall be used for measurements performed at 10 meters distance the limits are calculated according to CFR 47 Part 15 section 15.31(d) and (f)(1) using an inverse linear-distance extrapolation factor of 20 dB/decade.



Test instruments used:

| Used | Туре | | Model | Serial No. or ID | Manufacturer |
|-------------|----------------------|------|--------|------------------|-----------------|
| \boxtimes | EMI receiver | | ESVP | 881414/009 | Rohde & Schwarz |
| \boxtimes | Biconical antenna | EG 1 | HK 116 | 842204/001 | Rohde & Schwarz |
| \boxtimes | Log. per. antenna | EG 1 | HL 223 | 841516/023 | Rohde & Schwarz |
| \boxtimes | Open field test site | | EG 1 | 1450 | Senton |



6.4 Desensitization of pulsed Emissions

Since the EUT transmits pulsed energy, the desensitization factor α has been calculated and included in the calculation for the final peak value.

In the HP Application Note 150-2 the analyzer settings to measure a line spectrum are defined as follows:

- a) Bandwidth B < 0.3 x PRF
- b) Scan time Ts > Fs / B²

With the pulse repetition frequency (PRF) of the EUT of 3.6 MHz and the selected measuring bandwith of B =1 MHz the requirement a) was observed.

The scan width of Fs = 3 GHz and Bandwidth of B = 1 MHz leads to following values:

$$Fs/B^2 = 3 GHz / (1 GHz)^2 = 3x 10^{-9} s$$

The selected scan time of Ts= 20 ms meets requirement b). Hence, a line spectrum was measured, which could be seen, when the Pseudo-Noise-mode of the EUT was switched off (no influence on the measured amplitudes) and the frequency scale of the analyser zoomed.

The desensitization factor α_l was calculated according to HP Application note 150-2:

$$\alpha_{I}$$
 = 20log (τ eff / T) = - 46 dB

The calculation based on the pulse width τ eff = 2.79 ns and the pulse period T= 558.5 ns, which have been supplied by the applicant.

To avoid overloading the spectrum analyzer the internal preselector has been activated during final testing. A linearity check by adding a 3 dB attenuator to the input was used to ensure integrity of the test data.

Sample Calculation of Field Strength values for pulsed systems:

- 1) Measure Peak value with analyzer RBW set to 1 MHz, VBW set to 1 MHz, Ts set to 20 ms
- 2) Calculate Field Strength by adding antenna correction factor
- 3) Calculate True Peak Field Strength by adding Desensitization Factor
- 4) Calculate Average value by subtracting Duty Cycle Correction Factor from True Peak Field Strength Value



7 Photographs Taken During Testing



Test setup for conducted DC powerline emission measurement - continued -







Test setup for radiated emission measurement (fully anechoic room)





Test setup for radiated emission measurement (fully anechoic room) - continued -





8 Test Results

| FCC CFR 47 Parts 2 and 15 | | | |
|---|--|------|----------------|
| Section(s) | Test | Page | Result |
| 2.1046(a) | Conducted output power | | Not applicable |
| 2.202(a) | Occupied bandwidth | 20 | Recorded |
| 2.201, 2.202 | Class of emission | 22 | Calculated |
| 15.35(c) | Pulse train measurement for pulsed operation | 23 | Recorded |
| 15.205(a) | Restricted bands of operation | 25 | Test passed |
| 15.207 Conducted AC powerline emission 150 kHz to 30 MHz | | 26 | Test passed |
| 15.205(b) 15.209 | Radiated emission 9 kHz to 30 MHz | 28 | Test passed |
| 15.205(b) 15.209 | Radiated emission 30 MHz to 110 GHz | 29 | Test passed |



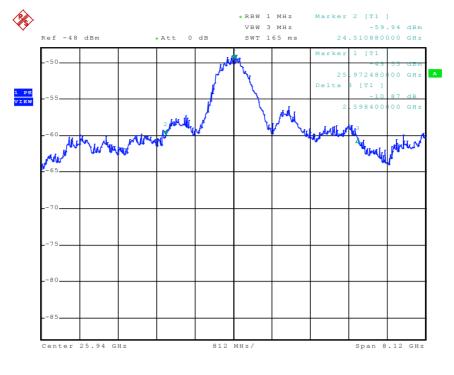
8.1 Occupied Bandwidth

| Rules and specifications: | CFR 47 Part 2, section 2.202(a) ANSI C63.4, annex H.6 | | |
|---------------------------|--|------------------------------|--|
| Guide: | ANSI C63.4 | | |
| Description: | The occupied bandwidth according to CFR 47 Part 2, section 2.202(a), is measured as the 99% emission bandwidth, i.e. below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission. | | |
| | The occupied bandwidth according to ANSI C63.4, annex H.6; is measured as the frequency range defined by the points that are 26 dB down relative to the maximum level of the modulated carrier. | | |
| | The resolution bandwidth of the spectrum analyzer shall be set to a value greater than 5.0% of the allowed bandwidth. If no bandwidth specifications are given, the following guidelines are used: | | |
| | Fundamental frequency | Minimum resolution bandwidth | |
| | 9 kHz to 30 MHz | 1 kHz | |
| | 30 MHz to 1000 MHz | 10 kHz | |
| | 1000 MHz to 40 GHz 100 kHz | | |
| | The video bandwidth shall be at least tresolution bandwidth. | three times greater than the | |

| Comment: | Test performed up to 26.5 GHz only |
|---------------|------------------------------------|
| Date of test: | September 2007 |
| Test site: | Fully anechoic room, cabin no. 2 |



Occupied Bandwidth (-26 dB):



Date: 3.NOV.2007 12:15:41

Occupied Bandwidth (-26 dB): > 4.8 GHz



8.2 Designation of Emissions

| Rules and specifications: | CFR 47 Part 2, sections 2.201 and 2.202 IC RSS-Gen Issue 2, sections 3.2(h) and 8 |
|---------------------------|--|
| Guide: | ANSI C63.4 / TRC-43 |

| Type of modulation: |
|---------------------|
|---------------------|

| B _n = Necessary Bandwidth | $B_n = 2 \text{ K/t}$ |
|---|---|
| K = Overall numerical factor | K = 1.5 |
| t = Pulse duration in seconds at half-amplitude | t = 2.79ns |
| Calculation: | B _n = 2 · 1.5 / 2.79ns = 1.075 GHz |

| Designation of Emissions: | 1G08P0NAN |
|---------------------------|-----------|
|---------------------------|-----------|



8.3 Duty Cycle Measurement

| Rules and specifications: | CFR 47 Part 15, section 15.35(c) IC RSS-Gen Issue 2, section 4.5 |
|---------------------------|---|
| Guide: | ANSI C63.4 |

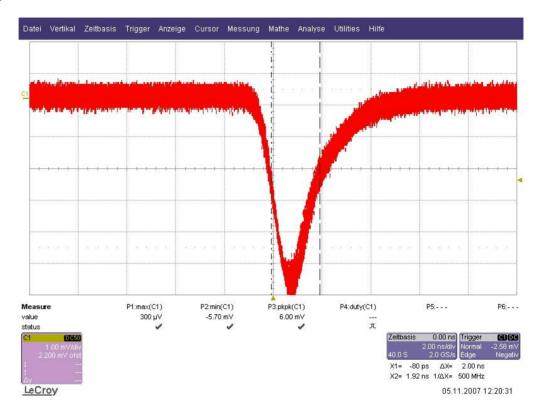
| Comment: | Measurement with negative diode detector. |
|---------------|---|
| Date of test: | 05 November 2007 |
| Test site: | Fully anechoic room, cabin no. 2 |

Total Pulse Train:





Single pulse:



Calculation of Duty cycle correction:

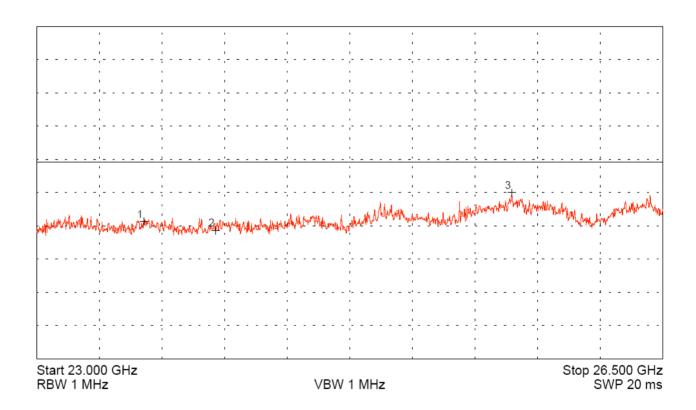
| TX-On-Time (worst case): | T _{on} | = | 2.79 ns |
|--------------------------|---------------------|---|---|
| Pulse Train Time: | T_{pt} | = | 558.5 ns |
| Period Time: | T _{period} | = | 558.5 ns |
| Pulse Train Correction: | C _{pt} | = | 20 · Log(T _{on} / T _{period}) dB |
| | | = | -46.0 dB |



8.4 Restricted bands of operation

| Rules and specifications: | CFR 47 Part 15, section 15.205(a) IC RSS-210 Issue 7, section 2.2(a) |
|---------------------------|--|
| Guide: | ANSI C63.4 |
| Limit: | Only spurious emissions are permitted in any of the frequency bands listed in CFR 47 Part 15, section 15.205(a) or IC RSS-210 Issue 7, section 2.2(a). |

| Comment: | DUT in vertical position |
|----------------|----------------------------------|
| Date of test: | |
| Test site: | Fully anechoic room, cabin no. 2 |
| Test distance: | 3 meters |



| Test Result: |
|--------------|
|--------------|



8.5 Conducted Powerline Emission Measurement 150 kHz to 30 MHz

| Rules and specifications: | | 5, section 15.207 ssue 2, section 7.2.2 | | |
|---------------------------|-----------------------------------|--|----------|--|
| Guide: | ANSI C63.4 / 0 | CISPR 22 | | |
| Limit: | | | | |
| | Frequency of Emission (MHz) | Conducted Limit (dBµV) | | |
| | | Quasi-peak | Average | |
| | 0.15 - 0.5 | 66 to 56 | 56 to 46 | |
| | 0.5 - 5 | 56 | 46 | |
| | 5 - 30 | 60 | 50 | |

| Comment: | EUT has no AC mains supply. Test performed on DC supply instead. |
|---------------|--|
| Date of test: | 2007 |
| Test site: | Shielded room, cabin no. 4 |

| | Test passed | Test Result: |
|--|-------------|--------------|
|--|-------------|--------------|

| Tested on: | DC supply: PLUS |
|-------------|------------------|
| 1 Colca on. | DO 34pply. 1 200 |

| Frequency | Detector | Reading | Correction | Final | CFR 47 | Part 15 | RSS | -210 |
|------------|------------|---------|------------|--------|--------|---------|--------|--------|
| | | Value | Factor | Value | Limit | Margin | Limit | Margin |
| (MHz) | | (dBµV) | (dB) | (dBµV) | (dBµV) | (dB) | (dBµV) | (dB) |
| 0.150 - 30 | Quasi-Peak | 0.0 | 0.0 | *** | | | | |

^{***} No measurements above noise level detected.

| Tested on: | DC supply: MINUS |
|------------|------------------|
| | |

| Frequency | Detector | Reading | Correction | Final | CFR 47 | Part 15 | RSS | -210 |
|------------|------------|---------|------------|--------|--------|---------|--------|--------|
| | | Value | Factor | Value | Limit | Margin | Limit | Margin |
| (MHz) | | (dBµV) | (dB) | (dBµV) | (dBµV) | (dB) | (dBµV) | (dB) |
| 0.150 - 30 | Quasi-Peak | 0.0 | 0.0 | *** | | | | |

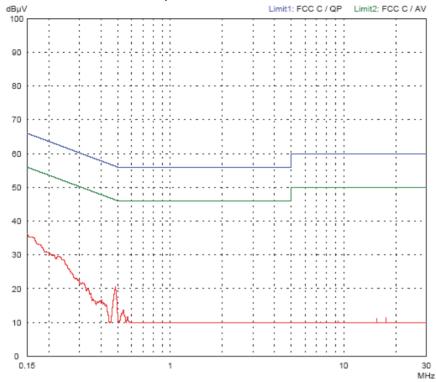
^{***} No measurements above noise level detected.

