ADVANCE DATA TECHNOLOGY CORP.

EMC & SAFETY TESTING LABORATORY

Certificate of Compliance

We hereby certify that:

The product : DISTRIBUTED DA & C SYSTEM BASED ON CAN

Trade Name : ADVANTECH

Model No. : PCM-3680

Applicant : ADVANTECH CO., LTD.

one sample of the designation has been tested in our facility on Sept. 12 ~ Sept. 22, 1998. The test record, data evaluation and Equipment Under Test (EUT) configuration represented in our report no. CE87090707, are in compliance with the following standards:

EN 55022:1994+A1: 1995+A2: 1997, Class A
EN 50082-1:1992
IEC 801-2:1984
IEC 801-3:1984
IEC 801-4:1988

Mike Su / Project Manager

Issue Date: Oct. 2, 1998

No.47, 14 Ling, Chia Pau Tsuen, Linkou Hsiang, Taipei Hsien, Taiwan, R.O.C. Telephone:02-6022180 Fax:02-6020942

EMC

TEST REPORT

REPORT NO. : CE87090707
MODEL NO. : PCM-3680
DATE OF TEST : Sept. 12 ~ Sept. 22, 1998

PREPARED FOR : ADVANTECH CO., LTD.

ADDRESS : FL. 4, NO. 108-3, MING-CHUAN ROAD,
SHING-TIEN CITY TAIPEI HSIEN, TAIWAN

PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION

NVLAP®
Accredited Laboratory

12F, NO.1, SEC.4, NAN-KING EAST RD.,
TAIPEI, TAIWAN, R.O.C.

TABLE OF CONTENTS

1.

CERTIFICATION

Issue date: Sept. 25, 1998

Product	:	Dual-port Isolated CAN Interface Module
Trade Name	:	ADVANTECH
Model No.	:	PCM-3680
Applicant	:	ADVANTECH CO., LTD.
Standard	:	EN 55022:1994+A1: 1995+A2: 1997, Class A
		EN 50082-1:1992
		IEC 801-2: 1984
		IEC 801-3:1984
		IEC 801-4:1988

We hereby certify that one sample of the designation has been tested in our facility Sept. 12 to Sept. 22, 1998. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

CHECKED BY: Ariel Hsieh, DATE: 9/25/'98
(Ariel Hsieh)

APPROVED BY: Mike Su, DATE: 9/25/98
(Mike Su)

ADVANCE DATA TECHNOLOGY CORPORATION

NVLAP®
Accredited Laboratory

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	Dual-port Isolated CAN Interface Module
Model No.	:	PCM-3680
Power Supply Type	:	DC (from PC)
Power Cord	:	N/A

Note: The EUT, **Dual-port Isolated CAN Interface Module**, is a special purpose communication module which enables a PC to be connected to a Controller Area Network (CAN). With the built-in CAN controller, the EUT provides bus arbitration and error detection with automatic transmission repeat function.

The EUT was tested together with the following three items, their brand: ADVANTECH:

- MODEL: **ADAM-5000/CAN**: Distributed DA & C System Based on CAN.
- MODEL: **ADAM-4525**: Isolated RS-232 to CAN Converter.
- MODEL: **ADAM-4515**: CAN Repeater.

ADAM-4525 is equipped with a built-in microprocessor, which uses one UART/CAN controller and automatically processes data before transmitting it to the RS-232 connected device. This enables ADAM-4525 to utilize different baud rates between the RS-232 and the CAN network. The microprocessor also handles the setting of communication rates for both RS-232 and CAN.

ADAM-4515 repeater simply amplifies, or boosts, existing CAN signals to enable them to cover longer distances. It extends the network communication distance by anywhere from 40m to 1,000m, depending on ht data transfer rate, and increases the maximum number of connected nodes by 64.

The EUT was installed in HP PC, model: VL SERIES 4 5/100.

For more detailed features description, please refer to manufacturer's specification and User's Manual.

2.2 GENERAL DESCRIPTION OF APPLIED STANDARD

According to the manufacturer's request, the EUT was tested with the requirements of the following standards:

EN 55022:1994+A1: 1995+A2: 1997, Class A

EN 50082-1:1992
IEC 801-2: 1984
IEC 801-3:1984
IEC 801-4:1988

All tests are performed and recorded as per above standards.

2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories are used to form representative test configuration during the tests.

EMISSION TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	PC	HP	VL SERIES 4 5/100	SG60500410	Nonshielded Power (1.8m)
2	MONITOR	ADI	PD-959	730020U00100373	Shielded Signal (1.5m) Nonshielded Power (1.8m)
3	KEYBOARD	FORWARD	FDA-104GA	FDKB8110109	Shielded Signal (1.4m)
4	PRINTER	HP	2225C+	3123S97230	Shielded Signal (1.2m) Nonshielded Power (2.0m)
5	MODEM	ACEEX	1414	980020504	Shielded Signal (1.5m) Nonshielded Power (2.0m)
6	MOUSE	DEXIN	A2P800A	80110011	Shielded Signal (1.5m)
7	VGA CARD	GORDIA	CP765	V102076	N/A
8	DISTRIBUTED DA & C SYSTEM BASED ON CAN	ADVANTECH	ADAM-5000/CAN	N/A	N/A
			ADAM-4525		
			ADAM-4515		

Note: 1. A cable (1.0m) was connected between the COM2 port of PC and ADAM-4525.
2. A cable (1.0m) was connected between EUT: PCM-3680 and ADAM-4515.
3. A cable (1.0m) was connected between PCL-841 and ADAM-5000/CAN
4. A cable (0.8m) was connected to EUT: PCM-3680 to form an open loop cable.
5. A cable (0.8m) was connected to ADAM-5000/CAN to form an open loop cable.

