

FCC ID: E9MSO40



EMISSION -- TESTREPORT

Testreport file no. : **T 20989-1-00 NF** Date : Sept. 11, 2001
of issue

Model : S040 (WMS 40)

Type : Wireless Microphone System, Snap On

Applicant : AKG Acoustics, U.S.

Manufacturer : Vtech Communications Ltd.

Licence holder : AKG Acoustics U.S.

Address : 914 Airpark Center Dr.

Nashville, TN 37217, U.S.A.

Test result accrdg. to the
regulation(s) at page 3

:

POSITIV

This testreport with appendix consists of 44 pages.
The testresult only responds to the tested sample. It is not allowed to copy
this report even partly without the allowance of the testlaboratory.

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TEST REGULATIONS

The tests were performed according to following regulations :

- o - EN 50081-1 / 2.1991
- o - EN 50081-2 / 7.1993

- o - EN 55011 / 3.1991

- o - Group 1
- o - class A
- o - Group 2
- o - class B

- o - EN 55014 / 4.1993

- o - Household appliances and similar
- o - tools
- o - Semiconductor devices

- o - EN 55014 / A2:1990
- o - EN 55104 / 5.1995

Category:

- o - EN 55015 / A1:1990
- o - EN 55015 / 12.1993

- o - EN 55022 / 5.1995

- o - class A
- o - class B

- o - prEN 55103-1 / 3.1995
- o - prEN 50121-3-2 / 3.1995
- o - EN 60601-1-2 / 4.1994

- o - VCCI

- o - class 1
- o - class 2

- - 47 CFR Part 74 Subpart H (74.861)

ADDRESS OF THE TEST LABORATORY

■ - MIKES BABT PRODUCT SERVICE GmbH
Ohmstrasse 2-4
D - 94342 Strasskirchen

o - _____

ENVIRONMENTAL CONDITIONS

Temperature: _____ 15-35 ° C
Humidity _____ 45-60 %
Atmospheric pressure _____ 860-1060 mbar

POWER SUPPLY SYSTEM UTILIZED

Power supply system : Internal battery DC 1.5 V

STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities that can account for a nominal measurement error of $\pm 4\text{dB}$. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

SHORT DESCRIPTION OF THE EQUIPMENT UNDER TEST (EUT)

The snap on transmitter SO 40 can be attached to hand-held microphones with adequate connectors and is used for e.g. in concerts, theaters and tv or radio studios to transmit audio signals to a receiver. The transmitter is processing the input signal which is given by a hand-held microphone, modulating it on a carrier (frequency modulation) and amplifying it. This signal will be feeded through filters to the antenna and then radiated. The snap on transmitters exist in 3 different version: US54 (710.4 MHz) / US58 (734.6) and KR4 (750.9 MHz).

Number of received/tested samples: 3 / 1

DEFINITIONS FOR SYMBOLS USED IN THIS TEST REPORT

■ - Black box indicates that the listed condition, standard or equipment is applicable for this Report.
o - Blank box indicates that the listed condition, standard or equipment was not applicable for this Report.

M E A S U R E M E N T P R O T O C O L F O R F C C , V C C I
A N D A U S T E L

Test Methodology

Conducted and radiated emission testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1993), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1993). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-1992 procedures and using the FCC limits or the CISPR 22 Limits.

Measurement Error

The test system for conducted emissions is defined as the LISN, tuned receiver and coaxial cable. The test system for spurious emissions is defined as the antenna, the pre-amplifier, the tuned receiver and the coaxial cable. These test systems have an expected error of ± 3 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

General Standard Information

The test methods used comply with CISPR Publication 22 (1993), EN 55022 (1987) and AS 3548 (1992) - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment" and with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

For detailed description of each measurement please refer to section testresults.

DISCOVERY OF WORST CASE MEASUREMENT CONDITION:

The model S040 consists of 3 different versions (each working on a fixed frequency) US54, US58, and KR4. The 3 versions are technically identical except the following items:

- 3 different operating frequencies
- PCB. The boards are similar with differences only in the output filter. The filters on the PCB have the same configuration but have different combinations of resistors, coils and capacitors. For more detailed information, please see technical documentation set. Due to the different output filter, the PCB's have different names.

To find out the worst case channel for the complete measurement the following tests have been performed:

- Measurement of the radiated fieldstrength at the operating frequency of the 3 versions. This measurement have been performed in order to find out the transmitter with the maximum fieldstrength.
- Measurement of the radiated spurious emissions of the 3 versions. This measurement have been performed in order to find out the maximum spurious emissions of the transmmmitter.
- Measurement of the modulation limiting data of the 3 versions. This measurement has been performed in order to find out, whether the modulation limiting data have different results at the different operating frequencies .
- Checking the occupied bandwidth with the maximum input level for the snap on transmitter on each version of the snap on transmitter at the operating frequency.

SUMMARIZING:

=> maximum fieldstrength: (difference US58-KR4: 1.2 dB)
=> maximum spurious emission: (difference KR4-US58: 9.1 dB
=> modulation limiting data: no essential differences on the 3 versions
=> occupied bandwidth: no essential differences on the 3 versions

Based on this testresults, the measurements have been performed completely on the version: KR4. This testresults are documented in the following sections of the testreport.

TEST RESULT**CONDUCTED EMISSIONS - 10/150 kHz - 30 MHz**

■ - Test not applicable

Testlocation :

- o - Shielded room no. 1
- o - Shielded room no. 2
- o - Shielded room no. 3
- o - Shielded room no. 4
- o - Shielded room no. 5
- o - Shielded room no. 6
- o - Shielded room no. 7
- o - Anechoic chamber
- o - Full compact chamber

For TEST EQUIPMENT USED please refer to ATTACHMENT B: _____

Description of Measurement

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit, which is equivalent to the Australian AS 3548 limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasipeak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasipeak and average detection and recorded on the data sheets.

Testresult

The requirements are

0 - MET

0 - NOT MET

Min. limit margin _____ dB at _____ MHz

Max. limit exceeding _____ dB at _____ MHz

Remarks: EUT is not having a mains connection. Operated by a internal
battery.

SPURIOUS EMISSION

Spurious emissions from the EUT are measured in the frequency range of 30 to 10 times the highest used frequency using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasipeak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection, remeasurement of results which may be critical will be repeated in average mode. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the

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test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.

SPURIOUS EMISSION (MAGNETIC FIELD) 10 kHz - 30 MHz

■ - Test not applicable

- o - in a shielded room
- o - at a non - reflecting open-site
- and
- o - in a testdistance of 3 meters.
- o - in a testdistance of 30 meters.

For TEST EQUIPMENT USED please refer to ATTACHMENT B: _____

Description of Measurement

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the EMI receiver (Level dB μ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has to be compared with the relevant FCC limit.

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	Limit (dB μ V/m)	=	Delta (dB)
1.705	5	+	20	=	25	30	=	5

Testresult

The requirements are

0 - MET**0 - NOT MET**

Min. limit margin _____ dB at _____ MHz

Max. limit exceeding _____ dB at _____ MHz

Remarks: Not applicable.**SPURIOUS EMISSIONS (electric field) 30 MHz - 1000 MHz**☐ - Test not applicable

- - Open-site 1
- ☐ - Open-site 2
- - 3 meters
- ☐ - 10 meters
- ☐ - 30 meters

For TEST EQUIPMENT USED please refer to ATTACHMENT B: SER2

Description of Measurement

The final level, expressed in dB μ V/m, is arrived by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored. This result then has the FCC or CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets at page 24 - 25. The CISPR 22 limit is equivalent to the Australian AS 3548 limit.

