

## EMISSION -- TEST REPORT

Test Report File No. : **T24751-00-09AA** Date of issue : June 16, 2004

Type Designation : TMLF-1

Kind of Product : Smart LF Oscillator System

Applicant : Toyota Motor Corporation

Manufacturer : Toyota Motor Corporation

Licence holder : Toyota Motor Corporation

Address : 1, Toyota Cho

Toyota Aichi, 471-8572 Japan

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

**Positive**

This test report with attachment consists of **41** pages.  
The test result only corresponds to the tested sample. It is not permitted to copy this report, in part or in full, without the permission of the test laboratory.

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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

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- |                                |                                      |             |
|--------------------------------|--------------------------------------|-------------|
| o - EN 55011 / 3.1991          | o - Group 1                          | o - Group 2 |
|                                | o - class A                          | 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) |                                      |             |
| o - Part 15 Subpart C (15.231) |                                      |             |



## **MEASUREMENT PROTOCOL FOR FCC, VCCI AND AUSTEL**

### **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 Uncertainty**

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of  $\pm 4.5$  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 test results.

## **DEFINITIONS FOR SYMBOLS USED IN THIS TEST REPORT**

- The black square indicates that the listed condition, standard or equipment is applicable for this report.
- Blank box indicates that the listed condition, standard or equipment was not applicable for this report.

**DISCOVERY OF WORST CASE MEASUREMENT CONDITION:**

The TMLF-1 is designed for the operation on the fixed transmitter frequency of 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 on the specified frequency. This measurement have been performed in order to find out the maximum transmitted fieldstrength of the different antennas.
- 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 antennas.

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

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

|                                |
|--------------------------------|
| <p>■ - Test not applicable</p> |
|--------------------------------|

**Test location :**

- ☐ - 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

For test instruments and test accessories used please see attachment B A4

**Description of Measurement**

The final level, expressed in dB $\mu$ 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 $\mu$ V and  $\mu$ 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 quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 $\Omega$ /50  $\mu$ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeter's above the floor and is positioned 40 centimeter's 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 quasi-peak and average detection and recorded on the data sheets.

**Test result:**

The requirements are

**o - MET**

**o - NOT MET**

Min. limit margin

\_\_\_\_\_ dB at \_\_\_\_\_ MHz

Max. limit exceeding

\_\_\_\_\_ dB at \_\_\_\_\_ MHz

Remarks: Test not applicable.

**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 quasi-peak 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 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres 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 polarization's and the EuT are rotated 360 degrees.

**SPURIOUS EMISSION (MAGNETIC FIELD) 9 kHz - 30 MHz**

|                         |
|-------------------------|
| o - Test not applicable |
|-------------------------|

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

For test instruments and test accessories used please see attachment B: SER1

**Description of Measurement**

The final level, expressed in dB $\mu$ V/m, is arrived at by taking the reading from the EMI receiver (Level dB $\mu$ 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.

The resolution bandwidth during the measurement is as follows:

9 kHz – 150 kHz: ResBW: 200 Hz

150 kHz – 30 MHz: ResBW: 10 kHz

Example:

| Frequency<br>(MHz) | Level<br>(dB $\mu$ V) | + | Factor<br>(dB) | = | Level<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | = | Delta<br>(dB) |
|--------------------|-----------------------|---|----------------|---|-------------------------|-------------------------|---|---------------|
| 1.705              | 5                     | + | 20             | = | 25                      | 30                      | = | 5             |

**Field Behavior:**

Because at the specified 300/30m measurement distance the signal is too small to measure.

Measurements were made at 3m. To translate the measurement from 3m to the 300/30m distance, we used an extrapolated factor of 40dB/decade (Ref. FCC 47 CFR 15.31) for the specified limit in the regulations.

**Testresult in detail:****1. Door Antenna / Door Oscillator**

Measurement distance: 3m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | 33.0         | 30.5         | 31.3         | 20.0          | 53.0           | 50.5           | 51.3           | 95.5           |

Measurement distance: 30m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | <-10         | <-10         | <-10         |               |                |                |                |                |

Measurement distance: 300m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | <-10         | <-10         | <-10         |               |                |                |                |                |

**2. Trunk Antenna**

Measurement distance: 3m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | 50.8         | 50.5         | 50.6         | 20.0          | 70.8           | 70.5           | 70.6           | 95.5           |

Measurement distance: 30m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | <-10         | <-10         | <-10         |               |                |                |                |                |

Measurement distance: 300m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | <-10         | <-10         | <-10         |               |                |                |                |                |

**3. Room Antenna / Luggage Antenna**

Measurement distance: 3m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | 43.5         | 43.1         | 43.2         | 20.0          | 63.5           | 63.1           | 63.2           | 95.5           |

Measurement distance: 30m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | <-10         | <-10         | <-10         |               |                |                |                |                |

Measurement distance: 300m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.402           | <-10         | <-10         | <-10         |               |                |                |                |                |

The requirements are

■ - MET

○ - NOT MET

Min. limit margin

25.0 dB at 0.402 MHz

Max. limit exceeding

           dB at            MHzRemarks: The limits are kept.

