

Akkreditiertes Prüflaboratorium

DAR-Registriernummer:
TTI-P-G 166/98-00 vom 18.09.98

Test report no.: 2_1518-B/99
FCC 47 Part 74.802
SKM 500 / SKM 300 / SKM 100

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1 General information

1.1 Notes

The test results of this test report relate exclusively to the item tested as specified in 1.5.

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1.2 Testing laboratory

CETECOM ICT Services GmbH

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Untertürkheimer Straße 6 - 10

Deutschland

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Internet : www.cetecom.de

Accredited testing laboratory

DAR-registration number : TTI-P-G-166/98-00 vom 18.09.98

1.3 Details of applicant

Name : Sennheiser electronic GmbH & Co. KG

Street : Am Labor 1

City : D-30900 Wedemark

Country : Germany

Telephone : +49 (0) 5120 / 600-0

Telefax : +49 (0) 5120 / 600-330

Contact : Mr. Klaus Willemsen

Telephone : +49 (0) 5120 / 600-542

1.4 Application details

Date of receipt of application : 21.07.1999

Date of receipt of test item : 02.08.1999

Date of test : 18.-24.08.1999

1.5 Test item

Type of equipment : Wireless Transmitter (Body pack)

Type designation : **SKM 500 / SKM 300 / SKM 100**

Manufacturer : applicant

Street :

City :

Country :

Serial number : 10000015 , 10000007 , 10000007

Additional informations: :

Frequency : 518 – 870 MHz Modulation:180KF3E

Number of channels : 1280 in 25 kHz steps

Antenna : Wire antenna ca. 8 - 13cm

Power supply : 9V DC alkaline battery

Type of equipment : not applicable

Unmodulated carrier : not applicable

1.6 Test standards

CFR 47, Part 74 Subpart H

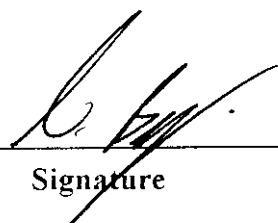
2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

Technical responsibility for area of testing :

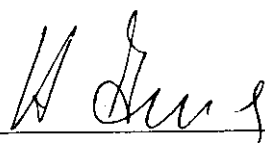
| | | |
|----------|---------|---------|
| 25.08.99 | RSC8411 | Berg M. |
| Date | Section | Name |



Signature

Technical responsibility for area of testing :

| | | |
|----------|---------|---------|
| 25.08.99 | RSC8414 | Ames H. |
| Date | Section | Name |



Signature

2.2 Testreport

TEST REPORT

Testreport no.: 2_1518-B/99

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

| PARAMETER TO BE MEASURED | PAGE |
|--|------|
| Transmitter parameters | |
| Effective radiated power - Maximum | 7 |
| Frequency stability | 8 |
| Temperature variation | 9 |
| Characteristic of the audio modulation circuitry | 10 |
| Occupied bandwidth | 15 |
| Spurious emissions | 18 |
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| Photographs of the equipment | - 22 |

Equipment under test : SKM 500 / SKM 300 / SKM 100
 Ambient temperature : 23°C
 Relative humidity : 62%

EFFECTIVE RADIATED POWER

FCC Rule Part 74.861

Polarisation of the measurements for the larger power level .: vertical

| TEST CONDITIONS | | TRANSMITTER POWER (mW) | | | | |
|---|---------------------------|------------------------|---------|---------|---------|---------|
| | | 518.100 | 646.000 | 756.000 | 806.000 | 870.000 |
| Frequency (MHz) | | | | | | |
| T _{nom} (23)°C | V _{nom} (9.0)V | 1.29 | 3.47 | 5.62 | 4.37 | 6.17 |
| Maximum deviation from output power under extreme test conditions (dBc) | | -2.2 | +5.3 | -3.6 | +2.7 | +2.8 |
| Measurement uncertainty | | ±3dB | | | | |

LIMIT

FCC Rule Part 74.861

| Frequency range MHz | Power level radiated mW |
|------------------------|----------------------------|
| 54-72, 76-88, 174-216 | 50 |
| 470-608, 614-806 | 250 |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : SKM 500 / SKM 300 / SKM 100
 Ambient temperature : 23°C
 Relative humidity : 62%

FREQUENCY STABILITY

| TEST CONDITIONS | | FREQUENCY (MHz) | | | | |
|-------------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|
| Theoretical Frequencies (MHz) | | 518.100 | 646.000 | 756.000 | 806.000 | 870.000 |
| T _{min} (23)°C | V _{min} (7.65)V | 518.10083 | 646.00026 | 755.99995 | 806.00062 | 870.0031 |
| | V _{max} (10.35)V | 518.10089 | 646.00029 | 755.99997 | 806.00075 | 870.00036 |
| Limit (MHz) | | 518.07410 to 518.12591 | 645.96770 to 646.00323 | 755.96220 to 756.03780 | 805.95970 to 806.04030 | 869.95650 to 870.4350 |
| Measurement uncertainty | | $< \pm 10^{-7}$ | | | | |