Sample calculation of final values:

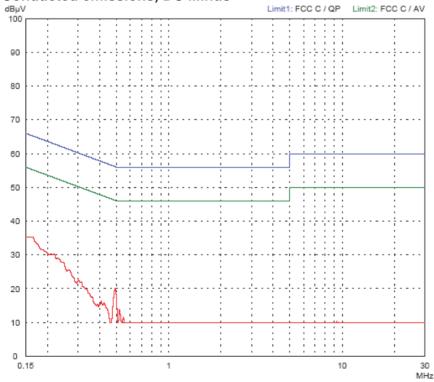
Final Value ($dB\mu V$) = Reading Value ($dB\mu V$) + Correction Factor (dB)



Conducted emiswsions, DC Plus



Conducted emissions, DC Minus





8.6 Radiated Emission Measurement 9 kHz to 30 MHz

| Rules and specifications: | CFR 47 Part 15, se IC RSS-210 Issue | | | |
|---------------------------|--|-----------------------------|-------------------------------|---------------------------------------|
| Guide: | ANSI C63.4 | | | |
| Limit: | Frequency of Emission (MHz) | Field Strength (µV/m) | Field Strength (dBµV/m) | Measurement Distance d (meters) |
| | 0.009 - 0.490 | 2400/F(kHz) | 67.6 - 20 · log(F(kHz)) | 300 |
| | 0.490 - 1.705 | 24000/F(kHz) | 87.6 - 20 · log(F(kHz)) | 30 |
| | 1.705 - 30.000 | 30 | 29.5 | 30 |
| | Additionally, the lev of the fundamental | • | ed emissions shall not ex | ceed the level |

| | Test Result: | Test passed |
|--|--------------|-------------|
|--|--------------|-------------|



8.7 Radiated Emission Measurement 30 MHz to 110 GHz

| Rules and specifications: | CFR 47 Part 15, section IC RSS-210 Issue 7, sec | | |
|---------------------------|--|--------------------------|----------------------------|
| Guide: | ANSI C63.4 | | |
| Limit: | Frequency of Emission (MHz) | Field Strength (μV/m) | Field Strength (dBµV/m) |
| | 30 - 88 | 100 | 40.0 |
| | 88 - 216 | 150 | 43.5 |
| | 216 - 960 | 200 | 46.0 |
| | Above 960 | 500 | 54.0 |

| Comment: | Tested at 0.5 m distance, reading recalculated for 3 m test distance, includes pulse desensitization factor. |
|----------------|--|
| Date of test: | September 2007 |
| Test site: | Frequencies ≤ 1 GHz: Open field test site Frequencies > 1 GHz: Fully anechoic room, cabin no. 2 |
| Test distance: | 3 meters |

| Test Result: | Test passed |
|--------------|-------------|
|--------------|-------------|

| Frequency (MHz) | Polarization | Detector | Reading (dBµV) | Correction (dB/m) | Pulse Train Corr. (dB) | Final Value (dBµV(m) | Limit (dBµV/m) | Margin (dB) |
|--------------------|--------------|----------|-------------------|-------------------|---------------------------|-------------------------|-------------------|----------------|
| 25972,000 | horizontal | Peak | 6,0 | 43,0 | 0,0 | 49,0 | 54,0 | 5,0 |



9 Referenced Regulations

All tests were performed with reference to the following regulations and standards:

| CFR 47 Part 2 | Code of Federal Regulations Part 2 (Frequency allocation and radio treaty matters; General rules and regulations) of the Federal Communication Commission (FCC) | October 1, 2008 |
|---------------------------------|---|---|
| CFR 47 Part 15 | Code of Federal Regulations Part 15 (Radio Frequency Devices) of the Federal Communication Commission (FCC) | October 1, 2008 |
| ANSI C63.4 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low- Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz | December 11, 2003 (published on January 30, 2004) |
| RSS-Gen | Radio Standards Specification RSS-Gen Issue 2 containing General Requirements and Information for the Certification of Radiocommunication Equimpment, published by Industry Canada | June 2007 |
| RSS-210 | Radio Standards Specification RSS-210 Issue 7 for Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, published by Industry Canada | June 2007 |
| RSS-310 | Radio Standards Specification RSS-310 Issue 2 for Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category II Equipment, published by Industry Canada | June 2007 |
| RSS-102 | Radio Standards Specification RSS-102 Issue 4: Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands), published by Industry Canada | March 2010 |
| ICES-003 | Interference-Causing Equipment Standard ICES-003 Issue 4 for Digital Apparatus, published by Industry Canada | February 7, 2004 |
| CISPR 22 | Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment – Radio Disturbance Characteristics – Limits and Methods of Measurement" | 1997 |
| CAN/CSA- CEI/IEC CISPR 22 | Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment | 2002 |
| TRC-43 | Notes Regarding Designation of Emission (Including Necessary Bandwidth and Classification), Class of Station and Nature of Service, published by Industry Canada | October 9, 1982 |



10 Revision History

| Edition | Date | Issued by | Note |
|---------|------------|---------------|---|
| 01 | 10.12.2007 | J. Roidt | First edition |
| 02 | 09.12.2008 | C. Jäger (jr) | Edition 2 required for FCC-/IC certification Test report updated: FCC regulations Radiated emission test 9 kHz - 30 MHz |
| 03 | 17.05.2010 | C. Jäger (jr) | Edition 3 required for FCC-/IC certification Test report updated: FCC regulations |



11 Charts taken during testing

Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

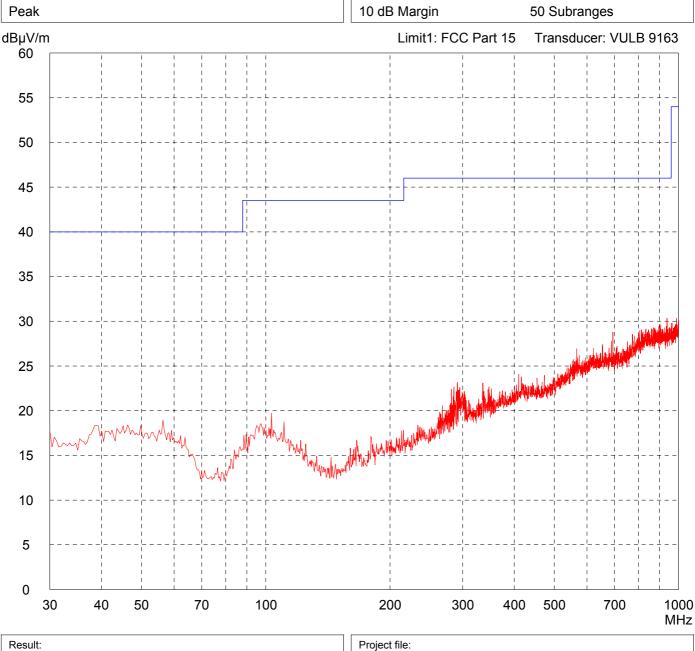
| Mandali | | |
|---|-------------|--|
| Model: FMR54X with 200 mm Parabol | | |
| | | |
| Serial no.: 940001010AD | | |
| | | |
| Applicant: Endres & Hauser GmbH & Co. KG | | |
| Test site: | | |
| Fully anechoic room, cabin no. 2 | | |
| Tested on: | | |
| Test distance 3 metre Horizontal Polarizatio | | |
| Date of test: | Operator: | |
| 06/12/2007 | M. Steindl | |
| Test performed: | File name: | |
| automatically | default.emi | |
| | | |

Prescan

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

List of values: Detector: Peak 10 dB Margin 50 Subranges



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Page

Pages

Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

| Model: | | |
|---|-------------|--|
| FMR54X with 200 mm Parabol | | |
| Serial no.: | | |
| 940001010AD | | |
| Applicant: Endres & Hauser Gmb | H & Co. KG | |
| Test site: Fully anechoic room, cabin no. 2 | | |
| Tested on: Test distance 3 metres Vertical Polarization | 3 | |
| Date of test: | Operator: | |
| 06/12/2007 | M. Steindl | |
| Test performed: | File name: | |
| automatically | default.emi | |
| | | |

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

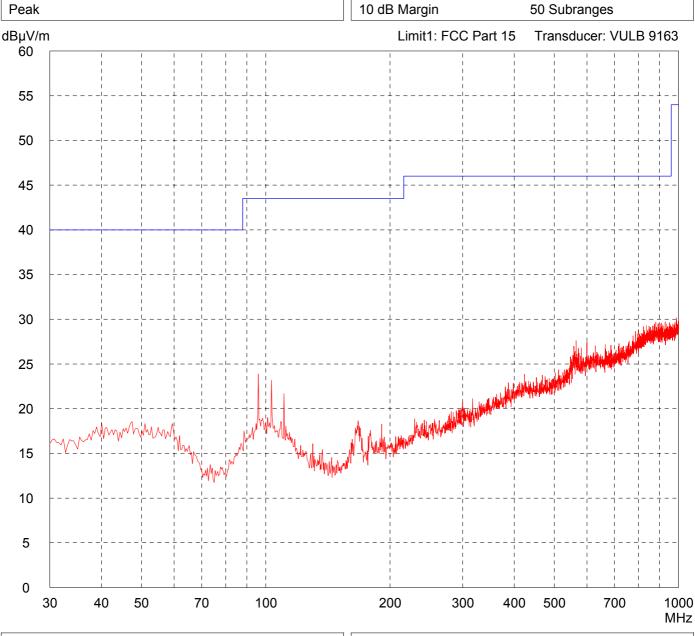
Detector:

Peak

List of values:

10 dB Margin

50 Subranges



Result:
Prescan

Project file:
50511-61106-1

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Radiated Emission Test 1 GHz - 2.6 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

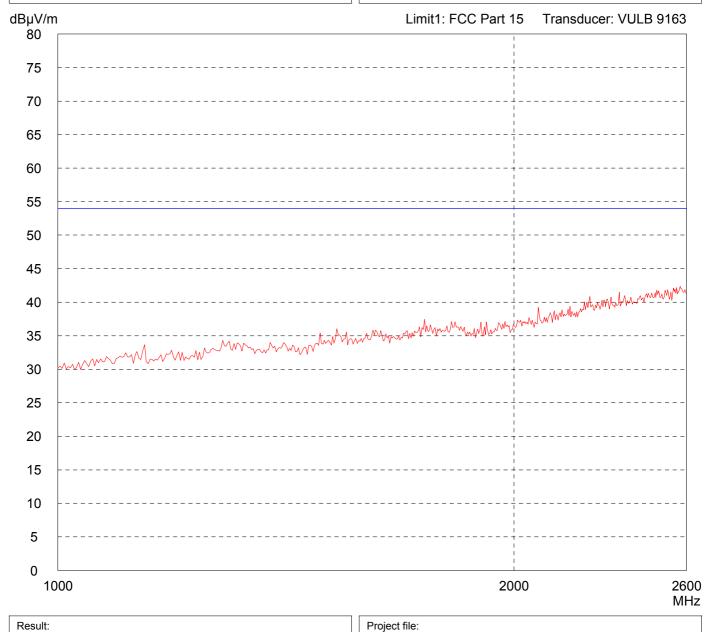
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
10 dB Margin

50 Subranges



Prescan 50511-61106-1 Page of Pages

Radiated Emission Test 1 GHz - 2.6 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

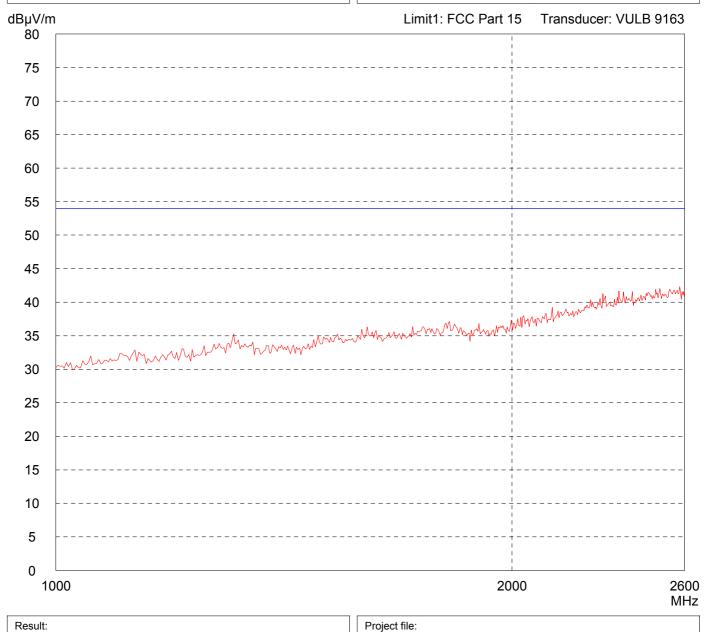
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
10 dB Margin

50 Subranges



Radiated Emission Test 2.6 GHz - 3.95 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 meters Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

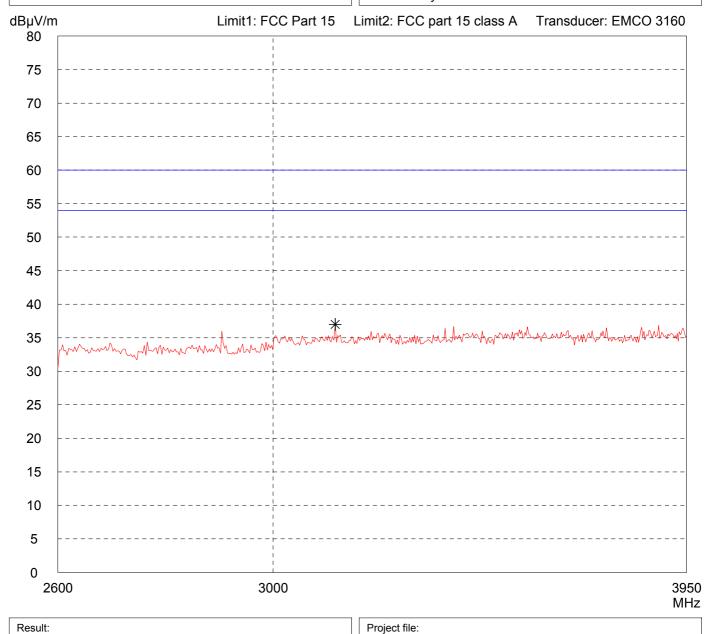
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



Radiated Emission Test 2.6 GHz - 3.95 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 meters Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Prescan

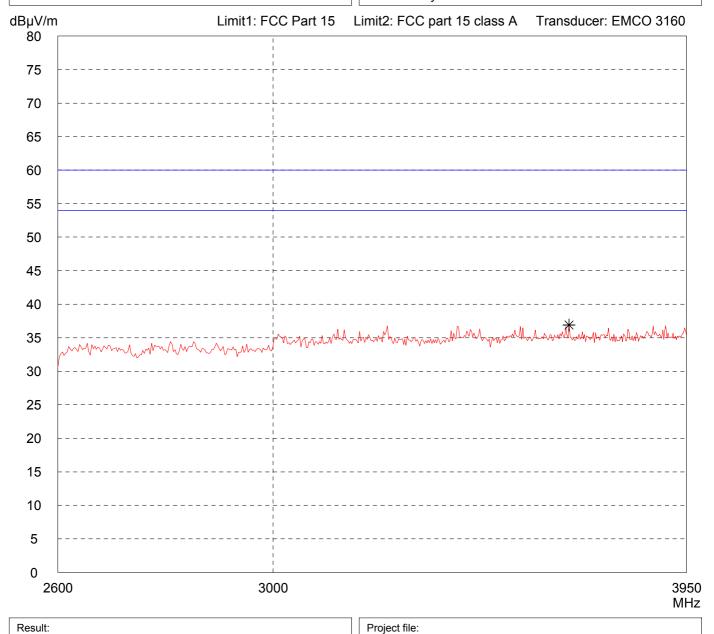
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



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Pages

Radiated Emission Test 3.95 GHz - 5.85 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Operator: Date of test: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