IMMUNITY TEST

No	Product	Brand	Model No.	Serial No.	I/O Cable
1	PC	HP	VL SERIES 4 5/100	SG60500410	Nonshielded Power (1.8m)
2	MONITOR	ADI	PD-959	730020U00100373	Shielded Signal (1.5m) Nonshielded Power (1.8m)
3	KEYBOARD	FORWARD	FDA-104GA	FDKB8110109	Shielded Signal (1.4m)
4	PRINTER	HP	2225C+	3123S97230	Shielded Signal (1.2m) Nonshielded Power (2.0m)
5	MODEM	ACEEX	1414	980020504	Shielded Signal (1.5m) Nonshielded Power (2.0m)
6	MOUSE	DEXIN	A2P800A	80110011	Shielded Signal (1.5m)
7	VGA CARD	GORDIA	CP765	V102076	N/A
8	DISTRIBUTED DA & C SYSTEM BASED ON CAN	ADVANTECH	ADAM-5000/CAN	N/A	N/A
			ADAM-4525		
			ADAM-4515		

Note: 1. A cable (1.0m) was connected between the COM2 port of PC and ADAM-4525.
2. A cable (1.0m) was connected between EUT: PCM-3680 and ADAM-4515.
3. A cable (1.0m) was connected between PCL-841 and ADAM-5000/CAN
4. A cable (0.8m) was connected to EUT: PCM-3680 to form an open loop cable.
5. A cable (0.8m) was connected to ADAM-5000/CAN to form an open loop cable.

2.4 TEST SETUP

Please refer to the photos of test configuration in Item 6.

3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP Spectrum Analyzer	8590L	3544A01042	April 29, 1999
HP Preamplifier	8447D	2944A08313	Sept. 18, 1998
ROHDE & SCHWARZ TEST RECEIVER	ESVS 30	841977/008	Oct. 5, 1998
SCHWARZBECK Tunable Dipole Antenna	VHA 9103 UHA 9105	E101051 E101055	Nov. 28, 1998
CHASE BiLOG Antenna	CBL6111A	1647	July 3, 1999
EMCO Turn Table	1016	1722	N/A
EMCO Tower	1051	1825	N/A
Open Field Test Site	Site 4	ADT-R04	June 19, 1999

Note: 1. The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESHS30	828765/002	July 29, 1999
ROHDE & SCHWARZ Artificial Mains Network	ESH2-Z5	828075/003	July 27, 1999
EMCO-L.I.S.N.	3825/2	90031627	July 27, 1999
Shielded Room	Site 5	ADT-C05	N/A

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

3.2 TEST INSTRUMENTS (IMMUNITY)

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
KeyTek, ESD Test System	2000	9105240/41	Aug. 9, 1999
KeyTek, ESD Simulator	MZ-15/EC	9507277	April 15, 1999
KeyTek, EFT Generator	CE-40	9508257	Sept. 8, 1999
KeyTek, Capacitive Clamp	CE-40-CCL	9508259	Sept. 8, 1999
ROHDE & SCHWARZ Signal Generator	SMY01	840490/009	Sept. 29, 1998
KALMUS Power Amplifier	LA1000V	091995-1	N/A
KALMUS Power Amplifier	757LC	091995-2	N/A
HOLADAY Field Probe	HI-4422	89915	Oct. 12, 1998
EMCO BiconiLog Antenna	3141	1001	N/A
COMTEST Compact Full Anechoic Chamber (7x3x3 m)	CFAC	ADT-S01	Aug. 4, 1999

Note: The calibration interval of the above test instruments is 12 months.
And the calibrations are traceable to NML/ROC and NIST/USA.

4. TEST RESULTS (EMISSION)

4.1 RADIO DISTURBANCE

Product Family Standard	:	EN 55022+A1: 1995+A2: 1997, Class A
Frequency Range	:	0.15 - 30 MHz (Conducted Emission)
		30 - 1000 MHz (Radiated Emission)
Input Voltage	:	230 Vac, 50 Hz
Temperature	:	24 ℃
Humidity	:	53 %
Atmospheric Pressure	:	998 mbar

TEST RESULT	Remarks
PASS	Minimum passing margin of conducted emission: -33.0 dB at 13.922 MHz Minimum passing margin of radiated emission: -4.7 dB at 80.02 MHz

4.1.1 EUT OPERATION CONDITION

1. Turn on the power of all equipment.
2. PC sends messages to ADAM-4515 via PCM-3680 (EUT).
3. ADAM-5000/CAN receives messages from ADAM-4515 and then repeats the messages back to PC.
4. PC sends messages to ADAM-4525 via COM2 of PC.
5. ADAM-5000/CAN receives messages from ADAM-4525 and then repeats the messages back to PC.
6. Repeat steps 2-6.