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	Limit (dB μ V/m)	=	Delta (dB)
719	75	+	32.6	=	107.6	110	=	-2.4

Testresult

The requirements are

■ - MET

0 - NOT MET

Min. limit margin > 45 dB at 30-1000 MHz

Max. limit exceeding _____ dB at _____ MHz

Remarks: The emissions have to be att. $43+10\log(P \text{ in W})$ below the carrier. $P_{\text{max-KR4}} = 3.6 \text{ mW} \rightarrow 18.6 \text{ dB att. Max. field strength in}$ OATS: 84.4 dB μ V/m. For plot see page A1-A2.**SPURIOUS EMISSION 1 GHz - 18 GHz**

0 - Test not applicable

Testlocation :

- o - Open-site 1
- o - Open-site 2

- - Anechoic chamber

- o - Full compact chamber

- o - 1 meters

- - 3 meters

- o - 10 meters

For TEST EQUIPMENT USED please refer to ATTACHMENT B: SER3

Description of Measurement

The final level, expressed in dB μ V/m, is arrived by taking the reading from the Spectrumalyzer in dB μ V and adding the correction factors of the test setup incl. cables.

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Example of the correction value at 1.8236 GHz

Level reading at 1.5 GHz	correction EMCO 3115	correction Amplifier AWT 8035 + cable	Correction Factor (summarized)	corrected level
56 dBµV	+25.7	-41.7	-16	40 dBµV

Testresult

The requirements are

■ - MET

○ - NOT MET

Min. limit margin

24.4 dB at 1.497 GHz

Max. limit exceeding

dB at GHz

Remarks: The limits are met. The measurement has been performed in Peak-mode.

Testresult in detail:

Frequency GHz	L: Peak dBµV	L: AV dBµV	Correct.	L: Peak dBµV/m	L: AV dBµV/m	Limit dBµV/m
1.497	75.6	--	-15.1	60.5	--	84.4
1.876	54.9	--	-12.8	42.1	--	84.4
2.255	68.2	--	-11.1	57.1	--	84.4
2.627	56.0	--	-10.3	45.7	--	84.4
2.991	52.0	--	-9.7	42.3	--	84.4
3.756	64.0	--	-6.8	57.2	--	84.4
4.505	50.3	--	+0.1	50.4	--	84.4
5.258	50.2	--	-0.2	50.0	--	84.4

CONDUCTED POWER OF THE FUNDAMENTAL WAVE MEASURED
ON THE ANTENNA TERMINALS

☒ - Test not applicable

Testlocation :

- ☐ - Shielded room no. 1
- ☐ - Shielded room no. 2
- ☐ - Shielded room no. 3
- ☐ - Shielded room no. 4
- ☐ - Shielded room no. 5
- ☐ - Shielded room no. 6
- ☐ - Shielded room no. 7
- ☐ - Anechoic chamber
- ☐ - Full compact chamber
- ☐ - Climatic test chamber VLK

For TEST EQUIPMENT USED please refer to ATTACHMENT B: _____

Description of Measurement

The conducted power of the fundamental wave measured on the antenna terminals in a climatic test chamber. The antenna jack was connected to the input of a communication test receiver. The internal batteries have been removed also and a variable DC power supply was used instead. The measurements have been made with the EUT unmodulated. During the test the supply voltage and the temperature were varied and applied simultaneously. The lower supply voltage was given by the manufacturer. In case the equipment was switching off before, the switch off voltage was used instead.

Testresult

The requirements are

0 - MET

0 - NOT MET

Frequency range of equipment								
Temperature/°C	DC supply voltage/V	Power/dBm	Power/dBm	Power/dBm	Power/dBm	Power/dBm	Power/dBm	Power/dBm
-30								
-20								
-10								
0								
+10								
+20								
+30								
+40								
+50								

Remarks: _____

MODULATION LIMITING DATA

☐ - Test not applicable

Testlocation :

- ☐ - Shielded room no. 1
- ☐ - Shielded room no. 2
- ☐ - Shielded room no. 3
- ☒ - Shielded room no. 4
- ☐ - Shielded room no. 5
- ☐ - Shielded room no. 6
- ☐ - Shielded room no. 7
- ☐ - Anechoic chamber
- ☐ - Full compact chamber

- - Climatic test chamber VLK

For TEST EQUIPMENT USED please refer to ATTACHMENT B: MLD

Description of Measurement

The modulation limiting data were measured on the antenna terminals for EUT's with external connector. Other EUT's are tested via an adequate coupling device with antenna jack. The antenna jack was connected to the input of a communication test receiver. The internal batteries of the EUT, have been removed also and an external DC power supply was used instead. The data have been taken by feeding the connectors used for connecting the microphone with different audio frequencies. These frequencies are generated in the communication test receiver. The level was varied in 10 dB steps from 20 dB μ V to the maximum audio input level specified by the manufacturer. The frequency deviation at this levels have been recorded.

PFD: Positive frequency deviation

NFD: Negative frequency deviation

For the occupied bandwidth plot the value of 50 % of the maximum frequency deviation was calculated. The level on the audio input was increased until this 50 % frequency deviation was achieved. To this level 16 dB have been added and a plot was made as described in the next chapter under section occupied bandwidth.

Testresult

The requirements are

■ - MET

0 - NOT MET

EUT: S0 40 Version: KR54 working on 750.9 MHz

Input audio level/dBµV	f _{mod} = 50 Hz		f _{mod} = 7.5kHz		f _{mod} = 15kHz	
	PFD/kHz	NFD/kHz	PFD/kHz	NFD/kHz	PFD/kHz	NFD/kHz
30	0.130	0.130	0.550	0.550	0.650	0.640
40	0.165	0.165	0.800	0.790	1.250	1.260
50	0.530	0.490	1.230	1.230	2.250	2.240
60	0.730	0.790	2.040	2.020	3.900	3.880
70	1.320	1.310	3.530	3.490	6.890	6.860
80	2.290	2.280	6.230	6.130	12.100	11.900
90	4.100	4.080	11.100	10.700	21.600	21.300
100	7.210	7.200	19.800	19.100	37.600	36.800
110	13.200	12.700	33.900	32.900	39.900	39.200
120	23.300	22.900	41.100	39.100	39.900	39.100
125	29.100	28.700	31.100	39.200	39.700	38.600
130	32.000	33.000	35.700	43.000	32.500	35.500
133	32.500	34.600	34.400	35.000	20.300	20.400

Remarks: The limit of ± 75 kHz is kept.

(PFD=Positive frequency deviation; NFD=Negative Frequency deviation)

Judging the requirements of the emission mask with the data from the modulation limiting data:

KR 4 working on 750.9 MHz:Max. measured frequency deviation: ± 43 kHz50% of the maximum deviation: ± 21.5 kHzAudio input level (ail) to get ± 21.5 kHz: L = 101.5 dBµV

L + 16 dBµV = 117.5 dBµV => Level for testing the occupied bandwidth

Occupied bandwidth:

version of EUT	KR4		KR4		KR4	
audio test level	L = 117.5 dBµV/1kHz		L = 117.5dBµV/7.5kHz		L = 117.5dBµV/15kHz	
shape of emission mask	$\pm 50-100\%$ [dB]	$\pm 100-250\%$ [dB]	$\pm 50-100\%$ [dB]	$\pm 100-250\%$ [dB]	$\pm 50-100\%$ [dB]	$\pm 100-250\%$ [dB]
min. limit margin/dB	> 5	> 10	> 5	> 10	> 5	> 10

Remarks: The limit is kept. For plot see pages A9-A14.

FREQUENCY ERROR

0 - Test not applicable

Testlocation :

- o - Shielded room no. 1
- o - Shielded room no. 2
- o - Shielded room no. 3
- - Shielded room no. 4
- o - Shielded room no. 5
- o - Shielded room no. 6
- o - Shielded room no. 7
- o - Anechoic chamber
- o - Full compact chamber
- - Climatic test chamber VLK

For TEST EQUIPMENT USED please refer to ATTACHMENT B: FE

Description of Measurement

The frequency error was measured on the antenna terminals for EUT's with external connector. Other EUT's are tested via an adequate coupling device with antenna jack in a climatic test chamber. The antenna jack was connected to the input of a communication test receiver. The internal batteries have been removed also and a variable DC power supply was used instead. The measurements have been made with the EUT unmodulated. During the test the supply voltage and the temperature were varied and applied simultaneously. The lower supply voltage was given by the manufacturer. In case the equipment was switching off before, the switch off voltage was used instead. The frequency error is defined as the deviation of the transmitting frequency from the nominal frequency.