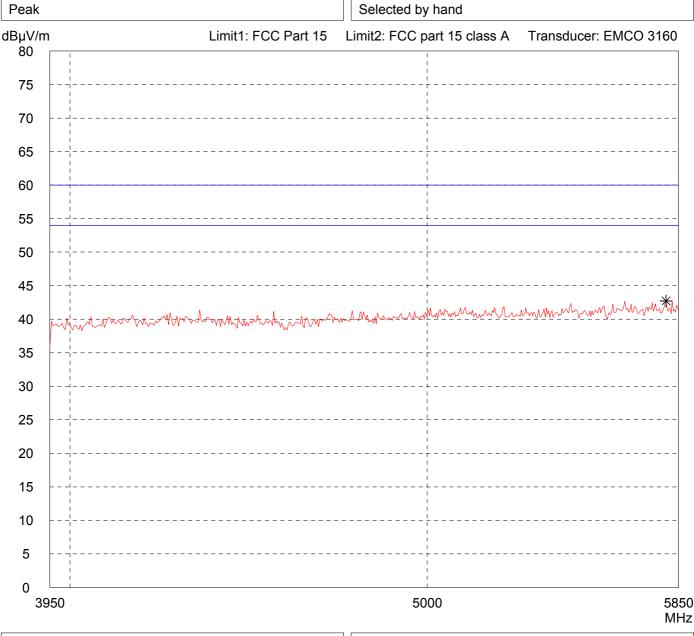
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



Result: Project file: 50511-61106-1 Page of Pages

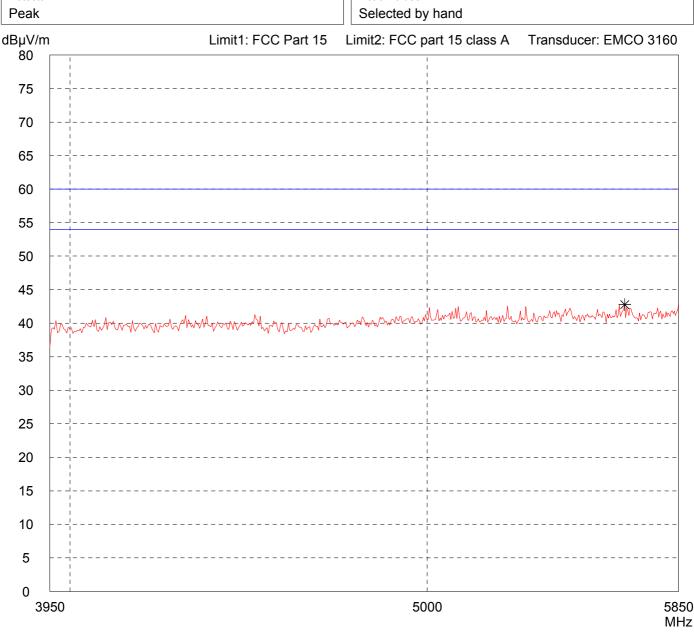
Radiated Emission Test 3.95 GHz - 5.85 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Peak Selected by hand



Radiated Emission Test 5.85 GHz - 8.2 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Operator: Date of test: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Comment:

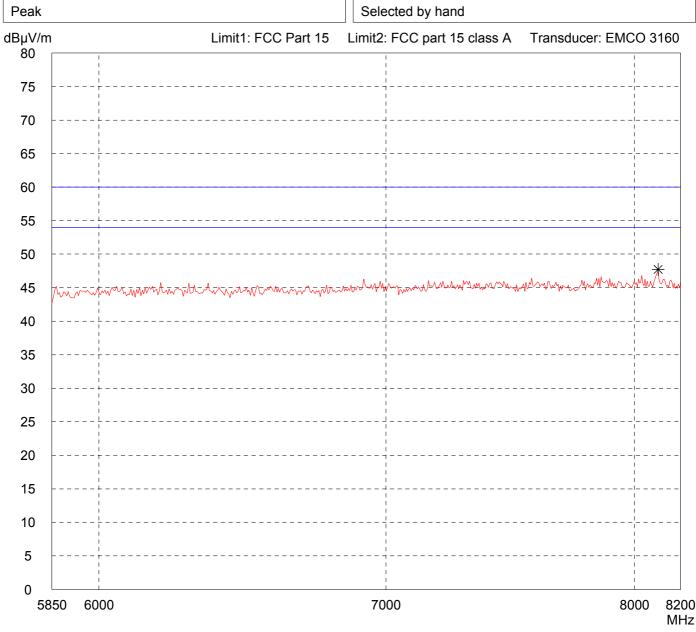
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:

Selected by hand



Result:
Prescan

Project file:
50511-61106-1

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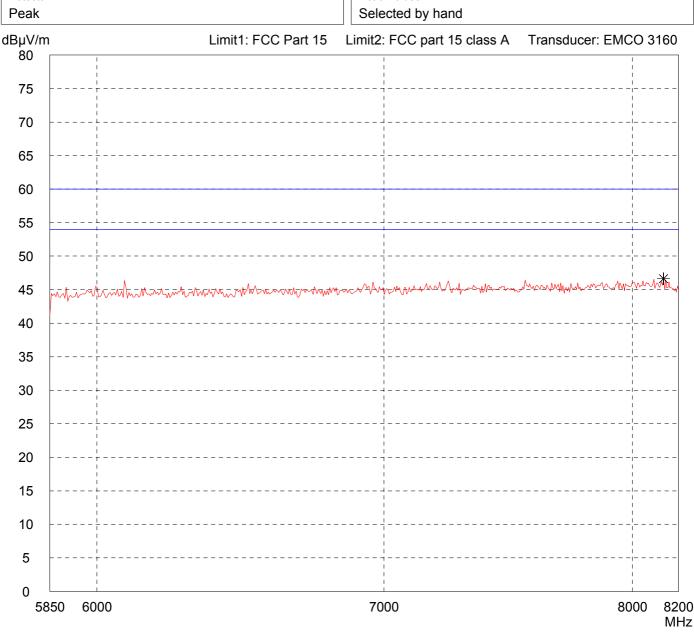
Radiated Emission Test 5.85 GHz - 8.2 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Comment:

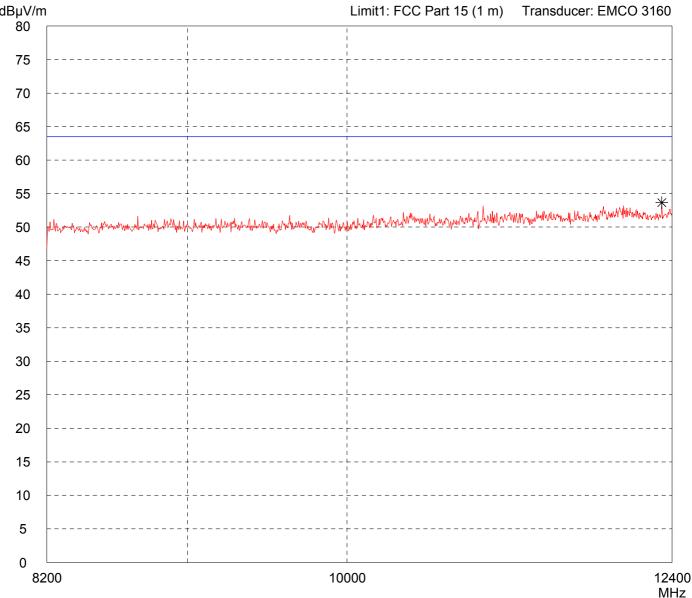
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Selected by hand



Radiated Emission Test 8.2 GHz - 12.4 GHz acc. to FCC Part 15 (EMCO 3160)

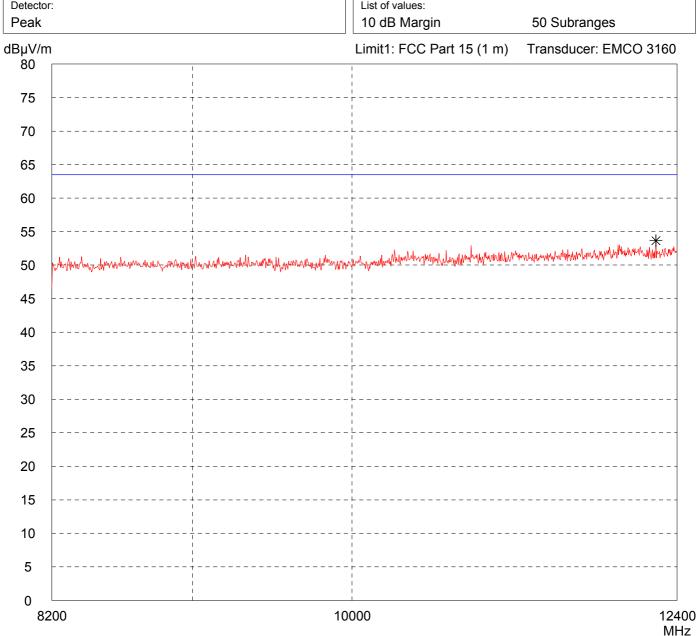
Model: Comment: FMR54X with 200 mm Parabol - DC 24 V with 330 Ohms resistor Serial no.: 940001010AD - EUT in vertical position Applicant: Endres & Hauser GmbH & Co. KG - Transmitting continuously Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi Detector: List of values: Peak 10 dB Margin 50 Subranges dBµV/m Limit1: FCC Part 15 (1 m) 80



Radiated Emission Test 8.2 GHz - 12.4 GHz acc. to FCC Part 15 (EMCO 3160)

Model: Comment: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi Detector: List of values: Peak 10 dB Margin dBµV/m

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously



Project file:

50511-61106-1

Page

Pages

Result:

Prescan

Radiated Emission Test 12.4 GHz - 18 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi Detector:

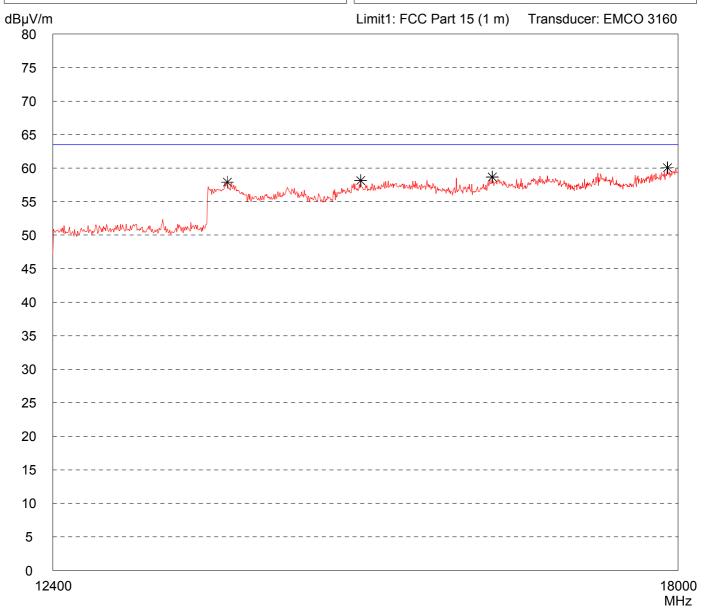
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



 Result:
 Project file:

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Radiated Emission Test 12.4 GHz - 18 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 200 mm Parabol Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

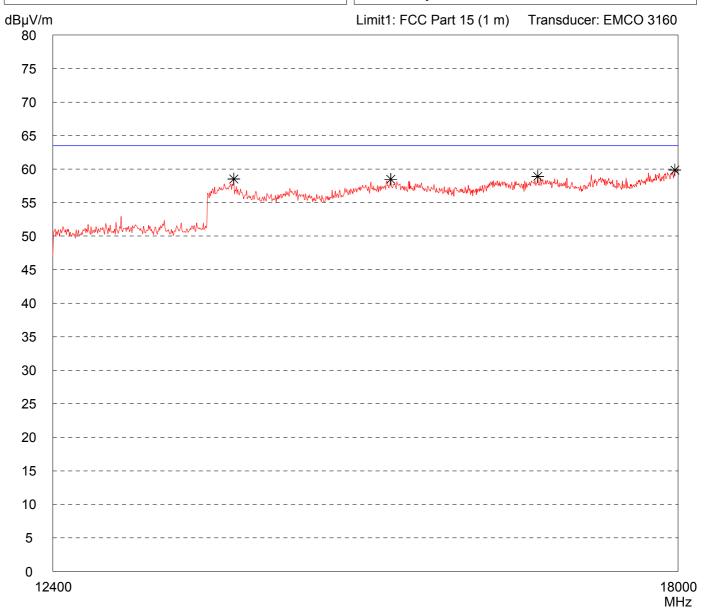
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



Result:
Prescan (VBR = 100 kHz)

Project file:
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Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

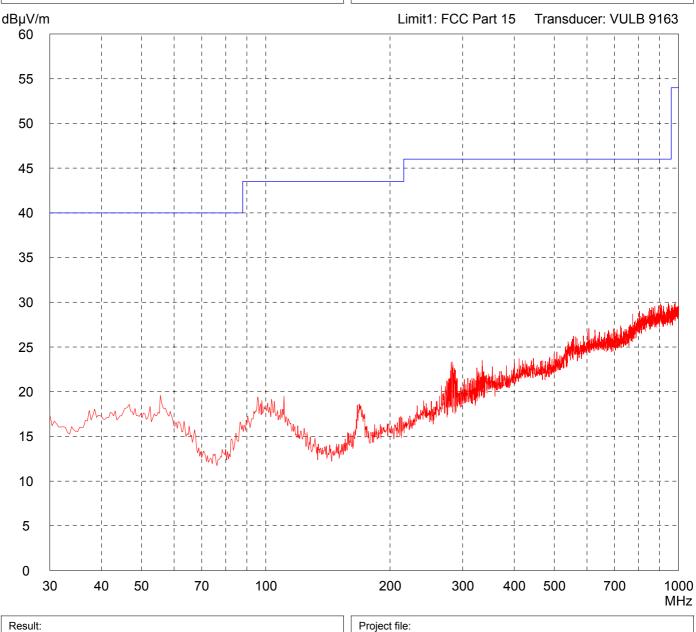
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
10 dB Margin

