CERTiTEK

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EMC TEST REPORT For FCC

Test Report No.	:	CTK03-F068
Date of Issue	:	June 23, 2003
Model/Type No:	:	SC-M-1514
FCC ID	:	QQMSC-M-1514
Kind of Product	:	TFT LCD Monitor
Applicant	:	Collins Inc.
Applicant Address	:	427-2 Noha-ri Paltan-myun Hwasung-city Gyunggi-do 445-913 Korea
Manufacturer	:	Collins Inc.
Manufacturer Address	:	427-2 Noha-ri Paltan-myun Hwasung-city Gyunggi-do 445-913 Korea
Contact Person	:	Mr. Soonwon, Seo (Manager)
Telephone	:	+82-31-354-8688
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

The test results presented in this report relate only to the object tested.

CERTiTEK Standards Laboratory Co., Ltd. is accredited by Korea Laboratory Accreditation Scheme (KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

Tested by

Joon Pak
EMC Test Engineer
Date: June 23, 2003

Reviewed by

James Hong
EMC Technical Manager
Date: June 23, 2003

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REPORT REVISION HISTORY

Date	Revision	Page No
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1.0 General Product Description

1.0.1 Tested Equipment

☒ Unless otherwise indicated, all tests were conducted on Model SC-M-1514.
☐ Tests performed on Model _____ were considered to be representative of Model(s) _____.

1.0.2 Equipment Size, Mobility and Identification

Dimensions:	Approx. 375 by 330 by 20	☒ mm ☐ in
Mobility:	☐ Hand-Held ☒ Table-top	☐ Floor-standing
	☐ -	
Serial No.:	Not applicable	

1.0.3 Electrical Ratings

Input:	Adaptor 1 – AC 100-240V, 1.5A
	Adaptor 2 – AC 100-240V, 1.0A
	EUT – DC 12V, 2.0A / DC 5V, 2.0A
Output:	Adaptor 1 – DC 12V, 2.7A / DC 5V, 2.0A
	Adaptor 2 – DC 12V, 2.0A / DC 5V, 2.0A
	EUT – Not applicable

1.0.4 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

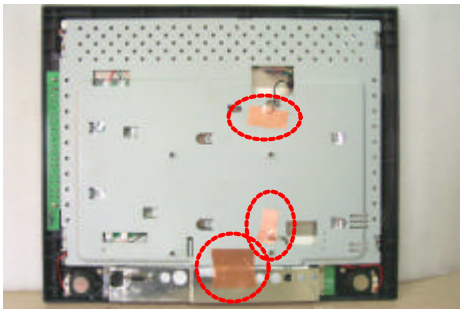
Voltage:	AC 120V
Frequency:	60Hz

1.0.5 Clock & Other Frequencies Utilized

MCU : 12MHz
LCD Controller : 14.31818MHz

1.1 Device Modifications

The following modifications were necessary for compliance:
As below photo, some copper tape will be used in internal chassis.



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1.2 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
AC adaptor 1	NEO ELECTRONICS	NE-012B	n/a	n/a
AC adaptor 2	C&C TECH	CE92HM	CCIQT024889165	n/a
Desktop PC	HEWLETT-PACKARD	DTPC27	5G01501776	DoC
Keyboard	SAN HAWK TECIING	KB120	n/a	D840902
Mouse (PS/2)	PANWEST	Cyber Beetle	PM1F184045737	DoC
Mouse (USB)	PANWEST	Cyber Beetle	PM1F144009945	DoC
Mouse (Serial)	Microsoft	BASM1	4476266-20000	DoC