**SPURIOUS EMISSIONS (electric field) 30 MHz - 1000 MHz**

o - Test not applicable

**Test location :**

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

For test instruments and test accessories used please see attachment B: SER2

**Description of Measurement**

The final level, expressed in dB $\mu$ V/m, is arrived by taking the reading from the EMI receiver (Level dB $\mu$ 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<br>(MHz) | Level<br>(dB $\mu$ V) | + | Factor<br>(dB) | = | Level<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | = | Delta<br>(dB) |
|--------------------|-----------------------|---|----------------|---|-------------------------|-------------------------|---|---------------|
| 719                | 75                    | + | 32.6           | = | 107.6                   | 110                     | = | -2.4          |

**Testresult in detail:**

Measurement distance: 3m

**1. Door Antenna / Door Oscillator**

| Frequency<br>[MHz] | L: PK<br>[dBµV] | L: AV<br>[dBµV] | L: QP<br>[dBµV] | Correct.<br>[dB] | L: PK<br>[dBµV/m] | L: AV<br>[dBµV/m] | L: QP<br>[dBµV/m] | Limit<br>[dBµV/m] |
|--------------------|-----------------|-----------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|
| 30-1000            | <-10            | <-10            | <-10            |                  |                   |                   |                   |                   |

**2. Trunk Antenna**

| Frequency<br>[MHz] | L: PK<br>[dBµV] | L: AV<br>[dBµV] | L: QP<br>[dBµV] | Correct.<br>[dB] | L: PK<br>[dBµV/m] | L: AV<br>[dBµV/m] | L: QP<br>[dBµV/m] | Limit<br>[dBµV/m] |
|--------------------|-----------------|-----------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|
| 30-1000            | <-10            | <-10            | <-10            |                  |                   |                   |                   |                   |

**3. Room Antenna / Luggage Antenna**

| Frequency<br>[MHz] | L: PK<br>[dBµV] | L: AV<br>[dBµV] | L: QP<br>[dBµV] | Correct.<br>[dB] | L: PK<br>[dBµV/m] | L: AV<br>[dBµV/m] | L: QP<br>[dBµV/m] | Limit<br>[dBµV/m] |
|--------------------|-----------------|-----------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|
| 30-1000            | <-10            | <-10            | <-10            |                  |                   |                   |                   |                   |

**Test result:**

The requirements are

■ - MET

○ - NOT MET

Min. limit margin

>20 dB at 30-1000 MHz

Max. limit exceeding

           dB at            MHzRemarks: The limits are met.



**FIELD STRENGTH OF THE FUNDAMENTAL WAVE**

|                         |
|-------------------------|
| o - Test not applicable |
|-------------------------|

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

For test instruments and test accessories used please see attachment B CPR1

**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<br>(MHz) | Level<br>(dBμV) | + | Factor<br>(dB) | = | Level<br>(dBμV/m) | - | Limit<br>(dBμV/m) | = | Delta<br>(dB) |
| 315                | 45              | + | 22.5           | = | 67.5              | - | 74.3              | = | -6.8          |

**Field Behavior:**

Because at the specified 300/30m measurement distance the signal is too small to measure. Measurements were made at 3m. To translate the measurement from 3m to the 300/30m distance, we used an extrapolated factor of 40dB/decade (Ref. FCC 47 §15.31) for the specified limit in the regulations..

**Testresult in detail:****1. Door Antenna / Door Oscillator**

Measurement distance: 3m

| Frequency<br>[MHz] | L: PK<br>[dBμV] | L: AV<br>[dBμV] | L: QP<br>[dBμV] | Correct.<br>[dB] | L: PK<br>[dBμV/m] | L: AV<br>[dBμV/m] | L: QP<br>[dBμV/m] | Limit<br>[dBμV/m] |
|--------------------|-----------------|-----------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|
| 0.134              | 71.4            | 71.4            | 71.4            | 20.0             | 91.4              | 91.4              | 91.4              | 105.0             |

Measurement distance: 30m

| Frequency<br>[MHz] | L: PK<br>[dBμV] | L: AV<br>[dBμV] | L: QP<br>[dBμV] | Correct.<br>[dB] | L: PK<br>[dBμV/m] | L: AV<br>[dBμV/m] | L: QP<br>[dBμV/m] | Limit<br>[dBμV/m] |
|--------------------|-----------------|-----------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|
| 0.134              | 31.4            | 31.4            | 31.4            | 20.0             | 51.4              | 51.4              | 51.4              | 65.0              |