50 Subranges



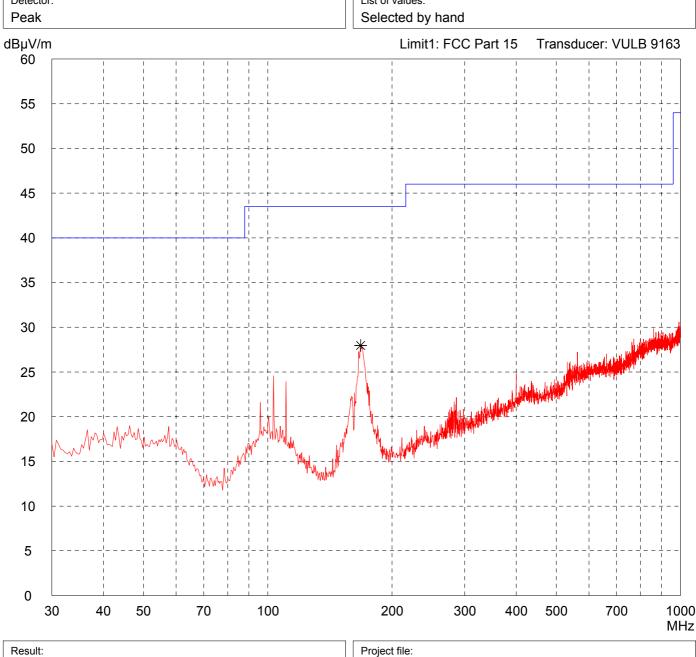
Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Selected by hand



Radiated Emission Test 1 GHz - 2.6 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

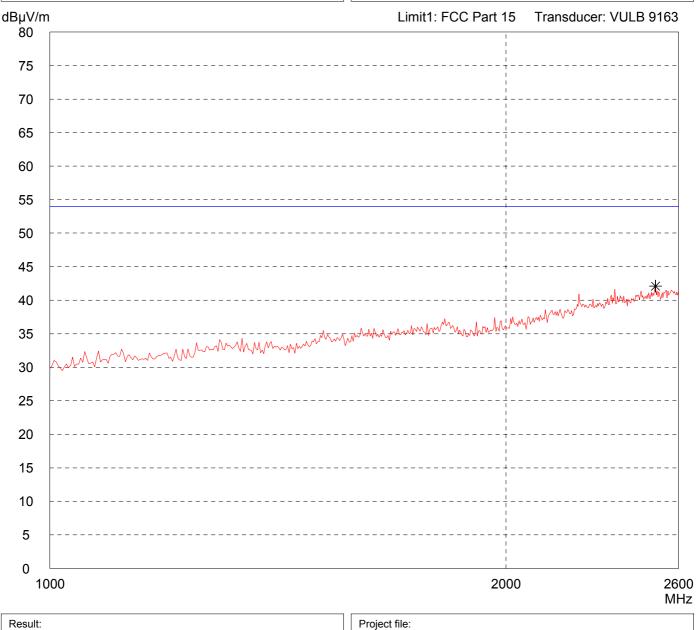
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



Radiated Emission Test 1 GHz - 2.6 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Prescan

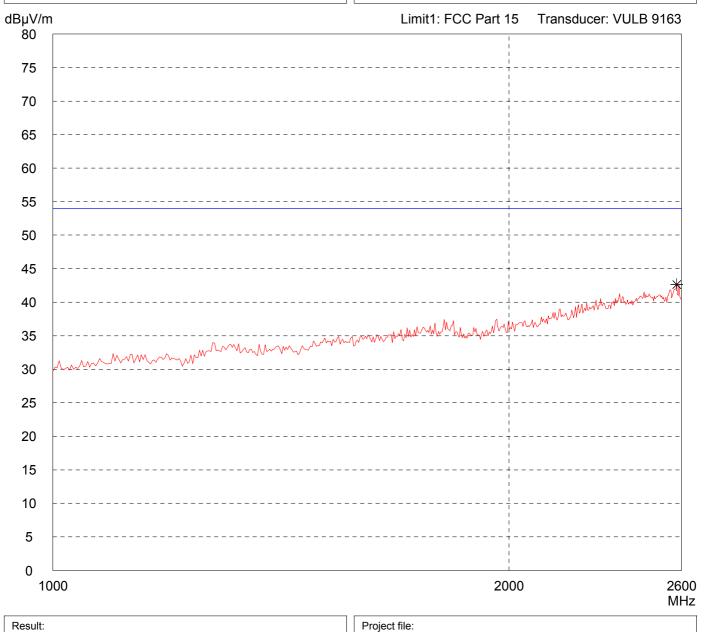
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



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Radiated Emission Test 2.6 GHz - 3.95 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 meters Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi Detector:

Comment:

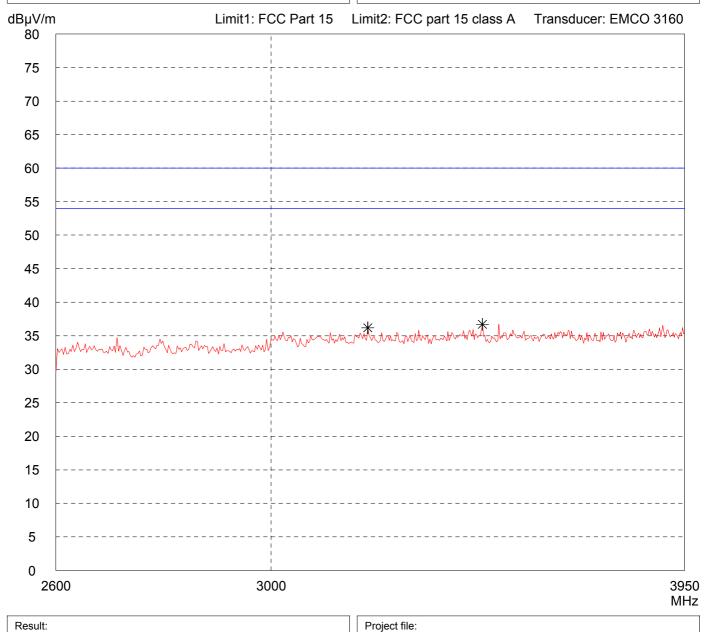
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:

Selected by hand



Radiated Emission Test 2.6 GHz - 3.95 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 meters Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi Detector:

Prescan

Comment:

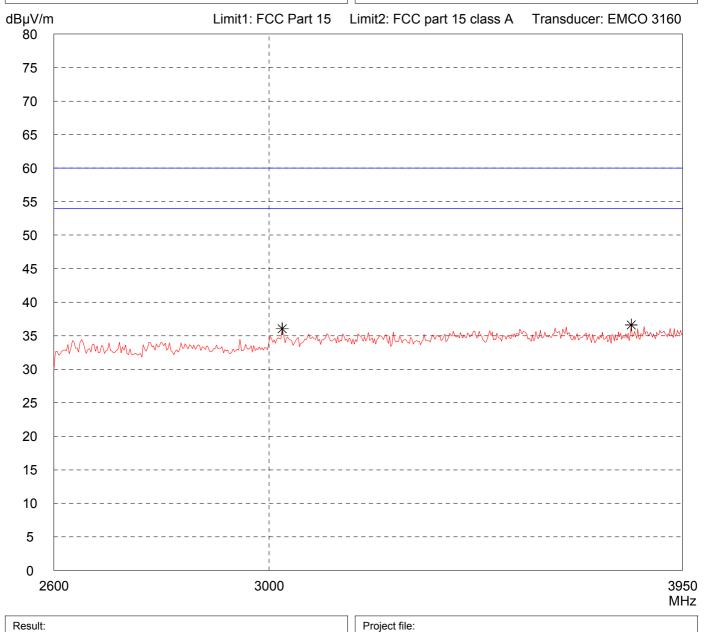
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:

Selected by hand



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Page

Pages

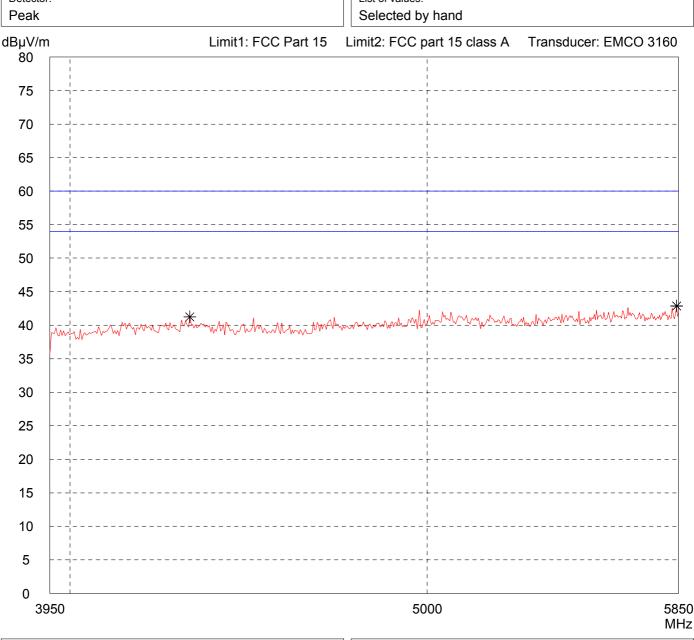
Radiated Emission Test 3.95 GHz - 5.85 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Peak Selected by hand



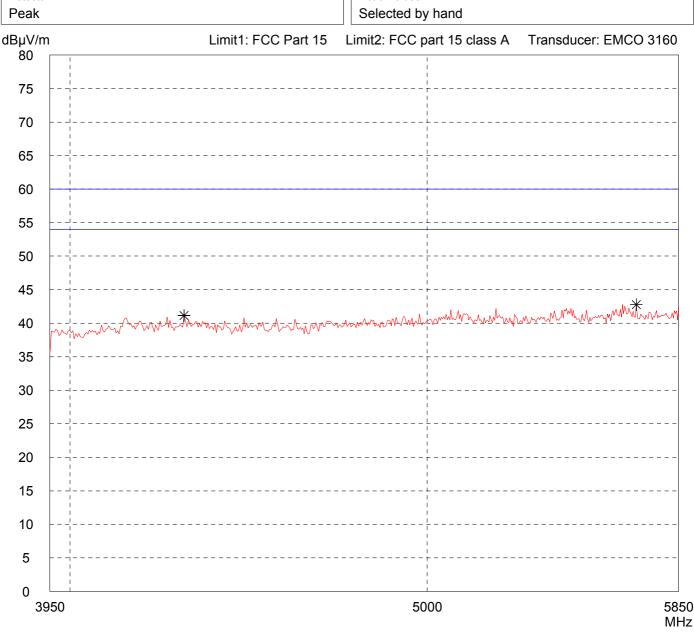
Radiated Emission Test 3.95 GHz - 5.85 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Peak Selected by hand



Radiated Emission Test 5.85 GHz - 8.2 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Operator: Date of test: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Result:

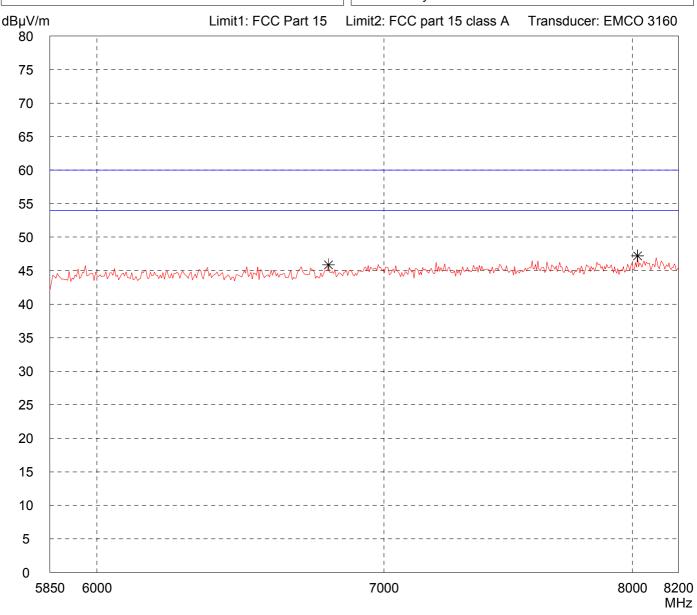
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



Project file:

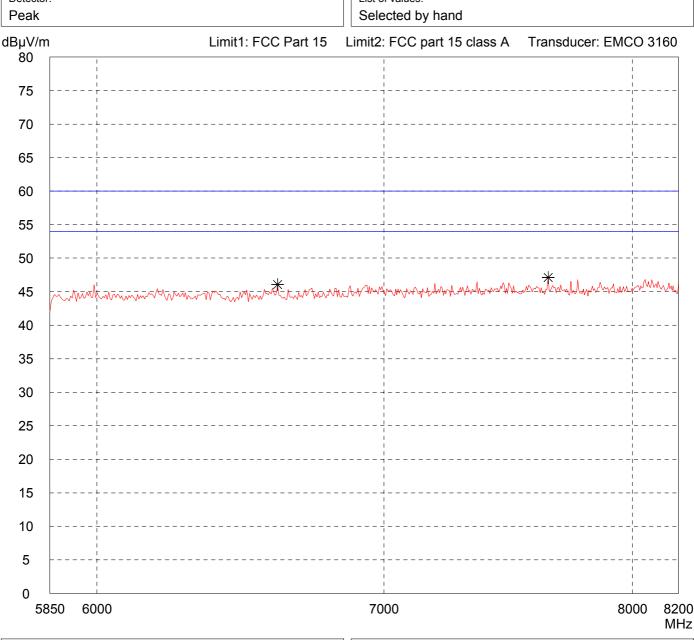
Radiated Emission Test 5.85 GHz - 8.2 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Peak Selected by hand



Radiated Emission Test 8.2 GHz - 12.4 GHz acc. to FCC Part 15 (EMCO 3160)

Model: Comment: FMR54X with 4" Horn - DC 24 V with 330 Ohms resistor Serial no.: 940001010AD - EUT in vertical position Applicant: Endres & Hauser GmbH & Co. KG - Transmitting continuously Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi Detector: List of values: Peak Selected by hand dBµV/m Limit1: FCC Part 15 (1 m) Transducer: EMCO 3160 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 12400 8200 10000 MHz Result: Project file: Prescan 50511-61106-1 Page **Pages**

Radiated Emission Test 8.2 GHz - 12.4 GHz acc. to FCC Part 15 (EMCO 3160)

Model: Comment: FMR54X with 4" Horn - DC 24 V with 330 Ohms resistor Serial no.: 940001010AD - EUT in vertical position Applicant: Endres & Hauser GmbH & Co. KG - Transmitting continuously Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi Detector: List of values: Peak Selected by hand dBµV/m Limit1: FCC Part 15 (1 m) Transducer: EMCO 3160 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 12400 8200 10000 MHz Result: Project file:

