

# EMISSION -- TEST REPORT

Test Report File No. :	T24751-00-09AA	Date : June 16, 2004 of issue
Type Designation :	TMLF-1	
Kind of Product :	Smart LF Oscillator Sy	rstem
Applicant :	Toyota Motor Corporat	tion
Manufacturer :	Toyota Motor Corporat	tion
Licence holder :	Toyota Motor Corporat	tion
Address :	1, Toyota Cho	
	Toyota Aichi, 471-8572	2 Japan
<b>Test result</b> accdg. to the regulation(s) at page 3	Pos	sitive

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 :

0 0	- EN 50081-1 - EN 50081-2	/ 2.1991 / 7.1993			
0	- EN 55011	/ 3.1991	o - Group 1 o - class A	0 0	- Group 2 - class B
0	- EN 55014	/ 4.1993	<ul> <li>o - Household appliances and</li> <li>o - tools</li> <li>o - Semiconductor devices</li> </ul>	sir	nilar
0 0	- EN 55014 - EN 55104	/ A2:1990 / 5.1995	Category:		
0 0	- EN 55015 - EN 55015	/ A1:1990 / 12.1993			
0	- EN 55022	/ 5.1995	o - class A	0	- class B
0 0 0	- prEN 55103-1 - prEN 50121-3-2 - EN 60601-1-2	/ 3.1995 / 3.1995 / 4.1994			
0	- VCCI		o - class 1	0	- class 2
■ 0	- Part 15 Subpart ( - Part 15 Subpart (	C (15.209) C (15.231)			

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# ADDRESS OF THE TEST LABORATORY

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

# ENVIRONMENTAL CONDITIONS

Temperature:

15-35 ° C

Humidity <u>45-60 %</u>

Atmospheric pressure

860-1060 mbar

### POWER SUPPLY SYSTEM UTILIZED

Power supply system

o 230V/50 Hz / 1¢ o 400V/50 Hz 3PE 12V DC
 400V/50 Hz 3NPE

### 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. The measurement uncertainty was calculated for all measurements listed in this test report accdg. to UKAS LAB34 and is documented in the MIKES BABT Product Service quality system accdg. to EN ISO/IEC 17025:2000. 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 Smart LF Oscillator Model TMLF-1 is a transmitter that is installed in a motor vehicle and is used as part of Smart Key System. In the system, the Smart LF Oscillator mainly functions as follows:

- Smart Door Unlocking 4 door antennas transmit a low frequency of 134.2kHz continuously. An electronic key, carried by the driver, will transmit a high radio wave when recognized the signal.
- Smart Trunk Unlocking The trunk antenna provides the signal for the electronic key to open the trunk.
- Detection of Electronic Key inside Trunk If the driver tries to close the trunk, the inside trunk antenna transmits a radio wave of 134.2kHz. The electronic key left inside the trunk will recognize the signal and transmits a high radio frequency back to alarm the driver.
- Smart Engine Start When the driver is inside the car the Inside Room Antenna transmits a radio wave of 134.2kHz. If the electronic key recognize the signal it transmits a high radio frequency back to trigger the engine start mechanism.

For the worst case three antennas have been tested in conjunction with the Computer assy (ECU):

3/1

- 1. Door antenna/Door oscillator
- 2. Trunk Antenna
- 3. Room Antenna/ Luggage Antenna

Number of received/tested samples:

Serial Number:

Prototype

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# 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 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 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.

o Blank box indicates that the listed condition, standard or equipment was not applicable for this report.

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### **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.

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# TEST RESULT

### CONDUCTED EMISSIONS - 10/150 kHz - 30 MHz

- Test not applicable

#### **Test location :**

- 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 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:

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

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 requirer	ments are	o - MET			o - NOT MET
Min. limit ma	argin		dB	at	MHz
Max. limit ex	ceeding		dB	at	MHz
Remarks:	Test not applicable.				

