EMISSION TEST REPORT

Test Report No. : **21CE0032-YW-2**

Applicant:	**SHINKO ELECTRIC CO., LTD.**
Type of Equipment:	**CMC (CMCBC, CMCBM, CMCTR)**
Model No.:	**CMC (CMCBC, CMCBM, CMCTR)**
Test standard:	**FCC Part 15 Subpart B**
Test Result:	**Complies**

The results in this report apply only to the sample tested.

Date of test: October 20, 2000

Tested by: _____

Masafumi Inui

Approved by: _____ **Issued date:** October 31, 2000

Kazutoyo Nakanishi
Section Manager of EMC section

Testing Laboratory
A-pex International Co., Ltd.
108 Yokowa-cho, Ise-shi, Mie-ken 516-1106 JAPAN
Telephone: int +81 596 39 1485
Facsimile: int +81 596 39 0232

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Testing Laboratory
A-pex International Co., Ltd. Telephone: +81 596 39 1485
108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN Facsimile: +81 596 39 0232

1 GENERAL INFORMATION

APPLICANT	: SHINKO ELECTRIC CO., LTD.
TRADE NAME	: SHINKO
ADDRESS	: 100 Takegahana-cho, Ise-shi, Mie-ken 516-8550 Japan Tel: +81-596-36-3180 Fax: +81-596-36-3974
REGULATION(S)	: FCC Part 15 Subpart B
MODEL NUMBER	: CMC (CMCBC, CMCBM, CMCTR)
SERIAL NUMBER	: -
KIND OF EQUIPMENT	: CMC (CMCBC, CMCBM, CMCTR)
TESTED DATE	: October 20, 2000
RECEIPT DATE OF SAMPLE	: October 20, 2000
TEST REPORT NUMBER	: 21CE0032-YW-2
TEST SITE	: A-PEX Yokowa NO. 2 Open Test Site

1.1 Product Description

Model: CMC (CMCBC, CMCBM, CMCTR), reffered to as the EUT in this report, is a communication between vehicles and the ground side vehicle controller, that is realized by power line communication. About 300kHz-350kHz signals are superposed on the power line of non-contact power supply or communication line.

The clock frequency used in the EUT is 24 MHz. (Printed circuit board: NBV-BC)

Power Supply: DC 24V, 5V, ±12V

FSK modulation (285.7kHz, 315.8kHz)

1.2 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Model	DoC or FCC ID	Description	Cable description	Backshell Material
(1) SHINKO M/N: CMCBC (EUT)	N/A	CMCBC	Shielded Interconnection Cable	P.V.C.
(2) SHINKO M/N: CMCBM (EUT)	N/A	CMCBM	Shielded Interconnection Cable	P.V.C.
(3) SHINKO M/N: CMCTR (EUT)	N/A	CMCTR	Shielded Interconnection Cable	P.V.C.
(4) SHINKO	N/A	HOST (Vehicle Controller)	Shielded Interconnection Cable	P.V.C.
(5) TAKASAGO M/N:GPT322 S/N:30290006	N/A (DC5V)	DC Power Supply	Shielded DC Power Cable	P.V.C.
(6) KIKUSUI M/N:PAB25-1TR S/N:30081818	N/A (DC24V)	DC Power Supply	Shielded DC Power Cable	P.V.C.
(7) TAKASAGO M/N:GPT601 S/N:25183147	N/A (DC±12V)	DC Power Supply	Shielded DC Power Cable	P.V.C

1.3 Tested Methodology

Radiated testing were performed according to the procedures in FCC/ANSI C63.4 (1992).

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on

108 Yokowa-cho, Ise-shi, Mie-ken 516-1106 Japan.

This site has been fully described in a report submitted to FCC office, and listed on May 15, 2000(Registration number: 90411).

2 SYSTEM TEST CONFIGURATION

2.1 Operation Environment

Temperature : 21•
Humidity : 78%
Power supply : DC 24V, 5V, ±12V

2.2 Justification

The system was configured in typical fashion (as a customer would normally use it) for testing.

2.3 EUT Exercise Software

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

The sequence is used:

Operation Mode : Communication
Communication between vehicle and vehicle controller is realized by power line communication.
About 300kHz – 350kHz signals are superposed on the power line.