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Page

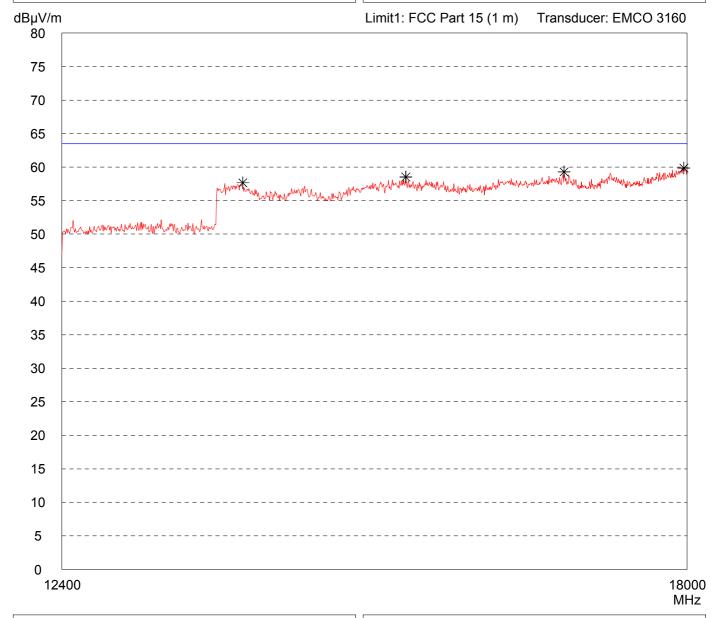
Pages

Prescan

Radiated Emission Test 12.4 GHz - 18 GHz acc. to FCC Part 15 (EMCO 3160)

Model: Comment: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi Detector: List of values: Peak Selected by hand

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously



Project file: Result: Prescan (VBR = 100 kHz) 50511-61106-1 Page **Pages**

Radiated Emission Test 12.4 GHz - 18 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 4" Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi Detector:

Comment:

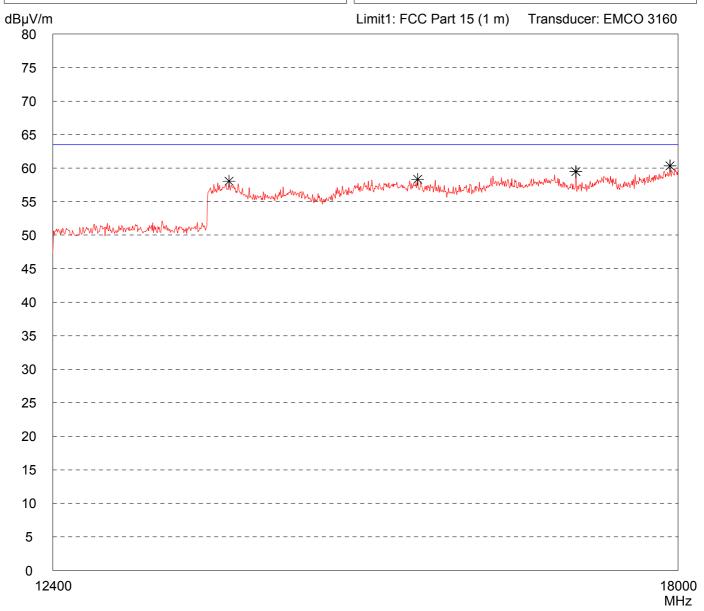
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:

Selected by hand



Result:
Prescan (VBR = 100 kHz)

Project file:
50511-61106-1

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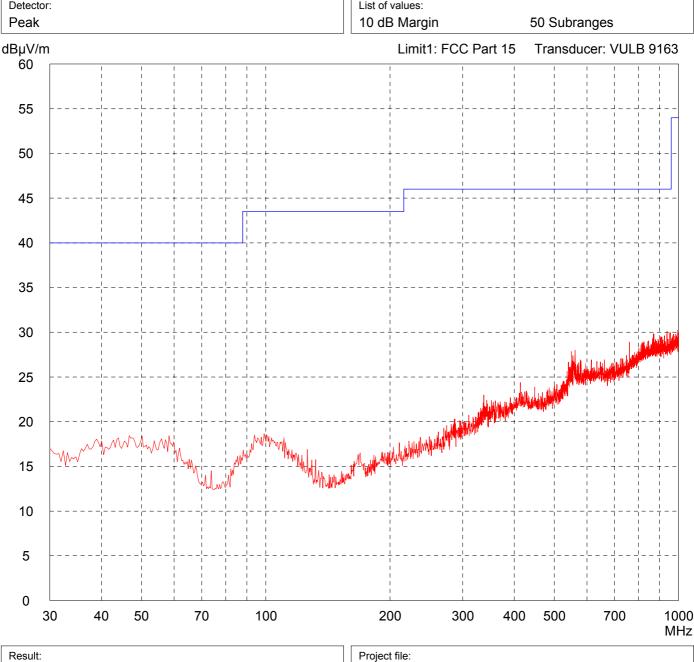
Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Peak 10 dB Margin 50 Subranges



Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

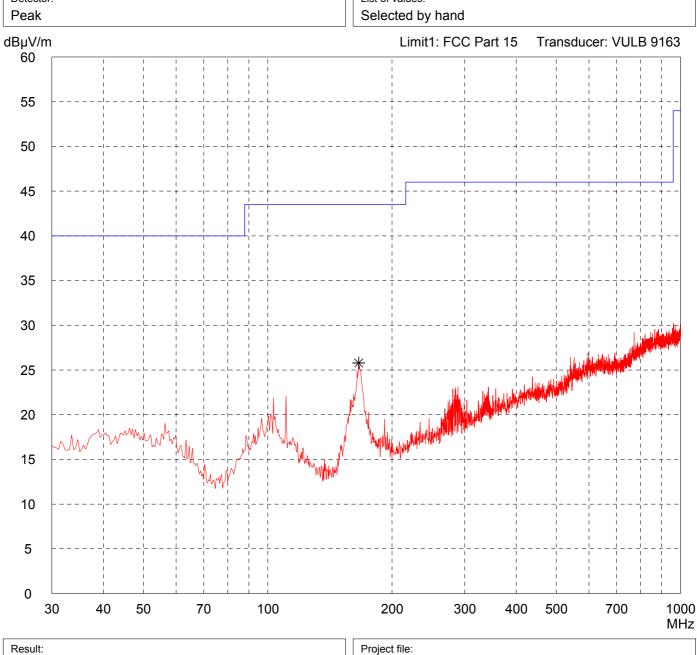
| Model: FMR54X with 3" plated Horn | | | |
|---|---------------------------|--|--|
| Serial no.: 940001010AD | | | |
| Applicant: Endres & Hauser GmbH & Co. KG | | | |
| Test site: Fully anechoic room, cabin no. 2 | | | |
| Tested on: Test distance 3 metres Vertical Polarization | | | |
| Date of test: 06/12/2007 | Operator: M. Steindl | | |
| Test performed: automatically | File name: default.emi | | |

Prescan

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

List of values: Detector: Selected by hand



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Radiated Emission Test 1 GHz - 2.6 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Result:

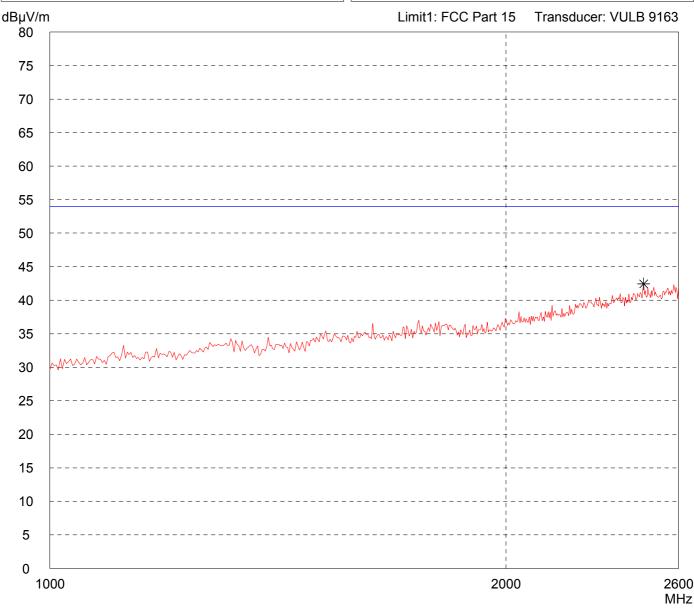
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



Project file:

Radiated Emission Test 1 GHz - 2.6 GHz acc. to FCC Part 15 (Fully Anechoic Chamber)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Prescan

Comment:

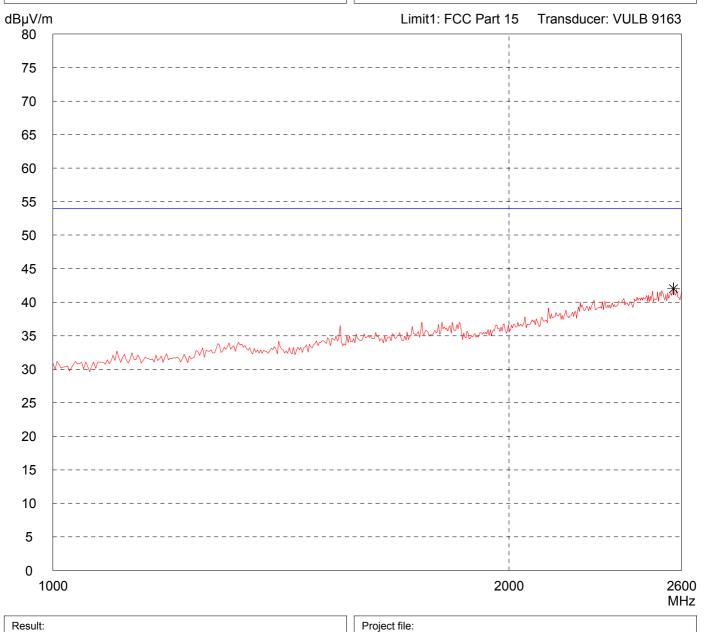
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:

Selected by hand



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Pages

Radiated Emission Test 2.6 GHz - 3.95 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 meters Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Comment:

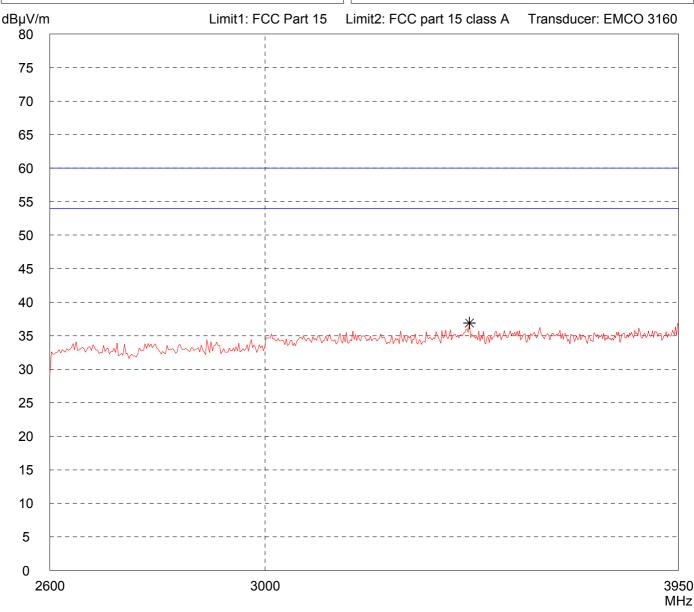
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:

Selected by hand



Result:
Prescan

Project file:
50511-61106-1

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Radiated Emission Test 2.6 GHz - 3.95 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 meters Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Comment:

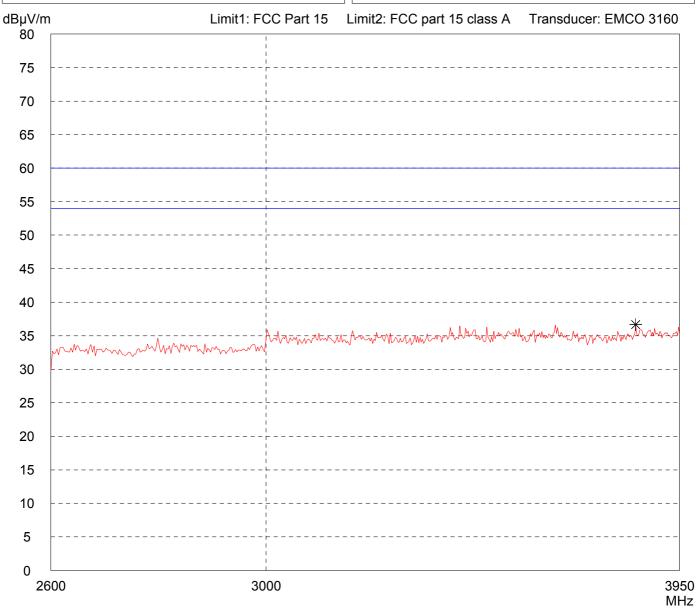
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:

Selected by hand



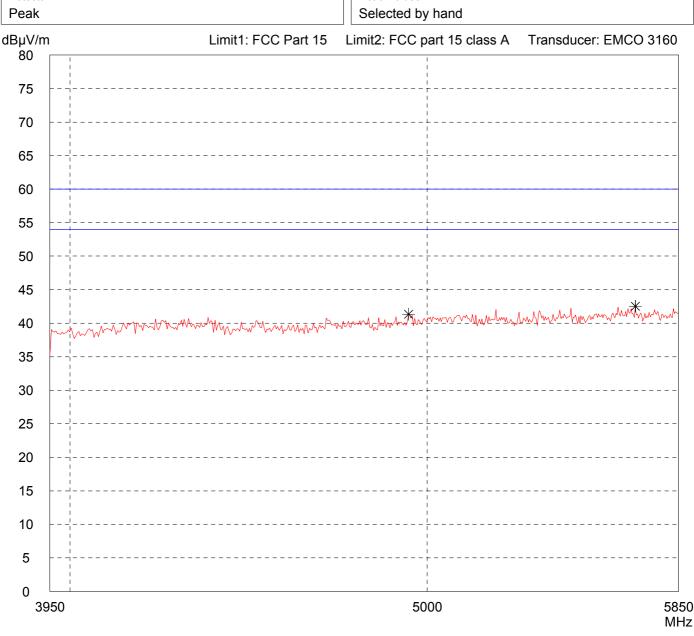
Radiated Emission Test 3.95 GHz - 5.85 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Operator: Date of test: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Peak Selected by hand