4.1.2 TEST DATA OF CONDUCTED EMISSION

EUT: **Dual-port Isolated CAN Interface Module**

MODEL: **PCM-3680**

6 dB Band Width: 10 kHz

TEST PERSONNEL: J. W. KUO

Freq.	L Level		N Level		Limit		Margin [dB (μV)]			
[MHz]	[dB (μV)]		[dB (μV)]		[dB (μV)]		L		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.168	33.00	-	34.00	-	79.00	66.00	-46.0	-	-45.0	-
0.339	30.40	-	32.00	-	79.00	66.00	-48.6	-	-47.0	-
0.945	29.00	-	30.50	-	73.00	60.00	-44.0	-	-42.5	-
2.166	30.20	-	30.00	-	73.00	60.00	-42.8	-	-43.0	-
13.922	40.00	-	39.00	-	73.00	60.00	-33.0	-	-34.0	-
20.009	31.00	-	30.00	-	73.00	60.00	-42.0	-	-43.0	-

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
4. The emission levels of other frequencies were very low against the limit.
5. Margin value = Emission level - Limit value

ADT CO. Shielded Room 5

12, Sep 98 17:21

EN55022 CLASS A

Report No. CE 8709070J

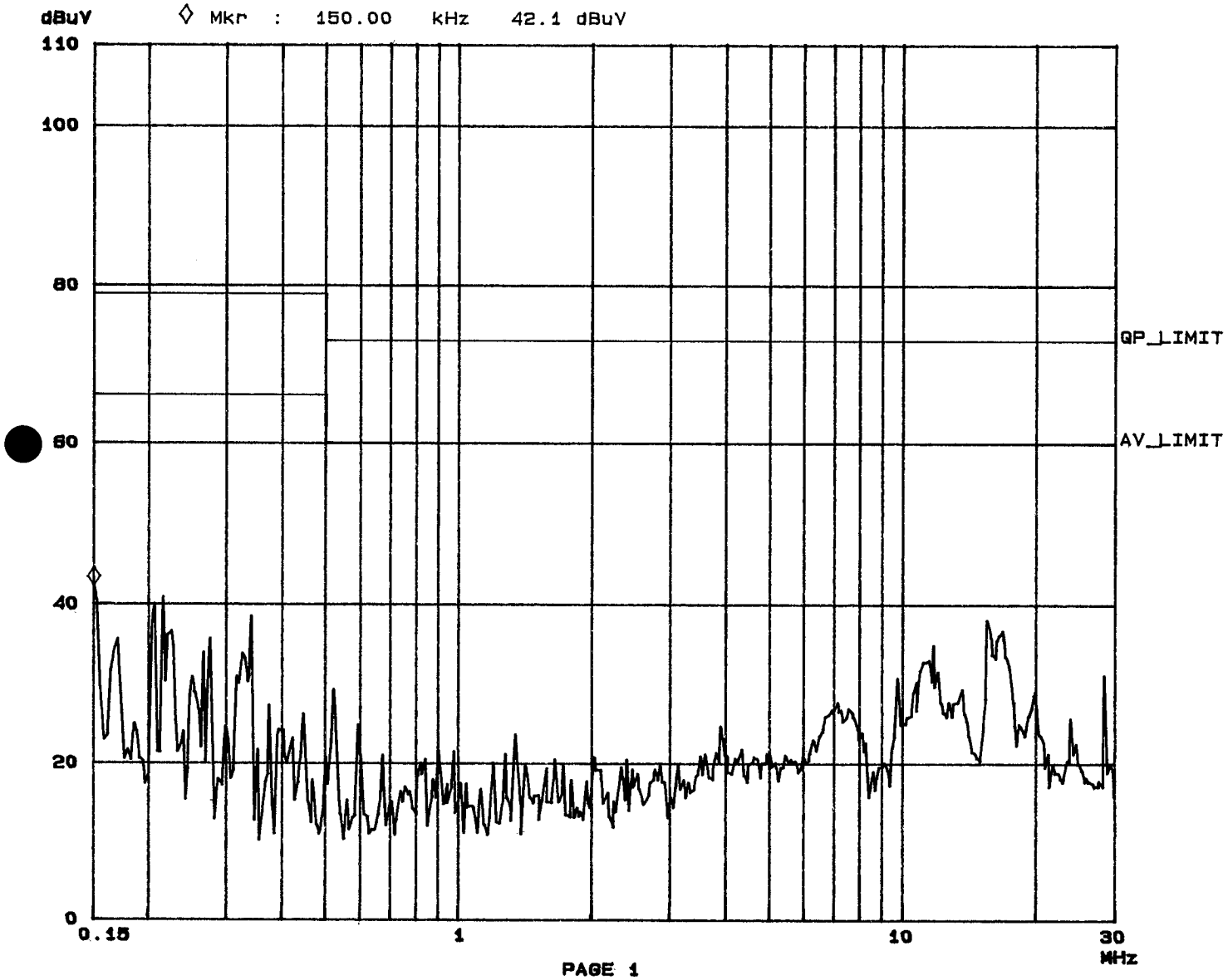
Page 9-1

Tested by J.W. Kuo

EUT: PCM-3680
Test Spec: LISN : L
Comment: 230V AC/50Hz

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	450k	3k	10k	PK	0.05ms	10dBLN	OFF	60dB
450k	5M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB
5M	30M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB



