

## EMISSION -- TESTREPORT

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

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.

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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

- - Part 15 Subpart C (15.209)



**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  $\pm 3$  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 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:

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

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

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 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



FCC ID: NI4RI-16BTY

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

○ - 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**

- Test not applicable

- Open-site 1
- Open-site 2
- 3 meters
- 10 meters
- 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	Level	+	Factor	=	Level	Limit	=	Delta
(MHz)	(dBµV)		(dB)		(dBµV/m)	(dBµV/m)		(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  - 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 Spectrumalyzer 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** **0 - 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)**

- Test not applicable

- in a shielded room
- at a non - reflecting open-site  
and
- in a testdistance of 3 meters.
- 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	<input checked="" type="checkbox"/> - MET	<input type="checkbox"/> - NOT MET
Min. limit margin	<u>        28.1        </u> dB	at <u>    0.1342    </u> MHz
Max. limit exceeding	<u>                    </u> dB	at <u>                    </u> 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								
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: NOT APPLICABLE

\_\_\_\_\_

\_\_\_\_\_

**EQUIPMENT UNDER TEST**

**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.
- - **not** met.

The equipment under test

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

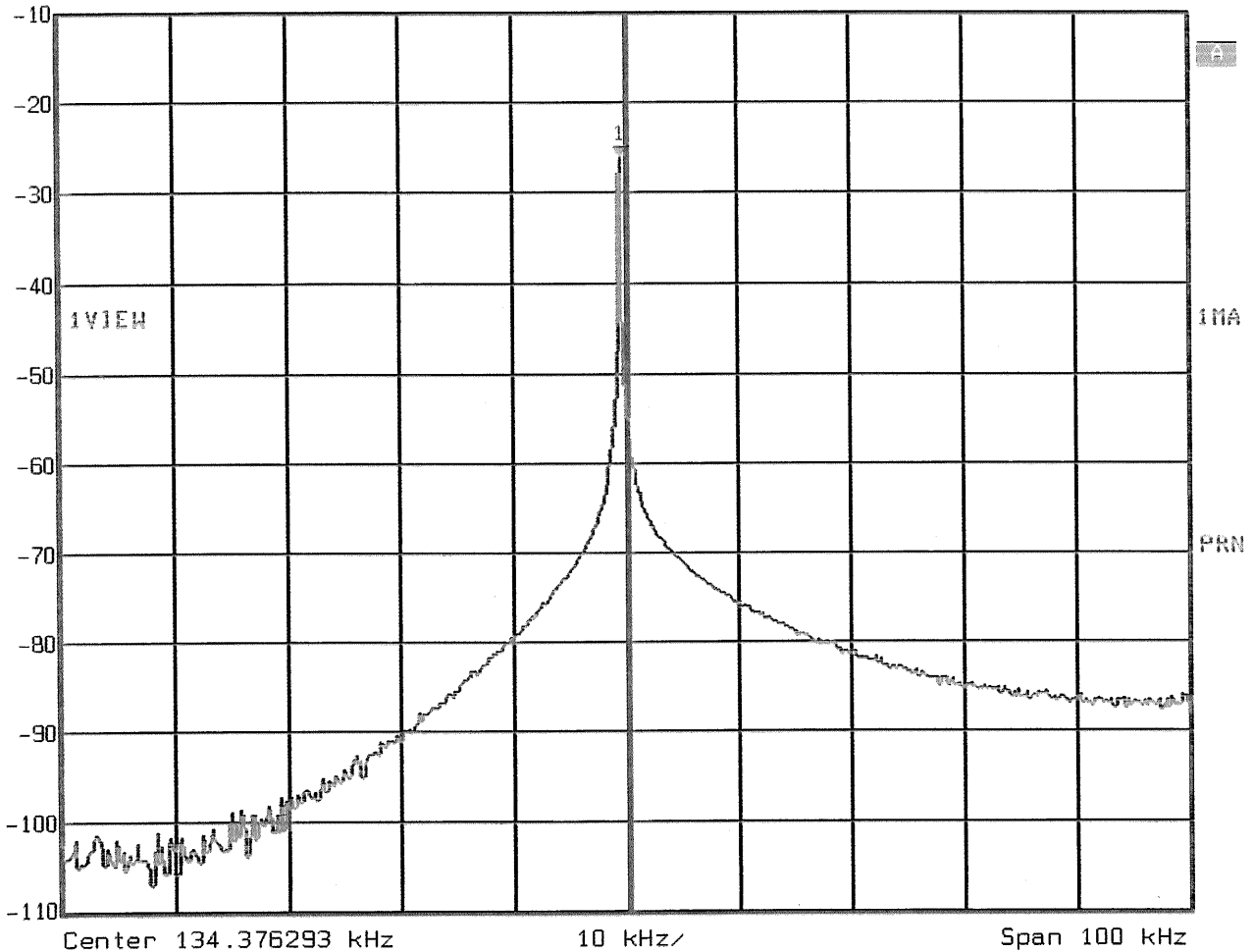
- MIKES BABT PRODUCT SERVICE GmbH -

Test-engineer

  
\_\_\_\_\_  
Günter Mikes  
Dipl.-Ing. (FH)