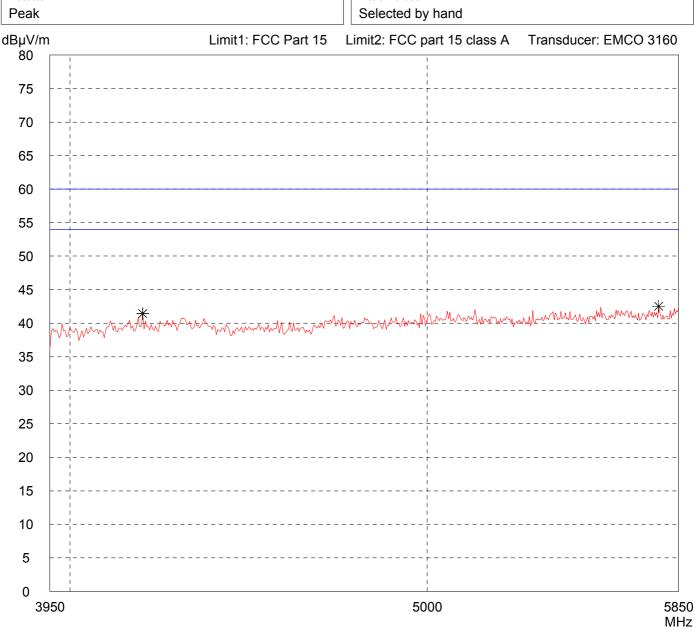
Radiated Emission Test 3.95 GHz - 5.85 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Peak Selected by hand



Radiated Emission Test 3.95 GHz - 5.85 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi

Comment:

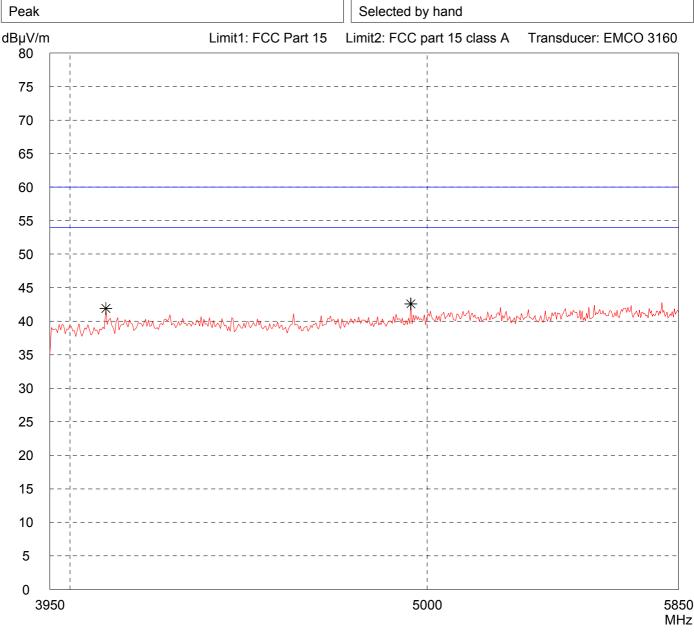
- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:

Selected by hand



Result: Project file: 50511-61106-1 Page of Pages

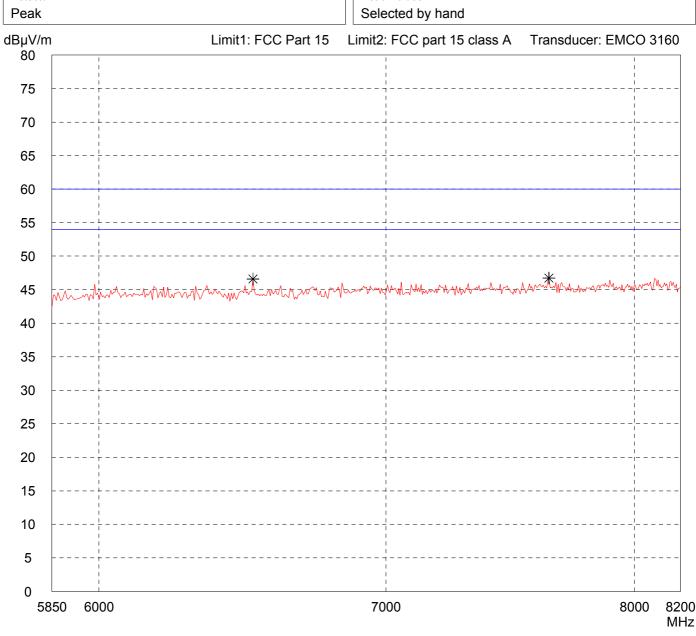
Radiated Emission Test 5.85 GHz - 8.2 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 3 metres Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi

Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector: List of values: Selected by hand



Radiated Emission Test 8.2 GHz - 12.4 GHz

acc. to FCC Part 15 (EMCO 3160) Model: Comment: FMR54X with 3" plated Horn - DC 24 V with 330 Ohms resistor Serial no.: 940001010AD - EUT in vertical position Applicant: Endres & Hauser GmbH & Co. KG - Transmitting continuously Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl File name: Test performed: automatically default.emi Detector: List of values: Peak Selected by hand dBµV/m Limit1: FCC Part 15 (1 m) Transducer: EMCO 3160 80 75 70 65 60 55 50 45 40 35

MHz Result: Project file: Prescan 50511-61106-1 Page **Pages**

10000

30

25

20

15

10

5

0

8200

12400

| | Ra | | est 8.2 GHz - 12.4 GHz t 15 (EMCO 3160) |
|---|---|--|--|
| Serial no 94000 Applicar Endres Test site Fully a Tested of Vertical Date of 106/12/2 | nt: s & Hauser GmbH & Co e: anechoic room, cabin no on: listance 1 meter al Polarization test: 2007 formed: F | | Comment: - DC 24 V with 330 Ohms resistor - EUT in vertical position - Transmitting continuously |
| Detector Peak dBµV/m 80 | | | List of values: Selected by hand Limit1: FCC Part 15 (1 m) Transducer: EMCO 3160 |
| 75 70 65 | | | |
| 60 55 | | | |
| 50 | pa | Machinal Comment of the Comment of t | waterdayarayang arang manang manang balang ang dayang ang manang dayang manang manang manang manang |
| 45 40 | | ' | |
| 35 | | | |
| 30 25 | | | |
| 20 | | ; ; ; ; | |

Project file: Result: 50511-61106-1 Prescan Page of **Pages**

10000

12400 MHz

15

10

5

0

8200

Radiated Emission Test 12.4 GHz - 18 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Horizontal Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi Detector:

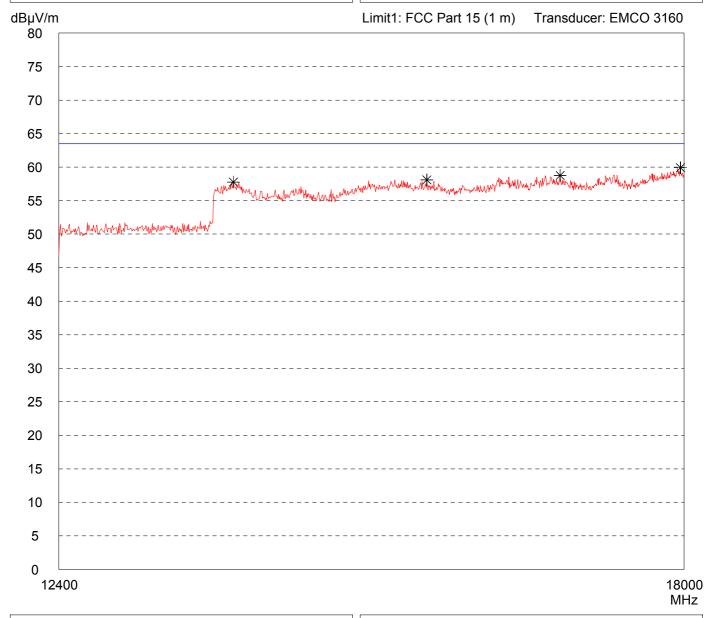
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



 Result:
 Project file:

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Radiated Emission Test 12.4 GHz - 18 GHz acc. to FCC Part 15 (EMCO 3160)

Model: FMR54X with 3" plated Horn Serial no.: 940001010AD Applicant: Endres & Hauser GmbH & Co. KG Fully anechoic room, cabin no. 2 Tested on: Test distance 1 meter Vertical Polarization Date of test: Operator: 06/12/2007 M. Steindl Test performed: File name: automatically default.emi Detector:

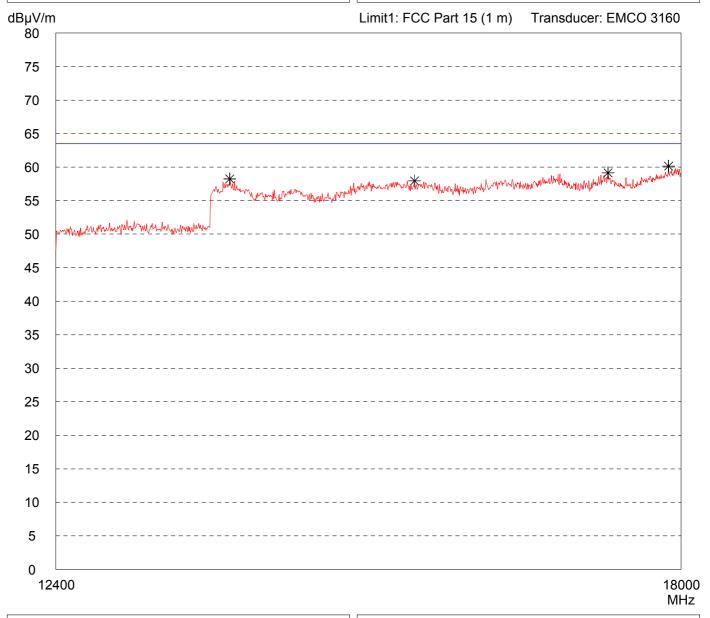
Comment:

- DC 24 V with 330 Ohms resistor
- EUT in vertical position
- Transmitting continuously

Detector:

Peak

List of values:
Selected by hand



 Result:
 Project file:

 50511-61106-1
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Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C (FAR)

| Model: FMR | | | | | | | | | Comm | ent: | | | | | | |
|------------------|--------------------------|-----------------------|------------------------|--------------|-----------------|----------------------|----------------------|---------------------------------------|-------------------|---------------------|---|-----------------|---------------------|---|-----------------|-------------|
| Serial r | | | | | | | | | - TX | mode | | | | | | |
| | | | | | | | | | - EU | Г DC po | wered : 24 | V | | | | |
| Applica Endre | ınt: ess & Hau | ıser Gn | nbH & | Co. | KG | | | | - Hea | ad unit : | FMR24 | | | | | |
| Test sit | e: anechoic | room (| cahin | no 2 | | | | | - Anto | enna :4" | ' Horn | | | | | |
| Tested | | 100111, (| Cabiii | 110. 2 | | | | | - RF | module | : | | | | | |
| | distance 3 ontal Pola | | | | | | | | | | | | | | | |
| Date of 11/13 | | | | Oper T. E | | | | | | | | | | | | |
| | erformed: natically | | | File i | | | | | | | | | | | | |
| Detecto | | | | | | | | | 1 | values: 3 Margir | 1 | 5 | 50 Subrai | nges | | |
| dBµV/r | n | | | | | | | | | | 15.209 (3 | | Transduc | | LB 9 | 163 |
| 60 | | | | | | | | I I I | | | | | 1 1 | | | I I |
| 55 | | - | - - | | - | - | | | | | | | | | | |
| 50 | | - | - | | | | - | | | + | | | | | - | |
| 45 | | - | | | - | | - | | | | | | | | | |
| 10 | | 1 | 1 | | | | | | | | | 1 | | | 1 | |
| 40 | | | | | | | i | ; r | | | i | | | | | T |
| 35 | | - - - - | - - | | | ' - | | | | | | | | | | |
| 30 | | - | | | - | | ! ! ! ! | | | | | | | | - | |
| 0.5 | | | 1 1 1 | | | | | 1 1 1 1 | | | | | 1.14 | | | |
| 25 | | | | | | | | | | | | المعاملين | | i i i la dia la | | |
| 20 | | - | | + | | | Mar. | i + | | ; + ! | ANN AIR AIR AIR ANN AIR | | | | | + ! |
| 15 | M/M | -¦ | ^¼√//v · / - | | - | - / - | ¦ Μω., | | | | | | | | | |
| 10 | | | | \\ | MMM | W - - | | "\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | γν η γ γ γ | | | | | | | 1 1 1 |
| 10 | | | | | | | | - | | | | | =, | | | T |
| 5 | | - | - | | | | | | | | | | | | | |
| 0 | 30 4 | 10 5 | 50 | 7 | | | 11 | 00 | 21 | 00 | 300 | 400 | 500 | 700 | | 1000 |
| | | +U C | ,,, | | J | | - 1 | | | | | - 00 | | 700 | | MHz |
| Result: Presc | | | | | | | | | Projec 5051 | t file: 1-61106 | 6-2 | | Page | of | Pa | ages |

