



RADIO TEST REPORT

Test Report No.: 30CE0195-SH-03-A

Applicant : BRIDGESTONE CORPORATION
Type of Equipment : TPMS (Tire Pressure Monitoring System)
Model No. : B672 (SENSOR)
FCC ID : SBDB672
Test regulation : FCC Part15 Subpart C: 2009
Test result : Complied

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Date of test: November 7, 2009

Tested by: T. Arai
Tatsuya Arai

Approved by: I. Isozaki
Ichiro Isozaki
Group Leader of Shonan EMC lab.

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1 Applicant Information

Company Name : BRIDGESTONE CORPORATION
Brand Name : BRIDGESTONE
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2 Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : TPMS(Tire Pressure Monitoring System)
Model No. : B672 (SENSOR)
Serial No. : 000784
Rating : DC3V/0.1A
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.
Receipt Date of Sample : October 30, 2009

2.2 Product description

Model: B672 (referred to as the EUT in this report) is a SENSOR.

Clock frequency : 13.56MHz

[Sensor]

Equipment type : Transmitter
Frequency of operation : 433.92MHz
Type of modulation : FSK
Mode of Operation : Simplex
ITU code : F1D
Antenna type : Loop Antenna
Method of Frequency Generation : Synthesizer
Operation temperature range : -40 to +125 deg.C.

FCC Part15.31 (e)

This test was performed with the New Battery (DC 3.0V) and the constant voltage was supplied to the EUT during the tests. Therefore, the EUT complies with the requirement.

FCC Part15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the transmitter. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3 Test Specification, Procedures and Results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2009 , final revised on February 27, 2009
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.209 Radiated emission limits, general requirements
Section 15.231 Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz

The EUT complies with FCC Part15 Subpart B: 2009, final revised on February 27, 2009.

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted Emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC 15.207	-	N/A *1)	-	N/A
Automatically Deactivate	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC 15.231(a)(3) *2) 15.231(e) *3)	Radiated	N/A	-	Complied
Electric Field Strength of Fundamental Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	FCC 15.231(e) *4)	Radiated	N/A	24.7dB (Horizontal, ,PK with Duty factor PK)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	FCC 15.205 FCC 15.209 FCC 15.231 (e) *4)	Radiated	N/A	9.9dB (1735.680MHz, Horizontal, PK with Duty factor)	Complied
-20dB Bandwidth	ANSI C63.4: 2003 13. Measurement of intentional radiators	FCC 15.231(c)	Radiated	N/A	-	Complied

*1) The test is not applicable since the EUT has no AC mains.

*2) In Normal mode, limit of 15.231(a)(3) was applied since the EUT is intended to be used for the purpose of security, monitoring the tire pressure.

*3) In Alarm mode, limit of 15.231(e) was applied.

*4) Limit of 15.231(e) was applied since the limit is harder than that of 15.231(a).

Note: UL Japan's EMI Work Procedures No.QPM05 and QPM15.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	-	Complied

* Other than above, no addition, exclusion nor deviation has been made from the standard.

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3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

	No.1 anechoic chamber (±)	No.2 anechoic chamber (±)	No.3 anechoic chamber (±)
Radiated emission (3m)			
30-300MHz	4.4 dB	4.3 dB	4.5 dB
300-1000MHz	4.3 dB	4.2 dB	4.5 dB
1GHz<	5.7 dB	5.6 dB	5.6 dB

The data listed in this test report has enough margin, more than site margin.

3.5 Test Location

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JAB Accreditation No. : RTL02610

No.1/ No.2/ No.3 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on April 17, 2009 (Registration No.: 697847).

IC Registration No. : 2973D-1 (No1 anechoic chamber)

2973D-2 (No2 anechoic chamber)

2973D-3 (No3 anechoic chamber)

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.1 Shielded room	6.8 x 4.1 x 2.7
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65 Maximum measurement distance: 10m	No.2 Shielded room	6.8 x 4.1 x 2.7
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35 Maximum measurement distance: 5m	No.3 Shielded room	6.3 x 4.7 x 2.7
No.4 Semi-anechoic chamber	8.1 x 5.1 x 3.55	No.4 Shielded room	4.4 x 4.7 x 2.7
		No.5 Shielded room	7.8 x 6.4 x 2.7
		No.6 Shielded room	7.8 x 6.4 x 2.7

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4 System Test Configuration

4.1 Justification

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Operating mode	Tested frequency
Automatically, Duty Cycle	Normal use mode (FSK)	433.92MHz
Other test	Continuous Transmitting mode* (As for the pulse train of sample used in this test, please refer to Appendix 4)	433.92MHz

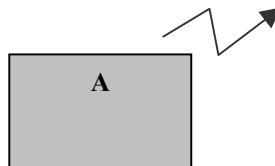
This EUT has two following modes.

Alarm mode: System detects that the pressure of the tire is too low and/or temperature is too high.

Normal mode: System doesn't detect any emergency signal.

* The test was performed in Normal mode which was the worse case in 2 modes (Normal mode and Alarm mode).

4.2 Configuration of Tested System



Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	SENSOR	B672	000784	YOKOWO Co.,Ltd	EUT

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5 Automatically Deactivate

5.1 Operating environment

The test was carried out in No.3 anechoic chamber.

5.2 Test procedure

The Automatically Deactivate was measured with a spectrum analyzer and a search coil placed by the EUT.

5.3 Results

Summary of the test results : Pass

6 Radiated Emissions (Fundamental & Spurious)

6.1 Operating environment

The test was carried out in No.3 anechoic chamber.

6.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. A drawing of the set up is shown in the photos of Appendix 1.

6.3 Test conditions

Frequency range : 30MHz – 4.5GHz
Test distance : 3m
EUT operation mode : Transmitting

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with PK detector.

The radiated emission measurements were made with the following detector function of the test receiver.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
Detector	PK with Duty factor	PK: RBW: 1MHz/VBW: 1MHz
IF Bandwidth	BW 120kHz	AV: PK with Duty factor

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

The equipment was previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 12. With the position, the noise levels of all the frequencies were measured.

	Below 1GHz	Above 1GHz
Horizontal	X	Y
Vertical	Z	Z

6.4 Results

Summary of the test results : Pass

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7 Bandwidth

7.1 Operating environment

The test was carried out in No.3 anechoic chamber.

7.2 Test procedure

The bandwidth was measured with a spectrum analyzer and a search coil placed by the EUT.

7.3 Results

Summary of the test results: Pass

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APPENDIX 1: Photographs of test setup

Page 11 : Radiated emission
Page 12 : Pre-check of the worst position

APPENDIX 2: Test Data

Page 13 : Automatically Deactivate
Page 14 : Radiated Emission
Page 15 : -20dB Bandwidth and Occupied Bandwidth
Page 16 : Duty Cycle (Fundamental)

APPENDIX 3: Test instruments

Page 17 : Test instruments

APPENDIX 4: Tested Pulse train

Page 18 - 19 : Tested pulse train