☒ Cable Description

#	Description	Ferrited	Length (m)	Other Details
1	AC power cable, Unshielded	No	1.8	Connect to AC power
2	DC output cable, Shielded	Yes	0.7	Between the EUT and adaptor
3	Monitor cable, Shielded	Yes	1.5	Between the EUT and PC
4	Line-In cable, Unshielded	No	2.1	Between the EUT and PC
5	AC power cable, Unshielded	No	1.8	Connect to AC power
6	Keyboard cable, Shielded	No	1.2	n/a
7	Mouse cable, Shielded	No	1.5	Serial type
8	Mouse cable, Shielded	No	1.5	PS/2 type
9	Mouse cable, Shielded	No	1.5	USB type

n/a = not available

1.3 Test Software

☐ Pinging
☒ Name / Manufacturer / Version / Type of Pattern
- EMC Test / Compaq Computer / 1.0 / Scrolling 'H'

1.4 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

☒ Test program (H-Pattern) ☐ Test program (color bar)
☐ Standby ☐ Test program (customer specific)
☒ Resolution / Refresh Rate - 1024 x 768 / 60Hz

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1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.6 Test Facility

The measurement facility is located at 386-1, Ho-Dong, Yongin-City, Kyungki-Do, Korea 449-100. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.7 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested.
Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)
Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Open Area Test Site. Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-1992 7.2.3, 7.2.4, 8.3.1.1, 8.3.1.2

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1.8 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	**FCC**	3 and 10 meter Open Area Test Sites to perform FCC Part 15/18 measurements.	93250
JAPAN	**VCCI**	10 meter Open Area Test Site and one conducted site.	R-948, C-986
KOREA	**MIC**	EMI (CE, RE) EMS (ESD, Burst, RS, Surge, CS, Power-Frequency Susceptibility, Voltage Dips and Short Interruptions)	No. 51, KR0025
International	**KOLAS**	EMC	
Europe	**GLAS**	EMC EN 55011, EN 55022, EN 55024, EN 61326, EN 50130-4, EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2, EN 61000-6-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11, EN 61000-3-2, EN 61000-3-3	No.13000796-02

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2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

☐ EN 50081-1:1992

☐ EN 55011:1998 +A1:1999 ☐ Group 1 ☐ Group 2
☐ Class A ☐ Class B

☐ EN 55013:1990 +A12:1994 +A13:1996 +A14:1999
☐ EN 55013:2001

☐ EN 55014-1:1993 +A1:1997 +A2:1999 ☐ Household appliances and similar
☐ Portable tools
☐ Semiconductor devices
☐ EN 55014-1:2000
☐ EN 55014-2:1997

☐ EN 55015:1996 +A1:1997 +A2:1999
☐ EN 55015:2000

☐ EN 55020:1994 +A11:1996 +A13:1999 +A14:1999
☐ EN 55020:1994 +A11:1996 +A12:1999 +A13:1999 +A14:1999

☐ EN 55022:1994 +A1:1995 +A2:1997 ☐ Class A ☐ Class B
☐ EN 55022:1998 +A1:2000 ☐ Class A ☐ Class B

☐ EN 61000-3-2:1995 +A1:1998 +A2:1998
☐ EN 61000-3-2:1995 +A1:1998 +A2:1998 +A14:2000
☐ EN 61000-3-2:2000
☐ EN 61000-3-3:1995

☐ VCCI V-3/99.05 : 1999 ☐ Class A ☐ Class B

☒ FCC Part 15 SUBPART B ☐ Class A ☒ Class B

☒ CISPR 22 (1997) ☐ Class A ☒ Class B

☐ AS 3548 (1992) ☐ Class A ☐ Class B

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2.1 Conducted Voltage Emissions

Test Date
April 2, 2003

Test Location
EMI-CE: Shielded Room

Test Instruments

☒ Field Strength Meter	Rohde & Schwarz	ESHS30	828144/002

Test Accessories

☐ LISN	EMCO	3825/2	9206-1971
☒ LISN	EMCO	3825/2	9409-2246
☒ LISN	EMCO	3825/2	9607-2574
☒ Control PC	HP	Vectra 500	SG72000192

Frequency Range of Measurement
☒ 150 kHz to 30 MHz
☐ 450 kHz to 30 MHz
☐ _____

Instrument Settings
IF Band Width: 9 kHz

Test Results
The requirements are:

☒ MET — Adaptor 1 - minimum margin is 5.1 dBuV at 0.18 MHz
Adaptor 2 - minimum margin is 3.5 dBuV at 0.87 MHz
☐ NOT MET — limit exceeded by maximum of ____ dBuV at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data.