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### **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	Level	+	Factor	=	Level	Limit	=	Delta
(MHz)	(dBµV)		(dB)		(dBµV/m)	(dBµV/m)		(dB)
1.705	5	+	20	=	25	30	=	5

#### **Field Behavier:**

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

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# Testresult in detail:

#### 1. Door Antenna / Door Oscillator

#### Measurement distance: 3m

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

#### Measurement distance: 30m

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

### Measurement distance: 300m

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

### 2. Trunk Antenna

#### Measurement distance: 3m

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

#### Measurement distance: 30m

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

### Measurement distance: 300m

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

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# 3. Room Antenna / Luggage ANtenna

#### Measurement distance: 3m

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

Measurement distance: 30m

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

#### Measurement distance: 300m

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

The requirem	nents are	■ - MET		o - NOT MET		
Min. limit ma	rgin	25.0	dB	at	0.402_ MHz	
Max. limit exc	ceeding		dB	at	MHz	
Remarks:	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	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:**

Measurement distance: 3m

#### 1. Door Antenna / Door Oscillator

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

#### 2. Trunk Antenna

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

### 3. Room Antenna / Luggage Antenna

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

# Test result:

The requirements are	■ - MET		o - NOT MET		
Min. limit margin	>20	dB	at	<u>30-1000</u> 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 instruments and test accessories used please see attachment B SER3

### **Description of Measurement**

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

Example of the correction value at 1.8 GHz

Level reading	Correction	correction	Correction	corrected
at	EMCO 3115	Amplifier	factor	level
1.8 GHz		AWT 4534 + cable	(summarized)	
56 dBµV	+27.3 dB	-41.2 dB	-15.8 dB	42.1 dBµV/m

### Testresult in detail:

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]

### **Testresult**

The requirements are	o - MET			o - NOT MET		
Min. limit margin		dB	at	MHz		
Max. limit exceeding		dB	at	MHz		

Remarks: Test not applicable.

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### FIELD STRENGTH OF THE FUNDAMENTAL WAVE

#### 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  $dB\mu V/m$ , 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	Level	+	Factor	=	Level	- Limit	=	Delta
(MHz)	(dBµV)		(dB)		(dBµV/m)	(dBµV/m)		(dB)
315	45	+	22.5	=	67.5	- 74.3	=	-6.8

#### **Field Behavier:**

Because at the specified 300/30m measurement distance the signal is to 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	L: PK	L: AV	L: QP	Correct.	L: PK	L: AV	L: QP	Limit
[MHz]	[dBµV]	[dBµV]	[dBµV]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[dBµV/m]
0.134	71.4	71.4	71.4	20.0	91.4	91.4	91.4	105.0

#### Measurement distance: 30m

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

### Measurement distance: 300m

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

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#### 2. Trunk Antenna

#### Measurement distance: 3m

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

### Measurement distance: 30m

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

#### Measurement distance: 300m

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

#### Measurement distance: 30m

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

#### Measurement distance: 300m

Frequency	L: PK	L: AV	L: QP	Correct.	L: PK	L: AV	L: QP	Limit
[MHz]	[dBµV]	[dBµV]	[dBµV]	[dB]	[dBµV/m]	[dBµV/m]	[dBµV/m]	[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			o - NOT MET
Min. limit margin	_11.4	B	at	<u>0.134</u> MHz
Max. limit exceeding	0	B	at	MHz
Remarks: The limits are kept.				

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# 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 requireme	ents are			o - MET	-	0 -	NOT ME	Т
Frequency ra								
Temperature	DC supply voltage	Power	Power	Power	Power	Power	Power	Power
°C	V	dBm	dBm	dBm	dBm	dBm	dBm	dBm
-30								
-20								
-10								
0								
+10								
+20								
+30								
+40								
+50								

Remarks: Test not applicable.

