Deutscher Akkreditierungs Rat DAR

TTI - P-G 009 / 98-00
TTI - P-G 089 / 94-50

E M I S S I O N -- T E S T R E P O R T

Testreport file no. : **T18173-1-10KG** Date of issue : March 20, 2000

Model : Amplifier **RI-16BTY**

Type : TOYOTA Electronic key System **TMEL-1**

Applicant : TPS Japan Ltd.

Manufacturer : Toyota Motor Corporation

Licence holder : Toyota Motor Corporation

Address : 1, Toyota-cho, Toyota

Aichi, 471-8572 Japan

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

This testreport with appendix consists of 27 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.

MIKES BABT PRODUCT SERVICE GmbH Ohmstrasse 2-4 94342 Strasskirchen Tel:+9424-9407-0 Fax:+9424-9407-60 Rev.No. 8.5

D I R E C T O R Y

FCC ID: NI4RI-16BTY

T E S T R E G U L A T I O N S

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

■ - Part 15 Subpart C (15.209)

ADDRESS OF THE TEST LABORATORY

■ - **MIKES 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 : vehicle battery DC 12.0V

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 ±4dB. 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 Amplifier RI-16BTY is part of the vehicle security system TMEL-1 of Toyota Motor Corporation.

Number of received/tested samples: 2/2

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 it’s 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 Amplifier is designed for the operation on the fixed transmitter frequency of approx. 134.2 kHz.
To find out the worst case conditions for the complete measurement the following tests have been performed:

- Measurement of the radiated fieldstrength of the operating frequency measured in permanent operation mode in the specified channel. This measurement have been performed in order to find out the maximum transmitted fieldstrength of the Amplifier.
- Measurement of the radiated spurious emissions measured in permanent operation mode in the specified channel. This measurement have been performed in order to find out the maximum spurious emissions of the Amplifier.

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

T E S T R E S U L T

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 D: _____

Description of Measurement

The final level, expressed in dBμV, 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 dBμV and μV, the following conversions apply:

dBμV = 20(log μV)
μV = Inverse log(dBμV/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 50Ω /50 μH (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 **O - MET** **O - NOT MET**

Min. limit margin _____ dB at _____MHz

Max. limit exceeding _____ dB at _____MHz

Remarks: EUT is connected to the DC power supply in the car. There are no requirements for conducted emissions on DC input port for car use.

SPURIOUS EMISSION

Spurious emissions from the EUT are measured in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The antenna was positioned 3, 10 or 30 meters horizontally from the EUT. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions.

Spurious emissions from the EUT are measured in the frequency range of 30 MHz 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 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

o **- Test not applicable**

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

For TEST EQUIPMENT USED please refer to ATTACHMENT D: SER1

Description of Measurement

The final level, expressed in dBµV/m, is arrived at by taking the reading from the EMI receiver (Level dBµV) 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 (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	Limit (dBµV/m)	=	Delta (dB)
1.705	5	+	20	=	25	30	=	5

Testresult in detail:

Frequency MHz	L: QP dBµV	L: AV dBµV	Correct.	L: QP dBµV/m	L: AV dBµV/m	Limit dBµV/m
0.269	23.7	19.3	+20.0	43.7	39.3	99.0
0.403	20.4	16.0	+20.0	42.4	36.0	95.6
0.537	15.3	10.4	+20.0	35.3	30.4	73.0

The requirements are ■ - MET o - NOT MET

Min. limit margin 42.6 dB at 0.537 MHz

Max. limit exceeding _____ dB at _____ MHz

Remarks: The limits are met.