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2.2 Radiated Electric Field Emissions

Test Date
April 2, 2003

Test Location
☒ EMI-OATS: Testing was performed at a test distance of 10 m
☐ EMI-OATS: Testing was performed at a test distance of 3 m

Test Instruments

☒ Field Strength Meter	Rohde & Schwarz	ESVS30	826638/008

Test Accessories

☒ ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014
☐ Biconical Antenna	Schwarzbeck	BBA9106	41-00201
☐ Biconical Antenna	EMCO	3110B	9607-2564
☐ Log-periodic Antenna	EMCO	3146	9607-4567

Frequency Range of Measurement
30 MHz to 1 GHz

Instrument Settings
IF Band Width: 120 kHz

Test Results
The requirements are:

☒ MET — Adaptor 1 - minimum margin is 4.00 dB (uV/m) at 138.00 MHz
Adaptor 2 - minimum margin is 4.46 dB (uV/m) at 904.68 MHz
☐ NOT MET — limit exceeded by maximum of ____ dB(uV/m) at _____ MHz
☐ NOT APPLICABLE

Remarks
See Appendix A for test data

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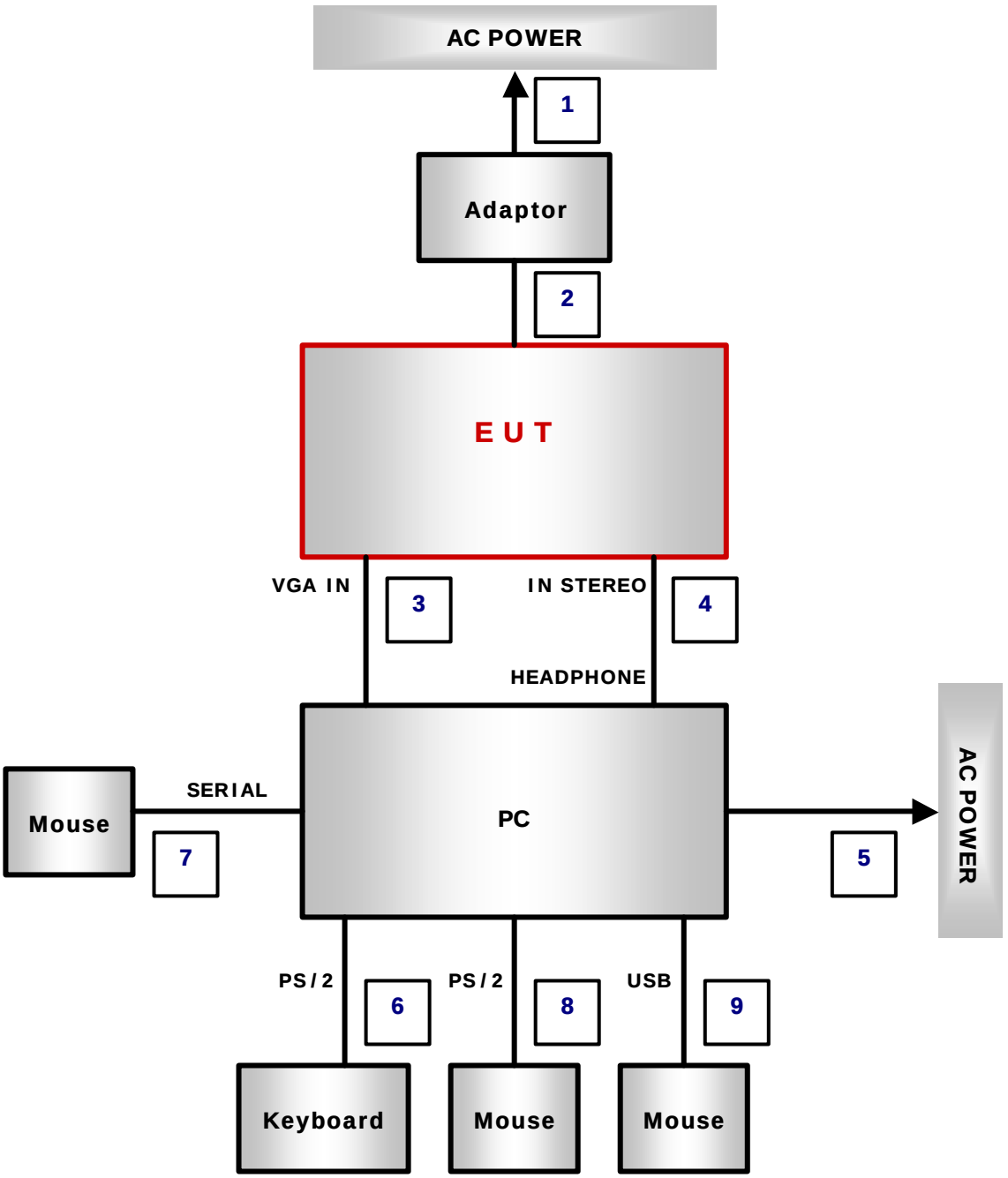
Configuration