LIMIT

FCC Rule Part 74.861

The frequency tolerance of the transmitter shall be 0.005 percent

Equipment under test : SKM 500 / SKM 300 / SKM 100

Ambient temperature : 23°C

Relative humidity : 62%

TEMPERATURE VARIATION :

| TEST CONDITIONS | FREQUENCY (MHz) | | | | |
|-------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-----------------------------|
| Theoretical Frequencies (MHz) | 518.100 | 646.000 | 756.000 | 806.000 | 870.000 |
| Temperature(°Celsius) | | | | | |
| -30 | 518.0998 | 645.9963 | 755.9895 | 806.0005 | 869.9918 |
| -20 | 518.1013 | 645.9982 | 755.9939 | 806.0026 | 869.9961 |
| -10 | 518.1026 | 645.9998 | 755.9967 | 806.0033 | 869.9983 |
| 0.0 | 518.1031 | 646.0006 | 755.9987 | 806.0033 | 869.9995 |
| +10 | 515.1021 | 646.0003 | 755.9996 | 806.0020 | 869.9998 |
| +20 | 518.1008 | 645.9999 | 755.9995 | 806.0011 | 870.0003 |
| +30 | 518.0994 | 645.9996 | 756.0001 | 805.9998 | 870.0007 |
| +40 | 518.0992 | 645.9996 | 756.0007 | 805.9991 | 870.0010 |
| +50 | 518.0990 | 645.9993 | 756.0011 | 805.9990 | 870.0011 |
| Limit (MHz) | 518.07410 to 518.12591 | 645.96770 to 646.00323 | 755.96220 to 756.03780 | 805.95970 to 806.04030 | 869.95650 to 870.4350 |
| Measurement uncertainty | $< \pm 10^{-7}$ | | | | |