SPURIOUS EMISSIONS (electric field) 30 MHz - 1000 MHz

o **- Test not applicable**

■ - Open-site 1
o - Open-site 2
■ - 3 meters
o - 10 meters
o - 30 meters

For TEST EQUIPMENT USED please refer to ATTACHMENT D: SER2

Description of Measurement

The final level, expressed in dBµV/m, is arrived by taking the reading from the EMI receiver (Level dBµV) 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 (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	Limit (dBµV/m)	=	Delta (dB)
719	75	+	32.6	=	107.6	110	=	-2.4

Testresult in detail:

Frequency MHz	L: QP dBµV	L: AV dBµV	Correct.	L: QP dBµV/m	L: AV dBµV/m	Limit dBµV/m
39.7	8.6		18.5	27.2		40.0
39.9	11.3		18.3	29.6		40.0
40.1	9.0		18.3	27.3		40.0
40.2	10.0		18.2	28.2		40.0
40.4	9.3		18.1	27.4		40.0

Testresult

The requirements are ■ **- MET** **O - NOT MET**

Min. limit margin 10.3 dB at 39.9 MHz

Max. limit exceeding _____ dB at _____ MHz

Remarks: The limits are met.

SPURIOUS EMISSION 1 GHz - 18 GHz

■ **- Test not applicable**

Testlocation :
o - Open-site 1
o - Open-site 2
o - Anechoic chamber
o - Full compact chamber

o - 1 meters
o - 3 meters
o - 10 meters

For TEST EQUIPMENT USED please refer to ATTACHMENT D: _____

Description of Measurement

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

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 **0 - MET** **O - NOT MET**

Min. limit margin _____ dB at _____GHz

Max. limit exceeding _____ dB at _____GHz

Remarks: NOT APPLICABLE. Because of the used frequencies there are no requirements for radiated emissions.

H-FIELD STRENGTH OF THE FUNDAMENTAL WAVE (MAGNETIC FIELD)

o **- Test not applicable**

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

For TEST EQUIPMENT USED please refer to ATTACHMENT D: CPR1

Description of Measurement

The final level, expressed in dBµV/m, is arrived at by taking the reading from the EMI receiver (Level dBµV) 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 (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	Limit (dBµV/m)	=	Delta (dB)
1.705	5	+	20	=	25	30	=	5

Testresult in detail:

Frequency kHz	L: QP dBµV	L: AV dBµV	Correct.	L: QP dBµV/m	L: AV dBµV/m	Limit dBµV/m
134.2	56.9	53.9	+20.0	76.9	73.9	105.0

Testresult

The requirements are ■ **- MET** **0 - NOT MET**

Min. limit margin 28.1 dB at 0.1342 MHz

Max. limit exceeding _____ dB at _____ MHz

CONDUCTED POWER OF THE FUNDAMENTAL WAVE MEASURED ON THE ANTENNA TERMINALS

■ - **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
o - Climatic test chamber VLK

For TEST EQUIPMENT USED please refer to ATTACHMENT D: _____

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 **O - MET** **O - NOT MET**

Frequency range of equipment								
Tempera-ture/°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: NOT APPLICABLE

E Q U I P M E N T U N D E R T E S T

Operation - mode of the EUT.:

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

o - Standby

o - Testprogram (H - Pattern)

o - Testprogram (color bar)

o - Testprogram (customer specific)

■ - Transmit on the frequency 134.2 kHz: _____

\- _____

o - _____

o - _____

Configuration of the equipment under test:

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

o - _____ Type : _____

o - _____ Type : _____

o - _____ Type : _____

o - _____ Type : _____

o - _____ Type : _____

o - _____ Type : _____

■ - unshielded power cable

o - unshielded cables

o - shielded cables MPS.No.:

o - customer specific cables (wireless microphone)

o - _____

o - _____

SUMMARY

GENERAL REMARKS:

The measured Amplifier RI-16BTY operate on the frequency 134.2 kHz

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 : November 01, 1999

Testing End Date : November 03, 1999

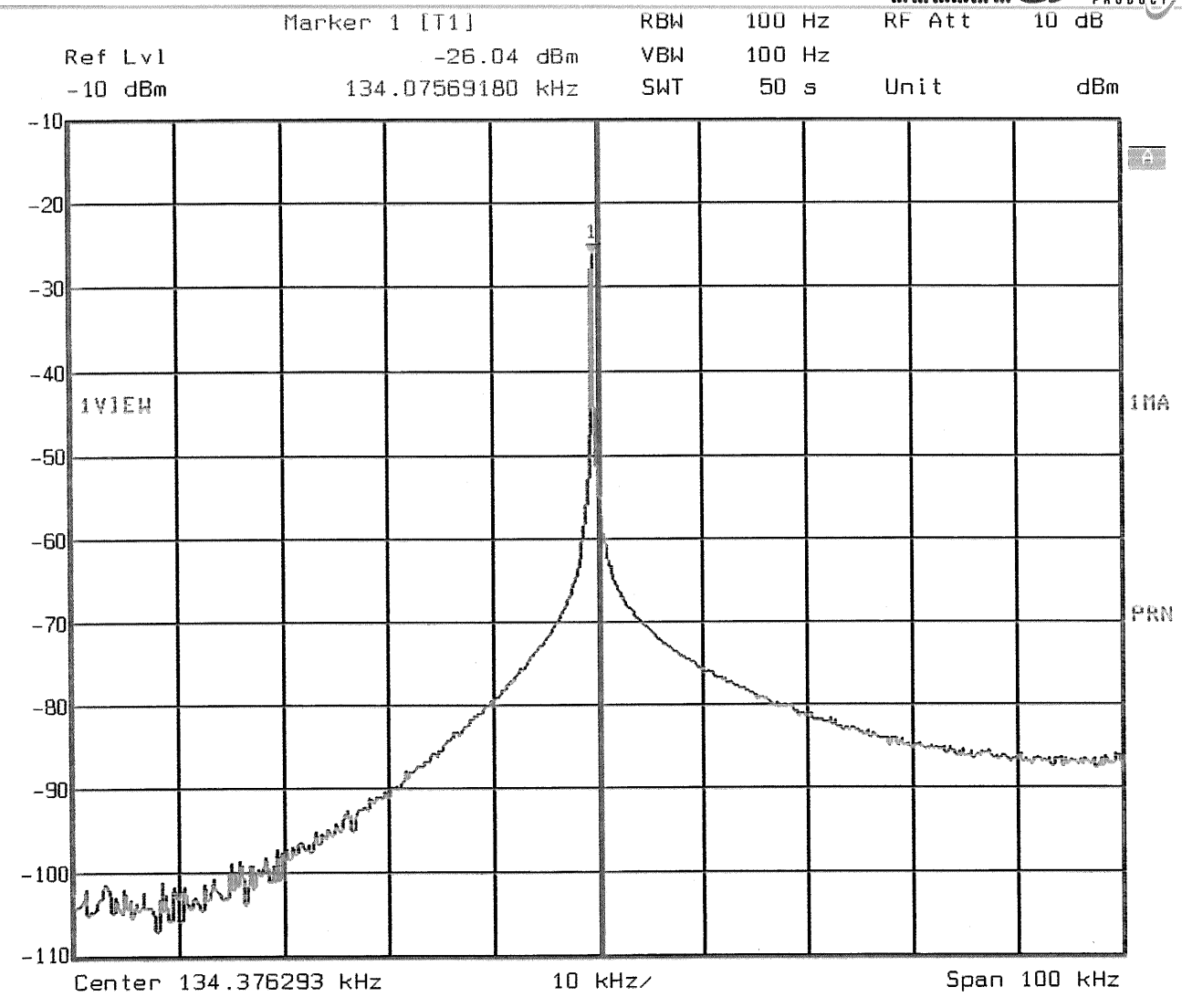
- MIKES BABT PRODUCT SERVICE GmbH -

i.V. Thomas Weise

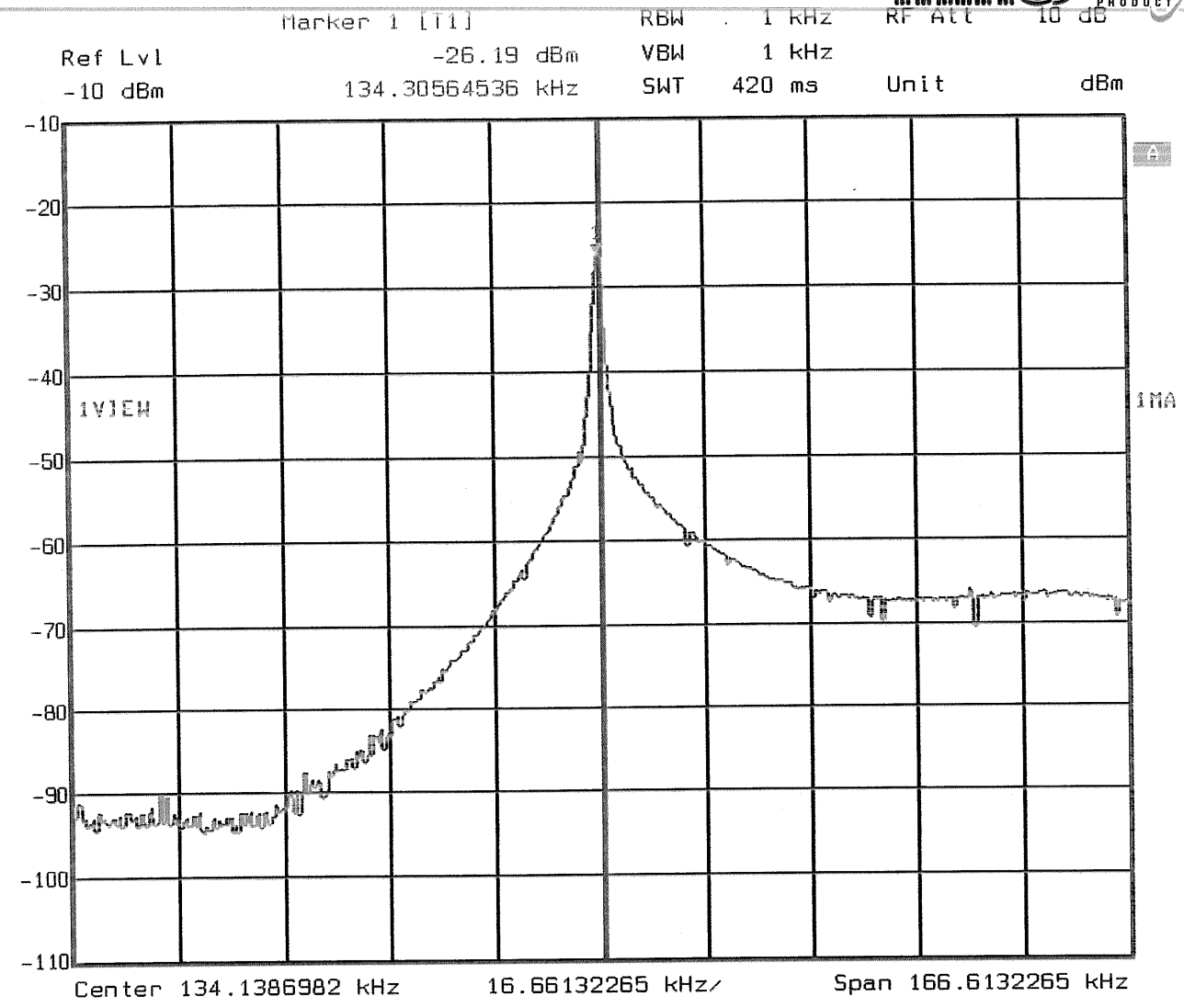
Günter Mikes
Dipl.-Ing.(FH)