Testresult:

The requirements are

■ - MET

0 - NOT MET

Frequency range of equipment		KR4					
Temperature/°C	DC supply voltage/V	Frequency error/kHz	Frequency error/kHz	Frequency error/kHz	Frequency error/kHz	Frequency error/kHz	Frequency error/kHz
-30	1.5	12.15	750.91215				
	1.2	11.40	750.91140				
-20	1.5	13.30	750.91330				
	1.2	12.59	750.91259				
-10	1.5	12.82	750.91282				
	1.2	12.12	750.91212				
0	1.5	10.45	750.91045				
	1.2	9.75	750.90975				
+10	1.5	7.44	750.90744				
	1.2	6.75	750.90675				
+20	1.5	3.25	750.90325				
	1.2	2.79	750.90279				
+30	1.5	-0.76	750.89924				
	1.2	-1.23	750.89877				
+40	1.5	-4.46	750.89554				
	1.2	-4.90	750.89510				
+50	1.5	-7.88	750.89212				
	1.2	-8.22	750.89178				

Remarks: The most strict limit for this frequency range is: 37.54 kHz
 (0.005% of 750.9 MHz)

KEEPING THE REQUIREMENTS OF THE EMISSION MASK

0 - Test not applicable

Testlocation :

- o - Shielded room no. 1
- o - Shielded room no. 2
- o - Shielded room no. 3
- - Shielded room no. 4
- o - Shielded room no. 5
- o - Shielded room no. 6
- o - Shielded room no. 7
- o - Anechoic chamber
- o - Full compact chamber
- o - Climatic test chamber VLK

For TEST EQUIPMENT USED please refer to ATTACHMENT B: EM

Description of Measurement

The requirements of the emission mask were measured with different input signals on the antenna terminals for EUT's with external connector. Other EUT's are tested via an adequate coupling device with antenna jack. The antenna jack was connected to the input of a spectrum analyzer. The spectrum analyzer was set up as following:

- video and resolution bandwidth: 10 kHz
- attenuation: automatic, low noise
- center frequency: nominal transmit frequency
- frequency span: 500 kHz

The reference level was set to the maximum value of the unmodulated carrier. The internal batteries have been removed also and a variable DC power supply was used instead. The measurements have been made with a modulation frequency and voltage accdg. to the specification of the manufacturer. The audio frequency was provided by a communication test receiver. During the test the supply voltage and the temperature were varied and applied simultaneously. The lower supply voltage was given by the manufacturer. In case the equipment was switching off before, the switch off voltage was used instead.

Testresult

The requirements are

■ - MET

○ - NOT MET

The **requirements** are as following:

Attenuation on any frequencies removed from the transmit frequency
 between 50 and 100 % of the authorized bandwidth: at least 25 dB
 between 100 and 250 % of the authorized bandwidth: at least 35 dB
 more than 250 % of the authorized bandwidth: see spurious emissions

The following table is showing the minimal margin to the required attenuations:

Frequency range of equipment		KR4		CH		CH	
input modulation	DC supply voltage/V	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]
1 kHz 92 dBμV	2.2	> 5	> 10				
	3.0	> 5	> 10				
15 kHz 92 dBμV	2.2	> 5	> 10				
	3.0	> 5	> 10				
20 kHz 92 dBμV	2.2	> 5	> 10				
	3.0	> 5	> 10				
1 kHz 50 mV	2.2	> 5	> 10				
	3.0	> 5	> 10				
10 kHz 50 mV	2.2	> 5	> 10				
	3.0	> 5	> 10				
20 kHz 50 mV	2.2	> 5	> 10				
	3.0	> 5	> 10				

Remarks: The limit is kept. The attenuation is related to the un-
 modulated carrier. For plot see page A2-A14.

EQUIPMENT UNDER TEST

Operation - mode of the EUT.:

The equipment under test was operated during the measurement under following conditions:

- ☐ - Standby
- ☐ - Testprogram (H - Pattern)
- ☐ - Testprogram (color bar)
- ☐ - Testprogram (customer specific)
- ☒ - Transmit (unmodulated for radiated measurements and frequency error)
- ☒ - Transmit (modulated for bandwidth under extreme conditions
measurements)
- ☐ -

Configuration of the equipment under test: see appendix

Following periphery devices and interface cables were connected during the measurement:

- | | |
|--|--------------------|
| ☐ - Hand Held Microphone | Type : D 880S, AKG |
| ☐ - | Type : |
| ☐ - | Type : |
| ☐ - | Type : |
| ☐ - | Type : |
| ☐ - | Type : |
| ☐ - | Type : |
| | |
| ☐ - unshielded power cable | |
| ☐ - unshielded cables | |
| ☐ - shielded cables | MPS.No.: |
| ☐ - customer specific cables | |
| ☒ - no cables | |
| ☐ - | |

S U M M A R Y

GENERAL REMARKS:

The product S040, version KR4 has been tested on the following frequency:
KR4 : 750.9 MHz

This channel was defined as the worst condition channel of all 3 versions:

US54 (710.4 MHz)
US58 (734.6 MHz)
KR4 (750.9 MHz)

FINAL JUDGEMENT:

The requirements according to the technical regulations and tested operation modes are

● - met.

o - **not** met.

The equipment under test

● - **Fulfills** the general approval requirements cited on page 3.

o - **Does not** fulfill the general approval requirements cited on page 3.

Date of receipt of test sample : accdg. to storage record

Testing Start Date : August 13, 2001

Testing End Date : August 31, 2001

- MIKES BABT PRODUCT SERVICE GmbH -



Günter Mikes
Dipl.-Ing.(FH)

