SENTON

EMV-Prüfzentrum ■ EMI/EMC-Testcenter ■

Straubing, January 22, 2001

# T E S T - R E P O R T

## No. 50217-00696-1

## for

## Funkfernbedienung 868 MHz, Typ 765

## Remote control transmitter

| | |
|---|---|
| Applicant: | Bayerische Motorenwerke AG |
| Purpose of testing: | To show compliance with |
| | FCC Code of Federal Regulations, Part 15 Subpart C, Section §15.231 |
| | Industry Canada Radio Standards Specification RSS-210 Issue 2, Section 6.1 (Category I Equipment) |

Note:
The test data of this report relate 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. Administrative Data

| | |
|---|---|
| Equipment Under Test (EUT): | Funkfernbedienung 868 MHz, Typ 765 |
| Serial number(s): | 01 |
| Type of equipment: | Remote control transmitter |
| Parts/accessories: | --- |
| FCC-ID: | --- |
| Applicant:<br>(full address) | Bayerische Motorenwerke AG<br>Petuelring 130<br>D-80788 München |
| Contract identification: | --- |
| Contact person: | Mr. Hochleitner |
| Manufacturer: | Bayerische Motorenwerke AG |
| Receipt of EUT: | December 6, 2000 |
| Date of test: | December 2000 to January 2001 |
| Note: | --- |
| Responsible for testing: | Rupert Kohlhäufl |
| Responsible for test report: | Rupert Kohlhäufl (cj) |

## 2. Identification of Test Laboratory

| | | |
|---|---|---|
| Test Laboratory:<br>(full address): | Senton GmbH EMI/EMC Test Center<br>Aeussere Fruehlingstrasse 45<br>D-94315 Straubing<br>Germany | |
| Contact person: | Mr. Johann Roidt | |
| Communication: | Telephone<br>Fax<br>eMail: | (+49) 0 94 21 / 55 22-0<br>(+49) 0 94 21 / 55 22-99<br>Office@senton.de |
| FCC registration number: | 90926 | |
| Industry Canada file number: | IC 3050 | |

## 3. Summary of Test Results

The tested sample complies with the requirements set forth in the

**Code of Regulations Part 15 Subpart C, Section §15.231 (intentional radiators) of the Federal Communication Commission (FCC)**

and the

**Radio Standards Specification RSS-210 Issue 2, Section 6.1 for Low Power Licence-Exempt Radiocommuniction Devices of Industry Canada.**

Johann Roidt
Technical Manager

Rupert Kohlhäufl
Test Engineer

## 4. Operation Mode of EUT

Transmitter in TX mode

## 5. Configuration of EUT and Peripheral Devices

### Configuration of cables of EUT

---

### Configuration of peripheral devices connected to EUT

---

# 6. Measuring Methods

## 6.1. Bandwidth of Emission(FCC §15.231.c / RSS-210 Section 6.1.1.c)

The Bandwidth of Emission is measured with a spectrum analyzer connected to measuring antenna (radiated measurement) or test fixture while EUT is operating in transmit mode with modulation at the appropriate center frequency. To increase received signal level distance to EUT is reduced (appropriate level offset is included).
The spectrum analyzer was set to:
RBW = 10 kHz, VBW = 10 kHz, span = 1 MHz, sweep = 40 ms
See figure 1 for the measurement setup.

Test equipment used (see equipment list for details):
02, 55, 67

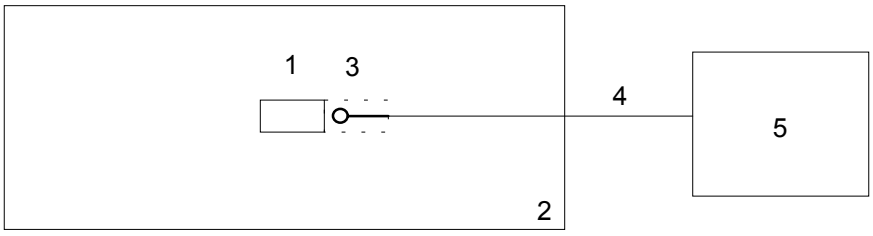



Figure 1: Measurement setup for bandwidth of emission test

1 Transmitter (EUT)
2 Wooden table
3 Test fixture
4 Test cable
5 Spectrum analyzer

## 6.2. Radiated Emission 30 MHz - 1 GHz (FCC §15.205.a,b, §15.209, §15.231.b / RSS-210 Sections 6.1.1.b, 6.3)

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 C63.4-1992.
Measurements are made in both the horizontal and vertical planes of polarization.
Preliminary scans are taken in a semi-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.

See figure 2 for the measurement setup.

Test equipment used (see equipment list for details):
01, 02, 05, 12, 38, 39, 40, 41, 58, 61, 64, 66

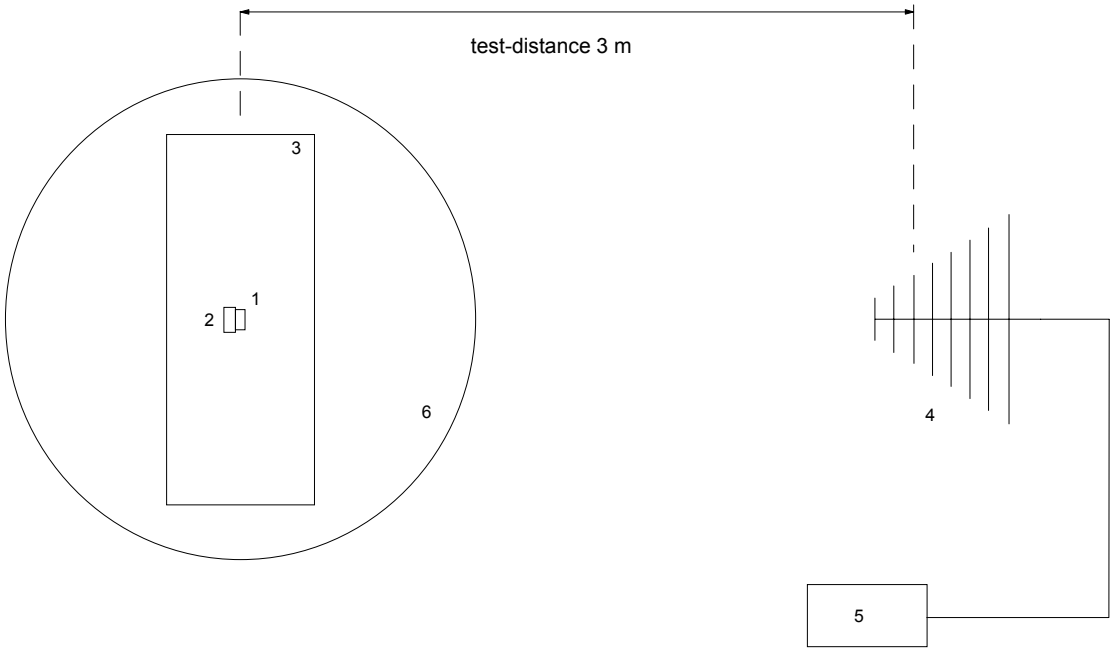



Figure 2: Measurement setup for radiated emission test below 1 GHz

| | | | |
|---|---|---|---|
| 1 | Transmitter (EUT) | 4 | Measurement antenna |
| 2 | Wooden pedestal (if necessary) | 5 | Test receiver |
| 3 | Wooden table | 6 | Turn table |

### 6.3. Radiated Emission 1 GHz - 8.7 GHz (FCC §15.205.a,b, §15.209, §15.231.b / RSS-210 Sections 6.1.1.b, 6.3)

Radiated emissions are measured in the frequency range 1 GHz to 8.7 GHz. Resolution and video bandwidth of the spectrum analyzer are set to 1 MHz.
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.
Additional measurements are performed at critical frequencies with reduced span.
EUT is rotated all around and receiving antenna is raised and lowered to find the maximum levels of emission. The cables and equipment are placed and moved within the range of position likely to find their maximum emissions.
All tests are performed in a semi-anechoic chamber with a test-distance of 3 meters.
If possible preamplifiers are used for the whole frequency range. Special care is taken to avoid overload in transmit mode (using appropriate attenuators if necessary).

See figure 3 for the measurement setup.