Radiated Emission Test 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C (FAR)

| Model: | 0.4 | | | | | | | | Comm | ent: | | | | | | |
|------------------|-----------------------------|--|---------------------|----------------|-----------------|---------------------------------|--|--|--------------|---------------------|----------------------|----------------|-----------------|-------------------|-----------------------|-----------------|
| FMR : | | | | | | | | | - TX | mode | | | | | | |
| | | | | | | | | | - EU | Г DC po | wered : 24 | 1 V | | | | |
| Applica Endre | ^{nt:} ess & Hau | ıser Gn | nbH & | Co. | KG | | | | - Hea | ad unit : | FMR24 | | | | | |
| Test sit | | room | oohin | no 2 | | | | | | enna :4" | | | | | | |
| Tested | anechoic on: | 100111, 0 | Cabin | 110. 2 | | | | | | module | | | | | | |
| | distance 3 al Polariz | | S | | | | | | | module | | | | | | |
| Date of 11/13 | | | | Oper T. E | | | | | | | | | | | | |
| I . | rformed: natically | | | File i | | | | | | | | | | | | |
| Detecto Peak | or: | | | | | | | | | values: 3 Margir | 1 | 5 | 50 Subra | nges | | |
| dBµV/r | n | | | | | | | , | Limi | t1: FCC | 15.209 (3 | s m) | Transdu | cer: VU | LB 9 | 163 |
| 60 | | | | | | | I I I | | | | | | | I I I I | | |
| 55 | | | | | | , - | | | | | | | | | - | <u> </u> |
| 50 | | | | | - | - | - | | | + | | | | | - - | |
| 45 | | - | | | | ; | i | | | | | | | | | + |
| 40 | | | | | | | - | | | | | · | | | · | † † – – |
| 35 | | - - - - | | | | - | - | | | | | | | | ! | 1 1 |
| 30 | | - | | | | ! ! | | | | | | | | | | <u>.</u> |
| 25 | | - | | | | - | - | | | | | | | | | 1 1 + — — |
| 20 | | - | | | - | , , , , , , , | - | | | ' - | | | | | | + |
| 15 | | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | <u> </u> | <u> </u> | - | <u> </u> | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | (//M _{NA/NA} / / _{NA} | alada | papane/pollulaphyty | Hallet Anne Malassin | | | | | |
| | | | | , γ\ , , | L-MV | ¦ /\ ' ¦ | | Mynywhyllyth | Madhhadi | | | | | | | |
| 10 | | - - | | | | | 1 1 1 | <u> </u> | | <u> </u> | | | <mark> </mark> | | | |
| 5 | | - | - | | | - | - | | | | | | | | | |
| 0 | 30 4 | 10 5 | 50 | 7 | | | 11 | 00 | 21 | 00 | 300 | 400 | 500 | 700 | | 1000 |
| | | +U C | ,,, | , | | | | | | | | 700 | | 700 | | MHz |
| Result: Presc | | | | | | | | | Project 5051 | t file: 1-61106 | 6-2 | | Page | of | Pa | ages |

Radiated Emission Test 1 GHz - 6 GHz acc. to FCC Part 15 Subpart C (FAR)

| | | | | | | - | | |
|-------------------|--------------------------------------|---|----------------|--|-------------------------------|---------------------------------------|----------------------|--------|
| Model: FMR 2 | 24x | | | Comment: | | | | |
| Serial n | | | | - TX mod | е | | | |
| | | | | - EUT DO | powered : 2 | 4 V | | |
| Applicar Endre | nt: ss & Hauser Gmb | oH & Co. KG | | - Head ur | nit : FMR24 | | | |
| Test site | _{e:} anechoic room, ca | abin no. 2 | | - Antenna | a :4" Horn | | | |
| Tested | on: | | | - RF mod | ule : | | | |
| | listance 3 metres ontal Polarization | | | | | | | |
| Date of 11/13/ | | Operator: T. Eberl | | | | | | |
| | rformed: | File name: | | | | | | |
| | natically | default.emi | | | | | | |
| Detecto Peak | or: | | | List of value Selected | | | | |
| dBµV/n | n | | I | | CC 15.209 (3 | m) Transduc | er: EMC | O 3115 |
| 80 | | | | | | | | |
| 75 | | | | | | | | |
| 70 | | | · - | | | | | |
| 65 | | | · | | | | | |
| 60 | | | | | | | - · | |
| 55 | | | ! | | | | | |
| 50 | | | · - | | | | أ سمار ل | |
| 45 | | | · - | . – – – – – – | | | Triffy Waldward Hard | |
| 40 | | | ! | · ₁ + | Joshyka — — — — — — — Joshyka | · · · · · · · · · · · · · · · · · · · | | |
| 35 | <u> </u> | www.mhwww | | ************************************** | ' | | | |
| 20 | ~~ M Mahad add Maha | www.mm.mm/mm/mm/mm/mm/mm/mm/mm/mm/mm/mm/mm/ | | | | | | |
| | | | | | 1 | | | |
| 25 | | | · -' | | | | <u></u> | |
| 20 | | | · -i | | | - | | |
| 15 | | | · - | | | - | - | |
| 10 | | | | . – – – – – – – | | - | | |
| 5 | | | · - | | | | | |
| 0 10 | 000 | 2 | 2000 | | 3000 | 4000 | 5000 | 6000 |
| Result: | | | | Project file: | | | | MHz |
| Limit k | kept | | | 50511-61 | 106-2 | Page | of | Pages |

Radiated Emission Test 1 GHz - 6 GHz acc. to FCC Part 15 Subpart C (FAR)

| Model: FMR 2 | 24x | | | Comment: | | | | |
|-------------------|--|--|------------------|--|-------------------------------|--------------|---------|--------|
| Serial n | | | | - TX mode | | | | |
| | -4. | | | - EUT DC po | owered : 24 V | | | |
| Applicar Endre | ss & Hauser Gmb | H & Co. KG | | - Head unit : | FMR24 | | | |
| Test site | _{e:} anechoic room, ca | ıbin no. 2 | | - Antenna :4 | " Horn | | | |
| Tested | on: | | | - RF module | : | | | |
| | listance 3 metres al Polarization | | | | | | | |
| Date of 11/13/ | | Operator: T. Eberl | | | | | | |
| | rformed: | File name: | | | | | | |
| autom | atically | default.emi | | | | | | |
| Detecto Peak | r: | | | List of values: Selected by | hand | | | |
| dBµV/n | n | | | | 15.209 (3 m) | Transduce | er: EMC | O 3115 |
| 80 | | | | | | | | |
| 75 | | | | | + | | | |
| 70 | | | - | | <u>+</u> | | | |
| 65 | | | - - | | 1 | | | |
| 60 | | | - | | <u> </u> | | | |
| 55 | | | | | <u> </u> | | | |
| 50 | | | <u>-</u> | | <u> </u> | | | |
| 45 | | | | | ; | | | |
| 40 | | ~~~M~mm~~Mpm/~ | -{ | | Marchan Marchald Marina March | | | |
| 35 | 4.44/4 + 2.44.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4. | SASA SAMAAMAMAMAMAMAMAMAMAMAMAMAMAMAMAMA | mmhmy/mm | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | | | | |
| 20 | Inili Mar law sama sa s | 1000 | | | | | | |
| | | | | | | | | |
| 25 | | | - | | <u>-</u> | - | | |
| 20 | | | - | | + | † | | |
| 15 | | | | | <u>+</u> | | | |
| 10 | | | _ | | 1 | | | |
| 5 | | | | | † | | | |
| 0 | 000 | 20 | 000 | 20 | 000 | 4000 | 5000 | 6000 |
| | | 20 | | | | +000 | | MHz |
| Result: | vont. | | | Project file: | 6.2 | Doso | o.f | Doggo |
| Limit k | ι e ρι | | | 50511-6110 | 0-2 | Page | of | Pages |

Radiated Emission Test 5.85 GHz - 8.2 GHz acc. to FCC Part 15 Subpart C (FAR)

| Model: FMR 24x | | | | Comr | ment: | | | | | | | |
|--------------------------------|-------------------|------------------------------|-------------|---------------------------|--|---|---------|------------------|-------------|--|--|--|
| Serial no.: | | | | - TX | mode | | | | | | | |
| Applicant: | | | | - EU | T DC powered : 24 \ | V | | | | | | |
| | auser GmbH & C | Co. KG | | - He | ad unit : FMR24 | | | | | | | |
| Test site: | ic room, cabin no | n 2 | | - An | tenna :4" Horn | | | | | | | |
| Tested on: | io room, cabin ne | J. 2 | | | | | | | | | | |
| Test distance Horizontal Po | | | | | | | | | | | | |
| Date of test: | | Operator: | | | | | | | | | | |
| 11/13/2007 | | T. Eberl | | | | | | | | | | |
| Test performed: automatically | | File name: default.emi | | | | | | | | | | |
| Detector: Peak | | | | | f values: B Margin | 50 Subrar | nges | | | | | |
| dBµV/m | | | | Limi | t1: FCC 15.209 (1 m | ı) Transduce | er: EMC | O 31 | 60 | | | |
| 80 | | | | | | | | | | | | |
| 75 | - | | | | | | | - | | | | |
| 70 | - | | | ا ا ـ ـ ـ ـ ـ ـ ـ ا | | | | | | | | |
| 65 | - <u> </u> | | | | | | | <u> </u> | | | | |
| 60 | | | | | | | | - | | | | |
| 55 | - - | | | | | | | .l | | | | |
| 50 | | | | | | | | ! | | | | |
| 45 | <u> </u> | | <u>.</u> | | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | mmms~M.An | Mynn | LMMM | ~\\\\ | | | |
| · • • | | M (1 d . 2 vir at tree atou | IM & AMM AA | | | , | | i ! ! | | | | |
| 40 | | | | | | | | | | | | |
| 35 | - | | | | | | | - - | | | | |
| 30 | - | | | | | | | | | | | |
| 25 | - | | | | | | | - - | | | | |
| 20 | | | | | | | | | | | | |
| 15 | - - | | | | | | | | | | | |
| 10 | - | | | - | | | | - | | | | |
| 5 | | | | - | | | | | | | | |
| 0 | | | | | | | | | | | | |
| | 6000 | | | 70 | 00 | | 80 | | 8200 MHz | | | |
| Result: Limit kept | | | | | ct file: 11-61106-2 | Page | of | Pa | iges | | | |

Radiated Emission Test 5.85 GHz - 8.2 GHz acc. to FCC Part 15 Subpart C (FAR)

| | | | | | 1 | | | | | | | | |
|-----------------------------|--|--|-----------|---------------------|--|--|----------------|--|-------------|--|--|--|--|
| Model: | 24x | | | Comr | ment: | | | | | | | | |
| Serial n | | | | - TX | mode | | | | | | | | |
| Applica | ınt· | | | - EU | T DC powered : 24 V | | | | | | | | |
| 1 | | mbH & Co. KG | | - Head unit : FMR24 | | | | | | | | | |
| Test sit | e: anechoic room, | , cabin no. 2 | | - Antenna :4" Horn | | | | | | | | | |
| Tested | | <u>, </u> | | - RF module : | | | | | | | | | |
| | distance 1 mete al Polarization | er | | | | | | | | | | | |
| Date of | | Operator: | | | | | | | | | | | |
| Test performed: Tile name: | | | | | | | | | | | | | |
| 1 | natically | default.emi | | | | | | | | | | | |
| Detector Peak | or: | | | | f values: B Margin | 50 Subran | ıges | | | | | | |
| dBµV/n | n | | | | t1: FCC 15.209 (1 m) | Transduce | r: EMC | O 316 | 30 | | | | |
| 80 | | | | | | | 1 | | | | | | |
| 75 | | | | | | | | | | | | | |
| 70 | | | | | | | I | | | | | | |
| 65 | | | | | | | | | | | | | |
| 60 | | | | | | | | - | | | | | |
| 55 | | | | | | | | | | | | | |
| 50 | | | | | | | · | ; | | | | | |
| 45 | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | man marrantes and the | AMM-WAVEN | L.My | hame some some some some some some some so | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ₩₩ <u>~₩</u> | <u>\</u> \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | ₩/ | | | | |
| 40 | | | | | | | | - | | | | | |
| 35 | | | | | | | · | | | | | | |
| 30 | | | | | ! | | | ! ! ! | | | | | |
| 25 | | | | | | | | | | | | | |
| 20 | | | | - | | | ₋ | | | | | | |
| 15 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |
| 0 | | | | | | | | | | | | | |
| 5 | 850 6000 | | | 70 | 00 | | 80 | | 3200 MHz | | | | |
| Result: | | | | 1 | ct file: | Dece | - r | D | | | | | |
| Limit I | кері | | | 205 | 11-61106-2 | Page | of | Pag | jes | | | | |

Radiated Emission Test 8.2 GHz - 12.4 GHz acc. to FCC Part 15 Subpart C (FAR)

| | | | . , | | | | | | |
|-----------------|--|---|--|--|--|--|--|--|--|
| Model: | 24x | | Comment: | | | | | | |
| Serial n | 0.: | | - TX mode | | | | | | |
| Applica | nt· | | - EUT DC powered : 24 V | | | | | | |
| 1 | ss & Hauser GmbH & 0 | Co. KG | - Head unit : FMR24 | | | | | | |
| Test site | ^{e:} anechoic room, cabin no | o. 2 | - Antenna :4" Horn | | | | | | |
| Tested on: | | - RF module : | | | | | | | |
| | listance 1 meter ontal Polarization | | | | | | | | |
| Date of 11/13/ | | Operator: T. Eberl | | | | | | | |
| | | File name: | | | | | | | |
| 1 | | default.emi | | | | | | | |
| Detecto Peak | or: | | List of values: 10 dB Margin | 50 Subranges | | | | | |
| dBµV/n | n | | Limit1: FCC 15.209 (1 m) | Transducer: EMCO 3160 | | | | | |
| | | | | | | | | | |
| 75 | | - + | | | | | | | |
| 70 | | - - - - - | | | | | | | |
| 65 | | | | | | | | | |
| 60 | | | | | | | | | |
| 55 | | I | | | | | | | |
| 50 | Mary Mary Mary Mary Mary Mary Mary Mary | Motor and the second | r jour Jupola Marson de Marson hans anna formante de collecte de la collecte de l | Helverter of the transfer of the second of t | | | | | |
| 45 | | | | | | | | | |
| 40 | | <u> </u> | | | | | | | |
| 35 | | ¦ - | | | | | | | |
| 30 | | | ! | | | | | | |
| 25 | | | | | | | | | |
| 20 | | - - - ! | - - ! | | | | | | |
| 15 | | | | | | | | | |
| 10 | | ; - | i | | | | | | |
| 5 | | - | | | | | | | |
| 0 | | | | | | | | | |
| 8: | 200 | 10 | 0000 | 12400 MHz | | | | | |
| Result: | | | Project file: | | | | | | |
| Limit I | kept | | 50511-61106-2 | Page of Pages | | | | | |