LIMIT

FCC Rule Part 74.861

The frequency tolerance of the transmitter shall be 0.005 percent

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

01 ; 02 ; 05

Equipment under test : SKM 500 / SKM 300 / SKM 100

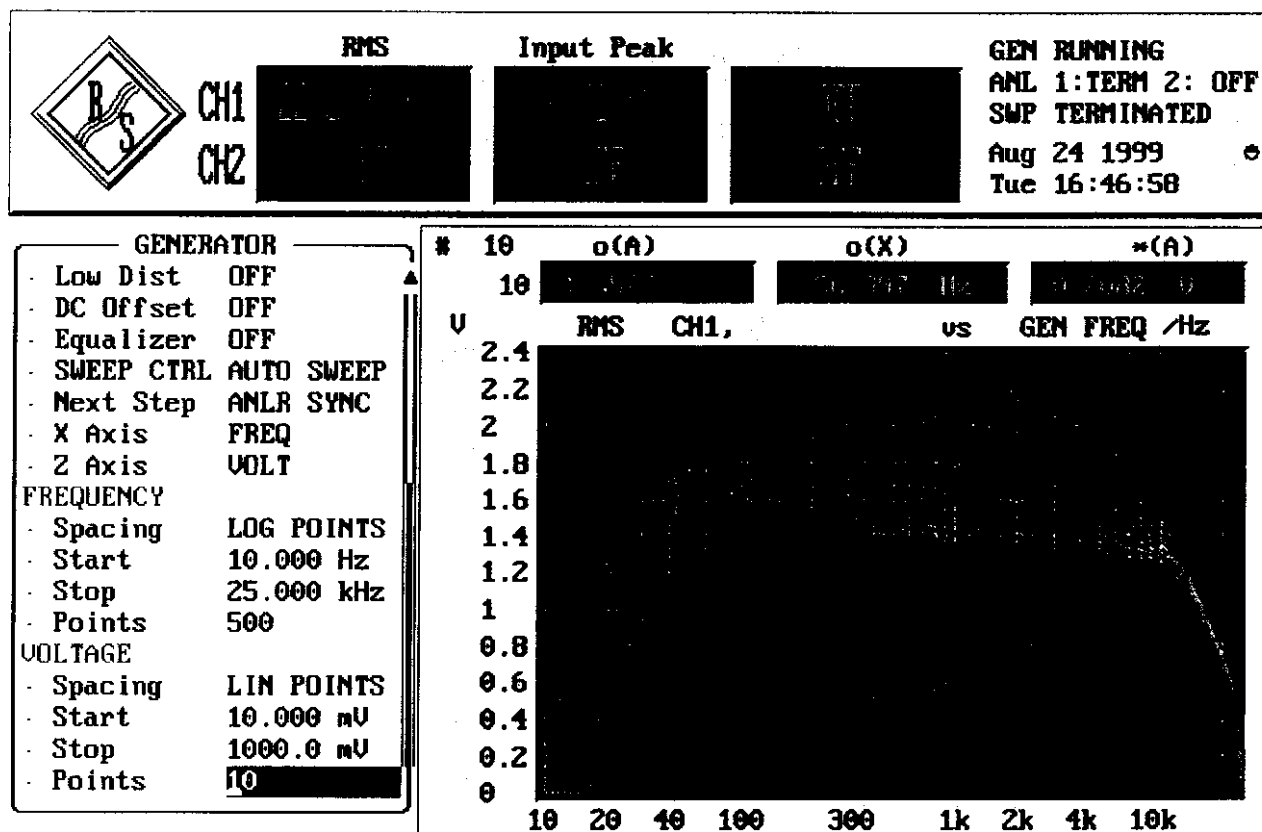
Ambient temperature : 23°C

Relative humidity : 62%

CHARACTERISTICS OF THE AUDIO MODULATION CIRCUITRY

FCC Rule Part 74 Sec. 2.987

Frequency: 518.100 MHz



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

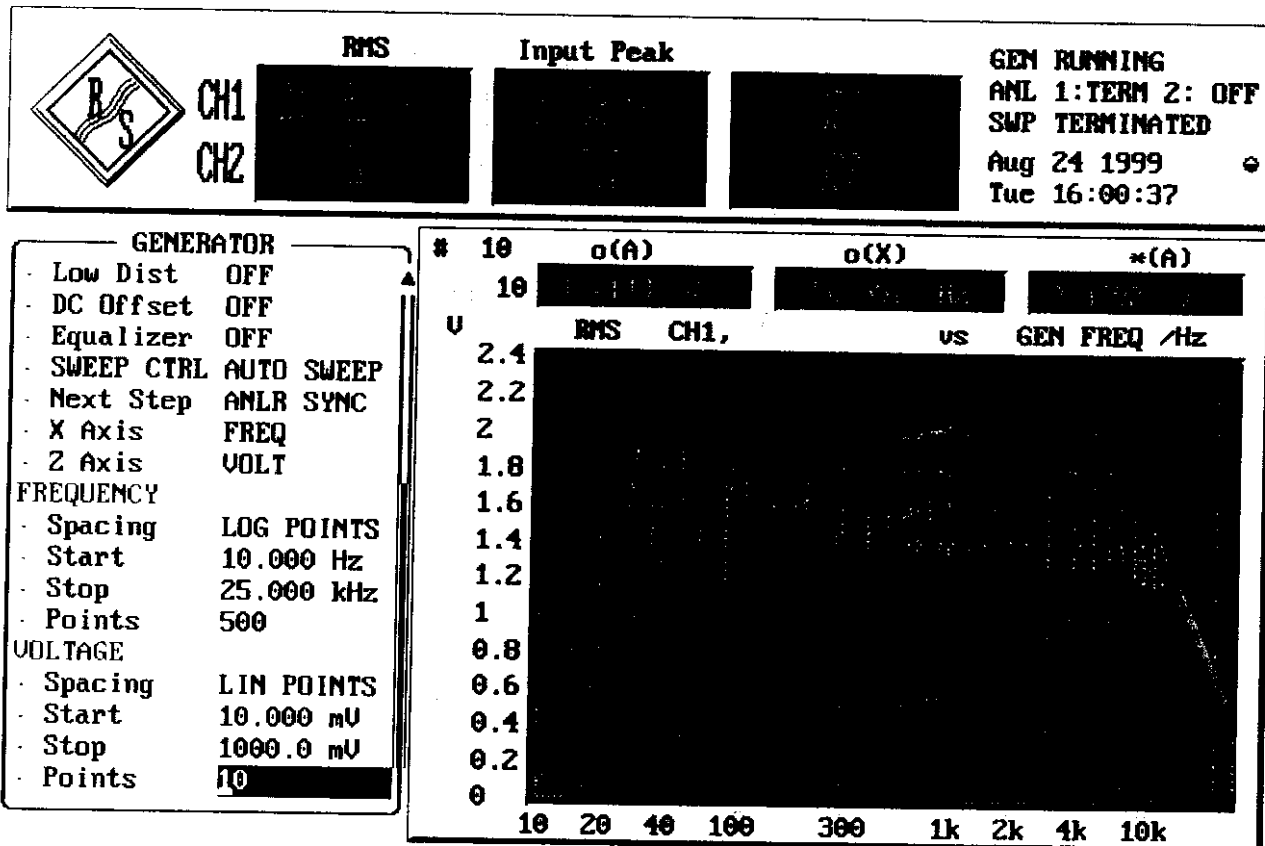
(for reference numbers see test equipment listing)

Equipment under test : SKM 500 / SKM 300 / SKM 100
 Ambient temperature : 23°C
 Relative humidity : 62%