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APPENDIX A – TEST DATA

Conducted Voltage Emissions (Quasi-Peak reading) – Adaptor 1

Frequency	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
0.18	2.3	0.1	N	64.5	57.0	59.4	5.1	54.5	36.9	39.3	15.2
0.25	1.5	0.1	N	61.8	49.1	50.7	11.1	51.8	31.7	33.3	18.5
0.31	0.8	0.1	N	60.0	44.5	45.4	14.6	50.0	28.0	28.9	21.1
0.37	0.8	0.1	N	58.5	37.3	38.2	20.3	48.5	19.6	20.5	28.0
3.53	0.3	0.1	H	56.0	42.9	43.3	12.7	46.0	37.1	37.5	8.5
3.59	0.3	0.1	H	56.0	42.7	43.1	12.9	46.0	37.8	38.2	7.8
3.65	0.3	0.1	H	56.0	43.1	43.5	12.5	46.0	37.2	37.6	8.4
3.90	0.3	0.1	H	56.0	43.1	43.5	12.5	46.0	37.4	37.8	8.2
3.91	0.3	0.1	N	56.0	43.4	43.8	12.2	46.0	37.6	38.0	8.0
15.53	0.4	0.2	H	60.0	51.2	51.8	8.2	50.0	41.4	42.0	8.0
15.55	0.4	0.2	N	60.0	51.3	51.9	8.1	50.0	41.3	41.9	8.1
15.84	0.4	0.2	H	60.0	51.2	51.8	8.2	50.0	41.2	41.8	8.2
15.86	0.4	0.2	N	60.0	51.1	51.7	8.3	50.0	41.2	41.8	8.2
16.15	0.4	0.2	H	60.0	50.9	51.5	8.5	50.0	40.2	40.8	9.2
16.33	0.4	0.2	H	60.0	50.9	51.5	8.5	50.0	40.5	41.1	8.9