Measurement distance: 300m

| Frequency<br>[MHz] | L: PK<br>[dBμV] | L: AV<br>[dBμV] | L: QP<br>[dBμV] | Correct.<br>[dB] | L: PK<br>[dBμV/m] | L: AV<br>[dBμV/m] | L: QP<br>[dBμV/m] | Limit<br>[dBμV/m] |
|--------------------|-----------------|-----------------|-----------------|------------------|-------------------|-------------------|-------------------|-------------------|
| 0.134              | -8.6            | -8.6            | -8.6            | 20.0             | 11.4              | 11.4              | 11.4              | 25.0              |

**2. Trunk Antenna**

Measurement distance: 3m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.134           | 73.6         | 73.6         | 73.6         | 20.0          | 93.6           | 93.6           | 93.6           | 105.0          |

Measurement distance: 30m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.134           | 33.6         | 33.6         | 33.6         | 20.0          | 53.6           | 53.6           | 53.6           | 65.0           |

Measurement distance: 300m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.134           | -6.4         | -6.4         | -6.4         | 20.0          | 13.6           | 13.6           | 13.6           | 25.0           |

**3. Room Antenna / Luggage Antenna**

Measurement distance: 3m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.134           | 73.2         | 73.2         | 73.2         | 20.0          | 93.2           | 93.2           | 93.2           | 105.0          |

Measurement distance: 30m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.134           | 33.2         | 33.2         | 33.2         | 20.0          | 53.2           | 53.2           | 53.2           | 65.0           |

Measurement distance: 300m

| Frequency [MHz] | L: PK [dBµV] | L: AV [dBµV] | L: QP [dBµV] | Correct. [dB] | L: PK [dBµV/m] | L: AV [dBµV/m] | L: QP [dBµV/m] | Limit [dBµV/m] |
|-----------------|--------------|--------------|--------------|---------------|----------------|----------------|----------------|----------------|
| 0.134           | -6.8         | -6.8         | -6.8         | 20.0          | 13.2           | 13.2           | 13.2           | 25.0           |

**Testresult**

The requirements are

■ - MET

○ - NOT MET

Min. limit margin

11.4 dB at 0.134 MHz

Max. limit exceeding

           dB at            MHzRemarks: The limits are kept.

## 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 instruments and test accessories used please see attachment B: CPC2

### 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: Test not applicable.

**EQUIPMENT UNDER TEST**

**Operation - mode of the EuT.:**

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

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (colour bar)
- ☒ - Test program (customer specific)

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**Configuration of the equipment under test:** see attachment D

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

- |                                                           |                                            |
|-----------------------------------------------------------|--------------------------------------------|
| <input checked="" type="checkbox"/> - Computer assy (ECU) | Type : <u>TMLF-1</u>                       |
| <input checked="" type="checkbox"/> - Test box            | Type : <u>supplied by the manufacturer</u> |
| <input type="radio"/> -                                   | Type : <u></u>                             |
| <input type="radio"/> -                                   | Type : <u></u>                             |
| <input type="radio"/> -                                   | Type : <u></u>                             |
| <input type="radio"/> -                                   | Type : <u></u>                             |

☒ - unshielded power cable

☒ - unshielded cables

☐ - shielded cables MBPS.No.:

☒ - customer specific cables

- ☐ -
- ☐ -

**S U M M A R Y**

**GENERAL REMARKS:**

The product TMLF-1 has been tested on the following frequency:  
TX-Mode: 134.2 kHz

The unit measurements met also the bandwidth requirements.

**FINAL JUDGEMENT:**

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

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

The Equipment Under Test

- - **Fulfils** the general approval requirements according to page 3.
- o - **Does not** fulfil the general approval requirements according to page 3.

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

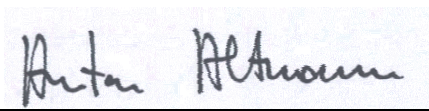
Testing Start Date : June 02, 2004

Testing End Date : June 08, 2004

Checked by:

