



ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

Test report file number : E013R-056

Applicant : C&C ENTERPRISE CO., LTD.

Address : 261, Nonhyun-Dong, Kangnam-Ku, Seoul, 135-010, Korea

Manufacturer : C&C ENTERPRISE CO., LTD.

Address : 261, Nonhyun-Dong, Kangnam-Ku, Seoul, 135-010, Korea

Type of Equipment : BUS VALIDATOR

FCC ID : PMSCCBV-320

Model / Type No. : CCBV-320

Serial number : N/A

Total page of Report : 14 pages (including this page)

Date of Incoming : April 09, 2001

Date of Issuing : May 18, 2001

SUMMARY

The equipment complies with the regulation of *FCC CRF 47 PART 15, SUBPART C, SECTION 15.225, 15.209*.

This test report contains only the results of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

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1. VERIFICATION OF COMPLIANCE

APPLICANT : C&C ENTERPRISE CO., LTD.
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CONTACT PERSON : Mr. Jin-Soo Soh
TELEPHONE NO : +82-2-3467-9613
FCC ID : PMSCCBV-320
MODEL NO/NAME : CCBV-320
SERIAL NUMBER : N/A
DATE : May 03, 2001

DEVICE TYPE	INTENTIONAL RADIATOR
E.U.T. DESCRIPTION	BUS VALIDATOR
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15, SECTION 15.225, 15.209
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3/10 METER OPEN AREA TEST SITE

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.



2. GENERAL INFORMATION

2.1 Product Description

The C&C ENTERPRISE CO., LTD., Model CCBV-320 (referred to as the EUT in this report) is a BUS VALIDATOR, which is installed in the entrance of bus, reads and validates the RF card and deducts the amount of RF Card automatically. The EUT is composed of two main parts as Main Unit and Driver's Control Unit. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
RF FREQUENCY	13.56 MHz
TRANSMISSION SPEED	106 Kbps
READING DISTANCE	Within 10cm
COMMUNICATION PROTOCOL	Handshake, Half Duplex
ANETNNA SIZE	45 X 88mm(Width X Length)
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	8 MHz, 3.69 MHz, 16 MHz
POWER REQUIREMENT	DC 6 ~ 60V
EXTERNAL CONNECTOR	2 RS-232 Ports, 2 Input Power Terminals

Model Differences:

-. The difference(s) compared to the EUT is as follows: none

2.2 Related Submittal(s) / Grant(s)

Original submittal only

2.3 Test System Details

The model numbers for all the equipments that were used in the tested system is:

Model	Manufacturer	FCC ID	Description	Connected to
CCBV-320	C&C ENTERPRISE CO., LTD.	PMSCCBV-320	BUS VALIDATOR (EUT)	-
N/A	C&C ENTERPRISE CO., LTD.	N/A	RF CARD	-
E3642A	H.P.	N/A	DC Power Supply	EUT

2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/1992. Radiated testing was performed at a distance of 3/10 meters from EUT to the antenna.



2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on January 12, 1999. (Registration Number: 92819)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE		MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN BODY	MAIN B'D	C&C ENTERPRISE CO., LTD.	N/A	N/A
	RF B'D	MIFARE	GCI681	N/A
	RF ANT. B'D	C&C ENTERPRISE CO., LTD.	N/A	N/A
	LED B'D	C&C ENTERPRISE CO., LTD.	N/A	N/A
DRIVER'S CONTROL UNIT	MAIN B'D	C&C ENTERPRISE CO., LTD.	N/A	N/A
	FUNCTION KEY B'D	C&C ENTERPRISE CO., LTD.	N/A	N/A
	LED B'D	C&C ENTERPRISE CO., LTD.	N/A	N/A

3.2 EUT exercise Software

During the testing, the EUT is continuously transmitting and monitoring the presence of an RF Card.