ADT CO. Shielded Room 5

12. Sep 98 17:14

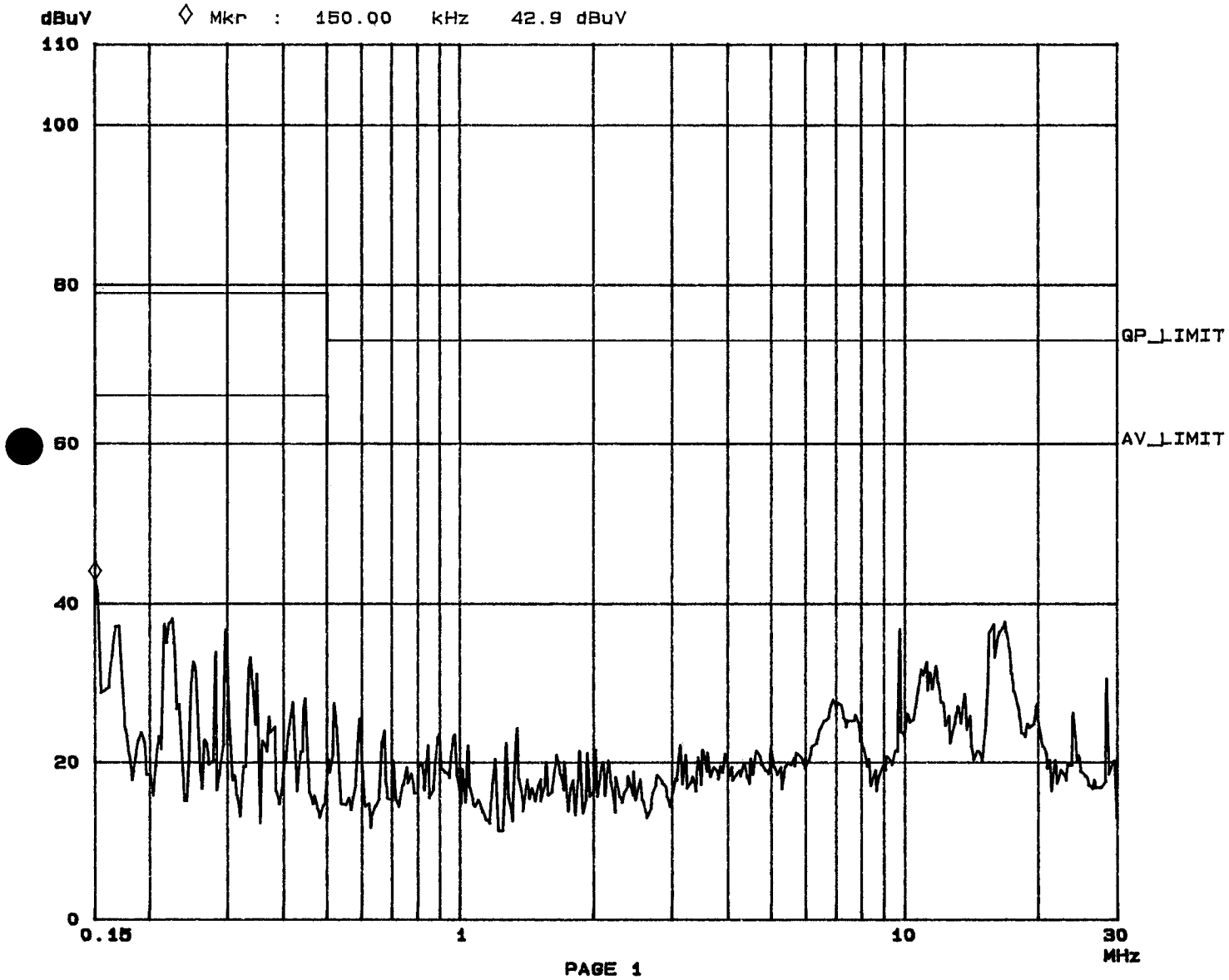
EN55022 CLASS A

EUT: PCM-3680
Test Spec: LISN : N
Comment: 230V AC/50Hz

Report No. CE87090707
Page 9-2
Tested by J.W. KUO

Fast Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150k	450k	3k	10k	PK	0.05ms	10dBLN	OFF	60dB
450k	5M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB
5M	30M	3k	10k	PK	0.05ms	10dBLN	OFF	60dB



4.1.3 TEST DATA OF RADIATED EMISSION

EUT: **Dual-port Isolated CAN Interface Module**

MODEL: **PCM-3680**

ANTENNA: CHASE BILOG CBL6111A POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: J.W. KUO

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
48.00	12.2	14.2	26.4	40.0	-13.6
80.02	9.8	21.7	31.5	40.0	-8.5
132.64	14.3	17.9	32.2	40.0	-7.8
160.00	12.0	18.1	30.1	40.0	-9.9
208.01	12.1	16.6	28.7	40.0	-11.3
232.11	13.7	22.2	35.9	47.0	-11.1
272.01	15.4	21.9	37.3	47.0	-9.7
360.03	18.5	15.6	34.1	47.0	-12.9
440.00	20.0	10.9	30.9	47.0	-16.1

REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB/m) +Meter Reading (dBuV).
2. Correction Factor (dB/m) = Ant. Factor (dB/m)+Cable loss (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

TEST DATA OF RADIATED EMISSION

EUT: **Dual-port Isolated CAN Interface Module**

MODEL: **PCM-3680**

ANTENNA: CHASE BILOG CBL6111A

POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

TEST PERSONNEL: J. W. KUO

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
48.00	10.5	19.7	30.2	40.0	-9.8
80.02	7.1	28.2	35.3	40.0	-4.7
132.64	14.7	18.9	33.6	40.0	-6.4
160.00	12.8	21.8	34.6	40.0	-5.4
208.01	12.4	20.6	33.0	40.0	-7.0
272.01	14.7	22.9	37.6	47.0	-9.4
360.01	20.4	15.7	36.1	47.0	-10.9
440.01	19.8	11.2	31.0	47.0	-16.0

REMARKS:
1. Emission level (dBuV/m) = Correction Factor (dB/m) +Meter Reading (dBuV).
2. Correction Factor (dB/m) = Ant. Factor (dB/m)+Cable loss (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value.

5. TEST RESULTS (IMMUNITY)

5.1 GENERAL DESCRIPTION

Basic Standard	:	IEC 801-2 (Electrostatic Discharge Test, ESD) IEC 801-3 (Radiated Radio-Frequency Disturbance Test, RS) IEC 801-4 (Electrical Fast Transient/Burst Test, EFT)
Generic Standard	:	EN 50082-1
Input Voltage	:	230 Vac, 50 Hz
Temperature	:	23 ℃
Humidity	:	56 %
Atmospheric Pressure	:	999 mbar

5.2 PERFORMANCE CRITERIA DESCRIPTION

Criterion A - The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion B - The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C - Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

5.3 EUT OPERATION CONDITION

Same as item **4.1.1**.

5.4 TEST RESULT OF ELECTROSTATIC DISCHARGE (ESD)

Basic Standard	:	IEC 801-2
Discharge Impedance	:	150 ohm / 150 pF
Discharge Voltage	:	Air Discharge - 8 kV (Direct)
		Contact Discharge - N/A
Polarity	:	Positive
Number of Discharge	:	Minimum 10 times at each test point
Discharge Mode	:	Single Discharge
Discharge Period	:	1-second minimum
Test Personnel	:	

TEST RESULT		Remarks
Criterion A	PASS	MODEL: PCM-3680

OBSERVATION DESCRIPTION

Direct Application			Test Result	
Discharge Level (kV)	Polarity (+/-)	Test Point	Contact Discharge	Air Discharge
8	+	1 ~ 3	N/A	Note 1

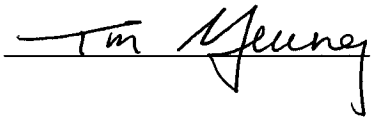
Description of test point:

1. I/O port
2. I/O bracket
3. Ground reference plane

Description of test result:

Note 1: There was no change compared with initial operation during the test.

5.5 TEST RESULT OF RADIATED ELECTROMAGNETIC FIELDS (RS)

Basic Standard	:	IEC 801-3
Frequency range	:	27 MHz - 500 MHz
Field strength	:	3 V/m
Modulation	:	N/A
Frequency step	:	1 % of fundamental
Polarity of Antenna	:	Horizontal and Vertical
Test distance	:	3 m
Test Personnel	:	

TEST RESULT		Remarks
Criterion A	PASS	MODEL: PCM-3680

Note: Four sides of EUT are verified separately.

Description of test result:

There was no change compared with initial operation during the test.

5.6 TEST RESULT OF ELECTRICAL FAST TRANSIENT (EFT)

Basic Standard	:	IEC 801-4
Test Voltage	:	Power Line – 1 kV
		Signal/Control Line - N/A
Polarity	:	Positive/Negative
Impulse Frequency	:	5 kHz
Tr / Tn	:	5/50 ns
Burst Duration	:	15 ms
Burst Period	:	300 ms
Test Duration	:	Not less than 1 min.
Test Personnel	:	