Test-engineer

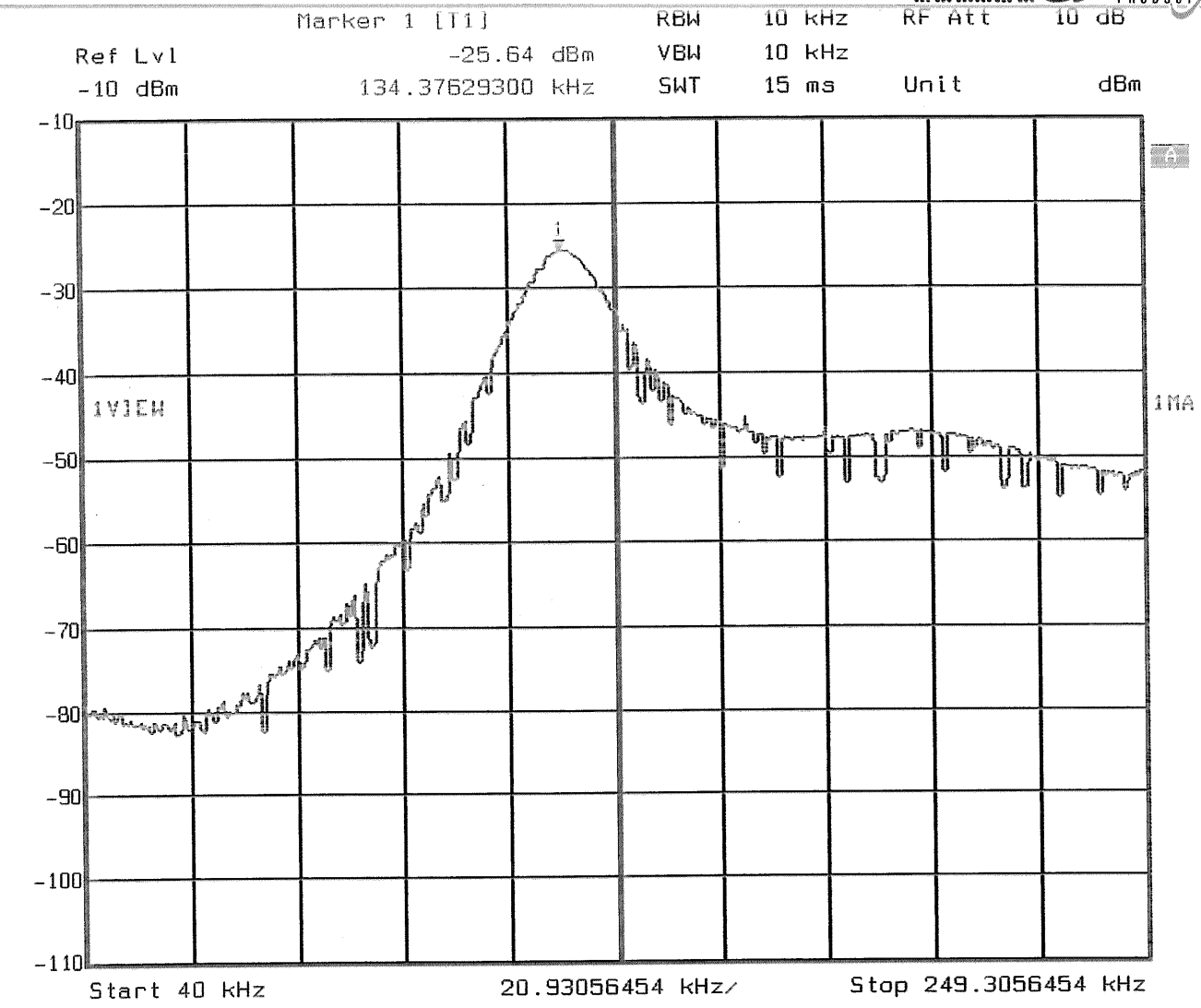
Klaus Gegenfurtner
Dipl. Ing.(FH)