Test equipment used (see equipment list for details):
02, 13, 14, 16, ,42, 44, 45, 57, 64

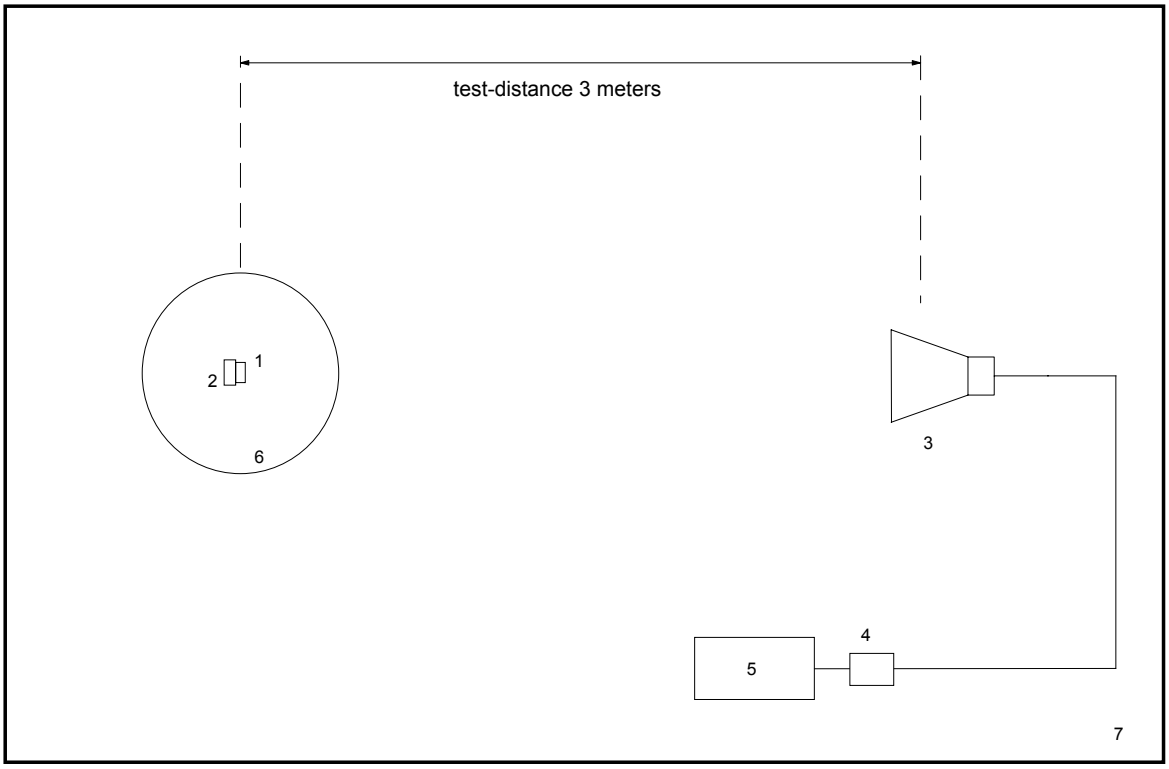



Figure 3: Measurement setup for radiated emission test above 1 GHz

1 Transmitter (EUT)
2 Wooden pedestal (if necessary)
3 Measurement antenna
4 Preamplifier (if applicable)
5 Spectrum analyzer
6 Turn table
7 Semi anechoic room

## 7. Equipment List

To facilitate reference to test equipment used for related tests, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory.

| No. | Type | Model | Serial Number | Manufacturer |
|---|---|---|---|---|
| 01 | Spectrum Analyzer | R 3271 | 05050023 | Advantest |
| 02 | EMI Test Receiver | ESMI | 839379/013<br>839587/006 | Rohde & Schwarz |
| 03 | Test Receiver | ESH 3 | 880112/032 | Rohde & Schwarz |
| 04 | Test Receiver | ESHS 10 | 860043/016 | Rohde & Schwarz |
| 05 | Test Receiver | ESV | 881414/009 | Rohde & Schwarz |
| 06 | Test Receiver | ESVP | 881120/024 | Rohde & Schwarz |
| 07 | Audio Analyzer | UPA | 862954 | Rohde & Schwarz |
| 08 | Power Meter | NRVS | 836856/015 | Rohde & Schwarz |
| 09 | Power Sensor | NRV-Z52 | 837901/030 | Rohde & Schwarz |
| 10 | Power Sensor | NRV-Z4 | 863828/015 | Rohde & Schwarz |
| 11 | Preamplifier | ESV-Z3 | 860907/004 | Rohde & Schwarz |
| 12 | Preamplifier | R14601 | | Advantest |
| 13 | Preamplifier | ACX/080-3030 | 32640 | CTT |
| 14 | Preamplifier | ACO/180-3530 | 32641 | CTT |
| 15 | Signal Generator | SMS | 872166/039 | Rohde & Schwarz |
| 16 | Signal Generator | HP 8673 D | 2930A00966 | Hewlett Packard |
| 17 | Waveform Generator | HP 33120 A | US34005375 | Hewlett Packard |
| 18 | Attenuator 20 dB | 4776-20 | 9503 | Narda |
| 19 | Attenuator 10 dB | 4776-10 | 9412 | Narda |
| 20 | Pulse Limiter | ESH 3-Z2 | 1144 | Rohde & Schwarz |
| 21 | Pulse Limiter | 11947 A | 3107A00566 | Hewlett Packard |
| 22 | V-Network | ESH 3-Z5 | 862770/018 | Rohde & Schwarz |
| 23 | V-Network | ESH 3-Z5 | 894785/005 | Rohde & Schwarz |
| 24 | V-Network | ESH 3-Z5 | 830952/025 | Rohde & Schwarz |
| 25 | V-Network | ESH 3-Z6 | 830722/010 | Rohde & Schwarz |
| 26 | V-Network | NSLK 8127 | 8127152 | Schwarzbeck |
| 27 | V-Network | NNLA 8119 | 8119148 | Schwarzbeck |
| 28 | V-Network | SE 01 | 01 | Senton |
| 29 | T-Network | ESH 3-Z4 | 890602/011 | Rohde & Schwarz |
| 30 | T-Network | ESH 3-Z4 | 890602/012 | Rohde & Schwarz |
| 31 | High Impedance Probe | TK 9416 | 01 | Schwarzbeck |
| 32 | High Impedance Probe | TK 9416 | 02 | Schwarzbeck |
| 33 | Current Probe | ESH 2-Z1 | 863366/18 | Rohde & Schwarz |
| 34 | Current Probe | ESV-Z1 | 862553/3 | Rohde & Schwarz |

| No. | Type | Model | Serial Number | Manufacturer |
|---|---|---|---|---|
| 35 | Absorbing Clamp | MDS 21 | 80911 | Lüthi |
| 36 | Absorbing Clamp | MDS 21 | 79690 | Lüthi |
| 37 | Loop Antenna | HFH2-Z2 | 882964/1 | Rohde & Schwarz |
| 38 | Biconical Antenna | HK 116 | 842204/001 | Rohde & Schwarz |
| 39 | Biconical Antenna | HK 116 | 836239/02 | Rohde & Schwarz |
| 40 | Log. Periodic Antenna | HL 223 | 841516/023 | Rohde & Schwarz |
| 41 | Log. Periodic Antenna | HL 223 | 834408/12 | Rohde & Schwarz |
| 42 | Horn Antenna | 3115 | 9508-4553 | Emco |
| 43 | Horn Antenna | 3160-03 | 9112-1003 | Emco |
| 44 | Horn Antenna | 3160-04 | 9112-1001 | Emco |
| 45 | Horn Antenna | 3160-05 | 9112-1001 | Emco |
| 46 | Horn Antenna | 3160-06 | 9112-1001 | Emco |
| 47 | Horn Antenna | 3160-07 | 9112-1008 | Emco |
| 48 | Horn Antenna | 3160-08 | 9112-1002 | Emco |
| 49 | Horn Antenna | 3160-09 | 9403-1025 | Emco |
| 50 | Digital multimeter | 199 | 463386 | Keithley |
| 51 | DC Power Supply | NGSM 32/10 | 203 | Rohde & Schwarz |
| 52 | DC Power Supply | NGB | 2455 | Rohde & Schwarz |
| 53 | DC Power Supply | NGA | 386 | Rohde & Schwarz |
| 54 | Temperature Test Chamber | HT4010 | 07065550 | Heraeus |
| 55 | Cable | RG214 | 1309 | Senton |
| 56 | Cable | 200CM_001 | 1357 | Rosenberger |
| 57 | Cable | 150CM_001 | 1479 | Rosenberger |
| 58 | Cable Set EG1 | RG214 | 1189 - 1191 | Senton |
| 59 | Cable Set Cabine 1 | RG214 | | Senton |
| 60 | Cable Set Cabine 2 | RG214 | | Senton |
| 61 | Cable Set Cabine 3 | RG214 | | Senton |
| 62 | Shielded Room | No. 1 | 1451 | Senton |
| 63 | Shielded Room | No. 2 | 1452 | Senton |
| 64 | Semi-anechoic Chamber | No. 3 | 1453 | Siemens |
| 65 | Shielded Room | No. 4 | 1454 | Euroshield |
| 66 | Open Area Test Site | EG 1 | | Senton |
| 67 | Test fixture | | | Senton |

## 8. Photographs Taken During Testing

**Photos No. 8.1 - 8.2**

**Test setup for radiated emission pre-test 30 MHz - 1 GHz and final test 1 GHz - 8.7 GHz (semi anechoic room)**

**Photos No. 8.3 - 8.4**

**Test setup for radiated emission pre-test 30 MHz - 1 GHz and final test 1 GHz - 8.7 GHz (semi anechoic room) - continued**

**Photos No. 8.5 - 8.6**

**Test setup for radiated emission pre-test 30 MHz - 1 GHz and final test 1 GHz - 8.7 GHz (semi anechoic room) continued**