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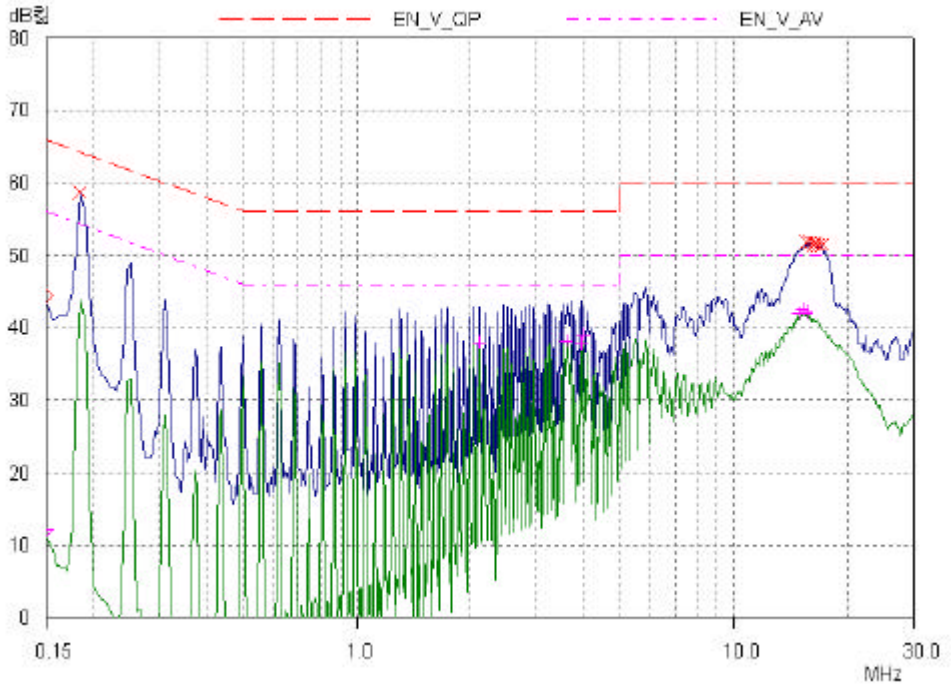
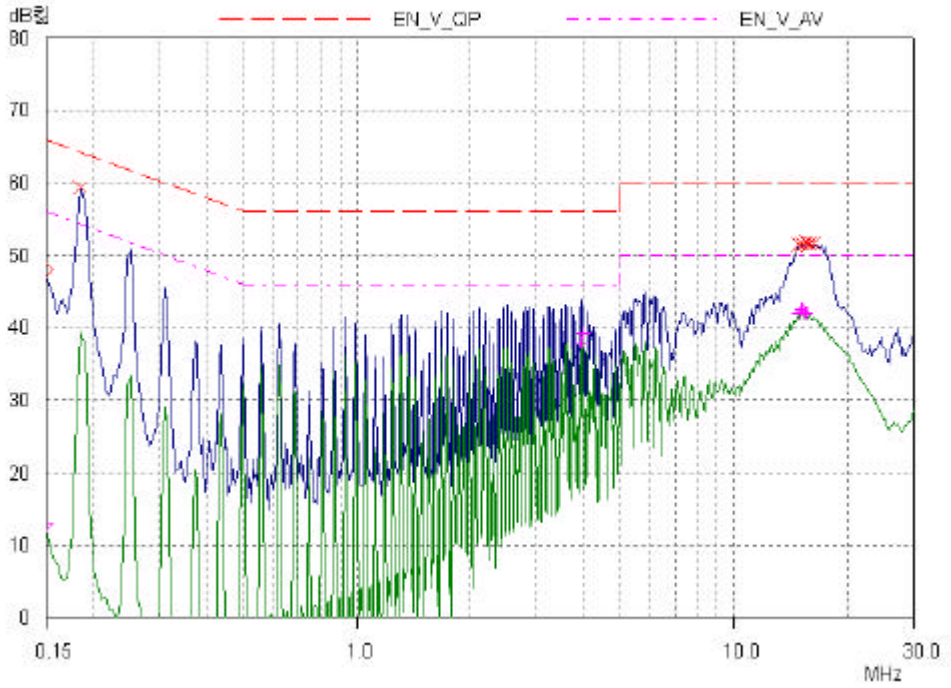
Adaptor 1





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Conducted Voltage Emissions (Quasi-Peak reading) – Adaptor 2