Test-engineer



Nikolaus Fischer

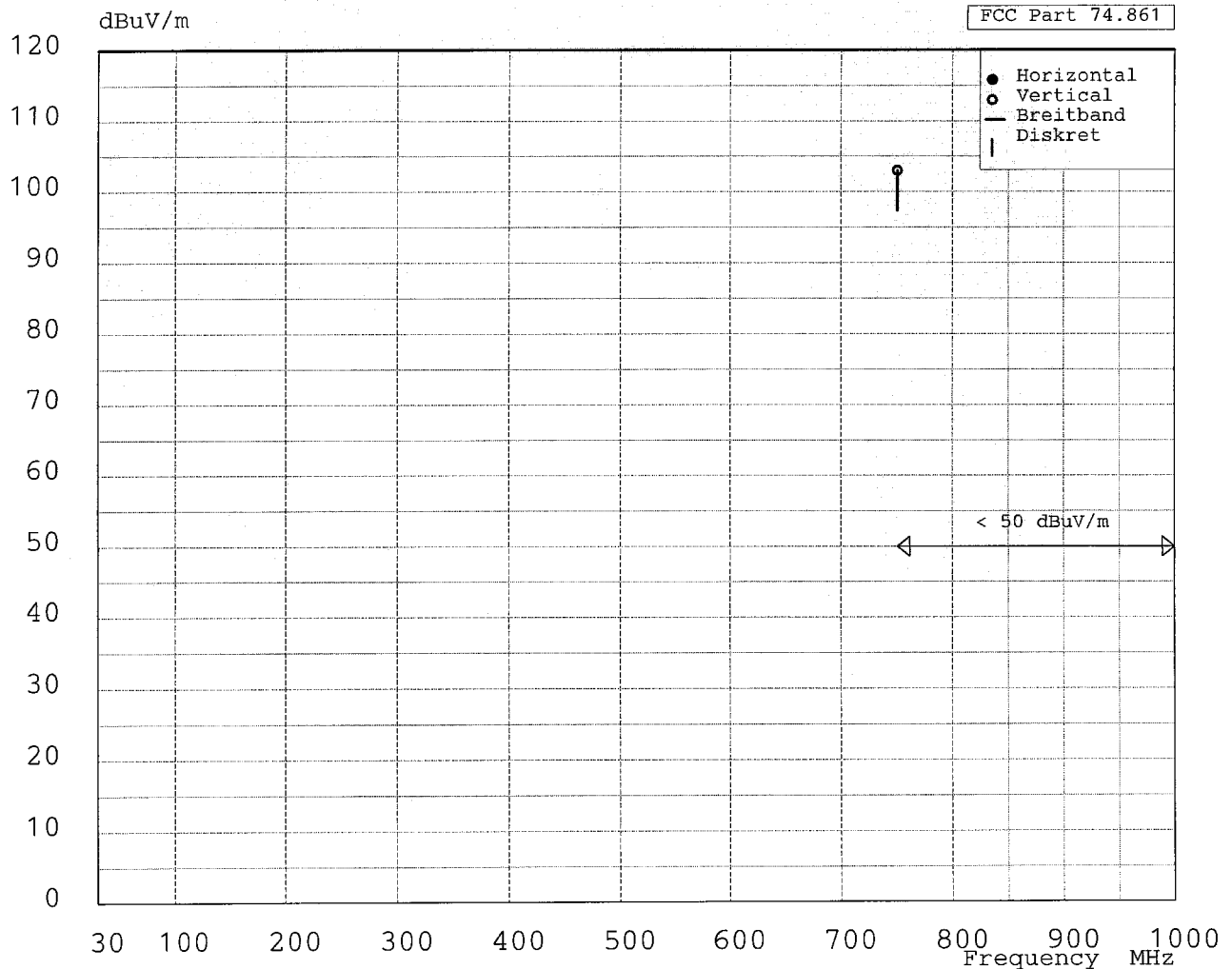
Radiation-Test

FCC ID: E9MSO40

accdg. 74.861

Typ: SO 40
Manufacturer: AKG
Client: AKG
Regulation: FCC Part 74.861
Order No.: T 20989-1-00
Operation Mode: TX-Mode
Remarks:

Testdistance: 3 m
Testreceiver: ESVP
Antenna: VULB
Testengineer: N.Fischer
Date: 10.9.2001



Radiation-Test

FCC ID: E9MSO40

accdg. 74.861

Typ: SO 40
Manufacturer: AKG
Client: AKG
Regulation: FCC Part 74.861
Order No.: T 20989-1-00
Operation Mode: TX-Mode
Remarks:

Testdistance: 3 m
Testreceiver: ESVP
Antenna: VULB
Testengineer: N.Fischer
Date: 10.9.2001

Result	Frequency [MHz]	Reading [dBuV/m]	Korr [dB]	Final [dBuV/m]	Limit [dBuV/m]	DLimit [dB]	Polarisation	Noise
	750.90	70.87	32.13	103.00	120.00	17.00	Vertical	Diskret

Calculation of the max. power based on the fieldstrength measured in a distance of 3m.

SO 40, Version KR4

Fieldstrength E (LOG) = 103.0 dBuV/m

Fieldstrength E (LIN) = 0.141 V/m

$$P = (E \times D)^2 / 49.5$$

$$P = (0.141 \text{ V/m} \times 3\text{m})^2 / 49.5 = 0.0036 \text{ W} = 3.6 \text{ mW}$$

Tue 2001 Aug 28 14:36

REF 0.0 dBm

MKR 750.9015 MHz

10dB/

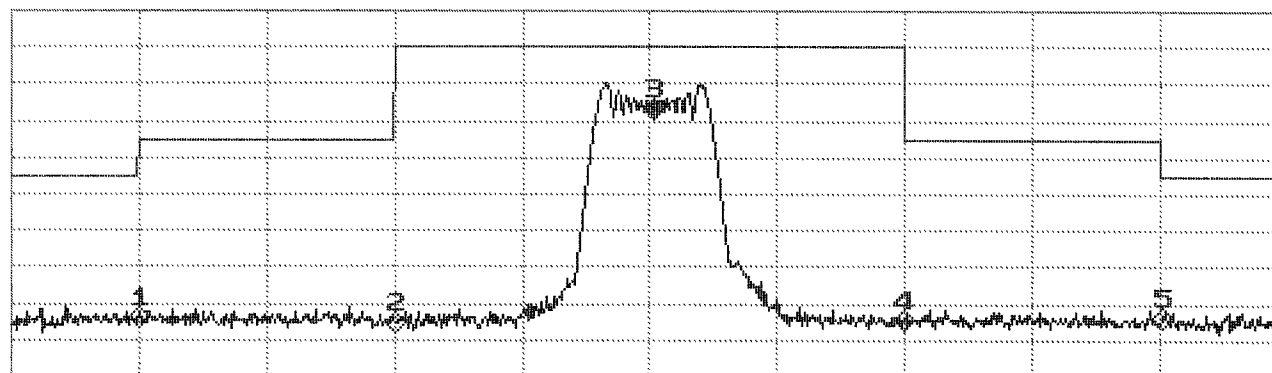
ALICE

Posi

B_B1ank

Norm

-26.65 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

VOW 1 KHZ

SHP 1.0 S

#ATT 10dB

Multi Marker List

1:	750.7000 MHz	-84.06 dBm
2:	750.8005 MHz	-85.08 dBm
3:	750.9015 MHz	-26.65 dBm
4:	751.0000 MHz	-84.60 dBm
5:	751.1010 MHz	-84.05 dBm
6:		
7:		
8:		
9:		
10:		
4:		

A3/A4

	TX	RX	TRX
■			
□			
□			
□			

☒ A ☐ R ☐ M ☐ Info

☐ PE
☐ CP
☐ CP
☐ MF
☐ AC
☒ MB
☐ SE
☐ SE
☐ FS
☐ DC

[illegible]

Tue 2001 Aug 28 14:46

REF 0.0 dBm

MKR 750.9005 MHz

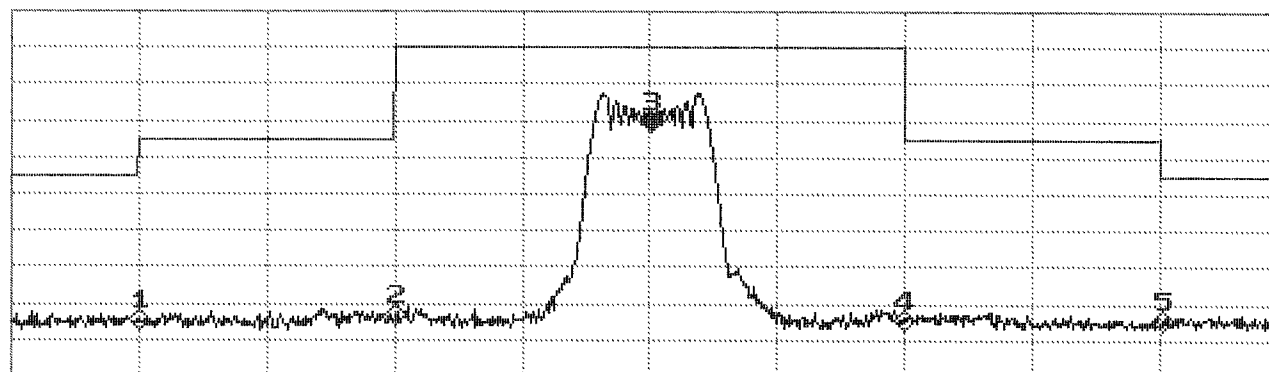
10dB/

View

Posi

Norm

-30.01 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

RECEIVED 1 KHZ

VBW 1 KHZ

SWP 1.0 S

#ATT 10dB

Multi Marker List

1:	750.7000 MHz	-84.28 dBm
2:	750.8005 MHz	-83.29 dBm
3:	750.9005 MHz	-30.01 dBm
4:	751.0000 MHz	-84.74 dBm
5:	751.1010 MHz	-84.59 dBm
6:		
7:		
8:		
9:		
10:		
4:		