**Photos No. 8.7 - 8.8**

**Test setup for radiated emission final test 30 MHz - 1 GHz (open area test site)**

## 9. List of Measurements

## 9.1. List of Measurements According To FCC Part 15 Subpart C

| | | | |
|---|---|---|---|
| **FCC Part 15 Subpart C** | | | |
| | | | |
| **Section(s):** | **Test** | **Page(s)** | **Result** |
| | | | |
| **§15.231.c** | Bandwidth of emission | | Passed |
| **§15.231.b**<br>**§15.209**<br>**§15.205.a,b** | Radiated emission test<br>9 kHz - 30 MHz | --- | Not Applicable (acc. to §15.33) |
| **§15.231.b**<br>**§15.209**<br>**§15.205.a,b** | Radiated emission test<br>30 MHz - 1 GHz | | Passed |
| **§15.231.b**<br>**§15.209**<br>**§15.205.a,b** | Radiated emission test<br>1 GHz - 8.7 GHz | | Passed |
| | | | |

## 9.2. List of Measurements According To Industry Canada RSS-210

| | | | |
|---|---|---|---|
| **Industry Canada RSS-210 Issue 2** | | | |
| | | | |
| **Section(s):** | **Test** | **Page(s)** | **Result** |
| | | | |
| **6.1.1.c** | Bandwidth | | Passed |
| **6.1.1.b**<br>**6.3** | Radiated emission test<br>9 kHz - 30 MHz | --- | Not Applicable (acc. to 6.3.e) |
| **6.1.1.b**<br>**6.3** | Radiated emission test<br>30 MHz - 1 GHz | | Passed |
| **6.1.1.b**<br>**6.3** | Radiated emission test<br>1 GHz - 8.7 GHz | | Passed |
| | | | |

## 10. Referenced Regulations

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

| | | | |
|---|---|---|---|
| ☒ | FCC Part 15 Subpart A | Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communication Commission (FCC) | October 20, 1997 |
| ☐ | FCC Part 15 Subpart B | Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communication Commission (FCC) | October 20, 1997 |
| ☒ | FCC Part 15 Subpart C | Code of Regulations Part 15 (Radio Frequency Devices), Subpart C (Intentional Radiators) of the Federal Communication Commission (FCC) | October 20, 1997 |
| ☒ | 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 - 40 GHz | October, 1992 |
| ☒ | RSS-210 | Radio Standards Specification RSS-210 Issue 2 for Low Power Licence-Exempt Radiocommuniction Devices of Industry Canada | February 24, 1996 |

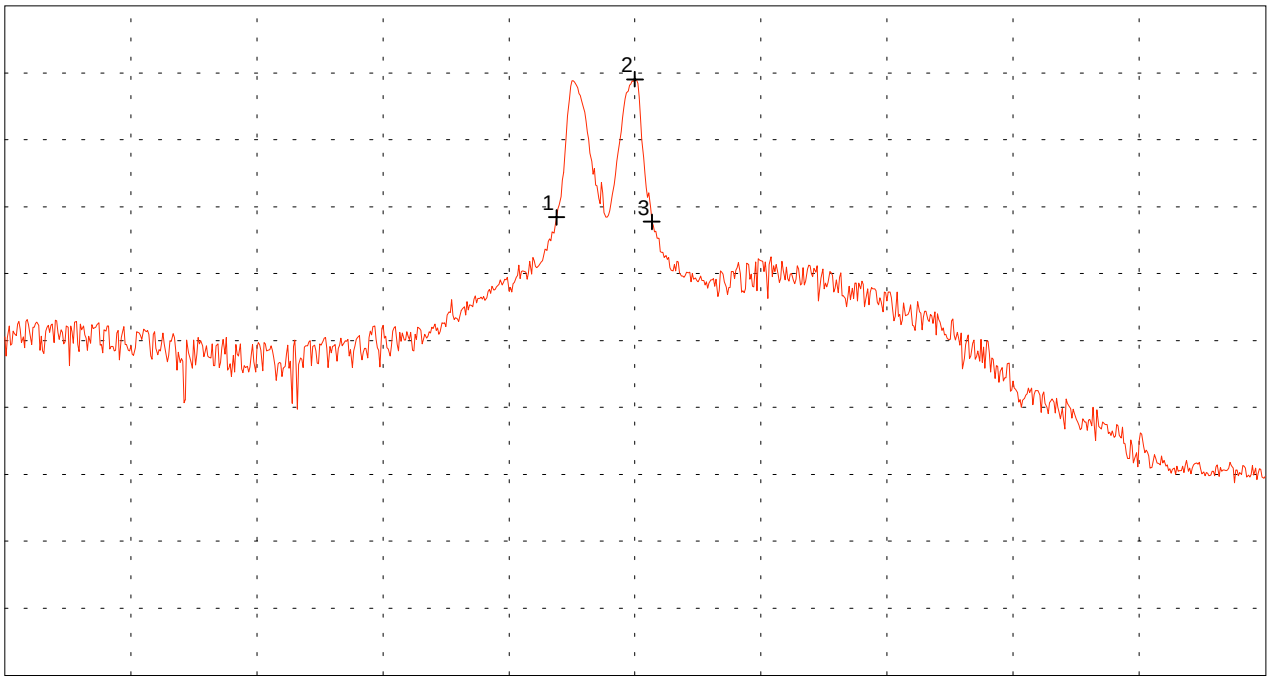
## 11. Test Results

# Bandwidth of emission according to FCC Part 15/C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode<br><br>Battery supply: 3.0 V DC<br><br>Maximum Bandwidth:<br><br>0.25% of center frequency = 2.17 MHz<br><br>Measured bandwidth: 0.15 MHz |
| Serial No.:<br>01 | |
| Applicant:<br>Bayerische Motorenwerke AG | |
| | |
| | |
| | |
| | |

Ref.Level 100 dBµV/m
10 dB/Div.

ATT 25 dB




Start 867.431111 MHz
RBW 10 kHz

VBW 10 kHz

Stop 869.431111 MHz
SWP 60 ms

Multi Marker List

| | | |
|---|---|---|
| No. 1 | 868.306667 MHz | 68.42 dBµV/m |
| No. 2 | 868.431111 MHz | 89.03 dBµV/m |
| No. 3 | 868.457778 MHz | 67.73 dBµV/m |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>12/22/2000 | Page 25 of 46 Pages |

## Radiated Emission 30 MHz - 1 GHz (Final Test)
## according to FCC Part 15 Subpart C, §15.231.b

| | |
|---|---|
| Model: | Funkfernbedienung 868 MHz, Typ 765 |
| Type: | Remote control transmitter |
| Serial No.: | eng 01 |
| Applicant: | Bayerische Motorenwerke AG |
| Test-site: | Open area test-site I |
| Test distance: | 3 meters |
| Date of test: | 01/09/2001 |
| Operator: | R. Kohlhäufl |
| Mode: | - transmitting continuously<br>- with battery supply 3 V DC |

EUT in horizontal position with rear on table

| | |
|---|---|
| Detector: | Peak |
| Polarization: | horizontal |

| Frequency [MHz] | Receiver reading [dBµV] | Correction factor [dB] | Fieldstrength Peak [dBµV/m] | Limit Peak [dBµV/m] | Duty cycle correction [dB] | Fieldstrength Average [dBµV/m] | Limit Average [dBµV/m] | Limit exceeded |
|---|---|---|---|---|---|---|---|---|
| 868.33 | 48.0 | 33.3 | 81.3 | 101.9 | 5.1 | 76.2 | 81.9 | |
| | | | | | | | | |

**Result:** The limits are kept.

## Radiated Emission 30 MHz - 1 GHz (Final Test)
## according to FCC Part 15 Subpart C, §15.231.b

| | |
|---|---|
| Model: | Funkfernbedienung 868 MHz, Typ 765 |
| Type: | Remote control transmitter |
| Serial No.: | eng 01 |
| Applicant: | Bayerische Motorenwerke AG |
| Test-site: | Open area test-site I |
| Test distance: | 3 meters |
| Date of test: | 01/09/2001 |
| Operator: | R. Kohlhäufl |
| Mode: | - transmitting continuously<br>- with battery supply 3 V DC |