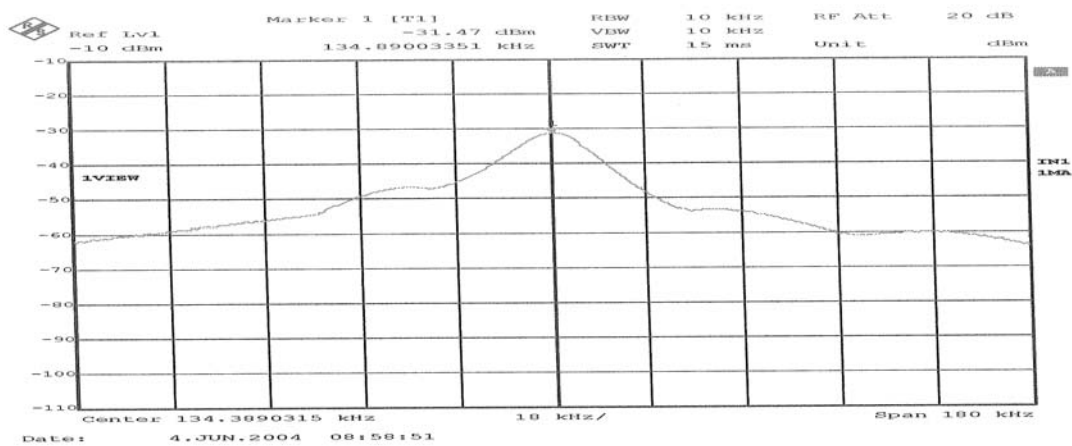
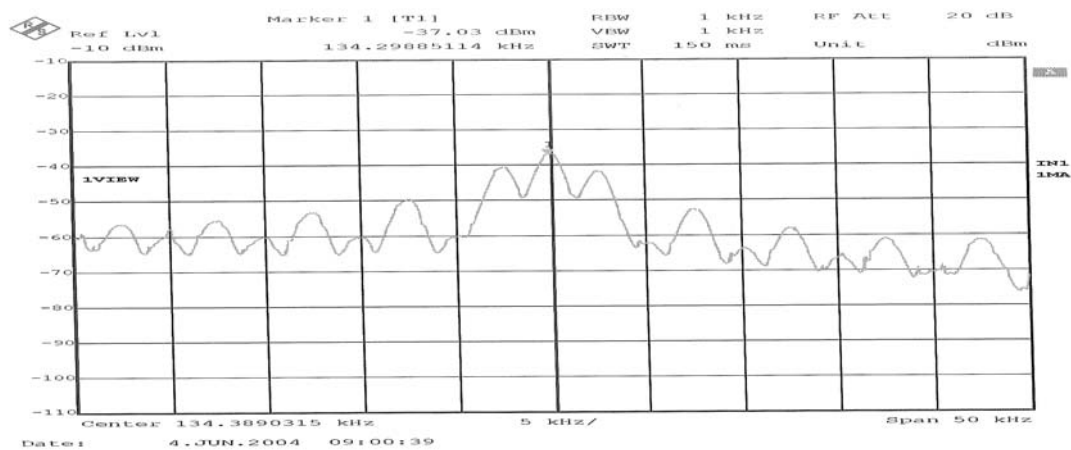
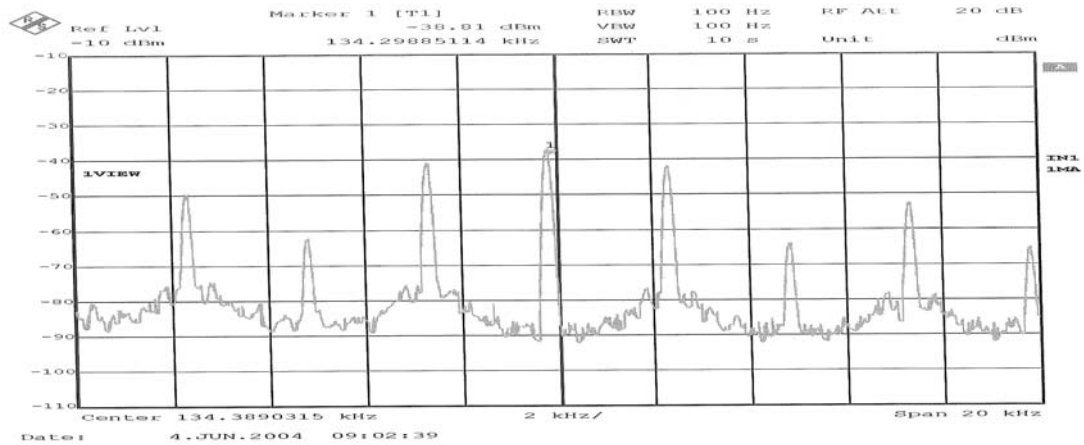
i. A.   
Günter Mikes  
Dipl.Ing.(FH)

Tested by:

  
Anton Altmann

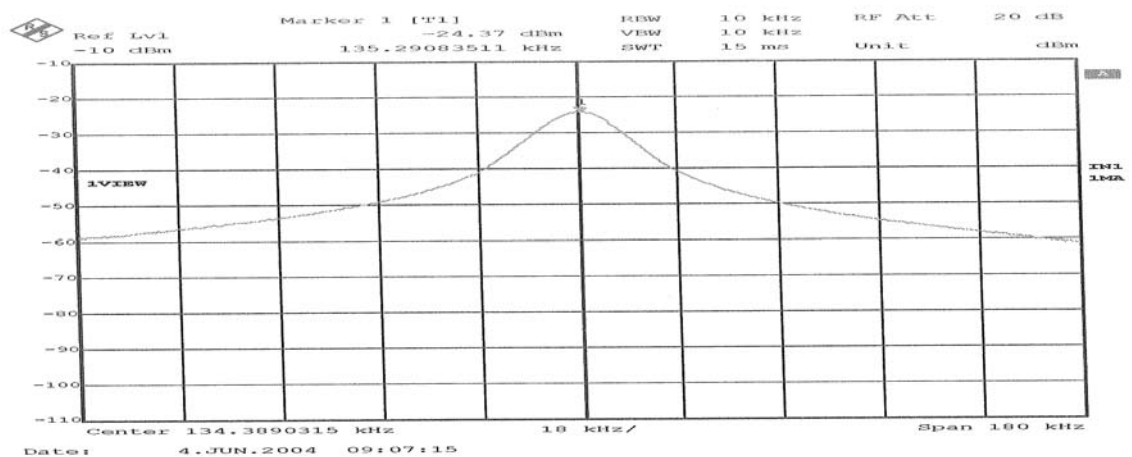
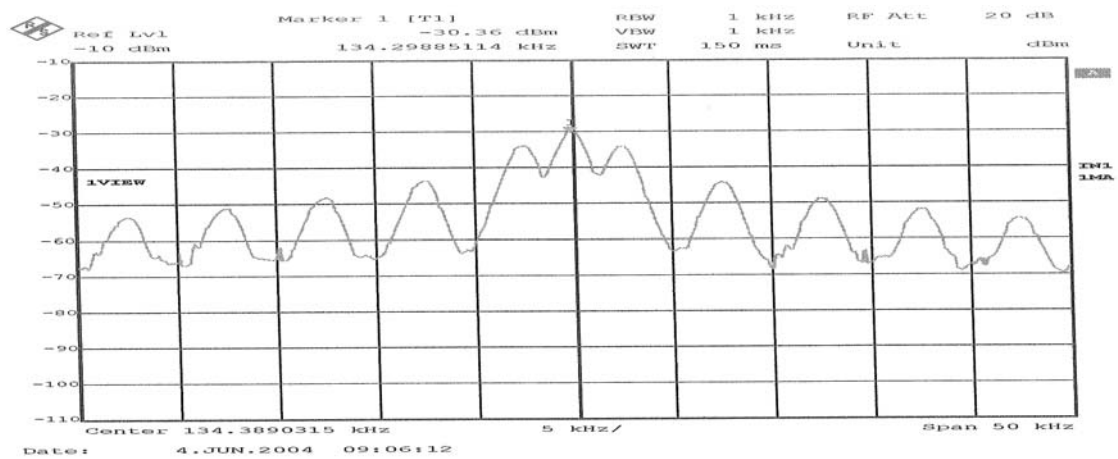
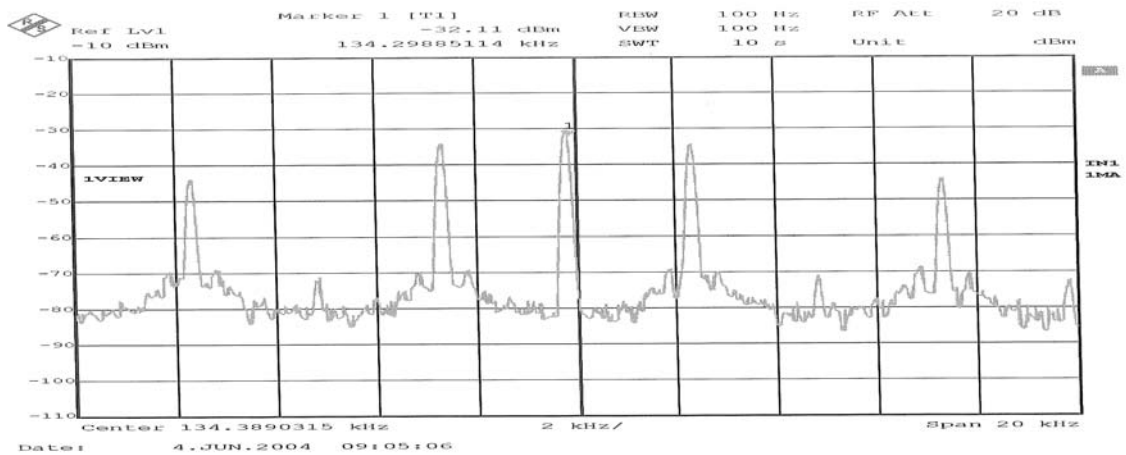
**Attachment A: Test data****Modulation bandwidth plots**