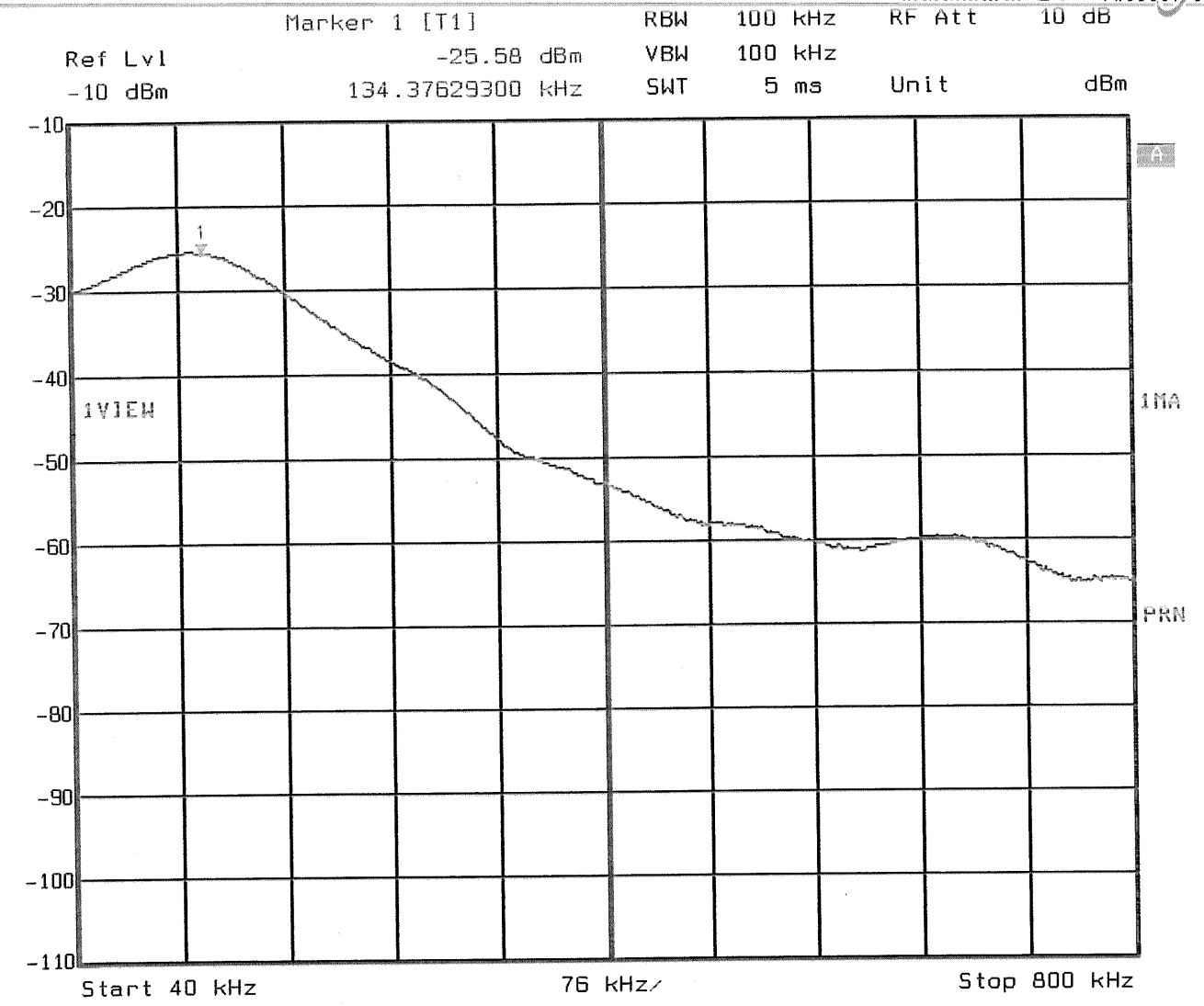
Date: 2.NOV.1999 16:20:36



Date: 2.NOV.1999 16:13:56



Date: 2.NOV.1999 16:17:54



Date: 2.NOV.1999 16:18:47

Attachment : B

List of Test Equipment

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

Test Report No: **T 18173-1-10 KG**

Beginning of Testing: 03-November-1999

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.
CPR1	FMZB 1516	Antenna	Schwarzbeck G.	04-07/62-90-018
	ESHS 30	Test Receiver	Rohde & Schwarz	04-07/63-92-045
MB	FMZB 1516	Antenna	Schwarzbeck G.	04-07/62-90-018
	FSEM 30	Spectrum Analyser	Rohde & Schwarz	04-07/74-97-001
SER1	FMZB 1516	Antenna	Schwarzbeck G.	04-07/62-90-018
	ESHS 30	Test Receiver	Rohde & Schwarz	04-07/63-92-045
SER2	BBA-9106	Antenna	Schwarzbeck G.	04-07/62-92-048
	UHALP-9108A	Antenna	Schwarzbeck G.	04-07/62-97-009
	ESVP	Test Receiver	Rohde & Schwarz	04-07/63-89-008