Auftragsnr.: *T 20989*

Kunde: **AKG**

Gerät: WPS, SIMPOM

Modell: 5040

Ser.Nr.: 128-KR4

Norm: FCC, SUBPART 4

Unterpunkt: 74.867

Messung: OC, BANDWIDTH

Bemerkung: $+20^{\circ}\text{C} / 1.1 \text{ V } \mu\text{C}$

Air: 7kHz, 127.5 dBuV

[illegible]

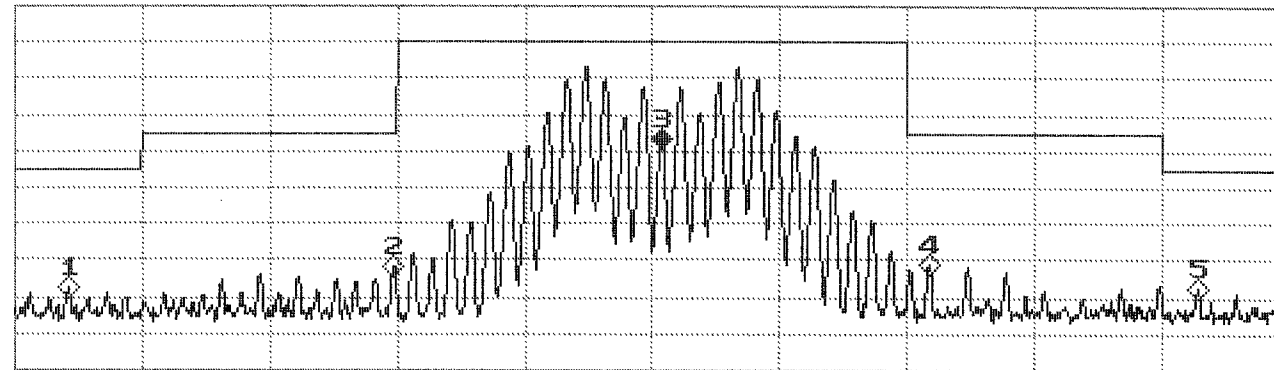
	TX	RX	TRX
□			
□			
□			
■			

☐ **A** ☐ **R** ☐ **M** ☐ **Info**

☐ FE
☐ CP
☐ CP
☐ MF
☐ AC
☒ MB
☐ SE
☐ SE
☐ FS
☐ DC
☐

A4/A14

REF 0.0 dBm MKR 750.9040 MHz
10dB/ A View Posi B Blank Norm -36.35 dBm



CENTER 750.9000 MHz SPAN 500.0 kHz
*RBW 1 kHz VBW 1 kHz SWP 1.0 s *ATT 10dB

Multi Marker List

1:	750.6710 MHz	-77.53 dBm
2:	750.7985 MHz	-71.52 dBm
3:	750.9040 MHz	-36.35 dBm
4:	751.0090 MHz	-71.28 dBm
5:	751.1135 MHz	-77.69 dBm
6:		
7:		
8:		
9:		
10:		
4:		

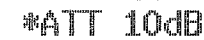
AS/A14

TX	RX	TRX
☒	☐	☐
☐	☐	☐

☒ A ☐ R ☐ M ☐ Info

☐ FE
☐ CPC
☐ CPR
☐ MFD
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC
☐ _____

-47.30 dBm



AG/A-14

☐ FE
☐ CPC
☐ CPR
☐ MFD
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC
☐ _____

[illegible]

Wed 2001 Aug 29 09:02

REF 0.0 dBm

10dB/

A View

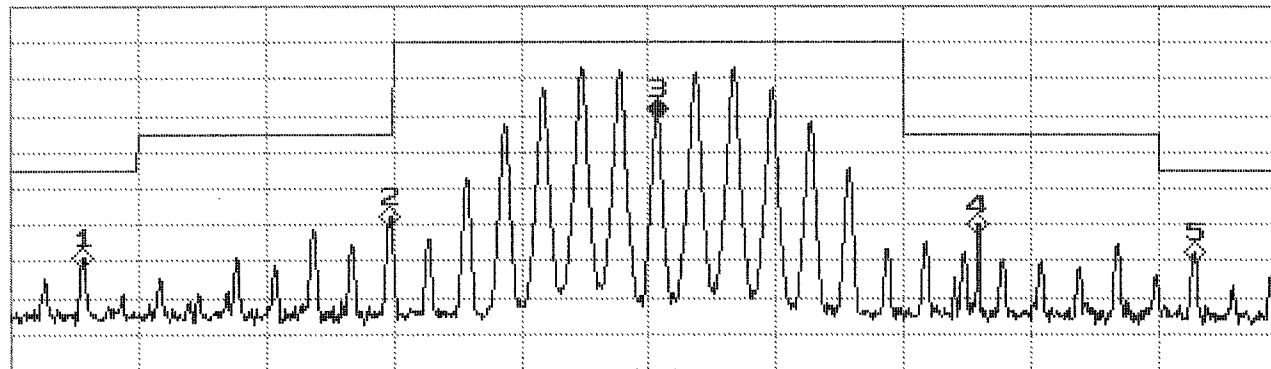
Posi

B_Blank

Norm

MKR 750.9035 MHz

-28.19 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

1. **RESEARCH DESIGN**

VHF 1 KHZ

SWP 1.0 S

#ATT 10dB

Multi Marker List

1:	750.6785 MHz	-68.91 dBm
2:	750.7985 MHz	-57.44 dBm
3:	750.9035 MHz	-28.19 dBm
4:	751.0290 MHz	-59.95 dBm
5:	751.1135 MHz	-67.46 dBm
6:		
7:		
8:		
9:		
10:		
4:		

Auftragsnr.: 7 20989

Kunde: **AKG**

Gerät: WMS, SNAP ON

Modell: 5040

Ser.Nr.: 118-KR4

Norm: *FCC, SUBPART H*

Unterpunkt: 74.867

Messung: OC, BANDWIDTH

Bemerkung: $+20^{\circ}\text{C}$ / 1.5 V DC

Air: 15 kHz, 117.5 dB μ V

[illegible]

□□□■
| ㄨ ㄨ ㄨ

☒ A ☐ R ☐ M ☐ Info

☐ FE
☐ CPC
☐ CPR
☐ MFD
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC
☐ _____

A7/1474

Wed 2001 Aug 29 09:10

REF 0.0 dBm

MKR 750.9025 MHz

10dB/

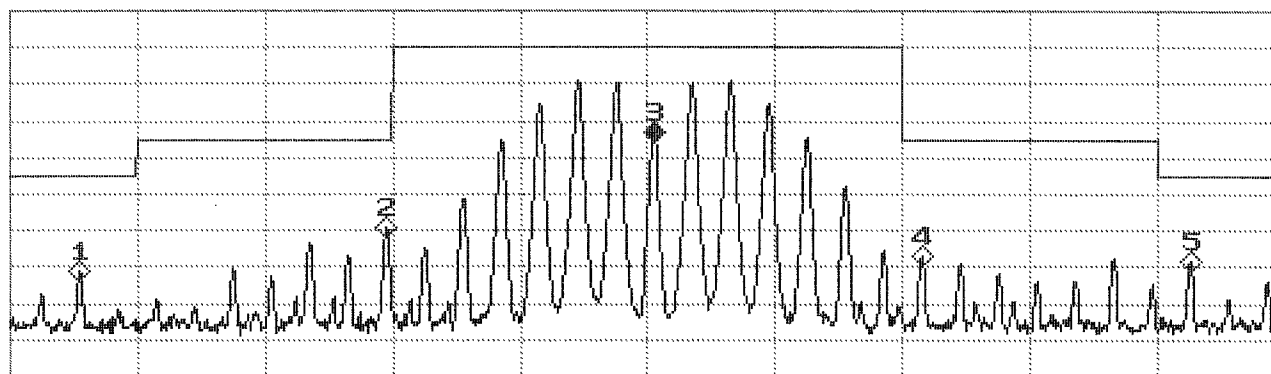
Advice

Pos i

Blank

Norm

-32.77 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

REF 1 kHz

VBW 1 kHz

SWP 1.0 s

*ATT 10dB

Multi Marker List

1:	750.6775 MHz	-71.31 dBm
2:	750.7975 MHz	-59.46 dBm
3:	750.9025 MHz	-32.77 dBm
4:	751.0075 MHz	-67.02 dBm
5:	751.1125 MHz	-68.63 dBm
6:		
7:		
8:		
9:		
10:		
4:		