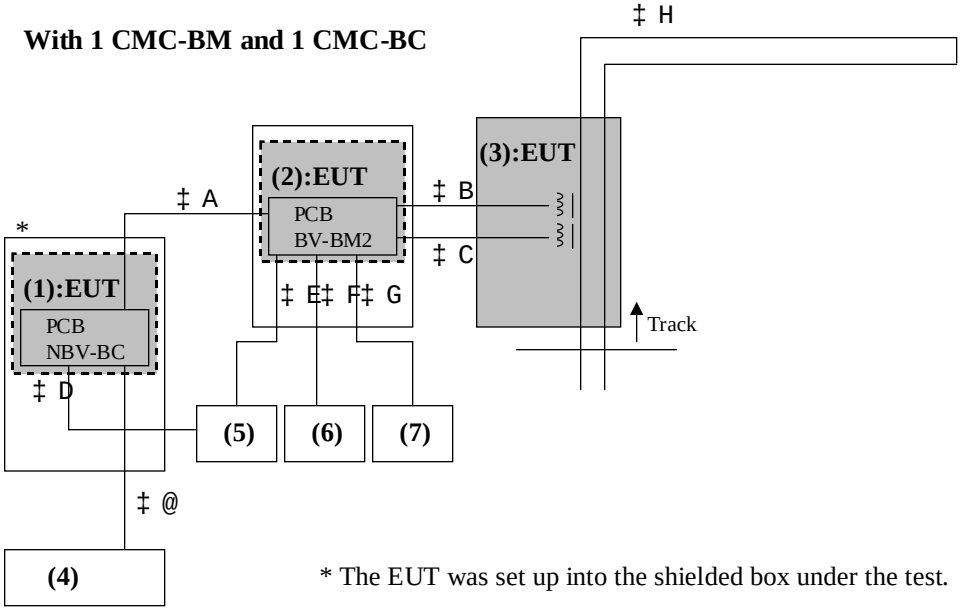
2.4 Test Procedure

Tabletop Equipment Radiated Emissions

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
The measurement distance was 10m.

Figure2.1 Configuration of Tested System

With 1 CMC-BM and 1 CMC-BC

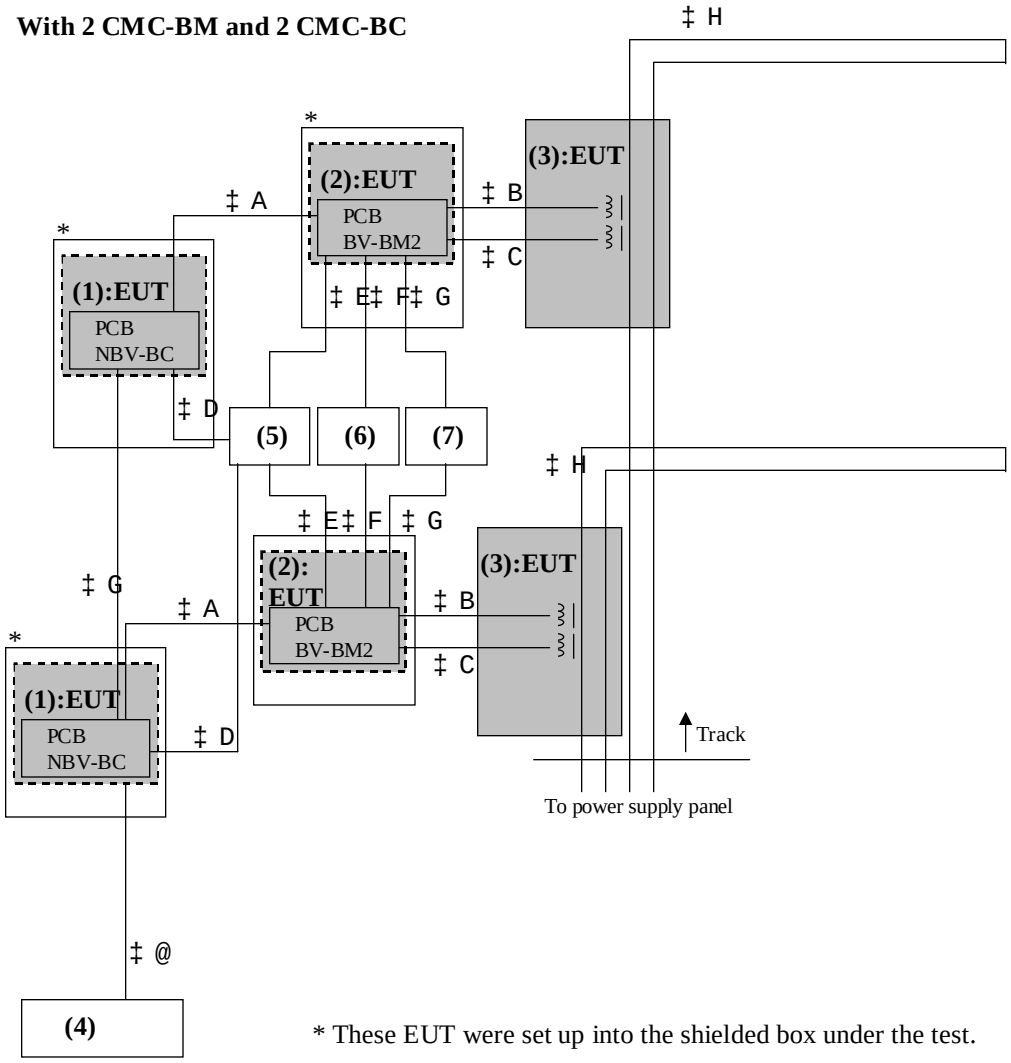


* The EUT was set up into the shielded box under the test.