EUT in horizontal position with rear on table

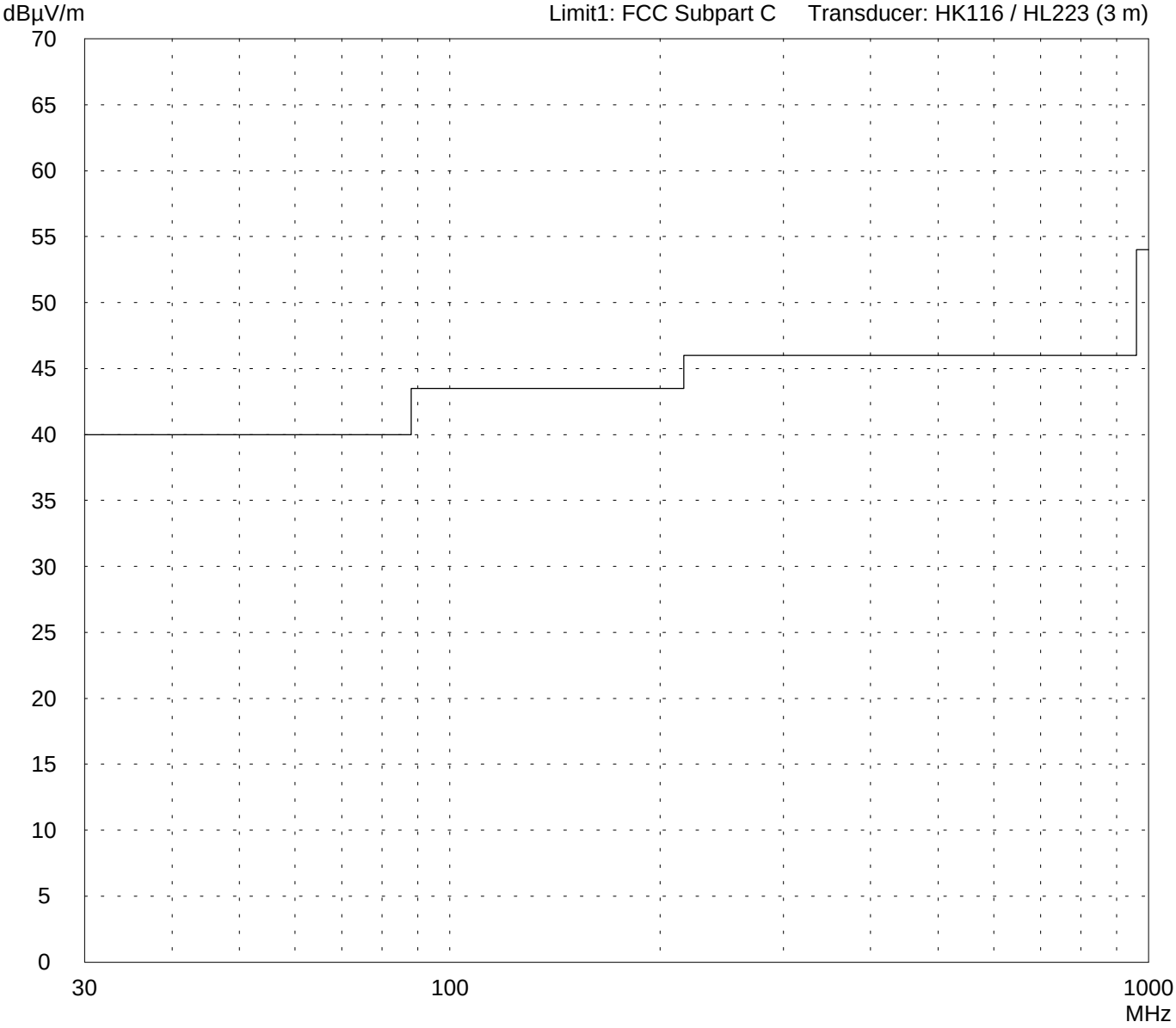
Detector: Peak
Polarization: vertical

| Frequency [MHz] | Receiver reading [dBµV] | Correction factor [dB] | Fieldstrength Peak [dBµV/m] | Limit Peak [dBµV/m] | Duty cycle correction [dB] | Fieldstrength Average [dBµV/m] | Limit Average [dBµV/m] | Limit exceeded |
|---|---|---|---|---|---|---|---|---|
| 868.33 | 33.5 | 33.3 | 66.8 | 101.9 | 5.1 | 61.7 | 81.9 | |
| | | | | | | | | |

**Result:** The limits are kept.

# Radiated Emission Test 30 MHz - 1 GHz
# according to FCC Part 15 Subpart C

| | |
|---|---|
| Model: Funkfernbedienung 868 MHz, Typ 765 | Mode: Transmitter in TX mode |
| Serial no.: 01 | Battery supply: 3.0 V DC |
| Applicant: Bayerische Motorenwerke AG | EUT in horizontal position with rear on table |
| Test site: Open area test-site I | |
| Tested on: Test distance 3 meters Horizontal Polarization | |
| Date of test: 12/21/2000 / Operator: R. Kohlhäufl | |
| Test performed: by hand / File name: | |
| Detector: Peak | List of values: Selected by hand |




Result:

Project file: 50217-00696-1

# Radiated Emission Test 30 MHz - 1 GHz
# according to FCC Part 15 Subpart C

| | |
|---|---|
| Model: Funkfernbedienung 868 MHz, Typ 765 | Mode: Transmitter in TX mode |
| Serial no.: 01 | Battery supply: 3.0 V DC |
| Applicant: Bayerische Motorenwerke AG | EUT in horizontal position with rear on table |
| Test site: Open area test-site I | |
| Tested on: Test distance 3 meters Horizontal Polarization | |
| Date of test: 12/21/2000 / Operator: R. Kohlhäufl | |
| Test performed: by hand / File name: | |

| | |
|---|---|
| Detector: Peak | List of values: Selected by hand |

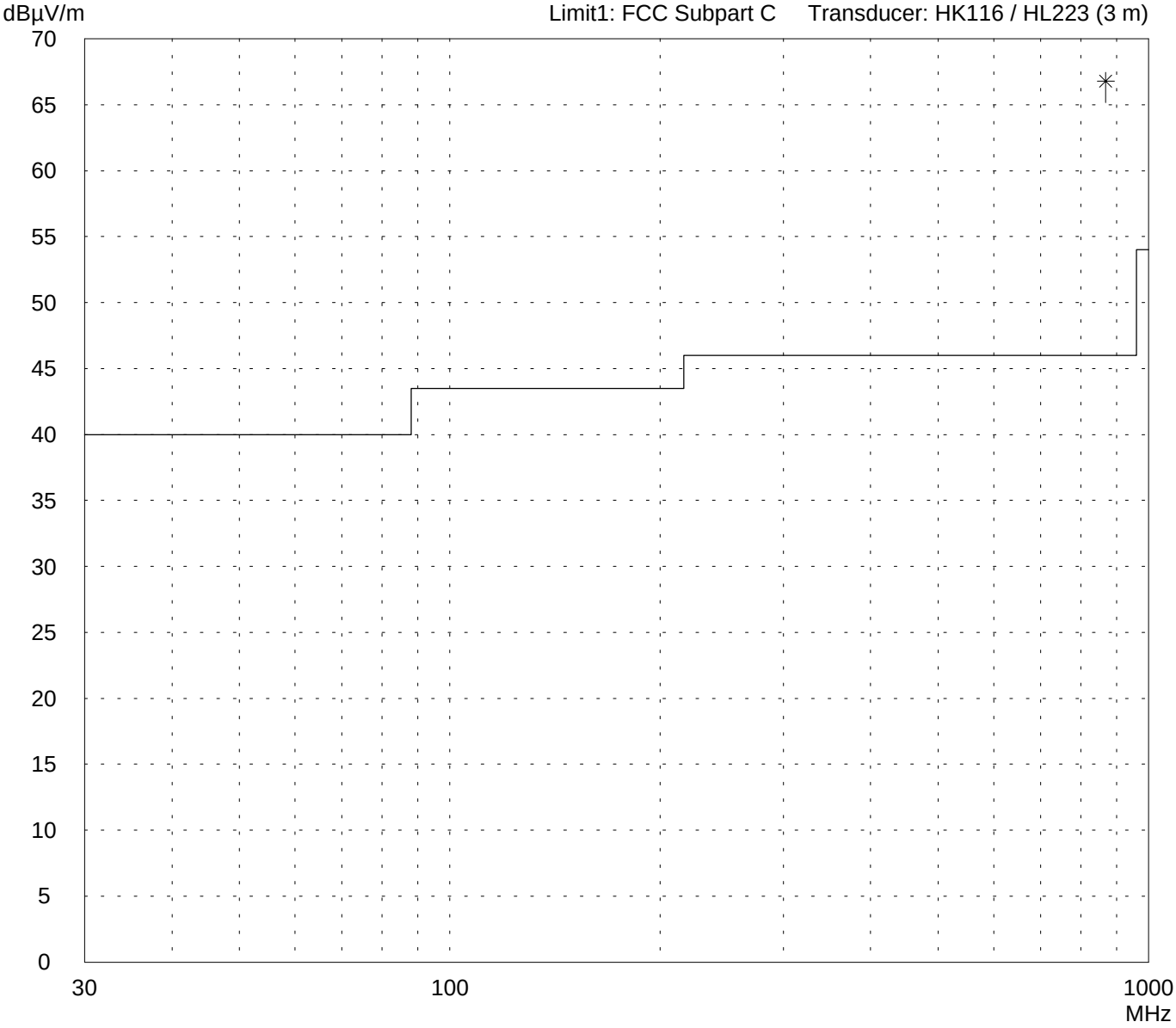
| *Frequency MHz* | *Reading dBµV* | *Correction factor dB* | *Value dBµV/m* | *Limit dBµV/m* | *Limit exceeded* |
|---|---|---|---|---|---|
| 868.33 | 48.0 | 33.3 | 81.3 | 46.0 | * |

| | |
|---|---|
| Result: | Project file: 50217-00696-1 |

# Radiated Emission Test 30 MHz - 1 GHz
# according to FCC Part 15 Subpart C

| | |
|---|---|
| Model: Funkfernbedienung 868 MHz, Typ 765 | Mode: Transmitter in TX mode |
| Serial no.: 01 | Battery supply: 3.0 V DC |
| Applicant: Bayerische Motorenwerke AG | EUT in horizontal position with rear on table |
| Test site: Open area test-site I | |
| Tested on: Test distance 3 meters Vertical Polarization | |
| Date of test: 12/21/2000 / Operator: R. Kohlhäufl | |
| Test performed: by hand / File name: | |