[illegible]

A8/A74

TX
RX
TRX

☐ A
☐ R
☐ M
☐ Info

☐ FE
☐ CPC
☐ CPR
☐ MFD
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC

Wed 2001 Aug 29 11:10

REF 0.0 dBm

MKR 750.9035 MHz

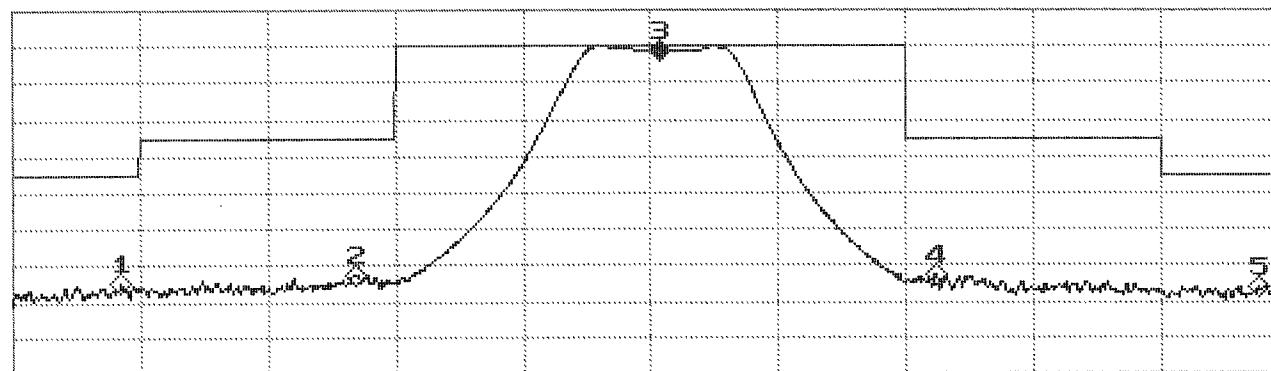
10dB/

View

Pos: 11

Norm

-11.24 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

#RBW 10 kHz

VIEW 10 kHz

SWP 20 ms

#ATT 10dB

Multi Marker List

1:	750.6925 MHz	-74.86 dBm
2:	750.7840 MHz	-72.36 dBm
3:	750.9035 MHz	-11.24 dBm
4:	751.0115 MHz	-72.40 dBm
5:	751.1375 MHz	-76.11 dBm
6:		
7:		
8:		
9:		
10:		
4:		

Auftragsnr.: T 20 989

Kunde: **AGG**

Gerät: *WHS, SNAP ON*

Modell: 5040

Ser.Nr.: 118-KR4

Norm: FCC, SUBPAA

Unterpunkt: 74.861

Messung: *EM*

Bemerkung: $+20^{\circ}\text{C} / 1.5\text{V DC}$

$A_{VL} : 1200 \text{ mV} / 1 \text{ kHz}$

[illegible]

TX
RX
TRX

☐ A _____
☐ R _____
☐ M _____
☐ Info _____
☐ _____

☐ FE
☐ CPC
☐ CPR
☐ MED
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC
☐ _____

A9/A74

Wed 2001 Aug 29 11:21

REF 0.0 dBm

10dB✓

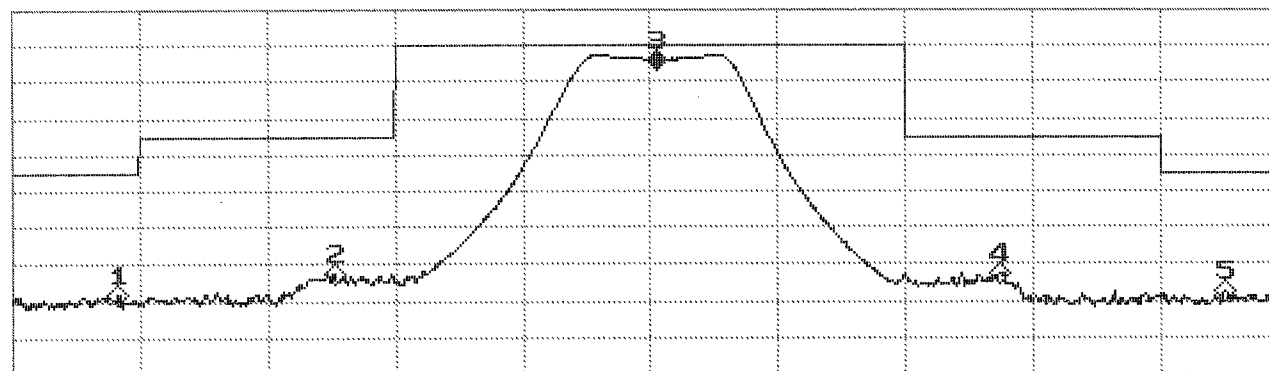
View

Posi

Norm

MKR 750.9030 MHz

-13.80 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

日期 10月22

VBW 10 kHz

SWP 20 ms

ATT 1008

Multi Marker List

1:	750.6915 MHz	-78.30 dBm
2:	750.7760 MHz	-72.56 dBm
3:	750.9030 MHz	-13.80 dBm
4:	751.0365 MHz	-72.45 dBm
5:	751.1250 MHz	-77.20 dBm
6:		
7:		
8:		
9:		
10:		
4:		

Auftragsnr.: T 20 989

Kunde: **AKG**

Gerät: WTS, SNAP ON

Modell: 5040

Ser.Nr.: 118-KR4

Norm: FCL, SUBPART H

Unterpunkt: 74.861

Messung: *EM*

Bemerkung: $+20^{\circ}\text{C} / 1.1 \text{ V DC}$

A12: 1200 mV / 1 kHz

[illegible]

A10/1714

TX
RX
TRX

☒ A ☐ R ☐ M ☐ Info

☐ FE
☐ CPC
☐ CPR
☐ MFD
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC
☐ _____

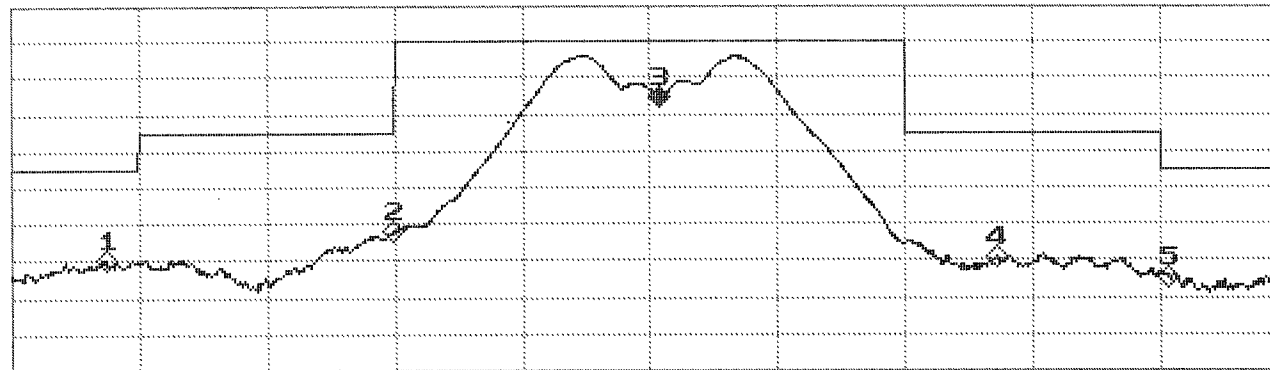
Wed 2001 Aug 29 13:04

REF 0.0 dBm

MKR 750.9035 MHz

10dB/	A_View	Posi	B_Blank	Norm
-------	--------	------	---------	------

-25.03 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

RES BW 10 kHz

VBW 10 kHz

SWP 20 ms

*ATT 10dB

Multi Marker List

1:	750.6870 MHz	-69.88 dBm
2:	750.7995 MHz	-62.31 dBm
3:	750.9035 MHz	-25.03 dBm
4:	751.0355 MHz	-69.27 dBm
5:	751.1025 MHz	-74.40 dBm
6:		
7:		
8:		
9:		
10:		
4:		