List of cables used

No.	Name	Length (m)	Shield	Remark
•	Interconnection Cable	3.0	Y	-
•	Interconnection Cable	3.0	Y	-
•	Interconnection Cable	3.0	Y	-
•	Interconnection Cable	3.0	Y	-
•	DC Power Cable	3.0	Y	-
•	DC Power Cable	3.0	Y	-
•	DC Power Cable	3.0	Y	-
•	DC Power Cable	3.0	Y	-
•	Power Supply Cable	4.0	N	-

With 2 CMC-BM and 2 CMC-BC



* These EUT were set up into the shielded box under the test.

Cabling was taken into consideration and test data was taken under worse case conditions.

3 RADIATED MEASUREMENT PHOTOS

Figure 3.1 Radiated Measurement (With 1 CMC-BM and 1 CMC-BC)

Figure 3.2 Radiated Measurement Photo (With 2 CMC-BM and 2 CMC-BC)

4 RADIATED EMISSION DATA

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range (30MHz-1000MHz).
The final data was reported in the worst-case emissions.
The minimum margin to the limit is as follows :

Frequency (MHz)	Receiver Reading (dB•V)	Correction Factor (dB•V)	Field Strength (dB•V/m)	Limit (dB•V/m)	Margin (dB•V)
30.31	44.5	-7.0	38.5	39.0	1.5

* quasi-peak mode

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4.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor and Antenna Pad, and subtracting the Amplifier Gain from the measured reading. The sample calculation is as follows :

FS = RA + AF + CF + AT - AG

where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Factor
AT = Antenna Pad
AG = Amplifier Gain

Assume a receiver reading of 45.4 dB•V is obtained. The antenna Factor of 18.6 dB, Cable Factor of 1.2 dB and Antenna Pad of 3.0 dB is added. The Amplifier Gain of 29.7 dB is subtracted, giving a field strength of 38.5 dB•V/m.

FS = 45.4 + 18.6 + 1.2 + 3.0 – 29.7 = 38.5 dB•V/m

5 TEST EQUIPMENT USED

INSTRUMENTS	Mfr.	MODEL	C/N	Calibrated Until
• Pre Amplifier	Hewlett Packard	8447D	AF-01	November 16, 2000
• Pre Amplifier	Anritsu	MH648A	AF-03	November 16, 2000
• Attenuator	Anritsu	MP721B	AT-04	June 8, 2001
• Attenuator	Anritsu	MP721A	AT-07	June 8, 2001
• Biconical Antenna	Schwarzbeck	BBA9106	BA-01	April 28, 2001
• Biconical Antenna	Schwarzbeck	BBA9106	BA-05	April 28, 2001
• Logperiodic Antenna	Schwarzbeck	UKLP9140-A	LA-08	April 29, 2001
• Loop Antenna	Rohde & Schwarz	HFH2-Z2	LP-01	November 3, 2000
• LISN	Rohde & Schwarz	ESH2-Z5	LS-01	November 15, 2000
• LISN	Rohde & Schwarz	ESH3-Z5	LS-02	November 15, 2000
• LISN	Schwarzbeck	NSLK8127	LS-03	November 15, 2000
• LISN	Rohde & Schwarz	ESH3-Z5	LS-04	November 15, 2000
• LISN	Schwarzbeck	NNLK8121	LS-05	November 15, 2000
• LISN	Rolf Heine	NNB-4/200	LS-06	November 15, 2000
• LISN	Schwarzbeck	NNLK8126	LS-07	November 15, 2000
• LISN	Schwarzbeck	NSLK8127	LS-10	April 8, 2001
• Spectrum Analyzer	Hewlett Packard	8567A	SA-03	December 13, 2000
• Spectrum Analyzer	Hewlett Packard	8567A	SA-04	December 13, 2000
• Test Receiver	Rohde & Schwarz	ESHS-20	TR-01	March 30, 2001
• Test Receiver	Rohde & Schwarz	ESVS-30	TR-02	July 13, 2001
• Test Receiver	Rohde & Schwarz	ESVS-10	TR-04	July 13, 2001
• Test Receiver	Rohde & Schwarz	ESCS30	KTR-01	August 7, 2001

•• indicates EMI Test Equipment used.
*All measurement equipment is traceable to national standard.

APPENDIX

A : Test Data

Radiated emissions A1 – A4

Testing Laboratory
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