| | |
|---|---|
| Detector: Peak | List of values: Selected by hand |




| | |
|---|---|
| Result: | Project file: 50217-00696-1 |

# Radiated Emission Test 30 MHz - 1 GHz
# according to FCC Part 15 Subpart C

| | |
|---|---|
| Model: Funkfernbedienung 868 MHz, Typ 765 | Mode: Transmitter in TX mode |
| Serial no.: 01 | Battery supply: 3.0 V DC |
| Applicant: Bayerische Motorenwerke AG | EUT in horizontal position with rear on table |
| Test site: Open area test-site I | |
| Tested on: Test distance 3 meters<br>Vertical Polarization | |
| Date of test: 12/21/2000 / Operator: R. Kohlhäufl | |
| Test performed: by hand / File name: | |

| | |
|---|---|
| Detector: Peak | List of values: Selected by hand |

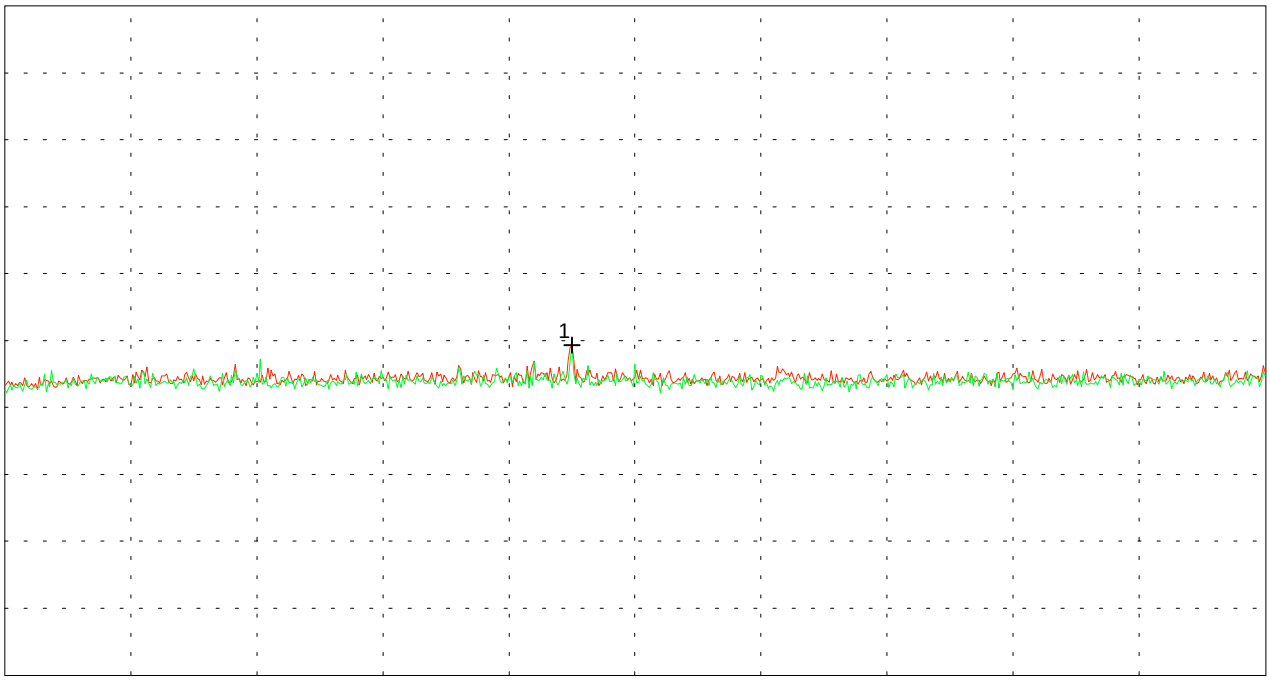
| *Frequency MHz* | *Reading dBµV* | *Correction factor dB* | *Value dBµV/m* | *Limit dBµV/m* | *Limit exceeded* |
|---|---|---|---|---|---|
| 868.33 | 33.5 | 33.3 | 66.8 | 46.0 | * |

| | |
|---|---|
| Result: | Project file: 50217-00696-1 |

# Radiated emissions 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode |
| Serial No.:<br>01 | Battery supply: 3.0 V DC |
| Applicant:<br>Bayerische Motorenwerke AG | EUT in horizontal position with rear on table |
| | Test distance: 3 meters |
| | Channel A: Horizontal polarization<br>Channel B: Vertical polarization |
| | PRESCAN WITHOUT ANY CORRECTIONS |

Ref.Level 80 dBuV ATT 0 dB
10 dB/Div.




Start 30.000 MHz Stop 300.000 MHz
RBW 100 kHz VBW 100 kHz SWP 60 ms

Multi Marker List

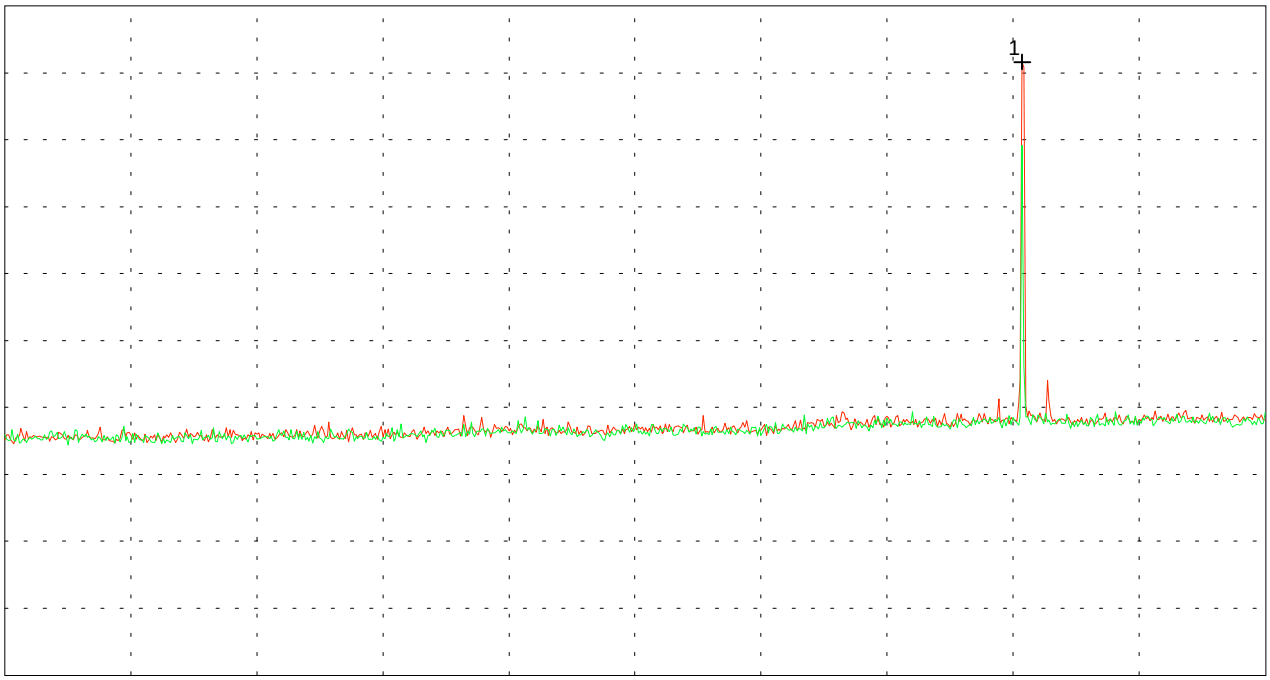
| | | | |
|---|---|---|---|
| No. 1 | 151.500000 MHz | 29.31 dBuV | A |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | Page 32 of 46 Pages |

# Radiated emissions 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode<br><br>Battery supply: 3.0 V DC<br><br>EUT in horizontal position with rear on table<br><br>Test distance: 3 meters<br><br>Channel A: Horizontal polarization<br>Channel B: Vertical polarization<br><br>PRESCAN WITHOUT ANY CORRECTIONS |
| Serial No.:<br>01 | |
| Applicant:<br>Bayerische Motorenwerke AG | |
| | |
| | |
| | |
| | |

Ref.Level 90 dBuV ATT 0 dB
10 dB/Div.