Frequency	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
0.17	3.0	0.1	N	65.0	54.1	57.2	7.8	55.0	42.6	45.7	9.3
0.19	2.3	0.1	N	64.0	49.4	51.8	12.2	54.0	36.8	39.2	14.8
0.26	1.5	0.1	N	61.4	45.9	47.5	13.9	51.4	33.4	35.0	16.4
0.35	0.8	0.1	H	59.0	43.9	44.8	14.2	49.0	36.0	36.9	12.1
0.43	0.7	0.1	H	57.3	44.0	44.8	12.5	47.3	33.6	34.4	12.9
0.44	0.7	0.1	H	57.1	44.2	45.0	12.1	47.1	32.2	33.0	14.1
0.69	0.5	0.1	H	56.0	46.7	47.3	8.7	46.0	38.7	39.3	6.7
0.78	0.4	0.1	H	56.0	48.0	48.5	7.5	46.0	41.0	41.5	4.5
0.87	0.4	0.1	H	56.0	48.1	48.6	7.4	46.0	42.0	42.5	3.5
1.30	0.3	0.1	H	56.0	47.7	48.1	7.9	46.0	39.4	39.8	6.2
1.39	0.3	0.1	H	56.0	46.9	47.3	8.7	46.0	39.6	40.0	6.0
1.46	0.3	0.1	H	56.0	47.3	47.7	8.3	46.0	38.8	39.2	6.8

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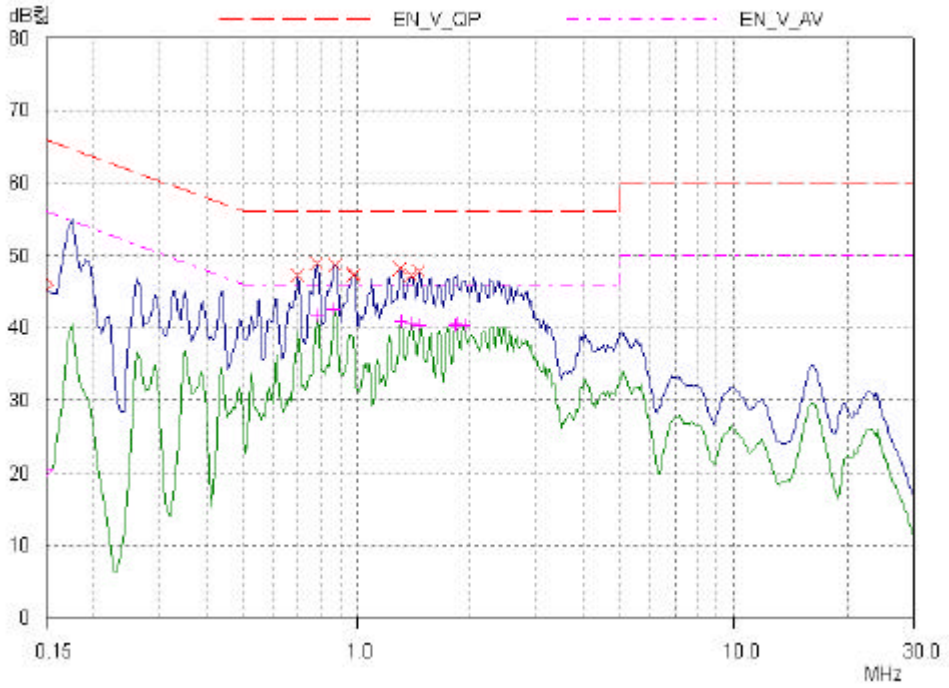
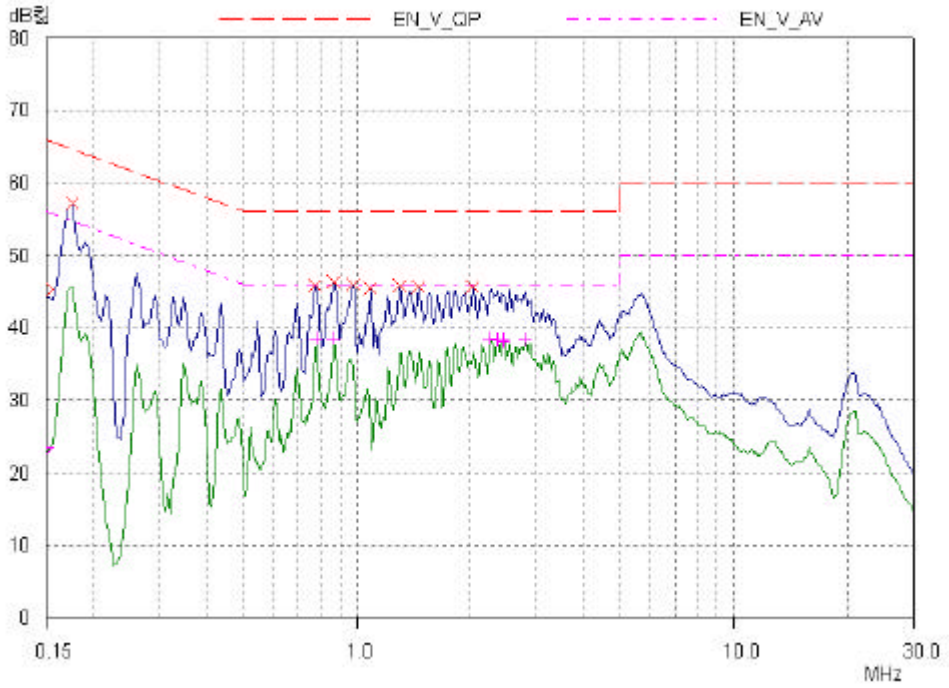
Adaptor 2





