FCC ID: NI4TMIMB-1

Deutscher Akkreditierungs Rat

DAT - P-011 / 91-02
TTI - P-G 089 / 94-11

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

Test Report File No.	:	**T24754-00-05AA**	Date of issue	: June 18, 2004

Type Designation	:	TMIMB-1
Kind of Product	:	Push Switch
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 **26** 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.

FCC ID: NI4TMIMB-1

D I R E C T O R Y

FCC ID: NI4TMIMB-1

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

The tests were performed according to following regulations :

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

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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)

MIKES BABT PRODUCT SERVICE GmbH Ohmstrasse 2-4 94342 Strasskirchen Tel.:+9424-9407-0 Fax:+9424-9407-60 Rev. No. 9.3

A D D R E S S O F T H E T E S T L A B O R A T O R Y

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

E N V I R O N M E N T A L C O N D I T I O N S

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

POWER SUPPLY SYSTEM UTILIZED

Power supply system	o 230V/50 Hz / 1ϕ	■ 5V DC
	o 400V/50 Hz 3PE	o 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 EuT TMIMB-1 is a Push Switch installed in any vehicle. When a driver goes into his car with electronic key, the Push Switch starts to induce the electromagnetic field of 134.4 kHz. The transponder built in electronic key gets its alimentation from the field and re-transmits a very small part of the power back to the Push Switch included the encrypted code. The installed ECU identifies the encrypted code and allows the vehicle to start.

Number of received/tested samples:	**3 / 1**
Serial Number:	Prototype

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.

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 ±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.

DISCOVERY OF WORST CASE MEASUREMENT CONDITION:

The TMIMB-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 antenna.
- 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 antenna.

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.

T E S T R E S U L T

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 dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit, which is equivalent to the Australian AS 3548 limit.

To convert between dBμV and μV, the following conversions apply:
dBμV = 20(log μV)
μV = Inverse log(dBμV/20)

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EuT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak 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 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 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.
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 (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	Limit (dBµV/m)	=	Delta (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.

Testresult in detail:

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]
0.403	-10.0	-10.0	-10.0	20.0	10.0	10.0	10.0	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]
0.403	<-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]
0.403	<-10	<-10	<-10					

The requirements are ■ - MET o - NOT MET

Min. limit margin 85.5 dB at 0.403 MHz

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

Example:

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

Testresult in detail:

Measurement distance: 3m

Test result:

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

Min. limit margin >20 dB at 30-1000 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 dBµV/m, is arrived by taking the reading from the Spectrumanalyzer in dBµV and adding the correction factors of the test setup incl. cables.

Example of the correction value at 1.8 GHz

Level reading at 1.8 GHz	Correction EMCO 3115	correction Amplifier AWT 4534 + cable	Correction factor (summarized)	corrected level
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.

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 (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	-	Limit (dBµV/m)	=	Delta (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:

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	61.4	61.4	61.4	20.0	81.4	81.4	81.4	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	21.4	21.4	21.4	20.0	41.4	41.4	41.4	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	<-10	<-10	<-10	20.0				

Testresult

The requirements are ■ - MET o - NOT MET

Min. limit margin 23.6 dB at 0.134 MHz

Max. limit exceeding _____ dB at _____ MHz

Remarks: 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.

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

Operation - mode of the EuT.:

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

o - Standby

o - Test program (H - Pattern)

o - Test program (colour bar)

■ - Test program (customer specific)

Continuous wave

Configuration of the equipment under test: see attachment D

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 MBPS.No.:

o - customer specific cables

o -

o -

S U M M A R Y

GENERAL REMARKS:

The product TMIMb-1 has been tested on the following frequency:
TX-Mode: 134.4 kHz

The unit measurements met also the bandwidth requirements.
The Eut could not be modulated. All measurements have been performed without modulation.

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:

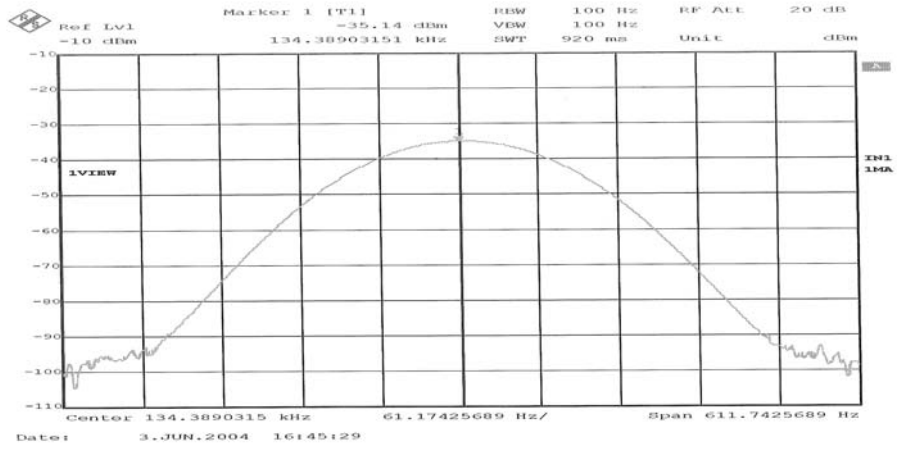
i. A.
Günter Mikes
Dipl.Ing.(FH)