Auftragsnr.: **T 20989**

Kunde: **AKG**

Gerät: Wies, SNAP ON

Modell: SO 40

Ser.Nr.: 128-KR4

Norm: FCC, SUBPART H

Unterpunkt: 74.861

Messung: EMISSION MASK

Bemerkung: $+20^{\circ}\text{C} / 1.5\text{VDC}$

Att: 1200 mV, 7.5 KHz

[illegible]

TX
RX
TRX

☐ A
☐ R
☐ M
☐ Info

☐ FE
☐ CPC
☐ CPR
☐ MFD
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC

Am/4-14

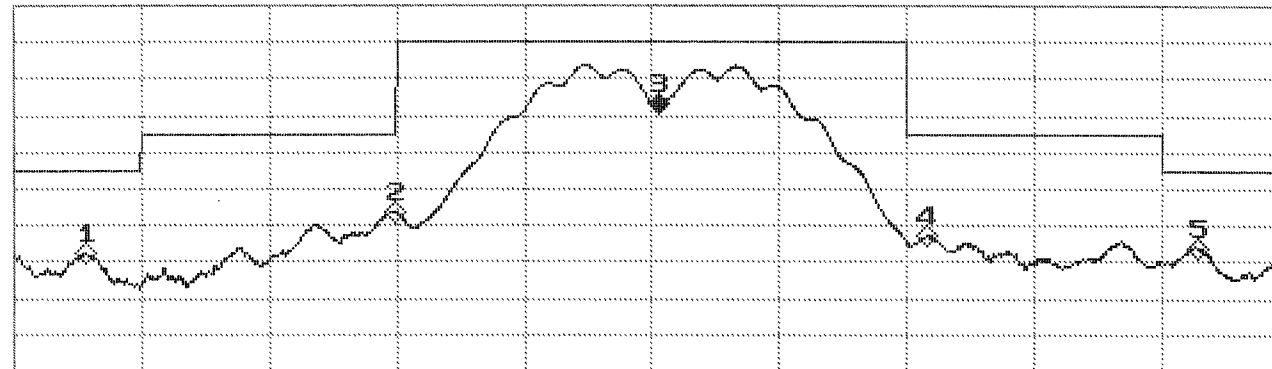
Wed 2001 Aug 29 13:19

REF 0.0 dBm

MKR 750.9030 MHz

10dB/	A_View	Posi	B_Blank	Norm
-------	--------	------	---------	------

-26.51 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

```
*RBW 10 kHz    VBW 10 kHz    SWP 20 ms    *ATT 10dB
```

Multi Marker List

1:	750.6785 MHz	-67.63 dBm
2:	750.7995 MHz	-56.69 dBm
3:	750.9030 MHz	-26.51 dBm
4:	751.0080 MHz	-63.02 dBm
5:	751.1140 MHz	-66.31 dBm
6:		
7:		
8:		
9:		
10:		
4:		

Auftragsnr.: **T 20989**

Kunde: **AK6**

Gerät: *WRES, SNAP ON*

Modell: 5040

Ser.Nr.: 218-KR4

Norm: FCC, SUBPART H

Unterpunkt: 74.861

Messung: *EMISSION MASK*

Bemerkung: $+20^{\circ}\text{C} / -1.5\text{V DC}$

AIL: 1200 mV, 75 kHz

[illegible]

A13/A14

TX	RX	TRX
☒	☐	☐
☐	☐	☐

☒ A ☐ R ☐ M ☐ Info

☐ FE
☐ CPC
☐ CPR
☐ MFD
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC
☐ _____

Wed 2001 Aug 29 13:26

REF 0.0 dBm

MKR 750.9025 MHz

10dB/

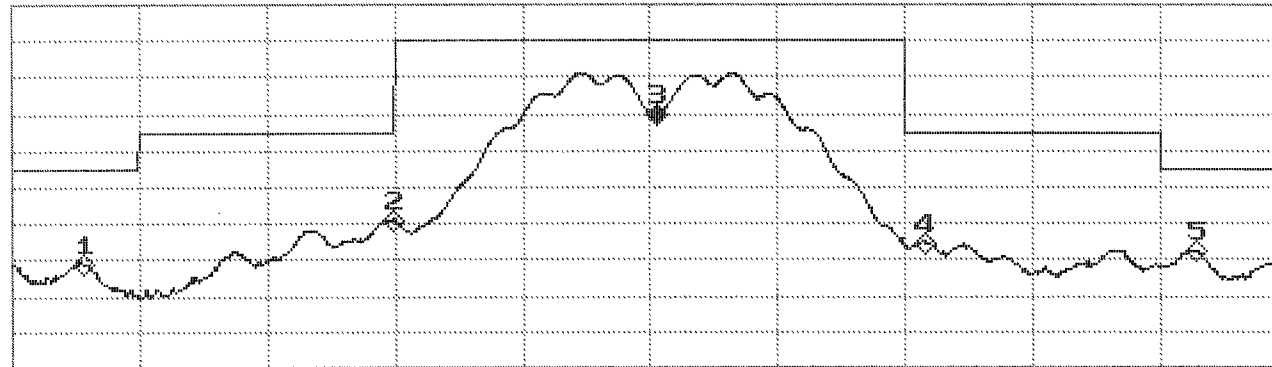
View

Posi

B_B1ank

Norm

-30.16 dBm



CENTER 750.9000 MHz

SPAN 500.0 kHz

*RBW 10 kHz

VBW 10 kHz

SWP 20 ms

#ATT 10dB

Multi Marker List

1:	750.6785 MHz	-70.91 dBm
2:	750.7995 MHz	-59.03 dBm
3:	750.9025 MHz	-30.16 dBm
4:	751.0080 MHz	-65.15 dBm
5:	751.1140 MHz	-67.72 dBm
6:		
7:		
8:		
9:		
10:		
4:		

Auftragsnr.: T 20 989

Kunde: **AKG**

Gerät: WRS, SNAP ON

Modell: 5040

Ser.Nr.: 218-KR4

Norm: FCC, SUBPART H

Unterpunkt: 74.867

Messung: 5/7

Bemerkung: $+20^{\circ}\text{C} / 1.4\text{V DC}$

A/L: 1200 mV / 15 kHz

[illegible]

TX	RX	TRX
☒	☐	☐

☐ A
☐ R
☐ M
☐ Info

☐ FE
☐ CPC
☐ CPR
☐ MFD
☐ ACP
☒ MB
☐ SEC
☐ SER
☐ FS
☐ DC
☐ _____

A74/A74

Attachment : B

List of Test Equipment

FCC ID: E9MSO40

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test Report No: T 20989-1-00 NF