Door Antenna / Door Oscillator



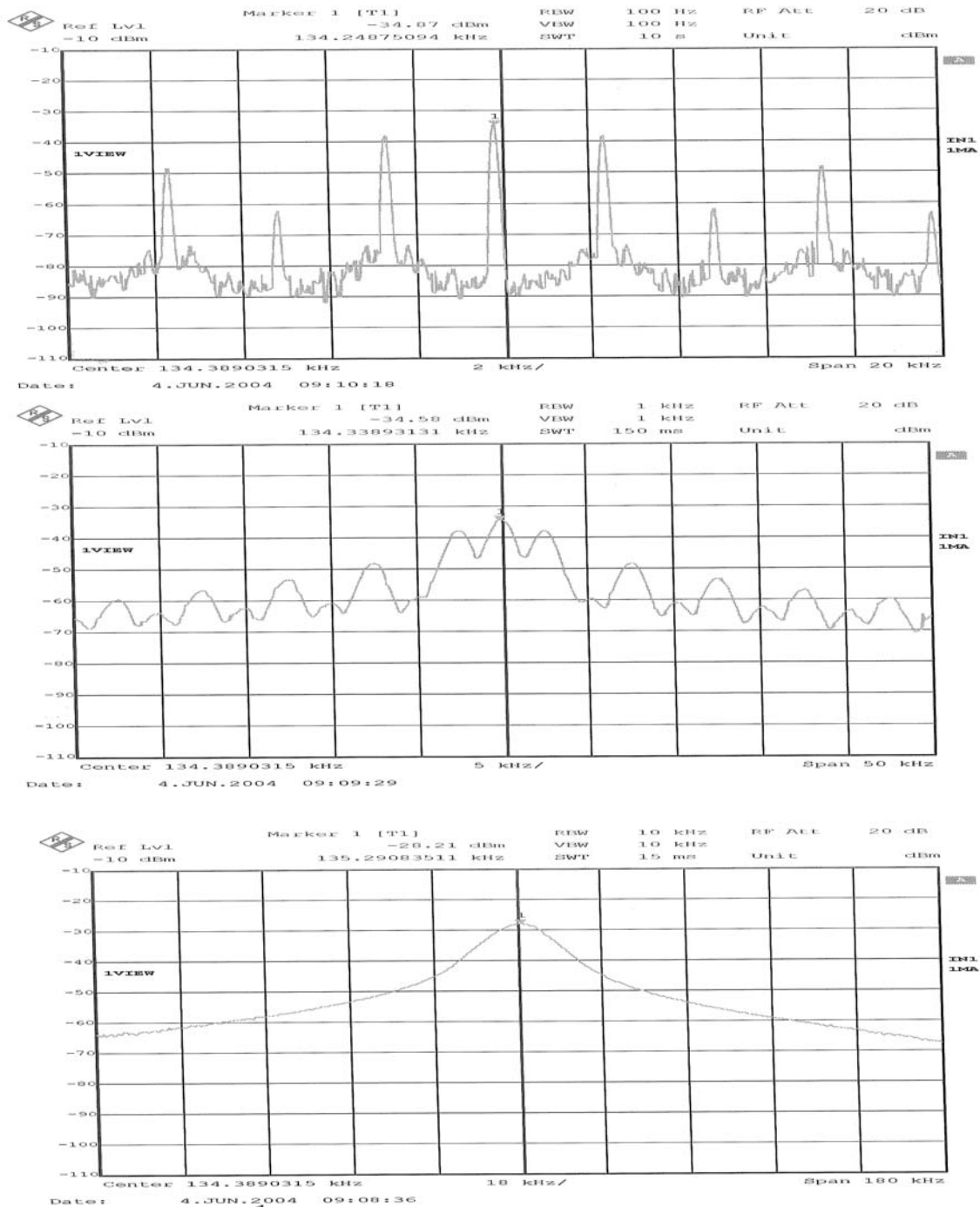
**Attachment A:** Test data

## Trunk Antenna



**Attachment A:** Test data

## Room Antenna / Luggage Antenna



**Attachment B:** List of Test Equipment

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

| Test ID | Model Type | Kind of Equipment      | Manufacturer                | Equipment No.   |
|---------|------------|------------------------|-----------------------------|-----------------|
| CPR1    | ESIB 40    | Test Receiver          | Rohde & Schwarz München     | 04-07/63-03-002 |
|         | FMZB 1516  | Magnetic Field Antenna | Schwarzbeck Mess-Elektronik | 99-07/62-03-004 |
| MB      | 3231-T25/E | Power Supply           | Conrad Elektronik GmbH      | 04-07/49-95-279 |
|         | HZ-10      | Magnetic Field Antenna | Rohde & Schwarz München     | 04-07/62-95-320 |
|         | ESIB 40    | Test Receiver          | Rohde & Schwarz München     | 04-07/63-03-002 |
|         | VLK 04/300 | Climatic Chamber       | Heraeus -Vötsch GmbH        | 04-10/90-89-001 |
| SER1    | ESIB 40    | Test Receiver          | Rohde & Schwarz München     | 04-07/63-03-002 |
|         | FMZB 1516  | Magnetic Field Antenna | Schwarzbeck Mess-Elektronik | 99-07/62-03-004 |
| SER2    | VULB 9165  | Super Broadband Antenn | Schwarzbeck Mess-Elektronik | 04-07/62-00-001 |
|         | ESVS 30    | Test Receiver          | Rohde & Schwarz München     | 04-07/63-04-001 |