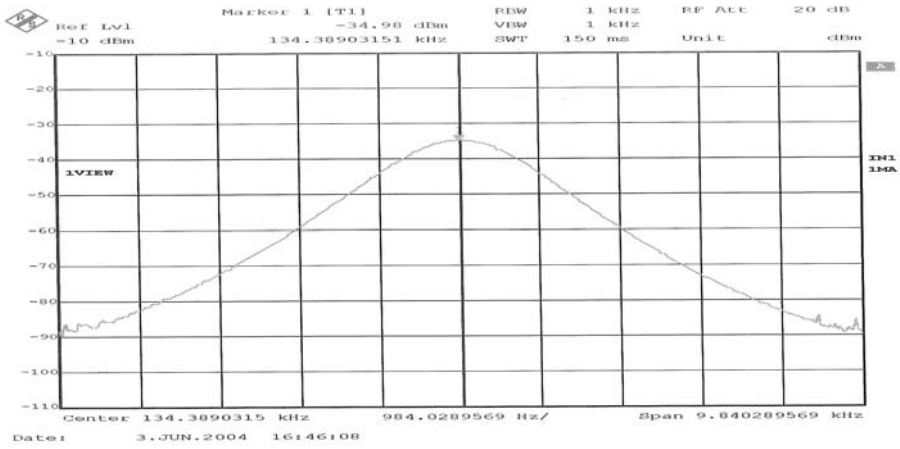
Tested by:

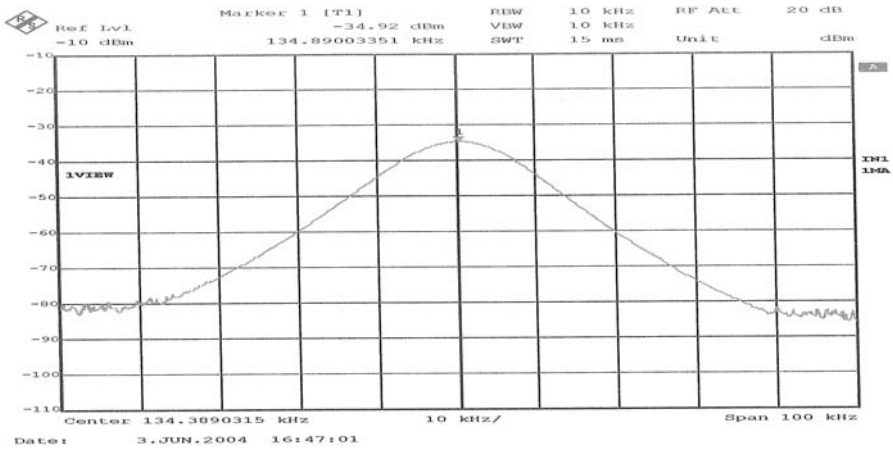
Anton Altmann
Dipl.Ing.(FH)

Attachment A: Test data

Carrier bandwidth plots







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

Attachment D: Constructional dataform for testing of radio equipment

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

Additional informations to the above named model:

Antenna:	Type: **Integral Inductive Loop Antenna**		
transmitter:	Length/size: **0.00085 m²**		
receiver:	Type: **Common to transmitter antenna**		
	Length/size: **Common to transmitter antenna**		
Power supply of the transmitter:			
Type:	nominal voltage:	**5.0 V**	
	lowest voltage:	**4.5 V**	
	highest voltage:	**5.5 V**	
	current consumption	**100 mA**	
Power supply of the receiver:			
Type:	nominal voltage:	**N/A V**	
	current consumption	**N/A A**	

Ancillary equipment:

Description:	**N/A**	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)

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

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

Connectable cables:

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

Attachment D: Constructional dataform for testing of radio equipment

Type designation:
TMIMB-1

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

Push Switch,

Type of equipment:

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

Technical characteristics:

	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	**60 dBuV/m (@10m)**		
Maximum effective radiated power (ERP)	**N/A**		
Output power variable	**N/A**		
Channel switching frequency range	**N/A**		

Method of frequency generation	☐ Synthesizer	☐ Crystal	■ Other (Ceramic resonator)
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	☐ Duplex mode	■ Semi-duplex mode	☐ Simplex mode
Power source	☐ Mains	■ Vehicle-regulated	☐ Integral
Antenna socket	☐ BNC ☐ M ■ None	☐ TNC ☐ UHF ☐ Other (customized)	☐ N ☐ Adapter ☐

Test specifications:

EN300 330-2 V1.1.1, EN301 489-1 V1.4.1 & -3 V1.4.1, EN60950-1:2001
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 ,date June 17, 2004 Tomoaki Katayama

place of issue Seal and signature of applicant