Start 300.000 MHz Stop 1.000 GHz
RBW 100 kHz VBW 100 kHz SWP 140 ms

Multi Marker List

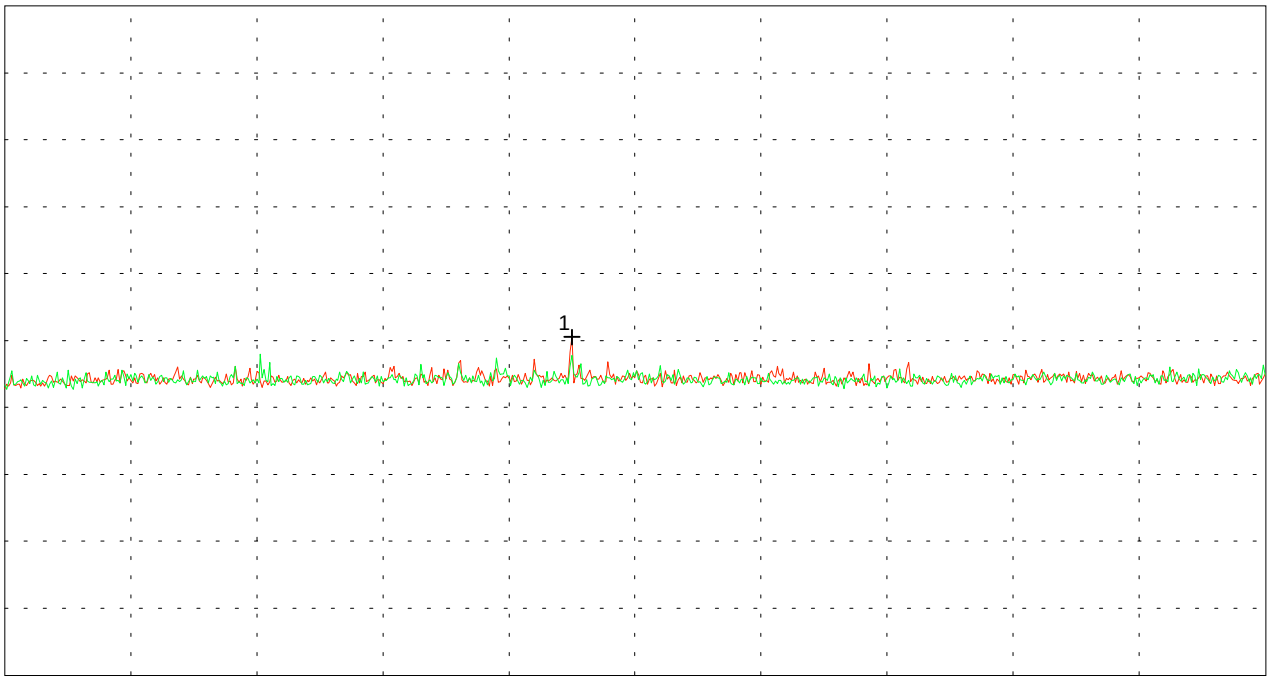
| | | | |
|---|---|---|---|
| No. 1 | 865.000000 MHz | 81.63 dBuV | A |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | |

# Radiated emissions 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode<br><br>Battery supply: 3.0 V DC<br><br>EUT in vertical position with front to the top<br><br>Test distance: 3 meters<br><br>Channel A: Horizontal polarization<br>Channel B: Vertical polarization<br><br>PRESCAN WITHOUT ANY CORRECTIONS |
| Serial No.:<br>01 | |
| Applicant:<br>Bayerische Motorenwerke AG | |
| | |
| | |
| | |
| | |

Ref.Level 80 dBuV ATT 0 dB
10 dB/Div.




Start 30.000 MHz Stop 300.000 MHz
RBW 100 kHz VBW 100 kHz SWP 60 ms

Multi Marker List

| | | | |
|---|---|---|---|
| No. 1 | 151.500000 MHz | 30.53 dBuV | A |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | |



Senton GmbH / EMI/EMC Test Center / Aeussere Fruehlingstrasse 45 / 94315 Straubing / Tel. +49 9421 55220

# Radiated emissions 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode<br><br>Battery supply: 3.0 V DC<br><br>EUT in vertical position with front to the top<br><br>Test distance: 3 meters<br><br>Channel A: Horizontal polarization<br>Channel B: Vertical polarization<br><br>PRESCAN WITHOUT ANY CORRECTIONS |
| Serial No.:<br>01 | |
| Applicant:<br>Bayerische Motorenwerke AG | |
| | |
| | |
| | |
| | |

Ref.Level 90 dBuV ATT 0 dB
10 dB/Div.

Start 300.000 MHz Stop 1.000 GHz
RBW 100 kHz VBW 100 kHz SWP 140 ms

Multi Marker List

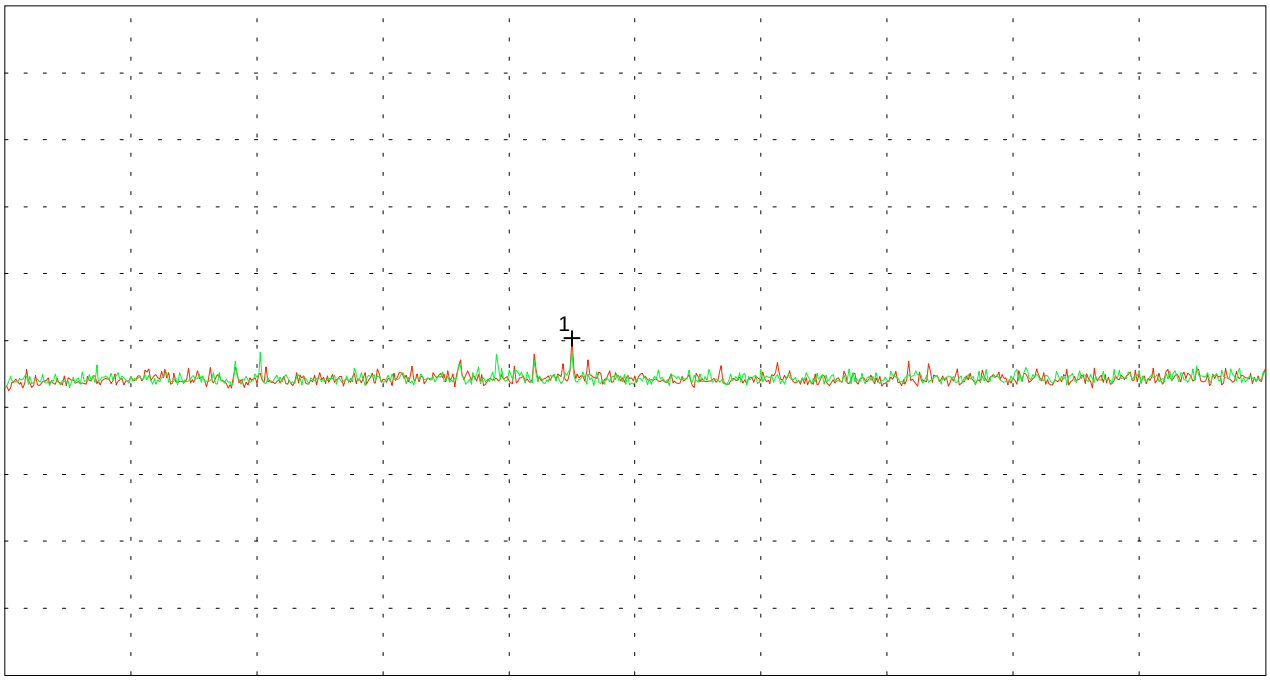
| | | | |
|---|---|---|---|
| No. 1 | 865.000000 MHz | 79.88 dBuV | A |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | Page 35 of 46 Pages |

# Radiated emissions 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode<br><br>Battery supply: 3.0 V DC<br><br>EUT in vertical position with right hand side on table<br><br>Test distance: 3 meters<br><br>Channel A: Horizontal polarization<br>Channel B: Vertical polarization<br><br>PRESCAN WITHOUT ANY CORRECTIONS |
| Serial No.:<br>01 | |
| Applicant:<br>Bayerische Motorenwerke AG | |
| | |
| | |
| | |
| | |

Ref.Level 80 dBuV ATT 0 dB
10 dB/Div.




Start 30.000 MHz
RBW 100 kHz
VBW 100 kHz
Stop 300.000 MHz
SWP 60 ms

Multi Marker List

| | | | |
|---|---|---|---|
| No. 1 | 151.500000 MHz | 30.31 dBuV | A |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | Page 36 of 46 Pages |

# Radiated emissions 30 MHz - 1 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode<br><br>Battery supply: 3.0 V DC<br><br>EUT in vertical position with right hand side on table<br><br>Test distance: 3 meters<br><br>Channel A: Horizontal polarization<br>Channel B: Vertical polarization<br><br>PRESCAN WITHOUT ANY CORRECTIONS |
| Serial No.:<br>01 | |
| Applicant:<br>Bayerische Motorenwerke AG | |
| | |
| | |
| | |
| | |

Ref.Level 90 dBuV ATT 0 dB
10 dB/Div.

Start 300.000 MHz Stop 1.000 GHz
RBW 100 kHz VBW 100 kHz SWP 140 ms

Multi Marker List

| | | | |
|---|---|---|---|
| No. 1 | 865.000000 MHz | 81.22 dBuV | A |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | |

## Radiated Emission 1 GHz - 8.7 GHz
## according to FCC Part 15 Subpart C, §15.231.b

Model: Funkfernbedienung 868 MHz, Typ 765
Type: Remote control transmitter
Serial No.: eng 01
Applicant: Bayerische Motorenwerke AG
Test-site: Semi anechoic room
Test distance: 3 meters
Date of test: 01/09/2001
Operator: R. Kohlhäufl
Mode: - transmitting continuously
- with battery supply 3 V DC

- EUT in horizontal position with rear on table
Detector: Peak

| Frequency [GHz] | Polarization | Analyzer-reading [dBµV] | Antenna-correction [dB] | Cable-correction [dB] | Fieldstrength Peak [dBµV/m] | Limit Peak [dBµV/m] | Duty cycle correction [dB] | Fieldstrength Average [dBµV/m] | Limit Average [dBµV/m] | Limit exceeded |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.7367 | horizontal | 27.2 | 27.9 | 0.5 | 55.6 | 81.9 | 5.1 | 50.5 | 61.9 | |
| 4.3417 | horizontal | 25.9 | 27.2 | 0.8 | 53.9 | 74.0 | 5.1 | 48.8 | 54.0 | |
| | | | | | | | | | | |

**Note:** Frequency error of markers is depending on span of analyzer. Therefore exact frequency values are calculated as harmonics of fundamental frequency.
**Result:** The limits are kept.