TEST RESULT		Remarks
Criterion A	PASS	MODEL: PCM-3680

OBSERVATION DESCRIPTION

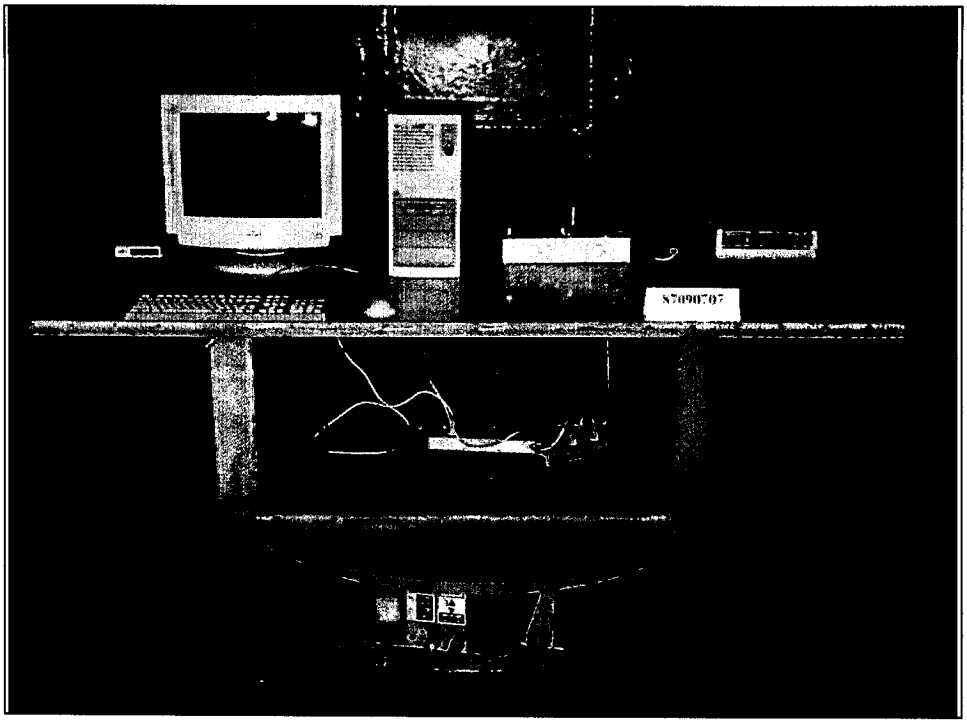
Test Point	Polarity	Test Level (kV)	Result
L1	+/−	1	Note 1
L2	+/−	1	Note 1
GND	+/−	1	Note 1

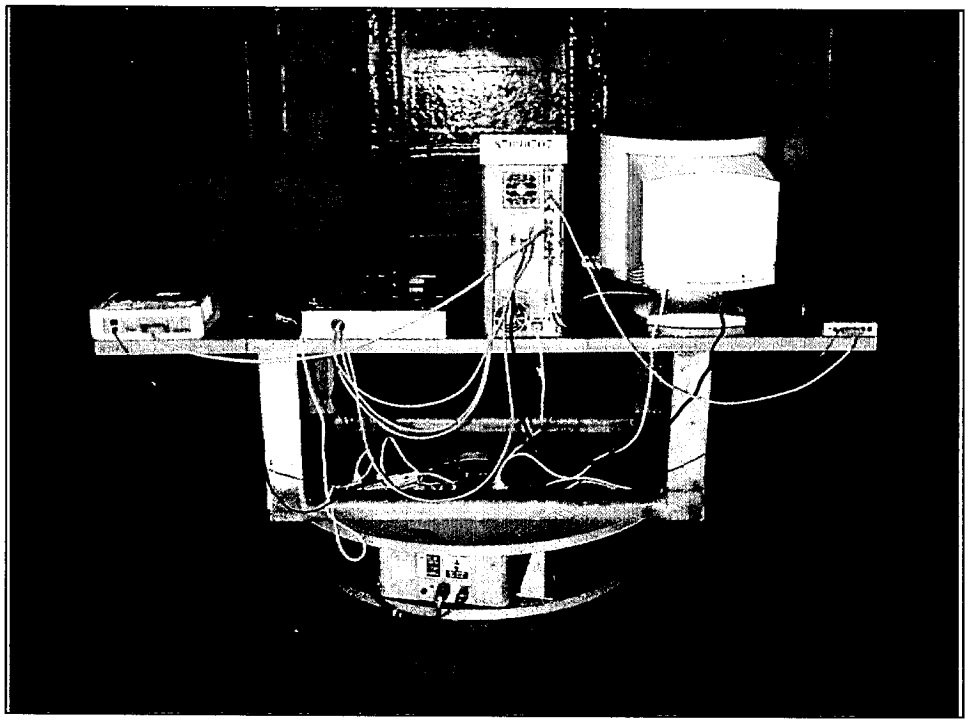
Description of test result:

Note 1: There was no change compared with initial operation during the test.

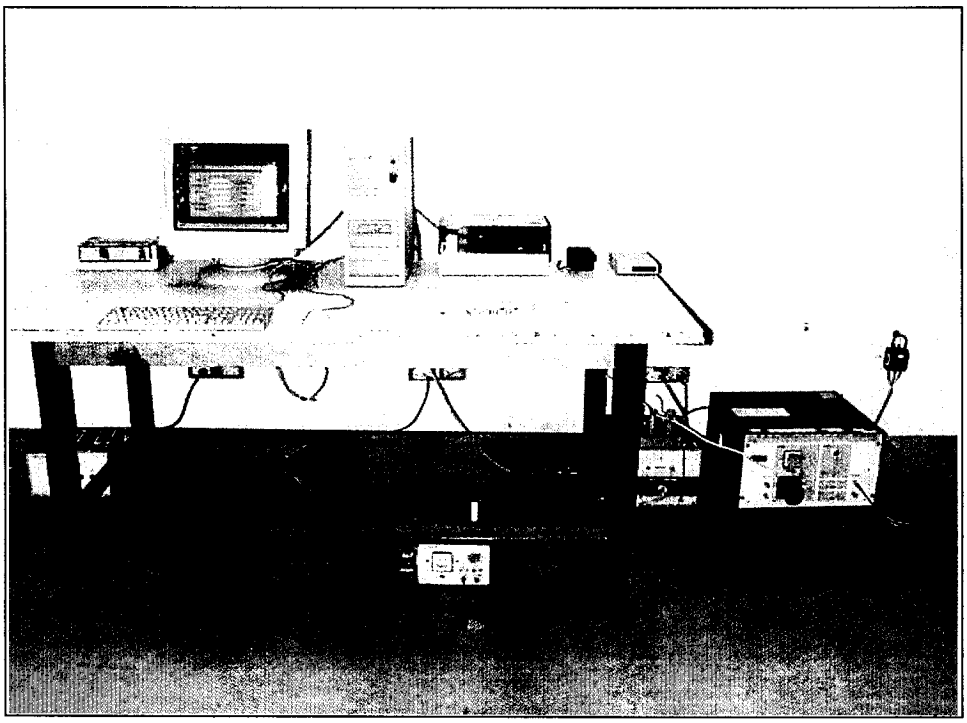
6. PHOTOGRAPHS OF THE TEST CONFIGURATION