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Radiated Electric Field Emissions (Quasi-Peak reading) – Adaptor 1

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor Antenna	Correction Factor Cable	Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
82.00	14.6	V	1.0	8.60	1.80	30.0	25.00	5.00
117.84	12.0	V	1.0	9.60	2.00	30.0	23.60	6.40
138.00	15.5	H	4.0	8.20	2.30	30.0	26.00	4.00
139.41	15.5	V	1.0	8.00	2.40	30.0	25.90	4.10
168.43	14.5	H	4.0	7.20	2.60	30.0	24.30	5.70
208.26	14.0	H	4.0	7.60	2.90	30.0	24.50	5.50
325.27	13.0	H	1.3	11.90	3.70	37.0	28.60	8.40
346.52	13.6	V	2.0	12.30	3.90	37.0	29.80	7.20
349.01	14.5	H	1.1	12.30	3.90	37.0	30.70	6.30
547.48	6.9	V	2.5	16.30	4.80	37.0	28.00	9.00
622.83	9.8	V	2.4	17.30	5.20	37.0	32.30	4.70
944.16	4.5	V	2.2	21.00	6.80	37.0	32.30	4.70

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Radiated Electric Field Emissions (Quasi-Peak reading) – Adaptor 2

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor Antenna	Correction Factor Cable	Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
49.62	15.0	H	4.0	7.90	1.30	30.0	24.20	5.80
130.63	10.8	H	4.0	8.80	2.20	30.0	21.80	8.20
139.48	10.3	H	4.0	8.00	2.40	30.0	20.70	9.30
163.00	14.3	V	1.0	7.30	2.60	30.0	24.21	5.79
173.82	12.0	H	4.0	7.00	2.60	30.0	21.60	8.40
215.00	12.4	V	1.0	7.90	2.90	30.0	23.21	6.79
349.27	10.5	H	2.2	12.30	3.90	37.0	26.74	10.26
484.22	11.9	V	2.4	15.20	4.40	37.0	31.54	5.46
622.51	8.2	H	1.6	17.30	5.20	37.0	30.70	6.30
690.37	4.7	V	2.3	18.20	5.70	37.0	28.64	8.36
899.03	3.8	H	1.7	20.60	6.60	37.0	31.02	5.98
904.68	5.3	V	1.5	20.60	6.60	37.0	32.54	4.46

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