CHARACTERISTICS OF THE AUDIO MODULATION CIRCUITRY

FCC Rule Part 74 Sec. 2.987

Frequency: 646.000 MHz



Equipment under test : SKM 500 / SKM 300 / SKM 100

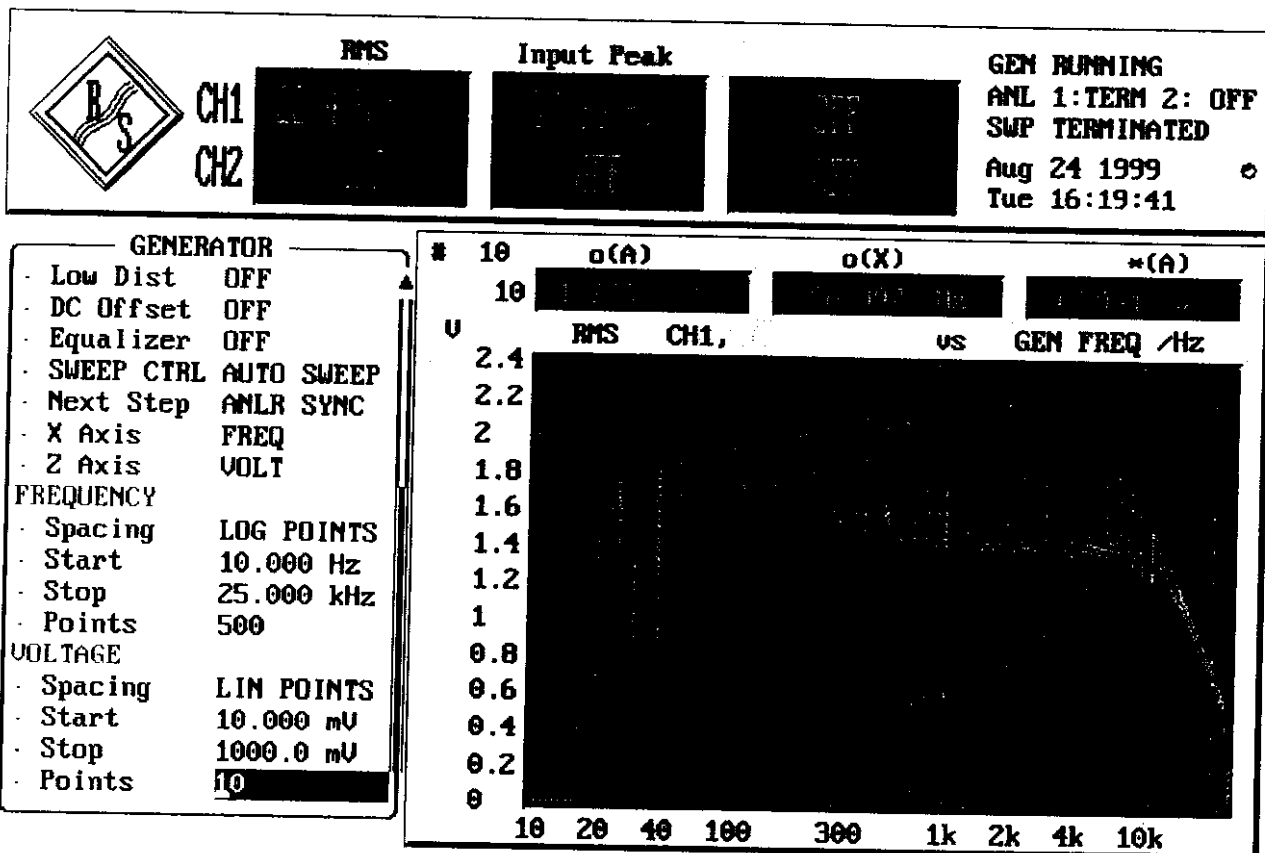
Ambient temperature : 23°C

Relative humidity : 62%

CHARACTERISTICS OF THE AUDIO MODULATION CIRCUITRY

FCC Rule Part 74 Sec. 2.987

Frequency: 756.000 MHz

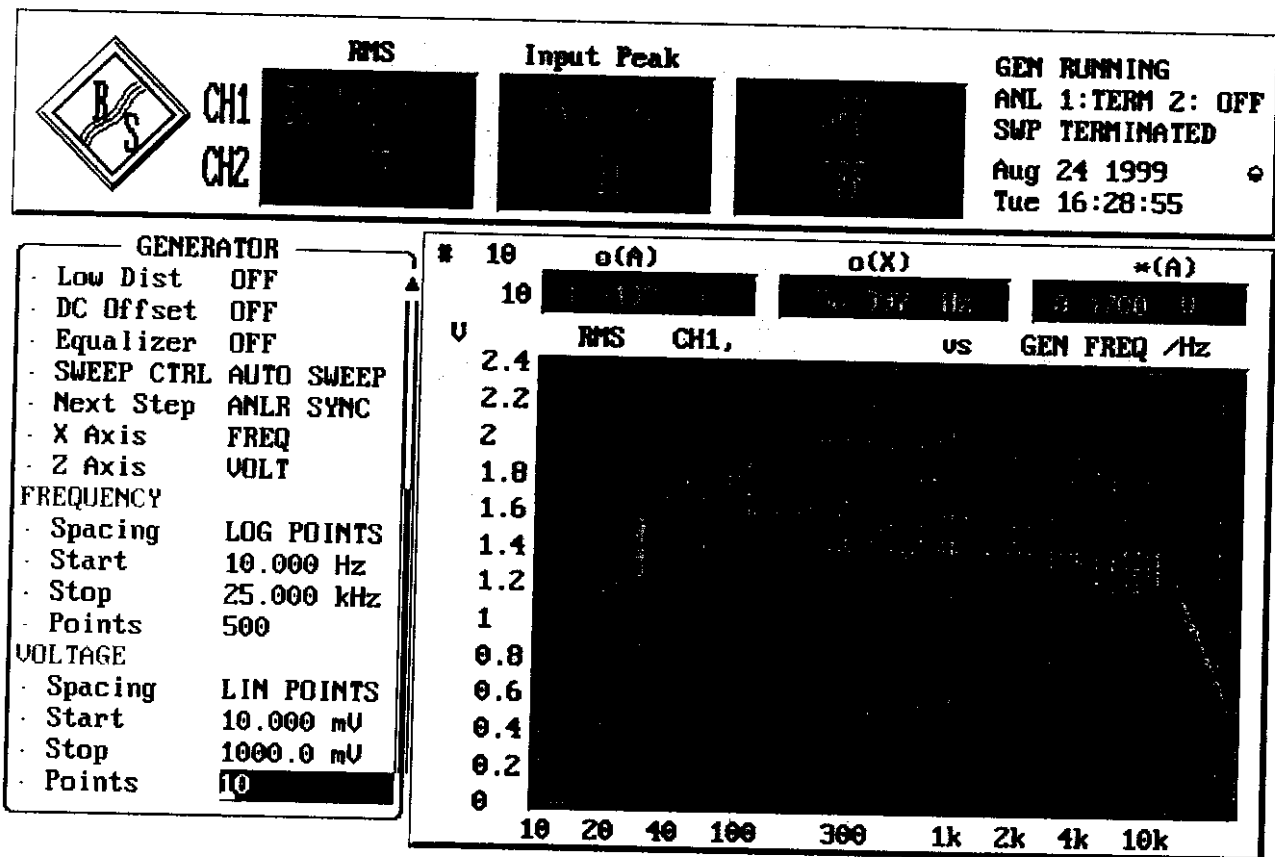


Equipment under test : SKM 500 / SKM 300 / SKM 100
 Ambient temperature : 23°C
 Relative humidity : 62%

