

TEST RESULT SUMMARY

FCC PART 15 SUBPART C

Section 15.231

| | |
|------------------------|--|
| MANUFACTURER'S NAME | Denso Corp |
| NAME OF EQUIPMENT | Transmitter for Keyless Entry System |
| MODEL NUMBER | 12BBA |
| MANUFACTURER'S ADDRESS | 1-1 Showa-cho, Kariya-shi Aichi-ken, 448-8661 Japan |
| TEST REPORT NUMBER | W9398 |
| TEST DATE | 29 August 1999 |

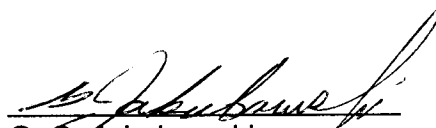
According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15.

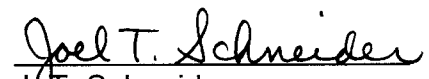
It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15.

Date: 15 September 1999

Location: Taylors Falls MN
USA


G.S. Jakubowski
Test Engineer


J.T. Schneider
Lead Engineer

EMC EMISSION - TEST REPORT

 Test Report File No. : **WC1H939801** Date of issue: 15 September 1999

 Model / Serial No. : **12BBA /**

 Product Type : **Transmitter for Keyless Entry System**

 Applicant : **Denso Corp**

 Manufacturer : **Denso Corp**

 License holder : **Denso Corp**

 Address : **1-1 Showa-cho, Kariya-shi**

 : **Aichi-ken, 448-8661 Japan**

 Test Result : **Positive** **Negative**

 Test Project Number Reference(s) : **W9398**

 Total pages including Appendices : **23**

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

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TÜV Product Service Inc and its professional staff hold government and professional organization certifications and are members of AAMI, ACIL, AEA, ANSI, IEEE, NVLAP, and VCCI

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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- | | | |
|--|---|------------------------------------|
| <input type="checkbox"/> - EN 50081-1 / 1991 | <input type="checkbox"/> - Group 1 | <input type="checkbox"/> - Group 2 |
| <input type="checkbox"/> - EN 55011 / 1991 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - EN 55013 / 1990 | <input type="checkbox"/> - Household appliances and similar | |
| <input type="checkbox"/> - EN 55014 / 1987 | <input type="checkbox"/> - Portable tools | |
| | <input type="checkbox"/> - Semiconductor devices | |
| <input type="checkbox"/> - EN 55014 / A2:1990 | <input type="checkbox"/> - Household appliances and similar | |
| <input type="checkbox"/> - EN 55014 / 1993 | <input type="checkbox"/> - Portable tools | |
| | <input type="checkbox"/> - Semiconductor devices | |
| <input type="checkbox"/> - EN 55015 / 1987 | | |
| <input type="checkbox"/> - EN 55015 / A1:1990 | | |
| <input type="checkbox"/> - EN 55015 / 1993 | | |
| <input type="checkbox"/> - EN 55022 / 1987 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - EN 55022 / 1994 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - BS | | |
| <input type="checkbox"/> - VCCI | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input checked="" type="checkbox"/> - FCC Part 15 Subpart C Section 15.231 | | |
| <input type="checkbox"/> - AS 3548 (1992) | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - CISPR 11 (1990) | <input type="checkbox"/> - Group 1 | <input type="checkbox"/> - Group 2 |
| | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - CISPR 22 (1993) | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |

Environmental conditions in the lab:

| | <u>Actual</u> |
|----------------------|---------------|
| Temperature | : 24 °C |
| Relative Humidity | : 72 % |
| Atmospheric pressure | : 98.7 kPa |
| Power supply system | : 3 VDC |

Sign Explanations:

- not applicable
- applicable

Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

■ - Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room
- New Brighton Lab Shielded Room

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number | Cal Date |
|--------------|--------------|-------------|---------------|----------|
|--------------|--------------|-------------|---------------|----------|

Use of the calibrated equipment on this list ensures traceability to national and international standards.

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)

at a test distance of :

- 3 meters
- 30 meters

■ - Test not applicable

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number | Cal Date |
|--------------|--------------|-------------|---------------|----------|
|--------------|--------------|-------------|---------------|----------|

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)

at a test distance of :

- 3 meters
- 10 meters
- 30 meters

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number | Cal Date |
|---------------|--------------------------|----------------------|---------------|----------|
| ■ - 3146 | Electro-Mechanics (EMCO) | Log Periodic Antenna | 9103-3075 | 11-98 |
| ■ - 3108 | Electro-Mechanics (EMCO) | Biconical Antenna | 2118 | 11-98 |
| ■ - 8566B | Hewlett-Packard | Spectrum Analyzer | 2221A01596 | 4-99 |
| ■ - 85662A | Hewlett-Packard | Analyzer Display | 2152A03640 | 4-99 |
| ■ - 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2811A01127 | 4-99 |
| ■ - ZHL-1042J | Mini-Circuits | Preamplifier | H072294-11 | 3-99 |

Use of the calibrated equipment on this list ensures traceability to national and international standards.