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# EQUIPMENT UNDER TEST

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

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

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

**Configuration of the equipment under test:** see attachment D Following periphery devices and interface cables were connected during the measurement:

	- Computer assy (ECU)	Type : <u>TMLF-1</u>
	- Test box	Type : supplied by the manufacturer
0	-	Туре :
0	-	Туре :
0	<u>-</u>	Туре :
0	-	Туре :
-	- unshielded power cable	
	- unshielded cables	
0	- shielded cables	MBPS.No.:
	- customer specific cables	
0	<u> </u>	
0	<u>-</u>	

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### <u>SUMMARY</u>

#### **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

	acada	to storage record of M	IDDC
•	accuy.	to storage record or iv	IDF 3

Testing Start Date

: June 02, 2004

:

**Testing End Date** 

June 08, 2004

Checked by:

Günter Mikes Dipl.Ing.(FH)

Tested by:

Anton Altmann

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# Attachment A: Test data

#### Modulation bandwidth plots

Door Antenna / Door Oscillator



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# Attachment A: Test data



#### Trunk Antenna

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# Attachment A: Test data



#### Room Antenna / Luggage Antenna

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# 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 Elektronic 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

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# 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		
Туре:	TMLF-1		
Model:			2
Serial-No.:		Protection class:	

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

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

#### Ancillary equipment:

Anomaly equ	ipinent.			
Description:	N/A	Туре:	Serial-no.:	
Description:		Туре:	Serial-no.:	
Description:	17230V4	Туре:	Serial-no.:	

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

Category I: General (-20°C to +55°C)

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

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

#### Connectable cables:

Digital	Length/m	shielded
O yes O no		O yes O no
O yes O no		O yes O no
O yes O no		O yes O no
O yes O no		O yes O no
	Digital O yes O no O yes O no O yes O no O yes O no O yes O no	Digital     Length/m       0 yes 0 no     0 yes 0 no       0 yes 0 no     0 yes 0 no       0 yes 0 no     0 yes 0 no

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# Attachment D: Constructional dataform for testing of radio equipment

Type designation: TMLF-1				
Name and type designation - Computer Assy, Sm - Door Driver - Door Antenna - Trunk Antenna - Room Antenna/Luge	of individual units comp art Key gage Antenna	prising the radio equipment:		
Type of equipment:				
Radiotelephone equipment	☐ Remote-control equipment	Radiomaritime equipment		
One-way radiotelephone equipment	Inductive loop system	n D Inland waterways equipment		
<ul> <li>Personal paging system</li> <li>Satellite earth station</li> </ul>	Radio-relay system     CB radiotelephone     equipment	<ul> <li>Radionavigation equipm.</li> <li>Antenna</li> </ul>		
Data transmission equipment	Movement detector	Aeronautical equipment		
Technical characteristics:				
	Transmitter-receiver	Transmitter	Receiver	
Frequency range	Transfirmer records	134.2 kHz		
Maximum no. of channels		Single channel		
Channel engling		Single channel	· · ·	
Channel spacing				
Class of emission		1KUUA1D		
(type of modulation)				
		Door Antenna: 95 dBuV/m (@ 3m) Trunk Antenna: 95 dBuV/m (@ 3m) Room Antenna/Luggage Antena: 95 dBuV/m (@ 3 m)		
Maximum effective radiated power (ERP)		N/A		
Output power variable		N/A		
Channel switching		N/A		
frequency range				
Method of frequency generation	□ Synthesizer	Crystal	□ 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		Several Contraction	
Modes of operation	Duplex mode	Semi-duplex mode	Simplex mode	
Power source				
Antenna socket	□ BNC □ M ■ None	□ TNC □ UHF □ Other	□ N □ Adapter □	
Test specifications: EN300 330-2 V1.1.1, E FCC Part 15, RSS-210	N301 489-1 V1.4.1 & -3 V	/1.4.1, EN60950-1:2001		

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Attachment D: Constructional dataform for testing of radio equipment

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Decia	rations:	
•	We declare that the above informat supplied with the maximum configu	ion are correct and the named model was ration to the accredited test laboratory.
		1 1 22-
	Toyota, Aichi June 17, 2004 ,date	amoaki Katayana
	place of issue	Seal and signature/of applicant

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