CHARACTERISTICS OF THE AUDIO MODULATION CIRCUITRY

FCC Rule Part 74 Sec. 2.987

Frequency: 806.000 MHz

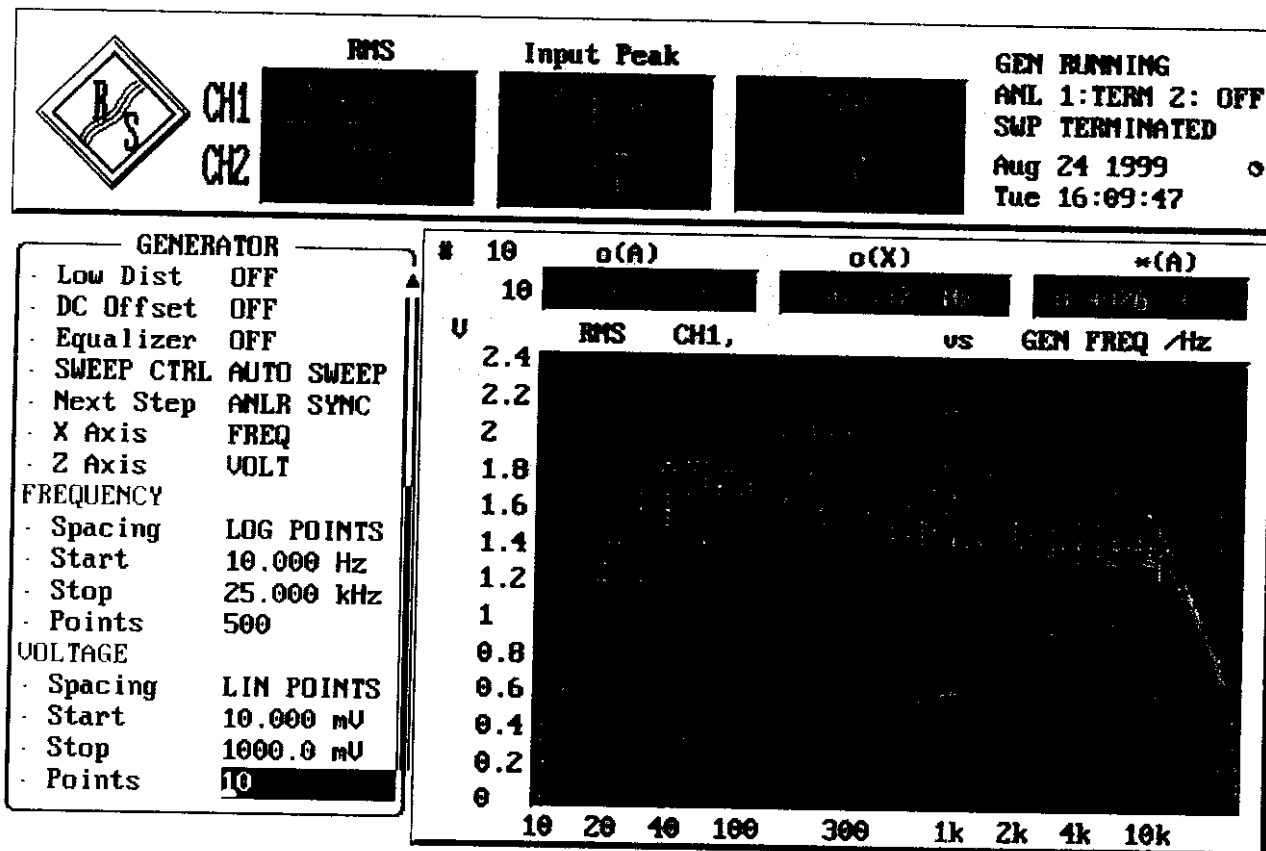


Equipment under test : SKM 500 / SKM 300 / SKM 100
 Ambient temperature : 23°C
 Relative humidity : 62%