Emissions Test Conditions: INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room
- New Brighton Lab Shielded Room

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number | Cal Date |
|--------------|--------------|-------------|---------------|----------|
|--------------|--------------|-------------|---------------|----------|

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 3.2 GHz were performed in a horizontal and vertical polarization at the following test location :

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room

at a test distance of:

- 1 meters
- 3 meters
- 10 meters

- Test not applicable

Test equipment used :

| Model Number | Manufacturer | Description | Serial Number | Cal Date |
|---------------|--------------------------|--------------------|---------------|----------|
| ■ - 3115 | Electro-Mechanics (EMCO) | Horn Antenna | 9001-3275 | 9-98 |
| ■ - 8566B | Hewlett-Packard | Spectrum Analyzer | 2221A01596 | 4-99 |
| ■ - 85662A | Hewlett-Packard | Analyzer Display | 2152A03640 | 4-99 |
| ■ - 85650A | Hewlett-Packard | Quasi-Peak Adapter | 2811A01127 | 4-99 |
| ■ - ZHL-1042J | Mini-Circuits | Preamplifier | H072294-11 | 3-99 |

Use of the calibrated equipment on this list ensures traceability to national and international standards.

Equipment Under Test (EUT) Test Operation Mode - Emission tests :

The device under test was operated under the following conditions during emissions testing:

- Standby
- Test program (H - Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal Operating Mode
- Transmitter on.

Configuration of the device under test:

- See Constructional Data Form in Appendix B - Page B2
- See Product Information Form in Appendix B - beginning on Page B3

The following peripheral devices and interface cables were connected during the measurement:

- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____

- unshielded power cable
- unshielded cables
- shielded cables
- customer specific cables

MPS.No.: _____

- _____
- _____

Emission Test Results:

Conducted emissions 10/150 kHz - 30 MHz

The requirements are - MET - NOT MET
 Minimum limit margin _____ dB at _____ MHz
 Maximum limit exceeding _____ dB at _____ MHz
 Remarks: _____

Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are - MET - NOT MET
 Minimum limit margin _____ dB at _____ MHz
 Maximum limit exceeding _____ dB at _____ MHz
 Remarks: _____

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are - MET - NOT MET
 Minimum limit margin for fundamental _____ 6 dB at 314.4 MHz
 Minimum limit margin for spurious _____ 9 dB at 628.8 MHz

Remarks: The fundamental was measured to be 77.5 dBuV/m in peak mode, minus 8 dB (based on 39.1% duty cycle) to get average measurement, or 69.5 dBuV/m (2985 uV/m) compared to a limit of 75.5 dBuV/m (5956 uV/m). The second harmonic was measured to be 45.3 dBuV/m in peak mode, minus 8 dB (based on 39.1% duty cycle) to get average measurement, or 37.5 dBuV/m (74.9 uV/m) compared to an average limit of 46 dBuV/m (200 uV/m).

Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are - MET - NOT MET
 Minimum limit margin _____ dB at _____ MHz
 Maximum limit exceeding _____ dB at _____ MHz
 Remarks: _____

Equivalent Radiated emissions 1 GHz - 3.14 GHz

The requirements are - MET - NOT MET
 Minimum limit margin _____ >10 dB at _____ MHz
 Maximum limit exceeding _____ dB at _____ MHz
 Remarks: No signals detected within 10 dB of the limit.

DEVIATIONS FROM STANDARD:

None.

GENERAL REMARKS:

The bandwidth of the fundamental must be less than 0.25% of the center frequency, or 785 kHz. Page A5 of A6 shows the bandwidth to be less than 60 kHz. The transmitter is on for 39.1 msec/100 msec, so a duty cycle relaxation factor of $20 \log 39.1/100$, or 8 dB is used to convert peak readings to average readings. Page A6 and A6 shows the on/off times.

SUMMARY:

The requirements according to the technical regulations are

- met

- not met.

The device under test does


- fulfill the general approval requirements mentioned on page 3.

- not fulfill the general approval requirements mentioned on page 3.

Testing Start Date: 29 August 1999

Testing End Date: 29 August 1999

- TÜV PRODUCT SERVICE INC -


 G. S. Jakubowski
 Test Engineer


 Tested By:
 J. T. Schneider

FCC ID: HYQ12BBA



Test-setup photo(s):
Conducted emission 10/150 kHz - 30 MHz

Not Applicable