## Radiated Emission 1 GHz - 8.7 GHz
## according to FCC Part 15 Subpart C, §15.231.b

Model: Funkfernbedienung 868 MHz, Typ 765
Type: Remote control transmitter
Serial No.: eng 01
Applicant: Bayerische Motorenwerke AG
Test-site: Open area test-site I
Test distance: 3 meters
Date of test: 01/09/2001
Operator: R. Kohlhäufl
Mode: - transmitting continuously
- with battery supply 3 V DC

- EUT in vertical position with antenna to the top
Detector: Peak

| Frequency [GHz] | Polarization | Analyzer-reading [dBµV] | Antenna-correction [dB] | Cable-correction [dB] | Fieldstrength Peak [dBµV/m] | Limit Peak [dBµV/m] | Duty cycle correction [dB] | Fieldstrength Average [dBµV/m] | Limit Average [dBµV/m] | Limit exceeded |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.7367 | vertical | 29.5 | 27.9 | 0.5 | 58.0 | 81.9 | 5.1 | 52.9 | 61.9 | |
| 3.4733 | vertical | 15.1 | 33.2 | 0.7 | 49.0 | 81.9 | 5.1 | 43.9 | 61.9 | |
| 4.3417 | vertical | 18.5 | 34.3 | 0.8 | 53.7 | 74.0 | 5.1 | 48.6 | 54.0 | |
| | | | | | | | | | | |

**Note:** Frequency error of markers is depending on span of analyzer. Therefore exact frequency values are calculated as harmonics of fundamental frequency.
**Result:** The limits are kept.

## Radiated Emission 1 GHz - 8.7 GHz
## according to FCC Part 15 Subpart C, §15.231.b

| | |
|---|---|
| Model: | Funkfernbedienung 868 MHz, Typ 765 |
| Type: | Remote control transmitter |
| Serial No.: | eng 01 |
| Applicant: | Bayerische Motorenwerke AG |
| Test-site: | Open area test-site I |
| Test distance: | 3 meters |
| Date of test: | 01/09/2001 |
| Operator: | R. Kohlhäufl |
| Mode: | - transmitting continuously |
| | - with battery supply 3 V DC |
| | - EUT in vertical position with right hand side on table |
| Detector: | Peak |

| Frequency [GHz] | Polarization | Analyzer-reading [dBµV] | Antenna-correction [dB] | Cable-correction [dB] | Fieldstrength Peak [dBµV/m] | Limit Peak [dBµV/m] | Duty cycle correction [dB] | Fieldstrength Average [dBµV/m] | Limit Average [dBµV/m] | Limit exceeded |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.7367 | vertical | 25.6 | 27.9 | 0.5 | 54.0 | 81.9 | 5.1 | 48.9 | 61.9 | |
| 4.3417 | vertical | 16.3 | 34.3 | 0.8 | 51.4 | 74.0 | 5.1 | 46.3 | 54.0 | |
| | | | | | | | | | | |

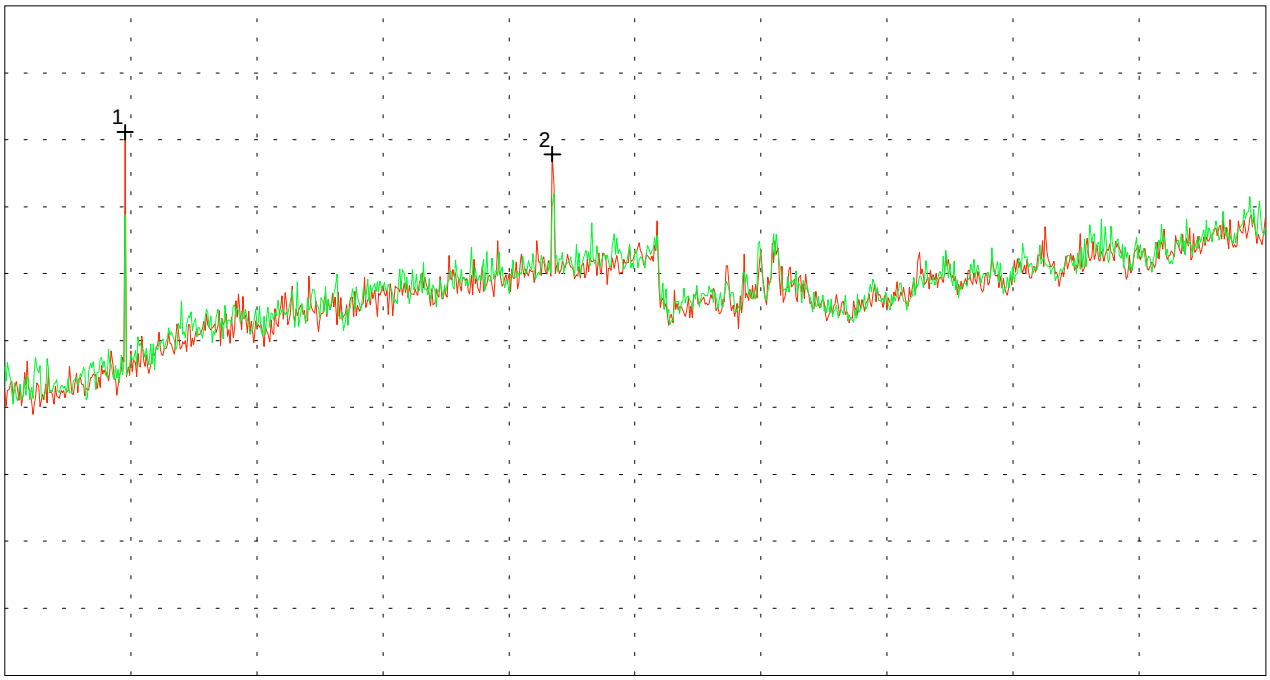
**Note:** Frequency error of markers is depending on span of analyzer. Therefore exact frequency values are calculated as harmonics of fundamental frequency.

**Result:** The limits are kept.

# Radiated emissions 1 GHz - 8.7 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode |
| Serial No.:<br>01 | Battery supply: 3.0 V DC |
| Applicant:<br>Bayerische Motorenwerke AG | EUT in horizontal position with rear on table |
| | Test distance: 3 meters |
| | Channel A: Horizontal polarization<br>Channel B: Vertical polarization |

Ref.Level 65 dBµV/m ATT 0 dB Ref. Offset -29.5 dB
5 dB/Div.




Start 1.000 GHz Stop 8.700 GHz
RBW 1 MHz VBW 1 MHz SWP 40 ms

Multi Marker List

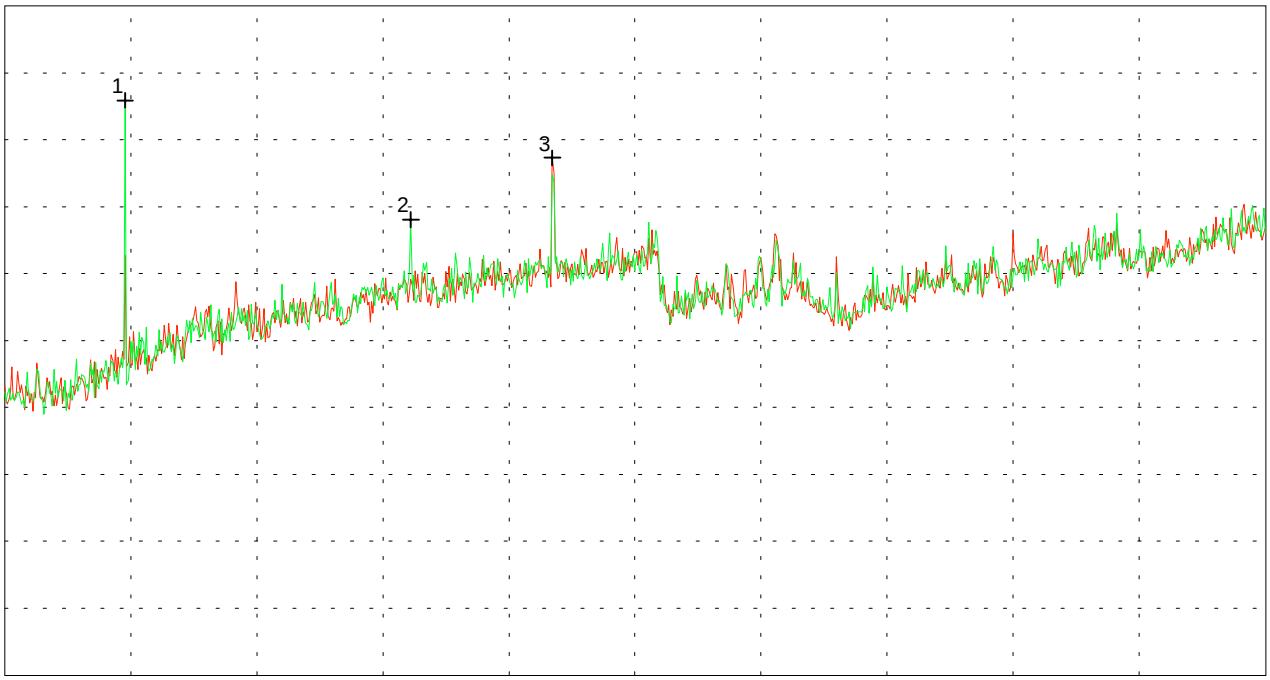
| | | | |
|---|---|---|---|
| No. 1 | 1.735778 GHz | 55.58 dBµV/m | A |
| No. 2 | 4.345222 GHz | 53.93 dBµV/m | A |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | Page 41 of 46 Pages |

# Radiated emissions 1 GHz - 8.7 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode<br><br>Battery supply: 3.0 V DC<br><br>EUT in vertical position with front to the top<br><br>Test distance: 3 meters<br><br>Channel A: Horizontal polarization<br>Channel B: Vertical polarization |
| Serial No.:<br>01 | |
| Applicant:<br>Bayerische Motorenwerke AG | |
| | |
| | |
| | |
| | |

Ref.Level 65 dBµV/m ATT 0 dB Ref. Offset -29.5 dB
5 dB/Div.