CHARACTERISTICS OF THE AUDIO MODULATION CIRCUITRY

FCC Rule Part 74 Sec. 2.987

Frequency: 870.000 MHz



Equipment under test : SKM 500 / SKM 300 / SKM 100

Ambient temperature : 23°C

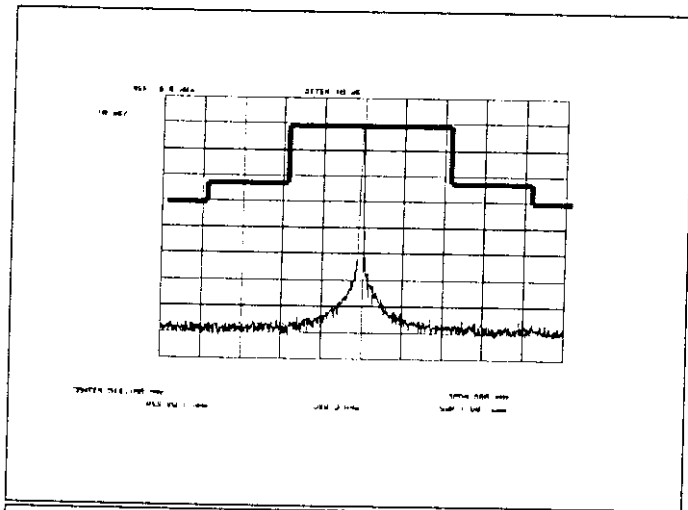
Relative humidity : 62%

OCCUPIED BANDWIDTH

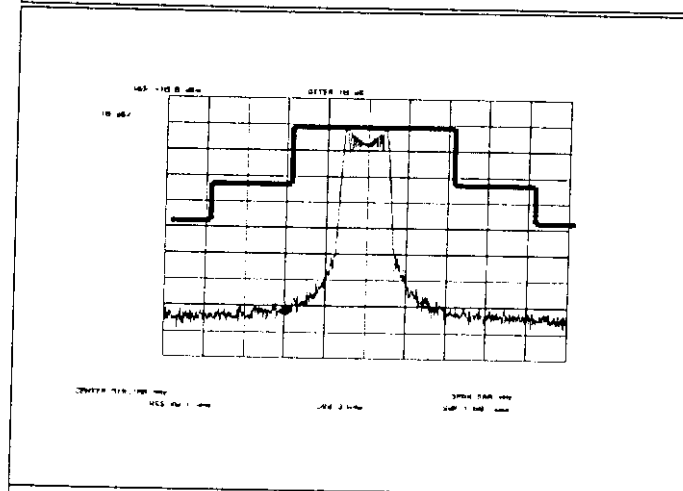
Frequency: 518.100 MHz

FCC Rule Part 74 Sec. 2.989

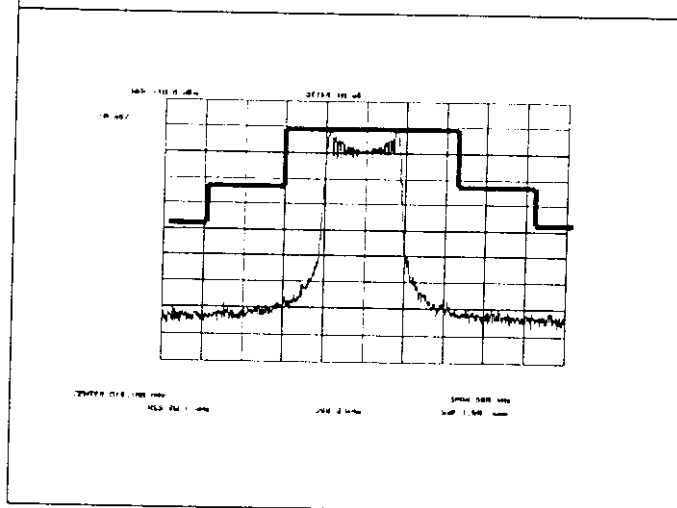
Unmodulated Carrier



50% Modulation



85% Modulation



Equipment under test : SKM 500 / SKM 300 / SKM 100

Ambient temperature : 23°C

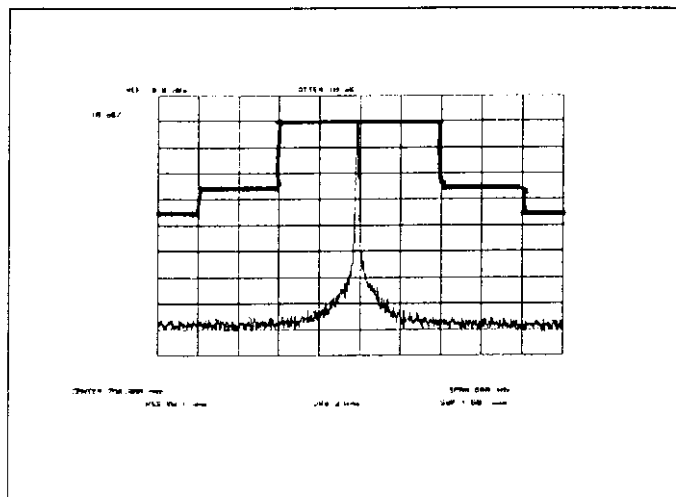
Relative humidity : 62%

OCCUPIED BANDWIDTH

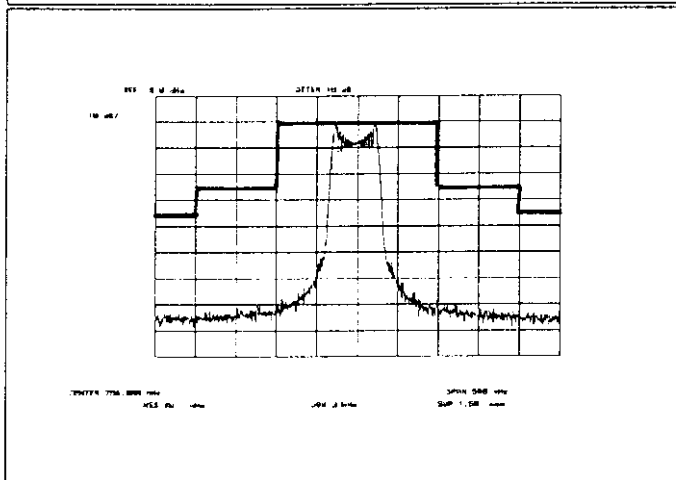
FCC Rule Part 74 Sec. 2.989

Frequency: 756.000 MHz

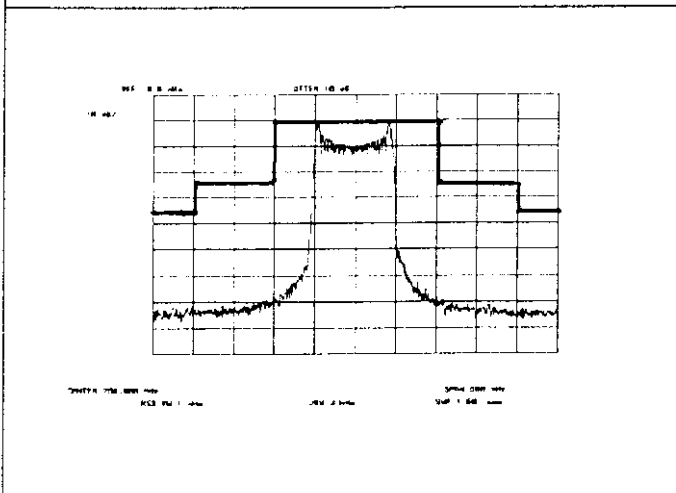
Unmodulated Carrier



50% Modulation



85% Modulation



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(For reference numbers see test equipment listing)