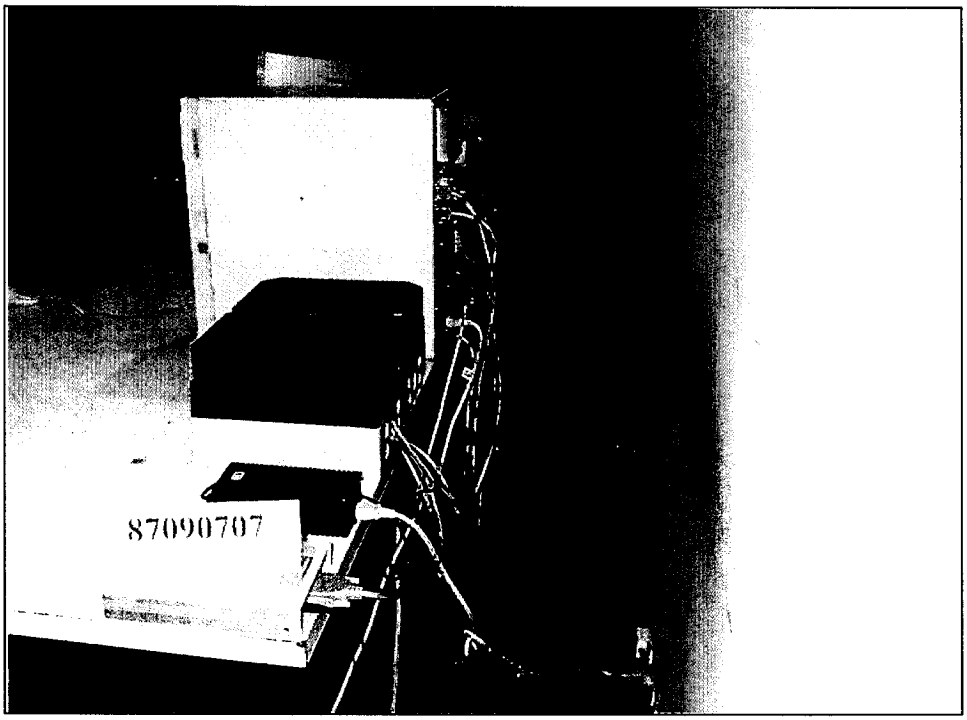
RADIATED EMISSION TEST



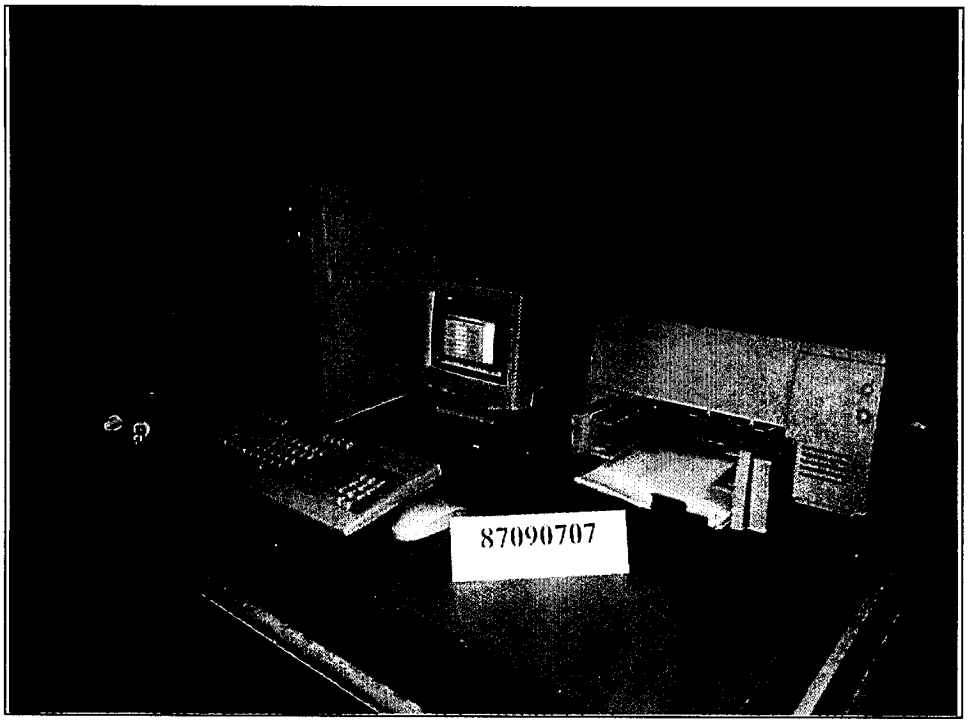