**Attachment D:** Constructional dataform for testing of radio equipment

|                 |                                            |                   |  |
|-----------------|--------------------------------------------|-------------------|--|
| Licence holder: | Toyota Motor Corporation                   |                   |  |
| Address:        | 1, Toyota-Cho, Toyota Aichi, 471-8572Japan |                   |  |
| Manufacturer:   | Same as Licence holder                     |                   |  |
| Address:        | Same as Licence holder                     |                   |  |
| Type:           | TMLF-1                                     |                   |  |
| Model:          |                                            |                   |  |
| Serial-No.:     |                                            | Protection class: |  |

**Additional informations to the above named model:**

|                                                                                                                                                                                           |                                                                                                                                                                                                                      |               |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--|
| <b>Antenna:</b><br><b>transmitter:</b><br><br><b>receiver:</b><br><br><b>Power supply of the transmitter:</b><br><b>Type:</b><br><br><b>Power supply of the receiver:</b><br><b>Type:</b> | Type: <b>Dedicated Inductive Loop Antenna</b>                                                                                                                                                                        |               |  |
|                                                                                                                                                                                           | Length/size: <b>Door Antenna: 0.0001 m<sup>2</sup> (loop average)</b><br><b>Trunk Antenna: 0.0000287 m<sup>2</sup> (loop average)</b><br><b>Room Antenna/Luggage Antenna: 0.0000671 m<sup>2</sup> (loop average)</b> |               |  |
|                                                                                                                                                                                           | Type: <b>N/A</b>                                                                                                                                                                                                     |               |  |
|                                                                                                                                                                                           | Length/size: <b>N/A</b>                                                                                                                                                                                              |               |  |
|                                                                                                                                                                                           | nominal voltage:                                                                                                                                                                                                     | <b>12.0 V</b> |  |
|                                                                                                                                                                                           | lowest voltage:                                                                                                                                                                                                      | <b>8.0 V</b>  |  |
| highest voltage:                                                                                                                                                                          | <b>16.0 V</b>                                                                                                                                                                                                        |               |  |
| current consumption                                                                                                                                                                       | <b>Max. 0.5 A (ave.)</b>                                                                                                                                                                                             |               |  |
| nominal voltage:                                                                                                                                                                          | <b>N/A V</b>                                                                                                                                                                                                         |               |  |
| current consumption                                                                                                                                                                       | <b>N/A A</b>                                                                                                                                                                                                         |               |  |

**Ancillary equipment:**

|                         |             |                   |
|-------------------------|-------------|-------------------|
| Description: <b>N/A</b> | Type: _____ | Serial-no.: _____ |
| Description: _____      | Type: _____ | Serial-no.: _____ |
| Description: _____      | Type: _____ | Serial-no.: _____ |

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

- ☒ Category I: General (-20°C to +55°C)  
☐ Category II: Portable (-10°C to +55°C)  
☐ Category III: Equipment for normal indoor use (0°C to +55°C)

**Connectable cables:**

| Name of the cable | Digital    | Length/m | shielded   |
|-------------------|------------|----------|------------|
| <b>N/A</b>        | 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 |