Equipment under test : SKM 500 / SKM 300 / SKM 100

Ambient temperature : 23°C

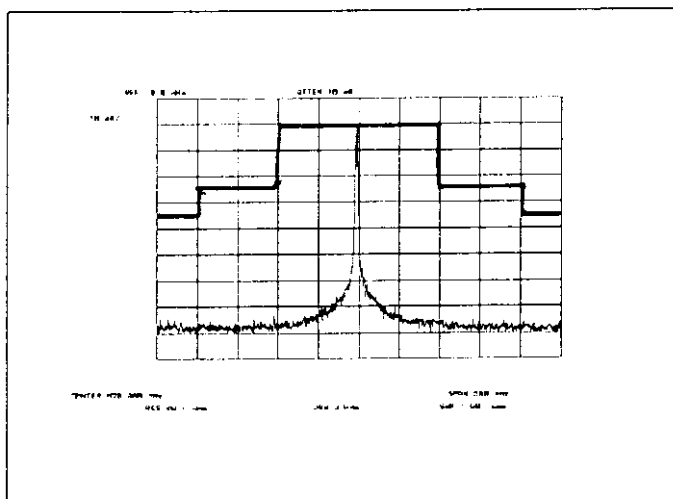
Relative humidity : 62%

OCCUPIED BANDWIDTH

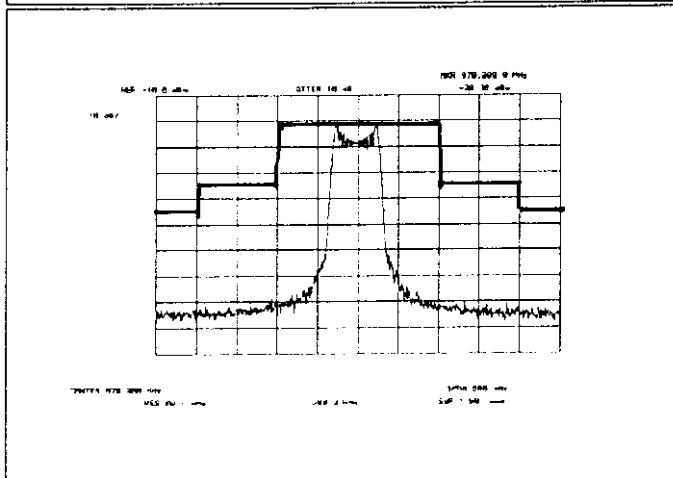
FCC Rule Part 74 Sec. 2.989

Frequency: 870.000 MHz

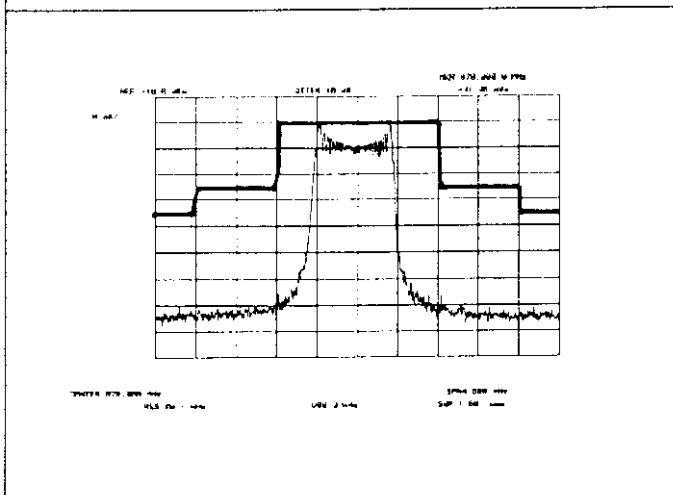
Unmodulated Carrier



50% Modulation



85% Modulation



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(See reference number in test equipment listing)

Equipment under test : SKM 500 / SKM 300 / SKM 100
 Ambient temperature : 23°C
 Relative humidity : 62%

RADIATED EMISSIONS

FCC Rule Part 74 subpart H

Power level at which the measurement has been performed :

| | | |
|-------------------|---------------------|---------------------|
| 518.100 MHz | 646.000 MHz | 756.000 MHz |
| 1.29 mW/+1.11 dBm | 3.47 mW / +5.40 dBm | 5.62 mW / +7.50 dBm |

Transmitter operating

| SPURIOUS EMISSIONS LEVEL (dBm) | | | | | | | | |
|--------------------------------|------------------|-------------|---------------|------------------|-------------|-------------|------------------|-------------|
| 518.100 MHz | | | 646.000 MHz v | | | 756.000 MHz | | |
| f (MHz) | Band-width (kHz) | Level (dBm) | f (MHz) | Band-width (kHz) | Level (dBm) | f (MHz) | Band-width (kHz) | Level (dBm) |
| 1036.2 | 1000 | -63.6 | no | peak | found | no | peak | found |
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| Measurement uncertainty | | | ± 3dB | | | | | |

Bandwidth (kHz); this refers to the bandwidth of the measurement receiver

Limits

FCC Rule Part 74.861(e)(6)

| f ± 100 kHz to f ± 200 kHz | f ± 200 kHz to f ± 500 kHz | f ± 500 kHz |
|----------------------------|----------------------------|--|
| 25 dBc | 35 dBc | -43 + 10 log ₁₀ (mean output power in watts) dB below the mean output power |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

Equipment under test : SKM 500 / SKM 300 / SKM 100

Ambient temperature : 23°C

Relative humidity : 62%

RADIATED EMISSIONS

FCC Rule Part 74 subpart H

Power level at which the measurement has been performed :

| | | |
|-------------------|---------------------|--|
| 806.000 MHz | 870.000 MHz | |
| 4.37 mW/+6.40 dBm | 6.17 mW / +7.90 dBm | |

Transmitter operating

| SPURIOUS EMISSIONS LEVEL (dBm) | | | | | | | | |
|--------------------------------|-----------------|-------------|-------------|-----------------|-------------|---------|-----------------|-------------|
| 806.000 MHz | | | 870.000 MHz | | | | | |
| f (MHz) | Bandwidth (kHz) | Level (dBm) | f (MHz) | Bandwidth (kHz) | Level (dBm) | f (MHz) | Bandwidth (kHz) | Level (dBm) |
| no | peak | found | 1740.00 | 1000 | -57.4 | | | |
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| Measurement uncertainty | | | ± 3dB | | | | | |