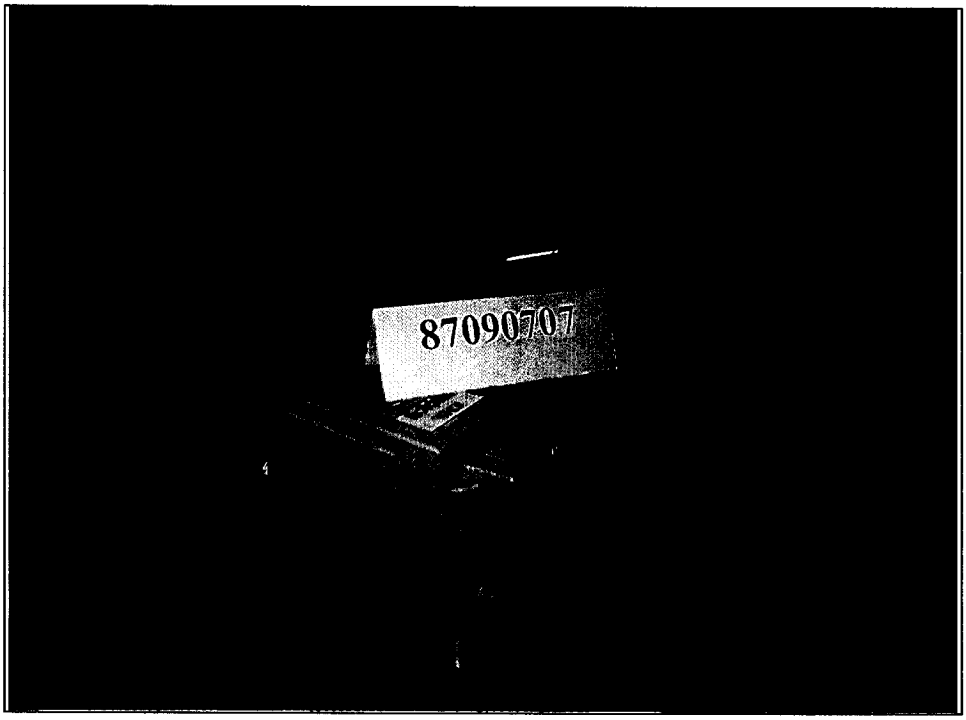
CONDUCTED EMISSION TEST



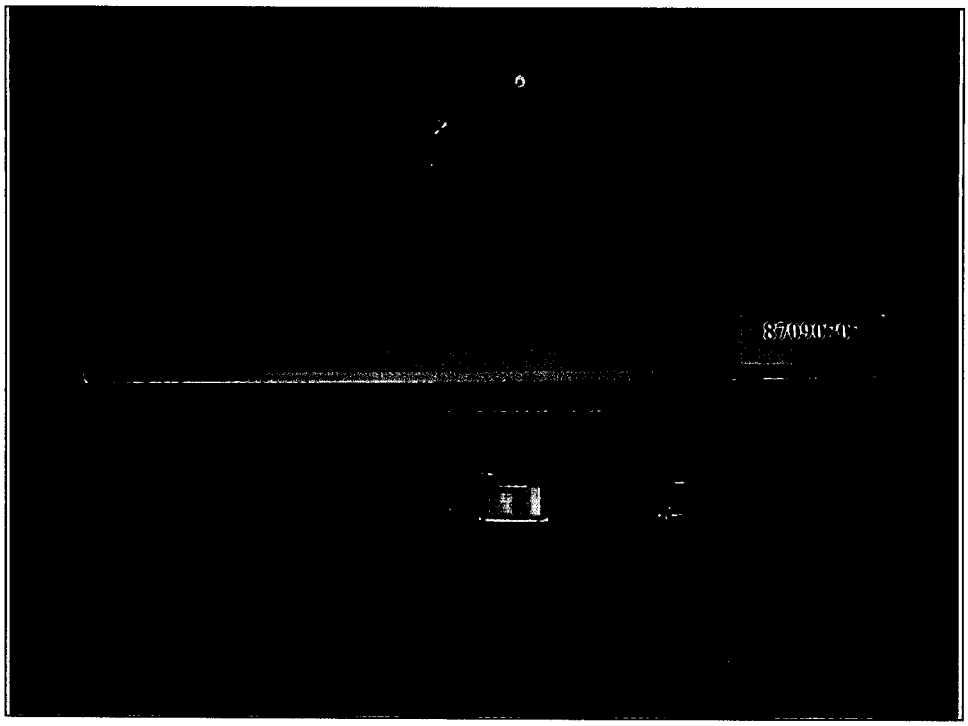


ESD TEST





RS TEST



EFT TEST