  
\_\_\_\_\_  
Klaus Gegenfurtner  
Dipl. Ing. (FH)

Marker 1 [T1]	RBW	100 Hz	RF Att	10 dB
Ref Lvl	-26.04 dBm	VBW	100 Hz	
-10 dBm	134.07569180 kHz	SWT	50 s	Unit dBm

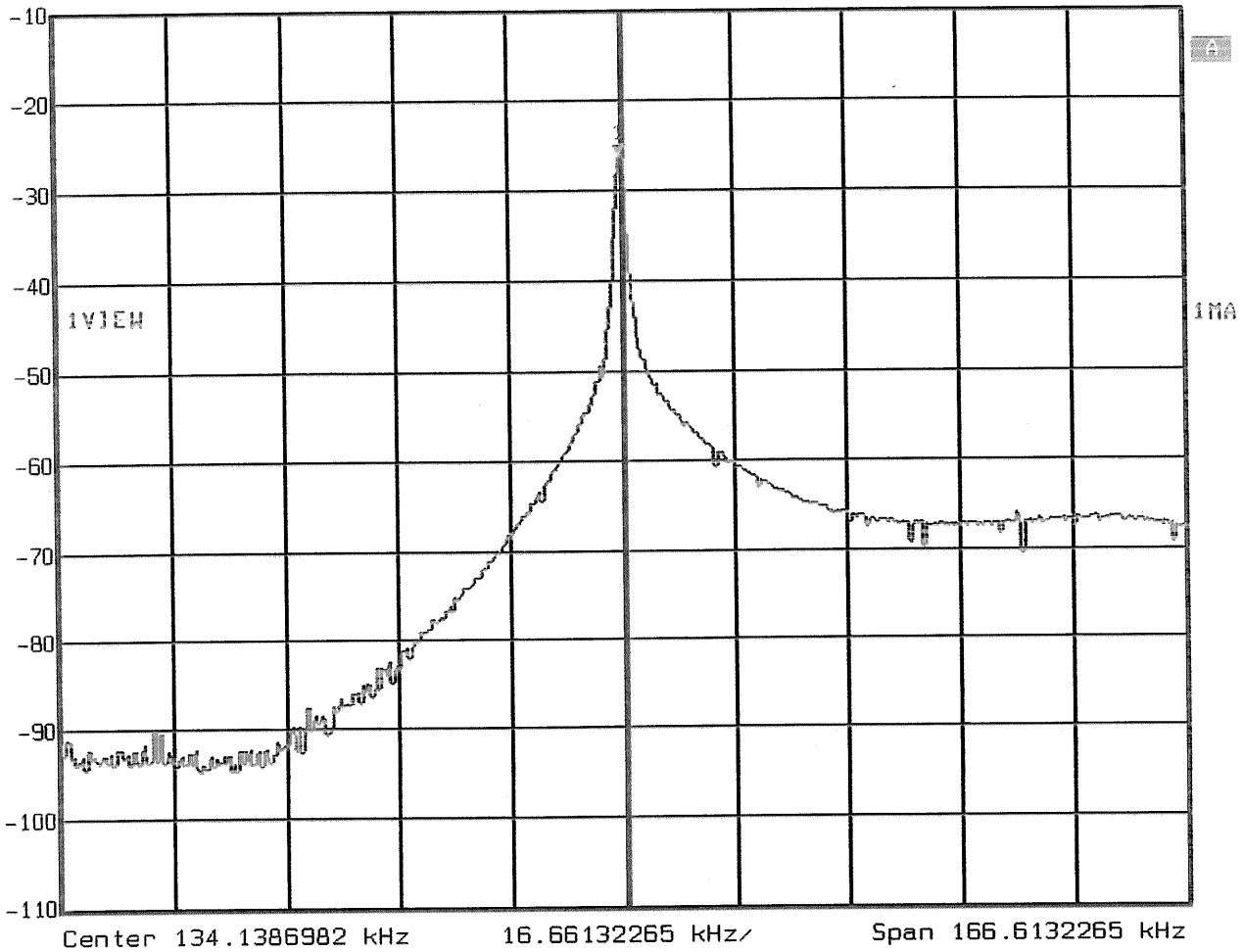


Date: 2.NOV.1999 16:20:36



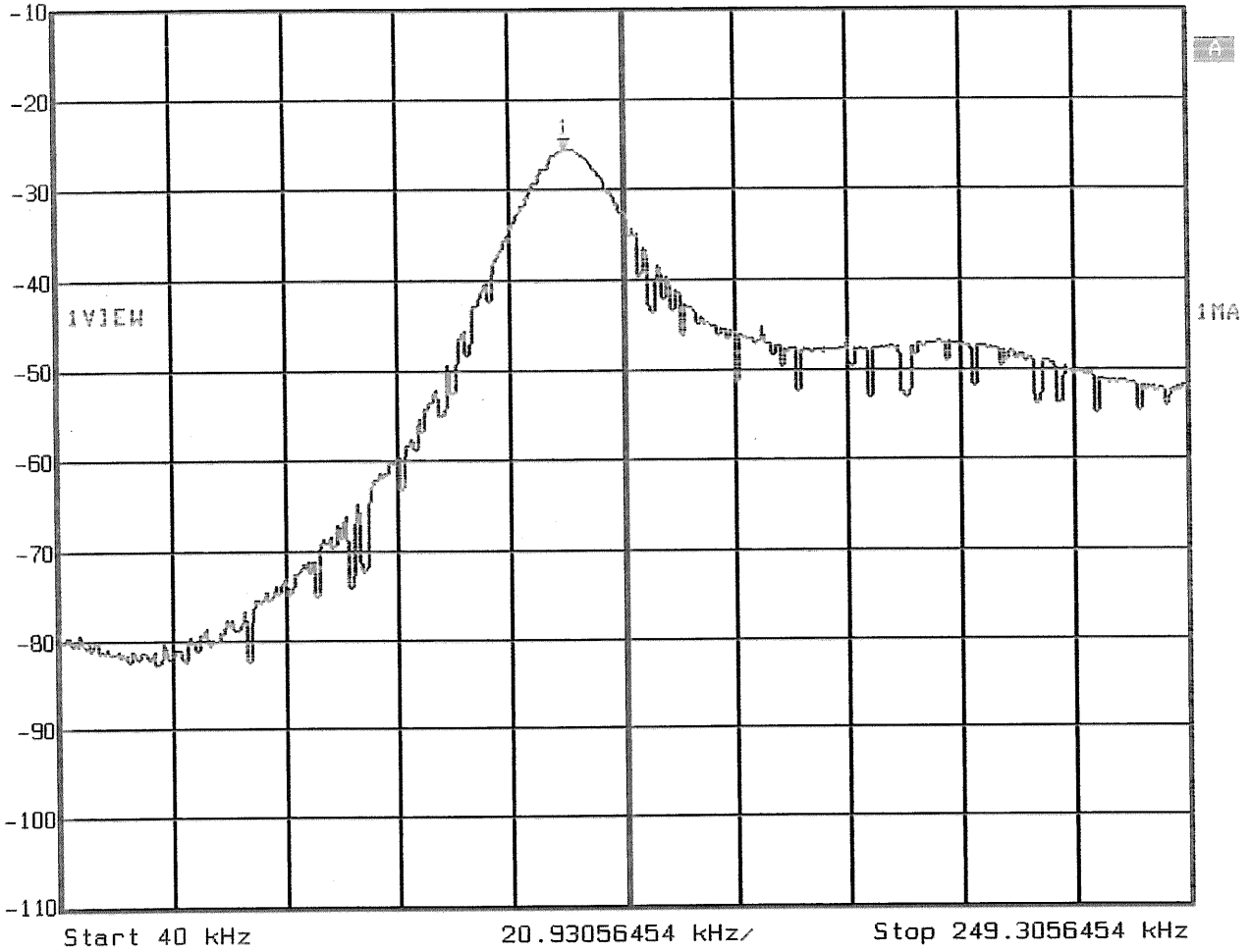
A wavelength ahead

Marker 1 [T1] RBW 1 kHz RF Att 10 dB  
Ref Lvl -26.19 dBm VBW 1 kHz  
-10 dBm 134.30564536 kHz SWT 420 ms Unit dBm



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

Marker 1 [T1]	RBW	10 kHz	RF Att	10 dB
Ref Lvl	-25.64 dBm	VBW	10 kHz	
-10 dBm	134.37629300 kHz	SWT	15 ms	Unit dBm



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



**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