Bandwidth (kHz); this refers to the bandwidth of the measurement receiver

Limits

FCC Rule Part 74.861(e)(6)

| | | |
|----------------------------|----------------------------|--|
| f ± 100 kHz to f ± 200 kHz | f ± 200 kHz to f ± 500 kHz | f ± 500 kHz |
| 25 dBc | 35 dBc | -43 + 10 log ₁₀ (mean output power in watts) dB below the mean output power |

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED

(for reference numbers see test equipment listing)

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

| No | Instrument/Ancillary | Type | Manufacturer | Serial No. |
|----|-----------------------|-----------|-----------------|-------------|
| 01 | Spectrum Analyzer | 8566 A | Hewlett-Packard | 1925A00257 |
| 02 | Analyzer Display | 8566 A | Hewlett-Packard | 1925A00860 |
| 03 | Oscilloscope | 7633 | Tektronix | 230054 |
| 04 | Radio Analyzer | CMTA 54 | Rohde & Schwarz | 894 043/010 |
| 05 | System Power Supply | 6038 A | Hewlett-Packard | 2848A07027 |
| 06 | Signal Generator | 8111 A | Hewlett-Packard | 2215G00867 |
| 07 | Signal Generator | 8662 A | Hewlett-Packard | 2224A01012 |
| 08 | Funktionsgenerator | AFGU | Rohde & Schwarz | 862 480/032 |
| 09 | Regeltrenntrafo | MPL | Erfi | 91350 |
| 10 | Netznachbildung | NNLA 8120 | Schwarzbeck | 8120331 |
| 11 | Relais-Matrix | PSU | Rohde & Schwarz | 893 285/020 |
| 12 | Power-Meter | 436 A | Hewlett-Packard | 2101A12378 |
| 13 | Power-Sensor | 8484 A | Hewlett-Packard | 2237A10156 |
| 14 | Power-Sensor | 8482 A | Hewlett-Packard | 2237A00616 |
| 15 | Modulationsmeter | 9008 | Racal-Dana | 2647 |
| 16 | Frequenzzähler | 5340 A | Hewlett-Packard | 1532A03899 |
| 17 | Absorber Schirmkabine | --- | MWB | 87400/002 |
| 18 | Spectrum Analyzer | 85660 B | Hewlett-Packard | 2747A05306 |
| 19 | Analyzer Display | 85662 A | Hewlett-Packard | 2816A16541 |
| 20 | Quasi Peak Adapter | 85650 A | Hewlett-Packard | 2811A01131 |
| 21 | RF-Preselector | 85685 A | Hewlett-Packard | 2833A00768 |
| 22 | Biconical Antenne | 3104 | Emco | 3758 |
| 23 | Log. Per. Antenne | 3146 | Emco | 2130 |
| 24 | Double Ridge Horn | 3115 | Emco | 3088 |
| 25 | EMI-Testreceiver | ESAI | Rohde & Schwarz | 863 180/013 |
| 26 | EMI-Analyzer-Display | ESAI-D | Rohde & Schwarz | 862 771/008 |
| 27 | Biconical Antenne | HK 116 | Rohde & Schwarz | 888 945/013 |
| 28 | Log. Per. Antenne | HL 223 | Rohde & Schwarz | 825 584/002 |
| 29 | Relais-Switch-Unit | RSU | Rohde & Schwarz | 375 339/002 |
| 30 | Highpass | HM985955 | FSY Microwave | 001 |
| 31 | Amplifier | P42-GA29 | Tron-Tech | B 23602 |
| 32 | Absorber Schirmkabine | | Frankonia | |
| 33 | Steuerrechner | PSM 7 | Rohde & Schwarz | 834 621/004 |
| 34 | EMI Test Reciever | ESMI | Rohde & Schwarz | 827 063/010 |
| 35 | EMI Test Receiver | Display | Rohde & Schwarz | 829 808/010 |

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

| No | Instrument/Ancillary | Type | Manufacturer | Serial No. |
|----|--|-----------|-----------------|--------------|
| 36 | Controler | HD 100 | Deisel | 100/322/93 |
| 37 | Relais Matrix | PSN | Rohde & Schwarz | 829 065/003 |
| 38 | Control Unit | GB 016 A2 | Rohde & Schwarz | 344 122/008 |
| 39 | Relais Switch Unit | RSU | Rohde & Schwarz | 316 790/001 |
| 40 | Power Supply | 6032A | Hewlett Packard | 2846A04063 |
| 41 | Spektrum Monitor | EZM | Rohde & Schwarz | 883 720/006 |
| 42 | Meßempfänger | ESH 3 | Rohde & Schwarz | 890 174/002 |
| 43 | Meßempfänger | ESVP | Rohde & Schwarz | 891 752/005 |
| 44 | Biconi Ant. 20-300MHz | HK 116 | Rohde & Schwarz | 833 162/011 |
| 45 | Logper Ant. 0.3-1 GHz | HL 223 | Rohde & Schwarz | 832 914/010 |
| 46 | Amplifier 0.1-4 GHz | AFS4 | Miteq Inc. | 206461 |
| 47 | Logper Ant. 1-18 GHz | HL 024 A2 | Rohde & Schwarz | 342 662/002 |
| 48 | Polarisationsnetzwerk | HL 024 Z1 | Rohde & Schwarz | 341 570/002 |
| 49 | Double Ridge G Horn Antenne 1-26.5 GHz | 3115 | EMCO | 9107-3696 |
| 50 | Microw. Sys. Amplifier 0.5- 26.5 GHz | 8317A | Hewlett Packard | 3123A00105 |
| 51 | Audio Analyzer | UPD | Rohde & Schwarz | 1030.7500.04 |
| 52 | | | | |
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