3.3 Cable Description

		Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
BUS VALIDATOR (EUT)	MAIN BODY	N	Y	1.2(P), 1.0(D)
	DRIVER'S CONTROL UNIT	N/A	Y	1.0(D)

* The marked "(P)" means the Power Cable.

3.4 Noise Suppression Parts on Cable

		Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
BUS VALIDATOR (EUT)	MAIN BODY	N	N/A	Y	BOTH END
	DRIVER'S CONTROL UNIT	N	N/A	Y	BOTH END



3.5 Equipment Modifications

The EUT complied with the applicable requirements without modifications during the testing.

3.6 Configuration of Test System

Line Conducted Test: It does not need to test this requirement, because the power of the EUT is supplied from the DC power of the bus.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4/1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3/10 meters open area test site.

Frequency Stability Test: The EUT was placed in an environmental chamber at 20°C and allowed to stabilize (minimum 30 minute soak). The nominal operating frequency was measured at this time with a small loop probe connected to a spectrum analyzer placed near the EUT. The EUT was then powered off and allowed to stabilize. With the DC input voltage at 115% of nominal, the test sample was powered on and operating frequency measurements were made at startup and 2, 5, and 10 minutes after power on. This procedure was repeated for all required temperature and voltage conditions.

3.7 Antenna Requirement

For intentional device, according to FCC Part 15 section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is built-in on the PCB in the EUT, no consideration of replacement by the user.



4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
N/A	N/A

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode (TX Mode)	X
Receiving Mode (RX Mode)	



5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level

5.1 Conducted Emission Test

Humidity Level : %

Temperature : °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.207

Result : PASSED BY dB at MHz

EUT : BUS VALIDATOR

Date: .

Operating Condition :

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Power Line Conducted Emissions			FCC Limit	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)
<i>It is not need to test this requirement, because the power of the EUT is supplied from the DC power of the bus.</i>				

Line Conducted Emissions Tabulated Data



5.2 Radiated Emission Test below 30 MHz

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 54 % Temperature : 18 °C
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225, 209
Result : PASSED BY -13.71 dB at 13.56 MHz

EUT : BUS VALIDATOR Date: April 04, 2001
Operating Condition : Transmitting mode
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)
Distance : 10 Meter

Radiated Emissions		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.56	85.2	V	9.49	0.70	85.39	99.1	-13.71
27.12	21.5	V	8.05	0.75	30.30	48.6	-18.30

Note: According to the distance of measurements was reduced to 10 meters, the limit was extrapolated by using the square of an inverse linear distance extrapolation factor (40dB/decade) as follows.

Limit calculation: Limit at specified distance + $40\log(30/10)$ = Limit + 19.1dB


Tested by: Young-Min, Choi/ Project Engineer



5.2 Radiated Emission Test from 30 MHz to 1000 MHz

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 54 %

Temperature : 18 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Result : PASSED BY -5.26 dB at 54.24 MHz

EUT : BUS VALIDATOR

Date: April 04, 2001

Operating Condition : Transmitting mode

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

Distance : 3 Meter

Radiated Emissions		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
54.24	23.40	V	10.37	0.97	34.74	40.00	-5.26
67.80	15.80	V	8.05	1.00	24.85	40.00	-15.15
81.36	22.20	V	6.76	1.03	29.99	40.00	-10.01
94.92	26.10	V	10.15	1.13	37.38	43.50	-6.12
108.48	14.60	V	13.59	1.19	29.38	43.50	-14.12
122.04	15.30	V	13.55	1.24	30.09	43.50	-13.41
135.60	14.80	V	12.46	1.29	28.55	43.50	-14.95

Radiated Emissions Tabulated Data


Tested by: Young-Min, Choi/ Project Engineer



5.3 Frequency Stability Test-Input DC Voltage

The following table shows the frequency deviation measured on a sample of the transmitter board compared to FCC CFR 47, Part 15, subpart C, section 15.225 limits of 0.01% with respect to input DC voltage.