**Attachment D:** Constructional dataform for testing of radio equipment

|                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                      |                                                                                                                               |                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>Type designation:</b><br>TMLF-1                                                                                                                                                                         |                                                                                                                                                                                                                                                                                      |                                                                                                                               |                               |
| <b>Name and type designation of individual units comprising the radio equipment:</b><br>- Computer Assy, Smart Key<br>- Door Driver<br>- Door Antenna<br>- Trunk Antenna<br>- Room Antenna/Luggage Antenna |                                                                                                                                                                                                                                                                                      |                                                                                                                               |                               |
| <b>Type of equipment:</b>                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                      |                                                                                                                               |                               |
| <input type="checkbox"/> Radiotelephone equipment                                                                                                                                                          | <input type="checkbox"/> Remote-control equipment                                                                                                                                                                                                                                    | <input type="checkbox"/> Radiomaritime equipment                                                                              | <input type="checkbox"/> LPD  |
| <input type="checkbox"/> One-way radiotelephone equipment                                                                                                                                                  | <input checked="" type="checkbox"/> Inductive loop system                                                                                                                                                                                                                            | <input type="checkbox"/> Inland waterways equipment                                                                           | <input type="checkbox"/> RLAN |
| <input type="checkbox"/> Personal paging system                                                                                                                                                            | <input type="checkbox"/> Radio-relay system                                                                                                                                                                                                                                          | <input type="checkbox"/> Radionavigation equipm.                                                                              | <input type="checkbox"/>      |
| <input type="checkbox"/> Satellite earth station                                                                                                                                                           | <input type="checkbox"/> CB radiotelephone equipment                                                                                                                                                                                                                                 | <input type="checkbox"/> Antenna                                                                                              | <input type="checkbox"/>      |
| <input type="checkbox"/> Data transmission equipment                                                                                                                                                       | <input type="checkbox"/> Movement detector                                                                                                                                                                                                                                           | <input type="checkbox"/> Aeronautical equipment                                                                               | <input type="checkbox"/>      |
| <b>Technical characteristics:</b>                                                                                                                                                                          |                                                                                                                                                                                                                                                                                      |                                                                                                                               |                               |
|                                                                                                                                                                                                            | Transmitter-receiver                                                                                                                                                                                                                                                                 | Transmitter                                                                                                                   | Receiver                      |
| Frequency range                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                      | 134.2 kHz                                                                                                                     |                               |
| Maximum no. of channels                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                      | Single channel                                                                                                                |                               |
| Channel spacing                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                      | Single channel                                                                                                                |                               |
| Class of emission (type of modulation)                                                                                                                                                                     |                                                                                                                                                                                                                                                                                      | 1K00A1D                                                                                                                       |                               |
| Maximum RF output power                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                      | Door Antenna:<br>95 dBuV/m (@ 3m)<br>Trunk Antenna:<br>95 dBuV/m (@ 3m)<br>Room Antenna/Luggage Antenna:<br>95 dBuV/m (@ 3 m) |                               |
| Maximum effective radiated power (ERP)                                                                                                                                                                     |                                                                                                                                                                                                                                                                                      | N/A                                                                                                                           |                               |
| Output power variable                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                      | N/A                                                                                                                           |                               |
| Channel switching frequency range                                                                                                                                                                          |                                                                                                                                                                                                                                                                                      | N/A                                                                                                                           |                               |
| Method of frequency generation                                                                                                                                                                             | <input type="checkbox"/> Synthesizer <input checked="" type="checkbox"/> Crystal <input type="checkbox"/> Other                                                                                                                                                                      |                                                                                                                               |                               |
| Frequency generation TX                                                                                                                                                                                    | N/A                                                                                                                                                                                                                                                                                  |                                                                                                                               |                               |
| Frequency generation RX                                                                                                                                                                                    | N/A                                                                                                                                                                                                                                                                                  |                                                                                                                               |                               |
| IF                                                                                                                                                                                                         | 1st IF    N/A                                                                                                                                                                                                                                                                        | 2nd IF    N/A                                                                                                                 | 3rd IF    N/A                 |
| Integral selective calling                                                                                                                                                                                 | N/A                                                                                                                                                                                                                                                                                  |                                                                                                                               |                               |
| Audio-frequency interface level at external data socket                                                                                                                                                    | N/A                                                                                                                                                                                                                                                                                  |                                                                                                                               |                               |
| Modes of operation                                                                                                                                                                                         | <input type="checkbox"/> Duplex mode <input type="checkbox"/> Semi-duplex mode <input checked="" type="checkbox"/> Simplex mode                                                                                                                                                      |                                                                                                                               |                               |
| Power source                                                                                                                                                                                               | <input type="checkbox"/> Mains <input checked="" type="checkbox"/> Vehicle-regulated <input type="checkbox"/> Integral                                                                                                                                                               |                                                                                                                               |                               |
| Antenna socket                                                                                                                                                                                             | <input type="checkbox"/> BNC <input type="checkbox"/> TNC <input type="checkbox"/> N<br><input type="checkbox"/> M <input type="checkbox"/> UHF <input type="checkbox"/> Adapter<br><input checked="" type="checkbox"/> None <input type="checkbox"/> Other <input type="checkbox"/> |                                                                                                                               |                               |
| <b>Test specifications:</b><br>EN300 330-2 V1.1.1, EN301 489-1 V1.4.1 & -3 V1.4.1, EN60950-1:2001<br>FCC Part 15, RSS-210                                                                                  |                                                                                                                                                                                                                                                                                      |                                                                                                                               |                               |

**Attachment D:** Constructional dataform for testing of radio equipment

**Declarations:**

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

Toyota, Aichi

place of issue

,date

June 17, 2004



Seal and signature of applicant