Radiated Emission Test 8.2 GHz - 12.4 GHz acc. to FCC Part 15 Subpart C (FAR)

| | | | . , | |
|-----------------|---|--|---|---|
| Model: FMR 2 | 24x | | Comment: | |
| Serial n | o.: | | - TX mode | |
| Applicar | nt· | | - EUT DC powered : 24 V | |
| 1 | ss & Hauser GmbH & 0 | Co. KG | - Head unit : FMR24 | |
| Test site | _{e:} anechoic room, cabin n | 0.2 | - Antenna :4" Horn | |
| Tested on: | | - RF module : | | |
| | listance 1 meter al Polarization | | | |
| Date of 11/13/ | | Operator: T. Eberl | | |
| | | File name: | | |
| 1 | | default.emi | | |
| Detecto Peak | r: | | List of values: 10 dB Margin | 50 Subranges |
| dBµV/n 80 | n | | Limit1: FCC 15.209 (1 m) | Transducer: EMCO 3160 |
| | | | | |
| 75 | | - † | ; ! ! | |
| 70 | | | | |
| 65 | | | | |
| 60 | | | i ! ! | |
| 55 | | | ; | |
| 50 | white the think was the same | ; polytykytyllenia/lenia/lenia-v-yhdiagh_nenhachenia-violenia | delinate and have been sold and many and sold sold sold sold sold sold sold sol | 10-200 Marsh Correspond Language Marsh Marsh Constraint |
| 45 | | - | ' | |
| 40 | | | | |
| 35 | | ; - + | i | |
| 30 | | | | |
| | | | | |
| 25 | | - | | |
| 20 | | - † | ' | |
| 15 | | | | |
| 10 | | - | | |
| 5 | | - | | |
| 0 | | | | |
| | 200 | 10 | 0000 | 12400 MHz |
| Result: | | | Project file: | |
| Limit k | kept | | 50511-61106-2 | Page of Pages |

Radiated Emission Test 12.4 GHz - 18 GHz acc. to FCC Part 15 Subpart C (FAR)

| | | 1 |
|-------------------|---|--|
| Model: FMR 2 | 24x | Comment: |
| Serial n | 0.: | - TX mode |
| Applicar | nt: | - EUT DC powered : 24 V |
| Endre | ss & Hauser GmbH & Co. KG | - Head unit : FMR24 |
| Test site | e: anechoic room, cabin no. 2 | - Antenna :4" Horn |
| Tested | | - RF module : |
| | listance 1 meter ontal Polarization | |
| Date of | • | |
| 11/13/ Test pe | /2007 T. Eberl rformed: File name: | |
| | atically default.emi | |
| Detecto Peak | r: | List of values: Selected by hand |
| dBµV/n | 1 | Limit1: FCC 15.209 (1 m) Transducer: EMCO 3160 |
| | | |
| 75 | | |
| 70 | | |
| 65 | | |
| 60 | | |
| 55 | | |
| 50 | | While me have a second of the form of the form of the second of the seco |
| 45 | Minus mande | |
| 40 | | |
| 35 | | |
| 30 | | |
| 25 | | |
| 20 | | |
| 15 | | |
| 10 | | |
| 5 | | |
| 0 | | |
| 12 | 400 | 1800 MH |
| Result: | | Project file: |
| Limit k | kept | 50511-61106-2 Page of Pages |

Radiated Emission Test 12.4 GHz - 18 GHz acc. to FCC Part 15 Subpart C (FAR)

| Model: FMR 2 | 24x | | Comment: | | | |
|-----------------|--|---|---|---|---------------|-----------------|
| Serial n | | | - TX mode | | | |
| Applica | nt· | | - EUT DC powered : 24 \ | / | | |
| | ss & Hauser GmbH & Co. k | (G | - Head unit : FMR24 | | | |
| Test site | e: anechoic room, cabin no. 2 | | - Antenna :4" Horn | | | |
| Tested | | | - RF module : | | | |
| | listance 1 meter al Polarization | | Tit module : | | | |
| Date of | | ator: | | | | |
| 11/13/ | | | | | | |
| 1 | rformed: File natically defa | _{ame:} ult.emi | | | | |
| Detecto | | | List of values: | | | |
| Peak | | | Selected by hand | | | |
| dBµV/n 80 | n | | Limit1: FCC 15.209 (1 m) | Transduce | r: EMC | O 3160 |
| | | | | | | |
| 75 | | | | | | |
| 70 | | | | | | |
| 65 | | | | | | |
| 60 | | | | | | |
| 55 | | | | · - | - | . = 10 = 2000/4 |
| 50 | | Mary Mary Mary Mary Mary Mary Mary Mary | , de la | wayayayayayayayayayayayayayayayayayayay | WWW.Mul-Mu | |
| | who many many that the will many or me | | | | | |
| 45 | 22.28. | | | | | |
| 40 | | | | , | | |
| 35 | | | | , | | |
| 30 | | | | | | |
| 25 | | | | · – – – – – – | | |
| 20 | | | | | | |
| | | | | | | |
| 15 | | | | | | |
| 10 | | | | | | |
| 5 | | | | | | |
| 0 | | | | | | |
| 12 | 2400 | | | | | 18000 MHz |
| Result: | | | Project file: | | | |
| Limit k | rept | | 50511-61106-2 | Page | of | Pages |

Radiated Emission Test 18 GHz - 26 GHz acc. to FCC Part 15 Subpart C

| Model: FMR 24X Serial No.: Applicant: Endress & Hauser GmbH & Co. KG | Mode: - TX mode - EUT DC powered: 24 V - Head unit : FMR24 - Antenna: 4" Horn - RF module: - Antenna pol. : horizontal - Test distance: 0.5 m | | | | | |
|---|--|--|--|--|--|--|
| Ref.Level 87 dB μ V ATT 10 dB/Div. | 0 dB | | | | | |
| | | | | | | |
| | | | | | | |
| | 21.413333 GHz | | | | | |
| | 16.41 dBµV | | | | | |
| | #ZpH~phHw=nnn /nv=nt_n-z-h-/ | | | | | |
| Start 18.000 GHz RBW 100 kHz VBW 1 | Stop 26.000 GHz 00 kHz SWP 2.40 s | | | | | |
| Tested by: Thomas Eberl | Project-No.: | | | | | |
| Date: | 50511-06110-2 | | | | | |
| 11/13/2007 | Page of pages | | | | | |

Radiated Emission Test 18 GHz - 26 GHz acc. to FCC Part 15 Subpart C

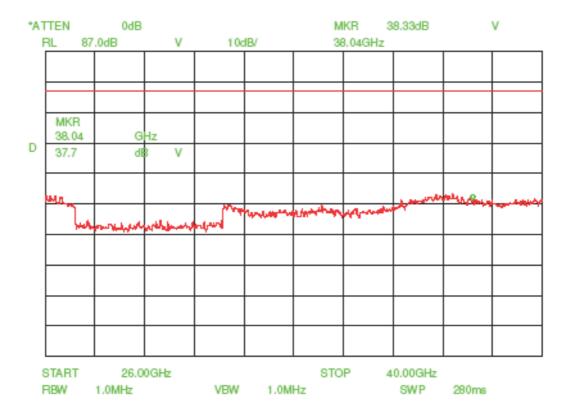
| Model: FMR 24X Serial No.: Applicant: Endress & Hauser GmbH & Co. KG | Mode: - TX mode - EUT DC powered: 24 V - Head unit : FMR24 - Antenna: 4" Horn - RF module: - Antenna pol. : vertical - Test distance: 0.5 m | | | | | | | |
|--|--|--|--|--|--|--|--|--|
| Ref.Level 87 dB μ V ATT 10 dB/Div. | T 0 dB | | | | | | | |
| | | | | | | | | |
| ļi | Marker | | | | | | | |
| | 21.964444 GHz | | | | | | | |
| | 16.59 dBµV | | | | | | | |
| No.No.~wp.4tha~wip.wh.4tha~wip.wh.4tha~wip.wh.4tha~wip.ap | # \doldress | | | | | | | |
| | | | | | | | | |
| | Stop 26.000 GHz 100 kHz SWP 2.40 s | | | | | | | |
| Tested by: Thomas Eberl | Project-No.: 50511-06110-2 | | | | | | | |
| Date: 11/13/2007 | Page of pages | | | | | | | |



3 Plots, graphs and data sheets: Measurement result

FRM54X Radar with Parabolic antenna 200 mm

Plot no.: 1



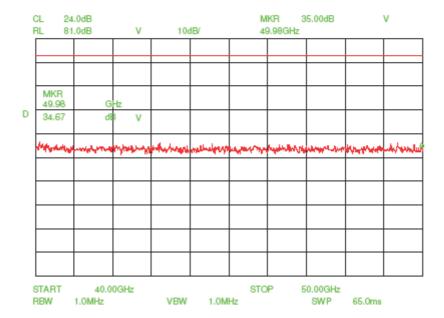
Calculation: Field strength = analyzer reading + cable loss - amplifier gain + antenna factor
$$e\left[dB(\mu V/m)\right] = u\left[dB(\mu V)\right] + a\left[dB\right] - g\left[dB\right] + k\left[dB(1/m)\right]$$
 see page 7 - 8

The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



FRM54X Radar with Parabolic antenna 200 mm

Plot no.: 2

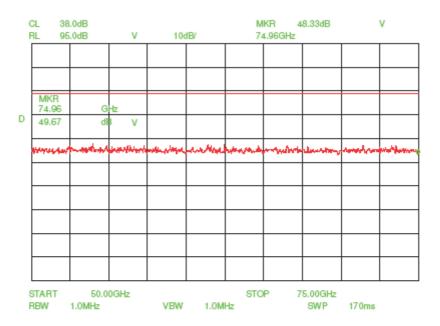


The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



FRM54X Radar with Parabolic antenna 200 mm

Plot no.: 3

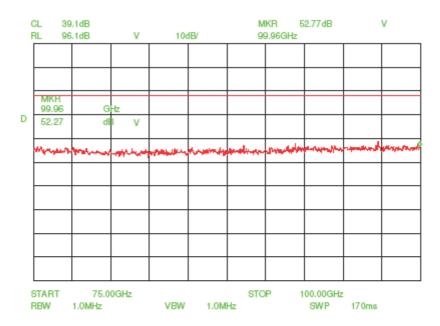


The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



FRM54X Radar with Parabolic antenna 200 mm

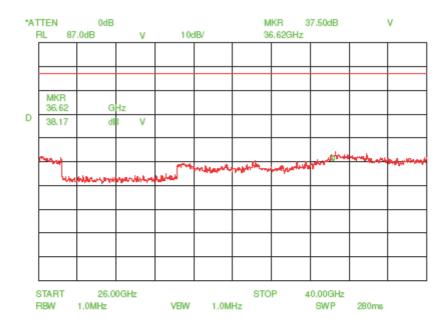
Plot no.: 4



The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



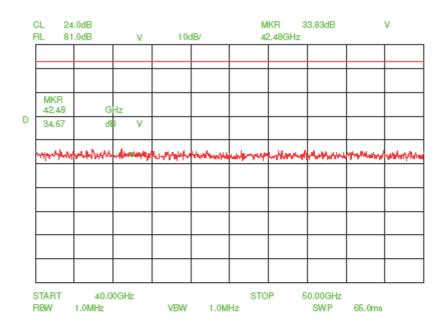
Plot no.: 5



The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



Plot no.: 6

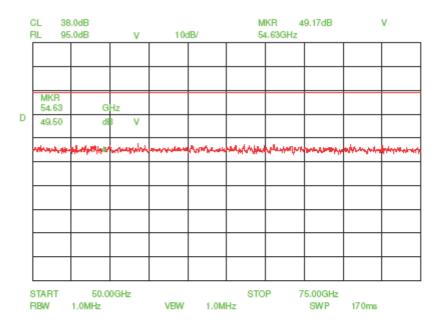


$$\begin{array}{lll} \mbox{Calculation:} & \mbox{Field strength} & = \mbox{analyzer reading} + \mbox{cable loss} & - \mbox{amplifier gain} + \mbox{antenna factor} \\ & = [dB(\mu V/m)] & = & u \left[dB(\mu V)\right] & + & a \left[dB\right] & - & g \left[dB\right] & + & k \left[dB(1/m)\right] \\ & = & \mbox{see page 7 - 8} \end{array}$$

The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



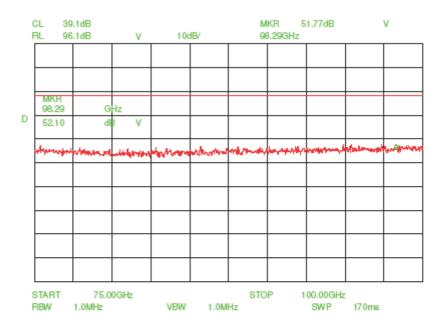
Plot no.: 7



The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



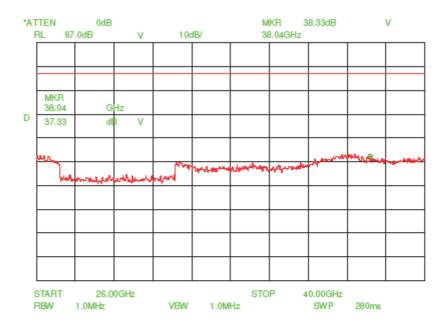
Plot no.: 8



The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



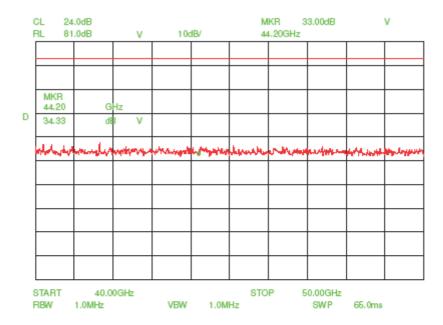
Plot no.: 9



The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



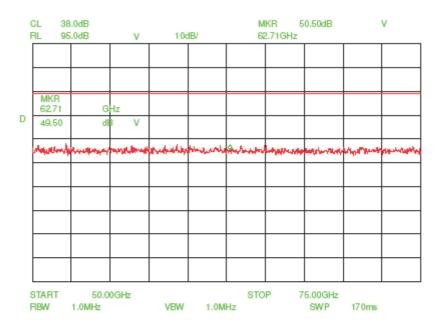
Plot no.: 10



The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



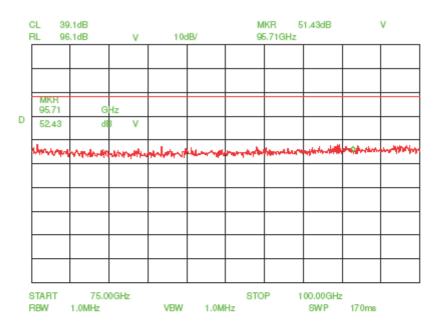
Plot no.: 11



The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.



Plot no.: 12



The offset (cable loss - amplifier gain + antenna factor) is calculated in the analyzer reading.