EUT : BUS VALIDATOR

Date: April 06, 2001

Condition	Time [min]	Frequency [Hz]	% Deviation from nominal	Result
20°C/24VDC (Nominal)	N/A	13560036	N/A	N/A
20°C/27.6VDC (115% Nom DC)	0	13560035	<<0.01%	Below limit
	2	13560037	<<0.01%	Below limit
	5	13560035	<<0.01%	Below limit
	10	13560035	<<0.01%	Below limit
20°C/20.4VDC (85% Nom DC)	0	13560036	<<0.01%	Below limit
	2	13560037	<<0.01%	Below limit
	5	13560035	<<0.01%	Below limit
	10	13560037	<<0.01%	Below limit


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**5.4 Frequency Stability Test-Temperature**

The following table shows the frequency deviation measured on a sample of the transmitter board compared to FCC CFR 47, Part 15, subpart C, section 15.225 limits of 0.01% with respect to temperature.

EUT

: BUS VALIDATOR

Date: May 18, 2001

Condition	Time [min]	Frequency [Hz]	% Deviation from nominal	Result
20°C/24VDC (Nominal)	N/A	13560036	N/A	N/A
50°C/24VDC	0	13560041	<<0.01%	Below limit
	2	13560043	<<0.01%	Below limit
	5	13560041	<<0.01%	Below limit
	10	13560041	<<0.01%	Below limit
40°C/24VDC	0	13560040	<<0.01%	Below limit
	2	13560042	<<0.01%	Below limit
	5	13560041	<<0.01%	Below limit
	10	13560041	<<0.01%	Below limit
30°C/24VDC	0	13560039	<<0.01%	Below limit
	2	13560040	<<0.01%	Below limit
	5	13560041	<<0.01%	Below limit
	10	13560041	<<0.01%	Below limit
20°C/24VDC	0	13560036	<<0.01%	Below limit
	2	13560037	<<0.01%	Below limit
	5	13560037	<<0.01%	Below limit
	10	13560039	<<0.01%	Below limit
10°C/24VDC	0	13560040	<<0.01%	Below limit
	2	13560042	<<0.01%	Below limit
	5	13560040	<<0.01%	Below limit
	10	13560040	<<0.01%	Below limit
0°C/24VDC	0	13560041	<<0.01%	Below limit
	2	13560043	<<0.01%	Below limit
	5	13560039	<<0.01%	Below limit
	10	13560039	<<0.01%	Below limit
-10°C/24VDC	0	13560042	<<0.01%	Below limit
	2	13560044	<<0.01%	Below limit
	5	13560046	<<0.01%	Below limit
	10	13560046	<<0.01%	Below limit
-20°C/24VDC	0	13560043	<<0.01%	Below limit
	2	13560043	<<0.01%	Below limit
	5	13560045	<<0.01%	Below limit
	10	13560045	<<0.01%	Below limit



Tested by: Young-Min, Choi/ Project Engineer

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EMC-004 (Rev.0)

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EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-Kun, Kyunggi-Do 464-860 Korea. (TEL: 82-31-765-8289 FAX: 82-31-766-2904)



6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+ Meter reading (dBuV)

+ Cable Loss (dB)

+ Antenna Factor (Loss) (dB/meter)

= Corrected Reading (dBuV/meter)

- Specification Limit (dBuV/meter)

= dB Relative to Spec (+/- dB)



7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/00	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	APR/01	12MONTH	■
3.	Spectrum analyzer	HP	8568B	3109A05456	APR/01	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	APR/01	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/01	12MONTH	■
6.	Loop Antenna	EMCO	6502	9108-2668	DEC/00	12MONTH	■
7.	Dipole Antenna	EMCO	3121C	9107-745	JUN/00	12MONTH	
8.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	APR/01	12MONTH	■
9.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	APR/01	12MONTH	■
10.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/00	12MONTH	
11.	Computer System	HP	98581C	98543A	N/A	N/A	■
	Hard disk drive		9153C	CMC762Z9153	N/A	N/A	■
12.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
13.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
14.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
15.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■