Start 1.000 GHz Stop 8.700 GHz
RBW 1 MHz VBW 1 MHz SWP 40 ms

Multi Marker List

| | | | |
|---|---|---|---|
| No. 1 | 1.735778 GHz | 57.95 dBµV/m | B |
| No. 2 | 3.481111 GHz | 49.03 dBµV/m | B |
| No. 3 | 4.345222 GHz | 53.65 dBµV/m | A |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | Page 42 of 46 Pages |

# Radiated emissions 1 GHz - 8.7 GHz acc. to FCC Part 15 Subpart C

| | |
|---|---|
| Model:<br>Funkfernbedienung 868 MHz, Typ 765 | Mode:<br>Transmitter in TX mode<br><br>Battery supply: 3.0 V DC<br><br>EUT in vertical position with right hand side on table<br><br>Test distance: 3 meters<br><br>Channel A: Horizontal polarization<br>Channel B: Vertical polarization |
| Serial No.:<br>01 | |
| Applicant:<br>Bayerische Motorenwerke AG | |
| | |
| | |
| | |
| | |

Ref.Level 65 dBµV/m
5 dB/Div.

ATT 0 dB

Ref. Offset -29.5 dB

Start 1.000 GHz
RBW 1 MHz

VBW 1 MHz

Stop 8.700 GHz
SWP 40 ms

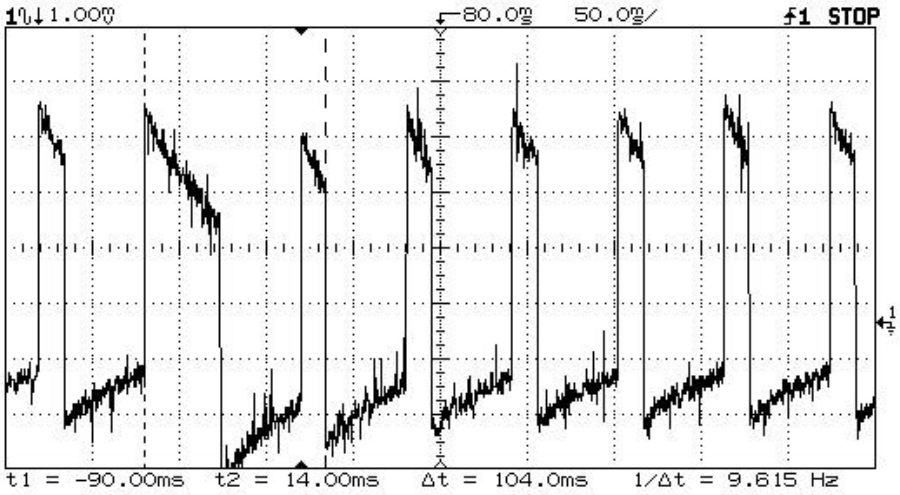
Multi Marker List

| | | | |
|---|---|---|---|
| No. 1 | 1.735778 GHz | 54.01 dBµV/m | B |
| No. 2 | 4.345222 GHz | 51.42 dBµV/m | B |

| | |
|---|---|
| Tested by:<br>Rupert Kohlhäufl | Project-No.:<br>50217-00696-1 |
| Date:<br>08/01/2001 | Page 43 of 46 Pages |

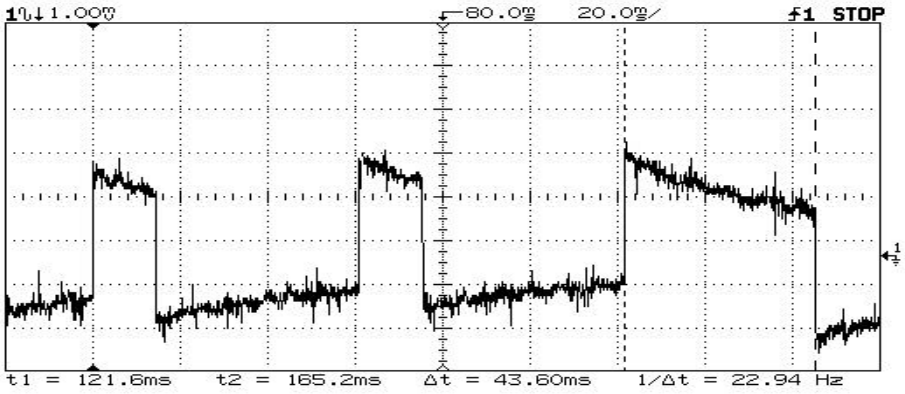
**Duty Cycle Test**
**according to FCC Part 15 Subpart C, §15.231 / ANSI C63.4-1992 (I4.10)**

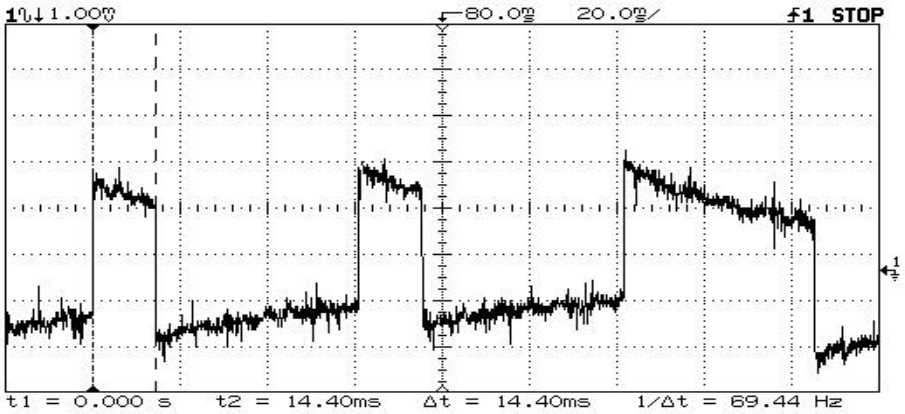
| | |
|---|---|
| Model: | Funkfernbedienung 868 MHz, Typ 765 |
| Type: | Remote control transmitter |
| Serial No.: | eng 01 |
| Applicant: | Bayerische Motorenwerke AG |
| Test-site: | Open area test-site I |
| | |
| Date of test: | 01/09/2001 |
| Operator: | R. Kohlhäufl |
| Mode: | - transmitting continuously |
| | - with battery supply 3 V DC |



## Duty Cycle Test (continued)
## according to FCC Part 15 Subpart C, §15.231 / ANSI C63.4-1992 (I4.10)

| | |
|---|---|
| Model: | Funkfernbedienung 868 MHz, Typ 765 |
| Type: | Remote control transmitter |
| Serial No.: | eng 01 |
| Applicant: | Bayerische Motorenwerke AG |
| Test-site: | Open area test-site I |
| | |
| Date of test: | 01/09/2001 |
| Operator: | R. Kohlhäufl |
| Mode: | - transmitting continuously<br>- with battery supply 3 V DC |



## Duty Cycle Test (continued)
## according to FCC Part 15 Subpart C, §15.231 / ANSI C63.4-1992 (I4.10)

| | |
|---|---|
| Model: | Funkfernbedienung 868 MHz, Typ 765 |
| Type: | Remote control transmitter |
| Serial No.: | eng 01 |
| Applicant: | Bayerische Motorenwerke AG |
| Test-site: | Open area test-site I |
| Date of test: | 01/09/2001 |
| Operator: | R. Kohlhäufl |
| Mode: | - transmitting continuously<br>- with battery supply 3 V DC |

(standard mode)

| | Number of pulses | T [ms] | Duty Cycle | Duty Cycle Correction [dB] |
|---|---|---|---|---|
| Pulse Train | | 104.000 | 0.277 | -11.2 |
| Transmitter ON (long time) | 0 | 43.600 | | |
| Transmitter ON (short time) | 2 | 14.400 | | |

(worst case mode)

| | Number of pulses | T [ms] | Duty Cycle | Duty Cycle Correction [dB] |
|---|---|---|---|---|
| Pulse Train | | 104.000 | 0.558 | -5.1 |
| Transmitter ON (long time) | 1 | 43.600 | | |
| Transmitter ON (short time) | 1 | 14.400 | | |