Beginning of Testing: 13-August-2001

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.
CPR2	HCC	Controller Ant.-Mast	Rohde & Schwarz München	04-07/59-97-001
	RG 214 U	Antenna cable 2 m	Huber+Suhner	04-07/60-89-463
	HF 7/8 inch	Antenna cable 13 m	Huber+Suhner	04-07/60-99-001
	HF 7/8 inch	Antenna cable 20 m	Huber+Suhner	04-07/60-99-002
	HF 7/8 inch	Antenna cable 40 m	Huber+Suhner	04-07/60-99-003
	KR - 200	Coax Antenna Switch	Rosenberger HF-Technik	04-07/60-99-004
	VULB - 9165	Super-Broadband-Anten	Schwarzbeck G.	04-07/62-00-001
	ESVP	Test Receiver	Rohde & Schwarz München	04-07/63-89-008
	ESVP-EZM	Spectrum Monitor	Rohde & Schwarz München	04-07/74-86-016
	Antennenmast	Antenna mast	Rohde & Schwarz München	04-07/92-97-001
EM	LMV-1817	Noise meter	Leader	04-07/31-86-025
	SINOISE-1	Sinusgenerator	Fischer Metallbau	04-07/48-95-277
	CCIR-559	Filter	Ing.-Büro Rohrbacher	04-07/60-96-364
	UHF	Telescopic Rod Antenna	Conrad Elektronik GmbH	04-07/62-01-008
	UHF	Telescopic Rod Antenna	Conrad Elektronik GmbH	04-07/62-01-009
	CMS-54	Com. Receiver	Rohde & Schwarz München	04-07/63-94-052
	R 3162	Spectrum Analyzer	Advantest	04-07/74-00-001
FE	R 3162	Spectrum Analyzer	Advantest	04-07/74-00-001
	VLK 04/300	Climatic chamber	Heraeus -Vötsch GmbH	04-10/90-89-001
MLD	LMV-1817	Noise meter	Leader	04-07/31-86-025
	SINOISE-1	Sinusgenerator	Fischer Metallbau	04-07/48-95-277
	CCIR-559	Filter	Ing.-Büro Rohrbacher	04-07/60-96-364
	UHF	Telescopic Rod Antenna	Conrad Elektronik GmbH	04-07/62-01-008
	UHF	Telescopic Rod Antenna	Conrad Elektronik GmbH	04-07/62-01-009
	CMS-54	Com. Receiver	Rohde & Schwarz München	04-07/63-94-052
	R 3162	Spectrum Analyzer	Advantest	04-07/74-00-001
SER2	HCC	Controller Ant.-Mast	Rohde & Schwarz München	04-07/59-97-001
	RG 214 U	Antenna cable 2 m	Huber+Suhner	04-07/60-89-463
	HF 7/8 inch	Antenna cable 13 m	Huber+Suhner	04-07/60-99-001
	HF 7/8 inch	Antenna cable 20 m	Huber+Suhner	04-07/60-99-002
	HF 7/8 inch	Antenna cable 40 m	Huber+Suhner	04-07/60-99-003

Test Report No: T 20989-1-00 NF

Beginning of Testing: 13-August-2001

FCC ID: E9MSO40

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.
SER2	KR - 200	Coax Antenna Switch	Rosenberger HF-Technik	04-07/60-99-004
	VULB - 9165	Super-Broadband-Anten	Schwarzbeck G.	04-07/62-00-001
	ESVP	Test Receiver	Rohde & Schwarz München	04-07/63-89-008
	ESVP-EZM	Spectrum Monitor	Rohde & Schwarz München	04-07/74-86-016
	Antennenmast	Antenna mast	Rohde & Schwarz München	04-07/92-97-001
SER3	Sucoflex 104, SMA	RF-cable 2 m	Huber+Suhner	04-07/60-97-485
	Sucoflex 104, N	RF-cable 3 m	Huber+Suhner	04-07/60-97-492
	Model 3115	Hornantenna	EMCO Elektronik GmbH	04-07/62-96-458
	AWT-4534	Microwave-Amplifier	TransTech Hochfrequenztechn	04-07/66-90-217
	AMF-4B-040130-25P	Microwave-Amplifier	TransTech Hochfrequenztechn	04-07/66-97-001
	FSEM 30	Spectrum Analyser	Rohde & Schwarz München	04-07/74-97-001

CONSTRUCTIONAL DATAFORM FOR TESTING OF RADIO EQUIPMENT

Licence holder:	AKG Acoustics, U.S.		
Address:	914 Airpark Center Dr., Nashville, TN 37217, U.S.A.		
Manufacturer:	Vtech Communications Ltd		
Address:	Vtech Science Park, Xia Ling Bei Management Zone, Liabou, Dongguan Guangdong 523411		
Type:	SO40		
Model:			
Serial-No.:		Protection class:	

Additional informations to the above named model:

Antenna: transmitter:	Type: dipole		
	Length/size: consists of SO40 and plugged in microphone		
	Type:		
	Length/size:		
Power supply of the transmitter: Type:	1 AAA Cell or NiCd	nominal voltage:	1.5 V
		lowest voltage:	1.05 V
		highest voltage:	1.6 V
		current consumption	~75mA@1.2V
Power supply of the receiver: Type:		nominal voltage:	V
		current consumption	A

Ancillary equipment:

Description:	Microphone to plug on	Type:	e.g. D880	Serial-no.:	
Description:		Type:		Serial-no.:	
Description:		Type:		Serial-no.:	

Extreme temperature range in which the approval test should be performed:

O Category I: General (-20°C to +55°C)

X Category II: Portable (-10°C to +55°C)

O Category III: Equipment for normal indoor use (0°C to +55°C)

Connectable cables:

Name of the cable	Digital	Length/m	shielded
	O yes O no		O yes O no
	O yes O no		O yes O no
	O yes O no		O yes O no
	O yes O no		O yes O no
	O yes O no		O yes O no

O If applicable, if necessary complete overleaf**Page D1**

Applicant: _____ AKG _____ Model-name: _____ SO40 _____

Type designation:
SO40**Name and type designation of individual units comprising the radio equipment:****Type of equipment:**

- | | | | |
|---|--|---|-------------------------------|
| ☐ Radiotelephone equipment | ☐ Remote-control equipment | ☐ Radiomaritime equipment | ☐ LPD |
| ☐ One-way radiotelephone equipment | ☐ Inductive loop system | ☐ Inland waterways equipment | ☐ RLAN |
| ☐ Personal paging system | ☐ Radio-relay system | ☐ Radionavigation equipm. | X wireless microphone |
| ☐ Satellite earth station | ☐ CB radiotelephone equipment | ☐ Antenna | ☐ |
| ☐ Data transmission equipment | ☐ Movement detector | ☐ Aeronautical equipment | ☐ |

Technical characteristics:

	Transmitter-receiver	Transmitter	Receiver
Frequency range		710.4..750.9MHz FCC (710.4..864.375 Europe)	
Maximum no. of channels			
Channel spacing		200k	
Class of emission (type of modulation)		200KF3E	
Maximum RF output power			
Maximum effective radiated power (ERP)		4mW+-3dB	
Output power variable		no	
Channel switching frequency range		1 channel	
Method of frequency generation	☐ Synthesizer X Crystal ☐ Other		
Frequency generation TX	Crystal/ multiplier		
Frequency generation RX			
IF	1st IF	2nd IF	3rd IF
Integral selective calling	no		
Audio-frequency interface level at external data socket	1.2Vrms for 60% of maximum deviation at 1kHz; impedance 220kOhm audio bandwidth 50Hz-15kHz		
Modes of operation	☐ Duplex mode ☐ Semi-duplex mode X Simplex mode		
Power source	☐ Mains ☐ Vehicle-regulated x Integral		
Antenna socket	☐ BNC ☐ TNC ☐ N ☐ M ☐ UHF ☐ Adapter X None ☐		

Test specifications:**FCC Part 74, Part 90.265****O If applicable, if necessary complete overleaf****Page D 2**

FCC ID: E9MSO40

Declarations:

- We declare that the above information are correct and the named model was supplied with the maximum configuration to the accredited test laboratory.

Nashville, 13.9.01
place of issue, date

Tracy Cranston
Seal and signature of applicant

issued: Peter Tiefenthaler
Vice President, Market Development
AKG Acoustics, U.S.